Chemical Pesticides

P 1

A COMPARISON OF THE EFFICIENCY OF SOME INSECTICIDES WITH MICROBIAL INSECTICIDE *BUTOXY BACILLINE (BTB)* AGAINST THE AMERICAN BOLL WORM *HELICOVERPA ARMIGERA* HBN. (LEPIDOPTERA; NOCTUIDAE). Aswad Al-Mhemid and Samar Al-Madlaji, Plant Protection Department, Faculty of Agriculture II, University of Aleppo, Syria

A field study was conducted to compare the efficiency of the Microbial insecticide *Butoxy bacilline* in five concentrations: 0.09, 0.11, 0.13, 0.15 and 0.18%. These concentrations achieved the following biological activity against the American Cotton Bollworm 66.6, 84, 88.2, 92.8 and 96.8%, respectively. A field study was carried out to compare the active concentration for the BTB (0.18%A.I) with five insecticides from different chemical groups: Arrivo 50 ml/100 liter water, Danitol 15 ml/100 liter water, Methyl Parathion 150 ml/100 liter water, Lannate 50 g/100 liter water, Sevine 175 g/100 liter water. The results obtained showed a high efficiency for the four insecticides, in the following descending order: Arrivo 25% (0.012% A.I), *Butoxy Bacilline* 45% (0.18% A.I), Danitol 10% (0.0015% A.I), Methyl parathion 50% (0.075% A.I). These four insecticides achieved the following biological activity 96, 95.2, 94.4 and 92.4%, respectively. Whereas, the other two insecticides with lower biological efficiency were Lannate 90% (0.045% A.I) and Sevin 85% (0.14% A.I), with a mortality rate of 85 and 79.1%, respectively.

P 2

HISTOPATHOLOGICAL EFFECTS OF LACTATION TRANSFER OF CERTAIN INSECTICIDES IN RATS. E.N. EL-Khatib[1], Z.H. Zidan[2], A.E. Bayoumi[2], M. Reem Ziada[1] and Eman M. Abd El-Mottaleb[3]. (1) Central Agriculture Pesticides Laboratory (CAPL), Dokki, Giza. Egypt; (2) Department of Plant Protection, Faculty of Agriculture, Ain-Shams University, Shubra El-Kheima, Cairo, Egypt, E-mail: zidan42@hotmail.com; (3) Animal Health Research Institute, Dokki, Giza. Egypt.

The present work was planned to illustrate the histopathological consequences of most essential body organs of pregnant female rats after delivery (liver, spleen and kidney) as a result of exposure to organophosphorus compounds represented by chlorpyrifos-methyl, and carbamate compounds represented by methomyl,, by applying two dose levels (1/10 and 1/30 of LD_{50}) and sacrificed within 3, 6, 12, 24, 36 and 48 hours after administration of a single oral dose. The histopathological studies revealed that the cytotoxic effects of methomyl on the organs examined was more intensive than chlorpyrifos- methyl and the highest dose of each insecticide caused the most toxic effect. Also, the cytotoxic effects of

each dose of the two tested insecticides increased with time increase after administration. The severity of the lesions was more intensive in 1/10 LD_{50} than that observed in 1/30 LD_{50} dose level. On the other hand, the severity of lesions were more extensive and strongly related to the duration of the exposed pesticides in each dose level.

P 3

BIOCHEMICAL EVALUATION OF THE PLACENTAL TRANSFER OF A SINGLE ORAL DOSE OF CHLORPYRIFOS-METHYL IN PREGNANT RATS. A.E. Bayoumi[1], Z.H. Zidan[1], E.N. El- Khatib[2] and M. Reem Ziada[2]. (1) Department of Plant Protection, Faculty of Agriculture, Ain-Shams University, Shubra El- Kheima, Cairo, Egypt, E-mail: zidan42@hotmail.com; (2) Central Agriculture Pesticides Laboratory (CAPL), Dokki, Giza, Egypt.

