



2nd Global Conference on Entomology (GCE-2)

November 8 -12, 2013 Kuching, Malaysia

Scientific Programme

VENUE: FOUR POINTS BY SHERATON KUCHING

November 8, 2013 **Registration Lobby** 15.00-18.00 hrs

November 9, 2013 **Registration Lobby** 08.00-09.00 hrs

November 9, 2013

RAINFOREST BALL ROOM

OFFICIAL OPENING OF THE CONFERENCE:

09.00 - 10.30

REFRESHMENT

10.30 -11.00

KEYNOTE ADDRESS : "Insect Science and technology in the service of humanity
in 21st Century"

Dr. G.T. Gujar, Head, Division of Entomology, Indian Agricultural Research Institute,
New Delhi 110012 (India)

11:00-11:30

PLENARY LECTURE I 0085 **Insect Natural Enemies as Bioindicators in Rice Paddies**

Dr. Takatoshi UENO, Associate Professor *Institute of Biological Control, Faculty of Agriculture, Kyushu University, Fukuoka, Japan*

11:30-12.00

PLENARY LECTURE II **Democratising Taxonomy for Human Well-being**

Dr. Priyadarsanan Dharma Rajan 0312 Ashoka Trust for Research in Ecology and the Environment
(ATREE), Bangalore - 560 064, India

12:00-12:30

LUNCH BREAK

12.30 – 13.30

November 9, 2013

CONCURRENT SESSIONS

Chairman: Dr. John Wise (USA)

Rainforest Ball Room

Technical Session I : Insect Taxonomy and systematics including geography

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| 13:30-13:45 | OS 1 | 0320. Experience in the analysis of perennial records of carabid beetles (<i>Coleoptera, carabidae</i>) in the Barguzin mountain ridge (North Pribaikalye) Ananina T.L., Russia |
| 13:45-14:00 | OS 2 | 0075 New Records of Two Species of <i>Cleora</i> Curtis (Lepidoptera: Geometridae) from Mt. Makiling, Luzon, with a Full Checklist of Species Known from the Philippines Aimee Lynn Dupo, Philippines |
| 14:00 14:15 | OS 3 | 0048 Systematic study on the various tribes of Tettigoniinae (tettigoniodea: Orthoptera) of Pakistan Riffat Sultana, Pakistan |
| 14:15-14:30 | OS 4 | 0059 Sand Flies of the Subgenus <i>Adlerius</i> (Diptera: Psychodidae) in an Endemic Focus of Visceral Leishmaniasis and Introduction of <i>Phlebotomus (Adlerius) comatus</i> as a New Record for Iran Alireza Zahraei-Ramazani, Iran |
| 14:30-14:45 | OS 5 | 0025 An account of whiteflies breeding on medicinal plants in South India T.G.Revathi Ganesan, India |
| 14:45-15:00 | OS 6 | 0319. Some studies on the taxonomic status of the genus <i>Aiolopus</i> Fieber (Acrididae : Acridoidea: Orthoptera) from Pakistan . Barkat Ali Bughio, Pakistan |
| 15:00-15:15 | OS 7 | 0118 Taxonomy of <i>Diachasmimorpha</i> Viereck (Braconidae: Opiinae) from Malaysia, with description of a new species <i>Diachasmimorpha albicans</i> , sp. n. and some information on their host preferences and DNA Barcode data. Salmah Yaakop, Malaysia |
| 15:15-15:30 | OS 8 | 0131 A faunistic survey on twirler moths of family Gelechiidae (Lepidoptera) from Jammu and Kashmir (India) Prakash Chand Pathania, India |
| 15:30-15:45 | OS 9 | 0180 Three New Records of Subfamily Ichneumoninae (Hymenoptera: Ichneumonidae) from Malaysia Norhafiza Ahmad Fazili, Malaysia |

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| 15:45-16:00 | OS 10 | 0191 A review of the taxonomy and diversity of Platygastriid parasitoids (Hymenoptera) attacking Hemiptera in India Rajmohana Keloth, <i>India</i> |
| 16:00-16:15 | OS 11 | 0200 Two new species of genus <i>Blacus</i> Nees (Hymenoptera: Braconidae: Blacinae), from India Mohammad Shamim, <i>India</i> |
| 16:15-16:30 | Tea /Coffee Break | |
| 16:30-16:45 | OS 12 | 0228 Taxonomy of Tree Termite <i>Nasutitermes matangensis</i> Haviland (Isoptera: Termitidae) Based on Morphological Characters and Enteric Valve Armature in Sebesi Island Eko Kuswanto, <i>Indonesia</i> |
| 16:45-17:00 | OS 13 | 0229 Taxonomy, Distribution, and Notes on Termites (Isoptera: Kalotermitidae, Rhinotermitidae, Termitidae) from Urban Environment of Bandung City Eko Kuswanto, <i>Indonesia</i> |
| 17:00-17:15 | OS 14 | 0231 Taxonomy and biodiversity of lantern flies (Hemiptera Fulgoridae) in Vietnam Hong Thai Pham, <i>Vietnam</i> |
| 17:15-17:30 | OS 15 | 0233 Taxonomy of Philippine stingless bees of the genus <i>Tetragonula mourei</i> (Hymenoptera: Apidae: Meliponini) Amelia Nicolas, <i>Philippines</i> |
| 17:30-17:45 | OS 16 | 0251 Taxonomic study of <i>Nadrana balyi</i> , 1865 (Coleoptera: Chrysomelidae: Galerucinae) from Sundaland Izfa Riza Hazmi, <i>Malaysia</i> |
| 17:45-18:00 | OS 17 | 0293 Taxonomic and Faunal study on the cicadas (Hemiptera: Cicadidae) from northern Vietnam Hong Thai PHAM, <i>Viet Nam</i> |

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Technical Session II Forest entomology

Chairman: Dr Aimee Lynn Dupo (*The Philippines*)
Conference Hall – 1

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| 13:30-13:45 | OS 18 | 0080 Foraging activity and damage of subterranean termites to forest trees in Bhadrachalam deciduous forest region of Khammam, Andhra Pradesh, India Chintha Sammaiah, <i>India</i> |
| 13:45-14:00 | OS 19 | 0265 Fauna of Termites in maidan, semi-malnad and Western Ghat segment of Shimoga District, Karnataka, India Kalleshwaraswamy C.M., <i>India</i> |
| 14:00-14:15 | OS 20 | 0323. Poor Acoustic Perception of Gleaning Bats Yields Alternative Modalities of Prey Response in Terrestrial Crickets (<i>Teleogryllus</i> spp.) Kibedi, J. Australia |
| 14:15-14:30 | OS 21 | 0056 Integrated management methods for the Eucalyptus Gall wasp problem in forest nurseries. John Prasanth, <i>India</i> |
| 14:30-14:45 | OS 22 | 0084 Diversity of webspinners (Insecta: Embioptera) at different habitat characteristic types in the lower northern Thailand Pisit Poolprasert, <i>Thailand</i> |
| 14:45-15:00 | OS 23 | 0129 Assessment of nesting habitat of stingless bees (Apidae: meliponini) in selected forest reserves of Oyo State, Nigeria. Bridget Bobadoy, <i>Nigeria</i> |
| 15:00-15:15 | OS 24 | 0074 Arthropod Community Structure During the Early Stages of Leaf Litter Decomposition Aimee Lynn Dupo, <i>The Philippines</i> |

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| 15:15-15:30 | OS 25 | 0143 Bialowieza Primeval Forest as a refuge of mycophagous thrips species (Thysanoptera: Phlaeothripidae) Halina Kucharczyk (Poland) |
| 15:30-15:45 | OS 26 | 0185 Forest Health Measurement through Biodiversity Index of Insect Distribution Achmad Solikhin, <i>Indonesia</i> |
| 15:45-16:00 | OS 27 | 0212 Natural Enemies of Invasive Gall Wasp, <i>Quadrastichus erythrinae</i> Kim Ramanagouda Hadlageri , <i>India</i> |
| 16:00-16:15 | OS 28 | 0283 'Aquatic insects in water-filled tree holes, from a Sub-tropical Rain forest, India' Anoop Das , <i>India</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 29 | 0326. Diversity pattern of Syrphidae family (Diptera) in different habitats in the eastern part of Zanzibar province, Iran Masumeh Naderloo, Iran |
| 16:45-17:00 | OS 30 | 0307 Unusual but astonishing observations on the attempts of mating between <i>Aeolesthes holosericea</i> Fab and <i>Neoplocaederus obesus</i> Gahn (Coleoptera: Cerambycidae) Sunil Gaikwad, <i>India</i> |
| 17:00-17:15 | OS 31 | 0318. Soil microarthropods as ecosystem health indicators of oil pollution in a secondary rainforest, Rivers State, Nigeria Gbarakoro T. N. Nigeria |

November 09, 2013

Technical Session III : Useful and beneficial insects-sericulture, apiculture, resin culture

Conference Hall – 2

Chairperson: Prof. Madya Dr. Margaret Chan (Sarawak)

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|-------------|--------------|---|
| 13:30-13:45 | OS 32 | 0083 <i>Cricula trifenestrata</i> : A potential Indian Vanya silk source for upliftment of socio-economic condition of the cashew farmers and rural population of India Gavas Ragesh, <i>India</i> |
| 13:45-14:00 | OS 33 | 0204 Economic potential of <i>Anaphe panda</i> (boisduval) (Lepidoptera: Thaumetopoeidae) wild silk moth in Kenya Everlyn Nguku , Kenya |
| 14:00-14:15 | OS 34 | 0322. Brief study on the occurrence and habitat of dwarf honeybee, <i>Apis florea</i> collecting honey from sugarcane in Bangladesh Khandker Nesar Ahmed, Bangladesh |
| 14:15-14:30 | OS 35 | 0338. Conservation Agriculture: An Option to Enhance Pollinators and Sustainability Neelam Chaudhary, India |
| 14:30-14:45 | OS 36 | 0314. Morphometric diversity of indigenous honeybee, <i>Apis dorsata</i> in district Nankana and Sialkot of Punjab, Pakistan Iram Nasi, Pakistan |
| 14:45-15:00 | OS 37 | 0329. Butterfly abundance and species diversity in some urban habitats Ashok Kumar, India |
| 15:00-15:15 | OS 38 | 0337. Interdisciplinary Approach for the Conservation and Sustainable Utilization of Tropical Tasar Silkworm <i>Antheraea mylitta</i> Drury R.Manohar Reddy, India |

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| 15:15-15:30 | OS 39 | 0060 Genetic Diversity Based on Morphometric Analysis of Honey Bee Population of Khairpur in a Global Context Naheed Rajper, <i>Pakistan</i> |
| 15:30-15:45 | OS 40 | 0336. Foraging ecology of large carpenter bees, <i>Xylocopa latipes</i> and <i>Xylocopa pubescens</i> (Xylocopidae) A.J. Solomon Raju, India |
| 15:45-16:00 | OS 41 | 0340 Apicultural Resources in Wynad region of Kerala State, India Roopa P, India |

November 09, 2013

Technical Session IV : Insects as bioresources-food, nutraceuticals, medicine and environmental health markers

Conference Hall – 2

Chairperson: Prof. Madya Dr. Margaret Chan (Sarawak)

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|-------------|--------------|---|
| 16:00-16:15 | OS 42 | 0020 Insecticidal activities aqueous extracts from twelve Iranian medicinal plants against Turnip moth, <i>Agrotis segetum</i> Schiff. (Lepidoptera:Noctuidae) in Iran. Karim , <i>Iran</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 43 | 0195 Insects as highly effective producers of renewable animal organics Shukhrat Madyarov, <i>Uzbekistan</i> |
| 16:45-17:00 | OS 44 | 0315. Evaluation of intercropping and organic soil ammendments against okra flea beetles, <i>Podagrica</i> spp Oladele Onunkun, Nigeria |
| 17:00-17:15 | OS 45 | 0334. Wild Fungus collection and its social implications in Nepal Krishna Kaphle , Nepal |
| 17:15-17:30 | OS 46 | 0297 Isolation of antimicrobial compounds from the whole body extract of <i>Zophobas morio</i> Fabricius larvae Johan Ariff Mohtar, <i>Malaysia</i> |
| 17:30-17:45 | OS 47 | 0165 A mega-diverse water beetle genus (Coleoptera: Hydraenidae: Hydraena) commonly overlooked in Southeast Asia and its potential use for environmental biomonitoring Hendrik Freitag, <i>The Philippines</i> |

November 09, 2013

Technical Session V : Acarology

Conference Hall – 2

Chairperson: Prof. Madya Dr. Margaret Chan (Sarawak)

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| 17:45-18:00 | OS 48 | 0163 New record of mesostigmatid mites associated with stingless bee, <i>Trigona irridipennis</i> (smith) (Apidae: Hymenoptera) colonies from Tamil Nadu, India Radhakrishnan, <i>India</i> |
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| 18:00-18:15 | OS 49 | 0182 Role of predatory mite, <i>Neoseiulus longispinosus</i> for the management of two spotted spider mite along with other bio-pesticides on Capsicum crop under polyhouse conditions Usha Chauhan, <i>India</i> |
| 18:15-18:30 | OS 50 | 0217 Cold storage of predatory mites <i>Neoseiulus californicus</i> is improved by pre-storage feeding on diapausing spider mites <i>Tetranychus urticae</i> Noureldin Abuefadel Ghazy, <i>Japan</i> |
| 18:30-18:45 | OS 51 | 0330. Field Application of Oberon® and Envirdor® on Sugarcane Yellow Mite, <i>Oligonychus sacchari</i> (Prostigmata: Tetranychidae) and Its Predator <i>Stethorus punctillum</i> Amin Nikpay, <i>Iran</i> |
| 18:45-19:00 | OS 52 | 0327. Plant Feeding Mites of Economic Plants of India R. N. Singh, <i>India</i> |

November 9, 2013

Technical Session VI: Insect behaviour and physiology

Conference Hall – 3

Chairman: R. N. Singh (India)

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| 13:30-13:45 | OS 53 | 0012 Effect Of Morpho-Physio Chemical Plant Factors On Preference Of <i>Lasioderma Serricornis</i> (F.) (Coleoptera: Anobiidae) On Four Types Of Tobacco Muhammad Saeed, <i>Pakistan</i> |
| 13:45-14:00 | OS 54 | 0036 Life Fecundity Tables of Tobacco Leaf Eating Caterpillar, <i>Spodoptera litura</i> Fabricius (Noctuidae: Lepidoptera) on Bidi Tobacco, <i>Nicotiana glauca</i> Linnaeus Patil R.A., <i>India</i> |
| 14:00-14:15 | OS 55 | 0045 Effect of starvation on digestive enzyme of female <i>Holotrichia serrata</i> (Fab) (Coleoptera: Scarabaeidae) Sanjay Kharat, <i>India</i> |
| 14:15-14:30 | OS 56 | 0103 Functional and numerical response of <i>Ooencyrtus telenomicida</i> (Hym.: Encyrtidae) against sunn pest <i>Eurygaster integriceps</i> (Hem.: Scutelleridae) eggs Shahzad Iranipour, <i>Iran</i> |
| 14:30-14:45 | OS 57 | 0124 A Comparative Study on Life Cycle of Red Palm Weevil, <i>Rhynchophorus ferrugineus</i> (Coleoptera: Curculionidae) on Coconut Cabbage and Sago Palm Wahizatul Afzan Azmi, <i>Malaysia</i> |
| 14:45-15:00 | OS 58 | 0142 Hierarchy-dependent non-consumptive effects in ants. Hellena Binz, <i>Germany</i> |
| 15:00-15:15 | OS 59 | 0313. Use of Botanicals Against Termites in Pakistan: Field Perspectives Farkhanda Manzoor, <i>Pakistan</i> |
| 15:15-15:30 | OS 60 | 0147 Intraspecific competition and experience affect oviposition in a leaf beetle Jörg Stephan, <i>Sweden</i> |
| 15:30-15:45 | OS 61 | 0167 Differences of food plants selections and morphology of mouthparts, salivary gland and digestive tract of <i>Prisomera repudiosa</i> (Phasmatodea: Heteroneimiidae) and <i>Pylaemenes mitratus</i> (Phasmida: Bacillidae) Nurul Wahida Othman, <i>Malaysia</i> |
| 15:45-16:00 | OS 62 | 0170 Laboratory Evaluation of the Biochemical Parameters in the Haemolymph of the Lepidopteran Larvae Before and After Stinging by the Potter Wasp, <i>Eumenes conica</i> (Insecta: Hymenoptera) Susheela, <i>India</i> |
| 16:00-16:15 | OS 63 | 0171 Host selection and parasitism rate of <i>Aphidius colemani</i> , <i>Lysiphlebus testaceipes</i> and <i>Lysiphlebus fabarum</i> on sugar beet. Loulou Albittar, <i>Belgium</i> |

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| 16:15-16:30 | | TEA BREAK |
| 16:30-16:45 | OS 64 | 0237 Preferential landing and engorging sites of <i>Culicoides</i> species on a bait horse Ahmed Rashed , <i>Libya</i> |
| 16:45-17:00 | OS 65 | 0301 Effect of Maternal Photoperiod Experience on Diapause Incidence of <i>Cotesia plutellae</i> , Umsalama Ahmed, <i>China</i> |

November 9, 2013 : **WELCOME DINNER : 19:00 HRS**

November 10, 2013 **Rainforest Ball Room**

PLENARY LECTURE III 0128 How to improve ecosystem services and biodiversity in agrosystems? The use of apparent competition for cereal aphid control.

Dr. Thierry Hance, *Earth and Life Institute, UCL, Louvain-la-Neuve, Belgium* 09:00-09:30

PLENARY LECTURE IV 0164 The assessment of macroecological and macroevolutionary patterns in butterfly-hostplant associations at a global scale

José R. Ferrer-Paris *Instituto Venezolano de Investigaciones Científicas, Maracaibo, estado Zulia, Venezuela.* 09:30-10:00

PLENARY LECTURE V 0106 Trunk Injection: A Discriminating Delivering System for Insect Control in Tree Fruit IPM

John Wise, *Michigan State University United States Minor Outlying Islands* 09:30-10:00

November 10, 2013

Technical Session VII: Insect pest management - I

Rainforest Ball Room

Chairman: Dr Hong Thai Pham (Vietnam)

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| 10:30-10:45 | | Tea / Coffee Break |
| 10:45-11:00 | OS 66 | 0002 Biodiversity of Insects Associated with Safflower (<i>Carthamus tinctorius</i>) Crop in Gachsaran, Iran Karim Saedi, Iran |
| 11:00-11:15 | OS 67 | 0013 Innovative corn-legume intercropping: a strategy to suppress insect pest occurrence Myleen Corpuz, <i>Australia</i> |
| 11:15-11:30 | OS 68 | 0014 Assessing the impact of carbofuran rates and okra varieties on the incidence of <i>Podagrica uniformis</i> , JAC. (Coleoptera: Chrysomelidae) Emmanuel O. Oga, <i>Nigeria</i> |
| 11:30-11:45 | OS 69 | 0017 A Diversity of Aphids and Ladybirds in Alfalfa Fields of Boyerahmad City, Iran Karim, <i>Iran</i> |
| 11:45-12:00 | OS 70 | 0022 Management of Angoumois grain moth, <i>Sitotroga cerealella</i> (Olivier) by using botanical plant materials in stored rice: a unique approach of integration in IPM. Sundar Tiwari, <i>Nepal</i> |
| 12:00-12:15 | OS 71 | 0031 Toxic Effect of Some Plant Extract on The Mortality of Flour Beetle <i>Tribolium confusum</i> (Duval)(Coleoptera: Tenebrionidae) Wand Ali, <i>Iraq</i> |

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| 12:15-12:30 | OS 72 | 0049 Reproductive synchronization and biocontrol potential of <i>dinarmus basalis</i> (rondani), a koinobiont parasitoid of bruchid pests D R Thakur, <i>India</i> |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTER OF ALL TECHNICAL SESSIONS) |
| 14:30-14:45 | OS 73 | 0115 Insect Pest of Neolamarckia cadamba Plantation in Sarawak, Malaysia Doreen Chai, <i>Malaysia</i> |
| 14:45-15:00 | OS 74 | 0093 Influence of JHa and Ecdysteroid on Reproduction in <i>Dysdercus similis</i> (Hemiptera : Pyrrhociridae) Versha Sharma, <i>India</i> |
| 15:00-15:15 | OS 75 | 0082 The effectiveness of various biocontrol agents in integrated control management Wan Fatma Zuharah , <i>Malaysia</i> |
| 15:15-15:30 | OS 76 | 0108 Evaluation of the survival rate, fecundity and life expectancy of <i>Tuta absoluta</i> (Mayrick) (Lep.: Gelechiidae) on two tomato cultivars under laboratory condition Gholamhossein Gharekhan, <i>Iran</i> |
| 15:30-15:45 | OS 77 | 0127 Sustainable management of spotted pod borer, <i>Maruca vitrata</i> (Geyer) in early pigeonpea S D Mohapatra, <i>India</i> |
| 15:45-16:00 | OS 78 | 0157 Response of cotton mealybug, <i>Phenacoccus solenopsis</i> Tinsley (Sternorrhyncha: Pseudococcidae) to biological, bio-chemical and chemical control tactics under semi-field and field conditions Muhammad Mamoon-ur Rashid, <i>Pakistan</i> |
| 16:00-16:15 | | COFFEE BREAK |
| 16:15-16:30 | OS 79 | 0169 Comparative Toxicity and Efficacy of Two Entomopathogenic Fungi against Cowpea Bruchid, <i>Callosobruchus maculatus</i> (F) (Insecta: Coleoptera) Radha Rajamma , <i>India</i> |
| 16:30-16:45 | OS 80 | 0174 Development of Compatibility of a bio-control agent , growth regulator and new generation insecticides in controlling brown plant hopper, <i>Nilaparvata lugens</i> (STAL) in Bangladesh Mahbuba Jahan' <i>Bangladesh</i> |
| 16:45-17:00 | OS 81 | 0178 Prospects of utilization of coconut shell oil for the protection of wood against termite attack in Indian conditions Shiny K S, <i>India</i> |
| 17:00-17:15 | OS 82 | 0189 Integrated management strategies for stalk borer <i>Chilo partellus</i> (Swin Hoe). A key pest of Maize, <i>Zea mays</i> L Ramasamy K, <i>India</i> |

November 10, 2013

Technical Session VIII: Biotechnological/Innovative Approaches in insect pest management

Conference Hall – 1

Chairman: Dr. Wand Ali (Iraq)

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| 10:45-11:00 | OS 84 | 0028 The first record of Bethyridae wasps in Iran Elahe Sadegh, <i>Iran</i> |
| 11:00-11:15 | OS 85 | 0030 Synthesis, Characterization and Evaluation of Polymeric Nanoformulation for Pest Management Sandeep Kumar, <i>India</i> |
| 11:15-11:30 | OS 86 | 0055 Isolation of plant-derived insecticides from leaves of Lantana camara for control of stored grain insect pests Yallappa Rajashekar, <i>India</i> |
| 11:30-11:45 | OS 87 | 0057 Parasitoids of synanthropic flies: advanced identification methods using an integrated approach Mircea-Dan Mitroiu, <i>Romania</i> |
| 11:45-12:00 | OS 88 | 0089 Functional characterization of Anopheles gambiae odorant receptors using a lepidopteran insect cell-based expression system Panagiota Tsitoura, <i>Greece</i> |
| 12:00-12:15 | OS 89 | 0114 The pest control role of NCPMS, National Crop Pest Management System, in the Republic of Korea Myung-Kyu Song, <i>Republic of Korea</i> |
| 12:15-12:30 | OS 90 | 0239 Effectiveness of the triple-layer hermetic bag in controlling <i>Prostephanus truncatus</i> (Horn) (Coleoptera: Bostrichidae) and <i>Sitophilus zeamais</i> (Mot) (Coleoptera: Curculionidae) on stored Maize. Jacob Paarechuga Anankware, <i>Ghana</i> |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTERS OF ALL SESSIONS) |
| 14:30-14:45 | OS 91 | 0328. Non Pesticidal management strategy for control of insects S.G.Deshpande, <i>India</i> |
| 14:45-15:00 | OS 92 | 0282 Integrated Pest Management of Cashew Stem and Root Borer, <i>Plocaederus ferrugineus</i> L. (Cerambycidae: Coleoptera) in India V.Ambethgar Vellaisamy, <i>India</i> |
| 15:00-15:15 | OS 93 | 0284 Performance of Bt cotton of different events under IPM umbrella Siddharudha.B. Patil, <i>India</i> |
| 15:15-15:30 | OS 94 | 0305 Development of <i>Gossypium Hirsutum</i> Cotton Transgenic events with Cry1Ac genes and comparison for efficacy Manjula Maralappanavar, <i>India</i> |
| 15:30-15:45 | OS 95 | 0092 Temperature-dependent development and parasitism of <i>Bracon hebetor</i> (Say) (Hymenoptera: Braconidae) under laboratory condition Muhammad Noor Ul Ane, <i>Pakistan</i> |
| 15:45-16:00 | OS 96 | 0079 Organic farming promotes the diversity of solitary non-Apis bees- A case study from south India Bijoy C, <i>India</i> |
| 16:00-16:15 | | Coffee Break |
| 16:15-16:30 | OS 97 | 0112 Comparison among different stage-frequency data analysis models for estimating number entering a stage Valeh Ebrahimi, <i>Iran</i> |

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| 16:30-16:45 | OS 98 | 0281 Distribution and impact of <i>Busseola fusca</i> (Fuller) (Lepidoptera: Noctuidae) and <i>Chilo partellus</i> (Swinhoe) (Lepidoptera: crambidae) on sorghum in northeastern Ethiopia Asmare Dejen Dmer, <i>Ethiopia</i> |
| 16:45-17:00 | OS 99 | 0183 Impact of abiotic factors on the population dynamics and biology of two spotted spider mite (<i>Tetranychus urticae</i> Koch) in eggplant Vinoth Kumar S, <i>India</i> |

November 10, 2013

Technical Session IX : Insect ecology-population dynamics, climate change

Conference Hall –2

Chairman: Prof. MyungKyu Song (Republic of Korea)

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| 10:45-11:00 | OS 100 | 0113 The genetic relatedness between the populations of the groundnut leaf miner collected from South Africa, Mozambique, India and Australia. Makhosi Buthelezi, South Africa |
| 11:00-11:15 | OS 101 | 0005 Population Dynamics of the Gypsy Moth, <i>Lymantria dispar</i> L. (Lepidoptera: Lymantriidae) in Yasuj, Iran. karim saeidi, <i>Iran</i> |
| 11:15-11:30 | OS 103 | 0011 Banana scarring beetle, <i>Nodostoma viridipenne</i> Motsch - a major problem of Eastern India Biswanath, <i>India</i> |
| 11:30-11:45 | OS 104 | 0021 'Visitation of macro-moths (Lepidoptera) to <i>Rubus fruticosus</i> agg flowers on hedgerows in intensive UK agricultural landscapes' Emma Coulthard, <i>UK</i> |
| 11:45-12:00 | OS 105 | 0042 Study of aquatic insects found in Manmade reservoir in Pathardi Tahasil, Babanrao Tilekar, <i>India</i> |
| 12:00-12:15 | OS 106 | 0310 Development of Grapevine Scale <i>Parthenolecanium persicae</i> (Fabricius) and Frosted Scale <i>Parthenolecanium prunosum</i> (Cocquillet) (Hemiptera: Coccidae) on Grapevines in vineyards in the Canberra Wine Region. <i>Canberra</i> ¹ <i>Australia</i> , Nelson A Simbiken, Australia |
| 12:15-12:30 | OS 107 | 0110 Butterfly Species (Lepidoptera: Rhopalocera) Inventory in Universitas Gadjah Mada Campus Area, Yogyakarta, Indonesia Fahmi ginanjar, <i>Indonesia</i> |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTERS OF ALL SESSIONS) |
| 14:30-14:45 | OS 108 | Poster |
| 14:45-15:00 | OS 109 | 0121 Spatio-temporal dynamics of <i>Chromaphis juglandicola</i> (Hem., Aphididae) in walnut orchards of northwest of Iran Shahzad Iranipour, <i>Iran</i> |
| 15:00-15:15 | OS 110 | 0149 A survey of roadside soil Arthropod communities from three elevations during summer in Mauritius Zaynab Jawaheer, Malaysia |
| 15:15-15:30 | OS 111 | 0154 Studies on the seasonal population dynamics of soil micro arthropods along the bank of river Benue in Adamawa state north-eastern Nigeria Hayward Mafuya, <i>Nigeria</i> |
| 15:30-15:45 | OS 112 | 0175 Temperature dependent bio-ecology of Cucurbit fruit fly, <i>Bactrocera cucurbitae</i> (Coquillett). Khandakar Shariful Islam, <i>Bangladesh</i> |

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| 15:45-16:00 | OS 113 | 0243 A preliminary checklist of pollen collected by stingless bees (Hymenoptera: Apidae: Heterotrigona Itama) in Taman Tropika Kenyir (TTK), Terengganu, Malaysia Roziyah Ghazi, <i>Malaysia</i> |
| 16:00-16:15 | OS 114 | 0246 Effect of plant leaves on Red Flour Beetle Md. Mizanur Rahman, <i>Bangladesh</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 115 | 0264 The dynamics of fig tree pollination in a highly seasonal environment Stephen G Compton, <i>South Africa</i> |
| 16:45-17:00 | OS 116 | 0104 Population dynamics of whitefly on green gram, <i>Vigna radiata</i> in Indo-Gangetic region of Uttar Pradesh, India Prem Shanker Singh, <i>India</i> |
| 17:00-17:15 | OS 117 | 0277 Population dynamics of tiger butterflies at Bishop Heber college, Tiruchirappalli, India Carlton Relton, <i>India</i> |
| 17:15-17:30 | OS 118 | 0279 Bishop Heber College, Tiruchirappalli –a migratory path of <i>Euploea core</i> Daisy Caroline Mary Arock, <i>India</i> |
| 17:30-17:45 | OS 119 | 0333. A short term study on insect fauna associated with cluster beans <i>Cyamopsis tetragonoloba</i> in an agro-ecosystem near Jhunjhunu, Rajasthan, India Sima, Dheeraj, <i>India</i> , |
| 17:45-18:00 | OS 120 | 0285 Sustaining the Population Density of Fireflies (Coleoptera: Lampyridae) in Mukah, Sarawak, Malaysia Het Kaliang, <i>Malaysia</i> |
| 18:00-18:15 | OS 121 | 0148 Ticks of Romania Andrei Mihalca, <i>Romania</i> |
| 18:15-18:30 | OS 122 | 0076. Climate change threats to cotton of Sindh-Pakistan Shahnawaz Khuhro, <i>Pakistan</i> |

November 11, 2013

Rainforest Ball Room

PLENARY LECTURE 0203 Harnessing natural silk fibre from cocoons of african wild silk moth, *Argema mimosae* boisduval (Lepidoptera: Saturniidae)

Boniface Ngoka ICIPE—African Insect Science for Food and Health, Nairobi, Kenya, Nairobi, Kenya

09:00-09:30

PLENARY LECTURE 0109 The Diversity of Dragonfly and Damselfly (Odonata) in Mangrove Ecosystem of Pasir Mendhit, Kulon Progo, Yogyakarta, Central Java, Indonesia

Fauziatul Fitriyah Universitas Gadjah Mada, Yogyakarta, Indonesia

09:30-10:00

PLENARY LECTURE 0197 Entomological and sociological investigations in an urbanized, high risk area for dengue transmission in Kurunegala district, Sri Lanka.

