ARAB AND NEAR EAST
PLANT PROTECTION NEWSLETTER

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CONTENTS

EDITORIAL

ECONOMIC VIEW TO PEST CONTROL

Losses due to agricultural pests are known to mankind since ages, and the archives are full with famine stories caused by pest's attack such as locust. In addition, insect pests involvement in the spread of human diseases is well documented. Such losses used to occur mainly because at that time no effective pest control measures were available. However, in spite of the significant pest management knowledge available at present, losses caused by pests continue, and spread from one region to another and across continents is becoming more common, because of the travel facilities available and the increase in international trade of food products. Furthermore, many of the secondary pests became major pests due to the natural imbalance between the pests and their natural enemies resulted from unwise human interventions.

The loss in agricultural production caused by pests is estimated worldwide by 35-45%, and during the last few decades the use of pesticides was intensified as the major control component that can give quick results. However, the misuse of these chemicals led to increase contamination and accumulation of toxic residues in the food products, in the soil and water, and consequently in the environment that we all live in.

It is very important to take a close economic view to pest control. When we estimate the control cost of a specific pest, which sometimes is higher than all other inputs for agricultural production, and varies based on the pest in question, the region and the growing season. Costly decisions to control a specific pest are usually been taken at times when such approaches could have been avoided through better knowledge of pest ecology and adopting ways to accurately predict future attacks. Often the risk of having a severe attack by a specific pest is a limiting factor to produce a crop in a specific region or plant it at a specific date. In high risk regions, the cost of pest control is higher than the anticipated income.

Because of the lack of qualified individuals in estimating crop losses due to pests attack, it is necessary to rely on the farmers, even though the figures provided by them are usually not accurate because of lack of skill to estimate losses caused by the pest in question, especially when the damage is not visible, as in the cases of internal fruit damage. Farmers also have a tendency to over estimate potential losses caused by a pest, especially when it is new, or tend to ignore it after getting used to its presence. On the other hand, farmers estimate high losses from a pest at a time when losses are normal and infestation level do not justify control application. In addition, farmers in general cannot identify the natural enemies associated with the pest and their levels which often can be high enough to maintain the pest numbers at a level that do not require chemical intervention. Farmers need to develop the attitude that not all insects observed in a field are damaging to the crop, and here is the importance of extension service which should empower farmers with the knowledge that help them make better decisions in their own fields.

In general, the important factors which affect crop productivity are the climate and damage caused by pests, which can often be managed through the use of reliable forecasting systems and the availability of integrated pest management options. The more efficient these options are in reducing pest damage, higher yields with lower production costs and better quality products are expected.

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This page is an open forum for all members of the Arab Society for Plant Protection to express their views to further develop the plant protection profession and enhance its positive role in agricultural development in the Arab and Near East Region.

DISEASE AND PEST OUTBREAKS

EGYPT

First Report of *Peach latent mosaic viroid* Infecting Peach in Egypt. *Peach latent mosaic viroid* (PLMVd) is a widespread pathogen of stone fruit trees in some European and Mediterranean countries and also in North America. To access the presence of the viroid in Egypt, a survey was conducted that covered five commercial peach orchards in the El Khatatba Region in Al Minufiya Governorate. During 2003 and 2004, 73 peach trees (cv. Florida grafted on Nemagard rootstock) were visually inspected and sampled. No symptoms characteristic of PLMVd infection, such as mosaic, delayed growth, or fruit suture cracking, were observed. All samples were tested for the presence of PLMVd using dot-blot hybridization and reverse transcription (RT)-PCR. Only 1 of the 73 peach trees was positive for PLMVd using these detection techniques. The RT-PCR product was of the size expected for PLVMd and was cloned and sequenced. The 339 nucleotide sequence was deposited in GenBank as Accession No. DQ839564. The sequence of this Egyptian PLMVd isolate was 94% identical to the reference PLMVd variant (GenBank Accession No. M83545) and most closely (95%) related to Canadian isolate variant 16 (GenBank Accession No. AJ550911). Such a low incidence compared with other countries may be because the survey was restricted to a limited number of samples, conducted on newly reclaimed lands where no sources of infection existed before, and material with relatively low PLMVd incidence might have been used for planting. Although the incidence of PLMVd was low in this survey, the occurrence represents a threat to the stone fruit tree industry in this country and regular screening of PLMVd in certification programs is suggested. To our knowledge, this is the first report of PLMVd on peach in Egypt. [M. Hassan, P. Rysanek, M. Malfitano and D. Alioto (Czech Republic & Italy). Plant Disease, 92(4): 649, 2008].

IRAN

First Report of '*Candidatus* Phytoplasma trifolii'-Related Strain Associated with Safflower Phyllody Disease in Iran. During a survey in 2003, safflower plants (*Carthamus tinctorius*) with phyllody symptoms were observed in production fields in several districts of Fars and Yazd provinces in Iran. Affected plants showed floral virescence, phyllody, proliferation of axillary buds, and little leaf symptoms. Incidence of the disease was less than 10%. Direct and nested PCR assays were used to verify association of phytoplasma with the disease. Although safflower phyllody disease has been previously reported in Israel, the associated phytoplasma was classified as a strain of the aster yellows subgroup 16SrI-B. To our knowledge, this is the first report of safflower as a host of a '*Ca*. Phytoplasma trifolii'-related strain. [M. Salehi, K. Izadpanah and M. Siampour (Iran). Plant Disease, 92(4): 649, 2008].

Characterisation of a Strain of *Potato virus Y* Causing Eggplant Mosaic in Southern Iran. Mosaic disease of eggplant (*Solanum melongena* L.) is common in many fields of southern Iran. A virus isolated from diseased plants in the Boushehr Province was characterised by biological, serological, physiochemical and molecular studies. The virus was mechanically transmissible to *Nicotiana tabacum* cv. Turkish and several other solanaceous species and to *Chenopodium amaranticolor* and *C. quinoa*. Purified preparations of the virus contained flexuous rod-shaped particles. Two aphid species, *Myzus persicae* and *Aphis gossypii*, transmitted the virus between Turkish tobacco plants. An antiserum raised against purified virus preparation was used in the detection of the virus. Molecular weights of the virus genome and the coat protein (CP) were estimated at $3.1–3.2 \times 10^6$ and 36×10^3 Da, respectively. The 3′ region of the virus genome, including the CP and the untranslated region (UTR), was amplified using two pairs of general primers of the family *Potyviridae*. Sequence information identified the virus as a strain of Potato virus Y (PVY), designated eggplant strain of PVY (PVY-Eg), with the highest sequence homology to a tomato strain of PVY (PVY-LY84.2) from Spain, and a somewhat lower homology to an Indian isolate of Eggplant mottle virus belonging to the PVY^O subgroup. Cluster dendrograms based on CP amino acid and 3′-UTR sequences placed PVY-Eg within the PVY^{NP} subgroup. This is the first report on the characterisation of a PVY^{NP} strain infecting eggplant in Iran. [M. S. Sadeghi, S.A.A. Behjatnia, M. Masumi and K. Izadpanah (Iran). Australasian Plant Pathology, 37(1): 79–86, 2008].

JORDAN

Detection and Molecular Characterization of *Squash leaf curl virus* (SLCV) in Jordan. *Squash leaf curl virus* (SLCV) was detected for the first time in Jordan using degenerated oligonucleotide primers. Two isolates of the virus, SLCV-E and SLCV-R, were detected using specific oligonucleotide primers in symptomatic *Cucurbita pepo*. SLCV was also found to occur naturally in *Malva parviflora*, which showed severe leaf curling, yellowing and stunting of the whole plants. The full-length genomes of *Squash leaf curl virus*-Malva (SLCV-Malva) isolate were amplified using the bacteriophage Φ DNA polymerase enzyme. Nucleotide sequence analysis showed that SLCV-Malva shared high nucleotide identity (98% and 97%) with SLCV-EG and SLCV-E from Egypt and USA, respectively. A survey using dot-blot hybridization indicated that squash leaf curl disease occurred in all surveyed areas. The highest

disease incidence (95%) was recorded in Dir Alla area, whereas disease incidence of 69% was detected in squash samples collected from North Ghor. [A. Al-Musa, G. Anfoka, S. Misbeh, M. Abhary and F.H. Ahmad (Jordan & USA). Journal of Phytopathology, 156(5): 311–316, 2008]

LEBANON

Incidence of Viruses and Nematode Vectors in Lebanese Vineyards. Surveys for virus diseases and nematode vectors were conducted in 95 commercial vineyards of four different Lebanese districts (Bekaa valley, Mount Lebanon, North and South Lebanon). Out of 915 randomly collected grapevine samples tested by ELISA, 511 (55.8%) were infected by one or more viruses. *Grapevine virus A* (30.9%) and *Grapevine leafroll-associated virus 3* (23.7%) were the prevailing viruses, followed by *Grapevine fleck virus* (15.1%), *Grapevine leafroll-associated virus 1* (10.6%) and *Grapevine leafroll-associated virus 2* (8.7%). *Arabis mosaic virus* was not found whereas *Grapevine fanleaf virus* (GFLV) and *Grapevine virus B* were little represented. The most important Lebanese grapevine varieties, i.e. Maghdouchi, Tfeifihi and Beitamouni, had average infection rates between 70% and 87%, whereas varieties of foreign origin had a better sanitary status with the exception of cvs Cinsaut and Thompson (*c.* 83% infection). *Grapevine rupestris stem pitting-associated virus* was detected in 79 of 90 (87.8%) samples tested by RT-PCR and closteroviruses were recorded in seven of 70 (10%) vines tested. One of these viruses was identified as *Grapevine leafroll-associated virus 5* by ELISA and partial genome sequencing. No nepoviruses other than GFLV were detected in any of 90 samples tested using three different sets of degenerate primers. *Xiphinema index* was found in 23 of 89 soil samples collected from vineyards, and in three of 15 samples collected primarily under fig trees in fields where no grapevines were grown. [E. Hanna, M. Digiaro, T. Elbeaino, E. Choueiri, J. Jawhar and G. P. Martelli (Lebanon & Italy). Journal of Phytopathology, 156(5): 304–310, 2008].

