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KEYNOTE ADDRESS

KN 1

THE ROLE OF PLANT PROTECTION IN MEETING FOOD SECURITY NEEDS IN THE ARAB REGION. Mahmoud Solh, Director General, International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: m.solh@cgiar.org

Food security is a concern throughout the developing world, and particularly in the Arab region. Almost all Arab countries are net importers of food. Some countries produce most of their needs of fresh vegetables and fruits, but still import a large portion of their grain, pulse and meat needs. The Arab region was the world's largest importer of cereals in 2007 in which 58.2 million tons of cereals were imported. FAO projections for the year 2030 indicate that West Asia and North Africa region will continue to have the world's largest gap between cereal production and consumption. This is largely due to the severe constraints to agriculture in the dry, the harsh agro-ecosystems predominating in the Arab world, the depleted natural resource base, especially acute scarcity of water, a range of biotic and abiotic stresses, and lack of improved technologies. Food security has multiple dimensions, encompassing not only production, but also availability, access, utilization and stability of supplies. To address these challenges, we will need concerted efforts in research, transfer of improved technology and institutional and human capacity development. One key area is plant protection which is critical both to enhance productivity and production stability. It is estimated that 25-35% of the already low crop yields in the Arab region is lost due to attacks by different pests. The major pests are weeds, insects and nematodes followed by viruses, bacteria and phyto-plasmas. Reducing pest-related losses will significantly improve food security in the region. Given the need to increase food production without causing damage to the environment, ICARDA and its partners have focused on integrated pest management (IPM) methods that require little or no use of chemical pesticides. For many pests, the backbone of IPM strategies is the development of varieties with durable resistance/tolerance to biotic stresses. Most pests do not respect political borders, and occur and spread across region or even beyond. Effective control of such trans-boundary pests requires that national efforts be supplemented by regional and international initiatives, such as regional networks to coordinate multi-country, multi-partner efforts. Good examples are the Sunn pest on wheat, desert locust and Ug99, the new race of wheat black stem rust. In all these cases, regional networks are playing a key role in establishing effective, sustainable solutions. This paper presents several examples where ICARDA and FAO, in collaboration with partners, have helped diagnose, monitor and control diseases and insect pests of economic importance. To ensure food security in the future, the Arab region needs to invest much more in IPM research and technology transfer.

SYMPOSIA

Symposium I: New Developments in Pest Management

S 1

NEW DEVELOPMENTS IN NEMATODE MANGEMENT. Saad L Hafez and P. Sundararaj, University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Idaho is the largest potato producer in the United States, growing about one-third of the country's potato production (12.5 billion pounds), which paid farmers about $700 million and worth about $2 billion to the state. Nematodes are one of the major limiting factors in quality potato production, causing economic loss to the industry in Idaho. More than 68 species of plant parasitic nematodes belonging to 24 genera are associated with potato fields from different parts of the world. Major nematode pests on potato in Idaho are root knot nematode, *Meloidogyne*; lesion nematode *Pratylenchus*; stubby root nematode *Trichodorus* and *Paratrichodorus* and stem nematode *Ditylenchus*. Other than these, the potato cyst nematode *Globodera pallida* is also in limited acreage. Chemical management tactics and the recent non-chemical novel practices developed by the University of Idaho nematology lab considerably reduced the nematode damage potential on potato. In addition to commercially available fumigant and non fumigant chemicals several other less toxic chemical nematicides have been developed. These include Dimethyl di-sulphide, two forms of biopesticide active ingredient Chancellor and WD, AdmirePro, BioNem, SYT-100 and Movento. Non chemical nematode management strategies include the development of new oilradish varieties colonel, defender, commodore; mustard varieties comet, luna, accent; rape varieties and other crops like cahaba vetch, pea, cabbage, arugula and lentil. As a component of integrated nematode management system in potato the resistant cultivars of economically important crops also developed. These includes lesion nematode resistant alfalfa cultivar ZC 0257A and TS5000, *M. chitwoodi* resistant bean germplasm apore, *M. hapla* resistant bean germplasm rosalle to mention a few. Along with these practices, selection of high-quality seed is essential for the production of a profitable potato crop. Idaho law requires that every field under the seed program should be free of major nematodes and the seed stock planted by the grower must be approved by the ICIA. Such a development of reliable nematode management tactics reduces the damage caused by the nematodes and allows Idaho potatoes to be exported to other countries.

S 2

NEW DEVELOPMENTS IN THE MANAGEMENT OF VIRUS AND VIRUS-LIKE DISEASES WHICH AFFECT FRUIT TREE CROPS. Anna Maria D'Onghia and Khaled Djelouah, Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari, Italy, Email: djelouah@iamb.it

In the last thirty years, identification, characterization and control of virus and virus-like diseases of fruit tree crops has revolutionary changed. Though symptoms are still the first and major approach for the viral disease identification, early and accurate agent/vector monitoring and diagnosis through recent developed techniques become essential in the framework of an integrated pest management programme of fruit tree crops. However, more convenient, effective, and sensitive field (i.e. hierarchical sampling, remote sensing, improved biological indexing) and laboratory (real-time and multiplex PCR, microarray, Dot blot) techniques are now supporting detection and identification of fruit tree viruses in breeding and quarantine programmes. New perspectives have also been achieved to sanitize infected fruit tree plants by the use of somatic embryos. The use of plant derived transgenes, allowing the introduction of natural resistance genes from one plant species to another, has many advantages, since in the public perception it is more readily accepted than moving genes from other organisms; work towards the isolation of candidate genes from relatives of *Prunus* spp. are in progress. Due to the considerable differences in transmission modes (grafting, nematode and insects vectors, pollen), host resistance is still the most attractive and sustainable approach to control virus diseases in long-lived horticultural crops such as fruit trees, where short-term measures may not give any benefit.

S 3

INNOVATIONS IN THE MANAGEMENT OF POSTHARVEST DISEASES. Antonio Ippolito and Franco Nigro. Department of Plant Protection and Applied Microbiology, University of Bari, Via G. Amendola 165/A, 70126, Bari, Italy, Email: ippolito@agr.uniba.it

The establishment of Euro-Mediterranean Free Trade Area (EMFTA) in 2010 is expected to accelerate trade growth in different fields, including the market in fresh fruit and vegetables from south, south-east Mediterranean countries to foreign markets. In this context, effective cold chain and management practices of fresh produce are required, also considering that safety is an additional prerequisite for market entry. Traditionally, chemical fungicides have been used effectively by exporters to ensure high quality of fruit and vegetables over extended periods of storage or transportation. However, the increased global chemophobia and the reduced efficacy of chemicals due to pathogen resistant strains, have forced producers to evaluate more safe alternatives to control postharvest diseases in a context of sustainable agriculture. Several means, such as natural compounds of animal and plant origin, organic and inorganic salts, antagonistic microorganisms, elicitors to induce natural host defences, physical means like ultraviolet illumination, hypobaric pressure, hot water, modified atmosphere storage and packaging, and integrated control, represent some of the approaches recently evaluated, and to some extend already applied, to ensure top fruit quality. This review deals with the substantial progress obtained by researchers in the use of alterative control means, also taking into account constraints and obstacles still making difficult their large diffusion and practical application.

S 4

RECENT ADVANCES IN WEED MANAGEMENT. Barakat Abu Irmaileh, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman 11942, Jordan**.** Email: Barakat@ju.edu.jo

A wide range of advances in various weed management processes have taken place**.** Some advances are already commercialized, and others are in the process of development. Vision guided machines have been developed to selectively target weeds; such as the light beam hoe, robotic hoe, computerized laser weeder and the computerized flame weeder. Super-heated water, ultra violet and infra red radiations have been implied in non-selective weed control. Advances in herbicide applications included the development of air inclusion nozzles to reduce application volume besides reducing drift. Herbicide formulation technologies are advancing towards improving herbicide efficiency with lower doses; and making formulations more water-based with little hydrocarbon solvents. Robotic sprayer which recognizes weed images selectively spray the weeds saving much of the herbicide. Searching for new genes to develop herbicide tolerant /resistant crops is underway. The human gene CYP1A1, coding for cytochrome monoxegenases, have been inserted in rice in order to metabolize foreign materials including several herbicides. Stacked crops are expected to be released in the near future. Biotech maize with eight genes, Smartstax™, with eight different genes coding for several pest resistant and herbicide tolerant traits is expected to be commercialized in the near future. Genes that improve crop allelopathy and/or crop competition, or genes that code for allelochemicals that will serve as templates are also being investigated. .

Symposium II: Novel teaching and training methodologies in plant protection for professional practitioners and farmers

S 5

TEACHING PLANT PROTECTION FOR UNIVERSITY STUDENTS. Maria Lodovica Gullino, AGROINNOVA, University of Torino and International Society for Plant Pathology (ISSP), Via Leonardo da Vinci, 44, 10095, Grugliasco, Italy, Email: marialodovica.gullino@unito.it

Specific courses in Plant Protection are in place in most Agricultural Universities around the world. They are generally given at the MS level, after the concepts of plant protection have been introduced to students in Plant Pathology and Agricultural Entomology courses offered at the BS level. Plant protection, with very few exceptions, is

thought worldwide in integrated courses, which combine the expertise of plant pathologists, entomologists and, less frequently, weed scientists. Such fragmentation represents one of the problems encountered, mostly at the student level, because a split view of the different topics, that generally need a holistic approach, is often given. Plant Protection is also the topic of MS courses and Ph.D. programmes. The changing role and importance of courses on plant protection in agricultural *curricula*, the need of such course also in food technology and agricultural biotechnology *curricula* are critically discussed. The importance of a good balance between theory and practical activities as well as the need of life-long learning in such field is discussed, together with the possible innovations in teaching methodologies.

S 6

PLANT PROTECTION THROUGH FARMERS' FIELD SCHOOLS IN THE MIDDLE EAST. Alfredo Impiglia, IPM Regional Coordinator for the Near East, FAO, P.O. Box 10709, Damascus, Syria, Email: alfredo.impiglia@fao.org

The FAO Project GTFS/REM/070/ITA–"Regional Integrated Pest Management (IPM) Programme in the Near East", funded by the Italian Government, operates in Egypt, Iran, Jordan, Lebanon, Palestine and Syria; recently the project expanded geographically to Algeria, Morocco and Tunisia. The project, through consolidation and strengthening of a community based IPM agricultural development, aims to improve food security in the region. Farmer Field School (FFS) is used as participatory extension methodology to promote local adoption of IPM strategies, building on farmer participation and understanding of local ecosystems. The goals of the project are often beyond simple reduction of use of pesticides. Looking at the broader agro-ecosystem also address production issues besides plant protection. Most IPM/FFS aim at farmers becoming better field decision makers, and taking a more active role in organizing local activities to promote efficient and environmentally friendly crop production and protection solutions. Besides the farmer education component, the project ensures that policy makers are informed about field results, and interacts with them on how supportive policy frameworks can be put in place to promote IPM and farmer education. This paper will present a brief overview of the project's achievements on plant protection tactics introduced to farmers through FFS as alternatives to chemical pesticides.

S 7

ROLE OF ORGANIC AGRICULTURE ORGANIZATIONS IN TRAINING FACILITATORS AND FARMERS IN SOIL AND CROP HEALTH MANAGEMENT; EGYPTIAN CASE STUDY: EBDA OF SEKEM. Zakaria Abdel Rahman El-Haddad, Banha University, Director of the Egyptian Biodynamic Association, Egypt, Email: zakaria.haddad@heliopolisacademy.org

In 1977 SEKEM initiative was founded 50 km in the north-eastern desert of Egypt on 220 acres.The initial success of the SEKEM biodynamic farm in cultivating fresh fruits, vegetables and herbs encouraged other farmers to cooperate. Since its start SEKEM has been growing locally, regionally and internationally on one hand and on the other hand expanding holistically to involve economic, social and culture dimensions. At the moment SEKEM farms amounts to 4500 acres and cooperating farmers cultivate another 7000 acres, in addition to SEKEM farms in Sudan and Uganda. All the products are of organic/biodynamic system and all processed at SEKEM for local market and for export. In 2007, the total revenue was 166 m LE and total cost was 94 m LE. The backbone behind this success has been the continuous efforts to establish healthy soil and healthy crops. In 1996 the Egyptian biodynamic association, EBDA, was established as an NGO to promote, and apply biodynamic farming system in Egypt and in the region. Biodynamic farming is a super organic system. In this paper the role of organic agriculture organizations in training facilitators and farmers in soil and crop health management will be described.

S 8

PLANT PROTECTION TRAINING NEEDS FROM THE INDUSTRY PERSPECTIVE. Keith Jones and Ali Mohamed Ali, Crop Life International.
(No Abstract)

Symposium III: Invasive Pest Species: Importance in the Arab Region and Risks Associated With Their Spread

S 9

EMERGING RACES OF WHEAT RUSTS: A GLOBAL THREAT TO WHEAT PRODUCTION AND FOOD SECURITY IN THE WORLD WITH SPECIAL EMPHASIS ON WEST ASIA AND NORTH AFRICA. Amor Yahyaoui, ICARDA-CIMMYT Wheat improvement coordinator, P.O. Box 5466, Aleppo, Syria, Email: a.yahyaoui@cgiar.org

Rust diseases of wheat (stem, stripe and leaf rusts) are among the oldest plant diseases known to man. Rusts are caused by versatile fungal pathogens able to destroy entire wheat crops. Dr. Norman E. Borlaug refers to rusts as "bush fire" that's when it starts it's very difficult to stop. Wheat is constantly at risk of new virulent rust races that can overcome the resistant genes or genes; hence wheat rusts present a clear danger to global wheat production and a potential threat to food security that the world is not well prepared to face. Over the years, intensive breeding work has been undertaken on breeding for resistance to rusts by major International and National research Institutions and Universities. Resistant cultivars have been developed and spread world wide. Since 1970's stem rust has been put to rest, leaf rust has been effectively controlled, and yellow has become sporadic due the exploitation of effective resistance genes in different forms and combination. Durable resistance has been linked to a number of resistance genes such as Sr2 for stem rust, Lr34 for leaf rust and Yr18 for yellow rust; coupled with some major effective genes such as Sr31, Sr24, Yr 9, Yr27; Yr1 these genes were associated with good combiner parental lines such as veery's and hence were extensively used by

breeding programs globally. In early 1980's virulent race affecting the Yr9 resistance gene occurred in East Africa and spread Eastward through the Gulf of Aden/Red Sea to Yemen and beyond causing heavy cop losses on wheat that amounted to 100's of millions of dollars incurred in major wheat producing countries such as Egypt, Syria, Turkey, Iran, Iraq, Pakistan, and India. Recent epidemics caused by the emerging new stem rust race known as Ug99 and referred to as "time bomb" by Borlaug who managed at the age of 91 to establish a global consortium on wheat rusts known as Borlaug Global Rust initiative (BGRI). While global efforts are being deployed to development of durable resistance and accelerated seed multiplication system, the rusts kept changing. Ug99 scientifically known as TTKS race has developed new variants that were able overcome more resistance genes. Yellow rust has provided new virulent races defeating widely used resistance genes such as Yr1, Yr27, and Yr18 causing unprecedented yield losses in many countries from Morocco to Pakistan. The potential of wheat rust epidemics from Ug99 under favorable weather conditions as well as from new emerging virulent yellow rust races remains a real threat to most wheat producing countries in the world.

S 10

INFESTATION AND MANAGEMENT OF THE RED PALM WEEVIL IN THE ARAB AND MEDITERRANEAN REGION. Francesco Porcelli[1], Ibrahim Al Jboory[2], Hasanein Yousif Abdul Raheem[3], Anna Maria D'Onghia[4]. (1) DiBCA Sez Entomologia e Zoologia, Università degli Studi di Bari; (2)University of Baghdad,College of Agriculture,Baghdad,Iraq (3) State Board for Plant Protection, Ministry of Agriculture,Iraq; (4) Coordinator IPM Division, CIHEAM Istituto Agronomico Mediterraneo di Bari. Email: porcelli@agr.uniba.it; francescoporcelli@alice.it

The inexorable spreading of *Rhynchophorus ferrugineus* Olivier 1790 from the area of origin to the Mediterranean across the Arab area forces us to manage its infestations both in palm orchards and urban areas. The weevil biology, ethology and consequent damages differ on *Phoenix dactylifera* and *canariensis* and thus the management in urban area and in orchards. Early detection of the RPW infestation and the remote sensing of infested palms are now promising tools to detect pest occurrence before the broods' dispersion and for the pest wide area survey and infestation forecast. These techniques make it possible the use of immediate palm cutting down and disposal as eradication measures. Tree surgery is also useful to cure urban palms of value because of their historical or landscape value but an IPM program focused on chemical control must manage the bulk of the plants. The very first step in IPM should be phytosanitary inspection at palm trade coupled with preventive chemical control. Cultural control, as a proper timing of the leaves-cut and stipe/trunk wound prevention and care, can play its role in urban palm management mainly. Preventive chemical control by trunk injection considered as the main pest control step. New modifications in the conventional injectors were made describing some application modalities and features of it. Due to the pesticide environmental pollution risk ,neither soil drenching nor trunk soaking is useful as a RPW control techniques. Biological control agents against RPW seems today negligible, a new parasitoid, EPF or EPN will increase an effectual IPM. The key mortality factor in Red Palm Weevil life table is the failure to reach a susceptible host plant during adult spreading; managing to increase this factor will greatly help the IPM control program.

S 11

FRUIT FLIES IN THE MEDITERRANEAN AND ARAB WORLD: HOW SERIOUS A THREAT ARE THEY AND HOW CAN WE MINIMIZE THEIR IMPACT. Mike Lysandrou, Dow AgroSciences, Athens Greece, Email: MLYSANDROU@dow.com

Tephritid Fruit flies are found distributed throughout the Mediterranean and Arab world and cause considerable economic damage to fruit and vegetable crops. With increasing emphasis on quality of fruit and vegetable produce and with the expansion of trade in horticultural commodities, the importance of good fly management policies is vital. Phytosanitary measures and quarantine checks are increasingly necessary to prevent transport to areas free of the infestation. It is fortunate that there are a range of effective control measures that can be employed alone and/or in combination and new techniques are being sought. Corporation across countries/region is also increasingly essential to combat the threat of fruit flies.

S 12

TOMATO BORER (*TUTA ABSOLUTA),* A SERIOUS THREAT TO VEGETABLE CROPS IN THE ARAB AND MEDITERRANEAN COUNTRIES. Khaled Alrouechdi, FAO Office for North Africa (SNE), 43, avenue Kheirddine Pacha, 1002, B.P.300, cité Mahrajène 1082 Tunis,Tunisie, Email: Khaled.Alrouechdi@Fao.org

The tomato borer, *Tuta absoluta* (Lep. Gelechiidae), is a new pest in the Mediterranean region including North Africa. The pest's origin is South of America. It attacks principally tomato but also other crops (potato, egg-plant, pepper and weeds of the family of *Solanaceae*. The pest feeds on the different airy parts of the plant: stems, leaves, and fruits, causing very important damages by its large mines. The threat of a widespread invasion of the pest in the Med region is extremely high, similarly to the case of Citrus Leaf Miner (*Phyllocnitis citrella* Stainton) in the 90th. Bio-ecological data as well as IPM strategy will be presented.

Symposium IV: Systems, standards and information sharing in Plant Protection

S 13

SURVEILLANCE, INFORMATION SHARING AND EARLY WARNING SYSTEMS FOR TRANSBOUNDARY PLANT PESTS AND DISEASES: THE FAO EXPERIENCE. Keith Cressman, AGP Division, Food and Agriculture Organization of the United Nations, viale delle terme di Caracalla, 00153 Rome, Italy, Email: keith.cressman@fao.org

The Desert Locust (*Schistocerca gregaria* Forskål) is probably the oldest and most dangerous migratory pest in

the world. The UN's Food and Agriculture Organization (FAO) has been operating a surveillance and early warning system for the past 30 years. The system incorporates the collection, transmission and analysis of locust and ecological field data with models, meteorological data and remote sensing imagery to assess current conditions and forecast the scale, timing and location of locust breeding and migration. A variety of information products are disseminated to warn affected countries and donors so that early action can be taken to avoid the development of locust plagues and protect crops and food security. Lessons learned in the Desert Locust system can be applied to other surveillance and monitoring systems. This paper provides an overview of the Desert Locust early warning system and its current application to other transboundary plant pests and diseases, such as wheat rusts.

S 14

PESTICIDE STOCK MANAGEMENT SYSTEM AND TRIANGULATION OF PESTICIDES IN EMERGENCIES. Mohamed Ammati, Pesticide management officer FAO, Rome, Italy, Email: Mohamed.Ammati@fao.org

The current strategy adopted by countries to manage Desert Locusts in Africa, the Near East and Southwest Asia is that of prevention – to take action before the problem becomes too big. The 2003-05 upsurge that developed in West Africa because of four outbreaks that were not stopped is a good example of a failure in preventive control. It took more than US$300 million and the treatment of 13 million hectares to stop the upsurge. An estimated US$137 million was spent on pesticide and its application. Nevertheless, crop losses were up to 100 percent, up to 60 percent of the household heads in affected countries became indebted, and some US$90 million was required in food aid. After the upsurge ended, more than 8 million litres of pesticides and a large quantity of empty pesticide containers remained which constitute a real and potential threat for becoming obsolete. This paper presents recent achievements, after the 2003-05 upsurges, in West Africa, on the management of pesticides used in Desert Locust control and an outline of Global Programme for effective and safe management of pesticides used in Desert Locust and related Transboundary pests. These include denvelopment and deployment of Pesticide Stock Management System (PSMS), a transparent tool that updates information related to pesticide stocks, their locations, the recommended shelf-life and registration status in all affected countries to allow easy and early access to certified pesticides and bio-pesticides in the region. It is a tool for national and regional coordination of pesticide management, to prevent creation of new obsolete stocks and to support urgent and safe control of Desert Locust and other trans-boundary pests. Other related achievements such as triangulation of pesticides in emergencies for Desert Locust and Red Locust control and remediation of heavy contaminated soils posing high risk to public health and environment will be presented.

S 15

IMPLEMENTATION OF PESTICIDES INTERNATIONAL CONVENTIONS AND THE CODE OF CONDUCT IN THE ARAB REGION. Taher El Azzabi, FAO Regional Office for the Near East Cairo, Egypt, Email: Taher.ElAzzabi@fao.org

Dependence on pesticides as a major means of pest management in recent decades has created a range of problems including disruption of agro-ecosystems and negative effects on environment and public health. The continuing globalization of the world economy increases potential for the spread of plant pests and diseases between regions including the Arab region requires increasing attention and action from countries. Quality controls such as standards for pesticide residues are becoming more stringent for both domestic consumption and for export, particularly for Western markets. Most of Arab countries are still facing many constraints to the effective enforcement of their pesticides regulatory systems. A broad range of international instruments has been developed in response to the international health and environmental concerns about pesticide use. Through ratifications of the international conventions, governments accept obligations to incorporate the objectives of the international polices into their national polices. The most directly relevant instruments to use of pesticides; the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in the International Trade (about 90% of the Arab region countries are parties , all parties has developed national action plans for implementation in collaboration with the Convention Secretariat), Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (most of the Arab region countries are parties to this Convention), the Stockholm Convention on Persistent Organic Pollutants (approx. 70% of the Arab region countries are parties to the Convention), and the Montreal Protocol for on Substances that Deplete the Ozone Layer. The International Code of Conduct on the Distribution and Use of Pesticides, is another important instrument on pesticide management, it sets voluntarily standards for the management of pesticides. For many countries in the region, the Code of Conduct has provided guidance for the pesticide management aspects. The Code articles Implementation survey in the Near East Region including Arab countries shown that testing of pesticide and reducing health and environmental risks were the lowest. This paper presents the role of the International Conventions and the Code of Conduct in pesticide management in order to minimize risks on human health and environment, the paper will focus on the levels of the Code of Conduct articles implementation, and actions taken by the region countries regarding the related International Conventions implementation.

S 16

IPM SYSTEMS IN INDUSTRIAL CROPS AND TRADE: CAMPBELL SOUP COMPANY'S EXAMPLE. Hasan Bolkan, Davis Research and Development, 28605 County Road 104, Davis, California 95618, USA, Email: hasan_bolkan@campbellsoup.com

Campbell Soup Company is no stranger to sustainable agriculture practices. The company has been working with its growers to promote sustainable practices since 1987. Today, Campbell tomato growers use: (a) cover cropping such as sudan grass, cow peas, faba beans, vetch, and mustard to improve soil texture and soil fertility; (b) two to three year crop rotation which includes tomatoes, safflower, dry beans, wheat, corn and others to reduce disease pressure and minimize pesticide use; (c) conservation tillage which is often done in conjunction with the cover crop to reduce fuel, dust, emission, water runoff, and soil erosion; (d) transplants to reduce herbicide and water usage; (e) better water management practices which include instruments to monitor moisture to irrigate only when needed, drip irrigation to reduce herbicides, fertilizers, and fuel, and holding ponds to reduce runoff and to conserve water; (f) disease resistant varieties to eliminate pesticide usage; (g) habitat management by replanting ditches with native grasses and vegetation and preservation of wetlands; and (h) integrated pest management (IPM) practices to reduce synthetic pesticide usage. In fact, Campbell Soup Company has a history of leadership in environmental stewardship by developing and helping its growers implement IPM practices in tomatoes, celery, Jalapeno peppers, and carrots for the last 20 years. The IPM program has been implemented across a number of locations in the United States and Mexico. The program involves development and implementation of strategies that reduce the need for synthetic pesticides, taking advantage of such innovative techniques as control with augmentative releases of beneficial insects, insect mating confusion, computer disease forecasting, and virus risk assessment coupled with GPS mapping.

S 17

THE ROLE OF THE POLICY ENVIRONMENT FOR THE IMPLEMENTATION OF IPM. Peter Kenmore, FAO, Rome, Italy.

(No Abstract)

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S 18

IS ARAB REGION PREPARED TO DEAL WITH GENETICALLY MODIFIED CROPS? Adnan I. Al-Samarrie, Abu Dhabi Agricultural and Food Safety Authority, P.O. Box 52150, Abu Dhabi, UAE, Email: adnan_ibraham@yahoo.com; adnan.alsamarrie@adfca.ae

Genetic Engineering is a reality that have been considered as one of the most important scientific revolution in the world now a days, it have been caused dramatic changes in the organ bio-characteristics and it may create a lot of new varieties of fauna and flora in to the ecosystem. Due to the wide spectrum approach of G.M., more awareness have been raised; concerning the risk and benefits of that new field, that caused different opinions among the scientists and public. In order to overcome these controversies; G.M. is needed to be evaluated in an approach that conceders all the environmental, agricultural and social ethics. The Arab region in recent era has no noticeable contribution in science and technology, in general, due to several factors, even though, the recent global communication and close international relations have opened a wide opportunities to the Arab region to join the developed countries and be a part in the overall world development. Arab region would like to improve their capability to enable it to share in the genetic engineering technology. It needs to concentrate on the following 1- Scientific capacity: the Arab region have several internal potentialities that provide remarkable opportunities to be a part of the world development, unfortunately, the region have no strategic policies to maintain and sustain the local education systems and scientific research policies. 2- Individual capacity: It seems clearly that no individual Arab country has the self-capability to run, maintain and sustain genetic engineering programs (scientists, financial and technology), so the regional collective work, is the more acceptable and rationale way to overcome the obstacles. 3- Joint work: The genetic engineering technologies have generated totally in the developed world and run mainly by giant firms, so to improve the Arabs sharing in G.E. it seems quite logic to create joint venture projects with those firms and the international genetic engineering institutes. 4- Under the recent international food demand and global trading legislations, which assist the distribution of Genetically Modified Organs (GMOs) in the world market, so that the Arab countries need to implement relative legislations with no confrontation with the trade international laws and comply with the local ethics (social, religion and economic). 5- The decision whether to accept or reject the genetically modified crops and foods in the Arabian markets, should rely on a realistic evaluation and strengthened by scientific justification and concentrate on risk-benefits, risk-risk characterizations and local ethics. 6- The Arabs need to learn from the past and harness the benefits of G.M. technology to avoid being by-passed, as they had lost the previous opportunities. Generally, the Arabian region recently is an applicator of the science and technology and not a creator. The region needs hard work to develop ways of thinking to integrate rapidly with the fast scientific development.

S 19

BT COTTON AND MAIZE: ASSOCIATED BENEFITS AND PROBLEMS IN THE DEVELOPING WORLD. Rory Hillocks, Natural Resources Institute, University of Greenwich, Chatham Maritime, Kent, ME4 4TB, UK, Email: r.j.hillocks@gre.ac.uk

Insect resistant genetically modified [Gm] crops containing genes from *Bacillus thuringiensis* [Bt] have been grown commercially for 15 years. Bt cotton and maize are the two Gm crops most widely grown in developing countries. Bt technology was developed by multinational seed companies for the benefit of large-scale commercial farming, where it has provided effective control of certain Lepidopteran insect pests and decreased insecticide use.

The benefits of adoption are more controversial for smallholders and a mixed picture emerges. South Africa has grown Bt crops since 1994 but until 2008, no Gm crops were grown in the rest of Africa. In 2008 Burkina Faso introduced Bt cotton and Egypt introduced Bt Maize. Several other African countries have enacted the necessary biosafety legislation and plan to introduce Gm crops over the next few years. This paper examines the evidence for the success or failure of Bt cotton and maize in developing economies and reflects on the lessons for their wider adoption in Africa.

ECONOMIC ENTOMOLOGY

E 1

FLIGHT ACTIVITY AND POPULATION TRENDS OF THE SMALL RED-BELTED CLEAR WING BORER, *SYNANTHEDON MYOPAEFORMIS* (BBORKH) IN APPLE ORCHARDS IN JORDAN. Tawfiq Mustafa Al-Antary and Mazen A. Ateyyat, Department of Plant Protection, Faculty of Agriculture, Amman, Jordan, Email tawfiqm@yahoo.com; t.antary@ju.edu.jo

Experiments were conducted in Ash-Shoubak area in Jordan from June 2003 to May 2005 on apple trees, to study the trends of eggs and immatures of the small red-belted clearwing borer (RBB) *Synanthedon myopaeformis* (Lepidoptera: Sesiidea). The moth flight activities were also studied from October 2004 to September 2005 using four phermone dispensers brought from different companies. The life cycle of this pest was observed: two generations per year, individual eggs laying under the bark, and six larval instars were recorded. Overwintering period was realized by the 4th, the 5th, and the 6th larval instars. The first pupation (first generation) was observed in spring while the second pupation (2nd generation) in summer. The phermone dispenser brought from Agrisense Company (UK) showed more efficacy in capturing adults than the others. However, the adult flight activity of this insect was observed from May to September with a peak of adult populations in June.

E 2

THE EFFECT OF LARVAL INSTARS AND HOST ON SOME NUTRITIONAL PARAMETERS OF *AGROTIS IPSILON* (HUFN.). Nabil M. Al-Mallah, Nazar M. Al-Mallah and H.M. Al-Jallal, Deparment of Plant Protection, College of Agriclture and Forestry, Mousl University, Iraq, Email: nbl_mstf@yahoo.com

The results of the present study showed significant effect of the host (corn and sugar beet) and larval instars on some nutritional parameters of *Agrotis ipsilon* under laboratory conditions (28±1 ºC and 65±5% R.H). The 1st instar had higher average values of efficiency of consumed diet (ECD) and efficiency of conversion of infested food (ECI) and relative growth rate (RGR) which reached 85.51, 170.55 and 0.294, respectively and the 2nd, 4th and 5th instars showed a higher average values of approximate digestibility (AD) and reached 82.76, 82.95 and 83.21, respectively. The results also showed that the larva reared on corn had a higher average values of ECD and ECI and reached 47.77 and 89.09, respectively, while the larva reared on sugar beet showed a higher average value of AD and RGR.

E 3

DESCRIPTION AND BIOLOGY OF THE POPLAR LEAF BEETLE *MELASOMA POPULI* L. IN IRAQ. Feyroz R. Hassan, Talal T. Mahmoud, Plant Protection Department, Agricultural College, Dohuk University, Iraq, Email: feyrozrh77@yahoo.com

The eggs of *Melasoma populi* L. were oval in shape with length and width of 1.96±0.03 mm. and 0.81±0.03 mm. respectively. The larvae were from carabiform type, posses many tubercles on their bodies which release chemical materials when disturbed, and their measurements were 2.42±0.09, 4.65±0.13 and 10.12±0.17 mm. in length, 0.93±0.03, 1.19±0.05 and 4.0±0.05 mm. in width for the first, second and third instars larvae, respectively. The pupae were of the free type, similar to larva in feature and measured 9.02±0.17mm in length and 4.99±0.06 mm in width. The adult's head and legs were greenish in colour with red elytra. The male was smaller than the female, the diameter of male was 8.44±0.18 mm in length and 4.5±0.47mm in width while that of the female was 10.13±0.03mm in length and 6.7±0.21 mm. in width. The biology of the poplar leaf beetle was studied in the laboratory. It was found that the mean incubation period was 4.89 days and the egg hatching rate was 98.31% and 74.80% for the first and second generations, respectively. The larvae completed their development after three instars. The mean period of each instar was 2.62, 2.71, and 4.57 days for the three instars, respectively. The mean natural mortality rate in the larval stage was 18.11%, and was found mainly among the third instar larvae. The mature larvae entered the pre-pupa stage in one day. The pupal stage lasted a mean period of 5.87 days. The natural mortality of pupa was 6.69% and 44.43% for the first and second generations, respectively. The mean pre-oviposition period was 13.65 days. This beetle had two generations within a year, the duration range was 26-49 days. The oviposition period range was 43-71 days. Eggs were usually deposited in masses of 2-58 egg each. The mean number of total eggs laid by a single female was 1370.17±116 eggs throughout their life with a mean of 43.67 eggs per day. The longevity of males and females range was 48-54 and 50-73 days, respectively. The general sex ratio was 1:1.9.

E 4

STUDIES ON THE PEACH FRUIT FLY *BACTROCERA ZONZTA* (SAUNDERS) AND ITS CONTROL IN FRUIT ORCHARDS IN ASSIUT GOVERNORATE, EGYPT. Samy Hussein Mohamed, Department of plant protection, Faculty of Agriculture, Assiut University, Assiut, Egypt, Email: samy_hussein@Yaho.com

Peach fruit fly *Bactrocera zonata* is considered one of the most dangerous pests infesting fruits in Assiut governorate. The fly infest peach, guava, mango, citrus and apricot and causes great loss in fruit production. The reduction in yield may reach 30%. The fluctuation of the pest density showed that the pest has two peaks, first during

March and April which infest citrus fruits and the second during August and September which infest guava, peach and mango fruits. Biological studies of peach fruit fly on natural hosts showed that shortest life cycle period was recorded for insects bred on peach (38.65 days), whereas the longest period was noticed on insects bred on balady orange. Use of prominal (degenerated protein) + Malathion 57% in addition to the blocks saturated with the sexual attractant (methyl Eugenol) + Malathion 98% reduced the population density of the pest by 88%. Studies showed also that the bio-product Vertemic reduced the infestation rate by 89.14%. The number of peach fruit fly trapped by six-pheromone traps was higher in areas cultivated by many kinds of its hosts than that cultivated by one host only. Balanced nutrition, fertilization specially with potassium, removal of weeds and controlled irrigation, also elimination of infested fruits may reduce the infestation by 21.44%.

E 5

SCARABAEOIDEA (COLEOPTERA) OF JORDAN.

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Specimens of Scarabaeoidea (Coleoptera) conserved at the University of Jordan Insects Museum which were collected from different localities in Jordan since 1973 till 2009 were studied. **A** total of 24 species were recorded for the first time from Jordan. A species list of Scarabaeoidea was prepared based on this study and on data from literature. For each species, the geographical distribution in Jordan, available biological or ecological data, taxonomical remarks and color photographs were assembled.

E 6

COLONIZATION OF *CERAMBYX DUX* FALDERMANN) IN STONE-FRUIT TREE ORCHARDS IN FUHEIS DIRECTORATE, JORDAN.

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A field study was conducted in five locations in Fuheis Directorate, Jordan, during the period from January 1, 2008 to June 30, 2009 to identify woodborers attacking stone-fruit trees based on damage symptoms, to determine the economic status of identified species based on their spatial and temporal distribution and their infestation rates, and to investigate the way woodborers colonize host trees. Three woodborers were identified: the roundheaded cerambycid borer, *Cerambyx dux* Faldermann (Coleoptera: Cerambycidae, the flatheaded buprestid borer, *Capnodis tenebrionis* L., and the peach tree borer, *Synanthedon exitosa* Say. Of these three species, *C. dux* was the most economically important borer as it damaged about one fourth (23.77 %) of cultivated trees in infested locations (Um-Na'ag; Hommar, and Ferdoos). *C. tenebrionis* attacked only 5 trees (0.07% infestation), and *S. exitosa* infested only 3 trees (0.04% infestation). Trees infested by *C. dux* was not infested by *C. tenebrionis*. Both borers are strong competitors and can't co-exist together. *C. dux* and *S. exitosa* can be found in the same infested tree, but they partition their feeding guild. *S. exitosa* inhabit the lowest trunk while *C. dux* inhabit the upper trunk. Young trees less than 5-years old were not infested with woodborers, because their trunk diameter was not thick enough to accommodate the large grown larvae. *C. dux* overwinters as partial-grown larvae, pupae, and adults. Adults emerge at the time of blooming of each host, feed on nectar of herbaceous plants, disperse locally or migrate, sometimes aided by wind, to other sites. Adult males emerge first, wait for females to emerge, and then they mate. Mated females land on selected host trees and begin depositing eggs in bark crevices. Selection of preferred trees depends on bark color and structure and chemical defense system of the tree. Plums were more susceptible to infestation by *C. dux* than peaches. Almonds were the least susceptible host. Eggs develop in short time. Hatched larvae move downward, locate suitable entry point, and start boring in the bark. As they grow, they bore deep in sapwood and heartwood creating tunnels full of tight or loose sawdust. Tunnels resembled in shape and size their own larval instars. Full-grown larvae pupate in cells below bark surface. Adults emerge when favorable environmental conditions prevail, and the life cycle was repeated. Recommendations for management of *C. dux* will be presented.

E 7

THE INFLUENCE OF CLIMATIC FACTORS ON THE RECENT SPREAD OF DUBASS BUG *OMMATISSUE LYBICUS* (DEBERGEVIN) ON DATE PALM TREES IN SOME UPPER EUPHRATES REGIONS OF AL-ANBAR PROVINCE IN IRAQ.

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The dubass bug *Ommatissus lybicus* (Debergevin) (Homoptera: Tropiduchidae) is considered as one of the most important pests on date palm trees mostly in the middle of Iraq. This pest was almost absent in Al–Anbar province during the past years, however, field survey conducted in different regions of the province during 2007 indicated the presence of dubass bug on date palm trees in some orchards toward the east of Hit city. Infestation was too high in term of affected trees and accumulation of honey dew. Scattered infestations were also observed in some orchards west of Hit city and around the cities of Haditha, Rawa, and Al–Kaim. The severe winter of 2008 in which the minimum temperature dropped below the zero for several days caused the complete or partial death for the date palm leaves in many orchards and resulted in harmful effects on dubass eggs inserted in the tissue of these leaves. The continuous occurrence of dust storms during spring and autumn was another harmful factor causing reduction of moving stages. Infestation was reduced to about 1–5 nymphs/leaflet at the third week of May 2008 compared to

an average of 40 nymphs/leaflet recorded during the last week of April and early May. Results also indicated that the spread of the pest occurred in a discontinuous manner with no correlation to infestation in close-by provinces indicating that pest spread happened in a way other than the normal spread. Therefore, this pest may not persist in date palm orchards in Al–Anbar province. The population might be reduced to non damaging levels or even disappear from the region during the next generation or at least during the few coming years.

E 8

A NEW RECORD OF *ELACHISTA* SP. (LEPIDOPTERA: ELACHISTIDAE) ON SUGARCANE IN EGYPT. Samir A. El-Serwy, Ministry of Agriculture, Plant Protection Research Institute, 7 Nadi El-Seid Street, Dokki, P.O. Box 12618, Giza, Egypt, Email: samirelserwy@hotmail.com.

The leafminer *Elachista* sp. (Lepidoptera: Elachistidae) is a new record pest species inhabiting sugarcane, *Saccharum officinarum* L., and stain tail, *Imperta cylindrica* L., in Egypt. Samples were collected weekly from untreated sugarcane fields at Al-Aiat region in Giza governorate from February 2001 to August 2003. Eggs were laid singly on the leaf upper surface near the margin. The initial mine was longitudinal and narrow and became a blotch by feeding larvae. Pupation took place outside the mine. Infestation levels were 1- 46% (mean, 18.4%) in 2001, 2-45% (mean, 14.1%) in 2002 and 1-54% (mean, 20.4%) in 2003 with a general mean of 17.8%. Number of mines were 1-4 per infested leaf and majority (> 91%) of infested leaves had a single mine. Generally, occurrence of live larvae started in November and continued until August and peaked in February, whereas the emergence of adults was from December to July and peaked in March during the period of this study. Larval parasitism by the abundant parasitoid *Chrysocharis* sp. and *Pnigalio* sp. (Hymenoptera: Eulophidae) varied between 13.2% in 2003 and 19.2% in 2002 with a peak about 30% recorded in 2001, with a general mean of 20.7%. Parasitoids activity started with low rates about 17 and 14% in January and February and continued until December and reached the highest rate of about 38 and 42% in May and July 2002 and 2001, respectively. In 2003, parasitism ranged from about 9% in January to 25% in May, but declined to about 4% in July. Parasitoids generally emerged from December to July with a population peak in occurred in April.

E 9

RED PALM WEEVIL IN 60 SECONDS. Khalid Alhudaib[1], Abdulaziz Al-Ajlan[1], Romeno Faleiro[2] and Khaled Al-Abdulsalam[1]. (1) Department of Arid Land Agriculture (Plant Protection Science Program), College of Agricultural and Food Sciences; (2) Date Palm Center, King Faisal University, King Faisal University, Al Hasa, Saudi Arabia, Email: aajlan@hotmail.com

The red palm weevil, *Rhynchophorus ferrugineus*, is one of the most important insect pests that destroy palm and lead to its death. In the mid eighties, it entered to the Gulf area and began to spread to other countries. In 1998, the red palm weevil web site was created to cover the information needed for interested researchers in red palm weevil (www.redpalmweevil.com). This site focuses on the red palm weevil in both Arabic and English languages describing the seriousness, the infestation parts of the palm and RPW geographical distribution. On the global level, it became a source of information to interested workers around the world. Through the site the infestation of red palm weevil was confirmed in Japan, Turkey, Cyprus, Italy and others. The RPW site held together with the ESA in 2008 the first symposium on the RPW during ESA 56th annual meeting in USA. Anyone interested in the red palm weevil can find information during his visit to the site in 60 seconds.

E 10

THE EFFECT OF SOME OLIVE FRUIT CHARACTERISTICS ON INFESTATION RATE OF OLIVE FRUIT FLY *BACTROCERA OLEAE* GEMLIN. Dummar Namoor[1], Osama Edriss[1] and Moin Alali[2]. (1) Department of plant protection, Faculty of agriculture, University of Albbath; Homs, Syria; (2) Plant Protection Department, Ministry of Agriculture, Homs, Syria, Email: osamaedriss@hotmail.com

The results of two season (2007 and 2008) showed that olive fruit qualities (weight, oil content) had an influence on the infestation date and rate with *Bactrocera oleae* (Diptera:Tephritidae). Eggs were laid on Aldebly olive variety when the average fruit weight was over 0.8 g, and on Aljalt variety when the average fruit weight was over 2.4 g. Whereas, it layed eggs on Kudiery variety fruit when the average fruit weight was 1.22 g.The correlation coefficient between infestation rate and both fruit weight and oil content was positive and high in the studied varieties. Infestation appeared first on Aldebly variety then on Aljalt variety in June in both seasons, and the average fruit weight of Aljalt variety was larger than that of Aldebly variety. The infestation rate wasc higher on Aldebly variety than on Aljalt variety, which was associated with a higher oil content in the Aldebly variety fruit compared to Aljalt variety. The average weight of Kudiery variety fruit was very low at the beginning of the two seasons, and infestation was only noticed in September when fruit weight and oil content increased.

E 11

EFFICIENCY OF THE EGG PARASITOID, *TRICHOGRAMMA EVANESCENS* WEST. IN COMPARISON WITH THE INSECTICIDAL APPLICATIONS AGAINST THE COTTON BOLLWORMS IN EGYPTIAN COTTON FIELDS. A.A. Khidr, A.H. El-Heneidy, A. Abdel-Halim, M.A. Eissa and Ali M. Matter, Plant Protection Research Institute, Agricultural Research Center, Giza, Egypt, Email: prof.abdelaziz.abouelela@gmail.com

Experimental trials to compare the efficiency of the egg parasitoid, *Trichogramma evanescens* West with the insecticidal applications on the infestation with the pink bollworm, *pectinophora gossypiella* (Saund.) and the spiny bollworm, *Earias insulana* (Boisd.) in cotton fields were carried out at Quesna district, Menoufia Governorqate for

two successive seasons 2002 and 2003. Three to four parasitoid releases were conducted during the growth, flowering and boll formation stages. Generally, the parasitoid releases showed higher reduction in both infestations compared with the insecticidal treatments. Reduction rates were 55% and 17% when the parasitoid was released early during the flowering stage and few weeks later during boll formation, respectively. In the parasitoid release areas, number of insecticidal applications was reduced to almost half and consequently, the cost was dropped by 2 – 2.5 folds. In addition, cotton boll weight averaged 3.14 and 2.82 grams in the *Trichogramma evanescens* treated and insecticide treated areas, respectively.

E 12

EFFECT OF GAMMA RADIATION ON THE HISTOLOGY OF THE TESTIS OF RED DATE PALM WEEVILS, *RHYNCHOPHORUS FERRUGINEUS* (OLIVIER). W.S. Al-Waneen[1], M.S. Al-Kalifah[2] and H.Y. Al-Ayedh[1]. (1) Natural Resources and Environment Research Institute (NRERI), King Abdulaziz City for Science and Technology (KACST), P.O. Box 6086, Riyadh 11442, Riyadh, Saudi Arabia; (2) Zoology Department, College of Science, King Saud University, Riyadh, Saudi Arabia, Email: alwaneen@kacst.edu.sa

The efficacy of different doses of Gamma radiation was evaluated to determine the optimal sterilizing dosage for red date palm weevil (RDPW) *Rhynchophorus ferrugineus* Oliv. (Coleoptera: Curculionidae). Five gamma radiation doses 10, 12, 15, 17 and 20-Gy were tested and compared to a control group. The treatments were replicated three times. Each replicate consisted of one week old 5-males and 5-females. The weevils were obtained from RDPW colony at the Natural Resources and Environmental Research Institute (NRERI), King Abdul-Aziz City for Science and Technology (KACST). The results indicated that Gamma irradiations caused significant changes in the histology of testis. There was no apparent change in apical germarium region. However, major changes in the histology of irradiated growth zone of spermatic tubules in terms of lysed spermatic cyst without boundaries were observed. Studies of the middle region of the normal spermatic tubules revealed intact spermatic tubules with cyst cells with clear boundaries, whereas, in irradiated males the ruptured spermatic tubules were clearly visible with scattered lysed cyst cells. Cross section of the testis of irradiated males also revealed prominent breakage of the spermatozoa tubes at the junction of sperm tube and vasa defferentia. This breakage had disconnected the normal pathway of the mature sperm flow towards vas deferens. The results of the study indicated that the sterilization insect technique (SIT) might be a potential component of integrated pest management designed for the efficient and effective control of red date palm weevil.

E 13

STUDIES ON PREDATORY INSECTS IN MAIZE AND SORGHUM FIELDS IN UPPER EGYPT. Gamal A. Karaman[1], Mona B. R. El-Mandarawy[2], Adel H. Gharib[1] and Hossam M. K. H. El-Gepaly[2]. (1) Plant Protection Department, Faculty of Agriculture, Minia University, Egypt; (2) Biological Control Department, Plant Protection Research Institute, ARC, Giza, Egypt, Email: Melmandarawy@gmail.com

Ten predaceous insect species were collected from maize (*Zea maize* L.) and sorghum (*Sorghum bicolor* L.) fields at Shandaweel Research Station, Sohag Governorate, during two planting dates and two successive growing seasons 2004 and 2005. The predatory species were: four coleopterous [*Coccinella undecimpunctata*, *Scymnus pallidivestis* Muls. and *Scymnus gilvifrons* Muls. (Coccinellidae) and *Paederus alfierii* Koch. (Staphylinidae)]; two hemipterous [*Orius albidipennis* Reut. and *Orius laevigatus* Fieb. (Anthocoridae)], two dipterous [*Xanthogramma aegyptium* Weid. and *Sphaerophoria flavicauda* Zett. (Syrphidae)] and a neuropteran [*Chrysoperla carnea* Steph. (Chrysopidae)]. Population densities of each predator were determined in the two planting dates and two seasons. Also, seasonal fluctuations of collected predators in relation to some weather factors as daily maximum and minimum temperatures and the mean relative humidity were calculated.

E 14

PRELIMINARY STUDY ON COLORADO POTATO BEETLE *LEPTINOTARSA DECEMLINEATA* (SAY) APPEARING FOR THE FIRST TIME IN NORTH OF IRAQ AND ITS CONTROL. Nassir A. Al-Jamali[1], A. Salah[2] and C. Abdul-Alkareem[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Karbala, Iraq; (2) Directory of Agriculture at Nineveh, Iraq, Email: nassir_aljamali@yahoo.com

A survey was conducted in potato fields at Nineveh and Dhouk governorates during 2005, to evaluate spread of Colorado beetle *L. decemlineata* (Coleoptera: Chrysomelidae) and its infestation severity, in addition to testing different insecticides for its control. Results showed that infestation severity differed between low as was found in the Rabeah, Baashiqa, Al-qush and Telkef at Nineveh governorate, where 0.4 egg mass/plant, 1.0 larvae/plant and 0.01 adult/plant were found, as compared to high infestation in Al-shekhan/Nineveh and Qasrouk/Dhouk, where 0.2 egg mass/plant, 4.6 larvae/plant and 0.04 adult/plant, and 0.03 egg mass/plant, 5.8 larvae/plant and 0.07 adult/plant, were observed. Results also revealed that Desiree potato variety was most commonly planted in these regions and the imported potato from Turkey was the source of infestation by this insect. The results showed that the insecticides Thiamethoxam 25 WG, Lambdacyhalothrin 5% EC and Sevin 85% WP were the most effective against larvae and adults, gave a killing rate of 99.38, 99.31 and 97.59 %, and 100, 96.56 and 94.84%, respectively. The insecticides Cypermethrin 10% EC and Lufenuron 5% EC gave on the other hand a killing rate of 58.56 and 62.7%, and 90.4 and 84.16% against larvae and adults, respectively. All above insecticides were less effective against eggs.

E 15

EVALUATION OF THE EFFICACY OF PYRETHROIDS INSECTICIDES AND BIO-INSECTICIDE (AGERIN) FOR THE CONTROL OF BLACK CUTWORM *AGROTIS IPSILON* (HUFENGED). Ensaf S.I. Mohamed, Agricultural Agricultural Research Corporation, Shambat Research Station, Kh. North, P.O. 30, Sudan, Email: ensaf11@hotmail.com

Field experiments were conducted at Elsheikh Eltayeb, Northern Umdorman, Sudan, on commercial potato production fields during 2005/2006, 2006/207 and 2007/2008 winter seasons. The performance of four pyrethroid insecticides, namely Karate, Kung Fu, Talstar and Force in addition to Agerin (*Bacillus thuringiensis*) against black cutworm *Agrotis ipsilon* were evaluated. All insecticides tested were significantly effective in controlling cutworm and increased potato yield as compared with the untreated control. Results of the study showed that foliar applied pyrethroids (Karate 10%, Kung Fu 5% and Talstar 2.5%) gave superior protection at all dosages applied compared with the untreated control. However, the soil applied pyrethroid, Force and the bacterial insecticide, Agerin resulted in a significantly lower tuber yield compared with the other insecticides tested. Force applied late at hilling had better effect than when applied early at planting.

E 16

EFFECTS OF BIOLOGICAL INSECTICIDE (SPINOSAD GF-120) ON THE GREATER MELON FLY *DACUS FRONTALIS* (BECKER). Shukri Shraif[1], Abubaker Elgarguotee[1] and Bob Cheke[2]. (1) Biotechnology Research Centre (BTRC), P.O. Box 30313, Tajora, Libya, Email: shokre2005@hotmail.co.uk; (2) Natural Resources, Greenwich University, UK.

Spinosad GF-120 is a new product which was registered as a reduced risk product by the US EPA in 1997. Spinosad is a combination of spinosyn A and spinosyn B, which are naturally occurring compounds derived from the soil-dwelling actinomycete bacteria *Saccharopoyspora spinosa* This experiment was conducted to investigate the toxicity of the new Spinosad product (biological insecticide) on adults of the Greater melon fly *Dacus frontalis* (Becker) and Spinosad showed high impact on the females of the Greater melon fly. It showed mortality in just 12 hours after the treatment in concentration of 1:1 (Spinosad: distilled water). Mortality was 100 % after 48 hours in concentrations of 1:1, 1:1.5, 1:2, 1:2.5, 1:3, and 1:3.5. Mortality was 90% after 48 hours when concentrations of 1:4 and 1:4.5 were applied. The mortality was 80% after 48 hours when concentration of 1:5 was added.

E 17

ECOLOGICAL A STUDY OF *LIRIOMYZA CONGESTA* (AGROMYZIDAE) ON ALFALFA PLANT IN HADA ASH SHAM REGION (MAKKAH ALMUKARAMAH) IN SAUDI ARABIA. O.M. Bahareth and Turkia K. Al–Qurashi, Biological Department, Faculty of Applied Science, Umm Al–Qura University, Makkah, Saudi Arabia, Email: turkiak2009@hotmail.com

In this study, 612 insects of *Liriomyza congesta* (Agromyzidae) on Alfalfa were collected in Hoda A-Sham by using sweeping nets and yellow sticky traps. By monitoring population dynamics, insects were found on alfalfa during the year and two peaks appeared in January and March when sweeping nets were used, with temperature average of 26.6°C, 27.2°C, for the two peaks, respectively. Relative humidity was 62.7% and 51.7%, for the two peaks, respectively. However, two activity peaks were observed in March and May when yellow sticky traps were used, with temperatures of 23.03°C and 26.6°C, for the two peaks, respectively. Relative humidity was 35.4% and 62.7%, for the two peaks, respectively. The highest peaks in both traps were in March. In addition, the effect of nitrogen level on alfalfa plant and spread of insect was made.

E 18

ECOLOGICAL AND BIOLOGICAL STUDIES ON PALM FROND BORER, *PHONAPATE FRONTALES* F., IN THE WESTERN COASTAL REGIONS OF LIBYA. Zaki M. Atia[1], Haloma Kara[2], Azzarok Al-Dankali[2] and Ali A.A. Kafo[3]. (1) Department of Biology, Faculty of Teachers Training at Kasr Bin Ghasher, Al-Fateh University, Libya; (2) Department of Plant Protection, College of Agriculture, Al-Fateh University, Libya; (3) Agriculture Research Center, Libya, Email: zekooz2001@yahoo.com

Palm frond borer, *Phonapate frontales* F. (Coleoptera: Bostrichidae) is one of the important pests infesting date palms in Libya, especially at oasis (Alwahat) regions; (Galo, Ogla and Egkhara) and the central regions. Its spread increased recently to the western coastal region. The investigation aimed to study the biology of this insect pest under laboratory conditions at 27±1ºC and to study some related ecological aspects of the insect. Results showed that the average number of eggs was 70 eggs/ female, the average durations of egg incubation was 12-17 days, the larval stage duration was 90-120 days, through 5 larval phases, the pupal duration was 19-25 days and the total life cycle ranged between 121 and 162 days. Longevity of males averaged 35 days and of females 30 days. Ecological aspects of the insect showed that it is nocturnal in activity and avoids light. The insect pest was entrapped by light traps placed on an elevation of 4 m. The insect and its infestation injuries were found on an elevation of 5.5 m. It pored a hole of 9-15 cm long inside frond's blade. Seasonal activity of the pest using light traps showed that the insect population started to increase in April, reached its peak in July then declined up to October and disappeared indicating that the insect had only one generation per year. The pest was recorded on different hosts, date palm was a major host and the other two tree species were *Tamarix aphylla* and *T. arborea*. The pest was recorded for the first time in Libya on the pomegranate, *Punica granatum* and Casurina trees *Casurina* sp.

E 19

TEMPERATURE EFFECT ON THE DEVELOPMENTAL PERIOD OF *BEMISIA TABACI*, AND ITS TWO PARASITOIDS *ERETMOCERUS NUNDUS* AND *ENCARSIA FORMOSA* IN SYRIAN ENVIRONMENT. Randa Abou-Tara[1], Fawzy Samara[2], Majd Jamal[2], Fawzy Shalaby[3], Samyr Assaf[1] and Ghassan Rostom[1]. (1) General Commission of Scientific Agricultural Research, P.O. Box 113, Douma, Damascus, Syria, Email: randaaboutara@hotmail.com; (2) Faculty of Agriculture, University of Damascus, Syria; Banha University, Egypt.

Temperature effect on the developmental periods of *Bemisia tabaci*, and its two parasitoid species, *Eretmocerus nundus* and *Encarsia formosa* was studied under laboratory conditions; temperatures 15, 20, 25, 30, and 35ºC, daily light and dark periods were constant at 16 and 8hr and the relative humidity ranged between 50 and 70%. Eggplant was the plant hosted *B. tabaci*. Average developmental periods of the local offsprings of the whitefly, from egg to adult were 14, 16, 20, 32, and 66 days, respectively. Thermal day degree (DD) constant attained was 344.82 K. Lowest thermal threshold of the developmental period reached 9.27ºC. The developmental periods of *E. mundus* at 15, 20, 25 and 30 ºC averaged 15, 19, 30 and 66 days, respectively, while the DD thermal constant attained was 333.333 K. The lowest development thermal threshold attained was 12ºC. Average developmental periods of *E. formosa* were 14, 18, 28, and 54 days, respectively. The DD thermal constant attained was 250 K. The lowest development thermal threshold reached 9ºC. None of the two parasitoid species was able to complete its development at 35 ºC.

E 20

OVICIDAL AND LARVICIDAL ACTIVITY OF TWO NONSTERIODAL ECDYSONE AGONISTS AGAINST THE COTTON LEAFWORM, *SPODOPTERA LITTORALIS* (BOISD.). M.I. Abdel-Megeed, Faiza M. Mairy, G.M. Hegazy and W.S. Mohamed, Plant Protection Department, Faculty of Agriculture, Ain Shams University, Shoubra El-Khemia, Cairo, Egypt, Email: m_mgeed@yahoo.com

The ovicidal and larvicidal activity of Tebufenozide and Dibenzoyl hydrazine against the cotton leafworm *Spodoptera littoralis* (Boisd.) was tested. The larval duration, the rate of pupation, moth emergence and reproductive capacity of produced moths were also considered. Egg hatchability rate was greatly reduced and also delayed when the eggs were treated with the higher concentration of two nonsteriodal ecdysone agonists. Newly laid eggs proved to be more sensitive than older ones, and Tebufenozide was more effective than Dibenzoyl hydrazine on three days old eggs. The toxic effect of two tested compounds were more potent on the 4th instar than 2nd instar larvae. Dibenzoyl hydrazine was markedly less toxic than Tebufenozide and the ovicidal and larvicidal activities of both compounds were concentration dependent. The rate of pupation and moth emergence were markedly reduced with the increase of the concentration used. Considering reproductive capacity of emerged female moths treated as 2nd instar larvae with either of the two tested compounds, the number of oocytes in the ovaries as well as female fecundity was drastically reduced as compared with the check. Generally, tebufenozide proved more effective on reducing reproductive capacity of *S. littoralis* than Dibenzoyl hydrazine.

E 21

MODELLING OF POPULATION DYNAMICS OF FRUIT FLY INSECT. S. El Messoussi[1], A. Lahrouni[2], M. Afif[3] and A.M.A. Al-Ajlan[4]. (1) Department of Biology; (2) Department of Physics; (3) Department of Math., Faculty of Science Semlalia, Marrakech, University Cadi Ayyad, Morocco, Email: saidsaid8@ucam.ac.ma; (4) Department of Plant Protection, College of Agriculture & Food Sciences, King Faisal University, P.O. Box 55009, Hofuf, Al-Hasa 31982, Kingdom of Saudi Arabia.

Modeling of population dynamics is an essential part of both research and management of pest insects. A population dynamic model for the complete life cycle of fruit fly pest (Diptera: Tephritidae) is described. Adult population dynamics from emergence to oviposition are based on biotic and abiotic factors. These factor-dependent development and age-dependent advancement determines adult population dynamics and oviposition. The model determines an optimal behavior of different system components during the life cycle with an adjustment by limiting factors like; temperature, humidity, parasitism, and predation. Abundance of fruit fly under a natural temperature change and under a constant effect of parasitoids and predators in optimal food conditions was estimated. These associations permit real-time monitoring and forecasting the pest at high spatial and temporal resolution. These predictions will enable public to institute control measures before fruit fly emerge as adults. The value of this kind of models is the development of technology that can handle spatial information.

E 22

PRELIMINARY STUDY OF THE PISTACHIO TWIG BORER MOTH, *KERMANIA PISTACIELLA* AMSEL IN ALEPPO GOVERNORATE. Salim Khoja, Mohamed Faez Mozaik, Yagoub Azar and Khloud Hokan, General Commission of Agricultural Scientific Research, Agricultural Scientific Research Centre in Aleppo, P.O. Box 4195, Aleppo, Syria, Email: khoja90@maktoob.com.

The Pistachio tree (*Pistacia vera* L.) are attacked by many insect pests, and pistachio twig borer moth, *Kermania pistaciella* Amsel (Lepidoptera: Tineidae), is one of the most important pests of pistachio trees. The study was carried out during 2007 and 2008 in Aleppo Governorate in the northern part of Syria. A Survey was conducted in the pistachio growing areas to determine damages caused by this pest. In addition, some biological characteristics of this insect were studied. The results showed that this pest was wide-spread in the region in Aleppo, causing considerable damage and infestation rate of orchards reached 96%, whereas twig infestation rate ranged from 7.5 to 90%. Results showed that this insect attacked flowers, fruits, clusters and twigs. Emergence from

diapause was observed in the second half of March to the second week of April, and signaled by larvae activity and pupation. Results showed that adult emergence was observed on the first week of April till the first week of May. This study indicated that this insect has one generation per year.

E 23

SEASONAL ACTIVITY OF THE CODLING MOTH, *CYDIA POMONELLA* L. IN SOME APPLE ORCHARDS AT LATTAKIA GOVERNORATE, SYRIA. Abdulnabi Mohamed Basher[1], Louai Hafez Aslan[1] and Shadi Ibrahim Al-Haj[2]. (1) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria; (2) Lattakia Center for Insectary Natural Enemies, Agriculture Department of Lattakia, Lattakia, Syria, Email: shadi_alhajj@hotmail.com

The aim of this research is to study seasonal activity of the codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae) and its different stages and to determine number of generations and thermal requirements by using the pheromone traps at apple orchards in two regions (Eramo and Rabiha) of Lattakia Governorate, Syria. Results indicated that the insect had three generations per year at Rabiha region. The duration of the first, second and third generations were 70, 43 and 28 days, respectively with cumulative temperatures of 672.75, 783.25 and 583.7 degree-days (dd), respectively. However, this pest had two generations per year at Eramo region. The duration of the first and two generations were 80 and 63 days, respectively with cumulative temperatures of 731.5 and 1062.25 dd.

E 24

STUDY OF *TUTTA ABSOLUTA* ON TOMATO PROTECTED CROPS, AT MZERAA, BISKRA OASIS, ALGERIA. N. Tarai[1], S. Doumandji[2], H. Messaoudia[1], B. Abdelli[1] and F. Allache[1]. (1) Département d'Agronomie, Université Mohamed Khider, Biskra, Algeria, Email: tarai_nc@yahoo.fr; (2) Département de Zoologie, Institut National Agronomique, Elharrach, Algeria.

A survey on the *Tutta absoluta* (Lepidoptera: Gelechiidae), newly introduced in the oasis of Biskra, was carried out on tomato greenhouse crop at Mzeraa, Biskra oasis, which produce more than 20% of the national production. This survey was based on TUTASON traps with the sexual pheromone PHERODIS, installed in 20 greenhouses according to direction (North, South, East, West). The highest number of males caught was recorded during the end of March, whereas the lowest number was recorded during the month of November. Temperature recorded was in the range of 20-25°C. The yield loss in the greenhouses without pheromone traps was 60%, whereas it was only 10% in greenhouses with pheromone traps.

E 25

EFFECT OF *CHAETOPTELIUS VESTITU*S ON THE PRODUCTIVITY OF THE FRUIT-BEARING PISTACHIO TREES IN ALGERIA. Nadjiba Chebouti-Meziou[1], Salah Eddine Doumandji[2], Yahia Chebouti[3]. (1) Department of Biology, Faculty of Siences, University M'hamed Bougara, P.O. Box 35000, Boumerdes, Algeria; (2) Institute national d'agronomie, Algeria; (3) National Institute of Research Forrester, Bainem, Algeria, Email: chnadjiba@yahoo.fr

Pistachios, *Pistacia vera* cultivation is rare in Algeria. Lack of knowledge on reproduction techniques led to low yield which does not exceed 0.75 tons / hectare. In addition, insect pests *Chaetoptelius vestitus* has led to poor production. Total production of a healthy tree is 25 kg, while the infested tree produces about 15 kg only, about 40% reduction. This is mainly due to infestation with *C. vestitus* which spends its aestivation in the young twigs of the healthy trees, boring in them, making tunnels in the newly formed branches, which leads to such yield loss.

E 26

SUSCEPTIBILITY OF GRAPE TREES VARIETIES TO INFESTATION WITH THE GRAPE LEAFHOPPER, *EURYTHRONEURA* SPP. AND UNDERSTANDING MECHANISIMS OF RESISTANCE. M.A.M. AI-Hayalee and F.M. Farag, College of Agriculture and Forestry, University of Mosul, Iraq; Email: semad82@yahoo.com

The study was conducted on the grape leafhopper, *Eurythroneura* spp. (Homoptera: Cicadellidae) which was abundant in grape orchard of horticulture station at Sulaimani a governorate, Iraq, to determine susceptibility of ten grape varieties to infestation with the insect and identify mechanism of resistance. The results showed that the infestation with insect eggs on grape leaves of some varieties began in the second week of June, with a few numbers on Sarkulah and Sadani Spi, then the numbers increased gradually and fluctuated until reaching the peak (696 eggs) during the last week of September for all varieties, Suraw variety was the least variety infestated or preferred by the insect for egg laying. Statistical analysis showed that there were significant differences at 5% probability of the population density of the eggs among the ten varieties. It was found that Sadani variety was the much susceptible with a population density of (602 insects) but the Sar variety was less susceptible with a low population density (146 insects). In addition, there was a significant negative correlation (-0.63 and -0.85) between population density of nymphs and adults and length and density of trichomes of grape leaf varieties, respectively.

E 27

ECONOMIC INJURY LEVELS OF THE MEDITERRANEAN FRUIT–FLY, *CERATITIS CAPITATA* (WIED.) ON NAVAL ORANGE (CITRUS) ORCHARDS IN EGYPT. Aida M. El Hakim, M.W. Makkar, A.M.Z. Mosallam and T.S. El Abbassi, Plant Protection Research Institute, ARC, Dokki, Giza, Egypt, Email: hadia.hamdy@gmail.com

Very low, low, medium, and high infestation levels of the Mediterranean fruit-fly (Medfly), *Ceratitis capitata* (Wied.) (Tephritidae: Diptera) were chosen at 5 naturally infested sites (naval orange orchards) in Fayoum and the same in Sharkia Governorates, Egypt. Infestation levels were evaluated weekly during September, October, November and December in 2008, to develop economic

injury levels of the (Medfly). Adult fly densities were monitored weekly using pheromone sticky traps and correlation between catch per trap and infestation level was foun positive. Fruits were rated for (Medfly) damage using 4 damage scales. F1 = no infestation or sound fruits, F2 = fruits with false stings, F3 = fruits with true stings, and F4 = fruits with larvae. Economic injury levels were 3.3 and 4.12% infestation in Fayoum and Sharkia and corresponding fly daily counts were 1.0 and 1.2 male adult fly/day/trap, respectively.

E 28

BIOLOGICAL STUDY OF THE ALMOND SEED WASP, *EURYTOMA AMYGDALI* END IN MIDDLE SYRIA AND ITS CONTROL. W. Kasses and Rawda Sukar Ghali, Entomology Lab, Plant Protection Department, Faculty of Agriculture, Damascus University, P.O. Box 31738, Syria, Email: rawdaghali@gmail.com

Almond seed wasp, *Eurytoma amygdali* End (Eurytomidae: Hymenoptera) is a serious pest of almond trees all over the world. It is a monophagous insect and causes a great reduction in yield. Biology of this insect was studied in Homs city (Syria), the largest province of almond production. The insect overwinters as matured larva inside the seed for six months. Larvae had a grey colour at the beginning of diapause which turns gradually into white colour. Pupation took place at the end of February, and emergence of adults was observed at the end of March. Some chemical insecticides such as Karate Zeon and Concord super were tested and proved to be very effective for controlling this pest.

E 29

BIOLOGY OF THE TENT CATERPILLAR MOTH *MALACOSOMA NEUSTRIA* L. IN AL-GABAL AL-AKHDAR REGION, LIBYA. Kamela A. Waheish, Adel H. Amen and Ibrahim M. El-Ghariani, Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, P.O. Box 919, El-Beida, Libya, Email: ghariani99@yahoo.com

The tent caterpillar *Malacosoma neustria* L. (Lepidoptera: Lasiocampidae) is a common pest throughout Al-Gabal Al-Akhdar region. It is a leaf feeder on oak, almond and apple trees. The present study provides a general account of the morphology of different stages of the insect and the most important biological indicators. The adults began to emerge from late May and mating occurred in early June. The females layed their eggs within several hours after emergence. Adults died within few days. Females layed eggs in band-like masses on small twigs. Embryos developed to first-stage larvae within three weeks. Larvae entered diapause and remained dormant within egg shells throughout summer, fall, and winter. Hatching usually occured during late March and early April, during leaf development. Caterpillars constructed webs and fed for about eight weeks. Pupation occured in silk cocoons during mid-May to early June. Adults emerged within two weeks to begin a new cycle. Only one generation per year was observed.

E 30

DURATION OF INJURIOUS GENERATIONS OF *BACTEROCERA OLEAE* GMEL. IN TAROM CITY OF ZANDJAN PROVINCE (IRAN). A.A. Keyhanian[1] and M.A. Taghaddosi[2]. (1) Iranian Research Institute of Plant Protection, Iran; (2) Agricultural and Natural Resources Research Center of Zandjan, Iran, Email: akeyhanian@yahoo.com

Olive fruit fly, *Bacterocera oleae* Gmel. (Dip.: Tephritidae) is one of the most important tephritid flies damaging olive orchards throughout the world. Although main damage occurs by larvae which feed exclusively on mesocarp of the olive fruits but adults' damage may be observed on other fruits too. This insect is a multivoltine pest and its damage happens from late October till late November over the region. To determine damaging generation, this study was conducted in 2007 by using the following method, in late July, months before infestation, 20 branches, each covering 15 olive fruits were randomly selected and enclosed in cage (40×15 cm). To obtain adult flies, on October 7th, infested olives were collected from olive growing area of Ghazvin province, Iran and transferred to the laboratory. On October 26th, five healthy female adults were released into each cage for egg laying for 24 hours. On Nov. 20th, first 3rd instar larvae of the pest came out of the fruit and this process lasted up to December 12th. Based on this finding, it could be concluded that damage in the last egg-larval generation needed 35.8 days to be completed.

E 31

SEASONAL ABUNDANCE OF GREEN PEACH APHID, *MYZUS PERSICAE* SULZER ON SOME WILD PLANTS IN ERBIL CITY, KURDISTAN REGION, IRAQ. Adil H. Amin[1] and Hana H. Mohammed[2]. (1) Department of Plant Protection, College of Agriculture, University of Salahaddin, Erbil, Kurdistan Region, Iraq; (2) Department of Biology, College of Science, University of Salahaddin, Erbil, Kurdistan region, Iraq, Email: ahkorachi@yahoo.com

Myzus persicae Sulzer was recorded on 16 species of wild plants belonging to 9 plant families, including 5 species of composite, 3 species of Brassicaceae, 2 species of Fabaceae, while one species was recorded for each of the families, Convolvulaceae, Umbelliferae, Malvaceae, Rutaceae, Solanaceae and Fumariaceae. The seasonal abundance of *M. persicae* on 6 wild plant species showed that the aphid stayed on *Aster squamatus* (Spring) for 8 weeks, from early November to late December, and reached its peak in early December; on *Convolvulus arvensis* L., for 18 weeks, from mid September to mid January, with a peak in late November. The insect was also found on *Capsella bursa-pastoris* L. for 9 weeks, from early March to early May, with a peak in mid March; on *Hirschfeldia incana* L. for 14 weeks, from mid February to late May, with a peak in early March; on *Sisymbrium irio* L. for 13 weeks, from mid February to early May, with a peak in mid March; and on *Sonchus oleraceus* L. for 7 weeks, from late January to early March, with a peak in late January. The temperature and relative humidity had a significant effect on the number of insects on C. *arvensis*, *C. bursa-pastoris* and *S. irio* and

without a significant effect on *A. squamatus*, *H. incana* and *S. oleraceus.*

E 32

SURVEY OF ARTHROPODS ASSOCIATED WITH CANOLA PLANT (RAPESEED) *BRASSICA NAPUS* L. IN SOHAG GOVERNORATE, UPPER EGYPT, EGYPT. Gamal Karaman, A. Younis, A. Salman and A. Ahmed, Plant Protection Department, Faculty of Agriculture, Minia University, El-Minia, Egypt, Email: radwakaraman@yahoo.com

Canola Plant (oilseed rape), nowadays became one of the most important oil crops all over the world. It was recently introduced for cultivating in Egypt in order to bridge part of the gap between production and consumption of edible oils. Due to lack of information on certain arthropods associated with the crop under local conditions of Upper Egypt, the present work was undertaken, in order to shed light on this new crop. Results revealed the occurrence of 29 species of arthropodes related to 24 families, belonging to 13 orders. Phytophagous species were represented by 6 important economic species (20.69%), 7 species as non pests (24.14%) and 4 species (13.79%) were classified as pollinators and visitors. However, natural enemies, pasasitiods and predators, were represented by 12 species (41.38%).

E 33

ABUNDANCE OF THE CITRUS MEALYBUG, *PLANOCOCCUS CITRI* (RISSO) ON SOME CITRUS SPECIES, IN THE GEZIRA STATE (SUDAN) AND THE EFFICACY OF THE PETROLEUM OIL SPRAY "D-C TRON® PLUS" IN ITS CONTROL. Tag Elsir E. Abdalla and Entisar A. Osman, Agricultural Research Corporation, Gezira Research Station, P.O. Box 126, Wad Medani, Sudan, Email tagelsirr@yahoo.com

This study was conducted during 2004 and 2005 seasons, to quantify the abundance of the citrus mealybug, *Planococcus citri* (Risso) on lemon (*Citrus aurantifolia*) and grapefruit (*C. paradisi*) trees in the existing orchards of the Gezira State (Sudan) and to determine the efficacy of the petroleum oil spray oil "D-C Tron Plus" in its control. The results showed that, the pest was widely distributed throughout the Gezira State. Infestation on lemon trees ranged between 6.2% and 81.4%, and on grapefruit between 25% and 100%. The infestation was higher in the southern compared to northern Gezira. The important factors determining the intensity of *P. citri* incidence were found to be climatic conditions, diversification of plant species within an orchard, plant spacing, management and age of the trees. The tested doses of the "D-C Tron Plus" 0.375%, 0.5% and 0.625% product (v/v) (product/water) were highly effective in controlling the pest and significantly increased the marketable yield in terms of fruits number and weight per tree as compared with the control. The highest dose, 0.625%, consistently and significantly gave the best results compared with the two lower doses. The study recommended the "D-C Tron Plus" at 0.625% for the control of the citrus mealybug, diversification of plant species in an orchard, spacing of citrus trees at 8 x 8 m, as earlier recommended by ARC, and adoption of annual pruning, hedging and pruning practices, particularly on narrowly spaced trees.

E 34

FRUIT FLIES IN SUDAN: THEIR SPECIES COMPOSITION, HOST RANGE AND FIELD RESPONSE TO FOOD-BASED AND MALE LURES ATTRACTANTS. Mohammed E.E. Mahmoud[1], Sumia Abukashwa[2], Mohammed A. Kambal[2] and Elsadig Masoud Belal[1]. (1) ARC, Sudan; (2) University of Khartoum, Faculty of Science, Department of Zoology, Khartoum, Sudan, Email: nazeiro@maktoob.com

Fruit flies (Tephritidae: Diptera) are notorious pests of horticultural crops in Sudan**.** This study was conducted to find out species composition of fruit flies at Khartoum and Kassala during 2007-2009, determine host range and asses their field response to protein hydrolaste (Nulure, Torula yeast, AFFI and GF-120) and male lures (Methyl Eugenol, Terpinyl Acetate, Culure, and Trimedlure). More than 10 species from 3 genera were recorded. Mango and Guava were found attacked by *Ceratitis capitata, Bactrocera. invadens, C. cosyra and C. quinaria*. Grape fruit, orange, mandarin and banana were found infested by *B.invadens*. Lemon and bananna were recorded as new hosts for *B. invadens* at Kassala. Cucumber, water melon, musk melon were found infested by *Dacus ciliatus*, *Dacus* sp and *B. cucurbitae* while Sidir *Zizyphus spinacristi* and *Juba juba* were found infested *by Paradalopsis incomplete.* Usher *Calotropis procera was attacked by B. longistylus.* Torula yeast for two consecutive seasons was the best attractant to *C. capitata, B. invadens, C. cosyra, C. quinaria, B. cucurbitae* while Nulure efficacy was decreased conspicuously in the second season. *B. invadens* responded to Methyl Eugenol, while *C. capitata*, *C. cosyra* and *C. quinaria* responded to Terpinyl Acetate and *C. capitata* alone was attracted to Trimedlure.

E 35

SURVEY AND SEASONAL ABUNDANCE OF CERTAIN HOMOPTEROUS INSECTS INFESTING BROCCOLI PLANTS AT MENIA EL-KAMH REGION, SHARKIA GOVERNORATE, EGYPT. Mustapha Hashem[1], Hamza El-sharkawy[2] and Abdallah Abd-El-Samed[1]. (1) Department of Plant Protection, Institute of Efficient Productivity, Zagazig University, Egypt; (2) Plant Protection Research Institute, Agriculture Research, Centre, Egypt, E mail: Hamzash@hotmail.com

Survey and seasonal abundance of certain homopterous insects (aphids, leafhoppers and white flies) infesting broccoli plants were carried out under field conditions at Menia El-Kamh region, Sharkia Governorate, Egypt during the two growing seasons of 2006/07 and 2007/08. The effect of some climatic factors on the population density of the dominant insects was also studied. Results obtained could be summarized as follow: a) surveyed aphid species were: *Brevicoryne brassicae* (Linnaeus), *Myzus persicae* (Sulz) and *Lipaphis erysimi* (Davis). b) surveyed leafhopper species were: *Empoasca decipiens* (Paoli), *Empoasca decedens* (Paoli) and *Balclutha hortensis* (Linds.), c) surveyed white fly species was only *Bemisia tabaci* (Genn.). Seasonal abundances of

the dominant insects species can be summarized as follow: a) for aphid species, three peaks for *B. brassicae* were noticed on broccoli by mid-October, end November and end March, three peaks for *M. persicae* were recorded on broccoli plants by mid-October, end November and end March. b) for leafhoppers species, two peaks for *E. decipiens* were found on broccoli by end October, and end March, one peak for *E. decedens* was recorded on broccoli by mid-November, *B. hortensis* population occurred with only one peak by end of October, c) white fly population density of immature stages of *B. tabaci* occurred with two peaks by the end of September and the end of March, whereas there were two peaks for the adult stage by mid-October and mid-March. On the other hand, results of the effects of temperature and relative humidity on the population fluctuations of the aphids, leafhoppers and white fly species revealed that the correlation coefficient was significant with some insects and insignificant with the others. Also, path coefficient between the temperature and relative humidity showed that temperature seemed to affect the population of insects first followed by relative humidity.

E 36

ECOLOGICAL STUDY ON THE PEACH/MANGO FRUIT FLY *BACTROCERA ZONATA* (SAUNDERS) IN LAHIJ GOVERNORATE, REPUBLIC OF YEMEN. Saeed A. Ba-Angood and Nasir Kh. Sunaid, Department of Plant Protection, Nasir's College of Agriculture, University of Aden, P.O. Box 6172, Khormaksar, Aden, Republic of Yemen, Email: baangood@yemen.net.ye

The peach/mango fruit fly *Bactrocera zonata* (Saunders) (Tephritidae: Diptera) is a quarantine pest that has been spread during the past few years causing economic damages to mango, peach, guava and other crops. Pheromone traps using methyl eugenol, were used to monitor the population of the pest in mango and guava fields in 2006/2007. The results have shown that the pest is present almost all the year around, but it reached its peak in September, where the mean pheromone trap catch was 2278 males. The number declined when the temperature decreased reaching its minimum (196 males) in January and March. It has been noticed that the number of males caught in pheromone traps were higher in the morning compared to that in the evening. The preferred color of the pheromone trap that attracts more males was the white color, followed by yellow; the least attraction was by the black color. A positive correlation was found between the increase in temperature and the number of adults caught in the pheromone traps (r=0.85). Rainfall has little effect on insect numbers, while the effect of winds was not clear. Field food preference trials, as well as fruit juices, showed that the insect prefers mango compared to other fruit trees available in the area. This information is important for developing an integrated pest management (IPM) program for the pest in the area.

E 37

NOCTUIDAE (LEPIDOPTERA) MATERIALS COLLECTED FROM KERMAN, IRAN. Asghar Shirvani Saadatabadi, Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, 76169-133 Kerman, Iran, Email: shirvani@mail.uk.ac.ir

In a faunistic survey during 2006-2008, fauna of Noctuidae family of Kerman was investigated. Different locations of various geographical coordinates and altitudes were chosen and sampling was done using light traps of different intervals. The relationships between geographical coordinate, altitude, season, and vegetation with species were evaluated. In total, 104 species of 51 genera belonging to 14 subfamilies from 500 to 3000 metres altitudes were collected and identified. Of these, 53 species are a first record for the fauna of Kerman. Noctuinae subfamily with 42 species had the highest number of species while Psaphidinae, Acronictinae and Amphipyrinae each had one species. Most species of Xyleninae showed either late or early flying pattern. Those of other subfamilies evenly differed through the seasons. The dominant vegetation of the locations was *Artemisia* species except for saline habitats where *Salsola* species dominated.

E 38

ECOLOGICAL STUDY OF *LEPIDOSAPHES BECKII* (NEWMAN) AND ITS PARASITOIDS IN CITRUS ORCHARDS AT LATTAKIA GOVERNORATE, SYRIA. Nabil Abokaf[1] , Eiad Mahamad[2] and Abd Alnabi Basher[3]. (1) Department of Plant Protection, Faculty of Agriculture, Tishreen University, P.O. Box 1446, Lattakia, Syria; (2) Centre of Biological Enemies Rearing, AlHanadi, Syria; (3) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: n.abokaf@scs-net.org

The research was carried out to study the ecology of the purple scale insect, *Lepidosaphes beckii* (Newman) and to determine parasitoid species associated with the pest at Lattakia Governorate, Syria during 2005-2007. Samples were collected from citrus orchards at Alhinadi, Stamo, Tergano, Hmemim, Lattakia governorate. During this study, three generations of the pest, on all citrus varieties, and seven parasitoid species were found associated with it. These parasitoids belonged to order Hymenoptera: superfamily Calcidoidea and family Aphelinidae. Four of them were ectoparasitoids (genus *Aphytis*) and two were endoparasitoids (genus *Encarsia*).

E 39

INVENTORY OF THE TYPES OF LOCUSTS AND HOPPERS IN SEMI-ARID REGION IN THE EASTERN REGION OF ALGERIA. Naima Benkenana and A. Harrat, Arthropods Systematic and Ecology Laboratory, Science Faculty, Mentouri University, Contantine, Algeria, Email: naima_benkenana@yahoo.fr

Inventory of the locust fauna in a semi-arid zone in the eastern region of Algeria, revealed the presence of 35 locust species, belonged to four families: Acrididae, Pyrgomorphidae, Pamphagidae and Acrydiidae. Family Acrididae was represented by 9 subfamilies. Subfamily Oedipodinae was the largest with 8 species. The subfamilies; Cyrtacanthacridinae, Catantopinae and Truxalinae were represented only by one species each. Species: *Anacridium eagyptium* (Linné, 1764), *Acrotylus*

patruelis patruelis (Herrich-schaeffer, 1884), *Pezotettix giornii* (Rossi, 1794) and *Ocneridia volxemii* (Bolivar, 1878) appeared to have economic importance in the area of study.

E 40

EFFECT OF DIFFERENT SOYBEAN CULTIVARS ON REPRODUCTION OF *HELICOVERPA ARMIGERA* HB. Safieh Soleimannejad, Yaghoub Fathipour and Saeid Moharramipour, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P.O. Box 14115-336, Tehran, Iran Email: soleimannejad2009@gmail.com

Reducing usage of chemicals for control of *Helicoverpa armigera* (Hubner) was the main purpose of this study. Demographic and reproductive responses of *H. armigera* to 10 soybean cultivars (Clark, M4, M9, M7, Sahar, L17, Tellar, Gorgan3, Sari and Zane) were evaluated. All experiments were conducted at 25± 1ºC, 60±5% RH and a photoperiod of 16:8 (L:D). Results demonstrated significant differences in life expectancy of immature stages raised on different soybean cultivars. Adults emerged from these larvae showed various reproductive ability as gross fecundity rate varied from 2558.4 eggs on Sari to 589.67 eggs on Sahar. Gross fertility rate varied from 1458.01 eggs on Clark to 132.1 eggs on L17. The highest amount of gross reproductive rate was observed on Clark (2103.53 eggs) and the lowest was on Sahar (626.29 eggs). These results suggest that the suppression of moths reproductive activity by Sahar and L17 cultivars had a good potential for a pest control.

E 41

CONTRIBUTION TO THE FUNCTIONAL DIVERSITY STUDY OF THE INSECTS FAUNA ASSOCIATED WITH OLIVE-TREE FOR THE MODULATION OF THE PESTS-AUXILIARY-PLANT HOST RELATIONS, IN CENTRAL MITIDJA REGION (ALGERIA). Amina Koutti, Leïla Allal Benfekih and Zahreddine Djazouli, Laboratory of Zoology, Department of Agonomic Sciences, Saad Dahleb University, Blida, Algeria. Email: acrido@yahoo.fr

The insects fauna associated with the olive-tree was studied in two orchards of different age: one young plantation of olive table variety and an old one of olive oil variety, located in Central Mitidja region (Algeria). Some parameters of the functionnal biodiversity are illustrated in the framework of this study, the presence and the abundance of the insect pests and random visitors of the crops need to be analyzed in a context of crop protection. We examined the structure of the settlements of the functional groups in the olive grove, on the seasonal level. Two groups seem correlated well at the season: that of the predatory and flower-dwelling visitors which are entering in diapause to spend the winter and which feed from the weak populations of *Saissetia olea* present at this period; the other gathers the opophagous lecanidae and psyllidae which will multiply because of the increase in the temperatures during the spring period. By considering their ecological succession, the phytophagous insects and random visitors appear during the same month, with early appearance of phytophagous which settles and evolves in April, followed by predators towards the end of this month. The predatory insects were dominant compared to parasitoids, and the coccinellid beetles were more abundant. Ladybirds were represented especially by the species *Chilocorus bipunctatus*, *Chilocorus bipustulatus*, *Pullus suturalis* and *Scymnus (Mimopullus) mediterraneus*. Correlation regression analysis, a multivariate analysis based on Detrended Correspondance Analysis, as well as the barycenter of the functional groups were used in the analysis.

E 42

BIOLOGY OF *APORIA CRATAEGI* L AND ITS ECONOMIC THRESHOLD LEVEL IN CENTRAL AND SOUTHERN-SYRIA. Amanni shlallo, Louai Aslaan and Wajih Alkassis, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: amannishllalo@yahoo.com

In Syria, almond plantations are located mainly in central area. *Aporia crataegi* attacks almond, apple, azarole, mahlab and it became the most important insect pest. This study was conducted during 2003 – 2009 in central Syria and 2008-2009 in southern Syria. Third instar larvae enter into diapause in winter nests started their reactivation according to the place and host. In central Syria, larval activity started in early February on early maturing almond, and later on late maturing almonds. The activity of the larvae on early maturing cvs. was delayed till March in southern Syria. *Apantales* sp. was noted to attack larvae, with parasitism rate of 29, 21, 41, 18, 3% in 2004, 2005, 2006, 2008 and 2009, in central Syria, and 19 and 20% in 2008- 2009 in southern-Syria. ETL study was conducted according to nets number, host age and host productivity. Three different host ages (5, 8 and 10 years) and different number of nests (3, 4 and 5) were maintained on different hosts to determine the highest number of nests on a host with no significant effect on productivity. Ten years old trees performed the best. Total fecundity, daily fecundity, mortality and survival rate, reproductive rate, the mean generation time and sex ratio were investigated.

E 43

REGISTRATION OF 11 NEW SPECIES OF INSECTS IN QATAR. Khaled Mohamed Mardini[1], Laurent Soldati[2], Michel Martinez[3], E. Pierre[3], and C. Cocquempot[3]. (1) Qatar insects Project, Friends of the Environment Center, P.O.Box 1822, Doha, Qatar,; Email: khaled-m92@hotmail.com; (2) Centre de Biologie et de Gestion des populations (CBGP), Montpellier, France ; (3) National Institute of Agronomic Researches (INRA), Montpellier, France.

In a recent insects survey in Qatar, 7 species belong to the order Coleoptera, 3 Diptera and one belong to Homoptera. *Cardiophorus* sp. (Eleteridae) were found in Doha, *Acmaeodera* sp. (Buprestidae) found in Traina area, *Phtora* sp. (Tenebrionidae) found in Doha and Umsht Island, *Trachyscelis* sp. (Tenebrionidae) found in Madinat Al Shamal and Al- Ghariyah, *Apsheronellus* sp. (Tenebrionidae) found in Umm said area, *Ammogiton* sp. (Tenebrionidae) found in Umm said area, *Mesostena* sp.

(Tenebrionidae) found in Al Wakra, Al Jamailiya and Dahl Al hamam area, *Afrotethina* sp.(Tethinidae) found in Umm said area, *Xanthocanace* sp. (Canacidae) found in Al Khor area, *Calliardia* sp. (Psyllidae) found in Umm said area. Through this project 11 new insect species were recorded from Qatar.

E 44

ECOLOGICAL STUDY ON BEET FLEA BEETLE, *CHAETOCNEMA TIBIALIS* (ILLIGER). (CHRYSOMELIDAE: COLEOPTERA) AND ITS CONTROL AT HOMS GOVERNORATE, SYRIA. M.Y. Ibrahim, E.A. Mehrez and F. Abass, GCSAR, Agricultural Scientific Research Center at Homs, Department of Plant Protection Research, Homs, Syria, Email: mohamedkozii@yahoo.com

The seasonal activity of beet flea beetle adults, *Chaetocnema tibialis* (Illiger), was studied on sugar beet varieties at Homs Region during 2007 season. Results obtained indicated that adults activity was started at the 2nd week of May on all varieties in the January and February planting dates. The number tended to increase gradually, starting from early June, and reaching a peak, 65.9 and 97.9 holes/25 leaves, for the two planting dates, respectively. The 2nd peak occurred in the 4th week of July, with 118.42 and 364.14 holes/25 leaves, for both planting dates, respectively. Vico variety was the most susceptible (48.53 and 109.48 holes/25 leaves for the two planting dates, respectively), meanwhile, Ramona and Prognos were the least infested varieties. Infestation started however with quite low holes (2.49 holes/25 leaves) at the 3rd week of May and increased gradually at the 4th week of June with 23.15 holes/leaf, and arrived at the end of season to (159.95 holes/25 leaves). Moreover, infestation rate was increased by that insect at the 2nd planting date (1st week of February) and doubled at the 1st planting date (the 1st half of January). Six pesticides were evaluated against beet flea beetle; results showed that Saprino and Cypermethrin pesticide gave the highest effective rate (90.88% and 90.69%), compared with Nimadol pesticide (49.35%), two weeks after treatment.

E 45

ADRESS: A NEW FUTURE SAFETY INTEGRATED TECHNOLOGY TO CONTROL MEDITERRANEAN FRUIT FLY. Ahmed Idlbi, Syngenta Agro Services, Syria, Email: Ahmed.idlbi@syngenta.com

The Mediterranean fruit fly is one of the pests which causes losses in the fruit sector worldwide. There are 19 million hectares of fruit trees in the world attacked by this pest, from which 7 million hectares are Citrus. In the Mediterranean countries such as Syria, Lebanon and other Middle Eastern countries where Citrus is an important crop, this pest represent a threat over the entire citrus sector. Adress is a Fruit fly chemosterilant system which includes: 3 kinds of pheromones and unique gel formulation containing the active ingredient lufenuron with feeding stimulant for Mediterranean fruit-flies (*Ceratitis capitata*) as a bait. Male and female fruit flies which ingest the bait are irreversibly sterilized by the lufenuron and Such flies may continue to lay eggs which do not hatch, thus breaking the pest lifecycle and reducing the pest population. The benefits of Adress are: (i) Very safe technology making its way to Syria and the Middle East for the first time; (ii) The compatibility of this system with the Syrian Ministry of Agriculture policy for IPM and biological control of citrus pests; (iii) Unique features and benefits compared to the conventional pheromone traps such as ease of application and placement at the start of the crop season with no need for repetition, thus saving time and Money. This approach permits farmers to keep fruits on the tree at will without having to harvest until such time as the crop price becomes more attractive.

E 46

BIO-ECOLOGICAL STUDY OF *APODIPHUS AMYGDALI* (GERMAR)(HEMIPTERA: PENTATOMIDAE) ON SOME FRUIT TREES IN ERBIL GOVERNORATE. Sarkaut H. Muhammed[1] and Riyad A. Al-Iraqi[2]. (1) Department of Biology, College of Science, Salahaddin University, Arbil, Iraq; (2) Department of Biology, College of Science, Mosul University, Iraq, Email: sarkawt_zanko@yahoo.com

This study was carried out in May 2007. Five species of Pentatomide stink bugs were recorded on many fruit and non-fruit trees in four locations (Shaqlawa, Kark village, Qusthapa and city center). These stink bugs were: *Apodiphus amygdali* (Germar), *Mustha spinulosa* (Lefebvre), *Mustha* sp., *Carcenoplistus acutus* (Signoret) and *Rhaphigaster nebulosa* (Poda), the last three species were recorded for the first time in Iraq. It has been found that the hibernated stink bugs *A. amygdali* began their activity during the end of May 2007, while the new emerged adults appeared at the beginning of July. The bug was present in the field for about five months. The stink bug was found on the following trees: Plum, Apricot, Apple, Olive, Almond, Peach, Pear, Grape, Pomegranate, Loquat, Citrus, Fig, Sumaq, Juglanus, Mulberry, Poplar, Planetree, Willow and Robinia. *A. amygdali* was found on the three fruit trees apricot, pear and apple.The mean egg incubation period was 3.75 days and the egg hatching rates were 89.29 and 100.0% for apricot, 96.94and 92.86% for pear and 100.0 and 100.0% on apple trees, for the two generations, respectively. The nymphs completed their development after five instars, the mean period of each was 4.0, 7.7, 7.8, 8.7 and 9.3 days for 1st, 2nd, 3rd, 4th and 5th instar, respectively. The mean natural mortality among the nymphal stages was 73.49%, and the majority of which occurred among the fifth instar nymph. The pre-oviposition period was in the range of 3-6 days for the first generation, but the overwintered females of the second generation had a long pre-oviposition period and began to lay their eggs after hibernation. The stink bug *A. amygdali* had two generations throughout the year, the first one began in the fourth week of June while the second began in the second week of August, and the emerged adult entered hibernation from mid October until the fourth week of May of the next year. The hibernating sites were in the Safeen Mountain. The general sex ratio was 1:1. The average body lengths and widths of each of the five nymphal instars were: 2.76-2.84 and 2.20-2.24; 4.00-4.72 and 3.00-3.44; 5.98-6.23 and 3.74-4.15; 9.96-10.79 and 5.64-6.39; 11.20-13.60 and 6.24-7.84

mm, respectively. The adult measurements were: 13.60-15.36 mm long and 7.20-8.00 mm wide for males and 15.36-17.60 mm long and 8.00-8.64 mm wide for females.

E 47

A CONTRIBUTION TO THE ECOLOGICAL STUDIES OF THE APPLE FRUIT WORM (*CYDIA POMONELLA*) AND ASSESSMENT OF YIELD LOSSES CAUSED BY IT IN AIN EL-TOUTE REGION IN BATNA GOVERNORATE, ALGERIA. Shafiaa Ismail and Mehdi Salame, National Institute for Agricultural Sciences, 16200 El-Harrash, Algeria, Email: mergueb2002@yahoo.fr

In Algeria, the apple fruit worm (*Cydia pomonella*) has 2-4 generations/year according to the location and host. To develop a forcasting system and to improve control strategy of the apple fruit worm in the El-Toute region, studies were conducted in three experiment stations. In one station the apple variety Star Crimson was planted, whereas in the other two stations, the variety Golden Delicious was planted. The use of male pheromone traps indicated the presence of three generations during the growing season. The use of cardboard traps next to the roots indicated the presence of large number of larvae which intered diapause during winter. The pest damage on the fruits still on the tree or those dropped on the ground was variable among the stations. The calculation of the cumulative temperature enabled the determination of number of days required for appluing appropriate international.

E 48

EFFECTS OF DIFFERENT CONCENTRATIONS OF TWO INSECT GROWTH REGULATORS CONCENTRATIONS, DIMILIN AND TRIGARD, ON SOME NUTRITIONAL PARAMETERS OF COTTON LEAF WORM, *SPODOPTERA LITTORALIS* (BOISD). Haitham Mohie Al-Ddeen Mohamed, Plant Protection Department, Agriculture College, Mosul University, Iraq, Email: d.haitham@yahoo.com

The effect three concentrations 150ml/l, 250ml/l, and 350ml/l, of the insect Growth Regulators (IGR) Trigard and Dimilin on some nutritional parameters of leaf cotton worm, *Spodoptera littoralis*, under laboratory conditions (28±1°C and 65±5% RH) were made. Trigard exhibited higher average values of approximate digestibility (AD), efficiency conversion of feed digestibility (ECD), and efficiency conversion of feed Intake (ECI) which reached 93.29, 3.127 and 2.905, respectively. Dimilin showed a higher average value of rate growth regulators (RGR) that reached 0.139. The results revealed lower average values of RGR, ECI and ECD at 250 ml/l concentration, for both gfowth regulators and reached 0.119, 1.65 and 1.82 for Dimilin, and 0.018, 0.43 and 0.46 for Trigard, respectively. The concentration 150 ml/l for the two growth regulators showed high AD values which reached 95.32 and 94.00 for Trigard and Dimilian respectively as compared to 92.75 for the control treatment.

E 49

MOLECULAR DIAGNOSIS OF SOME FRUIT FLIES FOUND RECENTLY IN EGYPT. Badr El-Sabah A. Fetoh, Plant Protection Research Institute, ARC, Dokki, Giza, Egypt, Email: badrelsabah@yahoo.com

In Egypt the cucurbit fly, *Dacus ciliatus* (Loew) and the peach fruit fly, *Bactrocera zonata* (Saunders) (Tephritidae: Diptera) were found infesting some horticultural fruits such as guava, mango, peach and orange in addition to some cucurbitaceous and solanaceous vegetables. Both flies resemble each other in infestation symptoms and in all immature stages. Furthermore, adults have the same shape, size and color. Morphological differences appear in the thorax, wings and abdomen. Electrophrosis of total protein (SDS-PAGE) in all stages of both species indicated the presence of 10 protein bands in *D. ciliatus* and 11 protein bands in *B. zonata* ranging between 151.17 kDa and 19.72 kDa with common major protein bands of 20.67 kDa. Similarity level was 72.92%, similarity coefficient was 0.90 and commonality level was 9.52%. Esterase isoenzyme pattern after electrophroesis showed the presence of 5 bands in both species ranging in size from 59.34 kDa to 169.24 kDa with a common major band of 97.17 kDa. Similarity level was 16.03%, similarity coefficient was 0.80 and commonality level was 22.22%. This could provide an effective tool for the identification of any stage of the insect (egg, larva, pupa and/or adult) in an easy and quick manner, thus help in agricultural quarantine and controlling both *D. ciliatus* and *B. zonata* when newly appear as serious pests in Egypt.

E 50

ECOLOGY OF DATE STEM BORER (*JABUSAEA HAMMERSCHMIDTII*) AND THE USE OF THE ENTOMOPATHOGENIC FUNGUS *BEAUVERIA BASSIANA* FOR ITS CONTROL. Emad M. T. Al-Hafidh, Private Trading Company, P.O. Box 27492, Abu Dhabi, United Arab Emirates, Email: emmothi@yahoo.com

Jabusaea hammerschmidtii is the most important pest on date palms trees in Iraq and Arab Gulf states. The results identified the duration of differentlife stages (egg, larvae, pupa, and adult) during the year, the time table of each stage in the field, and the effect of some ecological conditions on the infestation with this insect in date palm orchards. The effect of the fungus *Beauvaria bassiana* were studied on different stages of the stem borer and the best time for effective application of *B. bassiana* in the field for pest management was determined.

E 51

BIOLOGICAL AND ECOLOGICAL STUDIES ON *OMMATISSUS BINOTATUS LYBICUS* IN U.A.E. Emad M. T. Al-Hafidh, Private Trading Company, P.O. Box 27492, Abu Dhabi, United Arab Emirates, Email: emmothi@yahoo.com

The insect *Ommatissus binotatus lybicus* is one of the most important pests on date palm trees in U.A.E. The life cycle and the population density of two generations were studied in the field during the year. The results showed that the population density of the first generation was higher than the second generation of this insect and

such difference may be due to the temperature and relative humidity variability during the year in U.A.E. A large proportion of eggs (53.4%) were laid on the lower leaves, suggesting that thinning of lower leaves can reduce the damage caused by this peast.

E 52

EFFECT OF NITROGEN FERTILIZER AND THREE VARIETIES OF SUGAR BEET ON APHIDS INSECT AND RELATION TO ITS YIELD AND QUALITY. Salih M. Alrashidi, Mosul University, Mosul, Iraq, Email: sa53mah@gmail.com.

A Field experiment was carried out at the site of Hawija, famous for sugar beet cultivation. Five levels of nitrogen fertilizer (0, 20, 160, 200 and 240 kg Urea/ha) were used and of beet cvs. (Rosa, Jetan, Triple), over an experimental area of 6 hectares. The nitrogenous fertilizers were added at two times: the first at sowing seeds an April 5th, the second was after thinning. Super phosphate fertilizer 45% P_2O_5 was also added with at 150 kg/ha. The experiment was executed according to a randomized complete block design with factorial treatments in three replicates. A follow-up experiment from the seedling date in April, to the harvest time at the end of September. The last three leaves were used for one week (from 5 to 12th May) for observation of aphid population. Results showed that there was a significant positive relationship between aphid attack and amount of nitrogen fertilization, and also between the fresh weight of root/plant and root yield. The four nitrogen levels applied as mentioned above were accompanied by an increase in yield of 36.12, 50.89, 56.58 and 65.09%, respectively, compared to the control treatment. The sugar content has also increased compared with the control treatment. Results indicated that aphid infestation of sugar beet crop increased with the increase of nitrogen fertilizer.The "Tetan" monoembryonic cv. was the best, with low aphid indestation level. This study indicated that nitrogen fertilizer increased the total yield and decreased slightly the sugar content under high levels of nitrogen, while the infestaion with aphids increased with nitrogen fertilizer increase.

E 53

RELATIVE IMPORTANCE OF SOME CHARACTERISTICS RELATED TO SUNN PEST INFESTATION ON GRAIN YIELD OF BREAD WHEAT. Suaad Irdeny Abdullah[1], Khalid Mohammad Dawod[2] and Lazkin Hagy Assaf[3]. (1) Field Crops Department, College of Agriculture & Forestry, Mosul University, Iraq; (2) Plant Protection Department, College of Agriculture & Forestry, Mosul University, Iraq; (3) Plant Protection Department, College of Agriculture, Duhok University, Iraq, Email: khalddawod@yahoo.com

The experiment was conducted at the Research Station of the Faculty of Agronomy, Duhok University (Duhok Governorate, Iraq), during 2004/2005 and 2005/2006 seasons. Bread wheat varieties (Sham 6, Tamoze 2, IPA 99, Iraq, Noor, Az, Door 85, Door 29, IPA 95, Abo-Graib, Mexiback, Araz and Waha) were planted under rainfed conditions using randomized complete block design with three replications, to study the correlations of grain yield with characteristics related to Sunn Pest infestation (Sunn Pest mature adults, percent of infested grain per spike, nymphes and adults of Sunn Pest, number of infested leaves/m^2, percent of infested non carrier tillers and percent of infested spikes/m^2), and then partitioning the correlation coefficients to direct and indirect effects through path analysis, to get information about the higher effect of its characters on grain yield. Stepwise regression procedure was used to identify the best regression equation for predicting the grain yield related to the characters of the Sunn Pest infestation. The results are summarized as follows: (1) Significant negative correlation was found between the grain yield and Sunn Pest mature adults during the two seasons, (2) Sunn Pest mature adults had significant positive correlations with number of infested leaves/m^2, percent of infested non carrier tillers and the percentage of infested spikes/m^2, during the two seasons, and with the adults of Sunn Pest during the first season and the percentage of infested grain per spike during the second season, (3) The percentage of infested grain per spike had a significant negative correlation using 1000 grains weight during the first season and a germination rate during the second season, (4) Path analysis results showed the high importance of mature adults of Sunn Pest, the direct effect on the grain yield and its indirect effect through most other characters during the two seasons, indicating that mature adults of Sunn Pest had a strong passive effect on the reduction of the grain yield in the bread wheat followed by a percentage of infested non carrier tillers and Sunn Pest nymphs, (5) It was shown from stepwise regression procedure that the best regression equation is the one which contained mature adults of Sunn Pest and could be used for the prediction of grain yield.

E 54

THE HIDING PLANTS FOR THE DORMANCY PHASE OF THE SUNN PEST (*EURYGASTER INTEGRICEPS* PUT.) ATGARA MOUNTAIN IN DOHUK PROVINCE. Suaad Irdeny Abdullah[1] Suaad Irdeny Abdullah[1] and Lazkin Hagy Assaf[2]. (1) Plant Protection Departmant, College of Agriculture & Forestry, Mosul University, Iraq; (2) Plant Protection Department, College of Agriculture, Duhok University, Iraq, Email: lazgeenassaf@yahoo.com

Adults of Sunn Pest *Eurygaster integriceps* Put. hide beneath different plants and weeds in overwintering locations (Gara mountain) in Dohuk province to escape adverse conditions. 26 plant species were identified, 18 of them were registered for the first time during this study. The highest average number of alive adults (64.67 insects/plant) were found under *Acantholimon acerosum* (Willd.) Bioss, while total number of alive and dead insects were 74.67 insects/plant, followed by *Cruianella gilanica* Tirn., *Astragulus octopus* Tonw., *Marrubium vulgare* L., *Teucrium chamaedrys, Astragulus gossypinus* Fisch.ex Hor. with an average of 29.67, 26.33, 27.67, 27.00, 24.67 and 36.67 insects/plant for each plant species, respectively. Meanwhile the total number of insects were 36.33, 36.33, 31.00 and 27.33 insects per plant under each plant species, respectively.

E 55

EFFECTS OF FOUR INSECT GROWTH REGULATORS ON THE PREDATOR *CHRYSOPERLA CARNEA*. Jawad Kadhim Al-Rubaye, Plant Protection Department, Agriculture College, Baghdad University, Abu-Ghraib, Iraq, Email: jwd_kadhim@yahoo.com

The biological effects of four insect growth regulators (IGR); Insegar 25 wp (125, 250 and 500 ppm), Admiral 10 EC (50,100, and 200 ppm), Cascade 50 EC (250, 500, and 1000 ppm), and Trigards 75 wp (375, 750, and 1500 ppm) were studied on *Chrysoperla carnea*. The results showed that the effect of the Trigard treatment at all concentrations was high on the eggs hatchability of the predator which was registered 0%, while the highest percentage of hatching egg was 72% when Admiral was used. Treatment of the first larval instar with Cascade indicated that this stage will survive and can grow and complete its development. Meanwhile in the treatments of the third larval instar with IGR's the lowest and the highest percentages of development to pupal stage were 41.7% and 84.9% when Trigard and Admiral were used, respectively. This result means that the first instar of this predator is more sensitive to IGR than the third instar. The fecundity and fertility of females feeding on treated food with the IGRs were significantly affected.

E 56

A NEW RECORD OF *CERODONTHA* (*CERODONTHA*) *PHRAGMITOPHILA* HERING (DIPTERA: AGROMYZIDAE) ON OBOE CANE, *ARUNDO DONAX* L. IN EGYPT. Samir A. El-Serwy, Ministry of Agriculture, Plant Protection Research Institute, 7 Nadi El-Seid Street, Dokki, P.O. Box 12618, Giza, Egypt, Email: samirelserwy@hotmail.com.

The leafminer, *Cerodontha* (*Cerodontha*) *phragmitophila* Hering, is recorded for the first time on oboe cane, *Arundo donax* L. plants grown in or on the banks of the irrigation canals at Al-Aiat region in Giza governorate. The *Cerodontha* Rondani (Agromyzidae) fauna of Egypt includes now 3 species. Females laid their eggs singly near the margin on lower surface of the leaf blade. The initial mine of the newly hatched larvae was linear and became widen corridor by vertical feeding of larvae on the blade leaf tissue and pupation of the full-grown larvae within the mine. Infestation started in late August and continued until late October 2003 and during the last three weeks of September 2008 with general mean infestation levels of 3 and 8%, respectively. Larvae produce between 1-3 mines/infested leaf. Two larval and pupal parasitoids (Hymenoptera: Chalcidoidea: Eulophidae) i.e. *Diglyphus isaea* Walker (new record) and *Chrysocharis* sp. (new record) were identified. Pupal was generally higher than larval parasitism with rates of 64 and 34%, respectively. Both parasitoids started their activity in late August and continued until the third week of October 2003 including the last three weeks of September 2008. It fluctuated greatly with rates of pupal parasitism increased from about 48% in 2003 to 80% in 2008, whilst rates of parasitized larvae decreased from about 39% to 30% during the same period.

E 57

HOST PREFERENCE OF JASMINE WHITEFLY *ALEUROCLAVA JASMINI* (HOMOPTERA:ALEYRODIDAE)ON CITRUS IN SOUTH BAGHDAD ORCHARDS IN IRAQ. Mohammed Z. Khalaf, B.Sh. Hamd, B.H. Hassan, A.H. Salman and F.H. Naher, Integrated Pest Control Research Center, Ministry of Science & Technology, P.O. Box 765, Baghdad, Iraq, Email: mzkhalaf2007@yahoo.com

Field and laboratory studies were conducted in south Baghdad orchards aiming at determining population dynamics and host preference of jasmine whitefly *Aleuroclava jasmini* on Orange (*Citrus sinensis*), Mandarin (*C. reticulata*), Lemon (*C. limon*) and Bergamot (*C. aurantiom*) during the 2007 season. Results of biological studies revealed that this insect laid its eggs on the under surface of the leaves. It was apparent from the results of field sampling that the insect preferred mandarin trees more than orange, lemon and bergamot trees, respectively, for both feeding, egg laying and development of the immature stages. The adult numerical density was 66.6, 59.1, 25.5 and 16.1 insect per leaf on mandarin, orange, lemon and bergamot, respectively. Meanwhile the eggs population density was 341.1, 293.1, 232.3 and 193.4 egg per cm leaf respectively and 176.7, 134.4, 112.2 and 63.3 nymph per cm leaf, respectively. The results of this study can be used in developing practical biological and chemical control applications for this pest.

E 58

BIOLOGICAL AND ECOLOGICAL STUDY OF IRAQI BEETLE *ADORETUS IRAKANUS* OHS. Ismail N. Almaroof, College of Agriculture and Forestry, Mosul University, Iraq, Email: ismail_najim@yahoo.com

The life cycle of *Adoretus irakanus* Ohs. (Coleoptera: Rutelidae) which attack poplar species was studied in Iraq in 2007 under laboratory conditions (30.5 C° and 25.5%). The study showed that the mean length of egg incubation, eggs hatchability and larval stages length were 7.51 days, 82% and 432.8 days, respectively. Larval stages lived underground and fed on the decayed material and roots of different plants present in the soil. The mean period of pupa was 7.1 days. After the emergence of adults, it laid the eggs in the soil singly and dispersed. The study also indicated that the mean number of eggs laid by a single female were 106.5. The sex ratio of male to female was 1.1:1. The longevity of adults, males and females were 27.35, 30.75 days, respectively. Also it was found that this species of insect had one generation per year. The hibernation appeared in the second larval instar. Ecological study has shown that damage started with the primary appearance of the Iraqi beetle adults, at the beginning of April. The increase of insects number caused an increase in the area and percentage of damage, which reached their maximum means (16.20, 12.11, 10.7 cm^2) (44.87, 17.35, 41.07%) for *Populus nigra*, *P. deltoides* and *P. euphratica*, respectively. This happened when the insects number

means reached the maximum (2.81, 2.31 and 2.0 insects/leaf) for the above mentioned poplar species at mean temperature of 27.42°C and 34.5% R.H..The statistical analysis showed that there was a significant correlation between the mean insect number and mean of area and percentage of damage in the 3 poplar species, with r values of 90.64, 93.05 and 89.62 for damaged area, and 90.31, 88.32 and 89.49 for damage percentage, respectively.

E 59

SUSCEPTIBILITY OF THREE DATE PALM VARIETIES TO *ECTOMYELOIS CERATONIEA* IN TWO OASIS WAD RIGH AND BISKRA SOUTH-EAST OF ALGERIA. Farid Bounaceur[1], Naima M ebrek[2], Abdessalem Zabi[1], Bahia Doumaindji-Mitiche[3], Fatma Zohra Bissaad[3], Atika Benrima Guendouz[4] and Amina Djemai[4]. (1) Departement of Biology, University Ibn Khaldoun Tiaret, Algeria; (2) Departement of Agronomy, Faculty of Sciensce, University Mohamed Khieder Biskra, Algeria, Email: mebrekn@yahoo.fr; (3) Departement of Zoology, National Institut of Agronomy, Algiers, Algeria; (4) Departement of Agronomy, Faculty Agro-veto, University Saâd Dehleb, Blida, Algeria.

Ectomyelois ceratoniea is known to cause a considerable damage to date fruits in Algeria; infestation affecting date production was estimated between 10 to 40% which constitue a permanent danger to production and export of date fruits. The objective of the study was to determine the susceptibility of three varieties of date fruits in two oasis in south-east of Algeria: Wad Righ and Biskra. The study was conducted from October 2005 to June 2006 in three stations of el Wad governorate; Djamâa,El Maghier and Sidi Khellil, and three stations in Biskra governorate namely; Tolga, Sidi Okba and Felliache. Infestation levels of three varieties of date fruits "Deglet Nour, Mech Degla and Ghars" were investigated. Results indicated large differences in infestation by *Ectomyelois ceratoniea* occurred, with differences based on varieties, regions and storage area. The highest infestation level of 15-25% was registered at Wad Righ Oasis. However, Deglet Nour variety showed susceptibility to this insect under storage conditions.

E 60

SURVEY OF DATE FRUIT INSECTS UNDER TRADITIONAL STORAGE CONDITIONS AT BISKRA OASIS IN ALGERIA. Farid Bounaceur[1], Naima M ebrek[2], Abdessalem Zabi[1], Bahia Doumaindji-Mitiche[3], Fatma Zohra Bissaad[3], Atika Benrima Guendouz[4] and Amina Djemai[4]. (1) Department of Biology, University Ibn Khaldoun Tiaret, Algeria; (2) Department of Agronomy, Faculty of Sciensce, University Mohamed Khieder Biskra, Algeria, Email: mebrekn@yahoo.fr; (3) Department of Zoology, National Institut of Agronomy, Algiers, Algeria; (4) Department of Agronomy, Faculty Agro-veterinary, University Saâd Dehleb, Blida, Algeria.

A survey for stored date fruits insects was carried out during the period from January to August 2006, to identify insect species at Biskra Oasis in Algeria. Two locations were visited namely Tolga and Felliache. Around 15 samples of date fruits were collected in each location and for all the seasons studied "winter, spring and summer"; 5 samples per season and per location were collected. In this survey 6 species of insects from different families were identified. Mediterranean fruit fly *Ceratitis capitata*, family *Tephritida*e was found during spring and summer season. Dried fruit beetles *Carpophilus hemipterus* (family *Nitidulidae*) was found in damaged date fruits. Two species of angoumois grain moth *Plodia interpunctella* and *Ephestia calidella* (family, *Pyralidae*) and one species of date moth *Ectomyelois ceratoniea* were found in all seasons under storage conditions. Two species *Phanerotoma flavitestacea* and *Habrobracon hebetor* (family *Braconidae*) were found to be principal parasitoids of *Ectomyelois ceratoniea*.

E 61

POPULATION FLUCTUATIONS AND INTER-SPECIFIC COMPOSITION BETWEEN TEPHRITID FLIES ATTACKING FRUIT CROPS IN THE NEW VALLEY OASES, EGYPT. Farouk A. Abdel-Galil[1], Mohamed A. Amro[2], Abdellah S.H. Abdel-Moniem[3] and Ola O. Elfandary[3]. (1) Plant Protection Department, Faculty of Agriculture, Assiut University, Assiut, Egypt; (2) Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt; (3) Department of Pests and Plant Protection, National Research Center, Dokki, Giza, Egypt, Email: address: raoof_amro@yahoo.com

Population fluctuations of the Mediterranean fruit fly *Ceratitis capitata* (Wiedemann) and the peach fly *Bactrocera zonata* (Saunders) was monitored with lure trap collections in three provinces in the New Valley oases, Western Desert, Egypt. Results showed marked temporal differences in peak trap catches of the two flies in the selected sites all over the entire studied area. One annual peak of *C. capitata* was recorded during both October 2005 and February 2006 and coincided with the ripening period of citrus trees in Kharga oases. However, two annual peaks were recorded during June and September 2005 in Bodkholow province and coincided with the ripening period of apple and mango. On the other hand, two annual peaks of *B. zonata* were recorded in Kharga oases throughout May and September and coincided with the ripening periods of apricot, mango and guava. One annual peak only was recorded around September and/or October in both of Moot and Bodkholow in Dakhla oases and coincided with the ripening period of mango, guava and citrus. Occurrence of *C. capitata* was very limited in comparison with *B. zonata*. Population fluctuations of the two pests in the studied sites were significantly different. The ability of the used traps in capturing both *C. capitata* and *B. zonata* indicated that the yellow sticky trap was more effective in capturing *C. capitata*. However, Abdel-Kawi trap was efficient in trapping *B. zonata*. Occurrence of *B. zontata* in higher numbers than *C. capitata* during the study period was considered as an indicator that this invading fly might be an aggressive tephritid fly competitor to the native fly *C. capitata*.

