

Economic Entomology

E 1

STUDYING THE FLYING ACTIVITY CURVE OF CODLING MOTH, *CYDIA POMONELLA*, USING PHEROMONE TRAPS, AND ITS RELATION TO WEATHER CONDITION. Jehan Alabdalla¹ and Wa'el Almatni². (1) Al-Swaida Research Centre, General Commission for Scientific Agricultural Research, As-Sweida, Syria, Email: jihan_na@hotmail.com; (2) Division of Pest Management, Department of Plant Protection, Ministry of Agriculture, Damascus, Syria, Email: almatni@scs-net.org

Pheromone traps of codling moth, *Cydia pomonella* L., were hanged in apple orchards at Al-Sweida Agricultural Research Center (Ain Al-Arab). Three pheromone traps were monitored every 2-3 days from early spring until few days before harvest during the period 2002 to 2006. The numbers of caught moths were recorded. Curves for the mean of the caught moths and date of catching were drawn for each year. There were full two generations and partial third generation in each year. The relation between cumulative temperatures above the reference' development threshold (10°C) and the caught moths was calculated. Moths started their emergence at 99.2 ± 8 DD from the beginning of the year. 50% of moth flying occurred after 137 ± 67.2 DD from the first catch, and the flying ended after 386.5 ± 152.6 DD. Second flight began after 534.5 ± 20.6 DD from the first-generation flight. Data from agricultural weather warning station could be then used effectively to improve future predicting programs for the development of the codling moth in orchards, especially beginning of moth flying of the first and second generation, using cumulative temperatures record from agricultural weather stations.

E 2

THE RELATION OF DIAPAUSE DATE OF CODLING MOTH, *CYDIA POMONELLA* L., WITH THEIR EMERGENCE DATE AND MOTH'S FERTILITY. Wa'el Almatni¹ and Jihan Alabdalla². (1) Division of Pest Management, Department of Plant Protection, Ministry of Agriculture, Damascus, Syria, Email: almatni@scs-net.org; (2) Al-Swaida Research Centre, General Commission for Scientific Agricultural Research, Al-Sweida, Syria.

Diapaused larvae of codling moth, *Cydia pomonella* L., were collected from chemicals-untreated orchard in Sweida in 2002 and 2003. Larvae were collected weekly from the beginning of August until end of October. Those larvae were grouped based on the collection date. All were left in a protective cage in the orchard itself until the next spring. Emerged moths were kept in rearing cages: each date grouped together. It was found that the date when larvae entered to diapause had an effect on emergence date the following spring. Moths which emerged first were from first diapaused larvae. Moths from larvae that entered to diapause in August emerged 4-5 days earlier than those who entered diapause in September, which also were 5 days earlier than moths that their larvae diapaused in October. Fertility of moths that emerged from diapaused larvae were 17.2, 6.5, 12.5 egg/female in the seasons 2000/2001, 2001/2002 and 2002/2003, respectively. Moths that emerged from spring season larvae had an average fertility of 62 eggs/female. These results confirmed the effectiveness of diapause condition and diapause time on fertility of codling moths and their emergence date in the next spring.

E 3

BIOLOGY STUDY OF THE MEDITERRANEAN FRUIT FLY *CERATITIS CAPITATA* WIEDMANN, 1824 IN A TRADITIONAL AND MODERN WAY CULTURED OASIS USING TWO WARNING METHODS. Malik Laamari and Mustapha Slimane Bouasbana, Department of agronomy, Faculty of the Science, University of Batna, 05000, Batna, Algeria, Email: laamarimalik@yahoo.fr

The southern Algerian oasis is known for the diversity and density of plant cover which provides the Medfly all the favourable conditions for their development. The use of the pheromone traps permitted to assess 6 generations, capturing a maximum of 374.5 males per trap, per week. It also appeared that the traditional oasis covered by a high plant density of about 85%, presents a susceptible Medfly environment, which permitted to capture 3839 individuals. Whereas, in the modern oasis culture, characterized by a low plant density (57%), the number captured did not exceed 2630 individuals. The second technique based on monitoring temperatures is not useful for arid conditions.

E 4

IMPORTANCE OF HOST FRUITS AND SOME ENVIRONMENTAL FACTORS IN CODLING MOTH *CYDIA POMONELLA* L. POPULATION DYNAMICS AND ATTACK ON FRUITS. Ali Belouaer, Laboratoire de Protection des Végétaux, Institut National de la Recherche Agronomique de Tunisie, 49 Rue Hedi Karray, 2049 Ariana, Tunis, Tunisia, Email: belouaer.ali@iresa.agrinet.tn

In Tunisia, codling moth is a redoubtable pest of pome fruits. Following heavy larvae attack, apple and pear fruits fall down. Damage is more serious when orchards are not well managed, where in portent yield loss and reduced quality can occur. Even in treated orchards, the incidence of attacked fruits can reach 93, 83 and 100% for apples, pears and quinces, respectively. This work aims at studying the interaction between codling moth and apple tree. It focuses on the very important role of the presence of fruits on the tree in relation to insect population dynamics, the extension of activity period, as well as the attack rate on fruits. This work also focused on the effect of some secondary factors on reducing the proportion of attacked fruits. Finally, the study examines wrong planting practices which favours the pest invasion and makes its control more difficult. Some recommendations for codling moth management to reduce obviate the insect damage will be proposed.

E 5

SURVEY OF INSECT AND MITE PESTS WHICH ATTACK PEAR TREES DURING THE BLOOMING AND FRUITING STAGES IN ISMAILIA GOVERNORATE IN EGYPT. M.A.M. Osman and F.M. Mahmoud, Plant Protection Department, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt, Email: naeim70@hotmail.com, mfmfmousa@hotmail.com

The experiment was carried out for two seasons 2005 and 2006 at the two pear orchards of Suez Canal University, Ismailia Governorate, Egypt. The insect and mite pests associated with pear trees were surveyed during two successive blooming and fruiting seasons. For every pest the status, time of occurrence and plant parts damaged were determined. Survey revealed presence of pests in 4 insect orders and one mite order. Mealybugs were the major pests in the first season, whereas in the second season *Cacopsylla pyricola* was the most important and occurred towards the end of May, and was not found in the previous season.

E 6

EFFECTS OF BIOSTIMULANTS AND KAOLIN PARTICLE FILM ON PEAR (*PYRUS COMMUNIS* L.) RESISTANCE TO PEAR PSYLLA (*CACOPSYLLA PYRICOLA* FÖRSTER) INFESTATION. George Saour and Halah Ismail, AEC of Syria, P.O. Box 6091, Damascus, Syria, Email: gsaour@aec.org.sy

Field experiment was conducted in summer 2005 on pear (*Pyrus communis* L.) at Sargahia Agricultural Research Station, northwest of Damascus to assess the effectiveness of biostimulant and kaolin-based particle film against pear psylla *Cacopsylla pyricola* Förster. Pear psylla nymph counts showed that populations were significantly reduced after the application of kaolin particle film compared to the control for up to 12 weeks. Kaolin particle film had the lowest counts of pear psylla adults over the entire sampling period. Biostimulant applications at 30 days intervals did not suppress pear psylla nymph and failed to maintain population size at low level during the experimental period. The spray of Envidor 240 SC, a new acaricide, suppressed pear psylla population and protected the treated trees from infestation. No phytotoxic effect on pear due to particle film application was detected. In contrast, kaolin-sprayed trees were healthier and more vigorous compared with the control treatments. Spraying pear with kaolin particle film seems to hold promise as an alternative pest management tool.

E 7

ECOLOGY OF THE BLACK LOUSE *PARLATORIA ZIZIPHI* ON CITRUS IN THE AREA OF BOUFARIK, ALGERIA. Mehdi Sellami and M. Biche, Department of Zoology, National Institute of Agronomy 16200, El-Harrach, Algiers, Algeria, Email: mergueb2002@yahoo.fr

The study of the citrus insect *Parlatoria ziziphi* (Homoptera: Diaspididae) was carried out in a citrus orchard in the area of Boufarik, in Mitidja, Algeria. The results obtained show that the black louse had four generations per year. The plant host and the climate influenced the distribution, evolution and also the mortality of the individuals of *Parlatoria ziziphi*. Among the biological stages, the adult larvae and males

are affected by the mortality conditioned by the climate. The adult females showed resistance to the outside conditions. The parasite *Aspidiophagus citrinus* had three generations, its activity is more visible through the adult females. Its parasitic activity on the black louse was observed to slow down with time.

E 8

THE RELATION OF MINERAL SALTS CONTENT IN FOLIAGE OF TWO CITRUS VARIETIES (LEMON AND CLEMENTINE) TO INVASION WITH *PARLATORIA ZIZIPHI* IN ALGERIA.

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The effect of chemical constituents of lemon and clementine tree on the invasion of *Parlatoria ziziphi* (Diaspididae: Homoptera) was investigated. The results showed that potassium, sodium and magnesium content in both varieties was inversely proportional to insect invasion, regardless of the leaves age. In addition, the results of mineral analysis showed that there was a larger amount of potassium in lemon tree than in the clementine tree, which was most infested. The fluctuation of copper and iron in both varieties in relation to invasion with *Parlatoria ziziphi* did not suggest a significant correlation.

E 9

POPULATION OF *PARLATORIA PERGANDII* COMSTOCK AND PARASITISM RATE ON THE DIFFERENT PARTS OF THE CITRUS TREE.

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The population dynamics of the scale insect *Parlatoria pergandii* on the different parts of citrus tree was conducted in three locations in Lattakia during 2002/2003. The highest number of insects on fruit in location one (12.55 insect/fruit) reached in December and the lowest (0.45 insect/fruit) was in May 2002. The highest rate of parasitism on the fruit reached (9.83%) in March 2003 and the lowest (0%) in May, June and July 2002. In the second location, the highest number (24.25 insect/fruit) was in March 2003 and the lowest (2.28 insect/fruit) was in May 2002. The highest rate of parasitism on the fruit 7.95% reached in March 2003 and the lowest (0%) in May, June and July. In the third location the highest number (13.73 insect/fruit) was in October 2002 and the lowest (0.075 insect/fruit) was in May 2002. The highest rate of parasitism on fruit reached 16.98% in July 2002 and the lowest (0%) was in May and September 2002. The natural enemies on *P. pergandii* were *Aphytis* spp, *Encarsia* spp, and unknown parasitoid, and the predators were *Chilocorus bipustulatus* Linnaeus, and predator Cheletid mite which also predate its own eggs, but was rare.

E 10

ESTIMATION OF BIOLOGICAL PARAMETERS OF *PHYLLOCNISTIS CITRELLA* BY APPLYING LESLIE MODEL AND USING *POP TOOLS* PROGRAM.

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Phyllocnistis citrella Stainton is the most important pest which attacks citrus trees. The biological parameters were studied under laboratory conditions. A single female can lay from 6-79 eggs during its life, with an average of 42.7 eggs/female (Total fecundity), and lay 2-31 eggs per day, with an average of 7.12 eggs/female/day (Daily fecundity). The average reproductive rate (m_x) was 17.9 female/female. The next biological parameter was calculated after making a life table: The net reproductive rate was 15.14 female/female. The mean generation time (T) was 15.51 days, intrinsic rate of increase (r) was 0.174 female/female /Day; The Doubling time of Population (DT) was 3.98 days. *Phyllocnistis citrella* can give 11 generations or more per year. Leslie Model was used to obtain the expected increase in the density of *P. citrella* density during a limited period.