M.R.S.S. Bandara Regional Office, Anti-Malaria Campaign, Kurunegala, Sri Lanka

10:00-10:30

November 11, 2013**Technical Session X: Insect toxicology: insecticide efficacy and resistance****Chairman: Prof. Dr. Idris Abd. Ghani (Malaysia)****Rainforest Ball Room**

| | | |
|-------------|---------------|---|
| 10:30-10:45 | | COFFEE BREAK |
| 10:45-11:00 | OS 123 | 0010 The Effect of Bendiocarb Poison on Different Vectors of Visceral leishmaniasis in Meshkinshahr City, 2010 Eslam Moradiazl, <i>Iran</i> |
| 11:00-11:15 | OS 124 | 0019 Measurement of residual Diazinon in cucumber and tomato products in city Boyerahmad Saedi karim, <i>Iran</i> |
| 11:15-11:30 | OS 125 | 0029 Control of eight species of important stored products pest insects with environmentally compatible compounds Reza Sadeghi, <i>Iran</i> |
| 11:30-11:45 | OS 126 | 0032 The effect of essential oil of Indian clove, <i>Cynzygium aromaticum</i> on some physical and chemical properties of wheat Shahrazad Mohammadi, <i>Iran</i> |
| 11:45-12:00 | OS 127 | 0033 Biopesticidal effect of Yellow oleander, <i>Thevetia peruviana</i> (Pers) on the mortality of <i>Holotrichia serrata</i> (Fab) (Coleoptera: Scarabaeidae) Sagar Theurkar, <i>India</i> |
| 12:00-12:15 | OS 128 | 0034 Toxicity of <i>Datura innoxia</i> against the mortality of <i>Holotrichia serrata</i> (Fab.) Mahesh Ghadage, <i>India</i> |
| 12:15-12:30 | OS 129 | 0038 Chemical components of <i>Cynzygium aromaticum</i> essential oil and its fumigant toxicity on adults of <i>Tribolium confusum</i> (Col.: Tenebrionidae) Shahrazad Mohammadi, <i>Iran</i> |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTERS OF ALL SESSIONS) |
| 14:30-14:45 | OS 130 | 0051 Insecticide resistance monitoring in malaria vectors in Kilifi county, along the coastal Kenya Daniel Munywok, <i>Kenya</i> |
| 14:45-15:00 | OS 131 | 0065 efficiency of some natural and bioagant compounds in controlling the grape moth, <i>Lobesia botrana</i> Den and Schiff (Lep., Tortricidae), with reference to assessment of losses in grapes crop. Osman Ahmed Osman Zaghloul, <i>Egypt</i> |
| 15:00-15:15 | OS 132 | 0071 Effect of insecticide on testicular follicles of male <i>Holotrichia serrata</i> (Fab) Sakharam Patil, <i>India</i> |
| 15:15-15:30 | OS 133 | 0081 Effects of buprofezin and imidacloprid on the functional response of <i>Eretmocerus mundus</i> Mercet Fariba Sohrabi, <i>Iran</i> |
| 15:30-15:45 | OS 134 | 0087 The effect of a neonicotinoid insecticide, imidacloprid, on two sweetpotato whitefly parasitoids, <i>Encarsia inaron</i> (Walker) and <i>Eretmocerus mundus</i> Mercet Fariba Sohrabi, <i>Iran</i> |
| 15:45-16:00 | OS 135 | 0120 Insecticide Resistance in Diamondback Moth, <i>Plutella xylostella</i> (Linnaeus) in Different Locations of the Indian Punjab Kamaljeet Singh Suri, <i>India</i> |
| 16:00-16:15 | OS 136 | 0153 Detection of the kdr mutation in <i>Anopheles gambiae</i> in the Sahelian urban environment of Niger Rabiou Labbo, <i>Niger</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 137 | 0158 Impact of Insecticide Resistance Management Strategies in cotton ecosystems in North India Rishi Kumar, <i>India</i> |

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| 16:45-17:00 | OS 138 | 0188 Bioefficacy of certain newer insecticide molecules against stalk borer, <i>Chilo partellus</i> Swin. ON MAIZE, Zea mays L. Ramasamy K, <i>India</i> |
| 17:00-17:15 | OS 139 | 0207 The effects of juvenile hormone analogue pyriproxyfen on the egg production and ovary development of the Pharaoh ant, <i>Monomorium pharaonis</i> (Hymenoptera: Formicidae) Jia Wei Tay, <i>Malaysia</i> |
| 17:15-17:30 | OS 140 | 0218 Genetics of resistance to xenobiotics in insects Sonai Rajan Thangar, <i>India</i> |
| 17:30-17:45 | OS 141 | 0221 Effect of abiotic stress on cotton mealybug, <i>Phenacoccus solenopsis</i> Tinsley (Hemiptera: Pseudococcidae) and its parasitoid, <i>Aenasius bambawalei</i> Hayat (Hymenoptera: Encyrtidae) K Shankarganesh, <i>India</i> |
| 17:45-18:00 | OS 142 | 0240 Studies on mechanism of destruxin A against silkworm's hemocytes Jiqiao Fan, <i>China</i> |
| 18:00-18:15 | OS 143 | 0298 Green apple aphid <i>Aphis pomi</i> (De Geer) resistance to insecticides used in apple orchards in various regions of Poland. Michal Holdaj, <i>Poland</i> |
| 18:15-18:30 | OS 144 | 0308 The European red spider mite (<i>Panonychus ulmi</i> , Koch), resistance to METI acaricides analysed in selected Polish apple orchards. Damian Gorzka, <i>Poland</i> |

November 11, 2013

Technical Session XI: Insect Molecular Genetics, Molecular biology and biotechnology

Conference Hall – 1

Chairman: Dr. Natalia Li (Russia)

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|-------------|---------------|--|
| 10:45-11:00 | OS 145 | 0018 Study on Some Biological Characteristics of <i>Euxoa agricola</i> Boisduval, 1829 (Lepidoptera: Noctuidae) in the Laboratory Conditions Saeidi Karim, <i>Iran</i> |
| 11:00-11:15 | OS 146 | 0088 Characterization of a lef8 knock-out BmNPV bacmid: new data for old genes and possible biotechnological implications Konstantinos Ioannidis, <i>Greece</i> |
| 11:15-11:30 | OS 147 | 0130 Population Genetic Structure of <i>Aedes albopictus</i> in Penang, Malaysia Nur Zawani Mustafa Kamal, <i>Malaysia</i> |
| 11:30-11:45 | OS 148 | 0132 Preliminary Genetic Studies of <i>Rhynchophorus ferrugineus</i> (Coleoptera: Curculionidae) in Selected Areas of Terengganu, Malaysia Utilising the Mitochondrial Cytochrome Oxidase 1 (CO1) Marker Ju Lian Chong, <i>Malaysia</i> |
| 11:45-12:00 | OS 149 | 0141 DNA barcoding on insect pests of commercial crops in Malaysia Siti Zafirah Ghazali, <i>Malaysia</i> |
| 12:00-12:30 | OS 150 | 0145 Molecular Ecology and Population Genetic Structure of Subterranean Termite, <i>Reticulitermes flavipes</i> (Kollar) Abdul Hafiz Ab Majid, <i>Malaysia</i> . |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTERS OF ALL SESSIONS) |
| 14:30-14:45 | OS 151 | 0179 Parentage assignment of wild strains <i>Aedes aegypti</i> (Diptera: Culicidae) using ten DNA microsatellite markers Marcela Pimid, <i>Malaysia</i> |

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| 14:45-15:00 | OS 152 | 0206 Genes and Behaviour in Leaf-cutting Ants Sze Huei Yek, <i>Denmark</i> |
| 15:00-15:45 | OS 153 | 0215 Molecular characterization of seven species of Butterflies (Lepidoptera: Insecta) by RAPD-PCR Mahender Singh, <i>India</i> |
| 15:45-16:00 | OS 154 | 0232 Identification of long noncoding RNAs (lncRNAs) involved in immune response during baculoviral infection in Bombyx mori Satyavathi Valluri, <i>India</i> |

November 11, 2013

Technical Session XII Insect Biochemistry and physiology

Conference Hall – 1

Chairperson: Dr. Natalia Li (Russia)

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| 16:00-16:15 | OS 155 | 0173 Infection dynamic of Serratia symbiotica in A. pisum (Homoptera, Aphididae) after oral infection Francois Renoz, <i>Belgium</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 156 | 0186 Physiological mechanisms of adaptation of Aporia crataegi L. to extreme low winter temperatures and seasonal low water availability in Yakutia (Eastern Siberia, Russia) Natalia Li, <i>Russia</i> |
| 16:45-17:00 | OS 157 | 0192 Investigation of pheromone gland cells of Mamestra brassicae by microscopy and scattering methods Kitti Sipos, <i>Switzerland</i> |
| 17:00-17:15 | OS 158 | 0210 Exploration of beneficial gut microflora in select Lepidopteran insects Subramanian Sabtharishi, <i>India</i> |
| 17:15-17:30 | OS 159 | 0230 Physiological and Biochemical evaluation of Jatropha curcas for high yield and oil quality in Assam environment S. P. Saikia, <i>India</i> |

November 11, 2013

Technical Session XIII: Insect Pathology and biological control

Conference Hall – 2

Chairman: Dr. Takatoshi Ueno (Japan)

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| 10:45-11:00 | OS 160 | 0086 Assessment of residual bio-efficacy and persistence of Ipomoea cairica Linn plant extract against Culex quinquefasciatus Say mosquito Thiagaleetchumi Maniam, <i>Malaysia</i> . |
| 11:00-11:15 | OS 161 | 0094 Sublethal and oviposition- deterrent activity of Ipomoea cairica Linn. extract against dengue vectors. Ahbi Rami Rattanam, <i>Malaysia</i> |
| 11:15-11:30 | OS 162 | 0101 Effects of superparasitism on searching ability of Ooencyrtus fecundus (Hym.: Encyrtidae), egg parasitoid of sunn pest, Eurygaster integriceps (Hem., Scutelleridae) Shahzad Iranipour, <i>Iran</i> |
| 11:30-11:45 | OS 163 | 0102 Isolation of entomopathogenic nematodes from soil of olive orchards and their evaluation in biological control of the olive scale, Parlatoria oleae Glove. (Homoptera: Diaspididae) in Al jouf region, Saudi Arabia Magdy El-Kholy, <i>Saudi Arabia</i> |

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| 11:45-12:00 | OS 164 | 0321. study on the combined impact of henna and pyridalyl against <i>Spodoptera exigua</i> (Hubner) (Lepidoptera: Noctuidae) under laboratory conditions Saghfi, M. Iran |
| 12:00-12:15 | OS 165 | 0135 Larvicidal action of <i>Bacillus subtilis</i> and its parasporal inclusions on the mosquito, <i>Culex quinquefasciatus</i> Ganesh Arumugam, India |
| 12:15-12:30 | OS 166 | 0166 Evaluation of <i>Metarhizium anisopliae</i> Metschnikoff and <i>Isaria fumosorosea</i> Wize in Controlling <i>Cochlochila bullita</i> Stål Li Peng Tan, Malaysia |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION(POSTERS OF ALL TECHNICAL SESSIONS) |
| 14:30-14:45 | OS 167 | 0172 Efficacy of entomopathogenic fungus <i>Verticillium lecanii</i> (Zimmermann) against two cereal aphid species and the predator, <i>Coccinella undecimpunctata</i> L. Mohamed Alaa El-Dein Abdel-Rahman, Egypt |
| 14:45-15:00 | OS 168 | 0184 Effect of selected <i>Aglaia</i> spp (Meliaceae) plant extracts against <i>Epilachna indica</i> Mulsant (Coleoptera: Coccinellidae: Epilachninae) Radhiah Rajimin, Malaysia |
| 15:00-15:45 | OS 169 | 0214 Occurrence and diversity of entomopathogenic fungi from selected area in peninsular Malaysia Mohd Masri Saranum, Malaysia |
| 15:45-16:00 | OS 170 | 0220 Pathophysiological Changes in the Haemolymph of <i>Helicoverpa armigera</i> (Hubner) Larvae Infected with <i>Helicoverpa Armigera</i> Nuclear Polyhedrosis Virus (HaNPV) Vinod Kumari, India |
| 16:00-16:15 | OS 171 | 0225 Survey of mosquito larvae and copepods from different standing water bodies of Punjab, India Megha Kansal, India |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 172 | 0317. Host range and role of the Ectoparasitoid, <i>choetospila elegans</i> westwood (Hymenoptera: Pteromalidae) in the suppression of its host insect, <i>Sitophilus oryzae</i> (L.) Dr. Khandker Nesar Ahmed, Bangladesh |
| 16:45-17:00 | OS 173 | 0278 Biological control of rice leaf folder, <i>Cnaphalocrocis medinalis</i> Guenee (Pyraustidae: Lepidoptera) with mycoinsecticide based on an indigenous isolate of <i>Beauveria bassiana</i> (Balsamo) Vuillemin in Tamil Nadu, India V.Ambethgar Ambethgar, India |
| 17:00-17:15 | OS 174 | 0291 Biological Control of <i>Bemisia tabaci</i> (Homoptera: Aleyrodidae) with <i>Isaria fumosorosea</i> (Hypocreales: Cordycipitaceae) Rui-yan Ma, China |

November 11, 2013

Technical Session XIV Insect Quarantine and Insects as vectors of crop diseases

Conference Hall – 3

Chairman: Prof. Calin Gherman (Romania)

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| 10:45-11:00 | OS 175 | 0023 Efficiency of ten populations of <i>Schizaphis graminum</i> (Rondani) in transmission of barley yellow dwarf virus-PAV (BYDV-PAV) in Iran Ali Mirshekar, <i>Iran</i> |
| 11:00-11:15 | OS 176 | 0198 Effect of Watermelon silver mottle virus on the life history and feeding preference of <i>Thrips palmi</i> Karny Chien-Hao Tseng, <i>Taiwan</i> |
| 11:15-11:30 | OS 177 | 0234 Species diversity indices of insects associated with stored cocoa beans in Southwestern Nigeria Oyedokun Adegoke Victor, <i>Nigeria</i> |
| 11:30-11:45 | OS 178 | 0267 Protecting New Zealand from unwanted exotic pests. Disna Gunawardana, <i>New Zealand</i> |

November 11, 2013

Technical Session XV: Public health, medical and veterinary entomology

Conference Hall – 3

Chairman: Prof. Calin Gherman (Romania)

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| 11:45-12:00 | OS 179 | 0039 Comprasion of effect of <i>Artemisia siberi</i> and <i>Pelargonium geranium</i> essential oil with Meglumine antimoniate against <i>Leishmania major</i> promastigotes. Somayeh Layeghi ghalehsoukhteh, <i>Iran</i> |
| 12:00-12:15 | OS 180 | 0050 Experimental study of vertical transmission of Chikungunya virus in Malaysia strain of <i>Aedes albopictus</i> Skuse Rozilawati Harun, <i>Malaysia</i> |
| 12:15-12:30 | OS 181 | 0078 Insecticidal properties of <i>Schinus molle</i> leaves and berry extracts towards <i>Aedes</i> mosquito larvae Ntebaleng Makate, <i>Botswana</i> |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTERS OF ALL SESSIONS) |
| 14:30-14:45 | OS 182 | 0316. Therapeutic Potentials of Nigerian Insect-propolis against the Malarial Parasite, <i>plasmodiumberghei</i> (Haemosporida:Plasmodidae) Olayemi, I.K. ,Nigeria. |
| 14:45-15:00 | OS 183 | 0339. Effect of different solvents in propolis extraction. Neelam Chaudhary, India |
| 15:00-15:15 | OS 184 | 0325. Laboratory bioefficacy of commercial available sample for mosquito repellant against <i>Aedes aegypti</i> Dr G.D.Hebbalkar, India |
| 15:15-15:30 | OS 185 | 0090 A new online database for georeferenced management of parasitic arthropods Andrei Mihalca, <i>Romania</i> |
| 15:30-15:45 | OS 186 | 0244 evaluation of the effect of the consumption of termites (<i>Macrotermes subhyllanus</i>) on iochemical and haematological profile of albino rats. Francis Oguwike, <i>Nigeria</i> |

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| 15:45-16:00 | OS 187 | 0125 Epidemiological Basis and Chemotherapy of Bovine Tick Infestation in the River Ravi Region, Lahore (Pakistan) Muhammad Ijaz, <i>Pakistan</i> |
| 16:00-16:15 | OS 188 | 0126 Epidemiological survey and chemotherapeutic trials of tick infestation in equines in and around Lahore Muhammad Ijaz, <i>Pakistan</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 189 | 0306 Epidemiological pattern of Scabies and its social determinant factors in western Iran Mansour Nazari, <i>Iran</i> |
| 17:00-17:15 | OS 190 | 0190 Effect of Ethanolic Extract Marchantia sp. to Life Cycle of the Mosquito Aedes aegypti L (Diptera : Culicidae) Imam Fathoni, <i>Indonesia</i> |
| 17:15-17:30 | OS 191 | 0193 A three generational study of genetically modified cottonseeds on histological parameters of kidney from albino rat Megha Kansal, <i>India</i> |

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| 17:30-17:45 | OS 192 | 0196 Study on immunological parameters in the serum of chlorpyrifos immunized rabbits (Soviet chinchella) Prabha Parmar, <i>India</i> |
| 17:45-18:00 | OS 193 | 0226 Interruption of malaria transmission with selective and targeting introduction of Long-Lasting Insecticidal Nets (LLINs) in a low malaria transmission area in Sri Lanka. M.R.S.S. Bandara, <i>Sri Lanka</i> |
| 18:00-18:15 | OS 194 | 0111 Understanding of Ayurvedic treatment principles in the management of neuromuscular problems in Endosulfan victims Prashanth A S, <i>India</i> |
| 18:15-18:30 | OS 195 | 0253 Prevalence of some medical insects and arachnids (lice, scabies) depending on records from the Ministry of Health in Kurdistan region- Iraq. Shamall Abdullah, <i>Iraq</i> |
| 18:30-18:45 | OS 196 | 0304 A comparative study on effectiveness and acceptance of the use of 1% Temephos sand granules (Abate ®) and Larvivorous fish against dengue vector larvae in Kurunegala district, Sri Lanka. M.R.S.S. Bandara, <i>Sri Lanka</i> |
| 18:45-19:00 | OS 197 | 0151 The Recent outbreak of Chikungunya Fever in India: Implications for Major Challenges and Opportunities Kovendan, K, <i>India</i> |

November 11, 2013

Technical Session VII: Insect Pest Management - II

Conference Hall – 4

Chairman: Prof. Rui-yan Ma (China)

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| 10:45-11:00 | OS 198 | 0295 Utilization of females as attractants for trapping males of Arecanut white grubs, Leucopholis lepidophora (Scarabaeidae: Coleoptera) Kalleshwara swamy C.M., <i>India</i> |
| 11:00-11:15 | OS 199 | 0311. Integrated Management of Oligonychus sacchari (Prostigmata: Tetranychidae) in Sugarcane Commercial Fields Amin Nikpay, <i>Iran</i> |
| 11:15-11:30 | OS 200 | 0199 Experiences in coconut FFS for seedling pest management Sivakumar T, <i>India</i> . |

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| 11:30-11:45 | OS 201 | 0201 Effect of different diets on biology of <i>Coccinella septempunctata</i> Linneous under lab condition Aslam Bukero, <i>Pakistan</i> |
| 11:45-12:00 | OS 202 | 0205 Suitability of some date fruit varieties to the almond moth, <i>Ephestia cautella</i> Walker (Lepidoptera: Pyralidae) Abdel-Wahab Ali, <i>Egypt</i> |
| 12:00-12:15 | OS 203 | 0208 Biological control of bagworm; enhancement of parasitism activity through supplementation of beneficial plants in oil palm plantation Yusdayati Rashid, <i>Malaysia</i> |
| 12:15-12:30 | OS 204 | 0209 Laboratory evaluation of insecticidal potential of some aqueous plant extracts against cotton strainer, <i>Dysdercus superstitionis</i> (Herrich schaffer) (Hemiptera: Pyrrhocoridae) Jacobs Mobolade Adesina, <i>Nigeria</i> |
| 12:30-13:30 | | LUNCH BREAK |
| 13:30-14:30 | | POSTER PRESENTATION (POSTER OF ALL SESSIONS) |
| 14:30-14:45 | OS 205 | 0211 Impact of entomopathogenic bacterial symbionts, <i>Photobacterium luminescens</i> , and <i>Bacillus thuringiensis</i> subsp. <i>tenebrionis</i> on management of red palm weevil, <i>Rhynchophorus ferrugineus</i> (Olivier) in Egypt Atef Abdel-Razek, <i>Egypt</i> |
| 14:45-15:00 | OS 206 | 0213 Dissemination of "Integrated Productivity Management in Cotton Wheat Cropping System" in Indian Punjab Baljinder Singh, <i>India</i> |
| 15:00-15:15 | OS 207 | 0216 Occurrence, Abundance and Control of the Major Insect Pests Associated with Amaranths in Ibadan, Nigeria Ismaila Aderol, <i>Nigeria</i> |
| 15:15-15:30 | OS 208 | 0222 A comparative study of Silica Nanoparticles and <i>Pseudomonas fluorescens</i> for the control of <i>Aedes aegypti</i> for the eradication of dengue. Vani C, <i>India</i> |
| 15:30-15:45 | OS 209 | 0224 Impact of constant temperatures on the progeny production of <i>Trichopria</i> sp. Veena Narayana, <i>India</i> |
| 15:45-16:00 | OS 210 | 0236 Photosynthesis activity of delayed sown canola, <i>Brassica napus</i> L. varieties under ahids protected and free conditions in the Southern Punjab, Pakistan Muhammad Razaq, <i>Pakistan</i> |
| 16:00-16:15 | OS 211 | 0238 Role of Adsee AB 650 in management of sucking pests in cotton crop Dewa Ram Bajya, <i>India</i> |
| 16:15-16:30 | | COFFEE BREAK |
| 16:30-16:45 | OS 212 | 0241 Behavioral responses of whitefly, <i>Bemisia tabaci</i> (Hemiptera: Aleyrodidae) on chilli plant affected by previous infestation and sexes Khalid A. Saad, <i>Malaysia</i> |
| 16:45-17:00 | OS 213 | 0302 New Record of Soapbush (<i>Clidemia hirta</i> (L.) Don, 1823) as a host and the biology of Tea Mosquito Bug, <i>Helopeltis theivora</i> Waterhouse (Miridae: Hemiptera) Gavas Ragesh, <i>India</i> |
| 17:00-17:15 | OS 214 | 0254 Aspects of Biology and Control of <i>Cephonodes hylas</i> (Lepidoptera: Sphingidae) on <i>Coffea canephora</i> Okelana Feyisara Abiodun, <i>Nigeria</i> |
| 17:15-17:30 | OS 215 | 0261 Evaluation of intercropping and organic soil amendments against okra flea beetles, <i>Podagrica</i> spp Oladele Onunkun, <i>Nigeria</i> |
| 17:30-17:45 | OS 216 | 0268 Sugarcane insect pests management in sub-tropical part of India Rajinder Kumar, <i>India</i> |

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| 17:45-18:00 | OS 217 | 0331. Field Surveys of the Incidence of Sugarcane Stalk Borer <i>Sesamia</i> spp. in South West of Iran Amin Nikpay, Iran, |
| 18:00-18:15 | OS 218 | 0332. Wolbachia infection in some insect pests and disease vectors of agricultural importance and its implications in their management N. M. Guruprasad, India |
| 18:15-18:30 | OS 219 | 0252 Morphological variability of <i>Helicoverpa armigera</i> occurring in different regions of Punjab, India Arshdeep Kaur Gill, India |
| 18:30-18:45 | OS 220 | 0309 Biocontrol potential of Entomopathogenic nematodes for the management of Tea Mosquito Bug, <i>Helopeltis antonii</i> Signoret (Miridae: Hemiptera) Gavas Ragesh, India |
| 18:45-19:00 | OS 221 | 0194 Insect Pest Management in Rice: Impact and Challenges Dulcha Singh Brar, India |

November 11, 2013

BANQUET DINNER

: 19:00 HRS

November 12, 2013

Field Tour (optional) - For details contact at the Registration Desk

POSTER PRESENTATION

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| 0003 | Hymenopterous Pupal parasitoids of <i>Acanthiophilus helianthi</i> Rossi (Diptera: Tephritidae) in Kohgiluyeh safflower farms. Karim saeidi, Iran |
| 0004 | Efficiency of <i>Zataria multiflora</i> Boiss and <i>Thymus daenensis</i> Celak Essential Oils on Nutritional Indices of <i>Plodia interpunctella</i> Hubner (Lepidoptera: Pyralidae) Karim saeidi, Iran |
| 0007 | Effect of different host plants on biology of <i>Helicoverpa armigera</i> (Hübner) Yaghoub, Iran |
| 0008 | Study of nutritional indices of <i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae) on different bean cultivars Bahram Naseri, Iran |
| 0009 | Effect of different bean cultivars on growth indices of <i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae) Foroogh Rahimi Namin, Iran |
| 0015 | A study on attractiveness of some chemicals for jujube fruit fly, <i>Carpomyia vesuviana</i> Costa (Dip. Tephritidae) in Birjand, Iran Gholamreza Tavakkoli Korghond, Iran |
| 0016 | Growth and development of <i>Bactrocera oleae</i> Gmelin (Diptera: Tephritidae) immature stages at four temperatures in the laboratory mohammad reza abbasi mozhdehi, Iran |
| 0024 | Bark Beetles and their Natural Enemies on Oriental Spruce from the Black Sea Region of Turkey Cihan, Turkey |
| 0026 | Software designed to identify key insect order Hemiptera Isa Jabaleh, Iran |
| 0027 | Inclusion of Meliponini in honey regulations Patricia Vit, Venezuela |
| 0035 | Seasonal flight activity of <i>Lobesia botrana</i> (Lepidoptera: Tortricidae) and reporting two parasitoids on larva of it in Bojnourd vineyards, Iran. maryam zolfaghari, Iran |
| 0037 | Management protocol for the red palm weevil <i>Rhynchophorus ferrugineus</i> Oliv. (Coleoptera: Curculionidae) recently recorded in Libya |

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| | Mohamed Al-Eryan, <i>Egypt</i> |
| 0040 | On caligonellid mites (Acari: Trombidiformes) of Iran, with description of two new species Mohammad Bagheri, <i>Iran</i> |
| 0041 | On cameroibiid mites (Acari: Trombidiformes) of northwest Iran, with description of new species Mohammad Bagheri ¹ , Mansoureh Ahaniazad ¹ , Naser Maleki ¹ , Gholamhosein Gharakhani ¹ , ¹ <i>University of Margheh, Maragheh, Iran</i> |
| 0043 | Biological and physiological effects of honey bee products and its mixtures as nutritional additives on two hybrid strains of silkworm <i>Bombyx mori</i> Abir Gad, <i>Egypt</i> |
| 0044 | Laboratory evaluation of some essential oils against immature stages of the filarial mosquito <i>Culex quinquefasciatus</i> (Diptera: Culicidae) Abir Gad, <i>Egypt</i> |
| 0046 | Invasion of the spiralling whitefly <i>Aleurodicus dispersus</i> (Hemiptera: Aleyrodidae) in mangrove habitats of south India Revathi Ganesan, <i>India</i> |
| 0047 | Study the effect of ozone as non-chemical control of storage pests on <i>Tribolium confusum</i> Fahime Taheri Anaraki, <i>Iran</i> |
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| 0054 | Influence of methoxyfenozide and pyridalyl on life parameters of cotton bollworm, <i>Helicoverpa armigera</i> (Lepidoptera: Noctuidae) Moosa Saber, <i>Iran</i> |
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| 0062 | Effects of gibberellic acid (GA ₃) on hemolymph free amino acids of <i>Galleria mellonella</i> L. (Lepidoptera: Pyralidae) Hulya Altuntas, <i>Turkey</i> |
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| 0064 | Molecular phylogeny of spider mites (Acari: Tetranychidae) inferred from 18S and 28S ribosomal RNA sequences Tomoko Matsuda, <i>Japan</i> |
| 0066 | The efficacy of acetamiprid® on some physiological phases of the common pistaciae psylla, <i>Agonoscyta pistaciae</i> Burckhardt and Lauterer, under laboratory conditions Mahshid Sarnevesht, <i>Iran</i> |
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Insect Science and technology in the service of humanity in 21st Century

G.T. Gujar

Division of Entomology, Indian Agricultural Research Institute, New Delhi 110012 (India)

Insects are the predominant group of living organisms, constituting about 65% of living species and about 75% of animal species on the earth. Numerically, there are about 1 million species as recorded until date. Yet the diversity could be far more, with guestimate of as high as 30 million. They were evolved more than 350 million years ago and have adapted well to all kinds of vagaries of nature. This evolution has been both beneficial, harmful and indifferent to humans.