E 62

EVALUATING THE TOXICITY AND LATE EFFICIENCY OF BIOPESTICIDE SPINOSAD AGAINST THE COTTON LEAFWORM, *SPODOPTERA LITTORALIS* (BOISD.). A.A. Khidr, H.A. Mohamed and M.A. Ahmed, Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt, Email: prof.abdelaziz.abouelela@gmail.com

Spinosad is an insect control agents derived from the metabolites of the naturally occurring bacteria, *Saccharopolyspora spinosa*. The objective of this study is to evaluate the toxicity as well as the late efficiency of spinosad against the 4th instar larvae of the cotton leaf worm, *Spodoptera littoralis* (Boisd.). Dipping, contact to a surface film and immersion techniques were used in this investigation. The highest toxicity of spinosad was noticed 96 hours after treatment. Results illustrated the superiority of dipping techniques for 4th instar larvae to the biocidal action of spinosad. The efficiency of the bioassay techniques was in a decreasing order as follows: dipping, immersion and contact to a surface film. The corresponding LC_{50} and LC_{90} values against the tested larvae 96 hours after treatment with the three techniques were 122.85 and 518.61, 129.90 and 608.78, and 141.34 and 978.38 ppm, respectively. The 4th instar larvae of *Spodoptera littoralis* (Boisd.) showed moderate susceptibility to the biocidal action of spinosad as demonstrated by the toxicity ratios. The toxicity ratios of all bioassay techniques were less than 1.00. The susceptibility index as well as the potency level expressed as number of folds at both LC_{50} and LC_{90} values increased with increasing the period of determination. The latent effects of spinosad on the pupation as well as the adult emergence were determined. The corresponding EC_{50} and EC_{90} values associated with quintal scoring of pupation due to dipping, immersion and contact to a surface film of bioassays were 36.24 and 251.95, 50.02 and 549.34, and 63.57 and 711.97 ppm, respectively. Whereas, the corresponding IC_{50} and IC_{90} values associated with inhibition of the adult emergence were 7.28 and 215.44, 43.52 and 291.42, and 54.12 and 386.07 ppm, respectively.

E 63

DISTRIBUTION OF POPLAR STEM BORERS IN KURDISTAN REGION, IRAQ. Talal T. Mahmoud and Batool A. Karso, Department of Plant Protection, College of Agriculture, University of Dohuk, Iraq, Email: taherm47@yahoo.com

Survey results indicated that there were three main species of borers associated with poplar and willow trees in Kurdistan region, north of Iraq. Two of them belong to buprestidae; *Capnodis milliari*s Klug. and *Melanophila picta* Pall. in dry and warm regions, while the third one was related to Lepidoptera Aegeriidae, found associated with the wet areas and identified as *Parathrene* (*Sciapteron*) *tabaniformi*s Rott. The above-mentioned species were spread in Dohuk, Erbel and Sulaymania provinces. Eleven other species were recorded, three of them were a first record in Iraq. The adult borer appeared at the 1st week of June, feeding, flying and mating at range of 20.9-34.3°C and 29-51%.R.H where it starts laying the eggs inside bark cracks of the trunk. The larvae make feeding tunnel inside the trunk, excavating S-shaped fumels just under the bark, and continue until autumn. Pupal stage was observed from mid to late of spring. The life cycle of *C. miliaris* took two years while that of *M. picta* was one year.

E 64

A SURVEY AND IDENTIFICATON OF ANTS AND SOIL PROPERTIES ASSOCIATED WITH SOME SPECIES IN MOSUL. Nada S. Othman and Suaad I. Abdullah, Plant Protection Department, College of Agriculture and Forestry, Mosul University, Mosul, Iraq, Email: nadaaltayar@yahoo.com

In a survey of ants widely spread in Mosul, Iraq, workers and queens of the following species were identified: *Messor rufitarsis* (Fab.), *Cataglyphus bicolor* (Fab.), *Cataglyphus nodus* (Brulle), *Camponotus xerxes* Forel, *Pheidole sinaitica* (Mayr), *Tetramorium meridionale* Emery, *Monomorium* sp., *Tapinoma simrothi* Krausse, *Paratrechina jaegerskioeldi* Mayr, *Crematogaster aubrti* Emery. Humidity had a significant and positive effect on the distance between one opening and the other in the first four previous mentioned ant species. There was a significant relationship between the organic content and the number of the nests and the distance between one opening and the other and the mounds soil weight for *Cataglyphus nodus* and *Camponotus xerxes.* The data showed that the same four species were widespread in mixed soils, and the ant's soil mounds were characterized by their high content of organic matter in comparison with the soils near the nest opening.

E 65

EFFECT OF INCUBATION TEMPERATURES ON THE DEVELOPMENT OF EGGS AND PUPAL STAGE OF THE GREATER MELON FLY, *DACUS FRONTALIS* (BECKER). Shukri Shraif[1] and Bob Cheke[2]. (1) Biotechnology Research Centre (BTRC), P.O. Box 30313, Tajora, Libya, Email: shokre2005@hotmail.co.uk; (2) Natural Resources, Greenwich University, UK.

The Greater melon fly *Dacus frontalis* is considered to be the most dangerous pest of cucurbits and causes a great yield loss to these crops in Libya This study was conducted to test the effects of different incubation temperatures on the development of egg and pupal stages of the Greater melon fly. The results showed that the optimum temperature for egg hatching was in the range 30-33 °C, while the lethal temperatures were < 10 and >39 °C. Pupal development was strongly affected by changing of incubation temperature. Increasing temperature reduced the time required for the pupa to develop; no flies emerged at temperature of <15°C and >33°C and the optimum temperature was at 30°C.

E 66

DOMINANT WEEDS FOR RICE STEM BORER, *CHILLO SUPRESSALIS* OVERWINTERING IN PADDY RICE OF SOUTH OF CASPIAN SEA. Rouhollah Radjabi[1], Ahmad Nadimi[2], Ghodsialsadat Amirkiaei[3], Atefe Brari[3] and Ali Julazade Saki[4]. (1) Islamic Azad University, Dezful Branch, Dezful, Iran, Email: Radjabi1360@gmail.com; (2) Tabiat Modares University,

Agricultural Faculty, Department of Entomology, Tehran, Iran; (3) Plant Protection Clinic, Astane ahrafie, Guilan Province, Iran; (4) Islamic Azad University, Dezful Branch, Dezful, Iran.

Overwintering sites of rice stem borer, *Chillo supressalis* (Pyralidae: Lepidoptera) in Astane ashrafie (Guilan province, Iran) were studied to determine suitable and dominant weeds. Sampling of overwintering larvae was carried out during 2 month in late winter. For weed sampling (*Coix lacrima*, *Artemisia* spp., *Cyperus* spp., *Xanthium strumarium* and *Erigeron Canadensis*) four sites were selected and number of dead and alive larvae were recorded. The sample size was 20 larvae. The maximum number of dead and alive larvae was recorded in *Xanthium strumarium* and *Coix lacrima* (92 and 47 total alive and dead larvae, respectively). Results showed that among four weeds, *Xanthium strumarium* was the main weed for pest during diapause followed by *Coix lacrima*. Perhaps abundance of these two weeds affects on results of our investigation. Multiplication rate for the weeds *Coix lacrima*, *Artemisia* spp., *Cyperus* spp., *Xanthium strumarium* and *Erigeron canadensis* was more or less similar. It seems that rice stem borer select for overwintering, places with appropriate weeds based on different ecologies.

E 67

FIELD EVALUATION OF CERTAIN ATTRACTANTS OF MEDITERRANEAN FRUIT FLY *CERATITIS CAPITATA* WIEDMANN IN CENTRAL JORDAN VALLEY. Muna Salem Alfawwer[1], Muhammad Adel Eftayeh[2] and Tawfiq Mustafa Al-Antary[3].(1) National Center for Agricultural Research and Extension (NCARE), Amman, Jordan, Email: muna13001@yahoo.com; muna@ncare.gov.jo; (2) Faculty of Agriculture, Damascus University, Syria; (3) Faculty of Agriculture, Jordan University, Amman, Jordan.

Field trial was conducted in Central Jordan valley, to compare captures of the Mediterranean fruit fly *Ceratitis capitata* Wiedmann (Diptera: Tephritidae) traps baited with female and male targeted lures. Several types of traps were used; traps consisted of food synthetic attractants of three component lures (ammonium acetate, putreseine and trimethylamine) tested in MacPhail type traps with Dichloro divenyl phosphate (DDVP) and water, additionally dome traps baited with diammonium phosphate (DAP) + yeast and protein hydrolsate+ borax, vertical yellow sticky traps alone or with solid diammonium phosphate, ovoid yellow sticky traps alone or with soluble trimedlure and finally Jackson trap with TML. Jackson and ovoid yellow sticky traps baited with male specific trimedlure captured more males than traps baited with female attractants. However, the total capture of medfly was highest in Jackson trap than in McPhail traps baited with the three component synthetic lures. More females were captured in traps baited with the three component lures than in traps baited with other female targeted lures. Moderate numbers were obtained from dome trap with protein hydrolsate and borax. The lowest efficient traps were both vertical yellow sticky traps and dome traps with DAP.

E 68

ATTRACTION AND REPELLENCY EFFECTS OF SAP AND HEARTWOOD OF SOME FOREST TREES ON THE TERMITE *MICROCEROTERMES DIVERSUS* SILV. Nazar M. Al–Mallah[1], Shahin A. Mustafa[2] and Waleed A. Qasseer[3]. (1) Department of Plant Protection, College of Agriculture and Forestry, University of Musol, Iraq; (2) Department of Forestry, College of Agriculture, University of Koya, Erbil, Iraq, Email: shahinkifre@yahoo.com; (3) Department of Plant Protection, College of Agriculture and Forestry, University of Mosul, Iraq.

Attraction and repellency effects of phenols, alkaloids, terpens, fixed and volatile oils of sap and heartwood of *Platanus orientalis*, *Populus nigra*, *Cupressus sempervirens*, *Pinus brutia*, *Salix acmophylla* and *Eucalyptus camaldulensis* on the termite *Microcerotermes diversus* Silv. (Isoptera: Termitidae) workers showed significant differences according to the type of extract, chemical compound, wood type and tree species. The results showed that the repellent effect of phenols extracts of sapwood on the termite workers ranged from 5 to 40%, whereas attraction rates ranged from 35 to 80%, repellent rate in case of the sapwood extracted by alkaloids ranged between 30 and 50%, while attraction rates were 50-85%. Repellent rates of Terpens extract of sapwood were 10–46%, while attraction rates were 35-80%. For Sapwood extracted by volatile oils, repellent rates were 10–45% while attraction percent was 35-75%. Repellent rates ranged between 5 and 45% and attraction rates were between 10 and 75% for fixed oils extract. Heart wood extracts of the six tree species showed less attraction compared with the sapwood.

E 69

STUDIES OF SUGARCANE SUSCEPTIBILITY TO INFESTATION WITH THE RED PALM WEEVIL, *RHYNHOPHORUS FERRUGINEUS* OLV. Y. El Sebay and M.K. Abbas, Plant Protection Research Institute, ARC, Dokki, Giza, Egypt, Email: mohamed.kmal55@yahoo.com

The present work dealt with studying the susceptibility of sugarcane plants to infestation with the red palm weevil, *Rhynhophorus Ferrugineus* (Coleoptera: Curlionidae) in the field. Results obtained showed that the female adults could not infest the stalks of sugarcane plants due to the adults' inability to lay their eggs on the external hard layer of the plants can not feed or lay eggs, and consequently the insects were found dead in the green house. The results were confirmed in the laboratory, where the pest could only attack wounded stalks and females could lay their eggs inside the stalks. Newly hatching larvae were found boring into the stalks forming tunnels. Also, mechanical infestation could be achieved by both eggs and different larval instars. Studies showed that the life cycle was completed within 3 months, egg hatching during on 3-5 days, larval duration 40-73 days, pupal stage duration 16-27 days, weevils' adult duration was 40-70 days and number of eggs laid/female was 130-220 eggs at 29°C.

E 70

DEVELOPMENTAL THRESHOLD AND DEGREE DAYS OF THE COLORADO POTATO BEETLE, *LEPTINOTARSA DECEMLINEATA* (SAY.). R.S. Al-Jorany and M.K. Al-Fatlawy, Department of Plant Protection, College of Agriculture, University of Baghdad, Iraq, Email: redha_aljorany@yahoo.com

Results of the laboratory study showed that all biological aspects of the Colorado potato beetle *Leptinotarsa decemlineata* (Say.**)** were affected when it was reared on different host plants (potato, eggplant and tomato) and at different temperatures (20, 25, and 30ºC) with constant relative humidity (70±5%). Shortest life cycle of the insect (19.9 days) was at 30ºC on potato. The results also showed that the developmental threshold of the pest was 9.04, 10.72 and 9.62ºC on potato, eggplant and tomato, respectively and the degree days required for development to adult stage were 416.76, 400 and 476.19 on the three host plants, respectively. These temperature units requirements are satisfied by early February; therefore, the time of adult appearance in the field could be predicted. It was also found that the correlation among temperature degrees, plant hosts and daily developmental rate was significant and positive as R= 0.99, 0.99 and 0.96 on potato, eggplant and tomato, respectively.

E 71

FACTORS AFFECTING THE POPULATION DYNAMICS OF THE APPLE LEAF-MINER, *PHYLLONORYCTER BLANCARDELLA* (HÜB.) AND THE IMPORTANCE OF ITS PARASITOIDS IN SALAHDIN PROVINCE, IRAQ. H.K. Al-Zubaidy[1] and S.Z. Baker[2]. (1) College of Agriculture, Baghdad University, Iraq; (2) College of Agriculture, Tekrit University, Iraq, Email: alzubaidybio@yahoo.com

Nine hymenopterous parasitoids were recorded on the immature stages of the apple leaf-miner**,***Phyllonorycter blancardella* (Hüb.). Six were ectoparasitoids and three were endoparasitoids. Rate of parasitism varied, being 1.5–10.6% on the first 3 larval instars, 28.1–35% on the last two instars as well the pupa. Parasitism rate was highest on newly hatched larvae, reaching 49%, while it was 2.3–23.9% for the last two instars and the pupa. Abiotic factors particularly, adverse weather conditions through summer season played a major role in the population dynamics of the first three larval instars, when 12.5–69.6% mortality was recorded. Life cycle data revealed that fifth larval instar was the most affected, as K-value recorded ranged between 0.08 and 0.7. The trend index (TI) indicated simple increase in the insect population ranged between 0.59 and 1.73.

E 72

ACTIVITY OF DIFLUBENZURON ON HEMOLYMPH ECDYSTEROID LEVELS IN THE LARVAE OF *SCHISTOCERCA GREGARIA*. Ghania Tail[1], Patrick Porcheron[2], Bahia Doumandji-Mitiche[3] and Catherine Blais[4]. (1) Département de Biologie, Faculté des Sciences Agro-Vétérinaire, Université Saad Dahleb, 09000 Blida, Algérie, Email: ghaniatail@yahoo.fr; (2) UMR 1272 UPMC-INRA- AgroParis Tech Physiologie de l'Insecte, Signalisation et Communication, UPMC, 7, quai Saint Bernard 75005 Paris , France; (3) Département de Zoologie Agricole et Forestière, Institut National Agronomique, 16200 El-Harrach, Alger, Algérie ; (4) FRE2852 UPMC-CNRS, Groupe Biogenèse des stéroïdes, UPMC, case 29, 7 quai St Bernard 75005 Paris, France.

The insecticide Diflubenzuron (DFB), a benzoylphenyl urea derivative (BPU), was tested on newly 5th instar larvae of *Schistocerca gregaria*. Treatment was carried out at concentration of 30 mg per ml for 24h. The compound exhibited an insecticidal activity and larval mortality occurred after earlier inhibition of their development or by their inability to complete their ecdysis. Treatment resulted in a significant larvicidal effect and in an inhibition of adult emergence. Moreover, the compound disturbed growth and development when several morphogical types were compared to control. In a second series of experiments, the effect of DFB applied for 24h at a 30 mg/ml, was evaluated on hemolymph ecdysteroid levels in 5e instar larvae of *S. gregaria*. Results showed that the lowest ecdysteroid levels correlated with ecdysis in larvae. Following DFB treatment in *S. gregaria*, ecdysteroid titres in hemolymph were reduced as they remained low throughout the larval cycle.

E 73

DETERMINATION OF LARVAL INSTARS OF LEOPARD MOTH, *ZEUZERA PYRINA* (L.) BY USING THE BROOKS-DYAR RULE. Abdulnabi Mohamed Basher[1], Louai Hafez Aslan[1] and Jounar Aziz Ibrahim[2]. (1) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria; (2) Lattakia Center for Natural Enemies Rearing, Lattakia, Syria, Email: Jounar@aloola.sy

This study was conducted in two apple orchards in two regions (Aramo and Rabiia) of Lattakia governorate, Syria. The main objective of this study was to identify larval instars of the Leopard moth, *Zeuzera pyrina* L. (Lepidoptera: Cossidae) by using Brooks-Dyar Rule. Data obtained from measuring head-capsule were demonstrated by having capsule width placed on x-axis and class frequency on the y-axis. The results showed eight larval instars and a constant geometric increase (1.3) in size range of the head-capsule among instars.

E 74

THE EFFICIENCY OF MOLTING HORMONE (20-HYDROXYECDYSONE) AGAINST OLIVE FRUIT FLY *BACTROCERA (DACUS) OLEA* GMEL. IN LEBANON. Dalida Darazy[1] and Georges Kaddissi[2]. (1) Department of Plant Protection, Faculty of Agriculture, Lebanese University, Dekwaneh, Lebanon, Email: dchoubaya_darazy@hotmail.com; (2) Faculty of Agricultural Sciences, Holy Spirit University, Kaslik, Lebanon.

The olive fruit fly is the most serious pest attacking olive groves in Lebanon and the Mediterranean basin affecting the quality and the quantity of oil and table olive. Current control measures rely heavily on the use of

chemical pesticides, with its adverse effects on the olive ecosystem and on the environment. The aim of this work was to examine the anti-feedant effects and bioactivity of the molting hormone 20- Hydroxyecdysone (20E) on olive fruit fly and its possible use in integrated pest management (IPM) as an alternative to the traditional chemical control methods of the pest. In fact, there is a vast amount of knowledge showing that many plant species synthesize such hormone as a defense chemical and as an antifeedant. The molting hormone 20-E was extracted from spinach seeds. A field strain of olive fruit flies was collected and reared artificially in the Lab. Three concentrations of the extracted hormone 1, 5, 10 µg/ µl respectively were added to the dietary intake of 2-3 days old olive fruit flies. Results obtained were compared with those obtained from untreated flies to 20E media. Results showed that 66% of the insects during in the first 72 hours due to the dietary intake of 10 µg/µl of the 20E spinach seed extract. On the other hand, the bio-activity was reduced to 26% mortality in olive fruit flies for a similar concentration of technical 20E after the same period.

E 75

VARIATION IN DISTRIBUTION MAP OF MAJOR AGRICULTURAL INSECT PESTS BASED ON DIFFERENT ECO-GEOGRAPHICAL REGIONS OF THE SUDAN. Abdalla Abdelrahim Satti and Abdelrahman Hamed Ahdelrahman Hashim, Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan, Email: satisattisat@yahoo.com

Sudan is characterized by its vast geographical area of about one million square miles, lies between 4-22°N and 22-38°E, with variable climatic conditions ranged from very arid desert in the north to semi-arid, semi-humid and humid in the south. The variations particularly appear in the average annual temperatures and rainfalls (ranged from <20ml to >800ml) which contribute to a wide diversity in species and density of plants and coexisting fauna including insect populations. Therefore, agriculture varied from one area to another especially in cultivation systems, types and seasonality of crops, and associated pests. For instance, rain fed, irrigated, flooding and basin agricultural practices were known in their different locations and times. Thus, field studies reflected numerous primary economical or secondary insect pests, whether they are polyphagous species attacking various hosts or specialized on few closely related plant species. The latter generally showed their population buildup in certain ecosystems. The current paper deals with the above mentioned aspects concerning the nature of the country, kinds of crops and their growing areas and major pest species. Moreover, results identified important insect pests in the country and their reported host plants, together with breeding and resting sites for some insects of seasonal appearance or of narrow host range such as locusts in eastern and western Sudan. Andat bug in Blue Nile and kordofan, and melon bug in the latter region.etc, threaten crops in these areas.

E 76

EFFECIENCY OF DIFFERENT TRAPS IN CATCHING *ZEUZERA PYRINA* (L.) IN APPLE ORCHARDS IN SOUTHERN SYRIA. Adel Al-Manoufi[1], Majd Jamal[2], Enrico de Lillo[3] and Eustachio Tarasco[3]. (1) Administration of Plant Protection research, General Commission for Scientific Agriculture Research (GCSAR), P.O. Box 113, Douma, Damascus, Syria, Email: adel-agro@hotmail.com; (2) Department of Plant Protection, Agriculture College, Damascus University, Damascus, Syria; (3) Department of Agricultural and Environmental Biology and Chemistry, Section of Entomology and Zoology (DIBCA), Agriculture College, University of Bari. Bari, Italy.

The leopard moth borer, *Zeuzera pyrina* L., is a cossid moth whose larvae bore into twigs, branches and trunks of various woody species, weakening and sometimes killing trees or shrubs. Recently it caused serious losses of apple trees in Syria. This study was carried out in Damascus countryside and Qunaytirah provinces during 2008. Population dynamics of *Z. pyrina* was monitored by different types of traps (pheromone traps and light trap). Pest moths occurrence started by mid-May in Damascus countryside province and by early June in Qunaytirah province. Highest numbers of caught adults (the peak) was recorded by late July in Damascus countryside, whereas in Qunaytirah province there were small peaks found by mid-June and mid-July. Experiments were conducted to evaluate capture efficiency in relation to two different types of traps. Statistical analysis showed that there was a highly significant difference ($p < 0.01$) between the two types. Capta trap showed best results and caught more males than the others.

E 77

OCCURRENCE OF *TETRANYCHUS URTICAE*, *THRIPS TABACI*, *BEMISIA TABACI* AND *APHIS GOSSYPII* ON THREE DIFFERENT SQUASH CULTIVARS IN RELATION TO THE PHYTOCHEMICAL CONTENTS. A.A. Abdallah[1], E.M.A. El-Saiedy[2], Salwa M.E. Sholla[3] and E. Monera[3]. (1) Agriculture Zoology and Nematology Department, Faculty of Agriculture, Al–Azhar University, Egypt; (2) Plant Protection Department, National Research Centre, Dokki, Egypt; (3) Plant Protection Research Institute, Agricultural Research Center, Dokki, Egypt, Email: salwasholla@yahoo.com

Greenhouse experiments were conducted to estimate the population fluctuations of the two spotted spider mite, *Tetranychus urticae* Koch, *Thrips tabaci* Lind., *Aphis gossypii* (Glov.) and *Bemisia tabaci* (Genn.) on three squash cultivars (American, Hitec and Eskandarani) in Qalubiea Governorate, Egypt during a single growing season. Also, analyses of some specific chemical constituents of the leaves and its relation to the resistance of the pest infestations were carried out. Results obtained indicated that the infestation by phytophagous mite species *T. urticae* was significantly different among the three different squash cultivars. It was highest in case of Eskandarani cultivar, which was the most susceptible cultivar as its leaves harbored the highest average number

of spider mite stages (609.90 individuals /leaf). Hetic cultivar (483.62 individuals /leaf) was moderate. The lowest average number of spider mite infestations was recorded in case of American cultivar which was the most resistant to spider mite infestation (308.76 individuals/leaf). The results showed that significant difference was recorded on the leaves of different squash cultivars among the three phytophagous insect species. *A. gossypii* reached highest number of individuals per/leaf on all three squash cultivars, being highest on Eskandarani (12.61) and Hitec (11.86) followed by American (11.21), followed by *T. tabaci* on Eskandarani (10.72), Hitec (9.45) and American (8.04) individuals/leaf; while the population of *B. tabaci* was the lowest on all squash cultivars (Eskandarani (1.24), Hitec (0.72) and American (0.16) individuals/leaf). However, there were no significant differences among the three different squash cultivars leaf infestation by phytophagous insect species. The data obtained indicated that there were correlations between the phytochemical contents and the rate of mite infestation. There was a negative relationship between the infestation rate and the total phenol as well as the free amino acids contents in the squash cultivars, while there was a positive relationship between the infestation levels and the total sugar contents in each cultivar. The American cultivar showed a lowest sugar content (12.02%), followed by Hitec (12.95%), whereas, the Eskandarani cv. had the highest content (16.55%), while the correlation of infestation rate with total phenol (0.35, 0.28 and 0.23% for American, Hitec and Eskandarani, respectively) was negative. The total free amino acids content had a positive correlation with the infestation rate for American (37.34%), Hitec (27.75%) and Eskandarani (22.43%). On the other hand, there were no correlations between the phytochemical contents and the level of insect infestations.

E 78

DETECTION AND MONITORING OF SOME FRUIT FLIES SPECIES AND THEIR HOST RANGE IN ABUGUBEIHA, SOUTH KORDOFAN STATE, SUDAN. Suliman Abdalla Ibrahim Ali[1] and Samira Abuegasem Mohammed[2]. (1) Agricultural Research Corporation, Hudieba Research Station, Eddamer, Sudan; (2) International Center for Insect Physiology and Ecology, Nairobi, Kenya. Email: sulamonti@yahoo.com.

The present study was carried out in South Kordofan State, particularly in Abugubeiha in Sudan to identify fruit fly species prevailing in the area and to determine their host range and their infestation levels. Monitoring of tephritid fruit fly species, using Nulure as food attractant in Abugubeiha area revealed the presence of three species namely Mango fruit fly, *Ceratitis cosyra*, dominant species in the region, Melon fly, *Bactrocera cucurbitae* and Asian fly, *Bactrocera invadens*. Ten plant species out of 24 were identified as hosts for the three mentioned species. Infestation's level caused by the fruit fly in Abugubeiha area was much higher (67%) in Guava in the second season. While in first season, the highest was recorded in Guava (51%) followed by mango (31%) and grapefruit (18%). *B. invadens* was detected along the Rahad River near Sudanese-Ethiopian borders for the first time by using Lynnfield trap baited with mixture of 4 parts of methyl-eugenol as an attractant and 1 part of Malathion as killing agent.

E 79

A SURVEY OF *NEPHUS* (COLEOPTERA: COCCINELLIDAE) SPECIES IN SOUTHERN SYRIA. Nazir Khalil, Department of Animal Biology, Faculty of Sciences, Damascus University, Syria, Email: khalil-n@scs-net.org

A survey for ladybird beetles (Coleoptera: Coccinellidae) in southern Syria was conducted during the period of August 2001 to the end of July 2003. Results revealed the presence of 8 *Nephus* species: *N. bipunctatus, N. caucasicus, N. hiekei, N. includens, N. kreissli, N. ludyi, N. merkli* and *N. quadrimaculatus pictus.* This investigation showed the importatance, host plants, months of collection, and distribution of these species in southern Syria. The most abundant species was *N. quadrimaculatus*, witha wide distribution in southern Syria. All of the listed species are predatory beetles and important nautral enemies that could attack arthropod pests including aphids, scale insects and mealybugs.

E 80

BIOLOGY OF THE LONG HORNED BORER *TRICHOFERUS GRISEUS* (F.) IN AL-BATTNAN REGION, LIBYA. Aiad M. Abdunabi[1], Ibrahim M. El-Ghariani[2] and Hashmi A. Gleo[2]. (1) Faculty of Science, Tubruk, Omar Al-Mukhtar University, Libya; (2) Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, P.O. Box 919, El-Beida, Libya, Email: ghariani99@yahoo.com

Various aspects of the biology of the fig longhorned borer *Trichoferus griseus* (F.) (Coleoptera: Cerambycidae) were investigated. The results revealed that the total life-cycle of *T. griseus* under laboratory conditions reached 325.25 days indicating that there was only one generation per year, and the sex ratio(females : male) was about 1:1.04, and a gravid female of *T. griseus* showed a high propensity to ovipositor on fig branches when compared with two other hosts namly pomegranate and acacia the mean number of eggs was 40.2 on fig, 4.8 on pomegranate and 7.8 on acacia. The data indicated that there were significant effect for the kind of food on age and fertility of adults; the honey feeding had significant effect on age of females and the age period compared to that fed on desiccated fig fruits and fig phloem; the mean age was 42.75, 23.75 and 18.75 days for the three feeding types, respectively. The results showed also an effect of honey feeding on fertility of females and hatching which reached 40.45% as compared to 96.28% and 96.11% for feeding on dessicated fruit and fig phloem, respectively.

E 81

ECOLOGY OF CODLING MOTH *CYDIA POMONELLA* (L.) IN AL-JABAL AL-AKHDAR REGION, LIBYA. Mohamed A. Al-Mayr, Ibrahim M. El-Ghariani and Omran A. Abugela, Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, P.O. Box, 919, El-Beida, Libya, Email: ghariani99@yahoo.com

An ecological study for Codling moth *Cydia pomonella* (L.) (Lepidoptera: Tortricidae) was conducted at AL-Jabal AL-Akhdar region, Libya by using pheromone traps at three locations of different environmental and topographical conditions. Results showed that the pest appeared during the 1st week of May. The mean number of trapped insects was 24.67, 4.33 and 13.67 for coastal, middle and mountain areas, respectively. The data revealed that the highest pest number was during the end of May and August, and the lowest number was during October at the 3 locations. Three generations were found in the region of the study. The 1st one was through June and the 1st week of July, the 2nd from the 4th week of July until the end of August, and the 3rd was from the beginning of September until the 1st week of October. Results also indicated that there were relationship between insect population and some environmental factors such as temperature, relative humidity and wind volicity. The Statistical analysis of the results showed that there was a positive correlaion between the population density and temperature in the areas of the study in general and within each location of the study. There were significat differences at all locations. There was a weak insignificant negative correlation between the population density of the moth and the relative humidity in the area of the study. There was no significant relation between the population density and relative humidity in the coastal area, whereas, there was a negative significant correlation with relative humidity in the middle area, and no significat correlation between relative humidity and population density in the mountain area. In addition, there wasa positive weak correlation in the three areas between wind velocity and population density of the pest.

E 82

EFFECT OF CLIMATIC FACTORS ON FIELD POPULATION DENSITY OF CORN STEM BORER *SESAMIA CRETICA* LEDERER. Mohammad A. Al-Allan[1], Mohammad Z. Mahmalji[2] and Hisham A. Al-Rouz[2]. (1) Department of Entomology, Administration of Plant Protection, General Commission of Scientific Agricultural Research, P.O. Box 113, Damascus, Syria; (2) Plant Protection Faculty of Agriculture, Damascus University, P.O. Box 30621, Damascus, Syria; Email: allanmhd@gmail.com

The research was carried out at General Commission of Scientific Agricultural Research (1st of May station – Khrabo) during 2004-2005 to study the effect of ecological factors on population of corn stem borer *Sesamia cretica* (Lepidoptera: Noctuidae). Light traps were used for this study to catch the moths. The weather data were taken from climatic station in the assay area. Regression lines and equations for the correlation between moth number and climatic factors has been established. Results showed that there were significant positive correlations with mean temperature, evaporation ratio and sun light, and a negative correlation with relative humidity.

E 83

REVIEW OF FRUIT FLIES STATUS IN THE SUDAN. Tag Elsir E. Abdalla, Agricultural Research Corporation, Gezira Research Station, P.O. Box 126, Wad Medani, Sudan, Email tagelsirr@yahoo.com

The review summarizes the scientific efforts done in the Sudan on fruit flies and comprises an introduction on their economic importance, areas under fruit trees, yield, production, and export worldwide and in the Sudan with special emphasis on mango (*Mangifera indica*), banana (*Musa sapentium*) and guava (*Psidium guajava*). It also elucidates the current situation of fruit flies in the major fruit producing states of Sudan, their species composition, host range and preferences; the seasonal distribution of the most prevailing species *Bactrocera invadens*, *Ceratitis capitata* and *C. cosyra*, the promising control measures and research activities in progress at present in the Sudan.

E 84

IDENTIFICATION OF THE SEX PHEROMONE AND MOLECULAR CHARACTERIZATION OF THE LEBANESE CEDAR PROCESSIONARY MOTH, *THAUMETOPOEA LIBANOTICA*. Sarah Ezzedine[1], Nabil Nemer[1,2], Brigitte Frerot[3] and Youssef Abou Jawdah[1]. (1) Faculty of Agricultural and Food Sciences, American University of Beirut, P.O. Box 110236, Lebanon; (2) Ecole Supérieure des Ingénieurs d'Agronomie Méditerranéenne, Ubiversity Saint Joseph, P.O. Box 159, Taanayel, Lebanon; (3) Institut National de la Recherche Agronomique INRA, 78026, Versailles Cedex, France, Email: nabil.nemer@gmail.com

The cedar processionary moth, *Thaumetopoea libanotica* Kiriakoff and Talhouk (Lepidoptera: Thaumetopoeidae) is an endemic defoliator of the cedar forests in Lebanon. The present study aimed at identifying the sex pheromone of *T. libanotica*, and determine the phylogenetic relationship of this insect species. Two methods of pheromone extraction were used: trapping the volatiles on SPME fiber and the excision of the pheromonal gland and its extraction by solvent. The results of the GC-MS analysis indicated the presence of two major compounds: (Z,Z)-11, 13-hexadecadienal and (Z,Z)-11, 13-hexadecadienol. The biological activity of the pheromone formulations were also tested in different cedar forest stands for the determination of their attractiveness to *Thaumetopoea libanotica* males. Results showed that the most effective formulation that attracted the highest number of males contained 20 % Z11, Z13-16OH: 80% Z11, Z13-16Al followed by 40% Z11, Z13-16OH: 60% Z11, Z13-16Al. These findings would contribute to the use of pheromones in monitoring the insect abundance in the Lebanese cedar forests and subsequently to be used as a control measure by mass trapping of males leading to a reduced number of eggs laid by females. Amplified DNA fragments from the ITS1 region of three *Thaumetopoea* species, *T. libanotica*, *T. wilkinsoni* and *T. solitaria*, were sequenced. Blast analysis did not show a high nucleotide sequence homology with any reported *Thaumetopoea* species.

E 85

EFFECT OF TEMPERATURE ON DEVELOPMENT, SURVIVAL AND LONGEVITY OF *BACTROCERA UMBROSA* (FABRICIUS) IN THE LABORATORY.

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Development and survival of the immature stages as well as the longevity of the adults of *Bacrocera umbrosa* (Fabricius) were studied in the laboratory at six constant temperatures of 23, 25, 27, 30, 32 and 35˚C and a photoperiod of 12 L: 12 D. The development of the different immature stages accelerated with increasing temperature up to 32˚C. The shortest period of egg development (2.5 days) was at 32˚C, while the slowest egg development (5.1 days) occurred at 23˚C. Larval development periods decreased from 12.1 days at 23˚C to 10.1 days at 32˚C. High temperatures accelerated the development of larvae, except at 35˚C where the first instar larvae died. Optimum developmental time of pupae (10.6 days) was recorded when pupae were exposed at a temperature of 32˚C, while there was no pupal development and no adults emerged at 35˚C; this being the most lethal temperature. However, egg hatching continued at this temperature but at a low rate. The longest total development period of immatures occurred at 23˚C (33.4 days) and was shortest at 32˚C (23.2 days). Adults exposed to the different temperature regimes lived much longer at lower temperatures than at high temperatures. These findings are important to optimize laboratory rearing procedures for maximum egg production in mass rearing programs using sterile insect techniques. In addition, it help understand the biology and ecology of *B. umbrosa* and predict its geographical distribution for pest management purposes.

E 86

A PRELIMINARY SURVEY OF INSECT SPECIES AT EL KUFRA AND JABEL ELUWEINAT IN LIBYA.

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A preliminary survey of insect species, covered a wide range of ecological habitats in El Kufra Oasis (a flat plateau with numerous closed in depressions) and Jabel El Uweinat (the mountain area at the borders of Libya, Sudan and Egypt). During the period from May 2005 to April 2006, 42 insect species were collected and identified. The insects belonged to orders: Orthoptera, Hymenoptera, Homoptera, Odonata, Coleoptera, and Lepidoptera. The study revealed presence of seven new species recorded in Libya for the first time. In addition to insects, some species of ticks and mites (Class: Arachida) were also recorded.

E 87

PRELIMINARY FIELD STUDY OF THE SOLITARY CARPENTER WORM (*PAROPTA PARADOXA*. S) ON GRAPE ORCHARDS IN HOMS GOVERNARATE AND EVALUATION OF DAMAGE CAUSED BY IT.

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Grape is among the most important fruit trees in Syria especially in Homs. The solitary carpenter worm, *Paropta paradoxa* H.-Schaeff. (Lep., Cossidae) is a serious pest in grape orchards in Homs governorate. Larvae make small excavations under the bark and longitudinal tunnels through the stem and the branches, causing weakness, and eventually might cause the death of infected trees; especially the old ones. The study was conducted in Homs at Al-moushrifeh district on Al-bayadi cultivar (widespread cultivar in Homs) during two successive seasons (2006-2007). The laboratory part of the study was done at the Biological Studies and Research Center at the faculty of Agriculture, Damascus University. Reduction in trees productivity and increasing number of trees with drought symptoms were more observed in the second year compared to the first year of the study. AThe ratio between the width of the head capsule and the length of the larval stage individuals was 5.765±0.8. A significant correlation (P=0.01) between the width of the head capsule and the length of the larval stage was found (+0.94). The larval stage of the insect had five instars. The measurement of the head capsule width and the length of the five instars were determined to be for the first, second, third, forth, and fifth instar 1.225±0.1387 mm, 6.716±1.0242 mm, 1.6733±0.1444 mm, 9.8±0.9996 mm, 2.1909±0.269 mm, 13.9±0.7867 mm, 3.027±0.1677 mm, 17.54±1.5435 mm, 5.25±0.3533 mm, 33 ±1.4124 mm, respectively. A significant differences (P=0.01) was found between instar groups. Pest infestation was mainly on the trunk and main branches and much less was less on the two years old twigs and rare on the one year old twigs and young shoots.

E 88

TEFLUBENZURON EFFECTS ON REPRODUCTION OF FEMALE LOCUSTS *LOCUSTA MIGRETORIA*.

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The migratory locust *Locusta migratoria* occupies a particular place in Agriculture. It constitutes a permanent threat for the crops and pastures. The current methods of control employmainly insecticidal liquid products whose active ingrediant belong to different chemical groups. These preparations appeared to be effective on the locust but also harmful to other animal species in the environmentand cause an accumulation of toxic compounds in the treated ecosystems. For these reasons current research was directed towards the search for safer effective molecules that are less toxic to the environment. Among these products are growth regulators. In a laboratory study, the impact of teflubenzuron insecticide on the reproduction of the migratory locust was evaluated. Results showed that this product delayed the maturation of the females and

reduced egg production in treated females compared to the control

E 89

IDENTIFICATION OF BUTTERFLIES through wingEYESPOTS USING COMPUTER. Dua' Saadeh[1], Abd Alatif Al Hashash[1], Nour Safadi[1] and Katbeh-Bader, Ahmad[2]. (1) Computer Science Department, King Abdulla II School for IT, University of Jordan, Amman, Jordan; (2) Plants Protection Department, Agriculture College, University of Jordan, Amman, Jordan, Email: doaa.saadah@ju.edu.jo

Butterflies in nature, differ in wing pattern, colors, and number of eyespots on their wings. Using such information to identify the family and species of the butterfly will be an effective tool. The goal of this research was to develop a useful and an easy way to use computer program, to help in the process of identifying three species of Jordan's butterflies: *Ypthima*, *Temissa*, and *Colias croceus*. The program was developed using Matlab program to detect eyespots on wings surface and its numbers, and then identify colors of the butterfly's wings. The program will analyze the data to identify the butterfly species. The eyespots detection program can be used with any butterflies species, but in this research focus was made only on the above mentioned species, which can be easily extended to other. The success rate of the program is 82%.

E 90

THE NOCTUIDAE (LEPIDOPTERA) OF JORDAN, A SECOND LIST. Ahmad Katbeh-Bader. Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman 11942, Jordan. Email: Ahmadk@ju.edu.jo

This study is part of a research project sponsored by the Deanship of Scientific Research, University of Jordan which aimed to study the moths of Jordan. UV-Light traps were placed at several sites in Jordan in order to collect moths from the family Noctuidae. Specimens were sorted; representative samples for each species were pinned and then identified. A list of more than 200 species is presented which contain species reported in this study in addition to those reported earlier. Some of the report species are common plant pests, others are occasional pest and some are relatively rare. Brief available biological or ecological data and photographs for selected species will be presented.

E 91

INSECT DIVERSITY IN THE CENTRAL JORDAN VALLY. Ahmad Katbeh-Bader and Wafa'a Naser, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman 11942, Jordan. Email: Ahmadk@ju.edu.jo; nsr_wf@yahoo.com; nsr_wf@hotmail.com

A UV light trap was placed at the University of Jordan Farm (central Jordan Valley) during 2008-2009 in order to study the diversity of insects present in this area. Specimens were sorted and few individuals from most species were pinned. All specimens were identified to order level. Most specimens were identified to family level. Many specimens were identified to the genera or species level. Most specimens belonged to Lepidoptera, Coleoptera, and Diptera. Pest and beneficial species were mentioned. Common and rare species will be discussed.

E 92

GENETIC VARIATION AMONG SUNN PEST, *EURYGASTER INTEGRICEPS* PUT. POPULATIONS OF WEST AND CENTRAL ASIA. Lina Ali[1], Mustapha El-Bouhssini[2], Sripada Udupa[2], Michel Baum[2] and Mohammad Nayef Al-Salti[1]. (1) Plant protection section, Faculty of Agriculture, University of Aleppo, Aleppo, Syria, Email: Lina7755@hotmail.com; (2) ICARDA, P.O. Box 5466, Aleppo, Syria, Email: M.Bohssini@cgiar.org

The objective of this study was to study genetic variation of Sunn pest populations collected from six countries (Iraq, Iran, Uzbekistan, Kazakhstan, Turkey and Syria). The 19 populations of Sunn pest collected were studied using the AFLP (Amplified Fragment Length Polymorphisms) technique. The Nei's measures of genetic distance ranged from 0.428 (between Andijan from Uzbekistan and Varamin from Iran) to 0.029 (between Kermanshah and Marvdasht in Iran). There was no significant correlation between genetic distance and geographic distance (R=0.27). Genetic differentiation (G_{st}) was small in all countries, with the highest genetic differentiation found in Uzbekistan (Gst=0.26). The rate of gene flow between countries was high (Nm=3.9034), indicating a high rate of migration between countries. Based on cluster analysis, the highest genetic diversity was observed in Uzbekistan; indicating that the center of origin of Sunn pest may be in or near this country.

E 93

COMPARISON OF FEEDING INDEXES OF STEM BORER *SESAMIA NONAGRIOIDES* LEF. ON DIFFERENT SUGARCANE CULTIVARS IN IRAN. Mehrnoosh Minaeimoghadam and Alireza Askarianzadeh, Department of Plant Protection, College of Agricultural Sciences, Shahed University, Tehran, Iran, Email: askarianzadeh@shahed.ac.ir; hoseinpur181@yahoo.com

Stem borers, Sesamia nonagrioides Lef. and Sesamia cretica Led. are important pests of sugarcane and annually cause considerable injury in the Khuzestan province of Iran. An important strategy for borers control in sugarcane fields is the use of resistant cultivars. To study antibiosis resistance of sugarcane cultivars to Sesamia nonagrioides, feeding indexes on five cultivars (CP48-103, CP69-1062, CP57-614, NCO-310 and SP70-1143) were determined. Larvae (2 and 3 instars) were fed on the cultivars for five days and then feeding indexes including consumption index (CI), approximate digestibility (AD), efficiency of conversion of digested food (ECD) and efficiency of conversion of ingested food (ECI) were calculated. The trials were replicated six times. Data were analized by Kruskal-Wallis Test with SPSS 11.5 software. The results showed that CI, AD and ECD indexes were not significant among five cultivars but ECI index was significant. Comparison of means with Duncan's test showed that ECI index on NCO-310 and SP70-1143 cultivars was more than CP69-1062, CP57-614 and CP48-

103 cultivars. Therefore based on ECI index CP69-1062, CP57-614 and CP48-103 cultivars can be considered as resistant to *Sesamia nonagrioides*.

E 94

EFFECT OF ULTRAVIOLET IRRADIATION ON EGG MORTALITY OF *PLODIA INTERPUNCTELLA* (HUBNER.). Akram Bakhshi, Ali Asghar Talebi and Yaghoub Fathipour, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box 14115-336, Tehran, Iran. Email: akrambakhshi63@yahoo.com

The Indian meal moth *Plodia interpunctella* (Hubner) (Lepidopter: Pyralidae) is a polyphagous, monotypic and cosmopolitan species. This species is distributed in Iran and all over the World. In this research, the effect of ultraviolet irradiation (UV) on egg mortality of *P. interpunctella* was evaluated at 25±5 ºC and a photoperiod of 10:14 (L:D), without humidity control. Three age groups of eggs (1-, 2- and 3-days old eggs), were exposed to UV-irradiation (254nm wavelength). In each group 120 eggs were irradiated for 0.5, 1, 1.5, 2, 4, 8, 16, 24, 32, 40 min. The results indicated that all exposure periods of UV-irradiation increased the mortality of eggs in comparison to control. An increase in time of exposure to irradiation caused a gradual increase in percentage of mortality of eggs in all age groups of eggs. However, for each duration exposure, the mortality rate increased as the age of irradiated eggs increased from 1 to 3 days. The eggs mortality rate was 5.4% in the control treatment. In one-day-old eggs, mortality rates were 27.46 %, 62.68 %, 53.52%, 78.87%, 97.89% and 99.29% at 0.5, 1, 1.5, 2, 4, 8 min of irradiation, respectively. The egg mortality rate was 100% following 16, 24, 32 and 40 min exposure. Irradiation of 2-day-old eggs at 0.5, 1, 1.5, 2 and 4 min exposure duration resulted in 72.53%, 78.87%, 73.23%, 93.66% and 98.59% mortality, respectively. Egg hatching was inhibited up to 100% by 8 to 40 min exposure. Irradiation of 3 day old eggs at 0.5, 1, 1.5, 2 min exposure duration resulted in76.06%, 97.18%, 97.89% and 99.29% mortality, respectively. No eggs hatched following 4 to 40 min exposure. The 1 day old eggs were less sensitive to irradiation than 2 and 3 day old eggs. It may be concluded that UV-irradiation is a safe and clean method for stored product preservation and pest control.

E 95

PRELIMINARY EVALUATION OF RESISTANCE OF LETTUCE GENOTYPES TO LETTUCE APHID *NASONOVIA RIBISNIGRI* (MOSLEY) UNDER GREENHOUSE CONDITIONS. Jalal Kolahdooz, Moslem Basij and Mohammadhosin Hosinpour, Faculty of Agricultural Science, Shahed University, Tehran, Iran, Email: moslembasij@yahoo.com

A relatively new aphid species, the currant-lettuce aphid, *Nasonovia ribisnigri* (Mosley), has been creating problems for lettuce growers throughout the Tehran province of Iran. Lettuce aphid has a very short life cycle and population can build up rapidly. In this study, 8 lettuce genotypes including 5 land races (Shiraz, Jahrom, Siah, Sefid and Zireie), one promising line of lettuce and 2 lettuce cultivars (Great lacks and Conquistador) were investigated to evaluate their resistance to *N. ribisnigri*. Lettuce genotypes were planted in a randomized complete design in a greenhouse, with 15 replications (pots) during 2008. After 3 weeks, 10 wingless adult aphids were put on each pot. Number of aphids was counted after 7, 14 and 21 days after treatment. Results showed significant differences among treatments (genotypes) and sampling times. According to means comparison by Duncan's test, land race Sefid was the most fertile for aphids (180.7 aphids) and Great lakes cultivar (170.4 aphids) was susceptible to the aphid and ranked in group A and land race Shiraz was the least fertile for aphids (48.40 aphid) and land race Siah (50.33 aphid) were resistant and placed in group D.

E 96

EFFECT OF ULTRAVIOLET (254NM) IRRADIATION ON LIFE CYCLE AND REPRODUCTIVE PARAMETERS OF *CALLOSOBRUCHUS MACULATUS.* Roshanak Sedaghat, Ali Asghar Talebi, and Saeid Moharamipour, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P.O. Box 14115-336, Tehran, Iran, Email: sedaghatbaf@modares.ac.ir

The cowpea weevil, *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae) is a serious cosmopolitan pest of stored products, especially seeds of Leguminosae, and is prevalent throughout the tropics and subtropics. In this research, life cycle and reproductive parameters of *C. maculatus* (F.) were investigated at a mean room temperature of 25±5 ºC and a photoperiod of 10 hr of light and 14 hr of darkness without humidity control. Eggs were irradiated at 24h after laying for 0, 2, 4, 8, 16, 24, 32, 40 minutes. An increase in time of exposure of UV-rays caused a gradual increase in eggs mortality rate. Thus, egg mortality was 6.67, 37.5, 40, 68.34, 72.5, 81.67, 90 and 93.33% for the eight exposure durations, respectively. The results indicated that life expectancy of one-day-old eggs was estimated to be 48.2, 36.6, 33.4, 20.7, 17.1, 14.1, 9.5 and 8.5 days for the eight exposure durations,, respectively. Survival rate of the first instar larvae was 0.95, 0.68, 0.62, 0.28, 0.23, 0.10, and 0.08% for the eight exposure durations, respectively. In reproductive tests, eggs were irradiated at 24h after laying for 2 and 4 minutes. After adults emergence, 30 pairs (male and female) were selected and experiments continued until the death of the last female. The reproduction data were analyzed according to jackknife method and with MINITAB ver. 14 statistical soft ware. The gross fecundity rates of *C. maculatus* in control, 2 and 4 min exposure were 99.68±8.50, 101.63±2.00, 100.27±7.54 eggs, respectively. The gross fertility rates were 94.64±8.08, 68.49±1.35, 60.24±4.53 eggs, respectively following 0, 2 and 4 min exposure. The net fecundity rates and the net fertility rates were 87.25±7.61, 60.08±1.31, 52.93±5.08 and 82.92±7.22, 40.49±0.88, 34.64±2.72 eggs in control, 2 and 4 min exposure durations. It may be concluded that irradiation is a very safe and clean method for food preservation and pest control. However, much more comprehensive research is still needed.

E 97

SURVEY OF SCALE INSECTS (HOMOPTERA: COCCOIDEA) AND THEIR ASSOCIATED PARASITOIDS IN CITRUS ORCHARDS IN THE SYRIAN COST. Kais Gazal and Eiad Mahamad, Centre of Biological Enemies Rearing, Al Hanadi, Syria, Email: Kaisgazalbc@shuf.com.

Scale insects are considered the most important insect pests which attack citrus and cause serious economic damages in different areas of the world, icluding Syria. Survey of Coccoidea scale insects which attack citrus trees in the Syrian cost was conducted during the period 2005 - 2008. Four species belonged to family Diaspididae were identified. The most important were *Parlatoria pergandii*, *Aonidiella aurantii* (Maskell), *Lepidosaphes beckii* (Newman, 1869), *Chrysomphalusa onidum*. In addition, four species belonged to family Coccidae were also identified; *Coccus pseudomagnoliarum* (Kuwana), *Saissetia oleae* (Olivier, 1791), *Coccus hesperidum* Linnaeus, 1758, *Ceroplastes floridensis*(Comstock, 1881). Parasitoids found associated with the pests were recorded.

E 98

BIO-ECOLOGICAL STUDY OF FAMILY PAMPHAGIDAE (ORDER: ORTHOPTERA) IN EASTERN ALGERIA. Naima Benkenana and A. Harrat, Arthropods Systematic and Ecology Laboratory, Science Faculty, Mentouri University, Contantine, Algeria, Email: naima_benkenana@yahoo.fr

Family Pamphagidae belongs to Order Orthoptera which includes several species of locusts causing serious damages to cereal crops in arid and semi-arid regions of Algeria. The species identified so far in the east of Algeria, were divided into two sub-families (Akicerinae and Pamphaginae) and six genra. Subfamily Pamphaginae was the richest in number of species. A systematic and ecology study was conducted. The *Ocneridia* species were the most abundant in the study area, including *O. volxemii* (Bolivar, 1878).

E 99

SIDE EFFECT OF INDOXACARB AND PIRIMICARB ON SOME BIOLOGICAL CHARACTERISTICS OF *ORIUS NIGER*. Kamal Ahmadi and Yekta Baniadami, Department of Entomology and Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, 22 Bahman Blvd, Kerman, 76169-133, IRAN, Email: kahmadi@mail.uk.ac.ir

Orius niger (Wolff) is an important predator of several economic pests in Iran. One of the challenges of insect control with pesticides is achieving selection and kill of target pests while minimizing mortality to beneficial insects. Indoxacarb and pirimicarb had low toxicity to *O. niger* in the Petri dish bioassay. It is apparent that some investigation should be conducted to evaluate the effects of these pesticides on biological parameters of the predator. Laboratory experiments were conducted to study the influence of indoxacarb and pirimicarb with the highest label-recommended concentration on nymphal development, mortality, longevity and fecundity of the predator at 25±1°C. The result showed that the nymphal developmental duration of both sexes of the predator was not significantly different in indoxacarb, pirimicarb and control treatments, while the total mortality of nymphal instars, longevity of sexes, fertility and fecundity of females of the predator were affected by indoxacarb when compared with pirimicarb and control treatments.

E 100

BIO-ECOLOGICAL STUDIES PERTAINED TO THE ACTIVE AND RESTING PHASES OF THE ADULT SORGHUM BUG, *AGONOSCELIS PUBESCENS* (THUNBERG) (HEMIPTERA: PENTATOMIDAE) IN SUDAN. Abdalla Abdelrahim Satti and Hashim Ahmed El-Massaad, Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan, Email: dahamy2002@yahoo.com

Sorghum bug *Agonoscelis pubescens* (Thunberg) is one of the important economic national pests in Sudan, causing considerable damage to several host plants, particularly sorghum (*Sorghum bicolor*) and sesame (*Sesamum indicum*). It is distributed in vast areas in the central belt of the country north of latitude 11°N. However, the pest usually passes through two distinct active and passive periods throughout the year, the first being from August to October after which the adults enter a resting period from November to July. Adults coming from resting sites firstly feed and breed on weeds which germinate as a result of the rainy season and then the later generation attacks the cultivated crops during October. In this study, some biological aspects were compared among the first generation produced after resting period and the last generation, including fecundity, egg hatchability, and survival and nymphs development. Significantly high levels were obtained by the last generation regarding all biological aspects, as compared with the first generation. This revealed the critical role of the first generation in pest multiplication and subsequent crop damage. Moreover, the distribution areas, resting locations and host plants utilized for resting, feeding and/or breeding purposes were computed from the field data of bug surveys recorded for the previous six years. The important bug areas and preferred host plants were then indicated from their serial rankings based on population levels of the bug. The area lies east of the Blue Nile River including parts of the Gezira, Gedarif, Sennar and Blue Nile States and was ranked first in infestation level, followed by Darfur and lastly Kordofan States. Data obtained emphasized the importance of controlling the first generation before their breeding time, so as to cut the way for the second generation which cause damage to the sorghum crop.

E 101

A CONTRIBUTION TO THE RUBBER FLIES (DIPTERA: ASILIDAE) FROM ARASBARAN REGION AND VICINITY, NORTHWESTERN IRAN. H. Sakenin[1], Hassan Ghahari[1], Pavel A. Lehr[2], Hadi Ostovan[3] and Mohammad Havaskary[4]. (1) Department of Agriculture, Islamic Azad University, Shahre Rey Branch, Tehran, Iran, Email: h_ghahhari@yahoo.com; (2) Institute of Biology and Soil Science, Russian Academy of Sciences, Vladivostok-22, 690022, Russia; (3) Department of

Entomology, Islamic Azad University, Fars Science and Research Branch, Iran, Email: ostovan2001@yahoo.com; (4) Department of Plant Protection, Science and Research Branch, Islamic Azad University, Tehran, Iran, Email: h_havaskary@yahoo.com

The rubber flies (Diptera: Asilidae) are an abundant and diverse family that are known for their predatory behavior. Asilidae diversity can be attributed to their broad distribution and most species tend to occupy a selective niche. As their common name implies, rubber flies have voracious appetite and feed on a vast array of other arthropods, which may help to maintain a healthy balance between insect populations in various habitats. Asilidae adults attack wasps, bees, dragonflies, grasshoppers, other flies, and some spiders. Rubber flies are particularly abundant in arid and sunny habitats, which are optimal conditions in which to observe their many morphs and behavior. Asilidae is known to have 1634 species at Palearctic region (Geller Grimm, 2005). The fauna of Iranian Asilidae was studied during the period 2000-2004. In Arasbaran region (northwestern Iran), a total of 27 asilid species were collected, of which 7 species including *Ancylorhynchus glaucius* (Rossi, 1790), *Choerades fulva* (Meigen, 1804), *Holopogon albosetosus* Schiner, 1867, *Lasiopogon pilosellus* Loew, 1847, *Pegesimallus mesasiaticus* (Lehr, 1958), *Saropogon dasynotus* Loew, 1871 and *Tolmerus fuscus* (Macquart, 1839) were new records for Iran. In addition to the fauna of rubber flies in Arasbaran region, the preys of these beneficial flies were also collected and identified as *Aphodius foetidus* (Herbst) (Mashhad) (Scarabaeidae), *Ctenisomorphus major* (Raffray) (Staphylinidae), *Taphaeus hiator* (Thunberg) (Braconidae), *Copris hispanus* (Linnaeus) (Scarabaeidae), *Schizoprymnus terebralis* (Šnoflák) (Braconidae), *Rugilus similis* (Erichson) (Staphylinidae) and *Protaetia excavaata* Gomy & Percheron (Scarabaeidae). Since the rubber flies have efficient role in control of several agricultural pests, their conservation can be an effective pest management strattegy.

E 102

FAUNA AND DOMINANT SPECIES OF GROUND BEETLES (COLEOPTERA: CARABIDAE) IN ORCHARDS OF MAZANDARAN, NORTHERN IRAN. Hassan Ghahari[1], Memis Kesdek[2], Hamid Sakenin[3] and Mehrdad Tabari[4]. (1) Department of Agriculture, Islamic Azad University, Shahre Rey Branch, Tehran, Iran, Email: h_ghahhari@yahoo.com; (2) Ministry of Agriculture and Village Affairs, Head of District Agriculture, Turkey; Email: mekesdek@hotmail.com; (3) College of Agriculture and Natural Resources, Ghaemshahr Islamic Azad University, Mazandaran, Iran, Email: hchelave@yahoo.com; (4) Iran Rice Research Institute, Mazandaran, Iran, Email: ma_tabari@yahoo.com

The ground beetles (Coleoptera: Carabidae) are powerful predators and have important role in biological control of agricultural pests. The fauna of these beneficial insects was studied in fruit orchards of Mazandaran province through 2004 - 2006. A total of 23 species from 17 genera were identified in different regions which of these seven species (*Acinopus megacephalus*, *Bembidion menetriesi menetriesi*, *Carabus roseni*, *Chlaenius steveni*, *Corysa carinifrons*, *Merizomena grandella* and *Nebria wiedemanni*) are new records for Iran. The survey indicated that the highest species diversity was observed in Amol and Ghaemshahr, and the lowest was observed in Babolsar. The highest population density was observed in Ghaemshahr and Behshahr, and the lowest one in Babolsar and Noor. Among the studied species, *Harpalus griseus* had the highest distribution and *Acinopus megacephalus*, *Bembidion menetriesi*, *Carabus roseni*, *Chlaenius steveni* and *Merizomena grandella* had the lowest. The highest population density was observed for *H. griseus* and *Harpalus fuscicornis* and the lowest population density for *A. megacephalus*, *B. menetriesi*, *C. steveni*, *Cicindela rhodoterena*, *M. grandella* and *Zabrus spectabilis*, respectively. The results indicated that *Harpalus griseus* and *H. fuscicornis* were the dominant species in orchards of Mazandaran province.

E 103

BIOLOGICAL STUDY ON RED PLUM MOTH, *GRAPHOLITHA FUNEBRANA* TR. AND PRELIMINARY SURVEY OF ITS NATURAL ENEMIES ON ALMOND IN MID-SYRIA. Amanni Shlallo, Louai Aslaan and Wajih Alkassis, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: amannishllalo@yahoo.com

Grapholitha funebrana is the most important insect pest on almond, apple, causes damage to fruits and makes it drop before ripening but the most important damage occurs in stores. In Syria, almond plantations are located mainly in central area. This study was carried out in almond orchards in cages contained fruits infested by *G. funebrana* during 2004–2008. *G. funebrana* had two generations annually, but in 2008, it had a third generation that entered in diapause by the end of the year. Date showed that the first peak of the pest was in late May, the second was by early July. However, the third peak was noted in mid-August in 2008. First, second and third generations lasted for 84, 74 and 44 days, respectively. Survey of the parasitoids revealed the presence of two egg–larval parasitoid species of the family Chalcidoidea, with parasitism rate of 1.0 and 2.0%; two larval parasitoids of the family Ichenumonidea with parasitism rate of 11 and 13%; two larval parasitoids of the family Chalcidoidea with parasitism rate of 52 and 25%; a larval-pupal parasitoid of the family Ichenumonidea with parasitism rate of 3%; and three pupal parasitoids of the family Chalcidoidea with parasitism rate 2.0 and 2.4%.

E 104

SURVEY OF APPLE CODLING MOTH (CYDIA POMONELLA) FLYING CURVE IN HERMON AREA (SYRIA). Ehab Zgheb and Wajih Alkassis, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: szgheb@yahoo.com

Apple trees are considered one of the economically important fruit trees in Syria. The most damaging pest that infects apples is the apple codling moth, *Cydia pomonella*, which affects also walnut and many Amygdalaceae trees. This insect has two or three

generations per year and spends the winter in the form of a fifth-instar larva selecting safe locations on the tree. Monitoring the flying of the first generation and determining the start period of egg-laying are considered the most effective method to select the date of treatment. This study was conducted in 2008 in Arné, Hermon area, Rīf Dimašq, southern-Syria, by using sticky pheromone traps. Frequent observations were made to these traps with continuous monitoring of trapped moth numbers. The flying peak of the first and second generations was compared with minimal and maximal temperatures registered in surveyed areas.

E 105

SURVEY OF POTATO INSECT PESTS IN THE WESTERN AREA OF LIBYA. Fauzi A.Bisheya, Aida Adel Badi, S.A. Sherlala and M.M. Assol, Agricultural Research Center, Tripoli, Libya, Email: bisheya@yahoo.com

Potato (*Solanum tuberosum*) is one of the important vegetable crops in Libya. Potato crop is affected by infestation with some agricultural pests which cause directly or indirectly economic losses. Field survey was conducted during spring 2007, to identify insect pests associated with potato crop at some provinces in western Libya. The objectives of this work is to determine the important insect pests, their distribution, and natural enemies. Results indicated the presence of 70 different species which belong to 8 insect orders which are Hemiptera, Thysanoptera, Orthoptera, Coleoptera, Homoptera, Hymenoptera, Diptera, Lepidoptera based on morphological and anatomical characteristics. Four insect species were identified as *Liriomyza huidobrenses, Empoasca fabae, Lygus hesperus, Lygus elisus*. There were variation in their occurence from 0%-45.1%. Results also indicated the presence of two different species of parasites and predators which are *Diglyphus isaea, Diglyphus crassinervis, Hippodemia convergence* and *Hippodemia* sp.

E 106

SURVEY OF INSECT PESTS WHICH ATTACK *ACACIA* SP. ESPECIALLY *A. EHRENBERGIANA* IN QATAR. Khaled Mohamed Mardini[1] and Hadi Al Shayef[2]. (1) Qatar Insects Project, Friends of the Environment Center, P.O.Box 1822, Doha, Qatar, Email: khaled-m92@hotmail.com; (2) Ministry of Environment, Doha – Qatar.

A. ehrenbergiana is a perennial tree with many branches and tall thorns, and grows in the deep clay sandy and stony soils. It spreads in the valleys, especially in the south-western areas. The tender leaves, flowers and fruits are important food for camels and goats. Some species of Bruchidae attack the pods and damage the seeds. Some species of *Acmaeodera* sp. attack branches and roots. Field trips were made to collect insects in September 2007 from three areas; Al Shahannia in the west, Al Wakra and Traina in the south. Samples of infected pods collected from Al Wakra and Al Shahannia areas were infested by Bruchidius sp., while branches were infested with two *Acmaeodera* sp.

E 107

WEATHER FACTORS EFFECT ON LIFE CYCLE STAGES OF PEAR PSYLLA, *CACOPSYLLA PYRI* (L.) IN HOMS GOVERNORATE, SYRIA, Dumar Namoor[1], Mohamed Ibrahim[2] and Bassam Aoudi[2], (1) Plant Protection Department, Faculty of Agriculture, Al-Baath University, Syria; (2) GCSAR, Agricultural scientific Research Center at Homs, Syria, Email: B_oudee@Gawab.com

The correlation between weather fluctuations (temperature,, R.H., wind speed and sun shine duration) and population density of pear psylla (eggs, nymphs and adults) were studied. Results indicated that correlation between pest population s and maximum/ minimum temperatures and sun shine duration was positive and highly significant, wehereas withrelative humidity and rainfall was negative and highly significant. However, the correlation with wind speed during a period of two years was insignificant.

E 108

BIOLOGICAL STUDIES ON PARLATORIA DATE SCALE, *PARLATORIA BLANCHARDI* (TARG. - TOZZ.) UNDER LABORATORY CONDITIONS. E.A. Elwan and Maha I. El-Sayed, Plant Protection Research Institute, Agriculture Research Center, 7 Nady El-Seid Streat, Dokki, P.O. Box 12311, Giza, Egypt, Email: ssechem@hotmail.com; drsayedelwan@yahoo.com

Parlatoria date scale, *Parlatoria blanchardi* (Targ.-Tozz.) (Hemiptera: Diaspididae) was reared on date palm seedlings cultivated in black plastic bags for one year under laboratory conditions. The results obtained revealed that *P. blanchardi* completed four successive overlapping generations a year; two generations in summer, one generation in autumn and one generation in winter. The 1st generation started from mid-May, 2008 to late September with average duration of 69.7 days at 23.3 ºC and 77% R.H. The 2nd generation started from early July to early November with duration of 76.1days at 22.5ºC and 81% R.H. The 3rd generation occurred in autumn from mid-August to early February, 2009 with duration of 153.2 days at 19.7 ºC and 78% R.H., whereas the prolonged generation occurred in winter from early October to late March or early April, 2009 with average duration of 198.5 days at 18.5 ºC & 76% R.H. The eggs incubation period was relatively shorter in summer and autumn generations (6-11 days) than winter generation (10-13 days). The duration of the 1st instar female nymph was 7-18 days in summer and autumn generations and 15-18 days in winter generation, whereas the duration of the 1st instar male nymph was 6-11 days in summer and autumn generations and was prolonged to 11-19 days in winter generation. The duration of the 2nd instar female nymph was 9-13 days in summer and autumn generations and increased to 21-26 days in winter generation while the duration of the 2nd instar male nymph was 7-14 days in summer and autumn generations and prolonged to 14-22 days in winter generation. Duration of the nymphal female stage was 16 - 41 days compared with 19-47 days for male nymphal stage in the four generations. The pre-oviposition period was 8-18 days in summer and autumn generations and prolonged to 102-120 days in winter generation. The oviposition period varied among the

four generations; it was 45-85 days in summer and autumn generations and increased to 203-227 days in winter generation. Whereas, the post-oviposition period was shorter (4-20 days) in the four generations. The adult female longevity was shorter in summer generations (64.6-75.3 days) and was prolonged to 228.2 and 184.1 days in autumn and winter generations, respectively. The fecundity of females was 28-59 eggs/female in the four generations.

MITES

M 1

EFFICACY OF APIGAURD (THYMOL) IN CONTROLLING *VARROA* MITE *VARROA DESTRUCTOR* ANDERSON & TRUEMAN AND ITS EFFECT ON HONEYBEES *APIS MELLIFERA* L. Muzahim, A. Elsaiegh [1], Muhammad Hassan Sallo[2] and Muhammad Efraeah Edan[1]. (1) Plant Protection Department, College of Agriculture & Forestry, Mosul University, Iraq; (2) Plant Protection Department, College of Agriculture, Sallahu EldeenUniversity, Iraq, Email: muz_bees@yahoo.com

The study was conducted to evaluate the treatment by Apigaurd against *Varooa* mite during autumn 2002 season. The concentration 25% and 50% thymol concentrations showed a toxic effect, means of mite number on pupae significantly decreased to 3.93, 4.23 mites/pupa, respectively, compared with 14.95 mites/pupa for the control treatment. The treatments also significantly ($P<0.05$) reduced infestation severity, number of pupae infested and infestation rate (0.16, 3.00, 12% and 0.15, 3.60, 4.20 for the thymol treatments, respectively), compared with the control treatment (0.6, 9.4, 37.6%). Both treatments of 25% and 50% thymol were significantly effective on worker bee mite number (7.8, 6.6 mite) and significantly reduced infestation severity and rate to a low level (0.08, 0.07, 6.93, 5.5%, respectively), compared with untreated control (0.25 and 20.62 mites, respectively). The 50% thymol treatment was significantly more effective than the 25% treatment , as the number of mites dropped on the hive base were 159 and 116.9 mites, respectively, compared to thev control treatment (23.3 mites).These results correlated well with the relative efficacy rate of the treatments with an average of 77.27 and 78.52%, respectively compared with 40.79% for the control treatment. There were no significant differences in treatment efficacy between the 25% and 50% thymol treatments (18.84 and 25.26, respectively), but they were significantly lower than the control treatment (6.44). Statistical analysis did not show significant differences between treatments on the number of mites dropped on the hive base. The 50% thymol treatment was significantly more effective in mean number of mites dropped (15903) than the 25% thymol and control treatments (11687 and 2331, respectively). Based on these results it is recommended to the beekeepers to use the 25% or 50% thymol applications depending on the ambient temperature. Further more, the miticide treatments did not have any side effect on queen and worker honeybees.

M 2

EFFECT OF CERTAIN CHITIN SYNTHESIS INHIBITORS AGAINST *TETRANYCHYS URTICAE* KOCH. AND THEIR SIDE EFFECTS ON SOME COMMON PREDATORS IN EGYPTIAN COTTON FIELDS. H.M.G. El-Kawas, Hala M.I. Mead and W.M.H. Desuky, Plant Protection Research Institute, Dokki, Giza, Egypt, Email: dr.hanyelkawas@yahoo.com

Field experiments were carried out to evaluate effects of three chitin synthesis inhibitors, Chlorfluazuron, Hexaflumuron, and Diflubenzuron compared to, Chlorfenapyr against the two-spotted spider mite, *Tetranychus urticae* Koch immature stages and their side effects on some common predators in Egyptian cotton fields during 2007 and 2008 growing seasons at Zagazig district, Sharquia Governorate. Results showed that, Chlorfenapyr had the highest significant initial and residual effects on *T. urticae* immature stages during the two successive seasons, followed by Chlorfluazuron, Hexaflumuron, and Diflubenzuron. However, Chlorfenapyr was the most toxic and gave the highest significant reduction in the predator numbers recorded (83.88±2.56, 80.27±4.94%) in 2007 and (86.13±2.05, 74.99±2.97%) in 2008 as initial and residual effects, respectively. In addition, the changes in the activities of some enzymes of *T. urticae* as affected by tested treatments were also determined.

M 3

FEEDING PREFERENCE AND THE INFLUENCE OF PREY STAGE OF *TETANYCHUS URTICAE* KOCH. ON CONSUMPTION TIME AND SOME OTHER BIOLOGICAL CHARACTERISTICS OF THE PREDATOR *SCOLOTHRIPS SEXAMCULATUS* (PERG.) Sindab Sami Gasim[1], Abdul–Sattar Arif Ali[2] and Saleh Hasan Sameer[1]. (1) Department of Plant Protection, College of Agriculture, Abu–Ghraib, Baghdad, Iraq, Email: sindab_aldahwi@yahoo.com; (2) Department of Plant Protection, College of Agriculture, Al–Anbar University, Al-Anbar, Iraq, Email: abdulsattararif@yahoo.com

The sex spotted thrips *Scolothrips sexmaculatus* (Perg.) (Thysanoptera: Thripidae) is considered as an effective predator against small insects and spider mites. Several laboratory experiments were conducted to evaluate the feeding preference of this predator for the different stages of the two spotted spider mite *Tetranychus urticae* Koch. The influence of mite stage on some biological characteristics and consumption time were also investigated. Results showed that the predator larvae preferred spider mite egg for feeding and development. Spider mite larvae and nymphs became second and third respectively in the preference of the predator while mite adults were the least preferred host. Females of the predator preferred feeding on mite larvae in the first place fallowed by eggs and adults, while mite nymphs were the last in the female preference. The predator males followed the same trend of the larvae in their preference. Time of prey consumption was reduced as the predator larvae increased in size and was increased with increasing developmental stages of the mite. Results have also indicated that the kind of food had significant influence on larvae development

and adults performance of *Scolothrips sexmaculatus.* The best larvae performance was obtained when fed on combination of all mite stages. Mean development time and survival rate were 7.2 days and 93.1%, respectively. The longest duration and lowest survival rates were 11.3 days and 82.7%, respectively, recorded for individuals fed on just eggs and adults mite. Adult longevity and female fecundity were improved when the predator fed on mixed food of all mite stages. Therefore, results of this study would be of benefit for the future application of the predator against spider mites under field conditions.

M 4

THE BIOACTIVITY OF PINE OIL AGAINST PHYTOPHAGOUS MITES IN ORGANIC CUCUMBER PRODUCTION. Dalida Darazy and Abdallah Traboulsi, Department of Plant Protection, Faculty of Agriculture, Lebanese University, Dekwaneh, Lebanon, Email: dchoubaya_darazy@hotmail.com

Among phytophagous mites especially on cucumber, two mite species are considered potential pests: *Tetranychus urticae* Koch. and *Tetranychus cinnabarinus* Boisduval. With the considerable new interest in developing safer, environmentally friendlier control alternatives the present work aims to explore the bioactivity of pine oil against phytophagous mites in organic cucumber production in open field conditions. The bioactivity of the pine oil was investigated through three replicates of field trials with five different oil concentrations (0.5%, 1%, 2%, 4%, and 6%) were tested. Control treatment without pine oil was included for each test. Mortality was recorded 24, 48 and 72 hr after treatment. Results showed that the 6% concentration was the most effective with 97. 5% mortality for the two species after 48-72 h, followed by 86.3%, 88.5%, 89.9%, 91.9% mortality for the concentrations of 0.5%, 1%, 2% and 4%, respectively. In addition, these results revealed that pine oil is highly effective against the above phytophagous mites and of great importance in organic cucumber production under field conditions and in biological control systems.

M 5

EFFECT OF DIFFERENT PLANT HOSTS ON BIOLOGICAL ASPECTS, FECUNDITY AND LIFE TABLE PARAMETERS OF THE TWO SPOTTED SPIDER MITE *TETRANYCHUS URTICAE* KOCH. Mariam A. El-Sanady, Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt, Email: marim_elsanady@yahoo.com

Biological studies were carried out on the two spotted spider mite *Tetranychus urticae* Koch (Acari: Tetranychidea: Actenididea), when it fed on three different host plants: soybean (*Glycine max* L.), cotton (*Gossypium* sp.) and peatnut, (*Arachis hypogaea* L.) under the laboratory conditions of 25±2°C and 60±5% R.H. Data obtained and statistical analysis showed that the developmental stages and fecundity were affected by different host plants, whereas, soybean was highly preferred for spider mites followed by cotton, while peanut was the lowest. Therefore, total immature stages lasted 6.3, 7.5 and 10.25 days for female, when it fed on soybean, cotton and peanut, respectively. On the other hand, female longevity and fecundity were affected by hosts whereas the ovipositional period lasted 6.7, 6.8 and 7.2 days. The same pattern, females affirmatived the relationship between number of eggs deposited and host plant, whereas, the number of eggs on soybean was about 40.5 times greater than that obtained on cotton and pea-nut (31.6 and 26.5 eggs). The obtained results also predicated that net reproductive rates (Ro) were 25.92, 17.6 and 14.84 females/female at constant of 25±2°C and 60±5% R.H. when it fed on three different host plants, while generation times (T) were 15, 16.4 and 20.2 days, the intrinsic rates of natural increase (r_m) were 21, 19 and 13 times/female/day, finite rates of increase (e^{rm}) were 1.24, 1.19 and 1.14 times/female/day, respectively.

M 6

BIOLOGY OF TWO-SPOTTED SPIDER MITE, *TETRANYCHUS URTICAE* KOCH AND ITS PREDATORS *PHYTOSEIULUS PERSIMILIS* ATHIAS-HENRIOT AND *STETHORUS GILVIFRONS* MULSANT IN THE LABORATORY. M. Mofleh[1], M. Halloum[2] and M. Ahmad[2]. (1) Faculty of Agriculture, Tishreen University, Lattakia, Syria; (2) Agricultural Research Center in Lattakia, Lattakia, Syria, Email: magda_mofleh@yahoo.com

Biology of *Tetranychus urticae* Koch and two of its predators, at two different temperature (25 ±2°C) and (30 ±2°C) were investigated. The ages of individuals reached 23 and 18 days for *T. urticae* female, and 22 and 21 days for *Phytoseiulus persimilis* female on *Phaseolus vulgaris* leaf disk, and 29 and 36 days for female *Stethorus gilvifrons* on two hosts (*Ricinus communis*, eggplant) leaf disks at the two different temperatures, respectively. *T. urticae* Gross reproductive rates (*GRR*) were 143.6 and 120.5 eggs, and the net reproduction rates (R_0) was 108.96 and 98.46 eggs, and the doubling time of population (T, DT) was 10.96 and 1.65 days, and 8 and 1.2 days at the two different temperature, respectively. The *GRR* for *P. persimilis* was 48.35 and 42.91 eggs, and R_0 was 44.88 and 39.09 eggs, while (T, DT) was 9.79 and 1.82 days, and 10 and 1.87 days at the two temperatures respectively. The *GRR* for *S. gilvifrons* was 127.46 and 212.5 eggs, and the R_0 was 122.23 and 195.207 eggs, while T, DT was 13.03 and 1.88 days on *R. communis*, and 14.75 and 1.94 days on eggplant.

M 7

LABORATORY STUDIES ON THE RELATION BETWEEN THE EFFECT OF "NEONICOTINOID" INSECTICIDES AND THE "HORMOLIGOSIS" HYPOTHESIS ON THE BIOLOGY OF THE TWO SPOTTED MITE. Khawla Taha Ismail Al-Neami and Dr. Khalid M. Al-Adil, Plant Protection Department, College of Agriculture, University of Baghdad, Iraq, Email: ktalneami@yahoo.com

Two methods were used for treatment with Neonicotinoid insecticides. The first method was to treat the female of phytophagous two spotted mite directly with three sprays of different concentrations (recommended rate, half the rate and quarter the rate). Confidor caused an

increase in the number of eggs laid by the female to 8.30, 7.54, 9.37 eggs/day for the three used concentrations, respectively. Actara treatments gave 7.64, 7.12, 7.75 eggs/dayfor the same concentiations, respectively, as compared to 3.81, 4.70, 5.45 eggs/day for the control treatment.Similarly, the Confidor treatment had an obvious effect on the longevity (11.3 days) followed by Actara (9.70 days), then the control (8.00 days). The differences between the treatments were highly significant.The second method used to treat the mite females was by dipping discs of cotton leaf in solutions containing different concentration of the used insecticides. The results showed that Confidor treatments had the highest effect on the fecundity with means of 8.90, 7.05, 9.15 eggs/day for the three concentrations, followed by Actara treatments with means of 6.84, 6.57, 7.14 eggs/day while the control treatment showed a mean of 4.60, 4.58, 5.31 eggs/day. Confidor treatment increased female life span to 11.00 days compared to that for Actara (9.33 days) and control (7.66 days). Finally, the feeding of different stages of mite on seedlings treated with Neonicotinoid insecticides, indicated that Actara had the most visible effect compared to other treatments. Survival rate of juvenile stage larvae following Actara treatment was 46.67%, whereas it was 26.67% for both Confidor and control treatments, and the differences were not significant.In contrast the effect of Confidor on fecundity and longevity was high with a mean of 51.36 and 10.00, respectively; followed by Actara with means of 42.36 and 8.33, respectively. The mean for the control treatment was 24.66 and 6.00, respectively. In conclusion, the increased effects occurred when nicotinoid insecticides were used can be explained by the hypothesis of "Hormoligosis", based on decreases or unbanlance of hormones.

M 8

A SURVEY OF THE PREDATORY MITES ASSOCIATED WITH SPIDER MITES IN AS-SWIEDA, SYRIA APPLE ORCHARDES AND THE SIDE EFFECTS OF SOME ACARICIDES ON THESE PREDATORS. Jihan Al Abdullah, Division of Agricultural Researchs in As-Sweida, General Commission of Scientific Agricultural Research, Syria. Email: jihan_na@hotmail.com

A survey for the predatory mite species associated with spider mites in As-Swieda apple orchards in southern Syria was carried out. The following species were recorded: *Typhlodromus pyri* (Scheuten), *Typhlodromus cotoneaster* (Wainstein) (Fam.: Phytoseiidae), *Zetzellia mali* (Ewing) (Fam.: Stigmaidae) and unidentified species from Tydidae were found in very few numbers. All mentioned species are new for the Spiders' fauna of Southern Syria. The side effects of some acaricides on the predatory mite were tested. Those were: Mitac (Amitras 20%), Envidor (Spirodiclofen 240 g/l), mite clean (Pyrimidifen 4%), Turk (Fenbotatin oxide 550 g/l) and ReBack (Fenbotatin oxide 550 g/l). No significant differences were found among these acaricides in their effect on the spider mites (*Tetranychus urticae* (Koch) and *Panonychus ulmi* (Koch), 15 days after application. Significant differences among these acaricides in their effect on the predatory mites were found, 10 and 15 days after application (at P=0.05). Fenbotatin oxide 550g/l was least harmful to the predators, whereas Amitras was the most harmful acaricide, 10 and 15 days after application.

M 9

BIOLOGICAL STUDIES ON THE SPIDER *CRSCOLINA CONSPICUS* (CAMBRIDGE, 872) FEEDING ON WHEAT APHID *SCHIZAPHIS GRAMINUM* (RONDANI). Mohamed Hassan El-Erksousy, Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt, Email: el_erksousy10@yahoo.com

The life cycle of spider *Crscolina conspicus* (Cambridge, 872) (Araneida: Theridiidae) feeding on nymphs of the aphid species *Schizaphis graminum* (Rondani) (Homoptera: Aphididae) was investigated under laboratory conditions; 26ºC and 60-70% RH. In this study, the life spam was 169.8 and 135.7 days, for female and male, respectively. Food consumption of both female and male was 261.1 and 256.4 nymphs at the same conditions, respectively. Description of some biological aspects; mating, feeding behaviors and ovipositor were recorded.

M 10

PREDACEOUS MITES IN AL-QASSIM REGION, SAUDI ARABIA, WITH DESCRIPTION OF TWO NEW SPECIES *HYPOASPIS ZAHERI AND H. DACTYLIFERA*. Ahmed Fouly and Suloiman. Al – Rehiayani, Plant Production and Protection Department, College of Agriculture and Veterinary Medicine, Al-Qassim University, 51452 Buraydah, P.O. Box 6622, Saudi Arabia, Email: Alreh@Yahoo.com.

Survey study was conducted to determine predaceous mites attacking different agricultural pests which inhabiting different habitats during 2007-2008 in Al-Qassim region, Saudi Arabia. Predaceous mites living on plant cnopy and root systems of cultivated plants, debris and organic manure reached more than 30 species belonging to three suborders, 17 families and 28 genera. All collected predaceous mite species are considered as first records in Saudi Arabia, of which *Hypoaspis zaheri*; *H. dactylifera* (family Laelapidae), *Parasitus saifii* (family Parasitidae); *Sessiluncus qassimi* (family Ologamasidae); *Platyseius denmarki*; *Neojordensia qassimi* (family Ascidae); and *Mycetoglyphus qassimi* (family Acaridae) are considered new species. The present study aims to summarize their occurrence and relative abundance in different habitats. Illustration and description of the two new species *Hypoaspis zaheri*; *H. dactylifera* are also included.

M 11

POPULATION DYNAMICS AND MOST IMPORTANT HOST PLANTS OF THE TWO-SPOTTED SPIDER MITE, *TETRANYCHUS URTICAE* KOCH AND ITS PREDATORS IN THE SYRIAN COASTAL REGION. M. Halloum[1], M. Ahmad[1] and M. Mofleh[2]. (1) Faculty of Agriculture, Tishreen University, Lattakia, Syria; (2) Agricultural Research Center in Lattakia, Lattakia, Syria, Email: magda_mofleh@yahoo.com

A study on the population dynamics of *Tetranychus urticae* Koch was conducted through two seasons 2007-2008, in Syrian coastal region. It was found that the activity started on *Ricinus communis* plants and reached the highest peak in the first week of May (930 adults/30 leaves), then the population decreased on the same host plant at the end of May (33 adults/30leaves). In June, the population rose again on *Phaseolus vulgaris* (136 adults/30 leaves) in the same region during 2007, and reached the peak in July (556 adult/30 leaves) on the same host plant. In middle of August, the numbers of *T. urticae* started to decline and disappeared in late November in the study region. The activity and numbers of associated predators wer dependent on the presence of the prey. Many predators of *T. urticae* were found in the coastal region. They were *Phytoseiulus persimilis* and *Amblyseius* sp. (Phytoseiidae), *Stethorus gilvifrons* Mulsant and *Scymnus frontales* (Coccinellidae), *Feltiella acarisuga* (Cecidomyiidae), *Orius* sp. and *Geocoris* sp. (Anthocoridae), *Nabis* sp. (Nabidae), *Scolothrips sexmaculatus* Pergande (Thripidae) and *Chrysoperla carnea* (Chrysopidae). The most important host ten plants were determined for the predators of *T. urticae* in the coastal region.

M 12

FAUNA AND POPULATION FLUCTUATIONS OF SPIDERS (ARTHROPODA: ARANEI) IN RICE FIELDS OF MAZANDARAN PROVINCE, NORTHERN IRAN. Hassan Ghahari[1], Mehrdad Tabari[2], Yuri M. Marusik[3] and Hadi Ostovan[4]. (1) Department of Agriculture, Islamic Azad University, Shahre Rey Branch, Tehran, Iran, Email: h_ghahhari@yahoo.com; (2) Iran Rice Research Institute, Mazandaran, Iran, Email: ma_tabari@yahoo.com; (3) Zoological Museum, University of Turku, FIN-20014 Turku, Finland, Email: yurmar@mail.ru; (4) Department of Entomology, Islamic Azad University, Fars Science and Research Branch, Iran, Email: ostovan2002@yahoo.com

Spiders are one of the eleven orders of the class Arachnida, which also includes groups such as harvestmen (Opiliones), ticks and mites (Acari), scorpions (Scorpiones), false scorpions (Pseudoscorpiones), windscorpions (Solifugae), and vinegaroons (Uropygi). Spiders are the powerful and efficient predators in ecosystems which have effective role in pest control. The fauna population fluctuations and activities of these arthropods were studied in Mazandaran province during 2005-2009. A total of 41 spider species of 37 genera were collected and identified from the paddy fields of Mazandaran. Of these, eight species including, *Agalenatea redii*, *Cheiracanthium erraticum*, *Phlegra bresnieri*, *Allohogna singoriensis*, *Steatoda paykulliana*, *Tegenaria domestica*, *Neoscona subfusca* and *Scotophaeus scutulatus* are new records for Iranian fauna. The results of determining the egg masses' densities on different rice varieties (including, Tarom, Fajr, Khazar, Shafagh, Tabesh, Sahel, Neda, Pouya, and Kadus) indicated that the highest egg density was obtained on the varieties Tarom, Fajr, and Khazar, respectively and the lowest on Tabesh. Also, the egg masses' density was significantly different in various locations including, Savadkooh, Babolsar, Mahmood-Abad, Babol, Fereydon-Kenar, Sari, Nour, Amol. The highest population density was observed in Sari and Amol and the lowest density in Nour regions. The results of population fluctuations of spiders in paddy fields indicated that the population density was increased through the crop season (April-August), but insecticides' application and probably climatic factors decrease the population density severely after August. Furthermore, the population dynamics of spiders was significantly different through different hours of the day. The highest density was obtained at 10 am and 18 pm and the lowest density was observed at noon because of warm climate conditions.

FUNGAL DISEASES

F 1

EMERGING PLANT DISEASES IN VEGETABLE AND ORNAMENTAL CROPS IN ITALY. Maria Lodovica Gullino and Angelo Garibaldi, AGROINNOVA, University of Torino, Via Leonardo da Vinci, 44, 10095, Grugliasco, Italy, Email: marialodovica.gullino@unito.it

Vegetable and ornamental crops are economically important in Italy and share some common features, such as their high value, continuous intensification and innovation in their production systems, presence of a high number of crops and varieties, limitations in the use of chemicals, …etc. During the past few years many new diseases, mainly caused by soilborne pathogens (such as different *formae speciales* of *Fusarium oxysporum*, *Sclerotinia sclerotiorum*, *Rhizoctonia solani*, *Phytophtthora* spp.) as well as by foliar pathogens (mostly causal agents of powdery mildews, *Alternaria* sp., …) have been detected in north-western Italy. The phytopathological situations of leafy vegetables as well as new ornamental crops will be presented and the evolution of some diseases as a possible consequence of the globalization of the markets and/or of climate change will be critically discussed. Moreover, the emerging problems in the management of the new diseases will be presented.

F 2

EFFECT OF SEED INFECTION WITH FUNGI ON PHENOL LEVEL AND DEFENSE-RELATED ENZYMES ACTIVITY IN BEAN SEEDS. Z.I. El-Gali, Plant Protection, Faculty of Agriculture, Omer Al-Mukhtar University, P.O. 919, El-Beida, Libya, Email: Z_elgali@yahoo.com

Bean seeds, local variety and Giza-6 cultivars were inoculated with *Botrytis cinerea* and *Macrophomina phaseolina* and stored for different periods. Seeds inoculated with both fungi had higher total phenol content as compared to control seeds and the concentration increased until 20 days of storage after inoculation and thereafter started to decline. The activity of peroxidase, polyphenol oxidase, phenylalanine oxidase and phenylalanine ammonia-lyase was higher in inoculated seeds as compared to the control, but as the days of storage after inoculation increased the enzyme activities decreased. When inoculated seeds were incubated at different temperatures for 10, 20 and 30 days, and examined for their

impact on the total content of reduced and non-reduced sudars, total protein, soluble protein, amino acids and nucleic acids (DNA and RNA), results showed variability in changes according to pathogen incubation temperature and duration. Both pathogens have affected biochemical changes in the infected seeds and were directly proportional with incubation period compared to the control seeds. *B. cinerea* caused maximum reduction in seed quality at 20 °C, whereas *M. phaseolina* was most effective at 25°C. A negative correlation was observed between incubation period and seed contents.

F 3

EFFECT OF CONTROL ELEMENTS ON THE CONTROL OF FUSARIUM WILT OF KOCHIA. A.K. Al-Taae and T.M. Al Dujaly, Department of Plant Protection, College of Agriculture and Forestry, University of Mosul, Iraq, Email aaltaae@yahoo.co.uk

The results of a survey carried out in Mosul university gardens during the years 2006 and 2007 showed that disease incidence and severity of kochia wilt were gradually increased by age of plant from July until October. Disease incidence and severity for two years were 85.6%, 0.35 during 2006 and 97.2% and 0.41 during 2007. Results of isolation and diagnosis showed that the Kochia wilt was caused by *Fusarium oxysporum* Schlecht emend Snyder & Hansen. This is the first record of *F. oxysporum* on Kochia in Iraq. The following treatments were used in this study to control the disease: Alsa, Topsin, Techazole, Swich, Bettanol, Halex and *Trichoderma.* The most effective fungicides were Topsin and Alsa which reduced disease incidence to 61.67 and 61.67%, respectively compared with 100% in the control treatment. On the other hand Techazole and Halex were the best in increasing plant height, number of branches and fresh and dry weight of vegetative parts. The root dipping of plant seedlings in fungicide solution was more efficient than fungicide drenching of seedlings to control the disease.

F 4

IDENTIFICATION OF DIFFERENT *EUTYPA* ISOLATES FROM GRAPEVINE BY USING PLOYMERASE CHAIN REACTION. Ahmad Al-Momany, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman, Jordan, Email: momanyah @ju.edu.jo.

Eutypa dieback is a serious disease of grapevine in Jordan. *E maura* was reported for the first time in Jordan based on morphological features of ascospores obtained from remnants of pruned branches in vineyards. The purpose of this study was to identify the fingerprints of *Eutypa* isolates to be sure if there were more than one species and if there were differences among isolates of the same species. Isolates were obtained from different locations in the studied area. Five pure isolates were obtained during June 2005 from different infected vineyards in Ajloon province in Jordan.There was 30% genetic relatedness among isolates no 1 and 4 and 35% between isolates 2 and 3b. However, a high degree of similarity (32%) was found among isolates no. 1, 4 and 2, 3b, 3a. On the other hand, comparison of BOX PCR fingerprinting between isolates no. 1, 4 and 2, 3 and 5 showed that these isolates constitute two separate clusters with a low value of genotype similarity (40% and 60%, respectively). There were identical bands for isolates No. 1, 2, 3a, 3b and different bands for isolate 4. This suggested that there was two different species among the studied isolates. Isolate 4 was identified according to ascospore formation as *Eutypa maura* while the other four isolates were identified as *Eutypa lata.*

F 5

MORPHOLOGICAL AND MOLECULAR IDENTIFICATION OF SOME IISOLATES OF THE GENUS *TRICHODERMA.* Houda Boureghda and Zouaoui Bouznad, Département de botanique, Institut National Agronomique (INA), El-Harrach, Algiers, Algeria, Email: hou.boureghda@gmail.com

Species identification of 18 isolates of *Trichoderma* spp. revealed that classical approaches based on morphological criteria are not enough to determine species. Based on morphological characteristic two groups were distinguished among the 18 isolates obtained. The first group was made of 10 isolates: T1, T2, T4, T5, T8, T9, T10, T11, T14 and T17 of which the conidiophore morphology, as well as the ramifications and phialides morphology correspond to the *Longibrachiatum* section. The isolates of the first group presented conidia with different measurements intervals which overlap with those of several species of the Longibrachiatum section, and exhibit variability in the form, which made the identification of their species very fastidious. The second group: T3, T6, T7, T12, T13, T15, T16 and T18 was made of isolates with inflated phialides disposed in pair or virticil like of *Pachybasum* section. All the isolates presented conidia of globulous form. The conidia sizes subdivide them in two sub-groups. The first one includes the isolates: T6, T12, T15, T16, and T18 and the second one includes the isolates: T3, T7, and T13. The first sub-group has conidiophore with short branches like Pachybasum section, while the second one had long branches like Trichoderma section. The sequencing of internal transcribed spacer (ITS1, 5.8S, ITS2) of rDNA of the 18 isolates revealed that the 10 isolates of the first group corresponding to the Longibrachiatum section had identical sequences (100% of similarity) with those of several isolates of the species *T. longibrachiatum* and *Hypocrea shwenitzii*. Within the second group of isolates, those of the first sub-group T6, T12, T15 and T16 presented identical sequences with those of *T. harzianum* species and its teleomorphe *H. lixii*, but the T18 isolate presented a sequence with the highest homology with T. *harzianum* and *T. inhamatum* species sequences. The isolates of the second sub-group presented identical sequences with *T. atroviride* isolates only. The sequencing of the elongation factor 1 alpha gene (EF-1 α) showed that the ten isolates of the first group presented sequences with the highest homology (99%) with those of the species *T. longibrachiatum*, thus confirming their membership to this species. Isolates identified as *T. atroviride* by the sequencing of ITS had sequences with the highest homology with those isolates belonging to the species *T. atroviride* and its teleomorphe *H. atroviridis*,

which confirm that they belong to this species. The isolates: T6, T12, T15, T16 and T18 had sequences with the highest homology with those of *H. lixii* teleomorphe of *T. harzianum* confirming their membership to the species *T. harzianum*. The results of DNA sequencing confirmed that the morphological characters have a great plasticity at the *Trichodemra* genus, and that the ITS sequencing of this group is still confusing due to the presence of more than two species which may have identical sequences, but the ambiguity of the species identity determination can be resolved by sequencing the EF-1α gene.

F 6

SURVEY OF FUNGI ASSOCIATED WITH CEREALS. Taher Ahmed Abuhligha, Faculty of Agriculture, Alfateh University, Gafara, Libya, Email: taher_ahmed156@yahoo.com

The aim of this study was to isolate and identify fungi associated with cereals and covered 14 different cereals and other crops (wheat, barely, oat, peanut, chickpea, lentil, bean, pea, fenugreek, broadbean, rice, corn, sugar cane. Corn). The results revealed the presence of nine different fungal genera: *Aspergillus* spp., *Rhizopus* spp., *Penicillium* spp., *Helminthosporium* spp., *Chaetomium* spp., *Epicoccum* spp., *Acremonium* spp., *Alternaria* spp., *Tricothecium* spp. The results obtained and methods used will be presented

F 7

EFFICIENCY IMPROVEMENT OF THE BIOCONTROL AGENT *TRICHODERMA VIRIDE* BY USING THE MICROBIAL POLYSACCHARIDE FOR CONTROLLING OKRA SEED-BORNE FUNGI. Sulaiman Dawood Esam and Doha Ismaeel Al-Obaidy, Department of Biology- College of Education- University of Mosul, Iraq, Email: is_alr@yahoo.com

The antagonistic ability evaluation of the biocontrol agent *Trichoderma viride* against pathogenic fungi, indicated a strong inhibiting effect on the growth of two isolates of *Fusarium solani* and *Rhizoctonia solani* with moderate degree of antagonism, but weak effect on *Macrophomina phasealina*. The effect of the fungal polysaccharide produced by *Alternaria alternata* on the radial growth of both pathogenic fungi and biocontrol agent, showed that the relatively high concentrations (i.e. 4 and 5 gm/l) reduced their growth slightly, but simultaneously stimulated the development of spores *Trichioderma viride* spores, and increased their numbers. Seed treatment with spore suspension of *T. viride* revealed significant reduction in infection rate and disease severity of both pre- and post- emergence seedlings damping-off, and led to an increase in seedling length, and dry weight of seedlings in pot. The use of adhesive materials (i.e. fungal polysaccharide or Arabic gum) to seeds reduced further the infection rate and disease severity, and increased seedling length and dry weight. Although no significant differences were recorded, the microbial polysaccharide was found to be better than Arabic gum for disease control, and it improved plant growth.

F 8

PREDICTION SYSTEM FOR PHOMOPSIS CANE AND LEAF SPOT OF GRAPE CAUSED BY *PHOMOPSIS VITICOLA* (SACC.). Wazeer A. Hassan, Plant Protection Department, College of Agriculture, University of Duhok, Iraq, Email: wazerhassan@yahoo.com

A disease prediction model was developed based on temperature and wetness-duration requirements for infection of grape leaves and canes by *Phomopsis viticola*. Field evaluations were conducted in 2007 and more extensively, in 2008. The study consist of spraying vines with fungicides (benomyl in 2007 and thiophanate-methyl (Topsin) or mancozeb in 2008) according to a 7 day protecting program or when environmental conditions were favorable for infection. For prediction-model-based treatments, fungicides were mixed with an adjuvant, the wash liquid (Zahi) 0.5 and 1%, the spray program started at 12 cm shoot growth and treatments were applied 2 weeks after flowering; three applications were made in response to predicted infection periods, while four applications were made with the calendar-based protection program in 2007. A total of four applications were made in response to predicted infection compared to five with the protection program in 2008. Vines sprayed with mixed benomyl (Zahi) and mancozeb plus Zahi in response to predicted infection periods produced significantly less disease severity and incidence than the control and similar to that in the calendar-based fungicide schedule. Results indicated that disease forecasting will lead to better control of the disease.

F 9

GENETIC DIVERSITY OF *VERTICILLIUM DAHLIAE* KLEB CAUSING COTTON WILT DISEASE IN SYRIA USING RADP-PCR. Louleh Joumah[1], A.M. Mouhanna[2], M.N. Al-Salti[1], M.F. Azmeh[2] and M.A. Shaar[3]. (1) Cotten Research Ademenstration, General Commission for Scientific Agricultural Research, Aleppo, Syria, Email: jlouleh78@gmail.com; (2) General Commission for Biotechnology and University of Damascus, Faculty of Agriculture, Damascus, Syria; (3) Facylty of Agriculture, Aleppo University, Syria.

Cotton (*Gossypium hirsutum* L.) is one of the most important fiber crops in the world, and it has a big economical importance in Syria.Cotton growing area reached 205,000 ha in Syria. Cotton in Syria is infected with several diseases, the most important is vascular wilt caused by *Verticillium dahliae* Kleb. Lands adjacent to Euphrates, Orantes and Khabour rivers are the most contaminated areas with *Verticillium dahliae*. 17 samples of cotton plants showing symptoms of vascular wilt were collected from 17 different locations in Hama, Aleppo, Raqqa, Dier-Ezzor and Al-Hasakeh. Morphological variation between the 17 samples was studied *in vitro* on potato dextrose agar medium. DNA was isolated and analyzed by using 12 different primers and RAPD-PCR to study the genetic diversity of the 17 samples. The results showed morphological variation and genetic diversity within the populations of *V. dahliae* from cotton in Syria.

F 10

HANDLING OF CLIMATE CHANGE DATA AND ITS IMPACT ON PLANT DISEASES USING THE TECHNIQUE OF ARTIFICIAL INTELLIGENCE. S. Bouhrathi[1.2], D. Harazallah[1] and K. Benmahammed[2].(1) Laboratory of Microbiology, Department of Biology, Faculty of Sciences, University of Ferhat Abbas, Sétif, Algeria; (2) Intelligent Systems Laboratory, Department of Electronics, Faculty of Engineer Sciences, University of Ferhat Abbas, Sétif–19000, Algeria, Email: sbouharati@yahoo.fr

It is noticed that climate changes are going to increase the main temperature in the world with increased frequency of climatic extremes, such as drought, floods, and storms in some regions. Climatic factors that could greatly influence plant health should be carefully evaluated. Several fungal diseases of plants may become more devastating because of abiotic stresses, such as drought and flooding, are known to predispose plants to several pathogens; temperature and moisture affect pathogen dispersal, and changes in climatic conditions are likely to favor certain pathogenic fungi. Migration of fungi triggered by climatic changes may increase disease incidence or geographic range. Accurate prediction of the climate change on plant pathogens is uncertain because the climate variability is not stable. The use of artificial intelligence and exactly the fuzzy logic principels, is very adequate in uncertain environment. The fuzzy program was done for predicting the nature and effects of plant diseases according to specific environment.

F 11

EPIDEMIOLOGICAL STUDIES ON *PUCCINIA STRIIFORMIS* CAUSING STRIPE RUST OF WHEAT IN FAISALABAD (PAKISTAN). S. Ahmad[1], M. A. Khan[2], M.M. Haider[2], Z. Iqbal[1], M. Kamran[1] and N. Akhtar[1]. (1) University college of Agriculture, University of Sargodha, Pakistan; (2) Department of Plant pathology Agriculture University Faisalabad, Pakistan, Email: ahmadyarsalman@gmail.com

Fifty genotypes of wheat were screened against yellow (stripe) rust to determine its ecology. Among these genotypes 36 showed visible symptoms of yellow rust. Out of these, 18 were found susceptible, 6 were moderately susceptible to susceptible, 7 were moderately resistant to moderately susceptible and 5 genotypes remained resistant against yellow rust. All other genotypes showed no response or remained asymptomatic against yellow rust. For the epidemiological study of stripe rust, environmental factors including maximum and minimum temperatures, rainfall, relative humidity, sunshine radiations and wind speed data were collected. The correlation between stripe rust severity and environmental factors were then determined through correlation analysis. Four environmental factors including maximum and minimum temperature, relative humidity, and wind speed were found significant in causing stripe rust disease while the other two including rainfall and sunshine radiations had no significant effect. It was found that three environmental factors like maximum temperature, relative humidity and wind speed were positively correlated with disease severity while minimum temperature showed negative correlation. This study may be helpful in the future to develop predictive model to forecast the stripe rust disease which is an economical tool in the management of this disease.

F 12

BIOLOGICAL CONTROL OF WILT AND ROOT ROT OF SOYBEAN PLANTS CAUSED BY *FUSARIUM SOLANI* AND *MACROPHOMINA PHASEOLINA*. Majda Hadi Mahdi[1], Hadi Mahdi Abbod[2] and Ali Ibrahim Hamadi[3]. Department of Biological Science, College of Science, University of Baghdad; (2) Ministry of Sci. & Tech.; (3) Department of Plant Protection, College of Agriculture, University of Baghdad, Iraq, Email: alsaady_mh@yahoo.com; s_mouyed@yahoo.com

Isolation and identification of fungal pathogens associated with root rot and wilt of Soybean plants, showed the dominance of *Fusarium solani* and *Macrophomina phaseolina* in all samples tested. Both fungi have shown high pathogensity, with seed germination rate of 36.6, 46.6 and 50% for the two fungi, separately and combined, compared with 83.3% for the control. It was found that the growth rate of the two fungi, on the Potato Sucrose Agar (PSA), was 1.0 which indicate neutral relationships. The isolate T28 of *Trichoderma* sp. showed antagonistic rates 1.5 and 1.7 against the two fungi, respectively, compared with T21, T26 and Tm. Under greenhouse conditions, same isolate significantly increased seed germination rate by 86.6% compared with 43.3, 50.0 and 53.33%, and significantly decreased infection severity of root and foliage 44.4 ,41.36%, 42.2, 33.3% and 42.2, 47.16% compared to 82.2, 83.2%, 62.2, 74.96% and 68.87, 77.76% for the two fungi individually and their interaction, respectively.

F 13

EVALUATION OF EPIDEMIC AND CONTROL OF *MAGNAPORTHE GRISEA* (HEBERT) BARR. ON YIELD OF FOUR RICE CULTIVARS UNDER DIFFERENT LEVELS OF NITROGEN FERTILIZATION. Mona Hamody Al-Jubouri[1] and Zaidan Kailf Amran[2]. (1) College of Science, Baghdad University, Iraq; (2) College of Science, Babylon University, Iraq, Email: mustaffal_taie@yahoo.com

This study was carried out to evaluate the epidemic and chemical control of rice blast disease under field conditions and by using four rice cultivars (Anber 33, Anber local, Mishkab1 and Hageen 2) in a factorial experiment with complete randomized block design with three levels of nitrogen fertilization 0, 160 and 320 g/plot and two fungicides Benomyl and Mancozeb in Mishkhab Rice Research Station in the Najaf governorate in middle of Iraq. Results showed that Anber 33, and Anber local cultivars were more susceptible to infection by *Magnaporthe grisea*, while Mishkhab 1 and Hageen 2 were more resistant against *M. grisea*. Fertilization by 3 levels of nitrogen increased the blast disease on Anber 33, and Anber local cultivars while Mishkhab 1 and Hageen 2 were more resistant against *M. grisea*. Chemical control by Benomyl and Mancozeb in fertilized plots reduced disease effect and

increased yield of Anber 33 and Anber local as compared with Mishkhab 1 and Hageen 2.

F 14

PRODUCTION OF SOLANAPYRONE A AND TRANSFORMATION OF *ASCOCHYTA RABIEI*. Mohamed Mihoub Zerroug[1], Zouaoui Bouznad[2], Larbi Larous[1], Richard N. Strange[3] and Laouer Hocine[4]. (1) Laboratoire de Microbiologie Appliquée, Université de Sétif, Sétif, 19000, ALGERIA; (2) Ecole Nationale Supérieure d'Agronomie; El-Harrach; Alger; ALGERIE; (3) School of Biological and Chemical Sciences, Birkbeck College, University of London, WC1E7HX, UK; (4) Laboratoire de Valorisation des produits naturels, Département de Biologie, Faculté des Sciences, Université Ferhat Abbes Setif, ALGERIE. Email: med.zerroug@gmail.com

Isolate Tk21 of *Ascochyta rabiei* started producing solanapyrone A toxin from the 6th day of incubation (2.84±0.6µg/ml), reaching 22.29±4.37 µg/ml at 14 days. There was no significant difference in the production of Solanapyrone A from the 10th to the 14th day of incubation. The transformation of *Ascochyta rabiei*, using *Agrobacterium tumefaciems*, gave rise to 498 colonies which grew on media supplemented with the selective agent; hygromycin B. The 30 transformants that sporulated were grown on a defined medium conducive to the production of solanapyrone toxins. Solanapyrone A production, as demonstrated by the absorption of light at 327 nm, the λmax of the compound, varied from 2.11±0.10 µg/ml to 4.32±1.93 µg/ml, representing a reduction of 74.11% to 46.99% in comparison with the wild type (8.15±2.99 µg/ml).

F 15

INFLUENCE OF DIFFERENT ISOLATES OF *TRICHODERMA* SP. ON THE GROWTH AND PRODUCTION OF TOMATO UNDER GREENHOUSE CONDITIONS. Amal Haj Hasan, Kais Ggaza1, Jounar Ibrahim and Alisar Shaabow, Lattakia Center for Rearing Natural Enemies, Lattakia, Syria, Email: amal.haj@gmail.com.

Trichoderma sp is one of the biological control agents for controlling wilt diseases and also has good effects on plants by stimulating plant growth. To this end, comparison tests between five local isolates of *Trichoderma* sp. (T1, T2, T3, T5, T9) and an isolate from the commercial product Biocont (Tbio) were carried out to study the influence of those isolates on the growth and production of tomato. Results showed that there were significant differences between the control and that treated with isolates T1, T2, T5, T9 and Tbio, and no significant differences among the isolates themselves (T1, T2, T5, T9 and Tbio) for growth and for yield. The use of T1 and T3 gave the highest yield among all isolates and control.

F 16

COMPARATIVE AGGRESSIVENESS OF *MYCOSPHAERELLA PINODES* ON PEAS FROM DIFFERENT REGIONS IN WESTERN ALGERIA. Benali Setti[1], Mohamed Bencheikh[1], Jamel Henni[2] and Claire Neema[3]. (1) Institut de Biologie, Université de Chlef, BP151, 02000 Chlef, Algérie, Email: benseti@yahoo.fr; bencheikdz@yahoo.fr; (2) Institut des Sciences, Université d'Es Senia, Oran, Algérie, Email: hennijamel@hotmail.fr; (3) UMR de Pathologie Végétale, INRA/INA-PG/Université Paris VI, 16 rue Claude Bernard, 75231 Paris Cedex, France.

Mycosphaerella blight caused by *Mycosphaerella pinodes* (Berk& Blox) Vestergr. is now recognized as one of the major problems limiting pea yield in Algeria. The present work was carried out to study the aggressiveness of 75 *M. pinodes* isolates collected from different peas growing areas forming four population groups representing four geographic areas in western Algeria. Latent period, incubation period and disease severity were measured in the greenhouse for each of the isolate x cultivar combination. The results showed highly significant differences between isolates and between cultivars for all three aggressiveness components. No significant interaction, however, was noted between isolates and cultivars. Both the principal components analysis (PCA) and Hierarchical cluster analysis (HCA) were employed to analyze the variation pattern within and among population group. The cluster analysis summarized the relationship among the isolates according to their distance of similarity while the isolates were sorted into six distinct aggressiveness groups, AG1 was the most represented with 34% of total isolates. Both the PCA and the cluster analysis revealed that many isolates were closely related irrespective of the geographic or the host cultivar from which they were collected. On the other hand, and based on the same aggressiveness components, the cultivars Onward, Lucy and DP were found to be the most susceptible, whereas the cvs Rondo and MK were partially resistant.

F 17

INTEGRATED CONTROL OF SOYBEAN ROOT ROT CAUSED BY *MACROPHOMINA PHASEOLINA* AND *FUSARIUM SOLANI*. Hadi M. Aboud[1], Majedah H.M. Al-Saady[2] and R.A.Alani[2]. (1) Ministry of Science and Technology, Baghdad, Iraq; (2) Agriculture College, Baghdad University, Ministry of High Education, Iraq, Email: hadimahdiaboud@yahoo.com

This study was carried out to evaluate the integrated activity of two biocontrol agents: *Trichoderman harzianum* and *Rhizobium japonicum* with chemical fungicide Tecto in controlling soybean root rot caused by *Macrophomina phaseolina* and *Fusarium solani*. Results revealed that the use of two biocontrol agents separatly or together with the chemical fungicide Tecto induced significant reduction in disease severity and induced significant increment in growth and crop productivity. The mean number of emerged plants and disease severity of root system in biocontrol agents with Tecto treatment was 63.16% and 33.3%, as compared to infected untreated control which recorded 38.2% with disease severity of 72.7%. This treatment also significantly increased the shoot dry weight, root dry weight, number of branches and plant productivity of 100.3 gr, 36.3 gr, 8 branches and 81.3 gr/plant compared to 61.6 gr, 28.3 gr, 5.6 branches and 46.0 gr/plant in infected untreated control.

F 18

USE OF MOLECULAR AND BIOLOGICAL CHARACTERISTICS TO DIFFERENTIATE *PHYTOPHTHORA* SPECIES ATTACKING CUCURBITS UNDER GREENHOUSE CONDITIONS. Bahram Sharifnabi[1], Azadeh Sharifi-Zarchi[1], Shaban Shafiezadeh[2] and Seyed Alireza Esmailzadeh-Hosseini[3]. (1) Plant Protection Department, College of Agriculture, Isfahan University of Technology, Isfahan 84156-83111, Iran; (2) Plant Protection Research Department, Isfahan Agricultural and Natural Resources Research Center, Iran; (3) Plant Protection Research Dept., Yazd Agricultural and Natural Resources Research Center, Iran, Email: sharifna@cc.iut.ac.ir

Phytophthora species cause root rot of cucurbits under greenhouse conditions in Iran. Disease losses ranged from 5 to 75 percent. Diseased samples were collected and sixty isolates of *Phytophthora* and *Pythium* specimens were cultured on different media. Based on morphological and limited physiological characteristics, 40 isolates were identified as *Phytophthora melonis*. Pathogenicity tests were conducted using all isolates and results revealed that all isolates were pathogenic to cucumber. To distinguish *P. melonis* and *P. drechsleri* from each other, potato pink rot and safflower root rot tests were carried out. Genomic DNA was extracted using Silva *et al.* method and different regions of genomic DNA e.g. ITS, *Tef* and *B-tubulin* genes were amplified by three sets of primers: ITS_1/ITS_4, Tef_1/Tef_2 and bt_1/bt_2. PCR-RFLP of ITS region using *Rsa*I, *Hin*fI, *Taq*I, *Hpa*II and *Hae*III restriction enzymes was carried out. PCR-RFLP method, potato pink rot test and safflower damping off test couldn't distinguish *P. melonis* from *P. drechsleri*. Accordingly, it is necessary to design species-specific primers to provide informative results.

F 19

BIOLOGICAL STUDY OF *BOTRYDIPLODIA THEOBROMAE* FUNGUS. THE CAUSAL ORGANISM OF DIE BACK DISEASE OF MANGO IN YEMEN. Ali Khamis Rowaished and Najeeb Ahmad Mohsen, Plant Protection Department, Faculty of Agriculture, Aden University, Yemen, Email: rowaishedak@hotmail.com

Field survey was carried out in four Yemeni governorates where mango trees are densely planted (Lahag, Abyan, Alhodiada, Haja) during 2006/2007 season. Infected samples were collected from infected branches and kept in polyethylene bags, and were transferred to Plant Pathology Laboratory at Faculty of Agriculture. After isolation and purification of the fungus on PDA culture, four isolates of the fungus *Botrydiplodia theobromae* were obtained beside other fungi like *Fusarium oxysporum, Alternaria alternata, Colletotricum gloeosporioides* and *Aspergillus niger* using pathogencity test for all fungi isolated from mango seedlings of Baladi cultivar. Alhodida isolate (SR) seems to be highly pathogenic and necrotic area reached 40 mm^2 35 days after inoculation, while Haja isolate (AL) was less pathogenic, and the necrotic area reached 27 mm^2. While Lahag isolate (LA) and Abyan isolate (AB) were less virulent and caused necrosis of 28–32 mm^2 respectively. To compare between the four isolates, some other biological tests were carried out. The effect of temperature on the growth and sporulation of isolates was studied with increasing temperature. The mycelium growth increased when the temperature increased between 10-30 ºC, while the mycelium growth decreased at temperatures between 30-35ºC. The mycelium growth completely stopped at 40 ºC. No mycelial growth was noticeable at 10ºC. Conidiospores also germinated and reached 3850 conidia/ml. at 30 ºC with Alhodiada isolate (SR). Less spore germination occurred (3420 conidia / ml) with isolate from Lahag (LH) 15 days after inoculation. The growth rates of the four isolates under 27–30 ºC was variable where SR was more virulent followed by AB, AL and LA, where colony diameter reached 62.4 , 61.0, 58.4 and 56.6 mm, respectively. Micrometric measurements of the conidia of four isolates with deep brown colour and transversal and longitudinal lines ranged between 15- 30 x 10 -15 mm.

F 20

SAFE CHEMICALS TO OVERCOME PRE- AND POST HARVEST FUNGI ATTACKING DATE PALM FRUITS IN EGYPT. A.M. Abdelmonem and S. Y. Farag, Plant Pathology Research Institute, Agricultural Research Center, P.O. Box 12619, Giza, Egypt, Email: dimamt@yahoo.com; dimam@link.net; salahfarag@yahoo.com

Fresh date palm fruits are frequently attacked by a number of pathogenic fungi. *Aspergillus niger* and *Ceratocystis paradoxa* are often common. They infect date fruits leading to considerable losses at both pre and post harvest. They bring about serious infection to Samany, Zaghloul and Barhi varieties where they develop causing fruit decay whereas fruits are still on the tree. *A. niger* was found to develop more on Samani variety while *C. paradoxa* caused higher infection rate on both Zaghlol and Barhi varieties, especially in humid areas. After harvest, 3 species belonging to the genera *Penicillium*, *Alternaria* and *Cladosporium* caused a lot of decay to all varieties tested during cold storage. To overcome the disease problem, preharvest treatments were carried out using some safe chemicals. Spraying potassium thiosulfate at 1500 ppm, sodium carbonate at 3000 ppm and calcium chloride at 3000 ppm demonstrated high effects against all fungi tested diminishing their effect at both pre and post harvest cases. Less cracking and black nose were observed with both treatments on Zaghlol dates during fruit ripening. On the other hand, little decay was only observed during rutab stage in the cold storage. Those selected chemical treatments safeguarded date palm fruit quality without any adverse impact.

F 21

VIRULANCE OF *PUCCINIA TRITICINA* ERIKS, THE CAUSAL AGENT OF WHEAT LEAF RUST IN SYRIA AND LEBANON. Mohammad Kassem[1], Ahmed El-Ahmed[1], Mohammad Shafik Hakim[2], Mohammad El-Khalifeh[3] and Miloudi Nachit[3]. (1) Department of Plant Protection, Faculty of Agriculture, University of Aleppo, Syria, Email: agromohammad@msn.com; agromohd@scs-net.org; (2) Department of Field Crops, Faculty of

Agriculture, University of Aleppo; Syria; (3) ICARDA, P.O. Box 5466, Aleppo, Syria.

The wheat leaf rust caused by *P. triticina* Eriks, occurs annually throughout most wheat growing areas worldwide and becoming an important disease on durum and bread wheat in the Mediterranean region, due to increases in wheat irrigated area as well as sowing susceptible varieties. Consequently, there is an urgent need to develop durum and bread wheat cultivars with broad genetic resistance to leaf rust. This work aimed to determine the physiological races of *P. triticina* occurring in wheat fields in Syria during spring; and in Bekaa valley (Terbol, Lebanon) during summer of 2007. The North American System of Nomenclature for *P. triticina* was used to determine the races. Results revealed large variations in virulence within races studied, as some of them were able to breakdown resistance of Lr gene(s) such as *Lr* 9. The leaf rust races were grouped into three groups of virulence: weak, medium and high. The CBRT race, was found to be virulent on about 50% of the studied resistance genes.

F 22

DEVELOPMENT OF EFFICIENT METHODOLOGY FOR PROFUSE PRODUCTION OF CONIDIOSPORES AND PSEUDOTHECIA IN *PYRENOPHORA TRITICI-REPENTIS* THE CAUSAL AGENT OF TAN SPOT DISEASE ON WHEAT. Roula Shamsi[1], Amor Yahyaoui[2], Ahmed El-Ahmed[1] and Miloudi Nachit[2]. (1) Plant Protection Department, Faculty of Agriculture, Aleppo University, Aleppo, Syria, Email: r.shamsi@hotmail.com; (2) ICARDA, P.O. Box 5466, Aleppo, Syria.