E 11

SURVEY OF CITRUS LEAFMINERS *PHYLLOCNISTIS CITRELLA* STANTON ON DIFFERENT VARIETIES OF CITRUS TREES IN LIBYA. Salem Shebli¹ and Haluma Kerra². (1) Agriculture Research Center, P.O. BOX 2480, Tripoly, Libya, Email: s_shebli@yahoo.com; (2) Plant Protection Department, Agriculture Faculty, Al-Fateh University, Tripoli, Libya, Email: Kerra50@hotmail.com

A study was conducted on the citrus leaf miner (*Phyllocnistis citrella*) (Lepidoptera: Gracillariidae) on citrus trees during the 2005 growing season in the western region of libya (Ain Zaras and Zawia) on the following varieties of orange trees *Citrus sinensis*: Succari (sweet), Hasna, Blood and Navel, in addition to lemon. It was found that the highest population of the insect was lemon trees. The rate of infestation in Ain Zaras and Zawia reached 99.0% and 96.7%, respectively on the new shoots in the autumn season. The lowest population was on Hasna variety, where the rate of infestation reached 20%. No differences in the infestation of the rest of citrus varieties were observed.

E 12

FLUCTUATION DENSITY OF CITRUS LEAF MINERS *PHYLLOCNISTIS CITRELLA* STANTON, AND ITS PARASITIDS IN THE MIDDLE OF IRAQ. M.S. Abdul- Rassoul¹, Amal N. Al-Khalidy², N.N. Hama² and Ameara, N. Hassan². (1) Iraq Natural History Museum, Baghdad University, Baghdad, Iraq; (2) National Centre of Integrated Pest Management, State Broad of Agriculture Research, Ministry of Agriculture, Baghdad, Iraq, Email: msabr_1942@yahoo.com

This study was carried out from October 2004 till October 2005 at the district of Al-Gryaat, by using citrus seedlings to determine the activity of citrus leaf miners *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) and their associated parasitoids. The maximum density of the presence of insect larvae reached 256 per 100 leaves and declined till disappearance during the cold months, while the maximum density of the pupae reached 96 per 100 leaves during the second half of April. In addition, it was found that the insects had 11-12 generations a year. Two peaks of parasitoids population were found, the first one was during October (29 per 300 leaves at a ratio of 14.1%), while the second peak was during July (34 per 400 leaves at a ratio of 9.8%). The most dominant parasitoids found were *Ratzeburgiola incompleta* Boucek, *Cirrospillus* sp., *Neochrysocharis formosa* (Westwood), *Pnigalio* sp. and *Baryscapus* sp. at a parasitism rate 37.07, 27.59, 24.57, 5.17 and 5.60%, respectively, while the two species *Tetrastichus* sp. and *Pediobius* sp. were found in a very small number during the study. The field study showed that the parasites *Ratzeburgiola incompleta*, *Cirrospillus* sp., *Neochrysocharis formosa*, *Pnigalio* sp., *Baryscapus* sp., *Tetrastichus* sp. and *Pediobius* sp. were found at a parasitism rate of 52.94, 30.15, 6.62, 4.41, 4.41, 0.74 and 0.74%, respectively. The two parasites *Pediobius* sp. and *Baryscapus* sp. were recorded as citrus leaf miners parasitoids for the first time in Iraq.

E 13

ECOLOGICAL STUDIES ON THE OLIVE BUDS MOTH (JASMINE MOTH) *PALPITA UNIONALIS* HÜBNER AND ITS ASSOCIATED NATURAL ENEMIES IN SYRIA. Mahmoud Sabri Lababidi, Department of Plant Protection, Faculty of Agriculture, University of Aleppo, P.O. Box 12052, Aleppo, Syria, Email: mslababi@scs-net.org

In the last few years, a new olive insect pest that infests the buds and leaves was recorded and identified as the olive buds moth / or jasmine moth (*Palpita unionalis* Hübner) (Lepidoptera :Pyrilidae). Within a short period of time, the pest became epidemic in olive nurseries throughout the country. Ecological studies were conducted, during 2003 and 2004, on the olive buds moth in two regions in Syria. The rate of infestation with the pest reached 100% in all regions but at different times; infestation of 100% was reached on September and August in Idleb and Aleppo, respectively. The pest occurred between the 1st week of May until the end of October with a peak abundance during the last week of September in Idleb and the 2nd week in Aleppo, respectively. Many beneficial insects and pathogens as natural enemies of *P. unionalis* were found, and recorded for the first time, in olive orchards and olive nurseries in Syria. The 1st and 2nd larva instars were attacked by a hymenopteran endoparasitoid *Dolichognida trachalus* (Nixon, 1965) (Lepidoptera: Braconidae). Rate of parasitism ranged from 5.6 to 85% in two regions under field conditions.

E 14

PRELIMINARY FIELD STUDY OF *EUZOPHERA PINGUIS* HAW IN SYRIAN OLIVE ORCHARDS. Ayman Barani¹, Nazer Hamdan², Raja Eaid², Ahmad albashi¹ and Hosam Abd Alwahab². (1) Department of Olive Research, Idleb, Syria; (2) Directorate of Agriculture in Damascus Countryside, Damascus, Syria, Email: muminad@scs-net.org

Olive ranks first among fruit trees in Syria, and olive production ranks third in economic importance, where the number of olive trees reached to more than 79 million trees, out of which 58 million trees produce one million tons olive fruits in 2004. In the autumn of 1999, olive plantations in Damascus countryside, suffered from a severe decline, which was accompanied by gradual dryness of the tree. Our study indicated that the phenomenon is due to an infection with *Euzophera pinguis* Ha, and this is the first record of this pest in Syria. The number of generations for this pest in Syria was three, whereas it was only two generations in different Mediterranean regions. A study was carried out to determine the distribution and characterization of this new pest.

E 15

BIOLOGICAL STUDIES ON THE OLIVE BUDS MOTH (JASMINE MOTH) *PALPITA UNIONALIS* HÜBNER IN SYRIA. Mahmoud Sabri Lababidi, Department of Plant Protection, Faculty of Agriculture, University of Aleppo, P.O. Box 12052, Aleppo, Syria, Email: mslababi@scs-net.org

In the last few years, the olive buds moth appeared as a serious pest in all olive nurseries in Syria, and in some new olive orchards in the costal region. Larvae of *Palpita unionalis* Hübner (Lepidoptera: Pyralidae) devour young leaves and apical buds causing stunted growth of olive plants. The aim of the present work is to study the biology of this insect under controlled and uncontrolled laboratory conditions of temperature and relative humidity. The incubation period of eggs of *P. unionalis* ranged between 2.9 days (at 30 °C) and 11.5 days (at 15 °C). The egg embryos died at 35°C. Larvae had 6 instars. The duration of the last instar was almost double the duration of the first. The shortest larval period (14.8 days) was at 30 °C. Larvae fed on leaves spinning several leaves together to form shelter for the pupa. At 20 °C, the mean duration of pupal stage was 18.2 days for males and 15.1 for females. The most favourable relative humidity for moth emergence was 65%. Copulation took place at mid-night, 24 hours after emergence, and lasted 65 minutes on the average. The total duration of the developmental stages at 25 °C were 29.5 days for males and 28.7 days for females. Under laboratory conditions (23.2 °C and 64.4% RH), the mean pre-oviposition period of fertilized females was 1.8 days, and the oviposition period was 11.3 days, and post-oviposition period was 1.5 days. The total number of eggs laid per fertilized female averaged 534 with a maximum of 570 eggs, the highest number being laid during the first day. Terminal rows of leaves were preferred by the moth for egg laying and more than 78% of the eggs were laid singly at twilight, usually on the lower surface of foliage. The longevity of moth was much affected by feeding but was slightly affected by mating. The sex ratio (female: male) was 1:1. Under laboratory conditions, 10 generations per year were recorded.

E 16

SOME ASPECTS OF THE BIOLOGY AND ECOLOGY OF FIG STEM BORER (FSB) *BATOCERA RUFOMACULA* DEGEER. Ibrahim Barakat El-Bakhiet, Awad Abdullah Elseeg and Yousuf Salim Al Mashikhi, Salalah Agricultural Research Station, Salalah 211, P.O Box 475, Sultanate of Oman, Email: bakh47@yahoo.com

A study was conducted under laboratory conditions during May-November 1998, when temperature ranged between 26-31°C and relative humidity of 60-80%. Duration of the different developmental stages of *Batocera rufomacula* DeGeer (Cerambycidae: Coleoptera) was determined and morphology was described. Pre-oviposition period, incubation period, larval and pupal period were 3.0, 6.4, 107.5 and 15.6 days, respectively. Fecundity was 274.3 eggs/ female, and there appeared to be one generation per annum. Results from surveys made during 1999-2001 showed that fig trees (wild and cultivated) were attacked by the *Batocera rufomacula*. In addition to figs, a number of plant species were also attacked including mango and avocado. The adult was observed to feed on the bark of the stem and main branches. The larva causes the greatest damage by penetrating the bark and later bore into the sapwood and remains inside until pupation

and adult emergence. As a result the tree is weakened and when infestation is severe trees succumb. The insect is nocturnal in habit and adults were observed to emerge during the period May-August.

E 17

ABOUT THE PRESENCE OF GREEN LEAFHOOPER IN VINEYARDS FOR WINE GRAPE AT HADJOUT AND BOURKIKI (MITIDJA), ALGERIA. F. Bounaceur¹, S. Ameur Laine¹ and A. Guendouz-Benrima². (1) Institut National Agronomique d'El Harrach, 16200, Algeria; (2) Institut d'Agronomie, Université de Blida, B.P 09, 09470, Soumaa, Blida, Algérie, Email: atiguen@yahoo.fr

Experiments were carried out in the area of Hadjoute and Bourkika located in Mitidja, Algeria, in a vineyard with four types of grape: Merlot, Cabernet Sauvignon, Syrah and Grenache. Five leaves were collected randomly from 10 vines. The number of green leafhopper larvae was counted on the lower leaf surface. Yellow traps were used to catch adults. An important infestation by the first generation was noticed at mid May but without damage. The second generation appeared in June with burnt marks on the leaves which are thereafter generalized during the summer period. The third generation appeared by the end of August. The Green Cicadelle develop 3 generations per year on vineyard in Mitidja as quoted by Professor Martin Vanhellden in Bordeaux

E 18

MONITORING THE CHANGES IN THE POPULATION ACTIVITY OF GRAPE BERRY MOTH, *LOBESIA BOTRANA* SCH., IN HOMS, SYRIA. Mohamed Ibrahim and Naufal Al-Radwan, Agricultural Scientific Research Station, Homs, P.O. Box 626, Syria, Email: gcsarhomcin@mail.sy

The changes in the weekly number of grapeberry moth (*Lobesia botrana* Sch.) in delta pheromone traps to estimate timing of male moths activity in grape vine yards was carried out during 2003 season in Homs Agricultural research Station. Results obtained indicated that this pest had three successive peaks. The population was relatively low from 4th week of May to 4th week of July. Then the numbers tended to increase gradually to reach the first peak on the third week of July (3 male moths/trap/week). The 2nd peak occurred during the 1st week of August (10 male moths/trap/week) and the 3rd peak with the highest number of captured moths occurred in pheromone traps during the 1st week of September to early October (20 male moths/trap/week). Results obtained revealed the presence of three Overlapping field generations during the 2003 season. The 1st generation from the 1st week of June to the 3rd week of July (7-8 weeks), the 2nd generation from the 3rd week of July to the 3rd week of August (5-6 weeks) and The 3rd generation: from the 2nd week of August to the 4th week of September (4-5 weeks). The damage-score for grape berry moth, *L. botrana* during 2003 season was 27.71%, and the rate of infestation to grape increased from the 1st week of August (31%) to reach a maximum by the 4th week of September (95%).

