



Journal of
Entomology

ISSN 1812-5670



Academic
Journals Inc.

www.academicjournals.com

Resistance in Whitefly, *Bemisia tabaci* (Genn.)

Amit Sethi, M.S. Bons and V.K. Dilawari

Whitefly, *Bemisia tabaci* (Gennadius) is a serious pest of many economic crops through out the world. Farmers depend highly on insecticide usage to manage this pest. In this study, we investigated the capacity of field collected whitefly populations from different crops to develop resistance against imidacloprid, bifenthrin and fenvalerate by selecting up to 8 generations. Selection pressure was given by exposing the adults to insecticides using the treated leaf discs in the Petri dishes at the dosages sufficient to give 60-80% mortality. After 8th generation, strains selected with these three insecticides exhibited 21.90, 7.12 and 4.13-fold increase in tolerance for the three insecticides, respectively. The realized heritability of insecticide resistance was very high in imidacloprid-selected strains compared to bifenthrin and fenvalerate-selected strains. This indicated a high level of risk in the field populations for the development of resistance to imidacloprid compared to bifenthrin and fenvalerate. The mode of inheritance of insecticide resistance was found to be controlled by nearly completely recessive more than one gene. (*Journal of Entomology* 5 (1): 1-9, 2008; doi: 10.3923/je.2008.1.9)

Protein Banding Pattern and Major Amino Acid Component in De-Oiled Pupal Powder of Silkworm, *Bombyx mori* Linn.

Kanika Trivedy, S. Nirmal Kumar, Mousumi Mondal and C. Anil Kumar Bhat

Quantitatively *Bombyx mori* pupal powder contains significantly higher amount of protein in female as compared to male in both the hybrids of PM \times CSR2 and CSR2 \times CSR4 studied. On an average, in the former hybrid 14.81% and in the later hybrid 14.58% soluble protein was present as compared to total protein 60.81 and 63.66%, respectively. Qualitatively, no difference was found in amino acid content between the male and female of both hybrids. Five major amino acids found in PM \times CSR2 were nor leucine, methionine, glutamic acid, hydroxyl proline, Aspartic acid and in CSR2 \times CSR4 were isoleucine, valine, amino butyric acid, hydroxyl proline and leucine. SDS PAGE results revealed that there was no polymorphism between the sexes of two hybrids. Two polypeptides were identified in the range at 43 and 14.3 KD. Of the two polypeptides identified, the banding pattern of 43 KD was prominent in both the sexes of the two hybrids. (*Journal of Entomology* 5 (1): 10-16, 2008; doi: 10.3923/je.2008.10.16)

Some Ecological Aspects of Phlebotominae Sand Flies (Diptera: Psychodidae) in an Endemic Focus of Anthroponotic Cutaneous Leishmaniasis of Iran

Ali R. Zahraei-Ramazani, Mohammad R. Yaghoobi-Ershadi, Amir A. Akhavan, Hamid Abdoli, Reza Jafari, Ali R. Jalali-Zand, Mohammad H. Arandian, Nilofar Shareghi and Maryam Ghanei

Study on the Phlebotomine vectors is an interesting tool to make a better understanding of cutaneous leishmaniasis transmission dynamic which is used in prevention and control programs of the disease. This study was conducted in Isfahan city, central Iran, in 2005. Sand flies were collected with two methods, sucking tubes from indoors and sticky paper traps from indoor and outdoor resting places. A total of 3075 sand flies were collected and 10 species were identified. *Phlebotomus sergenti*, a probable vector of *Leishmania tropica*, was the predominant species through the entire period of activity. The seasonal activity of sand flies extended from late April to early October. There were two peaks in the density curve of most species. The parous rate of *P. sergenti* was high in July 92.9% and August 95.7%. The susceptibility test showed that *P. sergenti* is completely susceptible to DDT 4%. Identification of blood meals of *P. papatasi* using Enzyme Linked Immunosorbent Assay (ELISA) showed that 94.1% of sand flies fed on human and 5.9% on both human and poultry. The greatest risk of ACL transmission to human occurs probably during the second peak when parous rate and density of *P. sergenti* are high. (*Journal of Entomology* 5 (1): 17-23, 2008; *doi*: 10.3923/je.2008.17.23)

Assessment of the Efficacy of Actellic and Sumithion in Protecting Grains from Insect Infestation During Storage

A.A. Denloye, K.O. Tesilim, H. Negbenebor and W.A. Makanjuola

The insecticidal efficacy of Actellic and Sumithion (2%) dusts was assessed against 0-3 day old adult *Callosobruchus maculatus* (Coleoptera; Bruchidae) on cowpea (*Vigna unguiculata*) and 0-7 day old adult *Sitophilus zeamais* (Coleoptera; Curculionidae) on maize (*Zea mays*) grains in the laboratory at $30\pm 1^\circ\text{C}$ temperature and $70\pm 2\%$ relative humidity. Each insect species was exposed to insecticide/grain admixtures ranging from 0.063 to 0.5 g kg⁻¹ in comparison with untreated controls. Sumithion with LC₅₀ values of 0.073 g kg⁻¹ for *S. zeamais* and 0.104 g kg⁻¹ against *C. maculatus* was more effective than Actellic (LC₅₀ = 0.090 and 0.112 g kg⁻¹ *S. zeamais* and *C. maculatus*,

respectively) in acute toxicity tests. The efficacy of the two compounds declined as storage period increased with Sumithion showing consistent toxicity against *S. zeamais*. Both test compounds significantly reduced adult emergence in treated grains after infestation was established ($p \leq 0.05$). Both Sumithion and Actellic were effective at controlling *C. maculatus* and *S. zeamais*, but at admixture concentrations higher than the 0.005 g kg^{-1} recommended by manufacturers. (*Journal of Entomology* 5 (1): 24-30, 2008; doi: 10.3923/je.2008.24.30)

Presence and Abundance of Different Insect Predators Against Sucking Insect Pest of Cotton

G.S. Solangi, G.M. Mahar and F.C. Oad

The study on appearance and abundance of different insect predators against sucking insect pest of cotton in field conditions was conducted in the farmer's field, Kot Banglow District Khairpur, Pakistan. The population of sucking insect pests and insect predators were observed 20 days after sowing of the cotton crop. The insects were counted with the help of the magnifier lens. The analysis of data indicates that there was highly significant difference in days of observations, population of sucking insect pests and predator population. The mean maximum population of whitefly (31.98 plant^{-1}) was observed in first week of the September at relative mean temperature 32.60°C , however the maximum population of thrips (29.96 plant^{-1}) and jassids (3.93 plant^{-1}) was found in last week of the August at relative mean temperature 32.88°C . The maximum overall means of whitefly in various observation days were observed (15.90 plant^{-1}), followed by thrips (14.30 plant^{-1}) and jassid (2.08 plant^{-1}). The predator population of Green Lacewing, *Chrysoperla carnea*, Big eyed bug, *Geocoris punctipes* linearly increased but the population of Pirate bug, *Orius insidiosus* decreased in the last week of August at relative mean temperature 32.88°C . The maximum overall means of Green Lacewing in various observation days was 2.07 plant^{-1} , followed by Pirate bug (1.84 plant^{-1}) and Big eyed bug (1.28 plant^{-1}). The results indicated that the sucking insect pests were below the economic injury level at all phenological stages of the cotton plant due to the regular increase in predator population. The predators were active throughout the cotton season due to non-application of pesticides in and around the experimental area. The correlation coefficient ($R = 0.563$) showed a positive relationship between insect predators and sucking insect pest population. The increase in sucking insect population also exhibited an increase in predator population in observed days and trend line shows increase in insect predator population with sucking insect pest population during the growth stages of cotton crop. (*Journal of Entomology* 5 (1): 31-37, 2008; doi: 10.3923/je.2008.31.37)

Feeding Preference of *Chrysomya chloropyga* (Wied.) and *Musca domestica* (Linn.) on Some Animal Faecal Samples