As crop pests, they cause damage to the crops worth billions of dollars annually. And these losses are more in the monocrops like rice, maize, cotton, soybeans, vegetables which are grown all over the world. The global losses due to insect pests have declined from 13.6 per cent in post-green revolution era to 10.8 per cent towards the beginning of this century. In India, the crop losses have declined from 23.3 per cent in post-green revolution era to 17.5 per cent at present. Yet, as cropping system has intensified, crop losses in monetary terms remain all time high. In India, the agriculture currently suffers an annual loss of about Rs 8,63,884 million due to pest insects alone. Besides, post-harvest losses due to all factors together are equally high.

Control of crop losses due to insect pests requires use of measures that include chemical insecticides. Insecticides and other pesticides have thus become important tools. It is reported that global chemical pesticide market is of about \$ 50 billions annually and is annually growing at 3.5%. Biopesticide market is however about 4-5% of the chemical pesticide market, but growing at faster rate of about 15%. And as demand for more food increases, pesticide usage is likely to increase more in the developing countries like China, India and some latin American countries to save the crops from insect damage. This in turn has implications for environment.

In recent times, novel techniques of pest management like seed-driven biotechnological approaches that transforms crops with insecticidal genes have evolved. Bt transgenics along with other transgenes have acquired a centre stage with 70 million hectare of area under maize, soybean, and cotton. GM Crops are cultivated over 170 million hectares in 39 countries contributed to food security by increasing crop production valued at US \$ 98 billion; saving 473 million kg of pesticides, reducing CO₂ emission, conserving biodiversity and helping to alleviate poverty of more than 50 million people. While chemical control and transgenics have been a bane of crop protection; advocates of non-chemical and non-transgenics have been advocating organic approach for crop health management.

Pest insects also serve as vectors of plant and animal diseases including those of humans. Millions of people suffer from diseases like malaria, dengue, filarial, chikungunya and plague wherein insects play a major role of transmission of causal organism. Public health arthropod vector management often involves habitat management including use of insecticides. Recent advances have helped in better diagnostics and use of pesticides including chemotherapy. Like transgenic crops, transgenic mosquitoes are now new armour for their own control. Biotechnological interventions have demanded more knowledge of genome sequencing and hence, global initiative called Genome i5k has been taken up worldwide. It is also hoped that new products based on RNA interference will be available in the future.

Insects have a great role to play in food production with their services as biocontrol agents and pollinators. It is estimated that bees and other insect pollinators contribute \$ 29 billions to the farm income in US alone, based on 58 crops evaluated. Nearly 65% of angiosperms are insect-pollinated and 20% of insect species depend up on them for their food. Similarly, insects contribute immensely to the biocontrol services in managing pest species to some extent.

Asians also depend up on the insects as a direct food source. According to one study, about 2 billion people eat insects as a source of food directly or indirectly; with beetles, ants, bees, crickets, locusts, grasshoppers, cockroaches, butterflies, moths and silkworms... a list of about 1900 species forming a part of diet. Insect global mass is estimated at 10^{12} kg (1000 million tons) with 10^{18} individuals as against global cereal food grain production of about 2500 million tons. These are also a source of medicine in China and Korea.

Imaginative or hypothetical as it may sound to few; insects are likely to provide more succour for subsistence of the humanity in the 21st Century.

0002. Biodiversity Of Insects Associated With Safflower (*Carthamus Tinctorius*) Crop In Gachsaran, Iran

Karim Saeidi

Agriculture and Natural Resources Researches Center of Kohgiluyeh and Boyer-Ahmad,
Yasouj, Iran.

The present research conducted to see the biodiversity of insects in warm and cool areas from March to April in 2009 at the Gachsaran Agricultural Research Station. A total number of 4184 specimens, which were identified into 24 families and 62 species. In the warm area a total of 3004 specimens with a mean value of 52.702 and in the cool area a total of 1180 specimens with a mean value of 20.702 were collected, which differed significantly from each other. The mean values in the months of March, April and May were 28.395, 37.026 and 44.648 respectively and they did not differ significantly. The maximum mean value of 192.80 specimens was obtained for the family Pyralidae, which had no significant difference with Noctuidae. The minimum mean value of 1.167 was achieved in the family Satyriidae and it was statistically similar to most of other families.

Keywords: Gachsaran, Insects, diversity, Iran

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0003. Hymenopterous Pupal parasitoids of *Acanthiophilus helianthi* Rossi (Diptera: Tephritidae) in Kohgiluyeh safflower farms.

Karim saeidi

Agriculture and Natural Resources Researches Center of Kohgiluyeh and Boyerahmad,
Yasouj, Iran.

The Safflower capsule fly, *Acanthiophilus helianthi* Rossi (Diptera: Tephritidae) is the most destructive insect pest of attacking the safflower *Carthamus tinctorius* plant which is cultivated as an oil crop. It is mainly controlled through application of broad-spectrum insecticides, which can adversely affect safflower farms ecosystem and consequently human health. Since a first step in setting up an IPM program is to assess the biological control agents within the ecosystem, so in this research work the pupal parasitoid complex of Safflower Capsule Fly (SCF) on safflower was identified, and its natural potential in controlling the pest compared for different generations and in different locations in Kohgiluyeh during 2008-2010. Adults of the pupal parasitoids of SCF were recorded from laboratory-reared pupae, which had been collected on damaged small flower heads of the first generation and large flower heads of the second and the third generations. Rate (%) of parasitism on *A. helianthi* pupae was estimated as the number of parasitoids over the total count of parasitoids and flies. Ten pupal parasitoids of the host were found: *Bracon hebetor*, *Bracon luteator*, (Braconidae); *Isocolus tinctorious* (Cynipidae); *Pronotalia carlinarum* (Eulophidae); *Eurytoma acroptilae* (Eurytomidae); *Ormyrus orientalis* (Ormyridae); *Colotrechnus viridis*, *Pteromalus* sp. (Pteromalidae) and *Antistrophephes conthurnatus*, *Microdontomenus annulatus* (Torymidae). Total parasitism varied from 1.55 to 20.31%, with an average of 10.93% as revealed through the present study. A comparison of the means of the pupal parasitism rate showed a significant difference at 5% level between different generations and localities. The highest rate of parasitism occurred in the first generation in all localities, as well as in years.

Keywords: Biological control, Safflower, Safflower capsule fly, Iran, Kohgiluyeh, Parasitoid.

0004. Efficiency of *Zataria Multiflora* Boiss and *Thymus Daenensis* Celak Essential Oils on Nutritional Indices of *Plodia Interpunctella* Hubner (Lepidoptera: Pyralidae)

Karim Saeidi ^{1*}, Masoud Yousefi ²

^{1*} Department of Entomology, Natural Resources Research, Research Center of Agricultural and Natural Resources, 351, Yasouj, Iran

² Department of Forest and Rangelands, Natural Resources Research, Research Center of Agricultural and Natural Resources, 351, Yasouj, Iran

In this research, efficiency of plant extracts from *Zataria multiflora* L. and *Thymus daenensis* Celak was tested against the Indian meal moth, *Plodia interpunctella* Hubner for its antifeedant activity. Several experiments were designed to measure the nutritional indices such as relative growth rate (RGR), Relative consumption rate (RCR), efficiency of conversion of ingested food (ECI) and feeding deterrence index (FDI). Treatments were evaluated by the method of flour disk bioassay in the dark, at $25 \pm 1^\circ \text{C}$ and $60 \pm 5\% \text{ R.H.}$. Several concentrations of 0, 0.1, 0.5, 0.75, 1, 1.5 and 2 $\mu\text{L/disk}$ were prepared from each essential oil and 10 first instar larvae (15 days-old larvae) were introduced into each treatment. After 72 hours, nutritional indices were calculated. Results indicated that *Z. multiflora* oil was highly effective compared to *T. daenensis*, and significantly decreased the Relative Growth Rate and Relative Consumption Rate. Also, in higher concentration (2 $\mu\text{L/disk}$), the Efficiency of Conversion of Ingested food (9.384 %) was significantly low. The *Z. multiflora* oil was more effective on Feeding Deterrence Index than *T. daenensis*.

Key words: Essential oil, Nutritional Indices, *Plodia interpunctella*

0005. Population Dynamics of the Gypsy Moth, *Lymantria dispar* L. (Lepidoptera: Lymantriidae) in Yasuj, Iran.

Karim Saeidi^{1*}

^{1*} Department of Entomology, Natural Resources Research, Research Center of Agricultural and Natural Resources, 351, Yasouj, Iran.

Research was conducted in Yasuj region to determine population changes of the gypsy moth in 2006 and 2007. Also it was aimed to calculate the correlation coefficient between the population densities of 2006 and 2007, in order to build a predictive model for the pest. The number of overwintering egg masses was counted during the winter months in ten different orchards. The number of egg masses of the pest was recorded at weekly intervals in ten orchards during the growth seasons in 2006 and 2007. Results indicated that the egg mass densities were 1.72 and 3.67 per fifty squares meter and 342 and 576 egg masses per hectare in winters 2006 and 2007, respectively. Regression analysis of the pest population density in 2006 and 2007 indicated that only 32.37% of the 2007 population variance could be accounted for the population density in 2006. It was obvious that more than 68% of the population changes are under the influence of unknown biotic and abiotic environmental factors .

Keywords: Dynamism, Population, Gypsy moth, Yasouj

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0007. Effect of different host plants on biology of *Helicoverpa armigera* (Hübner)

N. Fallahnejad-Mojarrad¹, Y. Fathipour²

1. Faculty of Agrivulture , Science and Research Branch , IslamicAzadUniversity , P. O. Box 14155-775, Tehran, Iran

2. Faculty of Agriculture , Tarbiat Modares University , P.O.Box14115336,Tehran, Iran

The cotton bollworm , *Helicoverpa armigera* (Hübner) is one of the most important polyphgous pest of various crops in many parts of the word including Iran. Biology of *H. armigera* fed on different host plants including common bean (cultivar Khomein) , white kidney bean (cultivar Dehghan) , red kidney bean (cultivar Goli) and soy bean (cultivar Williams) was studied under laboratory conditions ($25\pm5^{\circ}\text{C}$, $65\pm5\%$) RH and photoperiod of (6:8 (L : D hours) . The result showed that there were significant difference among the host plants whit respect to the larval growth period , pupul period , daily oviposition and total fecundity. The highest larval , longevity and longevity, pupul development time and pre – adult period were observed on Dehghan (43.67 and 16.89 days) and Williames (32.77 and 10.29 days) . The shortest larval and longevity , pupal development time and per – adult period , pre-pupal period were observed on Khomein (14.23,9.98 , 7.35, 25.93, and 2.3 days). The highest daily fecundity (459.29 eggs) and total fecundity (1556.77 eggs) was on Khomein . There showed that oviposition period was the longest on Williams (3.77 days) and shortest on Khomein (2.83 days) compared with other host plants . According to these results , it could be concluded that cultivar Williams was unsuitable host fer growth and development of *H. armigera* . knowledye on resistant and partially host plants helps us to use them in IPM programs.

Keywords : cotton bollworm, host plants, biology , IPM

0008. Study of nutritional indices of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) on different bean cultivars

**Bahram Naseri, Foroogh Rahimi Namin, Jabraeil Razmjou
and Akram Arghand**

Department of Plant Protection, Faculty of Agricultural Sciences, University of Mohaghegh Ardabili, Ardabil, Iran.

The cotton bollworm, *Helicoverpa armigera* (Hübner), is one of the most important pests of different agricultural crops especially bean in Iran. Nutritional indices of the cotton bollworm according to the wet weight of the whole larval instars (fourth, fifth and sixth instars) were studied on seven bean cultivars including white kidney bean (cultivars Daneshkadeh, Pak and Shokufa), red kidney bean (cultivars Akhtar, Naz and Sayyad) and common bean (cultivar Talash) under laboratory conditions ($25 \pm 1^\circ\text{C}$, $65 \pm 5\%$ RH, and a 16:8 h light-dark photoperiod). The highest efficiency of conversion of ingested and digested food was on cultivar Shokufa (32.87 and 38.73 %, respectively), and lowest was on cultivar Talash (25.14 and 29.10 %, respectively). The highest and lowest values of relative consumption rate were observed in the larvae reared on cultivars Akhtar and Shokufa, respectively (5.61 and 3.24 mg/mg/day, respectively). The value of relative growth rate was the highest on cultivar Daneshkadeh (1.07 mg/mg/day) and lowest on cultivar Sayyad (0.72 mg/mg/day). Regarding to our results, cultivar Talash was the most unsuitable host for feeding of *H. armigera*.

Key words: *Helicoverpa armigera*, nutritional indices, bean

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0009. Effect of different bean cultivars on growth indices of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae)

**Foroogh Rahimi Namin, Bahram Naseri, Jabraeil Razmjou
and Akarm Arghand**

Department of Plant Protection, Faculty of Agricultural Sciences,
University of Mohaghegh Ardabili, Ardabil, Iran.

The cotton bollworm, *Helicoverpa armigera* (Hübner), is one of the most serious pests of different agricultural crops especially bean in Iran and elsewhere in the world. In this research, the growth indices and weight gain of the sixth instar larvae *H. armigera* were investigated in response to feeding on seven bean cultivars including white kidney bean (cultivars Daneshkadeh, Pak and Shokufa), red kidney bean (cultivars Akhtar, Naz and Sayyad) and common bean (cultivar Talash) under laboratory conditions ($25 \pm 1^\circ\text{C}$, $65 \pm 5\%$ RH, and a 16:8 h light-dark photoperiod). The results showed that the lowest values of larval growth (5.210) and standardized growth (0.024 gr/day) indices were on cultivar Sayyad. The weight gain of larvae was not significantly different on bean cultivars. Longest and shortest larval periods of the sixth instar were on Akhtar and Pak, respectively (10.08 and 7.37 days, respectively). Among different bean cultivars, Sayyad was an unsuitable host for growth of *H. armigera*.

Key words: *Helicoverpa armigera*, growth indices, bean cultivar

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0010. The Effect of Bendiocarb Poison on Different Vectors of Visceral leishmania in Meshkinshahr City, 2010

MoradiAsl E₁*; Sadeghi H₂; Mohebali M₃; Hazrati S₄; Ainolahzadeh F₅; Zareiy Z₆

1 Mangemant center of disease in Meshkinshahr Health Center, Ardabil university of Medical Sciences, Meshkinshahr, Iran.

2 Dept.of Environmental Health, School of Health, Ardabil university of Medical Sciences, Ardabil, Iran.

3Dept. of Medical Parasitology, School of Health, Tehran university of Medical Sciences, Tehran, Iran.

4 Dept.of Environmental Health, School of Health, Ardabil university of Medical Sciences, Ardabil, Iran.

5 Health Center of Meshkinshahr city, Ardabil university of Medical Sciences,Meshkinshahr, Iran.

6 Institute of public health research , School of Health, Tehran university of Medical Sciences, Meshkinshahr,Iran.

*Corresponding Author:

Background & objectives: In endemic area, chemically fighting with carrier of kala azar disease is one of the main ways for reducing disease, and ficam is one of the toxins that is appropriate to eliminate mosquitoes and is from health poison among the pesticides. Therefore, by considering the lasting in nature, using ficam can greatly destroy diseasecarrying mosquitoes.

Methods: In this cross - sectional study the rate of effect ficam on different vectors species were examined in Meshkinshahr city. First two infected villages, as cases and controls, and 10 households from each village selected and 1000 m² from the case village was spraying with ficam than 0.3 g /m². Then, using sticky traps set in the distances were attempted to identify species and Fon (per 2 villages).

Results: In the rate of 524 sand fly predating in this study included 70.5% Phlebotomus Kandelakii, 5% F. Papatasi, 7.5% F. Major, 7.5% F. Balcanicus, 9.5% F. longidoctus. In the case village was spraying and , respectively, 3-15 - 30 - 45-60 -75 and 90 days after spraying at about 79.5% - 69.5% - 83% - 90% - 93% - 100% and 100 % sand fly vanished.

Conclusion: According to this study can be said that ficam poison with the survival of three months in nature and with average of lethality coverage of appropriate terms of season to prevent from disease Kla-azar and eliminate sand flies and as a poison, appropriate of health before starts up the season of carriers activity. And ficam poison can be used in the whole of region and country.

Keywords: Ficam; Sandfly; Kala-Azar; Meshkinshahr

0011. Banana Scarring Beetle, *Nodostoma Viridipenne* Motsch – A Major Problem Of Eastern India

B. Bandyopadhyay

Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya
Kalyani, Nadia, West Bengal 741 235

Banana scarring beetle, *Nodostoma viridipenne* Motsch. is a major problem in eastern India. About 29 percent loss in yield and 40 percent in market price has been estimated so far. A detailed study has been carried out on bio-ecology, population dynamics and management of this pest. Adult beetles were noticed in the field during the early February and remained active up to second fortnight of October. Three peak periods of incidence of this pest were observed under field condition. Higher population were observed from second fortnight of February to first fortnight of March then during first fortnight of July and again during first fortnight of September. Maximum adult population was observed during the month of September. A number of experiments were undertaken during the study to develop an effective management schedule. Out of fifteen treatments tested, acephate (0.1125%) both spray and 20ml pour in heart were significantly higher than all other treatments followed by quinalphos (0.05%) and carbaryl (0.3%) as compared to untreated control. In another trial, ten different treatments (in combination) were applied during the peak period of incidence. Out of these treatment tilling and clean cultivation, bunch cover, mulching were found more effective as compared to any other treatments. In combination of treatments will lead towards the successful management strategies against banana scarring beetle.

Keywords : banana scarring beetle, *Nodostoma viridipenne* , management.

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0012. Effect of Morpho-Physio Chemical Plant Factors on Preference of *Lasioderma Serricorne* (F.) (Coleoptera: Anobiidae) on Four Types of Tobacco

Muhammad Saeed¹ *, Ayub Khan¹, Sher Aslam Khan¹, Muhammad Liaquat¹, Jehan Bakht², Shah Masaud Khan¹, Sardar Ali¹ and Bashir Ahmad²

1 Department of Agricultural Sciences, University of Haripur,
Khyber Pakhtoonkhwa, Pakistan.

2 KPK Agricultural University Peshawar, Pakistan

Flue-cured Virginia (FCV), Sun-cured Rustica (SCR), Dark Air-cured (DAC) and Air-cured Burley (ACB) were evaluated for preference by larvae and adults of *Lasioderma serricorne*. Leaf thickness (LT), moisture content (MC), nicotine, total sugars (TS), starch, chlorides and potassium contents were determined and the impact of these factors on preference was worked out. FCV tobacco was highly preferred by both larvae (2.18) and adults (1.49) due to high percentages of MC (12.50), TS (15.84) and starch (6.89). ACB was least preferred due to low contents of MC (11.40%), TS (1.29%) and starch (1.14%). Potassium had negatively significant effect on the beetle's preference. Regression analyses revealed a positive relationship of larvae and adults with MC (0.780, 0.803) TS (0.866, 0.713) and starch (0.888, 0.765) while negative relationship with potassium (-0.684, -0.407). LT (0.155, 0.101) nicotine (-0.047, -0.277) and chlorides (0.163, 0.305) had non-significant association with preference by both larvae and adults respectively. The relationship between MC, TS and starch is direct curvilinear as their increase had encouraged the population of *L. serricorne*.

Key words: *Lasioderma serricorne*; preference; tobacco types

0013. Innovative Corn-Legume Intercropping: A Strategy To Suppress Insect Pest Occurrence

Myleen Corpuz,

¹Isabela State University, Echague, isabela Philippines 3309, Australia

Intercropping corn-legumes increase food production per unit of land via better utilization of resources, minimizes the occurrence of insect pests, reduced weed competition and stabilize yield. This study was conducted to determine the significant effects of intercropping corn with legumes in terms of yield and yield component, population density of insect pests and compare the yield of sole corn with intercrop with legumes. A RCBD with seven treatments replicated three times was used as follows: Treatment 1 = sole corn, Treatment 2 = corn + peanut, Treatment 3 = corn + bush sitao, Treatment 4 = corn + snap bean, Treatment 5 = sole bush sitao, Treatment 6 – sole peanut, Treatment 7 = sole snap bean. Results showed that planting of sole corn at 30, 60 and 90 DAP produced the tallest plant height, heaviest biomass yield, wider diameter of corn ear and heaviest grain yield. While corn intercrop with peanut obtained the highest number of kernels and heaviest weight of 1000 seeds. Planting of sole legume revealed significant variation in terms of shoot length, number of pods and grain yield per hectare. At 20, 30 and 40 DAP, a lower number of insect pests, lowest damage of insect pest and higher number of beneficial insects observed at intercrops of corn + peanut (T₂). In like manner, the damage rating on corn at 35 and 45 DAP revealed significant differences among treatments.

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**0014. Assessing The Impact of Carbofuran Rates and Okra Varieties
On the Incidence of *Podagrica Uniformis*, Jac. (Coleoptera:
Chrysomelidae)**

Ogah, E. O.

Department of Crop Production and Landscape Management, Ebonyi State University,
PMB 053 Abakaliki, Nigeria

Okra, *Abelmoschus esculentus* L. (Syn. *Hibiscus esculentus*) is an important vegetable crop cultivated mainly for its immature edible green fruits that are known for its high level of Vitamins A, C and some Minerals. Unfortunately insect pests have been a major setback for the commercial production of okra in many countries in Africa. Amongst the insect pest that causes economic damage on Okra plants, Flea beetle, *Podagrica uniformis* has been recorded as the most serious pest in the recent time. In the present studies, I assessed the impact of carbofuran 3G rates (0.0, 0.75, 1.5, and 2.25 kg a.i. ha⁻¹) and Okra varieties (Tae-38, NHae-47 and cv 'Awgu early') in the management of *P. uniformis* during 2009/10 farming seasons in Nigeria. The results indicated that the incidences of *P. uniformis* were significantly influenced by the carbofuran rates and Okra varieties. Carbofuran at 1.5 kg a.i. ha⁻¹ significantly ($P < 0.05$) reduced the incidence of *P. uniformis* and differed from other doses with resultant increase in pod yield. The effect of the insecticide was also observed to decrease with increase in plants' age especially from 6 weeks after planting. The results also indicated that all the varieties planted differed significantly on the incidence of *P. uniformis*. Amongst the varieties assessed, NHae-47 was the most resistance and differed significantly from the rest of the varieties with Awgu early having the highest level of infestation of the beetle. The results of the pod yields showed that all the varieties performed better with higher pod yields under higher carbofuran application than the control with Nhae-47 producing the highest number of pods and Awgu early having the least pods yield. It could therefore be concluded that a combination of planting resistant variety of Okra with carbofuran application has significant effect on *P. uniformis* incidences and pod yield.

Keywords: Carbofuran, varieties, *Podagrica uniformis*, yield

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0015. A study on attractiveness of some chemicals for jujube fruit fly, *Carpomyia vesuviana* Costa(Dip. Tephritidae) in Birjand,Iran

Gholamreza Tavakkoli Korghond* & Hadi Mahmoudi

The Research Center of Agriculture and Natural Resources of Southern Khorasan provine,
Iran

The jujube fruit fly, *Carpomyia vesuviana* Costa (Dip. Tephritidae) is the most important pest of jujube (*Ziziphus jujube* Mill). This study have been carried out in order to replacing non-chemical methods, using some chemical solutions containing Protein Hydrolyzate(PH), Ammonium Bicarbonate(AB), Borax(Bo.), Ammonium Sulfate(AS), total combination (including PH+Bo.+AS and AB) in concentration (3%) as attractants. The significant difference between treatments was at 1% level for jujube fruit fly. The highest and lowest capture of jujube fruit fly were recorded in total combination and control (with means of 34.5 and 1.5), respectively. Thus they were placed in a and e groups, respectively. Bo. with mean of 19.0 was placed in b group and PH, AB and AS, respectively, with means of 1.5, 2.0 and 4.5 were placed in group c. Also about the Green lacewing (*Chrysoperla carnea*), there was a high significant difference between treatments at 1%. The maximum and minimum attracts were recorded in total combination and PH treatments (with means of 22.0 and 4.0), respectively and were placed in a and e groups. Also the highest and lowest FTD were obtained with the treatments total combination and control and the highest and lowest ITD were recorded with the treatments BA and PH, respectively.

Key Words: Protein Hydrolyzate, Ammonium, Bicarbonate, Borax, Sulfate.