MOROCCO

First Report of Fire Blight Caused by *Erwinia amylovora* on Pear, Apple, and Quince in Morocco. In the spring of 2006, symptoms similar to those of fire blight were observed on pear (*Pyrus communis*), apple (*Malus pumila*), and quince (*Cydonia oblonga*) trees at the flowering and early fruit set stages in an orchard in the Meknès Region, 140 km east of Rabat. Symptoms consisted of i) water-soaked flowers that became wilted, shrivelled, and then turned brown to black; ii) “shepherd's crook” of the shoots; iii) dark green pedicles that became brown to black; iv) wilted and shrivelled leaves that turned brown but remained attached; and v) water-soaked fruits that became brown to black with droplets of exudates on the surface. In an effort to eradicate the disease, 42 ha of pears were dug up and burned in October 2006. In the spring of 2007, fire blight reappeared in the same orchard and was encountered in five other orchards with disease incidences from 1 to 60%. Three hectares of pears were removed and burned. Samples of diseased young shoots and fruits were collected. Bacteria were isolated either from washed tissues or directly from bacterial ooze on the host with King's B (KB) and semiselective CCT media (1,4). Colonies with morphology similar to that of *Erwinia amylovora* were purified through repetitive plating on KB medium. The isolates were first characterized based on colony morphology and biochemical and physiological tests. Thirty-three isolates were identified as *E. amylovora* by immunofluorescence microscopy with a polyclonal antibody (IF), double-antibody sandwich indirect-ELISA, and PCR. Pathogenicity was performed with a detached-leaf test tube assay. The occurrence of fire blight in Morocco creates a serious threat to the pome fruit industry. [M. Fatmi, M. Bougsiba, and H. Saoud (Morocco). Plant Disease, 92(2): 314, 2008].

OMAN

First Report of *Pythium splendens* Associated with Severe Wilt of Muskmelon (*Cucumis melo*) in Oman. Muskmelon (*Cucumis melo* L.) is one of the most important vegetable crops in Oman. In the fall of 2004, sudden wilt was observed in muskmelon grown in a field at Sultan Qaboos University, Muscat. The disease was characterized by rapid collapse of vines and muskmelon plants at the fruit production to maturation stage, associated with brown-to-dark brown rotted primary and secondary roots. The disease resulted in death of more than 85% of muskmelon plants in that field. On potato dextrose agar (PDA), with published methods (1), *Pythium* spp. were consistently isolated from crowns and roots of plants showing wilt symptoms. Further identification of five isolates of *Pythium* with sequences of the internal transcribed spacer (ITS) of the ribosomal DNA (1) using ITS1 and ITS4 primers produced a nucleotide sequence 806 bp long, which was identical among all isolates. Comparison with sequences deposited at the National Center for Biotechnology Information revealed 100% nucleotide similarity to a previously published sequence (Accession No. DQ381808) of isolate P091 of *P. splendens* from cucumber from Oman, for which identification has also been confirmed by morphological characteristics. The sequence of one isolate of *P. splendens* (P222) was assigned GenBank Accession No. EF546436 and deposited at CBS under Accession No. CBS121855. In pathogenicity tests conducted in a greenhouse, *P. splendens* induced damping-off symptoms on 7-day-old muskmelon seedlings and also reproduced the same wilt symptoms observed in the field when 2-month-old muskmelon plants were inoculated with 3-day-old *P. splendens* grown in PDA. To our knowledge, this is the first report of association of *P. splendens* with wilt of muskmelon in Oman. [A. M. Al-Sa'di, M. L. Deadman, F.A. Al-Said, I. Khan, M. Al-Azri, A. Drenth, and E. A. B. Aitken (Oman & Australia). Plant Disease, 92(2): 313, 2008].

SAUDI ARABIA

First Report of a 16SrI, *Candidatus* Phytoplasma asteris Group Phytoplasma Associated with a Date Palm Disease in Saudi Arabia. Date palm (*Phoenix dactylifera*) has been affected by a disease called Al-Wijam in Saudi Arabia. The main symptoms are leaf stunting, yellow streaking and a marked reduction in fruit and stalk size, which progresses to no fruit production in the final stages. A putative lethal yellowing like 16SrIV phytoplasma has previously been reported in Al-Wijam diseased palms at Al-Hassa oasis, Eastern region (El-Zayat *et al.*, 2002). More than 30 leaf samples were collected from palms with and without Al-Wijam symptoms and 60 *Cicadellidae* specimens in a survey at Al-Hassa oasis during 2003–2005. Total DNA was extracted from plants and batches of three insects, and indexed by a nested PCR with phytoplasma generic primers P1/P7-R16F2n/R16R2. PCR products were characterized by RFLP and direct sequencing, and the 16S rDNA sequences were compared with those of other reference phytoplasmas. Phytoplasma rDNA was amplified from 28 palms with symptoms and 16 batches of insects. No PCR products were obtained from symptomless palms. RFLP patterns for all the PCR amplifications were identical following digestion with *Rsa* I, *Hinf* I, *Taq* I, *Hpa* II, *Kpn* I, *Dra* I, *Hha* I and *Sau3A* I enzymes. The 16S rDNA sequences of the phytoplasmas identified in date palm (DQ913090) and *Cicadulina bipunctata* (DQ913091) were 100% identical and showed 98% homology to that of Aster yellows phytoplasma (AF322644) from the 16SrI, *Candidatus* Phytoplasma asteris group. This is the first report of a *Ca.* P. asteris phytoplasma associated with a disease in date palm in Saudi Arabia, and the identification of a potential vector of Al-Wijam disease, which will contribute to the future control of the disease in Al-Hassa. Further studies will be required to know the factors involved in the epidemiology of Al-Wijam disease throughout the country. [K. Alhudaib, Y. Arocha, M. Wilson and P. Jones (Saudi Arabia & UK). Plant Pathology, 57(2): 366, 2008].

SYRIA

The First Record and Distribution of the Fire Blight Pathogen *Erwinia amylovora* in Syria. A survey of all major pome fruit growing regions was conducted during 2005 and 2006 to establish whether *Erwinia amylovora*, the causal agent of fire blight, was 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 the isolates were confirmed to be *E. amylovora* by PCR using primers specific for this bacterium. One set of primers amplifies a fragment of the native plasmid (pEA29) and a second set amplifies a fragment involved in the synthesis of amylovoran, the structurally unique exopolysaccharide of this bacterium. Fire blight was found to prevail in the Al-Zabadani region (Rif Damascus), an area with a moderate temperature range (10–29°C) and high relative humidity (above 70%) during the blossom 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. [H. Ammouneh, M. I. E. Arabi and A. Al-Daoude (Syria). Australasian Plant Pathology, 37(2) 137–140, 2008].

TUNISIA

Incidence and Distribution of *Verticillium dahliae* Races Infecting Tomato in Tunisia. Surveys for Verticillium wilt in 375 tomato greenhouses in the center and coastal regions of Tunisia, from 2004 to 2006 indicated that this disease is widespread in the regions of Nabeul, Sousse and Monastir but not in Mahdia and Sidi Bouzid areas. It occurs in 43% of the surveyed greenhouses. The mean disease incidence was 59% while the mean severity of the disease ranged from 0 to 4 with an average of 1.42 (according to a 0-4 scale) in the surveyed regions. The physiological races of 75 *Verticillium dahliae* isolates, recovered from susceptible and race 1-resistant cultivars in the surveys, were identified using two differential tomato cultivars. Among these isolates, 44 were race 2, 29 race 1, and 2 nonpathogenic. [H. Jabnoun-Khiareddine, M. Daami-Remadi, F. Ayed and M. El Mahjoub (Tunisia). Tunisian Journal of Plant Protection, 2: 63-70, 2007].

First Report of *Melon necrotic spot virus* on Melon in Tunisia. During April 2006, melon (*Cucumis melo*) showing necrotic spots on leaves, occasionally followed by death of affected plants, were observed in commercial, plastic houses heated by geothermic water in Kebili (southern Tunisia). Crude sap from leaves with symptoms was used for mechanical inoculation onto a set of differential host plants. Necrotic local lesions on inoculated leaves or cotyledons and systemic necrotic spots were observed on melon plants. Necrotic local lesions and no systemic symptoms were produced on cucumber (*Cucumis sativus*). In contrast, no symptoms were observed on non-cucurbit plants. The observed symptoms and host range were similar to those described for *Melon necrotic spot virus* (MNSV). The presence of MNSV was established by DAS-ELISA using a specific antiserum prepared at INRA. MNSV was detected in seven samples with symptoms. Virus identity was confirmed by RT-PCR using MNSV specific primers. MNSV is endemic in many melon and cucumber production areas; it has been reported in the Americas, Japan and Europe. It is transmitted by the fungus *Olpidium bornovanus* and through the seed with the assistance of its vector. Its prevalence in protected crops in Tunisia might be related to intensive and repeated melon cultivation in plastic houses. This is the first report of MNSV in Tunisia or indeed in any African country. [S. Yakoubi, C. Desbiez, H. Fakhfakh, C. Wipf-Scheibel, M. Marrakchi and H. Lecoq (Tunisia & France). Plant Pathology, 57(2): 386, 2008].

First Report of Verticillium Wilt of Artichoke Caused by *Verticillium dahliae* in Tunisia. In a survey of verticillium wilt in Chott Mariem region, situated in the eastern part of central Tunisia, wilt symptoms were observed on field-grown artichoke (*Cynara scolymus*) during the spring of 2006. Diseased plants showed stunting, yellowing, wilting and desiccation of the leaves, with extensive vascular browning in the stem. Discoloration was observed in the vascular tissue of roots, crown and leaves. Diseased plants produced a few smaller, deformed buds and, in severe cases, buds were discoloured with dried outer bracts. A high proportion of infected plants were seen in most fields examined near to harvest. Isolates from diseased plants were identified as *Verticillium dahliae* on the basis of microsclerotium production and pathoginicity tests. The appearance of *V. dahliae* in artichoke fields in Tunisia poses a threat to this and other economically important crops (potato, tomato, melon and eggplant), which are all susceptible. These crops are usually grown in the same fields as are used for artichokes but no rotations with *Verticillium*-resistant crops are used. The disease has been previously reported in Italy, France, Greece and California but this is the first report from Tunisia. [H. Jabnoun-Khiareddine, M. Daami-Remadi, F. Ayed and M. El Mahjoub (Tunisia). Plant Pathology, 57(2): 377, 2008].