Temitope Kehinde and Adesola Muse

Feeding preference of *C. chloropyga* and *M. domestica* on four animal faeces; cow, dog, goat and poultry faeces were studied in choice and no-choice experiments. The protein profile of the emerging adult flies was determined by electrophoresis. *M. domestica* was attracted to the four faecal samples but preference was shown for dog faeces throughout the choice experiment. Mean number of *M. domestica* that fed on either cow, dog or goat faeces however fluctuated with days of exposure, from days 4 to 20 in the no-choice experiment. *C. chloropyga* was attracted to all the faecal samples in the choice experiment with preference for poultry faeces on days 4 and 8, preference however shifted to dog faeces on days 12, 16 and 20. In the no-choice experiment, mean number of *C. chloropyga* that fed on dog faeces was consistently higher than those on cow, goat and poultry wastes on days 4, 12, 16 and 20. Electrophoresis of whole adult homogenate *M. domestica* emerging from the dog, goat and poultry faeces revealed the presence of heterogeneous proteins of different molecular weights including some that are similar in males and females reared on different diets. The different diets show a potential for supporting the development of the flies. Further experiments to study the development of the flies on these faecal samples and others in our environment is therefore recommended. (*Journal of Entomology* 5 (1): 38-44, 2008; doi: 10.3923/je.2008.38.44)

Larvicidal Efficacy of Neonicotinoid Classes of Compounds on *Culex quinquefasciatus*

M. Srinivasa Rao, U.S.N. Murty, B. Gangadasu, B. China Raju, C.H. Ramesh, S. Bharat Kumar and V. Jayathirtha Rao

Mosquito larvicidal efficacy of seven different synthesized imidacloprid compounds (IMD) with different substitutions (chlorine ion, methyl group, methoxy group, ester group, phenyl ring and pyridine ring) of Imidacloprid were studied on the IV stage larvae of mosquito, *Culex quinquefasciatus*. LC_{50} of each compound (IMD1-IMD-7) was determined using probit analysis. Effects of these compounds on biochemical toxicity were also determined by observing the changes in total protein, lipid and Acetylcholine esterase activity of the mosquito larvae. The results show that due to the action of these compounds, higher amount of protein production ($p \leq 0.001$) and AchE activity ($p \leq 0.001$) and significant decrease in

total lipid activity ($p \leq 0.001$) were observed when compared to the control. Similar types of results were also reported on increase production of protein, lipid and acetylcholine activity due to the action of insecticides in other insects. Hence, it is concluded that, these seven synthesized compounds can be used as mosquito larvicides. (*Journal of Entomology* 5 (1): 45-50, 2008; doi: 10.3923/je.2008.45.50)

Evaluation of Permethrin Treated Clothing for Personal Protection Against *Phlebotomus papatasi* (Diptera: Psymphodidae)

Mehdi Khoobdel

This study was performed to assess the efficacy of permethrin-impregnated cloth ($0.125 \text{ mg permethrin [AI] cm}^{-2}$) against natural population of *Phlebotomus papatasi* (Scopoli), which is the main vector of zoonotic cutaneous leishmaniasis, under field condition. Eight volunteers were selected for this study. Five of them put on the treated uniforms and the other three ones wore the untreated uniforms. All the subjects participated in the night biting tests for eight active nights between July and August 2004. In this study, the average number of biting among those who wore untreated uniforms (controls) was $1.75 \text{ sand flies bitings min}^{-1} \text{ person}^{-1}$ (105 h^{-1}) against 0.52 (31.2 h^{-1}) for volunteers who wore treated uniforms. The relative protection percent of treated uniforms, in comparison with untreated ones against *P. papatasi* (Scopoli), was about 70.3%. Although the technique of permethrin-impregnated clothes are provided considerable protection against sand flies biting, but it may be not acceptably decrease leishmaniasis, especially in endemic and hyperendemic areas. Therefore, in addition to permethrin-impregnated clothes protection, concurrently using of repellents on exposed skin is suggested. (*Journal of Entomology* 5 (1): 51-55, 2008; doi: 10.3923/je.2008.51.55)

Ixodid Tick Species Infesting Sheep and Cattle in Kelardasht Part (Chaloos), Iran

M.R. Youssefi, M. Keighobadi and M.Y. Asnaashari

Ticks are features which are apart of metastigmata order. All of these features are parasite of animals which only feed on them. Ticks and disease related, causes economical damages which in some case these damages reaches to million dollars each year. Because of the importance of recognition ticks, particularly Ixodidae,

this research has been done on Ixodidae ticks on domestic animals at Kelardasht in Mazandaran Northern Iran. The used method in this research it was cross-section and this ticks were studied on, were collected during 5 month (May to September 2004) from 150 sheep and cattle. From 980 collected samples, 798 numbers of them departed in genus and species and the rest were eliminated. In this study 6 groups species. In *Ixodes* the only observed species was *ricinus*, in *Boophilus* only *anulatus* species, in *Dermacentor* only *marginatus* was identified. But in *Haemaphysalis* two different species were observed *punctata* and *inermis*. In *Hyalomma* and *Ripicephalus bursa* was observed. In these study samples the most percentages was seen in *Ixodes* (26.8 %) and the minimum was in *Haemaphysalis* (0.2%). (*Journal of Entomology* 5 (1): 56-58, 2008; doi: 10.3923/je.2008.56.58)

Efficacy of Entomopathogenic Fungus *Fusarium pallidroseum* (Cooke) Sacc. Against Gypsy Moth (*Lymantria obfuscata* Walker)

N.A. Munshi, Barkat Hussain, G.N. Malik, Musavir Yousuf and N. Fatima

Fusarium pallidroseum isolated locally from cadaver of *Lymantria obfuscata* was evaluated as bio-control agent against caterpillars of same pest at concentrations of 1×10^{10} , 1×10^9 , 1×10^8 , 1×10^7 , 1×10^6 , 1×10^5 , 1×10^4 , 1×10^3 , 1×10^2 and 1×10^1 spores mL^{-1} . No mortality was observed up to 3rd day of inoculation. 1×10^{10} spores mL^{-1} was the most promising concentration as it inflicted an initial mortality of 43% on the 4th day and cent percent mortality on the 9th day. The LC_{50} values ranged from 1.969×10^3 (16th day) to 1.256×10^{11} (4th day). A linear positive association was observed between mortality and days of observation. (*Journal of Entomology* 5 (1): 59-61, 2008; doi: 10.3923/je.2008.59.61)

Histopathological Studies of Hard Tick *Hyalomma dromedarii* Infected of Entomopathogenic Nematodes

Hanan A. El-Sadawy, Amira El-Shazly and Rabab M.M. El-Khateeb

Histopathological studies revealed a highly damaged midgut epithelial cells with different species of Heterorhabditids. Also, the presence of differentiated cells in all of the midgut regions, as seen from serial sections, suggests that digestive processes appear to occur throughout the length and diameter of the midgut and its diverticulae. The ultrastructural study of the gut showed that the granules of S1

and S2 secretory cells were different and the two cell types could sometimes be found together in one caecum. (*Journal of Entomology* 5 (2): 62-76, 2008; *doi*: 10.3923/je.2008.62.76)

The Feeding Response of *Epilachna indica* (Coleoptera: Coccinellidae: Epilachninae) Towards Extracts of *Azadirachta indica*

Fauziah Abdullah and Partiban Subramanian

A study was conducted to observe the antifeedant properties of *Azadirachta indica* towards the pest of eggplant, *Epilachna indica* (Coleoptera: Coccinellidae: Epilachninae) in a farm at Unit of Landscape, University of Malaya. Eight eggplants of *Solanum melongena* tree were planted in a gardening pot and placed into a big rearing cage for the study on the life cycle of *E. indica*. Methanolic extraction method was used to extract the antifeedant properties from *A. indica* leaves. A dual choice feeding bioassay was conducted using agar as the feeding substrate in the feeding experiment. Different treatments were placed in two of the equal compartments in petri dishes. One of the agar compartments was treated with leaves extract or synthetic neem compound and the other half of the agar was treated with methanol as control. Analysis using High Performance Liquid Chromatography identified Azadirachtin as one of the chemical components that has the antifeeding property. Synthetic Azadirachtin compound in 50, 100 and 200 ppm concentration was bioassayed to determine the minimum concentration that can cause optimal antifeedant effect on *E. indica*. There was significant difference (ANOVA) in antifeeding response between 50 and 100 ppm concentration but a concentration of 100 and 200 ppm exhibited similar response. It was found that a 100 ppm concentration of Azadirachtin was the minimum concentration that can cause optimal antifeedant effect on *E. indica*. (*Journal of Entomology* 5 (2): 77-90, 2008; *doi*: 10.3923/je.2008.77.90)

Evaluation of Crude and Fractionated Gut Extract Antigens for Protection Against Camel Tick *Hyalomma dromedarii* (Acari: Ixodidae)

Sobhy Abdel-Shafy, Mona S. Mahmoud and Mohamed M. Abdel-Aziz

The study aim to evaluate crude and two fractionated gut extract antigens of engorged females of *Hyalomma dromedarii* for protection against tick-feeding.