0016. Growth and development of *Bactrocera oleae* Gmelin (Diptera:Tephritidae) immature stages at four temperatures in the laboratory

Abbasi mozhdehi, Mohammad reza¹. A, Kayhanian .Ali akbar ².

¹- Agricultural and natural resource research center of Guilan Iran, 2- Plant pathology Institute of Iran

Bactrocera oleae Gmelin (Diptera:Tephritidae) is the most important and widespread pest in the olive growing countries in the world. The development and survival of olive fruit fly, *B.oleae* from egg to adult stage was studied in the laboratory at 16,22,27 and 35°C. The objective of the study was to get information on the influence of temperature on immature stages as a prerequisite to optimize rearing procedures and to understand geographical pattern of fruit fly occurrence. Embryonic development was fastest at 35°C but there was no pupal development and, of course, no adults at 35°C. The slowest development of immature stages was at 16°C. The highest percentage of adults obtained from an initial set as 100 eggs was 74% at 27°C. The lower development thresholds for egg, larval and pupal stages were 9.19, 13.94 and 12.36°C, respectively. The optimum temperature for development and survival of immature stages was 27°C.

0017. A Diversity of Aphids and Ladybirds in Alfalfa Fields of Boyerahmad City

Saeidi Karim¹

¹Agriculture and Natural Resources Researches Center of Kohgiluyeh and Boyer-Ahmad, Yasouj, Iran.

In studies that during of years 2008-2009 in Alfalfa fields and in different parts around the city of Boyer-Ahmad was done, number four aphid species and 11 species of ladybirds base on various methods of sampling collected and was identified as follows:

Aphids: *Therioaphis maculate*, *Acyrtosiphon pisum*, *Aphis fabae* and *Aphis gossypii*

Ladybirds: *Hippodamia variegata* (Goeze), *Oenopia conglobata contaminata* (Montrouzier), *Propylea quatuordecimpunctata* (L.), *Exochomus nigromaculatus* (Goeze) *Hyperaspis quadarimaculata*, *Coccinella undecimpunctata* (L.) ‘*Coccinella septempunctata* (L.), *Psyllobora vigintiduopunctata* (L.) ‘*Scymnus apetzi* (Mulsant) ‘*Scymnus syriacus* ‘ Redtenbacher and *Exochomus quadripustulatus* L .

Among the aphid species collected, *Therioaphis maculata* and *Aphis fabae* with 54.5 and 31.7 percent respectively, were more abundant than any other species. All ladybirds' species are collected for the first time from Kohgiluyeh and Boyer-Ahmad province reported. Among the ladybirds species collected, *Coccinella septempunctata* and *Hippodamia variegata* with 48.8 and 32.4 percent respectively, were more abundant than any other species

0018. Study on Some Biological Characteristics of *Euxoa agricola* Boisduval, 1829 (Lepidoptera: Noctuidae) in the Laboratory Conditions

Saeidi Karim¹

¹Agricultural and Natural Resources Research, Yasouj, Kohgiluyeh and Boyerahmad,, Iran

The artichokes moth, *Euxoa agricola* Boisduval is a most important pest on artichokes in Kohgiluyeh and Boyerahmad. Larvae of this insect from leaves and young branches and also stems of the artichokes are fed and in addition to damage, caused general weakness and reduced plant growth. This research with aim study of duration of different life stages of pest, during the years 2007 to 2009 in the province Kohgiluyeh and Boyerahmad was conducted. Sampling in nature base on weekly, random and two – stage cluster sampling method, during the year was conducted. In this study, the biology of *Euxoa agricola* on artichokes was investigated under laboratory condition with temperatures $24 \pm 2^{\circ}$ and $27 \pm 2^{\circ}$ C, humidity 65 ± 10 % and photo period 16: 8 L: D. The results revealed that adults in late May of 2008 gradually began to appear in nature and laid eggs. This pest in Kohgiluyeh and Boyerahmad province has one generation a year. In laboratory condition, hatching period, during larval and pupation in temperatures 24 and 27° C was 2.9 ± 0.1 , 3.8 ± 0.1 , 17.1 ± 0.4 , 20.1 ± 0.5 , 14.7 ± 0.5 and 9.8 ± 0.2 days, respectively. All life stages of the pest from egg to adult in temperatures 24 and 27° C was 28.6 ± 0.7 and 32.7 ± 0.5 days respectively.

Key Words: Artichokes moth, *Euxoa agricola*, Biology, Kohgiluyeh and Boyerahmad

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0019. Measurement of residual Diazinon in cucumber and tomato products in city Boyerahmad

Saeidi Karim¹

¹Agricultural and Natural Resources Research, Yasouj, Kohgiluyeh and Boyer-Ahmad, Iran

Diazinon is a chemical pesticide used for a wide range of agricultural and horticultural crops. However, its residue in agricultural products could seriously threaten human health. The present study measured diazinon residue in cucumber and tomato by collecting samples from different areas including 6 regions for cucumber (Totnadeh, Jalil-Babakan, Sepidar, Sisakht, Keveshk and Yasouj), 2 regions for tomato (Jalil-Babakan and Keveshk). Diazinon residues were determined using gas chromatography (GC) technique. Analysis of pesticide in cucumber samples showed that pesticide residue in cucumber except in Keveshk cucumber, more than the permitted residue level, so that cucumber samples collected from Sepidar, Yasouj, Totnadeh, Sisakht and Jalil-Babakan were 7.1, 5.4, 5.2, 3.1 and 2.8 times higher than the permitted level, respectively. However, diazinon residue in cucumber and tomato grown in Keveshk were lower than permitted levels.

Key Words: Pesticide residue, Gas chromatography, Food safety

0020. Insecticidal activities of aqueous extracts from twelve Iranian medicinal plants against Turnip moth, *Agrotis segetum* Schiff. (Lepidoptera: Noctuidae) in Iran

Saeidi Karim¹

¹Agriculture and Natural Resources Researches Center of Kohgiluyeh and Boyerahmad, Yasouj, Iran.

Iranian medicinal plants extracts of a group of 12 species from 9 different botanical families, were screened for contact toxicity and repellency activities against *Agrotis segetum*. The extracts from six of the Iranian medicinal plants showed strong activity against the insect. The most effective plant extracts were from *Achillea wilhelmsii* (Asteraceae), *Thymus vulgaris* L. and *Myrtus communis* Mill. Three of the extracts exerted strong repellency .

Keywords: Biopesticides, Botanicals, Contact toxicity, Repellency activity, Turnip moth

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**0021. Visitation of macro-moths(Lepidoptera) to *Rubusfruticosu*
saggflowers on hedgerows in intensive UK agricultural landscapes**

E. Coulthard¹, J. Littlemore², D. McCollin³

¹PhD student at the University of Northampton UK

²Senior Lecturer in Countryside Management at Moulton Agricultural College UK

³Senior Lecturer in Ecology at the University of Northampton UK

Moth pollination is an understudied field, particularly in the UK. This study investigated visitation rates of macro-moths (Lepidoptera) to flowers of *Rubusfruticosus* agg; a common woody component of hedgerows in intensively farmed landscapes. The study sites were two areas of mixed lowland farmland in Northamptonshire, UK. Short transects were walked along hedgerows on both study sites, over 10 nights in the summer of 2012. This preliminary study revealed 17 macro-moth species visiting *R. fruticosus* inflorescences along hedgerows. Both Rustic (*Hoplodrinablanda*) and Spinach(*Eulithismellinata*) moths recorded are currently in decline in the UK, but were seen visiting flowers. As yet no rare or specific Biodiversity Action Plan species have been recorded, however the numbers of individuals recorded in the area suggests that hedgerow flowering plants are an important nectar resource for moths. The study supports existing suggestions that hedgerows are key landscape features for invertebrate species in agricultural areas.

Key words: macro-moths, moths, Lepidoptera, hedgerows, pollination.

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0022. Management of Angoumois Grain Moth, *Sitotroga Cerealella* (Olivier) by Using Botanical Plant Materials in Stored Rice: A Unique Approach of Integration in IPM.

Tiwari. S¹; G.P. Yadav² and S. Sharma¹

¹ Institute of Agriculture and Animal Sciences, Rampur

² District Agriculture Development Office, Kailali

The integrated management of Angoumois Grain Moth, *S. cerealella* (Olivier) was conducted in Kailali District of Nepal. Where, the six repellent plant materials and non-toxic materials like Sweet Flag (*Acorus calamus* L.), Neem leaf powder (*Azadirachta indica*. A. Juss), Neem oil (*Azadirachta indica*. A. Juss), Tulsi (*Ocimum sanctum* L.), Turmeric (*Curcuma domestica* Valet) and Wood ash were evaluated in room conditions against *S. cerealella*, in rice variety Sarju-52. The botanicals were treated @ of 2gm/kg, 5gm/kg, 2.5ml/kg, 5gm/kg, 3gm/kg and 5gm/kg respectively. Mortality of both sexes were recorded 100% in the grain treated with powder of dried rhizome (*A. calamus*) on the second day after treatment. The result showed that Sweet Flag and Neem oil were more effective against *S. cerealella*. Suitability ranges were recorded from 0.41 to 1.93 in various treatments. Therefore, there will be enough scope for long-term storage of rice by treating with locally available botanical material like *A. calamus* for management of *S. cerealella*.

Keywords: Angouinuous grain moth, *S. cerealella*, Integrated Managements, Botanicals

0023. Efficiency of ten populations of *Schizaphis graminum* (Rondani) in transmission of barley yellow dwarf virus-PAV (BYDV-PAV) in Iran

Ali Mirshekar¹, Gholam Reza Rasoulia² and Gholam Hossein Mosahebi²

University of Zabol, Zabol, Iran

Variation in transmission of clones of *Schizaphis graminum* (Rondani) originating from different regions of Iran was evaluated by transmitting an isolate of barley yellow dwarf virus-PAV (BYDV-PAV) for which this species is normally an inefficient vector. After acquiring the virus, aphids of each clone-virus isolate combination were caged on 30 seedlings using 3 fourth-instar nymphs per seedling. The inoculated and control plants were assayed by ELISA and assayed visually to determine the rate of transmission and the mean ELISA value for each treatment. A positive correlation was found between the rate of transmission and the mean absorbance value. Aphid clones differed in their efficiency of transmission of virus isolate. On the other hand, any single clone transmitted virus isolate with varying efficiencies. The aphid clone belonging to virus isolate origin transmitted virus isolate at highest rate. In general, Shahrekord and Shahreza clones of aphids showed highest efficiency of transmission and Delijan and Varamin clones have lowest transmission efficiency between aphid clones.

Keywords: luteovirus, aphid clones, BYDV-PAV, transmission efficiency, *Schizaphis graminum*, Iran

0024. Bark Beetles and their Natural Enemies on Oriental Spruce from the Black Sea Region of Turkey

Cihan

¹Kastamonu University Taşköprü Vocational High School, Kastamonu, Taşköprü, Turkey

Oriental spruce, *Picea orientalis* (L.) Link. (Pinaceae), is one of the main tree species that naturally grows in the Caucasus Mountains and the northeastern part of Turkey, known as the Black Sea Region. This tree species reaches optimal growth in the mountainous areas of heavy precipitation in Ordu, Giresun, Rize, Trabzon, and Artvin Provinces of the Eastern Black Sea Region of Turkey, but it can tolerate a wide range of climatic zones. The bark beetle species (Coleoptera: Curculionidae: Scolytinae) that attack oriental spruce, and their predators and parasitoids, were studied in Turkey in 2005-2006. Twenty-three species of bark beetles belonging to six subtribes and two tribes of Scolytinae were identified. In addition, 84 predatory species from 21 families and 23 parasitoid species from five families were detected. Identification of these predatory and parasitic species is an important starting point for the biological control of bark beetles attacking oriental spruce in Turkey.

0025. An account of whiteflies breeding on medicinal plants in South India

T.G.Revathi¹, S. John William¹ and R. Sundararaj²

¹P.G. & Research Department of Zoology and Biotechnology, Loyola College,
Chennai-34, Tamil Nadu, India.

²Forest and Wood Protection Division, Institute of Wood Science and Technology, 18th cross,
Malleswaram, Bangalore- 3, Karnataka, India

Whiteflies are an economically important group of insects infesting a wide range of host plants. They are small inconspicuous phytophagous insects belonging to the family Aleyrodidae (Insecta: Hemiptera: Sternorrhyncha) and are often overlooked despite their abundance on the surfaces of leaves. The name whitefly is derived from the white appearance of adults of most species due to the deposition of wax on the body and wings, and from their tendency to fly when disturbed. Aleyrodids rank among the most noxious insects attacking field crops, green house crops and trees around the world. The economic loss due to their activities of sucking the plant sap, acting as vectors of viral diseases, and production of honey dew leading to the development of mould on leaves, thus, adversely affecting photosynthesis. The present study focuses on the whiteflies breeding on medicinal plants in South India. Detailed surveys were conducted from 2009 to 2012 to identify the whiteflies breeding on medicinal plants of south India. The study revealed the breeding of 141 species of whiteflies under 39 genera on 130 species of medicinal plants. Among the genera *Aleuroclava* Singh was dominant with 26 species followed by *Aleurolobus* Quaintance & Baker by 18 species and *Aleurocanthus* Quaintance & Baker by 13 species. Among the whiteflies species *Aleurodicus dispersus* Russell was found breeding on 44 medicinal plants followed by *Acaudaleyrodes rachipora* (Singh) on 22 plants and *Dialeuropora decempuncta* (Q. & B.) on 12 plants. 85 whitefly species were found breeding on only one medicinal plant, 23 species on two plants and 13 species on 3 plants. Among the medicinal plants *Cinnamomum malabathrum* Burm. f. (Bl.) was found infested by 19 species of whiteflies species followed by *Streblus asper* Lour. by 11 species and *Phyllanthus reticulatus* Poir by 8 whiteflies species. Based on the study a checklist of whitefly species breeding on medicinal plants in south India is prepared and presented as well as the need to develop holistic management practices against these whitefly pests are discussed.

Key words: Whiteflies, medicinal plants, South India

0026. Software designed to identify key insect order Hemiptera

Isa Jabaleh^{1,*}, Fateme Poormokhtar, 2 elham asadi

1. Dr, Department of plant protection, JahadDaneshgahi higher education institution of Kashmar. Kashmar.Iran
2. BSc, Department of plant protection, JahadDaneshgahi higher education institution of Kashmar. Kashmar.Iran

Identification of insect because diversity in detail the shape of other creatures they are harder to identify. One of the problems that readers, especially for reference books used and rare with them are faced, access to works that all the copies sold and action is not regenerated for printing, aside from that due to the content use of book is difficult. Software as an information retrieval system makes it possible until problems that in printing, publishing and Use of book with it we face are somewhat elevated. The software was designed to identify the insect order Hemiptera, that with the images of the family this Order, texts of English key and Farsi translations, students can easily, the families of the Order identify to Borror and DeLong method. This software program written in C-Sharp.Net, it runs under Windows XP and above. Three Icons on the home page software, introduced the Order, the Suborder and software implementation is embedded. In icon introduced the SubOrder, three SubOrderHemiptera, completely and in table's inferaordersubfamilies and all their families with the generic name is mentioned. In Icon to run the software, order to identify key with the Persian translation of key paragraphs, glossary with 600 pictures of the family.

Key words: Software, Hemiptera, Identification, C-Sharp.Net.

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0027. NMR detection of *Melipona* and *Scaptotrigona* pot honey from Mexico and Brazil

Patricia Vit¹, Elisabetta Schievano², Ileana Menegazzo², Stefano Mammi²,

¹Universidad de Los Andes, Merida, Venezuela, ²Universita di Padova, Padova, Italy

Pot-honeys, have been neglected in international honey standards, but they are the most important honeys in the tropics. The biodiversity of bees producing honey in pots reach a maximum in the Neotropics. In this research, ¹H-Nuclear Magnetic Resonance (NMR) spectroscopy was used to analyze pot honey produced by *Melipona* and *Scaptotrigona* from Mexico and Brazil. For this purpose, 6g of each honey sample were treated with water and chloroform, and the organic extract dissolved in CDCl₃ was analyzed with a 600 MHz NMR instrument. This procedure was fast and not invasive, as no chemical modifications occurred on the compounds of the natural mixture. An NMR-based metabolomic approach, based on the multivariate statistical analysis of the NMR acquired data, was useful for the geographical and entomological discrimination. When restricted regions were considered, such as Mexico and Brazil honey origin, the entomological discriminant character became stronger and a clear differentiation was seen between honeys produced by different bees, by the first PCA component. The pot honeys produced by two genera of stingless bee were also well differentiated. Even if applied to a limited number of samples, the purposed method was an efficient tool to cluster the entomological bee origin of pot-honey from Mexico and Brazil.

Key words: *Melipona*, NMR, pot honey, *Scaptotrigona*

0028. The first record of Bethylidae wasps in Iran

E. Sadeghi¹*, V. Baniameri², A. Marouf²

1-Entomology Department, Islamic Azad University, Arak, Iran.

2- Department of Agricultural Entomology Research, Iranian Research Institute of Plant Protection, Tehran, Iran.

Date palm production in I.R. Iran is about 900 thousands ton and only 10% of produced date of Iran is exported annually. Some factors including postharvest pests cause this situation. *Batrachedraamydraulais* a postharvest pest. The pests occur in all groves of Iran. Study on the biological control of this pest is little, so in this research parasitoid wasp of Bethylidae family was studied as a parasitoid of Lepidoptera larvae. For this reason during different month of 2008-2012, samples were collected from Shahdad, Andohjerd, Ghadamgah and 4 thfarsakh in Kerman province. *Goniozusswirskiana* were reported for the first time from Iran and *Holepyris* sp. were reported as a new genus from the Middle East. We also study some biological aspects of *Goniozusswirskiana* in laboratory settings at $26\pm 2^{\circ}\text{C}$, $65\pm 5\text{RH}$, and LD 14:10. The mean duration of the egg, larva, pupa, and the mean total development time for adult of *Goniozusswirskiana* were $1/02\pm 0/093$, $3/58\pm 0/14$, $5/80\pm 0/303$, and $13/81\pm 0/144$ days respectively. The average number of eggs on a host larva is $2/21\pm 0/35$.

Key words: *Batrachedraamydraula*, *Goniozusswirskiana*, *Holepyris* sp.

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0029. Control of eight species of important stored products pest insects with environmentally compatible compounds

Reza Sadeghi

Department of Entomology and Plant Pathology, College of Abouraihan,
University of Tehran, P.o. Box: 33955-159, Tehran, Iran.

Due to economical importance of stored product insect pests and resistance to phosphine and methyl bromide, it is necessary to replace these insect control agents with novel and suitable compounds. To this end, the toxicity of ozone, and mixture of this gas with nitrogen, phosphine and carbon dioxide were evaluated under field conditions. The adults of *T. castaneum*, *S. oryzae*, *O. surinamensis*, *R. dominica*, *L. serricorne*, *C. furrurgineus*, *C. maculatus* and 3rd instar larvae of *P. interpunctella* were exposed either solely to nitrogen or as a mixture with phosphine and ozone, carbon dioxide. These experiments were carried out either in empty storehouse or in the storehouse contained foodstuffs, such date, wheat and rice, respectively. The toxicity of the gases was determined after 24 h of exposure. Concomitantly with these trials, the lethal impact of ozone on the *S. oryzae* and *O. surinamensis* in different depths of rice, wheat and date was estimated as well. The results of empty storehouse tests revealed that, the mixture of nitrogen with phosphine caused 84.73% mortality response on *S. oryzae*. In similar experiments in the presence of foodstuffs the highest mortality rates were occurred on *S. oryzae* and *P. interpunctella* 3rd instar larvae in the depths of 30, 35 and 40 cm in date. The mixture of carbon dioxide, as well as, the mixture of nitrogen with ozone both in empty storehouse and in the presence of the foodstuffs inflicts the highest level of mortality on *P. interpunctella* 3rd instar larvae. Due to applied nature of the project, studies were oriented towards achieving reliable quantitative information. To provide the information we the different regression models were employed to the data; the best fit regression lines with higher (R^2) values were obtained using Polynomial models. Factorial experiments with ozone using *S. oryzae* and *O. surinamensis* adults revealed significant interactions between foodstuff's type and depth. Using ozone, calculated omega square (ω^2) values showed that, this criterion (ω^2) for depth of the foodstuff is (0.05) more important than the correspondence value for type of it (0.004) in preventing insect's mortality response. The parallelism and relative median potency tests revealed a non-significant difference in either case.

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0030. Synthesis, Characterization and Evaluation of Polymeric Nanoformulation for Pest Management

Sandeep Kumar¹, Gaurav Bhanjana¹, R S Jaglan¹, Neeraj Dilbaghi¹,

¹Department of Bio and Nano Technology, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India

Nanotechnology is an emerging field with enormous potential in various fields like medicine, pharmaceuticals, agriculture, electronics, composites and sensors. The potential uses and benefits of nanotechnology include insects pests management through the formulations of nanomaterials-based pesticides and insecticides, enhancement of agricultural productivity using bioconjugated nanoparticles for slow release of nutrients and water and use of nanomaterials for biosensors especially for remote sensing required for precision farming. The traditional strategies being used such as integrated pest management are insufficient and application of chemical pesticides has adverse effects on animals and human beings apart from the decline in soil fertility. Novel formulations based on nanomaterials have the potential to provide efficient alternatives for the management of pests in agriculture without much harming the nature. Conventional application of pesticides results in groundwater contamination, which is a serious issue. Polymers are a class of materials that offer range of properties which are suitable for controlled release of encapsulated material. Polymers are extensively used in healthcare sector due to their interesting properties. In the present work, pesticide (imidacloprid) loaded polymeric nanoparticles were synthesized by emulsion cross linking technology. The entrapment efficiency, loading capacity and release profile of the prepared nanoformulation has been evaluated. Particle size and stability has been evaluated using electron microscopy, particle size analyzer and zeta potential. The cytotoxicity of the prepared formulation has also been investigated. The work related to evaluation of the formulation on crop is in progress. **Keywords:** Nanoformulations, Pesticides, Polymers, Toxicity, Crop.

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0031. Toxic Effect of Some Plant Extract on The Mortality of Flour Beetle *Tribolium confusum* (Duval)(Coleoptera: Tenebrionidae)

***Hana Hashim Mohammed and **Wand Khalis Ali**

*Biology Department-College of Science-Salahaddin University-Erbil- Kurdistan Region-Iraq

**Biology Department-College of Education-Salahaddin University-Erbil- Kurdistan Region-Iraq

The study was carried out in Entomology Laboratory in Biology Department, College of Science, Salahaddin University, Erbil, Kurdistan Region, Iraq. Methanol extracts of six local plants (*Anthium graveolens*, *Apium graveolens*, *Eucalyptus glauca*, *Malva parviflora*, *Mentha arvensis* and *Zingiber officinalis*) were studied for their toxicity effect on mortality of last larval stage of *Tribolium confusum* by assessing the mortality value of larvae for different plants extract and different exposure times (1–5 hrs) and estimating the value of LT_{50} for each plant extracts. The mortality were varying from plant to plant as follows: *Anthium graveolens* reaches its maximum value of 56.67% at 4.5hrs for *Eucalyptus glauca* was 90% at 2 hrs., for *Apium graveolens* was 93.33% at 5 hrs exposure, *Mentha longifolia* was 93.33% at 4 hrs, while for *Malva parviflora* reached 96.67% at 3 hrs, and for *Zingiber officinalis* reaches its maximum value of 100 % at 2 hrs. The LT_{50} values for *T. confusum* ranged from 1.111 for *Zingiber officinale*, and 3.146 for *Anthium graveolens*. While the obtained LT_{50} values were 2.451, 1.392, 1.364 and 1.143 for *Apium graveolens*, *Mentha arvensis*, , *Malva parviflora* and *Eucalyptus glauca* respectively, the results indicate that the most toxic plant was *Zingiber officinale* while the least toxic plant was *Anthium graveolens*.

Keywords: Plant extract, *Tribolium confusum*, mortality. LT_{50}

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0032. The effect of essential oil of Indian clove, *Cynzygium aromaticum* on some physical and chemical properties of wheat

Shahrzad Mohammadi¹, Sohrab Imani¹, Maryam Setayesh far¹, Yahya Ostadi¹,

¹Young Researchers and Elites club, Science and Research Branch, Islamic Azad University, Tehran, Iran, ²Department of Entomology, Science and Research Branch, Islamic Azad University, tehran,

Iran

Wheat is one of the world's major food sources. Harvested wheat is kept in storage for a while and at this time due to various pests, it could be considerable damaged. One of the new methods for pest control of this strategic commodity is the use of botanical insecticides. Indian Clove essential oil with some medicinal properties can control a number of its pests. But it should be noticed the mentioned essential oil doesn't have bad effects on wheat. For this purpose Essential oil of *Cynzygium aromaticum* was obtained using Clevenger device by distillation with water at 100 ° C and was dehydrated with sodium sulphate. Its effects on some physical and chemical properties of wheat including fat, protein, moisture and ash content were analyzed. To measure fat, protein, moisture and ash content, Soxhlet extractor machine, 4-step method (digestion - Distillation -collected and titration), the high temperature and furnace were used respectively. A treatment of wheat (Pishtaz cultivar) was considered as the control group. The results showed that essential oil had a significant influence on the amount of fat and ash content of wheat and increased them. It is concluded that mentioned essential oil has not changed significantly, but further studies are needed.

Key words: essential oil, clove, physical and chemical properties, wheat

0033. Biopesticidal effect of Yellow Oleander, *Thevetia peruviana* (pers) on the mortality of *Holotrichia serrata* (Fab) (Coleoptera: Scarabaiedae)

Theurkar SV*, Ghadage MK, Birkhade DN and Patil SB*

* Ph. D Research Scholar, JJT University, Rajasthan, INDIA Email Id: *Head, Department of Zoology, Hutatma Rajguru Mahavidyalaya, Rajgurunagar, INDIA

Ph. D Research Scholar, JJT University, Rajasthan, INDIA Email Id: Department of Zoology, Hutatma Rajguru Mahavidyalaya, Rajgurunagar, INDIA

White grub is called as “Chaffer Beetle” or “May- June beetle”. White grub is a National pest, it has worldwide distribution. The white grub’s damage agricultural crops and there adults were feed on leaves of economical and medically important host plants like neem, babhul, ber, khair. In Maharashtra, *Holotrichia serrata* (Fab.), *Holotrichia fissa* (Br.) and *Leucopholis lepidophora* (Bl.) are important agriculture pest cause damage to commercial crops like groundnut, potato, pea, maze, sugarcane etc. The biopesticides or insecticides, an alternative to systematic insecticides and are organic, often low mammalian toxicity and less hazardous to the environment. In present study, the leaf of *Thevetia peruviana* (pers.) or *Yellow Oleander* were extracted in aqueous and treated against the adults of *Holotrichia serrata* (Fab.). After 48 hours bioassay was conducted to determine the mortality of *Holotrichia serrata* adults against aqueous leaf extract of *Thevetia peruviana* (pers.) were 0.025g/100ml. The tested aqueous leaf extract effectively produced 50% mortality of *Holotrichia serrata* (Fab.) and their toxicity was 0.025%. Leaf extract was the toxic to *Holotrichia serrata* (Fab.).

Key words: Biopesticide, National pest, aqueous extract, mortality, *Holotrichia serrata*, *Thevetia peruviana*.

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0034. Toxicity of *Datura innoxia* against the mortality of *Holotrichia serrata* (Fab)

Ghadage MK*, Theurkar SV*, Patil SB and Bhor GL

*Ph. D Research Scholar, JJT University, Rajasthan, INDIA *Ph. D Research Scholar, JJT University, Rajasthan, INDIA

Head, Department of Zoology, Hutatma Rajguru Mahavidyalaya, Rajgurunagar, INDIA

Head, Department of Botany, Hutatma Rajguru Mahavidyalaya, Rajgurunagar, INDIA

White grubs are the larvae of Scarabaeidae beetles. The white grub is a major pest problem in India as well abroad also. White grubs are pests of national importance in India and are a serious constraint to production of Kharif crops. White grub is caused heavy damage to the agricultural commercial crops and wide variety of host plants like neem, babhul, ber, khair. The *Holotrichia serrata* (Fab.) is one of the harmful agricultural pests of white grub. *Holotrichia serrata* is prevalent in Karnataka, Maharashtra, Andhra Pradesh, Tamil Nadu, kerala, South Rajasthan, Tarai belt of UP and South Bihar. In the present study, aqueous seed extract of different concentrations treatment against the mortality of *Holotrichia serrata*. The seed extract of *Datura innoxia* (Mill) at 10, 15, 20, 25 and 30g/ 100ml concentrations were incorporated; 20% or 20g/100ml concentration shows 50% mortality against *Holotrichia serrata* (Fab) adults after 96 hours explosion.