Tan spot, caused by *Pyrenophora tritici-repentis*, is a common disease on wheat, responsible for economic losses in some wheat growing areas worldwide. The study aimed to develop reliable, applicable and economic methods for profuse production of conidio spores as well as pseudothecia of *Ptr in vitro*. Seven nutritious cultures and two methods of culturing were tested for fungal sporulation under different conditions of light with fixed temperature. Results indicates that the most suitable medium for *Ptr* sporulation was the media R-PDA (juice of diferent vegetables – PDA – $CaCo_3$ – Bacto Agar), which was inoculated by spreading mycelium suspension of the fungus on media surface and incubated under constant light for 24 hours at 20°C. Meantime, WL-PDA and WS-PDA (wheat leaves or grains – PDA – $CaCo_3$ – Bacto Agar) were the best for inducing pseudothecia production at 20° C and 16/8 hours (light/ dark). These three cultures proved to be the most efficient for high production of conidia (the first) and pseudothecia (the second and the third). Therefore, it is advisable to use these three media in breeding programs oriented to produce wheat cultivars resistant to tan spot disease on wheat**.**

F 23

MOLECULAR DETECTION OF *ASCOCHYTA RABIEI* IN INFECTED CHICKPEA SEEDS USING ITS MARKER. N. Hassan[1], S. Murad[1], B. Bayaa[2], S. Asaad[1], S. Kabbabeh[1], M. Abang[1] and M. Baum[1]. (1) International Center for Agricultural Research in the Dry Area (ICARDA), P.O.Box 5466, Aleppo, Syria, Email: s.murad@cgiar.org; (2) Faculty of Agriculture, University of Aleppo, Aleppo, Syria, Email: b.bayaa@cgiar.org

Ascochyta rabiei is considered to be the most damaging pathogen of chickpea. The disease can cause total yield loss in years of severe epidemic. The pathogen is dispersed by water splash in the field and by infected seeds. Therefore, widespread commercial distribution of plant material or seeds can rapidly facilitate its spread. Development of an effective crop disease management depends on the rapid detection and precise identification of the pathogen. The objective of the study was to identify markers that could be used as diagnostic tools, through identification of a sensitive, specific and rapid PCR-based diagnostic method for the identification of *A. rabiei* on infected seeds without the presence of disease symptomology. Seed of four chickpea varieties (Ghab 1, Ghab 2, Ghab 3, and Ghab 4) infected with *A. rabiei* were collected from ICARDA′ s research fields in Tel Hadia, Aleppo, in 2007. Total genomic DNA of the infected seeds was extracted using modified CTAB method. Four DNA samples were used as positive controls for *A. rabiei* and negative controls for chickpea. PCR amplification with ITS4& ITS5 primers with presence of the control produces a clear banding pattern as two clear bands of different sizes were amplified in each of the infected seeds. The first band was the chickpea ITS fragment of ~ 750bp and the second the *A. rabiei* specific ITS fragment of 565bp. The test could be used by regulatory and quarantine authorities to ensure safe and clean seed introduction into countries.

F 24

SUGAR BEET DISEASES AND PESTS INCEDENCE AND DAMAGE UNDER EGYPTIAN CONDITIONS THROUGH 25 YEARS. Mostafa Mohamed Ashour El-Kholi, Sugar Crops Research Institute, ARC, 12619 Giza, Egypt, Email: mostafa.elkholi@yahoo.com

Sugar beet crop has been cultivated as a commercial crop in Egypt since 1982, at Kafer El-Sheikh Governorate (16,000 feddans), and expanded with time to cover about 250,000 acres in 2008 at several governorates in different areas, i.e. North of Delta: Dakahlia, Domietta, Garbia, Sharkia, and Beheira; North West of Delta: Nobaria region; East of Delta: Sharkia, Port Said, Ismallia; and Middle and Upper Egypt: Giza, Fayoumm Bani Sweif, and Minia. Sugar beet plants are attacked by numerous diseases, which have been surveyed during the growing season (210 days). Most, but not all, of the major diseases and pests of sugar beet were already well known and some were quite understood, many have been identified. Under Egyptian conditions, seedling and root rot diseases, foliage diseases (leaf spot, powdery mildew, rust and virus diseases) are recorded. Also, nematode diseases are becoming a serious problem in the newly reclaimed soil which is located in West of Nobaria. Post harvest - root diseases caused by a number of pathogenic and saprophytic fungi were also recorded. Generally, some of these diseases seriously affect the total quantity of beet root and subsequently cause considerable economic losses on total sugar production, and this may threaten sugar beet plantation in the near future. Therefore, safe and effective control methodologies should

be found in order to minimize losses caused by such serious diseases.

F 25

ISOLATION AND IDENTIFICATION OF THE FUNGUS CAUSING WILT AND DEATH OF CITRUS TREES IN THE WESTERN REGION OF LIBYA. Issa Saleh Farag and Hatem Mostafa Younes, Plant Protection Department, Faculty of Agriculture, Fateh University, Libya, Email: hatem_younes@hotmail.com

Fusarium was isolated from the roots and soil of citrus trees that were showing wilting symptoms. The results of identification which was carried out at the Department of Plant Protection, Faculty of Agriculture, Al-Fateh University and confirmed by the International Mycological Institute, U.K., revealed that the fungus species was *Fusarium solani*, which is well known as the main cause of dry root rot in citrus trees. The survey demonstrated that this disease was widespread in all locations of citrus growing areas northwest of Libya within the area extended from Misurata in the east to El-Zawia in the west.

F 26

EFFECT OF GEOGRAPHICAL LOCATION AND RESISTANCE GENES ON DEVELOPMENT OF GENETIC STRUCTURE AND PATHOGENICITY OF BACTERIAL POPULATIONS OF *XANTHOMONAS AXONOPODIS* PV. *MALVACEARUM* CAUSING ANGULAR LEAF SPOT OF COTTON IN SYRIA. Marwan Abduo Hassan[1], Hassan Khalil[1], Nizar Mir Ali[2], Backri Debs[3] and Mohammed Nayef Al-Salti[4]. (1) Department of Plant Protection, Faculty of Agriculture, Al-Baath University, Homs, Syria, Email: merarabdohassan@hotmail.com; (2) Department of Molecular Biology and Biotechnology, AECS, Damascus, Syria; (3) Department of Plant Protection, Faculty of Agriculture, Aleppo University, Aleppo, Syria; (4) General Commission of Scientific Agricultural Research (GCSAR), Cotton Center, Aleppo, Syria.

Ten cotton differential lines in addition to a G. *barbadense* line containing B2 B6 resistance genes to black arm were grown under greenhouse conditions in 2006 and were artificially inoculated with nine races of the pathogen. Cultivars Acalla 44, Stoneville 20, Mebane B-1, 101-102B, Aleppo 118 (in 2007 only) in addition to *G. barbadense* were also grown under field conditions in six geographical locations in three governorates (Aleppo, Idleb and Hama) (natural infection). Chromosomal DNA of *Xam* bacteria causing angular leaf spot of cotton in Syria was extracted before and after artificial infection, and the PCR based ISSR technique was employed to determine the degree of bacterial capacity to break resistance under natural and artificial conditions, to study the development of pathogen races under favourable environmental conditions (artificial infection), the evaluation of Aleppo 118 against angular leaf spot under field conditions, and the influence of geographical sites and resistance genes on the development of genetical and pathogenicitial composition of *Xanthomonas axonopodis* pv *malvacearum*. Results showed that the pathogen was able to overcome the resistance genes of 101-102B line under greenhouse conditions where SM1 overcame all differentials. Similarly, the bacterium was able to infect all cultivars under field conditions. The results also showed a bacterial genetic flexibility when confronted with resistant cultivars under favorable conditions, and no correlation was found between the geographical location and pathogen races. Cultivar 101-102B was the most resistant unlike Aleppo118 which was the most susceptible to the disease compared with the check line Acalla44.

F 27

IDENTIFICATION OF SOME *ALTERNARIA* SPECIES CAUSING LEAF SPOT DISEASE IN VEGETABLE CROPS IN MOSUL, IRAQ. Warka S. Al-Taee and Riyadh K. Al-Barhawi, Department of Biology, College of Science, University of Mosul, Mosul, Iraq, Email: wsqassim2004@yahoo.com

Leaves of plants showing leaf spot diseases were collected from fourteen different summer and winter vegetable crops grown in various areas of Mosul city, Iraq. Using conventional identification methods and single spore isolation and slide culture method, a total of 150 fungal isolates from these leaf spots were assigned to eleven different species of the genus *Alternaria*, which included: *A. alternata*, *A. brassicae*, *A. brassicicola*, *A. cheiranthi*, *A. dianthi*, *A. dianthicola*, *A. longipes* , *A. radicina* , *A. raphani*, *A.* state of *Pleospora infectoria*, *A. tenuissima* and *A. alternata* species, were the most common among these isolates constituting 69.35% from summer crops and 48.86% from winter crops, and 57.33% from both crops. This was followed by two other species *A. brassicicola* and *A. tenuissima*, constituting 12.67% and 10% of the total isolates respectively. Other *Alternaria* species appeared at much lower frequencies and varied according to the crop examined.

F 28

CEREAL SEED HEALTH TESTING AT THE INTERNATIONAL CENTER FOR AGRICULTURAL RESEARCH IN THE DRY AREAS: IMPLICATIONS FOR THE SAFE MOVEMENT OF GERMPLASM. Siham Asaad and M. Hyani, The International Center for Agricultural Research in the Dry Areas (ICARDA), P. O. Box 5466, Aleppo, Syria, Email:s.asaad@cgiar.org.

The seed health and quarantine implications represent a major concern to international agricultural research centers (IARCs) and other institutions involved in genetic resources conservation and germplasm exchange. For the period of ten years, the Seed Health Laboratory at ICARDA tested all incoming cereal seed (251 seed lots comprising 91,993 samples) to minimize the risk of spreading pests and pests transmitted through seeds. Seed lots were received from 41 countries. All seeds were tested using different pest's detection methods including direct visual inspection, wash-filter, freezing-blotter, embryo, and seed gall nematode. Results of seed−borne pests in seed lots revealed 20.02% infection with *Tilletia caries* and/or *T. foetida*, followed by *T. controversa* (0.99%), *Ustilago tritici* (0.30%), *T. indica* (0.27%), *Fusarium* spp. (0.25%), *Helminthosporium* spp. (0.09%), *Ustilago* spp. (0.03%),

Urocystis agropyri (0.02%), *Anguina tritici* (0.02 %) and *Ustilago hordei* (0.01 %). The frequency of *Tilletia indica*-infection in seed samples from Ethiopia was 13.31%, Azerbaijan (10.20%), Tajikistan (0.64%) and Turkey (0.22%). Both *T. indica* and *T. controversa* do not exist in Syria and are considered as quarantine fungi with zero tolerance. To save valuable or rare genotypes at ICARDA, a cleaning/disinfection procedure was used to treat seed lots carrying non-quarantine pests. Genotypes carrying pests of quarantine significance were incinerated. The implications of these findings for the safe movement of cereal germplasm will be discussed.

F 29

EFFECT OF SOME PLANT EXTRACTS ON THE POPULATION OF *FUSARIUM OXYSPORUM* F. SP. *LENTIS*, THE CAUSAL ORGANISM OF LENTIL WILT. Leila Si Moussa[1], Lakhdar Belabid[1], Aicha Tadjeddine[1], Miloud Bellahcene[2] and Bassam Bayaa[3]. (1) Laboratoire de Recherche sur les Systèmes Biologiques et la Géomatique, Université de Mascara, BP 763, Mascara, 29000, Algérie; (2) Laboratoire des Microorganismes, Faculté des Sciences, Université de Mostaganem Algérie ; (3) Departement of Plant Protection, Faculty of Agriculture, Aleppo University, Aleppo, Syria, Email: belabidl@yahoo.fr

Fusarium lentil wilt caused by *Fusarium oxysporum* Schechet. emend. Snyder & Hansen f. sp. *lentis* Vasudeva and Srinivasan (Fol) is an important disease and is considered as a limiting factor to lentil production in Algeria. The use of the plant extracts is recently advocated as a potential control method of plant diseases. The present work aimed at evaluating the antifungal activity of essential oils and powders of ten medicinal plants (*Anacyclus valentinus* L., *Artemisia herba alba* Asso., *Eucalyptus sp, Inula viscosa* (L.) Aiton, *Laurus nobilis* L. , *Mentha pepirita* L. , *Rosmarinus officinalis* L., *Salvia officinalis* L., *Tetraclinis articulata* (Vahl) Masters and *Thymus vulgaris* L.) on *Fol* microconidia germination, mycelial growth and fungus population in the soil. Results obtained showed that treatments with 5 and 10% of the powders of *I. viscosa* and *M. pepirita* and the essential oils formulation in all treatments have significantly reduced the soil population densities of *Fol* and the disease incidence on lentil. Results obtained highlight the importance of this subject as it can offer the possibility of using plant derivatives in disease management against this soil-borne pathogen.

F 30

FUNGI ASSOCIATED WITH DECLINE OF GRAPEVINE IN ALGERIA (EUTYPA DIEBACK AND ESCA). Akila Berraf[1] and Alan J.L. Phillips[2]. (1) Département de Biologie, Faculté des Sciences Agro-Vétérinaire, Université Saad Dahleb, 09000 Blida, Algérie, Email: berraf.a@hotmail.fr ; (2) Centro de Recursos Microbiologicos, Faculdade de Ciencias e Tecnologia, Universidade Nova de Lisboa, Portugal, Email: alp@unl.fct.pt

Grapevine decline has become a limiting factor in many grapevine production areas, worldwide. Esca and Eutypa dieback are two fungal diseases most destructive of the woody tissues in grapevine. The etiology of Esca and Eutypa dieback is still partly unknown. The ban of sodium arsenite in European vineyards greatly contributed to the increase of these two diseases. In Algeria apparently, there has been little research on trunk diseases of grapevine. Esca presents two different types of symptoms, one characterized by leaf symptoms, the other by sudden death of the plant often called “apoplexy” which is frequent in Mediterranean regions when a hot dry period is preceded by rainfall. Esca can be typically identified by internal wood decay, symptoms on leaves and in some cases on berries. The internal symptoms can be seen when transverse or longitudinal cuts are made in the trunk and shoots. Surveys in wine growing regions of Algeria revealed high rate of dead vines. The most frequent fungi isolated from the lesions were *Eutypa lata* (the causal fungus of dieback), *Phaemoniella chlamydospora, Phaeoacremonium aleophilum, Fomitiporia mediterranea* and several species of *Botryosphaeriaceae.*

F 31

***STEMPHYLIUM VESICARIUM* THE CAUSAL PATHOGEN OF STEMPHYLIUM LEAF BLIGHT ON ONION: SURVEY AND SOME BIO AGENTS FOR ITS CONTROL.** M.A.M. Hussein, M.H.A. Hassan and K.A.M. Abou Elyousr, Plant Pathology Department, Faculty of Agriculture, Assiut university, 71526, Assiut, Egypt, Email: mhasanmha@yahoo.com

In the last few years, Stemphylium leaf blight was noticed as common disease, incited by *Stemphylium vesicarium,* is one of the serious diseases affecting onion in Egypt. The causal pathogen’s pathogenicity to onion plant was confirmed in Egypt. The causal pathogen was isolated and identified as *Stemphylium vesicarium* (Wallr.) Simmons and the telemorphic state *Pleospora allii* (Rabenh.) Ces. & De Not was observed. During a survey for the causal pathogen in Egypt, 32 isolates ere collected. Testing 25 isolates of *Stemphylium vesicarium* on Giza 6 onion cultivar under greenhouse conditions revealed that isolates of the pathogen were able to infect onion plants with different degrees of disease severity causing typical symptoms of Stemphylium leaf blight disease. The antagonistic capability of certain microorganisms was investigated *in-vitro*. Data revealed that all microorganisms tested were able to inhibit the mycelial growth of the causal pathogen with various degrees of growth inhibition. The highest inhibition was caused by *Pseudomonas fluorescens, Bacillus subtilis* and *Trichoderma harzianum*. However, *Gliocladium catenulatum* and *Saccharomyces cervisiea* showed the lowest mycelial growth inhibition.

F 32

ISOLATION AND DETERMINATION OF PHYSIOLOGICAL RACES OF WHEAT YELLOW RUST *PUCCINIA STRIIFORMIS* F. SP. *TRITICI* IN SYRIA DURING 2005/2006 AND 2006/ 2007. Amor Yahyaoui[1], M, F. Azmeh[2] and Shoula kharouf[2]. (1) International center for Agricultural Research in the Dry Area (ICARDA) P.O. Box. 5466, Aleppo, Syria; (2) National commission for Biotechnology (NCBT), Damascus, Syria, Email: shoulakharouf@yahoo.com

A number of diseases attack wheat crop in Syria. Yellow rust or stripe rust (*Puccinia striiformis* West f. sp. *tritici*) is considered to be the most important rust disease of wheat in cool and humid wheat growing area. The disease spreads in all wheat growing area in Syria especially in the irrigated and humid area. To identify the distribution and severity of the disease during the two seasons (2005/2006 and 2006/2007), field survey was conducted in 76 fields in the first season and 73 fields in the second season in different wheat growing area in Syria. Surveys included farmer's fields and the Agriculture Research Centers. Identification of physiologic races was done by evaluating the reaction type of seedling of the differential cultivars. Data of races identification showed that a number of physiologic races were spread in wheat field in Syria. Fourteen races have been isolated and identified (0E16, 14E166, 34E20, 36E6, 132E134, 102E130, 14E166, 0E0, 4E28, 164E22, 128E132, 230E150, 166E150, 38E6). The race 6E16 was the most frequent in the two seasons. The race 230E150 was the most virulent race, followed by 166E150 and the race 0E0 was the most weak race. Study of the physiologic races during two seasons showed five new races (34E20, 36E6, 132E134, 102E130, 14E166) in Syria; these races were different in their pathogencity on the differential sets.

F 33

EVIDENCE OF SEXUAL REPRODUCTION AND HIGH GENE FLOW BETWEEN *MYCOSPHAERELLA GRAMINICOLA* POPULATIONS IN TUNISIA USING SSR ANALYSES. Sameh Boukef[1], Salah Rezgui[1], Amor Yahyaoui[2], Bruce A. McDonald[3] and Patrick Brunner[3]. (1) Institut National Agronomique de Tunisie 43 Av. Charles Nicole Tunis 1082. Tunisia, Email: samehboukef@yahoo.fr; (2) International Centre for Agricultural Research in the Dry Areas (ICARDA), Box 5466, Aleppo, Syria; (3) Plant Pathology, Institute of Integrative Biology, ETH Zurich, 8092 Zurich, Switzerland.

Mycosphaerella graminicola is the causal organism of *Septoria tritici* leaf blotch on wheat. It causes significant yield losses on wheat in Tunisia. Previous studies showed the important effect of sexual reproduction and long-distance gene flow on the rapid development and spread of fungicide resistance in this pathogen. To address these mechanisms in Tunisian populations of *M. graminicola*, five field populations were collected from humid and semi-arid zone and from durum and bread wheat fields. The distribution of mating types and analyses of microsatellites were used to measure genetic diversity and to test for random-mating. Mating types ratios did not deviate significantly from 1:1 in all populations according to a $\chi 2$ test. High levels of genotypic diversity were found within populations. Multilocus association index (I_A) and gametic disequilibrium (GD) tests showed no significant departure from gametic equilibrium. No significant differentiation (G_{ST}) was found among populations sampled from different climatic regions and from different hosts, consistent with high gene flow among regions. This was confirmed by a high number of migrants per generation (N_em) between fields and regions. These results indicated that Tunisian population of *M. graminicola* are random mating and reproduce sexually, indicating that ascospores are likely to play an important role in the epidemiology of *Septoria tritici* leaf blotch in Tunisia and probably across north Africa.

F 34

EFFECT OF DRIP AND FARROW IRRIGATION ON GREY MOULD DEVELOPMENT IN GREEN HOUSE TOMATOES. Abdelhadi Guechi[1] and Kamel Aissat[2]. (1) Laboratory of Microbiology and Hytopathology, Faculty of Sciences, University Ferhat ABBAS, Sétif 19000, Algeria, Email: guechibio@yahoo.fr; (2) Laboratory of Applied Microbiology, Faculty of the Sciences of Nature and Life, University Mira, Bejaia, 06000, Algeria

A field experiment was conducted in 2007 in five unheated greenhouses. Plants were examined individually every 8 days and the proportion of plants attacked by grey mould on leaves, stems or fruits was recorded from the end of March until the end of June. Results showed that the attack of *Botrytis* on the stems occurred earlier in arrow irrigation, 98 days after planting on average, than in drip irrigation (106.3 days after planting). The kinetics of plant infection on stems, leaves and fruits were higher under farrow than under drip irrigation. Disease severity was measured by the average number of stem lesions per plant. Disease severity was higher in plants under farrow than under drip irrigation, reaching at the end of June 1.32 and 0.99, respectively. Plant mortality due to grey mould was first recorded at 94 and 110 days after planting, respectively, in the farrow- and in drip- irrigated greenhouses. These results suggest that drip irrigation could be a useful tool for the implementation of integrated protection schemes and for reducing the use of pesticides in unheated tomato greenhouses.

F 35

EFFECTS OF TEMPERATURE ON HOST RESITANCE AND PATHOGEN VIRUELNCE IN CHICKPEA-ASCOCHYTA PATHOSYSTEM. Seid Ahmed, Siham Kabbabeh, Imtiaz Muhammad and Rajendra, Malhotra, Biodiversity and Integrated Gene Management Program, ICARDA, P.O. Box 5466, Aleppo, Syria, Email: s.a.kemal@cgiar.org

Ascochyta blight (*Didymella rabiei*) is one of the major production constraints affecting both winter and spring-sown chickpea in different parts of the world. Major Ascochyta blight control strategy is development of resistant varieties with high yield and acceptable market classes and especially at locations where weather conditions are highly favorable for disease development. Strategic fungicide sprays are used mainly by commercial farmers. The durability of chickpea varieties developed and released in different countries is affected by the emergence of new aggressive pathotypes in the population of *D. rabiei*. Temperature is known to affect host plant resistance and pathogen aggressiveness in different pathosystems. The effect of different temperature regimes (10, 15, 20, 25 and 30^0C) on six chickpea varieties with varying levels of Ascochyta blight resistance and four pathotypes of *D. rabiei* with varying levels of aggressiveness were studied

under controlled conditions. Significant interaction effects ($p<0.001$) were observed between temperature and chickpea varieties; temperature and pathotype aggressiveness indicating that host resistance and pathogen aggressiveness were not similar under different temperature regimes. The roles of temperature regimes on host resistance, pathogen virulence, epidemiological parameters and implications on resistance screening will be reported.

F 36

INHIBITORY EFFECT OF BLACK CUMIN SEEDS ESSENTIAL OIL ON MYCELIAL GROWTH AND SPORE GERMINATION OF SOME PHYTOPATHOGENIC AND FOOD-CONTAMINATING FUNGI. Abdellaziz Taxanna[1] and Nouredine Bellatar[2]. (1) Laboratory of applied mycology, Biology department, Setif University, Algeria; (2) Laboratory of Biochemestry, Biology department, Setif University, Algeria, Email: Taxanna@yahoo.fr

The plant essential oils are for their inhibitory activity and its antimicrobial effects. The aim of this study was to investigate the inhibitory effect of two essential oils (Elnada, Surrat) and some essential oil compounds from black cumin seeds (Thymol, Thymoquinone, Carvone, Carvacrol) on mycelial growth and spore germination of *Aspergillus niger, A. flavus, Fusarium oxysporum* f.sp. *albedinis* and *Mauginiella scaettae.* The results showed an inhibitory effect against all fungi tested. The minimum inhibitory concentration (MIC) was 6.25-25 µg/ml and the minimal fungicide concentration (MFC) was 12.50-50 µg/ml. The oil compound from black cumin seeds (Thymol, Thymoquinone, Carvacrol) gave total inhibition of all fungi tested, and the MIC value was 6.25-25 µg/ml and the MFC value was 12.50-50 µg/ml. On the other hand, the Carvone compound did not have an effect on all tested fungi.

F 37

EFFECT OF OLIVE FRUITS INFECTION WITH *PILOCEAE OLEAGINA* ON OLIVE OIL QUALITY. S. Moamen[1] and N. Ali Mohamed[2]. (1) Food Science Laboratory, Faculty of Agriculture, Omar Al-Mukhtar University, El-Bayda, Libya; (2) Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, P.O. Box 919, El-Bayda, Libya, Email: noboshakoa@yahoo.com

Green olive fruits cv. Shamlawy were collected from Ghrayka and Wadi Bilghar in the Bayda region of Jabal Al-Akhdar (Green Mountain). The collected samples included healthy looking fruits as well as fruits with symptoms of peacock eye spot disease. The samples were split into two parts, one part was used to identify the causal agent of the disease, which proved to be *Piloceae oleagina* characterized by short and erect conidiophores carrying pear shaped, 1-2 cells conidia; whereas the second part of the sample was used to study the natural, physical and chemical characteristics of the oil extracted from healthy looking and diseased fruits. There was a significant difference between the oil from healthy and diseased fruits in most of the characteristics studies except oil viscosity. Diseased fruits were positive to the Gras test.

F 38

SOIL RECEPTIVITY OF DATE PALM GROVES IN ARAB COUNTRIES TO *FUSARIUM OXYSPORUM* F. SP. *ALBEDINIS*, CAUSAL ORGANISM OF BAYOUD DISEASE OF DATE PALM. My Hassan Sedra, Arab Organization of Agricultural Development (AOAD), Institut National de la Recherche Agronomique, Centre Régional de la Recherche Agronomique de Marrakech, BP. 533 Marrakech, Morocco, Email: sedramh@hotmail.com

The Bayoud disease caused by *Fusarium oxysporum*. f.sp. *albedinis* of the date palm tree is one of the most dangerous diseases in the world that it is difficult to control. It is now spread in some countries of North Africa and since its appearance, it caused huge losses in Morocco and Algeria and recently discovered in Mauritania. The Bayoud disease constitutes a serious threat for neighboring countries and other countries that produce dates. In the frame of a regional project on Bayoud disease of date palm executed by AOAD in 15 Arab countries, this paper research aims to evaluate the level of soil receptivity in 12 countries, represented by 42 date palm groves, to the pathogen. Results have permitted to develop simple technique to produce fungus chlamydospores and to evaluate soil receptivity to the fungus by measuring the spore germination rate using soil and soil extract during 48 hours. The results showed significant differences in soil receptivity to the fungus according to countries and regions in each country. Moreover, the results showed the same level of soil receptivity to several strains of the pathogen from different origins and presenting different pathogenicity levels. It has showed that nearly all Arab soils had high to middle level of receptivity to the fungus and some soils are such as Al-Ghamr in Libya and some soils in Syria, Iraq it is important to investigate further. Consequently, it is advised to take precautions to prevent the entry of the disease in the countries where soils showed high receptivity. This research gives an idea, not about the disease spread, but it permits to develop a spread risk map for the disease in countries that are still free from the disease. It is also possible to apply this technique to evaluate soil receptivity to other wilt diseases of vegetables and other crops.

F 39

BREEDING FABA BEAN FOR RESISTANCE TO CHOCOLATE SPOT. F. Maalouf, S. Ahmed, M. Kabakebji, S. Kabbabeh and K. Street, Biodiversity and Integrated Gene Management Program, International Center for Agricultural Research in the Dry Areas, Aleppo, Syria, Email.: F.Maalouf@cgiar.org

Faba bean (*Vicia faba* L) is adversely affected by numerous fungal diseases and parasitic weeds in different regions of the world. Chocolate spot caused by *Botrytis fabae* is one of the major diseases that affect faba bean production in many countries. The International Center for Agricultural Research in the Dry Areas (ICARDA) has the world mandate for improving the productivity of faba bean including development of resistance gene pools to

Chocolate spot that are suitable for different countries. Hence, this paper summarizes recent efforts in developing new sources of resistance to chocolate spot that can be utilized for developing high yielding and disease resistant varieties by the national agricultural research systems. Two hundred fifty genotypes obtained from Genetic Resource Section at ICARDA were planted in two replications with two repetitive checks Rebeya40 (susceptible rating 7 to 9) and Icarus BPL710 (resistant rating 1). The screening was performed under natural and artificial infections at Lattakia Research Station, Syria. The entries were scored for choclate spot reactions using 1-9 rating scale where 1 is highly resistant and 9 is highly susceptible. Single resistant plants were selected with a rating scale of 3 and below. The progenies of these single plant selections showing resistance reaction were further evaluated for three successive generations in Chocolate spot screening nursery. Among the tested genotypes, 18 were found resistance (scoring of 1 to 3) with 5 of them showing reaction similar to high resistant check 'Ascot' (rating of 1). These resistant lines were selected from populations of ILB4003 (Spain), BPL878 (Canada), ILB1485 (Netherlands), ILB2575 (Ukraine), ILB4088 (Turkey) and ILB1864 (Ethiopia). All the identified populations showed uniformity and are being used in the faba bean breeding program as parents to incorporate resistance genes to high yielding and adapted genotypes.

F 40

PCR-BASED DETECTION OF *COLLETOTRICHUM GLOEOSPORIOIDES* (PENZIG) PENZIG AND SACC. (ANTHRACNOSE) AND *GIBBERELLA MONILIFORMIS* WINELAND (TWISTER) INFECTING ONIONS IN THE PHILIPPINES. Ronaldo T. Alberto[1] and Vermando M. Aquino[2]. (1) Natural Sciences Research Institute, University of the Philippines, Diliman/ Department of Crop Protection, College of Agriculture, Central Luzon State University, Munoz, Nueva Ecija 3120; (2) National Institute of Molecular Biology and Biotechnology, University of the Philippines, Diliman, Quezon City, Philippines, Email: ronbert57@hotmail.com

Anthracnose is a serious problem of onions (*Allium cepa* L.) in the Philippines. It can cause huge yield losses as high as 80-100% resulting in shortages in both domestic and export supply, high price, unfair competition and smuggling of onions to the country. The disease caused typical anthracnose/ dieback symptoms on the leaves and anthracnose on bulbs associated with twisting and discoloration of the leaves, neck elongation and non formation of bulbs which is not typical for a *Colletotrichum* infected plants. Field observations also showed onions exhibiting anthracnose symptoms alone, twisting alone or both symptoms. These observations lead us to examine further the nature and real cause of the disease. Species-specific primers CgInt and CgInt in conjunction with conserved primer ITS4 were used to amplify the genomic DNA's of *Colletotrichum* isolates from anthracnose infected onions. The rDNA ITS region was amplified using primers ITS1Ext and ITS4Ext and *Histone* (*his4*) genes using H4-1a and H4-1b. Arbitrarily primed (AP)-PCR was carried out to obtain polymorphic bands using 15-bp primers: GACAC3, CAG5, TCC5 and MR. All onion *Colletotrichum* isolates were tested positive to *C. gloeosporioides* species-specific primer (CgInt2) and the pink isolates from onion to *C. acutatum* species-specific primer (CaInt2). Internal transcribed spacer (ITS) sequences and NTSYS dendogram analysis of ten gray white (GW) isolates were grouped into *C. gloeosporioides* and the four pink isolates to *Gibberella moniliformis*. Analysis of *his4* nucleotide sequences showed the groups were concordant with ITS, but differed on species level. Arbitrarily Primed-PCR analyses revealed intraspecific subgroups, but neither was useful to decipher species level relationships. Results also indicated the potential of using *C. gloeosporioides* and *C. acutatum* species-specific primers for routine pathogen diagnosis. Arbitrarity Primed PCR (AP-PCR) analysis using two repeat sequences primers (TCC5 and CAG5) and two microsatellite derived primers (GACAC3 and MR) demonstrated its potential in species identification and classification of the unknown strains of the two plant pathogens. Test for pathogenicity demonstrated that the two species isolated from onions were the causal agents of the anthracnose/twister disease complex. This is the first positive identification of *C. gloeosporioides* and *G. moniliformis* infecting onions in the Philippine.

F 41

EFFECT OF SOIL TEXTURE, WATER SURFACE DISTANCE, WATER GUTTER POSITION AND GREENHOUSES ORIENTATION ON ROOT AND CROWN ROT AND ON LEAF SPOT NECROSIS OF SWEET PEPPER (*CAPSICUM ANNUUM*) BY *PHYTOPHTHORA CAPSICI* FUNGI IN GREENHOUSES. Abdelhadi Guechi[1] and Messaouda Benabdelkader[2]. (1) Department of Biology, Science Faculty, Ferhat Abbes University, Setif, Algeria; (2) Department of Ecology, Science Faculty, Jijel University, Algeria , Email: yamina_messaouda@yahoo.fr

Pepper is an important crop in Jijel town, in Algeria. It is planted in different greenhouses orientation, with varying distance from the sea or river, on different soil textures, and are irrigated by water gutter. *Phytophthora capsici* proved to be a causal agent of root and crown rot, and leaf spot necrosis of sweet pepper (*Capsicum annuum*). The incidence of root and crown rot was higher in sandy clay (8.2%) than in sandy loam (5.08%), was higher in greenhouses located near the sea or the river with an incidence of 7.94 and 8.45%, which was higher than in greenhouses located away from the water surface (2.25%), or when the water gutter was near the plant base (6.92%) or away from plant base (2.91%). However there was no differece in leaf infection by spot necrosis between the two orientations of greenhouses (Vertical or horizontal on the sea). The vertical greenhouses had 0.32% leaf infection and 7.38% plant infection, whereas horizontal greenhouses had 0.26% leaf infection of and 7.04%, plant infection.

F 42

MYCELIAL COMPATIBILITY GROUPS AND PATHOGENIC VARIABILITY OF *SCLEROTINIA SCLEROTIORUM* POPULATIONS IN IRAN. Elham Karimi, N. Safaie, M. Shamsbakhsh, Department of Plant Pathology, Agricultural Faculty, Tarbiat Modares University, Tehran, Iran, Email: karimielham@yahoo.com

Population structure of *Sclerotinia sclerotiorum*, the causal agent of Sclerotinia stem rot of Canola, was examined using mycelial compatibility groups (MCGs). One hundred and seventy-seven isolates of S. sclerotiorum were collected from Canola fields of Kalale (67 isolates), Hashem abad (66 isolates) and Ali abad (37 isolates), Mazandaran (3 isolates) and Western Azarbaijan (2 isolates). Sixty-four isolates were selected for determining mycelial compatibility. Among these tested isolates, 37 MCGs were identified of which 42.1% constituted single isolate all of which were collected from Ali abad location. MCGs frequencies, at Kalale, Ali abad, Hashem abad, Gorgan, Mazandaran and Western Azarbaijan were 23.7, 42.1, 26.4, 2.6, 2.6 and 2.6%, respectively. In Kalale, 9 MCGs were identified each of them were consisted of two isolates. Ten MCGs were identified within the Hashem abad region; 8 of which consisted of two isolates and the remaining included three isolates. The other locations composed of one MCG. Isolate virulence varied within six locations. The results of this study demonstrated that high level of variation exists in populations of S. sclerotiorum in the North of Iran. Therefore, it is necessary to consider the population structure of this pathogen and virulence variation of isolates in designing disease management systems at these locations.

F 43

ISOLATION AND DIAGNOSIS OF SOME FUNGI ASSPCIATED WITH DATE NUMBNESS AND THE EFFECTIVENESS OF SOME FUNGICIDES TO CONTROL IT. I.I. Al-Yaseri[1], A. Najat[2], R. Ahmmed[2] and K. Zaid[1]. (1) State Board for Plant Protection; (2) State Board for Agricultural research, Ministry of Agriculture, Baghdad, Iraq, Email: ismail_alyaseri@yahoo.com

Spread of date numbness was increased last year in many date orchards and in many varieties in Iraq. In order to diagnose the main causes, a study was conducted in an orchard in Maysan. The main goal was to isolate and diagnose the fungi associated with this phenomenon by testing soil, root, stem and frond samples of the Deary variety. The fungi were isolated on PDA media were identified. Pathogenicity tests to determine the casual effect of the isolated fungi was carried out. Five systemic fungicides were applied (Beltanol, Phostrol, proplant, Bavistin and Nando) to evaluate their ability to control this disease in the field by adding directly to the soil or spraying on the foliage. Pathogenic fungi were identified such as *Fusarium* sp. Bavistin was found highly effective followed by Proplant and then Beltanol, and this was based on testing samples, one and two months after application, and determine frequency of fungi recovery and their pathogenicity index on the fronds.

F 44

WHEAT COMMON BUNT IN SYRIA: FIELD SURVEY, CAUSAL AGENTS, AND ITS PATHOGENICITY. Mayada Kyali[1], Ahmed El-Ahmed[1], Amor Yahyaoui[2], Salah Al-Chaabi[3] and Miloudi Nachit[2]. (1) Plant protection Dpeatrment, Faculty of Agriculture, Aleppo University, Syria, Email: a.el-ahmed@hotmail.com; (2) International Center for Agriucltural Research in the Dry Areas (ICARDA), P. O. Box 5466, Aleppo, Syria; (3) General Commission of Scientific Agricultural Research (GCSAR), Douma, Syria.

A field survey was carried out in the main wheat growing governorates during 2006 and 2007, and covered 220 and 151 durum, 119 and 80 bread wheat fields, respectively. Results revealed the presence of significant differences in percentages of infected plants in fileds studied. The highest infection rate was recorded in the first season at Idlib on durum (14.5%) and bread wheat (32.2%), and the lowest infection rate was obtained in Daraa (3.8 and 8.8%, respectively). In the second season the highest infection rate was at Aleppo 15.5 and 25.1% on durum and bread wheat respectively, while the lowest infection rate was obtained at Hasakah, on durum wheat (3.7%). Results showed that both pathogens (*Tilletia carries* and *T. foetida*) were found on wheat in all studied governorates, with variation in prefered hosts. The mean frequencies of *T. caries* and *T. foetida* teliospores in durum were 87.7 and 12.3%, and in bread wheat 19.1 and 80.9%, respectively. Pathogenicity test of 29 combinations (mixtures) consisted of *T. carries* and *T. foetida* (1:1 w:w) teliospores collected from different studied fields was tested under artificial infection conditions on four durum and four bread wheat cultivars with different reaction types against the disease: VS, S, MR, and R. Results revealed the presence of variation in rate of infected plants according to inoculum combinations, which ranged between 10 - 43.6% on the VS durum cultivar, and 26-80% on the VS bread wheat cultivar. Combinations of both pathogens were divided into 3 levels according to their pathogenicity: weak, moderate and highly virulent.

F 45

GENETIC VARIATION OF *VERTICILLIUM DAHLIAE* KLEB ISOLATES USING RANDOM AMPLIFIDE POLYMORPHIC DNA (RAPD). Huda Hazim Wafi Al-Taae and Ali Kareem Mohammed Al-Taae, Plant Protection Department, College of Agriculture and Forestry, Mosul University, Iraq, Email: htaae@yahoo.com

An increasing incidence and distribution of Verticillium wilt has occurred in the last few years in newly established olive orchards in Ninavah province, northern Iraq. This spread of the disease may result from use of *Verticillium dahliae* infected planting material. In this work genetic variation among the isolates of *V. dahliae* from Iraq and Jordan were analyzed by using Random Amplified Polymorphic DNA (RAPD) and 17 primers (Z1, Z19, T13, R10, R15, R16, F5, F6 F10, A15, A19, B12, M1, M2, M3, M4 and M5) showed significant results with 30 isolates of that pathogen using RAPD. The best results were found with the primers M1, M2, M3, M4 and M5 which exhibited a clear difference between isolates. The genetic similarity

between isolates ranged from 5% in the two isolates Alshallalat/2 and Tomato/Alkerak to 88% for Bashaika 1 and 2, while the average genetic variation between all isolates was 58%. This is the first time to use this technique in Iraq.

F 46

COMBINED EFFECTS OF FUNGICIDAL SEED TREATMENT AND STORAGE ON SEED GERMINATION AND SEED VIGOR IN CHICKPEA. Brakat Rahmoun[1], Abdul Aziz Niane[2] Bassam Bayaa[3], Mahmoud Hassan[4] and Zewdie Bishaw[2]. (1) GOSM, Idlib, Syria, Email: b_rahmon@aloola.sy; (2) ICARDA, P.O. Box 5466, Aleppo, Syria; (3) Department of Plant Protection, Aleppo University, Aleppo, Syria; (4) Tishreen University, P.O. Box 2233, Lattakia, Syria.

A trial was conducted to evaluate the combined effect of fungicidal seed treatment and storage of two chickpea varieties on seed germination and seed vigor. Results obtained showed that storage of chickpea seeds for 12 months reduced seed germination rate in the Ghab-3 variety when seeds were treated with difenoconazole and reached 26, 32 and 26% for the control, recommended and twice recommended doses, respectively. For Ghab 4, the reduction in germination rate following the above treatments were 13, 16 and 6%, respectively. For the carboxin+ thiram treated seeds, no reduction in germination rate was observed in any of the treatments. Regardless of variety and storage period, the chickpea seeds treated with twice the recommended dosage provided the most effective increase of seedling germination rate compared to the recommended and zero dosages. Moreover, the chickpea seeds stored under dry conditions maintained higher germination rate compared with those stored under humid conditions.

F 47

MOLDS OF GRAIN SORGHUM KERNELS AND FUMONISIN CONTAMINATION IN UPPER EGYPT. S.E. Botros, Fawziya M. Bekheet, A.M. Ismael and I.H. El-Abbasi, Plant Pathology Research Institute, Agriculture Research Center, 9 Gamma Street, Giza, Egypt, Email: him.basi@gmail.com

Survey carried out in the fields of grain sorghum in Assiut, Sohag and Qena governorates in 2003 and 2004 growing seasons revealed that the local cultivars were susceptible to infection with grain molds and showed high rate of infection severe. Whereas, the hybrids were highly resistant with low rate of infection. Isolates of *Fusarium* spp. followed by *Aspergillus* spp. were the most common fungi recovered from the discoloured kernels. Sowing seeds taken from infected heads (discoloured kernels) caused an obvious reduction in plant stand at different stages of plant growth. The same trend of susceptibility was observed when plant heads of different cultivars were artificially inoculated with toothpicks charged with *F. proliferatum*. Rotted kernels taken from the *F. proliferatum*-infested heads as well as the apparent healthy kernels showed detectable levels of fumonisin. The mycotoxin concentrations ranged from 12 ppm in cv. Dorado to 31 ppm in the Local cv. 29. The healthy, non-infected grains of the cv. Local 29, however, contained 9 ppm of fumonisin.

F 48

STUDY OF *IN VITRO* GROWTH AND PATHOGENICITY OF SOME ISOLATES OF *FUSARIUM* SPP. CAUSAL AGENT OF FUSARIUM HEAD SCAB (FHB) OF WHEAT. Houda Boureghda and Rachida Renane, Département de botanique Institut national Agronomique (INA), El Harrach, Algiers, Algeria, Email: hou.boureghda@gmail.com

The study of the effect of temperature on *in vitro* growth of *Fusarium* spp. isolates obtained from wheat spike exhibiting typical symptoms of head scab (ear blight) showed that the optimum growth was at 25°C for all isolates belonging to the four species of the *Fusarium* genus. The species were *F. avenaceum*, *F. culmorum*, *F. moniliforme* and *F. solani*; with a lack of growth of all isolates at 35°C. Among the species studied, the *F. culmorum* isolates showed the highest rates of growth at all temperatures tested (15, 20, 25 and 30°C). It was also noticed that the growth rate of the four species studied increased between 20 and 25°C, and decreased between 25 and 30°C. Pathogenicity tests of *Fusarium* spp. isolates were carried out in *in vitro* and *in planta*. The pathogenicity test *in vitro* was assessed by examining the coleoptile growth rate of wheat seedlings. The results obtained showed that all *Fusarium* spp. isolates were pathogenic. These induced retardation in coleoptile growth compared to the control at 20, 25 and 30°C. The most pathogenic of the four species was *F. moniliforme* isolates which conferred a complete reduction in coleoptile growth (100 %) at 25°C and 30°C. For the other isolates the highest rate of reduction in coleoptile growth was (95.92 %) for *F. culmorum* and 95.26% for *F. avenaceum* at 25°C, while the highest rate of reduction 95.28% for *F. solani* was obtained at 30°C. Pathogenicity carried out by soil inoculation and evaluated by the severity attack at the collar level estimated by a disease scale from 0 to 3 showed that the highest disease index (2.58) was conferred by *F. avenaceum* isolates, followed by *F. moniliforme* (1.28), *F. solani* (1) and least by *F. culmorum* (0.53). Results obtained in this study showed that there is no correlation between in *vitro* growth and agressiveness of *Fusarium* isolates used in this study and also between agressiveness assessed by the reduction in coleoptile growth and the attack at the collar level. Furthermore it was shown that *Fusarium* isolates which induced head scab of wheat were also aggressive on root and collar of wheat.

F 49

CHARACTERIZATION AND GENOMIC VARIATIONS AMONG *VERTICILLIUM* POPULATIONS IN LEBANON. Saad Adib[1], Bouazza Karma[1], Hanna Lucia[1], Kattar Mireille[2] and Chnais Elias[1]. (1) American University of Beirut, Agricultural Sciences Department, P.O.Box 11-0236, Riad El-Solh, Beirut 1107 2020, Lebanon; (2) Pathology Department, Medical Center, American University of Beirut, P.O. Box 11-0236, Riad El Solh, Beirut 1107 2020, Lebanon, Email: karmabouazza@gmail.com

Verticillium wilt caused by the vascular fungal pathogens, *Verticillium* spp., is one of the most important

soil-borne diseases which has a very widespread geographical distribution and host range. In this study, *Verticillium* isolates from almond, peach, potato and strawberry, in different regions of Lebanon, were characterized, and the genetic variability among the *Verticillium* isolates using vegetative compatibility grouping, serological and molecular techniques were determined. Morphological studies revealed three *Verticillium* species; *V. dahliae, V. albo-atrum* and *V. tricorpus.* Pathogenicity tests on eggplant seedlings showed different virulence levels within and among *Verticillium* species. In the Enzyme-linked immunosorbent assay test, 86.6%, 29%, 71.4% and 100% of *Verticillium* isolates from potato, strawberry, almond and peach, respectively, gave a positive reaction, using the *Verticillium* ELISA kit. Thirteen isolates from various geographic regions and host origins were assigned for vegetative compatibility groups (VCG) based on complementation among nitrate-non-utilizing (nit) mutants. The VCG groups were based on distinguishable morphological and physiological characteristics. Seven nit mutants had a positive compatibility reaction among each other and all were grouped as VCG2. Two nit mutants from potato showed VCG2 compatibility and one nit mutant from potato showed VCG1 compatibility when tested against tester strains. Among the thirteen nit mutants, two *Fusarium* isolates were found to be vegetatively compatible with some *Verticillium* isolates. Twenty isolates from different hosts were selected for the Polymerase Chain Reaction and sequencing of the Internal Transcribed Region. Some isolates showing morphological characteristics of genus *Verticillium*, were identified as *Fusarium* after sequencing. This study indicated that the Verticillium wilt disease is widespread in Lebanon and a genetic relationship may exist between *Verticillium* and *Fusarium* populations that might be due to genetic mutations, leading to similarities in their morphological characteristics. The significant overlap among ITS sequences of *Verticillium* and *Fusarium* identified in this study necessitates using a multilocus sequence typing approach to further characterize the phylogenetic relationships among species in these two genera.

F 50

USE OF AGRICULTURAL SULFUR WITH CARBENDAZIN FUNGICIDE TO CONTROL WILTING DISEASE OF WATERMELON UNDER FIELD CONDITIONS. Oadi N. Matny, Department of Plant Protection, College of Agriculture, University of Baghdad, Iraq, Baghdad, Email: Oadi77@yahoo.com; Udayal_hadethy@yahoo.com.

Field experiments were carried out in the fields of the Department of Plant Protection, College of Agriculture, University of Baghdad, in 2008 growing season. Results showed significant difference among watermelon varieties, with the local variety showing resistance to wilt disease under field conditions. Crimson variety treated with Sulfur 25 g/plant around the region of root and crown showed resistance/non-susceptibility. Sulfur treatment gave significant control of the three varieties Charleston, Crimson and charley with disease incidence of 24.6, 8.3% and 0% and disease severity of 8.3% and 35, 50%, respectively, compared with control treatment. The local variety showed no response to sulfur treatment. Treatment of sulfur + Carbendazin 50% had no effect on Charleston and local varieties relation to disease incidence and severity, while the varieties crimson and charley showed significant where incidence was 20, 34.3% disease severity was and 8.3 and 25%, respectively, compared with control treatments. The total dry weight of vegetative part, increased in the Charleston, Crimson and local varieties with sulfur treatment only, and reached 76.67, 78.34 and 88 g/plant respectively, compared with the control. The dry weight of the root system showed significant response for the control treatment of Charleston and was 3.25 g, sulfur treatment only for Crimson (3.4g), and sulfur + fungicide Carbendazin 50% (2 g/L) treatment for charley (4.3g), and sulfur treatment only for the local variety (5.35g/plant).

F 51

EFFECT OF ALCOHOLIC EXTRACT OF CRESS SEEDS AND CULTURE FILTERATE OF *BACILLUS CEREUS* ON GROWTH OF FUNGI CAUSING ROOT ROT OF SESAME. Nadeem Ahmad Ramadan, Najwa Bashir Al–Lashi and Heba Esam Dawood, Department of Biology College of Science University of Mosul, Iraq, Email: najwab_2005@yahoo.com

The effect of different concentrations (0, 1, 2, 3 and 4 mg/ml) of alcoholic extracts of Cress seeds (*Lipidium sativum*) on colony growth and its dry weight of sesame root–rot pathogens (*Pythium aphanidermatum*, *Fusarium solani* and *Macrophomina phaseolina*) was studied. Results indicated high significant inhibitory effect, as compared to control. *M. phaseolina* was the mostly inhibited (86.66 and 78.26%) when 4 mg/ml was used, respectively. Culture filtrate of *B. cereus* was more effective than seed extract in terms of growth inhibition and dry weight biomass of the studied fungi, with the gradual concentration increases from 10% to 20%, 30% and 40%. The highest inhibition was achieved with the use 4 mg/ml of alcoholic extract of Cress seeds and 40% of cultures filtrate of *B. cereus*. Also, results showed inhibitory synergy effect on studied fungi, which exceeds their individual effect separately.

F 52

DETERMINATION OF AFLATOXINS, THE MAJOR TOXIN OF *ASPERGILLUS FLAVUS* IN BLACK TEA (*CAMELLIA SINENSIS*). Rouhollah Karami-Osboo and Mansoureh Mirabolfathy, Mycotoxin Research Lab., Iranian Plant Protection Research Institute, P.O. Box 19395/1454, Tehran, Iran, Email: karamiosboo@yahoo.ca

Aspergillus is a genus of around 200 molds found all over the world that infect feed and foods. In particular, *A. flavus* is of great importance due to its impact on agriculture and human health and produces several types of mycotoxins, the most well known are the aflatoxins and aflatoxin B1 is one of the most mutagenic and carcinogenic natural compound known. After water, tea is the second most popular beverage in the world and excepting Asia, the vast majority of the tea consumed is black tea. All tea comes from the *Camellia sinensis* plant. Black tea differs from green tea and white tea in the way it is processed. In this research some samples of imported black tea that was

purchased from retail store in Tehran was analysed for determination of aflatoxins. Twenty five gram sample was extracted with methanol: water (80: 20 v/v) for 30 min after dilution with phosphate buffer saline (PBS), cleaned up via immunoaffinity column packed with monoclonal antibody and 100 µl of extract was injected to HPLC. Results showed that samples were only contaminated with aflatoxin G1 and amount of contamination was higher than 5 ppb.

F 53

FIRST RECORD OF CHARCOAL ROT CAUSED BY *MACROPHOMINA PHASEOLINA* ON MELON IN IRAQ. Ismail Ahmed Ismail, Alaa Khudair Hassan and Intisar J. Abooud, Plant Protection Department, Faculty of Agriculture, Abou-Ghrieb, Baghdad, Iraq, Email: a_khudair@yahoo.com

Macrophomina phaseolina causing charcoal rot disease on melon was identified for the first time in Iraq. Pathogencity test was carried out on stems of melon plants and symptoms developed four days after inoculation. They began with the appearance of light brown water lesions in the inoculation area at soil level and soon expanded to the upper parts of the stem to form a canker with gummy secretions in infected areas. The fungus then produced small sclerotia inside and outside the infected stem tissues while the control plants did not show any symptoms.

F 54

STUDIES ON DEATH OF DATE PALM OFF SHOOTS PHENOMENON AND ITS RELATION WITH SOME ENVIRONMENTAL FACTORS IN BASRAH. Fayadh A. Mohammed, Yeihia A. Salah and Ali Nasier Ahmed, Department of Plant Protection, College of Agriculture, University of Basrah, Iraq, Email: m_a_fayadh@yahoo.com

This study was conducted in the laboratories of the Plant Protection Department at Agriculture College, University of Basrah during the period of 2007-2008 in order to isolate and identify the fungi associated with the death of the date palm off shoots phenomenon in Basrah. The results of the survey indicated that the highest rate of death and deterioration of date palm off shoots recorded in Shatt Al-Arab were 71.38 and 18.3%, respectively, followed by Harth area 66.51 and 15.15%, respectively, while the lowest rate of death and deterioration of off shoots were recorded in Abu-Al-Kasseb where it was 19.05 and 4%, respectively. The results showed that rate of off shoots death increased as the salinity and pH value increased in soil and irrigation water. The highest death and deteriorate rate of off shoots was recorded in Hillawi cultivar which reached 66.84 and 17.41%, respectively, followed by Sayer, Zahdi, Prem, Khadrawi and Pyarm cvs.. Isolation from different parts of dead and deteriorated off shoots revealed the presence of many fungi such as *Fusarium* spp., *Chloropsis radicicola*, *Alternavia alternata* and *Rhizoctonin solani*. The fungus *C. radicicola* was frequently encountered. When the effect of some environmental factors on seedling infection by *C. radicicola* was studied, it was found that infection rate and disease severity increased to 80, 71.11% at 12 dc/m salinity level, respectively, compared to 40 and 73.33%, respectively for 2 dc/m salinity level. It was also found that *C. radicicola* had an effect on growth and dry weight of shoot and root increased with increasing water salinity, and the infection with *C. radicicola* was highest in clay soil compared to salty loam and sandy soils.

F 55

EFFECT OF SALT SOLUTIONS ON LETTUCE PROTECTION AGAINST PLANT PATHOGENIC FUNGI. Tamader G. Abdel Rahman[1], E.M. El-far[1] and Heba M. El-Nabi[2]. (1) Plant Pathology Research Institute, Agricultural Research Center, Giza, Egypt; (2) Suez Canal University, Faculty of Agriculture, Ismailia, Egypt, Email: oheba2004@yahoo.com

Lettuce (*Lactuca sativa* L.) is one of the most important leafy vegetables cultivated in Egypt and it is seriously affected by fungal diseases, like Grey mould (*Botrytis cinerea*) and white mould (*Sclerotinia sclerotiorum*). Six mineral salts with different concentrations, sodium bicarbonate, calcium chloride, calcium sulfate, potassium sulfate, mono potassium phosphate and potassium phosphate dibasic were evaluated for their ability to reduce the severity of both diseases on two different cultivars of lettuce cv_1 Roman and cv_2 local Balady. Dibasic potassium phosphate 1g/L completely inhibited the mycelial growth of *Sclerotinia sclerotiorum* while, sodium bicarbonate showed the least effect at the same concentration. All salts slightly affected the mycelial growth of *B. cinerea* at different levels. Calcium chloride and sodium bicarbonate gave significant reduction of disease severity of grey mould on both cultivars of lettuce. Dibasic potassium phosphate was the most efficient to control *S. sclerotiorum* infection on both cultivars.

F 56

EFFECT OF IRRIGATION AND FERTILIZERS ON DISEASES INCIDENCE AND AGRONOMIC CHARACTERS OF SUNFLOWER IN EL-BEHERA GOVERNORATE, EGYPT. S.M. Morsy[1], Elham A.Durgham [2] and A.A. Abd–Elbaky[1]. (1) Plant Path. Res. Inst., Agric. Rec. Center, Giza, Egypt; (2) Field Crops Department, Nuclers Research Center, Anshas, Egypt, Email: ahmad_abdelbaky2000@yahoo.com

Two field experiments were conducted to determine the effect of irrigation intervals combined with treatment of different types of fertilizers on the incidence of damping–off and charcoal–rot. Occurrence of fungal pathogens in rhizosphere and rhizoplane, yield and oil content of sunflower. Application of irrigation intervals combined with different types of fertilizers significantly affected incidence of diseases and density of fungi in the soil. The irrigation at 20 days intervals combined with gypsum as a fertilizer, significantly decreased incidence of damping-off and charcoal–rot diseases by 4.66%, and 31.66%, respectively, followed by the same irrigation treatment combined with phosphoren led to disease reduction of 5.66% and 38.31%, respectively in the two successive growing seasons 2007 and 2008. The irrigation interval treatments combined with farmyard manure stimulated the growth of some fungi in the rhizosphere and rhizoplane of sunflower plants, compared to other

fertilizers. Meanwhile, gypsum as fertilizer application under the irrigation intervals conducted decreased micro-organisms level in rhizosphere and rhizoplane by 42.8% and 40.8%, respectively, compared to other fertilizers. *Penicillium* sp. and *Fusarium* sp. were the dominant fungi in all rhizosphere and rihzoplane samples tested. In addition, irrigation at 20 days intervals combined with any fertilizers studied improved sunflower growth, yield and increased oil quantity.

F 57

CULTURAL CHARACTERISTICS AND MOLECULAR DIAGNOSIS OF *BOTRYODIPLODIA THEOBROMAE* THE CAUSAL AGENT OF DIE-BACK DISEASE ON MANGO (*MANGIFERA INDICA*) IN YEMEN. Najeeb Ahmed Mohsen Sllam[1] and Ali Khamis Rowaished[2]. (1) Lahegj Agric. Techn. Inst/Saber, Ministry of Techn. Edu & Voc, Yemen, Email: najeebcurd2007@yahoo.com; (2) Plant protection Department, Faculty of Agriculture, Aden University, Yemen, Email: Rowaishedak @hotmail.com

The present study was conducted on the mango Die-back disease, caused by *Botryodiplodia theobromae*, which was recently spread in Yemen and considered as one of the most important and devastating disease on mango in Yemen. Results of field survey carried on certain regions in some Yemen governorates (Hudeida, Hagah, Lahj and Abian) during the years 2006 and 2007, showed that disease incidence in Lahj governorate reached 12% and 15.8%, with disease severity of 0.08 and 0.10, in both seasons, respectively. Disease incidence in Hodeida governorate reached 11% and 14.7% and disease severity were 0.07 and 0.08, in both seasons, respectively. The fungi were isolated on (PDA) media. (*Alternaria alternata*, *Fusarium oxysporium*, *Colletotrichum gloeosporioides*, *Aspergillus niger* and (4 isolates of *Botryodiplodia theobromae*)) were found in all governorates. Pathogens were identified using cultural and microscopic characteristics. The 4 isolates of *B. theobromae* showed high virulence on Balady cv. mango seedling. The polymerase chain reaction (PCR) on these isolates was carried out in Plant Pathology Research Institute, Agricultural Research Center, Giza, Egypt using two specific pairs of primers (OPERON-3-d and OPERON-6-d) using RAPD technique. The study revealed the role of environment on polymorphism of the isolates as revealed from the linkage distance related to isolates of *B. theobromae*.

F 58

THE BIOLOGICAL ACTIVITY OF SOME BACTERIA AS BIOCIDES TO PROTECT SESAME CROP (*SESAMUM INDICUM*) FROM FUNGAL DISEASES. Hammad Nawaf Farhan, Ashwaq Talip Hameed, Heshim Mohammed Aobad and Mohamed Taleb Hamid, Al-Anbar University, Iraq, Email: drhammad51@yahoo.com

Many experiments were conducted at Biology Department, College of Scientific Education, Al-Anbar University during 2006-2007 to test the biological activity of some *Pseudomonas* species as biocides to protect sesame crop from infection with some plant pathogenic fungi like *Pythium, Alternaria and Fusarium*. For this purpose five *Pseudomonas* species were chosen to test their efficiencies and to select the best bacterial isolates. Complete randomized design (CRD) with three replicates was used. Results showed that *Pseudomonas putida2* and *Pseudomonas fluorescens3* were the best among the five isolates in their ability to inhibit the growth of the three fungi and were more effective than Dithan fungicide under incubator conditions. Under normal conditions, *Pseudomonas putida2* increased germination rate of sesame seeds with *Fusarium, Pythium* and *Alternaria* treatments to 89.7, 84.0 and 86.7%, respectively, while *Pseudomonas fluorescence3* increased germination rate to 70.7, 71.0 and 80.0%, respectively. Seed germination in the control treatment was 52%. *Pseudomonas putida2* and *Pseudomonas fluorescens3* treatments increased significantly leaf number per plant, leaf area per plant, height of plant, branches number per plant, total dry weight of shoot per plant, chlorophyll content, seeds number per pod per plant, total weight of 1000 seeds per plant, pods number per plant and N, P, K in total dry weight of shoot per plant and oil content in seeds per plant when *Fusarium, Pythium* and *Alternaria* treatments were compared with other and control treatments.

F 59

PATHOGENIC FUNGI TRANSMITTED THROUGH CUCUMBER SEEDS AND SAFE ELIMINATION BY SOME ESSENTIAL OIL VAPORS. Eman S.H. Farrag[1] and Maher H. Hosseny[2]**.** (1) Agricultural Botany Department (Plant Pathology), Faculty of Agriculture, South Valley University, Qena, Egypt, Email: eman_farrag@yahoo.com**;** (2) Horticultural Department, Faculty of Agriculture, Sohag University, El-Kawtheer-Sohag 82786, Egypt.

Diseases induced by Fusarium (damping-off, root-rot and wilt) on cucumber, are considered a serious problem worldwide. Twenty-five samples of cucumber seeds were collected from commercial markets in Egypt and tested for seed-borne fungi. In order to detect the maximum number of internal and external seed-borne fungi, blotter, deep freezing blotter, agar plate, examination of washing water from seeds and growing test methods were used. In addition, cucumber dissected seeds were incubated on Komada's selective medium for *Fusarium* spp. A total of 33 *Fusarium* isolates were obtained: *F. oxysporum*, *F. solani* and *F. proliferatum* were found to be the most frequent. Pathogenicity test indicated that *F. solani* isolate No. 4 was the most effective organism causing pre- and post-emergence damping off, while *F. oxysporum* isolate No. 8 induced wilt disease. *F. solani* and *F. oxysporum* occurred in all seed parts of tested seed samples. Some inoculated seeds could germinate, but they are either rapidly dominated by the pathogen or they produce diseased seedlings. When sown in soil, a large portion of diseased seedlings died before emergence. Seeds evaporated with pepper mint oil (1 ml l^{-1} air for 24 h in sealed chamber) gave reduction in infection rate, also reduced the seed - to - seedling transmission of concerned fungi. The seedlings vigor of treated seeds was better compared to seedlings

from the untreated ones. The oil vapors also increased the germination rate of treated seeds by 23%.

F 60

BIOLOGICAL CONTROL OF DAMPING–OFF AND STEM ROT DISEASES ON CHICKPEA CAUSED BY *SCLEROTIONIA SCLEROTIORUM* IN EGYPT. Ahmed M. Hassanein, Plant Pathology Research Institute, ARC, Giza, Egypt, Email: ahmedhassanein48@yahoo.com

Six biofungicides were tested for antagonistic affects against *Sclerotinia sclerotiorum* (lib) de Bary, the causal organism of damping off and stem rot disease in chickpea. All biofungicides, used (Biozeid: *Trichoderma album*, Plant Guard: *Trichoderma harzianum*, Gliomix: *Gliocladium* spp., Bioarc: *Bacillus megaterium*, Mycostop: *Streptomyces griseoviridis* and Rhizo-N: *Bacillus subtilis*) had significantly inhibited mycelial growth of *S. sclerotiorum* on PDA medium. *T. album* and *T. harzianum* suppressed the pathogen growth by 66.7 and 65.6%, respectively. *Gliocladium* spp., *S. griseovirids*, *B. megaterium* and *B. subtilis* decreased colony growth of the pathogen by producing a clear inhibitory zone, where colony growth was inhibited by 38.9, 67.8, 62.2 and 64.4%, respectively. Under greenhouse and field conditions, Biozed and Mycostop were the most effective biofungicide, to control damping off and stem rot diseases in chickpea, followed by Rhizo-N, Bioarc, Plant guard and Gliomix.

F 61

IMPACT OF *FICUS CARICA* L. LEAFE EXTRACTS ON SOME PATHOGENIC FUNGI. Abdul-Ghany O.I. Sarmamy[1] and K.S. Zhian[2]. (1) College of Science-Biology; (2) College of Agriculture, University of Salahaddin, Arbil, Iraq, Email: abdulghani_umer@yahoo.com

Several experiments were carried out in the laboratories of the College of Science, University of Salahaddin – Arbil, during 2006–2007 to determine the effects of leafe extracts of fig tree (*Ficus carica* L.) on the growth of four pathogenic fungi (*Alternaria alternata*, *Penicillium expansum*, *Fusarium oxysporum* and *Aspergillus flavus*). Fresh leaves were extracted with distilled water, ethanol, ethyl acetate and chloroform. Concentrations of 500, 1000, 5000 and 10000 μgml^{-1} were prepared from the raw extracts and applied to PDA medium. Completely Randomized Design (CRD) was applied with four replicates in all experiments. Data were analyzed statistically and the means compared by LSD at P=0.01. The results showed that leaf extracts of fig tree contains flavonoids, phenolic compounds, tannins, alkaloids, glycosides, carbohydrate and saponin. TLC of the leaf extracts showed three spots a, b and c, and Rf value of these three spots were 0.15, 0.46 and 0.72 for aqueous extract, 0.42, 0.54 and 0.70 for ethanol extract, 0.44, 0.59 and 0.68 for ethyl acetate extract and 0.30, 0.72 and 0.93 for chloroform extracts, respectively. The plant extracts affected the growth of the four fungi significantly at concentration of 500 μgml^{-1} and the effects increased as the concentration increased. Chloroform and ethyl acetate extracts were effective against the four fungi more than the aqueous and ethanol extracts. *Fusarium oxysporum* was sensitive against fig leaf extracts more than other three fungi and chloroform extract was effective against *Aspergillus flavus* more than the other extracts.

F 62

CHEMICAL CONTROL OF POWDERY MILDEW OF GRAPES IN EGYPT. Mounir A. Abdel–Aziz, Plant Pathology Research Institute, Agricultural Research Center, 9 El-Gamaa Street, Giza, Postcode 12619, Egypt, Email: dr.mounirabbas@hotmail.com

Grape powdery mildew (*Uncinular necator* (Schw Burr) is one of the most serious grape diseases occurring in many countries, including Egypt. The present work aimed to study the efficacy of six fungicides in controlling the disease and consequently its effect on grape vines yield. Fungicides Amistar top, Bellis, Topsin- M, Fungshow, Acoidal, and Thiovit Jet, at the recommended rates, significantly controlled the disease as compared with the control. Amistar top and Bellis were the most effective treatments. Significant increases in grape yield, particularly with Amistar top and Bellis treatments were observed.

F 63

INTRODUCING ENDOPHYTES IN NOVEL INTEGRATED PEST MANAGEMENT STRATEGIES. Mohamed E. Selim[1], A.A. Dababat[2], A. Schouten[1] and Richard A. Sikora[1]. (1) Soil-Ecosystem Phytopathology and Nematology, Institute of Crop Science and Resource Conservation (INRES), Department of Plant Health, University of Bonn, Nussallee 9, 53115 Bonn, Germany, Email: m_elwy76@yahoo.com; (2) Global Wheat Program/ CIMMYT, Turkey.

The fungus *Fusarium oxysporum* is a cosmopolitan soil inhabitant. The majority of the strains found are considered saprophytic, surviving on organic matter in the soil and rhizosphere of many plant species. Some strains are able to colonize plants and, by doing this, either cause root-rot and vascular disease or cause no symptoms at all. Because the plant pathogenic isolates can seriously damage a large variety of plant species and, consequently, lead to significant crop losses, such isolates have traditionally caught most attention. Relatively little is known about the non-pathogenic isolates. Nevertheless, these endophytic isolates can induce resistance in plants against both fungal pathogens and plant parasitic nematodes. Evidently, *F. oxysporum* may be interesting organisms that can be applied in novel integrated pest management (IPM) strategies. However, another important element in IPM is the application of resistant plant genotypes. Plants varieties that are resistant towards pathogenic *F. oxysporum* may thus not allow colonization of a beneficial endophyte. The level of colonization is often considered to be an important factor influencing both the mode of action involved and the level of biocontrol attained. We compared the colonization ability of the *F. oxysporum* endophytic strain Fo162, which can reduce colonization of tomato by the root-knot nematode, in *F. oxysporum* resistant and susceptible tomato varieties. Additionally, the effect of Fo162 colonization on root-knot nematode infection was verified. The results show that Fo162 was in several cases able to efficiently colonize the root and simultaneously reduced nematode infection in the

resistant cultivars. The plant resistance is apparently not affecting colonization by the endophyte, thus making Fo162 a potential interesting candidate in IPM for combating multiple diseases.

F 64

EFFECT OF PEA PATHOGENICITY OF CULTIVAR, CONCENTRATION OF SPORES AND LEAF WETNESS DURATION ON ASCOCHYTA BLIGHT CAUSED BY *MYCOSPHAERELLA PINODES*. Setti Benali [1], Mohamed Bencheikh[1], Henni Jamel[2] and Neema Claire[3]. (1) Institut de Biologie, Université de Chlef, BP151, 02000 Chlef, Algérie, Email: benseti@yahoo.fr; bencheikdz@yahoo.fr; (2) Institut des Sciences, Université d'Es Senia, Oran, Algérie, Email: hennijamel@hotmail.fr; (3) UMR de Pathologie Végétale, INRA/INA-PG/Université Paris VI, 16 rue Claude Bernard, 75231 Paris Cedex, France.

The effect of host leaf wetness duration, *Mycosphaerella pinodes* inoculum concentration and pathogen isolate on the latent and the incubation periods of the pathogen or disease severity were quantified on pea (*Pisum sativum* L.). Seedlings of two widely grown pea cultivars, Onward and Merveille de Kelvedon, susceptible and moderately resistant to *M. pinodes*, respectively were subjected to six leaf wetness durations of 6, 12, 24, 48 and 72 h, and inoculated with five inoculum concentrations, 2.5×10^3, 4×10^4, 3.5×10^5, $4x10^6$, and 5.2×10^7, in order to determine whether the cultivars reacted differently to *M. pinodes* isolates inoculated under identical conditions. Increasing the duration of leaf wetness and inoculum concentration caused significant (P<0.001) increases in disease severity within each cultivar. Both the incubation period and the latent period decreased with increasing conidial concentration and leaf wetness duration. Generally, the cv. Onward had a significantly shorter incubation period, and latent period and higher disease severity than cv. Merveille de Kelvedon. Isolates differed in aggressiveness at higher levels of leaf wetness (48 h) duration and of inoculum concentration (4×10^6), but there was no significant interaction between isolates and leaf wetness duration, or between isolates and inoculum concentration. The optimum levels for obtaining a consistent infection and for readily separating the susceptible and the partially resistant cultivars were a leaf wetness of 48 h and an inoculum concentration of 4×10^6. The study also showed that continuous leaf wetness for 48 h was a threshold for application of fungicides to control the fungus in the susceptible cultivar.

F 65

HOST SPECIFICITY OF *PHOMA* SSP. PATHOGENIC TO FODDER FABACEA. Nadra Boumédiène, Nawel Ghiat and Zouaoui Bouznad, Laboratoire de phytopathologie et biologie moléculaire, Ecole Supérieure d'Agronomie, El Harrach, Alger, Algérie, Email:boumediene_nadra@hotmail.fr

The identification of species or varieties of the genus *Phoma* on legumes is still very difficult, because of the similarity of their morphological features. Moreover their host range isn't well established yet. Attempts of artificial inoculation of 9 species of Fabaceae, with 24 isolates derived from different fodder crops in Algeria and France were made to identify the fungus pathogenic to *Trifolium alexandrinum* L. The results showed that the isolates had differences in host range. The collection studied included *Phoma pinodella* and *Phoma medicaginis* the 2 species described on fodder Fabaceae before. On the other hand, results suggested the existence of at least one other different species of *Phoma* strongly pathogenic to *T. alexandrinum*.

F 66

ISOLATE BY GENOTYPE INTERACTION IN *PHYTOPHTHORA DRECHSLERI* AND *BETA VULGARIS* UNDER GREENHOUSE CONDITIONS. Mahyar Sheikholeslami, Hassan Younessi, Darioush Safaei and Jahanshah Basati, Agricultural and Natural Resources Research Center of Kermanshah Province, Kermanshah, Iran, Email: m1sheikh@yahoo.com

Phytophthora drechsleri is regarded as the most prevalent and noxious species of *Phytophthora* spp. in sugar beet fields in Iran. In this study, 27 isolates were collected from sugar beet fields in Kermanshah province. Based on morphological characteristics and temperature preferences all were identified as *P. drechsleri*. Ten isolates which had more capability to produce sporangia were selected and tested on 4 sugar beet genotypes 7233, BR-1, Dorothy and FC-709. Results indicated that there was significant difference in pathogenicity among isolates and genotypes. On this basis, isolates Phy-11 and Phy-26 were highly and Phy-6, Phy-19 and Phy-26 were least pathogenic. For the tested genotypes, statistical analysis revealed variability among the four sugar beet genotypes. The genotype FC-709 which is resistant to *Rhizoctonia solani* was also recognized as tolerant to *P. drechsleri* and the genotype 7233 which is sensitive to other sugar beet diseases was identified as the most sensitive to this disease.

F 67

MYCOBIOTA ASSOCIATED WITH SEEDS OF SUNFLOWER (*HELIANTHUS ANNUS* L.) CULTIVARS GROWN IN IRAQ. Samir K. Abdullah[1] and Karim A. Al-Mosawi[2]. (1) Biology Department, College of Education, University of Dohuk, Iraq; (2) Biology Department, College of Science, University of Basrah, Iraq, Email: samer_abdalh@yahoo.com

Mycobiota associated with seeds of 9 sunflower cultivars (*Helianthus annus* L.) viz. Akmar, Eurofflore As508, Mannon, As15, Florasol and three unidentified local cultivars were studied using standard blotter method. The seeds were associated with 49 species of fungi belonging to 19 genera. The broadest species spectrum on most cultivars were represented by the genera *Aspergillus* (9 species), *Alternaria* and *Fusarium* (6 species each), followed by *Penicillium* (4 species), *Chaetomium, Drechslera, Trichoderma* and *Ulocladium* (3 species each). *Aspergillus niger, A. flavus, Chaetomium globosum, Alternaria alternata, A. fumigatus, C. atrobrunneum, A. terreus, Penicillium expansum, P. brevicompactum, Fusarium*

oxyspoum, F. solani, Rhizopus stolonifer, Mucor hiemalis and *A. ochraceus* were the most frequent species. The species composition, contamination rate by fungi and seed germination rate differed among cultivars. Akmar cultivar showed the lowest number of detected species (17 species), whereas, the highest number (49 species) were isolated from the unidentified local cultivar 3. Highest fungal contamination rate was recorded in unidentified local cultivar 3 (45%) and lowest was in Akmar (10%). Maximum seed germination was observed in Akmar (100%) and minimum in unidentified local cultivar 3 (38%). Seed-borne pathogenic species *Macrophomina phaseolina* was detected from the three unidentified local cultivars with low level of occurrence.

F 68

VARIATION OF CULTURAL, MORPHOLOGICAL AND BIOMETRIC CHARACTERISTICS OF *PYRENOPHORA TRITICI-REPENTIS* ISOLATES ISOLATED FROM DURUM WHEAT FIELDS IN SYRIA. Roula Shamsi[1], Amor Yahyaoui[2], Ahmed El-Ahmed[1] and Miloudi Nachit[2]. (1) Plant Protection Department, Faculty of Agriculture, Aleppo University, Aleppo, Syria, Email: r.shamsi@hotmail.com; (2) ICARDA, P.O. Box 5466, Aleppo, Syria.

Tan Spot (*Pyrenophora tritici-repentis* - Ptr), is one of the most dangerous diseases that attacks wheat in many areas in the world. The present study was conducted to identify cultural, morphological and biometric characteristics of 29 isolates, isolated from durum wheat fields in Syria and belonging to three groups of Ptr (I, II and III),based on their reaction on the differential line "coulter",. Results indicated that the isolates produced subhyline conidia, cylindrical, thin walled, taper slightly toward the top, divided into 4-11 septa, and measure 154-203 X 13–16 µm. Pseudothecia measure between 225-230 µm. Cluster analysis showed that the isolates can be divided into two sub-clusters. The first sub-cluster, characterized by light colored spores and slow growth rate on V8-PDA media (1.7–4.5 mm/day), and represent group "I". Whereas, the second sub-cluster characterized by the color of its colonies, and appeared black to olive colour and sometimes dark orange, and fast growth rate on V8-PDA (7.5–13.5 mm/day), this sub-cluster represent group II and III. Results indicated that there was a significant relationship between growth rate on media and isolate severity, and recorded +0.65, +0.99 and +0.98, for groups I, II and III, respectively. Accordingly, it is possible to take into account those characteristics to predict in advance the isolate virulence before conducting pathogencity test**.**

F 69

EFFECT OF *TRICHODERMA HARZIANUM* ON SOME SEED-BORNE FUNGI OF *PISUM SATIVUM* L. Zineb Sadik[1], Mohamed Birka[1], Issa Faraj[1] and Omar Haroun[2]. (1) Department of Plant Protection, College of Agriculture, EL-Fatih University, Tripoli, Libya; Omar Al-Moukhtar University, El-Beida, Libya, Email: zn20042008@yahoo.com

Seed borne Fungi isolated from Pea seeds cv. Zahra-8 were *Alternaria alternata, Aspergillus niger*, *Cladosporium* sp., *Fusarium* sp. and *Verticillium* sp. The reaction of these fungi to *Trichoderma harzianum*, (Biocont-T) was tested. Results showed that *T. harzianum* was antagonistic to most fungi under dual-culture, with a variable rate of antagonism (1-5) on Ciguantial scale. Extract of *T. harzianum* was significantly effective on development of fungal colonies, and on fungal dry weight, and was found to be effective on *Verticillium* sp. with 85.0% growth reduction.

F 70

PATHOGENEICITY AND METALAXYL SENSITIVITY OF *PHYTOPHTHORA INFESTANS* ISOLATES OBTAINED FROM POTATO AND TOMATO FIELDS IN ALGERIA. Bellahcene Miloud[1], Rekad Fatima Zohra[2], Guenaoui Yamina[2] and Belabid Lakhdar[3]. (1) Département de Biologie, Université de Mostaganem, Algérie; (2) Département d'Agronomie, Université de Mostaganem, Algérie; (3) Département d'Agronomie, Université de Mascara, Algérie, Email: belahcene_miloud@yahoo.fr

The present study showed that potato and tomato late blight caused by *Phytophthora infestans* (Mont.) de Bary in the north-west region of Algeria can be destructive for these crops if the weather is favorable during growing seasons. This is showed by the high severity and incidence of the infection recorded during the growing season of 2007–2008. Planting of seed tubers infected with late blight has been reported as a major cause in initiating the disease in the field. Nine isolates of the pathogen obtained from potato and tomato fields situated in different locations in the north-west region of Algeria were compared with French isolates and assessed for their biological characteristics by using different parameters. *P. infestans* populations in this region are characterized by the coexistence of the two mating types A1 and A2 which are collected from the same or different potato and tomato plots. Thus, the mating type A2 was found in all locations surveyed. This study also confirmed the emergence of metalaxyl resistant isolates (*in- vivo*). Moreover, all isolates collected from potato, showed a high level of metalaxyl resistance and those of mating type A2 had a highly complex virulence spectra, which overcame all specific resistance genes. Aggressiveness of these isolates was assessed on detached leaves of different potato cultivars by determining the lesion size and the sporulation capacity. Significant differences in aggressiveness were found among isolates. Evaluating susceptibility of potato cultivars to different isolates revealed that the cultivar Spunta (predominant in Algeria) appeared more susceptible to infection than Desiree and Atlas. However, the cultivar Bintje (widely cultivated in France) appeared highly susceptible. Knowledge of pathogeneicity of the isolates and their sensitivity to metalaxyl is very important for effective integrated management of late blight.

F 71

FUNGICIDES ACQUIRED RESISTANCE AND ITS EFFECT ON THE MORPHOLOGICAL CHARACTERS OF *STEMPHYLIUM VESICARIUM*, THE CAUSAL ORGANISM OF ONION STEMPHYLIUM LEAF BLIGHT. M.H.A. Hassan, S.A. Ahmed and W.T. Kenawy, Plant Pathology Department, Faculty of Agriculture, Assiut University, 71526, Assiut, Egypt, Email: mhasanmha@yahoo.com

Chemical control is considered the most effective mean to control onion stemphylium leaf blight caused by *Stemphylium vesicarium*. One of the main problems restricting chemical control of fungal diseases is pathogens that could produce resistant strains to the used fungicides, particularly to those used repeatedly at the same site for several subsequent seasons. The causal pathogen was isolated and identified as *Stemphylium vesicarium* (Wallr.) Simmons and the telemorphic state as *Pleospora allii* (Rabenh) Ces. & De Not. Probabilities of generating resistant strains by *Stemphylium vesicarium* affects the occurrence and development of acquired resistance. One of the most noticeable effects of development of acquired resistance is the phenomena of changes of the morphological characters of the pathogen. The resistant isolate (M) was remarkable by producing a dark red color pigments in the medium with white cottony mycelial growth and decrease in conidial production, while the sensitive one (S1) was distinguished by producing gray color pigments in the medium and increase in conidia production. Alternating the use of different fungicide groups was recommended to overcome the acquired resistance problem.

F 72

SUPPRESSION OF DAMPING-OFF AND PHYSIOLOGICAL RESPONSES OF CUCUMBER (*CUCUMIS SATIVUS* L.) SEEDLINGS AFTER APPLICATION OF COMPOSTS AND *PSEUDOMONAS FLUORESCENS* PF6. Sahar A. Youssef and Kamel A.H. Tartoura, Botany Department, Faculty of Agriculture, Suez Canal University, 41522, Ismailia, Egypt, Email: youssefs@msu.edu

Management of root and crown rot of cucumber (*Cucumis sativus* L.) caused by *Pythium ultimum* is not possible through a single approach. An integrated management was applied using composts and the plant-growth-promoting rhizobacteria *Pseudomonas fluorescens* Pf6. The effects of treatments on disease suppression, growth parameters, nutrient uptake, phenolic content, lipid peroxidation and antioxidant capacity were investigated. Dual culture of *P. fluorescens* Pf6 and *P. ultimum* revealed a high degree of antagonistic activity. The combined effect of cucumber seed bacterization and 25% compost (v/v) was the most effective treatment in controlling damping-off and inhibited lipid peroxidation. Treatments significantly increased cucumber fresh and dry weight and shoot and root length and uptake of mineral nutrients. The present results also showed that bacterized cucumber plants grown in soil amended with composts contained higher levels of endogenous total phenolics and antioxidant activity. It is concluded that seed bacterization and soil amendments are effective for suppression of damping-off of cucumber caused by *P. ultimum*.

F 73

MICROBIAL STUDIES ON BACTERIA FROM COMPOST-BASED SUBSTRATES: PLANT GROWTH PROMOTING ACTIVITIES AND ANTAGONISTIC EFFECT AGAINST SOME SOIL-BORNE PATHOGENS OF MELON. Claudine Sebaaly[1], Mariagrazia Antonelli[1], Anna Maria D'Onghia[2], Gabriele Chilosi[1] and Leonardo Varvaro[1]. (1) Department of Plant Protection, University of Tuscia, Viterbo, Italy; (2) Integrated Pest Management Research Department, Istituto Agronomico Mediterraneo, Bari, Italy, Email: claudine_seb@hotmail.com

The two main fungal pathogens of melon (*Cucumis melo* L.) causing a critical problem and economic losses in Central Italy are *Monosporascus cannonballus* (MC) and *Fusarium oxysporium* f. sp. *melonis* (FOM). These pathogens are agents of collapse and vascular wilts of the melon plants, respectively. Fluorescent pseudomonas and aerobic spore-forming bacteria were isolated and quantified from some compost-based substrates used for melon cultivation. The same bacterial groups were also isolated from the rhizosphere and from the rhizoplane of melon plants grown in those substrates. Representative strains of these bacteria were characterized, and then were *in vitro* tested for their antagonism towards two MC isolates or one FOM isolate and for their plant growth promoting ability on melon seedlings. A large number of bacteria were obtained from the substrates, rhizosphere and rhizoplane. In addition, the positive effect of roots on bacterial multiplication was confirmed. Finally, it was shown that few bacterial isolates expressed an antagonistic feature against the assayed fungi; whereas a higher number of bacteria were able to promote plant growth, in terms of phosphorous solubilization and siderophores production.

F 74

NET BLOTCH OF BARLEY IN NORTHWESTERN ALGERIA. Karima Bounguab[1], Lakhdar Belabid[1] and Zohra Fortas[2]. (1) Laboratoire de Recherche sur les Systèmes Biologiques et la Géomatique, Université de Mascara, BP 763, Mascara, 29000, Algérie; (2) Laboratoire de Biologie des microorganismes et de Biotechnologie, Département de Biotechnologie, Faculté des Sciences, Université d'Oran-Algérie, Email: belabidl@yahoo.fr

Barley is an economically important crop in Algeria. It contributes to increasing fodder production, particularly in semi-arid areas and it shows an adaptation as compared with other cereals. Despite this economic importance, barley suffers from many phytosanitary problems, which are probably the main causes of low production. A survey in the Northwest Algeria showed that net blotch disease is the most dominant in all sites. Our study also focused on the pathogenicity of some isolates of *Drechslera teres* (Sacc.) Shoem. The transmission of the pathogen by seeds is an effective way for its spread. Results of screening for disease resistance revealed that no resistant variety is available at present in Algeria.

F 75

FUNGAL DISEASES OF PEA (*PISUM SATIVUM*) AND CHICKPEA (*CICER ARIETINUM*) IN NORTHWESTERN ALGERIA. Merzoug Aoumria, Faouzia Benfreha, Malika Taleb and Lakhdar Belabid, Laboratoire de Recherche sur les Systèmes Biologiques et la Géomatique, Université de Mascara, BP 763, Mascara, 29000, Algérie, Email: belabidl@yahoo.fr

A Survey conducted over several fields of pea and chickpea at different phenological stages of the plant in the northwestern regions of Algeria (2006, 2007, 2008), followed by laboratory analysis allowed the identification of a large number of fungal diseases and their geographical distribution. Pea diseases in the surveyed region were powdery mildew (*Erysiphe polygoni*) by 10-35%, downy mildew (*Peronospora pisi*) from 0-23.75%, Anthracnose (*Ascochyta pisi*) from 0-13.5%, root rot (*Fusarium solani* f. sp. *pisi*) from 2.25-11.33%, wilt (*Fusarium oxysporum* f. sp. *pisi*) 9.5-14%. The presence of rust and grease bacteria was also noted. For Chickpea diseases wilt (*Fusarium oxysporum* f. sp. *ciceri*s) 37.7-100%, root rot and collar (*Fusarium solani, F. equiseté, F. culmorum*) 22.22-6.66, and other diseases caused by *Alternaria alternata* (12.5%) and *Stemphylium* sp. *(*50%) were reported.

F 76

EFFECT OF SOWING DEPTH AND SOIL MOISTURE ON INFECTION SEVERITY OF COMMON ROOT ROT DISEASE ON WHEAT. Omran Youssef, General Commission for Scientific Agricultural Research (GCSAR), Agricultural Research Centre of Kamishly, Kamishly, Syria, Email: om_youssef@yahoo.com

This work has obgected to study the effect of sowing depth and soil moisture in infection severity of common root rot disease on wheat. Three depth of sowing were tested (5, 10 and 15 cm) in plastic basins (50×15×20 cm) containing contaminated soil with a mixture of some isolates of three *Fusarium* species: *F. culmorum, F. moniliforme* and *F. graminearum*. Twenty seeds/ plot are planted with three levels of soil moisture was studied on disease development by adding known quantities of water at 5 cm sowing depth for all levels, with three replicates and compared to control treatment. Results showed that plant infection has been increased proportionally with sowing depth, but negatively with both low rate and/or high rate soil moisture.

F 77

EFFECT OF THREE MEDIA ON GROWTH RATE, BIOMASS PRODUCTION AND VIRULENCE OF *PHYTOPHTHORA SOJAE*. Nasrin Nooras Mofrad[1] and Abbas Mohammadi[2]. (1) Faculty of Agriculture, Islamic Azad University of Birjand, Birjand, Iran; (2) Department of Plant Pathology, Faculty of Agriculture, Birjand University, Birjand, Iran, Email: nasrin229@yahoo.co.in

Effect of three media [Oat meal agar (OMA), Corn meal agar (CMA) and Anasazi bean agar (ABA)] on growth, biomass production and pathogenecity of races 1 and 3 of *Phytophthora sojae* was studied on differentials. Race identification was done by hypocotyls inoculation technique with 2×2 mm plaque of fungal culture. Results did not show any difference in growth rate of *P. sojae* on all media. Biomass and oospore production in ABA was more than in OMA and CMA. There were no differences between OMA and CMA in oospore and biomass production. Results of race identification tests with OMA were similar to results of other research but results of CMA and ABA were different from results of standard tests. Results of this research showed that ABA was the best medium for growth and biomass production but OMA was the best medium for race identification test.

F 78

FIRST REPORT OF *PHYTOPHTHORA CITROPHTHORA* ON PISTACHIO FROM SOUTHERN KHORASAN. Nasrin Nooras Mofrad[1] and Abbas Mohammadi[2]. (1) Faculty of Agriculture, Islamic Azad University of Birjand, Birjand, Iran; (2) Department of Plant Pathology, Faculty of Agriculture, Birjand University, Birjand, Iran, Email: nasrin229@yahoo.co.in

During the summer of 2008, symptoms of a root rot were observed in pistacia gardens located in southern Khorasan province in Iran. The symptoms resulted in root and crown rot, and eventually plant death. The diseased tissue was disinfested for 1 min in 1% NaOCl and plated on a semi selective medium for Oomycetes. The microorganism consistently isolated from infected tissues, grown on corn meal agar (CMA) at 22°C. Isolations from the affected tissues repeatedly yielded a *Phytophthora* sp. that was determined by morphological and physiological characteristics to be *P. citrophthora*, produced hyphae with a diameter ranging from 4.7 to 5.2 µm. Sporangia were produced in sterilized 1% soil extract, papillate, and hyaline, measuring 43.3 to 54.4 × 26.7 to 27.7 µm. This is the first report of this pathogen affecting pistachio in southern Khorasan in Iran.

F 79

SEED ROT AND DAMPING OFF ON BEAN IN NINEVAH GOVERNORATE, IRAQ. Ali Kareem Al-Taae and Nihal Yonis Al-Murad, Department of Biology, College of science, Mosul University, Mosul, Iraq, Email: nihalym04@yahoo.com

The results of a field survey carried out on bean fields in two areas in Ninevah Governorate showed that infection rate of bean seedling post emergence damping off ranged between 40-49% in spring and 33-43% in autumn. The results of isolation and diagnosis showed that *Fusarium solani* Mart, *Macrophomina phaseolina* Tassi, and *Rhizoctonia solani* Kuhn were the causal pathogens. These fungi showed a high infection rate on local variety (*Phaseolus vulgaris*) with seedlings pre-emergence damping off, where *R. solani* had the highest infection rate (65%). Reaction of five varieties of beans showed that Mosul 36 was the most resistant variety to the above fungi and to their mixture. Seedlings pre-emergence damping off, incidence was 33.5%, while black beans variety was the most susceptible. The average infection rate with the fungi and their mixture was 79.5%. It became clear that *R. solani* was significantly more abundant than the other two fungi and their mixture, in relation to seedling pre-emergence

damping off. As for post-emergence damping off, Contender variety was the least susceptible, and *M. phaseolina* was more common than the other fungi and their mixture (34.4%).

F 80

CURRENT *RHIZOCTONIA SOLANI* ANASTOMOSIS GROUPS IN EGYPT AND THEIR PATHOGENIC RELATION TO COTTON SEEDLINGS. Maurice S. Mikhail[1], Kamel K. Sabet[1], Moawad R. Omar[2], Amal A. Asran[3] and Khaled K. Kasem[1,4]. (1) Plant Pathology Department, Cairo University, Egypt; (2) Plant Pathology Research Institute, Agricultural Research Center, Giza, Egypt; Botany and Microbilogy Department, College of Science, King Saud University, Saudi Arabia; (4) Agricultural Research Center in Hama, General Commission for Scientific Agric. Research, Syria, Email: kaldkas5@hotmail.com

Twenty eight isolates of *Rhizoctonia solani* were obtained from cotton seedlings and twenty three isolates from other hosts; eight from peanut, five from chickpea, two from each of flax, tomato and watermelon and one from each of potato, cantaloupe, pepper and lupine. Microscopic examination revealed that 17 isolates (33.33%) belonged to AG-2-2, 17 isolates (33.33%) belonged to AG-4 HG-I, while 7 isolates (13.73%) belonged to AG-4 HG-II and 10 isolates (19.61%) belonged to AG-5 groups. Pathogenicity test on cotton cultivar Giza 86, under greenhouse conditions, showed that 19 isolates significantly induced Pre- and post-emergence damping-off, while they significantly decreased survival, plant height and dry weight. However, the pathogenic isolates of AG-2-2 representing 19.61% of the total isolates as well as the highest percentage of the pathogenic isolates (52.63%). There were no significant differences between effects of different AGs on the cotton seedling variables. Cluster analysis suggested that grouping the isolates based on their virulence patterns was not related to their geographic origins or AG or host.

F 81

ISOLATION AND IDENTIFICATION OF *COLLETOTRICHUM COCCODES* THE CAUSAL PATHOGEN BLACK DOT DISEASE ON POTATO IN SYRIA. Mohamed Matar, Department of Plant Protection, Faculty of Agriculture University of Aleppo, Syria, Email: matar59@maktoob.com

Black dote (Anthracnose) is an important disease affecting potato in many regions worldwide, causing significant losses in yield. The disease was recorded for the first time in 2006 on potato in Syria, in some potato fields at Hama and Idleb, on Panella and Sponta varieties. The fungal pathogen was isolated from roots, stems and tubers of infected plants, and identified as *Colletotrichum coccodes* (Wallr) Hughes.The pathogenicity test of the fungus was studied in glasshouse under artificial inculcation of the soil, using 45-55 mm potato seed tubers of the Panella variety, (elite class). Symptoms were observed after 65-70 days, a leaf wilting and chlorosis followed by necrosis and death of infected plants. Black dots were observed on lower stem of infected plants, where the intensity of acervuli and sclerotia commensurate with the severity of infection. The disease was destructive to both stems and roots, but without vascular discoloration. Symptoms observed on the surface of affected tubers as a gray-brown patches, showing acervuli and sclerotia. The size of patches on tubers expanded and united under unfavorable storage conditions, which lead finally to crust wrinkling and canker, causing loss of tuber value.

F 82

FUNGAL DISEASES ON ROSES FROM LIBYA. Farhat Ali Abozakar[1] and Salah S.El-Ammari[2]. (1) Man Made River Investment Department, Sirt, Libya. (2) Department of Botany, Faculty of Science, University of Garyounis, Benghazi, Libya, Email: sselammari@yahoo.com

This study was carried out to identify the fungal diseases on roses imported from Morocco and grown in El-Gardabia nursries at Sirt. The following diseases were identified and their causal fungi were determined: powdery mildew (*Sphaerotheca pannosa*), black spot (*Marssonina rosae*), rust (*Phragmidium mucronatum* and *Ph.tuberculatum*), flower blight (*Botrytis* sp), leaf spot (*Alternaria sp.*), and root rots (*Rhizoctonia solani,Verticillium albo-atrum and Fusarium* sp.)

F 83

FUNGAL DISEASES ON PEAS IN BENGHAZI - LIBYA. Salah.S. El-Ammari and Mohammed A. Omar, Department of Plant Production, Faculty of Agriculture, University of Garyounis, Benghazi, Libya, Email : sselammari@yahoo.com

The areas included in this survey of fungal diseases on peas were Al-Magzaha, Wadi Al-gatara, Sidi Mansor, Benina and Sidi Kalifa. The following fungal diseases were recorded: powdery mildew, Ascochyta blight, root rots and leaf spots caused by *Erysiphe pisi, Ascocyta pisi, Fusarium solani, Rhizoctonia solani, Alternaria alternata* and *Stemphylium* sp. respectively. Rust on peas was not observed in any of the farms visited. Although, powdery mildew appeared late in the season, it reached 100% incidence. In Alkadra area no significant difference in intensity of powdery mildew between two varieties of peas naturally infected with *E. pisi* was observed.

F 84

DETECTION AND IDENTIFICATION OF *PHYTOPHTHORA* SPP. OCCURRING IN THE RHIZOSPHERE AND FEEDER ROOTS OF OLIVE PLANTLETS. Ahmed Mahmoud Ismail[1], Thaer Yaseen[1], Anna Maria D'Onghia[1], Antonio Ippolito[2] and Franco Nigro[2]. (1) Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari, Italy; (2) Dipartimento di Protezione delle Piante e Microbiologia Applicata, University of Bari, Via Amendola 165/A, 70126 Bari, Italy, Email: y.thaer@iamb.it

The aim of the present work was to monitor *Phytophthora* spp. in the soil and feeder roots of olive

plantlets growing in several nurseries located in Calabria and Apulia regions (Southern Italy). Traditional (plating on selective medium) and molecular (PCR) methods were used to detect the pathogen, both in soil and rootlets samples. *Phytophthora* spp. were found in 74 out of 200 samples tested. Similar colonies were grouped and identified according to their morphological characters. Primers Ph2-ITS4 also revealed the presence of the genus *Phytophthora* immediately, whereas the sequences of the amplicons generated by the primer pairs ITS4-ITS5 and COXF4N-COXR4N, unambiguously identified *P. palmivora*, and *P. citricola*. As a whole, results obtained from the samples tested indicated that *P. palmivora* was the predominant species (85.7%) in the olive nurseries, followed by *P. citricola* (14.3%), either in the soil or in feeder roots samples. The molecular tools used in this work confirmed the morphological identification of the *Phytophthora* species occurring in the rizosphere and feeder roots of olive plantlets.

F 85

APPLICATION OF SALTS AND NATURAL SUBSTANCES TO REDUCE INCIDENCE OF *PENICILLIUM* ROT ON MALTAISE AND VALENCIA LATE ORANGES IN TUNISIA. Wafa Rouissi[1], Simona Marianna Sanzani[2], Angela Ligorio[2], Youssef Khamis[2], Thaer Yaseen[1], Mahamed Cherif[3], Anna Maria D'Onghia[1] and Antonio Ippolito[2]. (1) Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari-Italy; (2) Dipartimento di Protezione delle Piante e Microbiologia Applicata, University of Bari, Via Amendola 165/A, 70126 Bari-Italy; (3) Département de Protection des Plantes et Maladies Post Récolte, Institut National Agronomique de Tunisie. 43, Avenue Charles Nicolle 1082, Tunis, Mahrajène, Tunisine, Email: ippolito@agr.uniba.it

At a time of increased public awareness about chemical treatments and development of fungicide resistance by postharvest pathogen populations, the adoption of alternative control means seems to be essential. However, an effective way to reduce losses requires the knowledge on epidemiology and complex interactions between host, pathogen and control agents. Results of the present study revealed that the population of *Penicillium* spp. on fruit surface and in the packing house atmosphere fluctuated along the packing line, reaching a peak at "bin emptying" step. In semi-commercial trials, organic and inorganic salts and natural substances were applied to Maltaise (postharvest treatment) and Valencia late (pre and/or post-harvest treatment) oranges. On both cultivars, sodium carbonate and bicarbonate were the most effective substances, being on the latter as effective as Imazalil in reducing *Penicillium* rots and populations on fruit surface. Pre-harvest spraying on Valencia late proved to be the best application strategy since, rot incidence was lower than in the other treatments. *P. ulaiense* and *P. digitatum* identification was confirmed by the use of specific sets of primers designed for the IGS regions of rDNA.

F 86

FUNGICIDE MANAGEMENT OF ASCOCHYTA BLIGHT OF FABA BEAN. Siham Kabbabeh[1], Seid Ahmed[1] and Mathew M. Abang[2]. (1) Biodiversity and Integrated Gene Management Program, ICARDA, P.O. Box 5466, Aleppo, Syria, Email: s.kabbabeh@cgiar.org; (2)Vegetable Breeding and Seed Systems (vBSS) Program AVRDC-The World Vegetable Center Regional Center for Africa, P.O. Box 10, Duluti, Arusha, Tanzania.

Ascochyta blight (*Didymella fabae*) is one of the major production constraints affecting faba bean production and quality in many counties. Many control strategies are being used in different parts of the world to reduce the impact of Ascochyta blight in faba bean production. Most faba bean breeding programs are working to develop Ascochyta blight resistant varieties for small and large scale growers. Although many varieties were developed by many national programs, they did not reach farmers mainly in developing counties where seed production and delivery are bottlenecks for technology transfer. In addition to shortage of seeds of improved varieties, the levels of resistance is not high enough in many of the released varieties and require additional disease control components like adjustment of sowing date and properly timed fungicide applications to increase productivity and quality of the crop. Field experiment was conducted to evaluate the effects of fungicide applications (Mancozeb, Chlorothalonil and Azoxystrobin (Ortiva)) and sowing dates (end of November and mid January plantings) on six faba bean genotypes with varying levels of resistance to Ascochyta blight in 2007/2008 cropping season at ICARDA, Syria. Disease epidemics were initiated from artificial inoculations of plots with infected debris and data on disease incidence, severity and seed yield were collected. The results showed significant ($p<0.001$) effects of sowing date and fungicide on disease incidence on leaves and stems as well as disease severity. Early sowing date showed high levels of disease incidence and severity. The fungicide Ortiva and Chlorothalonil reduced both disease incidence and severity of Ascochyta blight. There was no significant interaction effects among the variables studied for all disease parameters measured in the experiment. The role of fungicides as a component of integrated ascochyta blight management on faba bean will be presented.

F 87

IDENTIFICATION OF EUCALYPTUS AND SYCAMORE DEFENCE COMPOUND INDUCED AGAINST NATTRASSIA *MANGIFERAE* AND *PHOMA EXIGUA*. Khaled Hassan Taha[1] and Anwar Nouri Mohamad[2]. (1) Plant Protection Department; (2) Forestry Department, College of Agriculture & Forestry, Mosul University, Mosul, Iraq, Email: mahmoud_mm2005@yahoo.com

Defense compounds induced by the toxins of *Nattrassia mangiferae* such as (–) Catechin, (–) Epicatechin, (–) Gallocatechin, (+) Epiafzelechin, Phloroglycinol and the two unknown compounds (1) and (2) were induced when Glucuronic acid was injected in eucalyptus. Defense compounds were also induced by the

effect of *Phoma exigua* phytotoxin (Ascochitine) in sycamore seedlings and compounds such as, Phloroglycinol, (–) atechin and the unknown compound (3) were defected. The results of quantitative separation of some defense compounds showed the precipitation of gelatinous substance in glass vials which may induce defence compounds after their separation. There were differences in their quantities produced in sycamore. The highest value was for Gallic acid (2.4 mg/ 125 mg dry wt.), while the quantities of other defense compounds were between (10–14 mg/ 125 mg dry wt.) in sycamore branches. When the defense compounds were separated by chromatography they had different in R_f values. The highest rate was for Herniarin (0.93), followed by Scopoltine (0.86), unknown compounds (0.34), (–) Gallocatechin (0.34), Ellagic acid (0.11) and the lowest value for gallic acid (0.03). All the defense compounds were characterized by their gelatin texture and brown color except for the gallic acid which tended to be yellow in color. The calculation of inhibition concentration (IC50) for the defense compounds and their effect on the two pathogens (spores germination, sporulation, and growth of both fungi), showed that lower IC_{50} (0.31 µMole/ ml) for Heriniarin against *N. mangiferae* inhibition then Gallocatechin (IC_{50}= 0.34 µMole/ ml). Whereas, Heriniarin was more active against *P. exigua* sporulation (IC_{50}= 0.41 µMole/ ml). The effect of defense compounds on spore germination was higher by Gallic acid against *P. exigua* (IC_{50}= 0.32 µMole/ ml) and *N. mangiferae* spores germination than Gallocatechin (IC_{50}= 0.34 µMole/ ml). The strongest defense compound on fungal growth was by Heriniarin against *N. mangiferae* (IC_{50}= 0.52 µMole/ ml) and *P. exigua* growth (IC_{50}= 0.54 µMole/ ml).

F 88

DOSAGE REDUCTION OF THE FUNGICIDE TOPAZ FOR THE CONTROL OF POWDERY MILDEW ON CUCUMBERS BY MIXING IT WITH AN EXTRACT FROM *Urtica uren.* N. Ali Mohamed, Department of Plant Protection, Faculty of Agriculture, Omar Al-Mukhtar University, El-Bayda, Libya, Email: noboshakoa@yahoo.com

This study was conducted during 2009 winter and spring seasons, by treating 3 weeks old cucumber seedlings with conidial suspension collected from powdery mildew infected cucumber. The causal agent was identified as *Spherotheca* sp. with typical conidia. This fungal pathogen was also found on a number of weeds adjacent to the cucumber plants. Three days after inoculation, plants were treated with four treatments and four replicates. Each replicate was composed of 5 pots with four plants in each pot. The four treatments were boiled *Urtica uren* extract, boiled *Urtica uren* extract + Topaz fungicide at the recommended rate, *Urtica uren* extract + 1/3 of the recommended dose of the fungicide Topaz, and the fourth treatment was the recommended dose of Topaz. Powdery mildew infection 7 days after inoculation was significantly lower in all treatments as compared to the untreated control. There was no significant difference among treatments in relation to plant height and weight and was higher than the untreated plants (positive control). Chlorophile content (A, B or A+B) and sugar in infected plants were reduced, whereas phenol content was less in healthy plants. Data showed that it is possible to reduce the dosage of the fungicide Topaz to one third when the plant extract from *Urtica uren* is added, and gave similar results to the use of Topaz at the recommended rate.

F 89

CHARACTERIZATION AND PATHOGENICITY OF *PYTHIUM* SPECIES ISOLATED FROM MOROCCAN WATERS. Aicha El Aossami[1], A. El Androusse[1] and Z. Ejjalti[2]. (1) Laboratoire de Botanique, Mycologie et Environement, Département de Biologie, Faculté des Sciences de Rabat. Université Med V(Agdal), Morocco; (2) Département de Biologie, Faculté des Sciences et Techniques**,** *Université* Hassan II de *Mohammedia***,** Morocco, Email: vaicha@hotmail.fr; elaisami@fsr.ac.ma

Twenty-two *Pythium* spp. were obtained from irrigation wather in the region of Rabat (capital of Morocco) in northern Africa, from 2001 to 2005. The predominant species recovered were *P. catenulatum, Pythium diclinum, P. torulosum* and *Pythium"Group F"*. Taxonomic and morphological details of the *Pythium* species were identified. The isolates grew on potato carrot agar (PCA) containing various concentrations of NaCl, up to 700 mM, thus they were tolerant to high salinity. Pathogenicity of all *Pythium* species was analyzed in pre- and post-emergence inoculation tests. Tests were conducted on alfalfa and Berseem seeds and seedlings at 25°C and high relative humidity. For each *Pythium*, aggressiveness on alfalfa and Berseem (measured by disease index) were highly correlated. *P."Group F* was non pathogenic, *P. catenulatum and P. torulosum* were moderate but *P. diclinum* was highly aggressive and caused the most pre-emergence death of alfalfa and Berseem.

F 90

GENETIC VARIABILITY IN POPULATION OF *FUSARIUM OXYSPORUM* F. SP. *ALBEDINIS*, CAUSAL ORGANISM OF BAYOUD DISEASE OF DATE PALM USING RAPD AND ISSR MOLECULAR MARKERS. My Hassan Sedra and Naoual Zhar, Institut National de la Recherche Agronomique, Centre Régional de la Recherche Agronomique de Marrakech BP. 533 Marrakech, Morocco, Email: sedramh@hotmail.com

The date palm (*Phoenix dactylifera* L.) is the most important crop in Moroccan oasian ecosystem that produces dates and other products and preserves this system which is threatened by desertification. Several other constraints has also perturbed the development of date palm sector, of them the Bayoud disease, caused by *Fusarium oxysporum*. f.sp. *albedinis* (Foa) constitutes serious threat for these oases. In order to control this disease, the use of resistant varieties was until now the most appropriate approach. However, the resistance durability depends on pathogen genetic variability notably the appearance of new physiological races. Recent studies showed that the variability level was very low. This research work aimed to study genetic variability in *Fusarium oxysporum* populations of 45

pathogenic and non pathogenic strains from different areas in Morocco and other Arab countries using specific and non specific PCR techniques. The pathogen strains of *F.o.* f. sp. *canariensis* (Foc) isolated from Canary island palm (*Phoenix canariensis* L.) have been included in this study. New RAPD and microsatellites ISSR primers were selected; these primers have generated 163 polymorphic markers. The dendrogram using average linkage and established by polymorphic bands revealed by RAPD and ISSR analysis showed the polymorphism in Foa strains without discriminating them to other strains and globally clustered the strains based on their geographic or isolation origins. The specific PCR using two specific couples of primers showed relatively weak reliability level to detect Foa strains.

F 91

A SURVEY AND EVALUATON OF SUGAR BEET INFECTION WITH FUNGAL DISEASES. Abdul Rahman Khafateh, **F**aculty of Agriculture in Idleb, Aleppo University, Syria, Email: yousf-kh@scs-net.org

A field survey was conducted during the 2007-2008 growing season to determine the spread and distribution of sugar beet fungal diseases in Syria, where cultivated area amount to 29000 ha, and total production is 1.4 milion ton in Homs, Hama, Idleb, Raka, Der elzor. Leaf diseases such as cercospora leaf spot (*Cercospora beticola*), powdery mildew (*Erysiphe betae*), downy mildew (*Perenospora farinosa*), rust (*Urumyces betae*), Ramularia leaf spot (*Ramularia beticola*) were observed. Infection evaluation was done by using two scales for diseases severity (DS) based on 11 classes from healthy to totally destroyed foliage. In addition, rot diseases: Rhizoctonia crown rot (*Rhizoctonia solani*), crown wart (*Urophlycts leproides*), and Fusarium and pythuim rot were lesss observed.

F 92

GENOME FINGERPRINTING OF *SCLEROTINIA SCLEROTIORUM* POPULATIONS BY REP-PCR MARKER. Elham Karimi, N. Safaie and M. Shamsbakhsh, Department of Plant Pathology, Agricultural Faculty, Tarbiat Modares University, Tehran, Iran, Email: karimielham@yahoo.com

Genetic structure of twenty-seven isolates of *Sclerotinia sclerotiorum*, the causal organism of canola white stem rot, were determined by mycelial compatibility groupings (MCGs) and rep-PCR genomic fingerprinting. Total banding patterns of four primers, ERIC 1R, ERIC 2, REP2-I and BOX A1R produced 94 loci, of which one was monomorphic and 93 loci were polymorphic (98.9 polymorphism). Cluster analysis of obtained data based on UPGMA and Jaccard´s coefficient divided the isolates into seven groups at 55% similarity level, proposed high level of genetic diversity within and among populations of this fungus. Data indicated that in most cases the isolates belonging to the one MCG did not show identical pattern. This would be consistent with genetic exchange, mutation and mitotic recombination. This is the first study on genetic diversity of *S. sclerotiorum* populations using MCGs and rep-PCR genomic fingerprinting.

F 93

SURVEY OF POTATO DISEASES IN WESTERN LIBYA. Fauzi A.Bisheya, M.M. Zantuti and M.M. Maauf, Agricultural Research Center, Tripoli, Libya, Email: bisheya@yahoo.com

Potato (*Solanum tuberosum*) is considered one of the important vegetable crops in Libya which is cultivated twice a year, spring and autumn growing season. Potatoes are attacked by many diseases especially fungal, bacterial, viral and, nematode. Field survey was conducted during spring and autumn growing season for five consecutive years (2003-2007) in 19 different locations. Results indicated that the rate of mother tuber soft rot after sixty days of planting was 11%, and early blight was 18% (spring 2003), while average infection rate with early blight 3%, and late blight was 2.9% (spring 2004). Black scurf incidence was 13.75%, common scab 9% and root-knot nematode was 3.2% (autumn 2004-2005). The average infection rate of early blight was 0.7%, late blight was 18% and soft rot 21% (spring 2007). Physiological disorders on potato tubers were detected such as tuber deformation and cracking. Average of affected tuber surface was 11.2 cm². Number, length and depth of cracks were 4.3 cm, 3 cm and 4.3 mm, respectively. Infection incidence of examined samples with scab was 37%, and with black scurf was 10.2%. Some potato cultivars were evaluated during spring and autumn growing seasons. Results indicated some variation in infection rate between 0-12.3% for black scurf, 0-2.7% for soft rot and 5-42.3% for common scab. Total yield and other specifications related to value of production were determined.

F 94

SENSITIVITY OF SOME DATE PALM VARIETIES TO THE INFLORESCENCE ROT DISEASE CAUSED BY *MAUGINIELLA SCAITTAE* AND *FUSARIUM* SP. K.K. Alhassan, I.I. Al-Yaseri and T.M. Al-Noaimee, State Board for Plant Protection, Ministry of Agriculture, Baghdad, Iraq, Email: ismail_alyaseri@yahoo.com

The sensitivity of 14 date palm varieties (Alkhustawe, Khathrawe Al-Basrah, Alkhyara, Almakawe, Albraim, Albarhe, Dukal Taha, Dukal Kasim, Albarban, Altebrzal, Alzahdi, Alsultani, Khathrawe Mandely, Nuher Alsili and the Males) to the inflorescence rot disease was evaluated. Inoculation was carried out with a solution of 25 × 10^4 spore/ ml for two consecutive years. Results indicated that the highest incidence and severity caused by the fungus *Mauginella scaittae* was with cvs. Males, Alkhustawe and Albraim, and cvs. Alkhustawe, Males, Albraim and Alkhyara were highly sensitive. The varieties Albraim, Alkhustawe and Males were highly sensitive to infection with the fungus *Fusarium* sp.

F 95

GENETIC DIVERSITY OF THE *SEPTORIA TRITICI* ISOLATES BY USING RANDOM AMPLIFIED POLYMORPHIC DNA. Azadeh Ghaneie[1], N. Safaie[1], R. Mehrabi[2] and A. Saidi[3]. (1) Department of Plant Pathology, College of Agriculture, University of Tarbiat Modares, Iran; (2) Department of Gene Bank, Seed and Plant

Improvement Institute, Iran; (3) Department Biotechnology, College of New Technology and Engineering, Shahid Beheshti University, Iran, Email: A.ghaneie@yahoo.com

Septoria leaf blotch is one of the most important wheat diseases worldwide, including Iran which causes significant yield reduction. In this research the genetic diversity of *S. tritici* isolates using RAPD markers was evaluated. The infected samples were collected from Khusetan, Golestan, Ardebil, Kermanshah and Western Azarbayejan. Three primers indicated considerable polymorphism between genotypes. Cluster analysis of DNA fingerprint data using UPGMA method and Jaccard's coefficient, divided the isolates into 9 groups at 50% similarity level showing a high genetic diversity among populations of *S. tritici*. Accordingly, the isolates of Khusestan, Ardebil, Western Azarbayejan, Kermanshah, Golestan were categorized into 4, 1, 2, 1 and 1 group, respectively. There were no correlation between geographical origins and the resulting groups of RAPD analysis.

F 96

IDENTIFICATION OF THE CAUSAL FUNGUS OF APPLE STEM CANKER IN SWEIDA, AND TESTING THE SUSCEPTIBILITY OF SOME VARIETIES TO DESIEASE. Taissir Abou Al Fadil[1], Walid Naffaa[2], Taher Abou Faker[3], Bayan Muzher[3] and Hussam Amer[3]. (1) Administration of Plant Protection Research, General Commission for Scientific Agricultural Research (GCSAR), Doma, P.O. Box 113, Damascus, Syria, Email: tafadil@yahoo.com; (2) Administration Department of Plant Protection, Faculty of Agriculture, Damascus University, P.O. Box 30621, Damascus, Syria; (3) Agriculture Research Center of Al Siweda, Al Swieda, Syria.

Samples were taken from 25 apple trees showing stem canker symptoms at five different geographical locations of Daher Al jabal area in Sweida for isolation and identification of the pathogen. Results showed that more than 90% of isolates were *Alternaria alternata*. This pathogen was able to induce canker symptoms on stems of 12 apple varieties under artificial inoculation conditions. Isolates from different geographical sites were different in their pathogenicity. Apple varieties studied showed also significant differences in their susceptibility to the disease. Wealthy double red and Starking delicious varieties were the less susceptible, while Golden lody was the most susceptible to Alternaria canker disease.

BACTERIAL DISEASES

B 1

IDENTIFICATION AND SURVEY OF FIRE BLIGHT DISEASE ON APPLE AND PEAR TREES IN JABEL EL-AKHDAR AREA, LIBYA. Ngaat I. Omar, Azzeddin M.Y. Alawami and Mohammed A.M. Adem, Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, El-Beida, Libya, Email: Azzawami2002@yahoo.com

This study was carried out on apple and pear during 2007 growing season, to survey and identify the causal organism of fire blight disease in different regions (El-Faidia, Shahat, Elbieda, Elwesita and Gernada) of Jabel El-Akhdar area-Libya. The diagnostic symptoms of this disease included color changes of pear and apple flowers to black, pear leaves to black and apple leaves to brown. The oozing was observed on curly pear fruits, and finally fruit mummification. Results of the survey revealed that the highest disease severity was recorded in El-Faidia region followed by Shahat, Elbieda, Elwesita and Gernada. Infected samples were collected to study the morphological, cultural, biochemical and physiological characters of isolated bacterial pathogen. Results indicated that *Erwinia amylovora* was the causal organism of this disease. Pathgenicity test on premature pear fruits and slices of premature pear and apple fruits confirmed this conclusion. The specific PCR amplification by using specific *E. amylovora* primers confirmed the identification of these isolates.

B 2

ISOLATION AND EFFECT OF ULTRA-VIOLET RADIATION ON GROWTH OF *ERWINIA CAROTOVORA* STRAINS, THE SOFT ROT PATHOGEN ON POTATO IN ALGERIA. Ahmed Bensoltane, S. Tabak, N. Saidi, M. Mahi and Arezki Ait Abdeslam, Laboratoire de Microbiologie Alimentaire et Industriel, Département de Biologie, Faculté des Sciences, Université d'Oran 31000, Algérie, Email:dikra15ma@Yahoo.fr

Twenty five strains of *E. carotovora* were isolated from potato (*Solanum toberosum*) tubers (Desirée) in the region of Oran city (Western of Algeria). The strains were identified morphologically, biochemically and genetically by PCR, which confirmed that those strains belong to *Erwinia carotovora*. The objective of present work was to study the antimicrobial effects of ultra-violet (UV) radiation for disinfecting potato in the storage areas. *Erwinia carotovora* was submitted to three periods of treatment (5, 15 and 45 s) with three UV lamp distances (0.5, 1 and 2 cm). Studied strains proved to be sensitive to UV-light (80-99% inhibition), compared to *E. coli* strains which showed 74-99% inhibition). The inhibition of growth was increased with application period, where there was significant differance ($P<0.05$) between 5s and 15s-45s treatment.

B 3

STUDY OF FIRE BLIGHT ON POME FRUIT TRESS IN SYRIA. Hassan Ammouneh, Antonus Al-Daoude, Mohammad Imad Arabi and Amina Shoaib, Department of Molecular Biology and Biotechnology, AECS, PO Box 6091, Damascus, Syria, Email: hammouneh@aec.org.sy

A survey of all major pome fruit growing regions was conducted during 2005 and 2006 to establish whether *Erwinia amylovora*, the causal organism of fire blight, is present in Syria. Samples were collected from quince (*Cydonia oblonga*), pear (*Pyrus communis*) and apple (*Malus domestica*) trees suspected of being infected with *E. amylovora*. Seventy five isolates of *E. amylovora* were recovered mainly from quince and some from pear but none from apple. All isolates produced typical symptoms of fire blight when tested on immature pear fruit. Two isolates

were shown to induce a delayed hypersensitivity reaction on tobacco. All isolates were confirmed to be *E. amylovora* by polymerase chain reaction using primers specific for this bacterium. One set of primers amplified a fragment of the native plasmid (pEA29) and a second set amplified a fragment involved in the synthesis of amylovoran, the structurally unique exopolysaccharide of this bacterium. Fire blight was found to prevail in Al-Zabadani region (Rif Damascus), an area with a moderate temperature and high relative humidity during the blossoming period. However, the disease was found to be restricted within Syria and observed only in isolated foci near the Lebanese border. This is the first isolation and identification of *E. amylovora* from Syria. Furthermore, seventy five *Erwinia amylovora* isolates were tested for copper and streptomycin sensitivity. Susceptibility of locally important pear and quince cultivars was also determined. The growth of sixty eight isolates was inhibited by 10 µg/ml streptomycin and thus regarded as streptomycin sensitive. However, three isolates were not inhibited by 2000 µg/ml streptomycin and these isolates were considered resistant. Additionally, fifteen isolates were found to grow well on a synthetic medium in the presence of 1.2 mM copper sulfate and none survived on the same medium containing 2.4 mM copper sulfate. Additionally, fruits from one hundred *P. syriaca* ecotypes distributed throughout the interior of Syria were collected and examined. Merely, fruits from two ecotypes (Ps32 and Ps62) were found to inhibit fire blight development. Similarly, three *Pyrus communis* cultivated varieties were assessed and fruits from one variety, Muck Al-Jamal inhibited the growth of *E. amylovora*. Notably, the local quince cultivar Baladi showed, in heavily diseased orchards, complete resistance to this bacterial pathogen indicating the importance of this environmentally adapted variety as a potential source of resistance to *E. amylovora*. The existence of pEL60 plasmid in all Syrian isolates was confirmed using multiplex PCR. Finally, selected isolates representing the major collected areas, pathogenicity groups and hosts were finger printed using AFLP technique. No correlation was found between the isolates and their geographic distribution, host or their virulence.