TURKEY

Occurrence of *Cherry green ring mottle virus* in Turkey. *Cherry green ring mottle virus* (CGRMV) infects several *Prunus* species including sweet cherry (*P. avium*), sour cherry (*P. cerasus*), oriental flowering cherry (*P. serrulata*), peach (*P. persica*) and apricot (*P. armeniaca*) in fruit-growing regions throughout North America and Europe. Until recently, routine detection of CGRMV was solely based on graft assay to the woody indicator cv. Kwanzan, the only method accepted by inspection services during quarantine and certification procedures. A reverse transcription polymerase chain reaction (RT-PCR) was used for detection. Leaf samples were collected for the 2006 growing season from 34 sweet cherry trees originating from the eastern Anatolia region of Turkey. CGRMV was identified in 11 of the 34 sweet cherry samples, yielding a PCR product of the expected size (366 bp). PCR products from six cherry trees were directly sequenced and showed over 85% nucleotide sequence identity to sequences of other CGRMV isolates in the databases. This is the first record of the presence of CGRMV in Turkey and provides a starting point for investigation of the incidence of the virus in sweet cherry orchards of Turkey. [H. M. Sipahioglu, M. Usta and M. Ocak (Turkey), Plant Pathology, 57(2): 392, 2008].

First Report of *Fusarium dimerum* on *Solanum tuberosum* in Turkey. Potato (*Solanum tuberosum*) is the most important crop in Eastern Anatolia region of Turkey. In 2005, a routine disease survey was conducted in potato fields in seven districts in Kars, Turkey. Leaf lesions were frequently observed in different fields in the Akyaka district at one location (Demirkent village). The observed symptoms consisted of irregularly-shaped, small dark brown-to-black leaf spots that expanded and coalesced. Leaves displaying symptoms were surface disinfected for 2 min in 2% NaOCl, and incubated on potato dextrose agar (PDA) at 25ºC. A *Fusarium* species was consistently isolated from the leaves (67% of the samples) and single spore cultures from these colonies were established on PDA and water agar to assist species identification. The fungus was identified as *F. dimerum* based on its micro-morphology and cultural features. To satisfy Koch's postulates, conidia were harvested from 15-day-old cultures grown on PDA. A conidial suspension (5×10^6 conidia per mL) was sprayed onto leaves of *S. tuberosum* cv. Agria plants (4-weeks-old). Both inoculated plants and control plants (inoculated with sterile water) were covered with plastic bags for 72 h in a glasshouse at 23 ± 2^oC. Symptoms, similar to those originally observed in the field, began to appear on the leaves 9 days after inoculation. No symptoms developed on control plants. The fungus was successfully reisolated from inoculated plants with symptoms. *Fusarium dimerum* has been recorded previously on *S. tuberosum* in Australia and USA, but this is the first report of *F. dimerum* on *S. tuberosum* in Turkey. [C. Eken, İ. Hasenekoglu, İ. Çoruh, E. Demirer and E. Demirci (Turkey). Plant Pathology, 57(2): 378, 2008].

First Outbreak of Bacterial Black Rot on Cabbage, Broccoli, and Brussels Sprouts Caused by *Xanthomonas campestris* pv. *campestris* in the Mediterranean Region of Turkey. During warm and humid periods in the winters of 2004 to 2006, severe leaf necrosis and vein rot symptoms were observed on cabbage (*Brassica oleracea* var. *capitata* L.), broccoli (*Brassica oleracea* var. *italica* Plenck.), and Brussels sprouts (*Brassica oleracea* var. *gemmifera* D.C.) in the Mediterranean Region of Turkey. Symptoms were characterized by yellow, V-shaped areas of the leaf margin, with the internal tissue turning from brown to black. Infected seedlings were also observed in commercial nurseries in Adana with a disease incidence of nearly 10 to 25%. Isolations made from leaves and veins of the affected plants on yeast dextrose calcium carbonate agar yielded yellow, mucoid, and convex colonies. Twenty isolates recovered from diseased leaf samples were selected at random to identify the causal organism. All isolates were nonspore forming, gram negative, rod shaped, motile, aerobic, oxidase-negative, catalase-positive, and amylolytic-positive. All isolates induced hypersensitive responses on tobacco (*Nicotiana tabacum* cv. Samsun). The isolates were identified as *Xanthomonas campestris* pv. *campestris* on the basis of fatty acid methyl ester (FAME) profiles determined by Sherlock Microbial Identification System software (Microbial ID, Newark, DE) and indirect ELISA. The similarity indices for the FAME analysis ranged from 80 to 94%. Indirect ELISA with a polyclonal antibody (Agdia, Elkhart IN; BRA 97000/0500) further confirmed the identity of the pathogen in both pure culture and infected plant. The mean absorbance values for three replications of indirect ELISA tests ranged from 1.411 to 3.508 at a wavelength of A_{405}. Pathogenicity of the isolates was tested on 5-week-old cabbage plants by spray inoculation using bacterial suspensions (10^7 CFU/ml)

prepared in saline buffer (0.85% NaCl). Sterile saline buffer was sprayed on negative control plants. Inoculated and control plants were maintained for 5 days at 25°C and 70% relative humidity to observe symptom development. No symptoms developed on negative control plants. The bacterium was reisolated from inoculated cabbage plants and identified as *X. campestris* pv. *campestris* by FAME and an ELISA test. To our knowledge, this is the first report of the occurrence and outbreak of *X. campestris* pv. *campestris* in the Mediterranean Region of Turkey. [M. Mirik, F. Selcuk, Y. Aysan, F. Sahin **(**Turkey). Plant Diseases, 92(1): 176, 2008].

RESEARCH HIGHLIGHTS

EGYPT

Use of the Nematode *Steinernema feltiae* Cross N 33 as a Biological Control Agent against the Peach Fruit Fly *Bactrocera zonata.* Laboratory experiments were performed to determine the efficiency of the entomopathogenic nematode *Steinernema feltiae* Cross N 33 against second and third instar larvae and 1, 4 and 6 days old pupae of the peach fruit fly *Bactrocera zonata*. Mortality rates after 3 exposure times ranged from nil to 24%, nil to 40% and 8 to 56% for 2nd instar larvae and 8 to 72%, 28 to 84% and 32 to 88% for 3rd instar larvae, whereas mortality rates of pupae ranged from 4 to 56% for 1 day old pupae, nil to 32% for 4 day old pupae and nil to 20% for 6 days old pupae. Slope, LC20, LC50, and LC90 were estimated. Slope values were 1.25 and 1.44 for 2nd instar and 3rd instar larvae and 1.6, 1.1 and 0.97 for 1, 4 and 6 days old pupae, respectively. Results demonstrated that 3rd instar larvae and 1 day old pupae of *B. zonata* were significantly more susceptible to nematode infection than 2nd instar larvae and 4, 6 days old pupae at all tested concentrations. [M.F. Mahmoud and M.A.M. Osman (Egypt). Tunisian Journal of Plant Protection, 2: 109-115, 2007].

Integration of *Pseudomonas fluorescens* and Acibenzolar-*S*-methyl to Control Bacterial Spot Disease of Tomato. *Xanthomonas axonopodis* pv. *vesicatoria* was isolated from infected tomato seedlings grown in an open field in Egypt. All the tested isolates infected tomato plants but with different degrees of disease severity. In an attempt to manage this disease, tomato seeds and/or seedlings were treated with an antagonistic local isolate of *Pseudomonas fluorescens* as a suspension or its formulation or acibenzolar-*S*-methyl (BTH). When the above three treatments were applied to tomato seeds under laboratory conditions, they improved seed germination and seedlings vigour relative to control seeds treated with sterile distilled water and pathogen but *P. fluorescens* culture was the most effective. Under greenhouse and field conditions, combinations of the above treatments were used. All treatments significantly reduced disease severity of bacterial spot in tomato relative to the infected control. The biggest disease reduction compared to seedlings inoculated with the pathogen alone resulted from a foliar application of *P. fluorescens*. Combined application of *P. fluorescens* or its formulation with BTH reduced the pathogen population and increased seedling biomass and tomato yield relative to control seedlings. [Kamal A.M. Abo-Elyousr and Hoda H. El-Hendawy (Egypt). Crop Protection, 27(7): 1118-1124, 2008].

Efficacy of the Entomopathogenic Nematode *Steinernema feltiae* cross N_{33} against Larvae Pupae of Four Fly Species in the Laboratory. The susceptibility of larval, pupal and adult stage of the flies *Lucilia sericata, Callipbora vicina, Musca domestica* and *Stomoxys calcitrans* to the entomopathogenic nematode, *Steinernema feltiae* Cross N_{33}, was studied under laboratory conditions for 25±1°C, 60±10% RH. and 12:12 L/D h photoperiod. Bioassays of second and third instar larvae of the flies were conducted in Petri dish and pupae were bioassayed in soil and manure. Mortality of second and third instar maggots in all fly specifies in creased significantly with the increase of *S. feltiae* concentration and time post-application. *Lucilia sericata* was the most susceptible second instar to S. *feltiae* with LC_{50} and LC_{90} of 47.04 and 193.8 IJs, respectively. *Musca domestica* had the most susceptible third instar maggots with LC_{50} and LC_{90} of 75.1 and 292 IJs, respectively. In soil manure, the rates of infected pupae and fly emergence differed significantly among the tested concentrations which each fly species. Rates of infected pupae and LC_{50} and LC_{90} were consistently higher in soil than in manure. The reproduction of *S. feltiae* differed significantly among the tested fly species and was greatest in *Galleria mellonella (*control) followed by *L. sericata*. [M.F. Mahmoud, N.S. Mandour and Y.I Pomazkov (Egypt). Nematologia Mediterranea, 35: 221-226, 2007].