Key words: Aqueous extract, mortality, *Holotrichia serrata*, *Datura innoxia*, Kharif crops.

**

0035. Seasonal flight activity of *Lobesia botrana* (Lepidoptera: Tortricidae) and reporting two parasitoids on larva of it in Bojnourd vineyards, Iran.

Zolfaghari, M¹, J. Alavi², M. Rezaee¹

¹. Khorasan-e-shomali province plant protection office. m.zolfaghari_89@yahoo.com

²Agricultural and Natural Resources Research Center of Khorasan-e-shomali province, P.O. Box 94155-1416, Bojnourd, Iran

Grape berry moth, *Lobesia botrana*, is one of the most important pests of grape vine in most parts of the country. Losses caused by larval feeding leads to disrupted plant activities, reduction in flower buds and ultimately decrease quality and quantity of the crop. In order to study seasonal flight activity of *Lobesia botrana* and to determine spraying time, experiments were conducted for two consecutive years (during 2011- 2010) in three vine crops at two different longitudes regions as name Teimortash with 1326 and Badranloo with 909 in Bojnourd county. The seasonal flight of *Lobesia botrana* was investigated by using pheromone traps and collecting samples from eggs, larva and pupa stages of the pest. The results showed that *Lobesia botrana* has three generations with an incomplete 4th in the region. Damage of 2nd and 3rd generations were more as compared to the other generations. Regarding to the results, Badranloo region the 2nd generation peak was achieved in beginning of June and 3rd generation peak in the beginning of July and in Teimortash region, the 2nd generation peak was achieved at the end of June and 3rd generation peak was achieved in the beginning of July and in Teimortash region, the 2nd generation peak was achieved at the end of June and 3rd generation peak was achieved in the beginning of August. The distance between the attainment of peak in two regions was 2 weeks, added that *Goniozus gallicola* (Kieffer 1905) and *Goniozus audouinii* (Westwood 1874) are two ectoparasite wasp which are found on larva of *lobesia botrana* from Bojnourd vineyards.

Key words: Iran, Bojnourd, trap, phermon, ectoparasite wasp, *lobesia botrana*

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**0036. Life Fecundity Tables of Tobacco Leaf Eating Caterpillar,
Spodoptera Litura Fabricius (Noctuidae: Lepidoptera) on Bidi Tobacco,
Nicotiana Tabacum Linnaeus**

R. A. Patil¹, D. M. Mehta² And B. L. Jat*

¹Department of Entomology, B.A. College of Agriculture, AAU, Anand

²Bidi Tobacco Research Station, AAU, Anand – 388 110 (Gujarat)

*Department of Entomology, College of Agriculture, CCS Haryana Agricultural University,
Hisar-125 004 (Haryana)

Investigations on life table studies of tobacco leaf eating caterpillar, *Spodoptera litura* Fabricius (Noctuidae: Lepidoptera) were carried out on bidi tobacco (*Nicotiana tabacum* Linnaeus) cv. Anand-119 under laboratory condition at 26 ± 1 °C using BOD incubator during 2009-2010 at Bidi Tobacco Research Station, AAU, Anand. The net reproductive potential (Ro) obtained was 786.84 with a mean length of generation (T) 43.49 days. The intrinsic rate of natural increase in numbers (rm) was 0.1534 females per female per day with a daily finite rate of increased (λ) 1.1667 females per female per day and population would be able to multiply 2.94 times per week females per female per day. The hypothetical F₂ females were worked out be 619121.30.

Keywords: Life table, Laboratory, *S. litura*, Tobacco

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0037. Management protocol for the red palm weevil *Rhynchophorus ferrugineus* Oliv. (Coleoptera: Curculionidae) recently recorded in Libya

Mohamed Al-Eryan¹, Ibraheem El-Ghariani², Said Ismail³, Ayad Massry⁴, Salma Al-Taieb⁵, Soliman Raheel⁶,

¹Dept. Applied Entomology, Fac. of Agric., Alexandria Uni., Alexandria, El-Shatby, Egypt,

²Plant Protection Dept., Fac. of Agric., Omar Al-Mukhtar Uni., Al-Baidaa, Libya,

³Pest control center, Eastern region, Libyan Ministry of Agriculture., Al-Baidaa, Libya,

⁴Dept. Biology, Fac. of Science, Tobruk, Omar Al-Mukhtar Uni., Tobruk, Libya,

⁵Dept. Biology, Fac. of Science, Tobruk, Omar Al-Mukhtar Uni., Tobruk, Libya,

⁶Pest control center, Eastern region, Libyan Ministry of Agriculture., Al-Baidaa, Libya

Tobruk is a small coastal city on the Mediterranean basin. Desert surrounds the city from east, west and south. Vegetation coverage of the city is a combination of wild vegetation spots, smallholder farms, landscapes and house backyards. Date palm is one of the most popular trees in these areas. The red palm weevil, *Rhynchophorus ferrugineus* Oliv., (Coleoptera: Curculionidae), is an economically important, tissue-boring pest of date palm in many parts of the world. We detected the red palm weevil in Tobruk for the first time in January 2009. In May 2009, 40 pheromone-kiromone traps were introduced by the Pest Control Center, Libyan Agriculture Ministry. Nineteen traps were placed at 19 smallholder farms inside Tobruk city. Distance between each two traps was between 1000 - 2000 m according to the occurrence of palm trees; 14 traps were placed at 14 smallholder farms outside the city (more than 15 km from the city borders); Seven traps were placed at 7 commercial palm farms at El-Gaghboob oasis (300 km south Tobruk) to detect and monitor the activity of the red palm weevil. Data revealed that occurrence of adults was in center of Tobruk. The recorded numbers ranged between 0.33 – 7.91 adults /trap /week. Total numbers of collected adults were 565 during the period from May to October 2009. Traps placed at Tobruk borders and El-Gaghboob oasis did not record any weevil adults

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0038. Chemical components of *Cynzygium aromaticum* essential oil and its fumigant toxicity on adults of *Tribolium confusum* (Col.: Tenebrionidae)

Shahrzad Mohammadi², Sohrab Imani¹, Maryam Setayesh far², Yahya Ostadi²,

¹Young Researchers and Elites club, Science and Research Branch, Islamic Azad University, Tehran, Iran, ²Department of Entomology, Science and Research Branch, Islamic Azad University, Tehran, Iran

As a result of environmental pollution caused by conventional pesticides, in recent years essential oils are used. In addition, *Tribolium confusum* is one of the known pest insects for infesting stored commodities. So this study was performed to identify chemical components of Indian clove essential oil and its fumigant toxicity on adult of *T. confusum*. To detect the components, one microliter of the essential oil injected to GC / MS device. Also to investigate the fumigant effect of the mentioned essential oil, 100 male and female adults of *T. confusum* were held in 6 glass McCarthy with a volume of 33 ml and the insects were exposed to 151.5, 303, 606, 1515, 2121 ^{mic}/_{litr} concentrations of essential oil of Indian clove. The study was performed in three replications and in dark condition at $30 \pm 1^{\circ}\text{C}$ temperature. Mortality was recorded after 24 hours. LC50 values were calculated using Polo-PC software. Based on the results of the GC-MS 18 chemical components were identified in Indian clove essential oil. Components such as 2-methoxy-4-(2-propenyl) - phenol (Eugenol), Trans-caryophyllene and A-caryophyllene, with values of 83.13%, 12.42% and 1.69%, respectively, the highest value were allocated. Also, the mortality percentage for 151.5, 303, 606, 1515, 2121 ^{mic}/_{litr} concentrations were 10%, 10%, 70%, 70%, 80%, respectively. According to The obtained Results concluded that the insecticide effect of Indian clove essential oil compared with some other plant essential oils is not sufficient for commercial application.

Key words: Fumigant toxicity, Essential oil, *Cynzygium aromaticum*, Mortality

**

0039. Comprasion of effect of *Artemisia siberi* and *Pelargonium geranium* essential oil with Meglumine antimoniate against *Leishmania* major promastigotes

**Somayeh Layeghi ghalehsoukhteh¹, Khodadad Pirali kheirabadi¹, Hosein Hejazi¹,
Manijeh Narimani², Samira Layeghi ghalehsoukhteh²,**

Shahr e kord university, shahr e kord, Iran, ²Isfahan medicine university, Isfahan, Iran

Many of the available anti-leishmaial drugs are toxic and in certain cases parasite drug resistance is developed. The development of new compounds is urgently required. To compare the anti-leishmanial effect of *Artemisia siberi* and *Pelargonium roseum* with Meglomin antimoniate (Glucantime) a chemical drug used routinely for leishmaniasis treatment, parasites were incubated with different concentrations of the extracts (2%, 1/6%, 1/2%, 0.8%, 0.4% 0.2% and 0.1% in 1 mg/ml), and proliferation inhibitory effects were monitored after 24 h, 48 h and 72 h. These steps were done for 4 times. The results reveal that numbers of live parasites were exposed to plant extracts and Glucantime decreased significantly. The numbers of live parasite in Glucantime culture, did not decrease as much as plant extracts and showed that *P. roseum* and *A. siberi* were more effective than chemical drug. These data revealed that *A. siberi* and *P.roseum* extracts contain active compounds, which could serve as alternative agents in the control of cutaneous leishmaniasis. The activity of *P.roseum* against leishmania major promastigotes was reported for the first time in this research.

Keywords: *Artemisia siberi*, *Pelargonium roseum*, *Leishmania* major, Glucantime

**

0040. On caligonellid mites (Acari: Trombidiformes) of Iran, with description of two new species

Mohammad Bagheri¹, Naser Maleki¹, Mohammad Chanizi¹, Gholamhosein gharakhani¹, Saeed Paktinat¹,

¹University of Maragheh, Maragheh, East Azarbaijan Province, Iran

Family Caligonellidae was erected by Grandjean (1944) for a monobasic genus *Caligonella*, based upon *C. humilis* Koç, 1838. The peritremal arrangement and configuration on the dorsal surface of the stylophore are used to separate the genera. Members of the this family are relatively small, free-living predatory mites that feed on small arthropods. They often live on tree bark and in litter, soil, moss, storehouses and bird nests. In order to study the caligonellid mites of Iran, mites were collected and then extracted from soil and aerial parts of plants by using a Berlese Tullgren funnel. Specimens were cleared in Nesbitt's fluid, mounted in Hoyer's medium and slides were placed in oven at 45 °C for one week then examined at 1000× magnification under an Olympus BX41 phase contrast microscope. In this study, 3 genera and 11 species collected and identified as follows of which one species of the genus *Caligonella* and one species of the genus *Molothrognathus* are new species: *Caligonella humilis* Koç, 1838; *Caligonella* **n. sp.** *Molothrognathus azizi* Ueckermann & Khanjani, 2003; *M. bahariensis* Ueckermann & Khanjani, 2003; *M. mikaeeli* Ahaniazad & Bagheri, 2012; *M. mehrnejadi* Liang & Zhang, 1997; *Molothrognathus* **n. sp.** *Neognathus eupalopus* Meyer & Ueckermann, 1989; *N. spectabilis* Summers & Schlinger, 1955; *N. terrestris* Summers & Schlinger, 1955; *N. ueckermani* Bagheri, Doğan & Haddad, 2010.

Key words: Caligonellidae, *Caligonella*, *Molothrognathus*, Trombidiformes, Iran

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0041. On camerobiid mites (Acari: Trombidiformes) of northwest Iran, with description of new species

Mohammad Bagheri¹, Naser Maleki¹, Mohammad Chanizi¹, Gholamhosein gharakhani¹, Saeed Paktinat¹,

¹University of Maragheh, Maragheh, East Azarbaijan Province, Iran

The family Camerobiidae is the second largest family in the superfamily of Raphignathoidea after Stigmaeidae, which was designated by Southcott (1957). comprises mites with a discoidal idiosoma and slender legs, much longer than idiosoma. Member of this family are predators, preying on spider mites, false spider mites, eriophyid mites and first nymphal instars of scale insects. Camerobiidae is widely distributed and found in different habitats, such as the plants canopy, soil, grasses, straw, moss, leaf litter and bark. In order to study the camerobiid mites of northwest Iran, mites were collected and then extracted from soil and aerial parts of plants by using a Berlese Tullgren funnel. Specimens were cleared in Nesbitt's fluid, mounted in Hoyer's medium and slides were placed in oven at 45 °C for one week then examined at 1000× magnification under an Olympus BX41 phase contrast microscope. 2 genera and 12 species are described from Iran until now. In this study, one genus and four species collected and identified as follows of which one species was new and marked by asterisks. The identified mites are as follows:

Key words: Camerobiidae, *Neophyllobius*, Trombidiformes, Predatory mites, Iran

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0042. Study of Aquatic Insects found in Manmade Reservoir in Pathardi Tahasil, Ahmednagar district (MS), India

Tilekar BB^{*}, Dhamak RM and Patil SB

^{*}Research Scholar, JJT University, Jhunjhunu, Rajasthan- 333001

Head, Dept. of Zoology, Hutatma Rajguru Mahavidyalaya, Rajgurunagar, Tal- Khed, Dist- Pune 410505

Insects represent the most diverse group of organisms, not only in terrestrial but also in aquatic, especially freshwater, habitats. Among the most diverse aquatic insect orders are the Trichoptera, Diptera and Coleoptera; although Ephemeroptera can locally also be very abundant and diverse., the taxonomically best known orders of aquatic insects are the caddisflies (Trichoptera), dragonflies (Odonata) and stoneflies (Plecoptera) the Dipterans have medical importance. The interesting aquatic insect has been constantly growing in Pathardi reservoir, but scientific publications are widely dispersed and often difficult to locate. Due to the importance of aquatic organisms in environmental impact studies and biomonitoring of freshwater habitats, there is an urgent need for comprehensive studies and publications that are locally available.

Key words: Aquatic insects, abundant, ecology, life history, biomonitoring, inventory.

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0043. Biological and physiological effects of some honey bee products and its mixtures as nutritional additives on two strains of the mulberry silkworm *Bombyx mori*

Abir A. Gad

Department of Applied Entomology, Faculty of Agriculture, Alexandria University, Egypt

The effect of some honey bee products ; royal jelly (RJ 10mg/ml) , pollen (P 50mg/100ml) , propolis (PR 30mg/100ml) , honey (H 1g/100ml) and their mixtures as food additives, on several biological and physiological parameters of the 5th larval instar of (broad and local strains) of the silkworm *Bombyx mori* were studied. The above mentioned products , either separately or in combination increased weights of mature larvae, pupae, fresh cocoons and cocoon shells. Larvae fed on mulberry leaves treated with (RJ) showed a significant increase in weights followed by (H) and then (P) in the broad strain .While in the local strain,(RJ)gave the maximum weights followed by(P) and then (H). The same trend was observed in the total haemolymph protein and the CA surface area in both strains.

Key words: Honey bee products, silk production, haemocytes, *Bombyx mori*, silkworm.

0044. Laboratory evaluation of some essential oils against immature stages of the filarial mosquito *Culex quinquefasciatus* (Diptera: Culicidae)

Abir A. Gad

Department of Applied Entomology, Faculty of Agriculture, Alexandria University, Egypt

The larvicidal activity of four commercially available essential oils were tested on the 4th larval instar of *Culex quinquefasciatus* in the laboratory. These were the essential oils of *Cinnamomum osmophloeum* (cinnamon), *Matricharia chamomella* (chamomell), *Nigella sativa*(nigela) and *Sesamum indicum* (sesame) oils. The toxicity index, LC₅₀ values, LC₅₀ values were 26, 32, 82 and 26 ppm for cinnamon, chamomell, nigela and sesame oils, respectively after 48 hrs from treatment. All tested oils, at high concentrations, had high larvicidal toxicity. Furthermore, the increase of concentrations was directly proportional to reduction in pupation rates and adult emergence. Significant decrease in pupation rate was observed by cinnamon oil at 65 ppm. Adult emergence was 100% inhibited in cinnamon oil was used, especially at concentrations 50 and 6were5 ppm. The number of eggs/ female and eggs hatchability were also decreased by the application of all concentration of the tested oils. In addition, the tested plant oils exhibited various morphological abnormalities on larvae, pupae and adult stages The result from this study demonstrated that essential oil of cinnamon was the most potent oil and was the major cause of malformation of both larval and pupal stages .

Keywords: *Culex quinquefasciatus*, *Cinnamomum osmophloeum*, *Matricharia chamomella*, *Nigella sativa*, *Sesamum indicum*, larvicidal activity, Morphological abnormalities , essential oils.

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0045. Effect of starvation on digestive enzyme of female *Holotrichia serrata* (Fab) (Coleoptera: Scarabaeidae)

Sanjay Kharat¹, Dyandev Mhaske¹, Sakharam Patil¹, Sagar Theurkar¹, Mahesh Ghadage¹, GP Bhawane¹,

¹*Modern College, University of Pune, Pune, Maharashtra, India*

Freshly emerged female of *Holotrichia serrata* (Fab) were selected from groundnut, maize, potato, sugarcane growing area of Khed Tahasil in the first week of June after first monsoon shower used in the starvation experiment. The duration of starvation is 15 days. Well-fed individuals on the leaves of Neem served as control. The effect of starvation on the digestive enzymes of female *Holotrichia serrata* (Fab) shows that there are general considerable reductions in enzymatic activities except in a lipase in both gut sections; however there are considerable increases of soluble proteins, both the gut section homogenates of starved female. The maximum reduction of protease is 83% in a hindgut and 86% in mid gut followed by invertase which is 59% in a mid gut and 50% in hindgut and trehalse 62% hindgut and 51% in mid gut. The lipase is 80% reduction in a hindgut and 41% in mid gut in a starved female. In starved female, Lipase showing the significant decrease in activity of 11% in a hindgut and 5% increasing in midgut.

Keywords: Starvation, enzymes, *Holotrichia serrata*, Coleoptera: Scarabaeidae

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0046. Invasion of the spiralling whitefly *Aleurodicus dispersus* (Hemiptera: Aleyrodidae) in mangrove habitats of south India

T. Amuthavalli,¹ T.G.Revathi² and R.Sundararaj³

^{1&3} Forest and Wood Protection Division, Institute of Wood Science and Technology, 18th Cross, Malleswaram, Bangalore, India 560 003.

² Loyola College, P.G. & Research Department of Advanced Zoology and Biotechnology, Chennai 600 034, Tamil Nadu, India.

Mangroves are unique wetland forests consists of a variety of flora, fauna and microbes. The mangroves in India covering 4,471 sq. m. spanning across 9 states and 3 union territories play a vital role in biodiversity of costal India. These unique coastal forests are among the most threatened habitats in the world. In the recent years anthropogenic pressures have significantly damaged the mangroves the world over. Besides bioinvasion is fast becoming one of the world's most costly ecological problems, as it disrupts agriculture, alters ecosystems, spreads disease and interferes with shipping. The spiraling whitefly *Aleurodicus dispersus* Russell (Hemiptera: Aleyrodidae) is one such organism that invaded India. The spread of this whitefly was successful mainly due to its polyphagous nature and prolific breeding. It is reported to breed on 481 host plants throughout the world. In India, it has been reported on over 320 plant species belonging to 225 genera and 73 families. In the present study surveys were conducted for two years from 2011-12 to document the whitefly fauna in mangrove habitats of south India covering the states of Andhra Pradesh, Goa, Karanataka, Kerala, Odisha and Tamil Nadu. The survey indicated breeding of 12 species of whiteflies on 11 species of mangrove plants. Among them the report of whiteflies on four mangrove plants viz., *Acanthus ilicifolius*, *Avicennia officinalis*, *Bruguiera gymnorrhiza* and *Rhizophora apiculata* form first records. *Excoecaria agallocha* was found infested with five species of whiteflies followed by *Derris trifoliata* with three species, *Rhizophora mucronata* with two species and the remaining plants each with one species. Among the whiteflies the invasive species *Aleurodicus dispersus* Russell was found breeding on six mangrove plants in which its report on *Acanthus ilicifolius*, *Avicennia officinalis*, *Bruguiera gymnorrhiza*, *Rhizophora apiculata* and *Rhizophora mucronata* form first records. The study revealed that *A. dispersus* is increasing its host range and the findings are discussed in this communication.

Key words: Bioinvasion, *Aleurodicus dispersus*, Mangrove habitats, India.

**0047. Study the effect of ozone as non-chemical control of storage pests
on *Tribolium confusum***

Fahime Taheri Anaraki¹, Sohrab Imani¹, Reza Famil Momen¹,

¹Science And Research Branch Islamic Azad University of Tehran, Tehran, Iran

Ozone, as a non chemical pest controls and safe application progressively considered in food manufacture. *Tribolium confusum* is one of the important storage pests that create high damage. In the present study, the effect of ozone time rating and its concentration on *Tribolium confusum* has been studied. The rate of mortality increases by enhancing of ozone exposure time, concentration and time consuming after ozone exposure. The rate of mortality was calculated by three replicate for concentrations of: 1335.6, 2671.2, 4006.4, 5342.4 and 6678 ppm; in 40, 60, 80 and 100 minutes. Our results show that the rate of mortality increases directly by ozone exposure time, concentration and time consuming after ozone exposure. However, the effect of ozone exposure time was higher at concentration of 6678 and 534.4 ppm. Our calculated CT showed higher mortality rate in concentration of 5342.4 ppm, at 80 minute.

Keywords: Ozone, pest control, concentration, time.

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**0048. Systematic study on the various tribes of Tettigoniinae
(Tettigonioidea: Orthoptera) of Pakistan**

Riffat Sultana, Muhammad Saeed Wagan and Waheed Ali Panhwar
Department of Zoology, University of Sindh, Jamshoro, Pakistan

Tettigonioidea are phytophagous insects amongst them some are important pests of agriculture crops while many species are ecologically associated with forest biocenoses, damaging trees and shrubs. In addition to herbaceous plants, these facts extend the range of injurious plants to forest, fruits orchards, berry shrubs and grasses. Tettigonioidea occupies a large area but it is very faunistic that, their taxonomic studies are very limited from this area. At the present 3 species viz: *Calopterusa balucha* (Uvarov, 1932) belonging to tribe Drymadusini, *Platycleis intermedia* (Serville, 1839) of Platycleidini and *Gampsocleis akbari* of Drymadusini was reported. *G. akbari* recorded as new species to science while ♀ of *C. balucha* is described for the first time from this area. In addition to this, simplified taxonomic keys based on the easily recognizable morphological characters and supported by appropriate illustrations are also provided for the separation of various tribes. The correct identification of species obtained from this study will be instrumental in understanding and devising the population management strategies to adopt control measures at appropriate time.

Key words: Tettigonioidea, phytophagous, pest, agriculture crops, biocenoses, tribe, new species

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0049. Reproductive Synchronization and Biocontrol Potential of *Dinarmus Basalis* (Rondani), A Koinobiont Parasitoid of Bruchid Pests

D R Thakur

Department Of Biosciences, Himachal Pradesh University, Shimla - 5, India

Bruchids (Coleoptera: Bruchidae) cause heavy loss to stored legumes during monsoon and reasonably less throughout the year. *Callosobruchus maculatus* and *C. chinensis* serious pests of stored legumes, *Phaseolus mungo*, *P. aureus* and *Vigna sinensis* and many more edible legumes showed complete development and repeated generations in the absence of parasitoid. But reproductive strategies and biocontrol potential of *Dinarmus basalis* (Rondani) (Hymenoptera: Pteromalidae), a koinobiont parasitoid of many stored product pests disrupted the development of both pest, *C. maculatus* and *C. chinensis* in between. Early developing stages of parasitoid utilized the late developing stages of host insect for its growth and development. Female parasitoid precisely searched the developing stages of host insects inside the seeds and utilized the ovipositor initially for drilling and then placing the eggs on or close to the larval body. The most preferred and susceptible stages for oviposition and development were fourth instar larvae and prepupae of both the host species. The larval pupal development of parasitoid was 7.8 ± 1.4 and 17.2 ± 2.4 on *C. chinensis* and 6.8 ± 0.8 and 13.4 ± 1.4 days on *C. maculatus* and total development period was 29.7 ± 2.3 and 27.3 ± 1.3 days respectively. Parasitoid larvae completed their development at the cost of host larvae and pupae and kill them during metamorphosing into adults. The tendency of parasitoids to use the host stages for its own development could be exploited at a large scale for the biological control of bruchids and other stored product pests.

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0050. Experimental study of vertical transmission of Chikungunya virus in Malaysia strain of *Aedes albopictus* Skuse

**Rozilawati Harun¹, Tanaselvi Kanesan¹, Nazni WA¹, Mohd Masri S¹, Zairi Jaal²,
Lee HL¹,**

¹Institute for Medical Research, Kuala Lumpur, Malaysia, ²Universiti Sains Malaysia, Pulau Pinang, Malaysia

Chikungunya virus, an arbovirus is transmitted primarily by *Aedes. sp* mosquitoes. Several possibilities for the virus's survival in nature have been reported by researchers, one of which is transovarial transmission. While transovarial transmission has been reported in dengue virus, similar phenomenon is not known for Chikungunya virus. In order to determine the susceptibility and the possibility of transovarial transmission of Chikungunya virus, a laboratory study was conducted using a local laboratory strain of *Aedes albopictus*. A total of two hundred mosquitoes were orally fed with human isolates of Asian and Central/East Africa genotype CHIKV via artificial membrane feeding. Each species were individually separated after the feeding and set for egg laying. The infected mosquitoes were then maintained in the laboratory for two gonotrophic cycle. Two assays were conducted, firstly the mosquitoes were orally infected with infectious blood for first gonotrophic cycle and after 7 days they were given a clean blood meal for the second gonotrophic cycle. For the second assay, the mosquitoes were orally fed with clean blood for first gonotrophic cycle and then have the infected blood for the second gonotrophic cycle. All the adults were screened for the virus. Eggs produced in each gonotrophic cycle for both assays were counted and allowed to hatch.

0051. Insecticide Resistance Monitoring in Malaria Vectors in Kilifi County, along the Coastal Kenya

**Daniel munywoki¹, joseph mwangangi², elizabeth kokwaro¹,
charles mbogo²,**

¹Kenyatta university, nairobi, Kenya, ²KEMRI/wellcome trust research programme, Kilifi,
Kenya, Kilifi, Mombasa, Kenya

Vector control is an effective way of reducing malaria transmission. Control programmes in sub-Saharan Africa continue to rely heavily on indoor residual spraying (IRS) or insecticide-treated nets (ITNs), both of which depend on vector susceptibility to the insecticides used. The main vector control method along the coastal strip of Kenya is the use of long-lasting insecticide nets (LLINs). Unfortunately, the high level of pyrethroid resistance in *Anopheles gambiae* sensu lato (s.l.), threatens to undermine the success of pyrethroid treated nets. Here baseline data are presented on the insecticide resistance status in malaria vectors of Kilifi county, along the coastal Kenya.

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0052. Lethal and sublethal effects of methoxyfenozide and pyridalyl on *Habrobracon hebetor* Say (Hymenoptera: Braconidae)

Moosa Saber, Zahra Abedi, Vahid Mahdavi

Department of Plant Protection, College of Agriculture, University of Maragheh,
Maragheh, Iran,

Habrobracon hebetor Say is an ectoparasitoid that is used for controlling in inundative biological control program of various lepidopteran insect pests. Lethal and sublethal effects of two biorational insecticides methoxyfenozide and pyridalyl were evaluated on *H. hebetor* under laboratory conditions at $26\pm1^{\circ}\text{C}$, $70\pm5\%$ RH and a photoperiod of 16:8 (L:D) h. The adults were exposed to fresh residues of the insecticides applied on glass plates. Bioassay tests results showed that the LC_{50} value of methoxyfenozide and pyridalyl were 155.02 and 1226 $\mu\text{g a.i./ml}$, respectively. In order to assess the sublethal effects, adult wasps were exposed to an LC_{30} of each insecticide for appropriate time of exposure and then the demographic parameters of live wasps were studied. The sublethal effects study results showed that methoxyfenozide and pyridalyl negatively affected the fecundity, fertility and sex ratio of females and also the intrinsic rate of increase (r_m), finite rate of increase (λ), generation time (T) and doubling time (DT). The r_m values following exposure to methoxyfenozide, pyridalyl and control were 0.154, 0.144 and 0.179 female offspring per female per day, respectively. The longevity and net reproductive rate (R_0) of *H. hebetor* were not affected by the insecticides. The results showed that despite low acute toxicity of both insecticides on adult stage of *H. hebetor*, they may adversely affect the population of the parasitoid and interfere in IPM programs.