B 4

THE VIRULENCE FACTORS OF SOME STRAINS OF *ERWINIA* FROM POTATO INFECTED WITH SOFT ROT. AdeebaY. Shareef[1], Khawla A. Flayeh[2], Nadeem A. Ramadan[1] and M. Ameen Rawdha Al-Ramadany[2]. (1) College of Science; (2) College of Education for Girls, Mousl University, Iraq, Email: shareefadeeba@yahoo.com

The virulence of different strains of *Erwinia* was determined by studying its ability to lyse five species of potato including Billini, Colombus, Recolta, Ajiba and Desirre. The results showed that *Erwinia carotovora carotovora* was the most virulent, its mean lysis was 12.6 times compared to that of the control. Less virulent toward potato tissues was *Erwinia carotovora betavascularum* which showed lysis 10.1 times that of the control. Billini was the most resistant 1.58 times of the control. The most sensitive species of potato in response to infection with *Erwinia* was Recolta as the mean value was found to be 29.2 times compared to the control.

B 5

ANTAGONISTIC SPREAD OF *RHIZOBIUM JAPONICUM* AGAINST *FUSARIUM SOLANI* AND *MACROPHOMINA PHASEOLINA* THE CAUSAL AGENTS OF SOYBEAN WILT AND ROOT ROT DISEASE ON SOYBEAN. Majda Hadi Mahdi[1], Rakib Akif Alani[2] and Hadi Mahdi Abbod[3]. (1) Department of Biological Science, College of Science University of Baghdad; (2) Department of Plant Protection, College of Agriculture, University of Baghdad, Iraq; (3) Ministry of Sci. &Tech., Iraq, Email: s_mouyed@yahoo.com

The objective of this study was to evaluate the capacity of *Rhizobium japonicum* to reduce the severity of *Fusarium solani* and *Macrophomina phaseolina*, the causal agents of wilt and root rot on Soybean plants. Results showed a significant inhibition activity of culture filtrate of *Rhizobium japonicum* against the two pathogens as determined on yeast manitol agar, using agar well diffusion or food poisoning techniques. A positive correlation was observed between inhibition activity and the cultural filtrate concentrations. It has been found in the first technique that 25, 50, 75 and 100% of the filtrate induced 33.84, 46.46,56.02 and 65-58% inhibition of *Fusarium solani*, and 39.61, 47.12, 60.90 and 64.04% of *Macrophomina phaseolina*, respectively. This filtrate concentrations induced inhibition of 54.11, 63.33, 67.11 and 72.66% to *F. solani* And 46.33, 52.66, 59.66 and 71.33% level to *M. phaseolina*, as determined by food poison technique. Results of greenhouse experiments showed that the bacteria has increased seed germination and decreased disease severity on foliage and root system of plants treated by the two pathogens.

B 6

CHARACTERIZATION OF *ERWINIA AMYLOVORA*, A CAUSAL AGENT OF FIRE BLIGHT ON ROSACEA FRUIT TREES IN MOROCCO. El Hassan Achbani, Abdellatif Benbouaza and Najat Hannou. INRA Meknès, URPP, laboratoire de Bactériologie Végétale et de Lutte Biologique (BVLB), Km 11, Route Hadj Kddour, BP 578 VN Meknès, Morocco, Email: achbani5@yahoo.fr

Fire blight disease caused by the bacterium *Erwinia amylovora*, is among the most serious threats to ornemental and cultivated Rosacea fruit trees, world wide. In Morocco, it was first recognized in 2006 at the Meknes region. Two years later (2008), the disease spread to other regions. The objective of this study is to characterize the causal agent (*E. amylovora*) isolated since 2006. Morphological and biochemical characterizations of isolated strains of *E. amylovora* (60 strains) indicated high phenotypic and biochemical variability, particularly esculine hydrolysis and a morphological aspect of bacterial colonies on MM2Cu and CCT media. Tests of Api 20E system allowed determination of two main specific codes of *E. amylovora* 0005522 and 0007522. Using PCR technique with chromosomal (FliC1 2di & FliC1 2re) and extra-chromosomal primers (pEa13 hrp di & pEa14 hrp re), a clear band of 1000 pb in all strains for the first, and a band

of 200 bp on some strains for the latter (27%). This was the first characterization of a large collection of Morocco strains of *E. amylovora*.

B 7

OLIVE KNOT DISEASE IN JORDAN. Hamed Khlaif, Plant Protection Department, Faculty of Agriculture, University of Jordan, Amman, Jordan, Email: h-khlaif@ju.edu.jo

A field survey was conducted in 2002 revealed the occurrence of olive knot disease (*Pseudomonas savastanoi* pv. *savastanoi* Smith) in different olive growing areas in Jordan. The disease incidence varied according to location and cultivar. However, high disease incidence was reported in Amman, Aljuhfia, Deir yosef, Almazar Alshamali, Wadi Alsir, Alsmik, and low incidences were recorded in other areas. The reaction of cultivars to natural or artificial infection varied, as Nabali Muhasan, Rasei, Atrana and Shami were susceptible and Nabali Baladi was the least susceptible cultivar. Infection significantly reduced twig length, fruits number, weight and size. These parameters were found to be correlated with the number of knots/seedling. The pathogen was also isolated from jasmine, oleander and Ziziphus. Isolates of these hosts were found pathogenic to olive grown either inside or at the border of olive orchards. Consequently, these hosts could play an important role as a source of olive knot inoculum, and in disease epidemiology. Dipping olive twigs in cuprosan suspension, trimiltox, opper sulfate, copper hydroxide, resulted in reduction of disease incidence, knots number, and increased the fruits number compared to control.

B 8

IDENTIFICATION AND SEROLOGICAL STUDY ON THE CAUSAL ORGANISM OF BACTERIAL SOFT ROT ON POTATO IN JABAL AL-AKHDAR AREA, LIBYA. Hannan S. A. Mustafa, Azzeddin M. Y. Alawami and Issa A. Abogharsa, Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, El-Beida, Libya, Email: Azzawami2002@yahoo.com

The present study was conducted to identify the causal organism of bacterial soft rot on potato in Jabal Al-Akhdar area- Libya and prepare an antiserum to be used for detecting this pathogen in infected potato parts. Different bacterial isolates were isolated from the collected diseased potato tubers. Results of morphological, cultural, biochemical and physiological properties and pathogenicety test showed that six isolates (E625, E112, E122, E272, E393 and E3625) were identified as Erwinia *carotovora* subsp. *carotovora*, whereas the isolate E624 belongs to the bacterium *Erwinia chrysanthemi*. Antiserum of the isolate E625 was produced in New Zealand white rabbit injected with sonicated bacterial suspension. Results of indirect ELISA showed that serological relationship exist between the different isolates when they gave the same reaction with the antiserum, except isolate E624 that belongs to *E. chrysanthemi*, whereas the other isolates belong to *E. carotovora* subsp *carotovora*. Efficiency of antiserum to detect this pathogenic bacteria in diseased tubers was investigated. Data proved that ELISA values of diseased tissues were many times higher than those of healthy ones. These results confirmed the efficiency of serological methods to detect the pathogen of soft rot disease. Host range experiments showed that the bacterium *E. carotovora* subsp *carotovora* was able to induce typical symptoms of soft rot on pepper, tomato, onion and zucchini.

B 9

SEROLOGICAL STUDY ON FIRE BLIGHT PATHOGEN OF POME TREES AND COMPARISON BETWEEN ITS ISOLATES USING RESTRICTION ENZYMES. Ngaat I. Omar, Azzeddin M. Y. Alawami, Hosney A. younes and Mohammed A. M. Adem, Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, El-Beida, Libya, Email: Azzawami2002@yahoo.com

Antiserum of one isolate of *Erwinia amylovora*, isolated from Jabal Al-Akhdar area- Libya, was produced in NewZealand white rabbits injected with autoclaved or sonicated bacterial suspension. Injection of both bacterial suspensions produced antibodies aginst this bacterium. Results of indirect ELISA to determine the optimal period to collect the antiserum showed that the first collection (2 days) was the best when the rabbit was injected with sonicated bacterial suspension and the third collection (7 days) when injected with autoclaved suspension. Indirect ELISA also showed serological relationship between the isolates of different regions, because they gave the same reaction with antiserum, but they had no relationship with *Agrobacterium tumifasciens* and *Erwinia carotovora*. Efficiency of antiserum to detect this pathogenic bacterium in diseased plant was investigated. Data proved that ELISA values of diseased tissues were several folds higher than those in healthy ones. These results confirmed the efficiency of serological methods to detect the fire blight pathogen. DNA from five isolates of this bacterial pathogen collected from different regions in Jabel El-akhdar area as well as on identified isolate supplied by Faculty of Agriculture, Alexandria University, Egypt, were electrophoresed on a 1% agarose gel. The DNA digestion with five restriction enzymes (*EcoR1*, *BamH1*, *Xba*I, *Msp*I and *Hind*) showed that only three of them (EcoR1, BamH1and Xba1) gave positive results and proved that no differences was found among the isolates.

B 10

EXPRESSION PROFILING OF SOME *ARABIDOPSIS THALIANA* GENES FOLLOWING CHALLENGE WITH DIFFERENT STARINS OF *PSEUDOMONAS SYRINGAE*. Hassan Ammouneh[1] and John Mansfield[2].(1) Department of Molecular Biology and Biotechnology, AECS, PO Box 6091, Damascus, Syria, Email: hammouneh@aec.org.sy; (2) Life Science Department, Imperial College London, Unvesity of London, Wye, TN25 5AH., UK.

The effecter proteins VirPphA and AvrPtoB share sequence similarity and they are a major determinant of pathoegenicity of the bacterial pathogens *Pseudomonas syringae* pv. *phaseolicola* (*Pph*) and *P. syringae* pv. *tomato* (*Pst*), respectively. Both effectors are virulence determinants in bean but only AvrPtoB has clear activity in

Arabidopsis. Yeast two-hybrid screens identified protein targets in *Arabidopsis* that interact with AvrPtoB and VirPphA. Putative interactors (PIs) recovered, including cytoskeletal proteins and a receptor like-kinase may have an important role in plant defense. In this study, Northern blots were used to examine the gene expression of selected PIs after bacterial pathogen challenge using probes labeled with the isotope ^{32}P. The expression profiling of the transcripts showed different patterns including 1- *p*athogen *i*nduced *g*enes (*PIGs*), such response was observed with the protein kinase and receptor-like kinase; 2- delayed *PIGs*, this group included the 20S proteasome beta subunit, caltractin and carnitine racemase-like protein; 3- constitutive *g*ene pattern such as putative fibrillin; and 4- *p*athogen *s*uppressed *g*ene pattern (*PSG*), since it is the only gene predicted to encode 2-cys peroxiredoxin-like protein fell into this category.

B 11

BACTERIAL WILTS OF POTATO IN LEBANON. Adib Saad[1], Elias Chnais[1], Lucia Hanna[1], Mireille Kattar[2], and Karma Bouazza[1]. (1) American University of Beirut, Faculty of Agriculture and Food Sciences, Agricultural Sciences department; (2) American University of Beirut, Medical Center, Pathology department. P.O.Box 11-0236, Agricultural Sciences, FAFS, Riad El-Solh, Beirut 1107 202, Lebanon, Email: eliechnais@hotmail.com

The current study consisted of a survey that aimed to detect the quarantine pathogen *Ralstonia solanacearum* (*R.s*) and the blackleg bacterium *Erwinia carotovora* subsp. *atroseptica* (*Eca*). Three hundred and fourteen infected potato samples were collected from eleven localities in the Bekaa. One hundred and fourteen bacterial strains were isolated from these infected plants. The bacterial isolates were subjected to several biochemical and physiological tests to determine their pathogenicity, where thirty nine isolates were pathogens. A pathogenicity test was conducted on eggplants and tomato plants and rated on a scale of 1 to 4 according to the degree of virulence. Twelve isolates had a rating of 1, fourteen a rating of 2, thirteen a rating of 3, and none had a rating of 4 (highly virulent). The ability of the isolates to degrade potato tissues was assessed by rotting of potato slices and whole tubers. It was revealed that the higher the pathogenic rate the isolates had, the more likely they possessed the ability to rot potato. Resuts prooved that none of the isolates suspected as *R. s.* belonged to this species. However, *Eca* has many serotypes and it is probable that local *Eca* strains do not belong to the same serotypes previously identified which might explain why they weren't detected by the ELISA test. Sequencing of the 16S rDNA was performed on 24 out of 39 isolates selected to represent the major surveyed localities. Sequence analysis revealed that five isolates were *Eca*, eight were *Pantoea agglomerans* and four were *Agrobacterium tumefaciens*. None of the isolates were identified as *R. solanacearum*. Therefore, this study indicates that *R.s*. was not present in the surveyed areas during the period of survey. However, this study confirmed the presence of *E. carotovora* subsp. *atrospetica* in five localities in the Bekaa.

B 12

GENETIC VARIABILITY OF *PSEUDOMONAS SAVASTANOI* PV. *SAVASTANOI*. Chiaraluce Moretti[1], Franco Valentini[2], Abdelmonim A. Ahmad[2], Taha Hosni[1], Nael Alabdalla[2], Nabil S. Farag[3], Anwar A. Galal[4], M'Barek Fatmi[5], Mahmoud Abu-Ghorra[6] and Roberto Buonaurio[1]. (1) Department of Environmental and Agricultural Sciences, Faculty of Agriculture, University of Perugia, Italy, Email: chiaraluce.moretti@unipg.it; (2) Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari-Italy; (3) Agricultural Research Centre, Plant Pathology Research Institute, Giza, Egypt; (4) Department of Plant Pathology, Faculty of Agriculture, University of Minia, Egypt; (5) Institut Agronomique et Vétérinaire Hassan II, Complexe Horticole d'Agadir, Agadir, Morocco; (6) Division of (Department of) Plant Protection, Faculty of Agriculture, University of Damascus, Syria.

Olive knot disease, caused by *Pseudomonas savastanoi* pv. *savastanoi* (Pssa), poses a serious threat to many olive growing areas of the Mediterranean basin and can significantly affect olive yield and oil. The study of genetic variability of a wide Pssa population, coming from Albania, Algeria, Egypt, France, Greece, Italy, Morocco, Portugal, Serbia, Spain, Syria, Tunisia, Turkey, USA and ex-Yugoslavia, is currently in progress. This research work was undertaken following the results of the investigations carried out at MAIB-CIHEAM (Italy), in the framework of three Master theses in Integrated Pest Management, which allowed to conduct a preliminary molecular characterization of a Pssa population and to describe the disease for the first time in Egypt and Syria. Rep-PCR, and particularly, f-AFLP analyses revealed a high Pssa polymorphism which seems to be related to the country of origin and not to the olive cultivars nor to the bacterial virulence. Further Pssa characterisation was based on the establishment of the repertoire of effectors involved in the bacterium virulence. Since multi-locus sequence analysis revealed that Pssa is closely related to *P. savastanoi* pv. *phaseolicola* 1448A completely sequenced genome, primers designed on the basis of 21 bacterium effector genes were used to verify whether or not they are present in a selected number of Pssa strains.

VIRUSES DISEASES

V 1

BIOLOGICAL AND SEROLOGICAL IDENTIFICATION OF *TOMATO YELLOW LEAF CURL VIRUS* (TYLCV) AND DETERMINATION OF ITS STRAINS IN IRAQ. Rakib Akif AlAni, Mustafa Ali Adhab and Samir Abdul-Razzak Hassan Hamad, Plant Protection Department, College of Agriculture, University of Baghdad, Iraq, Email: maa_adhab@hotmail.com.

This study was conducted to identify *Tomato yellow leaf curl virus* and determine its strains in Iraq. Symptoms on indicator plants, incubation period of virus in vector, and serological properties of the virus were evaluated. Results of different isolates of the virus on

tomato plants, showed two types of symptoms. The first was manifested by curling, small leaves rolled upward at the margins accompanied with yellowing of the new leaves. The other type of symptoms was slight leaf curling, and blade inflection downward. Datura, infected with the two isolates, produced leaf curling, yellowing, deformation, and dwarfing of the plants. *Nicotiana glutinosa*, *N. tabacum Xanthi*, *N. tabacum Samsun* and *Phaseolus vulgaris* were infected by the two isolates without symptoms. It has been found that the incubation period of both isolates in the vector were between 16–24 hrs. Results of immunodouble diffusion test revealed spur formation between the virus antiserum and sample of purified virus and extracts from plants infected with the two isolates. This indicates the presence of two different strains of TYLCV in the tomato fields studied.

V 2

CURRENT STATUS OF *TOMATO SPOTTED WILT VIRUS* ON TOMATO AND PEPPER CROPS IN SYRIA AND SEROLOGICAL CHARACTERIZATION OF SOME OF ITS ISOLATES. Faiz Ismaeil[1], Amin Amer Haj Kasem[2] and Salah Al-Chaabi[1]. (1) General Commission for Scientific Agricultural Research, Adminstration of Plant Protection Research, Douma, P.O. Box 113, Damascus, Syria, Email: faizismail@mail.sy; (2) Plant Protection Division, Faculty of Agriculture, Aleppo University, Aleppo, Syria.

A survey to evaluate spread of *Tomato spotted wilt virus* (TSWV) in Syria was carried out. 643 tomato individual samples (leaves and fruits) collected from growers fields and from some Agricultural Research Centers, and 250 pepper individual samples (leaves and fruits) collected from growers fields only, during spring and summer 2007 and 2008, representing 8 Syrian governorates: Dar'a, Al-Qunaitara, Damascus countryside, Homs, Hama, Idleb, Aleppo and Tartous and tested using DAS-ELISA. Results showed that average infection of tested samples from both crops with virus was 19.6%, 11.1% of tomato samples and 41.2% of pepper samples, meanwhile, the rates of virus incidence in both tomato and pepper fields and in each crop individually were 1.4, 0.7 and 3.1%, respectively. The highest spread of the virus was in tested tomato samples collected from Al-Qunaitara (41.0%) followed by Dar'a, Damascus countryside, Aleppo, and Idleb (21.8, 12.0, 2.6, 1.8%). Meanwhile, virus incidence in tomato fields were 6.1, 2.2, 1.2, 0.3 and 0.1%, respectively. No virus infection was recorded in tomato samples collected from Homs, Hama and Tartous. Damascus countryside was in the first rank in virus spread on tested pepper samples (100%) and its incidence in the field (20.0%), followed by Dar'a (64.7% and 12.9) and Hama (15.4 and 0.8%), respectively. No virus infection was recorded in pepper samples collected from Al-Qunaitara, Homs, Hama, Idleb and Tartous. Reaction of 34 local TSWV isolates collected from tomato and pepper crops with 5 specific monoclonal antibodies by TAS-ELISA identified that they fall into two different serogroups; all tomato isolates (14) and 16 pepper isolates were similar in their positive reaction with MAb-2, MAb-4, MAb-5 and MAb-6, but they did not react with MAb-7, whwerase, 4 pepper isolates reacted positively with all MAbs.

V 3

SURVEY AND IDENTIFICATION OF TOMATO VIRUSES AT AL-ZAWIA DISTRICT IN LIBYA. Hanan Dabob[1], Jabr Khalil[1], Hosny Younis[2] and Omar Mousa Al-Sanusi[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Al-Fateh Tripoli, Libya, Email: khalil_reem@hotmail.com; (2) University of Omar Al-Mokhtar, Faculty of Agriculture, Plant Protection Department, Al-Baida, Libya.

Many farms and plastic houses planted with tomatoes at Al-Zawia west of Libya were visited to identify the viral diseases which infect tomato crop, during the growing seasons of 2005/2006 and 2006/2007. Sixty tomato leaf samples were collected depending on symptoms suggestive of viral infection, such as leaf rolling and curling, stunting, yellowing and leaf malformation. The results of indirect ELISA test using 8 different antisera indicated the presence of the following viruses in the samples: *Tomato yellow leaf curl virus* (TYLCV), *Cucumber mosaic virus* (CMV), *Potato virus Y* (PVY), *Tomato sptted wilt virus* (TSWV), *Tomato ring spot virus* (TRSV), *Tomato mosaic virus* (ToMV), *Tobacco mosaic virus* (TMV) and *Potato virus X* (PVX). Their incidence in the samples were: 46.7, 45, 25, 18.3, 15, 8.3, 6.7 and 1.7%, respectively. It was clear that TYLCV and CMV were the most prevalent viruses in this region. This is the first record for these viruses on tomato crop in Libya, except for TYLCV and CMV which were reported previously.

V 4

FIELD SCREENING AND MOLECULAR STUDIES ON *TOMATO LEAF CURL VIRUS* AND THE WHITEFLY *BEMISIA TABACI* GENN. IN SUDAN. Manasic Mohamadain Ahmad[1], Sana K. Mukhtar[1], Abdalla M. Abdalla[1], Ahmed Hashim[1] and Michel Peterschmitt[2]. (1) Plant Protection Department, University of Kordofan, Sudan, Email: sanamukhtar@hotmail.com; (2) Virology Laboratory, CIRAD, Montpellier, France.

Field studies to identify four tomato varieties (Strain B, Peto86, Castle Rock and Allakareem) resistant to TLCVD were conducted 2007/2008 and 2008/2009 growing seasons. In both seasons the response of cultivars to disease incidence was significant ($P<0.01$). The disease severity among cultivars was significantly different in 2007/2008 season. The cultivar Peto 86 gave the highest disease incidence and severity followed by the cultivar Castle Rock and Strain B in 2007/2008 season, whereas the cultivar Allakareem showed the lowest disease incidence and severity in both seasons. In 2008/2009 season the cultivar Strain B gave the highest disease incidence and severity followed by Castle Rock and Peto 86. Laboratory studies were conducted in the Virology Department at Plant Pathology Research Institute, Agricultural Research Centre, Giza, Egypt in 2009 to test samples collected from Bara (North Kordofan State) with two sets of primers to detect TYLCSV-ES, TYLCV-IL, TYLCV-MLd and Tomato yellow leaf curl Sardinia virus-Sicily (TYLCSV-Sic). The results showed that all these isolates have not been detected

in the samples. Other laboratory studies were conducted in CIRAD, France in 2004 to identify whitefly biotypes collected from different localities in the Sudan. Whiteflies were collected from El-Obeid (North Kordofan State) and Abu Haraz (Gezira State) were grouped with individuals from the American continent belonging to biotype A. Whiteflies collected from Sagai (Khartoum State) were grouped with biotype Q.

V 5

CLONING AND EXPRESSION OF THE MOVEMENT PROTEIN GENE OF *TOMATO YELLOW LEAF CURL VIRUS* IN *ESCHERICHIA COLI*. Misha Salimi and M. Shams-bakhsh, Department of Plant Pathology, Tarbiat Modares University, P.O. Box 14115-143, Tehran, Iran, Email: m.salimi@modares.ac.ir

Tomato yellow leaf curl virus is destructive pathogen of tomato (*Solanum lycopercicum*) and causes economic losses worldwide. Due to distribution of this pathogen in Iran, detection of this virus is necessary for controlling the damage caused by this pathogen. As Enzyme-linked immunosorbent assay (ELISA) is a convenient method for the detection of viruses, preparing a source of antigen for immunization process is important. The movement protein gene of TYLCV was amplified by PCR and cloned in the expression vector pET26. This plasmid was transformed to Escherichia coli BL21 competent cells. Expression of the cloned gene is in progress.

V 6

TOMATO YELLOW LEAF CURL VIRUS RESISTANCE IN EGYPT USING BOTH CONVENTIONAL BREEDING AND VIRAL-GENE SUPPRESSION TECHNOLOGIES. E. Khalil[1], A. Rezk[2], A.E. Aboul-Ata[2] and H.M. Mazyad[2]. (1) Tomato Department, Horticulture Research Institute, ARC, Dokki, Giza, Egypt; (2) Plant Pathology Research Institute, ARC, P.O. Box 1219, Giza, Egypt, Email: hamedmazyad@yahoo.com

Field work and laboratory analysis was conducted during 2002–2008 to study TYLCV resistance using conventional breeding and gene silencing. Twelve tomato genotypes with broad genetic background were chosen for crossing. Tomato hybrids resulted of the crossed materials was grown for confirmation and recording their reactions. Different tomato genotypes from Egypt, Israel, Jordan, Morocco, Lebanon and Guatemala were grown under climatic conditions of Egypt during 2006 growing seasons to evaluate their performance under severe TYLCV natural infection. Sixty eight genotypes from Egypt represent fourth and fifth generations of crossing between TYLCV-resistant and susceptible parents were categorized into 3 levels concerning type of growth, earliness, yield, firmness and TYLCV tolerance. TYLCV detection was done periodically using bioassay and PCR during the growing season. Vegetative growth of different genotypes was categorized into strong, moderate and week. 21 genotypes in the group, 39 in the 2nd group and 7 in the 3rd group. 28 genotypes were early yielders, and 29 genotypes have fruits larger than 70 gr. 30 genotypes have relatively from fruits. RNA silencing was used as a technique to produce genetically modified plants that can terminate the function of some endogenous genes. C1C2, C2C3 and V1V2 constructs of the TYLCV genome were prepared at the Dept. of Plant Virus and Phytoplasma Res. Silencing constructs had the ability to reduce concentration of TYLCV in tomato plants in sense–antisense directions compared with plants that have only sense direction. Plants with C1C2 construct were more resistant than plants with V1V2 construct. Plants with V1V2 construct were more resistant than those with C2C3 construct.

V 7

THE MOST IMPORTANT OF VIRAL DISEASES AFFECTING CULTIVATED SOLANACIOUS CROPS IN SYRIA. Amin A. Haj Kassem[1] and Om Eltuka Ghufran Rifai[2]. (1) Faculty of Agriculture, Aleppo University, P.O. Box 7548, Aleppo, Syria, Email: aahkasem@scs-net.com; (2) Seed Health Laboratory, Agriculture Directorate of Aleppo, Syria.

A field survey was conducted during 2004/2005 and 2005/2006 growing seasons to determine the incidence of virus diseases affecting solanacious crops in Syria. A total of 939 plant samples of eggplant, tomato, potato, pepper and tobacco with symptoms indicating a viral infection were collected from 52 fields in Aleppo, Edleb, Latakia, Tartous, Hama and Homs provinces. Serological tests indicated the presence of 9 viruses affecting these crops. *Cucumber mosaic virus* (CMV) was the most commonly encountered virus, followed by *Potato virus Y* (PVY), *Tobacco ring spot virus* (TRSV), *Tobacco mosaic virus* (TMV), *Potato virus X* (PVX), *Beet western yellows virus* (BWYV), *Tomato spotted wilt virus* (ToSWV), *Tomato black ring virus* (ToBRV) and *Tobacco rattle virus* (TRV). *Alfalfa mosaic virus* (AMV) was not encountered. Virus incidence in tested samples infected with one or more viruses were 22.8% and 42.8%, respectively. Virus incidence was higher in the first season in comparison with the second season. The natural infection of cultivated solanacious plants by some viruses such as TMV, ToSWV, ToBRV and TRV was recorded for the first time in Syria

V 8

SURVEY AND IDENTIFICATION OF VIRUSES INFECTING SOME CUCURBIT CROPS IN THE WESTERN REGION OF LIBYA. Amal Abo-Mhara[1], Jabr Khalil[1] and Khalid El-Dogdog[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Al-Fateh Tripoli, Libya, Email: khalil_reem@hotmail.com; (2) University of Ain-Shams, Faculty of agriculture, Cairo, Egypt.

A field survey was conducted during two growing seasons (20005/2006 and 2006/2007) to identify viral diseases of squash, cucumber and pumpkin in the western region of Libya. A total of 61 leaf samples with symptoms of mosaic, mottling, malformation, yellowing and blistering were collected from 25 fields in 16 sites in the region. All these samples were tested by indirect ELISA using the following 5 polyclonal antibodies for the following viruses: *Cucumber mosaic* (CMV), *Cucumber green mottle mosaic* (CGMMV), *Watermelon mosaic* (WMV), *Squash mosaic*

(SMV) and *Zucchini yellow mosaic* (ZYMV) viruses. Results indicated the presence of CMV, CGMM, WMV, SMV and ZYMV in the samples. The percentage of virus infection in squash, cucumber and pumpkin was 88.8, 90.0 and 92.0%, respectively. Some of these viruses are reported for the first time on these crops in Libya.

V 9

***CUCURBIT YELLOW STUNTING DISORDER VIRUS* A MAJOR THREAT TO CUCURBITS IN LEBANON: DEVELOPMENT OF SEROLOGICAL DETECTION METHODS AND SCREENING FOR RESISTANCE.**

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Cucurbit yellow stunting disorder virus (CYSDV), genus *Crinivirus* and family *Closteroviridae*, has emerged as a serious whitefly-transmitted virus of cucurbit crops, causing between 40 and 50% yield loss. CYSDV was first reported in Lebanon in 2000 using nucleic acid detection methods. The unavailability of serological detection methods prompted us to develop such methods. Since CYSDV is confined to the phloem, is present at low titer and is difficult to purify in good quality to produce specific antibodies, molecular techniques were used to clone the coat protein and express it as a fusion protein with an N-terminal hexa-histidine tag. Polyclonal antibodies were produced against this recombinant coat protein and used in serological tests, including tissue print immunoassay (TPIA), dot blot immunoassay (DBIA), and ELISA. Of 124 cucumber accessions screened for resistance, seven accessions were tolerant but none was immune. The three most tolerant accessions and one susceptible accession were selected for further evaluations. Time course studies at 3, 5, 8 and 14 dpi using TPIA revealed that tolerance to CYSDV in the three tolerant cucumber germplasms was not correlated with restricted or delayed virus movement. Preliminary results using DBIA and real-time RT-PCR-based assays proved that tolerance to CYSDV in two accessions was not correlated with reduced virus accumulation. The higher tolerance of the third accession may be correlated with reduced virus accumulation in young leaves, but not in roots.

V 10

BIOLOGICAL, SEROLOGICAL AND MOLECULAR IDENTIFICATION OF *LETTUCE MOSAIC VIRUS* AFFECTING LETTUCE IN SAUDI ARABIA.

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Mosaic symptoms were observed on field grown lettuce (*Lactuca sativa* Linn.) plants at Al-hair and Alkharj areas in Riyadh region. The virus was mechanically transmitted to lettuce (*L. sativa*) *G. globosa*, *Chenopodium ammaranticolor* Cost and Reyn, and *C. quinoa*. *N. glutinosa* and *N. tabacum* failed to develop symptoms when inoculated with leaf crude extracts of leaves of infected lettuce plants. Double antibody sandwish-enzyme linked immunosorbent assay (DAS-ELISA) was used to detect the virus responsible for these symptoms with the use of antisera of several viruses. Polyclonal antibodies specific to LMV reacted positively in DAS-ELISA. Negative serological reactions were observed with lettuce viruses such as *Alfalfa mosaic virus* (AMV), *Cucumber mosaic virus* (CMV), *Turnip mosaic virus* (TuMV) and *Tomato spotted wilt virus* (TSWV). Reverse transcription-Polymerase chain reaction assay was used for the detection and identification of the virus from nucleic acid extracts of infected lettuce plants using specific primer for detection of the 3` end of the NIb gene together with the 5` end of the CP gene (region II). The viral DNA amplified product was approximately 346 bp as estimated by agarose gel electrophoresis. The 346 bp DNA fragment from LMV isolate was purified and sequenced. The comparative nucleotide sequence analysis showed 92.4 to 98.8% similarity with LMV isolates recovered from Brazil, France, China, Audran, AF199 and strain E. These results suggest that the high nucleotide sequence homology between the Saudi Arabian isolate and the other well defined LMV isolates confirm that the Saudi Arabian isolate is LMV. This is the first report of LMV on lettuce in Saudi Arabia.

V 11

GENOME SEQUENCING, MOLECULAR CHARACTERIZATION AND WHITEFLY TRANSMISSION OF *LETTUCE CHLOROSIS VIRUS*.

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Members of the genus *Crinivirus* are emerging viruses with a highly complex single-stranded positive sense RNA genome, and are transmitted by specific whitefly species via unknown mechanisms. *Lettuce chlorosis virus* (LCV), a crinivirus that is endemic to Southwestern USA, was isolated from infected lettuce and a study to determine its complete genome sequence, genome expression and transmission by two whitefly species was carried out. LCV sequences were generated and determined through a combination of shotgun sequencing of cloned inserts from a cDNA library constructed using randomly-primed viral double-stranded (ds) RNAs, 5' and 3' RACE (Rapid Amplification of cDNA Ends), and primer walking strategies. A comparison of the amino acid sequence of four LCV encoded structural proteins, CP, CPm , p59 and HSP70h, with those of LIYV and *Cucurbit yellows stunting disorder crinivirus* indicated a low (19%) to moderate (68%) level of identity. As an initial study of LCV aimed at

understanding the mechanism of whitefly transmission, we purified LCV from infected plant materials and observed by electron-microscopy that purified preparations contained virion-like particles (VLPs). Western blot analysis of VLPs identified the approx. 29 kDa CP, which was consistent with the size determined from its deduced amino acid sequence. Furthermore, VLPs were readily acquired and transmitted by whiteflies (*Bemisia tabaci* and *B. argentifolii*) through membrane feeding, indicating that they contained all the essential components needed for whitefly transmission. To further demonstrate the biological activity of purified LCV, we extracted virion (v) RNAs and inoculated them to tobacco protoplasts. The plus and minus sense genomic RNAs and several smaller viral-specific (possibly subgenomic) RNAs indicative of viral replication were detected by Northern blot analysis in total RNAs isolated from the vRNA inoculated protoplasts.

V 12

STUDIES ON WHEAT AND BARLEY VIRUSES IN NINEVAH. Nabil Aziz Kasim and Fadhel Yousef Abbo, Plant Protection Department, College of Agriculture and Forestry, Mosul University, Iraq, Email: nabilaziz60@yahoo.com

Survey results indicated the presence of *Barley yellow dwarf virus* (BYDV) and *Barley yellow striate mosaic virus* (BYSMV) and *Wheat streak mosaic virus* (WSMV) on barley and wheat crops in Al-Hamdaniyah (Karakoush) and Tilkief districts during the 2005 growing season by using the tissue blot immune assay (TBIA). The same viruses mentioned above in addition to *Barley stripe mosaic virus* (BSMV) were also detected during the 2006 growing season by using the slide agglutination test. The detection of BYSMV, BSMV and WSMV is considered the first record on barley and wheat crops in Iraq. BYDV was also detected in *Avena fatua*, *Polypogon monspllensis* and *Sorghum halpense*, BYSMV in *Avena fatua*, *Sorghum halpense*, and *Lolium temulentum*, WSMV in *Avena fatua*, *Lolium temulentum* and *Phalaris minor* and wheat dwarf virus (WDV) in *Sorghum halpense* only. This is also the first record of BYSMV, WSMV and WDV in the above mentioned weeds in Iraq.

V 13

***WHEAT STREAK MOSAIC VIRUS* IN SYRIA.** Elias Al-Isaac[1], Safaa G. Kumari[2] and Bassel Al-Kai[1]. (1) Department of Plant Protection, Faculty of Agriculture, Albaath University, Homs, Syria, Email: sadadas@scs-net.org; (2) International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria.

Wheat streak mosaic virus (WSMV, genus *Tritimovirus*, family *Potyviridae*) is a recently detected virus in Syria. The main symptoms of WSMV are striping, dwarfing, tiller death, and reduced seed number and weight. Yield loss caused by this virus in five durum wheat (Cham 1, Cham 3, Cham 5, Younes 1 and Ammar 3) and five bread wheat (Cham 4, Cham 6, Cham 8, Cham 10 and Babaga 3) cultivars was studied. Results showed that bread wheat was more susceptible than durum wheat, and infection rates ranged between 5.9% (Ammar 3) and 72.6% (Cham 8). The effect of four different buffers and distilled water on virus stability using mechanical inoculation was evaluated. Results showed that the buffer KPO_4, pH: 7 was the best for mechanical inoculation. In addition, WSMV was found to be seed-transmitted in Cham 1 only (0.1%) and otherwise transmitted by wheat curl mite (*Aceria tosichella* Keifer) (100%). The infection rate reached 99% for both manual inoculation and compressed air inoculation. Furthermore, the effect of freeze drying and storage period on virus stability was studied; revealing that the infection rate was 99.3%, 99.6%, 96.0% and 30.0% when fresh tissue, new dry tissue, 9 year old tissue and 15 year old tissue were used, respectively.

V 14

SOURCES OF PRIMARY INOCULUM OF *BEAN YELLOW MOSAIC VIRUS* ON FABA BEAN IN BAGHDAD, IRAQ. Mothana E. El–Muadhidi, Virology laboratory, Agricultural Pests Diagnosis Department, State Board of Plant Protection, Baghdad, Iraq, Email: mothna200398@yahoo.com

Bean yellow mosaic virus (BYMV) is a serious virus affecting faba bean in all faba bean producing areas in Iraq, with incidence reaching more than 90%, leading in many cases to a serious yield losses. This study was conducted to determine the sources of primary inoculum of BYMV. Results of TBIA test showed that the rate of infection with BYMV in randomly collected plants from Baghdad were 2.3, 8.7 and 41.0% when the population of aphids were 0.0, 18.6 and 33.4 insects/plant during January, February and March, respectively. TBIA test revealed that 3.3, 13.4 and 1.4% of faba bean seeds for Local, Akwaderji and Cyprus cultivars collected from different locations in Iraq were infected with BYMV, respectively. Results of ELISA test showed that the virus was detected in 5 out of 10 adjacent weeds investigated in this study. It was concluded that the causal factors for a high percent of infection with BYMV on faba bean were aphids, seeds and the weed plants which act as a reservoir for this virus, and highly influenced by climatic conditions.

V 15

BIOLOGICAL, SEROLOGICAL AND MOLECULAR DETECTION OF THE MOST DOMINANT VIRUSES AFFECTING FABA BEAN IN NORTHERN EGYPT. Gaber Fegla, El-Sayed Wagih, Yehia El-Faham and Maha Kawanna, Plant Pathology Department, Faculty of Agriculture, Alexandria University, P.O. Box 21545, Alexandria, Egypt, Email: drgaberfegla@yahoo.com

Out of 881 tested faba bean samples collected from some locations of northern Egypt during four growing seasons (2000/2001 - 2003/2004), 524 samples were found infected with *Bean yellow mosaic virus* (BYMV), 514 with *Pea seed-borne mosaic virus* (PSbMV), 146 with *Broad bean true mosaic virus* (BBTMV), 112 with *Broad bean stain virus* (BBSV), 67 with *Broad bean mottle virus* (BBMV), 83 with *Faba bean necrotic yellows virus* (FBNYV), 9 with *Bean leaf roll virus* (BLRV) and 6 with *Beet western yellows virus* (BWYV). The sensitivity of using reverse transcription polymerase chain reaction (RT-PCR), indirect enzyme linked immunosorbent assay

(indirect ELISA), dot blot immunoassay (DBIA), tissue blot immunoassay (TBIA) and biological assay for the detection of the most common viruses in faba bean, namely BYMV and PSbMV, were studied. Results indicated that RT-PCR was the most sensitive assay as it detected BYMV one day after inoculation. BYMV was detected by indirect ELISA, DBIA, TBIA and infectivity test 2, 2, 3 and 5 days after inoculation, respectively. Nearly the same trend was observed with PSbMV. When serial dilutions of infectious sap extracted from leaves of infected faba bean plants, 15 days after inoculation, were used, BYMV was detected in infectious sap diluted up to 10^{-12} by RT- PCR, 10^{-9} by indirect ELISA, 10^{-5} by DBIA and 10^{-3} by infectivity test. Concerning PSbMV, results also confirmed that the most sensitive assay was RT- PCR followed by indirect ELISA, DBIA and infectivity test, since virus detection by these assays was possible at serial dilutions of infectious sap up to 10^{-12}, 10^{-6}, 10^{-5} and 10^{-4}, respectively.

V 16

SEROLOGICAL AND MOLECULAR STUDIES ON *COWPEA MOSAIC VIRUS*. Mervat Fath-Alla[1] and Gaber Fegla[2]. (1) Institute of Plant Pathology, Agriculture Research Center, Sabhia Research Station, Alexandria, Egypt; (2) Plant Pathology Department, Faculty of Agriculture, Alexandria University, Alexandria, Egypt, Email: mmmf_1992@yahoo.com

Cowpea mosaic virus (CPMV) was isolated from naturally infected fodder cowpea plants, showing mosaic, vein yellowing and leaf malformation symptoms, grown at Experimental Farm, Faculty of Agriculture, Alexandria University. Identification was based on symptoms developed on diagnostic hosts and serological reactions with antisera to AMV, BBMV, BYMV, CMV, CPMV and TRSV. The molecular weight of coat protein subunits of CPMV was determined using SDS-PAGE, and was approximately 58 KDa and 48KDa. Reverse transcription polymerase chain reaction showed that, the simultaneous amplification of 593 bp fragment of the genome. Among five fodder cowpea cultivars tested for seed transmission, the virus was found to be transmitted through seeds of only one: cultivar "ITTA Acc" with a low transmission rate of 1.5%. The virus was not transmitted by aphids, Yield of purified virus was 16.2 mg/100g infected leaf tissues. Specific antiserum was prepared and found to have a titer of 1: $1.28x10^5$ as determined by indirect ELISA. Sensitivities of three serological tests; optimized dot immunobinding assay (DIA), indirect enzyme-linked immunosorbent assay (ELISA) and tissue blot immunoassay (TBIA) were compared for detecting CPMV in 1:100 diluted sap extracted from leaves of infected plants after different periods of mechanical inoculation. Results showed that sensitivity of DIA was similar to that of indirect ELISA, which could detect CPMV 8, 16 and 24 days after mechanical inoculation. Whereas, the virus was detected 4,8, 16 and 24 days after inoculation by TBIA.

V 17

CHARACTERIZATION OF SOME GRAFT-TRANSMITTED CHICKPEA YELLOWS VIRUSES. Yaseen Naasan[1], Safaa G. Kumari[2], Amin A. Haj Kasem[1] and Fawaz Azmeh[3]. (1) Department of Plant protection, Faculty of Agriculture, Aleppo University, Aleppo, Syria, Email: Y_nassan@hotmail.com; (2) International Centre for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: s.kumari@cgiar.org; (3) National Commission for Biotechnology (NCBT), P.O. Box 31902, Damascus, Syria, Email: gcbt@mail.sy

Chickpea (*Cicer arietinum* L.) is one of the most important food legume crops, and ranks third in world pulse production. Chickpea yield is affected by several diseases and insect pests, including yellowing and stunting viral diseases that inflict high losses in quantity and quality of the production. Luteoviruses affecting chickpea have a special importance since they are difficult to detect and control. The aim of this research was to determine the viral diseases affecting chickpeas and causing yellowing and stunting symptoms in the main chickpea regions of Syria during the 2007/2008 growing season. Unidentified virus isolates were transmitted to healthy chickpea plants using virus-infected shoots as scions to graft onto chickpea root-stocks (reciprocal grafting) under greenhouse conditions. The graft-transmitted isolates were tested further by a serology test (Tissue blot immunoassay; TBIA) using specific monoclonal antibodies, and molecular analysis (Reverse Transcriptase-Polymerase Chain Reaction; RT-PCR) using specific primers to detect *Luteoviridae*. Results showed that two species, genus *Polerovirus*, family *Luteoviridae* were transmitted by grafting: *Chickpea chlorotic stunt virus* (CpCSV) and *Beet western yellows virus* (BWYV) with transmission rates of 65% and 68%, respectively. CpCSV was purified from systemically infected faba bean and yielded 0.2 mg of purified virus per kg of infected tissue. The purified virus was administered into a white rabbit, using seven intramuscularly injections at weekly intervals. The antiserum produced gave strong CpCSV-specific reactions and very weak background reactions with non-infected tissue when evaluated by TBIA.

V 18

SURVEY AND IDENTIFICATION OF *ALFALFA MOSAIC VIRUS* AND AN UNIDENTIFIED SPECIES IN THE FAMILY *LUTEOVIRIDAE* FROM ALFALFA PLANTS IN LIBYA. Yousif Izzo[1], Jabr Khalil[1] Safaa Kumari[2] and Nouran Attar[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Al-Fateh Tripoli, Libya, Email: khalil_reem@hotmail.com; (2) The International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria.

A field survey was conducted from May 2005 until February 2007 and covered 71 fields in 19 different sites in the southern region of Libya. A total of 124 alfalfa leaf samples (*Medicago sativa* L.) showing symptoms of mosaic, dwarfing, Leaf curling, yellowing, mottling and wilting were collected. Serological tests (indirect ELISA, tissue blot immunoassay and dot-blot) were conducted at the virology Laboratory, ICARDA, Aleppo, Syria, by using monoclonal and/or polyclonal antisera to the following viruses: *Alfalfa mosaic* (AMV), *Cucumber mosaic* (CMV), *Bean yellow mosaic* (BYMV), *Pea seed-borne mosaic* (PSBMV), *Broad bean mottle* (BBMV), *Broad bean stain* (BBSV), *Soybean dwarf* (SbDV), *Beet western yellows*

(BWYV), *Bean leafroll* (BLRV), *Faba bean necrotic yellows* (FBNYV) and Luteviruses monoclonal antibodies (5G4). These tests proved the presence of AMV and an unidentified virus species in the family *Luteoviridae*. This is the first report of these two viruses on alfalfa in Libya.

V 19

***POLEROVIRUS* AFFECTING COOL-SEASON FOOD LEGUMES IN SYRIA.** Nader Y. Asaad[1], Safaa G. Kumari[2], Amin A. Haj Kassem[1] and Salah Al-Chaabi[3]. (1) Department of Plant Protection, Faculty of Agriculture, Aleppo University, Aleppo, Syria, Email: asaad_nader@yahoo.com; (2) International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: s.kumari@cgiar.org; (3) General Commission for Scientific Agricultural Research (GCSAR), Douma, Damascus, Syria.

Extensive field surveys were conducted in Syria during the 2005/2006 and 2006/2007 growing seasons to identify the viruses of the family *Luteoviridae* causing yellowing, reddening and/or stunting symptoms on cool-season food legumes, to investigate their natural host range, and identify their biological characteristics. A serological test (tissue blot immunoassay; TBIA) on 3345 legume samples, followed by molecular analysis (Reverse transcription-polymerase chain reaction assay, RT-PCR) of 142 samples, indicated that viruses of the genus *Polerovirus* (family *Luteoviridae*) were most commonly identified, including at least two distinct viruses, *Beet western yellows virus* (BWYV) and *Chickpea chlorotic stunt virus* (CpCSV). These two viruses showed significant differences in their reactions with different antisera and primers used in this study. However, the comparison of the coat protein nucleotide sequence analysis of two Syrian isolates of both BWYV and CpCSV showed only 68% homology; although the two viruses appeared to have an overlapping natural host range, which included more than 27 crop and weed plant species from 11 families (*Apiaceae, Asteraceae, Brassicaceae, Euphorbiaceae, Fabaceae, Malvaceae, Papaveraceae, Polygonaceae, Ranunculaceae, Solanaceae*). Moreover, they could be transmitted by the same aphid species (e.g. *Aphis craccivora*), and spread within the same regions. Multiple infections of these viruses were also commonly found in this study (around 18% of the samples were a mixed infection with both viruses), and the occurrence of other new viruses/strains is most likely. Consequently, great difficulties will be encountered when breeding for resistance/tolerance. This paper has clarified the importance of the *Polerovirus* in Syria, and presents an accurate characterization of two distinct viruses.

V 20

SEROLOGICAL AND MOLECULAR DETECTION OF CUCUMBER MOSAIC VIRUS FROM OLIVE TREES IN EGYPT. Sahar A. Youssef[1], M. El-Sayed[2], Anna M. D'Onghia[3] and A.A. Shalaby[1]. (1) Virus and Phytoplasma Research Department, Plant Pathology Research Institute, Agriculture Research Center, Giza, Egypt; (2) Olive Department, Horticulture Research Institute, Agriculture Research Center, Giza, Egypt; (3) CIHEAM/Mediterranean Agronomic Institute, IPM Sector, Valenzano (BA), Italy, Email: saharyoussef@link.net

In a survey of olive (*Olea europaea* L.) orchard plantations in different location in Egypt. Samples from olive cultivars Picual, Manzanello and Maraki were collected and tested for the presence of cucumber mosaic virus infection using double antibodies sandwich-enzyme linked immunesorbent assay (DAS-ELISA) and reverse transcription polymerase chain reaction (RT-PCR) using virus-specific antibodies and specific primers respectively. In ELISA, all the three olive cultivars tested were found to be naturally infected with CMV. Total RNA from these cultivars was isolated using RNeasy Plant mini kit. RT-PCR was developed and applied to the detection of CMV using virus-specific primers. Amplified products showed clear bands (about 280 bp) of the expected size for CMV amplification. No amplification was observed in uninfected tissue. The successful application of RT-PCR for the accurate and sensitive detection of CMV was reported in olive trees in Egypt. This method could be used routinely for sanitary and certification programmes.

V 21

INCIDENCE OF MAJOR VIRUSES AND VIROIDS INFECTING STONE FRUIT SPECIES IN ALGERIA. Noureddine Rouag[1], A. Guechi[2] and A. Myrta[3]. (1) Department of Agronomy UFAS Sétif , 19000 Sétif, Algeria; (2) Department of Biology UFAS Sétif , 19000 Sétif, Algeria; (3) Istituto Agronomico Mediterraneo, Via Ceglie 9, 70010 Valenzano Bari, Italy, Email: rouag_rn@yahoo.fr

The sanitary status of stone fruit trees in relation to pathogens transmissible through plant propagating material constitute a preliminary measure for the establishment of certification program for the production of healthy plants. For this purpose, the main objective of this research was to quantify the incidence of several viruses and viroids infecting *Prunus* species cultivated in commercial orchards, nurseries and mother blocks in the eastern part of Algeria. Serological and molecular tests of 967 samples collected from three acroecological regions gave a general rate of infection around 17.58%. Among the most important were three Ilarviruses (PNRSV, PDV and ApMV) detected by DAS-ELISA and CVA detected by RT-PCR, whereas, ACLSV, ApLV, CGRMV and PBNSPaV were not detected. The detection of CVA in this study represent the first report in Algeria. Results also showed that the sensitivity to infection is related to *Prunus* species and varieties. Rootstock varieties were more infected (21.88%) than scion varieties (17.11%). In addition, peach varieties were the most infected with an infection rate of 27.14%, and almond was the least infected at the rate of 8.26%. In relation to viroids (PLMVd and HSVd), a total of 1128 samples were collected in autumn season (2004 – 2007) and analysed with two molecular techniques: Tissue immunoprinting hybridization and Dot-Blot hybridization. Results showed that general infection rate was 59%. Individually, PLMVd and HSVd were detected in 3.19% and 3.63%, respectively. This is the first record of HSVd in Algeria. Studies indicated that high temperatures in open

fields and low temperatures used for samples conservation reduced PNRSV concentration in infected samples.

V 22

DEVELOPMENT OF LEBANESE TYPE TOMATO WITH MULTIPLE RESISTANCE TO TOMATO YELLOW LEAF CURL VIRUS AND SOIL-BORNE PATHOGENS. Rasha Talhouk[1], Elvis Gerges[1], Rachel Dagher[1], Hagop Atamian, Choaa El-Mohtar[1], Hana Sobh[1], Yusuf Abou-Jawdah[1] and Douglas Maxwell[2]. (1) Faculty of Agricultural and Food Sciences, American University of Beirut, P.O. Box: 11-0236, Beirut, Lebanon, Email: rwt02@aub.edu.lb; abujawyf@aub.edu.lb; (2) Department of Plant Pathology, University of Wisconsin-Madison, Madison, WI 53706.

The Lebanese tomato landraces are characterized by their large tasty fruits and vigorous plants adapted to local environmental conditions. These landraces are highly susceptible to *Tomato yellow leaf curl virus* (TYLCV) and some soil-borne pathogens, factors that led to a sharp decline in their production along the coastal areas and middle elevations. TYLCV constitutes a major threat for tomato production in many other countries in the Middle East, Europe, Africa and more recently in the American continent. Lebanese landraces were crossed with four parents: two lines of *Solanum habrochaites* carrying a major dominant gene of resistance to TYLCV, and three other genes for resistance to *Fusarium oxysporum* fsp. *lycopercisi* (FOL) races 1 and 2, and *Verticillium* wilt race 1.; one line of *S. chilense*, which carries a major gene of resistance to TYLCV with partial dominance, and one line of *S. peruvianum* believed to carry multigenic recessive resistance to TYLCV. Inoculations with a high number of viruliferous whiteflies (*Bemisia tabaci*) were used to screen for resistance to TYLCV and TYLCV-Mld. Marker assisted selection tools were used to screen for resistance to FOL race 2, *Verticillum* wilt race 1 and the root-knot nematode *Meloidogyne* spp. Two primer pairs designed in our laboratory, based on published sequences for a locus co-segregating with *Verticillium* resistance, allowed efficient differentiation between susceptible genotypes, homozygous and heterozygous resistant genotypes in PCR assays. A multiplex PCR protocol was developed and was efficiently used to detect plants with resistance to FOL race 2. These MAS techniques allowed the selection of plants with double or multiple genes of resistance saving time, space and efforts. At present, tomato lines with relatively large fruit size carrying combined resistance to TYLCV and the two soil-borne fungal pathogens were developed along with lines carrying resistance to TYLCV and the root-knot nematode. Four of these lines showed excellent results in organoleptic tests. Breeding is in progress to combine resistances to the four pathogens listed above and to further improve the horticultural characteristics.

V 23

DETECTION OF *POTATO SPINDLE TUBER VIROID* (PSTVD) FROM POTATOES IN LIBYA. Hania Al-Gammudi[1], Jabr Khalil[1], Al-Taher Abo-Hleka[1] and Khalid El-Dogdog[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Al-Fateh Tripoli, Libya, Email: khalil_reem@hotmail.com; (2) University of Ain-Shams, Faculty of Agriculture, Egypt.

The aim of this study was to identify *Potato spindle tuber viroid* (PSTVd) on potatoes in Libya. Tuber samples were collected during autumn 2005 from farms in Al-Mamoura and Sebratha areas west of Libya. Disease symptoms were reduced leaf size and curling downward, tubers were spindle-shaped with cracks, and the buds were surrownded by a swollen tissue which looked-like protruding eyebrows. The causative agent was confirmed to be PSTVd by molecular hybridization of the nucleic acid and polymerase chain reaction (PCR) techniques. The Libyan isolate of PSTVd was similar to the Egyptian and the American isolates of PSTVd, where its nucleic acid contained about 360 bp and its movement in polyacrylamide gel electrophoresis was at the same level as the other two isolates. This is the first record for PSTVd on potatoes in Libya.

V 24

VIRAL DISEASES OF POTATO IN SOUTHERN SYRIA. Houda Kawas, Plant Protection Department, Faculty of Agriculture, Damascus University, Syria, Email: houdakawas@yahoo.com

Viral diseases are considered as the most important factors affecting potato production in the world. 2140 potato samples were collected from 122 fields in southern Syria during 1996-2000, and were tested serologically by ELISA and TBIA and by mechanical inoculation on indicator plants. Eleven viruses were recorded for the first time on potato in southern Syria. Potato virus Y was the most common at a relative rate of 76%. Nine potato cultivars Draga, Cinja, Sponta, Diamont, Mondial, Claustar, ArranKonsel, Escort and Nicola were tested to determine their reaction against natural viral infection in Abo-Gharach during 1997-1999. Seasonal abundance of aphid vectors of potato viruses and their efficiency in virus isolates transmissions was determined. In addition, 16 isolates of PVY and 2 of PLRV were characterized by using RT-PCR, IC-RT-PCR and RFLP. It can be concluded that new molecular tools are extremely important to understand variability among different isolates in a region and they are instrumental in detecting low virus concentrations in field samples.

V 25

INCIDENCE OF *PLUM POX VIRUS* IN JORDAN. Akel Mansour[1] and Ayda Al-Nsour[2]. (1) Faculty of Agriculture, Jordan University, Amman, Jordan, Email: akelman@ju.edu.jo; (2) Ministry of Agriculture, Amman, Jordan, Email: aydahalnsour@moa.gov.jo

Field surveys of *Plum pox virus* (PPV) incidence in Jordan stone-fruit growing areas was conducted during 2007 and 2008. A total of 1847 samples were collected from commercial orchards, a mother block and nurseries. A total of 27 almond, 572 apricot, 126 cherry, 41 nectarine, 603 peach and 478 plum trees were tested individually for PPV by the double-antibody sandwich enzyme linked immunosorbent assay (DAS-ELISA). Around 4% of tested samples were infected with PPV. The virus incidence in nectarine, plum, peach, cherry and apricot was 2.4, 3.1, 2.8,

3.1 and 6.1% of tested trees, respectively. The level of viral infection was highest in the mother block (7.4%), and lowest in the samples from the commercial orchards (3.5%).

V 26

PATHOLOGICAL STUDIES ON *FIG MOSAIC VIRUS* (FMV) OF FIG IN EGYPT. Esam Kamal Fahmi Yossef, Agriculture Botany Department, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt, Email: esam_elbeshehy@yahoo.com

Fig mosaic virus (FMV) was isolated from fig leaves, collected from orchards in Ismailia, Qana and El-Arish Governorates of Egypt. Leaves from infected trees showed chlorotic blotching, vein clearing and banding in the cv. Sultany. While, in the cv. Abode the mosaic spots were sharply delineated, the light green color of the affected areas contrasted sharply with the normal green color of the foliage. On the other hand, the fig mosaic systemic symptoms, including malformation in the cv. El-Adasy were typical to FMV symptoms. Host range, symptoms, electron microscopic investigation and effect of FMV on protein content were investigated. Virus particles were typical of viruses of the genus of *Closterovirus* (family *Closteroviridae*). An amplicon of 302 bp was produced from the amplification of FMV-RNA.

V 27

DETECTION AND CHARACTERIZATION OF THE EGYPTIAN CLOSTEROVIRUS ISOLATE AFFECTING FIG PLANTS. Khalaf A. Fayez[1] and Sabry Y. M. Mahmoud[2]. (1) Botany Department, Faculty of Science, Sohag University, Sohag 82524, Egypt; (2) Agricultural Botany Department, Faculty of Agriculture, Sohag University, El-Kawtheer-Sohag 82786, Egypt, Email: sabryaraby2003@yahoo.com

This work was carried out to identified an Egyptian isolate of fig mosaic virus (FMV) on fig plants by molecular tools, biological assays and electron microscopy. Changes in ultrastructure of chloroplasts were observed and analysis of some physiological parameters investigated. The results showed that fig mosaic virus systemically transmitted to *Ficus carica* plants by grafting, but no virus symptoms was recovered by mechanical inoculation to herbaceous hosts. Virus infection produced a variety of symptoms including discoloration, green blisters, mottling, crinkling and deformation of leaves and fruits. A double-stranded RNA (dsRNA) about 19 Kbp in size was obtained from tissue extracts of symptomatic fig plants. A sensitive assay for the detection of FMV using specific RT-PCR was developed. Using dsRNA preparation as a template, cDNA fragment (350 bp) was amplified by RT-PCR using specific primers designed to amplify motifs 1 and 2 of the heat shock-protein 70 homologue (HSP70h) of the family *Closteriviridae*. Purified virus preparations showed the presence of few numbers of filamentous closterovirus-like particles with length of about 1500 nm. Electron microscopy investigations of leaves from the infected plants revealed that virus inclusion bodied occurred in the chloroplasts and no virus inclusion was found in the cytoplasm. Moreover, ultrastructural investigations of virus-infected leaf demonstrated that chloroplasts lost their envelopes and the internal structures of chloroplast including grana and stroma thylakoids were deformed and replaced by isometric inclusion bodies. Soluble carbohydrate and protein contents increased while total amino acids decreased in virus infected leaves.

V 28

NEW DEVELOPMENTS IN VIRAL DISEASES OF FIG (*FICUS CARICA*). Toufic Elbeaino[1], Michele Digiaro[1] and Giovanni P. Martelli[2]. (1) MAIB-CIHEAM, Mediterranean Agronomic Institute of Bari, Valenzano, Bari, Italy; (2) Dipartimento di Protezione delle Piante e Microbiologia Applicata, Università degli Studi and Istituto di Virologia Vegetale del CNR, Sezione di Bari Via Amendola 165/A, 70126 Bari, Italy; Email: elbeaino@iamb.it

Thanks to the use of molecular techniques, only recently the list of putative fig-infecting viruses has increased rapidly. Particularly relevant is the identification of the putative agent of fig mosaic, a worldwide virus-induced disease (FMD), characterized by various patterns of discoloration and malformation of leaves and fruits. The virus particles have enveloped round to ovoid structures 90-200 nm in diameter (double-membrane bodies, DMB) and a complex genome organization which comprises at least of four RNA segments, completely sequenced and characterised. Based on its molecular characteristics, the virus has been tentatively assigned to the family *Bunyaviridae*. Among isometric viruses identified in infected figs one should particularly mention *Sowbane mosaic virus* (SoMV) detected in southern Italy, a possible member of the family *Comoviridae* in England and Italy, putative viruses of the genera *Luteovirus* and *Umbravirus* in the USA, of the genus *Cripavirus* (insect viruses) in Spain and a putative member of the genus *Tymovirus* in Italy. The list of fig infecting viruses comprises also several filamentous species, i.e. an unidentified potyvirus with particles 750-800 nm in length from former Yugoslavia (Herzegovina), a virus with particles 720 nm long from Spain and a possible member of the genus *Carlavirus* from Japan. Three distinct members of the family *Closteroviridae*, denoted respectively Fig leaf mottle-associated virus 1 (FLMaV-1), Fig leaf mottle-associated virus 2 (FLMaV-2) and Fig mild mottling associated virus (FMMaV), were recently described from Italy together with a tentative member of the genus *Trichovirus* denoted Fig latent virus 1 (FLV-1). For most of the above mentioned viruses, specific sets of primers have been produced and applied for large scale testing. Two viroids (*Hop stunt viroid* and *Citrus exocortis viroid*) and one phytoplasma have been also reported from Tunisia and Turkey, respectively. Whether such a high number of intracellular infectious agents affecting figs can explain the enormous variability in the symptomatology shown by mosaic diseased figs remains to be established.

V 29

VIRUS-FREE PRODUCTION OF LEBANESE FIG VARIETIES BY TISSUE CULTURE: PRELIMINARY RESULTS. Lamis Chalak[1], Toufic Elbeaino[2], Ahmad

Elbitar[3], Ali Chehade[3], Tala Fattal[3], Charbel Hobeika[3] and Elia Choueiri[3]. (1) Faculty of Agricultural Sciences, Lebanese University, Dekwane, Beirut, Lebanon. Email: lchalak@lari.gov.lb; (2) Istituto Agronomico Mediterraneo di Bari, Via Ceglie 9, 70010 Valenzano (Bari), Italy; (3) Lebanese Agricultural Research Institute, Zahle, P.O. Box 287, Lebanon.

A new disease of fig trees characterized by a wide rande of décolorations and malformation of the leaves, resembling those typical of fig mosaic disease and associated to two closteroviridae-like particles, *Fig leaf mottle-associated virus* 1 and 2 (FLMaV1 and FLMaV2), was recently reported in Lebanon. Infected trees of local varieties were subjected to a sanitation approach using two different tissue culture techniques. Accordingly, two sets of specific primers were used in RT-PCR to investigate the presence of both viruses in the fig plantlets of explants originated from both sanitation techniques. Shoot tip culture performance for regeneration of fig plantlets free from both viruses demonstrated to be an effective technique with a sanitation rate ranging from 60 to 100%, while the shoot regeneration rate didn't exceed 18%. Whereas, stem cutting culture coupled with thermotherapy seemed to be the most effective for shoot regeneration (40% of reactive explants). However, elimination of both viruses was possible even though with lower rates of sanitation ranging from zero to 81%. Finally, these preliminary results indicated that FLMaV-2 seems to be more susceptible than FLMaV-1 to thermotherapy.

V 30

A SURVEY OF TOMATO VIRUSES IN JORDAN. Abeer Abu-Shirbi, Akel Mansour and Nasser Tamimi, P.O. Box 639, Baqa'19381, Jordan, Email: abeer@ncare.gov.jo; Abeerqasem@yahoo.com

A field survey to identify tomato viruses in Jordan was conducted during fall of 2008 and spring of 2009. Samples were collected from tomato fields grown in southern and central Jordan Valley. All samples were tested individually for 10 viruses including AMV, PVY, PVX, TYLCV, TMV, TSWV, BSV, ToRSV, TRSV and PVA by the double-antibody sandwich enzyme linked immunosorbent assay (DAS-ELISA). The results indicated the presence of TSWV, ToRSV, PVY, TYLCV, PVA and TBSV on tomato grown in Jordan Valley. Around 29.5% of tested samples were infected with TSWV followed by ToRSV (11.3%) and PVY (9.7%). TSWV was dominant in both locations of Jordan Valley, whereas PVY was not detected in southern Jordan Valley.

V 31

EVALUATION OF THE SANITARY STATUS OF GRAPEVINE IN BEKAA VALLEY, LEBANON. Elia Choueiri[1], Sereen Hamieh[2], Souheir El Zammar[1], Charbel Hobeika[1] and Fouad Jreijiri[1]. (1) Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, P.O.Box 287, Zahlé, Beirut, Lebanon; (2) Faculty of Agriculture, Lebanese University, Beirut, Lebanon, Email: pretty.cyreen@hotmail.com

The incidence, severity and distribution of eight viral diseases were assessed in the main vineyard regions of the Bekaa Valley, where 75 % of grapevine production occurs. A total of 300 samples were collected randomly from 28 vineyards during 2008 growing season. Four ELISA procedures were used for the detection of eight different viruses: (i) Double antibody sandwich (DAS-ELISA) for Grapevine leafroll-associated virus 1 (GLRaV-1), Grapevine leafroll-associated virus 2 (GLRaV-2), Grapevine leafroll-associated virus 3 (GLRaV-3), Grapevine fanleaf virus (GFLV) and Arabis mosaic virus (ArMV); (ii) Protein-A (DAS-ELISA) for Grapevine virus A (GVA); (iii) Triple antibody sandwich (TAS-ELISA) for Grapevine fleck virus (GFkV) and (iv) Direct binding-ELISA for Grapevine virus B (GVB). Out of 300 samples, 178 (59.3%) were infected with one or more viruses. GVA (26.3%) and GLRaV-3 (17.3%) were the prevailing viruses, followed by GLRaV-1 (10%), GFkV (5.6%), GLRaV-2 (4.3%) and GFLV (3.3%). ArMV was not found, whereas GVB was rare. The most important Lebanese table grapevine varieties, i.e. Tfeifihi, Beitamouni, Maghdouchi and Obeidi had an average infection rate between 70% and 100%, whereas varieties of foreign varieties used as wine grapes such as Cabernet Sauvignon, Syrah, Merlot, Gamay and Chardonnay had a better sanitary status ranging from 20 to 40 % infection. GVA was the most widespread virus in both table and wine grapes, reaching 34.6% and 18% of infection, respectively. Clear symptoms of fanleaf were observed on Maghdouchi and Cabernet Sauvignon during spring; however, leafroll symptoms were seen on Cabernet Sauvignon and Syrah during autumn.

V 32

SEROLOGICAL CHARACTERIZATION OF SOME SYRIAN ISOLATES OF *APPLE CHLOROTIC LEAF SPOT VIRUS*. Khaldoun Al-Jabor[1], Imad D. Ismail[2] and Salah Al-Chaabi[3]. (1) Al-Sweida Agricultural Research Center, Al-Sweida, P.O. Box 461, Syria, Email: kaljebr@hotmail.com; (2) Facult of Agriculture, Tishreen University, Lattakia, Syria; (3) General Commission of Scientific Agricultural Research (GCSAR), Douma, Syria.

A total of 120 single samples of leaves, flowers and fruits were collected from apple, pear, almond, cherry and peach trees exhibiting viral symptoms from genetic blocks at Scientific Agricultural Research Center in Sweida governorate and were tested for *apple chlorotic leaf spot virus* during 2008 season, using modified double polyclonal antibodies sandwich DAS-ELISA and the monoclonal antibodies in the treble antibodies sandwich TAS-ELISA. 57 virus isolates were divided into 23 different serological groups. The monoclonal antibody MAb C1 reacted with 38 isolates, whereas MAb A2 reacted with 22 isolates. The reaction of some monoclonal antibodies (MAb C1, MAb C2, MAb C3, MAb A2 and MAb B2) with apple isolates was strong with the exception of MAb C2, whereas their reaction with isolates from other plant hosts was weak. The virus isolates collected from apple reacted positively with previous mentioned five MAbs and with polyclonal antibodies, but the ELISA reading obtained with MAbs were higher than that with polyclonal antibodies. With the exception of one ACLSV isolate obtained from peach flowers, the reactions of polyclonal antibodies with other

isolates were not consistent with monoclonal antibodies reactions; the reaction level of this isolate with three MAbs (MAb C1, MAb 2 and MAb C3) was weak, whereas its reaction with polyclonal antibodies was strong.

V 33

REGENERATION BY STIGMA/STYLE SOMATIC EMBRYOGENESIS OF CITRUS GENOTYPES IN ALGERIA: PRELIMINARY RESULTS. Malika Meziane[1], M. Boudjeniba[2], D. Frasheri[3], A.M. D'Onghia[3], A. Carra[4], F. Carimi[4], N. Haddad[5], S. Boukhalfa[5] and S.Braneci[5]. (1) Université Hassiba Ben Bouali. Hay salem , route national 19. (02000) Chlef. Algeria, Email: meziane_ma@yahoo.fr; (2) Laboratoire des Cultures in vitro. Ens Kouba BP:92, Alger, Algeria, Email: mboudjeniba@yahoo.fr; (3) Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM)/Mediterranean Agronomic Institute, Via Ceglie 9, 70010 Valenzano (BA), Italy; (4) Institute of Plant Genetics/CNR, Research Division of Palermo, Corso Calatafimi 414, 90129 Palermo, Italy; (5) Institut Technique de l'Arboriculture Fruitière et de la Vigne, (ITAF), Tessala–El erdja, Birtouta, Alger.

Stigma/style somatic embryogenesis proved to be highly effective in the elimination of the main citrus virus and virus-like diseases and an excellent method for the regeneration of most *Citrus* spp., except Clemetines, without inducing somaclonal variation in regenerates. This method was applied on a Citrus collection at ITAF, Algeria. The main citrus local and international varieties were chosen for regeneration by stigma/style somatic embryogenesis. Explants were cultured in medium I and II to induce somatic embryos formation. In both media, MS basal salts, vitamins, sucrose and malt extract were used. In medium II the growth regulator (6-benzylaminopurine 3 mg/l) was also added. All explants of *Citrus limon* and *C sinensis* produced callus at the cut end of the styles, about 8 days after culture initiation. Most of the tested genotypes proved to regenerate somatic embryos in a diffevariedrent period of time (25-90 days), and then cultured in a single tube before *in vivo* acclimatization.

V 34

DETECTION AND IDENTIFICATION OF *BARLEY STRIPE MOSAIC VIRUS* (BSMV) IN BARLEY AND DURUM WHEAT PLANTS IN ALGERIA. Khaldia Medjahed, Biological Department, Faculty of Agronomic and Biological science, University of Hassiba Benbouali, Algeria, Email: hanene_2@yahoo.fr; meziane_ma@yahoo.fr

This study was conducted at two different expermental stations in Algeria (Ouded Samar and Beni Sliman). The aim of the study was to survey the presence of *Barley stripe mosaic virus* (BSMV, genus *Hordeivirus*) in 37 varieties of Barley and 10 varieties of durum wheat by using DAS ELISA. In addition, disease development was also studied at Blida Experimental Station at different plant growth stages. The results of the study revealed that 26 varieties of barley and 7 varieties of durum wheat were found to be infected by BSMV. The study also showed that BSMV could be transmitted by mechanical methods and through infected seeds.

V 35

STUDY ON *POTATO VIRUS Y* (PVY) AFFECTING POTATO IN AL-DAKAHLIYA AND DAMMIETTA GOVERNORATES, EGYPT. Mahmoud A. El-Mazaty[1], Mohamed R. Rasmy[2] and Ahmed M.E. Eid[1]. (1) Plant Pathology Department, Faculty of Agriculture, Mansuora University, Egypt, (2) Plant Pathology Research Institute ARC, Giza, Egypt, Email: ayten999@yahoo.com

Two strains of *Potato virus Y* (PVY) were isolated from naturally infected potato *Solanum tuberosum* cv. Spunta plants from Al Dakahliya and Damietta governorates showing rougosity, mosaic, and leaf veinal necrosis, stunting and stem canker. The identification was based on the symptomatology, indicator plants, physical properties, serological tests "ELISA and immune electron microscopy", molecular weight, and electron microscopy. The virus induced a systemic and non systemic symptom which appeared on the indicator plants. *Datura stramonium* was resistant to both strains (PVY^N –W and PVY^O). On the other hand *Nicotiana tabacum* cvs. Turkish, White Burley, Xanth, and Samsun., *S. tuberosum* cvs. King Edwared, Spunta., and D. metel showed various systemic symptoms. The thermal inactivation point (TIP) was between 53ºC and 56ºC, dilution end point (DEP) for the tested virus between 10^{-3} and 10^{-4}, while longevity in vitro (LIV) was between 48 and 60 hr at room temperature (RT). Indirect-Enzyme Linked Immunosorbent Assay (I-ELISA) showed that there are nine positive samples from twenty fife samples. Electron microscopy showed separated particles of PVY with length of 600 nm, while using immune electron microscopy showed PVY particles in aggregates. The molecular weight of purified PVY coat protein was 34 KDa through polyacrylamide gel electrophoresis test.

V 36

THE OCCURRENCE OF A NOVEL STRAIN OF *POTATO VIRUS Y* IN SYRIA. Mohamad Chikh Ali[1], Tetsuo Maoka[2], Tomohide Natsuaki[1] and Keiko T. Natsuaki[3]. (1) Laboratory of Plant Pathology, Utsunomiya University, 350 Mine-machi, Utsunomiya, 321-8505 Japan; (2) National Agricultural Research Center for Hokkaido Region (NARCH), 1 Hitsujigaoka, Toyohira-ku, Sapporo, Hokkaido, 062-8555 Japan; (3) Laboratory of Tropical Plant Protection, Tokyo University of Agriculture, 1-1-1-Sakuragaoka, Setagaya-ku, Tokyo 156-8502 Japan, Email: mhmdsaidsyr@hotmail.com

A field survey of *Potato virus Y* (PVY) strains in Syria during the period from 2002 to 2007 revealed that PVY population included mainly a novel recombinant isolate group of PVY, which was temporarily designated as PVY^{SYR}. Isolates of PVY^{SYR} shared highest genomic identity and close phylogenetic relationships with PVY^{NTN} and $PVY^{N}W$ isolates from Syria suggest a common origin and a local emergence of these isolates in Syria. All PVY^{SYR} isolates (total of 20) induced tobacco veinal necrosis but reacted to a PVY^{O} monoclonal antibody, which are typical characteristics of the previously reported $PVY^{N}W$ (or $PVY^{N:O}$) stream. In potato, however, 4 isolates

tested induced potato tuber necrotic ringspot (PTNRS) which is the characteristic phenotype of PVY^{NTN}. Owing to the shared properties of PVY^{SYR} isolates with PVY^{NTN} and $PVY^{N}W$, they represent a new recombinant strain of the PVY^{N} strain group with the proposed name PVY^{NTN-NW}. The high prevalence of PVY^{NTN-NW} in potatoes and weeds as well as the ability to induce PTNRS indicated its importance and the need for its control. The continuous emergence of new PVY strains by genomic recombination would alter the control program of PVY and calls for the regular characterization of PVY population.

V 37

EFFECT OF SOME TREATMENTS ON CONTROL OF BEAN YELLOW MOSAIC DISEASE OF FABA BEAN. Nadeem A. Ramadan and Nehil Y. Al-Murad, College of Science, Mosul University, Mosul, Iraq, Email: nadeemramadan@yahoo.com

Spraying mineral oil (Sunoco) and insecticide (Alpha Methrin) separately and in combination and by using corn plants as barriers, reduced the incidence of mosaic symptoms on faba bean plants to 3%. The best treatment was the use of barrier plants planted at north-west direction, which reduced the disease to 3% compared with 4%, 6% and 9% by using mineral oil, insecticide and control treatments, respectively. Using a barrier crop increased the number of pods, seeds, bacterial nodules, stem and roots length compared with other treatments. It also increased wet and dry weight of broad bean plants. Accordingly, the use of barrier crop was considered as the best treatment. Statistical analysis showed significant differences among the three tratments in mineral content of diseased broad bean plants. The natural infection with BYMV reduced the number of shoots to 3, and the length of stem by 35%, the length of root system by 29.2%, reduction in fresh weight of stem and roots by 27.7% and 34%, and dry weight by 43.3% and 37.8%, respectively, and the number of pods by 55%, number of seeds by 77.5% and number of nodules by 75%.

V 38

STUDY OF *CUCUMBER MOSAIC VIRUS* ON SEVERAL HOSTS IN MIDDLE REGION OF EL-GABAL AL-AKHDAR. Soaad S. Ali, Omar, M. Elsanousi and Fathi S. Al-Mesmari, Faculty of Agriculture, University of Omar Al-Mukhtar, El-Beida, Libya, Email: omarelsanousi1@yahoo.com

This study aimed to survey for *Cucumber mosaic virus* (CMV) in some field crops and wild plants in the middle region of Al-Gabal Al-Akdar including Al-Hanya, Al-Wasita, El-Beida, Shahat and Susa. CMV was detected singly or in mixed infection on pepper plants in Al-Hanya, Al-Wasita and El-Beida, and on wild tobacco *Nicotiana glauca* in Shahat and Susa, and on squil plants in Shahat, but was not detected in tomato, eggplant, cucumber, wild cucumber, squash, watermelon and local roses. Purified virus was obtained from inoculated wild tobacco leaves, with purified virus yield of 12 mg/100 gr of leaves. The results showed that CMV was immunogenic and the antiserum produced had a titer 1:128. The wild tobacco CMV isolate induced mosaic on tobacco *Nicotiana glauca*, *N. glutinosa*, *N. tabacum* cvs. Burley 21, White Burley, Turkish and *Xanthi-nc*, and on pepper, squash, pumpkin; necrotic local lesions on C*henopodium amaranticolor* and broad bean; symptomless infection on cantaloupe and Datura and no infection on cucumber, watermelon, tomato and tobacco *N. rustica* and *N. sylvestrus*.

V 39

FURTHER MOLECULAR CHARACTERIZATION OF *CUCURBIT APHID-BORNE YELLOWS VIRUS* AFFECTING CUCURBITS AND LETTUCE IN TUNISIA. Monia Mnari-Hattab[1], Nathalie Gauthier[2] and Ali Zouba[3]. (1) Laboratoire de protection des végétaux, Institut National de la Recherche Agronomique de Tunisie, 2049 Ariana, Tunisie; (2) IRD, UMR CBGP (INRA/IRD/Cirad/Montpellier SupAgro), Campus international de Baillarguet, CS 30016, F-34988 Montferrier-sur-Lez cedex, France; (3) Centre régional de Recherches en agriculture oasienne de Déguache 2260 Tozeur, Tunisie, Email: hattab.monia@iresa.agrinet.tn

Surveys of yellowing viruses under non heated and geothermal heated plastic tunnels as well as in open field crops of melon (*Cucumis melo* L.*)*, cucumber (*C. sativus* L.), zucchini (*Cucurbita pepo* L.), squash (*C. maxima* L.), watermelon (*Citrullus lanatus* (Thunb.) Matsum & Nakai) and ware cucurbit (*Ecballium elaterium* L. T. Richard) were carried out year-round during 2001, 2003, and 2004 in the major cucurbit-growing areas in Tunisia. Severe yellowing symptoms on older leaves of cucurbits were observed in open fields and under plastic-tunnel production systems. These yellowing symptoms and the high aphid populations (*Aphis gossypii* Glover) on diverse cucurbit crops in Tunisia supported the hypothesis of a viral cause of the disease. Virus identification using DAS-ELISA, followed by RT-PCR and IC-RT-PCR showed that *Cucurbit aphid-borne yellows virus* (CABYV) was widely spread in melon, cucumber, zucchini, squash and watermelon crops. Ware cucurbit (*E. elaterium*) and lettuce (*Lactuca sativa* L.) crops were identified as potential CABYV reservoirs. Molecular characterization as well as phylogenetic study of Tunisian isolates of CABYV were conducted. The RT-PCR-amplified partial coat protein (CP) and P4 genes, from nine Tunisian CABYV isolates, were cloned and sequenced. When compared, the obtained sequences seemed to be much conserved; they shared 98.1 to 100% nucleotide identities but less in amino-acid sequence similarity 95.6 to 100% for P4 and 97.2 to 100% for the CP or P3. CP and P4 gene nucleotide and amino-acid sequence comparisons as well as phylogenetic reconstructions showed that the Tunisian isolates clustered into two major sub-groups. Otherwise, the comparison among Tunisian isolates sequences with those retrieved from Gene Bank clearly showed a high nucleotide and coat protein amino-acid identities, and close relationships with the Italian and French isolates and constitute one sustained group with a bootstrap of 77%.

V 40

DETECTION OF VIRUS DISEASES AFFECTING APPLE AND PEAR TREES IN EGYPT. Sahar A. Youssef[1], E.M. El-Fakharany[2] and A.A. Shalaby[1]. (1) Virus and Phytoplasma Research Department, Plant Pathology Research Institute, Agriculture Research Center, Giza, Egypt; (2) Deciduous Fruit Research Department, Horticulture Research Institute, Agriculture Research Center, Giza, Egypt, Email: saharyoussef@link.net

The purpose of this study was a survey on the occurrence and distribution of the viruses affecting apple and pear trees in Egypt. Five locations (Giza, Monufia, Nubaria, Kaliubia and Khataba) which are well known for their state and commercial orchard plantations of apple and pear (mixed with other stone fruits) were visited. About 500 leaf samples showing virus and virus like symptoms ranging from chlorotic and necrotic spots, calico, mosaic and deformation of the leaves to dwarfing and short internodes of the trees were collected. DAS-ELISA, RT-PCR and m-RT-PCR assays were used to detect the presence of apple mosaic virus (ApMV), apple chlorotic leaf spot virus (ACLSV), prunus necrotic ringspot (PNRSV), apple stem pitting virus (ASPV) and apple stem grooving virus (ASGV) infection in apple and pear trees. ACLSV and PNRSV were found to be the most widespread in different orchards. ApMV, ASGV and ASPV were the second important viruses recorded.

V 41

SPREAD OF *ZUCCHINI YELLOW MOSAIC* VIRUS ON CUCURBITS IN SYRIA AND ITS MOLECULAR DETECTION. M. Jamal Mando[1], Amin Amer Haj Kasem[2], Salah Al-chaabi[1], Safaa G. Kumari[3] and Massimo Turina[4]. (1) Pathology Division, Plant Protection Administration, General commission for Scientific Agricultural Research, Douma, P.O. Box 113, Damascus, Syria. Email: jamalagr@mail.sy; (2) Plant Protection Division, Faculty of Agriculture, Aleppo University, Syria; (3) Virology Laboratory, International Center for Agricultural Research in the Dry Areas, (ICARDA), P.O. Box 5466, Aleppo, Syria; (4) CNR, Torino, Italy.

To determine the spread of *Zucchini yellow mosaic virus* (ZYMV) in different cucurbit species (Squash, cucumber, melon, watermelon and pumpkin), samples showing symptoms of viral infection were collected from cucurbits growing areas in provinces of Latakia, Homs, Aleppo, Idleb and Daraa in Syria during 2006 and 2007 growing seasons. 43 fields were visited and 387 samples with viral infection symptoms were collected. Samples were tested using DAS-ELISA against ZYMV, *Watermelon mosaic virus* and *Cucumber mosaic virus*. The results of serological tests showed that 323 samples (83.9%) were infected with one or more virus, including 112 samples with mixed infection whereas 64 samples were negative. ZYMV was detected in 263 samples (67.9%) followed by WMV in 151 samples (39.9%) then CMV in 42 samples (10.8%). Squash isolate of ZYMV was detected using RT-PCR, and a 605 base fragment at the N-terminal of the coat protein gene was amplified.

V 42

RELATIVE INCIDENCE OF THREE IMPORTANT VIRUSES INFECTING CANOLA IN GOLESTAN PROVIENCE IN IRAN. A. Zahedi Tabarestani and M. Shams-Bakhsh. University of Tarbiat Modares, Department of Plant Pathology, Tehran, Iran, Email: atena.zahedi@yahoo.com

Oilseed rape (*Brassica napus* oliefera) is an important crop in Golestan province. *Turnip mosaic virus* (TuMV), *Beet western yellow virus* (BWYV) and *Cauliflower mosaic virus* (CaMV) can cause economicall losses in growing area of canola worldwide. In order to determine the distribution and relative incidence of these viruses in Golestan province during 2008, around 400 samples from canola fields were collected. The randomly collected samples were tested for the presence of TuMV, BWYV and CaMV by DAS-ELISA. The results showed that canola fields infection level in Golestan province with TuMV, BWYV and CaMV was 4.5%, 6% and 2.5%, respectively.

V 43

EFFECT OF *BEAN YELLOW MOSAIC VIRUS* ON SOME CHEMICAL COMPONENTS OF BROAD BEAN CELLS. Khalid Mahmood[1] and Nnadeem Ramadan[2] (1) Plant Protection Department, Agriculture College, Salahaddin University, Erbil, Iraq, Email: saidkhalid88@yahoo.com; (2) Science College, Biology Department, Mosul University, Mosul, Iraq, Email: nadeemramadan@yahoo.com

Bean yellow mosaic virus (BYMV) infection caused decrease in the value of the chlorophyll a, b and total chlorophyll. The reduction rate reached 15.31, 23.5 and 23.19%, respectively. The rate of inhibition by the virus in the first stage was significantly increased 48.71, 49.73 and 48.77%, respectively. The virus infection increased the amount of nitrogen in comparison with the control. The plants infected with the virus in the second stage had significant increase in the amount of nitrogen compared with healthy plants. BYMV infection of faba bean did not cause significant reduction in carbohydrates content during both stages when compared with health plants.

V 44

COMPARISON OF CRYOPRESERVATION AND ELECTROTHERAPY METHODS FOR THE ELIMINATION OF *GRAPEVINE VIRUS A* FROM INFECTED VINES. Masoud Shamsbakhsh and Shirin Bayati, Department of Plant Pathology, Tarbiat Modares University, P.O.Box:14115-336, Tehran, Iran, Email: shamsbakhsh@mail.modares.ac.ir

The incidence of *Grapevine virus A* (GVA) is reported from all of the major grape growing regions in Iran. Grapevine is propagated via vegetative material such as cuttings and grafts. In such plants, viral diseases are easily transmitted to the progeny. Therefore, the control of grapevine viruses is achieved through production of healthy mother plants. In the present research, cryopreservation and electrotherapy methods were employed for the elimination of GVA from naturally infected vine (*V. vinifera* L. cv Black) and their efficiency was compared. In two separate

cryopreservation experiments, 20 and 12 shoot tips of infected grape were examined. In both experiments 59% ± 1.4 of plants were regenerated. GVA detection by RT-PCR showed that none of the steps before freezing were able to eliminate GVA. In contrast, GVA was eliminated from 42.2%±0.8 of the plantlets recovered from freezing. In the electrotherapy method, the effects of electric current intensity and duration of treatment were investigated. Sixty eight Cane 3 cm long pieces were exposed to electric currents of 0, 10, 20 and 30 milliamperes (mA) for 10 or 15 minutes followed by immediate sterilization and culture of explants. The results showed that, the cryopreservation technique described above was more efficient and convenient protocol for elimination of GVA from infected grapevine than the electrotherapy technique.

V 45

STUDY OF *BEAN YELLOW MOSAIC VIRUS* (BYMV) ON BROAD BEAN IN AL-JABAL AL-AKHDAR REGION. Abdalla M. Abd-Alaleem, Omar, M. Elsanousi, Hosny A. Younes and Fathi, S. Al-Mesmari, Faculty of Agriculture, University of Omar Al-Mukhtar, El-Beida, Libya, Email: omarelsanousi1@yahoo.com

This study was conducted during growing season 2005/2006 to identify virus or viruses causing mosaic diseases on broad bean crop in different regions (Al-goba, Lamloda, Ain-mara, Elgaygab, Elabrag, Alsafsaf, EL-beida, Elwesita, El-hanya, Shahat, Gernada and Elfaedya of El-gable El-Akhtar district). Indirect ELISA test was carried out on 47 samples randomly collected from broad bean plants showed symptoms of virus infection by using antisera to *Broad bean mottle virus* (BBMV), *Broad bean stain virus* (BBSV), *Broad bean true mosaic virus* (BBTMV) and *Bean yellow mosaic virus* (BYMV). The results revealed that the causal agent of the disease was serologically related to BYMV, and 19 samples out of 47 samples were infected by the virus with an infection rate of 40.4%. Examination of ultrathin sections prepared from infected tissues of broad bean under electron microscope showed the presence of pinwheel inclusion bodies which are characteristic to the viruses of *Potyviridae* to which BYMV belongs and dense band and virus induced crystals were also observed. Isolate no. 11 from Al-goba infected with BYMV was selected for virus purification and andudies on symptoms host range, virus properties in the crude sap and insect transmission. The ultraviolet absorption spectrum for the purified viral preparation was typical for nucleoprotein with A260/A280 and A max/A min ratios of 1.62 and 1.47, respectively. The yield of purified virus was 8.8 mg/100 g infected tissues. The host range studies revealed it can induce mosaic symptoms on broad bean, bean, peas, lupine, peanut, and leaf yellowing of chickpea, cowpea, pepper and local lesions of *Chenopodium amaranticolor* and no infection on tomato, tobacco *Nicotiana glutinosa*, lentil, squash, sweet melon, watermelon cucumber, okra, cabbage, roquette, radish, turnip, lettuce, eggplant and Egyptian leek had occurred. Aphid transmission studies revealed that this isolate was transmitted mechanically and by *Aphis fabae* and *Myzus persicae* in a non persistent manner. The properties of the virus in the crude sap revealed that the thermal inactivation point was between 55–60ºC, the dilution point was between 10^{-3}-10^{-4} and longevity *in vitro* was 2 days.

V 46

MOLECULAR CHARACTERIZATION OF A SYRIAN ISOLATE OF *WHEAT STREAK MOSAIC VIRUS* AND ITS TRANSMISSIBILITY THROUGH WHEAT SEEDS. Nouran Attar and Safaa G. Kumari, Virology Lab., International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: n.attar@cgiar.org

Wheat streak mosaic virus (WSMV, genus *Tritimovirus*, family *Potyviridae*) is an important cereal virus in many countries in America, Europe, North Africa and Asia. WSMV is transmitted mainly by mites, but also mechanically; and was recently reported as a seed-borne pathogen in Australia and Canada. In this study, a field experiment was conducted to evaluate the effect of WSMV on six durum wheat (Lahn/Haucan, Dcc, Ammar-9, Gidara-2, ICDW-22942 and Boohai) and four bread wheat (Maringa, 12th-IBWSN-459, ICBW-208008 and Cham-6) genotypes during 2005/2006. All plants were inoculated mechanically with WSMV at the flowering stage and tested by tissue blot immunoassay (TBIA) two months after inoculation. Results showed that all tested wheat genotypes became infected with WSMV,with the infection rate varying between 37.8% (Maringa) and 68.1% (Cham-6). Seeds of infected plants from the field experiments were harvested and replanted in plastic houses, and 1000 seedlings from each genotype were tested by TBIA for presence of WSMV after 20 days. Results revealed that WSMV was seed-transmitted in four genotypes (Lahn/Haucan, Cham-6, ICDW-22942 and Maringa), and the seed-transmission rate was 0.1-0.3%. WSMV was confirmed in all infected seedlings by Reverse-Transcription Polymerase Chain Reaction (RT-PCR) using specific WSMV primers. Comparing the sequence of WSMV-amplicons from the Syrian isolate with the other WSMV isolates revealed identities of 98% (Turkish, Australian and American isolates) and 94% (Iranian isolate).

V 47

STUDY OF *ALFALFA MOSAIC VIRUS* IN LIBYA. Yousif Izzo and Jabr Khalil, Plant Protection Department, Faculty of Agriculture, University of Al-Fateh, Tripoli, Libya, Email: khalil_reem@hotmail.com

Alfalfa mosaic virus (AMV) is one of the newly discovered viruses on alfalfa in Libya. AMV mode of transmission, symptoms and host range, and properties in the crude sap were studied. It was found that AMV is transmitted mechanically, by dodder (*Cuscuta* spp., from alfalfa to alfalfa), and by two aphid species (*Myzus persicae* Sulzer and *Aphis fabae* Scopoli) in non-persistent manner (within 0.5–15 min). Its dilution end–point was between 10^{-3}-10^{-4}, longevity *in vitro* 3 days and thermal inactivation point between 60–65ºC. Twenty plant species in 4 families (Chenopodiaceae, Cucurbitaceae, Fabaceae and Solanaceae) were mechanically inoculated with AMV. AMV it infected 4 species only in Fabaceae, *Cicer arientinum* L. (leaf yellowing), *Phaseolus vulgaris* L. (red

brown local lesions), *Vicia faba* L. (blackening of the stem, wilting and death of the plants) and *Vigna sinensis* L. (red brown local lesions). AMV did not mechanically infect the following plants: *Chenopodium amaranticolor* Coste & Reyn., *Citrullus lanatus* Thunb, *Cucumis melo* L., *Cucamis sativus* L., *Cucurbita pepo* L., *Lathyrus sativus* L., *Lens culinaris* Medic, *Medicago sativa* L., *Pisum sativum* L., *Capsicum annuum* L., *Datura metel* L., *Nicotiana glutinosa* L., *N. tabacum* L. cv. White Burley, *Solanum Lycopersicum* L., *Solanum melongena* L. and *Solanum tuberosum* L.

V 48

BIOLOGICAL STUDY ON *TOMATO YELLOW LEAF CURL VIRUS* IN LIBYA. Hanan Dabob and Jabr Khalil, Plant Protection Department, Faculty of Agriculture, University of Al-Fateh, Tripoli, Libya, Email: khalil_reem@hotmail.com

Transmission of *Tomato yellow leaf curl virus* (TYLCV) mechanically and by the white fly (*Bemisia tabaci* Genn.), symptoms and host range, and susceptibility of Libyan tomato cultivars to infection with TYLCV were studied. Results showed that TYLCV was not transmitted mechanically, but it was transmitted by the whitefly persistently (circulative virus) after an acquisition feeding period of 20 min. when using 6–15 insects/plant, and after 30 min. with 3 insects/plant. Inoculation feeding period was 24–48 hrs., with a latent period of 22 hrs. The virus did not pass through the eggs. Twenty five plant species in 6 families were inoculated with TYLCV using viruliferous white flies. Only 9 species showed disease symptoms which varied from leaf rolling, curling and yellowing, small-sized leaves, stunting and leaf necrosis, they were: *Cucumis melo* L., *Phaseolus vulgaris* L., *Datura metel* L., *Capsicum frutescence*, *Abelmuschus esculentus* L., *Nicotiana glutinosa* L., *Solanum lycopersicum* L. cvs. Sankara, Karaz, Boshra and Hoda, *Solanum nigrum* L. and *Solanum tuberosum* L. TYLCV did not infect the following plants: *Vinca rosea* L., *Chenopodium album* L., *C. amaranticolor* L., *Cucumis sativus* L., *Citrullus lanatus* L., *Cucurbita pepo* L., *Pisum sativum* L., *Modicago sativa* L., *Lupinum termis* Forsk, *Lens esculentum* L., *Vicia faba* L., *Malva parviflora* L., *Althea rosae* L., *Capsicum annuum* L., *N. tabacum* L. cvs. White Burley and Xanthi-nc, and *Solanum melongena* L. Susceptibility of the following tomato cultivars to the infection with TYLCV was studied: Boshra, Senkara, Karaz, Hoda, Super Halim, Dunia, Felkato, Thoraia, Libda, Farwa and Nazeha. The infection rates were 100, 100, 100, 80, 50, 50, 40, 20, 10, 0.0 and 0.0%, respectively.

V 49

CHARACTERIZATION OF *WATERMELON MOSAIC VIRUS* FROM LIBYA. Amal Abo-Mhara[1], Jabr Khalil[1] and Khalid El-Dogdog[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Al-Fateh, Tripoli, Libya, Email: khalil_reem@hotmail.com; (2) Faculty of Agriculture, University of Ain-Shams, Cairo, Egypt.

Watermelon mosaic virus (WMV) is one of the recently discovered viruses on cucurbits in Libya. The experiments proved that WMV was transmitted mechanically and non-persistently by *A. gossypii* following 0.5-20 min. acquisition feeding time. Seventeen plant species in 6 families were mechanically inoculated with WMV. 13 species produced symptoms varied from local lesions, mosaic, leaf malformation and blistering. These species were: *Chenopodium album* L., *C. amaranticolor* L., *Citrullus lanatus* L., *Cucurbita maxima* L., *C. pepo* L., *Cucumis melo* L., *C. sativus* L., *Cicer arientinum* L., *Phaseolus vulgaris* L., *Hibiscus rosa-sinensis* L. and *Capsicum annuum* L. WMV didn't infect the following plants: *Datura metel* L., *D. stramonium* L., *N. glutinosa* L. and *N. tabacum* L. cv. White Burley. The longevity *in vitro* was 7 days, dilution end-point between 10^{-3}-10^{-4} and the thermal inactivation temperature waas 60–65ºC. WMV was successfully purified, and electron micrographs showed that its particles are flexuous rods with a length of 730–750 nm. and a width of 15 nm.

V 50

SEROLOGICAL IDENTIFICATION FOR SOME IMPORTANT VIRUSES ON STONE FRUITS IN SAUDI ARABIA. Khalid Alhudaib[1] and Gamal Ghanem[2]. (1) Plant Protection Department, P.O. Box 55009, Alhasa 31982, King Faisal University, Saudi Arabia, Email: alhudaib@hotmail.com; (2) Plant Pathology, Agriculture College, Cairo University, Egypt.

A field survey was carried out in the stone fruit growing area (Al Juof - North of Saudi Arabia) to assess stone fruit viruses in spring 2007. A total of 67 (38 peach and 29 apricot) leaf samples with virus symptoms including green mottle, vein clearing, necrotic spots, chlorosis and/or discoloration in addition to symptomless samples were collected and tested for the presence of *Plum pox virus* (PPV), *Prune dwarf virus* (PDV) and *Prunus necrotic ringspot virus* (PNRSV) using double antibody sandwich enzyme linked immunosorbent assay (DAS-ELISA). Result showed that 28 out of 67 leaf samples were infected with one and/or more viruses. The most common virus was PNRSV (detected in 12 samples), followed by PDV (9 samples) and PPV (7 samples). Mixed infections of PPV+PDV+PNRSV, PPV+PDV, and PDV+PNRSV were detected in 3, 3 and 2 samples respectively. Further investigations are needed for other commercial orchards and nurseries. This is the first report of the occurrence of PPV, PDV and PNRSV in Saudi Arabia.

V 51

FIRST RECORD OF *GRAPEVINE FANLEAF VIRUS* (GFLV) TRANSMITTED BY *XIPHINIMA INDEX* IN IRAQ. Mothana E. El-Muadhidi[1] and Bssima J. Anttwan[2]. (1) Virology laboratory, Agricultural pests diagnosis Department, State Board of Plant Protection, Baghdad, Iraq, Email: mothna200398@yahoo.com; (2) Nematology Laboratory, State Board of Agricultural Research, Baghdad, Iraq.

Grapevine (*Vitis vinifera* cv. Thompson seedless and French black cultivars) was found infected with a viral disease showing half-closed fan leaf shaped leaves, with margins irregularly dentate-serrated instead of lobate-serrated, the shoot internodes were abnormally short and arranged in a zigzag fashion. The causal virus was identified to be *grapevine fan leaf virus* (GFLV), by using

double antibody sandwich ELISA (DAS-ELISA) in 93% of symptomatic samples which were collected from different locations in three governorates. Results showed that the vector *Xiphinema index* nematode was found in all soil samples collected from the base of infected grapevine trees. Results of this study explained the heavy decline and yield losses that occurred in grapevine orchards and reached 80-100%, especially at Salah-Eldeen governorate. This study is the first record of GFLV in grapevine orchards in Iraq.

V 52

VIRAL DISEASES AFFECTING SQUASH (CUCURBITA PEPO) IN SOUTHERN SYRIA AND JORDAN VALLEY. Naser Al-Tamimi[1], Houda Kawas[1] and Akel Mansour[2]. (1) Plant Protection Department, Faculty of Agriculture, Damascus University, Damascus, Syria; (2) Plant Protection Department, Faculty of Agriculture, Jordan University, Amman, Jordan, Email: n_tami@yahoo.com

This study was conducted to identify viruses affecting squash plants in southern Syria and Jordan Valley. during the growing seasons 2004/2005 and 2005/2006, a total of 1760 squash samples with virus-like symptoms were tested serologically by ELISA. Results indicated the presence of 14 viruses affecting squash in Southern Syria and 15 viruses in Jordan Valley: *Zucchini yellow mosaic virus* (ZYMV) was the most commonly encountered virus in squash fields with infection rates in the tested samples in the two seasons were 59.9% in Syria and 53.2% in Jordan, *Watermelon mosaic virus* (WMV) (38.3%, 30.5%), *Cucumber mosaic virus* (CMV) (34.0%, 23.6%), *Papaya ring spot virus* (PRSV) (24.8%, 25.6%), *Cucumber green mottle mosaic virus* (CGMMV) (23.4%, 39.8%), *Squash leaf curl virus* (SLCV) (22.9%, 43.8%), *Tomato spotted wilt virus* (TSWV) (4.5%, 12.1%), *Lettuce mosaic virus* (LMV) (3.17%, 1.43%), *Tomato black ring virus* (ToBRV) (2.8%, 0.44%), *Squash mosaic virus* (SqMV) (2.35%, 2.0%), *Arabis mosaic virus* (ArMV) (0.59%, 1.43%), *Tomato ring spot virus* (ToRSV) (0.23%, 0.88%), *Tobacco ring spot virus* (TRSV) (0.23%, 3.1%) and *Alfalfa mosaic virus* (AMV) (0.23%, 0.33%), in addition to *Tomato bushy stunt virus* (TBSV) (0.396%) in Jordan. This is the first record of the natural infection of squash plants with LMV, ArMV, ToBRV, TRSV and ToRSV in the two regions, and it is the first record of the natural infection of squash plants with TSWV and TBSV in Jordan Valley and SLCV in Syria.

V 53

VIRAL DISEASES AFFECTING CHICKPEA AND LENTIL CROPS IN AZERBAIJAN. Eldar Mustafayev[1], Safaa G. Kumari[2], Zeynal Akparov[1] and Nouran Attar[2]. (1) Azerbaijan National Academy Science of Genetic Resources Institute, 155 Azadliq Ave, 1106, Baku, Azerbaijan, Email: eldar_agdam@yahoo.com; (2) Virology Laboratory, International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria

A survey to identify virus diseases affecting chickpea and lentil crops in five different regions (Absheron, Binagady, Bilasuvar, Jalilabad and Masalli) in Azerbaijan was conducted during June, 2007. A total of 306 (253 chickpea and 53 lentil) samples with symptoms suggestive of virus infection (yellowing, leaf rolling and stunting), and 3100 random samples (2400 chickpea and 700 lentil) samples from 17 fields (13 chickpea and 4 lentil) were collected. All the above samples were tested by the tissue-blot immunoassay (TBIA) using 11 specific virus antisera. Virus disease incidence was determined on the basis of laboratory testing of 200 individually randomly collected samples from each field. Serological tests of randomly samples indicated that Luteoviruses [e.g. *Chickpea chlorotic stunt virus* (CpCSV), *Beet western yellows* (BWYV) and *Bean leafroll viruses* (BLRV)] were the most common in chickpea fields, with an overall average of 13.5% followed by *Faba bean necrotic yellows virus* (FBNYV) (1.1%). In contrast, *Pea seed-borne mosaic virus* (PSbMV) was the most abundant virus in lentils, with an overall average of 22.1%, followed by FBNYV (17.4%) and Luteoviruses (8.7%). Twelve fields had a virus disease incidence of 5% or less based on the field inspection, and only four fields had around 6-20% virus disease incidence. Whereas on the basis of laboratory testing, 13 fields had more than 6% virus infection [five of them had 32.0%, 34.5% (chickpea), 44.5%, 45.5% and 100% (lentil), virus infection]. This is the first survey of legume viruses in Azerbaijan and first report of FBNYV, PSbMV, BWYV, BLRV and CpCSV naturally infecting legume crops in Azerbaijan.

V 54

***WHEAT DWARF VIRUS* IN SYRIA.** Ahmed Ekzayez[1], Safaa G. Kumari[1], Nouran Attar[1] and Imad Ismail[2] (1) Virology Laboratory, International Center for Agriculture Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: Ahmed-ekzayez81@hotmail.com; (2) Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria

Wheat dwarf virus (WDV, genus *Mastrevirus*, family *Geminiviridae*) causes a serious disease of several cereal crops in many countries in the world. The main symptoms of the disease are dwarfing, yellowing and reduced heading. WDV is persistently transmitted by leafhoppers (*Psammotettix alienus* Dahlbom). Surveys were conducted in the major cereal growing regions of Syria during April and May 2009. A total of 1909 plant samples (938 wheat and 971 barley) with symptoms suggestive of viral infection were collected from 103 fields (45 wheat and 58 barley). In addition, different leafhopper species were collected from wheat and barley fields. These leafhoppers were maintained on wheat and barley plants covered by cylindrical plastic cages, 15 cm in diameter and equipped with ventilation slots, under greenhouse conditions. The efficiency of leafhopper transmissibility of WDV was studied by following virus acquisition after 48 hours. The serological (Tissue blot immunoassay; TBIA) and molecular (PCR) tests showed that WDV was found only in the Al-Hasakah governorate with mean relative occurrence in tested samples of 16.3% (26.1% on wheat and 6.5% on barley). In addition, results indicated that only one leafhopper species, *Psammotettix provincialis* Ribaut, transmitted WDV under experimental conditions, at rates up to 41%. This is the first report of WDV infecting wheat

and barley in Syria, and the first report of *P. provincialis* as a WDV vector worldwide.

V 55

SEED TRANSMISSION OF VIRUSES IN SQUASH SEEDS (*CUCURBITA PEPO*) IN SOUTHERN SYRIA AND JORDAN VALLEY. Naser Al-Tamimi[1], Houda Kawas[1] and Akel Mansour[2]. (1) Plant Protection Department, Faculty of Agriculture, Damascus University, Damascus, Syria; (2) Plant Protection Department, Faculty of Agriculture, Jordan University, Amman, Jordan, Email: n_tami@yahoo.com; houdakawas@yahoo.com

This study was conducted to identify the transmission of viruses in squash seeds. Imported, local, seeds from infected fruits, and others from healthy-looking fruits, were collected from southern Syria and Jordan Valley, during the 2006/2007 growing seasons. Serological tests showed the presence of 8 viruses transmitted by seeds to seedlings in different rates: *Cucumber mosaic virus* (CMV) was the most commonly encountered virus in all seedlings (0.5%) and in infected fruits (2.4%), followed by *Arabis mosaic virus* (ArMV) (0.27%), and 1.8% in seeds of apparently healthy fruits, *Tomato ring spot virus* (ToRSV) (0.23%) and (1.2%) in infected fruits, *Zucchini yellow mosaic virus* (ZYMV) (0.04%) and 0.4% in infected fruits (was found in one seedling), *Tomato spotted wilt virus* (TSWV) (0.12%), *Tomato black ring virus* (ToBRV) (0.15%), *Squash mosaic virus* (SqMV) (0.08%), *Cucumber green mottle mosaic virus* (CGMMV) (0.08%). Seed viral infections were 5.2% and 4.8% in infected fruits and apparently healthy fruits, respectively; and it was lower in imported seeds (0.25%) than local Syrian seeds (0.64%). The serological test showed that viral incidence in all seeds was 1.47%; there were 38 virus infected seedlings from a total 2575 seedlings. This is the first record of seed transmission of ArMV, ToRSV, TSWV and ToBRV in squash seeds. Serological tests showed the seeds were free from *Papaya ring spot virus* (PRSV), *Watermelon mosaic virus* (WMV) and *Squash leaf curl virus* (SLCV) from the seeds.

V 56

VIRAL DISEASES OF APPLES IN SOUTHERN SYRIA. Houda Kawas, Plant Protection Department, Faculty of Agriculture, Damascus University, Syria, Email: houdakawas@yahoo.com

Several viral diseases are known to affect apple *Malus communis* L. worldwide. To investigate viral diseases of apple in Syria, 108 samples were collected from apple fields in southern Syria during 1998-2005. Main symptoms were recorded, and biological assays (mechanical inoculation on plant indicators and insect transmission) and serological assays by ELISA using antisera of *Apple mosaic virus* ApMV (genus *Ilavirus*, family *Bromoviridae*), *Apple chlorotic leaf spot virus* ACLSV (genus *Trichovirus*, family *Flexiviridae*), *Tomato ring spot virus* TomRSV (genus *Nepovirus*, family *Comoviridea*), *Tobacco ring spot virus* TRSV (genus *Nepovirus*, family *Comoviridae*), *Tomato black ring virus* ToBRV (genus *Nepovirus*, family *Comoviridae*) and *Arabis mosaic virus* ArMV (genus *Nepovirus*, family *Comoviridae*), were conducted. Results indicated that ACLSV and ApMV were the most commonly spread, with relative occurrence of 24% and 26.9%, respectively. TomRSV, TRSV, ToBRV and ArMV were registered for the first time on apple in Syria at a relative occurrence rate of 13%, 14.8%, 12.03% and 2.43%, respectively. With the possible existence of other viral and viroid diseases, more attention is needed to assess the health status of apple orchards in Syria.

V 57

MOLECULAR DETECTION OF *SPIROPLASMA CITRI* ASSOCIATED WITH STUBBORN DISEASE IN CITRUS ORCHARDS IN SYRIA. Raied Abou Kubaa[1], Maria Saponari[2], Ali El-khateeb[3], Raymond K. Yokomi[4], Khaled Djelouah[5] and Majd Jamal[6]. (1) Dipartimento di Protezione delle Piante e Microbiologia Applicata, Università degli Studi, Via Amendola 165/A, 70126 Bari, Italy; (2) Istituto di Virologia Vegetale del CNR, Unità Organizzativa di Bari, Via Amendola 165/A, 70126 Bari, Italy; (3) General Commission for Scientific Agricultural Research, Lattakia, Syria; (4) USDA-ARS San Joaquin Valley Agricultural Sciences Center, 9611 So. Riverbend Ave. Parlier, CA 92648; (5) Mediterranean Agronomic Institute, Via Ceglie 9, 70010 Valenzano (BA), Italy (6) International Center for Agricultural Research in the Dry Areas, P.O.Box 5466, Aleppo, Syria. E.mail: raedsir@hotmail.com

Spiroplasma citri, a phloem-limited pathogen, causes citrus stubborn disease (CSD) and can be transmitted from plant to plant by several species of phloem-feeding leafhoppers. CSD is an important disorder in certain warm and arid citrus-growing areas, and its agent has been recorded from several Mediterranean and Middle Eastern countries, including Syria. In September 2008, columella were collected from fruits of 130 symptomatic and symptomless trees, 102 were from 10 commercial fields in Lattakia and 28 were from 2 groves in Tartous. Silica gel-desiccated columella samples were brought to the University of Bari for S. citri detection. DNA extraction and polymerase chain reaction (PCR) were performed using the primer pairs P58-6f/4r and P58 3f/4r in conventional and real-time PCR, respectively. Twelve sweet orange trees (9.2%) from two different groves (11 in Lattakia and 1 in Tartous) were *S. citri*-positive in both assays. Nucleotide sequences of the P58-6f/4r amplicon of four selected spiroplasma isolates showed 98% identity with the putative adhesin gene of *S. citri* strain T9 (accession No. EU602314) from California and strain BR3-3X (DQ344812). The presence of S. *citri* in Syrian citrus orchards was therefore confirmed by molecular tools. Because PCR-based techniques are more apt than traditional *S. citri* culturing for large scale analyses, their use will allow more rapid and systematic surveys in commercial citrus plots as well as in mother plant repositories and nurseries. The leafhopper *Neoaliturus haematoceps* has been shown to be a vector of *S. citri* in Syria. Thus, the use of these tools for the early detection of the pathogen in infected plants and leafhopper vectors will be critical for improving the management and containment of the disease.

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THE PRESENCE OF CITRUS TRISTEZA VIRUS CAN CHANGE THE COURSE OF CITRUS INDUSTRY IN SYRIA. Raied Abou Kubaa[1,3], Khaled Djelouah[1], Maria Saponari[2], Majd Jamal[4] and Anna Maria D'Onghia[1]. (1) Mediterranean Agronomic Institute, Via Ceglie 9, 70010 Valenzano (BA), Italy; (2) Istituto di Virologia Vegetale del CNR, Sezione di Bari, Via Amendola 165/A, 70126 Bari; (3) Dipartimento di Protezione delle Piante e Microbiologia Applicata, Università degli Studi, Via Amendola 165/A, 70126 Bari, Italy; (4) International Center for Agricultural Research in the Dry Areas, P.O. Box 5466, Aleppo, Syria. E.mail: raedsir@hotmail.com.

Citrus tristeza virus (CTV) is the causal agent of the most important virus disease of citrus. CTV was detected for the first time in the Syrian citrus-growing areas of Lattakia and Tartous by *Direct Tissue Print Immunobinding Assay* (DTBIA) in 2006. About 2600 samples from commercial orchards and nurseries were tested, showing an infection rate of 3.5%. Sweet oranges were the most infected in both types of stands. In particular, the virus was detected in 16 Navel orange trees, used as budwood sources from Lattakia. Most of the infected trees were apparently symptomless. To determine the genetic diversity and CTV strains present in the country, infected samples were examined by single strand conformation polymorphism (SSCP) of the major coat protein (CP), multiple molecular markers analysis (MMM), and sequence analysis of the CP gene. SSCP analysis of CP yielded two distinct simple patterns and CP sequence analysis showed that both SSCP profiles belonged to viral isolates genetically related to the severe VT strain. This finding was also confirmed by MMM analysis. In fact, all infected samples reacted only with VT-specific markers (primer VTPOL, VT5', VTK17). None of the other known CTV genotypes were detected in the survey. Since the CTV-sensitive sour orange rootstock is widely used in the Syrian citrus industry, the discovery that only severe VT-like strains are spreading is especially worrying, and calls for the urgent enforcement of an effective national CTV management plan. Preventive measures such as monitoring and eradication of the pathogen as well as the control of vector populations must be prioritized as a first step towards the implementation of an efficient certification programme of citrus propagating material.

V 59

COMBINED EFFECT OF ROOTSTOCK AND EXOCORTIS VIROID ON THE ANTIMICROBIAL ACTIVITY OF ESSENTIAL OILS EXTRACTED FROM THE TUNISIAN CITRUS VARIETY "MALTAISE DEMI-SANGUINE". Nadia Chammem[1], Asma Najar[2], Chokri Jéribi[3], Wissal Ben Chalbi[1], Manef Abderabba[3] and Mokhtar Hamdi[1]. (1) Institut National des Sciences Appliquées et de Technologie (INSAT), Centre urbain Nord. B.P. 676, 1080 Tunis, Tunisie; (2) Institut National de la Recherche Agronomique de Tunisie (INRAT). Rue Hedi Karray. 2049 Ariana, Tunisie; (3) Institut Préparatoire aux Etudes Scientifiques et Techniques (IPEST) B.P. 51, 2070 La Marsa, Tunisie, Email: najar.asma@iresa.agrinet.tn

Essential oils have a multitude properties and are used in many fields such as agri-food, phytotherapy and cosmetics. This study aims to highlight the antimicrobial effect of essential oils extracted from the flavedo of Tunisian Maltaise "Demi-sanguine" trees grafted on two rootstocks cultivars: Sour orange and Citrumelo. Essential oils were extracted from one healthy and one exocortis inoculated for each rootstock. Results showed that regardless of their origin, the major component of those essential oils was the limonene. However, the level of this monoterpene varieed between 73% for a healthy citrumelo and infected sour orange and 91% for the healthy sour orange and infected citrumelo. Despite of the fact that each of these oils exhibited antimicrobial activity against Gram+ and Gram- bacteria tested, the inhibition diameter never exceeded 12 mm. The highest response was observed for *Staphylococcus epidermidis* in the case of sour orange extracts and for *Bacillus subtilis* in case of Citrumelo extracts. *Escherichia coli* was the most resistant bacteria with a maximum response of 8 mm. Finally, we have noticed that the essential oil extracted from the infected citrumelo has the most antifungal activity against *Penicillium sp.* isolated from an orange spoilage. This inhibition reached 50% after 24 hours and 42% after 48 hours of inocubation.

V 60

DISCRIMINATION OF CITRUS TRISTEZA VIRUS (CTV) INFECTED PLANTS BY SPECTRORADIOMETER MEASUREMENTS. Mabrouk Bouneb, Franco Santoro, Stefania Gualano, Khaled Djelouah and Anna Maria D'Onghia, Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari, Italy, Email: djelouah@iamb.it

CTV monitoring is of great importance for prompt large-scale detection of the virus outbreaks. Therefore, the Apulia Region funded the present research work aimed at applying proximal and remote sensing to virus monitoring. Leaf spectral signatures of a population of CTV-free and CTV-infected plants (Mexican lime on Troyer citrange) were measured by using a plant probe and a spectroradiometer. The trial was run by inoculating a pure CTV-quick decline isolate (IAMB-Q 109) and growing the plants under a climate-controlled greenhouse and under a screenhouse. Furthermore, a trial was conducted in two commercial groves of clementine and sweet orange selected in a CTV outbreak area of Apulia. Serological and molecular testing was performed to estimate the virus incidence in both plantings. Based on these results, 15 CTV-positive and 15 CTV-negative plants were selected and the canopy spectral signature was assessed. All the trials showed a significant difference of reflectance values within the whole wavelength range (325-1075 nm) of the instrument, highlighting a different reaction to the incident solar radiation of the CTV-positive plants compared to the CTV-negative plants. In the light of these results, it will be possible to characterize this discrimination by adopting

specific vegetation indices that might be subjected to algorithm processing in combination with satellite imaging.

V 61

SURVEY ON FIG VIRUSES IN LEBANON. Toufic Elbeaino[1], Christina Mortada[1], Elia Choueiri[2] and Michele Digiaro[1]. (1) MAIB-CIHEAM, Mediterranean Agronomic Institute of Bari, Valenzano, Bari, Italy; (2) Department of Plant Protection, Lebanese Agricultural Research Institute, Tal Amara, P.O. Box 287, Zahlé, Lebanon, Email: elbeaino@iamb.it

A survey for viruses was carried out in the main fig-growing areas of Lebanon (Bekaa and Mount Lebanon) in 2006-2008. A total of 102 samples was collected and checked by RT-PCR for the presence of Fig mosaic virus (FMV), *Fig leaf mottle associated virus 1* (FLMaV-1), *Fig leaf mottle associated virus 2* (FLMaV-2), *Fig mild mottling associated virus* (FMMaV) and an isometric still unclassified virus of the *Tymoviridae* family (hereafter referred to as FFkV) using virus-specific primers designed in our laboratory. About 90% of the trees were infected by at least one virus, with mixed infections in *ca.* 46% of the samples. FLMaV-1 closterovirus was the prevailing virus (47% infection), especially in Mount Lebanon (95%) and on cv. Aswad (80%), followed by FMV Emaravirus (42.2% infection), which was particularly spread in North Bekaa (68,1%) on cv. Biadi (50.8%). Other two viruses of the family *Closteroviridae*, FLMaV-2 and FMMaV, were detected respectively in 29.4% and 26.5% of the samples, with FLMaV-2 particularly spread in north Bekaa (57.4%) on cv. Biadi (39.4%). FFkV was detected in 13.7% of samples, with highest infection rate of 40% in cv. Houmairi.