The placental transfer of certain pesticides in female rats was studied. The pesticides tested included chlorpyrifos-methyl and methomyl as representative insecticides to the organophosphorus and carbamates chemical class, respectively. The placental transfer of the selected compounds was studied thorough their effects on certain biomarkers, i.e. acetylcholinesterase, total glutathione content, glutathione *S*-transferase and ATP-ase in various organs of the pregnant rats and their corresponding foetuses. To perform such study single oral dose of 1/10 and 1/30 of LD_{50} of the pesticides tested were administered on day 18^{th} of gestation to pregnant Spergue-Dawly rats. The treated rats were killed after 10 min and 0.5, 1, 3, 6, 12, 24, and 48 hr to obtain the desired organs and foetuses. Results obtained indicated that the two compounds were transferred through placental route and produced a significant decrease in the AChE activity of brain and serum of pregnant dams and their corresponding foetus brain AChE activity was time and dose-dependent. Also, the data showed a significant increase in liver total glutathione content. Conversely significant decrease in the placental GSH was recorded. The two doses of chlorpyrifos-methyl and methomyl tested caused a significant decrease in foetus liver GSH. The liver GSH content significantly decreased at 12 hr after lactated mothers treatment with 1/10 of LD_{50} of chlorpyrifos-methyl, but the lower dose level produced an alteration effect in relation to time after treatment. In case of glutathione S-transferases, the pesticides tested caused a significant alteration in the placental and serum GST activity of the pregnant dams. Administration of chlorpyrifos-methyl and methomyl to pregnant dams' produced a significant decrease in brain ATP-ases activity. Foetuses brain ATP-ases activities were not affected significantly by the treatment with the compounds tested.

P 4

BIOCHEMICAL EVALUATION OF THE MILK TRANSFER OF A SINGLE ORAL DOSE OF CHLORPYRIFOS-METHYL IN PREGNANT RATS. Z.H. Zidan[1], A.E. Bayoumi[1], E.N. EL-Khatib[2] and M. Reem Ziada[2]. (1) Department of Plant Protection, Faculty of Agriculture, Ain-Shams University, Shubra El- Kheima, Cairo, Egypt, E-mail: zidan42@hotmail.com; (2) Central Agriculture Pesticides Laboratory (CAPL), Dokki, Giza, Egypt.

The lactation (milk) transfer of certain pesticides in female rats were studied. The pesticides tested included chlorpyrifos-methyl and methomyl as representative insecticides to the organophosphorus and carbamates chemical groups, respectively. The milk transfer of the compounds selected were studied thorough their effects on certain biomarkers such as acetylcholinesterase, total glutathione content, glutathione S-transferase and ATP-ase in various organs of the dams after delivery and their corresponding suckling pups. To perform such study single oral dose of 1/10 and 1/30 of LD_{50} of the pesticides tested were administered on the third day after delivery. Rats and pups were killed after 3, 6, 12, 24, and 48 hr. Results obtained indicated that the two compounds were transferred through lactation route and produced a significant decrease in the AChE activity of brain and serum of dams and their corresponding pups brain AChE activity was time and dose-dependent. Also, the data showed a significant increase in liver total glutathione content. The two doses of chlorpyrifos-methyl and methomyl tested caused a significant decrease in the liver GSH content at 12 hr after lactated mothers treatment with 1/10 of LD_{50} of chlorpyrifos-methyl, but the lower dose level produced an alteration effect in relation to time after treatment. Pups liver GSH data showed a significant decrease after 3 hr of their corresponding lactated mothers' treatment with 1/10 and 1/30 of chlorpyrifos-methyl and methomyl LD_{50}. In case of glutathione S-transferases, lactated mothers treatment showed a significant increase in the liver GST activity while serum GST activity was decreased. ATPases, were not affected significantly by the treatments mentioned.