Catalase Inhibition as a Biochemical Marker of Resistance to Root-knot Nematodes in Tomato. Three tomato cultivars carrying the gene *Mi-1* which confers resistance to root-knot nematodes were compared to susceptible counterparts in terms of nematode reproduction and changes in catalase activity of roots due to nematode infestation. The resistant cultivars did not allow nematodes to reproduce significantly and maintained optimal growth parameters, whilst great nematode development and reproduction, along with loss plant fitness, were observed with the susceptible cultivars 40 days after inoculation. The resistant response was constantly associated with an inhibition of catalase activity in root extracts five days after inoculation, whilst such a change in enzyme activity was lacking in infested susceptible cultivars. Ultrafiltration of root extracts was carried out to get rid of free phenol and, in particular, salicylic acid. Such treatment did not alter catalsae inhibition in roots during the early stages of the incompatible plant-nematode interactions considered. The opportunity to use the method described in screening for resistance of core collections of tomato is discussed. [S. Molinari and M.M. Abd-Elgawad (Egypt). Nematologia Mediterranea, 35: 237-242, 2007].

JORDAN

Interaction between Plant Resistance and Predation of *Aphis fabae* (Homoptera: Aphididae) by *Coccinella septempunctata* (Coleoptera: Coccinellidae). The compatibility of host plant resistance to the black bean aphid in the faba bean crop with the use of the predatory ladybird beetle for biological control under laboratory and greenhouse conditions were investigated. Greenhouse experiments indicated that apteriform *Aphis fabae* reproduced on *Vicia faba major* (susceptible) and on 79S4 (partially resistant) cultivars at different rates. During the entire experimental period, aphids built up higher populations on *V. faba major* than on 79S4 cultivar. Aphid numbers on 79S4 were about 37% of those on *V. faba major* after 14 days. Release of a newly hatched *Coccinella septempunctata* larva onto each plant significantly reduced aphid density to 32.8% and 57.2% on *V. faba major* and 79S4 on day 14, respectively. Partial resistance combined with predation was more effective in lessening aphid numbers on faba bean than either the predator or the plant resistance alone. Laboratory tests showed that prey, *A. fabae*, raised on susceptible cultivar was more suitable for the predator as food source, enhancing the development rate and fecundity than aphids fed on the partially resistant cultivar. Consumption of aphids reared on susceptible cultivar significantly increased the female fecundity and fertility of *C. septempunctata* by 37.7% and 33.2%, respectively, more than those fed with aphids from partially resistant cultivar. Pre-oviposition time was shortened by 4.5 days, and oviposition period was extended by 11.4 days. Feeding the predator on aphids from the partially resistant cultivar prolonged the embryonic larval developmental time and the time required from egg laying to adult emergence by 19.8, 10.1 and 32.5 h, respectively. Adult longevity was not influenced by the aphid source. The results are discussed in relation to the compatible utilisation of host plant resistance and biological control in the integrated management of aphids. [H.K. Shannag and W.M. Obeidat (Jordan). Annals of Applied Biology 152(3), 331–337, 2008].

IRAN

Study on the Efficacy of Weed Control in Wheat (*Triticum aestivum* L.) with Tank Mixtures of Grass Herbicides with Broadleaved Herbicides. Field experiments were conducted in 2004–2005 to study weed control and winter wheat response to tank mixtures of a wide range of broadleaved herbicides currently applied in wheat in Iran with grass herbicides clodinafop propargyl and fenoxaprop-*p*-ethyl. These experiments were conducted at Gonbad, Shahroud and Dezfoul as a randomized complete block design with four replications. Herbicides were applied at wheat tillering. Results indicated that herbicide mixtures rarely resulted in antagonistic effects. Conversely, in some cases synergistic reactions were more distinct and better performance was achieved when herbicides were applied in mixture. It was found that clodinafop propargyl acted better than fenoxaprop-*p*-ethyl when tank mixed with broadleaved herbicides. Also, bromoxynil plus MCPA included treatments almost acted well with regard to the broadleaved weed control. Dual purpose herbicide iodosulfuron-methyl-sodium plus mesosulfuron-methyl at 21 g ai/ha was also a good option in controlling weeds. Overall, tank mixture bromoxynil plus MCPA at 600 g ai/ha with clodinafop propargyl at 96 g ai/ha resulted in the highest grain yield. [Mohammad Ali Baghestani, Eskandar Zand, Saeid Soufizadeh, Mohsen Beheshtian, Abdolaziz Haghighi, Alireza Barjasteh, Daryoush Ghanbarani Birgani and Reza Deihimfard (Iran). Crop Protection, 27(1): 104-111, 2008]

Detection of Aflatoxin in *Aspergillus* Species Isolated from Pistachio in Iran. To estimate the incidence contamination of fresh pistachio nuts by aflatoxigenic fungi in Iran, nut samples were collected from pistachio orchards in Kerman, Rafsanjan and Isfahan regions. Out of the 200 *Aspergillus* isolates obtained, 11 species were identified as *A. alliaceous*, *A. candidus*, *A. flavus*, *A. niger*, *A. niveus*, *A. ochraceus*, *A. parasiticus*, *A. tamari*, *A. terreus*, *A. unguis* and *A. wentii*. For detection of aflatoxin production ability of the isolates, three target genes, namely *aflR*, *aflJ*, and *omtB*, used in PCR amplification. In all the examined cases, the degenerate primer designed for amplification of *omtB* gene, named omtBII, was able to amplify an expected 611 bp fragment in aflatoxigenic isolates in this study and yielded the same result as those obtained from TLC analysis and fluorescence ability by application of methylated β-cyclodextrin in culture media. Using this procedure the significant incidence of aflatoxin-producing aspergilli was confirmed in pistachio nuts produced in different regions of Iran. The results indicated that PCR method described here, in combination with fluorescence assay, is a reliable and simple confirmatory test for monitoring pistachio nuts contaminated with aflatoxinogenic aspergilli. [P. Rahimi,B. Sharifnabi and M. Bahar (Iran). Journal of Phytopathology, 156(1): 15–20, 2008].

IRAQ

Influence of Temperature on Development of *Earias insulana* Boisd in Spring. Laboratory and field studies were conducted to investigate the influence of temperature on the development of the spiny bollworm *Earias insulana* Boisd (Lepidoptera: Noctuidaea). Lower threshold temperature and accumulated heat units required of each stage were also studied to determine the spring emergence pattern of the adults. Results indicated that the durations of stages were varied according to the temperature degrees. Egg to pupa lasted 65.2 days at 15°C without any chance for adult emergence. The longest duration for males was 22 days at 20°C and 52 days for females at 25°C. The highest number egg was 158.2 laid by females reared at 30°C. Sex ration found to be affected by temperature. The lower developmental threshold temperatures were 10.7, 10.5, 12.6 and 11.2°C for egg, larva, pupa and for egg to adult stages respectively. Heat units were 74.6, 227.2 and 166.6 for egg, larva and pupa stages development respectively. Spiny

bollworm need 454.5 heat units from egg to adult stage. Results of field studies indicated that moths began to emerge by the 11th of March with an accumulation of 257.4 heat units from February 1st. Accumulation of 459.8, 535.7, 677.2, 740.1 and 767.7 day-degree were necessary for the emergence of 10, 25, 50, 75 and 90% of adults respectively. The highest percent of adults emergence was 57% during May with sex ratio (females: males) for over wintering population was 1:1.3. Results of pheromone traps were nearly identical to that obtained from heat unit accumulation. Possible application of the information in predicting adults emergence and for control management the field was discussed. (A.S. Abdel-Razak, A.A. Ali and I.J.Al-Jiboory (Iraq). Iraqi Journal of Agriculture, 13(1): 1-9, 2008].

MOROCCO

***Ophiostoma ips* Colonization of Phloem and Sapwood in Maritime Pine Logs.** Blue stain fungi reduce the value of coniferous wood and are responsible for important economic losses in maritime pines (*Pinus pinaster*) in Morocco. However, all logs are not equally susceptible to fungal colonization. To better understand this variability, a study was carried out to determine if differences could exist between logs from different localities within Morocco. Maritime pine logs originating from localities in the High Atlas, Middle Atlas and Rif Mountains were compared regarding fungus and blue stain extension in their tissues. Logs were inoculated with fungus by crushing bark beetles (*Orthotomicus erosus*, a common vector of *Ophiostoma ips*) of various origins in holes made through the bark to the cambium. Histological observations were also made on fungus localization within sapwood tissues. Although differences existed between logs from the same localities, a significant effect of locality was observed on fungal and blue stain extension in both phloem and sapwood. Insect/fungus origin had no consistent effect on fungus extension. *O. ips* preferably colonized parenchyma rays, resin ducts and tracheids, passing from rays to tracheids through the simple pits and between tracheids through bordered pits, never invading the heartwood, and thus behaving the same way in maritime pine as do the other *Ophiostoma* fungi in other conifers. [D. Ghaioule, H. El Omari, M. Rahouti and F. Lieutier (Morocco & France). Tunisian Journal of Plant Protection, 2: 85-97, 2007].

OMAN

Genetic Diversity, Aggressiveness and metalaxyl Sensitivity of *Pythium aphanidermatum* Populations Infecting Cucumber in Oman. Seventy three isolates of *Pythium aphanidermatum* obtained from cucumber from four different regions of Oman and 16 isolates of muskmelon from the Batinah region in Oman were characterized for aggressiveness, sensitivity to metalaxyl and genetic diversity using AFLP fingerprinting. Twenty isolates of *P. aphanidermatum* from diverse hosts from different countries were also included in the study. Most isolates from Oman were found to be aggressive on cucumber seedlings and all were highly sensitive to metalaxyl ($EC_{50} < 0{\cdot}80\ \mu g\ mL^{-1}$). Isolates from cucumber and muskmelon were as aggressive as each other on both hosts ($P > 0{\cdot}05$), which implies a lack of host specialization in *P. aphanidermatum* on these two hosts in Oman. AFLP analysis of all isolates using four primer–pair combinations resolved 152 bands, of which 61 (~40%) were polymorphic. Isolates of *P. aphanidermatum* from Oman and other countries exhibited high genetic similarity (mean = 94·1%) and produced 59 different AFLP profiles. Analysis of molecular variance indicated that most AFLP variation among populations of *P. aphanidermatum* in Oman was associated with geographical regions ($F_{ST} = 0{\cdot}118$; $P < 0{\cdot}0001$), not hosts ($F_{ST} = -0{\cdot}004$; $P = 0{\cdot}4323$). These data were supported by the high rate of recovery (24%) of identical phenotypes between cucumber and muskmelon fields in the same region as compared to the low recovery (10%) across regions in Oman, which suggests more frequent movement of *Pythium* inoculum among muskmelon and cucumber fields in the same region compared to movement across geographically separated regions. However, recovering clones among regions and different countries may imply circulation of *Pythium* inoculum via common sources in Oman and also intercontinental spread of isolates. [A. M. Al-Sa'di, A. Drenth, M. L. Deadman and E. A. B. Aitken (Oman & Australia). Plant Pathology, 57(1): 45–56, 2008].