To obtain the two fractionated gut extract antigens (FGE₁ and FGE₂) from Crud Gut Extract (CGE), gel filtration was used. CGE, FGE₁ and FGE₂ were used as immunogens for rabbits with Freund's adjuvant. Six immunized and two control groups were challenged with adult and larvae of *H. dromedarii* (3 immunized and 1 control for each stage). Results showed that the efficacy of immunogens against adult (E%) showed that FGE₁ recorded the highest immune effects on the adults (64.97%) followed by CGE which recorded (30.97%) and the lowest protection recorded with FGE₂ (21.57%), while E% of CGE, FGE₁ and FGE₂ were 85.01, 82.13 and 70.1%, respectively, on larvae. The results of Enzyme Linked Immunosorbent Assay (ELISA) revealed that the level of antibodies for all tested antigens increased gradually until the date of challenge with ticks and then declined. Western blot technique for both adults and larvae showed that the antigen CGE revealed two reactive bands at molecular weights of 50 and 34 kDa before challenge with ticks. These bands still to be reactive after challenge with ticks. Meanwhile, before challenge, the antigen FGE₁ exhibited 3 reactive bands with molecular weights 145.89, 61.09 and 24 kDa and one band at molecular weight of 34 kDa after challenge with ticks. Moreover, the antigen FGE₂ had only one reactive band at molecular weight of 34 kDa before challenge with ticks and two reactive bands at molecular weight of 34 and 24 kDa after challenge with ticks. (*Journal of Entomology* 5 (2): 91-102, 2008; doi: 10.3923/je.2008.91.102)

Attraction of *Zonocerus variegatus* (Orthoptera: Pyrgomorphidae) to Pyrrolizidine Alkaloids: A Potential Novel Approach to its Management

J.A. Timbilla, K. Yeboah-Gyan and B.W. Lawson

The increasing importance of dry season populations of the African polyphagous grasshopper, *Z. variegatus* as a pest in agriculture and forestry has been attributed to the sequestration of pyrrolizidine alkaloids (PAs) from the flowers of the exotic noxious weed *Chromolaena odorata* for defense against natural enemies and protection of its diapausing eggs. This phenomenon is, however, seen as a novel opportunity to lure the insect with PAs for the development of PA-based attracticides for its management. This, notwithstanding, there is no empirical data on the efficacy of the available PA containing plants and the stage (s) of *Z. variegatus* worth targeting for the development of an integrated management strategy. Four categories of the growth stages of *Z. variegatus* were evaluated for the extent of migration to the roots of *C. odorata*, *Heliotropium indicum* and *Crotalaria retusa* which are plants containing PAs. Subsequently, fifth instar hoppers of *Z. variegatus* were evaluated for their attraction to the dry and fresh

roots and flowers of *C. odorata* with a blank control in the laboratory. The results showed that 300 g of the dry chopped roots of *C. odorata* hold promise for use as PA-lures for the development of PA-based attracticides. The 3rd to 6th instar larvae of *Z. variegatus* have the highest degree of attraction to PAs. Also, the roots of *C. odorata* stored for a year are effective lures for the grasshopper while the flowers lose their attractive principle after 24 h. The results raise hope for the cost efficient and sustainable management of the grasshopper to salvage the agriculture and timber industries in Ghana and the sub region. (*Journal of Entomology* 5 (2): 103-112, 2008; **doi:** 10.3923/je.2008.103.112)

Temperature and Ganglionectomy Stresses Affect Haemocyte Counts in Plain Tiger Butterfly, *Danais chrysippus* L. (Lepidoptera: Nymphalidae)

J.P. Pandey, R.K. Tiwari and Dinesh Kumar

Total and differential haemocyte counts following chilling, heating and ganglionectomy were studied in fifth instar larvae of *Danais chrysippus*. Chilling caused a decline in the number of haemocytes reaching a lowest level of about 57% in 48 h old larvae. Heating on the other hand elicited an increase of blood cells up to 30-50%. The ganglionectomy up to second abdominal ganglion caused a gradual reduction in total haemocyte count up to 93%. The relative percentage of different haemocyte types showed much variation. While prohaemocyte percentage increased both after heating and ganglionectomy but decreased after chilling; the percentage of plasmatocytes on the other hand declined in all experimental stages. The other cell types viz., granulocytes, spherulocytes, adipohaemocytes and oenocytoids also showed some variation in their counts. In addition, the aforesaid stresses adversely affected the structure of haemocytes causing their vacuolization, breaking of plasma membrane and fragmentation of nucleus and cell organelles leading to cell death. These stresses are thought to affect haemocytes through Median Neurosecretory Cells (MNSCs) mediated hormonal disturbance. (*Journal of Entomology* 5 (2): 113-121, 2008; **doi:** 10.3923/je.2008.113.121)

Population Trends of Two Spotted Spider Mite, *Tetranychus urticae* Koch (Acari: Tetranychidae) on Cotton Nearby Soil and Asphalt Road

N. Demirel and F. Çabuk

The two spotted spider mite (TSSM), *Tetranychus urticae* Koch (Acari: Tetranychidae) is one of the most important pests on cotton crops in Amik plain

of Turkey. The sampling were taken from forty-eight an irrigated cotton crop fields to describe affectability of dusty condition for the TSSM' population density. The population densities of two spotted spider mite were 1.72, 1.75, 4.39 and 2.65 times higher on cotton nearby soil road than asphalt road. Therefore, the dusty conditions can bring about increasing population of TSSM on cotton plants. Due to the dusty conditions, their beneficial insects were not affected on their population density. The decreasing of dusty condition can be reduced population density of TSSM and increase affectability of their beneficial insects. (*Journal of Entomology* 5 (2): 122-127, 2008; **doi:** 10.3923/je.2008.122.127)

Efficacy of Some Indigenous Pesticidal Plants Against Pulse Beetle, *Callosobruchus chinensis* (L.) On Green Gram

V. Sathyaseelan, V. Baskaran and S. Mohan

The effect of indigenous pesticidal plants viz., *Prosopis* sp., *Nerium* sp., *Ocimum* sp., *Acalypha* sp., *Catheranthus* sp. and *Vitex* sp. were tested against pulse beetle *Callosobruchus chinensis* (L.) in green gram. Leaf extracts of all the plants caused significant ovipositional deterrent effect against pulse beetle. Five percent leaf extract of *Vitex* sp. was the most effective in inhibiting the oviposition (26.6 eggs/female) as that of 79.4 eggs/female in untreated control. At 5% level, leaf extract of *Vitex* sp. caused maximum reduction in egg viability (61.7%) followed by *Catheranthus* sp. leaf extract (56.7%). The egg viability gradually decreased with the increase in dose level of each treatment. *Vitex* sp. treated seeds at 5% level caused maximum reduction in adult emergence (85.0%) followed by *Catheranthus* sp. (83.7%), *Acalypha* sp. (73.3%), *Nerium* sp. (70.0%), *Ocimum* sp. (68.7%) and minimum reduction was recorded in case of *Prosopis* sp. (68.0%). No adverse effect was observed on the germination of green gram up to 90 days after treatment. (*Journal of Entomology* 5 (2): 128-132, 2008; **doi:** 10.3923/je.2008.128.132)

Effect of Varying Temperature on the Survival and Fecundity of *Coccinella septempunctata* (Coleoptera: Coccinellidae) Fed on *Lipaphis erysimi* (Hemiptera: Aphididae)