P 5

OVICIDAL AND ELECTROPHORETIC PATTERNS OF EGGS SOLUBLE PROTEIN OF *SPODOPTERA LITTORALIS* AS AFFECTED BY INSECTICIDES. Z.H. Zidan[1], M.I. Abdel Mageed[1], S.A. Emara[2], A.E. Bayoumi[1] and F.I. El–Sweerki[2]. (1) Department Plant Protection, Faculty of Agriculture, Ain Shams University, Cairo, Egypt, E-mail: zidan42@hotmail.com; (2) Plant Protection Research Institute, Agriculture Research Center, Dokki, Giza, Egypt.

The ovicidal activity of eight different compounds relates to different insecticidal functional groups were investigated by dipping technique against *Spodoptera littoralis* eggs of two ages, i.e. one–and three–day old egg – masses.

The LC_{50} values (for one–day old egg-mass) were descendingly arranged as follows: 0.5, 1.4, 2.5, 3.3, 16.3, 24.2, 133.3 and 188.2 ppm for deltamethrin, flufenoxuron, Bioneem, cyanophos, Nat-l, Garlic gard, pyriproxyfen and Vertemic, respectively. As for the three- day old egg – masses, deltamethrin, flufenoxuron and cyanophos were noticeably more effective than the other compounds with LC_{50} values 0.6, 0.7 and 1.9 ppm, respectively, while the other compounds tested showed moderate effect. On the other hand, the soluble protein of both untreated and treated egg-masses of 1 and 3-days old with five tested materials, i.e. pyriproxyfen, Bioneem, Garlic Gard, Nat-1 and deltamthrin were separated electrophoretically using SDS polyacrylamide gel electrophoresis (SDS–PAGE). Results indicated that both number of the separated soluble protein bands and their corresponding molecular weights were affected by the treatments with the compounds tested. Usually, the compounds tested caused an increase in bands number of the separated soluble proteins.

P 6

CROSS RESISTANCE AND THE ROLE OF CHEMICAL INSECTICIDES IN THE BREAKDOWN OF RESSISTANT COTTON LEAF WORM TO CERTAIN BIOAGENTS. Mohamed El-Said El-Zemaity[1], W.M. El-Deeb[2],Y.A. Osman[3] and A.I. Huessin[2]. (1) Faculty of Agriculture, Ain Shams University, P.O. Box 68, Hadeyk Shoubra, 11241 Cairo, Egypt, E-mail: mselzemaity@hotmail.com; (2) Central of Pesticides Laboratory, Agriculture Research Center, Cairo, Egypt; (3) Faculty of Science, Mansora University, Egypt.

Resistant strains of cotton leaf worm (*Spodoptera litoralis*) larvae to certain bioagents (i.e., two *Bt* formulations Agerin & Diple2x and actinomycetes formulation, Spinosad) were selected under laboratory conditions. Resistant larvae were exposed to the chemical insecticides, Dursban, Larvin and Sumi- alfa. Data obtained indicated no cross resistance between the chemical insecticides and the bioagents tested. The organophosphorus insecticide Dursban showed higher activity in the relaxation of resistance to Agerin and Diple 2x than the carbamate insecticide Larvin and the pyrethroid insecticide Sumi-alfa. However, the pyrethroid insecticide Sumi-alfa showed higher activity in reducing of resistance ratio of Spinosad. Results confirmed the importance of rotating bioagents with chemical insecticides in pest control programs to manage resistance to *Bt* and other bioagents.

P 7

EFFECT OF TWO INSECTICIDES (SPARKILL AND TAFABAN) ON INCIDENCE AND GROWTH OF MAIZE PLANTS FUNGI AND THEIR ABILITY TO PRODUCE SOME ENZYMES IN UPPER EGYPT. S.I.I. Abdel-Hafez[1], A.H.M.El-Said[2], A.M. Moharram[1] and A.Saleem[2]. (1) Botany Department, Faculty of Science, Assiut University, Assiut , Egypt; (2) Botany Department, Faculty of Science (Qena), South Valley University, Egypt.