PAKISTAN

Susceptibility of Pakistani Populations of Cotton Aphid *Aphis gossypii* (Homoptera: Aphididae) to Endosulfan, Organophosphorus and Carbamate Insecticides. The Pakistani field populations of *Aphis gossypii* were assessed from 1996 to 2004 for their susceptibility to endosulfan, organophosphates (monocrotophos, dimethoate, profenofos, chlorpyrifos, quinalphos, parathion-methyl, pirimiphos-methyl and ethion) and carbamates (carbaryl, methomyl, thiodicarb, furathiocarb and carbosulfan) using a leaf-dip bioassay method. Generally, there was a very low resistance to endosulfan, monocrotophos, profenofos, chlorpyrifos, quinalphos, pirimiphos-methyl, carbaryl and methomyl, and a low to moderate resistance to dimethoate, parathion-methyl and thiodicarb. Some of the populations had a very high resistance to parathion-methyl, ethion and thiodicarb. However, no resistance was found to the carbamate aphidicides furathiocarb and carbosulfan. Correlation analysis demonstrated positive correlation of LC_{50}s within but not between the two insecticide groups (1) endosulfan, profenofos, chlorpyrifos and parathion-methyl and (2) monocrotophos, dimethoate, pirimiphos-methyl, ethion, carbaryl, methomyl and thiodicarb. This pattern of cross-resistance among organophosphates and carbamates, which are normally considered to have the same mode of action, is very useful for devising an insecticide resistance management strategy to mitigate resistance problems in *A. gossypii* and deserve further investigation at the resistance mechanism level. [Mushtaq Ahmadand M. Iqbal Arif (Pakistan). Crop Protection, 27(3-5): 523-531, 2008].

Comparison of Resistance to Cotton Leaf Curl Disease (Multan/Burewala) in *Gossypium hirsutum* L. Varieties and Breeding Lines. Twenty-four cotton varieties and advance breeding lines were evaluated for their resistance to cotton leaf curl disease (CLCuD; Multan/Burewala) under natural field and in glasshouse conditions for two consecutive years. Resistance was based on symptom expression and disease severity index. All the cotton genotypes exposed to the vector whitefly in the field and artificially infected by grafting manifested a high level of resistance against CLCuD (Multan) with the exception of genotype NIAB-999 that was moderately resistant. All the test varieties/breeding lines were highly susceptible to CLCuD (Burewala) both in the field and the glasshouse. However, substantial differences were noted between genotypes for disease index under field conditions. Graft inoculation studies showed that all genotypes inoculated with CLCuD (Burewala) developed disease within 9–13 days whereas those graft-inoculated with CLCuD (Multan) developed symptoms from 15 to 22 days after grafting. Severe reduction occurred in plant morphology, fibre and yield parameters of cotton variety NIAB-111 following inoculation with CLCuD (Burewala) as compared with CLCuD (Multan). [K.P. Akhtar, F.F. Jamil, M.A. Haq and I.A. Khan (Pakistan). Journal of Phytopathology, 156 (6): 352–357, 2008].

Potentiation between Pyrethroid and Organophosphate Insecticides in Resistant Field Populations of Cotton Bollworm *Helicoverpa armigera* (Lepidoptera: Noctuidae) in Pakistan. The combined action of pyrethroids plus organophosphates was assessed on putatively resistant field populations of *Helicoverpa armigera* from Pakistan by using a leaf-dip bioassay. Ethion showed a good potentiation with bifenthrin, lambdacyhalothrin, cyfluthrin, betacyfluthrin, fenpropathrin, esfenvalerate, fluvalenate and tralomethrin. Profenofos was potentiating with bifenthrin but additive with lambdacyhalothrin. Methyl parathion also exhibited potentiation with bifenthrin. Contrarily, quinalphos produced an antagonism with bifenthrin. Chlorpyrifos potentiated lambdacyhalothrin in one population but had an additive effect in the other. A strong potentiation of pyrethroids by ethion in some populations indicates that esteratic detoxification is a key mechanism involved in imparting resistance to pyrethroids in Pakistani *H. armigera*. [Mushtaq Ahmad (Pakistan). Pesticide Biochemistry and Physiology, 91(1): 24-31, 2008].

SYRIA

Effects of Planting Date, Varieties and Insecticides on Chickpea Leaf Miner (*Liriomyza cicerina* R.) Infestation and the Parasitoid *Opius monilicornis* F. The effects of planting date, varieties and insecticides on chickpea leaf miner (*Liriomyza cicerina* R.) infestation and the parasitoid *Opius monilicornis* F. were studied during the 1998 and 1999 cropping seasons. The experiments were conducted in the field at the experimental station of the International Center for Agricultural Research in the Dry Areas, at Tel Hadya in Aleppo, Syria. Chickpea planted in spring had a significantly higher number of damaged leaflets than the winter-sown crop. There was a significantly higher number of damaged leaflets on the local cultivar, as compared with an improved variety (Flip 82–150, 'Ghab 3'), in both planting dates and both years. For the spring and winter plantings, this number was, respectively, 1183 and 320 for the local cultivar and 968 and 244 for Ghab 3 in 1998; i.e., a nearly four-fold increase in the number of damaged leaflets between winter and spring planting. Both neem oil and deltamethrin significantly reduced leaflet damage in the two cultivars tested. However, deltamethrin significantly reduced the number of adult parasitoids compared with the unsprayed control and the treatment sprayed with neem oil for the spring-sown chickpea. This study shows that chickpea leaf miner could be effectively managed by integrating different pest management options such as winter sowing chickpea and the use of tolerant cultivars. [M. El Bouhssini, K. Mardini, R.S. Malhotra, A. Joubi and N. Kagka (Syria). Crop Protection, 27(6): 915-919, 2008]

TUNISIA

Biological Characteristics of the Cypress Bark Beetle *Phloeosinus aubei* in the Kessra Forest, Center of Tunisia. In this study, the biology and behavior of *Phloeosinus aubei* are described. The pest attacks the *Cupressus sempervirens* trunk while its maturation feeding takes place in shoots. In Tunisia, *P. aubei* has a clear bigamous behavior. Females establish up to two annual generations and three sister broods. Maternal gallery is 13±3.6 cm long with 9.8±4 egg niches each. The life cycle lasts 57±6 days. The cumulative female's fecundity is 54±4 eggs, the cumulative maternal gallery length is 68±1 mm. Total length of gallery and egg number decreased logarithmically with increasing attack density but the egg number per cm of maternal gallery was constant. [R. Bel Habib, M.L. Ben Jamâa and S. Nouira (Tunisia). Tunisian Journal of Plant Protection, 2: 99-108, 2007].

Morphological and Biological Studies of *Monosporascus cannonballus,* the Cause of Root Rot and Vine Decline of Melon in Southern Tunisia. Melons grown in greenhouses heated with geothermal water in Southern of Tunisia are subject to a high incidence of a decline disease that is widespread in the Tozeur, Kebili and Gabès areas. Laboratory tests showed that *Monosporascus cannonballus*, a soilborne fungus, is the principal disease organism. This fungus produces large perithecia (434.2 µm diameter) that releases ascospores measuring up to 41.1µm in diameter. The growth of *M. cannonballus* is optimum at temperatures ranging from 25 to 35°C, at pH 7 on PDA and APS media. Germination of the ascospores was obtained by host root induction of the growth of long germ tubes that roll around the root. [H. Hamza, M.S. Belkadhi, M.A. Triki and A. Zouba (Tunisia). Tunisian Journal of Plant Protection, 2: 71-77, 2007].

Population Structure and Mating System of *Ascochyta rabiei* in Tunisia: Evidence for the Recent Introduction of Mating type 2. The population structure of *Ascochyta rabiei* (teleomorph: *Didymella rabiei*) in Tunisia was estimated among five populations sampled from the main chickpea growing regions using simple sequence repeat markers (SSR) and a mating type (*MAT*) marker. Mating type 2 isolates (*MAT1-2*) had reduced genetic and genotypic diversity relative to mating type 1 isolates (*MAT1-1*). This result, coupled with previous observations of lower overall frequency and restricted geographical distribution of *MAT1-2* in Tunisia, and recent (2001) observation of the sexual stage, support the hypothesis of a recent introduction of *MAT1-2*. Despite the presence of both mating types in Nabeul, Kef and Jendouba, the hypothesis of random mating was rejected in these locations with multilocus gametic disequilibrium tests. Highly significant genetic differentiation ($\theta = 0{\cdot}32$, $G_{ST} = 0{\cdot}28$, $P < 0{\cdot}001$) was detected among populations and genetic distance and cluster analyses based on pooled allele frequencies revealed that populations from Nabeul and Kef were distinct from those in Beja, Bizerte and Jendouba. More than 70% of total gene diversity ($H_T = 0{\cdot}55$) detected was attributable to variation within populations compared to 28% among populations. This result, coupled with the occurrence of private alleles in each population, suggests that gene flow is currently limited among populations, even those separated by short geographic distances. The presence of two main genetic clusters was confirmed using Bayesian model-based population structure analyses of multilocus genotypes (MLGs) without regard to geographic origin of samples. The presence of *MAT1-2* isolates in both clusters suggests at least two independent introductions of *MAT1-2* into Tunisia that are likely to be the result of importation and planting of infected chickpea seeds. [A. Rhaiem, M. Chérif, T. L. Peever and P.S. Dyer (Tunisia, USA & UK). Plant Pathology, 57(3): 540–551, 2008].