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ASSESSMENT OF THE MAJOR CITRUS GRAFT-TRANSMISSIBLE DISEASES IN TWO EGYPTIANS NURSERIES ACCORDING TO THE MANAGEMENT CONDITIONS AND LOCALISATION. Mohammed Said Zaki Sherif[1], Hesham Fahmy[2] Monia Daden[1] and Khaled Djelouah[1]. (1) MAIB-CIHEAM, Mediterranean Agronomic Institute of Bari, Valenzano, Bari, Italy; (2) Certification Center of Bahteem, Egypt, Email: djelouah@iamb.it

Two Egyptian citrus nurseries, selected for their location and different citrus budwood management, were considered as a case study to highlight the importance of nurseries in a citrus certification programme. Surveys were conducted in both nurseries for the presence of the main graft-transmissible pathogens (CTV, CPsV, CIVV, *S. citri*, CEVd and CCaVd) and in the surrounding orchards for the presence of the main vector-borne diseases (tristeza and stubborn). CTV was not reported from the two nurseries, while CPsV, CIVV and *S. citri* infections reached 4.% of the tested plants, and viroid infection (CEVd, CCaVd) was considerably higher (18%). Comparing the results obtained in both nurseries, the management and origin of the plant material proved to be essential, since the mother plants kept under screenhouse were less infected (14%) than mother plants grown in the open field (30%). Certified and tested materials performed much better than the material of unknown origin, the latter representing 72% of the total infected material. Around the two nurseries, only one orchard was CTV infected, whereas no *S .citri* was detected.

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CITRUS TRISTEZA VIRUS IN THE MEDITERRANEAN REGION: STATE OF THE ART AND CONTROL. Khaled Djelouah and A.M. D'Onghia, Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari, Italy, Email: djelouah@iamb.it

The presence in northern Portugal and Spain of *Toxoptera citricidus*, the most efficient vector of citrus tristeza virus (CTV), represents a serious threat for the Mediterranean citrus industry, since the virus is present in perhaps all citrus growing areas. Despite the eradication programmes that have been undertaken by some countries in the last few decades, the CTV distribution in the Mediterranean area is not at all reassuring, most of these countries grow their citrus orchards with intolerable scion-sour orange combination, the inoculum is widely distributed and one of the most efficient CTV vectors *Aphis gossypii* is present. Considering the importance of this crop from the economic and social point of view, CTV outbreaks could be a disaster for the entire local citriculture. This situation prompted CIHEAM/Mediterranean Agronomic Institute of Bari to urgently promote a harmonized common action for the control of the virus and its vector in the whole region.

V 64

IDENTIFICATION OF SOME APHIDS VECTORS OF *CITRUS TRISTEZA VIRUS* IN CITRUS GROVES OF SYRIA. Raied Abou Kubaa[1], Rocco Addante[2], Khaled Djelouah[1], Mahmoud Sha'ban[3], Majd Jamal[4] and A.M. D'Onghia[1].(1) Mediterranean Agronomic Institute, Via Ceglie 9, 70010 Valenzano (BA), Italy. (2) Dipartimento di Biologia e Chimica Agro-forestale ed Ambientale, Università degli Studi, Via Amendola 165/A, 70126 Bari, Italy. (3) General Commission for Scientific Agricultural Research, Tartous, Syria; (4) International Center for Agricultural Research in the Dry Areas, P.O. Box 5466, Aleppo, Syria. E.mail: raedsir@hotmail.com.

During the period from March to July 2006, surveys were carried out to determine the occurrence of aphids vectors of *Citrus Tristeza Virus* in the coastal region of Syria. The experiment was conducted in 18 commercial fields in both Lattakia and Tartous Districts, in addition to two budwood sources in Lattakia. Fifteen trees were randomly selected in each grove across the diagonals of the field and two infested shoots per tree (when present) were collected every three weeks, from different tree heights and orientation. In this study, four aphid species were found. The green citrus aphid, *A. spiraecola* (Patch), was the dominant species in the investigated areas, representing 50.0% of the total aphid population, followed by the cotton aphid, *A. gossypii* Glover (27.3%), *T. aurantii* (Boyer de Fonscolombe), the black citrus aphid (20.3%), whereas the black bean aphid *Aphis fabae* (Scopoli) represented only 2.3% of the population. The recent presence of citrus

tristeza virus in the Syrian cit5riculture, and its easy dissemination by aphid vectors (as the cotton aphid is one of the most active vectors in the Mediterranean region which caused CTV- outbreaks in some countries such as Spain) highlighting the importance of continuing vector monitoring and rapid eradication specially in the mother tree fields, thus preventing the establishment of the brown citrus aphid, *T. citricidus* (Kirkaldy), the most efficient vector for CTV which was first reported close to the Mediterranean basin in the northern part of Portugal and Spain, and could be a potential threat to citriculture in the Mediterranean basin.

NEMATODES

N 1

ROLE OF CROP ROTATION ON *ROTYLENCHULUS RENIFORMIS* POPULATION WITH REFERENCE TO ITS MANAGEMENT ON COTTON PLANT, *GOSSYPIUM BARBADENSE* IN CEMENT BINS UNDER OUTDOOR CONDITIONS. A.G. EL-Sherif[1], A.E.M. Khalil[2] and A.R. Refaei[1]. (1) Nematology Research Unit, Agriculture Zool. Department, Faculty of Agriculture, Mansoura University, Egypt; (2) Nematology Division, Plant Pathology, Research Institute Centre, Giza, Egypt, Email: Elsherifmohammed@yahoo.com

Population behavior of *Rotylenchulus reniformis* as artificial infestation on winter crops, i.e. Egyptian clover (*Trifolium alexandrinum*) or faba bean (*Vicia faba*) preceding cotton cv. Giza 45 as a summer crop through crop rotation system, was studied within cement bins under outdoor conditions. The test also included management treatments using certain organic matters i.e. camel, horse manures, dried leaf powder of perwinkle and adhatoda in comparison with a herbicide (Emax) and a nematicide, (oxamyl) during the growing season 2005/2006. Results revealed that *R. reniformis* population fluctuated in soil of winter crops, increased from 200 individuals per 250 g. soil as the initial population to 264 or 300 individuals per 250 g. soil of Egyptian clover or faba bean in December 2005 and then declined down to 170 or 190 individuals/250 g. soil in March, 2006 where soil temperature reached 19±5 ºC, respectively, after sowing cotton cv. Giza 454 seeds. With respect to its management on cotton, oxamyl sharply suppressed nematode population below the economic threshold level that was 125 individuals per 250 g. soil throughout the growing season. Periwinkle dried leaf powder ranked second to oxamyl in suppressing nematode count, followed by Emax and camel manure with values of 78.92%, 69.95% 68.35% and 56.87% suppresion, respectively. Also, rate of nematode build-up on cotton roots under stress of the various tested treatments was adversely affected with range between 0.11 to 1.4 vs 1.04 folds for the control. Oxamyl treatment had the lowest rate of nematode build-up (0.11), while adhatoda powder had the highest one (1.11). Meanwhile, cotton yield increase values were 41.6%, 33.0%, 25.0% and 15.0% for oxamyl, periwinkle powder, Emax and camel manure, respectively, whereas, the lowest values were recorded for horse manure (8.3%) and adhatoda powder (5.0%), respectively.

N 2

EFFECT OF BIOLOGICALLY ACTIVE BREAD YEAST ON *MELOIDOGYNE INCOGNITA* INFESTING GREEN BEAN AND ON YIELD QUANTITY AND QUALITY. M.M.A. Youssef and Wafaa M.A. El–Nagdi, Nematology Laboratory, Plant Pathology Department, National Research Centre, Dokki, P.O. Code 12622, Cairo, Egypt, Email: myoussef_2003@yahoo.com

A biologically active compound, bread yeast *Saccharomyces cerevisiae* activated by adding sucrose, black honey and molasses was studied under field conditions. After fermentation, yeast was used at concentrations of 0.25, 0.50 and 1% for biocontrol of *Meloidogyne incogntia* root-knot nematode infesting green bean cv. Paulista. All treatments significantly ($P \leq 0.01$ and 0.05) decreased *M. incognita* as indicated by the number of galls and egg masses on roots. There was an inverse relationship between the number of galls and egg masses and the respective concentrations used. In other words: one month after application, the highest concentration of yeast caused the highest rate reduction of galls (66.7%) followed by the moderate and the lowest concentration (55.6 and 44.4%, respectively) for yeast activated by sucrose. Whereas, yeast activated by black honey at different concentrations caused equal reduction rate (66.7%) in the number of galls. Yeast activated by molasses at the highest concentration caused the highest reduction rate of galls (77.8%) followed the other concentrations (66.7%). After three months (at harvest), the same treatments behaved in the same trend in reducing nematode parameters(galls and egg masses) as the highest concentrations of each activated yeast caused the highest nematode reduction rate compared with other concentrations. In addition, yeast activated by the different materials improved pod production quality (number and weight of pods) and quantity (proteins and carbohydrates) and number of nodules and directly positively proportional to the concentrations tested.

N 3

EFFECT OF COMMERCIAL FORMULATION OF *BACILLUS THURINGIENSIS* AND *STREPTOMYCES AVERMITILIS* ON CITRUS NEMATODE *TYLENCHULUS SEMIPENETRANS*, YIELD AND FRUIT QUALITY OF MANDARIN. Wafaa M.A. El-Nagdi[1], M.M.A. Youssef[1] and M.H.A. Omaima[2]. (1) Department of Plant Pathology, Nematology Laboratory; (2) Department of Pomology, National Research Centre, Dokki, P.O. Box 12622, Giza, Egypt, Email: omaimahafez@yahoo.com

The present study was performed during 2007 and 2008 seasons on 15 years old Balady mandarin (*Citrus reticulata* Blanco) trees grafted on Sour orange (*Citrus aurantium* L.) rootstock, grown in sandy soil at 5×5m apart under flood irrigation system. When studying the effect of a commercial formulation (agerin®) containing an isolate of *Bacillus thuringiensis* at a rate of 1, 2 and 3 Kg/acre. and abamectin®1.8% (fermentation product of bacterium *Streptomyces avermitilis*) at concentrations of 200, 400 and 800 ppm on *Tylenchulus semipenetrans* citrus nematode,

nutritional status of mandarein trees and yield and fruit quality. It was found that all the treatments tested reduced nematode build up and the rate of build was positively correlated with the rates tested. Also, the treatments markedly improved nutritional status, yield and fruit quality. The best results were obtained from the highest rate of agerin® as it reduced the population of this citrus nematode as indicated by the rate of build up (final population/initial population). In other words, the highest rate of agerin® caused the lowest rate 0.16 and 0.15. As for abamectin®, it behaved similarly as the highest rate caused the lowest build up 0.21 and 0.15 in both seasons, respectively followed by the moderate rates and the lowest rates. Moreover, the best results in relation to nutritional status of mandarin trees occurred by both compounds at the highest rate and concentration of agerin® and abamectin®, respectively. These treatments increased the leaves mineral content of macro elements (N, P, K, Ca and Mg) and micro elements (Fe, Zn and Mn). Also, these treatments increased the yield average by about 52.9 and 69.2%, 84.6 and 115.4%, respectively for both compounds in the two seasons as compared to the untreated treatment (control). It could be concluded that these compounds may be used in the control management of citrus nematode for their efficacy in reducing nematode, improving nutritional status of mandarin trees, yield and fruit quality. Moreover, these are low cost and safe to environment and human.

N 4

FIELD APPLICATION OF BRASSICACEOUS AMENDMENTS FOR CONTROL OF ROOT KNOT NEMATODE *MELOIDOGYNE INCOGNITA* INFESTING SUNFLOWER PLANTS. Hoda H. Ameen and Moawed M.M. Mohammed, Nematology Unit, Plant Pathology Department, National Research Centre, Dokki, Giza, Egypt, Email: hoda_ameen@yahoo.co.uk

A field study was conducted to evaluate the biofumigation effect of three brassicaceous amendments (cabbage,canola and turnip plants) when incorporated into the soil at three rates equivalent to 4, 6 and 8 tons /area to control root knot nematode *Meloidogyne incognita* infesting sunflower plants, as compared to the chemical control using Vydate and bionematicide using a commercial product (Micronema) which contains the following microorganisms: *Bacillus* spp., *Rhizobacterium* spp. *Pseudomonas* spp. and *Rhizobium* spp. Results showed that all applications significantly reduced nematode population compared to the untreated check. The greatest reduction in nematodes population density was attained by incorporating cabbage amendment to soil at a rate of 8 tons/area followed by the canola amendment at 6 tons/area. On the other hand the highest amount of sunflower seeds production resulted from the canola treatments.

N 5

INDUCTION OF TOMATO SYSTEMIC RESISTANCE AGAINST ROOT-KNOT NEMATODES USING ENDOPHYTIC *FUSARIUM*. Mohamed E. Selim, Richard A. Sikora and A. Schouten, Soil-Ecosystem Phytopathology and Nematology, Institute of Crop Science and Resource Conservation (INRES), Department of Plant Health, University of Bonn, Nussallee 9, 53115 Bonn, Germany, Email: m_elwy76@yahoo.com

Mutualistic endophytes are well known for their antagonistic activity against a wide range of plant pathogenic fungi and nematodes. In such tritrophic interactions, several mechanisms may be involved in obtaining biocontrol of the pathogen and induced resistance in the host elicited by the endophyte is considered one of them. In order to obtain a better understanding of the responsible mechanisms and the abilities of the mutualistic endophytic fungus *Fusarium oxysporum* strain Fo162 in preventing colonization of tomato by the sedentary nematode *Meloidogyne incognita*, the induced resistance responses were compared with the typical induced systemic resistance (ISR) and systemic acquired resistance (SAR), which can be chemically induced using methyl jasmonate (MeJa) and salicylic acid (SA), respectively. A split-root technique was used, in which one side of the root system was treated with the inducing agent (inducer side) and the other side (responder side) was inoculated with *M. incognita* second-stage larvae J_2. Results showed that all treatments reduced ($P \leq 0.05$) tomato root galling by 68-91%. However, no significant differences in root weight and growth of the responder side of the twin pots were observed. Apparently, in host plants different systemically induced resistance pathways can be stimulated, which ultimately all mobilize defense mechanisms responsible for controlling *Meloidogyne incognita*. This knowledge unlocks new perspectives for further dissecting the mechanism underlying the systemic induced resistance by using molecular biological tools.

N 6

EFFECT OF THE ROOT-KNOT NEMATODE *MELOIDOGYNE JAVANICA* AND INTERACTION WITH CERTAIN SOIL BORNE PATHOGENS ON TOBACCO SEED GERMINATION AND SEEDLINGS GROWTH AT DIFFERENT AGES. Bassima G. Antoon[1], Muna H. Al-Jboory[2] and Z.A. Stephan[1]. (1) Plant Protection Research Center, State Board for Agricultural Research, Ministry of Agriculture, Baghdad, Iraq; (2) Department of Biology, College of Science, Baghdad University, Baghdad, Iraq, Email: basimanematod@yahoo.com; zuhairstephan@yahoo.com

Three experiments were conducted to study the effect of the inocula levels of the root-knot nematode *M. javanica* and the two pathogenic fungi *Fusarium solani* and *Macrophomina phaseolina* before and at sowing of tobacco seeds, and on 3, 5 or 7 weeks old seedlings. Also, an experiment was designed to study the effect of nematode population densities (0, 1000, 2000, 4000 and 8000 juveniles/pot) on 30 or 60 days old tobacco plants in plastic pots under plastic or shade house conditions. Results showed that application of different nematode inocula levels to 30 or 60 old tobacco days seedlings increased root galling index and decreased plant height and dry shot and root weights by 7.29–72.9%, 38.5–75.0% and 41.4–88.5%, respectively. Interaction of the nematode with both fungi negatively affected the seed germination rate and plant growth with significant differences compared to the control (untreated) plants. Also, the 5 and 7 weeks old tobacco

seedlings showed more resistance to infection by the disease complexes than those of the 3 weeks old seedlings.

N 7

CONTROL OF ROOT-KNOT NEMATODE USING BACTERIAL NITROGEN FIXATION NODULES. Faissal Farawati and Mahabba Ghannam, Department of Plant Protection Research, General Commission of Scientific Agricultural Research. Douma, P.O. Box 113, Damascus, Syria, Email: frwfai88@yahoo.com; mahaba.2008@yahoo.com

Root-knot Nematode, *Meloidogyne incognita* is a pest prevalent throughout many greenhouse cultures in the Syrian coast. It's considered among the most important pests causing severe economic damage to tomato. In the search of finding safe alternatives to control this pest, an *in-vitro* experiment was conducted to evaluate the efficiency of faba bean bacterial nitrogen fixation nodules (*Rhizobium* spp.) and soybean nitrogen-fixation nodules (*Bradrhizobium* spp.) for control of this disease. The different bacterial isolates showed a varied efficiency in the LC_{100} (Lethal concentration 100%) to kill/reduce the total number of the second stage-larvae of root-knot nematode. The average of LC_{100} capable to kill the total number of larvae according to the three tested isolates (BR, RH5, RH3) was 26.45, 27.25 and 56.77%, respectively. Moreover, the experiment showed an effective efficiency enhancement of the bacterial isolates to control of the root-knot nematode 48 hours after infection. The RH3 isolate showed greater efficiency of nematode control in the second reading, where LC_{100} reached 91.12%.

N 8

RESPONSE OF SOME CEREAL AND LEGUMINEOUS PLANT CULTIVARS TO ROOT-KNOT NEMATODES. Luma Al Banna and Walid Abu-Gharbieh, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman, Jordan, Email: lalbanna@ju.edu.jo

The response of some cereal and legumineous plant cultivars to three root-knot nematode species (*Meloidogyne arenaria, M. incognita* and *M. javanica*) was studied in a greenhouse pot experiment. Seven plants of each cultivar were inoculated with 3000 eggs per plant from each nematode species .Two months after inoculation, roots were rated for root galling and egg mass production. Results showed that cereal cultivars were poor hosts for the tested nematode species, where no galling or only few galls and egg masses were found on the roots. Legumineous cultivars were generally more susceptible to the tested nematode species, compared to cereals. However, legumineous cultivars reacted differently to the tested root-knot nematode species.

N 9

SCREENING OF SPRING WHEAT GENOTYPES FOR RESISTANCE TO THE CEREAL CYST NEMATODE, *HETERODERA AVENAE* IN SAUDI ARABIA. Ahmad S. Al-Hazmi[1], Ahmed A.M. Dawabah[1], Abdulla A. Aldoss[2] and Khaled A. Mustafa[2]. (1) Plant Protection Department; (2) Plant Production Department, Center of Excellence in Biotechnology Research, College of Food and Agricultural Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia, Email: asalhazmi@ksu.edu.sa

Cereal cyst nematode, *H. avenae* is one of the most serious pathogens, which causes severe yield losses to wheat in Saudi Arabia. In a breeding program to develop resistant cultivar(s) to the cereal cyst nematode, *H. avenae*, 32 wheat genotypes (some of them were developed by King Saud University) were screened for resistance to a local population of this nematode in an outdoor pot experiment. Clean plastic pots, 15 cm diam. were filled with a nematode naturally- infested soil (20 eggs + J_2/g soil). Pots were planted with wheat seeds, and seedlings were thinned to three plants/pots, soon after seed germination. Five replicates were used for each genotype, and the known susceptible cultivar "Yecora Rojo" was used as a susceptible check. Pots were kept in the outdoor during the wheat-growing season, watered and fertilized as needed. Seventy-five days after germination, plants were gently freed from soil, roots were washed with tap water, and the number of white cysts/plant was counted. Plants having three (or less) cysts/plant were designated as resistant, while those having more cysts were designated as susceptible. All the tested genotypes were found to be susceptible (with various degrees of susceptibility) to the local population of *H. avenae*. The tested genotypes were; 81470, 81471, 81472, 81473, 81474, 81475, 81476, 81477, HD 2329, Irena, Bonus, Kauz, Parus, TIA, Classik, KSU 101, KSU 102, KSU 103, KSU 104, KSU 105, KSU 106, KSU 110, KSU 111, KSU 115, KSU 118, KSU 119, L 11-7, L 11-8, L 11-15, L 11-17, L 11-19, L 11-21, and Yecora Rojo (susceptible check).

N 10

FIELD PERFORMANCE OF SOME SAUDI SPRING WHEAT GENOTYPES IN *HETERODERA AVENAE*-INFESTED SOIL. Ahmed A.M. Dawabah[1], Ahmed S. Al-Hazmi[1], Abdulla Abdul-Aziz Aldoss[2] and Khaled A. Mostafa[2]. (1) Plant Protection Department; (2) Plant Production Department, Center of Excelence in Bioltechnology Research, College of Food and Agricultural Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia, Email: dawabah@hotmail.com

Field performance of 11 spring wheat genotypes (developed by King Saud University) was evaluated in a *H. avenae*-infested field, in comparison with the international cultivars Irena and Yecora Rojo (the most commonly cultivated wheat cultivar in Saudi Arabia). A nematode-infested site (20 eggs/g soil) was selected and divided into 39 microplots (1.2 × 3 m), in a randomized complete block design with three replicates. Seeds were hand-sown in 6 rows of 20 cm distances. One month before harvest, five plant samples (10 plants, each) were collected from each microplot to determine the number of white cysts/plant as an indicator for nematode development. At the end of the season, plants were hand harvested, and the plant growth components [grain yield, plant biomass and harvest index (HI)] were recorded. Results showed that all genotypes tested were susceptible (number of white cysts/plant > 3) to *H. avenae*, but with various degrees of susceptibility.

Nematode development (number of white cysts/plant) on Saudi wheat genotypes was generally lower compared to the cultivars Irena and Yecora Rojo. However, plant growth components of Saudi genotypes were generally higher than those of Irena and Yecora Rojo. Saudi genotypes; KSU 118, L 11-21, KSU 102 and L 11-23 had the highest grain yields (8.5, 8.2, 8.0 and 8.0 tons/ha, respectively) among all the tested genotypes. Whereas, Irena and Yecora Rojo had the lowest productivity (6.9 and 7.3 tons/ha, respectively).

N 11

HOST SUITABILITY OF DIFFERENT GREEN BEAN CULTIVARS TO *MELOIDOGYNE INCOGNITA*. Saleh, N. Al-Nadary, A. S. Al-Hazmi, F. A. Al-Yahya and A. A. M. Dawabah, Plant Protection Department, Collage of Food Science and Agriculture, King Saud University, Email: nadary3@yahoo.com

The host suitability of 15 green bean cultivars (*Phaseolus vulgaris*) to *M. incognita* race 2 was studied in a greenhouse pot experiment (25±2ºC). Tested cultivars included: Alfa, Ambra, Catlas, Cilena, Concord Improved, Contender, Cora, Extra, Leader, Nita, and Strike, and four Yemeni cultivars. All cultivars tested were inoculated at the rate of 5000 egg / pot. Sixty days after inoculation, the test was terminated. Numbers of galls and eggs on roots were counted and recorded. Galling index (GI= 0-5) and reproduction factor (Rf) were calculated for each cultivar. Results indicated that all cultivars, were very heavily galled (GI= 5), except for the Yemeni cultivar Y3 (GI= 4). The nematode reproduced very well on all tested cultivars (Rf = 40-114), except on the Yemeni cultivar Y3 (Rf= 6.2). Based on values of GI, Rf and the Canto-Saennz slandered test, all cultivars are susceptible to *M. incognita* race 2 (GI>2), and considered to be good hosts (Rf>1) to this nematode.

N 12

FUNGI PARASITIZING THE CEREAL CYST NEMATODE *HETERODERA AVENAE* IN TUNISIA. Najoua-Namouchi Kachouri[1] and Kallel Sadreddine[2]. (1) Laboratoire de Protection des Végétaux 2049 INRAT Tunisie, Email: kachouri.najoua@iresa.agrinet.tn; n_najoua@yahoo.fr; (2) INAT, 1082 cité Mahrajène, Tunis. Fungal species parasitizing females and cysts of *Heterodera avenae* collected from cereal fields in six Tunisian regions were isolated and identified. More than 16 different fungal species were identified. The frequency of fungi colonizing brown cysts were relatively higher han those parasitizing white females. The frequency of fungi associated with the brown cysts in soil increased as the time they stayed in the soil increased. Cysts were generally associated with more than one fungus. *Pochonia chlamydosporia* (= *V. chlamydosporium*) was the most encountered fungal species on the females and cysts of *H. avenae*, and was found in all the surveyed regions.

N 13

COMPARISON OF GENE EXPRESSION PROFILES BETWEEN *MI*-VIRULENT AND AVIRULENT *M. JAVANICA* POPULATIONS USING THE COMPLEMENTARY DNA-AMPLIFIED FRAGMENT LENGTH POLYMORPHISM (CDNA-AFLP) TECHNIQUE. Mohamed A. M. Adam[1], Mark S.Phillips[2] and Vivian C. Blok[2]. (1) Plant Protection Department, Agriculture Faculty, Omar-Almuktar University, P.O. Box 919, El Bieda, Libya; (2) Scottish Crop Research Institute, Plant Pathogen Interactions Programe, Invvergowrie, Dundee DD2 5DA, UK, Email: M_A_M_ADAM@yahoo.com

The use of tomato cultivars with the *Mi* resistance gene to control the most common and widely distributed species of Root Knot Nematodes, *Meloidogyne incognita, M. javanica* and *M. arenaria,* is considered to be more environmentally friendly and safe approach compared with pesticide treatment. Unfortunately, resistance breaking (virulent) populations of these species can reproduce on these cultivars. Identifying avirulence factors should provide molecular markers that can be used to distinguish *Mi*-virulent from avirulent populations, which may replace traditional biological methods to distinguish virulent and avirulent RKN populations. Comparison of gene expression profiles between naturally *Mi*-virulent and avirulent *M. javanica* populations using the complementary DNA amplified fragment length polymorphism (cDNA-AFLP) technique using 185 combinations of primers with seven *M. javanica* lines revealed high similarities between the lines which ranged between 0.96-0.98. A phylogenetic tree showed two groups of lines that were independent of their virulence status. Four bands were identified, three of which displayed differences in their presence between the virulent and avirulent *M. javanica* lines. Two were present in the virulent but absent in the avirulent lines whereas the third one was present in the avirulent and not in the virulent lines. In contrast, a small difference in the size was observed between the virulent and avirulent lines with the fourth band. Moreover these fragments were sequenced and expression was tested using reverse transcription-PCR (RT-PCR). The full length of one of these sequences (1163 bp) was obtained and encodes a 322 aa protein with a signal secretion peptide of 22 aa. This proline rich protein, which was named *Prp*, consists of 16.2% proline. The gene is transcribed only in J2 but not in eggs or females, and is expressed in the subventral gland. However there were no differences in the expression of this gene between virulent and avirulent lines.

N 14

INTERACTION EFFECT BETWEEN ROOT-KNOT NEMATODE *MELOIDOGYNE INCOGNITA* AND THE MYCORRHIZAL FUNGI *GLOMUS MOSSEAE* ON EGPLANT. Asma Haidar[1], Khaled Al-Assas[2] and Kamal Al-Ashkar[3]. (1) Biological Control Studies and Researches Center, Faculty of Agriculture, Damascus University, Syria, Email: esraaha77@yahoo.com; (2) Plant Protection Department, Faculty of Agriculture, Damascus University, Syria, Email: khaledalass@hotmail.com; (3) Plant Department, Faculty of Science, Damascus University, Syria.

To identify the antagonism effect between mycorrhizal fungi *Glomus mosseae* and southern root-knot nematode *Meloidogyne incognita*, and their corporate effect on growth of eggplant, the inoculum of nematode and fungi

were collected from eggplant fields in Reef Damascus governorate, Syria. Results of a pot experiment in 2007 showed that inoculation with nematode reduced foliar and root weight by 18.77% and 16.48%, respectively in comparison with control treatment, and reduced production by 18.8% in comparison with control, but the treatment with the mycorrhizal fungi increased foliar weight between 0.95% and 25.54% in comparison with non-inoculated control according to plant phenological phase. Results also showed asured that ionculation of *G. mosseae* increased root weight with or without nematode based on time of addition of the nematode and the fungi. In addition, nematode addition reduced the mycorrhization by 28.55% in comparison with control, and the reduction level was higher than when the nematode was added to the root before the fungi. Inoculation with fungi reduced the number of the nematode 2nd juvenile larvae in soil by 29.30% in comparison with the control, and caused reduction of gall index of nematode on the roots by different rates. Results of soil elements analysis (NPK, C/N, organic material percentage) indicated that the role of *G. mosseae* is by increasing the phosphorous absorption from soil by 30.46% in comparison with control, and this improved foliar and root growth and plant production.

N 15

SURVEY OF NEMATODE GENERA IN VINEYARD AREAS AND THEIR GEOGRAPHICAL DISTRIBUTION IN NORTHEN ALGERIA VINEYARDS. Farid Bounaceur[1,2], Fadhila Safiddine[3], Dahouia Nebih-Hadj Sadouk[3], Amina Djemai[3] Fatima Zohra Bissaad[2], Bahia Doumaindji-Mitiche[2] and Atika Benrima Guendouz[3]. (1) Department of Biology, University Ibn Khaldoun Tiaret, Algeria; (2) Department of Zoology, National Institute of Agronomy, Algiers, Algeria; (3) Department of Agronomy, Faculty Agro-veto, University Saâd Dehleb, Blida, Algeria, Email: fbounaceur@yahoo.fr

A survey for nematodes was carried out in the major vineyard producing areas in central and western Algeria during 2007 and 2008 seasons. Nematode genera were extracted and identified from the soil samples. Inventory showed diversity of genera based on vineyards location: *Tylenchus, Tylenchorenchus, Helicotylenchus, Aphelenchus, Ditylenchus* and *Xiphinema*. The geographical distribution showed differences in among locations.

N 16

NEMATOPHAGAL ABILITY OF JORDANIAN ISOLATES OF *PAECILOMYCES VARIOTII* TO PARSATIZE ON THE ROOT-KNOT NEMATODE *MELOIDOGYNE JAVANICA*. M. Al-Qasim[1], W. Abu-Gharbieh[2] and K. Assas[3]. (1) National Center for Agricultural Research and Extension, MOA, Amman, Jordan, Email: mohdqasim@maktoob.com; (2) University of Jordan, Amman, Jordan; (2) University of Damascus, Damascus, Syria.

The distribution and nematophagal ability of local isolates of *Paecilomyces variotii* against the root-knot nematode (RKN), *Meloidogyne javanica*, was investigated under laboratory conditions. Eighty RKN-infected root samples from fig trees, tomato, eggplant and cucumber were collected from three geographical areas of Jordan (Safi, Central Jordan Valley and Jerash). *Paecilomyces variotii* occurred in 10% of the samples and was found in both females and egg masses of *M. javanica*. Results showed that the local isolates of *P. variotii*, as nematode antagonists, resulted in egg parasitism of about 61.4% compared to 68.5% for *P. lilacinus*. Moreover, both species were able to parasitize females and freed eggs and to reduce hatching of second stage juveniles. Under laboratory conditions, *P. lilacinus*, on agar plates, parasitized females significantly higher than local isolates of *P. variotii*. Isolates of *Paecilomyces lilacinus* and *P. variotii* parasitized heat-killed eggs nearly equally, but at rates higher than those of live eggs within egg masses, suggesting that both species possess high saprophytic ability.

N 17

STATUS OF THE NEWLY DISCOVERED PALE CYST NEMATODE, *GLOBODERA PALLIDA* ON POTATO IN USA. Saad L. Hafez and P. Sundararaj, University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Idaho is the number one potato producer in the United States, growing about one-third of the country's potato production (12.5 billion pounds), which earned farmers about US$700 million and was worth about US$2 billion to the state. The pale cyst nematode *Globodera pallida* was discovered in Idaho at a potato (*Solanum tuberosum*) processing facility in eastern Idaho. This is the first time the pale cyst nematode has been found in the United States. *G. pallida*, is a major pest of potato crops in cool-temperate areas. It primarily affects plants within the potato family including tomatoes, eggplants and some weeds. This was significant to producers because it can attack the roots and reduce yields by up to 80 percent. The finding immediately galvanized the potato industry into action. The university has conducted more than 9,000 soil sample tests since 2006. Early discovery of PCN in Idaho minimizes future potato production costs and enhances product quality and marketability. Though PCN is widely distributed in many potato-growing regions throughout the world, its infestation in Idaho appears to be isolated. The nematode does not pose any threat to human health, but can reduce the yield of potatoes and other crops. Affected potato plants may exhibit yellowing, wilting or death of foliage. However, there is no sign that the quality of tubers grown in Idaho has been affected. Regulatory programs were implemented at the positive site designed to prevent the pest's spread to other fields. Additional surveillance programs and regulations were implemented to restrict the movement of plants and soil with appropriate sanitation procedures for equipment used in regulated field to prevent the spread of this nematode. Appropriate crop rotation and the use of certified seed and nematicides are an effective and practical strategy to enhance PCN decline rates. Eradication program is under way in the infested fields by the use of high rate of soil fumigants and planting different

green mnaure crops. Potato production is prohibited in the infested fields.

N 18

COMBINATION OF THE NEMATOPHAGOUS FUNGUS *PAECILOMYCES LILACINUS* AND SOME AQUEOUS LEAF EXTRACTS IN CONTROLLING *MELOIDOGYNE JAVANICA* INFECTING POTATO. A.E. Khalil and Samaa M. Shawky, Nematology Department, Plant Pathology Research Institute, Agricultural Research Center, Giza, Egypt, Email: ashraf_373@yahoo.com

An experiment was conducted to determine the impact of six aqueous leaf extracts (*Vinca rosea, Datura stramonium, Tagetes erecta, Aambrosia maritima, Ocimum basilicum, Bougainvillea spectabilis*) alone or combined with the nematophagous fungus *Paecilomyces lilacinus* against the root-knot nematode, *Meloidogyne javanica* on potato(*Solanum tuberosum*) cv. Diamant, under greenhouse conditions in Egypt. Results indicated that most treatments caused significant increase in potato plant growth, but with different degrees. The combination treatment of *P. lilacinus + D. stramonium* caused the highest increase of whole plant fresh weight (78.1%), while the treatment of *O. basilicum* alone gave the lowest increase of the whole plant fresh weight (23.8%). In addition, treatments singly or combined increased fresh weight and length of the whole plants as well as weight of potato tubers. Also, the combination of *P. lilacinus + D. stramonium* showed the highest efficacy in reducing nematode population in both soil and roots. On the other hand, the treatment of *P. lilacinus* alone showed the least effect. The combined effect of *P. lilacinus + D. stramonium* induced a remarkable reduction in nematode numbers and improved both plant growth and tuber weight, compared to nematode treatment alone.

N 19

EFFECT OF CERTAIN MEDICINAL PLANT EXTRACTS AND BIO-AGENTS IN CONTROLLING *MELOIDOGYNE INCOGNITA* ON GRAPE. Wafaa M.A. El-Nagdi and M.M.A. Youssef, Nematology Laboratory, Plant Pathology Department, National Resaerch Centre, Dokki 12622, Cairo, Egypt, Email: wafaa_elnagdi@yahoo.com.

The effect of three aqueous extracts of the plants sweet marjoram, salvia and sea ambrosia on *Meloidogyne incognita*-second stage juveniles was primarily studied under laboratory conditions. All extracts, at the highest concentrations, caused 100% mortality of the nematode juveniles. The efficacy of all extracts, in addition to the bio-fertilizer "fertile", and the biocide "abamectin 1.8%", in controlling *M. incognita* on grape cv. "Bez Al-Anza" was also studied under field conditions. Results showed that single treatments of sweet marjoram and sea ambrosia gave the highest reduction rate in the numbers of *M. incognita*-second stage juveniles in both soil (94%) and grape roots (79-86%), and also, number of root galls (7-35%), one month after treatment. Two months after treatment, sea ambrosia extract gave the highest reduction (83%) in the numbers of nematode juveniles in the soil, while sweet marjoram extract gave the highest reduction (79%) in the numbers of these juveniles in grape roots, and also numbers of root galls (54%). At harvest, the highest rate reductions in the number of nematode juveniles in soil (70%), grape roots (40%), and root galls (72%) was achieved by sea ambrosia, sweet marjoram and salvia extracts, respectively. However, repeated treatment with sweet marjoram extract reduced number of nematode juveniles in both soil and grape roots by 100%. While, the highest reduction rate in the number of root galls was achieved by salvia extract (46%). At harvest, salvia caused the highest reduction in the numbers of nematode juvenile in both soil (84%) and grape roots (100%), as well as numbers of root galls (80%). Abamectin and fertile caused reductions in the numbers of nematode juveniles in soil (69 and 31%, respectively), and grape roots (76 and 62%, respectively) as well as numbers of root galls (36 and 76%, respectively). All treatments increased weight and numbers of clusters/vine, compared to the controls. However, repeated treatments twice were better than single treatments.

N 20

GROWTH AND YIELD OF MAIZE AT DIFFERENT LEVELS OF *PRATYLENCHUS ZEAE* IN SILTY CLAY LOAM SOIL. M.M.M. Mohamed and A.M. Korayem, Plant Pathology and Nematology Department, National Research Centre, Dokki, Giza, Egypt, Email: moawad_bondok@yahoo.co.uk

Seeds of Single Cross Hybrid 10 maize, *Zea mays* L. were grown in silty clay loam soil naturally infested with *Pratylenchus zeae* Graham. The initial nematode population densities were estimated in 100 micro-plots that were randomly selected to obtain different nematode population densities. The nematode population densities ranged from 250 to 1600 individuals per kg soil. There was a negative correlation between maize yield and the initial nematode population, but no significant reduction in maize yield was obtained by the nematode population tested. No tolerance limit and damage threshold level were detected within the *P. zeae* population range (250-1600 nematodes/kg soil) tested.

N 21

EFFECT OF CERTAIN ORGANIC COMPOSTS ON SUNFLOWER PLANTS INFECTED WITH ROOT KNOT NEMATODE, *MELOIDOGYNE INCOGNITA* UNDER FIELD CONDITIONS. Susan A. Hasabo, Nematology Laboratory, Plant Pathology Department, National Research Centre, Dokki, Cairo, Egypt, Email: moawad_bondok@yahoo.co.uk

The effect of three composts viz., pigeon, sheep and cattle applied at three different times were studied under field conditions for three consecutive years. These composts were applied as soil amendments for the control of Meloidogne incognita at the rates of 2, 4, 8 ton/feddan) to sunflower cv. Euroflower 40 days before planting (season, 2006), at planting (season, 2007) or left for a week to allow decomposition before planting (season 2008). All materials tested significantly reduced the number of galls, egg masses and second stage juveniles of the nematode in the soil and increased the weight of flowering discs, especially at the rate of 4 tons/feddan, during the three

cropping seasons. The application of the composts also inhibited growth of the pathogenic fungi Pythium sp. and Alternaria sp. and increased number of beneficial fungi such as Trichoderma harzianum, Arthrobotrys conoides and Dactylaria brochopaga.

N 22

GROWTH, YIELD AND CHEMICAL COMPOSITION OF SUNFLOWER SEEDS INFECTED WITH DIFFERENT ROOT-KNOT NEMATODE POPULATION DENSITIES. A.M. Korayem[1], Mona G. Dawood[2] and M.M.M. Mohamed[2]. (1) Plant Pathology and Nematology Department; (2) Botany Department, National Research Centre, Dokki, Egypt, Email: kor_asm@yahoo.com

The effect of *Meloidogyne incognita* root-knot nematode on the growth and yield of sunflower grown in two different geographical regions was investigated in microplots, at initial population densities of 0, 10, 100, 1000, 10000, 20000 eggs and juveniles/kg soil. Tolerance limits of sunflower growth and yield as well as the chemical composition of sunflower seeds including oil, protein, carbohydrate, phenolic compound contents and fatty acids composition were estimated. Tolerance limits (T) for fresh shoot and seed weights were 110, 350 eggs and juveniles of *M. incognita*/kg soil, respectively, at Kafr-Kandeel (Giza) region, and 105 and 153 eggs and juveniles/kg soil respectively, at Kafr-Elsheikh region. Seed oil content (seed quality) and protein content in oil cakes (meal) decreased due to nematode infection, and the reduction increased by increasing nematode inoculum. The fatty acids (oil quality) were not affected by nematode infection.

N 23

SALT SUPPRESSION OF *MELOIDOGYNE JAVANICA ON* TOMATO. Muwaffaq Karajeh[1] and Farah Al-Nasir[2]. (1) Plant Pathology Laboratory; (2) Soil Science Laboratory, Mutah University, Karak, P.O. Box 7, zip code 61710, Jordan, Email: muwaffaq@mutah.edu.jo

The influence of ammonium chloride, potassium nitrate and sodium chloride, and inoculation with the root-knot nematode *Meloidogyne javanica*, were evaluated at two levels of electrical conductivity (EC) 4 and 8 in two tomato cultivars (GS12, root-knot susceptible, and Asala, root-knot resistant). Ammonium chloride was more effective than potassium nitrate at both ECs in causing mortality of second-stage juveniles and reducing nematode reproduction (number of eggs/g fresh root weight) and root galling. Sodium chloride and potassium nitrate caused significantly greater reductions of shoot and root fresh weights of tomato than ammonium chloride. Thus, it is assumed that ammonium chloride could be used as an effective and environmentally acceptable control option against *M. javanica* on tomato.

N 24

SUPPRESSION OF ROOT KNOT AND CITRUS NEMATODES USING PHOSPHONATE FERTILIZERS. Samer Habash and Luma Al Banna, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman, Jordan, Email: ssmh_85@yahoo.com; lalbanna@ju.edu.jo

Root knot nematodes (RKN) and citrus nematode are important pests causing severe losses of economic plants. Several methods are used to effectively suppress RKN. However, there are constrains that limit the use of such methods. Therefore, we aimed to investigate the efficacy of calcium and magnesium phosphonate fertilizers, which are essential agricultural practices, in suppressing two RKN species *Meloidogyne javanica* and *M. incognita*, and the citrus nematode *Tylenchulus semipenetrans*. The results showed that the exposure to the phosphonat fertilizers caused a complete kill of the second stage juveniles of the three studied nematodes. Moreover the two fertilizers prevented hatching of the RKN juveniles. In conclusion, results were encouraging to recommend the use of these fertilizers, which are plant growth enhancers, as an ecofriendly alternative method to control plant parasitic nematodes.

N 25

A FIELD TRIAL TO USE THE NEMATODE-TRAPPING FUNGUS *ARTHROBOTRYS DACTYLOIDES* TO CONTROL ROOT-KNOT NEMATODE *MELOIDOGYNE INCOGNITA* INFECTING BEAN PLANTS. Ezzat M.A. Noweer, Nematology Unit, Plant pathology Department, National Research Center, Giza, Egypt, Email: enoweer@hotmail.com

Microbial control of root-knot nematode by using the nematode-trapping fungus *Arthrobotrys dactyloides* alone or in combination with yeast, molasses and vermiculate is reported under field condition. The results revealed that the highest percentage reduction in number of nematode larvae per 1kg soil was achieved when applying the fungus *A. dactyloides* with yeast, molasses and vermiculate. Also the highest percentage reduction in number of root-galls per plant (87%) was achieved by using the fungus *A. dactyloides* with yeast, molasses and vermiculate. The data revealed that the weight of fruits per bean plant significantly ($P \leq 0.05$ and/or $P \leq 0.01$) increased in all nematode-trapping fungus *A. dactyloides* treatments compared to the untreated check treatment.

N 26

OCCURRENCE AND DESCRIPTION OF *ROTYLENCHULUS BOREALIS* IN AL-QASSIM FIELDS, SAUDI ARABIA. Suloiman Al-Rehiayani, Medhat Belal and Hind Al-Twajrrey, Plant Production & Protection Department, College of Agriculture & Veterinary Medicine, Qassim University, Buraidah, P.O. Box 6622, Saudi Arabia, Email: Alreh@yahoo.com

Rotylenchulus borealis has been found in Al-Qassim fields, infecting native weed-grass roots grown along with Date palm trees. The morphological characters of the species indicated that female has high lip region, conoid with annulation, with a stylet length of 10-11µm, and vulva is located 55% of the body lentgth. The length of hyaline portion of the tail is 6-7 µm. The male of the species was present. Illustrations, key features, and measurements of representative populations indicated that

the given species was *Rotylenchulus borealis*. Also, sections from infected roots with females showed the nematode feeding on syncitia formed by endodermial, precyclic, and vascular paranchema cells in a manner similar to that reported for other hosts of the *R. borealis* nematode.

N 27

DETECTION OF ENTOMOPATHOGENIC NEMATODES (EPNS) IN ALMOND ORCHARDS OF HOMS AND HAMA GOVERNORATES OF SYRIA. Khaled Al-Assas[1] and Asma Haidar[2]. (1) Plant Protection Department, Faculty of Agriculture, Damascus University, Syria, Email: khaledalass@hotmail.com; (2) Biological Control Studies and Researches Center, Faculty of Agriculture, Damascus University, Syria, Email: esraaha77@yahoo.com

Fifty-seven complex soil samples were collected from peach, almond and prune orchards at Homs and Hama governorates of Syria, in order to identify entomopathogenic nematodes (EPNs) natural populations. EPNs (extracted by *Galleria melonella* larvae baiting technique) were found in 12.3% of sampled fields. Four isolates were identified as *Heterorhabditis* spp. (Rhabditida: Heterorhabditidae) with a relative frequency of 7.0%, and three isolates were identified as *Steinernema* spp. (Rhabditida: Steinernematidae) with a relative frequency of 5.3%. Soil analysis showed that *Steinernema* spp. distributed in silty-loam soils, and *Heterorhabditis* spp. in sandy soils and silty clay loam soils, and soil acidity (pH) in positive samples were between 7.6-7.9. This is the first record of (EPNs) in the middle region of Syria**.**

N 28

SUSCEPTIBILITY OF SOME CUCURBITACEAE PLANTS TO ROOT–KNOT NEMATODE *MELOIDOGYNE JAVANICA*. Ayoub I. Ahmed[1] and Sulaiman N. Ami[2]. (1) Department of Plant Protection, Agricultural College, University of Salahaddin, Erbil, Iraq, Email: ayoubdebaga@yahoo.com; (2) Department of Plant Protection, Agricultural College, University of Dohuk, Iraq, Email: sulaimanami@yahoo.com

Three varieties of each of cucumber, water melon and squash and two varieties of each of snake melon and melon were selected to test their susceptibility to root–knot nematode *Meloidogyne javanica*, depending on some infection criteria (number of rootknots, root–knot index, nematode population density and its reproduction rate). The results revealed that the varieties of cucumber (Babylon, Ghazeer and Hamada) were very susceptible to the nematode, and two varieties of water melon (Charlee and Sugar Baby) were intermediate, while the third variety (Charleston Grey) was intermediate in its resistance. Results showed that the squash variety zucchini Kriti was susceptible whereas the other two varieties (Hakim and Amjad) possessed an intermediate susceptibility. Snake melon variety Karamlase was highly susceptible while the local variety was susceptible. It was also found that one variety of melon (Ananas) was susceptible and the other (Extra Ananas) was intermediate in its susceptibility. In addition, results showed that the nematode caused distinct reduction in the length and dry weight of shoots and roots, and such reduction was proportional to the susceptibility of the cucurbit varities to the nematode.

N 29

CHEMICAL, BIOLOGICAL AND INTEGRATED CONTROL OF THE ROOT-KNOT NEMATODE *MELOIDOGYNE JAVANICA* ON CUCUMBER PLANTS. Sulaiman N. Ami[1] and Ayoub I. Ahmed[2] (1). Department of Plant Protection, College of Agriculture, University of Duhok, Iraqi Kurdistan region, Iraq; (2) Department of Plant Protection, College of Agriculture, University of Salahaddin, Erbil, Iraqi Kurdistan region, Iraq, Email: sulaimanami@yahoo.com

Three treatments were applied for controlling root–knot nematode *M. javanica* on cucumber plants cv Babylon. The treatments included: vydate (24%) in its liquid formula, and two biocontrol agents included *Trichoderma harziaum* and *Bacillus thuringinesis* as a single, twofold and triple treatments combined. The results revealed that all treatments reduced infection based on defined criteria (i.e, number of rootgalls, root-knot index, nematode population density and rate of reproduction), and improved growth of cucumber plants (i.e, length and weight of shoots and roots). It was also noted that pre-plant application of all treatments was better than that of post-plant application, and their effects increased when combined. The triple treatment which represented the application of the two biocontrol agents 15 days after vydate application was the best.

N 30

PLANT PARASITIC NEMATODES ASSOCIATED WITH PEACH (*PRUNUS PERSICA*) ORCHARDS IN DAMASCUS AND HAMA GOVERNORATES OF SYRIA. M. Al-Qasim[1], K. Assas[2], Lama Al-Banna[3] and W. Abu-Gharbieh[3]. (1) National Center for Agricultural Research and Extension, MOA, Amman, Jordan, Email: mohdqasim@maktoob.com; (2) University of Damascus, Damascus, Syria; (3) University of Jordan, Amman, Jordan.

The study surveyed the occurrence of plant parasitic nematodes in peach orchards in Damascus and Hama governorates of Syrian Arab Republic. One hundred twenty six random soil and root samples were collected from 63 bearing peach orchards of Ghuta, Zabadani, Yabrod, Syrghaya and Kharabo areas in Damascus governorate, and Salmieh, Qamhaneh, Sqailbieh, Rastan, Kufr Ton, Arzeh, Sheha, Balhasen, Sharaya areas in Hama governorate. The results revealed that the root-knot nematode (RKN) *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood 1949 was distributed in many peach orchards of Hama governorate of Syria (44% of samples), with an average of 10-90 second stage juveniles/100 cc soil, and 20-330 galls/10 gm roots, while samples of Damascus governorate peach orchards were free of the RKN infection. However, an infection appeared on peach transplants of Nasrieha nursery. On the other hand, the lesion nematode *Pratylenchus* spp. was reported in 4% and 23% with an average of 30 and 36 nematode counts per 100 cc soil in samples from Hama and Damascus peach orchards, respectively. The dagger nematode *Xiphinema* spp. was

reported in 11% of samples from Hama peach orchards only with an average of 28 nematode counts per 100 cc soil. Two species of the dagger nematode were identified as *X. pyrenaicum* Dalmasso, 1964 and *X. intermedium* Lamberti & Bleve-Zacheo, 1979. *Paratylenchus* spp., *Amplimerlinius* spp., *Helicotylenchus* spp. and *Tylenchus* spp., were found in 26%, 36%, 21% and 14% (223, 52, 46, and 29 nematode counts/100 cc soil), respectively, in samples from Hama. While *Amplimerlinius* spp. and *Helicotylenchus* spp. were reported in 3.8% and 40% (29, and 120 nematode counts/100 cc soil), respectively, in samples from Damascus peach orchards. This is the first report of plant parasitic nematodes associated with peach orchards of Syria.

N 31

MANAGEMENT OF *MELOIDOGYNE CHITWOODI* IN POTATO BY DMDS AND A BIOLOGICAL PRODUCT *BACILLUS FIRMUS* IN IDAHO, USA. Saad L. Hafez and P. Sundararaj, University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Dimethyl di-sulphide (DMDS) is a hihly volatile, water soluble compound found in the plants from Allium family. Chancellor is a biopesticide active ingredient, *Bacillus firmus*. The efficacy of these two products on *Meloidogyne chitwoodi* has been tested. Five months after planting, the tubers were harvested, graded and evaluated for nematode infection. Nematode population, nematode infected tubers as well as percent of nematode infection was significantly reduced in treated plots with an increase in clean and total yield compared to control plots. Percent of tubers with nematode infection in DMDS treated plots ranged from 0.2 to 25.6. Chancellor treatments indicated that percent of tubers with nematode infection in treated plots ranged from 31.5 to 97.8. Lowest level of nematode infection was recorded in the plots treated with Temik + Vydate treatment followed by the highest rates of *Bacillus firmus* treatments. DMDS is a promising alternative nematicide for Columbia root knot nematode on potatoes and Chancellor is a potential nonchemical alternative for Columbia root knot nematode management on potatoes. Stand alone treatment is not sufficient but effective in combination with other management practices.

N 32

USE OF TRAP CROPS IN THE MANAGEMENT STRATEGY OF *HETERODERA SCHACHTII* IN SUGAR BEET PRODUCTION. Saad L. Hafez and P. Sundararaj, University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Two experiments were conducted in order to study the effect of two oilradish (Colonel and Ramses) and one mustard (Saloon) varieties on *Heterodera schachtii*. For the first experiment (green house), all three varieties were planted in individual pots (500 cc) filled with soil infested with sugar beet cyst nematode (14 eggs and larvae/cc soil) in a completely randomized block design with five replications each. Eight weeks after planting, the crop was harvested and data on eggs and larval population in soil along with viable cysts were recorded. Data from this study revealed that there was a significant difference in the cyst, eggs and larval population among the varieties tested. The lowest level of cyst, eggs and larvae were observed with Colonel followed by Ramses. For the second experiment in the field study, three varieties were planted in the fall 2006 in a field that was naturally and heavily infested with *H.schachtii*. They were mechanically chopped three months after planting and roots and shoots were incorporated into the soil by double-disking. Sugar beet was planted over all treatments in spring, 2007 following incorporation of the green manure trap crops. Sugar beet was harvested at maturity and the yield data along with sugar percent were recorded. Data from this study revealed that that there was a significant increase of beet yield in trap crop planted plots compared to the fallow. The maximum yield increase was in the Colonel planted plots followed by Ramses and Saloon. There was no significant difference in sugar percent of beet due to the planting of trap crops.

N 33

EFFICACY OF SEED TREATMENT IN THE MANAGEMENT STRATEGY OF *HETERODERA SCHACHTII* ON SUGAR BEET. Saad L. Hafez and P. Sundararaj, University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Two field experiments were conducted in order to find out the efficacy of Temik 15G along with Admire Pro and Poncho Beta seed on the sugar beet cyst nematode management in sugar beet. Five months after planting beets were harvested from 20 ft of the middle two rows of each plot, weighed and yield data recorded. Results showed that application of Temik at planting along with the seed treatment has significantly increased the beet yield compared to the untreated control. Percent yield increase (25.9%) was also greatest in that treatment. The highest plant vigor was observed in the plots treated with Temik + the seed treatment. The combination of seed treatment and Temik performed better than other treatments in terms of beet yield and plant vigor. Maximum reduction of nematode population and yield increase were in the plots of seed treated withPoncho Beta plus Temik, followed by the treatment Poncho Beta plus EXP3. Application of Temik at planting and side dressing (20lb/A +13lb/A) or single application of Temik along with seed treatment (Poncho Beta Fs 453, 68 G A/Unit + Exp3 90 G A/Unit) significantly increased the beet yield compared to the untreated control. The highest plant vigor and percent yield increase (58.7 and 49.1) was also maximum in the same treatments. In general, split application Temik alone or single application of Temik along with seed treatment performed better than other treatments in terms of beet yield.

N 34

MANAGEMENT OF LESION NEMATODE *PRATYLENCHUS PENETRANS* ON POTATO WITH SYSTEMIC AND NON SYSTEMIC NEMATICIDES. Saad L. Hafez and P. Sundararaj, University of Idaho,

Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Systemic and non systemic nematicides were tested to control lesion nmeatode on potato, where Vydate L, Temik 15G and Mocap EC are tested in a silt loam field with an indigenous population of lesion nematodes (pre-treatment nematode population of 3500/500 cc soil).. Five months after planting, the tubers were harvested from 15 feet of the middle two rows of each plot and weighed. Results showed that maximum reduction in nematode population, compared to untreated control, was with Mocap + Temik treatments followed by Temik + Vydate combinatuin. The total yield was significantly increased by all Vydate and Temik treatments, compared to control plots, but there was no increase in saleable yield in different combinations of all treatments compared to control plots. Maximum reduction of nematode population was with Temik application followed by Vydate applied before row closure and two applications at 14 days interval.

N 35

IMPACT OF FUMIGANT AND NON FUMIGANT NEMATICIDES ON THE MANAGEMENT OF *MELOIDOGYNE CHITWOODI* ON POTATO. Saad L. Hafez and P. Sundararaj, University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, Email: shafez@uidaho.edu

Fumigant and non-fumigant nematicides are effectively used to control Columbia root-knot nematode, *Meloidogyne chitwoodi* on potato in Idaho, USA. to study The efficacy test of Telone II alone or in combination with Vapam HL or different combinations of Vapam HL, Temik 15G, Mocap 6EC, and Vydate C-LV for control of *M. chitwoodi* in potato, were conducted. Experiments are carried out in a silt loam field with indigenous population of Columbia root-nematodes (Pretreatment nematode population 2500/500 cc soil). Five months after planting, tubers were harvested from 20 feet of the middle two rows of each plot weighed, graded and evaluated for nematode infection. The percent nematode infected tubers were significantly reduced by the treatments compared to control plots. Percent of tubers with nematode infection in treated plots ranged from 0.0 to 35.6. The lowest level of nematode infection was recorded in the Telone 15 g/A + Vapam 30 gal/A (0.0 %) and Mocap 2gal + Temik 20 lb + Vydate 2.2 pt (6.0 %).

WEEDS

W 1

PARASITIC FLOWERING PLANTS IN JORDAN: PRESENT STATUS AND FUTURE THREAT. Jamal R. Qasem, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman, Jordan. Email: jrqasem@ju.edu.jo

A field survey of parasitic flowering plants in Jordan was carried out during the period 2003 to 2007. Results showed the occurrence of 8 genera of parasitic plants belong to 6 plant families. These were: Orobanchaceae that consists of two genera; *Orobanche* includes 7 species parasitizing 86 host species of 24 plant families, *O. ramosa* as the most common and attack 73 plant species, and *Cistanche* consists of three species attacks 20 plant species of 10 families; Cuscutaceae consists of *Cuscuta* genera that has six species parasitizing 120 plant species belonging to 37 plant families with *Cuscuta campestris* as the most common and attacks 78 plant species; Santalaceae includes *Osyris* with one species attack 23 plant species belong to 14 plant families and *Thesium* that has one species parasitizing onion plants; Cynomoriaceae includes one genus with a single species attack 4 plant species; Viscaceae that has one genus with one species parasitize 14 host species of 8 families and Loranthaceae includes one genus with one species attack 24 plant species belonging to 11 families. Parasitic species are divided between root and stem parasites of a wide host range including wild herbs, forage plants, range land shrubs, forest and fruit trees. Parasitic species were found spread in all biogeographical regions of Jordan. Results revealed the presence of new species of parasitic plants in Jordan and many newly reported hosts in the country and in the world.

W 2

RESPONSE OF LENTIL (*LENS CULINARIS* MED.) AND ITS NODULATION TO NITROGEN FERTILIZATION AND CHEMICAL WEED CONTROL. A.M. Sultan and A.A. Khudir, College of Agriculture and Forestry Mosul University, Iraq, Email: aaltaae@yahoo.co.uk

A pot experiment was carried out at the college of Agriculture and Forestry of Mosul University during the winter growing season of 2005 to investigate the effect of two herbicides (Trifluralin at 2.4 and 3.2 l/ha and Cyloxidim at 1.2 l/ha) and nitrogen fertilizer at 40 and 80 Kg N/ha on the growth of lentil and the number of nodulation on its roots. Results indicated that tifluralin significantly reduced all crop growth characteristics including the number of nodulation on its roots. However, cycloxidim significantly increased crop height, number of branches and number of nodulation. Nitrogen applied at 40 Kg/ha significantly enhanced plant height and as compared to 80 Kg/ha. In general, cycloxidim and 40 Kg N/ha enhanced crop growth in comparison to trifluralin or nitrogen at 80 Kg/ha. However, mixture of cycloxidm (2 l/ha) and nitorgen (40 Kg/ha) or cycloxidim (1 l/ha) and nitrogen (80 Kg N/ha) significantly enhanced root nodulation as compared to the check.

W 3

EGYPTIAN EXPERIENCE OF USING INSECTS FOR BIOLOGICAL CONTROL OF WATER HYACINTH. Yahia Hussein Fayad, Department of Biological Control, PPRI, ARC, 9 Gamaa Street, Giza, Egypt, Email: yhfayad1@hotmail.com

Water hyacinth (*Eichhorniae crassipes* (Mart.) Solms. is considered as one of the most serious floating aquatic weeds infesting fresh water in tropical and subtropical regions. During the period of 1978-1982, intensive host specificity tests were carried out under quarantine conditions in Egypt to study the plants and crops

host preference of two coleopterous curculionid weevils; *Neochetina eichhorniae* Warner and *N. bruchi* Hustachi. Results showed that both weevils are monophagous specific weevils that feed, reproduce and grow on water hyacinth only. Accordingly, during June 2000, both *Neochetina* weevils were collected and introduced from USA into Egypt. Weevils were mass produced under greenhouse conditions and released in the following four lakes in northern Egypt: Mariout, Edko, Al-Borollos and Al Manzalah. Results obtained through analyzing the satellite images taken after the release of weevils indicated that reduction in water hyacinth infestations reached 96, 95, 80 and 65% in Al Borollos, Edko, Manzalah and Mariout, respectively.

W 4

THE EFFECT OF PLANT EXTRACTS FROM *AMARANTHUS RETROFLEXUS* L. AND *CHENOPODIUM ALBUM* L. ON SEED GERMINATION AND GROWTH OF SPRING SOWN LOCAL CHICKPEA (*CICER ARIETENIUM* L.). Basima Barhoum[1], Abdul Aziz Niane[2] and Anwar Al-Maamaar[3]. (1) Al-Ghab Research Centre, Hama, Syria, Email: Basimabarhom@yahoo.com; (2) ICARDA, P.O. Box 5466, Aleppo, Syria; (3) Damascus University, P.O. Box 2233, Damascus, Syria.

Plants of *Amaranthus retroflexus* L. and *Chenopodium album* L were collected at the flowering stage. The plants were cleaned from dirt and separated into roots, stems, leaves, and seeds. The palnt parts were dried and ground into a fine powder. A weight of 100 g of each part was soaked in one liter of tap water for 48 hrs in the dark. The filtrate of each part was considered the stock from which the following concentrations were prepared; 20, 40 and 80%. A volume of 125 ml of each concentration were added to the test plate having 50 local chickpea seeds. Each treatment was replicted four times. Results were compared with the check in which only tap water was added. The experiment was carried out during 2005 and 2006 in the seed laboratory at ICARDA according to the ISTA guidelines. The results indicated that plant extracts significantly reduced germination rate of chickpea as well as the dry weights of shoot and root. Seed extracts of both weeds were more inhibitory than root or shoot extracts. Root extract of *Amaranthus* was more inhibitory than that of *Chenopodium*. Seed and shoot extracts of *Chenopodium* were more inhibitory at 40 and 80% compared with the check.

W 5

THE EFFECT OF SOME HERBICIDES AND FOLIAR FERTILIZER ON THE YIELD AND SOME CHEMICAL COMPONENTS OF SOYBEAN. Salwa Sayed Mohamed Gaweesh, Botany Department, National Research Centre, Dokki, Giza, Egypt, Email: salwgaweesh@yahoo.com

Two field experiments were carried out during 2007-2008 growing seasons at the experimental farm of the National Research Centre Egypt to study the effect of some herbicides and the foliar fertilizer stimufol on the yield and some chemical components of soybean. The experiment included five herbicidal treatments, hand weeding twice, as well as a weedy check for comparison. The treatments were arranged in a complete randomized block design. All treatments increased the chemical components and the yield significantly over the weedy check. Hand weeding treatment was the best followed by fluazifop-butyl, oxyfluorfen, then bentazon. The contents of chlorophyll a, carotenoids, total carbohydrates, crude protein, nitrogen, phosphorus, potassium, zinc, copper, manganese were the highest in hand weeding and pendimethalin treatments. The foliar fertilizer treatment at 400 g/feddan reduced weed mass and increased the photosynthetic pigments in the leaves at 75 days after planting, and increased total carbohydrates and protein in the seeds.

W 6

COMPARATIVE EFFECT OF THE AQUEOUS EXTRACTS OF THREE *CHENOPODIUM* SPP. ON SEED GERMINATION AND SEEDLING GROWTH OF DIFFERENT CROPS. Barakat Abu Irmaileh, Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman 11942, Jordan, Email: Barakat@ju.edu.jo

Leaves and tender branches of *Chenopodium album*, *Ch. murale* and *Ch. vulvaria* were mixed thoroughly in a Molinex blender for 5 minutes, at 75g fresh material of each species in one liter dH_2O, filtered, then centrifuged at 4000 rpm to get as clear aqueous extract as possible. Ten mls of each extract were added to a minimum of ten seeds of each crop placed on filter paper in a Petri dish. Each treatment was replicated four times. All treatments were incubated at 20ºC in a closed incubation unit for three weeks. Percent of germination, shoot and root lengths were calculated as percent of the check treatment which consisted of adding 10 mls dH_2O to seeds of each crop. Root length was the most affected parameter by all extracts followed by shoot length. Extract of *Ch. album* was the most effective in reducing germination rate and seedling growth, followed by *Ch. vulvaria*. Parsley germination was completely inhibited by all extracts. Extract of *Ch. album* completely inhibited germination of watermelon and Armenian cucumber, and effectively reduced germination rate and seedling growth of barley, okra and tomato. The extract of *Ch. vulvaria* effectively reduced germination rate and seedling growth of Armenian cucumber, beans, okra, squash and watermelon; while *Ch. murale* was effective in reducing germination rate and seedling growth of watermelon, but was not effective on cucumber, tomato and wheat. Moderately affected crops by *Ch. murale* included Armenian cucumber, barley, corn, okra and squash; while corn, cucumber, and wheat were moderately affected by *Ch. album* and *Ch. vulvaria* extracts.

W 7

THE EFFECT OF THE SHOOT AQUEOUS EXTRACT OF SUNFLOWER, MAIZE, OKRA, HOT PEPPER, COWPEA AND EGGPLANT ON SEED GERMINATION AND GROWTH OF CROPS. Salah Mohammad Saied Al-Tai and Hala Muzhir Yaqub Yousuf, Department of Biology, College of Science, University of Mosul, Mosul, Iraq, Email: dr_salahaltai@yahoo.com

This study was conducted to investigate the effect of aqueous extract of the vegetative shoots of sunflower, maize, okra, hot pepper, cowpea and eggplant on seed germination and growth of the same crops. Fresh weights of shoots; 3, 6, and 9 gr from each crop, were blended in 100 ml distilled water and the filtrate was used for testing their effect on seed germination and seedling growth of each crop. The results indicated that the rate of seed germination was reduced significantly by all extracts in all crops, at all concentrations compared with the control (in which distilled water was added). Extracts of maize, pepper and sunflower were the most inhibitory. The effect of extracts on seedling growth, as represented by shoot and root lengths as well as their dry weights, varied. Some extracts increased and others reduced the seedling growth.

W 8

FARMERS' FIELD SCHOOLS FOR TRAINING FARMERS TO CONTROL BROOMRAPE IN FOOD LEGUMES. Souhila Aouali[1] and Feliachi Kamel[2]. (1) Institut Technique des Grandes Cultures, BP.142, BIR Mourad Rais, Algeria, Email: saouali@yahoo.fr; (2) Institut National de la Recherche Agronomique Algérien, Algeria.

Food legumes are very important crops for human nutrition and animal feed. However, these crops are subject to many stresses that seriously compromise the yields. Among the menacing biotic stresses, the parasitic weed *Orobanche crenata*, is known to be very detrimental. This parasitic weed is very easily disseminated by the wind, equipments, seeds and animal grazing. One plant of orobanche can produce up to 500 000 seeds and these besides their very small size and their extremely light weight, can have a longevity of more than 15 years in the soil. Several methods of control have been developed in different countries in the Mediterranean region but these methods were not totally remedial as they only allow the reduction of infestation. It is therefore necessary to apply an integrated control strategy. To assure the success of the introduction of this strategy, at farmers' level, it is necessary to make farmers actively participate in their own field, through Farmers' Field Schools approach. The farmers need to know the orobanche and to understand its life cycle and the conditions of its development in order to be able to control and manage infestations; they also have to get acquainted with available control options and to use them effectively.

W 9

PALLAS® 45OD IS A NEW POST-EMERGENCE HERBICIDE CONTAINING PYROXSULAM FOR ANNUAL GRASS AND BROADLEAF WEED CONTROL IN WHEAT. Mike Lysandrou, R&D Mid-East, N.E Africa and Pakistan, DAS, Athens, Greece, Email: Mlysandrou@dow.com

Pyroxsulam is a cross-spectrum post-emergence herbicide for control of annual grass and broadleaf weeds in winter and spring cereals (soft wheat and durum wheat). It belongs to the triazolopyrimidine sulfonamide chemical family and mode of action is inhibition of the enzyme acetolactate synthase (ALS). The lead commercial offering in the Arab countries is Pallas 45OD, an oil dispersion formulation containing pyroxsulam at a concentration of 45 g ai/l and the crop safener cloquintocet-mexyl at 90 g ai/l. The oil dispersion formulation type reduces the need to mix with an adjuvant. Countries where the product has been tested and under development includes Syria, Iraq, Morocco, Tunisia, Algeria, Egypt, Sudan and Libya. Registration is anticipated in all these countries from mid-2009-2011. It is applied as a one shot application at low use rates from 18-22.5 g ai/ha, depending on the weed and stage of application, and it controls sensitive species from BBCH 11 to 24 stages for grass weeds (1 leaf to 4 tillers) and up to 8 leaf stage for broadleaf weeds. Where needed a broadleaved weed partner can be added to extend the weed spectrum. Pallas 45 OD has shown to be very active on a wide range of grass genera such as *Avena spp, Phalaris* spp., *Lolium* spp., *Bromus* spp., *Alopecurus myosuroides* and shows good suppression on other grasses, e.g *Hordeum* spp. Key dicotyledonous weeds include *Ammi majus, Anthemis arvensis, Beta vulgaris, Bifora radians, Brassica spp, Cephalaria syrica, Galium aparine, Malva* spp., *Raphanus raphanistrum, Sinapis arvensis and Vaccaria pyrimidata*. Due to the short half-life of pyroxsulam, there are no restrictions for crops that can be planted the following season after an application of Pallas 45OD.

W 10

ECO-PHYSIOLOGICAL STRATEGIES FOR WEED MANAGEMENT. Rosine Habchi and Mustapha Haidar, Department of Agricultural Sciences, Faculty of Agricultural and Food Sciences, Lebanon, Email: mhaidar@aub.edu.lb

Weeds pose a problem of considerable economic and environmental importance in various crops in Lebanon and Mediterranean region. Efforts to manage weeds in this region have centered primarily on chemical and cultural methods. However, the increasing economical and/or environmental costs of such practices have forced scientists to look for alternative control practices. Eco-physiological weed management system is an alternative way that could help in reducing the environmental and economical costs. It focuses on designing strategies based upon weed responses to different environmental signals. This strategy relies on a multi-tactic approach based on manipulation of all types of ecological interactions (including cultural and physical practices, webs of information, and farmer's skills) and careful selection of site-specific strategies. Thus, eco-physiological weed management enhances biodiversity and reduces environmental and health risks.

W 11

EFFECT OF SHEEP RUMEN DIGESTION ON GERMINATION AND VIABILITY OF COMMON WEED SEEDS OF LEBANON. Chady Gharib, Mustapha Haidar and Fouak Sleiman, Department of Agricultural Sciences, Faculty of Agricultural and Food Sciences, Lebanon, Email: mhaidar@aub.edu.lb

Studies were conducted to examine the effect of sheep rumen digestion on germination and viability of seeds of five common weed species of Lebanon and two crops (Barley and Lentil). Seed samples were put in a small monofilament nylon bags and placed in the plastic rumen of

fistulated sheep for 1, 2, 3 and 4 days, respectively. Total percent germination (germination + viability) of seeds after four days in the rumen were 86% for *Cuscuta* spp, 76% for *Amaranthus retroflexus*, 31% for *Convolvulus arvensis*. However, *Lolium multiflorum* and *Raphanus raphansitrum* seeds died two days after incubating them in the rumen . Seeds of lentil and barley, which were tested for comparison, died one days after incubating them in the rumen. The results indicate that grazing sheep could be an important vector for carrying viable weed seeds, particularly hard-coated seeds, in their digestive system and depositing them with their manure in un-infested fields.

W 12

SITUATION OF EXOTIC PESTS AND THEIR IMPACT ON AGRICULTURE AND NATURAL RESOURCES IN SUDAN. Abdalla Abdelrahim Satti and Abdelrahman Hamed Abdelrahman Hashim, Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan, Email: satisattisat@yahoo.com

The cultivated field and horticultural crops in Sudan were originally selected from indigenous flora since earlier times. These crops were usually attacked by different local pests at variable levels based on the prevailing climatic and ecological conditions. However, with the modernization of agriculture together with the rapid movement of global trade during the last decades, new exotic species of plants and insects were intentionally or accidentally introduced to the country. Unfortunately, most of these are potentially invasive organisms, hence becoming serious pests on agricultural crops or natural resources. This paper highlights the importance of alien pests such as water hyacinth, *Orobanche crenata*, green scale and mesquite trees, their distribution and impact on certain crops or ecosystems. It addresses the sources and distribution of these pests and fears from introducing new alien species. Finally, the paper emphasizes the importance of cooperation in eradicating exotic pests, and asks for upgrading of quarantine measures in Africa so as to keep pace with the accelerating world trade.

W 13

RESPONSE OF MAIZE TO WEED CONTROL AND DIFFERENT COMBINATIONS OF MACRO NUTRIENTS. Muhammad Azim Khan and M. Siraj Kakar, Department of Weed Science, NWFP Agricultural University Peshawar 25130, Pakistan, Email: ahmadzaipk@yahoo.com

Decreasing the cost of production and increasing the crop yield are the main objectives of farmers. However, many unnecessary measures were taken in developing countries to increase the yield. Study was conducted at NWFP agricultural University Peshawar during March 2009, using RCBD design with split plot arrangement. Maize Hybrid was planted in March 2009. One main plot of maize was kept weed free while another was kept as weed infested throughout the crop season. While the sub-plots were different combinations of macro nutrients viz; N, P, K, NP, NK, PK, and NPK. Statistical analysis of the data showed that weed control was more important than fertilizer application as there were no harvestable maize plants in weed infested plots. Although the importance of the major nutrients could not be ignored in crop production but weed infestation does not provide a fair choice of fertilizers application. This might be due to the abundance of grassy summer/perennial weeds in the experimental fields. Combination of NP showed promising results giving maximum yield. Overall, data suggested that weed control through herbicide application was as important as weed control itself because consistent hand weeding was difficult and uneconomical due to perennial weeds and the hot season during June and July. Farmers in the studied area usually give more importance to fertilizer application instead of weed control. The findings of this study advocate that weed control is more important than fertilizer application.

W 14

STUDY OF THE PHYTOSOCIOLOGICAL AFFINITIES OF THE PARASITIC WEED *OROBANCHE CRENATA* FORSK. WITH WEED COMMUNITIES IN THE MAJOR HOST CROPS IN EASTERN ALGERIA. M. Y. Ouallah[1], S. Benhouhou[1], N. Zermane[1] and C. Mallory-Smith[2]. (1) Ecole National Supérieure Agronomique (ENSA), Département de Botanique, El-Harrach, 16200, Alger, Algérie, Email: n_zermane@yahoo.com; (2) Department of Crop and Soil Science, 109 Crop Science Building, Oregon State University, Corvallis, OR 97331-3002, USA.

Phytosociological affinities that may exist between the parasitic weed *Orobanche crenata* Forsk. and weed communities in fields planted with faba bean (*Vicia faba* L.) in eastern Algiers were investigated during the 2008 growing season. A total of 47 samples were randomly collected and data were organized in phytosociological tables to distinguish syntaxonomic units. Floristic similarities between samples and plant species assemblages were investigated with factorial correspondence analysis (FCA) and ascending hierarchical clustering (AHC). The intensity of the *Orobanche* infestation was estimated using the 0-6 scale of Schmitt (1981). A total of 101 weed species representing 8 genera and 30 families were identified. The most representative families were Asteraceae, Poaceae, Fabaceae, Brassicaceae and Apiaceae which accounted for more than 58% of the total number of species. Hierarchical clustering of vegetation data pointed out 5 species assemblages, defined according to the dominant species, namely: (1) *Medicago hispida* & *Lolium multiflorum*, (2) *Emex spinosa* & *Oxalis cernua*, (3) *Stelleria media* & *Fumaria capreolata*, (4) *Sinapis arvensis* & *Avena sterilis* and (5) *Polygonum aviculare*. No phytosociological relationships were found between the *Orobanche* and weed assemblages identified in the present work. However, some correlations could be established between the *Orobanche* and some weed species. Hence, the following few weeds found to be correlated to very low infestation with *Orobanche: Rumex crispus, Cynodon dactylon, Polygonum aviculare, Lythrum junceum, Cyperus rotundus* and *Chenopodium album*. While *Emex spinosa* was found to be correlated with high infestations of *Orobanche*. Further

ongoing *in-vitro* and *in-planta* based experiments will verify or reject these assumptions.

W 15

EFFECT OF DIFFERENT IRRIGATION METHODS ON HERBICIDES ACTIVITY FOR CONTROLLING COTTON WEEDS AND ON PRODUCTION. B. Al Rahban[1], K. Mhemid[2] and A. Mhemid[3]. (1) Administration of Plant Protection Research, General Commission for Scientific Agricultural Research (GCSAR), Douma, P.O. Box 113, Damascus, Syria, Email: gcsarpartect@mail.sy; (2) Directorate of Agricultural And Agrarian reform in Deir Ezzor, Syria; (3) Faculty of Agricultural in Deir Ezzor, Syria.

The trial was conducted at Deir Ezzor Scientific Agricultural Research Center – Sa'alou Research Station during the 2008 season to study the effect of different irrigation methods on herbicides activity for controlling cotton weeds and on production. Cotton variety Deir Ezzor 22 was cultivated and the soil was treated with herbicides: *Pendimethaline* 50% EC, *Prometryn* 50% SC and *Trifluralin* 48% EC. The applied herbicides showed some slight phyto-toxicity symptoms 30 days after application. *Trifluralin* caused higher toxicity than other herbicides and this toxicity disappeared several days later. *Pendimethaline* didn't show any toxic symptoms in drip and furrows-irrigated cotton plants. The weeded control treatment was better than other treatments in terms of average plant height and number of complete bolls per plant for the three irrigation methods. This, in turn, affected yield which was the highest among treatments estimat and reached 4255 kg/ha. *Trifluralin* was the best among herbicides in terms of yield while *Pendimethaline* produced higher average plant height 80.25–86 cm. The findings revealed that *Trifluralin* was the best herbicide for controlling broad-leaf weeds and was better than the other herbicide treatments r 30, 45 and 60 days after application. Weed control with this herbicide observed 30 days after application was 80.6%, 84.3 and 77.5% for drip, furrow and traditional irrigation methods, respectively. *Trifluralin* and *Pendimethaline* were better than *Prometryn* against narrow-leaf weeds with 100% control.

W 16

EFFECT OF SWEET POTATOES AND RADISH RESIDUES ON GROWTH OF PURPLE NUTSEDGS (*CYPERUS ROTUNDUS* L.). Samir Tabbache, Plant Protection Department, Faculty of Agriculture, Tishreen University, Lattakia, Syria, Email: Tabbache@scs-net.org

Effect of dried residues of sweet potatoes and radish were evaluated on growth of nutsedgs in pots. Purple nutsedgs tubers were collected from the field in April and planted in pots. The addition of 1% and 2% of dried sweet potatoes residues in soil pots reduced fresh weights of nut grass by 42% and 51%, respectively. The addition of the same concentration of radish residues reduced fresh weight of nut grass by 18.5% and 52%. Utilizing crop residues as natural herbicides is a useful tool in weed management.

W 17

MANAGEMENT OF *PARTHEMIUM* WEED: NEW STRATEGIES FOR COMPLEMENTING BIOLOGICAL CONTROL IN AUSTRALIA. Asad Shabbir[1], Steve Adkins[1], Kunjitapatham Dhileepan[2] and Chris O'Donnell[1]. (1) School of Land Crop & Food Sciences, The University of Queensland, St Lucia Australia; (2) Alan Fletcher Research Station, Sherwood, Email: asad@uq.edu.au

Parthenium hysterophrus L. commonly known as parthenium is a weed of global significance affecting many countries including Australia. In Australia, parthenium mainly occurs in grazing areas in Queensland, where it causes severe human and animal health problems, agricultural losses and environmental problems. Currently biological control is the most widely used management tool for parthenium in Queensland. To date, 11 biological control agents (9 insects and 2 rusts) have been released in Australia where many of them are known to be established in the field. However, the impact of biocontrol is highly variable, and still parthenium is a major weed of concern in many areas in Queensland. There is a potential to integrate other management options with the existing biological control to enhance effectiveness. Competitive displacement of parthenium with native and introduced beneficial plants has shown potential in different parts of the world including Australia, India and Pakistan. But the combined effectiveness of biological control and competitive pasture plants are yet to be studied in detail. Hence, a study was initiated to quantify the combined effect of competitive pasture plants with biological control agents on parthenium growth and reproduction. This includes glasshouse experiments at Alan Fletcher Research Station (AFRS) and field trials at two different locations in central Queensland (Monto & Injune). The results from this study will provide an insight into how much more effective biological control agents will be in managing the weed in the presence of competitive plants under different conditions.

W 18

PERSISTENCE OF *SULFOSULFURON* AND ITS RESIDUAL EFFECTS ON FOLLOWING CROPS. Haddad, Atef[1], Samir Kodsiye[2], Khalil Al Saidi[2], Zilal Kaddour[3] and Yassen Khalil[1]. (1) International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: a.haddad@cgiar.org; (2) Faculty of Agriculture, University of Aleppo, Syria; (3) Directorate of Plant Protection, Ministry of Agriculture, Syria.

This study aimed at detecting residual effect of wheat herbicide *sulfosulfuoron* and to determine its phytotoxic effect on the subsequent crops. The study started in 2006 and completed in 2009 after observing severe damage on legume research fields preceded by sulfosulfuoron treated wheat at Tel Hadya research station of ICARDA. Initial greenhouse studies were conducted to grow 10 crops in pots filled from same soils having sulfosulfuron residues. Results indicated that residues were concentrated in the top soil layer and deep tillage enhanced degradation of the herbicide. Lentil, chickpea and coriander were identified from previous studies to have different

sulfosulfuron tolerance levels. Following wheat crop treated with herbicide, these crops were evaluated in field studies, under 2 levels of sulfosulfuron 0 and 30 g ai/ha with tillage and zero-tillage conditions. The experimental split-split plot design was used. Wheat was planted in the first season with different tillage and sulfosulfuron levels, indicator crops were grown in the following season. Biotic measurements were collected during the growing season. Results indicated that sulfosulfuron residues did not affect germination and phytotoxicity appeared on seedlings later. Sulfosulfuron residues significantly reduced plant height, especially coriander. Total biomass and grain yield were slightly better under zero tillage compared to conventional tillage and were significantly reduced by sulfosulfuron residues especially in susceptible lentil. This explains the severe damage to lentil grown under zero tillage, where most residues are concentrated in the top soil layer.

W 19

USE OF *CRESSA CRETICA* EXTRACT TO CONTROL DODDER. Oadi N.Al-Hadeethy[1], S.M.K. Saadedin[2] and Bashier A.Al-Nadaawi[2]. (1) Department of Plant Protection; (2) Department of Field Crop Sciences, College of Agriculture, University of Baghdad, Iraq, Email: Udayal_hadethy@yahoo.com

This experiment was carried out at an alfalfa field, heavily infested with dodder *Cuscuta campestris* L. at the College of Agriculture, University of Baghdad during the 2006 season, to evaluate the efficacy of the aqueous extract of *Cressa cretica* L. to control the parasitic weed. The full strength extract was prepared by soaking 50 g of ground dried shoots of *C. cretica* in one liter of water for 24 hours. The filtrate was then diluted to get one half, one third and one fourth strength extract solutions. Water was added as a check treatment. The spreader, Zahi, was added to the spray solution at 2% to all treatments. Each treatment was sprayed on 2 m^2 of an alfalfa plots heavily infested with the parasite. Each treatment was replicated three times. Data on dodder weight and diameter was taken on five 10 cm shoots branching from the main dodder stem. Compared with the check treatment, the results showed a significant decrease in the average weight of dodder stem and dodder diameter by all treatments four days after spraying. The full and half strength extracts showed significant decrease in dodder stem weight eight days after spraying as compared with the check. Dodder stem diameter was decreased by all extract treatments after two days. The least value of the stem diameter was obtained by spraying full, half and third strength aqueous extract after eight days. On a visual scale from 0 (not affected) to4(complete kill), the results showed that plots treated with full and half strengths aqueous extract of *C. cretica* were given a score of 4, eight days after spraying.

W 20

CONTROL OF LICORICE (*GLYCYRRHIZA GLABRA* L.) IN WHEAT (*TRITICUM DURUM*) CV. SENATOR CAPELLI FIELDS. Ali Mala Khedir Galalay[1] and Abdul-Ghany Omer Ismael Sarmmy[2]. (1) Field Crops Department, College of Agriculture, University of Salahaddin, Arbil, Iraq, Email: raassyan@yahoo.co.uk; (2) Biology Department, College of Science, University of Salahaddin, Arbil, Iraq.

This study was carried out during the growing season 2004/2005 , to determine the effects of burning, cutting, covering with green plastic boxes , glyphosate at 4 and 12 $l.ha^{-1}$, mayei soluble (composed of 360 g. l^{-1} 2,4-D+ 315 g. ha^{-1}MCPA) at 4 $l.ha^{-1}$, bentazon at 3 $l.ha^{-1}$, granstar at 30 g. ha^{-1} and the mixture of mayei at 1 $l.ha^{-1}$+glyphosate at 3 $l.ha^{-1}$,respectively in controlling licorice in wheat fields. All herbicidal treatments were sprayed twice, at 4 $l.ha^{-1}$ except for Glyphosate which was sprayed once.The results indicated that burning treatment as well as the treeatments with glyphosate , mayei and bentazon significantly reduced the fresh and dry weights of licorice. Licorice rhizome length was reduced significantly by glyphosate and Mayei treatments. The percent control of licorice by glyphosate at 12 $l.ha^{-1}$ was 99.53%. Glyphosate at 12 $l.ha^{-1}$ and the mixture of glyphosate and mayei reduced the vegetative growth of licorice significantly. The degree of licorice control by these treatments, at a visual scale from 1-10 (1= no effect, 10= plant death), were 9 and 8.75, respectively. The number of wheat seeds per plant and the 1000-seed weight were significantly increased by the mixture, glyphosate + mayei. Number of licorice branches was reduced significantly by granstar treatment which brought about a significant increase in the spike length. The cover treatment reduced the number of pods per licorice plant.

W 21

RESPONSE OF SOME GROWTH CHARACTERS OF FIELD AND VEGETABLE CROPS TO DIFFERENT CONCENTRATION OF THE HERBICIDE CHEVALIER 15 WG. K.W. Ibade[1], Saleh H. Samir[2] and Showkat A. Habib[1]. (1) College of Agriculture, Al-Anbar University; (2) College of Agriculture, Baghdad University, Iraq, Email: khalid.abade@yahoo.com

Several pot experiments were carried out to investigate growth parameters such as plant height, fresh plant weight, root length and weight of some field and vegetable crops to 0.02, 0.002, 0.0002 and 0.00002 ppm concentrations to treatment with Chevalier15 WG (methyl Na - 30 Iodosulfuron + methyl - Mesosulfuron 30 + Mefenpyr diethyl 90 g ai/kg) a newly registered herbicide in Iraq the control offor grassy and broadleaf weeds in wheat, in addition to the control treatment. The experiment was repeated three times. Results showed that the herbicide at concentrations 0.02, 0.002 and 0.0002 ppm significantly reduced plant height of cucumber, squash, sorghum, cowpea, chickpea and lentil while no adverse residual effects were detected on these crops at 0.00002 ppm. Other crops such as sunflower, corn, rice and green gram were not affected by the herbicide. The herbicide did not affect the germination rate of all crops tested. More studies are needed to test the influence of this herbicide on successive crops in the rotation.

W 22

REDUCTION OF WEED SEEDS RATIO IN HARVESTER SEED TANK IS INFLUENCED BY HARVESTER SPEED. Saad Abdul Jabbar Alrajabo and Momtaz Isaak Almitewty, Collage of Agriculture and

Forestry, Mosul University, Iraq, Email: saad21955@yahoo.com

This experiment was carried out in Talafar region (Nineveh governorate) in wheat field under supplementary irrigation to study the effect of different speeds of harvester units on weed seeds ratio in the harvester tank (john deere). Three factors were tested: harvester ground speed (2.5-3, 3.5-4 km.hr^{-1}), reel speed (21, 26, 31 rpm) and thresher cylinder speed (750, 850, 950 rpm). Treatments were replicated three times and laid in a randomized complete block design. Samples of the tank contents were taken after completing the harvest of 50 m-long line and 4.25m- wide for every treatment, then divided by Porner divider in order to obtain 60 gram-samples for calculating the number and ratio of weed seeds. Results were analyzed and means were separated by Duncan's Multiple Range test. The lowest weed seed ratio was obtained at 21 rpm reel speed and 950 rpm thresher speed of harvester. The harvesting speed of 3.5-4 km.hr^{-1} with thresher speed 950 rpm gave the lowest weed seed ratio in the harvester tank compared with other treatments. Generally, the best result obtained was at harvester ground speed 3.5-4 km.hr^{-1}, reel speed 26 rpm, and thresher speed 950 rpm.

W 23

THE EFFECT OF MIXING TYPE, NOZZLE TYPE AND SPRAY DEPTH FOR LOCALLY MADE EQUIPMENT FOR SEED WEED CONTROL USING THE HERBICIDE TREFLAN. Abdulrazzak A. Jasim and Saif A. Rudhan, Agricultural Mechanization Department, College of Agriculture, University of Baghdad, Iraq, Email: raz55iq@yahoo.com

The experiment has conducted in the fields of College of Agriculture, Bagdad University during the 2008 spring season, to evaluate the effect of the nozzle type and the type of mixture e and the spray depth by using Treflan on drifting rate ,efficacy in inhibiting weed growth, and slippage rate. A split-split plot design with four replications was used, with the nozzle type as the main plot (flabelliform, conical) and the mixture type for the sub-plot (with and without mixing the sprayed herbicide in the soil) and the depth of spray (0, 5, 10.0 cm) as the sub-sub plot. The flabelliform nozzle with a spray depth of 5 cm gave the highest weed control rate (76.8%) and weed growth inhibition rate(77.9%). Spraying at 5 cm depth without mixing gave the highest weed control rate (80.0%) and weed growth inhibition rate (80.41%). Increasing depths of sprayl from surface to 5 cm depth gave highest weed control rate (75.5%), with an increase in drift rate and weeg growth inhibition. Increasing the spray depth from 5 cm to 10 cm led to decrease in weed control from 75.55 to 68.60% in addition to decrease in weed growth inhibitionand drifting rate.The interaction among nozzle type, type of mixingand spray depth was significant for weed control, weed growth inhibition and drift rate, with highest weed control of 81.25% produced from the interaction of fan shape nozzle without mixing sprayed at 5 cm soil depth.

W 24

ALLELOPATHIC INTERACTION OF PROSTRATE SPURGE *EUPHORBIA PROSTRATA* WITH THREE KINDS OF ORNAMENTAL PLANTS. Janan A. Sa'eed, Department of Biology, College of Science, Mosul University, Iraq, Email: jansaeed@yahoo.com

This research was conducted to study the effect of prostrata spurge residues (shoot and root) on germination and growth of three kinds of ornamental plants which includes *Chrysanthrmum carinatum*, *Gaillardia pulchella* and *Lathyrus odoratus*. Laboratory results showed that the aqeous extract of the residues at concentration 5 and 10% (w:v) caused a significant reduction in seed germination of the three kinds of the plants as compared with distilled water, the greatest reduction was observed with the 10% concentration. The seedling growth showed an increase in the coleoptile length of *chrysanthemum* seedlings, but gaillardia and lathyrus coleoptile length was reduced, moreover, a reduction in the radicle length was seen in the three plant speciess. The greenhouse experiment also showed inhibition in seed germination of the three kinds of ornamental plants sown in the soil containing (Spurge) residues added at the rate of 5 and 10% (w:w) as compared with the control soil (without residues) treatment.Results revealed a significant increase in the growth of the plants (shoot and root and their dry weights) grown in the soil containing spurge residues at the two rates. The highest increase was found in shoot length and dry weight of *Gaillardia* at the 10% rate which reached 102.1% and 333%, respectively. The highest increase in root length and dry weight was noticed in *Chrysanthmum* and reached 174.5% and 166.6%, respectively.

W 25

EFFECT OF CHANGING TEMPERATURE ON SEED GERMINATION OF WEEDS. Adel Nadjib Chaker, Mohamed Fenii and Meriem Hani, Laboratoire de Valorisation des Ressources Biologiques, Faculté des Sciences, Université Ferhat Abbes, Sétif 19000, Algérie, Email**:** chakeran@yahoo.fr

Weeds are the biggest problem that face agriculture in the world especially cereal crops. For example, total area used to cultivate cereals in Algeria is about 80% of total area cultivated. The loss caused by weeds varies from 20% to 50% depending on the year. A study was carried out on seed germination of 31 species of weeds that are widely spread in the region of Setif (Northeast of Algeria). Samples of seeds were collected from different fields in the region and were described according to their form, colour, size, hardness, brightness and dimensions. Seed germination was carried out in laboratory under different temperatures (5, 10, 15, 20, 25 and 30ºC). Ten seeds were sown in a Petri dish covered with wattman paper. Three replicates were used for each species at the same temperature. Seeds were observed daily and their average germination and viability were calculated. From the results obtained, weed species were arranged into groups. Each group contains species that germinate at the same temperature. It was to differentiate between species, which show morphological similarities in their seeds. In addition, results showed that there was five groups

according to favourable temperature for seed germination. Last group their seeds did not germinate in spite of providing the right conditions. These results can help in defining ways for preventing weeds growth at the right time.

W 26

CONSERVATION VERSUS CONVENTIONAL TILLAGE ON WEED GROWTH IN BARLEY, CHICKPEA AND SAFFLOWER. S.K. Yau and Mustapha Haidar, Department of Agricultural Sciences, Faculty of Agricultural and Food Sciences, Lebanon, Email: mhaidar@aub.edu.lb

A rainfed field experiment was conducted in the semi-arid, central Bekaa Valley of Lebanon for 2-years (2005/2006 and 2006/2007) to compare minimum tillage, zero tillage with conventional tillage on weed control and performance of three crops. Tillage and crops were the 2 factors studied in a strip-plot design with 4 replicates. Tillage consisted of 3 treatments: conventional, minimum, and zero tillage. Crops studied were barley (*Hordeum vulgare* L.), chickpea (*Cicer arietinum* L.), and safflower (*Carthamus tinctorius* L.). Seeds were sown using a no-till drill, and weeds were controlled by herbicides (2,4-D and Fusilade) and hand weeding in all tillage systems. In each year, the zero tillage had similar weed number and weed dry weight m^{-2} as conventional tillage. The mean weed infestation over the two years was lower in both tillage treatments than minimum tillage. Although conventional tillage yielded higher barley than zero tillage, the zero tillage gave similar mean yield as conventional tillage for chickpea and safflower. This finding suggests that the fibrous root system of cereals may not do well under zero tillage than under conventional tillage, in contrast to legumes and safflower which have tap root system. Since zero tillage did not lead to higher weed infestation and lower yield, except for barley, than conventional tillage, it suggested that farmers should try the zero tillage. Further studies on other important crops need to be initiated.

W 27

EVIDENCE THAT CAROTENOIDS AND CHLOROPHYLL ARE NOT THE CHROMOPHORES OF BLUE LIGHT-INDUCED PREHAUSTORIA IN DODDER (*CUSCUTA CAMPESTRIS*) SEEDLINGS. Mustapha Haidar and Randa Chatila, Department of Agricultural Sciences, Faculty of Agricultural and Food Sciences, Lebanon, Email: mhaidar@aub.edu.lb

Previous studies demonstrated that cryptochromes are involved in blue light-induced coiling and prehaustoria development in young de-etiolated dodder seedlings. In this study, evidence suggests that "bulk" carotenoids and chlorophyll are not the blue light absorbing chromophores involved in the mediation of prehaustoria development to blue light. Norflurazon-bleached dodder segments coiled and formed prehaustoria under blue light. However, norflurazon significantly reduced prehaustoria number (62%) under a mixture of red and far-red light, suggesting that phytochromes could be affected by norflurazon.

W 28

CHEMICAL CONTROL OF BROADLEAF WEEDS IN LENTIL VARIETY IDLEB 2 (ILL 8553). Sobhi Mona[1] and Atef Haddad[2]. (1) Department of Plant Protection, Faculty of Agriculture Aleppo University, Aleppo, Syria; (2) International Center for Agrricultural Research in the Dry Areas (ICARDA). P.O. Box 5466, Aleppo, Syria, Email: s-mona@scs-net.org

Wide range of broadleaf herbicides belonging to different chemical groups were tested on lentil cv. Idleb 2 compared to weedy and hand weeded checks. The research work was conducted at the International Center for Agricultural Research in the Dry Areas (ICARDA) main station northwest Syria. Results showed that Bladex (cyanazine) at preemergence treatment, broadstrike (flumetsulam) at preemergence and early post emergence and Oroban (imazapic) at preemergence treatments were well tolerated by lentil but Brodal (diflufenican) and Boxer (prosulfocarb) were the most phytotoxic herbicides especially when applied as preemergence treatment. Best Biological and grain yields were obtained from Oroban treatment followed by Bladex at preemergence where lentil productivity, when using Brodal and Boxer at preemergence was poor, but these herbicides ranked first for 1000–grain weight. *Sinapis arvensis* L. was properly controlled by most herbicides tested except Oroban. Best control of *Vaccaria pyramidata* Medik was achieved by application of Brodal followed by Broadstrike at preemergence. Other tested herbicides had less performance in controlling this weed in addition to *Carthamus syriacum* Boiss and *Polygonum avicularie* L.

W 29

PENOXSULAM AS A NEW RICE HERBICIDE FOR DIRECT SEEDED AND TRANSPLANTED RICE IN EGYPT. Mike Lysandrou[1] and S. Temerak[2]. (1) Dow AgroSciences, Athens, Greece, Email: Mlysandrou@dow.com; (2) Assiut University, Egypt.

Field studies were conducted in Egypt to examine weed control, and the tolerance of six rice cultivars, to penoxsulam between 2003 and 2008. Two formulations of penoxsulam were evaluated: Rainbow® 25 OD (2.5%) for direct seeded rice and Granite® 240 SC (24%) for transplanted rice. Rainbow® 25 OD was applied POST at 24 gai/ha (400 ml/feddan) at 8-15 days after seeding, provided excellent activity on the main grasses, sedges and broadleaved weeds compared to bispyribac-sodium and thiobencarb. Granite® 240 SC demonstrated a similar trend of activity, using the poured-on technique in transplanted rice, with a wide application window of 4-15 days after transplanting. Weeds controlled included: *Echinochloa crus-galli E. colonum, Cyperus difformis, Scirpus juncoides, Ammannia* spp., and *Eclipta alba*. Both penoxsulam products were not phytotoxic to all rice varities and significantly increased the yield as compared with the control.

W 30

CHEMICAL CONTROL OF BRANCHED BROOMRAPE (*OROBANCHE RAMOSA* L.) IN PLASTIC HOUSES GROWN TOMATO. B. Alrahban[1], H. Habak[2] and M. Al Ahmad[3]. (1) General Commission for Scientific Agricultural Research, Doma, P. O. Box 113, Damascus, Syria, Email: gcsarpartect@mail.sy; (2) General Commission for Scientific Agricultural Research, Agricultural Research Center, Lattakia, Syria; (3) Tishreen University, Faculty of Agriculture, Lattakia, Syria.

Trials were careid out in Agricultural Research Center, Lattakia, in 2006. Three doses of the herbicide Imazapic (2.5, 5 and 7.5 g/h) were tested for their efficacy in controlling *O. ramosa* on tomato plants grown in plastic houses. Herbicide application was achieved with irrigation water, and before *O. ramosa* emergence. Results showed that, the three doses of Imazapic were efficient in controlling *O. ramosa* and they caused significant reduction in number of emerged shoots /m^2, dry and wet weight of these shoots. The efficacy rates measured on number of shoots/m^2 for the three applied doses were 46%, 90.28% and 94.64%, respectively. Toxicity symptoms were found on some tomato plants treated with 7.5 gr/ha, causing negative influence on tomato crop production, whereas 2.5 gr/ha caused increase in yield.

W 31

WEED CONTROL DECREASES THE COST OF PRODUCTION IN WEEDY FIELDS. Khan Bahadar Marwat, Department of Weed Science, NWFP Agricultural University Peshawar 25130, Pakistan, Email: kbmarwat@yahoo.com

Weed control is considered as an additional measure that increases the cost of production in certain crops by many farmers. To test the hypothesis, field experiment was conducted at ARF, NWFP Agricultural University Peshawar in spring 2009. Maize cultivar "Azam" was planted in rows, 75 cm apart, using RCBD design with split plot arrangements having 2 main plots and 5 subplots. One of the main plots was kept weed free while another was kept weed infested throughout the crop season. While treatments maize alone, maize + mungbean intercropped at 10 kg ha^{-1}, maize + mungbean at 20 kg ha^{-1}, mungbean alone at 10 kg ha^{-1} and mungbean alone at 20 kg ha^{-1} were assigned to the subplots. Data showed that weed control was the only option for the farmers as weed infestation throughout the season resulted in the failure of both crops planted individualy or intercropped. Thus crop failure can be avoided, and farmers will happily invest in weed control to decrease the cost of production. It was found that when weeds were controlled there was a maximum return in maize + mungbean at 20kg ha^{-1} intercropped. Predicting the long term advantage, intercropping and weed control suppressed the weed and its seed production and will fix atmospheric nitrogen that may increase the soil fertility which subsequently decrease the cost of production.

W 32

DEPLOYMENT OF HERBICIDE RESISTANCE FOR SUSTAINABLE WEED MANAGEMENT IN GRAIN SORGHUM. Kassim Al-Khatib[1], Mitch Tuinstra[2] and Kellan Kershner[1]. (1) Kansas State University, Manhattan, KS 66506 USA; (2) Agronomy Department, Purdue University, West Lafayette, IN 47907-4778 USA, Email: khatib@ksu.edu

Weed competition has been identified as one of the greatest challenges to sorghum. Grass weeds are of important concern due to their morphological and biochemical similarity and lack of herbicides that control these weeds. Although deployment of herbicide resistance crops has revolutionized weed control in several major crops, sorghum did not benefit from the technology. The objective of this research is to develop herbicide resistant sorghum utilizing resistance genes from wild relatives. Herbicide-resistant sorghum accessions that tolerate acetyl-coenzyme A carboxylase (ACCase)-inhibiting herbicides including quizalofop have been identified at Kansas State University. Studies were conducted to determine the level of resistance to ACCase-inhibiting herbicides in the wild sorghum and in a heterozygous genetic background of wild x grain sorghum. The wild biotype, elite sorghum parent Tx623, and their F1 progeny were grown under optimal conditions in a greenhouse. Sorghum seedlings were treated with selected rates of fluazifop, quizalofop, sethoxydim, or clethodim. Two weeks after treatment, plants were visually scored for injury and above-ground biomass was harvested, dried, and weighted. Levels of resistance to the four herbicides were observed in the wild biotype with a 3 to 150 fold difference. Herbicide rates that cause 50% visible injury (GR_{50}) for the wild biotype were 1956, 341, 227, and 16 g ha^{-1}; for the F1 progeny were 857, 88, 170, and 14 g ha^{-1}; and for Tx623 were 17, 2.1, 59, and 4.4 g ha^{-1} for fluazifop, quizalofop, sethoxydim, and clethodim, respectively. GR_{50} values for total plant dry weight measurement revealed similar pattern to visible injury ratings. In addition, segregation experiments showed that resistance is controlled by a single gene with point mutation at Trp2027 to Cys2027. This gene from wild sorghum represents a promising resource for developing sorghum hybrids with resistance to field rates of aryloxyphenoxypropionate herbicides, fluazifop and quizalofop, yet it still allows susceptibility to cyclohexanedione herbicides, sethoxydim and clethodim.

CHEMICALS PESTICIDES

P 1

EFFECT OF THE PESTICIDES ALPHAMETHRIN AND ACTARA ON SOME ENZYMATIC AND NON-ENZYMATIC ANTIOXIDANTS AND ON THE PEROXIDATION OF LIPIDS IN THE SERUM AND TISSUES OF WHITE MALE RATS (*RATTUS NORVGICUS*). Mona Husein Jankir and Sarab Yahya El-Qasem, Biology Department, Faculty of Sciences, Mosul University, Iraq, Email: munahj04aa@yahoo.com

The present study aimed to understand the effect of alpha-methrin and actara insecticides and to determine the medium lethal dose (LD_{50}) for these insecticides, as well as studying the effect of the different concentrations on non-enzymatic antioxidants existing in the rats body such

as glutathione (GSH) and enzymatic antioxidants such as super oxide dismutase (SOD) in the serum and tissues, taking into consideration the malodialdehyde (MDA) level which is considered as an indicator for the lipids rancidity in the serum and tissue. Results showed a significant decrease in GSH level and increase inSOD activity and a significant increase in MDA level in blood serum. Rat tissue showed a significant decrease in GSH level accompanied with significant increase in MDA level in different rat tissues (brain, heart and liver and Kidney), administeredwith different concentrations of the above mentioned insecticides compared with the control group. The alpha-methrin insecticide was considerably more poisonous than actara insecticide, expressed in the different biochemical parameters investigated.

P 2

EFFECT OF PRODUCING CONCENTRATED TOMATO PASTE AND PICKLED CUCUMBER ON OXAMYL RESIDUE. Rita Mansour and Mohamed Jamal Al-Hajjar, Faculty of Agriculture, Damascus University, Syria, Email: ritamansoor@yahoo.com

Soil was treated by the insecticide oxamyl at the recommended application rate (30 Kg/ha). The residues of oxamyl in cucumber and tomato fruits, cucumber pickles, and concentrated tomato paste were studied for a period of three weeks after treatment. The oxamyl residues were determined by high performance liquid chromatography (HPLC) using fluorescence detector at E_x= 338 nm and E_m= 455 nm. Results showed that the level of oxamyl deposits in cucumber and tomato fruits had not changed with time for the duration of experiment (0.1-0.2 mg/kg) and it was below the maximum residue limit (MRL) (2 mg/kg). The food processing to produce picked cucumber and tomato paste reduced pxamyl residues by 88-92% and 90-92%, respectively.

P 3

EFFECT OF TERPENOIDS, PHENOLS, AND ALKALOIDS OF *CONVOLVULUS ARVENSIS* L. AND *IPOMOEA CAIRICA* L. ON SOME BIOLOGICAL ASPECTS OF GREEN BUG APHID, *SCHIZAPHIS GRAMINUM* (ROND.). M. Al-Salami[1] and Fawzi S. Al-Zubaidi[2]. (1) Technical College-Authority of Technical Education, Iraq; (2) College of Science –Biology Department Baghdad- University, Iraq, Email: fawzi_alzubaidi@yahoo.com

A study was conducted to evaluate the probable effects of crude phenols, terpenoids, and alkaloids of *C. arvensis*, and *I. cairica* on some biological aspects of green bug aphid *S. graminum*. Results showed a direct correlation between crude allelochemicals mentioned above and the mortality rate of the nymphs. The data also revealed that *C. arvensis* extracts were more effective than *I. cairica* extracts. The mortality rate reached 90% at the concentration of 1% of *C. arvensis* crude phenols, and terpenoids. Whereas, it was 90% at the same concentration of terpenoids, phenols, and alkaloids of *I. cairica*. No individual nymphs were produced due to the effects of all extracts of *C. arvensis* and terpenoids and alkaloids of *I. cairica* at above mentioned concentrations. Nymphal mortality occurred within 24-48 hrs after treatment. Developmental period was also reduced in all treatments.

P 4

HISTORY OF INSECTICIDES USAGE AND THEIR NEGATIVE ENVIRONMENTAL IMPACTS IN SUDAN. Abdelrahman Hamed Abdelrahman Hashim and Abdalla Abdelrahim Satti. Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan, Email: dahamy2002@yahoo.com

Sudan is one of the pioneer world countries adopting insecticides application in agriculture, where wide scale spraying of DDT was firstly conducted at the Gezira scheme in 1945, and shortly followed by the other schemes. Consequently, several formulations of organic chemicals entered gradually to the country which started with the organochlorines, then the organophosphates, carbamates and pyrethroids, which were applied extensively for more than half a century in all agricultural sectors. Although, insecticide sprayings were greatly reduced in some large schemes as a result of IPM adoption during the end of the last century, but the problem due to the sole reliance on chemical control especially by the vegetable small holders continued. However, the irrational use of broad spectrum insecticides during that long period of time have caused several environmental catastrophies, which were discovered lately. The objective of this paper is to understand the real effects of such heavily used insecticides, on production of economic crops like cotton, besides their negative impact on different components of the environment. Studies showed that cotton yields for instance were poor, variable and uneconomical, in spite of the increasing trend in insecticidal application, during the whole period. On the other hand, toxicity and death were reported on humans, animals, birds and fish. In addition, the effects of pesticides on biodiversity were recognized from scientific research or technical reports of agricultural schemes. For example, counts of natural enemies revealed dramatic reduction in species diversity and population numbers of these bioagents during the time of pesticide use as compared with the preceded period. Hence, this presentation stresses the urgent need for applying all possible ecologically sound alternatives of pesticides within the IPM framework.

P 5

COMBINED EFFECT OF EQUIPMENT USED AND FORMULATION OF PESTICIDE ON SPRAY AND DUST DRIFT IN RELATION TO HARMFUL EFFECTS ON SOME NON-TARGET ORGANISMS. Ashraf Zalook[1] and Sherif Abouelkassem[2]. (1) Faculty of Agriculture, Al-Azhar University, Cairo, Egypt; (2) Faculty of Agriculture, Al-Azhar University, Asiut, Egypt, Email: abouelkassem_eg@yahoo.com

Field and laboratory studies were conducted in summer 2008 to investigate drift of cyanophos applied on cotton field onto adjacent maize plants in Dakalt village, Kafrelshikh governorate, Egypt. Drift deposits of Cyanophos was determined as µg/kg maize leaves. The determinations were conducted on leaves of maize grown at various distances from the edge of the treated cotton fields

(i.e. 5, 8, 14…. up to 51 m). Distances traveled by drift in the 1st spray were farther than those of the 2nd spray, mainly because wind speed was higher during 1st spray (wind speeds were 3.8 and 2.6 km/hr during time of application in the 1st and 2nd sprays, respectively). The farthest distance within maize field reached by drift was observed for the dust application followed by micron ULVA and mistblower spraying (the distances were 26, 35 and 44 m in the first spray when using the mistblower, micron ULVA and the mistblower as a duster, respectively). The corresponding values of drift deposits were 18.5, 13.6 28.4 µg/kg maize leaves, respectively. The potential drift emitted by micron ULVA compared with that of mistblower may be due to the smaller droplets of the former sprayer. Drift of Cyanophos released by each of the tested equipment caused 100% mortality of fish or honeybees placed at the distances 5 and 7 m from the edge of treated cotton field. For the dust application, 100% mortality was observed at longer distances (14 and 21 cm). The study suggests that buffer zones (no spray zones) have to be established downwind of the treated field to avoid environmental contamination due to off-target deposition of pesticide drift. The model and specifications of these zones depend on quality of spray, release height, wind speed and other factors. Other measures of drift mitigation have to be considered.

P 6

EFFECT OF FUNGICIDE TREATMENTS ON DRY MATTER AND SOME NITROGENOUS COMPOUNDS IN POTATO TUBERS. M.E.O. Elsayed[1, 2], E. Pawelzik and A. Keutgen[1]. (1) Section Quality of Plant Products, Department of Crop Science, Georg-August University Göttingen, Carl-Sprengel-Weg 1, 37075 Germany; (2) Departmant of gums chemistry and processing, Gum Arabic Research Centre, University of Kordofan, Elobeid, P.O. Box 160, Sudan, Email: mustafa2274@yahoo.co.uk

The application of fungicides guarantees disease control as well as improves growth of crop plants which leads to high yield. Research was conducted by several workers to assess the changes induced by fungicide application in chemical composition of different crops including potatoes *Solanum tuberosum* L. The purpose of this study was to assess the effects of different fungicide treatments of potato plant on changes in dry matter and some nitrogenous compounds namely crude protein, nitrate concentration and total free amino acids in potato tubers. In this respect, various fungicides were used against *Phytophthora infestans*, which cause late blight disease in potato foliage and potato tuber. The biochemical parameters studied contribute in a varied manner to the quality aspects and nutritional value of the tubers. The current study was conducted in two consecutive seasons (2000 and 2001) in Göttingen, Germany. Two potato cultivars Hansa and Milva and three different fungicides treatments were used. Results revealed that dry matter content and crude protein were increased. In cv. Hansa, in 2000, these parameters did not however change, nitrate concentration has been decreased and total free amino acids either remained unchanged or decreased in response to fungicide treatments. It is concluded that tubers produced by fungicide treated plants were healthy and had in general higher dry matter, compared to tubers from untreated plants. The decline of some parameters in tubers of fungicide treated plants may partly, but not considerably, influence their quality and nutritional characters.

P 7

EFFECT OF TEMPERATURES ON THE STABILITY OF SOME PESTICIDE FORMULATIONS. H.I. Awad[1], J.F. Wahib[2], I.I. Al-Yasyeri[2] and H. Shamkhi[3]. (1) State Board for Agric. Res., Ministry of Agriculture, Baghdad, Iraq; (2) State Board for Plant Protection, Ministry of Agriculture, Baghdad, Iraq; (3) Tarik State Company, Baghdad, Iraq, Email: hi_awad@yahoo.com

Fifteen pesticides representing different formulations, such as EC, ULV and WP were tested. Results revealed that solid formulations were more stable than liquid formulations at high temperatures 54±2°C. The most affected emulsifiable concentrates were Nogos (dichlorovos), Diazinon, and Senthion (fenitrothion). The effect is attributed to degradation in the active ingredient and to seperation of components of formulated pesticides such as emulsifiers. The results showed also the importance of active ingredients origin, and the emulsifying agents added to the failure of emulsifiable formulations. Low temperature was found to have no detectable effect on the stability of tested pesticides under study.

P 8

STUDY OF THE PERSISTANCE OF DIMETHOATE IN OLIVE FRUITS AND SOIL. M. Maher Khaznawi[1], M. Jamal Hajjar[2] and Marwan Dimashqi[3]. (1) Directorate of Plant Protection, Ministry of Agriculture, Damascus, Syria; (2) Plant Protection Division, Faculty of Agriculture, Damascus University, Syria; (3) General Agency of Environment affairs, Damascus, Syria, Email: asir78@hotmail.com

This study was carried out at Abou Jarash farm, Faculty of Agriculture, Damascus University, to estimate the persistence of Dimethoate and its oxygen–analogue metabolites (Omethoate) in olive fruits and soil. Recommended application rate of 100 ml/100 liter water of Dimethoate 40% EC on olive trees was used. Pesticide residues in olive fruits were extracted by chloroform following Paolo Cabras method. The soil samples were extracted with mixture of acetone–water (95:5). Dimethoate residues were detected by Gas Chromatography equipped with flame–photometric detector (GC–FPD). The results showed that the residues in olive fruits were 9.264 mg/kg after one hour post treatment and then decreased to 5.422, 3.968, 2.662, 2.278, 1.429, 1.687 and 0.723 mg/kg after 1, 3, 7, 10, 15, 20 and 25 days of application, respectively. Pesticide degradation occurred through two main stages: relative sharp degradation stage during the first 10 days after application which showed a reduction in residues from 9.264 mg/kg to 2.278 mg/kg. In this stage almost 74.41% of the initial deposit was degraded. In the 2nd stage, the degradation was relatively slow and the residues were decreased from 2.278 mg/kg to 0.723 mg/kg. The

remaining deposit of 0.723 mg/kg after 25 days was above the recommended level (MRL = 0.5 mg/kg) on olives. Dimethoate half-life on olives was 8.4 days and the calculated pre-harvest intervals (PHI) was 53.6 days. Whereas the PHI, as stated by the manufacturing company, was 21 days. The pesticide residues in soil was 5.059 mg/kg after one hour post treatment, then decreased to 0.789, 1.006, 0.614, 0.555, 0.687, 0.377 and 1.026 mg/kg, after 1, 3, 7, 10, 15, 20 and 25 days, respectively. The pesticide degradation occurred through two main stages: relative sharp degradation, which happened directly one day after application, in which the residues decreased from 5.059 mg/kg to 0.789 mg/kg. In the 2nd stage, the degradation was relatively slow with alternation in decrease and increase of residue quantities. The residues increased 3 days after application reaching 1.006 mg/kg, then decreased to 0.377 mg/kg after 20 days, with a total degradation of 92.54% of the initial deposit. The half-life in soil was 17.7 days (humidity percent was 2.7%, pH = 8 and the soil type was clay – loam). This study showed that the persistence of Omethoate in both olive fruits and soil, was observed at the beginning of the applications until the end of sampling period, 25 days post treatment. The residue quantities ranged from 0.836 to 0.361 mg/kg in olive fruits and from 0.069 to 0.001 mg/kg in soil.

P 9

TOXICITY OF THE PESTICIDE DELTAMETHRIN (K-OTHRINE) ON PLANT CELLS USING PLANT TISSUE CULTURE OF THE BLACK SEED *NIGELLA SATIVA* L. Hana Saeed Al-Saleh, Biology Department, College of Science, Mosul University, Iraq, Email: hanasa59@yahoo.com

The toxicity effect of the pesticide Deltamethrin (K-Othrine EC 2.5%) on the plant cell was conducted. The expermint was carried out using callus culture of *Nigella sativa* initiated from stem explants of seedlings cultured on MS medium supplemented with 10^{-6}M of 2,4-D (MS standard).Callus was cultured on MSO and MS (standard) medium with addition of 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1.0, 2.0, 4.0% of K-Othrine. Results showed that addition of 0.01, 0.02, 0.05% K-Othrineslightly enhanced callus growth,whereas, addition of 2.0 and 4.0% was harmful and caused callus death within 7 days. Fresh weight of callus grown on standard MS medium reached 2.585 g 30 days after culture, whereas, callus grown on MS medium with addition of 0.01, 0.02 and 0.05% of the pesticide reached 5.332, 3.839 and 7.112g. The study also showed enhancement of protein synthesis in the callus grown on these media.

P 10

EFFICIACY OF SOME ETHANOLIC PLANT EXTRACTS AGAINST SOME RODENT SPECIES UNDER AGAINST SOME RODENT SPECIES UNDER Laboratory AND FIED CONDITIONS. Abd El Raoof A. Mourad[1], Saied Dahroug[2], Zidan H. Abd El Hamied[2] and Hassen I. El Deeb[1]. (1) Plant Protection Research Institute, Agriculture Research Center, Dokki, Giza, Egypt; (2) Faculty of Agriculture, Ain Shams University, Cairo, Egypt, Email: dr_homam@hotmail.com

The efficacy of three plant extracts as rodenticides against some rodent species *Rattus norvegiens*, *Rattus rattus* and *Meriones shawi* was determined under laboratory conditions by using choice feeding method. The results showed that the three tested plant extracts namely, Oshar leaves, Cumin and Golden Shower seeds exhibited noticeable rodentical effects against the treated rats. Toxicity data revealed that ethanolic Oshar leaves extract proved the most effective one against the albino rats followed by Cumin seeds extract, while Golden shower seeds extract was the least effective. Under the field conditions, ethanolic extract of Oshar leaves caused the highest population of reduction 83.79% on *R. rattus* and 65.04% *M. shawi*. The corresponding reduction reached 74.50 and 67.69% (*R. rattus*) and 51.22 and 37.86% (*M. shawi*) with Cumin and Golden Shower seed extracts, respectively.