E 19

POPULATION DYNAMICS OF THE ACUMINATA SCALE (*KILIFIA ACUMINATA* SIGN.) ON MANGO TREES IN EGYPT. Al-Sayied A. Alwan, Plant Protection Research Institute, Agriculture Research Center, 7 Nady El-Saeid, Dokki, Giza 12311, Egypt, Email: ssechem@hotmail.com

Acuminata scale (*Kilifia acuminata*) (Homoptera: Coccidae) is an economic insect pest on mango trees in Egypt. The insect causes severe damage to the leaves by sucking the cell sap and excretes a large amount of honeydew that falls on the upper surfaces of the leaves and encourages the growth of sooty mould; the infested trees acquire a dirty black appearance. Population dynamics and effect of some weather factors on the insect activity were studied for two years (2004/2005) at the Horticulture Research Station in El-Qanater El-Khairia, Qalubya Governorate (40 km North Cairo). The results obtained showed that the insect has two overlapping generations per year under field conditions. The 1st generation occurred in spring with high numbers in April, whereas the 2nd generation occurred in autumn with high numbers in October/November. The insect population distributed randomly on the cardinal directions of the tree and concentrated with high numbers on the lower stratum of the tree, followed by the middle stratum, whereas the upper stratum harbored less numbers. Effect of the tested weather factors on the insect activity in both years revealed that daily mean minimum temperature had positive and highly significant effect, whereas daily mean maximum temperature had a negative and highly significant effect. Relative humidity had a positive effect on the insect activity in both years; insignificant in the 1st year and highly significant in the

2nd year. The combined effect of the tested three weather factors on the insect activity was highly significant and the amount of variability that could be attributed to the combined effect of these three factors on the insect populations was 58.7% and 67.9%, in the first and second year, respectively.

E 20

BIOLOGICAL STUDIES ON ACUMINATA SCALE (*KILIFIA ACUMINATA* SIGN.) IN EGYPT.

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Acuminata scale (*Kilifia acuminata*) (Homoptera: Coccidae) is an oviparous insect and reproduce parthenogenetically. The insect was reared successfully on small mango seedlings cultivated in black plastics sacs for one year (April, 2004 to April, 2005) under laboratory conditions. Results showed that the insect has three overlapping generations per year and the adult female passes through two nymphal instars before maturity. Duration of the nymphal instars varied in the three generations; the shortest period of the 1st instar nymph was 22.4±0.4 days at 24.1°C and 69.3% R.H and the longest period was 27.4±0.5 days at 16.8°C and 78.1% R.H. In the 2nd instar nymph, the shortest duration was 28.1±0.5 days at 24.1°C and 69.3% R.H. and the longest duration was 88.6±4.8 days at 16.8°C and 78.1% R.H. The pre-oviposition period greatly varied in the three generations; the shortest period was 33.4±2.4 at 23.7°C and 78.4% R.H and the longest period was 109.2±6.8 days at 13.7°C and 76.7% R.H. The shortest oviposition period was 61.3±3.6 days at 23°C and 78.5% R.H and the longest period was 102.9±18.4 days at 16.6°C and 77% R.H. The post-oviposition period varied, the shortest period was 6.9±1.9 days at 22.2°C and 71.4% R.H and prolonged to 53.5±12.1 days at 15.8°C and 77.1% R.H. The insect longevity varied in the three generations, the shortest period was 148.3±15.6 days and the longest period was 188.8±19.6 days. The fecundity of the insect also varied in the three generations, the highest mean number of crawlers /female was 95.8±3.9 and the lowest number was 54.9±2.3.

E 21

ENTOMOFAUNE OF THE PISTACHIO TREE (*PISTACIA*) IN THE PLAIN OF THE MITIDJA

(ALGIERS). Salal Eddine Doumandji¹, Nadia Boukaroui¹ and Nadjiba Chebouti². (1) Department of agricultural and forest zoology, agronomic National institute, (2) Department of Biology, Faculty of Science, University of Boumerdes, Algeria, Email: chnadjiba@yahoo.fr

Before expanding the pistachio tree culture in Algeria, it was necessary to survey its principal pests. The current status of pistachio pests in Algeria is not known. A survey was carried out in an orchard planted with Aleppo pistachio (*Pistacia vera* L) and Atlas pistachio (*Pistacia atlantica* Desf.) during the September 2004 until September 2005. Results obtained indicated that the following species were present: *Gryllus burdigalensis*, *Grillus binaculatus*, *Ochrilidia tibialis*, *Acrida turrita*, *Ailopus strepens*, *Oedipoda caerulecens sulfurescens* pertaining to Orthoptera, and *Mantis religeusa* which belongs to the family Mantodea. Hymenoptera species identified in the same area of study were: *Cataglyphis bicolor*, *Messor Barbara*, *Pheidole pallidula*, *Pheidole* sp., *Monomorium* sp., *Tetramorium biskrensis*, *Apis mellifera*. Members of the family Bethyridae are predators of Coleoptera or Lepidoptera larvae. The order Coleoptera was the most common and was represented by the family Carabidae. In the family Curculionidae, *Apion* sp. and *Polydrosus* sp., in the family Staphylinidae, *Ocyopus oleus*, *Ocyopus* sp., in the family Tenebrionidae, *Blaps* sp., in the family Buprestidae, *Anthaxia viminalis* were identified. As for the order Diptera, was represented by the family Asilidae (*Asida* sp.), Drosophilidae, Calliphoridae and Jassidae. Homoptera was represented by the family Aphidae.

E 22

PESTS OF THE PISTACHIO TREE IN THE TELMECEN EASTERN STEPPE OF ALGERIA.

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The culture of the pistachio tree (*Pistacia vera* L.) is very rare in Algeria. The economic and agronomic interest can expand the culture of this species in the country. Accordingly, a survey to identify

insect pest which attack pistachio trees in Algeria was carried out. The results obtained reveal the existence of five insect orders, Coleoptera with a frequency of 70 %, such as *Chaetoptelius vestitus* which digs galleries in young buds (the diameter of the gallery is 2.5 mm to 40 mm and the length is 4.81 mm to 18.12 mm), and *Mylabris oleae*, which consumes a considerable mass of the leaf area. Insects of the order Hymenoptera was present at a frequency of 10%, such as *Cataglyphis bicolor* and *Tetramorim biskrincis*. The dipterous insects were present at the rate of 5% (*Cyclorrapha* sp. and *Asida lefranci*). Insects of the order Orthoptera were present at a frequency of 10%, such as *Sphingonotus Caerulance* and *Anachridium aegyptium*. Insects species of the order Neuroptera were present at a frequency of 5%.

E 23

BIOLOGICAL STUDY OF CORN SAP BEETLE *CARPOPHILUS DIMIDIATUS* ON DATE FRUITS. M.Z. Najla and H.M. Kerra, Plant Protection Department, University of Al-Fatah. Tripoli, Libya, Email: najla_elzaidi@yahoo.ca

Biological studies on corn sap beetle *Carpophilus dimidiatus* (Coleoptera: Nitidulidae) was conducted under laboratory condition. The beetles were reared on semi dry date fruits, by using pairs of adult beetles (males and females) to determine the insect fertility. The life cycle of *Carpophilus dimidiatus* was studied under lab condition ($28 \pm 0.5^\circ\text{C}$) and in an incubator at 25 and 30°C . Results showed that the mean number of eggs/female was 413 eggs, the pre-oviposition period was 3 days, oviposition period was 59 days, and the post-oviposition period was 9 days. The mean incubation period of the eggs was 3 days and larvae molted three times. The mean larval stage took 12 days, pupa 6 days, male longevity was 77 days, and female longevity was 71 days. Sex ratio was 1 male: 2 females. The life cycle from egg to adult under laboratory conditions ($28 \pm 0.5^\circ\text{C}$) was 21 days while in the incubator at 25 and 30°C was 24 and 21 days, respectively.

E 24

MONITORING DATE PALM STALK BORERS *ORYCTES* SPP USING LIGHT TRAPS AND ITS RELATIONSHIP TO ENVIRONMENTAL FACTORS AT SEIYUN AREA IN WADI HADRAMOUT, YEMEN. Saeed A. Ba-Angood and Saleh O. Al- Baity, Department of Plant Protection, Nasir's College of Agriculture University of Aden, Yemen, Email: baangood@yemen.net.ye

Date palm stalk borers *Oryctes* spp are important date palm pests attacking date palm trees and causing a lot of losses in Wadi Hadramout. This research aims at monitoring the occurrence of the pest using modified Hjstand light traps that were installed during the period March 2003-February 2004 at Seiyun area in Wadi Hadramout; and studying the effect of some ecological factors that affect their occurrence in the area. The results have shown that the pest started to appear in light traps in the first week of March and reached their maximum number (188) in May 2003. The number decreased gradually in September, October and November; and in December, it completely disappeared. The pest started to appear again in January and February in low numbers with a mean number of 5 and 7, respectively. It has been shown that the pest has only one generation per year, and the sex ratio was 1.8: 1 females to males. There was no statistical significant difference (at 5% level) between the increase and decrease of the population of the pest that could be affected by the decrease or increase of temperature or relative humidity. The appearance of the moon had no relationship with the ability to trap the pest, as there was no significant difference (at 5% level) in numbers caught on moony or dark nights. It was concluded that light traps could be used successfully in monitoring the pest and reducing its number, and could also be used in any IPM program for the management of this pest.

E 25

SUSCEPTIBILITY OF DATE PALM CULTIVARS TO WHITE DATE SCALE *PARLATORIA BLANCHARDI* (TARG) IN WESTREN REGIONS OF LIBYA. Eman Jamahor¹, H.M. Kerra¹ and H. Maghrabi². (1) Plant Protection Department, College of Agriculture, El-Fatih University, Libya, Email: emanmb15@yahoo.com; (2) Zology Department, College of Science; El-Fatih University, Libya.

Parlatoria blanchardi Targ, a white date palm scale insect is known to cause a great damage to date palm trees all over the world, affecting plant growth, fruit quality, and could lead to death of newly planted offshoots. The objective of the study was to determine the Susceptibility of date palm cultivars to *Parlatoria*

blancha (Targ) in westren regions of Libya and study the population density. The study was conducted during May - November 2002. Eleven regions were surveyed (Zawia, Ben Gesheer, El-Swani, Janzore, Ain Zara, Tajora, Garaboly, Basis, Khoms, Zletin and Tawerga). Results indicated that all coastal cultivars (Bronsi, Taboni, Bekrari, Bayodi, Helawi, Hora, OM Hanash, Om Fteti, Om Adam, Elfarsha, Fezani, Najma) were found susceptible to infestation by *Parlatoria blanchardi*. The highest population density was recorded on Bekrari (5000 insects/10 leaflets), while infestation of the other cultivars varied (0-790 insect /10 leaflet), and no infestation on Saede cultivar was observed. In addition to white scale insect, *Parlatoria blanchardi* a green scale insect *Asterolecanium phoenicus* was also found in El-Swani on Bayudi cultivars only.