TURKEY

Biological Control of Onion Basal Rot Disease using *Trichoderma harzianum* and Induction of Antifungal Compounds in Onion Set Following Seed Treatment. *Trichoderma harzianum* KUEN 1585 (commercial product, Sim®Derma) was tested to determine its effect on the mycelial growth of *Fusarium oxysporum* f. sp. *cepae* (FOC) in dual culture and its control of basal rot disease in pot- and field-grown onion sets. The abilities of *T. harzianum* to induce the production of antifungal compounds in sets and to increase onion set diameter were also studied. In pot experiments, where the soil was inoculated with a pathogenic isolate of FOC, seeds were coated with *T. harzianum* at the dosage of $10\ g\ kg^{-1}$ seed. In field experiments, seeds coated with *T. harzianum* were sown in soil naturally infested with the pathogen. *T. harzianum* inhibited mycelial growth of the pathogen *in vitro*. Seed treatment with *T. harzianum* decreased disease incidence comparable to the imidazole fungicide, prochloraz in both pot and field experiments. It also enhanced bulb diameter of sets, especially in the pot experiment. Extracts from onion sets grown from treated seeds under both conditions were fractionated by thin-layer chromatography for their antifungal compounds. Most of the fractions obtained from the sets of *T. harzianum*-treated seeds showed high antifungal activity against the pathogen. This study suggests the possible role of *T. harzianum* in the induction of antifungal compounds against *F. oxysporum* f. sp. *cepae* in onion sets. [A. Coşkuntuna and N. Özer (Turkey). Crop Protection, 27(3-5): 330-336, 2008]

Investigation of Threatened Arable Weeds and their Conservation Status in Turkey. Agronomic operations carried out in arable lands may cause changes in weed populations and also decrease the number of animal species that depend on these weed species. An emerging paradigm is the conservation and sustainability of weed species. In this study, risk status of arable weeds in Turkey was evaluated and it was determined that 112 of them (76 endemic and 36 non-endemic species) were at risk according to the IUCN Red List. Turkey is extremely diverse, with over 3000 endemic plant species out of nearly 12 000 recorded. Considering endemic weeds, they are classified in the following risk categories: critically endangered (four weed species), endangered (EN) (six), vulnerable (VU) (14), near threatened (seven), least concern (41) and data deficient (DD) (four species). Among the non-endemic weeds, three species are EN, 31 VU and two are DD. The families with the highest threatened weed species are Scrophulariaceae, Fabaceae, Asteraceae, Brassicaceae and Lamiaceae. The identification of weed species in arable habitats and their risk status is a useful tool for assessing and monitoring how the sustainability of weed populations is affected by farming practices. The results show the necessity of adopting new environment-friendly agricultural methods to conserve the high number of endemic weed species under threat in Turkey. [C Ture and H Bocuk (Turkey), Weed Research, 48(3): 289–296, 2008].

❖ SOME PLANT PROTECTION ACTIVITIES OF FAO AND OTHER ORGANIZATIONS

DESERT LOCUST SITUATION

General situation during May 2008 Forecast until mid-July 2008

The Desert Locust situation was generally calm during May expect for the uncertainty about locust infestations in eastern Ethiopia. There is a high risk that locusts may be present and breeding in the Ogaden, which could give rise to hopper bands perhaps small swarms. All efforts are required to undertake the necessary survey and control operations. Locust numbers declined in Iran where breeding had occurred in April. Limited control operations were carried out against small infestations in central Algeria and northwest Mauritania. During the forecast period, scattered adults will appear in the summer breeding areas in the northern Sahel between Mauritania and Sudan and long

both sides of the Indo-Pakistan border. Small-scale breeding will occur after the seasonal rains commence in these areas. Only limited surveys are likely to be possible this summer in some the areas in the Sahel.

Western Region - The situation remained calm during May. Small-scale breeding continued in central Algeria where ground control operations treated 1.280 ha of hopper groups and adults. Local breeding also continued in northwest Mauritania where 9 ha of hoppers and adults were controlled. Low numbers of adults are expected to move during June towards the summer breeding areas in southern Mauritania, northern Mali, northern Niger, southern Algeria and eastern Chad where they will mature and lay eggs once the summer rains begin. Only limited surveys, if any, can be carried out in Mali, Niger and Chad due to insecurity. No locusts were reported elsewhere in the Region during May.

Central Region - Although locusts were not seen during surveys in southern Ethiopia in May, there is a high probability that they are present and breeding in the Ogaden in eastern Ethiopia where good rains fell in April and early May. If so, small hopper bands could form in the coming weeks that, if not treated, could become small swarms. Elsewhere in the Region, the situation remained calm. Only low numbers of adults were seen on the Red sea coast in Yemen and similar infestations may be present on the coast in northwest Somalia. Locusts are expected to appear in the summer breeding areas in the interior of Sudan, western Eritrea and Yemen where rainfall. Only limited surveys, if any, can be carried out carried in western Sudan.

Eastern Region - Locusts declined in the spring breeding areas in western Pakistan and southeast Iran. Nevertheless, small infestation on the southeast coast in Iran. Scattered adults are likely to appear in the summer breeding areas along both sides of the Indo-Pakistan border in June and breed on a small scale once the monsoon rains arrive.

Undetected Breeding may be in Progress in Eastern Ethiopia

Although Desert Locust infestations were not seen during surveys recently carried out in southern Ethiopia, there is high probability that locusts may be present and breeding in the Ogaden in eastern Ethiopia. If so, hopper bands could form that, if not treated, could give rise to small swarms later this month. All efforts should be made to clarify the current situation in eastern Ethiopia, undertake surveys in all accessible areas on a regular basis and carry out control operations as needed. Elsewhere, the situation remains calm. June is the month when locusts move from the spring breeding areas to the summer breeding areas. This year, low numbers of adults are expected to appear during June in southern Mauritania, northern Mali and Niger, eastern Chad, Darfur and Kordofan regions in Sudan, western Eritrea, the interior of Yemen, and along the Indo-Pakistan border. Small-scale breeding will occur in these areas once the seasonal rains commence. As part of the early warning system, regular surveys are recommended in all of the above areas.

❖ SHORT PLANT PROTECTION NOTES

- A probe using real-time PCR detected 'C*andidatus* Phytoplasma mali' in apple in 3 months compared to 4 or 7 months with other methods, report M. Aldaghi and associates at Gembloux Agricultural University, Belgium, and Plant Pests & Diseases Research Institute, Iran. (Ann. Appl. Biol. 151:251-258, 2007).

- Aerial spraying with insecticide slowed of pine wilt disease and maintained biomass in pine forests, report S. Ugawa and K. Fukuda at the University of Tokyo, Japan. (For. Pathol. 38:16-28, 2008).

- Because *Meloidogyne incognita* juveniles can migrate through soil pores with diameters of 30 to 100 µm and more, conventional tillage may enhance migration and reinfestation of crop by nematodes, report J. EO and associates at the University of Tokyo and National Agricultural Research Center, Japan. (Nematology 9:751-758, 2008).

- Eight of 14 plants obtained from interspecific crosses of *Coffea Arabica* and *C. canephora* were resistant to all races of *Hemileia vastatrix*, report L. Mahe and associates at IRD, UMR RPB, GeneTrop, France; and Instituteo de Investigacao Cientifico Tropical CIFC, Portugal. (Plant Breed. 126:638-641, 2007).

- In vitro heat treatment combined with shoot tip culture was more effective than conventional heat in eliminating *Plum pox virus* in apricot, report G.C. Koubouris and associates at Aristotle University of Thessaloniki, Greece. (J. Gen. Plant Pathol. 73:370-373, 2007).

- Phenolics and pisatin accumulate in response to some strains of rhizobacteria to induce resistance of pea to *Orobanche crenata*, report Y. Mabrouk and associates at Technobiologie Faculte de Tunis, Faculte des Sciences in Gafsa, INRAT, in Tunisia; and UFR and Universite de Nattes, France. (Weed Res. 47:452-460, 2007).

- Volatiles from 5% clove oil reduced egg hatch in *Meloidogyne incognita* in water by 30% and decreased viability of hatched second-stage juveniles by up to 100%, report S. L. Meyer and associates at USDA-ARS, Beltsville. (Pest Manag. Sci. 64:223-229, 2008).

- When Verticilluim wilt is present in an alfalfa stand, the most economically viable practice tested was two cutting fall geazing, report J.N. Sedman and associates at University of Wyoming. (Agron. J. 99:1635-1639, 2007).

❖ GENERAL NEWS

OVERCOMING PESTICIDE RESISTANCE

When it comes to the growing problem of insecticide resistance, evolution has a lot to answer for. A review article published by UK's Biotechnology and Biological Research Council (BBSRC) highlights the current researches in overcoming pesticide resistance. Scientists from the Rothamsted Research in UK developed an efficient, DNA based test to differentiate the two biotypes of whitefly *Bemisia tabaci*, the insect responsible for transmitting viruses that cause the African cassava mosaic, bean golden mosaic and tomato mottle among other diseases. The two types of whitefly coexist in many crop-producing areas. Managing them through pesticide is difficult since they have a different resistance profile. A scientist from the University of Liverpool is investigating a novel compound called Pyridalyl, which produces unique insecticidal symptoms against lepidopteran pests. Researchers from the University of Oxford, on the other hand, are turning their attention to a family of enzymes called cytochrome P450 monooxygenases (CYPs). These enzymes function to breakdown cellular metabolites and foreign compounds. The expression of the genes coding for this enzyme family were found to increase in pesticide resistant insects. Understanding the relationship of CYPs to insect resistance can lead to the development of more effective pest management systems. Read the BBSRC magazine at: http://www.bbsrc.ac.uk/publications/corporate/magazine/2008/0801_business.pdf

USDA RELEASES NEMATODE, VIRUS RESISTANT PEANUT VARIETY

The US Department of Agriculture, Agriculture Research Service (ARS) has released a new peanut variety that may help farmers in their fight against two major peanut problems. The new hybrid, Tifguard, is the first peanut variety to show resistance to both the peanut root knot nematode and tomato spotted wilt virus (TSWV). These diseases severely limit peanut yield in the US, where annual production reaches well above one million tons. Not only did Tifguard exhibit higher resistance to TSWV in field trials, it also produced higher yields than standard check cultivars when grown in areas with little or no nematode pressure. Tifguard seeds will be available to farmers by the 2009 planting season. Read more at:
http://www.ars.usda.gov/News/docs.htm?docid=1261