P 11

THERMAL DEGRADATION OF CARBENDAZIM AND THIOPHANATE-METHYL BY FTIR TECHNIQUE WITH PHYSICAL AND BIOLOGICAL EVALUATION. Alaa H. Al-Fartoosy, Plant Protection Department, College of Agriculture, Basra University, Iraq, Email: alaaalmufteen@yahoo.co.uk.

The aim of the study was to investigate the effect of tropical temperature on the storage of Bell and Topsin-M wettability, active ingredient, acidity measurement, absorbance of infrared radiation and bioassay. The results demonstrated that the thermal storage lead to increase in wettability time for both fungicides but did not exceed the acceptable period of 2 min. Storage heat caused partial degradation of active ingredients of Carbendazim 42% and 31.8% after one and two months of storage and Thiophanate-Methyl 44.5% and 37.6%, respectively. In addition, storage caused increase in acidity of Carbendazim value from 0.157 before storage to 2.47 after two months and for Thiophanate-Methyl, the value increased from 0.09 before storage to 0.402 after two months. The FTIR spectra improved the breakdown of active ingredients for both fungicides and led to the formulation of new metabolic products (5-hydroxycarbendazim for Carbendazim and Dimethyl-4,4-O-Phenylenebis (allophanate) for Topsin-M) after two months storage. Bioassay results indicated that the inhibitory effect of both fungicides on *Fusarium oxsporium* growth was the same before and after storage.

P 12

FIELD EVALUATION OF SIX ACARICIDES AND THE DISTRIBUTION PATTERN OF *ACULOPS LYCOPERSICI* (MASSEE) ONTOMATO LEAF. Mushtak T. Mohammed, Plant protection Department, College of Agriculture , Basra University, Iraq, Email: mushtak74@yahoo.com

A field study was conducted to evaluate the toxicity of six acaricides against tomato rust mite *Aculops lycopersici* (Massee) (Acari: Eriophyidae) and the distribution pattern on upper and lower of tomato plant at Al-Zuber region , Basra governorate during fall 2007 season. The results revealed that Polo 500 SC was the most effective acaricide against this mite, reaching 0.04 mite/leaf

followed by Ortus 5 SC and Neuron 500 EC which reduced mite population to an average of 0.49 and 0.56 mite/leaf. The highest mite population was recorded for the Hostathion 40 EC treatment. Studies of leaf surface preference and plant levels showed that mite prefers to live on the lower leaf surface and the lower parts of the plant.

P 13

PERACETIC ACID AND HYDROGEN PEROXIDE (JET 5) SUPPRESS PHYTOPATHOGENIC FUNGI AND BACTERIA *IN − VITRO* AND IN COLD ROOM ENVIRONMENT. Youssef Khamis[1,2], Corrado Cariddi[1], Arben Myrta[3] and Antonio Ippolito[1]. (1) Department of Plant Protection and Applied Microbiology, University of Bari, Via G. Amendola 165/A, 70126, Bari, Italy, Email: youssefeladawy@yahoo.com; youssefeladawy@agr.uniba.it; (2) Plant Pathology Research Institute, Agricultural Research Center, Giza-Egypt; (3) Certis Europe B.V. Via A. Guaragna 3, 21047 Saronno (VA), Italy, Email: ippolito@agr.uniba.it

The use of synthetic fungicides for the control of the diseases of fresh fruit and vegetables is restricted by the actual EU and national legislation due to the possible risks for humans and environmental health. Therefore, there is an increasing need for unconventional and preventive control means to establish an eco-compatible agriculture. The effect of Jet 5 (a mixture of peracetic acid 5% and hydrogen peroxide 20%) was tested against some important phytopathogenic fungi and bacteria and in a cold storage room for fresh fruit and vegetables. Jet 5 at concentrations of 0.25, 0.5, 0.75 and 1% mixed with Potato Dextrose Agar (PDA) medium was tested against *Penicillium italicum*, *P. expansum*, *Monilinia laxa* and *Botrytis cinerea*. Whereas, the compound at concentrations of 0.062, 0.125, 0.25, 0.5%, and 1% mixed with Sucrose-Nutrient Agar (SNA) medium was tested against several phytopathogenic bacteria including *Erwinia amylovora*, *Agrobacterium tumefaciens*, *Clavibacter michiganensis* subsp *michiganensis*, *Pseudomonas* spp., *Xanthomonas campestris* pv *vesicatoria* and *Pectobacterium carotovorum* subsp *carotorum.* Jet 5 at 0.75% gave a complete growth inhibition of all fungi tested, except for *B. cinerea*, being completely inhibited at 1%. The mixture at 0.125% gave a complete inhibition of all tested bacteria species, except for *Pseudomonas viridiflava* which was completely inhibited at 0.25%. In the application as aerosol for air sanitation in a cold storage room, Jet 5 applied at 0.6 ml/m^3, reduced microbial air population by 88.5% for *Penicillium* spp. and *Cladosporium* spp. and by 60.5% for yeasts.

P 14

ACTIVITY OF SALTS IN COMBINATION WITH WAX AGAINST POSTHARVEST ROTS ON CITRUS FRUITS. Youssef Khamis[1,2], Angela Ligorio[1], Thaer Yaseen[3], Franco Nigro[1] and Antonio Ippolito[1]. (1) Department of Plant Protection and Applied Microbiology, University of Bari, Via G. Amendola 165/A, 70126, Bari, Italy, Email: youssefeladawy@yahoo.com; youssefeladawy@agr.uniba.it; (2) Plant Pathology Research Institute, Agricultural Research Center, Giza-Egypt; (3) Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari, Italy, Email: ippolito@agr.uniba.it

Due to toxicity, oncogenic risk, environmental pollution and lack of activity due to the development of pathogen resistant strains, the use of fungicides to prevent microbial spoilage is in general no longer recommended to control postharvest disease. Therefore, the demand for alternative control means is continuously rising. Beside fungicide application, during postharvest handling, citrus fruit are waxed in order to improve their overall appearance and to preserve the internal quality. The role of mixed application of wax and salts on the development of postharvest diseases was examined on two citrus varieties, 'Comune' clementine and 'Tarocco' orange. Common food additives, i.e. sodium carbonate and bicarbonate, potassium carbonate and bicarbonate, ammonium bicarbonate and potassium sorbate, at a concentration of 6% (w/v), in combination with a commercial wax, were evaluated for their activity against postharvest rots. Fruit were stored for one month at 4°C ('Tarocco' orange) or 6°C ('Comune' Clementine), followed by one week of shelf life at 20±2°C. Major rots were due to *Penicillium digitatum* and *P. italicum*, with an incidence of 11 and 4% for 'Comune' clementine and 'Tarocco' orange, respectively; the incidence of *P. ulaiense* infection was negligible and appeared at the end of the storage. Rots caused by *Botrytis cinerea* and *Alternaria* spp. showed an incidence, on the whole, lower than 1% on 'Tarocco' orange and around 3% on 'Comune' Clementine. The incidence of post-harvest rots on fruits treated with wax was significantly higher as compared to fruit treated with water; whereas, in fruit treated with wax combined with different salts, rot incidence was significantly lower than the control, the combination wax/potassium sorbate was the most effective.

P 15

TESTING EFFECTIVENESS OF DIFFERENT PESTICIDES ON *FRANKLINIELLA OCCIDENTAILS*. Hassina Benmessaoud-Boukhalfa, Département de zoologie agricole et forestière Ecole nationale supérieure agronomique hacene Badi, Alger, Algeria, Email: h.benmessaoud@ina.dz; hassina_b52@yahoo.fr

Frankliniella occidentalis, causes serious damage to crops in greenhouses mainly cucumber on which our study was conducted. Thrips prefer moderate light intensities and that is why it is often found on the underside of leaves. A study of the spatial distribution of this pest has shown that the larval stages are more important on the leaves (43.6 larvae on the basal leaves and 28.1 larvae on upper leaves) than adults (11.75 adults basal leaves and 5.6 adults in the upper leaves). A test of effectiveness of seven active ingredients on *Frankliniella occidentalis* gave the following results: average corrected mortality of 85% was obtained with profenofos, pymetrozine and the thiametoxam; 79% wih Lufénuron and Abamectin and 65% with Lambda-cyhalothrin and Diafenthiuron.

PLANT EXTRACTS

EX 1

ANTIFUNGAL ACTIVITY OF SOME PLANT EXTRACTS. Faozia A.A. Ibrahim[1], Nawara Mohamed[2] and Zakia M. Senossi[2]. (1) Department of Food Sciences, Faculty of Agriculture, Omer Al Mukthar Unversity, Al-Baida, P.B. 919, Libya; (2) Department of Plant Protection Faculty of Agriculture, Omer Al Mukthar Unversity, Al-Baida, P.B. 919, Libya; (3) Department of Horticulture, Faculty Agriculture, Omer Al Mukthar Unversity, Al-Baida, P.B. 919, Libya, Email: noboshakoa@yahoo.com

Ethanolic extracts of tarragon (*Artemisia dracunculus*), rosemary (*Rosemarinus officinalis* L) and thyme (*Thymus vulgaris* L.) and the essential oil of oregano (*Origanum vulgare* subsp. *Hirtum*) were tested against several fungi including *Aspergillus niger, A. flavus, Penicillium* sp., *Rhizopus* spp. and *Fusarium* spp. Oregano essential oil showed a very strong antifungal activity against *Fuasarium* spp. (MIC 0.8 mg/ml) and *Penicillium* spp. (MIC 0.9 mg/ml) whereas other fungi were more resistant. The results showed that *Rhizopus* spp. were the most sensitive fungi to the plant extracts, whereas rosemary extract was the most effective. Application of oregano essential oil or rosemary extract with different concentrations (100, 500, 1000, 1500, 2000 ppm) and storage at either 5 or 25°C for postharvest control of tomatoes for three weeks showed that the combination of two treatments (refrigeration and rosemary extract or oregano essential oil) was more effective in preserving tomatoes quality.

EX 2

INHIBITORY EFFECT OF AQUEOUS AND ALCOHOLIC EXTRACTS OF *NERIUM OLEANDER* L. FLOWERS ON DIFFERENT SPECIES OF *ALTERNARIA*. R.K Al Barhawi and W.S. Kassem, Department of Life Science, Faculty of Sciences, Mosul University, Iraq, Email: riyadh.albarhawi@yahoo.com

The inhibitory effect of aqueous and alcoholic extracts of *Nerium oleander* L. flowers on different species of *Alternaria* isolated from summer and winter vegetables with leaf spot disease, in Mosul city, was studied. Alternaria species included: *A. brassicicola*, *A. brassicae*, *A. alternata*, *A. longipes*, *A. dianthi*, *A. cheiranthi*, *A. tenuissima*, *Alternaria* state of *Pleospora infectoria*, *A. radicina* and *A. raphani*. One of *Alternaria* isolate was greatly affected by the aqueous extract. The average inhibition in colony diameter was 42.3%. The inhibitory effects were 41.7, 40.5 and 22.9% for *A. raphani*, *A. dianthi* and *A. dianthicola*; respectively. The alcoholic extract of *N. olearder* flower showed clear effect on the average inhibition in colony diameter of different species; they were 67.9, 65.4, 65.3 and 53.1% in *A. alternata*, *A. brassicicola*, *A. dianthicola* and *A. radicina*, respectively. The study showed that these extracts can be utilized, especially the alcoholic extract, as aid agents in any future programme of biological control or integrated control of the above pathogens.

EX 3

THE EFFECT OF THE AQUEOUS AND THE ALCOHOLIC EXTRACTS OF *TRIBULUS TERRESTRIS* L. AND *CYNODON DACTYLON* L. ON SEED GERMINATION OF CUCUMBER (*CUCUMIS SATIVUS*) UNDER LABORATORY CONDITIONS. Othman Salem Edakhli, Higher and Middle Level Center of Agricultural Technology, Gheeran, Aljefara Branch, the Great Jamaheereyya, POB 151, Tripoli, Email: Organic_libya@yahoo.com; amn_de@yahoo.com

A 25 gram dry matter of *Cynodon dactylon* or *Tribulus terrestris* were soaked in 100 ml of dH2O to prepare the aqueous extract or 100 ml ethanol 96% to prepare the alcoholic extract. The effect of the following dilutions: 0, 1, 2, 3 and 4%, from each extract on seed germination of cucumber was studied. Germination of cucumber seeds were significantly higher in *Tribulus teresstris* extracts than in *Cynodon dactylon* extracts. Germination in the aqueous extract of *Tribulus teresstris* was higher (71.67%) than in the alcoholic extract (54.5%). Germination in either extracts of *Cynodon dactylon* was similar. The higher the concentration of the extract the lower was the germination rate and the longer was the pre-germination period.

EX 4

EVALUATION OF THE EFFICIENCY OF SOME PLANT EXTRACTS FOR ASCOCHYTA BLIGHT DISEASE CONTROL OF CHICKPEA. Mysire Majeed Jarjees[1], F. Al-Dulaimy[2], A. Al-Azawi[2], S. Al-Amry[2] and A. Faic[2]. (1) College of Agriculture, University of Baghdad, Baghdad, Iraq, Email: mysirem@yahoo.com; (2) State Board for Agricultural Research, Ministry of Agriculture, Iraq.

Ascochyta blight disease of chickpea is considered the most serious disease that affect chickpea worldwide. Garlic and thuja extracts were used for Ascochyta blight disease control. Results obtained showed that extracts of garlic and thuja were effective at 2, 4, 6 g/l concentration against the fungus *Ascochta rabiei* in culture media compared with untreated control. The highest level of inactivation was achieved by the application of thuja extract at 6 g/l concentration which reached 59.93% while the lowest inactivation level was recorded for garlic extract at 2 g/l concentration. Results also revealed that the application of both extracts after artificial inoculation with the fungus significantly reduced infection severity at 2, 4, 6 g/l concentrations. The infection rate for garlic and thuja extracts at 6g/l concentration were 44.4%, 48.10%, respectively, compared with control (unsprayed) (87.57%). The efficiency of extracts varied according to their concentration. The application of extracts before inoculation showed the same trend as the application after inoculation.

EX 5

FUNGICIDAL AND HERBICIDAL EFFECTS OF THE FORMULATIONS OF THE ACTIVE COMPONENTS EXTRACTED FROM SOME PLANTS. M.S. El-Zemaity[1], M.A. Abdel-Gawad[2], Naglaa M. Soliman[2]. (1) Plant Protection Department, Faculty of

Agriculture, Ain Shams University, Cairo, Egypt; (2) Central Pesticides Laboratory, Agriculture Research Center, Geiza, Egypt, Email: mselzemaity@hotmail.com

The study aims to evaluate the herbicidal and fungicidal activity of some potent components of plant extracts from the following species: *Peganum harmala*, *Solanum nigrum*, *Silybum marianum* and *Xanthium punganes*. Formulation of the alkaloids extracted from the seeds of *Peganum harmala* and fresh unripe from *Solanum nigrum* were evaluate for their pesticidal activities. Also, extraction and formulation of the naturally occurring terpenoids obtained from the leaves of *Silybum marianum* and *Xanthium punganes* were evaluated on seeds of cucumber and wheat as test plants representing monocotyledons and dicotyledonos herbs was determined. The fungicidal effect of the extracted alkaloids and terpenoids on *Alternaria sp*, *Sclorotium rolfsii*, and *Asperagulus flavus* fungi was also determined. Formulation of the extracted alkaloids and terpenoids that gave high pesticidal activity was carried out in the form of emulsifiable concentrate where their physico-chemical properties were measured to determine the most successful formulation. The data obtained indicated the high pesticidal activity of the extracted alkaloids from *Peganum harmala* and *Solanum nigrum* and their formulation as emulsifiable concentrates. All formulations tested passed physico-chemical properties tests based on WHO measures. Isolation and primary identification of compounds of the alkaloids extracted from *Peganum harmala* and *Solanum nigrum* were also carried out.

EX 6

EFFICACY OF SOME PLANT EXTRACTS AND PLANT OILS AS REPELLANTS TO THE HOUSE SPARROW AND INSECTS LARVAE ATTACKING SORGHUM HEADS IN THE FIELD. Adel M. El-Rawy[1] and Ahmad E.A.A. Mourad[2]. (1) Plant Protection Research Institute, ARC, Dokki, Giza, Egypt; (2) Sorghum Department, Field Crops Research Institute, ARC, Giza, Egypt, Email: adel_elrawy69@yahoo.com

The efficacy of seven plant extracts and five plant oils were tested as repellents to house sparrow, *Passer domesticus niloticus* and three head worms; *Autoba* (*Eublemma*) *gayneri*, *Cryptoblabes gnidiella* and *Pyroderces simplex* on sorghum Dorado variety under field conditions in Sids Agricultural Research Station, Beni-Sueif Governorate, during 2005 and 2006 seasons. This work revealed that, the bird damage was clearly higher for grains during the mature stage (8.6-45.9%) than those of the dough stage (2.1-8.2%). The plant extracts and oils caused a grain yield protection from the bird damage reached 36.3-69.7% in dough stage and 27.4-81.2% in mature stage at the same time the treatment decreased the insects' larvae numbers by 3.8-100% during the dough stage. Effects of the plant extracts differed according to the insect species. Cumin water extract was the best against all insects, it reduce their populations by 42.0-79.1 and 68.4-100% for the two years, respectively. The least effective was wormwood acetonic extract (26.7-34.0% reduction) and Lupine water extract (6.9-29.7% decrease) in the first and second seasons, respectively. As for plant oils, Neemix oil, was relatively the most effective in the first year, it reduced insect population by effective with 38.7-54.9%, the Lupine oil was the most effective in the second season (35.1-81.3%), whereas, coriander oil was the least effective with, 3.8-53.2% reduction only. The results revealed that, using 8% water extracts of Wormwood, Cumin, Coriander, Fenugreek, Lupine and Colocynth gave a high net benefit and protection for sorghum heads from house sparrow and insects' larvae.

EX 7

ANTIMICROBIAL INHIBITORY EFFECT OF ALCOHOLIC AND WATER EXTRACTS OF DATE PALM SEED POWDER ON SOME GRAM POSITIVE AND NEGATIVE BACTERIA. Sarab D. Al-Shamaa, Adeeba Y. Shareef, Shababa Abdul Latif Bahjat, Department of Biology, College of Science, Mosul University, Iraq, Email: drsarabalshamaa@yahoo.com

The objective of this work was to test the antimicrobial inhibitory effect of alcoholic and water extracts of date palm seed. Extracts had been prepared into two ways: alcoholic extract of date palm seed was prepared by soaking seeds in water for one week; crushed, solubilized in ethanol and dried. The crushed seed in the second way was solubilized in water and dried. The inhibitory effect of the two types had been studied against the following bacterial specieses: *Klebsiella* sp, *Staphylococcus aureus*, *Proteus* sp, *Neisseria gonorrhoea*, *E. coli*, *Salmonella* sp, *Serratia* sp, *Psedomonas auroginosa* and *Streptococcus* sp. These extracts revealed inhibitory effects against *Staphylococcus aureus* and *Niesseria gonorriea.* It is advised to test its inhibitory effect against harmful plant bacterial pathogens such as *Erwinia* and *pseudomonas.*

EX 8

PHYTOCHEMICAL AND TOXICOLOGICAL EFFECT OF CERTAIN PLANT EXTRACTS AGAINST POTATO TUBER MOTH, *PHTHORIMAEA OPERCULELLA* AND GREEN PEACH APHID, *MYZUS PERSICAE*. Homam B. Homam[1], Asma El-Z. Sharkawy[2], Halmey A. Zeidan[1], Afaf Abd El-Wahab[2] and Hala E.A. El-Mowafy[1]. (1) Agriculture Research Center, Plant Protection Research Institute, P.O. Box 12816, Giza, Egypt; (2) Faculty of Science, Al-Azhar University, Girls Branch, Egypt, Email: dr_homam@hotmail.com; homam_b@yahoo.com

Phytochemical constituents were separated and ethanol hexane extracts identified in the arial parts of *Peganum harmala* (Harmal) and *Pelergonium graviolens* Granum and Green potato crusts of potato tuber *Solanum tuberosum*. The evaluation of plant extracts was done by dipping and the residue film acted against both *Phthorimaea operculella* (PTM) larvae and *Myzus persicae* nymphs. Phytochemical analysis indicated that Harmal extract contained carbohydrate and/or glycocides, tannins, saponins, alkaloids, flavonoides, but sterols and/or triterpenies existed in medium amounts On the other hand, Geranium extract had carbohydrates and/or glycocides, tannins, saponins sterols and/or triterpenies, alkaloids, but flavonoides existed in medium amounts. Green potato

crusts contained carbohydrate and/or glycocides, tannins alkaloids but saponins and sterols and/or triterpenies existed in medium amounts. Green potato crusts had noflavonoides. Dipping technique was more effective to both Geranium and Green potato crusts than residue film against PTM. The extractions tested could be arranged in descending order as follows: Geranium, Green potato crusts and Harmal (76.6, 70.0 and 65.6% mortality at 120 ppm concentration, respectively). According to phytochemical analysis, sterols and/or triterpenies existed in Geranium more than Harmal and Green potato crusts and were effective against newly hatched larvae of PTM. Hence, the greatest amount of sterols and/or triterpenies may be responsible for the efficiency of Geranium extract against *P. operculella* larvae. In respect to *Myzus periscae*, dipping technique for Green potato crusts, Geranium and Harmal recorded 76.6, 63.3 and 56.6% mortality at the concentrations 200, 3200 and 4000 ppm, respectively.

EX 9

USE OF SOME PLANT EXTRACTS FOR CONTROL OF THE ROOT-KNOT NEMATODES *MELOIDOGYNE JAVANICA* IN LABORATORY AND GREENHOUSE EXPERIMENT. Idres A. Suliman[1], Mahmoud K. Al-hweati[2] and Issa A. Abougarsa[2]. (1) Plant Production Department, Faculty of Agriculture, Garyounis University, Libya, Email: aasa2080@yahoo.com, aasa2080@yahoo.com; (2) Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, Al-Bida, Libya.

The results and statistical analysis of the effect of garlic, rosmary and myoporum extracts on reproduction of *Meloidogyne javanica* indicated that all tested extracts suppressed reproduction of nematodes on "Riogrande" tomato seedlings receiving 100 J2 per plant. The most effective was garlic extract at 6% concentration, producing a high mortality of J2 at an average of 22.3 and 26.0 J2 after 96 and 120 hours treatment, respectively. The use of 6% garlic extract led to an average of 1.60, 4.44 and 1.25 for gall-index, number of females and egg masses index, respectively, as compared to 2.33, 17.79 and 5.58 at 4% concentration.

EX 10

REPELLENT ACTIVITY AND PERSISTENCE OF ESSENTIAL OILS FROM *CARUM COPTICUM* AND *VITEX PSEUDO-NEGUNDO* ON *SITOPHILUS ORYZAE*. Bibi Zahra Sahaf and Saeed Moharramipour, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P.O. Box 14115-336, Tehran, Iran, Email: sahaf@modares.ac.ir

Protection of stored agricultural products against insects is carried out mostly with chemical insecticides. These insecticides cause harmful effects on the environment. Recently, several studies on alternative substances with insecticidal activity, such as the use of essential oils of plants to control storage insect pests were reported. Essential oils are volatile and can act like fumigants offering the prospect for use in stored products protection. The objective of the present study was to test the possible properties of, essential oil vapors from medicinal plants, *Carum copticum* C. B. Clarke (Apiaceae) and *Vitex pseudo-negundo* (Haussk) Hand. I. MZT. (Verbenaceae) essential oil vapors against. *Sitophilus oryzae* L. (Coleoptera: Curculionidae) to elucidate their mode of action and persistence. The experiments were conducted at 27±1°C, 60±5% R.H. and in dark conditions. The essential oils were obtained from seeds of *C. copticum* and dry leaves of *V. pseudo-negundo*, and subjected to hydrodistillation using a modified Clevenger-type apparatus. The highest concentration of the *C. copticum* and *V. pseudo-negundo* oils (3 µL per 1 ml acetone) caused 69.64 and 57.45% repellency on adult insects, respectively. At 926 µL/L air, persistence and half-life time of the *C. copticum* (42.04 days) oil was significantly longer than that of *V. pseudo-negundo* (7.16 days).The results demonstrated the efficacy of these two essential oils for use in organic food protection. They can prevent the infestation of the stored-product pests in warehouses.

EX 11

EFFECTS OF *MELIA AZEDARACH* L. AND *OCIMUM BASILICUM* L. EXTRACTS AGAINST THE STORED PRODUCTS PEST *TRIBOLIUM CASTANEUM* HERBST. Mustapha Bounechada[1], R. Arab[2], W. Begam[3] and Z. Takerkert[3]. (1) Laboratory ADPVA, Faculty of Sciences, Setif; Algeria; (2) UFAS, Department of Biology, Faculty of Sciences, Setif; Algeria; (3) UFAS, Department of Agronomy, Faculty of Sciences, Setif; Algeria, Email: Bounechadam@yahoo.fr

Powder extracts from unripe fruits of *Melia azedarach* L. (Meliaceae) and leaves of *Ocimum basilicum* L. (Lamiaceae) collected from north east of Algeria (Setifian area), were tested at different concentrations 10, 15 and 30% for their effects against larvae and adults of *Tribolium castaneum* Herbst (Coleoptera: Tenebrionidae), the pest of stored grains grain stored under laboratory conditions, as a measure towards natural protection of crops, food stocks and the environment. In general, the fruits powdered extract of *M. azedarach* showed higher bioactivity at all doses than the same doses of the leaf extract of *O. basilicum*, while the leaf extract of *O. basilicum* proved to be more active, at higher doses. Laboratory experiments showed also that the fruits and leaves powdered extracts were more toxic on larvae than on adults activity of *T. castaneum* at all doses. The less expensive and naturally occurring biopesticides may be safe alternative to synthetic pesticides to protect cereal stored grains.

EX 12

EFFECT OF AMMOIDES PUSILA AND THYMUS NUMIDICUS ESSENTIAL OILS ON *PSEUDOMONAS SYRINGAE* PVS. Hocine Laouer[1], Meriem El Kolli[1], Mebarka Lamamra[1], Daoud Harzallah[2], Mohamed M. Zerroug[2], and Farida Sahli[1]. (1) Laboratory of Natural Ressources; (2) Valorization Laboratory of Applied Microbiology, Department of Biology, Faculty of Sciences, University Ferhat Abbas, Sétif 19000, Algeria, Email: hocine_laouer@yahoo.fr

The antmicrobial activity of the essential oils of *Thymus numidicus* and *Ammoides pusilla* were assayed against five strains of bacteria: *Pseudomonas syringae* pv. *morsprunorum* 330; *Pseudomonas syringae* pv. *morsprunorum* 1460; *Pseudomonas syringae* pv. *morsprunorum* 1781; *Pseudomonas syringae* pv. *phaseolicola* 1099 and *Pseudomonas syringae* pv. *maculicola* 1776. The results revealed that the investigated oils exhibited a remarkably higher antibacterial activity, particularly the *Ammoides pusilla* two fold dilution against *Pseudomonas syringae* pv. m*aculicola* and *Pseudomonas syringae* pv. *phaseolicola* 1099.

EX 13

FUMIGATION OF STORED DATES INSECTS *ECTOMYELOIS CERATONIAE* AND *EPHESTIA KUEHNIELLA* WITH *LAVANDULA OFFICINALIS* L. ESSENTIAL OIL AS ALTERNATIVE TO METHYL BROMIDE. Jouda Mediouni-Ben Jemâa[1], Olfa Bachrouch[2,3], Brahim Marzouk[3] and Manef Abderraba[2]. (1) Laboratoire de Protection des Végétaux, INRAT, 2049 Ariana, Tunisia; (2) Unité de Recherche de Physico-Chimie Moléculaire (URPCM). IPEST BP51270 La Marsa Tunisie ; (3) Unité de plantes aromatiques et Médicinales. Centre de Biotechnologie du Technopole de Borj Cedria BP 902, 2050 Hammam Lif Tunisie, Email: joudamediouni@lycos.com

The two pyralidae carob moth, *Ectomyelois ceratoniae* Zeller and the Mediterranean flour moth *Ephestia kuchniella* Zeller are the most important and destructive insect pests attacking dates fruits (*Phoenix dactylifera*) in storage in Tunisia. Methyl bromide is presently the primary method of post harvest insect control. However, the ozone depleting effect of methyl bromide has led to restrictions on its use. Consequently, it is urgent to develop alternative control methods which are both effective and friendly to the environment. In this context, essential oils from aromatic plant are widely being investigated for their insecticidal activity including their action as fumigants, repellents, anti-feedents. The present work aimed to assess the toxicity and biological effects of *Lavendula officinalis* essential oil fumigant against these two stored- date moths. The results showed that fumigant toxicity varied with insect species, essential oil concentration and exposure time. Thus, *L. officinalis* essential oil was more toxic to *E. kuehniella* than *E. ceratoniae*. Indeed, for *E. kuehniella*, 100% of mortality was achieved after 24 h of exposure at 90.91µl/l air. The LC_{50} was 0.443 µl/l air and the LT_{50} was 2.179 h. For *E. ceratoniae*, 100% of mortality was achieved at 159.1 µl/l air after 36h of exposure. The LC_{50} and the TL_{50} were 0.368 µl/l air and 6.641h, respectively. Moreover, *L. officinalis* essential oil decreased fecundity, larvae emergence, copulation rate and total protein content.

EX14

EFFICACY OF SOME VEGETABLE EXTRACTS ON THE COTTON LEAFWORM, *SPODOPTERA LITTOTALIS* (BOISD.). Ramadan M. Farrag, Plant Protection Research Institute, Agricultural Research Center, Egypt, Email: badrelsabah@yahoo.com; mohamedalelimi@hotmail.com

Effects of some vegetable extracts namely ethanolic extracts of seed kernels of chinaberry, apricot and mango as well as soybean leaves against the cotton leafworm *Spodoptera littoralis* (Boisd.) were evaluated. 1:1 acetone: hexane extract of mango seed kernels was used. Results were reported as larval mortality rates, 2 and 7 days after feeding on castor leaves treated with the tested compounds at the concentrations of 1 and 2% as well as inhibition of larval development. Mortality rates of larvae were estimated by all extracts used. Greatest effects were attained by using 2% concentration of apricot and soybean extracts which gave 20.0 and 16.7% mortality after 7 days, respectively. Chinaberry extract had extremely high effect on inhibiting pupation with 50.0 and 45.0% pupation when 1 and 2% concentrations, respectively, were used. The control gave 100% pupation. Malformed pupae were noticed in case of the acetone:hexane mango extract. All extracts decreased number of emerging adults in comparison with the control. Malformed adults were observed when 2% of soybean extract, as well as 1 and 2% acetone: hexane mango extract were used.

EX 15

THE EFFECT OF ESSENTIAL OILS BELONGING TO *MENTHA VIRIDIS* L., *SATURIEA HORTENSI* AND *CUMINUM CYMINUM*, ON THE GROWTH OF *FUSARIUM GRAMINEARUM*. Seyedeh Felour Mazhar[1], Farhang Aliakbari[1,2] and Rouhollah Karami-Osboo[3]. (1) Microbiology Department, Azad Islamic University, North Tehran Branch, Tehran, Iran; (2) Faroogh Life Sciences Research Lab., Tehran, Iran; (3) Plant Protection Research Institute, Tehran, Iran, Email: fmazhar110@yahoo.com

Essential oils extracted from plants are aromatic oily liquids, that have an antibacterial, antifungal and antioxidant properties. They have the potential to be used as an antimicrobial agent, or fungicide in agricultural industries. In this investigation, we investigated the antifungal potential of essential oils belonging to *Mentha viridis*, *Saturiea hortensi* and *Cuminum cyminum* on the growth of *Fusarium graminearum*, which causes *Fusarium* head blight or scab of small cereal grains such as wheat all over the world. Deoxynivalenol (DON) and nivalenol (NIV) are the two main mycotoxins produced by *Fusarium graminearum* that have toxicity to animals and humans. Broth dilution method was employed to assess the antifungal activity of essential oils. *Fusarium graminearum* was cultured in potato dextrose broth along with the individual essential oils at various concentrations for 48 h. similar culture without essential oils was used as a control. Lowest concentration, which inhibited the colony growth of microorganisms, was considered as the minimum inhibitory concentration (MIC). All cultures were sub-cultured on potato dextrose agar for the evaluation of minimum bactericide concentration (MBC). Results demonstrated that *Mentha viridis* L., *Saturiea hortensi* and *Cuminum cyminum* essential oils decreased the colony growth of *F. graminearum* in contrast to the control treatment.

EX 16

TOXICOLOGICAL AND BIOLOGICAL EFFECTS OF NEEM AND JOJOBA OILS ON THE BLACK CUTWORM *AGROTIS IPSILON* (HUFN.). A.M. El-Rawy and Soad M. Osman, Plant Protection Research Institute, ARC, Dokki, Giza, Egypt, Email: adel_elrawy69@yahoo.com

The present study aimed to investigate the toxicity and biological effects of neem oil (Neemix 4.5% azadirachtin) and jojoba oil (Nat-1 96%) on 4th instar *A. ipsilon* larvae. The two materials were tested as bait (with wheat bran) at 0.50, 0.75, 1.00, 1.25, 1.50, 1.75 and 2.00 liters/25 Kg. wheat bran under a constant temperature of 26±1ºC. The study revealed that Neemix was more toxic than Nat-1. LC_{50} and LC_{90} values were 0.84 and 1.85 for Neemix and 0.97 and 2.04 for Nat-1, respectively. At the same time the Neemix was more effective, it decreased pupation rate, pupal weight, adult emergence rate, fecundity and fertility. In general the two plant oils caused an increase in larval and pupal durations but decreased the pupal weight. Malformations in pupae and adults increased with increasing the concentrations of the two oils.

EX 17

EVALUATION OF TOXICOLOGICAL PROPERTIES OF SOME MEDICINAL HERBS ON THE CONFUSED FLOUR BEETLE *TRIBOLIUM CONFUSUM*. O.S. Mohammad, University of Mosul, College of Agriculture and Forest, Mosul, Iraq, Email: osa_1953@yahoo.com

The effects of five concentrations of nine herb powders against the confused flour beetle *T. confusum* (Tenebrionidae: Coleoptera) were studied under controlled conditions. The toxicological properties of different concentrations on the egg, larvae, pupae and adult of the insect showed that some, e.g. *Foeniculum capillaceum* and *Anethium graveolens*, have certain effects on the different stages of the studied insect even at the lowest concentration. The above mentioned two herb powders showed very high mortality effect on egg stage reached 96.6 and 93.3%, respectively, at the 1st concentration and 100% at the highest concentration for both powders. Other powdered herbs showed prolonged effect on the durations of larval stage. *Acorus calamus* powder prolonged this duration to 34.2 days, at the 1st concentration while it was 25.4 days for control treatment. At the second concentration it was 53 and 41.5 days for *Anethium graveolens* and *Pimpinella anisum* powders, respectively, *Matricaria chamomilla* powder also showed similar effect at 4th and 5th. concentrations. On the other hand, powders of some herbs affected the progeny of treated adults. The numbers of emerged adult at 1st concentration were 14, 11.7, and 20.3 for *Foeniculum capillaceum, Acorus calamus* and *Matricaria chamomilla* powders, respectively, while that of untreated beetles was 49.7 adult. At the 2nd concentration the numbers of pupae were very few reached 0, 0, 0, and 3.3 pupa for *Acorus calamus, Pimpinella anisum, Allium sativum* and *Matricaria chamomilla* powders, while it was 40 pupae for the Control. At the last 3 concentrations, powders of *Foeniculum capillaceum. Anethium graveolens* and *Allium sativum* led to few numbers of larvae, pupae and adults ranged between 0 and 1.3 individuals. Compared to high numbers of progeny for the control treatment. Some powdered herbs showed high effect on respiration of the adults. The quantity of oxygen consumed by untreated beetles during the time of experiment (90 min.) was higher than that of beetles treated with *Acorus calamus, Artemisia absithium* and *Allium sativum* powders. Moreover, the internal systems of both sexs have been affected by these products showing different changes when studied anatomically giving small size of ovarioles, deformed accessory glands, swollen stink glands with a liquid oil. Majority of male showed small testis. Most of the mentioned effects happened as a result of the powders of *Acorus calamus, Allium sativum* and *Matricaria chamomilla*. In addition, the powders of *Foeniculum capillaceum* and *Artemisia absithium* decreased the sizes of the testis and accessory glands.

EX 18

PLANTS CONTAINING ACTIVE INGREDIENTS WITH INSECTICIDAL PROPERTIES IN SUDAN. Abdalla Abdelrahim Satti and Osman Elhaj Nasr, Environment and Natural Resources Research Institute (ENRRI), National Centre for Research (NCR), Khartoum, Sudan, Email: satisattisat@yahoo.com

Sudan encompasses virtually every geographical and climatic features from the arid north to the tropical rain forests in the south which enriches its biodiversity in natural flora. Several plant species were used in traditional medicine or as deterrent for pests' damage since ancient times. The exploitation of these natural materials was diminished during the 20th century (1930-1970), when application of synthetic chemicals reached its peak against all pests. But, with the increased awareness about the various drawbacks of such chemicals, scientific research on botanical pesticides were attempted in Sudan for the first time during the last decades of the 20th century as sporadic works in different institutions. However, with upgrading of the National Centre for Research in 1991, a comprehensive research programme was put forward at the Environment and Natural Resources Research Institute to study active plants in controlling insect pests of agricultural and public health concern. More than 100 plants investigated showed variable results, and discovery of new active species continues. Potent plant species detected were listed by scientific and local names and their activities against important insect pests were explained. Generally, the study reflects the great potentiality of the country in the field of botanical insecticides, which invites cooperation of research efforts in the region so as to gain the prescribed objectives and protect our environment from harmful synthetic insecticides. In addition, the content of this paper could be considered as useful baseline data for establishing successful botanical insecticides industry in Sudan.

EX 19

LABORATORY EVALUATION OF NEEM (*AZADIRACHTA INDICA* A. JUSS) SEEDS INSECTICIDAL ACTIONS AS AFFECTED BY DIFFERENT STORAGE DURATIONS. Abdalla Abdelrahim Satti, Abdin Elhadi Mohamed, Amir Ibrahim

Futuwi and Mohamed Elamin Ellaithy, Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan, Email: satisattisat@yahoo.com

Extracts of neem proved very effective against various agricultural insect pests of storage and field crops in Sudan. Therefore, laboratory experiments were carried out to evaluate the insecticidal activities of water and oil extracts prepared from neem seeds stored at different durations (1-5 years) under shade, using the khapra beetle (*Trogoderma granarium* Everts), as test insect. Insect mortality was taken as the main parameter of the study, in addition to some other measurements including feeding rates and repellent or antifeedent effects. The results showed that water extracts of neem seeds stored at 2, 3 and 4 years exerted more or less similar significant mortality rates on insect larvae, but were all better than the results scored by the 1 and 5 years old seeds. On the other hand, comparing neem oils produced from seeds stored at three different durations (1, 2 and 3 years) showed no significant differences in insect mortality between the oils of different ages, two weeks after treatment, although, the highest larval mortalities were recorded by the last year seeds one week after treatment, followed by the 2nd year and finally the 3rd year seeds. Moreover, all treatments of either water or oil extracts significantly reduced damage of sorghum grains by nearly equal levels at the end of each experiment, compared to the untreated control. The current findings indicated that seeds of 2 to 4 years old were more toxic to the insect than the 1 year old seeds, but the latter may compensate the activity through stronger repellent or antifeedent effects. However, the diminishing of neem seeds activities seemed to start after four years of storage, while the toxic active ingredients in fresh seeds may require more than one year to gain their full concentration and activities. It is concluded that, when neem fruits stored under shade, neem seeds can remain potent as insecticides for up to four years after production.

EX 20

EFFECT OF PLANT EXTRACT *PEGANUM HARMALA* AGAINST THE WHITEFLY, *BEMISIA TABACI*, AT DOUCEN, BISKRA OASIS, ALGERIA. N. Tarai[1], S. Doumandji[2], H. Harzallah[1] and A. Achoura[1]. (1) Département d'Agronomie, Université Mohamed Khider, Biskra, Algeria, Email: tarai_nc@yahoo.fr; (2) Département de Zoologie, Institut National Agronomique, Elharrach, Algeria.

To minimize the side effect of chemical use against pests in greenhouses, a survey was conducted at Doucen, Oasis of Biskra, by applying plant extract of *Peganum harmala* (Zygophyllaceae) against the whitefly *Bemisia tabaci* (Homoptera: Aleyrodidae), one of the most devastating pests on tomato crops in greenhouses. Extracts were sprayed on the first, the second and the sixth day. Three different extracts were used; seed extract, oil extract from the seed and extract from dry leaves, with three concentrations (0.25, 0.5, 1.0 ml/ml). Extracts were tested on different larval stages and on adults under laboratory or field conditions, during the autumn and winter period of the year 2008. Results showed that the mortality level increased with increasing extract concentration, especially on the first and second larval stages. The high cumulative level of adult mortality was found 72 hours after oil extract treatment, with 96% adults mortality under laboratory conditions and 72% adults mortality under greenhouse conditions.

EX 21

FIELD RESPONSE OF TEPHRITID FRUIT FLIES (DIPTERA) TO WATER EXTRACT OF SOME FRUITS. Mohammed E.E. Mahmoud[1], Sunday Ekesi[2], Mohammed Kambal[3], Sumia Abu Kashwa[3] and Elsadig M. Billal[1]. (1) ARC, Sudan; (2) ICIPE, Sudan; (3) University of Khartoum, Sudan, Email: nazeiro@maktoob.com

Fruit flies of the order Tephritidae are the most notorious pests which attack various fruits and vegetables causing severe losses. A series of experiments to evaluate field response of fruit flies to water extract of mango, guava, apple, cucumber and a ready made mango juice Crystal® was conducted for five consecutive weeks in guava orchards in both Khartoum and Kassala States in Sudan. The number of fruit flies caught by different plant extracts compared with Torula yeast, the standard fruit fly attractant. Fruit flies *Ceratitis capitata*, *Bactrocera invadens*, *Bactrocera cucurbitae*, *Ceratitis cosyra*, *Ceratitis quinaria* responded positively to all tested plant material extracts in both states. *Dacus ciliatus*, *Dacus sp* were attracted to cucumber and Torula extracts. Two other unidentified species were trapped by Torula only. High numbers of *C. capitata* reacted positively to Crystal® in Khartoum state. The number of *B. invadens* attracted to water extract of mango and guava in Kassala was significantly similar to that lured by Torula. The results obtained will open a door for developing a cheap and simple attraction technique to be used by poor farmers to get rid of fruit flies invasion and protect their crops by using an environmentally sound practice.

EX 22

TOXICITY OF THE ESSENTIAL OIL OF *SALVIA OFFICINALIS* L. ON *TRIBOLIUM CASTANEUM* (HERBST). Fahimeh Rastegar[1,3], S. Moharramipour[2], M. Shojai[1] and H. Abbasipour[3]. (1) Department of Agricultural Entomology, Science and Research Branch, Islamic Azad University, Tehran, Iran; (2) Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran; (3) Department of Plant Protection, College of Agricultural Sciences, Shahed University, Tehran, Iran, Email: rastegar_fa@yahoo.com

Plant essential oils have been recognized as an important natural source of insecticides. Among many essential oils, those from plants within the Lamiaceae family have received considerable attention in the search for biologically active natural products against agricultural as well as stored products pests. *Salvia* is a wide genus of plants belonging to the mint family (*Labiatae*). The essential oil of dried leaves and flowers were obtained by using Clevenger-type apparatus. Fumigant toxicity of essential oil from *S. officinalis* was tested against 1-7 days old adults of *T. castaneum* (Coleoptera: Tenebrionidae). The experiment was carried out at 25±1°C and 65±5% RH under dark conditions. Probit analysis showed that the LC_{50}

and LC_{90} values for adults were 46.77 µl/l air and 584.33 µl/l air, respectively. Mortality was also increased with rising increase in the concentration of essential oil.

EX 23

EFFECT OF RUTA GRAVEOLENS L. EXTRACT ON FLOUR BEETLES *TRIBOLUM CONFUSEUM* AND *LATHETICUS ORYZE*A L. Hana S. Al-Saleh[1], Hani J. Al-Attar[2] and Mira U. Al-Katib[2]. (1) Biology Department, College of Science, Mosul University, Iraq; (2) Biology Department, College of Education, Mosul University, Iraq, Email: mirausama@yahoo.com

Ruta graveolens L. is a medicinal plant, it possesses anti insect activity, due to its content of secondary metobolites. In this study, the effect of this plant against two genera of flour beetles; *Tribolum confuseum* and *Latheticus oryze*a L. were examined, by using alcoholic extract of the plant. Acetone and methanol were used in preparing the extracts. The extract was examined to check its effect on the adults and larvae. Concentrations used were 25 and 50 microgram/ml for the acetone extract, and 50, 100 microgram/ml for the methanolic extract. 10 insects, with three replicates were used for each treatment. Results revealed that there was no effect during the 24th h, but during 48 h, the extract caused mortality to *T. confuseum* at 50 microgram/ml for the two types of extracts (acetone and methanolic). This caused 50% larval mortality in case of methanolic extract, and 40% in case of the acetone extract. In the adult stage, mortality reached 10% only, this was caused by 100 microgram/ml of methanolic extract in case of *L. oryze*a, the extracts caused 40 and 10% mortality by treatments with methanolic and acetone extracts, respectively.

EX 24

THE INFLUENCE OF *MENTHA POLEGIUM, LAVANDULA OFFICINALIS* AND *THYME* ESSENTIAL OILS ON *FUSARIUM GRAMINEARUM*. Farhang Aliakbari[1,2], Seyedeh Flour Mazhar[2] and Rouhollah Karami-Osboo[3]. (1) Faroogh Life Sciences Research Lab., Tehran, Iran; (2) Microbiology Department, Azad Islamic University, North Tehran Branch, Tehran, Iran; (3) Plant Protection Research Institute, Tehran, Iran, Email: aliakbari110@gmail.com

One of the most damaging species of *Fusarium* is *Fusarium graminearum*; causing Fusarium head blight or scab of wheat as well as other small cereal grains all over the world. Fusarium head blight occurs both in the field and during storage. *F. graminearum* produces two main mycotoxins; deoxynivalenol (DON) and nivalenol (NIV) in wheat and mold corn which are toxic to animals and humans. These mycotoxins are difficult to detect and thus present a serious risk to human health. Plant essential oils are a potentially valuable source of antimicrobial compounds. In this study, for the purpose of replacing chemical fungicides with essential oils, we examined the effect of *Mentha polegium, Lavandula officinalis* and *Thymus* sp. essential oils on the growth of *F. graminearum* using the broth dilution method in which the fungus was incubated with the individual essential oils at a range of different concentrations for 48 h. The minimum inhibitory concentration (MIC) was determined as the lowest concentration that inhibits growth of microorganism. For minimum bactericide concentration (MBC) assessment, *F. graminearum* was cultured on PDA medium. Results indicate that *Mentha polegium, Lavandula officinalis* and *Thymus* sp. essential oils reduced colony growth of *F. graminearum* compared with the control treatment.

EX 25

BIOLOGICAL EFFECTIVENESS OF LANTANA CAMARA L., LEAF EXTRACT ON POTATO TUBER MOTH, PHTHORIMAEA OPERCULELLA (ZELLER) UNDER LABORATORY CONDITIONS. M.Y. Ibrahem and M.A.Seed. GCSAR., Agricultural Scientific Research Center at Homs-Department of Plant Protection Research, Homs, Syria, Email: mohamedkozii@yahoo.com

The biological effect of *Lantana camara* L. leaves, acetonic and Ether petroleum extracts, on potato tuber moth**,** *Phthorimaea operculella* (Zeller) was studied to quantify natural mortality rates and age structure, under laboratory conditions. Results showed that acetonic extracts was more effective than Ether petroleum, and there was a linear relationship between bio-agents effect and concentrations. Apparent larvae mortality rates which fed on tubers treated with acetonic extract were 44.17 and 68.97% at 2.5 and 5% concentrations; whereas these values at both concentrations of petroleum extract were 46.82 and 61.29%, respectively, compared with 6% for the control. The total fecundity (Mx) values were 99 and 76.25, and 52. and 51 egg/female at 2.5 and 5% concentrations, when larvae were fed on tubers treated with acetonic and petroleum extracts at same concentrations, respectively. But respect the age specific survival were 13 and 10 days respectively. Whereas the total fecundity and age specific survival for control were 99 eggs /female and 19 days, respectively. Net reproductive rate values (Ro) in F2 was 14.57 and 7.05 female / female for acetonic extract and 6.37 and 3.54 female/female for petroleum extracts at 2.5 and 5% concentrations respectively, whereas it was 36.396 female/female in the control. Generation time (Gt) was increased to 31.6 and 33.9 and 28 and 32 days for acetonic and petroleum extracts respectively at 2.5 and 5% concentrations compared with 27.2 days for the control.

NATURAL ENEMIES

NE 1

NATURAL ENEMIS OF APPLE INSECT PESTS IN AS-SWEIDA GOVERNARATE, SOUTHERN SYRIA. Wa'el Almatni[1] and Nazir Khalil[2]. (1) Biological control division, Dept. of Plant Protection, Ministry of Agriculture, Damascus, Syria, Email: almatni@scs-net.org; (2) Department of Animal Biology, Faculty of Sciences, Damascus University, Syria, Email: khalil-n@scs-net.org

A survey of insect pests of some apple orchards in As- Sweida governorate, southern Syria was conducted from 2001 until 2009. Lepidopteran larvae and pupae were collected from and reared until emergence of the adult moths or its parasitoid(s), in addition, sweeping net samples

were used for aphid colonies. Associated parasitoids and predators were determined depending on standard keys or sent to specialists for identification. Surveyed natural enemies were initially sorted to the genus, family and order levels; and according to the related host/prey. A total of 77 natural enemies (parasitoids and predators) were identified in this survey, in addition to 2 entomopathogenic fungi. As a result, 2 predatory mites, 21 species of Coleoptera including 16 Coccinellids, 2 Carabidae, 2 Staphylinidae and one species of Cleridae were ifentified. One species of Dermaptera were also found in addition to 3 species of Diptera including 2 Syrphidae and one Chamaemyiid species. 8 species of Heteroptera, 7 of Neuroptera, and 32 species of Hymenoptera which includes 11 species of Braconidae, and various numbers of Ichneumonidae, Eulophidae, and Scoliidae. In addition to that one species of predatory Thrips (Thysanoptera) has been recorded. This study showed 32 new records of natural enemies in apple orchards in southern Syria. Natural enemies of aphids were the most abundant and diverse, followed by natural enemies of lepidopteran pests such as codling moth and leaf miners and defoliators. Some families need further investigation to identify related species, especially those of Carabidae.

NE 2

DIVERSITY AND BIOGEOGRAPHIC DISTRIBUTION OF ENTOMOPATHOGENIC NEMATODES (RHABDITIDA: STEINERNEMATIDAE AND HETERORHABDITIDAE) IN LEBANON. Elise Noujeim[1], Carla Khater[1] and Olivier Thaler[2]. (1) National Council for Scientific Research-CNRS, P.O. Box 11-8281, Ryad El Solh 1107 2260 59, Zahia Selman street, Beirut, Lebanon; (2) Laboratoire d'Ecologie Microbienne des Insectes et interactions hôte-Pathogène UMR INRA 1133, Université Montpellier II, Place Eugène Bataillon, 34000 Montpellier, France, Email: Enjeim enjeim@cnrs.edu.lb

Entomopathogenic nematodes-EPN are remarkably used for biological control of many soil insect pests. They are ubiquitous, having been isolated from every inhabited continent from a wide range of ecologically diverse soil habitats including cultivated fields, forests, grasslands, deserts, and even ocean beaches. They lodge in their intestine a bacterial symbiotic essential for parasitic success. The nematode-bacterium complex is able to kill insects so rapidly, giving a large spectrum of activity on different soil insects. This characteristic is largely exploited for biological control of insect pests in several ornamental and crop production systems. The diversity and distribution of entomopathogenic nematodes in the families Steinernematidae and Heterorhabditidae were assessed for the first time throughout an extensive biogeographical survey in Lebanon during 2008 and 2009. The survey was conducted according to the vegetation types extending from sea level to 3088m a.s.l in Lebanon covering 10 vegetation levels. Sampling framework consisted of 600 samples extracted from 20 sites. Within each vegetation type, wooded and herbaceous ecosystems were considered for sampling purposes. Four sites among 20 were positive for the presence of entomopathogenic nematodes (20%). Four EPN species including two *Steinernema* and two *Heterorhabditis* were recovered. Our study reports the diversity of EPN species in Lebanon and discusses their potential in biocontrol against the cedar weevil, *Cephalcia tannourinensis.*

NE 3

SUSCEPTIBILITY OF DIFFERENT TERRESTRIAL GASTROPOD SPECIES TO THE NATIVE RHABDITID NEMATODE, *PHASMARHABDITIS HERMAPHRODITA*. Marwa A. M. Genena and Fatma A. M. Mostafa, Agriculture Zoology Department, Faculty of Agriculture, Mansoura University, Mansoura, Egypt, EMail: marwaaz2002@yahoo.com

The susceptibility of four common adult helicid land snail species; *Cebaea hortensis*, *Eobania vermiculata*, *Monacha cantiana* and *Theba pisana*, and the tree slug, *Lehmannia marginata* to the rhabditid nematode, *P. hermaphrodita* was carried out *in vivo* after one, two and three weeks of exposure to constant inoculum nematode level (3000 IJs/ cup). The screened snails and slugs showed remarkable reaction to nematode infection, but with different degrees. After three weeks of exposure, the slug *L. marginata* proved to be the highest susceptible one to *P. hermaphrodita* with death ratio of 100% followed by the clover land snail, *M. cantiana* and the white land snail, *T. pisana* with values of 76.6 and 63.3%, respectively. However, *E. vermiculata* and *C. hortensis* gave 56.7% and 40.0% mortality, respectively. In another test, the susceptibility of three different size-classes of *M. cantiana* to *P. hermaphrodita* indicated that the small sized snails (4 mm wide & 1 mm high), the intermediate sized snails (7 mm wide & 3 mm high) and the big sized snails (13 mm wide & 7 mm high) were found to be susceptible to the rhabditid nematode, *P. hermaphrodita* but in different proportions. After two weeks of exposure to 3000 IJs/cup mortality percentage reached 100.0% in the small-sized, followed by intermediate and the big- sized snails at 92.0 and 40.0%, respectively. On the other hand, the impact of *P. hermaphrodita* against *M. cantiana* under three different temperature degrees revealed an inverse correlation between mortality percentages of *M. cantiana* and temperature degrees after one, two and three weeks of exposure to the target nematode. The capability of *P. hermaphrodita* to infect and kill *M. cantiana* has significantly increased as the temperature declined from 30°C to 20°C after three weeks of exposure. Hence, the mortality rate ranged from 63.6 to 87.0%.

NE 4

ARTHROPODS ASSOCIATED WITH THE YELLOW STARTHISTLE *CENTAUREA ONOPORDIFOLIA* BOISS. IN AS-SWEIDA, SOUTHERN SYRIA. Wa'el Almatni, Biological Control Division, Department of Plant Protection, Ministry of Agriculture, Damascus, Syria, Email: almatni@scs-net.org

A Survey of insects associated with the yellow star thistle *Centaurea onopordifolia* Boiss (Asterales: Asteraceae) conducted in 2008 and 2009 in As-Sweida governorate, southern Syria. Samples of insects were collected during growth period from March to the end of October, in addition to samples from dried plants during the

winter. Fourteen species of phytophagous insects which attack yellow star thistle were found, those belong to nine families and six orders. The list include seven species of fruit flies Tephritidae (Diptera), four species belong to family Curculionidae (Coleoptera), three species of moths (Fam. Gelechiidae and Noctuidae, Lepidoptera), one species of Aphidae (Homoptera), and two species of Cicada (Cicadoidea: Issidae), and one species each of thrips (Thysanoptera), grasshoppers (Orthoptera), and ants (Hymenoptera: Formicidae). In addition, this weed has one species of Eriophyidae (Acari). 12 insect species of natural enemies were recorded on this weed that feed on aphids, in addition to one non identified species of Acari which attacks aphids. Those insect natural enemies included six species of Coccinellidae, two species each of syrphid flies (Syrphidae) and mirid bugs (Miridae), one species each of Chrysopidae and Chamaemyiidae, in addition to one species of parasitoids (Braconidae). Consequently, the existence of the yellow star thistle close to the cultivated crops is very important as it host specialized species of aphid which could play the role of an alternative prey to aphids in nearby trees and crops, therefore, yellow star thistle is a source for natural enemies which could maintain and support the natural balance in the agricultural ecosystem.

NE 5

SURVEY OF NATURAL ENEMIES OF RED PALM WEEVIL IN SYRIA. Ghassan Rostom, Randa Abou-Tara, Amal Sydawi and Hosam Amer. General Commission of scientific Agricultural Research, Douma, P.O. Box 113, Damascus, Syria, Email: randaaboutara@hotmail.com

Red palm Weevil, Rhynchophorus ferrugineus, has been introduced into Syria since 2001. It caused severe damage to palm trees. Two locations were determined for its distribution (Lattakia –Tartous). Palm tree is the only host which has been reported so far for this pest. Six species of natural enemies were collected. Two species are parasites on the adults of red palm weevil, the first is external parasite from Acari and the second is an internal parasite from Diptera. Three species of entomopathgenic fungi were also found, *Trichoderma*, *Fusarium*, and *Beauvaria* sp. Four different isolates from these fungi were isolated which attack larvae, pupa and adults of red palm weevil. Two *Bacillus* bacterial isolates attacked larvae and pupa.

NE 6

POPULATION DYNAMICS OF PARASITOIDS AND PREDATORS ASSOCIATED WITH APHID INSECTS ON TOBACCO PLANTS IN ALHAFHE REGION, LATTIKIA, SYRIA. Fidaa Shamsin[1] and Nabil Abo Kaf[2]. (1) General Organization of Tobacco, The Research Section, Latakia, Syria; (2) Department of Plant Protection, Faculty of Agriculture, Tishreen University, P.O. Box 1446, Latakia, Syria, Email: n.abokaf@scs-net.org

The research was carried out to study the population dynamics of the parasitoids and predators associated with aphids on Tobacco plants in AlHafhe, Latakia, Syria during the two seasons 2008 and 2009. The results showed that the parasitoids found belonged to family Aphidiidae and the predators belonged to the families: Coccinellidae, Syrphidae, Cecidomiyidae, Chrysopidae, Miridae. Total number of specimens was 1570. Abundance rate of the natural enemies during the season 2008 was as follows: mummies 34.7%, coccinellids 41.59%, syrphids 10.31%, mirids 9.1%, cecidomiyids 2.1%, chrysopids 2.1%. The same study is continuing in 2009 and the results will be presented.

HOST RESISTANCE

R 1

EVALUATION THE SENSITIVITY OF SOME SOYBEAN VARIETIES TO THE WHITEFLY, *BEMISIA TABACI* (GENN.) AND SPIDER MITS, *TETERANY CHUSURTICAE* (KOCK.) INFESTATION. Magedy A. Ahmed, Agriculture Research Center, Plant Protection Research Institute, Giza, Egypt, Email: dr_homam@hotmail.com

Soybean plants are attacked by piercing-sucking insect pests causing severe damage. Six soybean varieties namely, Giza 83, 82, 22, 111, 35 and Giza 21 were evaluated in order to determine their sensitivity as well as their resistance to some insect sucking pests; i.e. whitefly, *Bemisia tabaci* (Genn.) and spider mites, *Tetranychus urtecae* (Koch.) during two successive seasons, 2004 and 2005. Giza 83 and Giza 21 varieties were the most sensitive varieties with high eggs deposited by the whitefly during the two seasons. Whereas Giza 35 variety was the most tolerant to eggs deposition. Giza 22 and 82 varieties were the most sensitive to nymphs infestation during the two season. On the other hand, Giza 111 and 83 were the least sensitive varieties to nymphs infestation. Giza 22 and 111 were the most sensitive varieties to spider mites. as they were preferred hosts for eggs deposition during the two seasons, whereas, Giza 83 and 35 varieties were the most tolerant varieties for depositing eggs during the two seasons. Generally, resistance level to infestation with spider mite adults during the 2004 season can be arranged in a decreasing order as follows: Giza 111, 35, 83, 21, 82 and Giza 22. However, resistance level to the spider mite adults infestation during the 2005 season can be arranged in a decreased order as follows: Giza 35, 22, 82, 83, 21 and Giza 111. Based on the mean of infestation rate caused by both whiteflies and spider mites during the two seasons, it could be concluded that Giza 35 was the most tolerant to infestation by both whitefly and spider mites; whereas, Giza 21 and 22 had the lowest tolerance levels toward infestation by whiteflies and spider mites.

R 2

EFFICACY OF SYSTEMIC ACQUIRED RESISTANCE USING BENZOTIADIAZOLE IN CONTROLLING *BEET NECROTIC YELLOW VEIN VIRUS* (BNYVV). A.M. Mouhanna[1] and G. Langen[2]. (1) Faculty of Agriculture, University of Damascus, and the General commission of Biotechnology, Damascus, Syria, Email: AhmadMouhanna@gmx.net; (2) Institute for Phytopathology and Applied Zoology, Justus-Liebig-

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Sugar beet is one of the most important economic crops as a major source of sugar. It could be infected with a number of viral diseases, the most serious of which is Rhizomania caused by *Beet necrotic yellow vein virus* (BNYVV), transmitted by the vector *Polymyxa betae*. *P. betae* has the ability to survive in the soil and preserve the virus for more than 15 years. This study aimed to investigate the ability of the resistance activator Benzothiadiazole (BTH) with different concentrations to induce Systemic Acquired Resistance (SAR) in Rhizomania-tolerant and -susceptible sugar beet cultivars against BNYVV infection, and to find out the biochemical changes associated with SAR induction. Several trials showed that BTH has the ability to reduce the level of BNYVV up to 80.5% in Rhizomania-tolerant and -susceptible sugar beet cultivars. The accumulation of PR-proteins (chitinase III, β-1,3-glucanases) as a proof of the activation of defense against pathogens in intercellular and extracellular regions in leaves and roots were examined by Northern-blot and DAS-ELISA. In addition, whether a transcript accumulation of chitinase III occurred in leaves and roots of sugar beet plants after infection with Rhizomania or virus-free *Polymyxa betae* was also examined.

R 3

SCREENING WHEAT GENOTYPES FOR RESISTANCE TO COMMON ROOT ROT OF WHEAT. Omran Youssef, Haleem Youssef and Sultan Shiekhmous, General Commission for Scientific Agricultural Research (GCSAR), Agricultural Research Centre of Al-Qamishly, Al-Qamishly, Syria, Email: om_youssef@yahoo.com

Twenty three genotypes of wheat were tested for resistance to common root rot of wheat during 2004-2005. The results of artificial and natural inoculation showed that all genotypes tested were infected by the disease with disease score ranging from 0.2 to 2.1 according to a 0-3 scale. Some genotypes were not infected under natural inoculation, and barley, oat and wild barley plants were not infected under artificial and natural inoculation. The results indicated the necessity of more in-depth studies for identifying genetic resources resistant to disease under special Syrian conditions.

R 4

EVALUATION OF SOME LOCAL TOMATO VARIETIES FOR EARLY BLIGHT RESISTANCE (*ALTERNARIA SOLANI*). Faten Alsafadi[1], Taisser Abo Alfadil[1] and Bassam Abo Trabi[2]. (1) General Commission of Scientific Agricultural Research, Sweida, Syria, Email: f.alsafadi@ gmail.com; (2) Faculty of Agricultur, Damascus University, Syria.

Laboratory evaluation of some local tomato varieties for early blight resistance, a disease which is caused by the fungus *Alternaria solani*, were carried out. The varieties were Haragel, Magdal Mawash, Daher aljabal, Breh, Baskanta, Kafer selwan, Dara, Wardiat, Gerdi, and Bosfer. Disease severity was rated on a 1-9 scale. Results showed that the varieties Bosfer, Daher aljabal has a high level of resistance to early blight. Plants with this level of resistance would normally not experience defoliation due to early blight in the field, and they out yielded others at P=0.05 compared with the varieties Dara, Gerdi, Haragel, Magdal Mawash, which were moderate to highly susceptible, and no significant differences were found compared with the varieties Wardiat, Breh, Baskanta, which had moderate level of resistance. Plants with this level of resistance would normally not suffer yield losses due to early blight in the field.

R 5

DEVELOPMENT OF A NEW WHEAT CULTIVAR RESISTANT TO YELLOW AND BROWN RUST DISEASES. Emad Al-Maaroof, Kazal Abas, Faris Fiahd, Hasan Ismael and Azhar Hussein, Agriculture & Food Technology Directorate, Ministry of Science & Technology, P.O. Box 765, Baghdad, Iraq, Email: ealmaaroof@yahoo.com

Bread wheat (*Triticum aestivum.*) is one of the most important cereal crops worldwide. Many diseases, particularly yellow and brown rusts incited by *Puccinia striiformis* and *Puccinia triticina* drastically decrease grain yield and quality of wheat in Iraq. Since the use of resistant cultivars is the most effective, economical and environmentally safe method to control rust diseases, a breeding program was initiated in Iraq, in order to improve spring bread wheat cultivars by combining high level of resistance to yellow and brown rusts with high grain yield and quality. A field trial was conducted to evaluate performance of 788 introduced lines from CIMMYT international wheat nurseries in comparison with the local commercial cultivars, at Twaitha and Latifia experimental stations, located at Baghdad and Babylon, respectively. Field screening of germplasm under artificial inoculation conditions for three successive generations resulted in the identification of 251 resistant and moderately resistant lines, while 225 lines were superior in yield. Among 11 resistant genotypes, a new promising one "Farris" was selected. This genotype surpassed the local cultivars in disease resistance, productivity and some of other useful agronomic traits at different locations. Farris was 14-30% higher yielding than "Tamuz 2" and "Maxipak". The genotype was submitted in 2006 to registration and release by the national committee of registration and release of agricultural cultivars/ Ministry of Agriculture, to be released as a new resistant wheat cultivar to yellow and brown rust diseases, as well as moderately resistant to common bunt disease and with high yield potential under Iraqi environmental conditions.

R 6

BREEDING FOR COMMON ROOT ROT RESISTANCE IN DURUM WHEAT. Mohammad El-Khalifeh and Miloudi Nachit, ICARDA Durum Breeding Program, ICARDA, P.O. Box 5466, Aleppo, Syria, Email: M.Khalifa@cgiar.org

Common Root Rot (CRR) on durum wheat is an important disease in the Mediterranean dryland. Using resistant varieties is considered as the best economic

method to control this disease. A breeding program specific for CRR resistance at ICARDA durum breeding program has been developed. More than 6000 segregating and advanced lines are screened annually for resistance to *Fusarium* spp. and *H.sativum*, under field and laboratory conditions. Several isolates of *F.graminearum* (F10 and F19), *F. avenaceum* (F6 and F16), and *H. sativum* (H5 and H7) were collected and used to screen for CRR resistance. During 2006, 2007 and 2008, 6289, 7300 and 8500 segregating populations were screened under field conditions (a Hot Spot site at ICARDA Tel Hadya research station), where the selected populations are re-screened under lab conditions for CRR. Results under field conditions showed gradual increases in CRR disease resistance, where 8% in 2006, 12% in 2007 and 16% in 2008 were recorded. These results were reconfirmed by the Petri dish screening of germinating seeds, where more than 50% of selected lines in the field showed good resistance against *F.graminearum* and *F. avenaceum* and more than 30% against *H. sativum.* The combined field and lab screening is a potential technique to identify and select resistance to CRR starting from segregating populations.

R 7

SUSCEPTIBILITY OF SOME LENTIL GENOTYPES TO THE BEAN ROOT APHID, *SMYNTHURODES BETAE* WESTW, INFESTATION. Atie Arab, Mohamed Fayez Mozyk, Khloud Hokan, Yagoub Azar and Bahaa kawroo. General Commission of Agricultural Scientific Research, Agriculture scientific research centre of Aleppo, Syria. Email: atiearab@hotmail.com

Lentil is an important leguminous crop in Syria. The bean root aphid, *Smynthurodes betae* Westw., one of gall forming aphid, found throughout Syria on *Pistacia* leaves (perennial host), and on the lentil roots (one of its annual host), could cause an economic damage in some years. The susceptibility of 6 lentil genotypes (local and improved) to the bean root aphid infestation was studied under natural conditions, and artificial infestation in the glasshouse in 2008 and 2009. The susceptibility to those infestations were measured by taking the level of infestation severity, and the mean number of aphids per plant roots. Results showed that there were significant differences among genotypes in the level of infestation, and in the mean number of aphids per plant roots. The infestation levels were 16.7-35% in 2008, and 11.1-24.4% in the field in 2009, and the mean number of aphids per plant roots were 0.82-3.34 in the glasshouse.

R 8

CHARACTERISATION OF RESISTANCE LEVEL OF WHEAT VARIETIES TO SPETORIA LEAF BLOTCH IN TUNISIA. Walid Hamada and Rania Zouid, Laboratory of Plant Genetics, National Agronomic Institute of Tunisia, 1082 Tunis, Email: hamada.walid@iresa.agrinet.tn

Septoria tritici, the causal agent of the septoria leaf blotch disease, is considered as the most serious pathogen for this crop. It can trigger enormous losses in yield especially during rainy season. To be able to control the pathogen, it is essential to study the interaction with its host and the mechanisms which lead to plant resistance. The evaluation of the interaction between two species of wheat (*Triticum durum*, *Triticum aestivim*) and *S. tritici* started in controlled conditions by measuring simultaneity the amont of H_2O_2 released and the induction of 3 genes encoding for PR proteins (PR2, PR3 and PR9). The wheat seedling was treated with two products inducing defence mechanism: salicylic Acid (AS) and Laminarine (L). The detection of H_2O_2 in *S. tritici* resistant varieties (Agili and Haidra) revealed, after the application of these two products, that they exercise a similar stimulating effect on the biosynthesis of H_2O_2. In sensitive cvs. of wheat (Karim and Salambo), the quantity of H_2O_2 released was lower than that released by the resistant cv. The induction of three genes coding for three PR proteins revealed that in the resistant durum wheat cv. (Agili), AS and L had a positive effect on the pathway of Peroxydase (PR9). These two defence inducer showed no particular effect on Chitinase (PR3) and repress the PR2 expression. For the sensitive durum wheat cv. (Karim), three studied genes, inferred by the pathogen at 48H, reached a normal level at 72H. The resistant bread wheat cv. (Haidra) revealed an accumulation of Peroxydase (PR9) at 48H after the application of AS and L. Concerning Chitinase and PR2, further to the presence of the pathogen, there was accumulation of the transcripts at 48H and 72H, while AS and L have led to a repression of this gene. In the sensitive variety (Salambo), while Peroxydase (PR9) was absent, Chitinase and PR2 accumulated under the influence of the pathogen. The efficiency of some inputs, that could decrease the damages trigged by *S. tritici* on durum and bread wheat was tested under natural conditions. Three parameters were considered: the percentage of the necrotic leaf area (PSFN), the yield and the thousand grains weight (PMG). The applied treatments showed different effect on three parameters considered to both tested varieties. The fungicide Triazole turned to be most effective for three parameters. However the growth regulators (Zn and Mn) showed a positive effect on the PSFN but not on the PMG and the yield. Laminarine was the least effective in controlling the disease even it was more efficient than the control. Besides, the time course of *S. tritici* infection on both sensitive cvs. (Karim and Salambo), was achieved for the RT-PCR technique by analyzing the cytochrome b gene of *S. tritici*. The follow-up realized every 5 days from the 10th day by inoculation revealed the presence of the pathogen at the end of the 20th day on bread wheat and at the 25th day on durum wheat. These results suggested that there is a difference in the susceptibility between the two species of wheat. This leads to suppose that the strain of *S. tritici* attacking bread wheat was more virulent than that on durum wheat.

R 9

EVALUATION OF THE SUSCEPTIBILITY OF SOFT WHEAT VAREITIES TO THE GRAIN WEEVIL (*SITOPHILUS GRANARIUS* L.). Abdelkrim Mebarkia[1], Hafidha Sabah Benkohila[1], Meriem Hamza[1], Abdelhak Bouras[2] and Mahfoudh Makhlouf[3]. (1) Department of Agronomy, Faculty of Sciences, University of Setif, Algeria; (2) Laboratory of Alimentary Production and leeway of Setif, Algeria; (3) Agricultural Experimental

Station of the Field Crop Institute of Setif, Algeria, Email: mebarkiabba@yahoo.fr

Evaluation of susceptibility of fifteen varities of soft wheat grown in Algeria for their vulnerability to an artificial infestation with the wheat weevil *Sitophilus granarius* L. after a month of storage at the temperature of 30±2°C and a relative humidity of 70±5% was carried out. Results obtained indicated that there were significant differences (at P= 5%) and the effect of weevil was more damaging for Seri 82 (+5.15% protein) compared with Tsi (+2.27%). Correlation matrix and ascending hierarchical classification (at P= 5%) indicated that there were two groups of varieties: the first group was resistant with good grain quality, these include: TSI, CHAM4, THB, K134 (160), ABAX, ACSAD440, WIFAK, ARZ, compared with the second group that contained: HIDHAB, AIN ABID, S.91314A, KAUZ'S ", SERI 82, PBW65, and CHAM-6. Results of laboratory analysis showed that infested wheat had reduced quality of flour protein, weight of 1000 grains, gluten, starch and dough strength. The difference in resistance or lack of susceptibility between the two groups was based quantity (12.39 and 7.03%, respectively) and quality of proteins which determines dough strength (256.01 and 106.37 × 10^{-4} J, respectively) and allows to attract or repelle the weevil, which hinders the penetration and development in wheat grain.

R 10

NOVEL SOURCES OF RESISTANCE TO RUSSIAN WHEAT APHID AND SUNN PEST IN WHEAT, IDENTIFIED USING THE FOCUSED IDENTIFICATION OF GERMPLASM STRATEGY (FIGS). M. El Bouhssini, K. Street, A. Amri, F.C. Ogbonnaya, A. Omran, F. Rihawi and A. Dabbous, International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: M.Bohssini@cgiar.org

Russian wheat aphid, *Diuraphis noxia* (Kurdjumov), and Sunn pest, *Eurygaster integriceps* Puton, are among the most important insect pests of wheat in North Africa and West and Central Asia. Host plant resistance is the most economical and practical means of controlling these insects. Two trait-specific best-bet subsets, composed of 1046 accessions of bread wheat and nine accessions of durum wheat, from the International Center for Agricultural Research in the Dry Areas, the Vavilov Institute and the Australian Winter Cereals Collection gene bank holdings, were selected from a total of 16,000 geo-referenced accessions using the Focused Identification of Germplasm Strategy (FIGS). The material was screened in the field and greenhouses in Syria for resistance to the two insect species. Twelve bread wheat lines resistant to Russian wheat aphid, one durum wheat were identified, along with eight bread wheat accessions with good levels of resistance at the vegetative stage to overwintered Sunn pest adults. These accessions will be used as sources of resistance in ICARDA's breeding programs, that will contribute to the overall integrated pest management program designed to control damage from these insects in North Africa, West and Central Asia, and elsewhere. This study also showed the relevance of the FIGS approach in better targeting accessions held in genebanks for valuable traits. In this context, FIGS has the potential to greatly reduce the resources required to mine genetic resource collections and thereby ensure a continuum between conservation and utilization of genetic resources.

R 11

BIOLOGICAL EFFICACY OF SOME GENETICALLY MODIFIED EGYPTIAN COTTON VARIETIES FOR RESISTANCE TO LEPIDOPTEROUS INSECT PESTS (THE COTTON LEAFWORM *SPODOPTERA LITTORALIS* (BOISD.)). Hassan F. Dahi, Plant Protection Research Institute, ARC, Dokki, Giza, Egypt, Email: hassandahi@yahoo.com

This study was conducted on four Egyptian cotton varieties (Giza 80, Giza 90, Giza 85 and Giza 89) Genetically Modified (GM) by transfer of two genes (Cry 1 Ac and Cry 2Ab) from the *Bacillus thuringiensis* (*Bt*) to the American cotton by the gene particle gun, then transfer those two genes to the four Egyptian cotton varieties by crossing between the American cotton and the Egyptian cotton varieties. The developed GM Egyptian cotton varieties clearly indicated high resistance against the cotton leafworm, *Spodoptera littoralis* (Boisd.) Mortality rate for larvae fed on Egyptian cotton varieties (non GM or non *Bt*) were 1.7, 5.0, 13.3 and 5.0% for Giza 80, 90, 85 and 89, respectively. On the other hand, the larvae fed on GM Egyptian cotton varieties (*Bt* progenies), the mortality rate varied from 95 to 100% for Giza 80, 81.7 to 100% for Giza 90, 100% for Giza 85 and from 86.7 to 100% for Giza 89. Biological aspects of *S. littoralis* stages (larval duration, pupal weight, pupal duration, emergence %, malformed adult %, male and female longevity, sex ratio, fecundity and fertility were affected by Cry 1 Ac and Cry 2 Ab of *Bt* genes transferred to the four Egyptian cotton varieties.

R 12

EVALUATION OF SOME TOMATO CULTIVARS FOR INFESTATION WITH WHITEFLY, *BEMISIA TABACI* GENN. Manasic Mohamadain Ahmed, Abdalla M. Abdalla and Sana K. Mukhtar, Department of Plant Protection, Faculty of Natural resources and Environmental Studies, University of Kordofan, PO Box 160, Elobeid, Sudan, Email: khalil2004@hotmail.com

Tomato, *Lycopersicon esculentum* Mill is a vital vegetable crop worldwide. The whitefly, *Bemisia tabaci* Genn. is the major insect pest that acts as a vector for the devastating disease caused by *Tomato yellow leaf curl virus*. In this study, four cultivars of tomato, namely Strain B, Peto86, Castle Rock and Allakareem were evaluated for their reaction to whitefly infestation under field conditions. Four replicates were made and study was conducted for two seasons: 2007/08 and 2008/09 in Bara town in Northern Kordofan State, Sudan. Records on the whitefly infestation and its population dynamic were taken on weekly basis from tomato plants and from sticky traps in each of the target cultivars. Data obtained were statistically analyzed using M-Stat-c software package (Version 2.10). Results revealed significance (P< 0.01) among the four cultivars in

term of infestation with whitefly and there were significant differences amongst time of observation.

R 13

DEVELOPMENT OF A SIMPLE METHOD FOR SCREENING CHICKPEA (*CICER ARIETINUM* L.) GERMPLASM FOR RESISTANCE AGAINST VIRAL DISEASES. Mosab Halwani[1], Safaa G. Kumari[1] and Imad Ismail[2]. (1) Virology Laboratory, International Center for Agriculture Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: sir_mosab@hotmail.com; (2) Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria

Breeding for genetic resistance is the most effective way to reduce economic losses due to viral diseases. However, the characteristics of the chickpea plant makes it an inappropriate host for colonization by aphids, and this in turn makes screening of chickpea germplasm for resistance to aphid-transmitted viruses difficult. It is then essential to develop an appropriate method for virus inoculation. Chickpea plants were artificially inoculated with *Beet western yellows virus* (BWYV, genus *Polerovirus*, family *Luteoviridae*) by viruliferous *Myzus persicae* (Sulzer) after feeding on virus-infected radish, and with *Bean leaf roll virus* (BLRV, genus *Luteovirus*, family *Luteoviridae*) by viruliferous *Acyrthosiphon pisum* (Harris) after feeding on virus-infected faba bean. Inoculated plants were caged individually with viruliferous aphids in cylindrical plastic cages, 15 cm in diameter, and equipped with ventilation slots. By employing an appropriate combination of factors (viruliferous aphid, virus replication host, time of inoculation and use of plastic cages) it was possible to get 100% infection of cultivar, Ghab 4 and ILC 15566. By using this methodology, 108 chickpea genotypes, originating from 27 countries held at ICARDA's Gene Bank, were screened during the 2007/2008 growing season under plastichouse and under field conditions for their reaction to Syrian isolates of BLRV and BWYV. Two genotypes (ILC 10284 and ILC 10479) highly sensitive to infection were used as controls. Four genotypes (CICA 0704, CICA 0705, CICA 0706 and CICA 0708) were found to be resistant to BLRV infection and all genotypes were susceptible to BWYV infection. However, 10 genotypes (ILC 10501, ILC 10652, ILC 1455, ILC 7266, ILC 7272, ILC 10298, ILC 9904, CIAR-18, CICA 0512 and CICA 0611) were found to be tolerant to BWYV infection. These results were also confirmed during the 2008/2009 growing season under field conditions.

R 14

SUSCEPTIBILITY OF SOME PEAR CULTIVARS TO PEAR PSYLLA, *CACOPSYLLA PYRI* (L.) IN SYRIA. Dumar Namoor[1], Mohamed Ibrahim[2] and Bassam Aoudi[2]. (1) Plant Protection Department, Faculty of Agriculture, Al-Baath University, Syria; (2) GCSAR, Agricultural scientific Research Center at Homs, Syria, Email: B_oudee@Gawab.com

The infestation of pears psylla *Cacopsylla pyri* L. was studied on some pear cultivars *Pyrus communis* L. (Abo-Satl, Beurre Giffard, Spadona, Cocia, Red Bartlet, White Bartlet) by the direct count for eggs and nymphs, and adults through beat tray and sticky yellow traps during 2007 and 2008 seasons in Mokhtaria Research Station of the Agricultural Research Center at Homs. Results showed that the highest number of eggs were on Abo-Satl cultivar at the rate of 28%, followed by Beurre Giffard (23-30%), while Red Bartlett Cultivar had the least infestation rate (5 to 10%). Cultivars Spadona, Cocia and white Bartlett had intermediate infestation rates (8 - 20%). This result was in line with the nymphs count, as infestation rate was 22-26% for the cultivars Abo-Satl, Beurre Giffard, while Red-Bartlett Cultivar had the least infestation rate (4-9%). With regard to adults, Abo-Satl was the most preferable cultivar with an infestation rate of 26 to 28%, followed by Cocia 21%), whereas, Red Bartlett proved to be the least preferable cultivar (7-10%).

R 15

EVALUATION OF RESISTANCE OF IRANIAN BREAD WHEAT TETRAPLOID LINES TO INFECTION WITH *SEPTORIA TRITICI*. Azadeh Ghaneie[1], N. Safaie[1], R. Mehrabi[2] and A. Saidi[3]. (1) Department of Plant Pathology, College of Agriculture, University of Tarbiat Modares, Iran; (2) Department of Gene Bank, Seed and Plant Improvement Institute, Iran; (3) Department Biotechnology, College of New Technology and Engineering, Shahid Beheshti University, Iran, Email: A.ghaneie@yahoo.com

The ascomycete *Mycosphaerella graminicola*, the causal agent of *Septoria* blotch disease of tetraploid wheat. It is a serious foliar disease of wheat worldwide, resulting in a decrease in both yield and grain quality. Host resistance is the most effective mean for controlling the disease. In this study the reaction of several tetraploid wheat lines to *S. tritici* collected from Fars were examined. Factorial experiment was carried out in a completely randomized design with four replications in the greenhouse. Disease severity was measured using Kema *et al*. method. The analysis of variance showed that there was a significant difference between these lines in reaction type to this fungus (P=0.01). According to mean disease severity, the cultivars were placed into 18 groups. 46, 5,36, 9,1 lines with disease severity of 0.96, 89.7, 82.7, 78.6, 78.1%, respectively, were the most susceptible. In contrast, 21, 17, 23, 44, 45, 29 and 2 lines with disease severity of 0, 0, 1.3, 2.4, 2.4, 2.7 and 4.9%, respectively, were the least susceptible. Other lines were of intermediate reaction. This is the first study for determining relative resistance of tetraploid wheat lines to *Septoria tritici*.

R 16

THE SUSCEPTIBILITY OF DATE PALM VARIETIES TO THE STORED PRODUCTS INSECTS IN U.A.E. DATE PALM ORCHARDS. Emad M. T. Al-Hafidh, Private Trading Company, P.O. Box 27492, Abu Dhabi, United Arab Emirates, Email: emmothi@yahoo.com

The susceptibility of some varieties of date palm fruits were studied to determine the insect infestation on the most important date varieties in U.A.E. The results showed that some insect species infested the fruits during the pre-harvest period of dates in orchards. Khlas and Khsab were

more susceptible than the other varieties to the infestation of stored product insects. The high infestation level was during October and November and in the dates without caps than fruits with caps. The population density of *Carophilus* spp., *Ephesria* spp., and *Oryzaephilus* were highest on the different varieties in orchards and new spieces of stored product insects were recorded.

R 17

TOLERANCE OF TEXAS HYBRIDS OF MAIZE TO THE CORN STEM BORER, *SESAMIA CRETICA* LED. Abbas M. Al-Khafaji[1] and Hameed H. Al-Karboli[2]. (1) Agricultural Section, Directorate of Municipal Babylon governorate, (2) Department of plant protection, College of Agriculture, Abu-Ghraib, Baghdad, Iraq, Email: alkarbolihameed@yahoo.com.

Field experiments were conducted in Babylon province (Iraq) to evaluate the tolerance of 10 hybrids of maize, recently introduced to the country from Texas University USA, after exposure to natural infestation with the corn stem borer, *Sesamia cretica* Led. (Lepidoptera: Phalaenidae). These experiments were conducted during the spring and fall seasons of 2004-2005. Results indicated that all hybrids were susceptible to corn borer, and they can be divided according to their susceptibility to the borer into several groups, Hybrid MSI4387 was the most tolerant to stem borer, MSI4387 showed the least rate of infested plants (5, 0.00%) and yield loss (12, 17%) for the spring and fall seasons respectively. However, these values were significantly different from the highest corresponding values of 58.53, 7.26% ecorded for hybrids MSI4290 and the local hybrid (IPA 5012), whereas, the highest yield loss (48%) was recorded for hybrids MSI4317 and MSI4290 for the two seasons. It could be concluded that further field studies are necessary in the future to confirm these results and evaluate further its potential use in IPM programs for the corn borer.

R 18

POPULATION FLUCTUATIONS OF *APHIS CRACCIVORA* AND *LIRIOMYZA TRIFOLII* AND THEIR ENDOPARASITOIDS ON FABA BEAN VARIETIES. Salwa S. Abdel-Samad and M.A. Ahmed, Plant Protection Research Institute, Agriculture Research Center, Giza, Egypt, Email: salwa_ssss@yahoo.com

Infestation by the aphid (*Aphis craccivora*) and leafminer (*Liriomyza trifolii* Burg) and its associated parasitoids on the faba bean (*Vicia faba*) varieties Misr 1, Misr 2, Giza 40 and Giza 429 were investigated at Shandawel, Sohag governorate during 2004/05 and 2005/06 growing seasons. The results revealed that most spread occurred during February and March for both pests. Susceptibility of faba bean varieties could be arranged (in both months) in an increasing order based on the mean average of infestation by aphids per plant as follows: Misr 1 (40.6), Misr 2 (42.6), Giza 40 (54.2) and Giza 429 (58.7). For susceptibility to leafminer the arrangement of genotypes in an increasing order was: Misr 2 (18.2%), Giza 429 (19.8%), Misr 1 (23.9%) and Giza 40 (26.1%). Three species of hymenopterus parasitoids attacking *Aphis craccivora* were identified, namely *Lysiphlebus fabarum*, *Aphidius matricariae* and *Trioxys* sp. Moreover, three species of parasitoids associated with *Liriomyza trifolii* were also identified, namely *Diglyphus isaea* Walker, *Pnigalio* sp. (Eulophidae) and *Opius* sp. (Braconidae). These parasitoids reached its maximum parasitism rate during February and March; 21.1% during February and 17.2% during March for aphid parasitoids and 12.8 % during February and 13.1 % during March, for leaf miner parasitoids.

R 19

TOWARDS PRODUCTION OF SUGARBEET CLONES RESISTANT TO INSECTS: ENGINEERING OF PLANT CELL WITH BT GENE. Shawky A. Bekheet, Plant Biotechnology Department, National Research Center, El-Tahrir Street, Dokki, Cairo, Egypt, Email**:** shawky005@yahoo.com

An attempt of engineering sugarbeet plants with Bt (*Bacillus thuringiensis*) gene was achieved. An efficient regeneration protocol through *in vitro* direct and indirect organogenesis of sugarbeet was developed. Construct containing Bt (*Cry 1AC*) was prepared and cloned in a vector plasmid. Transformation of sugarbeet explants was done using *Agrobacterium* strain LB4404 containing pBI121 plasmid containing. CaMV 35S promoter, nos terminator, GUS (reporter gene), hygromycin (plant selection), kanamycin (bacterial selection). Two types of explants i.e., leaf (taken around the midrib and with part of petiol) and shoot bases were used as plant materials. Transient expression of GUS in transformants was assayed since the positive response was recorded as showing blue patches. Although shoot bases explants were appropriate for direct and quick regeneration but their transformation frequency was relatively poor. Plant tissues which successfully grew and regenerated on selective medium containing antibiotics were taken and subcultured on elongation and rooting medium to obtain complete plantlets. Transformation was confirmed by using PCR analysis. The presence of the reporter gene was detected by using the total plant DNA and primers flanking a region within the gene. PCR analysis results indicated that there was a high percentage of GUS positive cultures indicating successful transformation.

R 20

SUSCEPTIBILITY OF TOMATO CULTIVERS TO INFECTION WITH *POTATO SPINDLE TUBER VIROID* AND ITS EFFECT ON GROWTH AND PRODUCTION OF TOMATOES IN LIBYA. Hania Al-Gammudi[1], Jabr Khalil[1], Al-Taher Abu-Hlaka[1] and Khalid El-Dogdog[2]. (1) Plant Protection Department, Faculty of Agriculture, University of Al-Fateh Tripoli, Libya, Email: khalil_reem@hotmail.com; (2) University of Ain-Shams, Faculty of Agriculture, Egypt.

The Susceptibility of most of the cultivated tomato cultivar in Libya to infection with *Potato spindle tuber viroid* (PSTVd) and its effect on growth and production were evaluated. The following cultivars were mechanically inoculated with the Libyan isolate of PSTVd: Felkato, Sinkara, Libda, Yasamin, Thoraia, Hanaa and Kanza, and infection rates were 95, 95, 90, 90, 80, 80 and 20%,

respectively. Disease symptoms included malformation, yellowing, necrosis, reduced leaf size and formation of dark brown, yellow and white spots. The following cultivars were mechanically inoculated with the Egyptian isolate of PSTVd: Felkato, Zahra, Thoraia, Libda, Hoda, Farwa, Cherry tomato, Naziha, Reem Star and Kartika, and infection rates obtained were 95, 95, 85, 85, 80, 80, 70, 40, 0.0 and 0.0%, respectively. Disease symptoms observed were leaf curling, rolling, malformation, dark brown spots, swelling of veins and large yellow spots, which turned white. In addition, the effect of the Egyptian isolate of PSTVd on the growth and production of Yasamin, Libda, Super Halim, Kanza and No. 185 Libyan tomato cultivars was studied. It was found that the average reduction in the production of tomato fruits was 34.4%, and in plants height was 17%, and in shoots fresh and dry weights was 41 and 37%, respectively, and in roots fresh and dry weights was 35 and 37%, respectively.

R 21

SUSCEPTIBILITY OF THE NEWLY INTRODUCED POTATO CULTIVARS INTO LIBYA TO BACTERIAL SOFT ROT INFECTION AND ITS ASSOCIATION WITH PHYSIOLOGICAL CHANGES. Hanan S. A. Mustafa, Azzeddin M. Y. Alawami and Issa A. Abogharsa, Plant Protection Department, Faculty of Agriculture, Omar Al-Mukhtar University, El-Beida, Libya, Email: Azzawami2002@yahoo.com

Tubers of newly introduced potato cultivars in Libya, namely Spunta, Pamela, Daisy, Daifla, Atlas and Apollina were tested for their susceptibility to infection with soft rot bacterium (*Erwinia carotovora* subsp *carotovora*). Atlas cv. proved to be the most susceptible, whereas Daifla was the most resistant. The activities of pectolytic and oxidative enzymes in diseased tubers were profoundly higher than those in healthy ones. The highest enzymatic activities of pectin methyl esterase (PME) and polygalacturonase (PG) were observed in diseased tubers of Daifla cultivar. However, diseased tubers of Spunta gave the highest activities of polymethyl galacturonase (PMG). On the other hand, the highest significant activities of PME in healthy tubers was detected in Pamela cultivar compared to other cultivars. Moreover, there were insignificant differences in PG and PMG activities in infected compared to healthy tubers of different cultivars. Daisy and Apolline cvs. gave the highest activity of peroxidase (PO) in diseased tubers, whereas the highest activity of polyphenol oxidase (PPO) was detected in infected tubers of Atlas. Concerning healthy tubers, the highest activities of PO and PPO were noticed in Atlas and Pamella, respectively, compared to other cultivars. Electrolyte leakage from plant cells was estimated by measuring electrical conductivity as indicator for permeability changes in potato tissues. There were significant increases in the value of electrolyte leakage in infected tubers of all tested cultivars, compared to healthy ones. Electrolyte leakage in diseased tubers of Apolline and Atlas cvs. were significantly higher than at of other cultivars. It can be concluded that infection with soft rot bacterium caused permeability changes in tuber tissues in all tested cultivars.

R 22

DIFFERENTIATION BETWEEN SUSCEPTIBLE AND RESISTANT FABA BEAN, LENTIL AND PEA GENOTYPES TO *BEAN YELLOW MOSAIC VIRUS* ON THE BASIS OF VIRUS MOVEMENT AND MULTIPLICATION. M. Alkhalaf[1], S.G. Kumari[2], A.A. Haj Kasem[1], K.M. Makkouk[2] and S. Al-Chaabi[3]. (1) Faculty of Agriculture, Aleppo University, Aleppo, Syria, Email: Malkhalaf72@yahoo.com; (2) Virology Laboratory, International Center for Agricultural Research in the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: s.kumari@cgiar.org; (3) General Commission of Scientific Agricultural Research (GCSAR), Douma, P.O. Box 113, Damascus, Syria

The movement and multiplication of *Bean yellow mosaic virus* (BYMV, genus *Potyvirus*, family *Potyviridae*) were evaluated in 12 faba bean, 13 lentil, and 15 pea genotypes, which varied in sensitivity and susceptibility to BYMV infection. Experiments were conducted under artificial infection conditions in greenhouse and field conditions during the 2006/2007 growing season. All plants of all crops were inoculated at the four leaf stage. In the greenhouse, five plants from each genotype were tested for 24 days after inoculation (at two days interval). Different plant parts (growing point, stem, stem base, root) were cut and printed on nitrocellulose membrane (NCM), and then all membranes were tested at the same time by the tissue blot immunoassay (TBIA). From samples collected in the greenhouse and the field, virus concentrations in each section were estimated using a 0-3 scale (0= no reaction, to 3= extensive staining of the plant blot) and accordingly the relative TBIA values for the different faba bean genotypes, and infection rate for lentil and pea genotypes were estimated. The TBIA results revealed that the systemic movement and multiplication of BYMV were slower in the resistant than in the susceptible genotypes. Eight to ten days after inoculation, the virus was detected in all four plant parts of the susceptible faba bean (ILB 6101, ILB 6167, ILB 2134, ILB 3038, ILB 454, PBL 507), pea (IFPI 378, IFPI 953, IG 134573) and lentil (ILL 262, ILL 1645, ILL 4400, ILL 8635) genotypes tested; whereas, the virus was not detected in all plant parts of the resistant lentil (ILL 8216, ILL 7163, ILL 4736, ILL 336, ILL 83) and resistant pea (IFPI 224, IFPI 791, IFPI 1643, IFPI 2527, IFPI 3378, IFPI 3660, IG 134697) genotypes until 24 days after inoculation. The correlation coefficients were significant (P = 0.05) between the results obtained from greenhouse and the field experiments. These findings suggested that virus movement and multiplication can be useful criteria in differentiating between BYMV resistant and susceptible faba bean, lentil and pea genotypes at around 8-10 days after inoculation.

R 23

PURIFICATION AND CHARACTERIZATION OF A PLANT PEROXYGENASE, AN ENZYME IMPLICATED IN OXYLIPINS BIOSYNTHESIS INVOLVIED IN PLANT DEFENSE MECHANISMS. Abdulsamie Hanano[1], Michel Burcklen[2], Martine Flenet[2], Anabella Ivancich[3], Mathilde Louwagie[4], Jérôme Garin[4],

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Oxylipins are various families of oxygenated poly-unsaturated fatty acids. In mammalians, oxylipins were largely studied and known to be defense-related molecules. Multiple studies have demonstrated that oxylipins play important roles in animal reactions against biotic stresses, especially in bacterial infection. All enzymes of ploy-unsaturated fatty acids metabolism have been characterized and their encoding genes have been identified. In this work, we studied a new plant enzyme, named Peroxygenase, which is involved in plant oxylipins biosynthesis. A purified fraction of the Peroxygenase from oat seeds (*Avena sativa*) which contain a high quantity of this protein was obtained. The first 23 amino acids in the N-terminus of purified protein were identified. If was found that a purified protein shares a high sequence homology with unknown protein in *Arabidopsis thaliana*. Cloning and characterization of peroxygenase encoding gene have shown that this enzyme belongs to a new family of genes, called Caleosins. Functional recombinant protein expressed in yeast demonstrated an important activity of enzyme giving oxygenated fatty acids. *In-vitro*, a significant activation of peroxygenase activity was observed in wounded plants or those treated with some signal molecules such as jasmonic acid, abscisic acid and salicylic acid. Oxylipnis resulting via peroxygenase pathway possesses a dramatic inhibition to the growth of *Magnaporthe grisea*, a plant fungal pathogen. The germination of fungal spores and their mycotoxins production have also been altered. These observations suggest that preoxygenase pathway could have potential role not only in plant defense but also in mycotoxins production in agricultural commodities.

R 24

SUCEPTIBILITY OF THREE WATERMELON VARIETIES TO INFESTATION WITH TWO SPPOTTED SPIDER MITE TETRANYCHUS URTICAE KOCH IN BAGHDAD AREA, IRAQ. Luaay K.Khalaf Al-Ani, Plant Protection Department, College of Agriculture, University of Baghdad, Baghdad, Iraq, Email: Luaay_kalani@yahoo.com

A field study was conducted to compare the susceptibility of three different varieties of water melon (charlestong gray, crimson sweet, charle) to infestation with two spotted spider mite *Tetranychus urticae* Koch during 2008. *T. urticae* is considered one of the serious pests attacking watermelon production in Iraq. Weekly samples were collected and examined under dissecting microscope, and the mobile stages were counted. Charleston Gray variety showed the highest infestation along the whole study reaching 89.66 mite/ leaf atthe 10th week of sampling. The lowest infestation was in Charle with 10 mites/leaf atthe 10th week of sampling. Moreover, the infestation of Crimson sweet was in between 27 mites/leaf at the same time of sampling. In Charle cv. the infestation started at the 7th week, whereas in the other two varieties infestation started in the second week.

R 25

REACTION OF SOME OLIVE CULTIVARS TO PEACOCK EYE SPOT DISEASE IN SYRIA. S. Al-Chaabi[1], L. Matrod[1], Y. Kutaefani[1], J. Asmar[2] and F. Qaem[3]. (1) Administration of Plant Protection Research at GCSAR, Douma, P.O. Box 113, Damascus, Syria, Email: gcsarshaabi@mail.sy; (2) Centre of Scientific Agricultural Research, Tartous, Syria; (3) Centre of Scientific Agricultural Research, Lattakia, Syria.

Peacock eye spot (*Spilocaea oleaginea* (Cast.) Hughes) is the most wide spread and harmful disease on olive trees in the coastal region of Syria. The total infected areas with this disease was estimated in April 2008 by 3400 and 2560 ha in Tartous and Lattakia governorates, respectively. Except for some infected olive trees., the disease was not recorded in all other non-coastal governorates of Syria. Disease incidence in some areas of Tartous gov. (Majdalone Al-Bestan and Bshebtah) was 100% during spring of 2008, whereas it ranged between 20 and 60% in some areas of Lattakia gov. (Set-Markhow) according to cultivar and location. Results of susceptibility evaluation of 14 local and imported olive cultivars against the disease under artificial inoculation in the glasshouse, during 2008 showed that reaction levels varied; Nebali cv. was the most susceptible, followed by Sorani, Mokharam Abu-Satl and Musa´abi, with lowest infection levels recorded on Kaessi and Zorallena, while rooted cuttings of Tirilya cv were disease free. Duaibli, Besholeen, Khaoukhi, Khda´ari and Sorani olive cvs. were the most susceptible to the disease under natural infection conditions during 2008 and 2009 seasons, whereas Abu-Satl, Mohasan, Abu-Satl-Aadi, Jabeh, Aba´ady Aswad, Tirilya, Ayrouni and Zorallina (Italy) cvs. were most resistant.

R 26

BREEDING FOR RESISTANCE TO *SEPTORIA TRITICI* BLOTCH IN DURUM WHEAT. Mohammad El-Khalifeh and Miloudi Nachit, ICARDA Durum Breeding Program, ICARDA, P.O.Box: 5466, Aleppo, Syria, Email: M.Khalifa@cgiar.org

Durum wheat is one of the main agricultural crops in the Mediterranean countries, where the fungal diseases are among the primary constraints in these countries, particularly Durum Wheat which is largely grown in this region and seriously attacked by *Septoria tritici* blotch (STB). The objective of this study is to look for sources of resistance to STB to be used in the crossing program at durum wheat breeding program/ICARDA, in order to improve the resistance to that disease. Therefore, a durum population of 112 F14 recombinant inbred lines (RILs) derived by single-seed descent from the cross ICD-MN91-0012 between Tamgurt (Jennah Khetifa) and Cham1 was screened under field conditions by using a bulk of *Septoria tritici* (ST) isolates; in addition it was screened under greenhouse conditions using two virulent isolates of ST (Gh1 and Gh10). The readings were taken at dough stage in the field and at tillering stage in the greenhouse using a 0-5

scale, taking in consideration the vertical and horizontal distribution of the pycnidia. The results demonstrated that 32 Lines were found resistant to moderately resistant under field conditions, as well as 56 Lines under the greenhouse conditions against the first isolate and 90 Lines against the second isolate. By comparing these results with the screening data for the last 7 years, 20 lines showed the same resistance; in addition, these lines showed also good agronomic traits, such as yield, grain quality, and resistance to other diseases. Consequently, these lines were used intensively in the crossing program of 2009.

R 27

SELECTION OF BARLEY RESISTANT LINES TO A TUNISIA ISOLATE OF BARLEY YELLOW DWARF VIRUS-PAV. Asma Najar[1], Hajar Ben Ghanem[1], Salah Rezgui[2], Safaa G. Kumari[3], Stephania Grando[3], Haitham Al- Saed[3], Micheal Baum[3] and Abderrazak Daaloul[3]. (1) Institut National de Recherche Agronomique de Tunisie, Rue hedi Kharray, 2049, ARIANA, Tunisia, Email: najar.asma@iresa.agrinet.tn; (2) Institut National Agronomique de Tunisie, Tunis, Tunisia; (3) International Center of Agricultural Research for the Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria

The objective of this study was to select barley lines resistant to *Barley yellow dwarf virus* under Tunisian environmental conditions. Promising resistant lines were selected among ten crosses between parental cultivars carrying the BYDV resistant gene Yd2 and others which carry resistant genes for major fungal diseases and high yielding under Tunisian conditions. Studies were conducted over four growing seasons (2002/2003-2005/2006) under field conditions, with artificial inoculation of BYDV-PAV using *Rhopalosiphum Padi* as the virus vector. Selection was carried out among F2, F3, F4 and F5 segregating populations. 198 resistant lines to BYDV-PAV were selected. These lines were then evaluated for agronomic performance in different growing areas: Beja (sub-humid) and Kef (semi-arid) during 2007 cropping season. Considering especially the grain yield, 25 lines were shown to be superior to Rihane. Within these lines, only 8 exceeded Manel and 16 could be used for both grain and forage crops. However, 2 lines seemed to have wide adaptation under both semi-arid and sub humid conditions.

R 28

RELATIVE RESISTANCE OF FLAX GENOTYPES TO POWDERY MILDEW. Ghodratollah Saeidi and Mozhdeh Moshksar, Department of Agronomy and Plant Breeding, College of Agriculture, Isfahan University of Technology, Isfahan 84156-83111, Iran, Email: gsaeidi@cc.iut.ac.ir

Powdery mildew of flax (*Linum usitatissimum* L.) caused by the fungus *Oidium lini* is one of the important flax diseases. In this study, 81 genotypes of flax were evaluated for both infection to the disease and agronomic traits. In this experiment, there was no control of the disease and the plants were infected under field conditions. The infection intensity of each genotype was recorded based on a scale from 1-5, where 0 (no infection) to 5 (complete infection of the plant). The results showed significant differences ($P < 0.01$) among the genotypes for their responses to disease and the range of mean infection was 0 (for KH40 genotype) to 5 (for KO12 genotype). Baseed on level of infection, all genotypes were classified in 3 significantly distinct groups: susceptible (one genotype with a mean of 5), moderately susceptible (17 genotypes with a mean of 2.5) and resistant (18 genotypes with amean of 1.1). Phenotypic and genetic coefficients of variation (50% and 38%, respectively) and broad-sense heritability (64%) indicated that there was genetic variation among the genotypes for powdery mildew infection. Phenotypic and genetic correlation coefficients between intensity of infection with seed yield ($r_{Ph} = 0.12$ and $r_g = 16$) indicated that, the disease had no significant adverse effect on seed yield in this experiment, most probably because late infection. The results indicated the possibility of selection for resistance to powdery mildew.

R 29

EVALUATION OF CUCUMBER CULTIVARS RESISTANCE TO VEGETABLE LEAFMINER, *LIRIOMYZA SATIVAE* IN GREENHOUSES. Moslem Basij, Alireza Askarianzadeh, Saeid Moharramipour, Shahriyar Asgari and Ramin Rafezi., Shahed. University, Faculty of Agricultural Science, Tehran, Iran, Email: moslembasij@yahoo.com

Leafminer, *Liriomyza sativae* Blanchard has been widely distributed in the world in recent years and it is presently an important pest of vegetables and ornamentals. Because of its high potential for resistance to current insecticides, the use of resistant cultivars seem to be an effective approach in developing IPM programs for the pest. Cucumber is a preferred host for *Liriomyza sativae.* In this studt 17 cultivars of cucumber were examined to evaluate their antixenosis resistance to this insect. Trials were conducted with 5 replications in a growth chamber at 25±1C,55±5% RH and 16:8 (light:dark) photoperiod. Cucumber cultivars were evaluated on the basis of feeding punctures, number of larval mines, proportion of mines to punctures and rate of injury. Cucumber cultivars were ranked by cluster method based on all measured characters to four groups: susceptible (karim, Koraxh), semi-susceptible (khasib, Jiroft1, Evergreen, Vikima, and Soltan), semi-resistant (Maximus, Victor, Green magic, Royal, Service plus, Roodbar local) and resistant (Sanandaj local, Gorgan local). No cultivar was immune to the injury.

R 30

SUSCEPTIBILITY OF ALMOND VARAITIES TO INFESTATION WITH THE RED PLUM MOTH, *GRAPHOLITHA FUNEBRANA IN* CENTRAL SYRIA. Amanni shlallo, Louai Aslaan and Wajih Alkassis, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: amannishllalo@yahoo.com

Almond trees are one of the important trees in SYRIA and plantations are located in the central area of the country. Many pests attack almonds; *Eurytoma amygdali* and *Grapholitha funebrun* were the most important. This study was made to identify almond varieties resistant to *G. funebrana*. Seven varieties (grown in central Syria) were investigated during the period 2004-2008 depending on the

ability of larvae to enter the hard stone and if the larvae could complete their life cycle inside the stone during storage period. The most susceptible varieties were Shami Fourk (local) 40%, Princess (French) 38%, and Provista (27%) while the varieties Dimashq, Kastantin, Colorado and Dafadae (local) were resistant.

INTEGRATED PEST MANAGEMENT

IPM 1

CURRENT STATUS AND FUTURE OUTLOOK OF THE INTEGRATED MANAGEMENT OF RED PALM WEEVIL (*RHYNCHOPHORUS FERRUGINEUS* OLIVIER). Emad Hussain Al-Turaihi, Agricultural Development Department, Ministry of Environment, P.O. Box 1966, Doha, Qatar, Email: al_turaihi@yahoo.com

Date palm (*Phoenix dactylifera* L.) is one of the most important fruit trees in the Arab countries. Since the late 1980s red palm weevil (*Rhynchophorus ferrugineus* Olivier) (Curculionidae: Coleoptera) has become a serious insect pest in the region. The aim of this study is to develop new pest control strategies for reducing the damage caused by red palm weevil. The study showed that in spite of all the efforts or methods used to control the red palm weevil such as biological agents, pheromone traps and chemical pesticides, thousands of date palm trees are dieing annually in certain locations and the weevil is still invading new areas in the region, posing a potential threat to date palm plantations. The current measures are not effective enough to succeed in eliminating red palm weevil because of great difficulty in early detection of infection and reaching all life stages of the weevil inside the palm trunk. The study also revealed that new strategies of control could be introduced in the near future to suppress red palm weevil through using further techniques. These techniques include acoustic or ultrasonic instruments, early detection sensors, plant traps, forecasting model and improving the methods of trunk injection.

IPM 2

THE EFFECT OF BIOFERTILIZER AND POTASSIUM ON THE INTERACTION BETWEEN ROOT KNOT NEMATODE *MELOIDOGYNE INCOGNITA* AND *FUSARIUM OXYSPORIUM* F. SP. *LYCOPERSIC* ON TOMATO CV. RIO GRANDE. Asma S.W. Almabrok, Mahmoud E.M. Ehwaeti, Azzeddin M. Y. Alawami and Mohamed A.M. Adam, Department of Plant Protection, Faculty of Agriculture, Omar El-Mukhtar University, P.O. Box 919, El-Beida, Libya, Email: goody3cot@yahoo.com

This study aimed to evaluate the effect of biofertilization (Halex) and mineral potassium as a tool to reduce the wilt and root knot diseases on tomato Rio Grande cultivar. Root knot nematode population was collected from eggplant from El-Hamama region. *M. incognita* and *M. javanica* were identified from this population based on perineal pattern. In addition, the identification of these species were confirmed by detection of esterase phenotype in adult females, where *M. incognita* had one band while *M. javanica* had three bands. *M. incognita* was propagated in pure culture. Numerous treatments were evaluated: Halex, potassium fertilizer, Halex and potassium fertilizer, control, and inoculationwith *Fusarium* alone, by nematodes alone and by *Fusarium* + nematodes and control. For the application of the Biochemical fertilizer (Halex), the roots of two weeks old tomato seedlings var. Rio Grande were immersed in suspension of Halex and moist soil at the rate of 800g Halex + 50 kg moist soilfor 20 min before planting in pots arranged in a randomized split–split plot design. The potasium treatment 3 days after planting was with 0.46g potassium sulfate placed on the soil surface and mixed with soil, irragated and then ionculated with *Fusarium* + nematodes (3 replicates for each treatment) for the split-split designg treatment. The main Blocks consisted of the inoculated treatments, and the secondary Blocks of the fertilizer treatment.Results were recorded 45 days after planting. Results showed that the *Fusarium* inoculation reduced the gall index as compared to the control (3.3/4.0).Similarly, number of eggmases (63.00/114.60), eggs/eggmases (100/163.30) and adult females/root (88.6/136.00) were reduced as compared to the control. In contrast, presence of *M. incognita* increased slightly *Fusarium* wilt severity (3.6) compared to *Fusarium* alone(3.3). The severity of wilt disease decreased in the halex and potassium fertilized plants (1.0) followed by potassium fertilized plants (1.60) compared to unfertilized plants (3.60). The fertilization with Halex alone or together with potassium gave significant reduction in disease severity and *M. incognita* reproduction (7.18/29.25) and number of second stage juveniles/pot (23.7/126.6) as compared to the controls. The reproduction factor was 6353 compared to 18603 for unfertilized plants. Moreover, the final nematodes population was decreased on the plants that received potassium compared to untreated plants.

IPM 3

EVALUATION THE IMPACT OF FARMER FIELD SCHOOLS ON THE INTEGRATED PEST MANAGEMENT PROGRAM IN JORDAN. Ashraf Saber Alhawamdeh[1] and Alfredo Impeglia[2]. (1) National IPM Project Coordinator, Ministry of Agriculture, National Center for Agricultural Research and Extension NCARE, Email: ash_agri@yahoo.com; (2) Regional IPM Project Coordinator in the Near East, Food and Agriculture Organization FAO, Email: faoipmne@scs-net.org

The Integrated Pest Management (IPM) is a concept which promotes the use of biological control, good agronomic practices and other means before using chemical pesticides to control pests. The Regional IPM Programme in the Near East GTFS/REM/070/ITA, executed by FAO with funds from the Italian Government, was launched in 2004. One of the aims of the program is to educate farmers in IPM using the Farmers Field School (FFS) extension method to provide practical training to farmers based on adult education; it empowers farmers through the participatory and non-formal education process. The FAO Reg. IPM program trained so far more than 1,500 farmers (20% of them are female farmers) and established more than 100 FFSs in different agricultural areas in Jordan, especially in the Jordan valley and South Ghour (Safi). The

Project deals with several crops, but particularly with cucumber and tomato. The positive results of the Project improved the crop and pest management, increased farmer's income by reducing the use of chemicals and improved farmer's livelihood. The Project in brief has a technical, social and institutional impact at the rural community level through farmer education, technology development, farmers' empowerment, alliance building and policy support. The member farmers in FFS succeeded to reduce the cost of production mainly related to chemical pesticides use by 60%. The Project results encouraged the National Center for Agriculture Research and Extension (NCARE) to establish few FFSs as part of a newly established national program.

IPM 4

THE USE OF FOLIAR FERTILIZERS, ALTERNATIVE CHEMICAL COMPOUNDS AND RELEASE OF *TRICHOGRAMMA EVANESCENS* IN THE INTEGRATED PEST MANAGEMENT FOR CONTROLLING SPINY BOLLWORM, *EARIAS INSULANA* IN ORGANIC AND CONVENTIONAL COTTON PRODUCTION. H.A. Awad[1], A.A. Saad[2], Kh. A. Abdel-Rhman[1] and M. M. EL- Beasiony[1]. (1) Plant Protection Research Institute, Agriculture Research Center, Alexandria, Egypt; (2) Department of plant protection, Faculty of Agriculture (Saba Basha), Alexandria University, Egypt, Email: ayten999@yahoo.com

The present study was conducted to evaluate four IPM organic regimes [Naturalytes, Biocides, Botanicals and release a parasitoid of *Trichogramma* spp.] for organic cotton production and six IPM regimes for conventional cotton production [O.P., oxime carbamate, pyrethroids, a naturalyte, Spinosad and their mixtures with chemical insecticides at half recommended dose for each compound] to determine the effective regimes for the integrated pest management (IPM) of the spiny bollworm. The results obtained indicated that the most effective foliar treatment was either ascorbic or salicylic acid at a rate of $^1/_2$ g/l in both seasons during flowering period for organic cotton production at higher plant density (average reduction 52.5%). Whereas for conventional cotton, the highest reduction of spiny bollworm (51.10%) was obtained by using 0.2 g/L Greenzit$_{SP100}$ + 0.5 g/L of ascorbic acid and 0.5 g/l salicylic acid**.** The application of *Trichogramma*, Agerin + Achook; *Trichogramma* + Agerin + Achook, Spinosad + Meenark, Dipel + Meenark during boll formation was most efficient in reducing infestation of SBW in green bolls of organic production of cotton plants at lower plant density in both seasons (75.97%). In conventional cotton production, the use of Curacron + Match, Pindelta+ Cotton Seed Oil, Spinosad + KZ oil, Larvin + Dipel with deflowering at the early flowering at lower plant density produced the lowest infestation level (80.34 and 78.5%, in respect)**.** In comparison to the untreated control in organic cotton, all the evaluated treatments, gave somewhat lower mean numbers of each inspected predator species/15 plants and ranged between 7.31 and 9.64 against 8.31 and 11.31 in the untreated control. In conventional cotton production, the level of decrease was somewhat higher in all tested treatments and ranged from 3.75 to 6.75 against 6.94 to 8.69 predatory species/15 plants in the untreated control. The observed variable decrease of monitored predators could be attributed to the species specificity and sensitivity to each of the tested treatments in organic and/ or conventional cotton production.

IPM 5

INTEGRATED PEST MANAGEMENT OF CEREAL PESTS THROUGH A FARMER PARTICIPATORY APPROACH IN MOROCCO. Saadia Lhaloui[1], Rachid Dahan[1], Hassan Ouabbou[1], Driss Hadarbach[1], Fouad Abbad[1], Hamida Hilali[1], Hamid Ramdani[1], Hamid Hamal[1], Kaddour Saffour[1], Mustapha El Bouhssini[2] and Amor Yahyaoui[2]. (1) INRA-CRRA Settat, P.O. Box 589, Settat, Morocco; (2) ICARDA, P.O. Box 5466, Aleppo, Syria, Email: slhaloui@yahoo.com; lhaloui@hotmail.com

The Moroccan economy is based mainly on agriculture. Cereals and food legumes are the major crops of the country and occupy nearly 70% of the arable lands. However, insects, diseases, and weeds are major production limiting factors and damage inflicted by these pests is around 30% yearly and may reach 100% in cases of heavy attacks. To protect these crops, INRA-Morocco and ICARDA have been conducting an IPM program to reduce the use of agricultural chemicals and advocate sustainable, environment-friendly management practices, with a farmer participatory approach on wheat, winter chickpea, and Faba bean. IPM Pilot Sites were established in major regions where rainfed wheat and chickpea are the most important crops. Wheat production faces a major pest problem, the Hessian fly. The major pest problem for chickpea is the fungal disease Ascochyta blight. In each community, three lead farmers were selected to test IPM options for wheat and chickpea. Through consultation meetings prior to planting, it was agreed that the IPM options for wheat will focus on (i) Hessian fly control, (ii) weed control, (iii) appropriate fertilization, (iv) and planting date. As for chickpea, the IPM options focused on (i) improved chickpea variety, (ii) weed control, (iii) use of drill for planting, and (iv) planting date. The IPM options for Faba bean focused on Orobanche and Botrytis control. For wheat, the results showed that there were significant gains in grain yield between Hessian fly resistant and susceptible cultivars; and between early and late planting dates, up to 100% increase. Use of resistant cultivars gave a yield increase of two fold over the susceptible one at the early planting date, while it was up to three folds for the late planting date. In chickpea, using the best IPM options improved yield significantly. Major gains came out from winter planting and early weed control compared to traditional spring planting. Advancing sowing date from spring to winter using adapted chickpea variety with optimum package increased yields from 2 to 4-folds or more. On the other hand, pre-emergence herbicide application significantly improved yields. Yields increase ranged from 20 to over 100%. This emphasizes early weed control as a principal component of winter chickpea technology. For Faba bean, major gains (from near zero yield to more than 4 folds) were registered in the Orobanche and Botrytis controlled plots. The lead farmers'

sites were used as training sites for neighboring farmers throughout the growing season. These sites were visited by a large number of farmers (over 500), and several decision makers including newspapers reporters, and reporters from the TV channels of Morocco. Meeting with farmers and extension agents were organized during the season and after harvest to discuss the results obtained from the exercise and establish plan of work for the upcoming season.

IPM 6

ENHANCING MAIZE PRODUCTIVITY THROUGH DISEASE MANAGEMENT. Hidayat Rahman, Department of Plant Breeding and Genetics, NWFP Agricultural University, Peshwar, Pakistan, Email: kbmarwat@aup.edu.pk

A maize breeding scheme has been adopted at NWFP Agricultural University, Peshawar (Pakistan) that facilitates the completion of one cycle of recurrent selection for the incorporation of leaf blight resistance and grain yield improvement in one year. The schedule entails growing three maize crops in one year and has been successfully undertaken during the last two years (2006 and 2007) to complete two cycles of S1 lines recurrent selection in Azam and Sarhad White maize populations. The gain for resistance to maydis leaf blight disease was about 22.5%, reflecting a significant reduction in disease severity. The gain per cycle during these two years was 13%, each for grain yield and ear length and about 35% for 1000 kernel weight in Azam population. Similarly for Sarhad White population, the gain per cycle was 19.5% for grain yield while10.4% and 4.1% for ear length and 1000 kernel weight, respectively. This new procedure allows maize breeders to produce three generations of maize crop in single year which would have a significant impact by speeding up maize cultivars development. The scheme can be easily adopted for the incorporation of disease resistance in maize and tolerance to other biotic stresses as well in maize breeding material of tropical origin.