Two insecticides, Sparkill (25% Cypermethrin) and Tafaban (48% Chlorpyifos) were used in the treatment of maize plants. By using three different doses, both Sparkill and Tafaban were toxic to total and individual fungal population of rhizosphere and non-rhizosphere soil as well as to fungi inhabiting roots and foliage of maize. The most common fungal species were *Alternaria alternata, Aspergillus flavus, A. fumigatus, A. niger, A. terreus* and *Emericella nidulans*. The ability of different fungal isolates to produce extracellular enzymes in solid media was evaluated. The effect of both Sparkill and Tafaban (at 50-400 ppm) on mycelial growth and production of amylase, cellulase, lipase and protease by certain fungi was variable. In most cases the low doses were promotive where as the high doses were depressive.

P 8

BIOCHEMICAL INDICATORS OF HEPATOTOXIC EFFECTS OF PESTICIDES. Dahamna Saliha[1] and C.H. Walker[2]. (1) Biology department, Faculty of Sciences, Ferhat Abbas University, Setif 19000, Algeria, E. mail: dahamna@yahoo.fr; (2) Department of Physiol.& Biochem., Univiversity of Reading, UK.

Pesticides have useful and harmful effects. On the one hand they are useful for controlling pests that damage crops ; on the other hand they can cause damage to man and beneficial organisms. Some sub-lethal effects of pesticides were studied in rabbits and birds with a view to identify characteristic biochemical responses that may be useful for the monitoring of exposure to sub-lethal levels in the field. New Zealand White rabbits (NWR), wild rabbits starlings and house sparrows were used in this study. Seven pesticides were used : demeton-S-methyl, (DSM), chlorpyriphos, chlorfenviphos, triazophos, pirimicarb, methiocarb and permethrin. Blood was collected before dosing, and 2, 6, 24, 48 and 72 hours after the treatment from the ear vein of rabbits and from the brachial vein of birds. Enzyme activities were assayed in the plasma or serum samples obtained.The assays used were GOT, MDH , GDH, SDH, GAMMA GT and ChE. The results showed an increase in plasma and serum GOT and gamma-GT levels were found in all animals treated with the previous pesticides. The level of ChE increased in birds after treatment with permethrin. Histopathological investigations showed cell

enlargement in the liver tissue in NWR treated with DSM. It was concluded that the pesticides cause structural and functional changes in the liver, and also, the measurement of the previous parameter activities may be useful for assessing exposure and sub-lethal effects of pesticides on the wildlife.

P 9

SAFE DISPOSAL OF OBSOLETE PESTICIDES AND THEIR PACKING. Ibrahim Nazer and Naim Sharaf, Plant Protection Department, Faculty of Agriculture, University of Jordan, Amman 11942, Jordan, E-mail: nazeri@ju.edu.jo and sharaf@ju.edu.jo

Obsolete pesticides are toxic wastes polluting the environment. These wastes must be disposed by using environmentally safe techniques to be chosen according to certain criteria based on the safety of the environment, safety of the staff, the technical experience available, and the financial cost of the operation in each country or region. In this regard, the most useful technique is the use of stationary or mobile high temperature incinerators. Incinerators by-products as well as empty and unwanted containers should be also disposed according to well-established international regulations. A study was conducted by FAO in 1996 on obsolete pesticides stocks in 53 countries. They reported the presence of over 47 thousand tons. In 15 Arab countries, the estimated stocks were about 7 thousands tons.