BACTERIAL EXTRACTS TO COMBAT FUNGAL DISEASES

Scientists from the U.S. Department of Agriculture Agricultural Research Service (USDA-ARS) are using natural bacterial extracts to treat fungal diseases such as the brown rot in peaches and pecan scab. Bacterial methods to control fungi are not new, but according to the ARS scientists, the compounds they isolated from the bacteria *Xenorhabdus* and *Photorhabdus* have never been used to control disease in these two commodities. Various diseases result in annual losses of more than $3.5 million for peach growers and $13 million for the pecan industry. The bacterial extract, when applied in 6 to 12 percent dilutions, can suppress the growth of *Phytophthora*, which causes root and crown rots, as well as foliar and fruit infections. It is an effective and safe alternative to chemical fungicides. The scientists have submitted a patent on these treatments. They are now planning to develop the bacterial metabolites for commercial use. Read more at
http://www.ars.usda.gov/News/docs.htm?docid=1261

IMPACT OF HERBICIDE REGIMES USED WITH GM MAIZE

Results of a study conducted by scientists from the Ghent University in Belgium show that most herbicide regimes used with genetically modified (GM) herbicide-resistant maize have a better environmental impact than those used in non-GM varieties. This is due to the lower potential of glyphosate (Gly) and glufosinate ammonium (Glu) to leach into the groundwater and their lower acute toxicity to aquatic organism. The scientists used a pesticide occupational and environmental risk (POCER) indicator to gauge the impacts of the herbicide regimes. When Gly or Glu is used alone, the POCER factor values for the environmental modules were reduced approximately by a sixth. However, the environmental impact of novel herbicide regimes tested may be underestimated due to the assumption that the active ingredients used with herbicide-tolerant maize would be used alone. The article published in the journal Transgenic Research is available at: http://www.springerlink.com/content/r45l62h1k246331g/fulltext.pdf

BACTERIA TO COMBAT WHEAT SCAB DISEASE

Researchers from the US Agricultural Research Service (ARS) are looking to the possibility of using strains of flower-dwelling bacteria to combat the *Fusarium* head blight disease in wheat, barley and other cereal crops. The naturally occurring bacteria compete with *Fusarium* for nutrients exuded by the flowers' anther. One such nutrient is choline, needed by both the bacteria and the fungal pathogen for growth. *Fusarium* also needs choline as a chemical cue to send a germ tube into the anther tissues. By using the flowers' choline stores, the bacteria leave less for the fungus, depriving it of the chemical cue. Spraying formulations of the bacteria onto plots of two commercial wheat cultivars reduced head blight disease severity by as much as 63 percent. A particular strain, a *Pseudomonas* species dubbed AS 64.4, was found to be the best all-around performer out of all the identified choline metabolizing bacteria. The beneficial bacteria cause no harm to wheat and pose no danger to consumers. The strain will be combined with other scab fighting microbes, like yeasts and antibiotic-secreting bacteria, to provide wider protection for cereal crops. Read more at:
http://www.ars.usda.gov/is/pr/2008/080403.htm

EARLY DETECTION OF DISEASES USING PLANT REFLECTIONS

When plant diseases and insect problems are visible to the naked eye, it may be difficult if not impossible to treat. Christian Nansen, an entomologist from Texas AgriLife Research, has developed a non-intrusive and easy way of diagnosing plant disease at an earlier stage using a hyper-spectral camera. The camera determines how much light is being reflected from the plant surface. When plants experience stress caused by pathogens, insects or the environment, they change their metabolism that leads to subtle changes on how they reflect light. The technology developed by the researcher can be utilized in plant breeding to determine genetic differences in germplasm. The same principle is being applied in seed analyses, detecting protein content in wheat, oil content in peanuts and maturation in tomatoes. Researchers are now using the technology to detect zebra chip in potato, cotton root rot and spider mites in corn at the early stages of infection. Read more at:
http://agnews.tamu.edu/showstory.php?id=326

COTTON VARIETIES RESISTANT TO THE FUSARIUM WILT

The US Agricultural Research Service (ARS) is offering cotton lines resistant to the *Fusarium* wilt, a devastating disease severely reducing cotton yields in the country. It is caused by a soil borne fungus that clogs the plant's vascular system, disrupting water and nutrient transport. There are currently four *Fusarium* races in the US. The disease was first reported in California in 2001. ARS scientists have developed four new kinds of *Fusarium*-resistant plants that produce pima cotton-the kind that is processed into premium fabrics for upscale apparel or for bedding, towels, and other home products. The scientists are also screening upland cotton varieties for resistance to the fungus. Upland cotton offers excellent, less expensive fibers. In Australia, where *Fusarium* wilt is more prevalent, annual yield loss is estimated at US$ 100 million. The press release is available at:
http://www.ars.usda.gov/News/docs.htm?docid=1261

RECENT APPROACHES IN DEVELOPING INSECT 'PROOF' PLANTS

One of the major successes of plant biotechnology is the introduction of insect-resistance to important crops. Bt cotton and maize have been widely used in global agriculture and have led to significant reductions in pesticide usage. Not all pests, however, are efficiently targeted by the Bt toxins used at present. There is still a need to develop solutions for problems like Bt toxin resistance. A new review paper published by the journal Plant Physiology looks at the recent development to the basic Bt strategy and alternative methods to develop insect "proof" plants. Plants expressing novel *Bt* toxins like Vip and Cry3Bb1 have been shown to be effective against lepidopteran larvae. Bt genes have also been expressed in the chloroplast genome, resulting to higher levels of toxin accumulation. Scientists are currently exploiting plant-defense proteins like lectins and alpha-amylase inhibitors to combat Bt resistant pests. John Gatehouse, author of the review, enumerated novel approaches for engineering insect-resistant plants. These include: (i) The use of new insecticidal proteins like cholesterol oxidase and avidin; (ii) Increasing the expression of plant secondary metabolites like cyanogenic glycosides and volatile communication compounds; (iii) RNA interference for targeting insect resistance genes. The article can be accessed for free at http://www.plantphysiol.org/cgi/content/full/146/3/881

❖ EVENTS OF INTEREST

MEETINGS AND SYMPOSIA

2008

*** 1-3 September**
6th International Workshop on Grapevine Trunk Diseases, Florence, Italy. Contact: Laura Mugnai <laura.mugnai@unifi.it>
or Guido Marchi <guido.marchi@unifi.it >

*** 22-26 September**
16th Ornamental Workshop on Diseases and Pests, Hendersonville, North Carolina, USA. See www.cals.ncsu.edu/plantpath/activities/societies/ornamental

*** 13-15 October**
ENDURE International Conference "Diversifying Crop Protection", Congress Palace of La Grande Motte, near Montpellier, France.
See http://www.endure-network.eu

*** 20-24 October**
3rd European Whitefly Symposium, Aguadulce, Almeria, Spain. See: http://www.ews3.org

*** 4-7 November**
2nd InternationaL Symposium on Biological Control of Bacterial Plant Diseases, Orlando, Florida, USA. Contact: JBJones@ufl.edu

*** 19-22 November**
8th Australasian Plant Virology Workshop, Rotorua, New Zealand. Contact: Dr Robin MacDiarmid: rmacdiarmid@hortresearch.co.nz
See: http://www.biosecurity.govt.nz/apvw2008

*** 23-27 November**
International Conference "Genetic control of plant pathogenic viruses and their vectors: towards new resistance strategies", Puerto de Santa María, Cádiz, Spain. See: http://www.richalia.es/congreso/index.html

*** 2-4 December**
2008 National Fusarium Head Blight Forum, Indianapolis, Indiana, USA.
Contact: scabusa@scabusa.org
See: http://www.scabusa.org/forum08.html

2009

*** 5-7 February**

5th Australasian Soilborne Diseases Symposium, Thredbo Alpine Hotel, NSW, Australia.
See: http://www.conlog.com.au/asds/
Contact: conference@conlog.com.au

*** 31 May-4 June**

14th International Sclerotinia Workshop, Wilmington, North Carolina, USA.
See: http://www.cals.ncsu.edu/sclerotinia_conference/index.html

*** 5-10 July**

21st International Conference on Virus and other Graft Transmissible Diseases of Fruit Crops, Germany. See: http://www.phytomedizin.org/icvf.html
http://www.icvf.phytomedizin.org

*** 30 September-2 October**

APPS 2009 "Plant Health Management-An Integrated Approach", Civic Precinct, Newcastle, Australia. Contact: Conference Secretariat, PO Box 6150, Kingston, ACT 2604, Australia. Phone: +61 2 6281 6624, Fax: +61 2 6285 1336. Email: conference@conlog.com.au

*** 10-13 November**

5th International Conference on Plant Pathology, with the theme "Plant pathology in the globalized era", Indian Agricultural Research Institute, New Delhi, India. Contact: ipsdis@indiatimes.com; or <ipsdis@yahoo.com

❖ PUBLICATIONS

❖ Selected Research Papers — أوراق علمية مختارة

Entomology and Acarology — الحشرات والعناكب

Aerobic and facultative anaerobic bacteria from gut of red palm weevil (*Rhynchophorus ferrugineus*). 2008. M. Khiyami and E. Alyamani (Saudi Arabia). African Journal of Biotechnology, 7(10): 1432–1437.

Biological and ecological studies on the parasitoid *Dolichogenidea trachalus* (Nixon) (Hymenoptera: Braconidae), collected from the olive moth (Jasmine Moth) *Palpita unionalis* Hübner (Lepidoptera: Pyralidae) in Syria. 2008. M.S. Lababidi and D. Haj Hammoud (Syria). Arab Journal of Plant Protection, 26: 1-6.

Pollination of the broad bean (*Vicia faba* L.var. *major*) (Fabaceae) by wild bees and honey bees (Hymenoptera: Apoidea) and its impact on the seed production in the Tizi-Ouzou area (Algeria). 2008. M. Aouar-sadli, K. Louadi and S. Doumandji (Algeria). African Journal of Agricultural Research, 3 (4) : 266-272.