E 26

POPULATION DENSITY OF FRUIT STALK BORER *PHYLLOGNATUS EXCAVATUS* ON DATE PALM TREES IN EL-WAHAT, LIBYA. H.M. Kerra, A. Gaga and A. Hamza, Date Palm & Olive Development and Corporation, Karbouly, Libya, Email: kerra50@hotmail.com

A study was conducted in 2000/2001 to determine population density of *Phyllognatus excavatus* (Coleoptera: Scarabaeidae) in El-Wahat, Libya. Twelve light traps were distributed in three locations in El-Wahat (Ojela, Jallo and Ejker). Results showed that the fruit stalk borer *Phyllognatus excavatus* had one generation per year, and its population density reached 214 beetles in the first year and 323 beetles in the second year. The highest peak was reached in September in all studied locations, where it reached 87 beetles in 2000 and 111 beetles in the 2001. The beetles disappeared in December, January and February in both years. Results of this study support the role of light traps as a mechanical method to reduce & control the population of the fruit stalk borer and it can be used as a component of integrated pest management package in date palm orchards.

E 27

SURVEY AND DESCRIPTION OF FOREST STEM BORERS IN NORTHERN IRAQ. Batool A. Karso and Talal T. Mahmoud, Department of Forestry, College of Agriculture, University of Dohuk, Kurdistan Region, Iraq, Email: batool1220@yahoo.com

This study was carried out in north of Iraq (Kurdistan) during 2004 and 2005. The results indicated that there were many borer species which infested forest trees in Dohuk, Erbil, and Suleymaniya provinces. Taxonomically, identified beetles belong to the family Buprestidae. The larvae of this species are known as flathead borers, and cause serious damage to the plant usually excavating inside the trunk S – shaped. There Another borer *P. tabaniformis* Rott. (family: Aegeriidae) was identified The eggs hatched and the larvae penetrate the stem and dig a tunnel under the bark and deepened in the wood, to make circularly tunnels and produce a gall-like structure in the tissue invaded by the larvae. This causes large amounts of sap mixed with frass oozing out from entrance holes on the trunk. Borer species collected from the poplar planting and natural forests in Kurdistan region (from Zakho to Sulaimani) and described.

E 28

THE MAIN PESTS OF OAK CORK TREES AND THEIR IMPACT ON THE QUALITY OF CORK. Rashid T. Bouhraoua, Faculty of Sciences, Tlemcen University, B.P. 119, Amama, 13000 Tlemcen, Algeria, Email: rtbouhraoua@yahoo.fr

The oak cork tree is economically important in Algeria, and the cork it produces is used for several purposes. Cork production in Algeria is declining because of the reduction of the area planted and the deterioration of the health of the trees. The reasons are many and include drought, absence of silviculture, frequent fires, overgrazing, diseases, insects and poor forest management. A study in some forests in the Algerian west enabled the identification of 20 species of wood-boring insects belonging to the family Cerambycidae. The level of infestation of these species is higher at the littoral areas which face dryer climatic conditions. The population of some species such as *Platypus cylindrus* reached high levels which is responsible for 8% trees of mortality. The two other species *Stromotium fluvium* and *Lichenophanes numida* reduced the quality of the cork.

E 29

SURVEY OF COFFEE INSECTS UNDER TRADITIONAL STORAGE CONDITIONS IN YEMEN. Hassan Soliman Ahmed Mahdi, Plant Protection Department, Faculty of Agriculture, Sana'a University, P. O. Box 14430 Sana'a, Yemen, Email: hsamahdi@yahoo.com

A survey for stored coffee bean insects was carried out during the period April to July 2004, to identify insect species in Yemen. Four locations in Sana'a were visited, namely Babb Al-Yemen (Sauk Al-Mullah), Math bah, Al-Safia (Al-Bolali neighborhood) and Al-Kuwait neighborhood. Around 22 samples of stored coffee beans were collected, 6 of naked stored coffee beans (without hulls and prepared for grinding) one of them was imported from Ethiopia, 12 of whole stored coffee beans (with hulls), 2 of coffee bean hulls called Qisher in Yemen, and 2 samples of debris. In this survey, 7 species of insects from different families were identified. Flour beetle (*Tribolium castaneum* Herbst) and confused flour beetle (*Tribolium confusum* Duval), family Tenebrionidae, were found on damaged coffee beans and debris. One specie, the saw-toothed beetle (*Oryzaephilus surinamensis* (L.)), family Silvanidae, was found on damaged coffee beans and debris. Another specie, Lesser bean borer (*Rhizopertha dominica* (F.)), family Bostrichidae, was found on debris only. A third specie, the chine's cowpea beetle (*Callosobruchus chinensis* L.), family Bruchidae, was found on debris. Results showed that dead adults of the coffee berry borer, *Stephanoderes hampei* (Ferr.), family Scolytidae, was found inside coffee beans imported from Ethiopia, and this is the first report of the coffee berry borer in coffee stores in Yemen. Results showed that all samples of stored coffee grains were infested with coffee berry moth *Prophantis smaragdina* (Butler) (Pyralidae: Lepidoptera) in the field. The identification of insects in collected samples of stored coffee beans from other locations will continue in the future.

E 30

BIODIVERSITY OF INSECT FAUNA IN YEMEN. A.M.A. Sallam and S.A.Ba-Angood, Department of Plant Protection, Nasir's College of Agriculture, University of Aden, P.O. box 2106 Sheikh Othman, Aden, Yemen, Email: amasallam2005@yahoo.com

The Republic of Yemen is characterized by a good diverse plant cover in some regions, which renders it of special importance in biodiversity. The identified insect species in Yemen reached more than 4000 species, which belong to 1346 Genera, 335 Families and 27 Orders. Out of these, 98 species were identified recently, and are new to science. In addition, 403 species were recorded for the first time. It is expected that this number would be doubled in the coming 10 years. This insect list includes 350 species that cause economic damage to field crops, fruit and forestry trees, stored products, as well as domestic animals and human beings. The list also includes 180 beneficial species (parasites, predators, honeybeesetc) that need conservation. The paper also refer to some secondary pests that reached the status of primary pests in recent years, and mentioned non-chemical control alternatives that could be used for the management of these pests in Yemeni agriculture.

E 31

SPATIAL DISTRIBUTION AND SAMPLING METHODOLOGY OF THE WHITEFLY, *BEMISIA TABACI* STAGES ON CUCUMBER PLANTS. Abd El-Ghany M. El-Sayed¹, G.K. Erain² and Abla F. Abdul Salam¹. (1) Plant Protection Research Institute, Dokki, Egypt; (2) College for Arts, Science and Education, Ain Shams University, Cairo, Egypt, E-mail: dr_homam@hotmail.com.

Distribution pattern of *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera-Hemiptera) were studied on cucumber varieties (Madin, Sweet crunch and Amera). Results showed significant differenced among infestation to leaves on the main stem. The greatest number of adult's, eggs, larvae and pupae were recorded on the leaves at the main stem nodes 4-6, 8-10 and 9-11, respectively. This study suggested that when sampling leaves of cucumber plants in the field only ten leaves from 10 plants are enough to be collected from each plot (1/50 feddan), from the main stem nodes 4-6 for adults, 8-10 for eggs and 9-11 for larvae and pupae to make the best assessment of whitefly stages in cucumber plants. Based on Taylor's Power Low, results indicated that patchiness regressions of each stage of whitefly were aggregated, but there were distinct degrees of aggregation between main stem nodes.

E 32

STUDY THE EFFECT OF IRRIGATION STRESS ON POPULATION DENSITY OF COTTON WHITEFLY (*BEMISIA TABACI*) IN VARAMIN AREA, IRAN. Sayyede Masoumeh Hasheminia, Faculty member of Islamic Azad University, Roudehen Branch, Iran, Email: angelarmita@yahoo.com

Cotton whitefly is one of the important pests in most cotton growing areas of Iran and in the world that reduces the quality of cotton. Proper time and optimum water use decrease cotton whitefly population. In order to determine the effect of water stress on cotton whitefly population density, an experiment was conducted in 2005 in Varamin area. The experimental design was split-split plot with three replicates and two irrigation intervals, 7 and 14 days at 50% and 100% of water requirement. Results in Varamin showed that, irrigation frequencies of 7 days increased yield to 71.3% than frequencies of 14 days and decreased whitefly population (egg, nymph and adult insect). The reduction of water requirement from 100% to 50% decreased whitefly population and also yields by 11%. The yield of Varamin variety was 34.5% more than the yield of Sahel variety.

E 33

POPULATION DYNAMICS OF CUCURBIT FLY, *DACUS CILIATUS* LOEW ON ZUCCHINI PLANTS IN RIYADH AREA, KINGDOM OF SAUDI ARABIA. Abdulrahman Saad Aldawood, Department of Plant Protection, College of Food and Agricultural Sciences, King Saud University, P.O. Box 2460, Riyadh 11450, Saudi Arabia, Email: aldawood@ksu.edu.sa

Population dynamics of Cucurbit fly, *Dacus ciliatus* Loew (Diptera: Tephritidae), on two zucchini varieties (local and Hybrid) at two locations in Riyadh region (Huraymela and Dirab) during 2003 growing season was studied. The objective was to find out the appropriate timing of applying control measures towards controlling this pest. Cucurbit fly causes great damage to zucchini fruits that renders the marketing of this crop difficult due to damage caused by egg laying and fruit rot. This study showed that there were two peaks of activity, one at the beginning of May and the second at the beginning of June, in both locations. Infestation rate fluctuated between 4% and 71%. When comparing these two locations, it was shown that number of infected fruits and rate of infestation were higher in Huraymela compared to Dirab location, where numbers of infected fruits were 50.2 and 20.3 and rate of infestation were 35.1% and 19.6%, respectively. There were no significant differences in the rate of infestation between the varieties. Results showed that zucchini plants were best grown in Huraymela location due to the favorable weather conditions that reflected in higher yield, and planting the hybrid variety was advised. The recommended time of applying control measures immediately before the occurrence of the two peaks, in early May and early June.

E 34

RECENT STATUS OF WHITEFLY SPECIES IN YEMEN WITH SPECIAL REFERENCE TO *BEMISIA TABACI* (GENNADIUS) POPULATIONS COLLECTED FROM DIFFERENT LOCATIONS. N.M.M. Abdullah¹, Jon Martin² and Judith K. Brown³. (1) Department of Plant Protection, Sana'a University, P.O. Box 13609, Main Post Office, Sana'a, Yemen, Email: abd_nasher@yahoo.co.in; (2) Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, UK, Email: j.martin@nhm.ac.uk; (3) Department of Plant Sciences, The University of Arizona, Tucson, AZ 85721, USA, Email: jbrown@ag.arizona.edu

Although more than 1500 species of whiteflies have been identified worldwide, only three have hitherto been recorded in Yemen: *Aleurocanthus woglumi* (Ashby), *Bemisia tabaci* (Gennadius), and *Dialeurodes citri* (Ashmead). Here we report the identification of three additional whitefly species from Yemen, namely, *Acaudaleyrodes rachipora* (Singh), *Neomaskellia bergii* (Signoret) and *Singhiella elbaensis* (Priesner & Hosny). In addition, *B. tabaci* has long been known as a major pest and virus vector in Yemen, causing economic damage, due to feeding and its ability to transmit begomoviruses. Begomoviruses are emerging plant viruses that cause serious diseases in a number of important crops, like tomato, pepper and watermelon which are widely consumed as a source of vitamin C. To assess the genetic variability of *B. tabaci* in Yemen, populations were collected from several low and high desert habitats and subjected to molecular analysis using the mitochondria cytochrome oxidase I gene (mtCOI) as a molecular marker. Polymerase chain reaction (PCR) amplification of the mtCOI, followed by DNA sequencing, and

phylogenetic analysis indicated that at least three distinct haplotypes were represented. Among these, only the B biotype had been previously documented in Yemen. The other two haplotypes are thought to represent local or indigenous *B. tabaci*. A distinct haplotype was found exclusively in the mountainous high desert habitat, while the other predominated in the west coastal and southern highlands of the country. At times, the latter haplotype was found mixed with the B biotype. The differences in the two topographies and associated climatic variability may play a major role in establishing barriers between the two (putative) indigenous haplotypes. That the B and the native lowland haplotype occurred as a mixed population on some of the same plant hosts suggests that the B biotype may not be native to Yemen, and further that the two may not be reproductively compatible. Comparative studies, including mating compatibility, endosymbiont composition, and begomovirus-vector competency is required to better understand the biological differences between the native lowland haplotype and the B biotype, and between these newly discovered native lowland desert and mountainous, highland desert haplotypes.