Arshad Ali and Parvez Qamar Rizvi

The observations on the survival and fecundity of *Coccinella septempunctata* at varying temperatures viz., 18±1, 24±1°C and 28±1°C coupled with 65±5%

RH and 12 h L: 12 h D photoperiod under laboratory condition was made for two successive generations. The highest potential fecundity and net reproductive rate of *C. septempunctata* were obtained at $24\pm 1^{\circ}\text{C}$ (165.67 eggs/female and 41.09 females/female/generation, respectively) and the lowest at $28\pm 1^{\circ}\text{C}$ (146.63 eggs/female and 29.70 females/female/generation, respectively). Finite, intrinsic and annual rate of increase were however, found maximum at $28\pm 1^{\circ}\text{C}$ (1.0876, 0.0840 females/female/day and 2.04×10^{13} /annum, respectively) and minimum at $18\pm 1^{\circ}\text{C}$ (1.0794, 0.0764 females/female/day and 1.281×10^{12} /annum, respectively). The mean length of generation and doubling time was found minimum at $28\pm 1^{\circ}\text{C}$ (40.77, 8.26 days, respectively) and maximum at $18\pm 1^{\circ}\text{C}$ (48.27 and 9.08 days, respectively). (*Journal of Entomology* 5 (2): 133-137, 2008; doi: 10.3923/je.2008.133.137)

Spectrum of Insecticide Resistance in Whitefly from Upland Cotton in Indian Subcontinent

Amit Sethi and V.K. Dilawari

Cotton, *Gossypium hirsutum* L. is a chief fiber crop of India and contributes significantly to Indian agricultural and industrial economy. Its economic cultivation is very much affected by insect pest infestations. Whitefly, *Bemisia tabaci* (Genn.) has attained a status of key pest among these insect pests and the main reliance has been on the use of insecticides for its management. Insecticide resistance develops more readily due to their injudicious and indiscriminate use by growers. Thus, it is imperative to test the level of resistance to design a successful insecticide resistant management program. In this study, the resistance level to triazophos, endosulfan and imidacloprid were determined in whitefly populations from cotton growing areas of India. Whitefly populations from seven different locations; Guntur, Coimbatore, Kolar, Ludhiana, Bathinda, Sri Ganganagar and Sirsa were tested for resistance at two discriminating doses (0.25 and 1%) of each insecticide. Populations from all locations displayed widespread resistance to triazophos, endosulfan and imidacloprid with highest in Bathinda and lowest in Coimbatore. High resistance levels were recorded in populations from North India compared to populations from south India against all three insecticides. Whitefly populations from all locations did not show any resurgence against any insecticide. (*Journal of Entomology* 5 (3): 138-147, 2008; doi: 10.3923/je.2008.138.147)

Management of Thrips (Thysanoptera: Thripidae) on French Beans (Fabaceae) in Kenya: Economics of Insecticide Applications

J.H. Nderitu, M.J. Kasina, G.N. Nyamasyo, C.N. Waturu and J. Aura

This study was conducted to measure economic benefit of using different spray schedules to control thrips on French beans. It was done using different spray regime scenarios of two insecticides: Lambda cyhalothrin (Karate 1.75% EC) and Methiocarb (Mesuro 500 SC). It is shown that increasing the number of sprays results to lower thrips infestations, explaining why local farmers practice calendar spraying. However, this lowers the net returns obtained from French bean sales. In contrast, application of one to two sprays maintains thrips below economic damage and provides the highest net returns. It is suggested that farmers should only use the effective insecticide after noting a density of three thrips per flower. This is possible if farmers embrace monitoring of thrips buildup on French beans. (*Journal of Entomology* 5 (3): 148-155, 2008; *doi*: 10.3923/je.2008.148.155)

Effect of Chemical Spray on Insect Pests and Yield Quality of Food Grain Legumes

J.W. Muthomi, P.E. Otieno, G.N. Chemining'wa, J.H. Nderitu and J.M. Wagacha

Effectiveness of dimethoate 40 EC and copper oxychloride mixture in the management of legume pests and diseases was tested in field experiments during 2005 growing seasons. Grain legumes used were the common bean (*Phaseolus vulgaris* L. var. GLP 2), the lima bean (*Phaseolus lunatus* L.), the green gram (*Vigna radiate* L.), the lablab (*Lablab purpureus* L.) and the chickpea (*Cicer arietinum*). The experimental design was a randomized complete block design in a split plot replicated thrice. The parameters observed were insect pest incidence, number of pods per plant, percent seed damage and total grain yield. Pesticides spray significantly reduced the incidence of insect pest species like; the flower thrips (*Megalurothrips sjosdetji* Trybom), the African bollworm (*Helicoverpa armigera* Hubner) and the legume pod borer (*Maruca testulalis* Geyer). Pod and seed damage were significantly reduced in lablab, chickpea and green gram. Only lablab, chickpea and green gram showed significant increase in number of pods per plant and total seed yield resulting from pesticide spray. In addition, the quality of yield increased through reduction of shrivelled and discoloured seeds due to diseases. The study showed that the use of dimethoate and copper oxychloride was beneficial for the management of the common insect

pests and diseases in legumes. However, studies on the optimum number of sprays, time of application and use of other control measures that are ecologically viable for the management of the pests ought to be done. (*Journal of Entomology* 5 (3): 156-163, 2008; doi: 10.3923/je.2008.156.163)

Enhancement of WHO Technique for Glucose Feeding of Adult Mosquitoes in Laboratory under Dry Arid Environment

A. Umar, S.L. Kela and J.A. Ogidi

The laboratory colonization of mosquitoes is vital for various bioassay techniques for evaluation of bioefficacies of pesticides against mosquitoes. Glucose meal is essential for mosquito culture maintenance and reproduction (Klowden, 1986; Anderson, 1992). The maintenance of mosquito colony in laboratory under the dry arid environment is often frustrating due to evaporation of glucose meal resulting from excessively high temperature and lower relative humidity particularly during the dry periods of the year. The current WHO technique use cotton wool inserted in to glass jar. This technique provides smaller surface area for the mosquitoes and lower absorption capacity. In the current WHO (1970) improvised technique for mosquito culture, the glucose meal is prone to evaporation. This paper puts forth an improved technique for providing mosquito colony with glucose meal in culture under tropical arid environment. (*Journal of Entomology* 5 (3): 164-166, 2008; doi: 10.3923/je.2008.164.166)

Culturable Bacteria Associated with the Guts of Pea Aphid, *Acyrtosiphon pisum* (Homoptera: Aphididae)

Mazen A. Ateyyat

Gas Chromatography (GC) based on fatty acid profiles and API system (API 20NE and API CH50) techniques were used to identify several bacterial isolates isolated under sterile conditions from the guts of apterous adults and immatures of pea aphid. Pea aphids harboured two bacterial forms in their guts; Cocci Bacterial Cells (CBC) and Rod Bacterial Cells (RBC). Significantly greater density of RBC was obtained in the distal part of the gut than that in the proximal part. Adults and immatures of pea aphid harboured RBC in their guts. The first and second nymphal instars had no CBC. Adults harboured higher densities of CBC and lower densities of RBC than immatures do. Taken as a whole, the guts of apterous adults and immatures of pea aphid contained at least 9 species of cultivable bacteria in five genera. *Stenotrophomonas maltophilia* was found in

31.9% of the samples, was the genus most frequently isolated from the aphid's gut, followed by *Bacillus licheniformis*. *Comamonas acidovorans*, *Pseudomonas putida*, *Pseudomonas* sp., *Micrococcus luteus* and *Micrococcus varians* were absent in the 1st and 2nd nymphal instars. (*Journal of Entomology* 5 (3): 167-175, 2008; **doi**: 10.3923/je.2008.167.175)

Co-Transmission of *Pepper huasteco yellow vein virus* and *Pepper golden mosaic virus* in Chili Pepper by *Bemisia tabaci* (Genn.)