Keywords: acute toxicity, IGRs, insecticides, population parameters, side effects

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0053. Effects of emamectin benzoate and abamectin on the life parameters of the cowpea weevil, *Callosobruchus maculatus* F. (Coleoptera: Bruchidae)

Ehsan Parsaeyan¹, Moosa Saber¹, Samad Vojoudi¹ and Reza Navaei²

1-Department of Plant Protection, College of Agriculture, University of Maragheh,
Maragheh, Iran

2- Department of Plant Protection, College of Agriculture, University of Bu-Ali sina,
Hamedan , Iran

Cowpea weevil, *Callosobruchus maculatus* F. (Coleoptera: Bruchidae) is a polyphagous and cosmopolitan insect pest that causes damages on the stored pulses such as bean, cowpea, lentil, chickpea or other legume grain. Biorational insecticides have a unique mode of action with a very low toxicity to mammalian and may be useful for controlling the pest. In current research, lethal and sublethal effects of emamectin benzoate and abamectin were determined against adults of *C. maculatus* at $26\pm1^{\circ}\text{C}$, $70\pm5\%$ RH and photoperiod of 16:8(L:D)h. The LC_{50} values of emamectin benzoate and abamectin were 8.8 and 4.9 $\mu\text{g a.i./ml}$, respectively. For studying the sublethal effects of the insecticides, cowpea weevil adults were exposed to LC_{20} of emamectin benzoate and abamectin (4.3 and 2.2 $\mu\text{g a.i./ml}$, respectively) and life table parameters were evaluated. The results showed that the mean longevity was 3.9, 8.8 and 11.3 days, the mean fecundity was 13, 24.7 and 55.2 eggs and the mean fertility was 8.7, 17.2 and 44.4 in emamectin benzoate, abamectin and control, respectively. The results showed that both of insecticides negatively affected biology of *C. maculatus* and had a strong potential for controlling cowpea weevil in stores.

Key words: *Callosobruchus maculatus*, biorational insecticides, Longevity, lethal and sublethal effects

0054. Influence of methoxyfenozide and pyridalyl on life parameters of cotton bollworm, *Helicoverpa armigera* (Lepidoptera: Noctuidae)

Ehsan Parsaeyan, Moosa Saber, Zahra Abedi, Samira Bahrimotlagh
Department of Plant Protection, College of Agriculture, University of Maragheh,
Maragheh , Iran

The cotton bollworm *Helicoverpa armigera* (Hübner) is one of the major devastating and highly polyphagous insect pests in many parts of the world. This species has a high potential for population increase and outbreak on different host. Using new types of insecticides, originated from natural agents or products that disrupt the physiological processes of the target pest, could be useful as an alternative for the integrated management approach. In this study, lethal and sublethal effects of methoxyfenozide (Runner 2 F)[®] and pyridalyl (Sumipleo)[®] were evaluated on biology of *H. armigera*. Bioassay tests carried out by oral method and the artificial diet glomeration at 26±1°C, 70±5% RH and a photoperiod of 16:8 h (L: D). The LC₅₀ values for methoxyfenozide and pyridalyl were 34.6 and 105.4 µg a.i./ml, respectively. For studying the sublethal effects, the third larvae were allowed to feed on the treated diet with LC₃₀ of methoxyfenozide and pyridalyl (15.2 and 57.5 µg a.i./ml, respectively) in individual vial cells for 96 hours. Then, the survivors were kept on artificial diet until adult emergence of *H. armigera*. The results showed that sublethal concentration of the insecticides had a significant effect on duration of larval and pupal stage compared with control. The means of larval weight was 19.8, 3.6 and 4 mg and the means of pupal weight was 280.2, 215.7 and 236.1 mg and the mean of female longevity was 18.8, 9.5 and 13.8 days in control, methoxyfenozide and pyridalyl, respectively. The mean fecundity was reduced by 55.2% and 50.8% in methoxyfenozide and pyridalyl-treated insects compared to control, respectively. Also the LC₃₀ value of methoxyfenozide and pyridalyl reduced egg hatching by 66.9% and 48.8%, respectively, in comparison to control. The results showed that both insecticides negatively affected biology of *H. armigera* and these are an excellent alternative to conventional pesticides.

Key words: Cotton bollworm, Methoxyfenozide, Pyridalyl, Life parameters, Lethal and sublethal effects

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0055. Isolation of plant-derived insecticides from leaves of *Lantana camara* for control of stored grain insect pests

Yallappa Rajashekar

¹Animal Bioresources Programme, Institute of Bioresources and Sustainable Development, Department of Biotechnology, Govt. of India, Takyelpat, Imphal-795001, Manipur India

Insect infestation control of stored grain is primarily achieved by the use of synthetic gaseous insecticides such as methyl bromide and phosphine. In several countries including India, mixing of any synthetic insecticide with stored grain is not permitted. Due to environmental concerns, health hazards to man and the evolution of resistance in insect pests, there have been constant efforts to discover newer insecticides both from natural sources and by chemical synthesis. Natural sources for novel molecules hold promise in view of their eco-friendly nature, selectivity and mammalian safety. We have isolated one natural bioactive molecule from the leaves of *Lantana camara* named Coumaran, based on various physico-chemical and spectroscopic techniques (IR, ¹H NMR, ¹³C NMR and mass). Coumaran is highly toxic and very low concentration is needed for control of stored product insects. Coumaran is selective insecticides with a average margin of safety to mammals and showed promise as novel fumigant candidate for grain protection.

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0056. Eucalypts gall wasp management in nurseries

J. Prasanth Jacob*, N. Krishnakumar, S Hariharan and K. Senthil

Institute of Forest Genetics and Tree Breeding, Coimbatore-641 002

The invasive Eulophid gall wasp *Leptocybe invasa* (Hymenoptera: Eulophidae) is damaging extensive areas of less than one year old Eucalyptus plantations, coppice shoots and nursery stock by inducing galls on the shoots of *E. camaldulensis* and *E. tereticornis*. In plantations susceptible Eucalyptus clones suffer loss of vigour resulting in retarded growth and poor stem form and in nurseries there is a total loss of quality planting material. Because of thelytokous type of reproduction *L. invasa* is invading new biogeographical regions, where clones of *Eucalyptus* are raised for commercial purposes. The magnitude of the damage in nurseries and young plantations necessitates increased efforts to reduce the incidence and impacts of this pest. Considering the adverse impacts of chemical pesticides and the difficulty in application in vast areas of plantations besides the concealed nature of the pest inside the gall, more reliable and feasible methods have to be identified for gall wasp management particularly in nurseries. Identification of integrated management measures for Eucalyptus gall wasp was attempted in nurseries involving methods like traps, plant based extracts and pesticides. Feasible methods standardized are discussed in this paper. Deployment of appropriate methods will help in reducing the high cost of containing the pest in outbreak situations and avoid loss of planting material by state Forest Departments, Corporations and Farmers raising commercial *Eucalyptus* plantations.

Key words: gall wasp, eucalyptus, management methods.

0057. Parasitoids of synanthropic flies: advanced identification methods using an integrated approach

**Mircea-Dan Mitroiu, Lucian Fusu, Ovidiu Popovici and
Maria Magdalena Dascalu**
Ioan Cuza University, Iasi, Romania

The synanthropic flies are insect pests that develop in relation to some major human activities such as food processing and conservation, and animal husbandry. They cause major health problems to both humans and livestock e.g. nuisance and irritation, pain, weight loss, transmission of various pathogens etc. The control of these insects is usually problematic since it is based mainly on chemical insecticides that are also a threat to humans and livestock and usually cause resistance of the pest. An environmental-friendly alternative to chemical control is biological control, which uses the natural enemies of the pests. In the case of the synanthropic flies, most natural enemies are small parasitoid wasps (Hymenoptera) that develop as larvae in flies' puparia and finally kill them. However, one of the greatest obstacles in the successful rate of many biological programs is considered the poor taxonomic knowledge of the parasitoid groups involved, which is mainly caused by the lack of taxonomic expertise. The current identification methods of the parasitoid wasps are based almost exclusively on morphological characters. These are often difficult to assess and only a trained eye can separate closely related species. Cryptic species complexes can also occur in an unknown percentage. The DNA barcoding basically proposes to use a short DNA fragment of the COI mitochondrial gene to enable the correct identification of a specimen. We here propose an integrated approach to the taxonomy of the parasitoid wasps from the families Pteromalidae and Diapriidae using a combination of detailed morphology and DNA barcodes. Hopefully, this approach will prove to be a powerful tool for a correct identification of the parasitoid wasps, which could be used for other taxonomically difficult groups of insects.

Key words: Diapriidae, Diptera, DNA barcoding, Hymenoptera, morphology, parasitoid, Pteromalidae, synanthropic fly.

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0058. Attraction of the Western Flower Thrips, *Frankliniella occidentalis* (Thysanoptera: Thripidae) to the Flowering Chrysanthemum Trap Plant

YongSeok Choi¹, DeogGee Park¹, InSu Hwang¹, YunGyu Nam¹, KwangRyul Choe¹,

¹ChungCheongNamDo Agricultural Research & Extension Services, Yesan,
Republic of Korea

Frankliniella. occidentalis reached is major pest in chrysanthemum in world wide. The density of *F. occidentalis* increased continuously in spite of the periodical chemical control after planting in this study. *F. occidentalis* began to increase mid-May. The numbers of *F. occidentalis* collected on a tray with wet paper by heating the flowers of pink, white, and yellow Chrysanthemum standard mums were 18.4, 56.6, and 52.6 in flowering season. Also, The numbers were 15.2, 45.8, and 41.6 in bud season, but in the case of the leaves, the numbers were 2, 8.8 and 3.4. In the Y-tube olfactometer test, the frequency of *F. occidentalis*' visits to one side arm of the Y-tube olfactometer was higher in the odor cue of the white flower than of the yellow, red, and violet flowers, but the frequency was higher in the odor cue of the violet and red flowers than of the yellow without white. In the case of the four-choice olfactometer test, in the same visual cues as the odor cues of the pot mum flowers, the frequency of *F. occidentalis* was higher in the yellow flower than in the other flowers (white, red, and violet) in all the observation times (10, 15, and 20 minutes).

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0059. Sand Flies of the Subgenus *Adlerius* (Diptera: Psychodidae) in an Endemic Focus of Visceral Leishmaniasis and Introduction of *Phlebotomus (Adlerius) comatus* as a New Record for Iran

Alireza Zahraei-Ramazani¹, Dinesh Kumar¹, Mohammad Reza Yaghoobi-Ershadi¹, Abdollah Naghian¹, Reza Jafari¹, Mohammad Reza Shirzadi¹, Hamid Abdoli¹, Hassan Soleimani¹, Maryam Ghanei¹, Mohammad Hossein Arandian¹, Ahmad Ali Hanafi-Bojd¹,

Banaras Hindu University, Varanasi, Uttar Pradesh, India,

²Tehran University Of Medical Sciences, Tehran, Iran

Sand flies of subgenus *Adlerius* has a wide geographical distribution in Iran and are mostly found in wild form in mountainous areas. They are always considered as probable vectors of visceral leishmaniasis. The objective of this study was to determine the *Adlerius* species and its composition in an endemic focus of zoonotic visceral leishmaniasis in northwest of the country. Sand flies were collected from 6 different areas of Azarbaijan-e-Sharqi Province using sticky paper traps from August to September which is active season for sand flies in this area, in 2009. The flies were mounted and identified. The length of third antennal segments, ascoid, labrum, coxite, surstyle, style, aedeagus, genital filament, genital pump, width of style, and the end of aedeagus were measured and the number of costal hairs group was also counted as the morphological characters. A total of 30 adults and flies, (26 males and 4 females) including *Phlebotomus halepensis* (46.8%), *P. longiductus* (13.3%), *P. balcanicus* (23.3%), *P. comatus* (3.3%), and *Adlerius* spp. (13.3%) belong to subgenus *Adlerius* were identified respectively in 6 counties. One *P. comatus* male was captured in front of a cave located in the hillside of a mountain covered with the vegetation in Varzeqan area. The presence of at least 5 species of the subgenus *Adlerius* in Azarbaijan-e-Sharqi Province, an endemic focus of zoonotic visceral leishmaniasis in Iran, shows that the risk of parasite transmission among man and reservoir animals is high during the active season of sand flies. *P. comatus* is a new record for Iran and needs to be added to the list of Iranian Phlebotomines of subgenus *Adlerius*.

Keywords: *Phlebotomus (Adlerius) comatus*, Phlebotomine sand flies, visceral leishmaniasis, new species, Iran

**

0060. Genetic Diversity Based on Morphometric Analysis of Honey Bee Population of Khairpur in a Global Context

Rajper Naheed^{*} and Shakeel R. Farooqi^{}**

Department of Genetics, University of Karachi, Pakistan

Honey bees are described by genetic and morphological diversity. This study addresses partitioning the morphometric variance within and between honey bee populations and find the relationship between different honey bee populations. For this purpose, morphometric data of honey bee from five other studies were taken and compared with that obtained from district Khairpur. A total of fourteen characters of one hundred worker bees from Khairpur were studied and only common characters from Khairpur and world datasets were used for comparative study which were fore wing length, tibia, femur and metatarsus lengths. The data was organized and analyzed by Multivariate Statistical Analysis, Mean, Standard deviation, Principle Component Analysis (PCA), Discriminant Function Analysis (DFA) and Cluster analysis (CA). Statistical results showed that significant differences were present in Khairpur honey bee populations and other honey bee data sets from Ilam, Khuzestan, Bushehr, Hormuzgan, Cambodia, N. India, S. India, Srilanka, Iran, Mayanmar, Nepal, Oman, Pakistan, Thailand and Vietnam. Principle component analysis placed all the honey bee groups in four separate morphoclusters, the PC1 accounted for 51% variation in data and was mainly associated with Metatarsus length, whereas PC2 accounted for 29% of the variation associated with forewing length. Dendarogram constructed from a cluster analysis for the samples previously defined formed three main groups.

Key words: Khairpur, Morphometric analysis, Multivariate analysis, Dendarogram.

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**0061. Low temperature induces embryonic diapause in the spider mite,
*Eotetranychus smithi***

Tetsuo GOTOH and Yasunobu KAMEYAMA

Laboratory of Applied Entomology and Zoology, Faculty of Agriculture, Ibaraki University,
Ami, Ibaraki 300-0393, Japan

The spider mite, *Eotetranychus smithi* Pritchard & Baker (Acari: Tetranychidae) exhibits a facultative diapause that occurs at the egg stage. Diapause was induced by low temperatures alone ($\leq 17.5^{\circ}\text{C}$) and averted by high temperatures ($\geq 20^{\circ}\text{C}$). Photoperiod had little effect on diapause induction. This is the first example of temperature-induced diapause in spider mites. The diapause eggs became larger and darker (orange) than non-diapause eggs (white to pale yellow), suggesting that egg size and egg color are associated with diapause. When mites that were reared from eggs at 25°C and 16L:8D h were transferred to 15°C and 16L:8D h just after start of the teleiochrysalis stage (the final molting stage before adulthood), all females laid non-diapause eggs during the first 30 days and then switched over to laying diapause eggs. The switch to diapause may be caused by the aging of mothers.

Keywords: Acari, *Eotetranychus smithi*, overwintering, aging, life-history strategy, strawberry

**

0062. Effects of gibberellic acid (GA₃) on hemolymph free amino acids of *Galleria mellonella* L. (Lepidoptera: Pyralidae)

Hulya Altuntas¹, Fevzi Uckan², Yavuz Kilic¹, Ekrem Ergin³,

¹Anadolu University, Eskisehir, Turkey, ²Kocaeli University, Kocaeli, Turkey, ³Gulhane Military School, Ankara, Turkey

The impacts of the plant growth regulator, gibberellic acid (GA₃) given in diet on the quantity of hemolymph free amino acids were investigated using *Galleria mellonella* L. (Lepidoptera: Pyralidae) larvae. To investigate the effects of different doses of GA₃ (50 to 5,000 ppm), hemolymph free amino acids were analyzed using high performance liquid chromatography, and eighteen different free amino acids were detected in the hemolymph of treated and untreated larvae. The amount of serine, asparagine, glycine, isoleucine, leucine, and phenylalanine displayed differences only among doses in treatment groups. However, exposure to different GA₃ doses resulted in remarkable differences in the amounts of histidine, threonine, alanine, proline, tyrosine, methionine, tryptophan, and lysine in larval hemolymph when compared to control and among doses. Our study indicated that application of GA₃ resulted in different effects in the quantity of free amino acids associated with energy metabolisms of the insects.

Keywords: *Galleria mellonella*, Gibberellic acid, Hemolymph, Free amino acids

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0063. Effects of gibberellic acid (GA₃) on hemolymph proteins of the endoparasitoid *Pimplaturionellae* L. (Hymenoptera: Ichneumonidae)

Hülya Altuntaş¹, Yavuz KILIÇ¹, Fevzi UÇKAN², Ekrem ERGİN³

¹Department of Biology, Faculty of Science, Anadolu University, Eskişehir, 26470, Turkey

²Department of Biology, Faculty of Science-Literature, Kocaeli University, İzmit – Kocaeli, 41300, Turkey

³Gülhane Military Medical Academy, Nursing School, Ankara, 06018, Turkey

The non-target effects of the plant growth regulator, gibberellic acid (GA₃) on the hemolymph protein profile were investigated using the endoparasitoid *Pimplaturionellae* (Hymenoptera: Ichneumonidae) reared on its host *Galleria mellonella* (Lepidoptera: Pyralidae) treated with different doses of the GA₃ in diet. Hemolymph proteins were analyzed using spectrophotometry and sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). SDS-PAGE (10% acrylamide) was carried out with the method described by Laemmli. The gel was subsequently scanned using an Uvitec Gel Documentation (BioLab) system and the optical densities (OD) of the bands were analyzed by Gel-Pro Analyzer. Exposure to different GA₃ doses (50 to 5,000 ppm) resulted in a remarkable difference in the quantities of some proteins from larval hemolymph when compared with those of controls. Of the eighteen different protein bands detected at a range of 20.5 to 252.6 kDa in hemolymph, there were only changes in OD values of bands at 252.6, 207.9, 167.9, 105.2, 59.5, 55.0, 43.0, 31.6, 28.2, 23.7 and 22.6 kDa following GA₃ treatment. There were no qualitative changes in terms of novel protein bands in the hemolymph of larvae post treatments. Applications of GA₃ only lead up- or down- regulation of these proteins. Thus, we favor the possibility that quantitative changes in the host plasma may include alterations in the amount of juvenile hormone esterase, apolipophorin-I, apolipophorin-II and storage proteins. Therefore, we suggest that the increase or decrease in the amount of hemolymph proteins in larvae may indicate a physiological adaptability to compensate for GA₃-induced stress.

Key Words: *Pimplaturionellae*, Hemolymph proteins, Gibberellic acid

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0064. Molecular phylogeny of spider mites (Acari: Tetranychidae) inferred from 18S and 28S ribosomal RNA sequences

T. Matsuda¹, M. Morishita¹, Y. Kitashima¹, N. Hinomoto² & T. Gotoh¹

¹Laboratory of Applied Entomology and Zoology, Faculty of Agriculture, Ibaraki University; Ami, Ibaraki, 300-0393; Japan; ²NARO Agricultural Research Center, National Agriculture and Food Research Organization, Tsukuba, Ibaraki 305-8666, Japan.

The spider mite family Tetranychidae comprises about 1,200 species, including the most injurious plant-feeding mites. As for many other organisms, molecular information of spider mites is increasingly used to answer taxonomic and systematic questions. The cytochrome *c* oxidase subunit I (COI) gene of mitochondrial DNA and the internal transcribed spacer (ITS) of nuclear ribosomal RNA gene are being used for species identification and phylogenetic reconstruction within the family Tetranychidae. Although the ITS region and COI gene are effective for differentiation among some closely related species, these sequences have not consistently resolved genus-level phylogenetic relationships, because of low bootstrap values. More useful for resolving higher-level phylogeny, in this case among genera of Tetranychidae, may be 18S and 28S rRNA genes. Therefore, we determined sequences of 18S and 28S rRNA genes of 87 spider mite species belonging to 15 out of the 17 Japanese genera and examined their phylogenetic relationships. Some genera, such as *Bryobia*, *Aponychus*, *Sasanychus*, *Panonychus*, *Stigmaeopsis* and *Amphitetranynchus*, appeared to be monophyletic with high bootstrap values. On the other hand, the four genera, *Schizotetranychus*, *Eotetranychus*, *Oligonychus* and *Tetranychus*, were polyphyletic, suggesting that the diagnostic morphological characters of species of these four genera should be reconsidered.

Key words : Tetranychidae, Phylogenetic analysis, ribosomal RNA gene

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0065. Efficiency of Some Natural and Bioagant Compounds in Controlling the Grape Moth, *Lobesia Botrana* Den and Schiff (Lep., Tortricidae) , with Reference to Assessment of Losses in Grapes Crop.

Osman Ahmed Osman Zaghloul¹,

¹Faculty of agriculture Saba basha, Alexandria university, Saba basha,
Alexandria, Egypt

Field experiments were carried out in a commercial vineyard near Alexandria city, Egypt. Five insecticides as treatments were evaluated for their efficiency in controlling the grape moth , *Lobesia botrana* in the subsequent years of 2011 and 2012. The adopted treatments were as follows: (T1) included the inundative release of the indigenous egg parasitoid, *Trichogramma bourarachae*, (T2) concentrated on the use of the sweetened bioagent, Dipel - 2x[®], (T3) referred to the use of the recommended dose of the natural insecticide “Spinosad[®]”, (T4) represented the application of the combined bioagents *T. bourarachae* +full dose of Dipel-2X[®] in a certain valid schedule, and (T5) as untreated check. Treatments followed the randomized block design (RBD), with four replicates. Pheromone traps were installed to detect and count the males of the assigned insect-pest for determining the proper time for initiating the control regime. Data revealed that all the aforementioned treatments reduced the infestation at varied extents. For example, the mean infestation percentages of grape bunches were 13.40, 12.70 , 5.64 and 0.00 for the treatment T1,T2 ,T3 and T4, in respect , whereas (T5) witnessed the highest infestation of 60.50%.The corresponded values of the mean losses in grapes were 1.34, 1.20, 0.60 and 0.00 ton/fed. for the same treatments, respectively, compared with 6.10 ton /fed. in the untreated check. Based on the control costs and grapes crop revenues, the economics and profits of each treatment were worked out to indicate the most profitable one for the grower. Detailed results were statistically analyzed and discussed.

Key words: natural, bioagents, control, lobesia botrana and losses.

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0066. The efficacy of acetamiprid[®] on some physiological phases of the common pistaciae psylla, *Agonosцена pistaciae* Burckhardt and Lauterer, under laboratory conditions

Mahshid Sarnevesht¹, Hamzeh Izadi¹, Mohammad Amin Jalali¹,

¹Valy-E-Asr, Rafsanjan, Iran

The common pistachio psylla, *Agonosцена pistaciae* Burckhardt and Lauterer (Hem: Psyllidae) is known as a key pest of pistachio orchards in Iran. In this study, effect of acetamiprid (a neonicotinoid insecticide) was investigated on some physiological aspects of the fifth instar nymphs of *A. pistaciae* by measuring glycogen, glucose, lipid and protein contents. The 5th instar nymphs dipped in insecticide (sub lethal dose, 300 mg/l) for 3s. Treated nymphs allowed to air dry and then located on the pistachio leaves in controlled conditions (27±2 °C, 60±5 RH and 16:8 h L:D). The effect was studied in 24, 48 hours after treatment. Low molecular weight carbohydrate (glucose) as well as glycogen and lipid contents were measured by a methods described by (Warburg and Yuval, 1996). Protein content of whole body was measured by Lowery method (Lowery et al., 1951). Glycogen content of treated nymphs 24 after treatment (9.18±0.85 mg/g fresh body weight) and 48 hours after treatment (16.1±0.28 mg/g fresh body weight) was significantly lower than control (9.51±0.88 and 16.8±1.97 mg/g fresh body weight) but after 48 hours protein contents is changes (acetamiprid 14.59±0.73 and control 10.51±0.55) but no significant difference was observed between protein (after 24 hoysr), lipid and glucose contents of treated nymphs and control (P>0.05). This study revealed that acetamiprid is able to significantly decrease glycogen and protein (after 48 hours) level of treated 5th instar nymphs in relation to control.

Key words: Physiology, Acetamiprid, *Agonosцена pistaciae*

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0067. Effect of *Ferula assafoetida* Linnaeus, essential oil on some physiological phases of the common pistaciae psylla, *Agonoscena pistaciae* Burckhardt and Lauterer, under laboratory conditions

Mahshid Sarnevesht¹, Hamzeh Izadi¹, Mohammad Amin Jalali¹,

¹Vale-E-Asr, Rafsnjan, Iran

The common pistachio psylla, *Agonoscena pistaciae* is a key pest of pistachio orchards in Iran. In this study, effect of *Ferula assafoetida* essential oil (a toxic extract from stinking assa plant) was investigated by measuring glycogen, glucose, lipid and protein contents of the 5th instar nymph of *A. pistaciae*. The 5th instar nymphs were dipped in insecticide (sub lethal dose, 6 mg/l) for 3s. Treated nymphs allowed to air dry and then located on the pistachio leaves in controlled conditions (27±2 °C, 60±5 RH and 16:8 h L:D). The effect was studied in 24, 48 hours after treatment. Low molecular weight carbohydrate (glucose) as well as glycogen and lipid contents were measured by methods described by (Warburg and Yuval, 1996). Protein content of whole body was measured by Lowery method (Lowery et al., 1951). Glycogen content of treated nymphs 24 after treatment (19.29±0.95 mg/g fresh body weight) and 48 hours after treatment (7.7±0.93 mg/g fresh body weight) was significantly lower than control (9.51± 0.88 and 16.8 ±1.97 mg/g fresh body weight) but after 48 hours protein contents is changes (*Ferula assafoetida* essential oil 10.93±0.73 and control 10.51±0.55) but no significant difference was observed between protein (after 24 hoysrs), lipid and glucose contents of treated nymphs and control (P>0.05). This study revealed that *Ferula assafoetida* is able to significantly decrease glycogen and protein (after 48 hours) level of treated 5th instar nymphs in relation to control.

Key words: Physiology, *Ferula assafoetida*, *Agonoscena pistaciae*

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0068. Sublethal effects of acetamiprid[®] and *Ferula assafoetida* Linnaeus, essential oil on the voracity of *Adalia bipunctata* Linnaeus, a predator of *Agonoscena pistaciae* Burckhardt and Lauter

Mahshid Sarnevesht¹, Hamzeh Izadi¹, Mohammad Amin Jalali¹,

¹Vale-E-Asr, Rafsnjan, Iran

The common pistachio psylla, *Agonoscena pistaciae* Burckhardt and Lauterer (Hemiptera: Psyllidae) is a key pest of pistachio orchards in Iran. The chemical control is a common method for control of this pest. *Adalia bipunctata* L. (Coleoptera: Coccinellidae) is one of the most important psyllophagous predators throughout the pistachio growing regions of Iran. Compatibility between natural enemies such as *A. bipunctata* and pesticides is a primary concern in integrated pest management programs of *A. pistaciae*. Currently, acetamiprid is considered a selective and effective insecticide for the control of aphids and psyllids. In this research, sublethal effects of acetamiprid and *Ferula assafoetida* on the food consumption of female adults of *A. bipunctata* were investigated under laboratory conditions (26±1°C, 55% RH, and a 16:8 h (L:D) photoperiod). Females coccinellid adults were fed with 4th and 5th instar nymphs of psyllids treated with 300 mg/l and 6 mg/l of acetamiprid and *ferula* extract, respectively. In the controls distilled water was applied. The results showed that during the first two weeks of adult life span of *A. bipunctata*, female adults statistically consumed less psyllids (25 and 30 psyllids/day in average in acetamiprid and *ferula* extract, respectively) than control (34 psyllids/day averagely). Our laboratory findings indicate that chemical control of *A. pistaciae*, using acetamiprid and *F. assafoetida* is not fully compatible with the use of *A. bipunctata*.