The effect of some chemical components of sap and heart wood of some forest trees on termite preference *Microcerotermes diversus* Silv. (Isoptra: Termitidae). 2008. Al–Mallah, N.M., S.A. Mustafa and W.A. Qasseer (Iraq). Arab Journal of Plant Protection, 26: 7-11.

Vegetation indices as indicators of damage by the sunn pest (Hemiptera: Scutelleridae) to field grown wheat. 2008. H. Genc, L. Genc, H. Turhan, S. E. Smith and J. L. Nation (Turkey & USA). African Journal of Biotechnology, 7 (2): 173–180.

Diseases — أمراض

Viruses — الفيروسات

A survey for transmission of *Prune dwarf virus, Prunus necrotic ring spot virus* and *Apple mosaic virus* in rootstock seedlings of stone fruits in Syria. 2008. S. Al-Chaabi and A. R. Darwesh (Syria). Arab Journal of Plant Protection, 26: 20-26.

A survey for *Apple chlorotic leaf spot virus* on stone and pome fruits in Syria. 2008. K. Al-Jabor, I. Ismail and S. Al-Chaabi (Syria). Arab Journal of Plant Protection, 26: 27-31.

Biological, serological and molecular studies on *Prunus necrotic ring sport virus* infecting *Rosa hybrida* L. in Egypt. 2008. A.M. Abdel-Salam, I.A.M. Ibrahim, H.S. Abdelkader, S.A. Mokbel and M.A. El-Shazly (Egypt). Arab Journal of Biotechnology, 11(1): 125-138.

Characterization of *Cucumber mosaic virus* monoclonal antibodies (mAbs) specificity, neutralization of infectivity and gene sequence. 2007. Haggag Salah Zein, Mona Hashem Hussein, Kazutaka Miyatake (Egypt & Japan). Plant Viruses, 1(2): 193-200.

Characterization of two isolated of *Prunus necrotic ringspot virus* (PNRSV) from peach and apricot in Egypt. 2008. A.M. Abdel-Salem, I.A.M. Ibrahim, H.S. Abdelkader, A.M.E. Aly and S.M. El-Saghir (Egypt). Arab Journal of Biotechnology, 11(1): 107-124.

Cloning, sequencing and expression of immunoglobulin variable regions of murine monoclonal antibodies specific to *Cucumber mosaic virus* coat protein. 2007. Haggag Salah Zein and Kazutaka Miyatake (Egypt & Japan). Plant Viruses, 1(2): 201-207.

First report of *Eggplant mottled crinkle virus* in geranium in Iran. 2008. R. Rasoulpour and K. Izadpanah (Iran). Plant Pathology, 57 (2): 397–397.

Occurrence in Tunisia of potato tuber necrotic ringspot disease (PTNRD) caused by variant PVY^{NTN} of *Potato virus Y*. 2008. S. Boukhris Bouhachem, N. Khamassy, L. Glais and C. Kerlan (Tunisia & France). Plant Pathology, 57(2): 388–388.

Phylogeny and genetic recombination of *Grapevine fanleaf virus* isolates from naturally infected vineyards in Tunisia. 2007. Moncef Boulila (Tunisia). Phytopathologia Mediterranea, 46(3): 285-294.

The relationship between *Barley yellow dwarf virus-PAV* and cereal flight activities of aphids in wheat and barley crops in Syria. 2008. A. Ansi, S.G. Kumari, A. Haj Kasem, K.M. Makkouk and I. Muharram (Syria & Yemen). Arab Journal of Plant Protection, 26: 12-19.

The utilization of monoclonal antibodies in immunocapture RT-PCR and dot blotting immunobinding assays for the detection of Cucumber mosaic virus. 2008. H.S. Zein, M.H. Hussein, H.A. Hussein and K. Miyatake (Egypt & Japan). Arab Journal of Biotechnology, 11(1): 95-106.

Fungi الفطور

Cultural and molecular characterizations of some isolates of *Trichoderma* spp. 2008. H. Boureghda, Z. Bouznad and C. Decock (Algeria). Arab Journal of Plant Protection, 26: 75-80.

First report of anther smut caused by *Microbotryum violaceum* on forked catchfly (*Silene dichotoma*) in Turkey. 2008. D. Berner and B. Tunali (Turkey & USA). Plant Disease, 92(2): 315.

First report of brown patch on bristle basket grass in Iran. 2008. M. A. Aghajani, A. Alizadeh and H. Rahimian (Iran), Plant Pathology, 57(2): 384–384.

First report of leaf spot caused by *Colletotrichum* cf. *linicola* on field bindweed in Turkey. 2008. B. Tunali, D. K. Berner and H. J. Dubin (Turkey & USA). Plant Diseases, 92(2): 316.

First report of *Oidium neolycopersici* on tomatoes in Turkey. 2008. L. Yolageldi, B. Sin and E. Onogur (Turkey). Plant Pathology, 57(2): 373–373.

First report of rust caused by *Puccinia carduorum* on Italian thistle in Tunisia. 2008. D. Mejri, T. Souissi and D. Berner (Tunisia & USA). Plant Disease, 92(1): 174.

Identification and characterization of resistance gene analog (RGA) and the leaf rust resistance gene Lr21 from the wheat cultivar Giza168. 2008. A.S. Abd El-Aal, A. Ageez, W. Maaty, A. Gaber and N.A. Abdallah (Egypt). Arab Journal of Biotechnology, 11(1): 85-94.

Preliminary study on evaluation of some chickpea cultivars to root-rot and damping-off disease caused by *Macrophomina phaseolina.* 2008. Z.I. El-Gali (Algeria). Arab Journal of Plant Protection, 26: 68-71.

Vegetative compatibility grouping of *Verticillium dahliae* from pistachio in Iran. 2007. Iman Hadizadeh, Zia Banihashemi (Iran). Phytopathologia Mediterranea, 46(3): 272-284.

Bacterial البكتيريا

First record of *Clavibacter michiganensis* subsp. *michiganensis* causing canker of tomato plants in Syria. 2008. R. Ftayeh, A. von Tiedemann, B. Koopmann, K. Rudolph and M. Abu-Ghorrah (Germany & Syria). Plant Disease, 92(4): 649.

Outbreak of *Ralstonia solanacearum* biovar 2 causing brown rot on potato in the aegean region of Turkey 2008. N. Ustun, M. Ozakman and A. Karahan (Turkey). Plant Disease, 92(6): 973.

Nematodes النيماتودا

Effect of *Meloidogyne* incognita on the potato crop. 2007. W. Hlaoua and N. H. Raouni (Tunisia). Nematologia Mediterranea, 35: 213-220.

Control مكافحة

Biological control of wilt and root rot disease of sage plant. 2008. K.I. Zaki, A.M. Waleed and A.M. El-Hadidy (Egypt). Annals of Agricultural Science (Egypt), 53(1): 261-270.

Biological potantial of some Iranian *Trichoderma* isolates in the control of soil borne plant pathogenic fungi. 2008. B. Hajieghrari, M. Torabi-Giglou, M.R. Mohammadi and M. Davari (Iran). African Journal of Biotechnology, 7(8): 967–972.

Control of damping-off caused by *Rhizoctonia solani* and *Fusarium solani* using olive mill waste water and some of its indigenous bacterial strains. 2008. Thabèt Yangui, Ali Rhouma, Mohamed Ali Triki, Kamel Gargouri, Jalel Bouzid (Tunisia). Crop Protection, 27(2): 189-197

Effect of natural and chemical insecticides on *Hyalopterus pruni* and *Armeniaca vulgaris*. 2008. A. Ali and S. Al-Quraishy (Saudi Arabia). African Journal of Biotechnology, 7: 1865–1869.

Effect of seed solarization on the control of seed-borne *Ascochyta rabiei* in chickpea seeds. 2008. B. Rahmoun, A.A. Niane, B. Bayaa, M. Hassan and Z. Bishaw (Syria). Arab Journal of Plant Protection, 26: 32-37.

Effects of planting date, varieties and insecticides on chickpea leaf miner (*Liriomyza cicerina* R.) infestation and the parasitoid *Opius monilicornis* F. 2008. M. El Bouhssini, K. Mardini, R.S. Malhotra, A. Joubi, N. Kagka (Syria). Crop Protection, 27(6): 915-919.

Evaluation of fungicide application during the incubation period of ascochyta blight pathogen on biomass and seed yield of chickpea. 2008. R. Shamsi, A. El-Ahmed, R. Malhotra and Y. Idrees (Syria). Arab Journal of Plant Protection, 26: 38-44.

Evaluation of some non-chemical methods for reducing infection with *Tomato leaf curl virus* transmitted by *Bemesia tabaci* (Gennadius). 2008. A.A. Alshami, M.M. Abdullah Nasher, M. Almezgagi and A. Alyaremi (Yemen). Arab Journal of Plant Protection, 26: 45-49.

Evaluation of the efficiency of some resistance-inducing chemicals and biocontrol agents in controlling potato stem canker disease under glasshouse and field conditions. 2008. K.S. Juber and I.K. Hassoun (Iraq). Arab Journal of Plant Protection, 26: 50-57.

Lethal effects of Spinosad and Azadirachtin on the cotton leafworm, *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae). 2008. A.E. Hatem, S.S.M. Abdel-Samad and H.A.A. Abul Fadl (Egypt). Annals of Agricultural Sciense, Ain Shams University (Egypt), 53(1): 273-282.

The efficiency of the predatory mite *Phytoseiulus persimilis* Athias-Henroit in controlling *Tetranychus urticae* Koch. on strawberry. 2008. A. Shaabo, M. Halloum and R. Zidan (Syria). Arab Journal of Plant Protection, 26: 58-61.

Weed Control مكافحة أعشاب

Chemical weeds control in canola. 2008. Khan, I.A., G. Hassan, I. Daur and B. Khattak (Pakistan). Arab Journal of Plant Protection, 26: 72-74.

Study on the efficacy of weed control in wheat (*Triticum aestivum* L.) with tank mixtures of grass herbicides with broadleaved herbicides. 2008. Mohammad Ali Baghestani, Eskandar Zand, Saeid Soufizadeh, Mohsen Beheshtian, Abdolaziz Haghighi, Alireza Barjasteh, Daryoush Ghanbarani Birgani, Reza Deihimfard (Iran). Crop Protection, 27 (1): 104-111.