E 35

SURVEY OF *BEMISIA TABACI* (GENNADIUS) (HOMOPTERA: ALEYRODIDAE) BIOTYPES IN JORDAN USING RAPD MARKER. Hazem S. Hasan, Department of Agricultural Technology, Agricultural Technology Collage, Al-Balqa Applied University, 19117 Salt, Jordan, Email: hazem@bau.edu.jo

Random amplified polymorphic DNA polymerase chain reaction (RAPD-PCR) was used to survey the B biotype and other biotypes of *Bemisia tabaci* in Jordan. A total of 123 whiteflies were collected from cultivated plants, wild plants and weeds from 9 different localities and on 12 distinct crops. RAPD analyses using three selected 10-mer primers reliably identified *B. tabaci* biotypes. The total number of clear bands obtained from it was 29 DNA bands. Cluster analysis demonstrated that, in general, biotype B individuals which are scattered independently in the localities according to the host plant and coexists with cultivated plants. While an intermediate whitefly populations BA having biotype A a distinguish band only with OPR-04 but according to Jaccard similarity they have higher genetic distance with biotype B and these samples were restricted to wild plants and weeds. And finally the biotype A was restricted to the isolated area compared to other biotypes. The occurrence of Whitefly biotype A, B and BA in the sample was approximately 12.5, 75 and 12.5%, respectively, in the Jordan Valley and Upland tested samples.

E 36

EFFECT OF WEED AND WHITEFLY MANAGEMENT IN CUCUMBER FIELDS ON WHITEFLY INFESTATION IN NEIGHBOURING COTTON FIELDS. M. I. Shedeed, S. M. Hassan and H. B. Homam. Plant Protection Research Institute, Nadi El-Said Street, Dokki, Giza 12618, Egypt, Email: dr_homam@hotmail.com

Cotton whitefly *Bemisia tabaci* (Genn.) can be managed in cucumber fields by hand hoeing of weeds two times during the season and spraying of chlorpyrifosmethyl (Reldan 50% EC), pirimiphosmethyl (Actellic 50% EC), or mineral oil such as Caple-2, botanical oil such as Jojoba oil or neem seed extract or by using Caple-2+ micronized sulphur. The effect of *B. tabaci* and weeds management was monitored by counting the cotton white flies, which causes the infestation of neighboring cotton fields. The investigations were conducted at Monofiea Governorate during 2002 and 2003 cotton seasons. The results obtained indicated that weed management and spray with the insecticide, Actellic 50% EC or mineral oil, Caple-2 +micronized sulphur in cucumber fields had significant effect on reduction of *B. tabaci* infestation in cotton fields. In an attempt to replace the highly toxic chemical compounds by less toxic ones, the combination of mechanical control (hand hoeing) with mineral oil + micronized sulphur gave promising results.

E 37

DIRECT AND INDIRECT EFFECT OF SPINY BOLLWORM *EARIAS INSULANA* BOISD. ON COTTON BOLLS FORMED AFTER THE FIRST PICKING. Suaad Irdeny Abdullah, Plant Protection Department, College of Agriculture and Forestry, University of Mosul, Mosul, Iraq, Email: suaad53irdeny@yahoo.com

The results of direct and indirect effect of spiny bollworm *Earias insulana* Boisd. on ten varieties of cotton (Sp8886, Ashur, Montana, Dun1517, Dun 325, Dun1047, Astonofel 887, Delta Bin 50, Lashata and Cocker 310) on the cotton bolls formed after the first picking, indicated that the larvae prefer the bolls of the size ranging from 10-15 cm³, followed by the bolls of the size ranging from 16-20 cm³. The largest number of holes was found in the second week of October, with an average of 273 holes (16, 54, and 203 on the high, medium and low levels, respectively). The number of the living larvae and the dead carpel's was increased at the same period mentioned above with an average of 70 larvae and 240 carpels, respectively. On the other hand, the rate of dead seed reached 28% in Astonofel 887. This high rate was accompanied with an increase in the percentage of larvae holes and the boll rot that reached 77 and 92%, respectively.

E 38

THRESHOLD TEMPERATURES AND THERMAL REQUIREMENTS OF THE LESSER COTTON LEAFWORM *SPODOPTERA EXIGUA* HB. Hassan F. Dahi and S.M. Abdel-Khalek, Plant Protection Research Institute, Agriculture Research Center (ARC), 7 Nadi El-Said Street, Dokki, Giza, Egypt, Email: hassandahi@yahoo.com

The effect of three constant temperatures (20, 25 and 30°C) on the lesser cotton leafworm (*Spodoptera exigua*) (Noctuidae: Lepidoptera) growth and development was studied. The egg incubation period, length of larval, pupal, pre-oviposition stages and duration of generation time were assessed. The time required for the different developmental stages decreased as the temperature increased from 20 to 30°C. The threshold temperatures were 13.15, 9.64, 11.07, 9.64 and 10.67 °C for egg incubation, larvae, pupae, pre-oviposition stages and adults, respectively. The average thermal requirements needed for completing growth and development were 36.0, 196.1, 111.29, 29.06 and 368.3 degree-days for the above mentioned five stages, respectively.

E 39

EFFECT OF SOME SOIL FERTILIZERS AND INORGANIC SALTS AGAINST LARVAL AND PUPAL STAGES OF COTTON LEAFWORM, *SPODOPTERA LITTORALIS* (BOISD.). S.A. Mohamed¹, H.F. Dahi¹ and A.G. El-Sisis². (1) Plant Protection Research Institute, Agriculture Research Center (ARC), 7 Nadi El-Seid Street, Dokki, Giza, Egypt; (2) Pesticide Central Laboratory, ARC, Dokki, Giza, Egypt, Email: hassandahi@yahoo.com

Two different experiments were conducted to evaluate the toxicity of soil fertilizers (ammonium sulfate, potassium sulfate and super phosphate) and two inorganic salts (ammonium oxalate and potassium bromate) against the larval stage of the cotton leafworm infesting vegetative growth of cotton plants and the pupal stage present in the soil. Results obtained of testing the above compounds at 2.0, 1.0 and 0.5% dilutions on cotton plants against the larval stage indicated that all showed low initial toxic effect but they showed latent toxic effect, as the death of the larvae increased as time after treatment with continuous feeding with treated leaves increased. Potassium bromate showed the highest effect followed by potassium oxalate and super phosphate since they gave the lowest rate of emerging pupae. On the other hand, results indicated that super phosphate was the highest toxic material against pupal stage (63.3 mortality %) followed by potassium bromate (56.1 mortality %) potassium sulfate and ammonium oxalate, whereas ammonium sulfate showed the lowest toxic effect. Moreover, malformation, fecundity, moth emergence and egg hatchability rate were recorded. Results indicated that all treatments caused reduction in both fecundity and fertility. Potassium bromate was the best material to reduce the number of egg /female, followed by super phosphate and potassium sulfate as compared with untreated one. It could be concluded that the tested material played two roles; nutrient for cotton and a pesticide to cotton leafworm.

E 40

INCIDENCE AND DAMAGE CAUSED BY THE AFRICAN BOLLWORM, *HELICOVERPA ARMIGERA* (HUB.) IN THE FIELD IN GEZIRA AND RAHAD SCHEMES IN SUDAN. El Nayer Hamid Suliman, Crop Protection, Agricultural Research Corporation, Entomology Research Section, P. O. Box 126, Wad Medani, Sudan, Email: elnayer15@yahoo.com

The first appearance of *Helicoverpa amigera* in the field was recorded on 15/8 and 19/8/1997 in the Rahad and Gezira Research Station farms, respectively. In both sites the pest was first recorded on weeds such as Tabar, *Ipomea cordofana* Choisy; Ibreg Elfaki, *Commelina kostchyi* Hassk and on groundnuts, *Arachis hypogea*. The pest invaded sorghum on 12 and 13/9/1997 in the Gezira and Rahad sites, respectively. Two annual generation of the pest were recorded during the season. The first or second generation in both sites took the same period to develop i.e. 28 days. The larvae of the first generation continued in the field until 10 and 11 October, 1997 in the Gezira and Rahad, respectively, while those of the second generation disappeared from the field of respective sites on 13 and 18 November, 1997. In both sites the peak of infestation by first generation larvae was recorded on 19 and 27 September, 1997 (mean of 5.6 and 6.45 eggs and /or larvae/100 plants, respectively) and during October 1997 (13.3 and 6.6 eggs and/or larvae /100 plants, respectively).

E 41

BIOLOGICAL STUDY ON LEAF MINER *LIRIOMYZA HUIDOBRENSIS* (BLANCHARD). Rasmia Al-Muallem, General Commission of scientific Agricultural Research, Damascus, Douma, P.O. Box: 113, Damascus, Syria, Email: arasmia@scs-net.org

Liriomyza huidobrensis (Diptera: Agromyzidae) is the most widely distributed species of leafminers in protected cultures and open fields in Syria. It attacks various species of vegetables, field crops and ornamentals causing serious damages especially in greenhouses. Life cycle and development were studied at constant temperatures on cucumber (*Cucumis sativus* L. var. Toshka). Total development time was 65.6, 26.6 and 18.1 days at 4, 22 and 28°C, respectively. Egg development took 16.3, 5.4 and 3.6 days, larval development lasted 20.3, 8.4 and 7 days, whereas development of pupae required 29.1, 12.7 and 8.2 days at the above mentioned temperatures, respectively. The temperature threshold for eggs was 10.6 °C, for larvae 7.1 °C and 10 °C for Pupae. The effect of host plant on the developmental time was studied at 14 and 28 °C. Development time on broad beans (*Vicia faba* L.) was significantly shorter than the development time on cucumber at both temperatures. It took 48 and 16 days on broad beans, whereas it took 66 and 18 days, at 14 and 28 °C, respectively. Host preference was studied using cucumber and broad beans. *L. huidobrensis* significantly preferred broad beans for feeding and oviposition. The average number of feeding and oviposition punctures/ plant was 49.7 and 386.9, and the average number of pupae/plant was 10.8 and 251 on cucumber and broad beans, respectively.

E 42

YIELD LOSS CAUSED BY THE CHICKPEA LEAF MINER, *LIRIOMYZA CICERINA* ROND. Soha Khoja¹, M. El Bouhssini², N. Kagka³ and A. Joubi². (1) General Commission for Scientific Agricultural Research, Aleppo, Research Center, Aleppo, Syria; (2) International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria; (3) College of Agriculture, the University of Aleppo, Aleppo, Syria.