IPM 7

INTEGRATED CONTROL OF *MELOIDOGYNE INCOGNITA* INFESTING TOMATO USING DRIED CALLUS POWDERS APPLIED SINGLY OR IN COMBINATION WITH OXAMYL UNDER MICROPLOT FIELD CONDITIONS. Ahmad H. Nour El-Deen, A.G. EL-Sherif, Fatma A.M. Mostafa and A.R. Refaei, Nematology Research Unit, Agricultural Zoology Department, Faculty of Agriculture, Mansoura University, Egypt, Email: ahnoureldeen2003@yahoo.com

The effect of four dried callus powders derived from certain plants, i.e. tomato, periwinkle, thorne apple and oleander applied separately or concomitantly with oxamyl at a half of the recommended dose each on tomato seedlings grown in soil naturally heavily infested with *M. incognita* under field conditions, indicated that dried callus powder derived from *N. oleander* either alone or mixed with oxamyl significantly surpassed the other tested treatments in improving whole plant fresh and shoot dry weights as well as increasing numbers and weights of fruits with values of 137.1 and 140.9%; and 54.8 and 313.7% or 147.1 and 212.3%; and 91.8 and 412.0%, respectively. *C. roseus* plus oxamyl demonstrated a high rate of increase in whole plant fresh weight (141.4%) and shoot dry weight (189.7%) and ranked second to *N. oleander* + oxamyl compared to untreated plants. All tested treatments reduced significantly the total number of galls, egg-masses and number of eggs in egg-masses and were more efficient when used singly. Among the materials tested, dried callus powder of *N. oleander* applied singly or combined with oxamyl surpassed the other treatments in reducing number of galls, egg-masses and number of eggs with values of 76.3 and 85.5%, 78.4 and 79.4% and 93.2 and 94.3%, respectively. Application of oxamyl either alone or mixed with *D. stramonium* gave equal results in reducing the number of galls by 73.8%. It can be conducted that callus powder derived from *N. oleander* applied either singly or integrated with oxamyl at its half recommended dose was the best treatment to improve growth of tomato plants, increase fruits yield and suppress *M. incognita* development and reproduction in naturally infested soil.

IPM 8

EFFECT OF SOME CULTURAL PRACTICES ON TWO SUCKING PESTS INFESTATION OF SOYBEAN (*GLYCINE MAX* L.) IN SOHAG GOVERNORATE. Fargel A. Salman[1], Hamed A. Abd El Daiem[1], Magedy A. Mohamed[1] and Ahmed M. Salman[1]. (1) Agriculture Research Center, Plant Protection Research Institute, P.O. Box 12816, Egypt; (2) Plant Protection Department, Faculty of Agriculture, Sohag University, Egypt, Email: dr_homam@hotmail.com

This work was conducted at the Agricultural Research Station at Shandaweel, Sohag Province at Upper Egypt, during two consecutive seasons, 2006 and 2007, to study the effect of some agricultural practices (sowing dates, irrigation intervals, nitrogen fertilization levels, phosphorus fertilization levels and row spacing) on the infestation level of two pests, the two spotted spider mite, *Tetranychus urticae* Koch. and the whitefly, *Bemisia tabaci* (Genn.), on soybean. The results obtained revealed that the population density of *T. urticae* decreased significantly with delayed sowing date, whereas *B. tabaci* populations were at their lowest level when planted early in the two seasons. The soybean plants irrigated every 14 and 21 days represented the lowest significant numbers of the both pests compared to those obtained with 7 days irrigation interval during two seasons, respectively. On the other hand, Interaction effect between sowing date 1st June and irrigation intervals every 14 and 21 days showed the lowest level of *T. urticae* infestation, while the 1st May sowing date and irrigation intervals every 14 and 21 days showed the lowest level for *B. tabaci* infestation, during the two seasons, respectively. However, the population density of the two pests decreased significantly with the decreasing of both nitrogen and phosphorus fertilization levels. Interaction effect of nitrogen levels 5 or 15 Kg N/fed. and phosphorus fertilization levels 15 or 30 Kg P^2O^5/fed. exhibited the lowest level of the two pests infestation, during the two seasons, respectively. Row spacing had a significant effect on both pests, since the planting distance of 70 and 80 cm between rows led to low average population density of the two pests during the two seasons.

IPM 9

EFFECT OF CULTIVAR, PLANT SPACING AND SOME INSECTICIDES ON TOMATO YIELD AND DAMAGE BY *HELICOVERPA ARMIGERA*. Mohamed H. Soliman[1] and Hany E. M. Ismail[2]. (1) Plant Protection Research Institute, Agriculture Research Center, Dokki, Giza, Egypt; (2) Hort. Department, Faculty of Agriculture, Zagazig University, Zagazig, Egypt, Email: dr_homam@hotmail.com

Two tomato cultivars, i.e., Castlerock and Super Strain- B were evaluated under two plant spacings (25 or 50 cm within row) and three chemical treatments (Ectacron and Ectaphos as insecticides and Kemesol as mineral oil, each at 100% and 75% of the recommended rate (Ectaphos, Ectacron and Kemesol at 2.5, 1.75 and 12.5 cm^3/I liter water) for yield and control of tomato fruit borer, *Helicoverpa armigera* during summer seasons of 2005 and 2006 at Abu- Kabeer district, Sharkia Governorate. Results indicated that Castlerock *cv* was less infested than Super Strain-B *cv* by tomato fruit borer for both plant spacings, whereas close spacing (25 cm) resulted in less yield damage than wider spacing for both tomato varieties. In case of chemical control, Ectacron at 100% of the recommended rate was the best treatment for initial effect, while Kemesol oil at 75% of the recommended rate was the superior treatment for residual effect during both seasons. It could be concluded from this study that, transplanting tomato *cv* Castlerock at 25 cm and spraying with Kemesol oil at 75% of the recommended rate produced maximum marketable yield/acre.

IPM 10

INFLUENCE OF SOME AGRICULTURAL PRACTICES ON THE CABBAGE APHID, *BREVICORYNE BRASSICAE* (LINN.) INFESTATION ON CANOLA, *BRASSICA NAPUS* (L.), AND YIELD LOSSES OF THREE CANOLA GENOTYPES IN UPPER EGYPT. Fargel A. Slman[1], Magedy A. Ahmed[1], Hamed A. Abd El Daiem[1] and Ahmed M. Salman[2]. (1) Agriculture Research Center, Plant Protection Research Institute, Giza, Egypt, (2) Plant Protection Department, Faculty of Agriculture, Sohag University, Egypt, Email: dr_homam@hotmail.com

Effects of four sowing dates (1st October, 15th October, 1st November and 15th November), three nitrogen fertilization levels (30, 45, and 60 Kg/acre) and two potassium fertilization levels (24 and 48 Kg/acre) on the cabbage aphid, *B. brassicae* infestation on canola plants were studied. In addition, yield losses of three canola genotypes due to aphid infestation were estimated at the Agricultural Research Station at Shandaweel, Sohag Governorate, upper Egypt during 2004/2005 and 2005/2006 growing seasons. Results obtained indicated that the infestation with *B. brassicae* increased by delaying sowing dates during the two seasons. The effect of planting dates 1st Oct., and 15th October, exhibited the lowest rate of infestation by *B. brassicae* and increased significantly with increasing nitrogen fertilization levels during both seasons. On the contrary, the *B. brassicae* infestation decreased significantly by increasing potassium fertilization levels during both seasons. The results of interactions among the different treatments, sowing dates x nitrogen fertilization levels, sowing dates x potassium fertilization levels, nitrogen potassium fertilization levels and sowing dates x nitrogen levels x potassium levels had a significant effect on the population density of *B. brassicae* during both seasons. Also, interactions between the early sowing date (1st October) x N level (30 Kg/acre), the early sowing date (1st October) x K level (48 Kg/acre) x K level (48 kg/acre) and the early sowing date (1st October) x N level (30 Kg/acre) x K level (48 Kg/acre) gave the lowest aphid population density during both seasons. In spite of the treatments 1stOctober x 45 kg N/acre and 48 Kg k/acre were suitable for giving lower aphid infestations and high yield at the same time. There was a highly significant positive correlation between aphid numbers and yield losses of three canola genotypes during 2005 and 2006 seasons and insignificant differences among the three genotypes during both seasons.

IPM 11

EVALUATION OF THE EFFICIENCY OF SOME PLANT EXTRACTS FOR CONTROLLING *PSEUDOMONAS SYRINGAE* PV. *PHASEOLICOLA* UNDER LABORATORY AND FIELD CONDITIONS. Kamil S. Juber[1] and Rajaa G. Al-Janabi[2]. (1) College of Agriculture, University of Baghdad; (2) College of Agriculture, University of Karbalaa, Iraq, Email: rajaahalo@yahoo.com

This work was carried out to control *Pseudomonas syringae* pv. *phaseolicola* , the causal organism of halo blight disease on common bean by using some plant extracts, biocontrol agents and pesticides. Laboratory results showed that all treatments studied inhibited the bacterial growth on nutrient agar, with variable effect. Beltanol was the most effective, where the diameter of inhibited zone reached 18.32 mm, followed by 8% garlic extract (18.00 mm). The 10% clove tree extract produced inhibition zone of 13.66 mm and Bremitox forte produced the least inhibition (5.00 mm), whereas, the inhibition zone by others varied between 8.15-12.19 mm. In the first field experiment Beltanol proved its superiority in decreasing disease severity to 1.00%, followed by 8% garlic extract (3.25 mm). The disease severity in others ranged between 7.25% and 12.00%, compared to inoculated control (39.00%). Treatments varied in their effect on pathogenic bacteria, where Beltanol produced the highest significant reduction in disease severity (1.00%), followed by *Pseudomonas fluorescent* treatment (6.75%), and other treatments ranged from 7.25% to 10.00%. Results on the effect of garlic water extract, the aromatic oil of sage and clove tree, did not show any negative effect on the common bean plants dry weight, compared to check treatment.

IPM 12

INTEGRATED CONTROL OF WHITEFLY AND TOMATO YELLOW LEAF CURL DISEASE ON TOMATO IN SUDAN. Ensaf S.I. Mohamed[1], Ahmed H. Ahmed[2], Mohamed O. Idris[2] and Mustafa M. El Bella[3]. (1) Agricultural Research Corporation, Shambat Research

Station, Kh. North, P.O. 30, Sudan; (2) Department of Crop Protection, Faculty of Agriculture, University of Khartoum, Kh. North, P.O. Box 32, Sudan; (3) Department of Horticulture, Faculty of Agriculture, Kh. North, P.O. Box 32, Sudan, Email: ensaf11@hotmail.com

The tomato yellow leaf curl virus (TYLCV) transmitted by the whitefly *Bemisia tabaci*, is one of the most devastating viral diseases that causes severe tomato yield losses in Sudan. Field trials were carried out during 2006/2007 to 2008/2009 growing seasons at Faculty of Agriculture, University of Khartoum. A significant reduction of whitefly population, TYLCV disease incidence and severity and increase in tomato yield (Ton/fed.) were observed in net protected nursery followed by spraying with systemic insecticides in the open field and in plots sprayed both in the nursery and field compared with the untreated control. The insecticide treatment of seedlings in the nursery without spraying in the field showed slight decrease in the disease incidence and severity compared with untreated plots.

IPM 13

CONSTRUCTED MODEL FOR AN INTEGRATED PEST MANAGEMENT STRATEGY OF STEM CORN BORER *SESAMIA CRETICA*. Hassan F. Hassan, Plant protection Department, College of Agriculture, University of Baghdad, Baghdad, Iraq, Email: Flayiah@yahoo.com

A mathematical model was constructed for an integrated pest management strategy of stem corn borer *Sesamia cretica* by using different corn genotypes resistant to stem borer together with chemical insecticide diazinon 60%. Based on cost/benefit analysis, it was found that cultivation of the resistant genotype (SAKHA 9433) gave highest economic return when no chemical control was applied. The use of diazinon 60% on average of one spray or two during growing season resulted in economic loss because the reduction in borer damages value due to insecticide use, was lower than the cost of control (spray). However, in the case of planting moderately resistant genotype (IPA 2052) and susceptible one (CML 323), the application of one spray for first cultivar and two sprays for the second during corn growing season would be cost effective but did not accomplished similar economic return compared with resistant genotype.

IPM 14

INTEGRATION BETWEEN THE USE OF FASTAC (ALPHACYPERMETHRINE) AND THE PREDATOR *CHRYSOPERLA CARNEA* (NEWST.). Sahil K. Al–Jameel, Plant Protection Department, College of Agriculture and Forestry, Mosul University, Mosul, Iraq, Email: sahilaljameel@yahoo.com

Integration between different concentrations of Fastac (0.5, 1.5, 3%) and method of application (treating the leaf only, leaf and *A. orientalis*, leaf and *A. orientalis* and larvae of *Chrysoperlla carnea*) were evaluated in terms of their mortality rate and predacious efficiency. Fastac killing rate of *A. orientalis* increased with increased concentration and reached 80.3% at concentration of 0.5% after 24 h. of treatment, and second larvae instar of *Chrysoperla carnea* were more sensitive to Fastac. Predacious efficiency reached 44.3, 65.5% for second and forth instar of *C. carnea* larvae, following Fastac leaf spray. However killing rate reached 28.2, 17.1% for second and forth larval instar, respectively, 7 days after leaves treatment with *A.orientalis* and larvae of *C. carnea*.

IPM 15

INTEGRATED CONTROL OF THE SUNN BUG IN SYRIA. Abdul Hamid Hafez, Department of Plant Protection, Faculty of Agriculture, University of Aleppo, Syria, Email: hafez2224@hotmail.com

A field study was carried out to estimate the efficiency of the bacteria *Bacillus subtilis* Ehr. (isolated from the soil of the Faculty of Agriculture, University of Aleppo Farm), *B. thuringensis* Berl. (Commercial isolation) at the concentration of 10^7 cells/ml, the bioinsecticide Neem Azal T/S (1% Azadirachtin A) at 0.5% concentration 0.5%, the organic insecticide Dimilin (25 W.P.) at 1% concentration (IGR) and the entomopathogenic fungus, *Beauveria bassiana* (Balsamo) Vbuillemin at the concentration of 10^7 propagule/ml to control the Sunn bug (*Eurygaster integriceps*) in durum wheat variety Sham 1 in northern Syria during the growing season 2006/07. The wheat was sprayed once, at the three leaves growth stage. Results showed superiority of Dimilin, *B. subtilis*, and Neem Azal treatments with significant differences in comparison with control, while the pest was not affected by *B. thuringensis* and *B. bassiana.*

IPM 16

EFFECT OF ENTOMOPATHOGENIC NEMATODES AND THE INSECTICIDE IMIDACLOPRID AGAINST STONE-FRUIT ROOTBORER LARVAE *CAPNODIS TENEBRIONIS* L. IN SEMI-FIELD CONDITIONS. Zakaria Musallam[1], Adel Hourieh[2] and Nada Allouf[2]. (1) Plant Protection Directorate, Ministry of Agriculture, Amman, Jordan; (2) Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria, Email: zak682001@yahoo.com

The effect of two application rates 100 and 200 of infective juvenile stage IJ per cm² of local entomopathogenic nematode isolate, *Heterorhabditis bacteriophora* Poinar (*H.b*), commercial formulation of *Steinernema feltiae* Filipjev (*S.f*) at application rate 100 IJ/cm² and the imidacloprid insecticide at a rate of 0.01 gr a.i/l against *Capnodis tenebrionis* (Coleoptera: Buprestidae) larvae before and after *Capnodis* larvae enter the root of potted peach transplant were evaluated in semi-field conditions. Results showed that all treatments significantly reduced the number of *Capnodis* larvae before and after entering the root compared to control (untreated treatment). Mortality rate of *C. tenebrionis* larvae before entering the roots were 60, 67, 40 and 100% for *H.b* (100 IJ/cm²), *H.b* (200 IJ/cm²), *S.f* and imidacloprid, respectively; while after entering the roots they were 79, 84, 58 and 68%, respectively.

IPM 17

ADOPTION AND IMPLEMENTATION OF INTEGRATED PEST MANAGEMENT PRACTICES IN APPLE ORCHARDS IN SYRIA. Shadi Faskha[1], Mohamed El-Said El-Zemaity[2], Sayed Dahroug[2] and Hamed Sakr[2]. (1) Agriculture Scientific Researches Centre, Tartous, Syria; (2) Faculty of Agriculture, Ain shams University, Cairo, Egypt, Email: Shadi1779@hotmail.com

A study to evaluate IPM adoption in apple orchards in three regions in Syria, i.e. El-Marrana (Tartous Governorate), Daher El-Jabal (As-Sweida Governorate) and Sirghaya (Rif Dimashq Governorate) was carried out. The data obtained indicated that the dominant practice by apple growers in the three regions was just entry level IPM. The use of sex pheromone traps in conjunction with the day-degrees (DD^{o}C) model showed that the key insect pest codling moth, *Cydia pomonella* L., had three generations in El-Marrana, and two generations in both the Daher El-Jabal and Sirghaya. Utilize day-degrees (DD) as a practical tool for IPM decisions was implemented. Also, a simple table to extract accumulated DD by growers instead of using mathematical models was adapted. On the other hand, the integration among three control elements, i.e. the parasitoid *Trichogramma cacoeciae*; two insecticides Esfenvalerate + Chlorpyrifos, and cardboard traps in one program to manage codling moth showed the best results in controlling codling moth**,** which reached 82.28%.

IPM 18

IMPLEMENTATION OF INTEGRATED PEST MANAGEMENT ON GREENHOUSE TOMATO AND APPLE CROPS THROUGH FARMERS FIELD SCHOOLS (FFS) IN SYRIA. Mohammed Ezziddin Al Sayed and Alfredo Impiglia, IPM Project, Damascus, Syria, Email: me.sayed.955@hotmail.com

Farmer Field Schools (FFS) on horticultural and field crops was recently introduced by the FAO GTFS/REM/070/ITA project in Syria starting 2004. This approach was valid participatory extension methodology for introducing integrated pest management practises to farmers. IPM/FFS on greenhouse tomato and apple orchards produced satisfactory results and quick adoption of several IPM options. Chemical pesticides and fertilizer have been sometimes drastically reduced with good crop yields and high quality. Different alternatives to chemical sprays were implemented from mechanical to biological methods with proper use of natural resources such as water. For instance, pesticide applications were reduced from 20 to 2 sprays combined biological control methods. The use of soil analyses reduced fertilizer use from 140 kg to 20 kg per greenhouse for tomato production. On the other hand, bumble bees were used to enhance tomato pollination instead of plant oxenes. Reduction of pesticides and fertilizers was also achieved in apple orchards because of adapting integrated pest managements options by farmers.

BIOLOGICAL CONTROL

BC 1

EFFICIENT CONTROL OF THE TOMATO FRUIT WORM, *HELICOVERPA ARMIGERA* (HB.) BY RELEASING THE EGG PARASITOID, *TRICHOGRAMMA EVANESCENS* WEST. IN TOMATO FIELDS IN SOUTHERN EGYPT. Ahmed H. El-Heneidy[1], Shalaby M. El-Awady[2] and Hamdy N. El-Dawwi[3]. (1) Agricultural Research Center, P. O. Box 915, Maadi, Cairo, Egypt, Email: aheneidy@link.net; (2) Plant Protection Department, Faculty of Agriculture, El-Azhar University, Cairo, Egypt; (3) Center of Bio-Organic Agricultural Services, Aswan, Egypt.

Tomato is one of the major vegetable crops in the southern region of Egypt. The tomato fruit worm, *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae) is the major insect pest on tomato in the region**.** The present study focused on use of the egg parasitoid, *Trichogramma evanescens* West. (Hymenoptera: Trichogramatidae), as a non-chemical secured mean for controlling the pest in tomato fields in the region. Infestation rates were estimated biweekly using direct counts of pest larvae on 20 tomato plants and number of moths per pheromone trap for two successive seasons 2004/2005 and 2005/2006. Highest rates of infestation ranged between 5.6 and 20.1%. General seasonal means of infestation were 4.5 and 5.5% in 2004/2005 and 2005/2006 seasons, respectively. Highest monthly mean numbers of moths/trap (21.2 and 24.6) were recorded during February and March. General seasonal means number of moths/trap were 17.9 and 7.9 in the two seasons, respectively. Releases of *T. evanescens*, testing different rates, numbers and timing of releases were evaluated. Releases started at the flowering and fruiting growth stages during November and December, respectively. In all cases, use of *T. evanescens* reduced the pest rates of infestation. The treatment of using 40,000 parasitoid individuals/feddan, four times, in two weeks intervals and at the flowering growth stage achieved lowest rate of infestation (1.5%) compared with the control (5.5%). Reduction rate was 72.7%. Cost benefit of using *T. evanescens* for controlling *H. armigera* in tomato fields in the southern region was estimated at LE 852 (=155 US$)/feddan beside the benefits of applying an environmental friendly safe control method.

BC 2

IMPACT OF ENTOMOPATHOGENIC NEMATODES ON DIFFERENT STAGES OF THE PUMPKIN FLY, *DACUS CILIATUS* AS A NEW APPROACH IN ITS BIOLOGICAL CONTROL. Badr El-Sabah A.Fetoh[1] and Seham S. El-Gendi[2]. (1) Plant Protection Research Institute, ARC, Dokki, Giza, Egypt; (2) Faculty of Agriculture, Fayoum University, Egypt, Email: badrelsabah@yahoo.com

The infectivity of two steinernematid entomopathogenic nematodes, namely *Steinernema carpocapsae* All and *Steinernema riobravae* (Weiser, 1955) Poinar and one species of heterohabdit nematode, *Heterohabditis bacteriophora* Poiner on the leaping larvae, pupae and adults of the pumpkin fly, *Dacus ciliatus* (Loew)

(Diptera: Tephritidae) was evaluated. Data obtained demonstrated that *D. ciliatus* larvae was more susceptible to the nematode *S. riobravae* than to *S. carpocapsae* or *H. bacteriophora*. The parasitism rate followed by death varied from 9.93% to 93.33%. *D. ciliatus* pupae and adults, however, were more susceptible to *H. bacteriophora* than to the other two steinernematid nematodes *S. riobravae* and *S. carpocapsae*. The parasitism rate followed by death ranged from 6.33 % to 90.00% and from 11.10% and 91.13 % for pupae and adults, respectively.

BC 3

SIGNIPHORIDAE (HYMENOPTERA: CHALCIIODEA) IN EGYPT WITH EMPHASIS ON SUPPRESSION ROLE OF THE PRIMARY PARASITOIDS OF ARMORED SCALE INSECTS. Shaaban Abd-Rabou, Plant Protection Research Institute, Agricultural Research center, Dokki, Giza, Egypt, Email: shaaban59@yahoo.com

Family Signiphoridae are said to be external hyperparasitoids of scale insects, aleurodids, psyllids, aphids and certain Diptera. Some species are also known to be primary ectoparasitoids on the puparia of the dipterous families Chamaemiidae and Chloropidae, whereas others have been recorded as primary parasitoids of mealybugs and armored scale insects. The present work dealt with the survey of Family Signiphoridae in Egypt. The results indicated that this family is represented in Egypt by four species, namely *Chartocerus niger* (Ashmead), *Chartocerus subaeneus* (Foerster), *Signiphora flavella* Girault and *Signiphora* sp. These species were found associated with *Chrysomphalus aonidum* (L.), *Hemiberlesia rapax* (Comstock) (Hemiptera: Diaspididae), *Maconellicoccs hirsutus* (Green) (Hemiptera: Pseudococcidae) and C. *aonidum*, respectively. The reduction of the primary parasitoids of armored scale insects was 10-23% by *C. niger* and *S. flavella*.

BC 4

INFESTATION OF TOMATO FRUITS WITH TOMATO FRUIT BORER, *HELICOVERPA ARMIGERA* (HUBNER) AND ITS CONTROL USING SOME LOCAL AND MORE SAFE MATERIALS COMPARED WITH CONVENTIOAL INSECTICIDE. Mohamed H. Soliman[1], Gehad M. Mousa[1] and El Sayed M. Farag[2]. (1) Plant Protection Research Institute, Agriculture Research Center., Dokki, Giza, Egypt; (2) Central Agricultural Pesticides Laboratory, Agriculture Research Center, Email: dr_homam@hotmail.com

The experiments were carried out in mitawa village, Fakous district in Sharkia Governorates during 2006 and 2007 summer seasons, respectively, to study the vertical levels of infestation of tomato variety (*Lycopersicon esculentum*, Mill.) (high and low) super strain with *Helicoverpa armigera* (Hubner) (Lepidoptera, Noctuidae). The efficiency of some oils including CAPL-2, SOL. E.C. and organophosphorus compound Selecron (Profenofos) 72.0% EC in reducing damage of tomato fruits was evaluated. Statistical analysis of the results indicated that tomato plants during 2006 season had more infestation than 2007 season. The plants lower parts were more infested with pest's eggs and larvae than the upper parts. Results also showed that there were three peaks of infestation at 3rd, 5th and 7th inspection weeks. On the other hand, evaluation of pesticidal efficiency of the tested materials for reducing the damage of *H. armigera* suggested that profenofos was the superior insecticide followed by Sol. EC and CAPL-2 in their immediate effect. However, 7 days after spraying, Sol EC and CAPL-2 were the most efficient chemicals compared with Profenofos during the two growing seasons.

BC 5

BIOLOGICAL CHARACTERISTICS OF THE APHID PARASITOID SPECIES, *DIAERETIELLA RAPAE* M'INTOSH. Salwa Abdel-Samad and Ahmed H. El-Heneidy, Plant Protection Research Institute, Agricultural Research Center, Giza, Egypt, Email: salwa_ssss@yahoo.com; aheneidy@link.net

Diaeretiella rapae M'Intosh (Hymenoptera: Braconidae) is a cosmopolitan solitary endoparasitoid of adult and immature stages of several species of aphids, commonly associated with the aphids infesting cruciferous crops. The life cycle of *D. rapae* when parasitized the bird cherry-oat aphid, *Rhopalosiphum padi* L. was studied under the laboratory conditions (25±2°C and 65±5% RH). Durations of immature stages averaged 18.9±3.35, 134.4±22.78, 127.3±6.91 and 280.6±9.84 hours (11.69 days) for egg, larvae, pupae and total duration of immature stages, respectively. Mating behavior of *D. rapae* adults showed that the premating period averaged 82.7±14.9 minutes (fed adults) and 117.2±12.1 min (unfed adults), while the mating period lasted for 0.36±0.15 min (fed) and 0.41±0.15 min (unfed). Ovipositional periods were 45.6±12.5 minutes (fed) and 63.9±13.3 min (unfed); 0.79±0.22 min (fed) and 0.81±0.20 min (unfed) and 677.7±101.5 min (fed) and 351.3±61.95 min (unfed), for preovipositional, ovipositional and postovipositional periods, respectively. Average number of eggs deposited by one female reached 218±14.4 eggs/ 31.4±2.7 hosts (6.96±0.31 eggs/aphid). *D. rapae* females and males lived for 4.06±0.65 (fed) and 2.62±0.43 days (unfed), and 2.98±0.49 (fed) and 1.94±0.32 days (unfed), respectively. Sex ratio was 1.93:1 in favor of females.

BC 6

PATHOGENECITY OF *BEAUVERIA BASSIANA* (BALS.) VUILL. AND *PAECILOMYCES FARINOSUS* (DICKS EXFR.) ON THE ADULTS OF SUNN PEST (*EURYGASTER INTEGRICIPS* PUT.) IN THE DORMANCY LOCATIONS (GARA MOUNTAIN) AND IN THE FIELD IN DOHUK PROVINCE. Suaad Irdeny Abdullah[1] and Lazkin Hagy Assaf[2]. (1) Plant Protection Department, College of Agriculture & Forestry, Mosul University, Iraq; (2) Plant Protection Department, College of Agriculture, Duhok University, Iraq, Email: suaad53irdeny@yahoo.com

Adults of Sunn Pests were treated twice at overwintering locations (Gara mountain), in autumn and winter with water spores suspension of *B. bassiana* and *P. farinosus* (10^7 spore/ml), with the addition of milk powder, corn oil, glucose, molasses and tween 80. The highest mortality rate in adults of Sunn Pests 15 days after

treatment with *B. bassiana* reached 98.33% when corn oil was added. Spring treatment was more effective (83.83 % adults mortality) compared to the autumn treatment (80.06%). In the field, the highest adults mortality rate was recorded 15 days after treatment with *B. bassiana* after addition of corn oil (66.67%). However, the highest parasitism rate on eggs of Sunn Pests in the open field was achieved 14 days after treatment with *B. bassiana* and using corn oil and milk powder to 76.19 and 64.29%, respectively. The highest mortality rate to the first stage of insect nymphs was recorded 5 days after treatment with spore suspensions of *B. bassiana* and corn oil (73.33%), with 26.67% only of nymphs successfully reached the second stage.

BC 7

INFLUENCE OF TEMPERATURE AND STORAGE PERIOD ON SURVIVAL AND PERFORMANCE OF THE EGG PARASITROID *TELENOMUS BUSSEOLAE* GAHAN. Jasim Khalaf Mohammed[1], Abdul–Sattar Arif Ali[2] and Hatem Motaab Hussain[1]. (1) State Board for Agriculture Researches, Abu–Ghraib, Baghdad, Iraq, Email: jasim_aljanabi1968@yahoo.com; (2) College of Agriculture, Al–Anbar University, Al–Anbar, Iraq, Email: abdulsattararif@yahoo.com

The species *Telenomus busseolae* Gahan. (Scelionidae: Hymenoptera) is considered as an effective egg parasitoid against Lepidopteran stalk borers. Several laboratory experiments were conducted to determine the suitable tempreture for storing this parasitoid to be used in mass rearing programs and field releases. Two temperature regimes 20ºC and 15 ºC were considered during the duration of this test. Results have indicated that both survival and adult life span were significantly influenced by storage conditions. Survival rate was 97% after storage period of 10 days at 20ºC reduced to 64 and 14% after 35 and 50 days of storing at the same temperature, respectively. Female survived storage periods of 10 and 50 days were able to infest 51 and 20 of the corn stalk borer *Sesamia cretica* Eggs, respectively. When the parasitoid adults stored at 15ºC, survival rates were 100, 85, 58 and 13% after 30, 60, 90 and 120 days of storage, respectively. The number of stalk borer eggs attacked was 58 for females survived 30 days of storage, however it was reduced to 31 and 24 eggs for females stored for 60 and 120 days, respectively. Females reared at 26ºC were able to live for 17 days and infest 118 of the corn stalk borer eggs. Results have also indicated that newly parasitized eggs left for 4 days at 26ºC and then kept in the refrigerator at 7ºC for 5 and 22 days and then returned to the normal conditions, resulted in 80 and 89% adult emergence and total generation duration of 30 and 36 days, respectively. No effect was observed on behavior and performance of emerging females of these treatments compared to control females reared at normal conditions. Therefore, the present results would be of benefit in mass rearing programs especially in case of shortage or absence of the principle host.

BC 8

CORRELATION BETWEEN ANTIFUNGAL METABOLITES PRODUCTION OF ANTAGONISTIC BACTERIA AND BIOLOGICAL CONTROL OF *RHIZOCTONIA SOLANI*, THE CAUSAL ORGANISM OF CANOLA DAMPING-OFF. S. Sarani[1], A. Sharifi Tehrani[2], M. Ahmadzadeh[2] and M. Javan Nikkhah[2]. (1) University of Zabol, Iran; (2) University of Tehran, Iran, Email: saranisistani@gmail.com; Sarani59@uoz.ac.ir

In this study, Seven bacterial strains were studied for their ability to suppress canola damping-off (*Brassica napus*) caused by *Rhizoctonia solani*. Four bacterial species *Pseudomonas fluorescence* (strains P1, P2 and P3), *Burkholderia cepacia* (strain Bu1), *Bacillus subtilis* (strains B1 and B2) and *Streptomyces* sp.(strain S1) were used. Isolate P3 had the greatest effect inhibition of *in vitro* growth and greenhouse of the fungus. The effective strains on disease reduction in comparaison with the control were identified. All isolates were capable of colonizing canola root under free-causal organism conditions. For this, P3 was the strongest colonizer of canola root. Results of the studies on biocontrol mechanism showed that Isolates produced antibiotics and volatile metabolites that prevented the mycelia growth of the fungus. Also the isolates produced some antimicrobial metabolites including hydrogen cyanide, protease and siderophore. Research showed that in many cases there was no significant correlation between *in-vitro* antibiotic production and effect of bacteria under the greenhouse conditions. A significant correlation between the production of other antimicrobial metabolites such as siderophore, hydrogen cyanide and protease and reduction of disease occurrence under the greenhouse conditions.

BC 9

SUSCEPTIBILITY OF SOME SUGAR BEET PESTS TO ENTOMOPATHOGENIC FUNGI *BEAUVERIA BASSIANA* AND *METARHIZIUM ANISOPLIAE*. Amal A. El-Zoghby and Amira A. Ibrahim, ARC, 9 Jammaa Street, Giza, Egypt, Email: amalzoghby@hotmail.com

Entomopathogenic fungi areknown world wide as a microbial control agents for different insect pests. An experiment was conducted at Kafr El- Sheikh Governorate, north of Egypt. The area was 0.5 acre, the concentrations of *M. anisopliae* used were $3x10^7$,$8x10^6$, $3x10^6$, $8x10^5$ and 10^4 conidia/ml. *B. bassiana* at concentrations 10^7, 10^6, $5x10^3$, 10^5 and 10^4 conidia/ml on larvae and pupae of sugar beet pests *Scrobipalpa ocellatella* and *Cassida vittata* in the laboratory. The LC50 for the 3rd instar larvae and pupal stage of S.ocellatella rercorded was $2x10^6$, $5x10^5$ and $5x10^5$, $8x10^4$ conidia/ml when treated with *M. anisopliae* and *B. bassiana*, respectively. The LC50 of 3rd larval instar, pupa and adult stages for *C. vittata* when treated with both entomopathogenic fungi *M.anisoplia* and *B. bassiana* were 10^6, $2x10^6$, $2x10^6$ and $8x10^5$, $7x10^4$, $2x10^5$ conidia/ml, respectively. Application *B.bassiana* against *C. vittata* in sugar beet field led to a reduction of 40.11, 87.7, 80 and 25.6% of eggs, larvae, pupae and adults, respectively.

BC 10

BIOLOGICAL CONTROL OF CHARCOAL ROT DISEASE ON SUNFLOWER CAUSED BY *MACROPHOMINA PHASEOLINA* (TASSI) GOID. Fayadh A. Mohammed, H.J. Al-Tmeme and Layla A. Benyan, Department of Plant Protection, College of Agriculture, University of Basrah, Iraq, Email: m_a_fayadh@yahoo.com

The work was carried out at the college of Agriculture, Basrah University during the period 2004-2006, in order to study the effect of some biological agents in controlling *Macrophomina phaseolina*, the causal organism of charcoal rot disease on sunflowers. Result showed that isolates of *T. harzianum* (T_C and T_B isolated from Qurna and Berjisiyah towns respectively) had a high antagonistic activities against *M. phaseolina*, compared to isolates from Muttaiha and Owasian T_M and T_A, where the zone of inhibition reached 2.3 and 2 cm compared to 1.94 and 1.5 for T_M and T_A, respectively. Results also showed that the bacteria *P. fluorescens* had higher antagonistic activity against *M. phaseolina* than *Bacillus cereus* as the inhibition zone reached 100%, compared to 65.36% for *B. cereus*. In field experiments lower infection rate and disease severity was recorded for the combined treatment (*P. fluorescens* + *T. harzianum*) which reached 39.2 and 34.16%, followed by *T. harzianum* 57.91 and 41.66% and *P. fluorescens*treatment 52.38, 39.16%, respectively. Positive effect of using the biological agent was reflected in all growth and yield parameters.

BC 11

ROLE OF PARASITOIDS IN BIOLOGICAL CONTROL OF WHITEFLIES INFESTING SOME ECONOMIC CROPS AT DAKAHLIA GOVERNORATE, EGYPT. M.E. Ragab, N.F. Abdel-Baky, M.E.El-Nagar and M.M. El-Dessouky, Depatment of Economic Entomology, Faculty of Agriculture, Mansoura University, Egypt, Email: mohamedragab2002@yahoo.com

Whiteflies are well known as serious insect pests for numerous economic crops.Because of recent restriction on pesticides use for chemical control, biological control of insect pests received more attention as a safer substitute. Dakahlia Governorate is considered as one of the most important agricultural Governorates in Egypt, where several vegetable and field crops are cultivated and suffer from high damage by whiteflies. This study aimed to survey the different parasitoid species associated with different whitefly species infesting potatoes, cotton, watermelon and pomegranate at Dakahlia Governorate, and to estimate the role of these parasitoids as natural biological control agents for these whiteflies. Random samples from the above mentioned crops were taken at 10 days intervals from three different districts (Mansoura, Bilqus and Kalabsho) and transfered to the laboratory for inspection of whiteflies and their associated parasitoids**.** Results indicated that silver whitefly, *B. argentifolii* was the most abundant and attacked a large number of host plants and represented 55 and 67% of the total whiteflies surveyed during 2003 and 2004 growing seasons, respectively. The ash whitefly, *S.phillyreae* ranked second, whereas the castor bean whitefly, *T. ricini* population was found lowest. The four parasitoid species, *Er. mundus, En. inaron, En. lutea, and En. formosa* were found attacking these whiteflies. The most dominant and important parasitoid was *Er. mundus* witha parasitism rate of 72% in 2003 and 57% in 2004. This parasitoid attacked *B. argentifolii* and *T. ricini*, whereas *En. inaron* attacked the ash whitefly *S. phillyreae* and represented 20 and 15% of the total parasitoids' population during the two seasons. *En. lutea* was found at low level, while *En. formosa* was observed only in 2004 and represented 21% of the total parasitoids. The parasitism rate of each parasitoid on different studied crops were also determined during the present study. The maximum rate of parasitism was recorded for *Er. mundus* (48%) attacking *B. argentifolii* on watermelon at Kalabsho region, followed by *En. inaron* (26%) attacking *S. phillyreae* on pomegranate at Mansoura. In conclusion, these parasitoids, especially *Er. mundus* could be mass reared and employed against whiteflies as an effective and safe component in the biological control programs of different economic crops.

BC 12

EFFECT OF *BEAUVERIA BASSIANA* (BALSAMO) VUILL. AND *LACANICLLIUM (=VERTICULLUM) LECANII* (ZIMM) ZARO AND OAMI ON LARVAE OF ANGOMIS GRAIN MOTH *SITROTROGA CEREALELLA* (OLIVER) (LEPIDOPTERA: GELECHIIDAE) ON RICE SEEDS ANBER VARIETY 33. Hana Kadhm Jassim, State Board for Seed Testing and Certification, Abu-Ghraib, Baghdad, Iraq, Email: stateboardseed@yahoo.com

A Laboratory and storage experiment indicated the efficacy of four concentrations of two isolates (No. 4 and 6) of *Beauveria bassiana* (Balsamo) Vull. were tested against the larvae of Angomis grain moth *Sitrotroga cerealella* (Oliver*)* (Lepidoptera: Gelechiidae). When dipping method of rice seed in fungal isolates' suspension were used, the highest larval mortality was achieved with fungus concentration of 1×10^6 spore/ml and reached 90, 89 and 88%, for the three isolates, respectively, while the lowest mortality rate was obtained by the concentration of 1×10^3 spore/ml and reached 79, 78 and 78%, for the three isolates respectively) after 15 days of treatment. Results revealed that the treatment of empty rice seed sacks by the concentration of 1×10^6 spores/ml protected the seed against infestation by this insect for 11 month compared with untreated ones. Results of statistic analysis showed no significant differences between the three isolates with others, however significant differences were noticed between fungus concentrations and treatment times.

BC 13

BIOLOGICAL CONTROL OF CITRUS MEALYBUG, *PLANOCOCCUS CITRI* (RISSO) ON CROTON PLANT, *CODIAEUM VARIEGATUM* (L.) USING THE COCCINELLID PREDATOR, *CRYPTOLAEMUS MONTROUZIERI* MULSANT. A.I. Afifi[1], S.A. El-Arnaouty[1], Angel R. Attia[2] and Asmaa E. A. El-Metwally[1]. (1) Department of Economic Entomology and Pesticides, Faculty of Agriculture, Cairo University, Giza, Egypt; (2) Plant Protection Research Institute, Agricultural Research

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The coccinellid predator, *Cryptolaemus montrouzieri* Muls. was used to control the citrus mealybug, *Planococcus citri* (Risso.) (Homoptera: Pseudococcidae) on the ornamental plant, *Codiaeum variegatum* (L.) at Giza region in Egypt. Adults of the predator were released once at the end of October, 2008 in open field, at the rate of 50 *Cryptolaemus* adults/Croton plant. Results obtained indicated that reduction rate of egg masses, nymphs and adults of *P. citri*, one month after releasing the predator reached 41.44, 42.29 and 57.45%, respectively and increased after two months to 80.63% for egg masses, 86.45% for nymphs and 91.54% for adults and after three months, it reached 100% for all stages of the mealybug. Although the predator *Cryptolaemus* had positive results in reducing the population of the mealybug but it had also negative effects on the population of other natural enemies associated with *P. citri* in the area.

BC 14

PRELIMINARY SURVEY OF THE NATIVE ENTOMOPATHOGENIC NEMATODES AND FUNGI IN SOUTHERN SYRIAN SOILS. Adel Almanoufi[1], Majd Jamal[2], Enrico de Lillo[3], Eustachio Tarasco[3] and Thaer Yaseen[4]. (1) Administration of Plant Protection Research, General Commission for Scientific Agriculture Research (GCSAR), Damascus, Syria, Email: adel-agro@hotmail.com; (2) Department of Plant Protection, Agriculture College, Damascus University, Damascus, Syria; (3) Department of Agricultural and Environmental Biology and Chemistry, Section of Entomology and Zoology (DIBCA), Agriculture College, University of Bari. Bari, Italy; (4) Department of Integrated Pest Management, International Centre for Advanced Mediterranean Agronomic Studies (IAMB), Bari, Italy.

Occurrence of entomopathogenic fungi and nematodes was assessed in soil samples collected from different orchard habitats in southern Syria, included those utilized for trapping. Entomopathogenic nematodes and fungal species were isolated from the soil samples by "baiting" using larvae of the wax moth, *Galleria mellonella* (Lepidoptera: Galleriidae). A total of 157 soil samples were collected from different orchard habitats during 2008. Two positive samples of entomopathogenic nematodes (1.27% out of the total samples) were identified as *Steinernema* spp. and 26 positive samples of entomopathogenic fungi (16.56% out of the total samples) were identified as *Beauveria* spp., *Paecilomyces* spp., *Aspergillus* spp. and *Nomurea riley*.

BC 15

SURVEY OF PARASITOID SPECIES ON THE CODLING MOTH, *CYDIA POMONELLA* L. AND THE LEOPARD MOTH, *ZEUZERA PYRINA* (L.) IN SOME APPLE ORCHARDS IN LATTAKIA GOVERNORATE, SYRIA. Abdulnabi Mohamed Basher[1], Louai Hafez Aslan[1], Jounar Aziz Ibrahim[2] and Shadi Ibrahim Al-Haj[2]. (1) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: goitkb@scs-net.org; (2) Lattakia center for Natural Enemies Rearing, Lattakia, Syria, Email: shadi_alhajj@hotmail.com; Jounar@aloola.sy

The main objective of the research was to identify the parasitoid species associated with the codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae) and the Leopard Moth, *Zeuzera pyrina* L. (Lepidoptera: Cossidae) in apple orchards in two regions at Lattakia Governorate (Rabiha & Eramo), Syria. Results revealed the presence of 9 parasitoid species associated with the codling moth in Rabiha region. The parasitoids were: *Ascogaster quadridentata, Bassus rufipes, Habrobracon hebator, Pristomerus vulnerator, Ephialtes caudatus, Coccygomimus turionellae, Dibrachys cavus, Perilampus tritis* and *Trichogramma cacociae*. Parasitism rate ranged from 20.32 to 30.94%. *A. quadridentata* was the predominant parasitoid species (14.51%) in the first season and in the second season (21.52%). The results revealed also the presence of 5 parasitoid species associated with the codling moth in Eramo region. The parasitoids were: *A. quadridentata, P. vulnerator, T. cacociae, T. enecator* and *Meteorus* sp. The parasitism rate ranged from 13.5 to 15.56%. *A. quadridentata* was the predominant parasitoid species (4.5%) in the first season and in the second season (8.53%). There were four parasitoid species associated with the Leopard moth in the two regions. The parasitoid species were: *P. vulnerator, Diadegma terebrans, Hypercampos sp.* and *Copidosoma trunctellum*. The parasitism rate ranged from 4.17 to 26.06% at Rabiha, and from 16.1 to 31.12% at Eramo. *C. trunctellum* was the predominant parasitoid species at Rabiha region (50%) while *P. vulnerator* was the predominant parasitoid species at Eramo region (42%).

BC 16

EFFICIENCY OF THE PREDATORY MITE *PHYTOSEIULUS PERSIMILIS* ATHIAS-HENROIT FOR CONTROLLING *TETRANYCHUS URTICAE* KOCH. ON TOMATO UNDER GREENHOUSE CONDITIONS. Alisar Nadim Shaabow, Kais Ggaza1 and Amal Haj Hasan, Lattakia Center for Rearing Natural Enemies, Lattakia, Syria, Email: alisar78@scs-net.org

The study was carried out during 2007-2008, in two greenhouses planted by tomato in Lattakia, and infested with *Tetranychus urticae* Koch, in order to evaluate the efficiency of the predatory mite *Phytoseiulus persimilis* Athias-Henroit for controling T. urticae, and understand the relation between this predatory mite and its prey. Results showed that the efficiency of the predator reached 69.90% after 6 weeks and reached 99% in the twelfth week, after spreading the predator.

BC 17

EFFICACY OF *BEAUVERIA* SPECIES AGAINST THE PISTACHIO BARK BEETLE *HYLSINUS VESTITUS* M. & R. IN SYRIA. Mahmoud S. Lababidi, Department of Plant Protection, Faculty of Agriculture, University of Aleppo, P.O. Box 12052, Aleppo, Syria, Email: mslababi@scs-net.org

Field Experiments were conducted in Morek region, Hama, Syria in 2006 and 2007, to study the efficacy of *Beauveria* species against the pistachio bark beetle *Hylesinus vestitus* M. & R. (Coleoptera: Scolytidae) in

Syria, as a biological control method for *H. vestitus*. Results showed that the scolytid beetles *H. vestitus* died rapidly after high-dose treatment with *Beauveria bassiana* and *B. brongniartii* spores powder but mortality rate was significantly slower with *B. tenella*. All three fungus-species affected high infection rates. *B. bassiana* showed the best results in relation to the other fungus species after a limited contact of the beetles with contaminated bark pieces, that resulted in beetle mortality and infection rate as a function of contact time. The fortuitous contact of untreated beetles with fungus overgrown dead beetles led to high *B. bassiana* infection within a short time. Motality of *H. vestitus* correlated with incubation temperature after treatment with *B. bassiana*.

BC 18

EFFICACY OF A LOCAL ISOLATE OF THE ENTOMOPATHOGENIC NEMATODE *HETERORHABDITIS BACTERIOPHORA* POINER AS A BIOCONTROL AGENT AGAINST HOUSE FLY *MUSCA DOMESTICA* L. Khalifa H. Dabaj[1] and Milad A. Massuod[2]. (1) Plant Protection Department, Faculty of Agriculture, Al-Fateh University, Tripoli, Libya; (2) High technical Agriculture Institute, Al-Ghiran, Tripoli Libya, Email: dabajhk@uahoo.com

A local isolate of the entomopathogenic nematode *Heterorhabditis bacteriophora* was tested as a biocontrol agent against house fly *Musca domestica* L. larvae, to determine the effective dosage in direct and in rearing media under laboratory conditions and in cattle stable. Results showed that in a bioassay test the nematode suspension of $3x10^4$ infective juveniles / treatment caused 78% larval mortality of house fly in direct treatment compared with 4% in control treatment. The nematode suspension of $2.5x\ 10^5$ infective juveniles/treatment reduced adult emergence to 36.5% in rearing media compared with 97.5% in control treatment. The nematode suspension of $1.25x\ 10^5$ infective juveniles/ treatment reduced adult emergence to 51.11% in cattle stable compared with 100% in control treatment.

BC 19

PHOTOPROTECTION OF *BACILLUS THURINGIENSIS* FOR CONTROLLING THE POTATO TUBER MOTH. Magda Sabbour, Mohamed Ragaei and Rasha Samey, National Research Center, Department of Pests & Plant Protection, Cairo, Egypt, Email: sabbourm9@yahoo.com

Effectiveness of several commercial photoprotectants in protecting *Bacillus thuringiensis* var. *kurstaki* (HD-73) against inactivation by solar irradiation was assessed in the laboratory. Addition of antioxidant materials (UV-absorbers) to HD-73 formulation prolonged the residual insecticidal activity, resulting in greater effectiveness against the potato tuber moth, *Phthorimaea operculella*, compared with a formulation lacking these protectants. The combinations between the antioxidants tested increased the protection of *B. thuringiensis* against UV radiation. Persistence of HD-73 mixed with Vitamins A+E, A+C, E+C and A+E+C mixtures, after exposure to the artificial UV light for 24 hours was 9.907, 12.036, 14.692 and 16.445 hours, respectively, compared to 4.712 hours in the control. The persistence of HD-73 mixed with titanium dioxide after exposure to the artificial UV light for 24 hours was 9.767 hours compared to 4.712 hours in the control. Charcoal gave slightl photoprotection to (HD-73), the persistence of (HD-73) mixed with charcoal was 5.381 hours compared to 4.712 hours in the control. These results indicated that use of Vitamins A, E, C and selenium in mixture will be the most effective for the protection of *B. thuringiensis* var. *kurstaki* (HD-73) against UV radiation because it absorbs UV radiation.

BC 20

USE OF THE EGG PARASITOID *TRICHOGRAMMA* SPP. TO CONTROL THE AFRICAN BOLL WORM (*HELICOVERPA ARMIGERA*, HUB.) IN SUDAN. Sara A. A. Kehail[1], H. Abdelgader[1] and O. Zimmermann[2]. (1) Agricultural Research Corporation, Crop Protection Research Corporation, P.O. Box 126, Wad Medani, Sudan, Email: saraagric@yahoo.com; (2) JKI, Institute for Biological Control, Darmstadt, Germany.

The objective of this study was to select effective *Trichogramma* species, at high temperatures to control the African boll worm (*Helicoverpa armigera*) in cotton in Sudan. Three species of *Trichogramma* (*bourarachae*, *nerudai* and *piceum*) were selected to be used in Sudan due to their high parasitism efficiency on eggs of the grain moth *Sitotroga cerealella* and African boll worm *Helicoverpa armigera*. Preference and life table tests were carried out using *H. armigera* eggs as host at different temperatures (25, 30 and 35°C). A comparative study was carried out for evaluating egg parasitism, emergence rate and fecundity of the *Trichogramm*a spesies (BOU, PIC and NER) at 25, 30 and 35°C. Results showed that the parasitization and fecundity levels decreased as temperature increased, when using both BOU and PIC species, in contrast emergence rate increased as temperature increased. At 25-30°C, parasitism by NER species and female ratio increased as temperature increased. Emergence rate also decreased with increase in temperature. PIC species showed highest efficiency in parasitization and fecundity levels compared with NER and BOU. NER species recorded highst emergence rate. On the other hand, BOU species recorded lowest parasitization rate at 35°C and highest emergence rate and fecundity. The study also investigated the life-table characteristic of the above *Trichogramma* species when reared on *Sitotroga* and *Helicoverpa* eggs. The results confirmed the preference test results in case of parasitization and emergence, except NER which had a negative correlation with temperature in relation to parasitization. Among the species tested, longevity and developmental time decreased as temp increased, NER and PIC recorded longer life span (12-15 days) at 25°C than BOU (10- 13 days). NER had longest life span at 30°C (11-12 days) compared with PIC (7-8 days) and BOU (8-9 days).

BC 21

COMPARATIVE STUDY ON THE EFFECTIVENESS OF FOUR FOOD BAITS ON THE NUMBERS OF RED PALM WEEVIL *RHYNCHOPHOROUS FERRUGINEUS* OLIVIER CAUGHT BY PHEROMONE TRAPS. Ahmad Hussen Al-Saoud, Baniyas Agricultural Research & Experiment Station, General Agricultural Directorate of Abu Dhabi, Agricultural Section, Abu Dhabi, P.O. Box 2945, UAE, Email: ranahm58@hotmail.com

Red palm weevil, *Rhynchophorous ferrugineus* Oliv. (Coleoptera: Curculionidae) is one of the most important insect pest which attacks palm trees in the Gulf Countries. Trapping the weevil constitutes a major element of the IPM strategy. Field trials conducted in date palm plantations at Al-Rahba (UAE) from 20 November 2008 to 8 June 2009, using CRBD design with 6 replicates and four treatments: Khajour (forage date fruits), banana, sugarcane and date leaf pieces, (350 g each). The objective of this study was to evaluate the efficiency of these food baits in combination with pheromone lures, 4-Methyl-5-Nonanol 90% + 4-Methyl-5-nonanon 10% and 4-5 liters of water. The results indicated that, there were significant differences between treatments. *Khajour* treatment produced highest cumulative weevil catch of 151.3 weevils per trap. Banana and sugarcane were equally effective and led to 72.8 and 69 weevils per trap, respectively and were better than the date palm leaf pieces, which led to the lowest catch of 32.8 weevils per trap. The number of captured weevils during the study period was 908, 437, 414 and 197 weevils, for the four treatments respectively. The total catch were 1956 weevils (644 male and 1312 females) with sexual ratio of 1: 2.03. The number of trapped males was 292, 144, 139 and 69 weevils, compared to 616, 293, 275 and 128 females for the four treatments, respectively. It is important to add the pheromone, kairomone and water to the traps to increase the number of captured weevils. The food bait and water should be changed as needed. The traps should be well maintained and distributed all over the date plantation area throughout the year. More studies are needed to improve the efficacy further.

BC 22

PATHOGENICITY OF *VERTICILLIUM LECANII* AGAINST *BEMISIA TABACI*. Lazreg Fatiha[1], Shaukat Ali[2], Ren Shunxiang[3], Muhammad Afzal[2] and Belabid Lakhdar[1]. (1) Laboratoire de Recherche sur les Systèmes Biologiques et la Géomatique, Université de Mascara, BP 763, Mascara, 29000, Algérie; (2) Department of Agri. Entomology, University of Agriculture, Faisalabad, Pakistan; (3) College of Natural Resources and Environment, South China Agric. University, Guangzhou 510642, China, Email: belabidl@yahoo.fr

Four strains of *Verticillium lecanii* (Zimmermann) Viegas (V20, V26, V07 and V17) were tested for the biological characteristics and pathogenicity against *Bemisia tabaci*. The four strains were morphologically compared using three different artificial media (SDAY, PDA and CZAPECK-DOX) under laboratory conditions of 25±2°C, 80±5% RH and 16:8 h (L: D). Isolates tested were significantly different from each others. The isolate V20 showed the greatest potential in mycelium growth rate compared with other three isolates. The highest was 0.37 cm.day^{-1} and the lowest for isolate V20 was 0.161cm.day^{-1}. Colony growth rates were then cultured on SDAY and CZAPEK media respectively. SDAY was the best medium for the sporulation of the four isolates. The isolate V20 showed the highest sporulation (32.75×10^7conidia mL-1) and the isolate V17 showed the lowest sporulation ($3.45x10^7$ conidia mL-1). Pathogenicity test at saturated humidity showed that the third instar larva was very susceptible to fungal infection. The LC_{50} values for third instar were 1.65×10^7, 1.87×10^7, 2.2×10^7 and 2.58×10^7 conidia/ml for isolates V20, V26, V07 and V17, respectively. The least and highest LT50 values were 2.909 and 3.534 noted for isolate V20 and V17 respectively. The isolate V20 was more virulent on the third instar of *Bemisia tabaci* as compared with other isolates.

BC 23

MOLECULAR CHARACTERIZATION OF A LEBANESE ISOLATE OF *BEAUVERIA* AND ITS EFFICACY FOR CONTROL OF *BEMISIA TABACI* AND *PIERIS BRASSICAE* IN LEBANON. Farah Baroudy, Lucia Hanna, Yusuf Abou-Jawdah and Nabil Nemer, Department of Agricultural Sciences, Faculty of Agricultural and Food Sciences, American University of Beirut, Beirut, Lebanon, Email: fab10@aub.edu.lb; nabil.nemer@gmail.com; abujawyf@aub.edu.lb

A Lebanese isolate of a *Beauveria* species was isolated from *Cephalcia tannourinensis*, a hymenopterous insect pest that attacks cedar trees. Molecular characterization based on partial sequencing of four genes showed that the Lebanese *Beauveria* isolate was most closely related to *B.* cf. *bassiana* (Clade C) according to the classification scheme proposed by Rehner and Buckley (2005). This is interesting since no isolates of *Beauveria* Clade C were previously reported in Asia. Therefore, the possibilities of using this isolate for the biological control of several insect species deserves thorough investigation. Greenhouse experiments were conducted on different stages of *Bemisia tabaci*; a spray of a spore suspension at 10^7 spores/mL, targeted the eggs, did not kill the eggs but was effective against the crawlers which died soon after egg hatching. This spore concentration was also effective against the nymphal stages, and led to 88% mortality which increased to 91% when corn oil was added to the treatment. The efficacy against another insect pest, *Pieris brassicae*, was also studied. Under greenhouse conditions a spray concentration of 10^7 spores/mL showed 80 % mortality of the 1st larval instar and, the efficacy was increased to 96% when corn oil was added. Under laboratory conditions, application of 10^3 spores per larva on the 2nd and 3rd instars led to 86.5% mortality; when corn oil was added mortality increased to 100%. These preliminary results are quite promising and further greenhouse tests are planned to compare the efficacy of *B.*cf *bassiana* to that of commonly used pesticides.

BC 24

PATHOGENICITY OF SYRIAN ISOLATES OF THE ENTOMOPATHOGENIC FUNGI; *METARHIZIUM SP.* AND *PAECILOMYCES SP.* AGAINST THE NEONATE LARVAE OF PEACH FLATHEADED ROOTBORER, *CAPNODIS TENEBRIONIS*. Khalil Abdu-Alhaleem, Amal Sidawi, Rasmia Al-Muallem and Abdu-Alrahman Katmeesh, General Commission of Scientific Agricultural Research, P.O. Box 113, Douma, Damascus, Syria, Email: arasmia@hotmail.com

The entomopathogenic fungi *Metarhizium* sp. and *Paecilomyces* sp. were isolated from larvae of *Capnodis tenebrionis* attacking peach in Syria. This study was conducted to evaluate the pathogenicity of the two fungi against the neonate larvae of *Capnodis tenebrionis* (Coleoptera: Buprestidae), the most serious pest on stone-fruit in Syria. *Metarhizium* sp. and *Paecilomyces* sp. were pathogenic to the neonate larvae of *C. tenebrionis*. Mortality rates, 14 days after inoculation with the suspension of each fungus, at the concentration of 10^6 conidia/ml was 95% for *Metarhizium* sp. and 85% for *Paecilomyces* sp.

BC 25

THE ROLE OF *PAENIBACILLUS POLYMYXA* BIOFILM FORMATION IN PROTECTION OF NURSERY PLANTLETS AGAINST SOIL BORNE PATHOGENS. Wafaa M. Haggag, Plant Pathology Department, National Research Centre, Egypt, Email: wafaa_haggag@yahoo.com; mkelany@link.net

Root rot pathogens are one of the most devastating diseases for nurseries in Egypt. They cause considerable economical losses in non-seasonal nurseries (cucumber, pepper, tomato, strawberry) as well for the open nurseries for fruit plantlets (mango, grape). The fungi are present in practically all cultivated soils and attack plant roots especially in nurseries under warm and humid conditions. Almost all plants are susceptible to root rot pathogens and the diseases are difficult to control once rot has begun. Several strategies have been used against the pathogens in nurseries. Due to environmental concerns, there is considerable interest in replacing fungicides with environmentally friendly biocontrol agents. Biocontrol agents generally do not perform well enough under uncontrolled conditions in soil to compete with chemical fungicides. That is due to the lack of the knowledge of their mechanism of action. We have observed significant reduction of root rot pathogens on plant roots inoculated by *Paenibacillus polymyxa.* We have developed a model system to study the bacterial interaction to plants and showed the bacterial biofilm formation pattern on the model as well in soil. We also have developed the technology (real-time PCR) for the bacterial rapid detection in natural environments. We characterized the biofilm of wild type and mutant matrix by FTIR. The study create a basis for *P. polymyxa* efficient and reproducible application against root rot pathogens in nurseries. It is a step towards ecologically friendly agriculture, reducing dependence on agrochemicals.

BC 26

EVALUATION OF *ERETMOCERUS MUNDUS* PARASITOID MERCET FOR THE CONTROL OF *BEMISIA TABACI* ON EGGPLANT IN CAGES. Rafeek Abboud and Mohamed Ahmed. (1) General Commission of Scientific Agricultural Research, Lattakia, Syria; (2) Department of Plant Protection, Tishreen Univesity, Lattakia, Syria, Email: abboudrafeek@hotmail.com

Eretmocerus mundus Mercet (Hymenoptera: Aphelinidae) is an important agent for biological control of *Bemisia tabaci* (Homoptera: Aleyrodidae) in the Mediterranean region. The experiments were conducted for whitefly control on eggplant in cages. Mummies of *E. mundus* were placed on eggplant at the rate of 4 and 8 mummies per plant for first and second treatment respectively; no mummies were placed in the third treatment (control). Densities for immature stages of pest were decreased from 12.7 and 8.1 of immature stages/1 cm² of disk leaf before the release to 2.0 and 1.1/1 cm² for first and second treatment, respectively, seven weeks after application. Whereas it was increased from 10.2 to 11.8 of immature stages/1 cm² in the control during the same period. Results clearly showed that the parasitoid was able to control *B. tabci* on eggplant under experimental conditions.

BC 27

ECO–FRIENDLY APPROACHES FOR THE MANAGEMENT OF BACTERIAL LEAF BLIGHT OF COTTON USING A MIXTURE OF *PSEUDOMONAS FLUORESCENS* AND *BACILLUS SUBTILIS*. Salaheddin Khabbaz[1], D. Ladhalakshmi[2] and V. Valluvaparidasan[2]. (1) General Commission for Scientific Research, Hama, P.O. Box -1003, Syria, Email: salah_edk@yahoo.co.uk; (2) Department of Plant Pathology, Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Tamil Nadu, Coimbatore–641 003, India.

The potential of antagonistic rhizobacteria in the management of bacterial blight of cotton caused by *Xanthomonas axonopodis* pv. *malvacearum* (Xam) was evaluated under greenhouse and field conditions. In this study, 93 bacterial isolates from the rhizosphere of different crops were screened for their efficacy in inhibiting the growth of Xam in vitro. Among them, 21 isolates were found to inhibit the growth of Xam in vitro. These isolates were identified as *Pseudomonas fluorescens* and *Bacillus subtilis* based on phenotypic characteristics, biochemical properties and by using 16S-23S intergenic transcribed spacer-Polymerase Chain Reaction (PCR). Among the 21 isolates, *P. fluorescens* Pf32 and *P. fluorescens* Pf93 and *B. subtilis* B49 had exhibited the maximum inhibitory activity against Xam. Talc-based powder formulations of the effective antagonistic isolates of *P. fluorescens* (Pf32, Pf93) and *B. subtilis* (B49) were developed and evaluated individually and in combination for their efficacy in the management of bacterial blight of cotton under greenhouse and field conditions. These last three isolates had survived well in the talc-based formulation for more than 90 days. Application of a mixture of them to seed, soil and foliage,

significantly reduced the bacterial blight incidence and increased the plant height, number of branches and number of bolls under field conditions. Treated plots with their mixture produced the maximum yield of 1915 kg ha^{-1} and 1512 kg ha^{-1} in trial I and trail II, compared to 1210 kg ha^{-1} and 987 kg ha^{-1} in the untreated control, respectively.

BC 28

EFFICIENCY OF *PSYLLOBORA VIGINTIDUOPUNCTATA* (L.) IN BIOLOGICAL CONTROL OF POWDERY MILDEW FUNGI. Mohammad Ahmad[1], Gaidaa Younes[2] and Nawal Ali[2]. (1) Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria; (2) Department of Botany, Faculty of Science, Tishreen University, Lattakia, Syria, Email: alaaagh4@yahoo.com

The coccinellid *Psyllobora vigintiduopunctata* (L.) spreads in different regions of the Syian coastal area,where its activity starts usually from April first up to end of November. The insect (larvae and adult) feeds on powdery mildew of many different plant species. The leaf area cleaned *from Erysiphe cichoracearum* DC., by the 1st larval instar was 0.27±0.15 cm^2 on *Helianthus annuus* L.leaves and 0.77±0.53 cm^2 on *Vitis vinifera* L. leaves, and increased in the 4th larval instar to 11.23±5.79 cm^2 on *Helianthus annuus* leaves, and to 8.59±6.003 cm^2 on *Vitis vinifera* leaves, and reached 19.83±2.21 cm^2 on *Helianthus annuus* leaves and 16.43±2.98 cm^2 on *Vitis vinifera* leaves by all larval stages.The percentage of leaf area cleaned *from* powdery mildew on black mulberry leaves in various larval stages was 93.6%, and the male consumed 3.64± 3.04cm^2/day and female 4.722±3.32 cm^2/day. Results had indicated that *Psyllobora vigintiduopunctata* could be a candidate as biological control agent against many powdery mildew fungi.

BC 29

STUDY OF SOME MORPHOLOGICAL AND CULTURAL PROPERTIES OF *AMPELOMYCES QUISQUALIS* CES. AND ITS POTENTIAL IN BIOLOGICAL CONTROL OF POWDERY MILDEW. Gaidaa Younes[1], Nawal Ali[2] and Mohammad Ahmad[2]. (1) Department of Botany, Faculty of Sciences, Tishreen University, Lattakia, Syria; (2) Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria, Email: alaaagh4@yahoo.com

Ampelomyces quisqualis Ces. naturally hyperparasites powdery mildew fungi. This species was recorded as a parasite on many species of powdery mildew, in different regoins of the Syrian coast. The presence of the fungus was determined from the pycnidium formed in different stages of powdery mildew. *Ampelomyces quisqualis*Ces.was isolated and identified for the first time in Syria on different powdery mildew species. *A.quisqualis* pycnidia was formed on mycelium during 10 days period on culture media. The mean number of pycnidia and conidiospores formed by the fungus varied based on different culture media used. The infection rate of *Sphaerotheca fuliginea* (Schlecht.: Fr) Poll. with *Ampelomyces quisqualis* on Cucumber leaves reached more than 90%. The results indicated that *Ampelomyces quisqualis* may be a candidate as biological control agent against many powdery mildew fungi.

BC 30

ISOLATION AND USE OF *BACILLUS THURINGIENSIS* BACTERIA IN THE BIOCONTROL OF THE OLIVE FLY *BACTROCERA OLEAE* IN MOROCCO. Houda Aboussaid[1, 2], S. El-Messoussi[2] and K. Oufdou[1]. (1) Environnemental Microbiology and Toxicology unit, Laboratory of Biology and Biotechnology of des Microorganisms. (2) Laboratory of Molecular Modeling and Ecophysiology, University Cadi Ayyad, Faculty of Sciences-Semlalia, Boulevard Prince My Abdellah, B.P. 2390, 40000 Marrakech, Maroc, Email: saidsaid8@ucam.ac.ma; khoufdou@yahoo.fr

Olive is one of the most common trees in the Arab world, particularly in countries bordering the Mediterranean basin. This proliferation is associated with the economic, environmental and social importance in those countries. In spite of that, olive production known to be seasonal because of several factors, most notably the excessive and irrational use of insecticides. One of the most serious pest of olive trees, olive fly "*Bactrocera oleae"*, which affects olive fruit that lead to poor quality of olive oils, and thus reduces export value, and total loss may exceed 30% of its production. In order to combat this insect, chemical pesticides are essentially used. They are very effective and fast, which encourages farmers to acquire and use on a regular basis. However, the consumption of olive oil which contains the remnants of these toxic substances, lead to human and environmental damages. These results stimulated researchers to find alternative solutions to reduce the use of these pesticides. *Bacillus thuringiensis* (Bt) bacteria is the most commonly used worldwide, and constitut 95% of the total global sales of biological pesticides against insects. The absence of impact of these bacteria to human health and environment, it is considered as the best biological pesticide for pest control. During this study, several bacteria were isolated from Moroccan soil. After taxonomic study, the pathogenicity of these bacteria was tested on the olive fly by developing an initial few drops of bacterial suspension on a glass box inside a plastic dish, and the adult olive fly were transferred to and left in the incubator for seven days. The ability of micro-bacteria to infect adult olive fly in less than 48 hours led to high mortality in 72 h. This is consistent with the results of most researchers on the sensitivity of olive fly to these bacteria which opens prospects for its use as a bio-control agent.

BC 31

SUB-LETHAL DOSE EFFECT OF *BEAUVERIA BASSIANA* (BALS.) VUIL. ON THE FECUNDITY OF SUNN PEST, *EURYGASTER INTEGRICEPS* PUTON. A.N. Trissi[1], M. El Bouhssini[2], M. N. Alsalti[1] and Z. Sayadi[2]. (1) Aleppo University, Aleppo, Syria, Email: N-trissi@Aloola.sy; (2) ICARDA, P.O. Box 5466, Aleppo, Syria, Email: M.Bohssini@cgiar.org

Adult Sunn pest, *Eurygaster integriceps* Puton, were treated with the entomopathogenic fungus *Beauveria bassiana* in field and greenhouse experiments to assess the sub-lethal dose effect of this fungus on Sunn pest fecundity

and leaf damage. The insects were inoculated with conidial suspensions ($2x10^3$, $2x10^4$ and $2x10^5$ conidia/ml^{-1}) of three isolates of *B. bassiana*, with sterile water as a control treatment, and then caged individually on wheat plots (1x1x1 m for field treatment), and in wheat pots (16 cm in diameter for greenhouse treatment). *B. bassiana* significantly reduced the fecundity of Sunn pest and the percentage of leaf damage in comparison to untreated plots. At the concentration of $2x10^5$ conidia/ml^{-1}, the Syrian summer isolate SPSR2 gave the highest reduction of fecundity (40% and 37% for greenhouse and field treatment, respectively), and the highest reduction of leaf damage (39% and 62% for greenhouse and field treatment, respectively). However, the pathogen did not affect the number of eggs hatching.

BC 32

DISTRIBUTION OF *PHYTOMYZA OROBANCHIA* KALT. IN TOMATO FIELDS INFESTED WITH *OROBANCHE RAMOSA* L. AND ITS EFFECT ON SOME BIO–PARAMETERS OF THIS PARASITIC WEED ON DIFFERENT HOST PLANTS. Hanan Habak[1], M. Ahmad[2] and B. El-Rahban[3]. (1) Agricultural Research Center of Lattakia. Lattakia, Syria; (2) Faculty of Agriculture, Tischreen University, Lattakia, Syria; (3) General Commission for Scientific Agricultural Research, Administration of Plant Protection, Douma, P.O. Box 113, Damascus, Syria, Email: gcsarpartect@mail.sy

A survey of tomato fields (*Lycopersicum esculentum* Mill.) infested with branched broomrape (*Orobanche ramosa* L.) along the Syrian coastal areas was conducted in order to study the distribution of agromyzid fly *Phytomyza orobanchia* Kalt. and its effect on some bio-parameters of this parasitic weed. Branched broomrape samples were randomly collected from infested fields. These samples were inspected by dissection of shoots and fruit capsules of *O. ramosa* to study the infestation rates with *P. orobanchia* larvae and effect of this infestation on seeds number and capsules weight. Results showed that *P. orobanchia* is naturally distributed in these fields, the larvae feed in high efficiency on seeds inside capsules. *Phytomyza orobanchia* infestation rates were different and ranged between 15.87 and 79.5%. Larval feeding has caused significant reduction in the fresh weight of infected capsules in comparison with healthy one. The number of seeds in infested capsules with 3rd instar larvae was reduced by 86.18%. These results are considered as positive indicator to the possibility of using *P. orobanchia* in biological control of *O. ramosa*.

BC 33

ANT PREDATION AND MORTALITY FACTORS ON FRUIT FLY LARVAE OF *CERATITIS CAPITATA* WIED. ON ARGAN *ARGANIA SPINOSA* (L.) FOREST IN WEST MOROCCO. Abderahim El- Keroumi[1], Khaled Naamani[1], Abdallah Ddhbi[2], Isabel Luque[3], Ana Carvajal[3], Xim Cerda[3] and Raphaal Boulay[3]. (1) Laboratory of Biotechnologies and Plant Resources Valorisation, Faculty of Sciences Semlalia, 40001 Marrakesh, Morocco; (2) Poly-disciplinary faculty. Route Sidi Bouzid, BP 4162 - 46000 Safi, Morocco; (3) EstaciÛn BiologÌca de Donana, CSIC, Avenida MarÌa Luisa s/n, 41013, Sevilla, Spain, Email: kabderahim@gmail.com

The Argan *Argania spinosa* (L.) Skeels (Ericales: Sapotaceae) is an endemic and emblematic tree growing in the centre and the south west of Morocco. Argan fruits are frequently infested by the Mediterranean fruit fly *Ceratitis capitata* Wied (Diptera: Tephritidae). However, until now, no control program has been implemented in the Argan forest. This research is the first investigation of natural mortality factors of *C. capitata* larvae in the Argan forest. The study was conducted at two locations near the city of Essaouira with different climatic conditions. 260 last instar larvae were deposited on the ground, under fruiting host trees, where they naturally fall to find a suitable pupation site. Overall, 42 % of the larvae died before being able to bury themselves into the ground, irrespective of the location. Larvae survival and chance of burying decreased with increasing ground temperature, as 53% of all the larvae mortality occurred at temperature beyond 48ºC. However, at lower ground temperature, predation by ants and spiders accounted for 47% of all mortality. Four species of ants carried out 94% of the captures. *Monomorium subopacum* Mayer (Hymenoptera: Formicidae), which frequently forages under Argan trees, was by far the most efficient predator, thanks to a powerful sting that rapidly immobilizes the prey. Results suggested that burring performances of larvae is affected by high thermal conditions and the presence of ant predators.

BC 34

EFFECTIVENESS OF MICROBIAL INSECTICIDES BASED ON *BACILLUS THURINGIENSIS* (BT) FOR THE CONTROL OF ON *HELICOVERPA ARMIGERA* HB. IN FIELD. Jalal Kolahdooz, Moslem Basij and Mohammadhosin Hosinpour, Faculty of Agricultural Science, Shahed University, Tehran, Iran, Email: moslembasij@yahoo.com

Tomato is one of the most important vegetables that is cultivated as offseason in more than 14,000 ha. in Jiroft and Kahnuj region, Iran. *Helicoverpa armigera* Hb. (Lep.: Noctuidae) is the most important pest that damages tomato, maize and pea in this region. Hazardous effects of application of chemical pesticides to environment led to search for other control methods. In this 2 years study, an experiment was conducted in randomized complete block design, with 4 replications. Treatments included: 4 commercial forms of *Bacillus thuringiensis* (BT) named Katlas, Condor, Delphin, B.T.H. and control. Sampling times were 3, 6, 9 and 12 days after treatment. Mortality rate were determined by using the Henderson & Tilton formula. Results showed significant differences among treatments and sampling times. According to means comparison by Duncan's test, Katlas ranked in Group A was the most effective (60.87%) and highest mortality rate was observed at 4th sampling time (12 days after use).

BC 35

SURVEY AND SEASONAL FLUCTUATION OF CITRUS INSECT SCALES PREDATORS (HOMOPTERA: DIASPIDIDAE) ALONG THE SYRIAN COST REGION. Eiad Mahamad[1], Nabil

Abokaf[2] and Abd Alnabi Basher[1,3]. (1) Centre of Biological Enemies Rearing, Al Hanadi, Syria; (2) Department of Plant Protection, Faculty of Agriculture, Tishreen University, P.O. Box 1446, Latakia, Syria; (3) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus , Syria, Email: n.abokaf@scs-net.org

Scale insects are considered the most important pests which attack citrus and cause serious economic damage in different areas in the world, including Syria. This study was conducted during 2006 and 2007. Six predators were identified to attack these pests which belong toorders Coleoptera, Neuroptera and Hemiptera: *Chilocorus bipustulatus* (72.89%), *Exochomus quadripustulatus* (4.07%), *Rhyzobius lophanthae* (2.97), *Chrysoperla carnea* (11.49%), *Scymnus syriacus* (4.58%), *Orius majuscules* (4.00%). *C. bipustulatus* was the most abundant.

BC 36

SUPPRESSION OF SOIL BORNE DISEASES OF CITRUS AND OLIVE PLANTATIONS USING ORGANIC MEDIA AMENDED WITH BIO-CONTROL AGENTS. Thaer Yaseen[1], Antonio Ippolito[2], Anna Maria D'Onghia[1], and Franco Nigro[2]. (1) Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM/MAIB), Via Ceglie 9, 70010 Valenzano, Bari, Italy; (2) Dipartimento di Protezione delle Piante e Microbiologia Applicata, University of Bari, Via Amendola 165/A, 70126 Bari, Italy. Email: y.thaer@iamb.it

Effects of two organic growing media (MAIB-BIO and MAIB-ECOS), alone or in combination with Clonotri or Sublic, two bio-products based on a mixture of *Trichoderma harzianum Fv178* plus *Clonostachys rosea Fv114*, and *Bacillus licheniformis* plus *B. subtilis*, respectively, on *Verticillium dahliae* infection of olive, and on *Phytophthora nicotianae* of citrus were evaluated. In the tested organic media, the micro and macro nutrients of the conventional substrate were replaced by 1% (v/v) of a bio-fertilizer obtained from sea birds manure (Guano). In the MAIB-ECOS medium, 30% (v/v) of peat moss was replaced by commercial certified compost. Trials were carried out on 3-4 month old sour orange, volkameriana lemon and citrange troyer, as well as on 18 months old olive plantlets (cv Leccino). Before transplanting, citrus plants were artificially inoculated with a virulent strain of *P. nicotianae*. Olive plantlets were inoculated by dipping roots in a conidial suspension of *V. dahliae*. Uninoculated plantlets were used as a control. The tested plants showed a different behavior when the bio-control products were added. In particular, Clonotri was very effective on citrange troyer and sour orange seedlings, significantly enhancing plant growth and reducing Phytophthora root rot incidence, as compared to the untreated control. Instead, Sublic reduced the inoculums density of *Phytophthora* spp. in the rhizosphere of all the tested plants, except for citrange troyer. Olive plantlets growing in *Verticillium* free organic MAIB-BIO medium showed a significant increase of the vegetative parameters (Plant height, plant weight and root weight). Moreover, olive plantlets growing in the organic MAIB-ECOS medium amended with the bio-products showed the best vegetative parameters, as well as a significant reduction of *V. dahliae* inoculum density, as compared to the unamended control.

BC 37

SURVEY AND SEASONAL FLUCTUATIONS OF PARASITOIDS OF THE CITRUS LEAF MINER, *(PHYLLOCNITIS CITRELLA* STAINTON) ON CITRUS ALONG THE SYRIAN COAST. Kais Ghazal, Abeer Kher Beck, Ebtessam Bagdash, Eiad Muhamad, Amal Haj Hasan and Alisar Shapoo, Lattakia Centre for Insectary and Reared Natural Enemies, Agriculture Department of Lattakia, P.O. Box 3100, Lattakia, Syria, Email: Kaisgazalbc@shuf.com; amal.haj@gmail.com

A survey of citrus leaf miner *(Phyllocnitis citrella* Stainton) parasitoids conducted in the Syrian coast during 2006-2008 indicated the presence of five parasitoid species. The parasitoid *Semielacher petiolatus* Girault, which was imported from Australia in 1995 was the most common. Its relative occurrence was 88.89, 95.13 and 94% in the three years, respectively. The relative occurrence of the local parasitoid (*Ratzeburgiola incompleta*) was 5.65, 2.52 and 5% in the three years, respectively. Whereas, the rest of local parasitoids were rare and the relative occurrence of the local parasitoid *Citrostichus phyllocnistoides* Narayanan was 4.9, 1.85 and 1% and *Cirrospilus nr. lyncus* was 0.19, 0 and 0% and the parasitoid *Cirrospilus ingenus*, which was imported from Australia in 1995 was, 0.38, 0.5 and 0%, respectively, in the three years, respectively.

BC 38

SUSCEPTIBILITY OF CITRUS TREES TO INFESTATION WITH THE JASMINE WHITEFLY, *ALEUROCLAVA JASMINI* TAKAHASHI WITH REFERENCE TO DISTRIBUTION OF NATURAL ENEMIES. Amal Salman Abdul-Razak, Israa Fadhel, Hassanien Abdul Rahim, Nagi Jaber, Thawya Nagi and Salah Fares, Ministry of Agriculture, State Board for Agricultural Research, Baghdad, Iraq, Email: amal2004s20000@yahoo.com

The jasmin whitefly, *Aleuroclava jasmini* Takahashi is one of the exotic pests attacking citrus trees in Iraq and was first recorded at Diala province in July 2001, then widely spread throughout the whole citrus areas in the province. Field studies were conducted to investigate the susceptibility of citrus trees to infestation with this pest from late 2007 till mid 2009 in Baghdad province. Results indicated that the grape fruit and bitter orange were the most preferred hosts in term of adult's attraction and egg laying. The first spring peak was recorded at the average of 116.2, 102.1 egg/20 leaves, for the two citrus species, respectively. The winter peak of the insect on sweet lemon averaged 54.24 egg/20 leaves. In 2009, the adults laid 161 eggs/20 leaves on bitter orange trees. The predator *Chrysoperla mutata* was the most dominating on bitter and pour orange trees. The results of this study are considered essential information to develop an integrated management program for this pest in Iraq.

BC 39

BIOLOGICAL CONTROL OF POTATO BLACK SCURF IN LIBYA. Fauzi A. Bisheya, M.M. Zantuti and M.M.Maauf, Agricultural Research Center, Tripoli, Libya, Email: bisheya@yahoo.com

Potato (*Solanum tuberosum*) is one of the important vegetable crops in Libya which is cultivated twice a year; spring cultivation by using imported seeds and autumn cultivation using local seeds. Black scurf disease of potato caused by *Rhizoctonia solani* produces stem cankers, and affects sprouts emergence and produce poor quality of tubers due to black sclerotia attached to the skin and is difficult to remove. Two field experiments were conducted, the first during autumn 2006/2007, and the second during spring 2008 to control black scurf disease by using fungicides and biocides at Zahra research station in western Libya. Preliminary results indicated presence of some variations in the disease incidence on potato tuber produced during autumn 2006-2007 treated with fungicides and biocides. The average disease incidence was 33.4%, 18.2%, 19%, 32.6%, 10.6% and 24.4% on tubers produced from seeds treated with Rizolex, tachgreen, Remilten, Tricoderma powder formulation, and Tricoderma lab preparation and control respectively. Results of the second experiment showed that disease incidence was 1.2%, 1.27%, 0.07% and 1.2% when using seeds treated with Tricoderma powder, Tricoderma lab preparation, Rizolex and control, respectively. Comparison between disease incidence and productivity will be presented.

BC 40

EVALUATION OF DIFFERENT MICROBIAL INOCULANTS AGAINST *RHIZOCTONIA ORYZEA*. Hayyan Ismaeil Al-Taweil, Mohammad Bin Osman, Aidi Abdul Hamid and Wan Mohtar Wan Yussof, School of Bioscience and Biotechnology, Faculty Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia, Email: mail:hayyan3@hotmail.com)

Laboratory tests and pot experiments were conducted to evaluate the effect of inoculants of indigenous beneficial microorganisms on rice disease suppression. Microbial inoculants, *Trichoderma* spp. and *Bacillus* spp were isolated from soil. Data from the dual culture test showed that although the linear growth of both *Rhizoctonia oryzae* and *T. viride* and *B. megaterium* on single culture plates increased after inoculation, the linear growth of *T. viride* was more rapid than that of *R. oryzae*. Significant inhibition of 62.5%, 50.0% and 55.0% of *R. oryzae* occurred after 8 days for *Trichoderma*, *Bacillus* and triple culture, respectively. Compared to the control, (untreated plants), lowest pathogen incidence on the resulted grain, while there were significant differences in disease severity (DS) & disease index (DI) in any treatments 7 days after the initial application. Compared with the control, 21 days after the initial application, significant differences in DS & DI were observed between the rice seedlings plots. The exploitation of biocontrol agents for the management of plant diseases have achieved greater significance in recent years due to its readily available nature, antimicrobial activity, easy biodegradability, non-phytotoxicity, besides inducing resistance in host.

BC 41

CHARACTERIZATION OF A NEW EPIZOOTIC STRAIN OF *BACILLUS THURINGIENSIS*. Mohammad Shojaaddini[1], Saeid Moharramipour[1], Mahvash Khodabendeh[2] and Ali Asghar Talebi[2]. (1) Department of Agricultural Entomology, Faculty of Agriculture, Tarbiat Modares University, P.O. Box 14115-336, Tehran, Iran, Email: shojaaddini@modares.ac.ir; (2) National Institute of Genetic Engineering and Biotechnology, Tehran, Iran, Email: saba@nigeb.ac.ir

After several epizootics in laboratory cultures of *Plodia interpunctella* Hub. in insectaria of Tabriz University, Iran, a new strain (BTA) of *Bacillus thuringiensis* Berliner was isolated from dead larvae. The insecticidal activity of this strain toward two Lepidopteran species, *Plodia interpunctella* and *Plutella xylostella* (L.) was compared to *B.t. kurstaki* strain HD1 and *B.t. aizawai* strain HA3 as reference strains. In order to characterize the strain, H-antigen serotyping, SDS-PAGE and PCR-based identification of *cry* genes were carried out. Results showed that the strain belongs to Aizawai serovar. Parasporal inclusions of the BTA consisted of a major protein of about 67 kDa and several minor proteins. Seven out of fourteen genes have been screened including *cry*1Aa, *cry*1Ab, *cry*1C, *cry*1D, *cry*1I, *cry*2A and *cry*9 which were present in a BTA strain. Larvae of Indianmeal moth were very susceptible to spore/crystal preparations of BTA (LC_{50}=7.13µg/ml) and HD1 (LC_{50}=15.34µg/ml) strains, and to a lesser extent to HA3 (LC_{50}=25.40µg/ml). Spore/crystals preparations of BTA was highly toxic toward diamondback moth larvae (LC_{50}= 3.1 µg/ml) that was significantly different from HA3 (LC_{50}=5.6 µg/ml) but not from HD1 (LC_{50} =1.7 µg/ml).

BC 42

MASS REARING OF THE TWO PREDATORY MITES, *NEOSEIULUS CALIFORNICUS* AND *PHYTOSEIULUS MACROPILIS* ON THE TWO-SPOTTED SPIDER MITE, *TETRANYCHUS URTICAE* AND DIFFERENT KINDS OF POLLEN. I.H. Heikal, Central Lab. of Organic Agric. ARC, Giza, Egypt, Email: organic_agr@yahoo.com

The two predatory mites, *Neoseiulus californycus* (McGregor) and *Phytoseiulus macropilis* (Banks) were reared in the laboratory on mulberry leaf infested with the two-spotted spider mite (*Tetranychus urticae* Koch) as animal diet and pollen as plant diet. Both predators were successfully maintained and reared on the two-spotted spider mites. The rate of increase of *N. californicus* on the two-spotted spider mite were 8.1, 12.0 and 23.5 times after 6, 12 and 15 days, respectively, and they were 17.9, 33.6 and 53.1 times for *P. macropilis*. Pollen of apricot, palm, peach and apple were unsuitable for rearing the predatory mite, *P. macropilis*, but proved to be suitable for the predatory mite, *N. californycus*. However, the rate of the predator increase was comparatively low when compared with rearing on the two-spotted spider mite. Average

predator increase was 1.2, 3.6, 1.5 and 1.8 times after 15 days when reared on pollen of apricot, palm, peach and apple, respectively.

BC 43

THE ENCYRTID PARASITOID, *COMPERIELLA LIMINISTACA* (HYMENOPTERA: ENCYRTIDAE) AND ITS ROLE IN CONTROLLING ARMORED SCALE INSECTS IN EGYPT. Shaaban Abd-Rabou, Mona Moustfa and Hoda Badary, Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt, Email: shaaban59@yahoo.com

The encyrtid parasitoid, *Comperiella liministaca* Compere and Annecke (Hymenoptera : Chalcidoidae: Encyrtidae) is considered as an effective parasitoids of armored scale insects. It is recorded as a primary parasitoid of red scale, *Aonidiella aurantii* (Maskell) (Hemiptera: Diaspididae) in different locations in Egypt. The aim of this work was to study the distribution and insect host of this parasitoid in Egypt. This parasitoid was found distributed in 10 locations and associated with one armored scale insect, *A. aurantii*. Abundance of this parasitoid in three locations was evaluated. Maximum parasitism reached 27% on *A. aurantii* which infested *Ficus nitida* in Giza governorate.

BC 44

ECOLOGICAL STUDY ON *LIROMYZA TRIFOLII* (BURGESS)AND and ITS PARASITOIDS ON *VICIA FABA*. Abd El Ganeey M. El-Sayed, Mohamed I. Shedeed and Mohamed H. Soliman. Agriculture Research Center, Plant Protection Research Institute, Email: dr_homam@hotmail.com

Field experiments were conducted at Menofia Governorate during 2004/2005 and 2005/2006 seasons to study the population density and fluctuation of *Vicia faba* leafminer. Inspections showed that *Liriomyza bryoniae* appeared on some leaves at negligible numbers, whereas some other inspections detected *Liriomyza trifolii* at a higher level. All immature stages of *Liriomyza trifolii* were permanent on leaves of broad bean during the growing period. Counting punctures, eggs, mines, and numbers of larvae are considered to be a more suitable method to express *L. trifolii* infestation. The number of *L. trifolii* pupae on broad bean leaf samples were not suitable to give idea of *L. trifolii* population. Based on the overlapping numbers of peaks punctures, eggs, mines and larvae recorded on leaf samples of broad bean, it could be concluded that *L. trifolii* had five or six generations during the growing season. Field and laboratory inspections showed that no parasitoids played a role against the egg stage of *L. trifolii*. However, two eulophid parasitoids *Diglyphus isaea* and *Chrysocharis parksi* and braconid parasite *Opius concolor* emerged from *L. trifolii* larvae and pupae. An initial rate of parasitism on *L. trifolii* larvae and pupae occurred early in the growing period and then fluctuated, during both seasons. Parasitism rate of *D. isaea* was higher than that of *O. concolor* and *C. parksi*.

BC 45

THE ROLE OF THE PARASITOID *TETRASTICHUS* SP. IN THE NATURAL DEATH OF *PHYTOMYZA OROBANCHIA* KALT. AT EL-TATRIR, EGYPT. Mohamed O. Kolaib[1], Aly I. Farag[1] and Mohamed I. Shedeed[2]. (1) Department Economic Entomology and Agriculture Zoology, Faculty of Agriculture, Minufiya University, Shebin El-Kom, Egypt; (2) Agriculture Research Center, Plant Protection Research Institute, Email: dr_homam@hotmail.com

Phytomyza orobanchia Kalt. Is a well recognized bio-control agent of broom-rape (*Orobanche crenata* Forsk.) all over the world. The insect is subject to attack by the Eulphid parasitoid *Tetrastichus* sp. among other factors which can reduce its natural population. . Our studies revealed that the insect was exposed to about 3.8% to 12% natural death from February to April during 2007 and 2008. However, death due to *Tetrastichus* sp. During the same period at El-Tahrir area, Menoufyia Governorate, Egypt, did not exceed 4%. Other factors are being investigated.

BC 46

EVALUATION OF LOCUST FIFTH INSTARS FOR INFECTION WITH A ENTOMOPATHOGENIC NEMATODE ISOLATES FROM EGYPT AND COMPARED WITH AN EXOTIC ISOLATES. Souad A. Shairra, Plant Protection Research Institute, Agriculture Research Center, Giza, Egypt, Email: s_shairra_egy@yahoo.com

The entomopathogenic nematodes, *Heterorhabditis* and *Steinernema* together with their associated bacteria *Photorhabdus* and *Xenorhabdus*, respectively, proved to have biological control potential. A hypothesis that the insect immune-mediating eicosanoid pathway may be affected by the virulent action of the Egyptian nematode isolate *H. indicus* (RM_1) on *Schistocerca gregaria*. Haemocoelic injection of the nematode into the fifth instar nymphs of *S. gregaria* evoked the haemocyte nodulation reactions as well as increased the mortality rate of these economically important pests. Separate treatments with specific inhibitors of the phospholipase A_2; the cyclooxygenase and the dual cyclooxygenase/ lipoxygenase pathways, reduced both haemocyte nodulation reaction, supporting the point of view that nodule formation is a complex process involving both cyclooxygenase and lipoxygenase products. The inhibitory effects of the phospholipase A_2 inhibitor, dexamethasone, nodulation were obviously apparent during the first hour of injection and these effects increased greatly over the following 24h . The dexamethasone effects were expressed in a dose-dependent manner and they were reversed by the co-injection of the nematode-injected insects with the arachidonic acid (C20:4n-6). These findings strongly support the identification of nodulation as specific insect cellular defense reactions that are mediated by eicosanoids. The *Sc. gregaria* nymphs contain trace levels of the eicosanoid-precursor polyunsaturated fatty acids in six different tissues as detected by mass spectrometry.

BC 47

DECONTAMINATION OF WHEAT KERNELS INOCULATED WITH *FUSARIUM GRAMINEARUM* BY *CUMINUM CYMINUM, SATURIEA HORTENSIS* AND *MENTHA VIRIDIE* L. EXTRACTS. Rouhollah Karami-Osboo[1], Seyedeh Flour Mazhar[2] and Farhang Aliakbari[2,3]. (1) Mycotoxin Research Lab., Iranian Plant Protection Research Institute, P.O. Box 19395/1454, Tehran, Iran; (2) Microbiology Department, Azad Islamic University, North Tehran Branch, Tehran, Iran; (3) Faroogh Life Sciences Research Lab. Tehran, Iran; Email: karamiosboo@yahoo.ca

Fusarium graminearum (teleomorph: Gibberella zeae) is a fungus of main concern to agriculture and food industries, because this cereal pathogen facades significant threats to human and animal health by contaminating wheat, maize, and barley with the trichothecenes deoxynivalenol (DON), nivalenol (NIV), and their derivatives. Fungi-inhibiting chemicals (chiefly low-molecular-weight organic acids) have been used for the preservation of stored grain. Nevertheless, various disadvantages are related to the use of acids and world trend are going to reduce their use in grain and foodstuffs. Natural plant essential oil may provide an alternative to these preservatives. Essential oils have antimicrobial, antiviral, antimycotic, antitoxigenic and insecticidal properties. The objective of the present study was to asses the effect of decontamination of wheat kernels with *Cuminum cyminum, Saturiea hortensis* and *Mentha viridis* L. (spearmint) essential oils on the amount of the inoculated *F. graminearum*. Decontamination tests were carried out by watery solutions at concentrations of 0.05% and 0.1% of essential oils. In the control sample, submersion was done in distilled water with no essential oil for 2 min. Results showed reduction of *F. graminearum* on artificially inoculated wheat, as a result of decontamination with watery suspensions of essential oils.

BC 48

EFFICACY OF CERTAIN NEMATOPHAGOUS FUNGI IN CONTROLLING ROOT-KNOT NEMATODES ON OKRA. Tawfik M. Muhsin, Kadim J. Hamadi and Ali A. Kasim, Department of Biology, College of Education, University of Basrah, Basrah,Iraq, Email:tmuhsin2001@yahoo.com

The efficacy of four nematophagous fungal species (*Arthrobotrys oligospora, A. dactyloides, Dactylellae brochopag*a and *D. leptospora*) in controlling root knot nematode, *Meloidogyne* spp. was evaluated on Okra, *Hibiscus esculantus* L. Okra seedlings (cv Local) were transplanted in pots containing sterilized soil mixture. Fourteen days after transplanting, the potted soil was infested with nematode and fungal inocula at $1x10^3$ eggs /pot, and $1x10^4$ fungal conidiospores/pot, respectively. Nematode-infected plants without fungal inocula, and free plants were used as control checks. A similar experiment was conducted in a nematode-infested field over an area of 20 m^2 (4x5 m) using a randomized complete block design (RCBD), with four replicates (microplots). The area of each microplot was 0.5 m^2. Microplots were infested with nemtode and fungal inocula at $1x10^3$ eggs/microplot, and $1x10^6$ fungal conidiospores/microplot, respectively. At the end of each experiment, fresh and dry weights of okra plants, and also number of galls/root system were determined. Results of both laboratory and field experiments revealed that the fresh and dry weights of okra plants inoculated with both nematophagous fungal species and root-knot nematode were increased ($P \leq 0.05$), compared to the plants inoculated with nematode only. Numbers of galls/root system were reduced variably with the fungal treatments, and reduction rate reached up to 50% with some nematophagous fungal species, compared to the controls.

BC 49

INTRODUCTION OF SOME IMPORTANT ANTAGONISTIC BACTERIA AFFECTING CANOLA DAMPING-OFF IN IRAN. S. Sarani[1], A. Sharifi Tehrani[2], M. Ahmad zadeh[2] and M. Javan Nikkhah[2]. (1) University of Zabol, Iran; (2) University of Tehran, Iran, Email: saranisistani@gmail.com; Sarani59@uoz.ac.ir

In this study, Three hundred ninety five bacterial isolates were collected from canola root and rhizosphere in Golestan, Mazandaran, Guilan and Tehran provinces. At first, antagonistic effect of bacterial isolates on *Rhizoctonia solani* was studied using dual culture test assay. The results showed that 60 isolates had the ability to inhibit the growth of the fungus on PDA medium. On the basis of biochemical, physiological and morphological tests, isolates Pf41, Pf51, Pf411 and Pf412 were identified as *Pseudomonas fluorescens*, isolate Bu1 as *Burkholderia cepacia*, the isolates B1, B2, Bs44 and B6 were identified as *Bacillus subtilis* and S44, str45 as *Streptomyces* sp. Results of studies on biocontrol mechanism showed that isolates produced antibiotics and volatile metabolites that prevented the mycelial growth of the fungus. Also the isolates produced some antimicrobial metabolites including hydrogen cyanide, protease and siderophore with inhibition effect on *in-vitro* growth of the fungus. The effect of isolates on disease reduction in comparaison with control was significant. None of the isolates were able to completely prevent disease occurrence. Isolates applied as soil treatment had a significantly higher disease control effect as compared to seed treatment. Isolates had considerable effect on disease reduction under the greenhouse conditions.

BC 50

EFFICACY OF *BEAUVERIA BASSIANA* (BALS.) VUIL. IN BIOCONTROLLING COTTON LEAFWORM *SPODOPTERA LITTORALIS* (BOISD.). Sh. H. Alobaidi and S.H. Samir, Department of Plant Protection, College of Agriculture, University of Baghdad, Iraq, Email: salehsamir2004@yahoo.com

A study was conducted to evaluate the pathogenicity of *Beauveria bassiana* at a rate 1×10^6 spores/ml as a biocontrol agent on the cotton leafworm *Spodoptera littoralis*. Laboratory results on the eggs revealed that hatching rate of at 1-2 day eggs was 5 and 9.4% 2 and 4 days after application, respectively, while hatching of 3-4 days eggs was 8.7%, 2 days after treatment. Regarding

larval stages (1^{st},3^{rd},5^{th} instar), the mortality rate was 100% 14 days after application. When the pupal stage was treated with the biocontrol agent, the rate of adult emergence was 50%, 15 days after treatment compared to control treatment (100%emergence). The biocontrol agent achieved 3.4, 26.7, 83% mortality 1, 3, 5 days after treatment. In glasshouse experiments tow weeks after treatment, the mortality rate for 1^{st} instars was 97.7 and 39.7% for soil and eggplant treatments, respectively. However, the mortality rate for 3^{rd} instars was 100% and 86.6% for soil and plant treatments, respectively. In 5^{th} instar mortality rate reached 87.6 and 80.1% for soil and plant treatments, respectively.

BC 51

***IN-VITRO* BIOLOGICAL CONTROL OF *BOTRYTIS CINEREA* BY *TRICHODERMA VIRIDE*.** Messaoud Bachagha Bensaci, Laboratory of Ecosystems Protection in Arid and Semi-arid Areas, University of Kasdi Merbah, Road of Gardaia, P.O. Box 511, Ouargla, Algeria, Email: mbachagha@gmail.com

Gray mold caused by *Botrytis cinerea* on tomatoes plants grown in plastic greenhouses is one of the most important fungal diseases in the region of Ouargla in the south-east of Algeria, especially between the months of February and April After isolation and identification of a virulent strain of *Botrytis cinerea* from tomatoes plants, it has been subjected to biological control *in-vitro*, radial growth of the isolate was reduced to 42 mm in a Petri dish of 90 mm by *Trichoderma viride* on PDA culture medium at a rate of 44.44%. In an experiment to test the effect of volatile substances secreted by *Trichoderma viride*, a 5 mm in diameter disk of *Trichoderma viride* was placed at the bottom of the dish and a 5 mm diameter disk of *Botrytis cinerea* on the lid of the dish after three days of growth. In an antagonism study on the surface of a culture medium, *Trichoderma viride* colonized 2/3 of surface, a rate of 60%, after two weeks. The use of *Trichoderma viride* gave very encouraging results.

BC 52

EFFECT OF THREE SPECIES OF *BACILLUS* ON BEET ARMYWORM *SPODOPTERA EXIGUA* (HUB.). Juhina A.M. Ali, Plant Protection Department, College of Agriculture and Forestry, University of Mosul, Iraq, Email: juhina1234@yahoo.com

Three different species of pathogenic bacteria were identified as causal organisms of diseases to beet armyworm, *Spodoptera exigua*: *Bacillus gibsoni, B. melolonthae* and *B. thuringiensis* var. *alesti*. Larvae were treated with different concentrations of bacterial suspensions: (6, 9, and 12×10^6 cell/ml as well as their mixture with Crozer). The killing rate of 1^{st} instar larvae treated with the concentrations of 12×10^6 cell/cm^3 with the three pathogenic bacteria was 52, 68 and 92%, respectively. *B. thuringiensis* var. *alesti* with Crozer gave the best killing rate of 82.4%, and 1^{st} instar larvae were very sensitive as compared to other instars.

BC 53

REARING THE MEDITERRANEAN FLOUR MOTH *EPHESITA KUHNILLA* AS HOST FOR THE EGG PARASITOID *TRICHGRAMA* SP. AND LARVAE PARASITOID *BRACON HHEBETOR*. Faraj Elbakosh and Shukri Sharif, Biotechnology Research Centre (BTRC), P.O. Box 30313, Tajora, Libya, Email: shokre2005@hotmail.co.uk

The Mediterranean flour moth *Ephestia kuehnilla* lives inside the grain store and feed on flour and its products. The insect can also feed on dried fruits and dates in the field and during storage.The Mediterranean flour moth is widely used as a host to rear many natural enemies (parasites and predators) under laboratory conditions. In this study the insect was reared in the laboratory on fine semolina in plastic cages (17×20×27 cm) under a temperature of 24±1ºC and relative humidity of 65-70%. The insect was reared for many generations, and the eggs were collected in order to rear on them the egg parasitoid *Trichgramma brassice*. The larva of the Mediterranean flour moth were also collected to be used as host for the larvae parasite *Bracon Hebetor*.

BC 54

EFFECT OF SOME LOCAL ALTERNATIVES ON THE NATURAL ENEMY LADY BIRD: *COCCINELLA UNDECIMPUNCTATA*. Gehad M. Mousa, Plant Protection Research Institute, ARC, Egypt, Email: mohamedalelimi@hotmail.com

Studies were carried out on the effect of local alternatives: inorganic salts (Potassium bromate), organic acid (citric acid) and biocides (profect, protecto, bioranse, biovar, virotecto, virosat) against different life stages of the natural enemy lady bird (egg, larvae, pupae and adult) compared with Actellic as a conventional pesticide. Four experiments were carried out to determine the effect of alternative products at their recommended rates for controlling aphids or cotton leafworm; ovicidal effect, toxic effect against larval stage, effect against pupae and adult stages. Two methods were used for treatment based on the stage of the natural enemy. In case of non-feeding stages (eggs and pupae) direct spraying method was used with recommend rate, while in the case of feeding stages (larvae and adults) indirect treatment method was used by spraying leaves of cucumber heavily infested with cotton aphid with the recommend rate of the material tested. Results obtained indicated that the conventional insecticide Actellic and potassium bromate were the most hazardous treatments against all stages of the ladym bird while organic acid (citric acid) was the safest, followed by all biocides tested.

BC 55

BIOLOGICAL STUDY ON *RHYZOBIUS LOPHANTHAE* BLAISDELL PREDATOR OF SCALE INSECT *ASPIDIOTUS HEDERAE* BOUCHE. Asem Abu- Alloush and Thabet allawi, National Center for Agricultural Research and Extension (NCARE), Amman, Jordan, Email: asemhabes@hotmail.com

Biology of *Rhyzobius lophanthae* (Coleoptera: Coccinellidae) was studied under laboratory conditions at temperatures of 25±1 and 30±1ºC, 16:8 light: dark

photoperiod and % 45±10 relative humidity. Using *Aspidiotus hederae* (Homoptera: Disapididae) as insect host and Acacia seedlings as plant host *A. hederae* was reared successfully on another 2 hosts; potato tubers and its sprouts and fruit of butternut squash were used in maintaining the culture. Temperature significantly affected the biology of the predator. Mean incubated period was 6 and 4.76 days at 25 and 30ºC, respectively. Mean postembryonic 4 larval instars plus prepupa and pupa duration lasted 3.0, 2.25, 2.3, 3.45, 2.0 and 4.05 at 25ºC, while they were 2.2, 1.66, 1.77, 2.44, 178 and 3.56 days at 30ºC, for the 1st, 2nd, 3rd, 4th instars, prepupa and pupa, respectively. The total mortality rate of eggs and immature stages was 3.33% and 6.77% at 25 and 30ºC, respectively. The mean feeding consumption of the four larval instars were 1.72, 2.4, 4.34 and 15.8 at 25ºC, and 2.55, 3.72, 6.0 and 21.2 scales at 30ºC, respectively. The mean preoviposition period lasted 4.47 and 3.23 days at 25 and 30ºC, respectively. The sex ratio F:M. was 1.06:1. The mean adults consumption was 3.76, and 4.25 and 7.54 scales for male, female and mated adults at 25ºC, whereas the mean adults consumption was 5.72, 6.58 and 10.7 for male, female and mated adults at 30ºC, respectively. The mean fecundity per day was 20.3 and 24 eggs per female and the mean total was 1165 and 1059 eggs per female at 24 and 30ºC, respectively. The mean oviposition period was 3 and 4.95 days at 25 and 30ºC, respectively. The mean adult longevity was 64.57, 62.42, 115.64 and 114.7 for mated female, mated male, individual female and individual male at 25ºC, whereas the mean adult longevity was 50.15, 50.00, 80.57 and 78.02 days at 30ºC. The mean adult longevity was 5 and 3.94 days for starved female and male, 17.24 and 9.3 days for female and male fed on honey, 28. 32 and 20.76 days for female and male fed on pollen and 15.18 and 12.4 days for female and male fed on sugar solution. Three other natural enemies of A. hederae were recorded; they were the predators *Chilocorus bipustulatus* and *Exochomus quadripustulatus* and the parasitoid *Aphytis* sp.

BC 56

POPULATION DYNAMICS OF APHIS *BRACHYCAUDUS AMYGDALINUS* ON ALMOND IN MID-SYRIA. Amanni Shlallo, Wajih Alkassis and Louai Aslaan, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: amannishllalo@yahoo.com

Brachycaudus amygdalinus is one of the most important pests on almond, apricot and peach causes weak growth, soft twigs and leaf curl. This study was carried out to study population dynamics of *B. amygdalinus* and development of its colony in almond orchards during the 2004-2007. *B. amygdalinus* colony started on winter hosts from winter eggs by mid-March, when day temperature was 25°C. The colony reached its peak during late April until late May; however, increase of temperature and numbers of natural enemies limited its population. Winged individuals started to appear by mid-April and reached its peak in July. Winged individuals moved from summer hosts to winter hosts for egg laying by mid-October and disappeared by late October. Common associated predators belonged to Coccinellidae and Chrysopidae.

BC 57

SIDE-EFFECTS OF SOME INSECTICIDES ON THE LIFE STAGES OF THE EGG PARASITOID, *TRICHOGRAMMA CACOECIAE* MARCHAL. Faiha'a Al- abbar[1], M. Jamal Hajjar[1] and Majd Jamal[2]. (1) Department of Plant Protection, Faculty of Agriculture, Damascus University, Syria, Email: abbar.faihaa@gmail.com; (2) ICARDA, P.O. Box 5466, Aleppo, Syria.

Side-effects of six insecticides used on apple trees in Syria were tested on the life stages of the egg parasitoid, *Trichogramma cacoeciae* Marchal (Hym: Trichogrammatidae) using direct spray on parasitized host egg containing the parasitoid stages; eggs, larvae and pupae. Highest recommended field application rates were used. This study showed that Cloroyrifos was the most harmful insecticide on all life stages of the parasitoid inside the host egg, as it ranked class 4 according to categories of the International Organization for Biological Control (IOBC). Deltamethrin was harmful to the larval stage only and moderately harmful to the other two stages (eggs and pupae). Acetamiprid was also harmful to the egg stage and moderately harmful to larvae and pupae. Whereas, the IGR insecticides (Fenoxycarb, Diflubenzuron and Lufenuron) were harmless to the pupal stage and with low effect on the eggs and larvae, with an exception of Diflubenzuron, which was harmless to the larval stage which led to the highest rate of adult emergence (81.27%) compared with control.

BC 58

PARASITIC COMPLEX OF THE Whitefly *Bemisia tabaci* (Gennadius), AND HOST RANGE OF THE TWO PARASITOIDS *Eretmocerus mundus* (Mercet) AND *Encarcia formosa* (Gehan) IN THE SYRIAN HABITAT. Randa Abou-Tara[1], Fawzy Samara[2], Majd Jamal[2], Fawzy Shalaby[3], Samyr Assaf[1] and Ghassan Rostom[1]. (1) General Commission of Scientific Agricultural Research, Douma, P.O. Box 113, Damascus, Syria; (2) Faculty of Agriculture, University of Damascus, Damascus, Syria; (3) University of Banha, Egypt, Email: fawzyshalaby@yahoo.co.uk

A comparative study was carried out for exploration of the parasitioids' complex of the whitefly *Bemisia tabaci* (Gennadius) in the Syrian local environment. Four species of parasitoids were identified: *Eretmocerus mundus* (Mercet), *Encarcia formosa* (Gehan), *Encarcia tricolor* (Foerster) and *Encarcia pergandiella* (Harvard). Concerning hosts' specificity of the first two parasitoids, five were identified for *E. mundus*: *B. tabaci*, *B. tabaci* biotype B, *Trialeurodes vaporariorum* (Westwood), *Dialeurodes eitri* (Ashmead) and *Acaudialeurodes rachipora* (Singh). Four hosts were identified for *E. formosa*: *B. tacaci*, *B. tabaci* biotype B, *T. vaporariorum* (Westwood), and *Bulgarialeurodes cotesii* (Maskall). The whitefly *B. tabaci* had, at least, two strains in the Syrian habitat. *B. tabaci* biotype B, was registered for the first time in Syria and the other is being identified. More than 63 host plants were registered in local environment for the whitefly *B. tabaci* in Syria.

BC 59

SURVEY OF ENTOMOPATHOGENIC NEMATODES IN ORCHARDS AND FIELDS OF REEF DAMASCUS GOVERNORATE, SYRIA. Amani Jawiish, Khalid Al-Assas and Abdul Nabi Bashir, Plant Protection Department, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: amanisaeed73@yahoo.com

A survey of entomopathogenic nematodes (EPNS) in some fields and orchards of Reef Damascus governorate, Syria was conducted during March-June, 2008. Results showed the presence of some entomopathogenic nematode genera in the rhizosphere soil samples of pome fruits, stone fruits, citrus, walnut tree, and vine orchards. The genera Heterorhabditis and Steinernema were the most prevalent (FO%= 47.06% and 52.94%, respectively). Heterorhabditis was found in sandy loam soils, while Steinernema was found in sandy clay loam, sandy loam and sandy clay soils. This is the first record of EPNS in the Damascus Governorate, Syria.

BC 60

PATHOGENICITY OF *ASPERGILLUS FLAVUS* LINK TO NYMPHAL AND ADULT STAGES OF THE AMERICAN COCKROACH UNDER LABORATORY CONDITIONS. Layth Hamd Abdulla Altalib[1] and Salim Jameel Jarjes[2]. (1) Science Department, College of Basis Education, Mousl University, Iraq, Email: laythaltalib@yahoo.com; (2) Plant Protection Department, Faculty of Agriculture and Forestry, Mousl University, Iraq.

This study revealed the presence of numerous parasitic fungi within the body of American coakroach. The predominant fungus was *Aspergillus flavus* (Link). The next was *Rhopalomyces* followed by *Syncephalstram*. These entomopathogenic fungi were found at rates of 53.5, 32.3 and 14.2%, respectively. Serial concentrations ($1.115x10^8$, $x10^7$ and 10^6 spore/cm³) have been achieved from aqueous suspension of the fungus, and were applied on the insects either by direct spraying or as bait. Significant differences were found in the insecticidal activity against nymphs and adults. At these three concentrations, 43.89, 33.33 and 24.44% insect mortality was reached, respectively. The aqueous suspension of the fungus was found to be the best in increasing killing rate of the nymphs and adults of the American crokcoach. Killing by baites amounted to 33.33%, whereas killing by direct spray of fungus on insect amount to 17.5%. The killing rate was correlated with the development stage of the insect, with a mortality rate of 30.56% and 20.28% for nymphs and adults was reached, respectively. Finally the duration had a direct effect on mortality, as 5, 7 and 10 days after treatment, the fungal killing action reached 9.58, 25.83 and 40.83%, respectively.

BC 61

SURVEY OF PREDATORY INSECTS OF THE COTTON BOLLWORM, *HELICOVERPA* (*HELIOTHIS*) *ARMIGERA* (HB.) AT HASAKE, SYRIA. Abdulnabi Basher, Muhamed Mahmalje and Abdulla Khalled, Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: goitkb@aloola.sy

The study was conducted during 2005, 2006 and 2007 seasons. Samples were collected from cotton fields in Hassaka governorate (Malkia, Qamshle, Hassaka), Syria. Eleven species of predatory insects, belonging to Orders: Coleoptera, Neuroptera and Hemiptera were recorded associated with the cotton bollworm, *Helicoverpa* (*Heliothis*) *armigera* (Hb.). Population density of *Chrysoperla carnea* (18.53) was higher than the others. Highest rate of eggs predation was found in July (49.28%) at Malkia, in August (66.66%) at Qamishli and Hassaka. Highest rate of larval predation was noticed in July (55.1%) at Malkia and Qamishli (25%), and in August at Hassaka (50%).

BC 62

EVALUATION OF *TRICHODERMA* ISOLATES FOR CONTROLLING *FUSARIUM* WILT OF TOMATO UNDER GREENHOUSE CONDITIONS. Jahanger Amini, Department of Plant Protection, University of Kurdistan, P.O. Box 416, Sanandaj, Iran, Email: aminij2002@yahoo.com

Fusarium oxysporum f. sp. *lycopersici* is a fungal pathogen that causes wilt of tomato. Antagonistic effects of five isolates of *Trichoderma* spp. were evaluated for biological control against the Fusarium wilt of tomato in vitro and greenhouse. Dual culture, cellophane overlays technique and volatile metabolites were used in *in vitro* assay. Greenhouse experiments were carried out to test Trichoderma isolates against *F. oxysporum* f. sp. *lycopersici* by seed and soil treatment. Results of *in vitro* assay indicated that tested isolates of Trichoderma inhibited the growth of the pathogen. Mycelia inhibition varied between isolates of Trichoderma and ranged from 40 to 69% in dual culture and from 13 to 100% using the cellophane overlay methods. Mycelial growth of pathogen was reduced 9-46% by volatile metabolite of Trichoderma isolates throughout 120 hours inoculation. Also in greenhouse, results obtained indicated that five isolates *Trichoderma* spp. could reduce the disease incidence from 1.5 to 3 times and stimulated plant growth up to 3 times in comparison with infected control. Population of antagonists and pathogen were estimated (cfu/g) in potting mix 15 and 40 days after planting. The population (cfu/g) of pathogen and antagonist were fixed during experiments.

BC 63

RELEASE OF THE LOCAL PREDATOR *CLITOSTETHUS ARCUATUS* ROSSI FOR THE CONTROL OF JASMIN WHITEFLY *ALEUROCLAVA JASMINI* IN CITRUS ORCHARDS IN IRAQ. Amal. S. Abdul Razak, Ahmad A. Afy, Abdul Salam Abdul Wahab and Leith Adel, State board for Agricultural Research, Bagdad, Iraq, Email: amal2004s2000@yahoo.com

Mass rearing of the local predator, *Clitostethus arcuatus* Rossi was carried out in a plastic house under controlled conditions for the control of the Jasmine whitefly, *Aleuroclava jasmini* which attacks citrus trees in Diyala Province, Iraq during 2006 growing season. In early

spring, when the Jasmine whitefly was at its egg stage, the predator was released in three different citrus locations in Diyala Province. The predator was distributed at an average rate of 10 predators/tree. Results revealed a significant reduction in the whitefly egg numbers, the average eggs per leaf was decreased from 247.3 to 52.7 in location (1) and from 450.5 to 108.9 in location (2) and from 246.7 to 123.9 in location (3). As for the adults' stage, they were decreased from 68.4, 92.4 and 72.2 to 45.4, 17.6 and 47.2 per leaf, in the three locations, respectively. However, nymphs' number was very limited on citrus leaves. The study also showed gradual increase in the density of the predatory adults as time passed. Maintaining this important natural enemy and increase its role to gain effective biological control measure is recommended.

BC 64

THE EFFICACY OF *BACILLUS THURINGIENSIS*, *SACCHARPOLYSPORA SPINOSA* AND FENVALERATE AGAINST THE GRAM POD BORER *HELICOVERPA ARMIGERA* (HUB.) IN THE SUDAN. Tag Elsir E. Abdalla[1], Francis L. Oji[2] and Entisar A. Osman[1]. (1) Agricultural Research Corporation, Gezira Research Station, P.O. Box 126, Wad Medani, Sudan; (2) Hudeiba Agricultural Research Station, Hudeiba, Sudan, Email tagelsirr@yahoo.com

This study was conducted at Gezira Research Station (GRS) and Hudeiba Research Station (HRS) (Sudan) during 2004/05 and 2005/06 seasons, to evaluate two biopesiticide formulations derived from *Bacillus thuringiensis* (Bt) and *Saccharpolyspora spinosa* (spinosad) bacterium plus the pyrethroid product, fenvalerate against the gram pod borer, *Helicoverpa armigera* (Lepidoptera: Noctuidae), and the consequence on yield. Each product was tested at three rates versus an untreated control. A supportive laboratory test was carried out in the GRS. All treatments reduced the number of larvae, damaged pods per plant and increased the yield in both seasons and sites, compared with the control. The Bt at 1.488 kg/ha, spinosad at 0.248 l/ha and fenvalerate at 0.714 l/ha, showed the best results compared with the other corresponding doses; the laboratory test strongly supported the field results. Therefore, these treatments were released in the 75th meeting of the Pests and diseases Committee for gram pod borer control in the Sudan.