P 10

PHYTOTOXICITY OF SOME INSECTICIDES: II. PHYTOTOXICITY OF DIMETHOATE 40 EC TO VEGETABLE CROPS. Tawfik M. Elbagermi[1] and Mohamed Alaib[2]. (1) Environment Department, Faculty of Public Health, Garyounis University, P.O. Box 9290, Benghazi, Libya, E-mail: elbagermi@yahoo.com; (2) Plant Department, Faculty of Science, Garyounis University, Benghazi , Libya

Insecticides are important for pest control on variety of crops. In recent years the use of insecticides have increased particularly in greenhouses in Benghazi area to protect vegetable crops, improve their quality and to increase crop production. In this study, dimethoate was used to test their phytotoxicity to cauliflower, cucumber, eggplant, okra, squash, turnip, tomoto and onion.The results showed that germination and root extension in all tested species were inhibited by dimethoate treatment. The results also showed that root elongation in all tested species except cucumber was sensitive to dimethoate.

P 11

DEVELOPMENT OF DISCRIMINATING MONITORING TECHNIQUES FOR MOTHS INSECTICDE RESISTANCE IN *PECTIONPHORA GOSSYPIELLA* (LEPIDOPTERA: NOCTUIDAE) IN COTTON. M. Ali Mater[1], A.A. Khidr[1], H.E. Abd-Elkarim[2], E.G. Abo- Elghar[3] and A.A. Abd-Elhalim[1]. (1) Plant Protection Research Institute, Agriculture Research Center, Dokky, Giza, Egypt; (2) Faculty of Agriculture, Mochtohor, Zagazig University, Egypt; (3) Faculty of Agriculture, Menoufia University, Egypt.

Techniques were developed to monitor insecticide resistance in moths of the pink bollworm, *Pectinophora gossypiella* (Saunders). Adult stage of a susceptible laboratory pink bollworm strain were tested with six insecticides namely Profenofos, Chloropyrifos, Thiodicarb, Carbaryl, Esfenfalerate 5 EC, Esfenfalerate 20 EC, with a glass vial technique to estimate concentration-mortality curves. An approximate Lc_{99} was selected to discriminate the resistance in three field populations. Tests with pink bollworm moths resulted in 40- 96.7% mortality for different field populations (Kafr-Elshaikh, Menoufia and Beni-suif Governorates) at early and late season of 2000. A formula [100-(MF/MSx100)] allowed to determine the percentage of resistant insects in the field and simultaneously to correct for partial survival of susceptible insects at the discriminating concentration used. The methods were then tested on field-collected insects during early and late cotton season of 2000. Accuracy of the method was confirmed with another technique for measuring insecticide resistance. These techniques were developed to supplement monitoring data for adult resistance to provide timely and accurate resistance data when the insect is an actual pest, and to provide producers or consultants with a predictive bioassay useful in detecting resistance before any insecticide application.

P 12

EFFICACY OF CERTAIN NEMATICIDES, A BIOTIC AGENT (NEMALESS), OR ORGANIC AMENDMENTS ALONE OR IN COMBINATION IN CONTROLLING *MELOIDOGYNE INCOGNITA* ON BANANA. A.M. Amin[1], A.M. Kheir[1], H.H. Hendy[2] and M.S. Mostafa[2]. (1) Department of Agriculture Zoology and Nematology, Faculty of Agriculture, Cairo University, Egypt; (2) Plant Protection Department, Desert Research Institute, Nematology Unit, Egypt.

Control of *Meloidogyne incognita* on banana cv. Williams was first practiced in a greenhouse experiment, and then in a field trial. Two nematicides (Vaydate® L 24% and Rugby® E.C 20%) and a biotic agent (Nemaless) were applied alone or in combination with some organic amendments (poultry droppings + dry ground eucalyptus leaves + fresh minced garlic cloves) and used in both experiments.

Rugby® or Vydate® were the most effective products in reducing the nematode population, whereas "Nemaless" or the organic amendments were comparatively less effective in both experiments. In the combined treatments, antagonistic or synergsetic effect reflected on the materials efficacy. Rugby® plus organic amendments was highly effective against the nematode, whereas the efficacy of Vydate® or (Nemaless), was reduced when added to the organic amendments. Improvement in banana growth parameters due to the nematode management by means of the above-mentioned additives has been assessed in the greenhouse. The chemical nematicides surpassed all other materials in improving growth. However, the organic amendments hindered the prositive effect of the other materials on growth parameters.