Leaf miner, *Liriomyza cicerina* Rond., is an important insect pest of chickpea in North Africa and West Asia. The present study was conducted at Tel Hadya, ICARDA's experimental station, to quantify yield losses caused by this insect. Two resistant cultivars (ILC 5901 and ILC 3800), one susceptible cultivar (ILC3397) and the local cultivar (ILC1929) were used in this study. The experiment was conducted using a factorial combination of spray treatments (treated vs untreated) and varieties in a randomized complete block design with four replications during 2001/2002 and 2002/2003 cropping seasons. In 2001/2002, the percent leaflet damage at the vegetative stage was lowest (9.1%) on the resistant cultivar ILC5901 compared to the susceptible check (23.7%). At the reproductive stage, the resistant cultivar ILC3800 had the lowest leaflet damage (10.3%) compared to the susceptible one with 70.8%. The percent yield loss was significantly lower in the two resistant cultivars compared to the susceptible, and this was respectively 11.8, 13.9 and 33% for ILC3800, ILC5901 and ILC3397. The 2002/2003 results were similar to those of the 2002. The results of this study confirmed that the leaf miner is an important pest of chickpea. It also showed that

the deployment of chickpea cultivars resistant to leaf miner would contribute significantly to the reduction of damage caused by this pest.

E 43

EFFECT OF PLANTING DATES AND INSECTICIDES APPLICATION ON THE INFESTATION BY *ETIELLA ZINCKENELLA* T. ON SOYBEAN, AND A SURVEY OF ITS PARASITES. Khaled Mohamed Mardini¹, Hisni Abu Khaled¹ and Soha Khoja¹. (1) General Commission for Scientific Agricultural Research, Scientific Agricultural Research Center, Aleppo, Syria, Email: kmardini62@hotmail.com.

The larvae of *Etiella zinckenella* T. (Lepidoptera: Pyralidae) attack soybean plants and cause serious yield loss. Results of the first season differences in the infestation level; 9.2% for the first planting (6 June), 13.8% for the second planting date (5 July), and 15.8% for the third planting date (20 July). Results of insecticides' application indicated that deltamethrin and methyl alparathion reduced infestation in the first planting date to 4.85 and 6.47%, respectively. Results of the second season indicated that infestation was 9.5% for the first planting date, 22.4% for the second planting date, and 46.8% for the third planting date. Results of insecticides' application with deltamethrin and methyl parathion showed that infestation in the first planting date reached 8.6 and 10.4%, respectively. Grain yield reached 2484 kg/ha in the first planting date, 2048 kg/ha in the second planting date, and 1086 kg/ha in the third planting date. Insecticides' application with deltamethrin and methyl parathion increased yield to 2549 and 2488 kg/ha, respectively. Results of the second season were similar to those of the first one. Three parasitoids was found to attack *E. zinckenella* in Tal Hadya area: *Bracon* sp. (Hymenoptera, Braconidae), *Eurytoma* sp. (Hymenoptera, Eurytomidae) and *Cyotoptyx* sp. (Hymenoptera, Pteromalidae).

E 44

POPULATION DYNAMICS OF *APHIS FABAE* ON BROAD BEAN AND SURVEY OF ITS NATURAL ENEMIES IN THE COUNTRYSIDE OF DAMASCUS, SYRIA. Loulou Al Bittar¹, Nabil Abou Kaf² and Ziad Chek Khamees³. (1) Administration of Plant Protection Research, General Commission for Scientific Agricultural Research (GCSAR), Douma, P.O. Box 113, Damascus, Syria, Email: louloual@maktoob.com; (2) Plant Protection Department, Faculty of Agriculture, University of Tishreen, Lattakia, Syria; (3) Plant Protection Department, Faculty of Agriculture, University of Albaath, Homs, Syria.

A field study conducted during the season 2004-2005 in the countryside of Damascus to study the dynamics of *Aphis fabae* on broad bean according to change of meteorological conditions and the population of natural enemies (syrphid flies and ladybird beetle). The Design of experiments was completely randomized, 30 plants were randomly chosen to count the aphids (alate and non alate) and their natural enemies, and also to count the rate of infestation and population density causing injury according to Geibler scale. The first appearance of aphid 2 alates on March/12/2005 with injury level of 3.33%, then this level reached 100% on May 9, 2005 accompanied with a peak number of *Aphis* sp. The appearance of natural enemies was noticed in low numbers at the beginning of colony establishment. Later on, this number slowly increased to reach a peak in middle of April for the ladybird beetles and in early May for the syrphid flies. Five species of ladybird beetles were found: *Coccinella Septempunctata*, *C. undecimpunctata*, *Adalia decimpunctata*, *Propylaea quaterdecimpunctata* and *C. bipunctata*. In addition, two unidentified species were identified and *C. undecimpunctata* was the most common species. The correlation of aphid number (alate and non alate) with temperatures (lady bird beetles) was low and ($r = 0.476$) and not significant. While the correlation with syrphid flies was medium significant ($r = 0.68$), and the correlation was strong and significant with the level of injury ($r = 0.941$). The correlation of natural enemies (ladybird beetles and syrphid flies) with temperatures was strong and significant ($r = 0.73$).

E 45

DETERMINATION OF RESISTANCE OF EXPERIMENTAL SOYBEANS TO THE LIMA BEAN POD BORER *ETIELLA ZINCKENELLA* TREITSCHKE AND THE WHITEFLY *BEMISIA TABACI* GENNADIUS AT DAKHLA OASIS, NEW VALLEY, EGYPT. Mohamed A. Amro¹, Mahmoud S. Omar¹ and Abdellah S. Abdel-Moniem². (1) Plant Protection Research Institute, Agricultural Research Center, Dokki, Egypt; (2) Department of Pests and Plant Protection, National Research Center, Dokki, Egypt, Email: a7med_3mr@yahoo.com

Three soybean varieties and two cultivars have been planted in an isolated and closed agro-desert ecosystem in El-Dakhla Oases, New Valley Governorate. The resistance of the selected soybeans against the lima bean pod borer *Etiella zinckenella* (Lepidoptera: Pyralidae) and the whitefly *Bemisia tabaci* (Homoptera: Alyrodidae) was evaluated. The results obtained indicated that the tested soybean varieties Clark, Giza 22 and Tono had a higher infestation rate by *E. zinckenella* with an average of 4.30, 3.54 and 9.13%, respectively. Similar results were obtained by calculating the rate of damaged soybean seeds. The highest damage rate appeared on Tono variety (9.30%), while the lowest on Hagen 32 cultivar (1.97%). High compatibility was recorded between the resistance status of the tested soybeans and the mean numbers of *E. zinckenella* individuals attacking the developing pods. The newly produced cultivars Hagen 32 and S5 appeared as moderately resistant cultivars. However, the soybean varieties Clark, Giza 22 and Tono were resistant, susceptible and highly susceptible varieties, respectively. Results obtained indicated a distinct compatibility between the nymphal infestation rate of *B. tabaci* and the level of resistance. Although, the tested soybeans exhibited different degrees of resistance, the newly developed cultivar S5 was found resistant to *B. tabaci* infestation. Consequently, plant breeders can use these resistant cvs in their crossing program.

E 46

THE EFFECT OF TEMPERATURE ON SOME BIOLOGICAL TRAITS OF THE SOUTHERN COWPEA WEEVIL *CALLOSOBRUCHUS MACULATUS* (F.). Khadija Suliman Mahmood¹ and Tariq Mohamood Salih². (1) Biology Department, Faculty of Science and Arts, Al-Tahady University, Hoon, Libya, Email: khadjas@yahoo.com; (2) Biology Department, Science College, University of 7th October, Misurata, Libya.

The present study was an attempt to evaluate the effects of four temperatures (20, 25, 30 and 35°C) on some biological traits of the southern cowpea weevil *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae) reared on cowpea seeds in the laboratory at constant relative humidity. Life cycle duration was significantly reduced by increasing temperature from 62.80 at 20 °C days to 30.5, 21.34 and 21.23 days at 25, 30 and 35°C, respectively. Eggs hatching rate was 59, 97, 51 and 80% at those temperatures, respectively. The mean adult life duration recorded was 14.4, 10.3, 7.2 and 3.5 days for male, and 12.7, 8.0, 6.0 and 4.2 days for females at temperatures of 20, 25, 30 and 35 °C, respectively.

E 47

EFFECT OF DROUGHT STRESS ON THE POPULATION DENSITY OF CERTAIN ARTHROPOD PESTS AND PREDATORS INHABITING COWPEA PLANTATIONS. F. A. Abdel-Galil¹, M. A. M. Amro² and A. S. H. Abdel-Moniem³. (1) Plant Protection Department, Faculty of Agriculture, Assiut University, Egypt; (2) Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Egypt; (3) Department of Pests and Plant Protection, National Research Centre, Dokki, Cairo, Egypt, Email: abdellah65@yahoo.com

To evaluate the impact of drought stress on the population density of some arthropod pests and their associated predators which inhabit cowpea plantations, field tests were conducted in two different levels of irrigation (10 and 20 days intervals) by using five newly developed cowpea cultivars (Dokki 331, Kaha 1, Monarch black eye, TVu21 improved and Kafr El-Seikh 1). Results indicated that the main piercing and sucking pests *Bemisia tabaci* (Genn.) and *Tetranychus urticae* Koch. were represented in high numbers in stressed plantations than in non-stressed ones. On the other hand, the common predators associated with these pests were not affected by irrigation levels. The damage caused by the pod borer pest *Etiella zinckenella* Treitschke was higher on stressed plantations than on the normally irrigated ones in most of the tested cultivars. At harvest, the results obtained indicated an obvious decrease in the net yield of all the

stressed cultivars. Therefore, to improve yield it is recommended to irrigate cowpea plantations at least every 10 day intervals to avoid high infestations by sucking pests and pod borers.

E 48

PHOSPHINE RESISTANCE IN FIELD STRAINS OF *RHIZOPERTHA DOMINICA* (FABRICIUS) INFESTING WHEAT AND BARLEY GRAIN IN 10 STORAGE FACILITIES IN NORTHERN SYRIA. Abdul Aziz Niane¹, Serpil Kornosor², A.J.G van Gastel¹ and Zewdie Bishaw¹. (1) ICARDA, P.O. Box 5466 Aleppo, Syria; (2) Cukurova University, Adana Turkey, Email: a.niane@cgiar.org

To assess the presence, extent and reasons for Phosphine resistance, 14 grain samples infested with *Rhizopertha dominica* (Fabricius) were collected from storage and grain handling facilities of 10 institutions in northern Syria. The 14 strains were subjected to a range of Phosphine concentrations including the discriminating dose of 0.03 mg/l for 20 hours at 25 °C and above 75% relative humidity. Two out of the 14 strains tested were found resistant. The level of resistance was as high as 2.8 and 8.1 folds of the susceptible strains at the LD₅₀ level and 3.4 and 3.8 at the LD₉₀ level. The two out of 14 resistance rate detected in this study is less than the 23.4% resistance rate reported on *R. dominica* in the FAO global survey of 1972, but nonetheless is substantial. Sub-lethal dosage resulting from non-air-tight conditions during fumigation may be the reason.