Key words: Acetamiprid, *Ferula assafoetida*, *Adalia bipunctata*, *Agonoscena pistaciae*

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0069. Survey of toxicity of *Ferula assafoetida* Linnaeus, essential oil and acetamiprid[®] against the common pistachio psylla, *Agonoscena pistaciae* Burckhardt and Lauterer, under laboratory conditions

Mahshid Sarnevesht¹, Hamzeh Izadi¹, Mohammad Amin Jalali¹,

¹Vale-E-Asr, Rafsnjan, Iran

The common pistachio psyllid, *Agonoscena pistaciae*, is the key pest of pistachio in Iran. Chemical control is the common method for the control of this pest. With growing concerns about unwanted impacts of conventional chemicals, investigations on compounds with few environmental side-effects such as some plant extracts for pest control receives increasing attention. Use of some plant extracts which are toxic to insects is a good way in pest control. In this research, susceptibility of the 5th instar nymphs of *A. pistaciae* to *Ferula assafoetida* essential oil, a toxic extract from stinking assa plant, and acetamiprid (a neonicotinoid insecticide) was investigated. Probit analysis of concentration-mortality data conducted to estimate the LC₅₀ values of the test chemicals. The 5th instar nymphs dipped in different concentrations of acetamiprid (100, 150, 200, 250 and 300 mg/l) and *Ferula assafoetida* essential oil (3, 4, 5, 6 and 7 mg/l) for 3 seconds. Treated nymphs were then allowed to air dry and then located on the pistachio leaves in controlled condition (27± 2°C, 60±5 RH and 16:8 h L:D). The LC₅₀ value was estimated 300 mg/l for acetamiprid and 6 mg/l for *Ferula assafoetida* essential oil after 72 hours. Our results showed that *Ferula assafoetida* in comparison with acetamiprid is more effective and more toxicity against 5th instar nymphs of *A. pistaciae*.

Key words: Toxicity, *Ferula assafoetida*, Acetamiprid, *Agonoscena pistaciae*

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0070. Evaluation of genetic diversity in indigenous breeds of Iranian silkworm *Bombyx mori* using ISSR markers.

Mojtaba Zarei¹, Elham Sanatgar¹, Rouhollah Radjabi², Hossein Souhani³, Ali zhoola zadeh saki⁴, Mehdi Ibrahi GhalehSeyedi¹,

¹Entomology Department, Agriculture College, Islamic Azad University, Arak Branch, Arak, Iran, ²Plant Protection Department, Agriculture College, Islamic Azad University,

Dezful Branch, Dezful, Iran,

³Entomology Department, Agriculture College, Islamic Azad University, Jahrom Branch, Jahrom, Iran., Jahrom, Iran,

⁴Faculty of bioscience and medical engineering (FBME), Department of biotechnology, University technology Malaysia, Johor Bahru, Johor, Malaysia,

⁵Entomology Department, Agriculture College, Islamic Azad University, Arak Branch, Arak, Iran

In order to isolate the Iranian native *Bombyx mori* silkworm breeds ISSR molecular marker were used. DNA extracted was performed by using phenol- chloroform. The qualitative and quantitative measurements of extracted DNA and its dilution, Values obtained from the bands on 1.5% agarose gel were marked and analyzed. Results showed that the observed bands were between 200- 1000bp and most bands were observed corresponding to Harati-Yellow, Khorasani-Pink, Gilani-Orange and Khorasani-Lemon had their lowest. Primers were the second highest number of gang-related primers and primer 3 had the lowest number of gang-related. Cluster analysis of races, placed them in two main groups. The first group, consist of Baghdadi and Khorasani-Lemon and another group consist of Khorasani-Pink, Harati-Yelow and Gilani-Orange. Gilani-Orange showed the most similar to Herat-Yellow and these two races in whit Khorasani-Lemon were put in the second group. It second ISSR markers appear to be well separat into different races of different origin to silkworm very well. Therefore prove useful for more than 30 Primer for 14 silkworm individuals with $2n = 28$ is better.

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0071. Effect of insecticides on the testicular follicles of male *Holotrichia serrata* (fab)

Patil SB, Theurkar SV and Ghadage MK

*Head, Department of Zoology, Hutatma Rajguru Mahavidyalaya, Rajgurunagar,

Tal: Khed, Dist: Pune. 410505

Department of Zoology, Hutatma Rajguru Mahavidyalaya, Rajgurunagar,

Tal: Khed, Dist: Pune. 410505 Department of Zoology, Hutatma Rajguru Mahavidyalaya,
Rajgurunagar, Tal: Khed, Dist: Pune. 410505

The effect of sublethal concentration of insecticides viz. BHC, Brvistine, Chloropyrriphors and Fenvelrate. Were used to find out the effect of these insecticides on the testicular follicles. *Holotricha Serrata* is a Polyphagous Pest on various crops in many endemic Pockets of Maharashtra. Grubs are soil borne insects damaging roots of various crops like Jawar, Maize, Paddy, Sugarcane etc. Where as adults after emerging from soil at dusk alight on the branches of host plant mostly Neem & Babhul for feeding & mating purpose. They feed on the tender leaves of the food plants. One of the strategies in the control of adults of *H. Serrata* is insecticidal spraying on the host plants. The above mentioned pesticides were used to screen the effects on testicular follicles of male *Holotrichia serrata*. Testicular follicles shows hyperactivity cellular deformities, loosening of the spermatogonia, sperm bundles and pycnosis of the spermatogonia, rupture of basement membrane vacuolization in the follicles were marked due to treatment of pesticides.

Key words: insecticide, *Holotrichia serrata*, testicular follicles, polyphagous

**

0072. Application of ISSR (Inter-Simple Sequence Repeat) molecular marker in the genetic diversity of Honeybee (*Apis mellifera* L.) populations in some areas of Iran

Hossein Shouhani¹, Abufazel Dousti¹, Rouhollah Radjabi², Mojtaba Zarei³, Ali zhoola zadeh saki⁴,

¹Entomology Department, Agriculture College, Islamic Azad University, Jahrom Branch, Jahrom, Iran, ²Plant Protection Department, Agriculture College, Dezful Branch, Islamic Azad University, Dezful, Iran,

³Entomology Department, Agriculture College, Islamic Azad University, Arak Branch, Arak, Iran, ⁴Faculty of bioscience and medical engineering (FBME), Department of biotechnology, University technology Malaysia, Johor Bahru, Johor, Malaysia

ISSR molecular marker for the isolation of five races of honey bee *Apis mellifera* from Khuzestan, Kurdistan, Markazi, Fars and Isfahan provinces was studied. DNA extracted from the worker bees using the salting out and their quality and quantity of extracted DNA were measured. Values obtained from the bands on agarose gel 1.5 % were scored and analyzed. Results showed that the bands of primers are in the range 250 to 1000 bp. Maximum number of bands recorded for primer 1 and primer 3 had minimum. Cluster analysis of races placed them in two main groups that in the first group were Kurdistan and Khuzestan and another group including Markazi, Fars and Isfahan was Distance of most of these groups. It seems that ISSR molecular marker could separate different races of honey bee origin

0073. Evaluation of Entomopathogenic Fungi *Beauveria bassiana* and *Lecanicillium muscarium* on Different Nymphal Stages of Greenhouse Whitefly *Trialeurodes vaporariorum* in Greenhouse Conditions

Naser Malekan¹, Bijan Hatami¹, Rouhollah Radjabi², Alireza Akhavan¹, Ali zhoola zadeh saki³,

¹Department of Plant Protection, Isfahan University of Technology, Isfahan, Iran,

²Department of Plant Protection, Dezful Branch, Islamic Azad University, Dezful, Iran,

³Faculty of bioscience and medical engineering (FBME), Department of biotechnology, University technology Malaysia, Johor Bahru, Johor, Malaysia

The susceptibility of different larval stages of *T. vaporariorum* to the fungal pathogens, *Beauveria bassiana* and *Lecanicillium muscarium* were assessed. Conidial suspensions containing 10^3 - 10^6 conidia/mL⁻¹ were applied to the underside of each leaflet on young and old nymphal stages of *T. vaporariorum* using a sterilized hand sprayer with fine droplet spray nozzle in a randomized complete block design with 6 replications. Results showed the percentages of mortality caused by *B. bassiana* and *L. muscarium* were 63/74% and 62/49% on young nymphs and 71.68% and 87.13% on old nymphs, respectively; the old instars were significantly more susceptible than young instars.

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0074. Arthropod Community Structure During the Early Stages of Leaf Litter Decomposition

Juveneil Eissyd Perez¹, Aimee Lynn Dupo¹,

¹institute Of Biological Sciences University Of The Philippines, Los Banos Laguna,
The Philippines

Arthropods constituting 51 families of 13 orders were collected from leaf litter during the early stages of decomposition. These groups were classified into their respective trophic categories based on mouthpart inference. These categories are as follows: chewing detritivores (15 families) >chewing predators (6 families) >chewing herbivores and sucking herbivores (5 families) > sucking predators (3 families) > chewing parasites and chewing omnivores (2 families). A simplified food web of the arthropods in leaf litter is also presented.

Keywords: arthropod community, foodweb, leaf litter, trophic categories

**

0075. New Records of Two Species of *Cleora* Curtis (Lepidoptera: Geometridae) from Mt. Makiling, Luzon, with a Full Checklist of Species from the Philippines

Aimee Lynn Dupo

Institute Of Biological Sciences University Of The Philippines, Los Banos, The Philippines

Cleoracontiguata bigladiata is recollected from its type locality 48 years after its original description in 1953. Meanwhile, *C. decisaria* and *C. determinata* are recorded in Mt. Makiling for the first time. The latter species is also a new country record. These additional locality data are added to the updated checklist of *Cleora* from the Philippines. The Mt. Makiling Forest Reserve is a solitary peak which rises to just over 1,000 meters. Its forest is generally of the lowland type. Above 900m however, some montane forest can be found (Mallari, *et al.*, 2001). While most current researches focus on floral, bird and mammal inventories, records of geometrid moths from Mt. Makiling are still wanting. In fact, the only geometrid species ever recorded from Mt. Makiling was *Cleoracontiguata bigladiata* Fletcher (Scoble, 1999). Meanwhile, other records of *Cleora* from the Philippines are made available through the studies of Sato (1989, 1997). Like many boarmiine genera, *Cleora* possess strongly bipectinate antennae and distinct forewing fovea in males (Holloway, 1994). In the male genitalia, there is strong ornamentation of the sacculus. According to Holloway (1994), vesica of aedeagus is bifurcate. Meanwhile, female genitalia, are characterized by long sclerotized bursa copulatrix

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0076. Climate Change Threats to Cotton of Sindh-Pakistan

Shahnawaz Khuhro, Ali Muhammad Kalroo, Mushtaque Ali Leghari, and Muhammad Waris Sanjrani

Pakistan Central Cotton Committee, Cental Cotton Research Institute Sakrand, Sindh-Pakistan

Pakistan is the fourth largest producer of cotton in the world. Global temperature increased by 0.6⁰C over the last century though it is expected to increase further by 1.8 - 4.0 ⁰C through the current century. Climate change scenario may affect the cotton development in Sindh-Pakistan. Climate change is leading to a rise in average temperature and precipitation pattern. Higher temperature may lead to a longer growing season, shedding of flower buds and adverse effects on cotton yield. Five years data showed that maximum Cotton production 4270.68 (000 bales) was recorded in 2009-2010. The maximum yield (1650kgs/hectares) was recorded in 2011-2012. The increasing trend of per hectares yield was recorded from 2007-2008 to 2011-2012. Climate change also influenced the environmental science and biology of insect pests and diseases of cotton. The five years data indicated that population of cotton insect pests were fluctuated by weather factors. Among the sucking insect pests maximum thrips population (10.33 per leaf) was recorded in 2011-12 and maximum bollworm damage (11.20%) was recorded in 2010-11. The maximum CLCuV incidence (10.40%) was recorded in 2010-2011. Five years data also found to be statistically different in their response to wards CLCuV on cotton. The trend of increasing temperature and R.H % also helps to raising the incidence of CLCuV. Five years meteorological data indicate that highest average temperature (33.86⁰C) was recorded in 2009-2010, highest relative humidity (59.70%) in 2010-2011 and maximum rainfall (555 mm) in 2011-2012. Future research needs to consider the impacts of climate change on cotton.

Key words: Climate Change, Cotton, Temperature, CLCuV and rainfall

**

0077. Monitoring and forecasting rice brown planthoppers and their significant natural enemies using three sampling methods

**Badrulhadza Amzah, Mohd Fitri Masarudin, Maisarah Mohamad Saad, and
Habibuddin Hashim**

MARDI Seberang Perai, Locked Bag No. 203, Kepala Batas, Pulau Pinang

Brown planthopper (*Nilaparvata lugens*) is one of the major pests that attack rice. Occurrence and incidence of this pest in Malaysia is getting serious from year to year and closely related to the increasing of modern rice culture practices. The rate of its population build up is depended upon several factors such as the intensity of migrant population and abundance of its natural enemies. It is important to measure the population level of the brown planthopper (BPH) and its natural enemies to forecast the levels of infestation or outbreaks in the future. The gathered information may lead to ability to develop an effective technique to forecast BPH occurrence in the fields. A study was done during the main season of 2012/2013 at MARDI Seberang Perai to monitor BPH and its significant natural enemies using light trap, net sweeping, and board tapping methods. Forecasting of BPH population density was based on the degree of occurrence (DOC) according to the following scale : none : 0 adults and nymphs found per hill with board tapping method (0 insects found/20 strokes of net sweeping /light trap), rare: 1-10 adults and nymphs (1 -100 insects/20 strokes of net sweeping /light trap), medium: 11 -50 (101-300), abundant: 51-100 (301-700), severe: over 101 (over 701); hopperburn may accompany this rating. From the surveillance data of the three sampling methods, it was found that BPH population in MARDI Seberang Perai's rice field were either under category 'none' or 'rare' and their occurrence were within stages of active tillering up to milky of the plant. The study showed that BPH population was under control and below economic threshold level that can damage the rice plants and cause yield loss. Level of BPH's natural enemies was higher than the BPH itself showing that the pest population was regulated naturally and kept in check. Species like *Microvelia douglasi*, *Cyrtorhinus lividipennis*, and spiders which are the significant natural enemy of the BPH were commonly found in the samples. These surveillance data are important to detect an impending outbreak and when an insecticide application is needed with consideration for the BPH's natural enemies as well. These sampling methods can be applied in rice field areas over the country as monitoring and forecasting tools for a better decision making in managing these major pest.

Key words: Brown planthopper, monitoring, forecasting, surveillance, degree of occurrence

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0078. Insecticidal Properties of *Schinusmolle* Leaves and Berry Extracts towards *Aedes* Mosquito Larvae

N. Makate*, L.M. Lesole

*Department of Biological Sciences, University of Botswana,
Private Bag UB 0704 Gaborone, Botswana.

The chemical use of pesticides has proven to be non-selective and harmful to other beneficial organisms and also cause environmental pollution. Botanical products have become very important in controlling the developmental stages larvae, pupae and adult mosquitoes. The essential oils from both the leaves and berry fruits of *Schinusmolle* were extracted and used to determine the larvicidal effects at different concentrations of 100, 200, 300, 400 and 500ppm on the 3rd instar larvae species of *Aedes*. (DipteraCulicidae). The larval mortality of the third instar larvae of *Aedes* after 24 hours of treatment were observed separately in the control and in the different concentrations of both the leaf and berry fruit extracts of *S. molle*. The LC₅₀ values for both the leaves and the berries were calculated using the Probit Analysis and these were found to be 380 ppm for the leaves and 240 ppm for the berry fruits. However, the berry fruit extract was found to be more effective than the leaf extract, with a percentage mortality of 80% to 70% of the leaf. Mosquitoes that eventually survived and reached the adult stage were subjected to PAGE gel analysis and the presence of active detoxifying esterases were revealed.

Key words: Insecticidal, Mosquito larvae, Essential oil extracts, detoxifying esterases, *Schinusmolle*.

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0079. Organic farming promotes the diversity of solitary non-*Apis* bees - A case study from South India

Bijoy C¹, Rajmohana K¹, Jobiraj T², Gnanakumar M³,

¹Westren Ghat Regional Centre, Zoological Survey Of India, Calicut, Kerala, India,

²Government college, Kodenchery, Calicut, Kerala, India, ³Kerala Forest Research Institute,
Peechi, Thrissur, Kerala, India

Many of the recent works have suggested that when compared with conventional farming, organic farming enhances the biodiversity in agricultural landscapes, meanwhile its effects are likely to differ between organisms and landscapes. This preliminary study aimed to monitor and compare species richness and diversity of the solitary non-*Apis* bees of two differentially managed paddy field ecosystems- a conventional and an organic one, located in Chittur, Palakkad district (Kerala), India. Altogether 37 individuals belonging to 19 species under 7 genera of solitary bees were collected during the study period, which comprised of both flowering and post flowering phase of the crop, extending from February to April, 2011. All the specimens were identified upto species level. Accordingly 15 species belonging to 6 genera were recorded from the organic field and 7 species belonging to 5 genera from the conventional field. Supported by a higher value of Simpson's Diversity Index ($0.91 > 0.78$), it was found that both the abundance as well as diversity of solitary non-*Apis* bees were considerably higher in organic paddy ecosystem compared to that of the conventional one and bee genera like *Nomia* Latreille and *Lassioglossum* Curtis that are known to be more susceptible and sensitive to agrochemicals were totally absent in the conventional paddy. The most abundant genera being *Halictus* Latreille followed by *Nomia*. However genera like *Braunsapis* Michener, *Ceratina* Latreille, *Sphecodes* Latreille and *Halictus* were recorded from both the ecosystems. As per the Jaccard similarity index, only 16% similarity existed between the species community of the solitary non-*Apis* bees among both ecosystems.

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0080. Foraging activity and damage of subterranean termites to forest trees in Bhadrachalam deciduous forest region of Khammam, Andhra Pradesh, India

Chintha Sammaiah¹, apka NageshwaraRao², Chintha sravanthy³,

¹Department of Zoology, kakatiya university, warangal, Andra pradesh, India, ²kakatiya university, warangal andra pradesh, India, ³kakatiya university, warangal, Andra pradesh, India

Foraging activity and nature of damage caused by subterranean termites to different forest trees was investigated in a semi-arid tropical deciduous forest in Bhadrachalam forest region, Khammam district, Andhra Pradesh, India. Thirteen species of termites were recorded within forest, of which viz *Coptotermes hemi* (Wasmann), *Heterotermes indicola* (Wasmann), in Rhinotermitidae. *Odontotermes boveni* (Thakur), *Odontotermes brunneus* (Hagen) *Odontotermes feae* (Wasmann), *Odontotermes guptai* (Roonwal and Bose), *Odontotermes indicus* (Thakur), *Odontotermes obesus* (Rambur), *Odontotermes redemanni* (Wasmann), *Odontotermes wallonensis* (Wasmann), *Macrotermes convulsionaries* (Koning), *Microtermes obesi* (Holmgren) and *Microcerotermes besoni* Snyder in Termitidae were found foraging activity and damaging on different trees such as *Tectona grandis*, *Polyalthia longifolia*, *Miliusa tomentosa*, *Largerstroemia pariflora*, *Madhuca indica*, *Ixora pavetta*, *Morinda pubescens*, *Anacardium occidentale*, *Hardwickia binata*, *Buchanania lanzan*, *Albizia odoratissima* etc. *C. hemi* and *H. indicola* workers foraging for the food infest the dry parts of standing live trees eating up the inside dry part of tree leaving out thin outer shell being perforated irregularly with channel like holes plugged with wood dust and excrete. High foraging activity of these termites was recorded during wet season. *O. dontotermes* spp. constructed shelter tubes and earthen sheet on different tree trunks as a line of communication between subterranean nest and tree trunks and branches. The damage under the earthen sheet was found irregular, the tree trunks being eaten in to various depths and filled with soil in case of severe damage; there was no discernible difference in the pattern of damage and foraging activity of different species of *O. dontotermes* and *M. obesi*. These termites foraging activity was recorded high during dry season. *M. convulsionaries* foraging activity only found on floor and on forest litter during winter to early monsoon. Among all the termites *C. hemi* and *H. indicola* cause damage maximum to forest trees. An estimated loss due to subterranean termite damage to trees in forest ecosystem was discussed.

Key words: Termites, Foraging, damage, forest

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0081. Effects of Buprofezin and Imidacloprid on the Functional Response of *Eretmocerus mundus* Mercet

Fariba Sohrabi¹, Parviz Shishehbor², Moosa Saber³,

¹Persian Gulf University, Bushehr, Iran, ²Shahid Chamran University, Ahvaz, Iran, ³University of Maragheh, Maragheh, Iran

Eretmocerus mundus Mercet is one of the key natural enemies of *Bemisia tabaci* (Gennadius). In this study, the sublethal effects of LC₂₅ of imidacloprid and field-recommended concentration of buprofezin on the functional response of *E. mundus* to different densities of second instar *B. tabaci* nymphs were evaluated. The results revealed a type III functional response in the control and imidacloprid treatment. The type III functional response was altered into a type II by buprofezin. Although imidacloprid did not alter the type of functional response of *E. mundus* compared to the control, it negatively affected the handling time and maximum attack rate of the parasitoid. Therefore, the use of this insecticide should be evaluated carefully in IPM programs.

Keywords: *Bemisia tabaci*; Buprofezin; *Eretmocerus mundus*; Functional response; Imidacloprid

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0082. The Effectiveness of Various Biocontrol Agents in Integrated Control Management

**Zuharah WF, Dieng H, Fadzly N, Ahmad AH, Rajen S, Gurbel SS, Maniam T,
Rattanam AR, AbuBakar S**

School of Biological Sciences, Universiti Sains Malaysia,
11800 Minden, Penang, Malaysia

With the difficulties in finding new biocontrol materials/methods for mosquitoes, improving the efficacy of existing biological agents is one of the major current issues in conservation of biological control. In this prospect, a better understanding of the integrated method between various existing biocontrol is relevant in selecting the best possible effective combination. Here, we integrated *Toxorhynchites splendens* predatory mosquito larva with three others biocontrol agent; Discarded cigarette butt (DCB), *Metarhizium anisopliae* fungi and *Ipomea cairica* plant extract. We have applied combinations of: (1) *T. splendens* + plant crude extract (*Ipomea cairica*); (2) *T. splendens* + *Metarhizium anisopliae* (entomophagic fungi); (3) *T. splendens* + Discarded Cigarette Butt (DCB) on *Ae. albopictus* larvae. The mortality of *Ae. albopictus* larvae caused by *T. splendens* predatory alone was decreased from 100% to 85% in 72h. While, *Ae. albopictus* mortality maintained at the 95% for 72h with combination of *M. anisopliae*. The combination with *I. cairica* caused the significantly increased in larval mortality by time, while with combination with DCB the mortality had decreased. Field study also approved that all of these selected agents gave good control over mosquito populations in comparison to control. Our results suggested that biocontrol agents are still viable as an effective control method and integration between agents can improve the successfulness of vector management in Malaysia.

Keywords: *Aedes*, Biocontrol, Integrated Vector Management, Mosquito

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0083. *Cricula trifenestrata* : A potential Indian Vanya silk source for upliftment of socio-economic condition of the cashew farmers and rural population of India

Gavas Ragesh^a , Jayaprakash. P^b and Pushpalatha P. B^c

^a Assistant Professor, Agricultural Entomology, Cashew Research Station, Kerala Agricultural University, Madakkathara, Thrissur-680 651, Kerala, India

^b Scientist-D & Head, Muga Silkworm Seed Organization, Central Silk Board, Govt. Of India, 2nd Floor, Banphool Nagar Path, Basistha Road, Guwahati-781 006, Assam,, India

^c Professor and Head ,Cashew Research Station, Kerala Agricultural University, Madakkathara, Thrissur-680 651, Kerala, India

Cricula trifenestrata Helfer, 1837 (Family: Saturniidae, Order: Lepidoptera) is a minor defoliating insect pest of cashew plantations in India. Of late it was also identified as one of the wild sericigenous insect producing small meshi golden yellow cocoon that occurs from June to December. Life table studies indicates that during summer and monsoon the duration of Egg, Larval, Pupal and Adult stages were 68 and 166 days respectively. The pupae of winter population undergo diapauses for 4-5 months. Certain wild tress /plants viz., *Persea macrantha* (vernacular name: Kulirmavu), *Olea dioica* (Family: Oleaceae, Common name: Rose Sandalwood), *Litsea coriacea* (Family: Lauracea), Indian Badam tree etc. are reported to be very good hosts of *C. trifenestrata*, thus opening up the opportunity of rearing of these wild silk moths on such host plants. These plants are easily grown in waste lands. This is the first report from India on successful exploitation of sericigenous potential of *C. trifenestrata*, where silk fabric and artefacts were made successful on commercial level. The paper also discusses about pre and post cocoon activities to exploit scientifically in large scale *C. trifenestrata* and their economics and marketability.

Keywords: *Cricula trifenestrata*, Vanya silk, India, Cashew, silk clothes and artefacts, commercialization, economics.

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0084. Diversity of webspinners (Insecta: Embioptera) at different habitat characteristic types in the lower northern Thailand

Pisit Poolprasert¹, Sangdaw Krueamee¹, Waraporn Ponkaew¹,

¹Pibulsongkarm Rajabhat University, Phitsanulok, Thailand

The species richness and distribution of the webspinners (Insecta: Embiopera) were conducted in both natural forests and human habitations in lower northern Thailand from June, 2012 to May, 2013 by hand collecting. Seven species and three morphospecies in four families and seven genera were recorded. The family Oligotomidae contained the greatest number of species (6). Two species of genus *Oligotoma* (*O. nigra* and *O. saundersii*) were found only in human inhabited sites particularly in forest parks throughout the study areas. On the other hand, *Dactylembia siamensis*, *Lobosembia mandibulata*, *Oedembia* sp. 1, *Ptilocerembia* sp. 1 and *Ptilocerembia* sp. 2 were found solely in natural forests. The most common species, which was distributed throughout the lower northern Thailand, was *Eosembia auripecta* and was able to be encountered in both residential areas and natural forests. Of all studied habitat types, the highest number of species (5) occurred in the hill evergreen forests, whereas the lowest numbers of species (1) occurred in coniferous forests. Herein, *Dactylembia siamensis* found here is considered to be the new genus and species. Additionally, the common habitats of webspinners are on and under tree barks and others were found on rocks covered with mosses and lichens, under leaf litter and in soil. The species composition of the embiid fauna of the lower northern region is partially consistent with known Embiopteran of Thailand. Further studies on the systematics and ecology of this order in Thailand need to be investigated

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0085. Insect Natural Enemies as Bioindicators in Rice Paddies

Takatoshi Ueno¹

¹Institute of Biological Control, Faculty of Agriculture, Kyushu University, Fukuoka, Japan

Rice is the main food in Asia, where rice paddy systems are traditionally used for the production of rice. Rice paddies, together with the associated irrigation ponds, ditches and ridge, often constitute the traditional landscape in rural environments. Rice paddies commonly occupy the largest cultivated area among agricultural land, and form an ecosystem representing a major semi-natural environment with high biodiversity. Insect natural enemies inhabiting rice paddies have an important function for rice production as agents of 'ecosystem services' because they play a major role in suppressing rice pests. The diversity and abundance of natural enemies can be a good index reflecting the 'healthiness' of agro-ecosystem services in rice paddies. The present study investigates whether insect natural enemies could be good biological indicators for general arthropod biodiversity and agricultural practice. First, the concept of ideal bio-indicators was summarized. The strategy to explore and select such bio-indicators was then proposed. Lastly, the results of field survey was given to evaluate whether the abundance and biodiversity of natural enemies in Japanese rice paddies could be good indicators to assess environmental soundness of agricultural practices and general biodiversity. The results showed that reduction of pesticide use led to an increase in species richness or diversity of natural enemies including parasitoids and predators. Use of chemical manure enhanced parasitoid diversity. The density of several species of natural enemies did respond both to pesticide use and to general arthropod biodiversity. The analyses thus have indicated that natural enemies are suitable bio-indicators. Usefulness of indicator species in rice paddies is discussed in the context of ecologically sound agriculture.