Gabriela Medina-Ramos, Rodolfo De La Torre-Almaráz, Rafael Bujanos-Muñiz, Ramón G. Guevara-González, Nancy Tierranegra-García, Lorenzo Guevara-Olvera, Mario M. González Chavira and Irineo Torres-Pacheco

The capacity of simultaneously acquiring and transmitting *Pepper huasteco yellow vein virus* (PHYVV) and *Pepper golden mosaic virus* (PepGMV) geminiviruses by their whitefly vector (*Bemisia tabaci* Gennadius) to pepper plants *Capsicum annuum* was investigated. Information was obtained relating to the effect of factors involved in the virus-plant interaction such as whiteflies density by plant, Acquisition Access Periods (AAP), Inoculation Access Periods (IAP) and source of viral infected plants. Transmission trials indicated that a single virus-infested whitefly can transmit PHYVV and PepGMV to pepper plants. It was demonstrated that an AAP of 1 h was sufficient for acquisition of PHYVV and PepGMV by the vector. A minimum IAP of 48 h was required for the vector to transmit these geminiviruses to the plant. We also determined that one whitefly was capable of acquiring and transmitting both geminiviruses simultaneously. It appears that PHYVV helps in the dispersion of PepGMV inside the plant. Several possible explanations of our results are discussed. (*Journal of Entomology* 5 (3): 176-184, 2008; **doi**: 10.3923/je.2008.176.184)

Blowfly and Flesh Fly (Diptera: Cyclorrhpha) Fauna in Tehran, Iran

Mehdi Khoobdel, Nematollah Jonaidi and Mohammadali Seiedi Rashti

The blow fly (Calliphoridae) and flesh fly (Sarcophagidae) (Diptera: Cyclorrhpha) are flies of great ecological, medical and sanitary importance because they are decomposers of organic matter, mechanical vectors of pathogenic agents and causers of myiasis. This study was conducted to ascertain the fauna of Sarcophagidae and Calliphoridae in Tehran and suburb, over the period of three

years during 1996-97 and 2000-2002, with ten monthly collections, continuously. Adult flies were netted and collected in different areas, indoors and outdoors and taken to the laboratory for identification. Twenty-two species of flies were identified. Thirteen species were medically important and four species consisting: *Calliphora vomitoria*, *Lucilia richardsi*, *Sarcophaga fertoni* and *Sarcophaga peregrina* were identified and reported for the first time in Iran. (*Journal of Entomology* 5 (3): 185-192, 2008; doi: 10.3923/je.2008.185.192)

Bioactivities of Essential Oils of *Aframomum melegueta* and *Zingiber officinale* both (Zingiberaceae) Against *Rhyzopertha dominica* (Fabricius)

The essential oils extracted from *Aframomum melegueta* seeds and *Zingiber officinale* rhizomes were evaluated for their repellency against *Rhyzopertha dominica* in a four-armed airflow olfactometer. Parameters assessed were time spent and number of entries or visits made by male and female adults into the treated and control arms of the olfactometer. Ten microliters of both crude oil extracts significantly repelled the beetles when tested singly and in combination with 5 g winter wheat grains. These results suggest that the essential oils from *A. melegueta* and *Z. officinale* may be used in grain storage against insect pests. The details of the bioassay procedure used and the results obtained are reported. (*Journal of Entomology* 5 (3): 193-199, 2008; doi: 10.3923/je.2008.193.199)

Reduction in Haemocyte Mediated Immune Response in *Danais chrysippus* Following Treatment with Neem-Based Insecticides

J.P. Pandey, R.K. Tiwari and Dinesh Kumar

The bioefficacy of some neem-based insecticides (NBIs) (neemazal, multilineem and nimbecidine) was evaluated using fifth instar larvae and pupae of *Danais chrysippus*. All the NBIs caused reduction in total haemocyte count and much variation in their normal profile. This caused disintegration of haemocytes leading to reduction in immune response. In addition, the NBIs produced ecdysial stasis thereby resulting in the larval-pupal intermediates, pharate adults and deformed imagoes. A reduction in body weight of treated larvae was recorded too. (*Journal of Entomology* 5 (3): 200-206, 2008; doi: 10.3923/je.2008.200.206)

Evaluation of Synthetic and Neem-Based Insecticides for Managing Aphids on Okra (Malvaceae) in Eastern Kenya

J.H. Nderitu, J.M. Kasina, J.W. Kimenju and F. Malenge

This field study was conducted to evaluate the efficacy of two synthetic insecticides (Imidacloprid 350 g L⁻¹ (Gaucho FS^R) and Lambda-cyhalothrin 17.5 g L⁻¹ (Karate 1.75 EC^R), two neem products (Azadirachtin 0.15%w/w (Achook^R) and Azadirachtin 0.6% w/w (Neem extractive^R) and a spray alternation of Azadirachtin 0.6% w/w and Lambda-cyhalothrin, in the management of aphids (*Aphis gossypii* Glover) infesting okra (*Abelmoschus esculentus* L. Moench). The crop was established in two seasons, December 2003-March 2004 and February-May 2004 at Kibwezi, Eastern Kenya. Imidacloprid was applied as a seed dresser while the other insecticides were foliar applied. The population of live and parasitized aphids was monitored on the leaves and pods of the plants for 9 and 7 weeks, respectively. The number of live and parasitized aphids was significantly ($p < 0.05$) lower in plots treated with Imidacloprid, causing more than 95% aphid reduction. Plots treated with spray alternation of Lambda-cyhalothrin and Azadirachtin 0.6% had higher pest infestation than the other treated plots. Plants in Imidacloprid-treated plots had slightly higher yields than in other treatments. The results of this present study show that neem products are as effective as the synthetic insecticides in the management of aphids infesting okra. The study provides the best alternative of managing aphids' pests in okra that can reduce both the cost of production and chemical residue levels in the produce. (*Journal of Entomology* 5 (3): 207-212, 2008; *doi*: 10.3923/je.2008.207.212)

Studies on Pentatomidae and Scutelleridae (Heteroptera) Fauna of Isparta Province (Turkey)

Y. Karsavuran, O. Demirözer, B. Aslan and İ. Karaca

Pentatomidae and Scutelleridae (Heteroptera) fauna of Isparta province were studied between 2000 and 2005. The samples were collected from different plants, on the ground, under the stones and in debris both from cultivated and non cultivated areas. A total of 18 species, of which 14 species belonging to Pentatomidae and 4 species belonging to Scutelleridae were determined. Among those *Eurygaster maura* (Linnaeus) (Scutelleridae) and *Rhaphigaster nebulosa* (Poda) (Pentatomidae) were the common species. (*Journal of Entomology* 5 (3): 213-217, 2008; *doi*: 10.3923/je.2008.213.217)

A Prescreen of Termicidal Potentials of Aerial Parts of Castor, *Ricinus communis*, (Euphorbiaceae)

S.A. Babarinde, O.O.R. Pitan and F.A. Iyiola

Preliminary investigations were carried out on the termiticidal potentials of aqueous extract of the leaf, fruit and bark of castor, *Ricinus communis* (Euphorbiaceae), on mortality and repellency of *Macrotermes natalensis* in the laboratory towards the development of alternative to synthetic termiticides. Ability of *Nasutitermes* species to rebuild broken termatarium treated with leaf and fruit extract was also investigated on the field. Results obtained show that the extracts had significant ($p < 0.05$) effect on the test parameters. Symptomological response of *M. natalensis* to the extract included back lying of the insects prior to their death with overall reduced excitability. Highest response was observed in fruit extract. At 3 h after treatment (HAT), leave extract caused significant mortality. Between 6-12 HAT, mortality due to different extracts was not significant. However, at 24 HAT, mortality (82.00%) due to fruit extract was significantly higher than mortality due to other extracts. Also, fruit extract exerted highest repellency (90%) to *M. natalensis*, which was followed by 87.27% repellency due to leaf extract, both being class V repellency. The repellency due to bark (40%, class II) was significantly the lowest. On the field, both leaf and fruit extracts inactivated *Nasutitermes* species from rebuilding broken termatarium, whereas untreated control was rebuilt within 24 h. (*Journal of Entomology* 5 (4): 218-223, 2008; **doi:** 10.3923/je.2008.218.223)