P 13

EFFECTS OF BOTANICAL INSECTICIDES ON THE EGG PARASITOID *TRICHOGRAMMA CACOECIAE* MARCHAL (HYM. TRICHOGRAMMATIDAE). H. Abdelgader[1], S. Hassan[2] and Tag elsir E. Abdalla[1]. (1) Agricultural Research Corporation, Gezira Research Station, Crop protection Research Center, Entomology Section, P.O. Box 126, Wad Medani, Sudan; (2) Institute for Biological Control, Federal Biological Research Center for Agriculture and Forestry, Heinrichstr. 243, D- 64287 Darmstadt, Germany.

A Laboratory study was carried out to investigate the side effects on *Trichogramma cacoeciae* of two formulated products of each of two botanical insecticides: Azadirachtine (Neemazal T/S Blank and Celaflor®) and Quassin (alcohol or water extracts). In one set of experiments, the results showed that by exposing adults of *T. cacoeciae* to residues of Azadirachtine formulations on glass plates (standard test method), the preparation was either harmful (Neemazal-Blank) or moderately harmful (Celaflor). The two Quassin formulations tested were harmless. When treated host eggs were offered to Trichogramma adults, all treatments were almost harmless. In another test, host eggs parasitized at different times (1-8 days) were sprayed on the same day, only Neemazal was slightly to moderately harmful reducing adult emergence. The results showed, in general, that both Azadirachtion and Quassin were relatively safe to the tested parasitoid and could therefore be used in combination with *Trichogramma* releases.

P 14

EVALUATION OF EFFECACY OF SOME PESTICIDES ON THE CITRUS RED MITE *PANONYCHUS CITRI* (MCG.). N.K. Abukhashim, S. Hadya, H.S. Elghoul and N.E. Hashim, Plant Protection Department, El-Fateh University, Libya.

The mites used in this study were the progeny of a *Panonychus citri* population, obtained from citrus plants at the faculty of Agriculture Research Station, University of Alfateh, Tripoli. The mites stock culture was placed in a constant temperature cabinet for propagation, maintained on lemon fruits for six months. Three concentrations of three pesticides (Reldane, Kelthane and Nuroun) were tested under laboratory conditions for their effect on the citrus mite. The results obtained were statistically analysed after being transferred into percentage using Abbot's formula. The highest killing effect was 100% for Reldane at a concentration of 0.02%.

P 15

STUDY OF ORGANOPHOSPHATE (OP) RESISTANCE MECHANISM IN *CULEX PIPIENS* MOSQUITOES (DIPTERA:CULICIDAE). Naima Laias[1] and Amanda Callaghan[2]. (1) Department of Zoology, Faculty of Science, University of Alfateh, P.O. Box 13106, Tripoli, Libya; (2) Division of Zoology, School of Animal and Microbial Sciences, the University of Reading, Whiteknights, P.O. Box 228, Reading, RG6 6AJ, UK.

Culex pipiens mosquitoes are vectors of diseases such as Filariases in tropics and viruses in temprate and tropics areas. These vectors are controlled by chemicals including organophosphates insecticides. Since 1970 the effectiveness of the chemical control has been reduced by the development of resistance that has been linked to the increase in carboxylesterase activity. Previous studies had shown that the esterase B1 gene was activated 500 times in OP *Culex* Tem-R strain. A B1 DNA probe was used for the study of the structure and organisation of B1 esterase gene amplification. This will help understanding the mechanism of the B1 amplification, which is the aim of this study.