E 49

SEASONAL ABUNDANCE OF CEREAL APHIDS AND LADYBIRD BEETLE, *COCCINELLA UNDECIMPUNCTATA* (L.) IN FOUR CEREAL CROPS IN SOUTH EGYPT. F.A.A. Slman and M.A. Ahmed. Plant Protection, Agriculture Research Center, Dokki, Giza, Egypt, Email: dr_homam@hotmail.com

Field experiments were conducted at Shandaweel Agriculture Research Station, Sohag, A.R.C, during 2004 and 2005 seasons for wheat and barley, and for sorghum and maize during 2003 and 2004 seasons. Results showed that wheat plants were infested with the oat aphid, *Rhopalosiphum padi* (L.), the greenbug *Schizaphis graminum* (Rond.), the corn leaf aphid *Rhopalosiphum maidis* (Fitch) and the English grain aphid, *Sitobion avenae* (Fab.). *R. padi* started to appear earlier than *S. graminum*, *R. maidis* and *S. avenae*, respectively. The peak of these aphids occurred on 26-27 March and it was in harmony with the highest numbers of *C. undecimpunctata* during the two studied seasons. Barley plants were infested with *R. maidis* on the first week of February in the two seasons. The aphids peak occurred from the end of February to the first week of March in the two seasons, and it was in accordance with highest numbers of *C. undecimpunctata*. As for the sorghum plants, *R. maidis* started to appear earlier than *S. graminum*, *R. maidis* on the 2nd and 3rd of July during 2003 and 2004 seasons, respectively. *S. graminum* reached its maximum number in the first week of September and the last week of August during 2003 and 2004 seasons, respectively. The corn leaf aphid reached its peak on the last week of August during the two seasons, in accordance with the highest numbers of *C. undecimpunctata*. Corn plants were only infested with the corn leaf aphid. This pest started to infest corn plants on the first week of August in 2003 and 2004 seasons. However, its peak was observed on the first week of September during 2003 and 2004 seasons, which coincided with the high numbers of the ladybird beetle, *C. undecimpunctata*.

E 50

PRELIMINARY SURVEY FOR TOMATO PESTS (INSECTS AND MITES) IN GREENHOUSES IN THE SYRIAN COASTAL REGION. Mohammad Ahamad, Department of Plant Protection, Faculty of Agriculture, Tishreen University, Lattakia, Syria.

A survey of insect and mite pests, was conducted on greenhouse tomatoes in Syrian coastal region (Lattakia and Tartous) during the 2004/2005 and 2005/2006 growing seasons. The following pests were recorded: *Bemisia tabaci*, *Trialeurodes vaporariorum* (Homoptera: Aleyrodidae), *Liriomyza* sp. (Diptera: Agromyzidae), *Plusia gamma*, *Spodoptera littoralis*, *Helicoverpa armigera*, *Agrotis* sp., *Chrysodeixis chalcites* (Lepidoptera: Noctuidae), *Agriotes* sp. (Coleoptera: Elateridae), *Tetranychus urticae* (Acari: Tetranychidae), *Aculops lycopersici* (Acari: Eriophidae), *Aphis gossypii*, *Myzus persicae* (Homoptera: Aphidae), *Thrips tabaci* (Thysanoptera: Thripidae). The occurrence dates, and population density changes were determined for some pests in some locations.

E 51

ASSESSMENT OF DAMAGE CAUSED BY WIREWORMS *AGRIOTES* SPP. TO POTATO CROP IN THE CENTRAL OF IRAQ. R.S. Al-Jorany¹ and Azzy Habitalla Shoraim². (1) College of Agriculture, University of Baghdad, Baghdad, Iraq, Email: redha-aljorany@yahoo.com; (2) Yemen, Email: shoriam74@yahoo.com

The study was conducted in three different fields in Radhwania, Baghdad Province, Iraq during 2003 and 2004 potato growing seasons in order to assess the damage caused by wireworm *Agriotes* spp. The rate of infection and damage in the spring season was higher than that in the fall season. The rate of damaged tubers was 37%, which led to 50.60% reduction in total weight, whereas the rate in the fall season was 18.52% and 22.62%, respectively. The most injured was the class of small weighted tubers. The damaged small size tubers represent more than 50% of all classes of tubers. It was possible to correlate the damage level to the number of holes without cutting the tubers.

E 52

DETRMINATION OF SOME MORPHO-BIOLOGICAL PARAMETERS WITH *EPHESTIA KUEHNIELLA* (ZELL) AND *BRACON BREVICORNIS* (WESM) REARED AT THE BIOLOGICAL CONTROL CENTER IN HASAKA, SYRIA. Rawda Al-Hashemi¹ and Louai Aslan². (1) Al-Hasake Center for Rearing Natural Enemis, Al-Hasake, Syria; (2) Faculty of Agriculture, Damascus University, Damascus, Syria, Email: louai@arabscientist.org

Some morpho-biological parameters of the laboratory-reared *Ephestia kuehniella* (Zell), and *Bracon brevicornis* (Wesm) were studied at the Biological Control Center in AL-Hasaka, Syria during 2005. The biological study of the alternative insect host showed that the life cycle of the butterfly continued up to 96.1 days under laboratory conditions. There were no significant differences between the age of males and females. Whereas for parasite, there was a significant difference between the males and females age (3.3 ± 0.15 and 6.3 ± 0.5 days, respectively). Most of the males died after pupal instar, estimated by three days after mating, while females survived up to six days after mating and egg-laying at 28 ± 1 C°. The duration of the embryonic development was 1.3 ± 0.11 days, and 3.4 ± 0.18 days for the larva development, and 11.1 ± 0.35 days for the pupa development.

E 53

CONTRIBUTION IN THE STUDY OF BIOECOLOGY OF THE ENTOMOFAUNA OF THE *AMPELODESMA MAURITANICUM* IN THE TLEMCEN REGION, ALGERIA. Amina Damerdji, Departement of Biology, Faculty of Sciences, University Aboubekr Belkaid,, B.P. 119, Tlemcen, Algeria, Email :damerdji_halim@yahoo.fr

The region of Tlemcen is situated in the occidental north of Algeria. The degradation of forests causes an open formation often called "mattoral" containing Diss and Doum. *Ampelodesma mauritanicum*, a "xerophile" plant that adapts it self to climatic conditions which are rather dry by having certain morphological characteristics. We proposed to study the entomofauna piedged to vegetal species. Three stations in the city of Mansourah were surveyed from July 2000 to March 2001. The inventory has permitted us to collect 112 species, 88 of which are part of the entomofauna which is very diversified. The insecta Pterygota include 85 species and 3 species are apterygota. Concerning insecta Pterygota, the order of *Coleoptera* is the most important with 22 species followed by the order of *Orthoptera* with 16 species. The *Hymenoptera* include 14 species and *Lepidoptera* 13 species, 11 species of *Hemiptera* and 6 species are *Diptera*. The specific richness of *Dermaptera* remains weak with only 2 species, and *Nevroptera* with one specie. A comparaison is realised between three stations for different orders. The seasonal and monthly importance of the various groups entomofaunic met were given. The use of statistic methods gave us information for the entomofauna of *Ampelodesma mauritanicum*.

E 54

ARMOURED SCALE INSECTS AND THEIR NATUREL ENEMIES IN MITIDJA (ALGERIA). Hafida Saighi, Département de Biologie, Université Saad Dahleb, B.P.270, route de Soumaa, Blida, Algérie, Email: hdhh@caramail.com

The research made on scale insects in Mitidja (sublitoral vast plain of Algeria) allowed to identify 50 species of *Diaspididae* belonging to four sub-families, Aspidiotinae, Diaspidinae, Leucaspinae and Odonaspinae. The sub-family Aspidiotinae included the largest number of species (42%), followed by Diaspidinae with 16 species (30%), sub-family Leucaspinae with 11 species (22%), and Odonaspinae (2%). Two scale insects *Clavaspis herculeana* which attack Asteraceae, Fabaceae and Euphorbiaceae and *Parlatoresia chinensis* on *Ficus retusa* were reported for the first time in Algeria, North Africa and the Mediterranean region. Natural enemies belonging to *Hymenoptera* parasites (Aphelinidae) and to Coleopteran predators (Coccinellidae) were also identified.

E 55

BIOLOGICAL AND ECOLOGICAL STUDY OF PAMPHAGIDAE (ORTHOPTERA) IN ALGERIA. Mustapha Bounechada¹ and Salah Eddine Doumandji². (1) Department of Biology, Faculty of Sciences, University of Setif, Algeria, Email: Bounechadam@yahoo.fr; (2) National Institut of Agronomy, El-Harrach, Algiers, Algeria.

The family of Pamphagidae is represented by few species throughout the world. The known Pamphagidae species (Orthoptera) is estimated to be 300 species world wide. The geographical distribution is often limited to the arid areas; North Africa, Southern of Europe and Asia. In Algeria, we recorded fourteen species until now. Because there is a little information about the Pamphagidae of Algeria, the aim of this work is to provide a list of species, their description, biology and ecology in this country.

E 56

BIOLOGY AND CONTROL OF THE SHOOT FLY *ATHERIGONA SOCCATA* ROND. ON SORGHUM. Hameed H. Mohammed¹ and Adel I.Al-Nakhli². (1) Plant protection Department, College of Agriculture, Abu-Ghraib, Baghdad, Iraq, Email: alkarbolihameed@yahoo.com; (2) Taaz Province, Yemen.

The shoot fly *Atherigona soccata* (Diptera: Muscidae) is one of most important pests attacking sorghum, maize and millet in many parts of Asia and Africa. Laboratory and field investigations were conducted to study some aspects of biology, damage and control of this pest. The shoot fly *A. soccata* is considered to be a new record on sorghum, maize and johnson grass in Iraq. Females started oviposition on sorghum seedlings one week after emergence. Eggs were white, elongate and approximately 1.25-1.30 mm in length. A peak of oviposition of 15.33/ten seedlings were recorded during the fifth week and no eggs were observed during the eight the week after emergence. Adults lay more eggs on the third and fourth leaf, with an average of 22 eggs/ten seedlings. Larvae were nearly 1.5-7.8 mm long, vermiform and creamy white in color. Larvae tunneled in the sorghum seedlings causing wilt and finally a dead heart. About 93% of the mature larvae were observed to make an exit hole in the crown of the seedlings stalk and pupate inside the stalk near the soil surface. Pupal developments were completed in about 7 days. There were no significant differences between the three sorghum cultivars (Inkhad, Rabih and Kaifer) tested in terms of resistance to the shoot fly. The average infestation four weeks after emergence was 66%. Shoot fly caused more dead hearts to sorghum seedlings than the corn pink borer, *Sesamia cretica* Led.

E 57

EFFECT OF ABIOTIC FACTORS ON POPULATION OF *BREVICORYNE BRASSICAE* L. ON CANOLA CROP IN VARAMIN PROVINCE (IRAN). A.A. Keyhanian, Plant Pests and Diseases Research Institute, P.O. Box 1454, Tehran 19395, Iran, Email: akeyhanian@yahoo.com

Cabbage aphid, *Brevicoryne brassicae* L. is a key pest on canola crop which decreases its quality and yield by sucking plant sap. Field studies during 2001-2003 revealed that activity of *B. brassicae* L. differs in the different regions of Iran. In Tehran province (Varamin region), the initial infestation and the establishment of aphid colonies starts on young canola seedlings (Winter crops) during November and spreads in February and March depending on climatic conditions. Maximum population of *B. brassicae* L. was observed during April-May and then gradually declined. Path coefficient analysis of abiotic factors

affecting the population of *B. brassicae* L. on canola crop showed that minimum temperature, minimum relative humidity and sunshine had direct positive effect on the aphid population.

E 58

COMPARATIVE STUDY OF CUTICULAR HYDROCARBONS COMPOSITION OF *PAMPHAGUS ELEPHAS* AND *PAMPHAGUS MARMORATUS*. Farida Benia¹ and Mustapha Bounechada². (1) Department of Agronomy, Faculty of Sciences, University of Setif; (2) Department of Biology, Faculty of Sciences, University of Setif, Algeria, Email: Bounechadam@yahoo.fr.