A New Ecdysiotropic Factor in Adult Male Crickets

S. Reza Kazemi Nezhad and Franz Romer

Oenocytes of the cricket, *Gryllus bimaculatus*, were characterized by a continuously high secretion of ecdysteroids over several hours. A factor extracted from heads of the male adults caused the oenocytes to enhance immunoreactive ecdysteroid secretion *in vitro*. This factor was isolated by high performance size exclusion chromatography. Its molecular weight ranged from 26.5 to 30.0 kDa. The partially purified bioactive substance stimulates the ecdysteroid synthesis of oenocytes in a time- and dose-dependent manner. The ecdysiotropin was susceptible to protease degradation and furthermore showed resistance to boiling and alkylation. Exopeptidase did not affect the activity of the peptidergic factor, suggesting that N- and C-terminus are protected. Treatments with dithiothreitol and neuraminidase suggest that disulfide bridge and carbohydrates are necessary

for the biological activity of the oenocyte-stimulating ecdysiotropic factor. This study is the first evidence that a factor of head adult insect increased *in vitro* ecdysteroid secretion in oenocytes that are epidermal in origin. (*Journal of Entomology* 5 (4): 224-238, 2008; doi: 10.3923/je.2008.224.238)

Insect Pests of *Mangifera indica* Plantation in Chuping, Perlis, Malaysia

Fauziah Abdullah and Kamarulnizam Shamsulaman

A survey of insect pests of *Mangifera indica* plantation was conducted between July 2006 and March 2007 in Chuping, Perlis, Malaysia. Day sampling and night observations (with light traps) was carried out to observe the presence of insects on leaves, flowers, fruits and branches of the mango tree. Nine orders of insects belonging to 45 families were observed and this includes Coleoptera, Demaptera, Diptera, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Odonata and Orthoptera. Coleoptera was the most abundant (Margalef index: 4.446) of which 680 belonging to 30 species and 12 families were collected throughout the period of study. Diptera was the most specious (Simpson Diversity index, 0.89). The result of field study showed that during the non-fruiting season 165 individuals of *Monolepta bifasciata* was recorded probably due to the presence of many young mango shoots during the season. Six adults of *R. simulans* were also observed in fruiting season including a mating pair. The implications of these results are discussed in relation to the management of insect pests of mango plantation in Malaysia. (*Journal of Entomology* 5 (4): 239-251, 2008; doi: 10.3923/je.2008.239.251)

Evaluating Biological Based Insecticides for Managing Diamondback Moth, *Plutella xylostella* (L.) (Lepidoptera: Plutellidae)

Mohamed F.R. Khan, R.P. Griffin, G.R. Carner and C.S. Gorsuch

This study evaluated multiple applications of spinosad at three application rates, emamectin benzoate, *Beauveria bassiana*, azadirachtin and different *Bacillus thuringiensis* delta endotoxins for controlling diamondback moth populations, *Plutella xylostella* (L.), on three commercial collard (*Brassica oleracea* var. *acephala* de Condolle) farms in South Carolina. Spinosad and emamectin benzoate were the most efficacious at consistently providing excellent control of diamondback moth populations. Azadirachtin, *B. bassiana* and *B. thuringiensis*

delta endotoxins may be useful early in collard growth to control low populations of diamondback moth, but were not consistently effective at maintaining diamondback moth populations below the economic threshold in the later stages of field trials, especially when diamondback moth larvae averaged more than three per plant. (*Journal of Entomology* 5 (4): 252-261, 2008; doi: 10.3923/je.2008.252.261)

Evaluating Border Cropping System for Management of Aphids (Hemiptera: Aphididae) Infesting Okra (Malvaceae) in Kenya

J. Nderitu, M. Kasina and F. Malenge

A field experiment was carried out in 2003 and 2004 to evaluate border-cropping system as a strategy for management of aphids infesting okra (*Abelmoschus esculentus* (L.) Moench). Four crops used as border crops; maize (*Zea mays* L.), Sorghum (*Sorghum bicolor* (L.) Moench) pigeon peas (*Cajanus cajan* (L.) Milisp.) and millet (*Pennisetum glaucum* (L.) R. Br.) were planted 14 days prior to okra sowing, providing a protection perimeter around the whole plot. The number of live and parasitized aphids was monitored *in situ* on randomly selected leaves of okra in each plot for ten weeks. This was also done weekly on pods of randomly selected okra plants per plot for seven weeks after their formation. The number of aphids in okra leaves was significantly ($p < 0.05$) different among the treatments during the two seasons. The plots bordered by pigeon peas and maize had lowest and highest mean aphid population among the border crops respectively. However, maize bordered plots recorded the highest number of parasitized aphids in both seasons. In all the treatments, there was no significant difference ($p > 0.05$) in the yield of okra. This study concludes that some border crops have potential use in aphid management in okra crop and can be used in combination with border spraying in an integrated pest management strategy to maintain the pest below economic damage. In addition, such a system would lower insecticide sprays in a season, reduce cost of production and improve farm profits. The strategy is also friendly to the environment. (*Journal of Entomology* 5 (4): 262-269, 2008; doi: 10.3923/je.2008.262.269)

Records of the Genus *Aphaereta* Foerster (Hymenoptera: Braconidae) from India, with Descriptions of Three New Species

Ahmad Samiuddin, Zubair Ahmad and Mohammad Shamim

The genus *Aphaereta* Foerster is recorded for the first time from India and three species viz., *A. breviterebrata* sp. nov., *A. indica* sp. nov. and *A. minys* sp. nov.

are described as new. A key to the Indian species is also given. (*Journal of Entomology* 5 (4): 270-276, 2008; doi: 10.3923/je.2008.270.276)

Insecticidal Activities of Flowerheads of *Anacyclus cyrtolepidioïdes* Pomel Growing in Tunisia Against *Tribolium confusum* du Val

Afifa Zardi-Bergaoui, Saoussen Hammami, Monia Ben Halima-Kamel, Lamia Sakka-Rouis, Olfa Boussaada, Dalila Haouas and Zine Mighri

The effects of *Anacyclus cyrtolepidioïdes* flowerheads (Compositae family) on *Tribolium confusum* du Val (Coleoptera: Tenebrionidae) adults and larvae were determined. Insecticidal activity of the flowers essential oil, four crude extracts as well as twenty one fractions deriving from solid-liquid chromatographic separation was assessed using direct contact application method. The ethylacetate crude extract and eight fractions (A₃, A₄, P₈, P₁₆, F₂, F₃, F₅ and F₇) showed a significant inhibitory effect of the test material on *Tribolium confusum* du Val growth. One hundred percent mortality of the adults was achieved twelve days after treatment using fractions A₄, P₈ and F₇, respectively. This preliminary study suggested that *A. cyrtolepidioïdes* may be considered as a potential source of insecticidal compounds. (*Journal of Entomology* 5 (4): 277-283, 2008; doi: 10.3923/je.2008.277.283)

Evaluation Population Density of *Tetranychus urticae* Koch on Cotton Fields Planted Nearby Dirt and Asphalt Roads

N. Demirel and F. Çabuk

The two spotted spider mite (TSSM), *Tetranychus urticae* Koch (Acari: Tetranychidae), is one of the most important pests on the cotton crop in Hatay region of Turkey. A two-year study was conducted between 2006 and 2007 to evaluate the population density of TSSM on cotton fields planted by dirt and asphalt roads. In 2006, the cotton plants nearby dirt roads had 1.72, 1.75, 4.04 and 2.65 times higher TSSM population than the cotton plants nearby asphalt roads in the four sampling dates, respectively. In 2007, the cotton plants nearby dirt roads had 5.54 and 10.64 times higher TSSM population than cotton plants nearby asphalt roads in two sampling dates, respectively. Consequently, the population densities of the TSSM were 1.79 and 13.86 times higher on the cotton plants nearby dirt roads than cotton plants nearby asphalt roads in 2006 and 2007, respectively. It is thought, the dusty conditions may bring about increasing

population of TSSM on cotton plants. (*Journal of Entomology* 5 (4): 284-289, 2008; doi: 10.3923/je.2008.284.289)

Evaluation of the Different Control Methods for the Two-Spotted Spider Mites by Computer Software and Percentage Efficacy