P 16

CONTROL OF GRAY MOULD (*BOTRYTIS CINEREA*) ON STRAWBERRY FRUITS BY FOLIAR SPRAY OF MONO-POTASSIUM PHOSPHATE. Mona A. El-Shamy and Shawky M. El-Desouky, Plant Pathology Research Institute, Agricultural Research Center, Giza, Egypt, E-mail: monash512@hotmail.com

A foliar spray of 1% (w/v) solution of mono-potassium phosphate (MKP), applied at two weeks interval starting from flowering till the end of the fruiting

stage, on fruiting strawberry grown in the open field, significantly reduced both the disease incidence and disease severity of gray mould (*Botrytis cinerea*). This was expressed by a reduction in fruit area covered with sporulating colonies, and in conidia production on fruit tissues. The efficacy of MKP was compared with that of other salts i.e. sodium bicarbonate, ammonium bicarbonate and calcium chloride as well as with fungicides recommended to control the disease. All treatments significantly inhibited gray mould development as compared with the non-treated controls. A remarkable control of strawberry fruit gray mould was obtained when strawberry fruits were sprayed with mono-potassium phosphate, followed by sodium bicarbonate while ammonium bicarbonate and calcium chloride were the least effective treatments. Microscopic examination suggested the destruction of fungal hyphae and conidia structures in MKP-treated fruits. Phosphate solutions were not phytotoxic to plant tissues, and had no residual effects in fruit yield. Lower yields were recorded in non-treated control plots due to fruit infection. It is suggested that MKP may be used as an alternative practice to control gray mould on strawberry fruits at a commercial scale.

P 17

DETERMINATION OF (LC50) FOR SOME INSECTICIDES ON SUSCEPTIBLE TWO SPOTTTED SPIDER MITE *TETRANYCHUS URTICAE* (KOCH) INFESTING CASTER BEAN. N.M. Zaidi, S.M.Ahdaya and E.T.Zentane. Department of Plant Protection, Faculty of Agriculture,University of El-Fatah, Libya.

Two spotted spider mite *Tetranychus urticae* (Koch) is a very dangerous agriculture pest which attacks over 100 different crops. Lately the mite problem was substantiated due to change in agro ecosystem, especially intensive use of pesticides which resulted in ecological imbalance, and destruction of natural enemies of mites, in addition to the increased level of resistance in the population. A laboratory study was conducted on a strain of *T. urticae* infesting caster bean *Ricinus cammunis* (F) which was never treated with pesticides, hence regarded as susceptible. To determine toxicity lines to some insecticides, a slide dip technique was used, and results were recorded 48 hours after treatment. The data were subjected to statistical analysis, and the (Lc50) of the insecticides Bromopropylate, Dicofol, Chloropyrifos-metthyl, Pyridaphenthion and Halfenprox were 185, 7.4, 20.8, 46 and 900 ppm, respectively. The results illustrated the strong efficacy of Dicofol on this strain. These results could also be used as a data base to monitor the development of pesticide resistance in this strain of *T. urticae* in westren Libya.

P 18

TECHNIQUES FOR PREDICTING THE INSECTICIDE DOSE RECEIVED BY THE DESERT LOCUST, *SCHISTOCERCA GREGARIA* (ORTHOPTERA: ACRIDIDAE) WHEN SETTLED. Khaled El-Gadgoud, National Committee for Desert Locust Control, Libya.

An equation was developed to assess the correlation between the number of droplets on the collected dead adults *Schistocerca gregaria* and the volume of these droplets. The correlation values indicated that the relationship between droplet numbers and their volumes was strongly positive. Both water and oil-based formulations produced a highly positive correlation between spray droplet number and their volumes for all locust positions. The two variables showed a highly significant relationship ($P<0.01$) for all positions tested. Regression equations were calculated for both water and oil-based formulations These were ($y = 0.002(x) + 0.16$) and ($y = 0.0017(x) + 0.060$), respectively. These two equations can be used to predict the volume of droplets from known droplet numbers. The regression equations (*Pr*) for all positions were used as essential parts of the equation. The prediction obtained through the equation developed suggested that locusts receive a very high dose of active ingredient if malathion and fenitrothion are applied at the recommended field application rate. It also suggested that the application rate can be reduced to one third for malathion and one fifth for fenitrothion.