Gas chromatography and mass spectrometry were used to compare the cuticular hydrocarbon composition of males and females of *Pamphagus elephas* and *Pamphagus marmoratus* (Orthoptera: Pamphagidae). The cuticular hydrocarbon composition was found to consist mainly of the following: monounsaturated alkenes; 73.9% C24 to C36 compounds in *Pamphagus elephas* and 79.9% C24 to C34 compounds in *Pamphagus marmoratus*, monomethyl content was 8.8% in *P. elephas* and 4.8% in *P. marmoratus*, dimethyl content was 2.1% in *P. elephas* and 6.6% in *P. marmoratus*, and trimethyl content was 4.1% in *P. elephas* and 4.3% in *P. marmoratus*. Sex-dependant, quantitative differences in certain hydrocarbons were apparent in both species. The variability in the composition of cuticular hydrocarbons in the analyzed species, produced different patterns according to species and sexes, which reinforces the role of these compounds in differentiation among species that are morphologically similar.

E 59

SURVEY OF INSECTS ASSOCIATED WITH THE THORNY PLANT, *CYNARA* SP. (ASTERACEAE) IN IRAQ. Adil H. Amin, Department of Plant Protection, College of Agriculture, University of Salahaddin, Erbil, Iraq, Email: nadeemramadan@yahoo.com, saidkhalid88@yahoo.com

The present study was conducted during the period September 2001 - August 2003 to survey the insect species associated with the thorny plant, *Cynara* sp. in Iraq. The study also investigated the relationship between these insects and the host plant. The results showed that 27 species of insects belonging to 19 families and 7 orders were recorded associated with *Cynara* sp. The species observed included 9 species of order Coleoptera; *Agapanthia annularis* L. and *A. cardui* L. in the family Cerambycidae, *Cassida* sp. and *Phyllotreta* sp. in the family Chrysomelidae, *Coccinella septempunctata* L. and *C. novemnotata* L. in the family Coccinellidae, *Larinus* sp. and *Lixus* sp. from family Curculionidae and *Potosia morio* F. from family Scarabaeidae. The order Diptera included 2 species, *Acanthiophilus helianthi* Rossi and *Chaetorellia carthami* Stack in the family Tephritidae. In addition, 3 species of order Hemiptera were recorded; *Anthocoris* sp. in the family Anthocoridae, *Spilostethus pandurus* Scop. in the family Lygaeidae and *Dolycoris baccarum* L. from family Pentatomidae. The order Homoptera included 3 species; *Aphis compositae* Theobald and *A. craccivora* Koch in the family Aphididae, and *Empoasca* sp. in the family Cicadellidae. Three species of order Hymenoptera were recorded; *Andrena* sp. and *Apis mellifera* L. in the family Apidae, and *Megachile* sp. in the family Megachilidae. The order Lepidoptera included 6 species; *Pieris rapae* L. and *Colias croceus* Fourc. in the family Pieridae, *Pyrgus* sp. in the family Hesperidae, *Vanessa cardui* L. in the family Nymphalidae, *Pyronia* sp. in the family Satyridae, and *Macroglossa stellatarum* L. in the family Sphingidae. The order Thysanoptera included one species, *Thrips* sp. in the family Thripidae. The results also showed that the species *Agapanthia annularis*, *A. cardui*, *Larinus* sp., *Lixus* sp., *Potosia morio*, *Acanthiophilus helianthi* and *Chaetorellia carthami* can be used as biological agents for *Cynara* sp. weed control.

E 60

BIODIVERSITY AND BIOECOLOGICAL OUTLINE OF ORTHOPTERA IN PART OF MAGHNIA OF TLEMCEN REGION, ALGERIA. Amina Damerdji. Departement of Biology, Faculty of Sciences, University Aboubekr Belkaid, B.P. 119, Tlemcen, Algeria, Email: damerdji_halim@yahoo.fr

A study on diversity of orthoptera fauna found in Maghnia of Tlemcen region was conducted between March and September, 2005. The specific Orthoptera richness was estimated to be 18. An analysis of species showed that 2 was accessory, 6 accidental and 10 very accidental. The importance of Orthoptera spp. fluctuated in 3 stations surveyed, based on seasons and months. In spring, 7 species were identified in the second station. In summer, 12 species were found in the first station. During March, April, may and July

2 species in the third station. *Calliptamus barbarus* (Acrididae) had a frequency of 61.53% in the first station (Sidi- Belkhir) and 38.46% in the second station (Route Sabra) but was not present in the third station (Hammam Chiguer). *Oedipoda fuscocincta* had a frequency of 53.84% in the first station and was not present in the other two stations. *Oedipoda miniata* was not present in the first station, and occurred at 18.42% in the second station. Similar abundance (0.59%) in the first station was observed for 3 species: *Tmethis maroccanus* (Pamphagidae), *Oedipoda coerulescens coerulescens* and *Anacridium aegyptium* (Acrididae). The same level of occurrence was value is found for 3 species of *Gryllidae* in the first station. These species were not present in the second and third stations. *Tmethis maroccanus* occurred at the same level in stations 2 and 3.

E 61

A SURVEY OF CUT WORMS IN NORTHERN IRAQ. Haitham M. Al-Jalal, Faculty of Agriculture, Mosul University, Mosul, Iraq, Email: d.haitham@yahoo.com

A survey of cut worms in northern Iraq was conducted during 2003. The total captivity of cutworms adults were (3978) of the Noctuidae family captured by light traps in three locations (Al-Rashidia, Al-Shalalat, Yarimcha). Captured insects belonged to twelve species, three of them were terranean species, namely *Agrotis ipsilon* (Hufn), *A. segetum* (Schiff) and *A. spiniera* (Hubn) and their capture rate was 19.1, 7.74 and 5.15%, respectively. The remaining nine species were climbing species, namely *Anua trihaca* (Cr.), *Dysgonia parallela* (Guen.), *Earias insulana* (Boisd), *Heliothis amigera* (Hubn.), *Mythimna loreyi* (Dup.), *Sesamia cretica* (Led.), *Spodoptera exigua* (Hubn.), *S. litura* (Fab) and *Trichoplusia ni* (Hubn.), and their capture rate was 2.46, 2.86, 12.56, 3.24, 6.33, 7.41, 15.23, 7.39 and 10.48, respectively. The adults capture rate in Al-Rashidia, Al-Shalalat and Yarimcha was 42.84, 14.78 and 42.38%, respectively where Al-Rashidia and Yarimcha differed significantly from Al-Shalalat. The first record for adults capture was in the first half of February and the final capture was in the second half of November. The traps were almost empty during winter. There was a positive correlation between capture density and temperature average, and a non-significant negative correlation with relative humidity and rain fall.

E 62

HOST RANGE OF SAP BEETLES (NITIDULIDAE) IN THE COASTAL REGIONS OF LIBYA. M.Z. Najla and H.M. Kerra, Plant Protection Department, University of Al Fateh, Tripoli, Libya, Email: najla_elzaidi@yahoo.ca

Sap beetles of the family Nitidulidae are one of the most important insect pests infesting a considerable number of economically important host plants in the field, stores, and super-markets. A study was conducted to determine the host range of sap beetles associated with fruit and vegetable crops in coastal regions of Libya. The following seventeen regions were selected: Tawrga, Mosratha, Zliten, Wadi Kaam, Al-Khoms, Besees, Al-Garaboly, Wadi Arabiae, Tajora, Ein Zara, Janzoor, Al-Soani, Al-Zahra, El-Zawia, Sobrata, Al-Ajilat and Jemeal). Results showed that sap beetles were present in all regions surveyed. Twenty species were recorded as natural host plants. Date fruits, apricot, peach, plum, apple, citrus, lemon, pomegranate fruits, figs, pear, grape, guava, strawberry, olive, tomato, onion, water melon, squash, and pumpkin. The mean infestation rate was 68-100% on fruit trees. The highest population of the pest was found on pomegranate fruits, date fruits, apricot, peach, apple, figs, citrus, and tomato, in all regions surveyed. Results indicated the presence of seven species of sap beetles, the most dominant were: *Carpophilus hemipterus*, *C. dimidiatus* and *Urophorus humeralis*. Results also showed that sap beetles attack unripe, ripe and fallen fruits in the field, and are found all year round. Since the numbers of plant hosts are increasing, an urgent integrated program is needed to control this pest.

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

Specimens of Jordanian Noctuidae (Lepidoptera) were examined which were kept at the University of Jordan Insect Museum and the Ministry of Agriculture, in addition to specimens collected by the author since 1992. A list of species was prepared based on the examined specimens and on species recorded previously from Jordan. More than 50 species were listed belonging to more than 30 genera. Some of these

species are considered important pests on cultivated plants and on forest trees, while many species feed on wild plants.

E 64

COMPUTER APPLICATION IN ENTOMOLOGICAL STUDIES. Aead Y. Ismail, Biology Department, Education College, Mosul University, Mosul, Iraq, Email:aeadismail@yahoo.com

Since 2000, 15 educational CDs prepared in entomological studies were prepared in the multimedia laboratory. In the Ejaz of the Quran, two CDs, "fly creation: an example of the Ejaz of the Quran" and "Treatment with Honey Bee Products: the Ejaz of the Quran (2005)". In education and information fields, the following CDs were produced: Research on Pests of Stored Product of IRAQ: Database (2000), Teaching of the science of Entomology laboratory aided by Computer (2003), Facts and information on Sun Pest (2005), Collecting, Preservation, Identification and Study of Insects (2006). In the Internet fields, the following CDs were prepared: Gateway to Entomological Science sites, Stored Products Pests Research down loaded from the Internet (2005), Protection of Food and Feed Products, physiological and ecological presentations on insects, The Syllabuses of Entomological science in the world from the Internet, and finally, the Ehab Baker collection of scientific programs (2006).

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BIOLOGY OF *APORIA CRATAEGI* L. IN CENTRAL SYRIA AND ITS CONTROL MEASURES. Wajih Alkassis and Amanni Shlallo, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: lamsamer@scs-net.org

The life cycle of *Aporia crataegi* L. was studied in the central region of Syria during the period of 2003-2006. The insect attacked almond, apple, azarole, mahlab (type of wild cherry) and willow tree. Mating and oviposition occurred at the begging of April. Eggs hatched after 13-15 days. Larvae (5 instars) attacked leaves and formed silken net at the top of twigs and hibernated inside it during summer and autumn. In the following February, larvae started activity at the time of almond buds sprouting and fed voraciously on them and caused great damage. The study showed that the insect population was affected by many factors: (1) parasitism was 29, 21 and 41% in 2004, 2005 and 2006, respectively by *Apanteles* spp.; (2) deformation of wings; (3) incomplete metamorphosis in some cases, and (4) diseases that cause drying and death of pupae or loss of wings. Observations revealed that there was a 10% extra mortality by the applied insecticide compared to natural death factors.

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ALMOND'S IMPORTANT PESTS IN CENTRAL SYRIA AND THEIR CONTROL MEASURES. Wajih Alkassis and Rawda Sookar, Faculty of Agriculture, Damascus University, Damascus, Syria, Email: lamsamer@scs-net.org

In Syria, almond plantations are located mainly in the central area (Homs city and surroundings). This crop is attacked heavily by several insect pests, affecting the productivity and survival of trees. The most important insect pests were: *Eurytoma amygdali* End., *Capnodis carbonaria* Klug, *C. tenebrionis* L., *Aporia crataegi* L. and the moth, *Lymantria lapidicola* H.S. However, almond seed wasp *E. amygdali* was considered as the most serious pest with the highest infestation rate of 90% in 2002 followed by curculio, plum fruit worm. Chemical spray was carried out to control *E. amygdali* with the following insecticides: Desis D, Zenet, Agrothoel and Mezrol and this treatment resulted in reducing the infestation up to 10%. Recently, in collaboration with French Center of Agricultural Research (INRA), trials to determine the date of the first appearance of this insect in the field by using sex pheromone traps are carried out, in order to identify the best time to control this pest.