Saied Alzoubi and Sultan Çobanoğlu

The trials were carried out, under greenhouse conditions in Ankara-Turkey to control the two spotted spider mite (TSSM) *Tetranychus urticae* Koch as part of a mite management program in 2007 season, on cucumber (*Cucumis sativus* L.). Three different control methods namely, chemical (by using hexythiazox, bifenthrin and dimethoate), biological (by releasing *Phytoseiulus persimilis* and *Amblyseius californicus*) and combination between chemical and biological control were applied and evaluated by two different methods. One of them, depended on measuring the feeding damage rate of TSSM by computer software (Compu Eye, leaf and Symptom Area). The other one is common in used and rely on calculation the percentage efficacy by mathematical formula (Henderson and Tilton formula). The ANOVA analysis of results of the tested evaluation methods could separate the mean of values of percentage efficacy and feeding damage rate and relatively assemble into counterpart groups and gave same decision in evaluation the effectiveness of the control methods. The results indicated that hexythiazox and dimethoate could not repress the TSSM population, which gave significant damage rate in its treatments and the efficacy of mention pesticides not provided well controlling, which was low to TSSM when compared with bifenthrin, predators and combination of chemical and predators. While, bifenthrin and hexythiazox combined with predators or bifenthrin alone could repress well the TSSM population so that, the damage rate was low, which its percentage efficacy was high. Feeding damage rate, which was assessed by computer software may be satisfactory recommend to evaluate the effectiveness of control methods against spider mites under IPM programs. (*Journal of Entomology* 5 (4): 290-294, 2008; doi: 10.3923/je.2008.290.294)

Toxicity and Oviposition Deterrence of *Piper guineense* (Piperaceae) and *Monodora myristica* (Annonaceae) Against *Sitophilus zeamais* (Motsch.) on Stored Maize

Donald A. Ukeh, Gabriel A. Arong and Emmanuel I. Ogban

Plant powders from the seeds of *Piper guineense* and *Monodora myristica* were separately applied at different dosages of 1, 5 and 10% (w/w) on stored maize grains and tested against the maize weevil, *Sitophilus zeamais* in the laboratory for 12 weeks. Parameters assessed were adult mortality at 24, 48 and 72 h, adult emergence and adult weight. The results showed that 5 and 10% powders of both plants were significantly more toxic to *S. zeamais* and suppressed F₁ progeny emergence compared to 1% powders and the controls. However, the mean weight of the emerged adults was not significantly influenced by any of the treatments. The efficacy of the powders on the weevils was dose-dependent with higher doses providing greater protection of the maize grains. This research provides the scientific basis for the potential use of *P. guineense* and *M. myristica* powders in stored-product protection at the small-scale farmer level to reduce the application of toxic synthetic insecticides. (*Journal of Entomology* 5 (4): 295-299, 2008; doi: 10.3923/je.2008.295.299)

Population Fluctuations of *Tingis sideritis* Štusák (Heteroptera, Tingidae) on Wild Mountain Tea *Sideritis scardica* Griseb. (Lamiaceae) of Mount Vermion in Greece

N.P. Deligeorgidis, C.G. Ipsilandis, G. Sidiropoulos, V. Greveniotis,
L. Giakalis and P.N. Deligeorgidis

The aim of this study was to record the population and the fluctuations of *Tingis sideritis* Štusák, on a wild population of *Sideritis scardica* Griseb. of mount Vermion, Greece. This is the first reference for the presence of *T. sideritis* in Greece, a new enemy of *S. scardica*. In year 2005, recordings of *T. sideritis* population started at 15 of May and lasted until 4 of July. These recordings were repeated every 10 days (6 periods in total) on 50 wild tea plants selected in random. Two branches of each wild tea plant were studied. In year 2006, recordings of *T. sideritis* population started at 12 of May and lasted until 1 of July (with the same procedure as in 2005). In the laboratory, the insects of each branch were measured under a stereoscope and total replications were 100 (50 plants X2 branches). Period of recordings x year interaction found statistically significant at $p < 0.001$. In general, year 2006 showed lower total number of adult insects in comparison to year 2005, may be due to the presence of natural enemies of *T. sideritis*, but most important is the different population fluctuations between the two years and it seems to be a common biological phenomenon in insects. If we take in consideration that a *Sideritis* plant may possess about 9-10 branches, then we can find about 100 adult insects/plant. (*Journal of Entomology* 5 (4): 300-304, 2008; doi: 10.3923/je.2008.300.304)

Enhancing the Humoral and Melanization Responses of *Aedes aegypti* Mosquito: A Step Towards the Utilization of Immune System Against Dengue Fever

A.M. Ahmed, E.M. Al-Olayan and M.A. Amoudy

Great efforts are currently being done to utilize the immune system of mosquito vectors in the battle against the different mosquito-borne parasitic and viral diseases. Based on this control strategy, the current study has been conducted to induce and enhance the most effective immune responses, the humoral and melanization responses, in the dengue fever vector, *Aedes aegypti* against live bacteria and non-biological agents at 24 h post-treatments. The humoral activity against *Bacillus subtilis* and *Escherichia coli* was investigated after thoracic injection of the same bacteria or the lipopolysaccharide (LPS) into mosquitoes using the inhibition zone assay. Melanization response was tested against the thoracic inoculated Sephadex® beads, positively charged CM A-25, negatively charged CM G-25 and neutral CM C-25 and inert glass beads. These immune responses were then enhanced via the oral administration of 0.3% thymoquinone (Thq), the main active ingredient of the black seeds, *Nigella sativa*, to mosquitoes. Data demonstrated that, on one hand mosquitoes exhibited strong humoral activity against the injected bacteria as well as against the well-known immune sensitive bacteria, *Micrococcus luteus*. Moreover, melanization response was strong against differently charged Sephadex® beads, but not against the inert glass beads. On the other hand, significant increases in the humoral anti-bacterial lyses activity and anti-beads melanization response (up to 6 folds in some cases) was clearly shown when mosquitoes were maintained on 0.3% Thq-glucose mixture (in 10% glucose). Therefore, these data may indicate that both humoral antimicrobial activity and melanization response could be enhanced to be more effective against disease-organisms transmitted by mosquitoes. Thus, this study suggests a possible immuno-control strategy in the battle against mosquito-born diseases which, in fact, will be tested against dengue viruses in the future studies. (*Journal of Entomology* 5 (5): 305-321, 2008; doi: 10.3923/je.2008.305.321)

Integrated Control of Pod Borer, *Helicoverpa armigera* (Hub.) (Lepidoptera, Noctuidae), Releasing *Chrysoperla lucasina* (Neuroptera, Chrysopidae) and Treatment of Insecticides

Alinaghi Mirmoayedi and Mehdi Maniee

Chickpea was planted in a complete randomized block design (CRBD) in an experimental field of Agricultural Faculty of Razi University, in Kermanshah, Iran,

for a two years period. Bivenich, a local Desi type variety mostly sown, by the farmers in the Kermanshah province in west Iran was used. Six treatments applied, release of green lacewing *Chrysoperla lucasina* larvae, 4 different insecticide treatments and control. The statistical softwares of SAS and MSTAT-C were used for analysis of data and comparison between means, respectively. The green lacewing 2nd instar larvae were released, one month after insecticide sprayings. The perforation of the seed coat and the weight of attacked seeds by chickpea pod borers, have been chosen as signs and impact of damage caused by the pest and inefficiency of insecticide treatments used, in both years of experiment, 2005 and 2007. (*Journal of Entomology* 5 (5): 322-327, 2008; doi: 10.3923/je.2008.322.327)

Temporal Occurrence of *Spodoptera exigua* (Lepidoptera: Noctuidae) in Cameron Highlands, Pahang