BC 65

EFFICIENCY OF *BEUVARIA BASSIANA* IN *CONTROLLING* CERTAIN SPECIES OF INSECTS. Rafeek Abbood[1], A.M. Mouhanna[2] and Bahaa Al Rahban[3]. (1) Agricultural Research Center in Lattakia, General Commission for Scientific Agricultural Research (GCSAR), Lattakia, Syria, Email: gcsarpartect@mail.sy; (2) General Commission for Biotechnology and University of Damascus, Faculty of Agriculture, Damascus, Syria; (3) Administration of Plant Protection Research (GCSAR), Douma, P.O. Box 113, Damascus, Syria

Experiments to evaluate the efficacy of a biopesticide was carried out in the Agricultural Research Center in Lattakia, Syria. The product BIOAY was tested against the white fly *Bemisia tabaci* in Tomato greenhouses. It was also tested under field conditions against the larvae of leaf cotton worm *Spodoptera littorialis*, and in the laboratory against larvae of cabbage white butterfly *Pieris rapae*. A concentration of 1.5 cm^3/L of the biopesticide was sprayed twice with one week interval. 14 days after treatment, the results showed that the control efficiency reached 75% on *Bemisia tabaci* and *Pieris rapae* larvae and more than 90% on *Spodoptera littorialis* larvae

BC 66

THE EFFECT OF FOOD QUALITY ON SOME LIFE MESURMENTS OF *TRISSOLCUS SEMISTRIATUS NESS*, A PARASITOID OF SUNN PEST (*EURYGASTER INTEGRICEPS* PUTON) EGGS. Rawda Al-Hashemi[1] and Louai Aslan[2]. (1) Biocontrol Center, P. P. Administration, Directoration of Agricultural and Agrarian Reform, Al-Hasake, Syria, Email: rawda_alhashemi@yahoo.com; (2) Biocontrol Research Center, Agriculture Faculty, Damascus University, Damascus, Syria, Email: louai@arabscientist.org

Sunn pest, *Eurygaster integriceps* Puton infests wheat and barley and is considered one of the most important economic pests in Syria. *Trissolcus* spp. egg parasitoids (*Scelionidae*) are considered the most important and the most effective natural enemies of this pest. In this experiment we studied the importance of food supply to the adults of *T. semistriatus Ness* under laboratory conditions. The results showed that the availability of food and its quality affected the life measurements of the parasitoid. Five types of food (treatments) were tested: wild mustard flowers, linden flowers, honeydew, sugar solution and honey in addition to the control (without feeding). For each treatment, ten replicates were used (each replicate consisted of a newly hatched and fertilized female). In the middle of each dish the food source; flowers, a leaf with honeydew, solution or honey drop were placed. Each dish was supplied daily with fresh unviable sunn pest eggs, with quantity more than what one female can parasitize. Those dishes were placed in an incubator with special conditions (25±2ºC; 60-70% RH; 16:8 L:D). Some life mesurments for the parasitoid were studied (female longevity, number of parasitized eggs, number of hatched parasitoids, number of hatched females). Highly significant differences were found between the treatments for all studied life measurements, the sugar solution treatment had surpassed all other treatments for all studied parameters. Female longevity was 16.20 and 2.80 days, the number of parasitized eggs were 102.2 and 12.1 egg, the number of hatched parasitoids were 101.9 and 11.4 parasitoid and the number of hatched females were 85.8 and 7.5 female for sugar solution and control treatments respectively. Results indicated that there were various natural food resources for Sunn pest egg parasitoids, that maintain these resources and encourage farming practices to conserve these recourses next or near wheat fields as a good practice within the integrated management program for this pest. In addition, there is a possibility to test and use less costing artificial food sources to be adopted for the laboratory rearing of these parasitoids.

BC 67

PATHOGENICITY OF SUDANESE STRAINS OF *BACILLUS THURENGIENSIS* TO THE RED FLOUR BEETLE *TRIBOLIUM CASTANEUM* (HEBST) LARVAE. Naiema Eltayeb Alim, National Centre for Research, Environment and Natural Resources Research Institute, khartoum, Sudan, Email: naiemaeltayeb@yahoo.com

Bacillus thurengiensis (Bt) is a group of gram positive bacteria, aerobic, motile, endospore-forming soil bacteria. It is also common in water or plants. Bt is one of the micro-organisms being used as a microbial pest control agent, having the following advantages: low environmental pollution, low persistence and high specificity against target insects, with low or no activity against non-target insects and animals, and a low development of resistance to the target insects. The red flour beetle *Tribolium castaneum* (Herbst) is considered as serious pest attacking the store products especially wheat flour, resulting in reduction of quantity, bad smell, and affecting the quality of the bread manufactured from infested wheat. The control of this pest depends mainly on chemical insecticides which are hazardous to human and environment. In addition, this pest has been resistant to some of them such as phoshine, thus it is required to use safer and efficient alternatives. One of the most powerful safe pest control strategy is the microbial control, where *Bacillus thurengiensis* is used as a bio-agent. In this study 39 Bacillus strains were isolated and identified from local habitat in Sudan and their pathogenicity to insect pests from different orders were evaluated. Wheat bran was treated with 500 ppm concentration from each isolate and the red flour beetle larvae were added and observed daily. Different mortality rates were achieved from the different strains. Some strains gave the same mortality rate as control treatment, but others were significantly different from the control.

BC 68

EFFECT OF EARTHWORM (*ALLOLOBOPHORA*) ON BIODEGRADATION OF SELECTED HYDROCARBON- CONTAMINATED AGRICULTURAL SOIL. Muna H. Al-Joubori[1] and Ayad A.A.H. Abd Al-Razaq[2]. (1) Department of Biology, College of Science-University of Baghdad; (2) Department of Geology, College of Science-University of Baghdad, Baghdad, Iraq, Email: mustaffal_taie @yahoo.com

Oil drilling and production activities have generated complex hydrocarbon pollution problems, affecting both surface and underground environments. The recent study has supported the idea that using earthworm with selected organic amendments may hasten the long-term recovery of conventionally treated petroleum contaminated soil. This paper represents for the first time the worm-driven (type *allolobophora)* biodegradation has been used to treat oily drill cuttings contaminated soil and to convert organic wastes into organic fertilizers. The applied biotreatment process is cost effective since most of the materials used were available and cheap agricultural and animal wastes. Good results were obtained using the new earthworm compared to another study which employed the two fungal isolates *Pleurotus ostreatus* and *Trichoderma harzianum* for the same type of diesel contamination.

BC 69

LABORATORY CHARACTERIZATION AND EVALUATION FOR EFFICACY OF 11 ISOLATES OF *BEAUVERIA BASSIANA* (BALS.) VUIL. ON OVERWINTERED ADULTS OF SUNN PEST (*EURYGASTER INTEGRICEPS* PUTON). Mohammed Abdulhai[1], Mustapha El-Bouhssini[2], Majd Jamal[3], Bruce L. Parker[4], Margaret Skinner[4] and Z. Sayyadi[1]. (1) General Commission for Scientific Agricultural Research, Aleppo Center, Aleppo, Syria, Email: mohamad_abdulhai@yahoo.com; (2) ICARDA, P.O. Box 5466, Aleppo, Syria, Email: M.Bohssini@cgiar.org; (3) Faculty of agriculture, Damascus University, Damascus, Syria; (4) Entomology Research Laboratory, University of Vermont, Burlington, Vermont, USA 05405-3400.

Eleven isolates of *Beauveria bassiana* (Bals.) Vuil. were included in this study: five isolated from overwintered adults of Sunn pest, *Eurygaster integriceps* Puton, and six isolated from nymphs and new generation adults of Sunn pest from wheat fields. Growth rate and conidia production of fungal isolates were tested at temperatures of 15, 20, 25 and 30°C. Results showed that the highest growth rate of the tested fungal isolates was at 25°C, except for the two isolates SPDR1 and SPDR2 with their highest growth rate at 20°C. The highest production of conidia of the tested fungal isolates was at 20°C, except for the two isolates SPSS and SPSQ, which exhibited the highest production of conidia at 25°C. A virulence test of the tested fungal isolates on overwintered adults of Sunn pest showed that the percentage mortality after 14 days was 86-100%, and the value of LT50 was 7.3-11.4 days.

BC 70

SCREENING *OF BACILLUS THURINGIENSIS* STRAIN COLLECTION IN ARGAN SOIL FROM MOROCCO AND EVALUATION OF THEIR INSECTICIDAL ACTIVITY AGAINST MEDFLY, *CERATITIS CAPITATA*. Houda Aboussaid[1,2], S. El-Messoussi[2] and K. Oufdou[1]. (1) Environnemental Microbiology and Toxicology unit, Laboratory of Biology and Biotechnology of Microorganisms; (2) Laboratory of Molecular Modeling and Ecophysiology, University Cadi Ayyad, Faculty of Sciences-Semlalia, Boulevard Prince My Abdellah, B.P. Box: 2390- 40000, Marrakech, Morocco, Email: saidsaid8@ucam.ac.ma; khoufdou@yahoo.fr

The Mediterranean fruit, *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is a devastating fruit pest worldwide due to its global distribution, wide host range , rapid dispersion, and adaptation to low temperatures. The demand for insecticide-free fresh fruit has encouraged the use of environmentally friendly methods, such as microbiological control by *Bacillus thuringiensis* (Bt) toxins for prevention, suppression, or eradication of Mediterranean fruit. Bt was considered a favorable alternative to the use of chemical insecticides. Bt formulations have also been used as an effective pest control measure adapted for integrated pest management in horticulture and forestry. This study was conducted to

extract Bt in Argan field from Morocco and evaluate their insecticidal activity on the adults of *C. capitata* in the search for an alternative control method with minimal undesirable side effect compared with synthetic chemical insecticides. From a total of 64 soils samples, 58 strains were selected, recording a total Bt index of 0.045. The Moroccan soils were characterised by the abundance of Bt strains producing spherical shapes rather than other forms of inclusions, similar to those typical of isolates active against Diptera. The selected strains showed different toxicity levels between 0 and 30% (by δ-endotoxins). The supernatant of most of the strains showed a low toxicity against medfly adult (never higher than 12%).

BC 71

SURVEY AND IDENTIFICATION OF A PARASITOID SPECIE: *PSYTTALIA CONCOLOR* ASSOCIATED WITH THE FRUIT FLY *CERATITIS CAPITATA* ON THE ARGAN TREE IN SOUTH OF MOROCCO. Houda Aboussaid[1,2], S. El-Messoussi[2] and K. Oufdou[1]. (1) Environnemental Microbiology and Toxicology unit, Laboratory of Biology and Biotechnology of des Microorganisms; (2) Laboratory of Molecular Modeling and Ecophysiology, University Cadi Ayyad, Faculty of Sciences-Semlalia, Boulevard Prince My Abdellah, B.P. 2390-40000, Marrakech, Maroc, Email: saidsaid8@ucam.ac.ma; khoufdou@yahoo.fr

The fruit fly *Ceratitis capitata* (Diptera, Tephritidae), is a polyphagous insect, and widely distributed in the world, especially on fruit plant species. Survey and identification of associated parasitoid species was carried out on one of the wild Argan plants, which grow at the Argan forest. The Argan plant belongs to the family Compositae and is considered as an alternative host for this pest. The study was carried out during the year 2009. Infested Argan fruits were collected weekly and kept in the laboratory to observe and count emerging parasitoid species. One parasitoid species associated with the pest belonging to *Psyttalia concolor* was recorded. Stability has been observed in the proportion of parasitism during the study period of around 11%, and a higher rate was recorded on these trees in the suburb of the Essaouira.

BC 72

EFFICACY ENTOMOPHAGOUS NEMATODES *STEINERNEMA CARPOCAPSA*. ON MORTALITY AND BEHAVIOR OF SUBTERRANEAN TERMITE *MICROCEROTERMES DIVERSUS* (SILV.) UNDER DIFFERENT TEMPERATURES. R.F. AL-Jassany[1] and M.A.A. Al-Salhi[2]. (1) Plant Protection Department Collage of Agriculture University of Baghdad, Iraq, Email: Radhi1957@yahoo.com; (2) Biology Department Collage of Science, Al-Mustanseria University, Baghdad, Iraq.

Laboratory studies were conducted to evaluate efficacy of entomophagous nematodes *Steinernema carpocapsa* on water infective/ml distilled concentrations 10^5, 10^6 and 10^7 infective larvae per ml of distilled water, Against workers and soldiers of subterranean termite *Microcerotermes diversus* at 20, 25, 30, 35 ±3 ºC. The results of this study showed that all nematode concentrations were efficient, producing high termite workers and soldiers mortality. However, their efficacy was significantly influenced by nematodes concentration, exposure, time and temperature. The maximum activity was demonstrated at 25±3º where 100% mortality rate was reached during 7-14 days after treatment.The termite individuals died gradually when they were artificially exposed to the pathogenic nematodes, while quick mortality rate (100%) was produced when the termicide Dursban 48% TC was applied as control. However, a 100% mortality rate was also realized during 21, 21, 14 days after treatment with 10^5, 10^6 and 10^7 infective juvenile (ij)/ ml, respectively. Under laboratory conditions, survival time of termites reached 90, 120, 150 days after treatment with 10^5, 10^6 and 10^7 infective juvenile (ij)/ml, respectively, and termite individuals death continued for 240 days, and no dead ones were observed following 360 days after treatment. The termite individuals were repelled during 7-10 days after treatment with nematode concentrations, and a long time was required (70-80 days after treatment at 30±3ºC) to reach a 100% mortality. The best concentration of nematodes to reach high mortality was a 10^7 ij/ ml water and the workers and soldiers had the same sensitivity to ij of nematodes.

BC 73

CONTROL OF SESAME WILT USING MEDICINAL AND AROMATIC PLANT EXTRACTS. Amal Sidawi[1], Ghada Abou Ammar[1], Abdalhakim Yousef[1], Zainab Alkhider[2], Taha Arifi[2], Ebtisam Alsaleh[2], Safaa Alalees[3] and Salim Kharoob[4]. (1) General Commission for Scientific Agricultural Research, P.O. Box 113, Damascus, Duma, Syria, Email: ramakot94@maktoob.com; (2) Research Center, Dair Alzor, Salo, Syria; (3) Research Center, Arraqua, Syria; (4) Research Center, Edleb-kafar sandal, Syria.

The objective of this research was to evaluate extracts which reduce infection rate *Macrophomina phaseolina* (Tassi) Goid and *Fusarium oxysporum* Schlecht causing sesame charcoal root rot and wilt diseases. Sesame seeds treated with 6% methanol extract of azedrach seeds (*Melia azedarach*), leaves of peppermint (*Mentha piperita*), thyme (*Thymus serpyllum*), eucalyptus (*Eucalyptus rostratua*), and *Allium sativum* (cloves) were planted in Dair Alzor-Salo, Råqqa, and Idleb-kafar- Sandal research centers with three replicates for each treatment and control during the 2008 season. All extracts significantly reduced infection rate charcoal root rot and wilt diseases. Moreover, the *Mentha piperita* (peppermint) extract significantly increased the yield as compared with the control. The laboratory, tests showed that *Macrophomina phaseolina* (Tassi) Goid was more frequently isolated than *Fusarium oxysporum* Schlecht. All above extracts inhibited *Macrophomina phaseolina* growth on PDA media compared with the control. The eucalyptus, mint and thyme extracts in PDA media and sands inoculated with *Macrophomina phaseolina* increased sesame seed germination, and the garlic extract activated the seedlings stem growth compared with the control.

BC 74

IMPACT OF NUTRITION ON THREE APHID SPECIES ON SOME BIOLOGICAL ATTRIBUTES OF *COCCINELLA ALGERICA* KOVAR. Abdelmadjid Benzara, Lounes Sahraoui and Nassima Mahiaoui, Institut National Agronomique. Avenue Pasteur, Hacen. El Harrach, Alger, Algeria, Email: benzaraabdelmadjid@yahoo.fr

A study aimed to identify some biological attributes of the predator, *Coccinella algerica* Kovar after being fed on three aphid species: *Toxoptera aurantii*, *Aphis nerii* and *Aphis citricola* was conducted. Results showed that the aphid species did not have the same nutritional values and directly affected its life cycle. The life cycle was prolonged when the predator fed on *A. citricola* and shortened when fed on *T. aurantii*. Egg incubation period was 4-7 days when the predator fed on *T. aurantii* with high fertility (66.6%). In addition, the study pointed out the importance of the predator 4th instar larvae, which fed on their eggs (more than 70%) after 3 hours of fasting. In addition, *C. algerica* consumed an average of 0.081 mg of aphids in the pre-ovipositional period, while the daily consumption rate was 0.0122 mg per individual.

BC 75

INFLUENCE OF HOST PLANT AND TEMPERATURE ON IMMATURE STAGES DEVELOPMENT OF THE PREDATOR *STETHORUS GILVIFRONS* MULSANT IN THE LABORATORY. M. Ahmad[1], M. Mofleh[2] and M. Halloum[1]. (1) Faculty of Agriculture, Tischreen University, Lattakia, Syria; (2) Agricultural Research Center in Lattakia, Lattakia, Syria, Email: magda_mofleh@yahoo.com

Temperature plays a key role in the time needed for immature stages development of the predator *Stethorus gilvifrons* Mulsant (Coleoptera: Coccinellidae). Total time of development varied significantly (egg, larva, pupa) according to temperature. Total immature development period on eggplant leaf disk was longest (28.9±0.38 days) at 20±2°C, and shortest (11.84 ±0.19 days) at 30±2°C, and 18.96±0.26 days at 25±2 °C. The development and survival of the predator was affected by host plant of prey. All predator larvae died in the first or second instar when reared on *Phaseolus vulgaris* leaf disk, while eggplant and cucumber were suitable host plants for the development and survival of immature stages of the predator. The longest development total time (egg, larva, pupa) was on cucumber 31±0.35 days at 20±2°C, and 28.9±0.38 days on eggplant at the same temperature with significant difference at P=0.0 5.

BC 76

EFFECT OF THE ESSENTIAL OILS OF *FERULA GUMMOSA* BOISS, *ROSMARINUS OFFICINALIS* L. AND *EUCULYPTUS CAMOLDULENSIS* DEH. ON THIRD INSTAR LARVAE OF *EPHESTIA KUEHNIELLA* (ZELLER). Habib Abbasipour, Alireza Seyedi, Mohammad Mahmoudvand and Ali Deylami, Department of Plant Protection, College of Agricultural Sciences, Shahed University, Tehran, Iran, Email: Habbasipour@yahoo.com

Protection of stored agricultural products against insects is carried out mostly with chemical insecticides. These insecticides cause harmful effects on the environment. Recently, there have been several studies on alternative substances with insecticidal activity, such as essential oils of plants, on stored insect pests. Essential oils are volatile and can act like fumigants offering prospect for use in stored product protection. The objective of the current study was to determine the fumigant toxicity of two essential oils that were isolated via hydrodistillation from resins of *Ferula gummosa* and dry leaves of *Rosmarinus officinalis* and *Euculyptus camoldulensis*. The fumigant toxicity of these essential oils was tested against third instar larvae of *Ephestia kuehniella* at 27±1°C and 60±5% r.h. in dark conditions. The mortality of larvae was tested at different concentrations and different exposure times. The results indicated that the mortality rate increased with increase in concentration and exposure time. Data probit analysis showed that lethal concentration to kill 50% of the population (LC_{50}) for *F. gummosa* and *R. officinalis* and *Euculyptus camoldulensis* were estimated as 17.97, 100.52 and 53.88 µL/L air, respectively. The findings indicated that *F. gummosa* had stronger insecticidal activity than *R. officinalis* and *Euculyptus camoldulensis*. These studies suggested that the essential oils from these three medicinal plants can be used as botanical alternative fumigants to protect stored grains and could be used in the management of stored product pests.

BC 77

EFFECT OF *BEAUVERIA BASSIANA* ON HOST SELECTION OF *APHIDIUS MATRICARIAE*. Maryam Rashki[1], A. Kharazi- Pakdel[1] and A. Shirvani[2]. (1) Department of Plant Protection, Campus of Agriculture & Natural Resources, University of Tehran, Karaj, Iran; (2) Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, 76169-133 Kerman, Iran, Email: ma_rashkigh@yahoo.com

The response of *Aphidius matricariae* (Hymenoptera: Aphidiidae), a parasitoid of green peach aphid towards *Beauveria bassiana* (Ascomycota: Hypocreales) was assessed using Y-tube olfactometer and *Myzus persicae* sporulating cadavers on eggplant ander laboratory conditions. The olfactometer test showed that *A. matricariae* did not enter aphid colonies containing *B. bassiana*- sporulating cadavers and that there was no significant difference in the attraction of *A. matricariae* to undamaged eggplants and clean air. Observational behavioral experiments indicated that the presence of *B. bassiana* affected the search time of *A. matricariae* on eggplants infested with either healthy *M. persicae* or *B. bassiana* sporulating cadavers. In petri dish bioassays using aphids infected with *B. bassiana* over a period of 120 h, *A. matricariae* showed difference in attack rate against uninfected aphids or living aphids infected with the fungus for 48 and 96 h. However, sporulating cadavers (96 and 120 h infections) were not attacked.

BC 78

EFFECT OF PLANTS ON THE BIOLOGY OF *MYZUS PERSICAE* (SULZER) Asghar Shirvani Saadatabadi, Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, 76169-133 Kerman, Iran, Email: shirvani@mail.uk.ac.ir

Under laboratory conditions, biology of the green peach aphid *Myzus persicae* (Sulzer) on three plants rape, eggplant and sweet pepper were investigated. For the purpose of calculating the standard errors, jackknife method was used. Net reproductive rates (R0) on rape, eggplant and sweet pepper were 9.40±4.51, 27.73±4.53 and 3.05±1.67%, respectively. Based on Birch method the values of intrinsic rate of increase on rape were 0.196±0.0367, on eggplant 0.335±0.0132, and on sweet pepper 0.131±0.0571 were calculated. The maximum value of generation time (T) was estimated 11.86±0.49 days on rape and the minimum on sweet pepper was of 9.521±0.56 days. There was no significant difference of doubling time (DT) values between the three plants.

BC 79

MORTALITY RATES OF *HELICOVERPA ARMIGERA* HB. LARVAE BY DIFFERENT DOSAGES OF *BACILLUS THURINGIENSIS* UNDER LABORATORY CONDITIONS. Jalal Kolahdooz, Mohammadebrahim Mohajeri, Moslem Basij and Mohammadhosin Hosinpour, Faculty of Agricultural Science, Shahed University, Tehran, Iran, Email: moslembasij@yahoo.com

Effectiveness of bio-insecticides formulated on the basis of *Bacillus thuringiensis (BT)* named; Katlas, Condor, Delphin and B.T.H. to control 2nd instar larvae of *Helicoverpa armigera* Hb. was compared in 3 replications under laboratory conditions. *Bt* was mixed with 1.5 and 2 kg/ha of artificial medium for larvae feeding. Larval mortality was determined 3, 5, 8 and 12 days after treatment. The mortality rates were determined by using the Henderson & Tilton formula. Results showed significant differences among treatments and sampling times. According to means comparison by Duncan's test, Katlas was the most effective (80.45%) followed by Delphin (77.76%). Highest mortality (94.2%) was observed 12 days after treatment. Mortality rate of 2nd instar larvae by these insecticides at 2 kg/ha application rate was higher than a 1.5 kg/ha.

BC 80

STUDY OF PARASITOIDS ASSOCIATED WITH CHAFF SCALE *PARLATORIA PERGANDII* COMSTOCK AND EVALUATION OF THEIR EFFECTIVNESS IN SOME CITRUS ORCHARDS IN LATTAKIA GOVERNORATE, SYRIA. Abd Alnabi Basher[1], Eiad Mahamad[2] and Nabil Abokaf[3]. (1) Department of Plant Protection, Faculty of Agriculture, Tishreen University, P.O. Box 1446, Lattakia, Syria; (2) Centre of Biological Enemies Rearing, Al Hanadi, Syria, (3) Department of Plant Protection, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: n.abokaf@scs-net.org

A study was conducted during 2006-2007 to determine the parasitoids associated with chaff scale *Parlatoria pergandii* Comstock and environmental correlation between parasitoids and their preferable host stages. Samples were collected from citrus orchards at Lattakia governorate (Albassa, Stamo, Tergano, Hmemim), Syria. During this study, six parasitoid species were found associated with chaff scale; these parasitoids belonged to order Hymenoptera: super family Calcidoidea; family Aphelinidae. Four ectoparasitoids species: *Aphytis hispanicus, A. chrysomphali, A. melinus, A. maculicornis* and two endoparasitoid species: *Encarsia citrina, E. enquirenda* were identified. The correlation values showed the fact of intensive positive environmental correlation between parasitoids and their preferable host stages.

BC 81

FUMIGANT TOXICITY OF ESSENTIAL OIL FROM *ZHUMERIA MAJDAE* AGAINST *CALLOSOBRUCHUS MACULATUS*. Mehrnoosh Nikooei, Saeid Moharramipour and Ali Asghar Talebi, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P.O. Box 14115-336, Tehran, Iran, Email: Mehr.nikooei@gmail.com

Protection of stored agricultural products against harmful insects is carried out mostly with chemical insecticides. Due to the health hazards of these insecticides and their toxic residues in the environment, there is an urgent need to introduce some botanical insecticides. Recently, there have been researches on alternative substances with insecticidal activity on stored insect pests. *Zhumeria majdae* is one of these plants that has medicinal effects on human. Therefore, the essential oil was obtained from aerial parts of *Z. majdae* and subjected to hydrodistillation using a modified Clevenger- type apparatus. Thereafter, fumigation toxicity of the essential oil was tested against 1-3 days old adults of *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae). The experiments were conducted with five replications at 27±1 °C and 65± 5 % R.H in dark conditions. Mortality of adults was tested at different concentrations ranged from 0.36 to 2.14 µL/L air after 24 h. LC_{50} value was 1.39 µL/L air. Results showed strong insecticidal activity of *Z. majdae* oil and its potential role as a fumigant of stored-product insects.

BC 82

INSECTICIDAL ACTIVITY OF ESSENTIAL OIL FROM *MENTHA MOZAFFARIANI* AGAINST *CALLOSOBRUCHUS MACULATUS*. Mehrnoosh Nikooei, Saeid Moharramipour and Ali Asghar Talebi, Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P.O. Box 14115-336, Tehran, Iran, Email: Mehr.nikooei@gmail.com

The genus *Mentha* is widely distributed in Iranian territory and comprises several species reported in folk medicine as having biological activity. *Mentha mozaffariani* Jamzad (Lamiaceae) grows in the wild of southern Iran, near Bandar-Abass (40 km. north of the Persian Gulf). In this study, the essential oil was obtained from dry leaves of *M. mozaffariani* and subjected to hydrodistillation using Clevenger-type apparatus. The

fumigant toxicity was tested against 1-3 days old adults of *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae) at 27±1°C and 65±5% R.H in dark condition. The experiment was conducted with five replications and mortality of adults was assessed at different concentrations from 37.03 to 259.25 µL/L air after 3 to 24 h exposure time. Mortality increased with the concentration from 37.03 to 259.25 µL/L air and with exposure time from 3 to 24 h. The lowest concentration (37.03 µL/L air), achieved 31.66% mortality with a 3 h exposure. Concentrations from 185.18 to 259.25 µL/L air and exposure time of 3 h was enough to obtain more than 50% mortality of the insects. The mortalities of the insects reached 100% at all of the concentrations after 12 h exposure time. The findings indicated the strong insecticidal activity of *M. mozaffariani* oil and it could be used as an alternative in the control programs against this pest.

BC 83

EFFECT OF *TRICHODERMA HARZIANUM*, FUNGICIDES AND PLANT EXTRACTS ON LEAF SPOT DISEASE OF BROAD BEAN CAUSED BY *ALTERNARIA ALTERNATE* IN GREENHOUSE. Anfal M. Al-Jalili, Department of Biology College of Science University of Mosul, Iraq, Email: demadreem@yahoo.com

Several components to control leaf spot disease of *Vicia faba* caused by *Alternaria alternate* were evaluated. The bio control agent *Trichoderma harzianum* proved to have a high invitro antagonistic effort against the pathogen. All three fungicides, benomyl, captan and metalaxyl gave significant inhibition to the growth of *A. alternate*. Benomyl was the best caused 100% inhibition at the concentration of 200 mg a.i / Liter. Plant extracts of *Datura innoxia*, *Olea europaea* and *Ocimum basilicum* Inhibited the growth of the fungus, with maximum inhibition of 85.55% caused by *Datura* extract at 25mg/ml followed by Olive and Ocimum extracts. In greenhouse experiments, all individual treatments caused significant reduction of infection and severity of the disease as compared to control. Seed treatment with benomyl was the best treatment and gave 20.4% infection and 0.15 severity. The incorporation of different control measures together using plant extract of *Datura*, benomyl and *T.harzianum* gave a high synergistic effect in decreasing disease incidence and severity to 10.5% and 0.06, respectively. Moreover, it gave a significant increase in plant length and fresh weight.

BC 84

BIOCONTROL OF TAKE-ALL DISEASE IN WHEAT BY MYCORRHIZA-LIKE FUNGI AND *TRICHODERMA* SPECIES IN GREENHOUSE. Mojgan Rabiey Ghahfarokhy[1], E. Mohammadi Goltapeh[1], E. Purjam[1], A. Varma[2] and S.A.M. Modarres Sanavy[3]. (1) Department of Plant Pathology, Faculty of Agriculture, Tarbiat Modarres University, P.O. Box: 14115-111, Tehran, Iran; (2) Amity Institute of Herbal and Microbial Studies Sector 125, New Super Express Highway, NOIDA, India; (3) Department of Agronomy, Faculty of Agriculture, Tarbiat Modarres University, P.O. Box: 14115-111, Tehran, Iran, Email: Rabieym@yahoo.com

Gaeumannomyces graminis var. *tritici* (Ggt) an important damaging root disease worldwide, is very important in north, central and southwest provinces of Iran, is the causal agent of take-all disease of wheat (*Triticum aestivum* L.). *Piriformospora indica* and *Sebacina vermifera*, are newly discovered endophitic arbuscular mycorrhiza-like fungi, could be observed in various plant species. But compared to mycorrhizal fungi, this is possiblity to cultivate this fungus axenically. These fungi improve the growth and overall biomass production of different plants, like herbaceous mono- and dicots, trees, including medicinal plants and several economically important crops. *Trichoderma harzianum* and *T. viride* are an efficient biocontrol agents that are commercially produced to prevent development of several soilborne pathogenic fungi. Interaction among mycorrhiza-like fungi, *Trichoderma* species and Ggt on wheat roots in greenhouse were investigated and results indicated that these fungi could inhibit the progress of take-all disease in wheat roots.

BC 85

EFFECT OF *TRICHODERMA SPP.* ISOLATES ON SOUR ORANGE SEEDLINGS ESTABLISHMENT AND AVAILABILITY OF NUTRIENTS. Falih H. Said[1], Hadi M. Aboud[1], M.R. Abood[2], Hamdia Z. Hafud[1], Usama A.Alwan[1] and Ali.J.Abd alsada[1]. (1) Ministry of Science and Technology, Agriculture Research Center; (2) College of Agriculture, Baghdad University, Baghdad, Iraq, Email: falihss@yahoo.com

This study was conducted to evaluate the effect of three isolates of *Trichoderma* spp. (T9, T26, T28) on establishment of sour orange seedlings (60 days) and their effect on N, P, K, Fe, Mn, Zn and Cu availability. Results revealed that isolates T9, T26 and T28 induced significant increase in plants survival (9.3, 9.6 and 9.3 respectively, as compared to control treatment of 7.6 plants). Soil analysis also showed significant increase in N, P, K, Fe, Mn, Zn and Cu availability (33.6, 36.6, 33.6), (45.2, 34.3, 38.2) (106.1, 45.1, 42.9), (6.6, 7.8, 6.7), (5.0, 6.7, 5.7), (4.5, 4.2, 2.7) and (1.6, 2.2, 1.3) mg/kg, respectively, as compared to control treatment (5.6, 4.4, 1.8, 1.28, 36.8, 15.8 and 27.4) mg/kg respectively. The results of seedling shoot analysis revealed that the total content of tested elements increased significantly compared to that in control treatment which recorded (74.4, 78.3, 76.5), (4.5, 30.0, 3.4) and (26.1, 24.2, 24.2) mg/plant and (6.4, 8.9, 10.6) mg/plant in treated plant with the three isolates (T9, T26, T28), respectively, as compared to (19.6, 1.4, 44.3) mg/plant in control untreated treatments.

BC 86

ASSESSMENT OF TEMPERATURE AND DIET QUALITY ON DEVELOPMENT OF *ANTHOCORIS NEMORALIS*: AN IMPORTANT PREDATOR ON OLIVE TREES. Touria Ba M'hamed[1] and Chemseddine Mohamed[2]. (1) Faculté des Sciences et Techniques Guéliz, Département de Biologie, B.P 549, Av.Abdelkarim elkhattabi, Guéliz, Marrakech, Université CADI AYYAD, Marrakech, Maroc; (2) Faculté des Sciences Semlalia, Département de Biologie, Université CADI AYYAD, Marrakech, Maroc, Email: bamhamed.t@gmail.com

Anthocoris nemoralis (Heteroptera, Anthocoridae) is a very common bug in south Moroccan olive groves. In

the present study, the larval stage development duration of *A.nemoralis* was evaluated based on to three diets and a range of temperatures which mimic natural orchads (7, 15, 20, 25, 30, 35 and 40°C). The selection of preys that served as food was done according to their economic interest (Psylla of the olive-tree), their aptitude to be multiplied in the herbaceous cover associated with the olive-tree (aphids) and their rearing facility in laboratory (*Ephestia kuhniella* eggs). The study of temperature effect on the larval development showed that the development speed of each stage increased significantly with increase of the temperature. An optimum was recorded at 25°C. At 7°C, the development was drastically slowed down. The test was carried out at 40°C, showed that no larva was able to develop and few hours only after the exposure to this temperature the death rate was 100% for all the stages. The nature and the stage of the prey had an important effect on various developmental stages of *A. nemoralis*. The results indicated that the psylla adults of the olive-tree were not favorable for a fast development. The psylla eggs offered an easy and accessible preys for the first larval instars L1 and L2 of *A. nemoralis*, while *A. nemoralis* larvae L3, L4 and L5 developed faster on psylla larvae than on psylla eggs.

BC 87

BIOLOGICAL CONTROL OF SOILBORNE PATHOGENS ON CUCURBITS UNDER ORGANIC AGRICULTURAL SYSTEMS. Charbel Abou Haidar[1], Adib Saad[1], Yusuf Abou-Jawdah[1], Issam Bashour[1]. (1) Department of Agricultural Sciences, Faculty of Agricultural and Food Sciences, American University of Beirut, Beirut, Lebanon, Email: asaad@aub.edu.lb; charbel_leb@hotmail.com

Cucurbits represent important vegetable crops in Lebanon. Soilborne pathogens constitute a major threat to cucurbit cultivation causing severe losses. The present study explored the comparative efficacy of different biological control agents against soilborne pathogens on cucumber under organic production systems. The efficacy of the following biological control agents, Promot® (*Trichoderma harzianum + Trichoderma koningii*), Fulzime® (*Bacillus subtilis + Pseudomonas putida*), *Trichoderma harzianum*, *Trichoderma viride* and the mixture of *Trichoderma harzianum* and *Trichoderma viride* were evaluated in two trials. In the first trial cucumber was planted in a plastic tunnel in Lebaa Experimental Agriculture Station (LEAS), south Lebanon. The growth and yield of plants treated with the mixture of *Trichoderma harzianum + Trichoderma viride* was significantly higher than all the other treatments; whereas *Trichoderma harzianum*, *Trichoderma viride*, Promot® and Fulzime® gave higher yields than the control, although the differences were not statistically significant. The second trial consisted of a pot experiment in the AUB greenhouse in Beirut; the mixture of *Trichoderma harzianum + Trichoderma viride*, *Trichoderma harzianum* or Fulzime® gave significantly higher yields in comparison to all other treatments including the untreated control. Four soilborne pathogens namely *Fusarium oxysporum*, *Fusarium nivale*, *Pyhtium ultimum* and *Rhizoctonia solani* were isolated from plants showing damping off or wilting symptoms, and their pathogenicity was confirmed in a pot experiment. The *in-vitro* experiments conducted to observe the mode of action of the biocontrol agents on the soilborne pathogens isolated from LEAS showed that Fulzime®, *Trichoderma viride* and *Trichoderma harzianum* suppressed the growth of the two *Fusarium spp.* isolated in this study; whereas they showed a lower suppressive activity against *Pythium ultimum* and *Rhizoctonia solani*. Promot® suppressed the growth of the four isolated soilborne pathogens. The mixture of *Trichoderma harzianum + Trichoderma viride* suppressed the growth of the two *Fusarium* spp., and grew over the mycelia of *Pythium ultimum* and *Rhizoctonia solani* and suppressed their further growth and development.

CONTROL OF INSECT PESTS

C 1

EFFECTS OF SOME NATURAL DUSTS FOR THE PROTECTION OF SORGHUM SEEDS FROM KHABRA BEETLE (*TROGODERMA GRANARIUM*). Ali Abdulla Baoum and Abdulla Omer Bakhwar, Food Research and Post-harvest Technology Centre, Agricultural Research and Extension Authority (AREA), Khormaksar, Aden, Republic of Yemen, Email: baoumali@hotmail.com; baoumali_a@yahoo.com

This experiment was conducted during 2005 and 2006 growing seasons at laboratories of Food Research and Post-harvest Technology Centre on sorghum seeds (cv. Graua). Sorghum seeds were mixed with natural dusts as a method of protection from the khabra beetle (*Trogoderma granarium*) through out the storage period for 12 months. Results showed varying impact of natural dusts, where neem powder at dosage 25 g/kg of seeds was the best, in comparison with control. Seed germination increased by using neem dust. Other natural dusts were also successful in comparison with control, and sand powder was the least effective. In conclusion, natural dusts could be used for protecting sorghum seeds from the khabra beetle as a natural pesticide during storage.

C 2

EVALUATION OF THE EFFECT OF THE PESTICIDE SPIROTETRAMAT ON SCALE INSECTS POPULATION IN A CITRUS ORCHARD IN ALGERIA. Mohamed Rabih Biche, A. Siafa, R. Waada and Y. Ghakakna, National Institute for Agricultural Sciences, 16200 El-Harrash, Algeria, Email: m.biche@ina.dz

Experiments were conducted to evaluate the effectiveness of the pesticide spirotetramat (Movento) in comparison with the pesticides ultracide 40 and dursban 4 to control scale insects in a citrus orchard where the variety Washington Navel is grown. The pesticide was used to control *Lepidosaphes beckii* population as the dominant pest during the growing season until harvest. Spirotetramat was sprayed during June 2008 at the rate of 1.2 L/ha and using a total volume of 3000L and 4000 L per ha. A significant reduction in pest population was observed.

Larvae killing rate exceeded 50% as compared to 36% for adults coupled with 100% reduction in fertility. The pesticide spirotetramat had also a negative effect on eggs development. These effects led to a 90% reduction in the pest population (compared with the pesticide dursban and the control) and the production of healthy looking fruits. Reduction in pest population when using spirotetramat reached 99.42 % when compared with that of ultracide 40. In addition, the use of spirotetramat had a limited effect on natural enemies, with no effect on parasitoids such as *Aphytis lepidosaphes* when the recommended dose was applied.

C 3

EFFECTS OF SUB-LETHAL TREATMENT OF SOME CHEMICAL AND MICROBIAL INSECTICIDES ON THE BIOLOGY OF POTATO TUBER MOTH (*PHTHORIMAEA OPERCULELLA* ZELL). Nezar M. Al-Mallah[1] and Faiz A. Al-Taie[2]. (1) Plant Protection Department, College of Agriculture & Forestry, Mosul University, Mosul, Iraq; (2) Technical Institute, Mosul, Iraq, Email: naz53ar_almlaah@yahoo.com

Results of a recent study showed that the treatment of the adult potato tuber moth (*Phthorimaea operculella* Zell) by sub-lethal concentration of bacterial strains, insecticides and their combination led to a decrease of the average life span of the adults which reached 2.7 days in the treatment of Fastac mixed with *B.t. alesti* strain alone or in combination with *B.t. kurstaki* strain. Females didn't lay eggs in the treatment of adult insects with Fastac alone and when it was mixed with the *B.t. alesti* strain in addition to the mixtures of both Medamec and Runner with the *B.t. alesti* + *B.t. aegypti* strains and with the three strains together, whereas highest average incubation period of eggs reached 5.7 days in the treatment of mixed strains *B.t. aegypti* + *B.t. kurstaki* and a mixture of Fastac with the three strains together. The eggs produced by adults treated by a mixture of Fastac with *B.t. alesti* + *B.t. kurstaki*, a mixture of Medamec with *B.t. kurstaki* and mixture of Runner with *B.t. alesti* did not hatch.

C 4

EFFECT OF FOUR VEGETABLE OILS ON THE EFFICIENCY OF POLO INSECTICIDE AGAINST COWPEA WEEVIL *CLLOSOBRUCHUS MACULATUS* (FAB.). H.M. Abdulkarim, Department of Plant Protection, College of Agriculture and Forestry, University of Mosul, Iraq, Email: ab_hsh@yahoo.com

The results of synergistic effect of four vegetable oils (sesam oil, caster oil, black cumin seed oil and myrtle oil) on polo insecticide against cowpea weevil *Callosobrcus maculates* (Fab) (Coleoptera: Bruchidae) revealed that the synergistic ratio varied according to the kind of oil, and black cumin seed oil was the most effective with a synergistyic effect of 1.66. The use of 0.25 concentration produced a killing rate of 75%, whereas a 0.5 concentration led to a 100% killing rate. Myrtle oil had a synergistyic effect of 1.285 followed by sesame oil (1.25), and the least effective was caster oil with a synergistyic effect of 1.18.

C 5

THE INTEGRATION OF *BACILLUS THURINGIENSIS* AND CHEMICAL INSECTICIDE ON *BACTRACHEDRA AMYDRAULA*. Emad M. T. Al-Hafidh, Private Trading Company, P.O. Box 27492, Abu Dhabi, United Arab Emirates, Email: emmothi@yahoo.com

B. amydraula is the most important pest on date palms in Gulf States. All evaluated treatments were effective in controlling this insect but the use of the mixture Tharicide ® + Folithion was better than all other treatments. The application of dust formulations of chemical and biological insecticide treatments on date palm's flowers were used during the pollination operation period. These treatments lowered the infestation by *B. amydraula* on immature dates.The effect of temprature on the the treatments of mixing each insecticide with the pollen for different durationswere evaluated. There were significant differences for some treatments when compared with the control.

C 6

RELATIVE VIRULENCE OF TWO ISOLATES OF *BEAUVERIA BASSIANA* (BALSAMO) VUILLEMIN AND ONE ISOLATE OF *METARHIZIUM ANISOPLIAE* (METSCH.) ON THE COTTON LEAFWORM, *SPODOPTERA LITTORALIS* (BOIDS.). Mohamed A. A. Abdel-Rahman[1], Ahmed Y. Abdel-Mallek[2], Saad S. El-Maraghy[2] and Khalid A. Hussein[2]. (1) Plant Protection Research Institute, Agriculture Research Center, Egypt, Email: alaaa4@hotmail.com; (2) Botany Department, Faculty of Science, Assiut University, Egypt.

Two isolates of *B. bassiana* (AUMC No. 3263 and 3076) and one isolate of *M. anisopliae* (AUMC No. 3085) were tested against the egg, 3rd instar larvae and pre-pupal stages of the cotton leafworm. In general, mortality increased as the conidial concentration increased. It seems that the *B. bassiana* isolate AUMC No. 3076 at $1.1x10^9$ conidia/ml concentration was effective in achieving 92.86% egg mortality. In addition, virulence of *B. bassiana* (2 isolates) and *M. ansopliae* (one isolate) against the egg stage of cotton leafworm indicated that *M. anisopliae* was more effective than *B. bassiana* due to low LC_{50} value compared with other *B. bassiana* isolates. As for the larval stage, data indicated that isolate No. 3076 for *B. bassiana* was the most pathogenic (LC_{50} = $2.68x10^8$ spores/ml) followed by *M. anisopliae* AUMC No. 3085 (LC_{50} = $5.68x10^8$ spores/ml), while the least pathogenic isolate was *B. bassiana* isolate No. 3263 (LC_{50} was $3.94x10^9$ spores/ml). Results also showed that *B. bassiana* isolate AUMC No. 3076 at the concentration of $1.1x10^9$ spores/ml was effective to reach 100% mortality for the pest pupal stage.

C 7

INSECTICIDAL ACTIVITY AND CHEMICAL COMPOSITION OF EXTRACTS DERVIED FROM *ANNONA SQUAMOSA* LINN. (ANNONACEAE) AGAINST THREE INSECT SPECIES. Gamal Elsayed Abo-Elghar, Hany Kamal Abd-Elhady, Zeinab A. Elbermawy and Adel G. Yousef, Department of Pesticides, Faculty of Agriculture, Menoufiya University, Shebin El-

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The insecticidal properties of methanol extracts derived from leaves and seeds of the Custard Apple, *Annona squamosa* (Annonaceae), were tested on three insect species, i.e. cotton leafworm, *Spodoptera littoralis*; cowpea weevil, *Callosobruchus maculates*; and house fly, *Musca domestica.* The bioassay tests for both crude extracts and purified fractions were examined for their toxicity and inhibitory growth effects, whereas phytochemical analysis was done by GC/MS analysis. Crude seed extracts showed high toxicity against *C. maculatus* adults, *M. domestica* larvae and *S. littoralis* larvae with 48 hour LC_{50}'s of 0.67, 1.29, and 1.67 %, respectively. Feeding assay showed that sublethal concentrations (LC_{25} and LC_{50}) of both seed and leaf extracts showed deterrent effects, in a concentration-dependent manner, on larvae of *S. littoralis* and *M. domestica*. Pupation rate and fecundity of the adult females were significantly decreased, at LC_{50}, compared to the control treatment. The insecticidal properties of the fractions eluted from methanol extracts of *A. squamosa* seeds and leaves were also evaluated against three insect species. The LC_{50} data of eluted fractions from *A. squamosa* extracts showed high toxicity against 4th *S. littoralis* instar, 2nd *M. domestica* instar, and *C. maculatus* adults. The biological activity of the most effective fractions was evaluated against the insect species tested. Pupation, adult emergence and fecundity were remarkably inhibited at LC_{50}s of *A. squamosa* extracts in both *S. littoralis* and *M. domestica*. GC/MS analysis of *A. squamosa* extracts demonstrated the presence of some phytochemicals (phthalic acid esters, alkaloids, terpenes, and fatty acids) which may provide the insecticidal properties of these extracts against tested organisms. Phthalic acid esters were found to be the most bioactive components in the eluted fraction of methanolic extract from *A. squamosa* seeds and leaves.

C 8

EFFICIENCY OF INSECTICIDES AND OIL COMBINATION AGAINST *AONIDIELLA ORIENTALIS* (NEWST.) AND *PHYLLOCNISTIS CITRELLA* (STAINTON). Sahil K. Al–Jameel and Salim J. Jarjees, Plant Protection Department, College of Agriculture and Forestry, Mosul University, Mosul, Iraq, Email: sahilaljameel@yahoo.com

Field experiments were conducted on citrus trees infested with *Aonidiella orientalis* and *Phyllocnistis citrella* in Mosul during 2007. Results indicated reduction in the rate of *A. orientalis* infestation. Treatments were in the following order: Serin (Cypermethrin) + oil, Nomolt + oil, Serin and oil. These treatments significantly reduced number of nymph/leaflets to 0.9, 1.1 and 1.45 and 2.5 nymphs, respectively after 14 days. The results indicated that treatments which combine Serin + oil show high efficacy against citrus leafminer by reducing degree of infestation. The treatments were as follows: Serin + oil, Nomolt + oil, Serin and oil. Results obtained were encouraging to introduce oils into *A. orientalis* and citrus leafminor control program either alone or in combination with insecticides.

C 9

DESERT LOCUST CONTROL IN LIBYA: PROBLEMS AND SOLUTIONS. Farg Jbail[1] and Sherif Abouelkassem[2]. (1) Faculty of Agriculture, Algabl Algharbi University, Elraiaina, Libya, Email: r-bahloul@yahoo.com; (2) Faculty of Agriculture, Al-Azhar University, Asiut, Egypt, Email: abouelkassem_eg@yahoo.com

The Arabs called it Jarada as depriving the ground from its plant or transplant, leaving it barren, threatens economy and spreads famine all over the world from China to Africa. It is the desert locust which is known scientifically as *Schistocerca gregaria* (Peraknl). Libya is one of the countries affected by this pest. The swarms of locusts invaded the country in April 2004, attacking about one million hectares of farmland and vegetation. In addition to spending more than forty million dollars to control it over a period of five months, in collaboration with Algeria and Tunisia. This is the seventh invasion of locusts on the territory of Libya over 70 years. The aim of the working paper is to shed light on the risks of locust attack and summarize the locust situation in Libya from 2003 until 2009, to identify problems that resulted from the 2004 attack to provide solutions to these problems with emphasis on recent trends to reduce pollution of the environment.

C 10

IMPACT OF TRAP CROPS ON THE POPULATION OF THE JASSID *AMRASCA DEVASTANS* (DIST.) IN OKRA. J.M. Mari, M.K. Lohar and S.M. Nizamani, Department of Entomology, Sindh Agriculture University, Tandojam, Sindh, Pakistan, Email: janmarree@yahoo.com

A study on impact of trap crops on jassid (*Amrasca devastans* (Dist.) population in okra (*Hibiscus exculentus* L.) was carried out at Latif experimental farm, Sindh Agriculture University, Tandojam during summer of 2008. Monitoring jassid population indicated that it reached its highest value of 11.35/leaf on October 29 when vegetative growth and succulence of leaves was at its peak, and then decreased to reach its lowest value of 1. 46/leaf on December 13. When evaluating the effect of mixed cropping on the pest population dynamics, jassid population was highest (7.87 insects/leaf) on okra (mono crop), followed by okra with sunflower (5.50 insects/leaf), okra with maize (4.89 insects/leaf) and okra with garden pea (4.00 insects/leaf). It was concluded that okra is the major host plant for the *A. devastans* jassid. The infestation of jassid started one month after germination and continued untill harvesting of the okra crops. The trap crops i.e sunflower, maize, and garden pea can also attract jassid population in presence of okra. However, jassid had preference for okra in the presence of other trap crops. Thus, jassid resistant varieties could be the best approach for jassid management.

C 11

BIOASSAY OF SOME VEGETABLE OILS ON SAW-TOOTHED GRAIN BEETEL *ORYZAEPHILUS SURINAMENSIS* L. Emad Q.M. Al-Ebadi, Department of Plant Protection, College of Agriculture and Forestry, University of Mosul, Iraq, Email: semad82@yahoo.com

The results of the bioassy of differents plant oils showed repellant and attractent effects of crucifer oil (*Lepidium sativum* L.), celery oil (*Apium graveolens* L.), carnation oil (*Dianthus caryophyllus* L.), Black cuminl oil (*Nigella sativa* L.) and castor oil (*Ricinus communis* L.) on the saw-toothed grain beetel (*Oryzaephilus surinamensis* L.). Result showed that carnation oil gave the highest mean of attractivness of the adults (17%), other oils had significant repellant effect of the adults with celery oil having the highest repellant effect which reached 73%, followed by castor oil (63%), and crucifer oil and black cuminl oil (50%), while the carnation oil had the lowest effect (47%).

C 12

THE EFFECT OF SOME INERT DUSTS ON THE BIOLOGY OF *TROGODERMA GRANARIUM* EVERTS. Riyad Al-Iraqi[1] and Maan Abdul Azize[2]. (1) Department of Biology, Collage of Science, Mosul University, Mosul, Iraq; (2) Department of Science, Collage of Basic Education, Mosul University, Mosul, Iraq, Email: riyadaliraqi@yahoo.com

The effect of eleven natural and synthetic inert dusts on the biology of khapra beetle *Trogoderma granarium* Everts was studied. The results showed that the inert dusts were significantly different in their effects on the biological aspects studied. The lowest larval period was found to be 9.66 days for carborandom dust, while the longest was 35.30 days for celite in comparison to 25.30 days for the control. The dusts showed insignificant effect on pupal duration. The longest developmental period was 39.17 days for celite dust, while it was 10.66 days for carborandom dust. Carborandom dust showed serious effect on adults, where they stay alive only for 0.33 day in comparison with 8.80 days for control. The incubation period decreased with the presence of dusts in comparison to the control except that of gypsum which was 4.00 days, compared to 3.66 days in control. Hatching percentage of eggs decreased for more than half when treated with dust. The emerging females from a generation previously exposed to dusts laid less eggs compared to the control.

C 13

INSECTICIDAL ACTIVITY OF ESSENTIAL OIL FROM *CITRUS RETICULATA*, AGAINST *HELICOVERPA ARMIGERA* LARVAE. Mahdieh Saeidi, Saeid Moharramipour, Samira Farahani and Ali Asghar Talebi, Department of Entomology, Faculty of Agriculture, Tarbiat modares University, Tehran, Iran, Email: Mah63_s@yahoo.com

Unbalanced and extensive uses of broad-spectrum pesticides have caused development of resistant strains of insects, vast destruction of beneficial organisms, outbreak of secondary pests and undesirable environmental effects. In recent years, essential oils have received much attention as pest control agents because of their insecticidal, repellent and antifeedant properties. *Helicoverpa armigeria* (Hubner) is a moth whose larvae are known to feed on a wide array of plants including a range of cultivated plants. They are among the most polyphagous and cosmopolitan pests. In this research**,** Insecticidal activity of essential oil from *Citrus reticulata* Blanco was studied against *H. armigeria* larvae. Essential oil was obtained from the fruit peels using water steam distillation. Mortality of 1-3 days larvae was tested at different concentrations ranging from 0.39 to 1.67 µl/l air. The experiment was conducted with five replications at 20±1°C and 60±5% RH. Results showed that the mortality increased significantly as its concentration and exposure time were increased. LC_{50} value was 0.64 µl/l air for 24 hours fumigation. In general, 100% larvae mortality was reached at 1.67 µl/l air. Findings indicated that volatile oil from *C. reticulata* had considerable toxicity compared with other related species. Accordingly, it could be a useful component for integrated management of *H. armigera.*

C 14

RELATIVE VIRULENCE OF TWO ISOLATES OF *BEAUVERIA BASSIANA* (BALSAMO) VUILLEMIN AND ONE ISOLATE OF *METARHIZIUM ANISOPLIAE* (METSCH.) ON THE GREATER WAZ MOTH, *GALLEROA MELLONELLA* L. Mohamed A. A. Abdel-Rahman[1], Ahmed Y. Abdel-Mallek[2], Saad S. El-Maraghy[2] and Khalid A. Hussein[2]. (1) Plant Protection Research Institute, ARC, Egypt, Email: alaaa4@hotmail.com; (2) Botany Department, Faculty of Science, Assiut University, Egypt.

Two isolates of *B. bassiana* (AUMC No. 3263 & 3076) and one isolate of *M. anisopliae* (AUMC No. 3085) were tested against the larvae of the greater wax moth, *Galleria mellonella* L. In general, mortality increased as the conidial concentration increased. Forth instars larvae of the Greater wax moth were inoculated with different concentrations of *B. bassiana* and *M. anisopliae* conidia. The different concentrations resulted in considerable mortalities of the treated larvae. The calculated LC_{50} and LC_{59} values were 739.77, 1.2x10 and 48292.2, $1.87x10^7$ conidia/ml for *B. bassiana* isolates No. 3263 and 3076, respectively. These values were 50156.06 and 6.9x10 conidia/ml for *M. anisopliae* isolate No. 3085. It seems that isolate No. 3263 for *B. bassiana* was the most pathogenic, (739.77 spores/ml) followed by *B. bassiana* isolate No. 3076 (LC_{50} = 48292.2 spores/ml, while the least pathogenic isolate was isolate No. 3085 LC_{50} 50156.06 spores / ml.

C 15

EFFECTIVENESS OF SOME CHEMICAL COMPOUNDS AGAINST CITRUS LEAFMINER IN NURSERIES. Zahraa A. Eebadeh Al-Ghadhban, Radih Al-Jassani and Khalid Al-Adil, Plant Protection Department, College of Agriculture, University of Baghdad, Iraq, Email: Zahraa_alghadan@yahoo.com

This study was conducted in a citrus nursery during 2005–2006 growing season. The results showed that all insecticides used were effective against citrus leafminer. Confidor SL (Imidacloprid) used as a soil treatment has decreased the infestation from 2.1 larvae/new branch before

the treatment to 0.8, 0.08, 0, 0 following 2, 10, 20 and 30 days after treatment, respectively. When Confidor was used as a foliar spray, it decreased the infestation from 3.0 larvae/new branch to 0.7, 0.3, 0.2 and 0 larvae following 2, 10, 20 and 30 days after treatment respectively. The IGR Match (lufenuron) caused a reduction of infestation from 4.9 larvae / new branch to 0.6, 0.4, 0.08, and 0 following 2, 10, 20, and 30 days after treatment, respectively. The Vertemic (Abamectin) also decreased the infestation from 2.5 larvae/new branch before treatment to 0.6, 0.5, 0.1 and 0 larvae following 2, 10, 20 and 30 days after treatment, respectively. For environmental safety and protection of natural enemies particularly the parasitoids, a treatment with the IGR Match and Confidor with irrigation water were preferred. The results showed that it is recommended to conduct a protective spray in spring season at the beginning of March after 10 % of adult emergence from overwintering period and three applications in autumn season with different insecticides application is sufficient to control the insect and to reduce infestation on small trees(seedlings) of sour orange.

C 16

EFFECT OF VACUUM WITH HIGH TEMPERATURE, HIGH TEMPERATURE ALONE AND VACUUM ALONE ON DIFFERENT STAGES OF LESSER GRAIN BORER, *RHIZOPERTHA DOMINICA* (F.). L.M. Abdullah, Department of Plant Protection, Faculty of Agriculture, Baghdad University, Iraq, Email: Laithm.abdullah@yahoo.com

Results of this study showed that the combined effect of vacuum with temperatures 40, 45 and 50ºC at 30, 28 and 24% RH on the mortality of *Rhizopertha dominica* (F.) (Coleoptera: Bostrychidae) were greater than the effects of these temperatures alone or vacuum alone. Adults of *R. dominica* were more sensitive to such treatments than the larvae which in turn were more sensitive than pupae and eggs. The rates of LT100 values of the mentioned stages respectively at 40C with vacuum were 30, 55, 60 and 220 minutes and at 45ºC with vacuum were 25,50,45 and 40 minutes, respectively. On the contrary, heat treatment alone at 40, 45 and 50 ºC at the same exposure times were less effective against different stages of insect.

C 17

UTILIZATION OF SOME COMMERCIAL TERPENES AGAINST THE CUT WORM *AGROTIS IPSILON* (HUFNAGEL). Aziza mohammed Sharaby[1] and Asma Abd-Allah Al- Nujiban[2]. (1) Pests and Plant Protection Department, National Research Center, Cairo, Egypt, Email: sharabyaziza@yahoo.com; (2) Biology Department, Faculty of Education for Girls, Eneeza, El-Kasim University, Saudi Arabia.

The cutworm *Agrotis ipsilon* infests many vegetables in different parts of the world. Some of volatile fractions from terpenes such as Carvon-Linalool-Nerol-άTerpeniol-Phyllandrine and Citronellol act as contact and stomach poisons against 3rd larval instars of *Agrotis ipsilon*, in addition to starvation and antifeedant action. The tested terpenes differ in their toxicity on different insect stages (eggs-larvae-pupae). The most effective terpenes were Phyllandrine against eggs and pupal stages, while Nerol act as stomach or contact poison on the 3rd larval instars. The contact effect of terpenes was more efficient than their stomach toxicity by feeding treatment. Combination of different plant volatile oils like (Garlic and Mint oils) increased their toxicity action; the larvae treated with sub lethal concentration (LC_{50}) of terpenes showed some biological differences in their development and gave some abnormalities through larval, pupal and adult stages. Moth sterility rate increaserd in the emerging moths, whereaslarval and pupal weight decreased. Combination of Garlic and Mint oils gave some histopathological changes in different larval tissues, especially mid and hind gut of the alimentary canal, integument, muscular layer and fat tissues. Terpenes may by used as spray or as bait traps for controlling *A. ipsilon* and consequently can be a safe alternative to chemical pesticide sprays on vegetable crops in IPM programs.

C 18

EFFICACY OF NEW INSECTICIDES AGAINST POD BORER, *HELICOVERPA ARMIGERA* HUB. ON SOYBEAN IN IRAN. A.A. Keyhanian[1], H. Barari[2], A. Shikhi Garjan[1], S. Ghadirirad[3] and P. Sharifi Ziveh[4]. (1) Iranian Research Institute of Plant Protection, Iran; (2) Agricultural and Natural Resources Research Center of Mazandaran, Iran; (3) Agricultural and Natural Resources Research Center of Golestan, Iran; (4) Agricultural and Natural Resources Research Center of Ardabil, Iran, Email: akeyhanian@yahoo.com

The soybean pod borer, *Helicoverpa armigera* Hub. is a major pest of soybean in Iran. In recent years, chemical control of this pest has become difficult because common insecticides are becoming less effective. Therefore, the efficacy of the common and new insecticides from Sumitomo and Keshtgar companies on the pest larvae were tested in a randomized complete block design with six treatments and a control (only water) in four replications in three provinces, Ardabil, Golesta and Mazandaran, Iran during 2007-2008. The treatments were Sevin (Carbaryl) (3 kg/ha), Avaunt (Indoxacarb) SC15 (250 ml/ha), EC15 (250 ml/ha), Pridalyl (sumipleo) EC50 (200 ml/ha), Pridalyl (sumipleo) EC50 (150 ml/ha) and Tracer (Spinosad) SC24 (150 ml/ha). Insecticide applications were carried out when most of the pest eggs hatched and young larvae started their feeding on terminal and apical buds and pods. Sampling and counting of live larvae was done a day before treatment and 1, 3, 7 and 10 days after treatment by randomly selected 10 plants from four middle rows in each replication. Data were analyzed with SAS software, the means were compared using Duncan test and larval mortality was calculated by Henderson-Tilton formula. The results of the seven and ten days after treatment with insecticidal applications showed significant differences among treatments at 1 and 5% levels. Indoxacarb SC15 (250 ml/ha), Carbaryl and Avaunt Ec 15 (250 ml/ha) were the most effective treatments and were placed in group (A), Indoxacarb EC 15 (250 ml/ha), Pridalyl EC50 (200 ml/ha) Pridalyl EC50 (150 ml/ha) in group (B), while Tracer SC24 (150 ml/ha) were in group (C).

C 19

CRUISER® 350 FS (THIAMETHOXAM); THE SEED DRESSING INSECTICIDE, FOR CONTROLLING WHEAT GREEN BUG SCHIZAPHIS GRAMINUM (ROND.) AND TERMITE ON WHEAT IN SUDAN. Hassbelrasul A. Mohamed, Mohammed E.E. Mahmoud, Suliman A. Ibrahim and Francis Leju Oji. ARC, Hudeiba Research Station, Khartoum, Sudan, Email: nazeiro@maktoob.com

An experiment was carried out to evaluate the efficacy of Cruiser® 350 FS, at three dosage rates (0.75, 1.0, and 1.25 ml/kg of seeds) compared to the standard Gaucho 70WS at 0.5 g/kg seeds and untreated control, for the control of wheat green aphid and termite on wheat. The results revealed that Cruiser® 350 FS at three dosage rates and the standard treatment significantly reduced the population of aphids, termite infestation and consequently increased the wheat grain yield compared to untreated control.

C 20

RECOMMENDATION OF SOME INSECTICIDES FOR CONTROL OF THE GREEN BUG *SCHIZAPHIS GRAMINUM* (ROND.) ON WHEAT. Mohammed E. E. Mahmoud, Samira A. Mohamed and Tag Elsir E. Abdalla, ARC, Hudeiba Research Station, Khartoum, Sudan, Email: nazeiro@maktoob.com

The green bug *Shizaphis graminum* (Rond.) (Aphididae: Homoptera), is an important economic pest that considerably reduces wheat yield worldwide and in the Northern and River Nile States in Sudan. This study was conducted at Hudeiba Research Station, during 2006-2007 season to evaluate the performance of three new imidacloprid formulations viz. Vital 70WS, Master 70WS and Imidal 70WS, and two new chlorpyrifos formulations: Morisban 48%EC and Sharchlor 48%EC, for the control of *S. graminum* on wheat and its effect on yield. The first three seed dressing insecticides were applied at the previously recommended dose of imidacloprid on wheat (0.5 g/kg seeds, 0.35 g a.i) and evaluated versus the counterpart Gaucho 70WS. The rest two foliar insecticides were sprayed at the formerly recommended dose of chlorpyrifos (0.125 l/acre, 60 g a.i.) and evaluated versus the counterpart Dursban 48%EC. The test included the standard Metasystox 50%EC (oxidemeton) at 0.125 l/acre (62.5 g a.i.) and an untreated control. The results reflected biological performance of Vital, Master and Imidal equal to the counterpart Gaucho and reported persistence for three months. Morisban and Sharlchlor, applied once each, were found effective enough to reduce aphid population to the level of the counterpart Dursban and the standard Metasystox for two weeks after spraying. Regarding yield, Imidal significantly out-yielded all other treatments including the counterpart compared to the standard and the control. Vital, Master, Morisban and Sharchlor did not produce significant increase in yield.

C 21

RESISTANCE INDUCTION IN TOMATO ROOTS BY SALICYLIC ACID AGAINST *FUSARIUM OXYSPORIUM* F. SP. *LYCOPERSICA*E. Adnan Mahmood Al-Mallah, Department of Biology, College of Education, Mosul, Iraq, Email: adnan.almallah@yahoo.com

Pre-inoculation of tomato (*Lycopersicon esculentum* Mill) roots with Tricoderma fungi showed induced systemic resistance against infection by virulent stains of *F. oxysporum* f. sp. *lycopersicae* (Foa) through activation of plant defence mechanisms. The effect of salisylic acid (SA) was examined in a split-root system of tomato by dipping one half of the seedling root system in SA solution. The activation of defence responses was measured on the remaining roots. SA-treated plants enhanced systemic resistance by reduction of disease severity of roots inoculated with foa as well as activated peroxidase and phenylalanine ammonia-lyase (PAL) enzymes, in a manner similar to that observed with Tricoderma pre-treatment. Treatment of fungal spores with SA did not have affect on spore's germination, whereas treatment of spores with extract of non-treated roots showed reduction in spore's germination. It is concluded that SA may result in the induction of resistance to foa by induction of increasing peroxidase and PAL activity.

C 22

MOVENTO®, AN INNOVATIVE TWO-WAY SYSTEMIC SOLUTION FOR EFFECTIVE CONTROL OF SUCKING PESTS ON ANNUAL AND PERENNIAL CROPS. M. Elsherif, R. Nauen, U. Reckmann, E. Salmon, H. J. Schnorbach and W. Thielert, Bayer CropScience AG, Alfred-Nobel Str. 50, D- 40789 Monheim am Rhein, Germany, Email: Mohamed.elsherif@bayercropscience.com

Movento® (Spirotetramat) is a lipid biosynthesis inhibitor with a new two–way systemicity property allowing up- and down-way translocation via xylem and phloem. This results in an effective control of particularly hidden juvenile stages of a broad range of sucking pests, including aphids, whiteflies, psyllids and scales on vegetables, tree crops including citrus and tropical crops, cotton and soybean. In addition, the fecundity and fertility of adult whiteflies and aphids is also strongly affected resulting in a significant reduction of insect population. Due to the lack of any cross-resistance to existing chemical classes of insecticides, Spirotetramat is an excellent tool to manage insecticide resistance in many crops and pests worldwide. Movento® shows a very good crop safety, if used according to the label instructions and a long lasting efficacy, which allows the control of more than one pest generation or new infestation. Laboratory, semi-field and field trials showed that Movento® can be considered as safe to populations of beneficial arthropods including bees. The good selectivity discloses manifold options for the combined use of Movento® with beneficial's and it is therefore especially recommended for the use in Integrated Pest Management. Movento® shows a very favorable ecotoxicological profile and there is no unacceptable risk to ecosystems and non-target organisms in recommended uses.

C 23

CHEMICAL CONTROL OF POTATO TUBER MOTH, *PHTHORIMAEA OPERCULELLA* ZELLER AT HOMS GOVERNORATE. Mohamed Ibrahim[1] and Sameer Assaf[2]. (1) GCSAR, Agricultural Scientific Research Center at Homs, P.O. Box 626, Homs, Syria, Email: mohamedkozii@yahoo.com; (2) GCSAR, Administration of Plant Protection Research, Doma, P.O. Box 113, Damascus, Syria.

Seven pesticides were tested against potato tuber moth at Homs during 2007 and 2008. Results showed that Laneet pesticide gave the highest effective percentage (93.80%) in controlling of potato tuber moth, followed by Sharkoneel (90.77%), Saprino (90.10%) and Saypermethrin (89.28%). An intermediate effect was observed with Protecto, Karaty zone and Karaty (52.74, 67.17 and 72.04%), respectively.

POST HARVEST PESTS

PHP1

EFFECT OF GIBBERLLIN, LIQUORICE EXTRACT AND STORAGE TEMPERATURE ON REDUCING FRUIT DECAY OF DATE PALM CV. ZAHDI. Sameer Abed Ali Al-Isawi, Department of Horticulture, College of Horticulture, Al-Anbar University, Iraq, Email: samirlamh@yahoo.com

This study was conducted in a private orchard in Falluja city in 2002 to investigate the effect of spraying date with GA_3 and liquorice extract on yield, quality characteristics and storability of date palm fruits *Phoenix dactylifera* L. cv. Zahdi. The study included field and storage experiments. In the field experiment, 21 homogenous twenty years old date palm trees planted on 9x9 m were selected. Hand pollination was carried out in April 1, 2002. After the fruits setting was completed, six bunches were left on each tree. The spraying with GA_3 and liquorice extract was done in two periods. The first one was at Hababuk stage and the second was at Chemri stage (after four and eight weeks from pollination time, respectively). In both stages, dates fruits were sprayed with 250 mg/l GA_3, 2 and 4 gm/l of liquorice extract in addition to the control (fruits left without spraying). At Rutab stage (time of fruits ripening) one bunch was taken from each experiment to carry out the storage experiment. At the end of the season (October 5, 2002), total yield and their components were determined. The storage experiment was conducted in the Cold Storage Unit of Horticulture Department, College of Agriculture, University of Baghdad. Stalks were cut from each bunch and kept in 2 kg waxed carton boxes. The boxes were stored at either 0±1°C and 80-90% RH or at -3±1°C and 85-90% RH for four months started from Sept. 15, 2002. Treating fruits with GA_3 decreased the percentage of dropped fruits at the end of the storage period at 0C° to 0.27%. However, spraying with 2 gr/l and 4 gr/ liquorice extract increased this ratio to 0.43% and 0.50%, respectively for fruit stored at -3°C. Percentage of shriveled and decayed fruits treated with 4 gm/l liquorice extract and stored at -3°C decreased to 1.52% and 0.27%, respectively, while fruits treated with GA_3 and stored at 0°C had an apposite result. Storage at 0°C increased fruits dripping rate to 2.72% as compared to 1.43% when stored at -3°C.

PHP 2

RECENT ADVANCES IN CONTROLLING POST HARVEST DISEASES OF FRESH FRUITS AND VEGETABLES. Saneya Mohamed Aly El-Neshawy, Department of Post Harvest Diseases, 9 Gamaa Street, Plant Pathology Research Institute, ARC, 12619, Giza, Egypt, Email: saneyaneshawy@yahoo.com

There is an increasing public concern over the use of chemical protectants and food additives in many countries including the Arab region. Consequently, health authorities recently introduced new limits to their use. However, postharvest losses of a large number of fruits and vegetables are still extremely high, compared with other perishable commodities and represent a threat to their marketing competitveness. Although some relevant alternatives to synthesized chemicals were studied and some important results were obtained, none of them are fully achieving the objective to protect perishable commodities from harvest to consumer. The knowledge in this field concerning postharvest pathology, protection, packaging and storage, working on fresh fruits and vegetables in order to fill the gaps that prevented the realization of an integrated disease management approach through postharvest chain is focused. To develop protection strategies that are ecologically sound, economically viable and safe for the consumers, considerable research methods on physical and biological and natural control agents methodologies are required. The potential role of GRAS (Generally Recognized As Safe) chemicals alone and in combination with the post harvest fungicides in the control of the major post harvest diseases is also recommended. Effects of the recommended methods on fruit characteristics are investigated.

PHP 3

EFFICACY OF WHEAT SPIKE HUSKS AND ITS EXTRACTS ON THE PROTECTION OF STORED SEEDS FROM INFESTATION BY *TROGODERMA GRANARIUM* (EVERTS). Abed-Aljasim M. Aljibouri[1], Hussain F. Alrubeai[2] and Falah K. Mohammed[2]. (1) Biotechnology Research Center, Al-Nahrain University, Baghdad, Iraq; (2) Ministry of Science & Technology, Directorate of Agricultural Research, Baghdad, Iraq, Email: dr_aljibouri@yahoo.com

The use of wheat spike husks and its extracts in protecting wheat seeds from *Trogoderma granarium* (Coleoptera: Dermestidae) Infestation was evaluated. Measuring the effect of husks presence indicated that removal of husks increased the level infested seeds by 26% in comparison with 15% when they were present. It was obvious that storage of seeds as spikes, protected the seed from Khapra beetle infestation. The infestation rate was not more than 7% and continued at this low level for 13 weeks, then increased to its highest level. Testing the efficacy of the spike extracts on Khapra beetle infestation showed that treatment of wheat seeds with 40% water extract reduced the damage from 35% to 26%. It was found that seed

damage rate increased gradually and became significant after four month. The results obtained from treatment of wheat seeds with methanolic extract of spike, depicted significant reduction in seed damage level in comparison with water extract treatment. The damage level was reduced to 1% at concentration of 18% compared with 40% for the control, and such protection continued for more than 10 months. There were no significant differences between the wheat varieties used.

PHP 4

EFFECT OF PLANT HORMONE (GA3) ON THE FUNGI CAUSING GREEN AND BLUE MOLD OF CITRUS. Ramadhan Y.M. Al-Gorani[1] and A.M.lopez[2]. (1) Plant protection Department, College of Agriculture, Salah Al-Deen University, Iraq, Email: ramadhangoran@yahoo.com; (2) Plant Protection Department College of Agriculture, Higher Technical School of Agricultural engineering, Polytechnical University of Cartagena, Spain, Email: juanatonio.martinez@upct.es.

The green and blue molds of orange caused by *Penicillium digitatum* and *P.italicum* are considered as important diseases causing considerable losses. The effect of plant hormone (gibberellic acid - GA3) on the growth of *P. digitatum* and *P. italicum* was studied on PDA medium in Petri dishs. Three concentration of GA3 were used (5, 50, 500 microgram/ml/dish). The conc. 500 microgram/ml/dish inhibited the growth of *P. digitatum* and the colony surface was 7.31 cm^2 and the control (without GA3) 40.86 cm^2 with effect on the mycelial growth and abnormal hyphe. 500 microgram/ml/dish also inhibited the colony surface 6.54 cm^2 and the control area 32.54 cm^2, and caused abnormal growth of hyphe and germ tube of conidia. *P. digitatum* growth is likely to be accompanied by secretions that could be toxic to both human or plant.

PHP 5

EFFICACY ESSENTIAL OIL EXTRACTS FROM GALBANUM, *FERULA GUMMOSA* BOISS. AS A POST-HARVEST PROTECTANT AGAINST *TRIBOLIUM CASTANEUM* BEETLE. Mohammad Hossein Hosseinpour[1], Alireza Askarianzadeh[1], Saeid Moharramipour[2] and Jalal Jalali Sendi[3]. (1) Department of Plant Protection, College of Agricultural Sciences, Shahed University, Tehran, Iran; (2) Department of Entomology, College of Agriculture, Tarbiat Modarres University, Tehran, Iran; (3) Department of Plant Protection, College of Agriculture, University of Guilan, Rasht, Iran, Email: askarianzadeh@shahed.ac.ir

The fumigant toxicity of the essential oil from Galbanum plant *Ferula gummosa* belonging to family Apiaceae was investigated against the rust-red flour beetle, *Tribolium castaneum* (Herbst). The oil extracted from the plant gum was purchased from ZARDBAND Co., Tehran, Iran. Mortality rate of 1-7 days old adults of *T. castaneum*, increased with increase in concentration from 36 to 500 µL/L in air and exposure time from 2 to 24 hours. In fumigant toxicity bioassays, essential oils showed different effect. A concentration of 500 µL/L in air and an exposure time of 8h were sufficient to obtain 100% mortality. In order to assess the LC50 and LC90, the second experiment was performed and LC50 value was 225.3 µL/L in air. This finding showed that *Ferula gummosa* essential oil could bean efficient product for the control of stored-gram insect pests.

PHP 6

BIOLOGY OF *BRACON HEBETOR* ON DATE MOTH *PLODIA INTERPUNCTELL* AND *EPHESTIA ELLUTELA*. Halluma Kerra, Zenab Hadad and Fatema Ben Nafeh, Plant Protection Department, Faculty of Agriculture, Fateh Univesity, Tripoli, Libya, Email: Kerra50@hot mail.com

Bracon hebetor is a parasitoid on larvae of family Pyralidae, which attack stored grains, dates and dried fruits, especially *Ephestia spp*. The objective of this research was to study the biology of *B. hebeto*r under three different temperatures (25, 28 and 30°C) on two hosts, *Plodia interpunctella* and *Ephestia ellutela*, by using different media. Results indicated that at the temperature of 25ºC on *P. interpunctella*, total number of eggs obtained was 298 eggs, with an average of 29 eggs with 93% hatchability and 279 larvae produced. Progeny were 270, and the life cycle lasted 11 days. While on *E. ellutela* at 28 ºC, 268 eggs were collected with 80.7 % hatchability, 210 larvae produced and the number of progeny was 194 and the life cycle lasted 10.6 days. Results showed that 25ºC was the optimum temperature for rearing *B. hebetor* on *P. interpunctella*, while 28ºC was the optimum temperature for rearing on *E. ellutela*. Glycerin media gave 93% adult emergence compared to date syrup which gave 53%. *B. hebetor* can be considered a potential biological control agent of date moths.

PHP 7

REACTION OF SOME WOODS TO DECAY CAUSED BY *NATTRASSIA MANGIFERAE* IN NINEVAH, IRAQ. Aree Adel Abdulqader[1], Walid Aboodi J. Kasir[2] and Khalid Hassan Taha[2]. (1) Forestry Department, College of Agriculture, University of Duhok, Iraq; (2) College of Agriculture, University of Mosul, Iraq, Email: aree_adel@yahoo.com

The effect of wood decay fungi on some local traded wood was studied in Ninevah on Oak (*Quercus aegilops* L.), Poplar (*Populus nigra* L.), Sycamore (*Platanus orientalis* L.), Willow (*Salix acmophylla* Boiss.), Pine (*Pinus brutia* Ten.), Walnut (*Juglans regia* L.) and Tamarisk (*Tamarix articulata* vahI.) *in-vitro*. The results showed that all wood types were infected with brown rot at different levels. Isolation demostrated the presence of *Nattrassia mangiferae* (H. & P. Sydow) Sutton & Dyko, 1989 and *Alternaria*, *Fusarium*, *Aurobasidium*, *Cephalosporium*, *Phytophthora*, *Amblysporium*, *Dendryphiopsis*, *Ulocladium* fungi in the decayed woods in Ninavah governorate and the most effective fongus on wood decay was *N. mangiferae.*

PHP 8

EFFECT INFLUENCE OF SOME PLANT EXTRACTS ON THE SUSCEPTIBILITY OF DOMESTIC ORANGE FRUITS *CITRUS SINESIS* L. OSBECK. Omar Hashim Moslih Al-Mohammedi, Faculty of Agriculture, University of Anbar, the Ministry of Higher Education and Scientific Research, Iraq, Email: omar_hasham2000@yahoo.com

The moisture losses of fruits during storage led to a significant losses and bring some changes in its chemical structure, which reduces its nutritional and marketing values. Meantime, it is imperative to use substitutes to fruit chemical treatments, such as plant extracts, for reducing moisture losses, fruit and fruit physiolocal damages. Some plant extracts (Fenugreek, caraway, Okra and ber) have been used where fruits were dipped in plant extracts for 10 and 20 minutes and stored at 4±1ºC and relative humidity of 80-85% at the Faculty of Agriculture, University of Baghdad, for a period of two months. Results showed effectiveness of Okra Extracts treatment for 20 minutes, by preventing occurrence of any fruit damages, even after 60 days of storage. Okra extracts applied for 20 minutes achieved 100% effectiveness, with fruit weight reduced by only 1.30%.

PHP 9

IDENTIFICATION AND PATHOGENSITY OF *PENICILIUM* SPECIES ISOLATED FROM ROTTED CITRUS FRUITS ROT, AND THEIR TOXIC ABILITY. Fatin N. Mulla Abid and Nadeem A. Ramadhan, Biology Department, College of Sciences-Mosul University, Iraq, Email: nadeemramadan@yahoo.com

Fungi isolated from orange, lemon and tangerine fruits showed the existence of two species of *Penicilium* (*P. digitatum* and *P. italicum*), and *Alternari citri* in tangerine. *P. digitatum* was more widespread than *P. italicum*, the former was isolated from oranges and lemon at a rate of 100% and from tangerine at a rate of 57.14%, while *P. italicum* was isolated from tangerine at a rate of 42.85%. Fruits of citrus inoculated with two species of fungi, showed that *P. digitatum* growth covered the fruits completely within 5 days of inoculation, with a growth rate faster than that of *P. italicum*. This clearly showed that citrus fruits are susceptible towards infection by *P. digitatum* and it has fast growth rate. *P. digitatum* was found to have a greater influence on inoculated eggs than *P. italicum*. Blackening of the air-space membrane with *P. digitatum* growing on it, while the other species remained at inoculation site without spread to other areas of the air-space membrane. *P. digitatum*'s growth is expected to be accompanied by secretions that could be toxic to both humans or plants.

PHP 10

ISOLATION OF CORN SEED BORNE FUNGI AND DETERMINE THE AFLATOXIGENIC STRAINS. Ali Abed Al-Rawi, Biology Department, Collage of Science, Mosul Yniversity, Mosul, Iraq, Email: alialrawi1975@yahoo.com

Seed health testing of ten samples of stored corn grains revealed the presence of sixteen seed-borne fungi and identified as storage fungi such as *Alternaria alternata*, *Aspergillus* spp., *Fusarium* spp., *Penicillium* spp. and *Rhizopus* spp. also *Fusarium* spp. and *Penicillium* spp. were isolated at high frequency. Others, such as *Cladosporium* spp., *Drechslera* spp., *Macrophomina* spp., *Mucor* spp., *Pythium* spp., *Rhizopus* spp. and *Stemphylium* spp were isolated at low frequency. Four species of the genus *Aspergillus* have been isolated, they were *A. flavus*, *A. fumigatus*, *A. niger* and *A. parasiticus*. The isolates of *A. flavus* produces AFB1 and AFB2 only, but *A. parasiticus* was non-aflatoxigenic. Isolation of aflatoxigenic strain, *A. flavus* from stored corn grains (samples) gives an indication that these samples are contaminated with afltoxins, and there was a relation between level of aflatoxin in the grains and isolation rate of *A. flavus*. The high value of AFB1 (10 ng/gm) was detected in the sample No. 3, whereas the low value of AFB2 (1.2 ng/gm) was detected in the sample No. 10.

BENEFICIAL INSECTS

BI 1

EFFECT OF SOME OVERTWINTERING METHODS ON PROPERTIES OF PRODUCTIVE QUEENS AND THE ACTIVITIES OF HONEY BEES. Salim Jamel Jarjees and Fuad Abdullah Thabet**,** Plant Protection Department, College of Agriculture and Forestry Mosul University, Mosul, Iraq, Email: salim1941@yahoo.com

The results showed an average successful queen's cells at reached 46.471 in the Wintering with styropor (WS) treatment, and was higher than the average registered on the control treatment of queen's cells at reached 38.408. A higher average of queen's cells size was reached in the WS treatment (0.976 cm^3), while the average in the control treatment was slight less (0.921 cm^3). The average of the royal jelly weight registered in the WS treatment was 222.175 mg which was higher than the average in the control group (210.957 mg). The average of scaled honey area reached 1364 cm^2 for the WS treatment and was higher than that registered for the control group (1277.10 cm^2). The average of unsealed honey area reached 1340.67 cm^2 in WS treatment and was higher than the average in the control group (1263.38 cm^2). It was clear that the average honey yield on 25th May 2001 (5.73 Kg) in the WS treatment was higher than the average of the control group (5.10 Kg).

BI 2

THE NEGATIVE EFFECT OF MULBERRY LEAVES ENRICHMENT WITH ASPARGINE AMINO ACID ON ECONOMIC CHARACTERS OF SILKWORM *BOMBYX MORI* L. IN NATANZ OF ISFAHAN. Rouhollah Radjabi[1], Rahim Ebadi[2] and Seyed Zialdin Mir Hoseini[3]. Islamic Azad University, Science and Research Branch, Tehran, Iran, Email: Radjabi1360@gmail.com; (2) Plant Protection Department, Agriculture College, Isfahan University of Technology, Isfahan, Iran; (3) Animal

Science Department, Agriculture College, Guilan University, Rasht, Iran.

The effect of mulberry leaves enrichment with L-aspargine in 10, 100, 500 and 1000ppm concentrations on cocoon characteristics of *Bombyx mori* L., Hybrid 31×32 was studied. L-aspargine diluted to different concentrations with distilled water. Silkworm larvae were fed on fresh mulberry leaves of shin inche nevise variety enriched with L-aspargine, once a day from first day of 4th instar until end of larval stage. Normal leaves were used as control treatment. All economic parameters were determined by using standard technique in sericulture. Results showed that male and female cocoon weight decreased significantly in all treatments compared to normal control. Maximum male and female weight recorded in normal control was 1.043 and 1.342 gr, respectively, with significant difference with all treatments. Normal control had greater male and female shell weight. Maximum male and female shell ratio of 26.88% and 22.03%, respectively, was recorded in the distilled water treatment. Results of this investigation showed a negative effect of aspargine amino acid on economic characterstic of silk worm.

BI 3

INFLUENCE OF FOOD SUPPLEMENTS AND POLLEN SUBSIDIES ON HONEYBEE COLONIES ACTIVITIES. K.W. Shaher and R.S. Al-Gorane, Faculty of Agriculture, Baghdad University, Baghdad, Iraq, Email: sh_sb2000@yahoo.com; kmela@yahoo.com

Experiments were conducted on food preference of honeybees' workers at Baghdad and Al-Mussab apiaries to measure the influence of food supplements and pollens; including 60% sugar solution, syrup mixture at different concentrations (whey + sugar solution 60%) and protein subsidies (rape, chickling vetch + broad bean) as well as to evaluate the efficiency of food attractants (funnels seeds, cinnamon, clove tree). Results showed honeybees' preference towards 60% sugar solution. Number of workers attracted was 388.67 within 2 hours of observation, while the number of workers attracted towards the syrup mixture (50% whey + 50% sugar solution 60%) and whey alone were 392.17 and 24 workers/2 hours, respectively. Addition of attractant funnel seed powder to sugar solution increased the number of workers to 387.61/2 hours compared with other attractants. Addition of cinnamon to the mixture resulted in highest number of attracted workers. Comparing to other materials, the whey 75% inside honeybee colonies increased significantly the brood area, pollen and honey size.

BI 4

BIODIVERSITY OF BEES IN THE NATURAL ENVIRONMENT AND THEIR ROLE IN THE POLLINATION OF CROPS SUCH AS FABA BEAN (*VICIA FABA* L.) AND MELON (*CUCUMIS MELO* L). Sihem Aguib and Kamel Louadi, Laboratory of Biosystematics and Ecology of Arthropods, University Mentouri Constantine, Algeria, Email: sihem_ent@yahoo.fr

The fauna of the Apoidea in two different enviroments (natural and cultivated) were investigatedin four stations of the Constantine region. The observations were made from November 2004 to July 2005. This survey identified 62 wild bee species, distributed in four families: Apidae (41%), followed by Megachilidae (26%), Andrenidae (24%), and Halictidae (9%). The relative abundance of the species, and the quality of sampling were also studied. The ecological analysis showed that SHANNON–WEAVER indicator was 5.00 bits, whereas the LEGENDRE indicator was 4% and the GRENNBERG indicator was 0.96. This showed that the population of the bees was variable. This diversity is bigger in the natural habitat compared to the one observed in the cultivated environment. The results in the phenology of the families and the species of bees showed that most werewell represented in the spring at the flowering time of most plant species. The survey of the floral choices of the bees in natural habitat showed that they had a marked preference for Asteraceaes (47.81% of visits) and Boraginaceaes (15.29% of visits). The importance of the wild bees in the pollination of crops was also studied. Study of bean (*Vicia faba* L) field showed that two species efficiently visited flowers: *Eucera numida* represented 71.25% and *Eucera notata* 17.27% of visits. However, surveying cantaloup (*Cucumis melo*) flowers indicated that the species *Megachile apicalis* represented 34.58% of visits and *Ceratina saundersi* 31.8%. These two species were the most abundant and contributed significantly to melon pollination in the Constantine region.

BI 5

A PRILEMINARY PROGRAMME TO PRODUCE PURE SYRIAN HONEYBEE, *APIS MELLIFERA SYRIACA*. Abdallah Hatoum[1], Wafaa Yakoub[2], M. Oumran[3], M. Hanafi[4] and Bassam Barakat[4]. (1) Ministry of Agriculture, Lattakia Directorate, Lattakia, Syria; (2) Department of Agriculture, Damascus University, Email: yako-ce@scs-net.org; (3) Department of Agriculture, Tishreen University, Lattakia, Syria, Email: m_oumran@hotmail.com; (4) Department of honeybees, Ministry of Agriculture, Damascus, Syria .

Three hundred and sixty five samples of honeybee workers were collected from different Syrian regions representing different ecological and genetic diversity of Syrian honeybee communities. The apiaries used for sampling were at fixed locationa, distant from the migratory apiaries and dose not includes foreign queens or swarms. Morphometrical study was carried out and included: appearance of workers, cubical index, shape of wax mirror on hind margin on the fifth abdominal segment and disk deviation. Results showed that the number of genetically pure colonies was 91. The Syrian Honeybee Improving Committee developed a scientific plan to reach that goal through the selection of four isolated places as genetic banks, six places for selection and improvement and seven places as mating areas. The results obtained during 2006-2009 season will be discussed.

BI 6

THE EXPECTED OUTPUT FROM INTRODUCTION OF HONEYBEES WITHIN THE COMPONENTS OF IPM IN MAJOR IRRIGATED SCHEMES OF CENTRAL SUDAN AND ITS IMPORTANCE IN

PEST AND DISEASE CONTROL. Siham Kamil Nagi and Abdalla Abdelrahim Satti, Environment and Natural Resources Research Institute (ENRRI), National Centre for Research, Khartoum, Sudan, Email: sihamnahal@yahoo.com

The agricultural irrigated area in Sudan was estimated to be about 2 million hectares, most of it lies in the central region of the country, where there are three major irrigated schemes with an area of more than 1 million hectares. Such schemes which contributed greatly in the national economy are the Gezira, Rahad and New Halfa schemes. Many field and horticultural crops are grown in these schemes in rotational manners, including cotton, sorghum, sunflower, wheat, beans, peas, vegetables, citrus and guavas. It is important to state that there are no beekeeping activities adopted in these agricultural schemes, mainly because they depend extensively on pesticides application for pests control. Recently, it was noticed that some of these agricultural projects have attempted the idea of IPM, and the introduction of some ecologically safe ways of control were applied to reduce the hazards of chemical pesticides. This paper is a contribution in supporting the introduction of beekeeping activities within the IPM programmes in the above mentioned three major schemes. It contains information about the economical and environmental roles which the beekeeping can play in producing strong healthy crops with high tolerance to different agricultural pests and diseases.

BI 7

REARING OF THE HONEY BEE QUEENS IN CLONES CONTAINING THEIR MOTHER. Taher Ahmed Abuhligha and Husain Mustafa Huass, Faculty of Agriculture, Alfateh University, Gafara, Libya, Email: taher_ahmed156@yahoo.com

In rearing queen of honey bees, colonies respond in different ways to adverse conditions to permit survival. Scientists gave importance to develop new races with higher honey and royal jelly production. They paid specially attention to artificial queen rearing. In this study we concentrated on queen rearing during the autumn and the summer seasons, through rearing queens within the hives which include the mother queen. Comparisons were made between the transfer of queen larvae under field and laboratory conditions. Results obtained will be presented.

BI 8

BEEHIVES IN IRAQ - AN ENVIRONMENTAL AND ACCOUNTING STUDY. K.I. Rajab[1], M.K. Ibrahem[2] and Z.H. Alska[3]. (1) Technical Institute, Mosul, Iraq; (2) College of Agriculture and Forestry, Mosul University, Mosul, Iraq; (3) College of Economics and Administration, Mosul University, Mosul, Iraq, Email: khalel_bees@yahoo.com

Iraq's climate is humid and hot in the summer and dry and cold in the winter. Besides, the climate is humid and hot in the south and it is moderate in the north. This variation in climatic conditions led to a variety of beehive types across the country because of the hundred varieties of plant species and vegetations, including perennials and annuals (trees, shrubs, grasses and weeds), which are considered the source of pollen for bees. Building dams and many new agricultural projects led to the boom in bees breeding and affect indirectly on bee forages, and its environmental habitats which are the main source of pollen and nectar. The study considers the conditions for selecting a bee forage describing the most important annual and perennial wild plants, their flowering dates and dispersion dividing them into three main categories; 1) main plants (67.1%) that are visited by the bees for pollens and nectars, 2) medium plants (19.4%) are visited by bees for collecting pollens and 3) limited plants (13.5%) are visited by the bees for nectars only The Iraqi people have preserved the forages and plants frequently visited by the bees, however Iraq is still considered the limited country in the number of forages besides there is a lack of information concerning the plant distribution of relevance to bees in various regions in Iraq. It was concluded that there is no clear vision or determined policy to develop honey bee breeding in Iraq. Thus, we see that it is necessary to pay care to the quality of breeding forages taking into consideration financial costs in order to achieve an optimal economic method to classify and qualify regions appropriate for honey bee breeding.

BI 9

EVALUATION OF DIFFERENT ARTIFICIAL DIETS ON THE ACTIVITY OF HONEY BEES COLONIES (*APIS MELLIFERA* L.). I.M.A. Al-Juboori and Saadi H. Sabr, Plant Protection Department, College of Agriculture, University of Baghdad, Baghdad, Iraq, Email: saborsadi@yahoo.com

The impact of three formulations of artificial diets on the activity of honey bee colonies were evaluated; 1- corn powder mixed with vitamins A,E , D3, dry bread yeast and sugar solution, 2-sugar solution 45% and 3- sugar solution mixed with vitamins E, D3 and A. These formulations were compared with natural nutrition as a control treatment. Results showed a significant effect of the artificial diets on the worker brood area during autumn and winter. Worker brood area ranged from 465.73 sq cm for the control treatment compared to 944.52 sq.cm for sugar syrup mixed with vitamins E, D3 and A on 15th of March 2004 with superiority of the last treatment upon the other treatments. In spring, worker brood area for all treatments reached their peak on 7th of May 2004, in which sugar solution mixed with vitamins E, D3 and A with a worker broad area of 12213.3 sq. cm, while the formulation of corn flour mixed with vitamins E, D3 A, bread yeast and sugar solution with a worker broad area of 10285.5 sq. cm. was better than the sugar solution and control treatments with worker broad areas of 3802.1, 5801.7 sq. cm., respectively. In spring drone brood area was 817.7 sq cm for the sugar solution mixed with vitamins E, D3 and A treatment, which is significantly better than the sugar solution and control treatments (513.6, 421.9 sq. cm, respectively). Results revealed that addition of vitamins E, D3 and A to honey bee food through winter contributed to raise the queen activity in laying eggs in early spring.

BI 10

STUDY OF THE ROLE OF SOLITARY WILD BEES IN THE POLLINATION OF BEAN CROP AT MITIDJA AREA, ALGERIA. Leila Bendifallah[1], Kamal Louadi[2] and Salah Eddine Doumandji[3] (1) Biology Department, Science Faculty, M'hamed Bougara, Boumerdes University, Algeria, Email: bendif_l@yahoo.fr; (2) Arthropods Systematic and Ecology Laboratory, Science Faculty, Mentouri University, Contantine, Algeria; (3) Zoolog Department, Agronomic National Institute, Algiers, Algeria.

Bees have a key role in the pollination of plants and crops. For this purpose, a study was conducted throughout the year to identify the most important species of bees which visit flowering crops and estimate the numerical density and to study its behavior in flower pollination at the test station of the National Institute for Agriculture at El Harrach, Algiers. Results showed the occurance of three different species of wild bees which belong to the order Hymenoptera, and genera *Andrena, Eucera* and *Xylocopa. Eucera* was found on broad beans during of its flowering in the months of April and May. The genera *Andrena* and *Xylocopa* were found on herbal plants after beans flowering period. This means that these two species do not have a special type of vegetation preference compared to the specie *Eucera*. The results also indicated that there was a difference in the behavior and activity of the three different bees that have a significant role on beans crop pollination.

BI 11

MEASUREMENT OF POLLEN GRAINS COLLECTION IN SPRING, SUMMER AND AUTUMN USING POLLEN GRAINS TRAPS IN BEE HIVES IN NINEVEH. Mahdi Mohammed Salih Saeed and Salim Jameel Jarjees, Plant Protection Department, College of Agriculture and Forestry, Mosul University, Iraq, Email: mahdialbadrani@yahoo.com

Quantity of pollen collected using traps indicated significant differences among the three groups of hives based on dry weight of pollen. The strong hives group traped the highest (2.007g/hive) and the weak hives traped less (0.253 g/hive). Results indicated that collected pollen quantity in these traps was more in May (2.287 g/hive), followed by April (2.149 g/hive), June (1.565 g/hive), October (0.810 g/hive), July (0.755 g/hive) and September (0.115 g/hive). No pollen was collected in August because of the high temperature and dry weather. Results also indicated that collection of dry pollen by bee workers (ten workers) was more in strong bee hives (0.036 mg/bee worker), whereas it was less in weak bee hives (0.022 mg/bee workers). The largest amount in pollen collected was in April, October, May, June, September and July with 0.051, 0.041, 0.039, 0.028, 0.026 and 0.023 mg/bee worker, respectively.

BI 12

EFFICIENCY OF OXALIC ACID USE TO CONTROL VARROA MITE *VARROA JACOBSONI* OUD. (*VARROA DESTRUCTOR*) AND ITS EFFECTS ON BEE COLONY. Nouraldin Y. Daher Hjaij[1], Ali Alburaki[2] and Tamam Abed[3]. (1) General Commission of Scientific Agricultural Research, Douma, P.O. Box 113, Damascus, Syria, Email: nouraldinz@gmail.com; (2) Faculty of Agriculture, Damascus University, P.O. Box 30621, Syria, Email: ali.alburaki@gmail.com; (3) Faculty of Agriculture, Baath University, Homs, Syria.

Oxalic acid (OA) is one of the most worldwide natural materials used to control varroa bees *V. destructor*. However, its use in Syria is still limited. This study aimed to study the effect of oxalic acid on both varroa and bee populations. Several methods were used; fumigation inside hives, providing it in nutrient solutions, and sprayed directly over bees. In addition, suitable concentration and most appropriate application time were determined. This study showed that the effectiveness of oxalic acid ranged between 83.8% and 95% when fumigation made with 2 g using electrical bobbin for heating, as compared to 89.5 and 92.8% for direct sprays, when oxalic acid solution was used at 2 and 3% concentration, respectively. The effectiveness was 89.9% when oxalic acid was used in nutrient solutions (2 g/L). The difference was significant between treatment and control at P=0.01. Results showed that oxalic acid can effectively prevent the development of varroa populations without posing harmful side effects on the honey bee population**.**

BI 13

BREAKDOWN OF *CITRUS LIMONIA* DRY LEAVES BY *ARMADILLO OFFICINALIS* AND *HEMILEPISTUS REAUMURI* IN BENGHAZI, LIBYA. Farag A. Muttardy, G.Achuthan Nair and Rukaya A. Mersal, Zoology Department Faculty of Science, Garyounis University, Benghazi, Libya, Email: Hamzash@hotmail.com

Armadillo officinalis and *Hemilepistus reaumuri* are the common woodlice found in the semi-arid regions of Benghazi, Libya. Studies conducted for 21 days on the breakdown of *Citrus limonia* (Lemon) dry leaves by *A. officinalis* and *H. reaumuri* either separately or by both species, revealed that higher breakdown of *C. limonia* leaf occurred in the presence of *A.Offininalis* followed by *H. reaumur* alone and was less than breakdown when both species were introduced together. Faunal effects of both species on the breakdown of leaves were significantly higher ($P < 0.05$) than those of the control treatment.

RODENTS, BIRDS & SNAILS

RO 1

IPM TECHNIQUES AGAINST VERTEBRATE PESTS WITH SPECIAL EMPHASIS ON BIRDS IN SUDAN AND SOME AFRICAN COUNTRIES. El-Sadik Awad Bashir, Qatar Birds Project, Doha, Qatar, Email: elsadigbashir@hotmail.com

Many mammal species and birds can cause serious economical damage to cereal, vegetable and fruit crops, particularly grain-eating birds which are among the most important vertebrate pests (VPs) in Africa. The published literature and field research on integrated pest management (IPM) against VPs, is considered scanty compared to insect pests, and further development, using new integrated

approaches, is needed. Thus, this paper presents and discusses such methods which require further research. It also sheds light on some case studies in Sudan and some other African countries related to integrated management of Quelea birds.

RO 2

THE DAILY CONSUMPTION OF DRY WHEAT GRAINS FOR FOUR RODENT SPECIES. Samir Alahmad[1], Fawzi Samar[1] and Adwan Shehab[2]. (1) Department of Plant Protection, Faculty of Agriculture, Damascus University, P.O. Box 30621, Damascus, Syria, Email: samerjik@hotmail.com; (2) Administration of Plant Protection Research, General Commission for Scientific Agricultural Research (GCSAR), Doma, P.O. Box 113, Damascus, Syria.

Within the course of a comprehensive study to evaluate the damage caused by rodents to cereal stocks outdoor storage in Al-Qamishly area in northern east of Syria, a laboratory experiment was conducted to evaluate the daily intake of four wild rodent species commonly found in the storage area; the domestic mouse, *Mus musculus* (n=26), Tristram jird, *Meriones tristrami* (n=5), the black rat, *Rattus rattus* (n=2) and the Indian gerbil, *Tatera indica* (n=2). The rats were caged solitary in suitable glass cages (40×40×30 cm), while the house mice were caged as pairs (two in each cage). To ensure presence of sufficient quantity of food; 20 gr of dry grains of wheat was placed in each cage on daily basis, except in the Indian gerbil cages, 40 gr were added (Lab. temperature at 28 ºC). The experiment lasted for ten days, where the daily consumption was recorded for each cage. The results showed that consumption average was related to the rodent size, where large sized rodents consumed more; 3.4±0.7 gr for the house mouse, 7.4±1.7 gr for Tristram jird, 10.4±1.9 gr for the black rat and 21.1±1.7 gr for the Indian gerbil. The daily consumption with respect to the body mass of the rodent was high in small rodent species, and was less in the largest species. The consumption rate constituted 19.9, 12.1, 7.2 and 7.5% of the body mass of the house mouse, Tristram jird, the black rat and the Indian gerbil, respectively.

RO 3

ECOBIOLOGICAL AND TOXICOLOGICAL STUDIES ON THE FRESH WATER CRAYFISH *PROCAMBARUS CLARKII* AT SHARKIA GOVERNORATE. Hasan.I. El-Deeb, Maher.H. Khalifa, Magdy. Wilson and Samah Abdul Kader. (1) Plant Protection Research Institute, Cairo, Egypt; (2) Faculty of Science, Cairo University, Cairo, Egypt, Email: magdy_wilson2000@yahoo.com

Many of the Egyptian farmers consider the Crayfish, *Procambarus clarkii* as an agricultral pest damaging the irrigation systems. The burrowing activities near the irrigation canals, lead to drying out the water from the fields to the drainage canals. In addition, the crayfish feeds on roots and seedlings of the cultivated crops as well as on the fresh water fish. The present work was carried out under different conditions at Sharkia Governorat to study some ecobiological aspects of the fresh water caryfish *P. ciarkii* during two successive seasons of 2003 and 2004 in addition to measuring the efficacy of some biological and chemical control methods against it. The results showed that *P. clarkii* is distributed at the three investigated districts (Abo- kabir, Hehia and Belbies) and dig its burrow at the lower sites of irrigation ditches and levels of field in the different types of soil. The highest mean numbers of burrows were recorded during winter and spring followed by autmm, while the lowest was in summer at the three mentioned districts. The highest population densities of *P. clarkii* were recorded during two successive seasons in irrigation canal of Belbies (85.2 individual) followed by Abou- kabir (60.7 individual) while the lowest density was recorded at Hehia (38.8 individual). In drain age canals, there was a marked reduction in collected numbers of *P. clarkii* at the three investigated sites throughout the study period. Experiments on the efficacy of biological and chemical control methods against *P. clarkii*, revealed that Malathion proved to be the most toxic, followed by Bayluscide and Spinosad, while *Metarhizium anisoplae* showed the lowest efficacy. On the other hand, male animals exhibited more sensitivity to all compounds tested than females.

RO 4

EFFICACY OF BORIC ACID AGAINST TWO SPECIES OF LAND SNAILS UNDER DIFFERENT AGRO-SYSTEMS CONDITIONS. Magdy Wilson[1], Maha F. Mahmoud[1] and Ahmad M. Soliman[1], Plant Protection Research Institute, ARC, Dokki, Giza, Egypt, Email: magdy_wilson2000@yahoo.com

The molluscicide effects of boric acid against two land snail species; *Monacha cartusiana* and *Monacha obstructa* (Ferussoc) were studied under different conditions, i.e. laboratory, green house and field. Data obtained revealed that in all cases satisfactory results were achieved against the two land snail species. Under laboratory conditions, boric acid reduced 52.7, 65.7 and 74.5% of *M. cartusiana* animals and 54.4, 70.0 and 82.0% of *M. obstructa* when used at 0.5, 1.0 and 1.5% concentrations, respectively. Under green house conditions, when boric acid was used at 1.0, 2.0 and 3.0% concentrations, the population of the two species was reduced by 50.3, 62.4 and 66.3 and 52.7, 65.5 and 72.8%, respectively. Regarding its molluscicidal effects against these two land snail species under field conditions, it was clear that its toxic effects were less than when applied under laboratory and greenhouse conditions as it achieved only 45.9, 48.7 and 50.8% population reduction for *M. cartusiana* and 44.5, 49.0 and 51.4% for *M. obstructa*. It could be concluded that the molluscicidal effect of boric acid was higher when applied under laboratory and green house conditions. Moreover, *Monacha obstructa* exhibited a higher response to this compound than *Monacha cartusiana*. This could be attributed to the soft shell and small body size of *M. obstructa* animals.

RO 5

DIVERSITY OF LAND SNAILS IN SYRIA. Adwan Shehab[1], Mohamad Asaad[1] and Zuhair Amr[2]. (1) Administration of Plant Protection Research, General Commission for Scientific Agricultural Research (GCSAR), Doma, P.O. Box 113, Damascus, Syria, Email: a.shehab@mail.sy; (2) Department of Biology, Jordan University of Science & Technology, P.O. Box 3030, Irbid, Jordan.

A filed survey was conducted during the period 2004-2009 to investigate the diversity of land snails in all Syrian habitats and their distribution and their agricultural importance. The survey indicated the presence of 31 species of land snails belonging to 11 families and 23 genera. Land snail diversity in wet lands was higher than in dry lands. The following species: *Monacha obstructa*, *Monacha haifaensis*, *Cochlicella acuta*, *Levantina caesareana*, *Eobania vermiculata, Helix engaddensis*, *Helix texta*, were the most abundant land snails in the agricultural areas causing damages to fruit trees and field crops. The impact of land snails on agriculture crops was obvious mainly in the coastal region.

RO 6

IMPACT OF GAUCHO PESTICIDE ON RENAL PARENCHYMA STRUCTURE AND SOME HAEMATOLOGICAL PARAMETERS IN ADULT RATS. Leila Saadi[1], Wassila Aissa Brahim[1], Rafika Matalah[2] and Nemcha Lebaili[2]. (1) SAAD DAHLAB University, 0009, Blida, Algeria; (2) Physiological laboratory, Normal School of teacher, BP 92, Kouba, 16000, ALGERIA, Email: maboitels@yahoo.fr

Many pesticides are likely to play a role in presence of inflammatory disease. In this context, we proposed to study the impact of imidacloprid, the active ingredient of the Gaucho pesticide, administered orally, on renal parenchyma structure and some haematological parameters in the adult rats. Strain of rats "Wistar" were watered only with distilled water (control) or containing a low concentration of imidacloprid (44 mg / kg / d) for 50 days (treated). Chronic exposure to this insecticide was induced in rats, renal tubule and Bertin space regression, a statistically significant decrease in erythrocytes number, hemoglobin and hematocrit, but increases in the platelets number was observed. The leukocytes number did not change. Based on these results, even the small concentration resulted in deleterious effects on the rat's renal parenchyma and blood parameters.

RO 7

TOXICOLOGICAL IMPACTS OF SOME PLANT EXTRACTS ON THE NORWAY RAT, RATTUS NORVEGICUS UNDER LABORATORY CONDITIONS. Zidan H. Abd El-Hameed[1], Hassan I. El-Deeb[2] I.K. Ibraihm[2] and Abd El Raoof A. Mourad[2]. (1) Faculty of Agriculture, Ain Shams University, Cairo, Egypt; (2) Plant Protection Research Institute, Agriculture Research Center, Dokki, Giza, Egypt, Email: dr_homam@hotmail.com

Several toxicological experiments had been conducted to evaluate the toxicoity of some plant extracts on the Albino strains of the Norway rat *Rattus norvegicus* under laboratory conditions. The obtained results revealed the following: 1-Toxicity results revealed that ethanolic Oshar leaves extract was the most effective one against the albino rats followed by Cumin seeds extracts, while Golden shower seeds extracts was the least one. 2- The effects of three tested plant extracts at sublethal doses (1/4 LD. 50) on haematological parameters of males and females of albino rat, *R. norvegicus* showed that, the ethanolic Oshar, Cumin and Golden shower extracts induced significant decreased in haemoglobine, haemaocrit, red blood cells in both sexes. 3- Treatment with 1/4 LD.50 of the ethanolic Oshar, Cumin and Golden shower extracts induced a considerable increase in Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), and Alkaline phosphatase (ALP) enzyme activities in plasma of male rats treated with ethanolic Oshar extract. On the other hand, there was no significant increase in total protein of both rat sexes treated with either ethanolic Cumin or Golden shower extract.

GENERAL TOPICS

GT 1

IDENTIFICATION OF INSECTS USING COMPUTER. Lubna Nasir Eddeen[1], Ola Shalbak[1] and Ahmad Katbeh-Bader[2]. (1) Computer Science Department, King Abdulla II School for IT, University of Jordan, Jordan; (2) Plant Protection Department, Faculty of Agriculture, University of Jordan, Amman, Jordan, Email: Lubna@ju.edu.jo

Insect pest species play a great role in damaging agricultural crops. Quick identification of pest species may help to accelerate the process of decision making in plant protection. A computer program, using Matlab software, has been developed to achieve this purpose. The first step in the program was to scan some images for insects' wings (which can be used to identify insect species). A filter was used to get rid of impurities that may appear in the image. The image was converted to a black-white image. Next step was to process the image using Canny algorithm to produce a drawing figure of the wing image. A thinning algorithm was applied on the resulting wing figures, to draw all veins with one thickness. Specific vein's intersection points were then selected to calculate the distances between these points, using a program developed for this purpose. This program analyzed the results statistically to identify the insects' species. Two species of insects were selected to implement the program. The results will be discussed to show how these insects were identified.

GT 2

ANALYTICAL STUDY FOR FARMER'S KNOWLEDGE LEVEL IN PESTICIDE USAGE IN HAMAM AL-ALIL DISTRICT, NENAVAH GOVERNORATE, IRAQ. Ahmed Awad Talip Ali Al Talip And Abdusatar Omar O. Al-Tai. College of Agriculture and Forestry, University of Mosul, Iraq, Email: Ibn_almosul@yahoo.com

The research aimed at estimating Farmers' knowledge level in the field of agricultural pesticide usage,

finding out significant differences between the farmers' knowledge level according to defined variables (age, education, the years of pesticide usage, agricultural invested area, farm owner ship, income, pesticide source, training course, agricultural information sources) and identifying problems facing Farmers' in using agricultural pesticides and controlling pests. The research sample included 220 Farmers, representing 10% of the total members of four agricultural farmers' cooperative societies (Al-Khithrania, Egmaila, Al-Kholood, Al-Hoda), Salahaddin Governerate. Special questionnaire was developed to estimate Farmers' knowledge level by using test method. After testing the validity of the questionnaire, the reliability was measured by using split-half method. The data were collected by personal interviews with the respondents. In order to analyze the data gathered, many statistical means were employed: Analysis of variance, person's correlation coefficient, Spearman-Brown equation, F-test, Duncan's test. Results revealed that 42.73% of respondents had moderate knowledge level of agricultural pesticides use, 40.45% had high knowledge level and 16.82% had low knowledge level. Results also revealed the existence of significant differences in the level of knowledge of those who are subjected to this research. The results did not reveal significant differences in level of knowledge according to pesticide source. The results also showed the various problems that faces farmers involved in using pesticide and agricultural pest control in Shirqat district. The first three problems were pesticide availability at agricultural offices, pesticide high price, and presence of bad pesticides in the market. It can be concluded that agricultural extension staff should disseminate the new knowledge and the latest information about pesticides among farmers of Shirqat district and hold training courses about pesticides use.

GT 3

MANAGEMENT OF PLANT PROTECTION DATA USING "RESEARCH DATA REPOSITORY". Hashem Abed and Joanna Arab, International Center for Agricultural Research in Dry Areas (ICARDA), P.O. Box 5466, Aleppo, Syria, Email: h.abed@cgiar.org

Research data is considered the lifeblood of the scientific research and the fruit of all valuable efforts and contributions to the plant protection sciences. Its value lies in its use and thus all scientists and researchers need to capture, preserve, protect, maintain and have easy access to these data. Research Data Repository is a web-based database system, which has been established in order to respond adequately to the demands of preserving research data and eventually create an integrated, adaptive, and accessible infrastructure for the vast and valuable resource of scientific and technical data. In this paper focus will be on preserving Integrated Pest Management research data.

GT 4

ELIMINATION OF BACTERIAL GROWTH IN PLANT TISSUE CULTURES. Kadhim M. Ibrahim, Biotechnology Dept., College of Science, Al-Nahrain University, Baghdad, Iraq, Email: kadhimm2003@yahoo.co.uk

Contamination associated with plant tissue cultures represents a serious problem for plant tissue culturists. Surface disinfection with the most commonly surface disinfectants may not always result in a contaminant free cultures. This is mainly due to endogenous contamination born inside tissues which makes surface disinfection inefficient system. The current paper deals with addition of antibiotics to the culture media to eliminate bacterial infection. Sensitivity discs may offer a reliable method for identifying the proper antibiotic to be added to the culture medium. Results revealed that tetracycline, ampicilin, or chloramphenicol at 100, 25 or 50 mg, respectively, were efficient in inhibiting growth of *Coryneform* spp. in callus cultures when were supplemented to the culture medium. Details of callus initiation and maintenance will be discussed.

GT 5

EFFECT OF POTASSIUM PERMANGANATE ($KMNO_4$) ON THE PHYSIOLOGICAL DISORDERS OF GOLDEN DELICIOUS AND RED DELICIOUS APPLE FRUITS. Nameer N. Fadhil and Sarfaraz F. Ali, College of Agriculture and Forestry, University of Mosul, Iraq, Email: namer_ff@yahoo.com

The study was conducted on apple cvs. Golden Delicious and Red Delicious grown in Ineshky orchard Dohuk, Iraq, and the central laboratory of the college of Agriculture, Dohuk University, with the objective to study the effect of dipping apple fruits in potassium permanganate ($KMnO_4$) on storage characteristics and physiological disorders. Apple fruits harvested in 24 and 27 October of 2005 and 2006 seasons were divided into five groups, three of them were dipped in 1% and 2% potassium permanganate for one minute, dried, and placed in non-perforated transparent polyethylene bags and closed tightly, while the other two groups were placed in similar bags with 10 or 20g $KMnO_4$/bag in Petri dishes. The five groups were stored in cool rooms at 0±1°C and 85-90% RH for 6 months. Results showed that treatment with $KMnO_4$ significantly preserved the fruit firmness and increased acidity of fruits compared to non-treated, but significantly decreased the rate of respiration especially when fruits were dipped in 2% $KMnO_4$. Also, treatment with $KMnO_4$ (especially 20 g $KMnO_4$/bag) reduced significantly superficial scald incidence and significantly reduced fruits senescence breakdown in particular for Red Delicious fruits. Some non treated Golden Delicious apple fruits were cracked after storage during 2006, while treated fruits with KMnO4 were less affected.

GT 6

MORPHOLOGICAL AND HISTOPATHOLOGICAL STUDY OF MOST IMPORTANT LICHENS INFECTING CITRUS TREES IN EGYPT. Ali M. Koriem, Efficient Productivity Institute, Zagazig University, Egypt, Email: Ali.Koriem@yahoo.com

The harmful effect of the epiphytic lichens, as one of the plant pathogens, on higher plants, especially trees, have been reported recently. Collected lichen samples from neglected citrus orchards, led to the identification of two lichen species which belong to the genus *Xanthoria* (*X.*

parietina L. and *X steineri* Lamb.), and another one species belongs to the genus *Diploicia* (*D.canescens* Dicks.). The freezing microtome was used to study the histopathological characters as well as the physical attachment between lichen thallus and the tissues of citrus tree bark and twigs. For lichens *X. parietina* and *X. steineri*, no penetration was noticed except the loosely cork layer in the point of contact, while lichen *D. canescens*, superficial penetration by the lichens hyphae through the cork tissue was noticed which caused disruption and separation of the cork layer.

GT 7

THE POTENTIAL USE OF MAGNETIC WATER IN AGRICULTURAL APPLICATIONS INCLUDING PLANT PROTECTION. Mothafer Ahmed Al-Mosuly, College of Agriculture and Forestry, Mosul University, Mosul, Iraq, Email: mothafermosuly@gmail.com

The idea of magnetic water came from Michael Faraday, 120 years ago, when he noted that water passing through conductive medium will generate a weak electrical charge. This discovery was the foundation on which researchers investigated the use of magnetized water, which passed through a magnetic field, or by placing the magnet inside it or near it for a period of time. Magnetic field can change many of the water properties. The process of magnetization of water is working to strengthen the properties of water through the organization of electrical charges. This leads to a change in 14 water characteristics, such as increase in oxygen dissolved in water, increase the capacity to solubilize salts and acids, crystallography, polymerization, surface tension, the change in the speed of chemical reactions, evaporation, wettabilty, flexibility, optical properties, electrical insulation and penetration. Magnetized water is used today at the global level for treatment of diseases affecting humans and animals. In the agricultural area, magnetized water was found to reduce attack with insect pests and diseases by 60 to 70%. Research also pointed out that such use can increase such attack. The current study tries to explain the contradiction in the use of magnetic water. Magnetic water with northern polarization stopped the growth of bacteria and viruses, whereas magnetic water with southern polarization strengthened the activity of micro-organisms, while magnetic water with both types of polarization had no impact. The current study explains how to prepare three types of magnetic water and identify the negative effects of excessive use and how to test water magnetization and determine life span of the magnetic water and economic feasibility of its use.

GT 8

BIOTIC AND ABIOTIC INJURIES TO NATURAL FORESTS IN SHAQLAWA-ARBIL, IRAQ. Zana Abubakr Ahmed, Othman Omer Ali **a**nd Abdul bast Muhamad Amin, College of Agriculture, University of Salahaddin, Arbil, Iraq, Email: Iraqforest@yahoo.com

This study was conducted to understand the effect of biotic and abiotic stresses on the natural forests in the Safeen mountain at Shaqlawa/Erbil governorate, Iraq. 53 insect species were recorded, 32 belonged to the order Coleoptera; 14 species in the family Buprestidae, 5 species in Cerambycidae, 4 species in Cetonidae, 3 species in Prionidae, 3 species in Meloidae, 2 species in Melothidae, one species in Carabidae; 12 species belonged to order Lepidoptera; 4 species in the family Sphingidae, 2 species in Phalaenidae, 2 species in Satyridae, 2 species in Pieridae, one species in Lymantriidae, one species in Saturnidae and 9 species belonged to the order Hymenoptera, all belonged to family Cynipidae. In addition, the presence of fungal infection of 2 species, *Ganoderma* and *Crepidotus* on oak trees was detected. This study also identified species of the forest trees and shrubs, annual and biennial herbs and perennial herbs in the region. *Quercus aegilops* L., *Quercus Infectoria* Olivr, *Pyrus syriaca* Boiss, *Crataegus azarolus* L., *Prunus microcarpa* C.A. Mey in addition to 14 annual species, 3 biennial, 5 perennial and 11 Shrubs wer reported.