P 19

TESTING NEW INSECTICIDES AND THE EFFECT OF AUTUMN AND SPRING APPLICATION OF TREBON 7.5 ULV FOR CONTROLLING DUBAS BUG. Abdul-Sattar Al-Khafaji, Naser Abdul-Saheb and Tadhamun Eskander. Ministry of Agriculture State-Board of Agricultural Researches Baghdad, Iraq.

Dubas bug is one of the most important pests attacking date palm trees in Iraq. To avoid insect resistance to insecticides that has been applied frequently and annually on large scale, new insecticides with low and environmentally safe doses were tested. Two experiments were conducted at Diyala governorate (Wajeehia area) during 1999-2000. In the first trial, 6 ULV insecticides were applied: Trebon 7.5, Ofunak 25, Senthion 100, Decis 12.5, Zolon 300 and Beticol 20 SL. Results indicated that all tested chemicals were effective against the pest but Trebon 7.5 was highly effective, the mortality rate was 94.72% and 91.76% in the first and second year, respectively. In the second experiment, when Trebon 7.5 ULV was applied during the Autumn season against the Dubas bug, the results indicated that this chemical was equally effective the in controlling this pest when applied during spring.

P 20

THE EFFICACY OF ALUMINUM PHOSPHIDE, BRODIFACOUM AND FLOUCOMAFEN AGAINST THE MOLE RAT *SPALAX LEUCODON* IN SYRIA. Adwan H. Shehab, Department of Plant Protection, General Commission of Agricultural Scientific Research, Douma P.O. Box 113, Damascus, Syria, E-mail: a.shehab@mail.sy

Field trials were carried out during winter and spring of 2001, to evaluate the efficacy of a fumigant poison, and the preliminary field performance of two formulations of a single dose anticoagulant rodinticides, against the mole rat *Spalax leucodon* in different localities in Syria. The efficacy was determined by measuring the mole rat activity to close opened holes made in the burrow system, before and after the treatment. Aluminum phosphide applications were conducted during January-March where the soil humidity was high after rainfall. Two holes, close to the animal's nest, in each burrow system were treated by inserting two tablets of phostoxine (6 g) and closed again firmly with soil to prevent escape of the released gas. The means of efficacy were 92.51, 92.01, 86.60 and 88.18% in the southern, costal, northern and the central regions, respectively. No significant difference was found between the means of efficacy against mole rats in cultivated and uncultivated locations; 88.42 and 91.23%, respectively. Ready for use formulations of the single dose second-generation anticoagulant rodenticides were used in April and May; where the soil humidity was low, in southern Syria (where it was difficult to use a fumigant poison). Two holes, in each burrow system, were treated by inserting 14 g of the formulations. The efficacy of Brodifacoum application in reducing the activity was very high (100%), whereas that of Flocoumafen was only 50%.

P 21

EFFECT OF SOME VOLATILE OILS ON WORKER BEES. H.M. Fathy, Abd El-Satar I. Abd El-Kareim, Samir S. Awadalla and Amro A. Taha, Department of Economic Entomology, Faculty of Agriculture, Mansoura University, Mansoura, Egypt, E-mail: elboray2000@yahoo.com

The study included the influence of three volatile oils, camphor (*Eucalyptus rostrata*), thymes (*Thymus vulgaris*), and rosemary (*Rosmerinus officinalis*) on development of hypopharyngeal glands, and dry weight and nitrogen content of worker bees. Statistical analysis revealed that glands development differed significantly in relation to the time of the year. In all treatments, the average of thorax dry weight decreased significantly in January, September and November. Nitrogen content increased first in March and reached 6.70, 5.68 and 6.34% in treated colonies with camphor, thymus and rosemary, respectively. The highest

average dry weight and nitrogen content of thorax were recorded for the nurse workers of treated colonies with camphor (12.250 mg and 5.10%, respectively), followed by colonies treated with thymes (11.130 mg and 4.77%).