A.A. Azidah

Adult of *Spodoptera exigua* populations were monitored in Cameron Highlands using pheromone traps between 24 January 2003 and 27 February 2004 in the vegetables farm and between 24 March 2003 and 27 February 2004 in the carnation farm at Kampong Raja. They were captured all the time in the studied areas, although the numbers fluctuated. The highest number of adult catches per trap per day was 5.75 individuals between 6 to 13 June 2003, followed by 5.14 individuals between 23 to 30 May 2003 at the vegetables farm. The lowest number of adult catches per trap per day was 0.25 individuals between 3 to 10 October 2003. Whereas, at the carnation farm, the highest number of adult catches per trap per day was 1.22 individuals between 25 July to 8 August 2003. The lowest number of adult catches per trap per day was 0.06 individuals between 31 October to 7 November 2003 and 30 January to 6 February 2004. In general, capture increased towards the middle part of the year with four capture peaks occurring between April and June 2003 at the vegetables farm. Whilst, at the carnation farm, there were several capture peaks occurred between April and October 2003. Thus, this date could be used as a benchmark to determine when and if population levels are high enough to have the potential to cause economic damage to crops in Cameron Highlands, Pahang. (*Journal of Entomology* 5 (5): 328-322, 2008; doi: 10.3923/je.2008.328.333)

Pictorial Keys of Chironomid Species (Order: Diptera) in El-Tall El-Keber Wastewater Treatment Plant, Egypt

R. Saleh-Ahmed, F.M. Ismail, A. Abo-Ghalia and N.S. El-Shenawy

In the present study, pictorial keys are given for the identification of larvae, pupae and adults of chironomid species collected from El-Tall El-Keber wastewater treatment plant, Egypt. Two genera: *Chironomus* Meigen and *Kiefferulus* Goetghebuer and six species: *C. calipterus* Kieffer, *C. formosipennis* Kieffer, *C. cafferarius* Kieffer, *C. imicola* Kieffer, *C. seydeli* Goetghebuer and *K. brevibucca* (Kieffer) are recorded from this region for the first time. Outline drawings of the representatives of each genus were presented. (*Journal of Entomology* 5 (6): 334-355, 2008; doi: 10.3923/je.2008.334.355)

Role of Host Plants on the Biological Aspects and Parasitism Levels of *Eretmocerus mundus* Mercet (Hymenoptera: Aphelinidae), a Parasitoid of *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae)

Nagdy F. Abdel-Baky and M.A. Al-Deghairi

Impact of the host plant type on certain biological aspects and parasitism level of *E. mundus* under laboratory and semi-field conditions was evaluated. The parasitoid biological aspects were greatly differed within the host type. Parasitoid life cycle was shorter on squash, followed by common beans and sweet pepper, which lasted 27.6 ± 1.9 , 25.9 ± 1.3 and 23.7 ± 1.1 days, respectively. In contrary, female longevity was shorter on the sweet pepper (9.9 ± 1.6 days), followed by the common bean (10.8 ± 1.1 days) and was longer on squash (11.7 ± 1.3 days). Additionally, *E. mundus* life span and female fecundity were also studied and varied among the studied hosts. Effect of host plants on both colonization of pest nymphs and parasitism percentages, were also evaluated. Greater numbers of young and old nymphs and higher parasitism rates were observed on squash followed by common beans, whereas, sweet pepper was last in this respect. Subsequently, the reproduction and biological characteristics of *E. mundus* have been shown obviously to be influenced by host plant. Efficiency of releasing parasitoids was greatly affected by host plant type as well as releasing rates. Releasing the parasitoid with constant numbers against various population densities of the pest achieved different pest control levels. Releasing rates of 1:5 and 1:10 (parasitoid:pest) gave good control measures, whereas, moderated control levels were fulfilled with ratios 1:20 and 1:30. Increasing pest densities negatively

correlated with good control measures. (*Journal of Entomology* 5 (6): 356-368, 2008; doi: 10.3923/je.2008.356.368)

Spatio-Temporal Trends of Insect Communities in Southern Brazil

R. Riedel, R.C. Marinoni and N. Martins-Opolis

In this study, insect seasonality using Malaise traps at eight stations was investigated from abundance collections taken between August 1986 and July 1988 in four climatic regions and one transitional region of Paraná State, Southern Brazil. Temperature and humidity were also measured to represent environmental conditions at the eight stations. One station was located in the coastal region, one in the coastal mountain range, one in the first and third plateaus and three stations were located in the second plateau. All insects were counted and identified to order. Randomization-based techniques were used to assess insect abundance variation by season for the nine most abundant taxa. An Analysis of Similarity (ANOSIM) using stations and seasons as factors and a non-metric multidimensional scaling (NMDS) to assess the 2-D projection of station along axes of abundance were used to assess insect community dissimilarities. A Mantels test assessed correlations between the abundance similarity matrix and the matrix for the environmental factors. Of the most common orders, the most abundant was Diptera, followed by Hymenoptera, Lepidoptera, Collembola, Homoptera, Coleoptera, Psocoptera, Orthoptera and Hemiptera. Insect orders were generally most abundant during the spring and summer, but least abundant during the winter. Following ANOSIM analysis, station location and season best explained variations in abundance. The NMDS analysis found that the coastal station differed most from all the other stations. Humidity was positively correlated with insect abundance. (*Journal of Entomology* 5 (6): 369-380, 2008; doi: 10.3923/je.2008.369.380)

Monitoring and Control of *Quadraspidiotus perniciosus* (Comstock) Hemiptera: Diaspididae on Apple Trees in the Prefecture of Florina, Greece

P.N. Deligeorgidis, N.P. Deligeorgidis, S. Kayoglou, G. Sidiropoulos, M. Vaiopoulou, D.G. Stavridis, V. Greveniotis and C.G. Ipsilandis

The aim of this study was monitoring and control of *Quadraspidiotus perniciosus* on apple trees, in the prefecture of Florina, Greece. Half of the experimental area

was used as a check field (no application) and in the rest a chemical insecticide was used. Sticky and pheromone traps of the same type were used for monitoring *Q. perniciosus* in both fields. Samples were taken every 10 days and pheromone application was renewed every month until 17 of October for year 2004 and 22 of October for year 2005. Sticky traps were used for monitoring insects of immature stages. For controlling *Q. perniciosus* two applications were made using insecticide chlorpyrifos (Dursban) in the application field, at 19 of June and 19 of July for year 2004 and 14 of June and 14 of July for year 2005. Results showed that, populations of adult insects and of immature stages of *Q. perniciosus* were considerably increased in the check field during the two years of this study. In the application field insect populations were considerably decreased due to the effectiveness of the insecticide used applied. Year conditions influenced statistically significantly population fluctuations of insects (in adult and immature stages). There was not found any relation between trapped male population and larvae population and this was considered the most important finding for monitoring purposes. (*Journal of Entomology* 5 (6): 381-388, 2008; doi: 10.3923/je.2008.381.388)

Attraction of Various Sticky Color Traps to *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) and *Empoasca decipiens* Paoli (Homoptera: Cicadellidae) in Cotton

N. Demirel and A.E. Yildirim

The onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae), leafhoppers, *Empoasca decipiens* Paoli (Homoptera: Cicadellidae) are significant common pests on cotton crops in Turkey. A two-year study was conducted to evaluate the relative attraction of thrips and leafhopper species to various color traps in the cotton growing areas of Hatay province. In 2006, two trials consisting of yellow, orange, blue, red, white and green color traps were conducted in Kırıkhan district. In 2007, the first trial containing blue, orange, red and yellow color traps was conducted in Kırıkhan district. The second trial including blue, white, yellow and green color traps was conducted in Reyhanlı district. The yellow sticky color traps were significantly attractive for thrips species in 2006, but not in 2007. In 2007, the blue sticky color traps were significantly attractive for species in both trials. On the other hand, in the second trial in 2007, the white sticky color traps were significantly attractive for thrips species. The green and red color traps were not attractive for thrips species. The yellow sticky color traps were significantly attractive for leafhoppers species in 2006-2007. The orange sticky color traps were the second attractive for leafhoppers species in 2006 and 2007. The green sticky color traps at the last trial were significantly attractive for leafhoppers

species in 2007, while they were not attractive previous three trials. The white, blue and red sticky color traps were not attractive for them in both years. In conclusion, the yellow, blue and white sticky color traps for thrips species and the yellow and orange sticky color traps for leafhoppers species are strongly suggested for monitoring their population densities in cotton crops. (*Journal of Entomology* 5 (6): 389-394, 2008; **doi**: 10.3923/je.2008.389.394)