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0086. Assessment of residual bio-efficacy and persistence of *Ipomoea cairica* Linn plant extract against *Culex quinquefasciatus* Say mosquito.

Thiagaletchumi Maniam¹, Wan Fatma Zuharah Wan Mustapha¹, Ahbi Rami Rattanam¹,

¹Universiti Sains Malaysia, Penang, Malaysia

Specification on residual action of a possible alternative insecticide derived from plant materials is important to determine minimum interval between applications and the environmental persistence of the biopesticides. The objective of this study is to evaluate leaves acethonilic crude extract of *I.cairica* plant for its residual and persistence against wild strain of *Cx. quinquefasciatus* larvae. Two test designs were carried out; with replenishment and without replenishment of water. For the first design, 10ml of test solution containing *I. cairica* extracts was replenished and replaced with 10ml of distilled water daily. For the second design, distilled water was maintained at 1500ml and water was only added in occasion of evaporation. Larval mortality was recorded at 24 hours post-treatment followed by day 3, day 5, and week 1 until the efficacy dropped below 50%. The trial was terminated when mortality rate falls below 50%. Adult emergence from survived larvae was observed and number of survival was recorded. For the non-replenishment design, mortality rate significantly reduced to below 50% after 28 days, meanwhile for replenishment of water the percentage mortality decline significantly after 21 days to less than 50% ($P < 0.05$). There was no adult emergence observed up to seven days for non-replenishment and first two days for replenishment of water design. In jars without replenishment of water a better control was observed. The short period of residual effectiveness of leaves acethonilic crude extract of *I.cairica* plant that was observed in this study endorses fewer concerns of having excess residues in the environment which may risk insect resistance and environmental pollution.

Keywords: *Culex quinquefasciatus*, plant extracts, residual efficacy

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0087. The effect of a neonicotinoid insecticide, imidacloprid, on two sweetpotato whitefly parasitoids, *Encarsia inaron* (Walker) and *Eretmocerus mundus* Mercet

Fariba Sohrabi¹, Parviz Shishehbor², Moosa Saber³,

¹Persian Gulf University, Bushehr, Iran, ²Shahid Chamran University, Ahvaz, Iran,

³University of Maragheh, Maragheh, Iran

The effect of imidacloprid on preimaginal stages, adults and population parameters of whitefly parasitoids, *Encarsia inaron* (Walker) and *Eretmocerus mundus* Mercet was studied. Parasitised host (*Bemisia tabaci* (Gennadius)) nymphs were exposed to field recommended concentration of imidacloprid (1000 ppm) at larval and pupal stages of the parasitoids. The insecticide significantly reduced the parasitoids emergence rate at both larval and pupal stages. The toxicity of imidacloprid to adult parasitoids was assessed using a leaf dipping method. Based on concentration-response experiments, the LC₅₀ value of imidacloprid for *E. inaron* and *E. mundus* adults was 208.9 and 4.75 ppm, respectively. Population parameters of adults treated with the LC₂₅ of imidacloprid (23.37 and 1 ppm for *E. inaron* and *E. mundus*, respectively) were also studied. Adult longevity, fecundity, the net reproductive rate (R_0), intrinsic rate of increase (r_m), finite rate of increase (λ), and mean generation time (T) of *E. mundus* were significantly reduced by the insecticide. However, neither of the population parameters of *E. inaron* adults were significantly affected by imidacloprid exposure. Overall, results of this study shows that imidacloprid imparts deleterious lethal effects on preimaginal and adult stages of *E. inaron* and *E. mundus* (in addition to its significant sublethal effects on *E. mundus*) and the use of this product in crops should be avoided in situations where biological control by these parasitoids is important.

Keywords: *Encarsia inaron*; *Eretmocerus mundus*; Imidacloprid; Population parameters; Toxicity assessment

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0088. Characterization of a *lef8* knock-out BmNPV bacmid: new data for old genes

Konstantinos Ioannidis¹, Luc Swevers¹, Kostas Iatrou¹,

¹Institute of Biosciences and Applications, National Centre for Scientific Research
"Demokritos", Aghia Paraskevi Attikis, Athens, Greece

BmNPV is an insect infecting closed-circular dsDNA virus with a host spectrum restricted to the silkworm, *Bombyx mori*. As a model member of the nucleopolyhedrosis virus (NPV) family, it exhibits the typical 3-phase gene expression profile with early, late and very late transcripts and a virus-encoded multi-subunit RNA polymerase, required for the transition from the early to later gene expression. The *lef8* gene, which encodes a subunit of this polymerase, is the target of this study: using the virus in bacmid form, we replaced the *lef8* ORF with a zeocin resistance/YFP-reporter element by homologous recombination, thus creating a Δ *lef8* knock-out BmNPV. Previous data from a temperature-sensitive mutant of *lef8* had suggested that the pathogenic capacity of the virus is disrupted at the restrictive temperature, while its replication competence is retained at levels similar to wild-type (wt). We now show that when the entire ORF is removed from the viral genome, the viral replication capacity is also abolished, leaving the Δ *lef8* bacmid as a persisting entity in *Bombyx* Bm5 cell cultures up to the 160 h post-transfection. Rescue of the wt phenotype by administration of LEF8 through extra-viral *lef8* gene-constructs (episomal or cell genome-integrated) or ectopic production from within the viral genome was not possible. Further study revealed the existence of putative promoter elements inside the *lef8* ORF 5' region that possibly drive the expression of the essential neighboring gene *orf40*. Complementation experiments with both ORF40 – a DNA-J like protein – and LEF8 expression vectors either in episomal form or inside the bacmid succeeded in inducing virion production and in the latter case the formation of a pseudo-wt virus. These findings suggest a previously unidentified essential function of *lef8* in the control of *orf40* expression and a previously unsuspected involvement of ORF40 in viral replication.

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0089. Functional characterization of *Anopheles gambiae* odorant receptors using a lepidopteran insect cell-based expression system

Panagiota Tsitoura¹, Alexandra Amaral-Psarris¹, Zafiroula Georgoussi¹, Kostas Iatrou¹,

¹Institute of Biosciences and Applications, National Centre for Scientific Research
"Demokritos", Aghia Paraskevi Attikis, Athens, Greece

Insect odorant receptors (ORs) are heteromeric ligand-gated ion channels whose systematic functional characterization has been carried out primarily by electrophysiological analyses in transgenic flies and frog oocytes. This presentation will discuss the development of a new system for expression of mosquito ORs and identification of cognate ligands without requirements for elaborate infrastructure. The new system employs a calcium-sensitive luminescent photoprotein that is expressed in lepidopteran insect cells co-expressing mosquito ORs and allows robust and quantitative readouts of OR responses. Through its use, we demonstrate that recently described Orco agonists can be employed to establish the functionality of orphan ORs and augment OR responses without sacrificing specificity. Besides being useful for receptor pharmacology studies, this system is adaptable to use as medium to high throughput screening platform for identification of ligand leads acting as receptor agonists or antagonists. Relevant examples derived from studies on the function of newly discovered mosquito repellents will be presented.

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0090. A new online database for georeferenced management of parasitic arthropods

Andrei Daniel Mihalca

Department of Parasitology and Parasitic Diseases, Faculty of Veterinary Medicine,
University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca
Calea Mănăştur 3-5, Cluj-Napoca 400372, Romania;

Arthropoda is the most diverse group of extant organisms, comprising over 80% of all known animal species. Although only relatively few groups are parasitic, their medical and social importance is huge, mostly because of the vector competence in the transmission of human and animal pathogens. Vector-borne diseases kill annually millions of people and livestock worldwide, especially in tropical and sub-tropical areas. The geographic distribution of parasitic Arthropoda and reservoir hosts gives the distribution of vector-borne pathogens and diseases. New ecological conditions essentially contribute to emergence of diseases into new territories or re-emergences of old diseases. Understanding the dynamics of the geographical distribution of vectors facilitates the development of predictive models in human and animal health. Moreover, an analytical geographical approach to distribution of parasitic Arthropoda and their host association, combined with genetic data, contribute to a more complex understanding of phylogenetic and co-evolutionary interrelations of parasites and hosts. The data on the geographical distribution of parasites is most often presented without information on host associations. Moreover, there is no interactive free database available on georeferenced parasite-host associations. With this view, our aim was to create a freely accessible multi-user/multi-task online database with georeferenced data on parasitic Arthropoda-host associations. Scientists around the world will be allowed and encouraged to permanently submit georeferenced data on their research or to digitalize older references. The potential users of this free database will include researchers, students, scholars, medical and veterinary personnel, health officers, epidemiologists, climatologists, officials etc.

Keywords: geospatial tools, GIS, parasitic arthropods

0091. Insecticidal Effects of Ethephon on the Greater Wax Moth *Galleria mellonella* L. (Lepidoptera: Pyralidae)

Sümeýra Nurşanal¹, Hülya Altuntaş², Emine Duman¹

¹Anadolu University, Graduate School of Sciences Department of Biology, Eskişehir, 26470, Turkey

²Department of Biology, Faculty of Science, Anadolu University, Eskişehir, 26470, Turkey

Plant growth regulators (PGRs), playing role in the regulatory mechanisms of plants growth and development, are widely used for increasing agricultural production. Evidence from early studies have shown that PGRs cause death of insects by their toxic impacts, deformations, weight reduction, antifeedant effect, retardation in morphological and sexual development, sterility and reduction in fertility and obstruction of going through diapause. Ethephon, one of the PGRs, is used in agricultural systems as a valuable tool due to its property of regulating fruit maturation. No studies determining the toxicological, biological and physiological effects of ethephon on model organism *G. mellonella*, have been found in open literature. In this study, we aimed to investigate the insecticidal activity of ethephon on the greater wax moth *Galleria mellonella* which is an experimental animal and a serious pest in wax. Last instar larvae were exposed to various concentrations (54, 60, 66, 72, 76 and 80 µg/µl) of ethephon administered by forced-feeding method. The last instar larvae (n = 30 for each concentration) were treated topically or by forced ingestion by applying respectively 5 µl of ethephon solution on esophagus with a Hamilton syringe. Results showed that treated larvae exhibited toxic symptoms with a dose-dependent mortality. Ethephon declined in larval survival of larvae beyond 72 µg/µl (LC₅₀) of ethephon and 100 % mortality the highest concentration tested (80 µg/µl). Therefore, ethephon has insecticidal activity against *G. mellonella*. The present study suggests that ethephon is an effective integrated pest management agent for Lepidoptera pests larvae.

Keywords: Ethephon, *Galleria mellonella*, mortality, Plant growth regulator.

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0092. Temperature-dependent development and parasitism of *Bracon hebetor* (Say) (Hymenoptera: Braconidae) under laboratory condition.

Muhammad Noor Ul Ane¹,

¹University of Agriculture, Faisalabad, Pakistan

The Present study was carried out to evaluate the influence of twelve constant temperatures (10-37°C) on the development and parasitism of *Bracon hebetor* (Say). It was observed that development periods of different stages of *Bracon hebetor* decreased with the increase of temperature with range from 10 to 37°C. Males have shown shorter developmental periods as compared to females. Fecundity is higher (158.36) at 25°C and decreased with increase of temperature with range from 136.16 to 42.92. Linear regression model was used to determine lower developmental thresholds. Egg, larval and pupal's lower developmental thresholds were recorded 9.55°C, 15.75°C and 11.63°C, respectively and 50, 31.25 and 125 DD are required for egg, larval and pupae, respectively. Higher parasitism (99.83%) was recorded at 25°C. Low parasitism was recorded at higher temperatures as compared to lower temperatures

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0093. Influence of JHa and Ecdysteroid on Reproduction in *Dysdercus similis*. (Hemiptera: Pyrrhociridae)

Versha Sharma¹,

¹Dr.H.S. Gour Central University Saugor, Saugor, Madhya Pradesh, India

Juvenile Hormone analogue, Fenoxycarb and Ecdysterone when applied at varying concentrations in the adult females of *Dysdercus similis*, in situ histochemical observations of treated ovarian and adipose tissues during the first gonotrophic cycle elicited drastic histomorphological changes in both the tissues. The action and effect of both JHa and ecdysterone on ovarian development, vitellogenesis, activity of follicular epithelium, chorion formation all have been monitored in detail. SDS-PAGE electrophoretic analysis showed drastic down regulation on the protein profile of different treated tissue samples. After exogenous JHa supply, resorption of the developing oocytes was also often noticed. Gradational decline and disappearance of different protein bands in treated both ovarian and adipose tissues noticed could be due to the depletion of specific metabolites essential for oocyte development and maturation. Natural products support both crop production and the environment that being effective in pest control, less toxic to non target organisms and at the same time biodegradable. Hence these could be utilized as an attractive alternative to the synthetic chemical insecticides for at least cotton bug pest management. Increasing IGR dosages is found to elicit both qualitative and quantitative depletion of protein metabolites and drastic histochemical changes in the gonads of the treated forms brought forth the production of large number of immature mal-formed oocytes. Findings in greater detail could be discussed.

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0094. Sublethal and oviposition- deterrent activity of *Ipomoea cairica* Linn. extract against dengue vectors.

Ahbi Rami Rattanam¹, Wan Fatma Zuharah Wan Musthapa¹, Thiagaletchumi Maniam¹, Sreeramanan Subramaniam¹,

¹School of Biological Sciences Universiti Sains Malaysia, Minden Heights, 11800, Georgetown, Penang, Malaysia

Plant derived insecticides have considerable potential for mosquito control because these products are safer than conventional insecticides. *Ipomoea cairica* Linn. (Family: Convolvulaceae) is an indigenous plant that has demonstrated marked toxicity towards larvae of *Ae. albopictus* and *Ae. aegypti*. Plant materials of *I. cairica* were collected and extracted using Soxhlet apparatus with two different solvents; methanol and acetone. Preliminary bioassay tests revealed that crude acetone extract of *I. cairica* leaves were more toxic than the methanol extract and other fractions of the plant and hence only this fraction were selected to study their sublethal effects on the mosquitoes. The late third instar larvae of *Ae. albopictus* and *Ae. aegypti* were exposed to sublethal dose at LC₅₀ and survived larvae were further cultured to evaluate sublethal studies. Fecundity, fertility, egg length, width of larval head capsule and wing length were the end points studied and compared to control group. Oviposition deterrent activity was carried out against gravid females in choice tests with three concentrations (50, 100, 450 ppm) and a control containing seasoned water. The study demonstrated significantly lesser egg production (fecundity) and eggs hatchability (fertility) in *Ae. albopictus* by 34.46% and 49.06% relative to control ($P < 0.05$). The sublethal dosage of crude extract significantly reduced width of larval head capsule and wing length of both sexes in both species relative to control ($P < 0.05$). The leaf acetonetic extract of *I. cairica* had shown remarkable oviposition activity in which 100% deterrent activity were found at 100 ppm and 450 ppm for *Ae. aegypti* and 450 ppm for *Ae. albopictus*. This study marks the first time the biological activity (sublethal and oviposition deterrent) of *I. cairica* have been determined on *Aedes* mosquitoes.

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0095. Fecundity-life tables of *Ooencyrtus telenomicida* (Hym., Encyrtidae), egg parasitoid of *Eurygaster integriceps* (Hem., Scutelleridae)

Ashkan Rafat¹, Shahzad Iranipour², Seyed Ali Safavi¹

1. Department of Plant Protection, Faculty of Agriculture, Urmia University

2. Department of Plant Protection, Faculty of Agriculture, University of Tabriz

Ooencyrtus telenomicida Vassiliev (Hym.: Encyrtidae) is an important and broadly distributed egg parasitoid of sunn pest *Eurygaster integriceps* Puton (Hem.: Scutelleridae) in Iran. Few studies have been carried out on this species. In this study, life history of *O. telenomicida*, were studied on *E. integriceps* eggs under laboratory conditions in 25±1°C, 60±5% RH and 16: 8 (light: darkness) photoperiod. All parameters were compared in two levels of parasitism *i.e.* superparasitised (SP= two progenies per host egg) and non-superparasitised (NSP= one progeny per host egg) cohorts. Development time of overall immature stages within the host eggs took 13-17 days. Adult lifespan of males and females also was ranged between 25-35 and 23-41 days respectively. The number of eggs/female was recorded to be 43-191. Moreover, mean number of daily *per capita* eggs was 5.3-19.12 per female. Pre-adult survival rate of the two cohorts was 100%, *i.e.* all wasps of the two cohorts hatched successfully from the host eggs. Superparasitism was observed in all female wasps. Observed sex ratio of the emerged broods of a female was 0.437-0.898 females /total offspring. The intrinsic rate of increase of NSP and SP wasps was estimated 0.224±0.004 and 0.234±0.004 per day, respectively. Net replacement rate was 76.13±7.55 and 81.6±9.66 female/female/generation for the same cohorts respectively. Mean generation time also was estimated to be 19.36±0.41 and 18.84±0.40 for the same treatments respectively. No significant difference in fecundity-life table parameters of the two parasitoid cohorts was observed. It suggests that superparasitism has had no negative effect on reproductive fitness of the parasitic wasp.

Keywords: Demography, life history, egg parasitoid, *Ooencyrtus telenomicida*, *Eurygaster integriceps*.

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0096. Yellow sticky trap as a tool for estimating *Lixus incanescens* (Col.: Curculionidae) populations

Atena Sharifi¹, Shahzad Iranipour², Roghayeh Karimzadeh², Keyvan Fotouhi³

- ¹. Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran
2. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran
3. Faculty member, Sugar Beet Seed Research Institute, Karaj, Iran

One essential issue in IPM programs is a fast, accurate and reliable sampling method to determine pest population levels in order to make a proper action decision. Yellow sticky traps are the most common tools of sampling which are easily and quickly used for trapping tiny flying insects such as small weevils. Sugar beet weevil (SBW) is one of the most important pests of sugar beet that may sampled by this tool. Active area of the traps can affect their performance; hence determining proper distance between them as well as relationship between absolute estimates and trap counts for SBW were the objects of the present study. During 2011-2012 as far as trapping adult SBW by yellow sticky traps, absolute estimates per plant also was done in 100 replications. The traps were mounted on wooden stocks at four distances of 1.25, 2.5, 5 and 10 meter from each other in 10, 9, 6 and 3 replications respectively and one week later the number of insects captured on one side of each trap was counted. One way ANOVA was used to determine possible differences among traps of each distance and post hoc test of Duncan at both levels of 1 and 5% were used for grouping the treatments. Except for traps of 16 July 2011 in which a significant increase was observed in SBW captures by sticky traps with their distance and a significant difference without a determined trend at 5% level in 6 July 2011 traps, no significant difference was present between traps of each group of the other dates. On the other hand no obvious relationship was observed between absolute estimates and trap counts. So, a strict statement about active area of the trap for SBW adults and their applicability as a surveying tool of density is impossible and needs the experiments be repeated at higher densities in the future.

Keywords: Distance, Yellow sticky traps, Sugar beet, *Lixus incanescens*

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0097. Spatial distribution of adult sugar beet weevil, *Lixus incanescens* (Col.: Curculionidae) in sugar beet fields of Miyandoab region, Iran

Atena Sharifi¹, Shahzad Iranipour², Roghayeh Karimzadeh², Keyvan Fotouhi³

¹. Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran

². Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

³. Faculty member, Sugar Beet Seed Research Institute, Karaj, Iran

Spatial distribution of adult sugar beet weevil (SBW) was inspected by weekly samplings in a 25×25 meters field which had been divided to a grid of 100 units of 2.5×2.5 meters squares during two growing seasons 2011 and 2012. A single sugar beet plant were chosen as sampling unit in which coefficients of 5.18 and 4.56 respectively may apply to convert counts of 2011 and 2012 to densities per meter square considering the field density of sugar beet. In order to determine the pattern of the distribution, expected values of frequencies was measured following estimating parameters of mathematical functions of Poisson and negative binominal statistical distributions representing random and clumped patterns of population distributions respectively. To realize the goodness of fit of the observed frequencies with the so called functions, Chi-square test was used. Aggregation indices including David & Moore (I_{DM}), dispersion index (I_D), Arbous & Kerrich's λ , mean crowding of Lloyd (X^*), Morisita index (I_δ) and index of patchiness (I_p) as well as Taylor and Iwao regression models also were used to support the results. The results of all indices, models and goodness of fit tests in most sampling dates showed a higher tendency to aggregation patterns, while in many cases, there was no significant discrepancy from Poisson distribution. It seems however that low insect density in both years has led to a higher similarity between the two statistical distributions; consequently, no significant difference has shown with anyone. Yet, the aggregation indices as well as Taylor and Iwao parameter estimators confirm a clumped population. Value of λ was less than 2 in all sampling times suggesting that habitat attributes have been responsible for the insect crowding.

Key words: aggregation, negative binomial distribution, Poisson distribution, Sugar beet, *Lixus incanescens*,

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0098. Effect of treating eggs of cotton bollworm with *Bacillus thuringiensis* Berliner on functional response of *Trichogramma brassicae* Bezdenko

Nahid Vaez¹, Shahzad Iranipour¹, Mir Jalil Hejazi¹,

¹Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

Cotton bollworm, *Helicoverpa armigera* (Hubner) is a cosmopolite insect pest of a wide spectrum of crops such as cotton, maize, tomato, soybean, etc. Egg parasitoids mainly *Trichogramma brassicae* Bezdenko and *Bacillus thuringiensis* Berliner (*Bt*) are biological control agents, that are used as components of sustainable and environmentally compatible IPM systems. Although *Bt* does not come in direct contact with egg parasitoids, it may persist within the host's body and affect quality of the host's eggs via biochemical changes in their mother and possibly behavior and potency of the parasitoids. In this study, the functional response of *T. brassicae* to different densities of *H. armigera* eggs was investigated in two sets of experiments at 26 ± 1 °C, 65 ± 5 % RH, and 16: 8 h photoperiod. The first group was a control and the second one were eggs laid by hosts treated as 3rd instar larvae with LC₂₀ of *Bt* (determined as 9.8×10^5 IU/l of artificial diet based on a preliminary bioassay). A type III functional response was observed in both treatments with a direct density dependent mortality up to eight host eggs and an inverse one upward. Both handling time and searching efficiency were affected by *Bt* treatment as the handling time was increased by a factor of 1.5 and the searching efficiency was decreased by a factor of 0.6. Searching efficiencies were 0.0310 ± 0.003 and 0.0182 ± 0.005 h⁻¹, and handling times were 1.134 ± 0.042 and 1.672 ± 0.082 h in control and *Bt* treatment respectively.

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0099. Tolerance of four commercial varieties of tomato against *Helicoverpa armigera* (Lep., Noctuidae) in northwest of Iran

Shahzad Iranipour¹, Mehrnaz Tankhahi², Esmail Alizadeh³, Manizheh Jamshidi², Nahid Vaez¹

¹. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

2. Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran

3. West Azerbaijan Research Center of Agriculture and Natural Resources, Urmia, Iran

Tomato fruit worm (TFW), *Helicoverpa armigera* Hubner is one of the most important insect pests of tomato in the World. It is also the most important species of *Heliothis/Helicoverpa* in northwestern tomato fields in Iran. The tolerance of four varieties "Super Beta", "Super Luna", "Super Chief" and "KJN3" that widely are cultured in the region were studied against TFW in greenhouse condition. An experiment was conducted as Completely Randomized Blocks Design (RCBD) with 10 blocks. Each block consisted of a couple of plants of each variety allocated as random to "control" and "pest released treatment". In the released treatment, 10 third instar larvae of the pest were simultaneously released in fruiting stage and isolated with a mechanical barrier to prevent their movements. Total number of fruits and injured fruits per plant, mean weight of a fruit and bush yield were measured as tolerance criteria. A 4×2 factorial ANOVA was conducted for all the parameters with four levels of varieties and two levels of infestation (treated and control). Post hoc test of Tukey was used for comparison of means at 0.01 and 0.05 probability levels. A relative tolerance was observed in Super Chief, but due to low yield in absence of damage and smaller fruits, it is not recommendable. Results revealed that weight of fruits as well as yield have been impacted by infection. Super Luna and Super Beta loosed more weight and acknowledged as relatively susceptible varieties. Yet, they displayed highest yields in presence of the pests.

Key words: Tolerance, Tomato fruit worm, *Helicoverpa*

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0100. Feeding and oviposition preference of *Helicoverpa armigera* (Lep. Noctuidae) to some tomato varieties in Iran

Mehrnaz Tankhahi¹, Shahzad Iranipour², Nahid Vaez², Esmail Alizadeh³, Manizheh Jamshidi¹

¹. Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran

2. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

3. West Azerbaijan Research Center of Agriculture and Natural Resources, Urmia, Iran

Tomato fruit worm (TFW), *Helicoverpa armigera* Hubner is a polyphagous insect pest attacking several important crops as well as weeds throughout the world. Although a wide spectrum of host plants are attacked by TFW, some plant species or varieties may be preferred by it for feeding or oviposition. Such tendencies may benefits IPM programs of this pest by choosing a correct temporal or special arrangement of plant species/varieties. In this study, two sets of experiments were conducted in choice tests to surveying feeding preference of larvae as well as oviposition preference of adults to four frequently cultivated tomato varieties "Super Beta", "Super Luna", "Super Chief" and "KJN3". In the first experiment, 1500 mm² leaf cuts from the four varieties randomly distributed in four sides of a petri dish in 10 replications as a Completely Randomized Design (CRD). Then, 10 third instar larvae were released from the center of the dishes. After 1, 6, 12, 18 and 24 hours, the area of damaged leaves measured by a checkered paper sheet. At the second experiment, the four varieties were planted in plastic pots and put in a random order beside each other beneath a cloth net. Five pairs of male and female TFW were released inside nets and five days later, the number of eggs laid upon each variety was counted. This experiment was conducted as CRD with four replications. Antixenosis was observed as feeding preference of larvae toward KJN3 and Super Luna. No oviposition preference however was observed among female moths.

Key words: antixenosis, tomato, insect pest, IPM.

0101. Effects of superparasitism on searching ability of *Ooencyrtus fecundus* (Hym.: Encyrtidae), egg parasitoid of sunn pest, *Eurygaster integriceps* (Hem., Scutelleridae)

Shahzad Iranipour¹, Sajjad Ahmadpour¹, Shahryar Asgari²

¹. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

². Research Center of Agriculture and Natural Resources of Tehran Province, Varamin, Iran

Ooencyrtus fecundus Ferriere & Voegelé (Hymenoptera: Encyrtidae) is a gregarious egg parasitoid of sunn pest *Eurygaster integriceps* Puton. A possible effect of superparasitism is reduction in searching ability of parasitoid. In this study the effect of superparasitism on functional response of *O. fecundus* was investigated in laboratory conditions (26 ± 2 °C, $50 \pm 10\%$ RH and 16: 8 (L: D) photoperiod). Host densities including 1, 2, 4, 8, 16 and 32 eggs, respectively in 30, 25, 25, 25, 20 and 15 replications was offered to singleton, twin, triplet and quadruplet females for five hours. The total time was indicated based on direct observations on handling time required for whole daily number of attacks/ female wasp. Mortality rate was 100% until host density was ≤ 8 . Hence it seems that the wasp act density independent in lower densities as expected from a type I functional response. In such circumstances handling time expected to be zero although it was recorded 0.19 to 0.238 h (11.4 to 14.3 min) in different treatments by direct observations. In contrast searching time was ≈ 0 , so it seems that such an implication that handling time omission leads to a type I functional response may be partially incorrect and better is to say omission of either handling time or searching time may cause such a phenomenon. Taking into account that each host egg provides four spaces for the parasitoid, all the densities multiplied by 4 and data reanalysed. Functional response was determined by logistic regression to be of type III, II, III and II in four above mentioned treatments respectively. In spite of logit analysis however, total rate of parasitism increased in twine females up to density of four hosts that may indicate a type III response. Data inspection revealed that a high variance in lower densities has been the reason. Therefore both type II and III functional responses were fitted to the data and SSE's were compared in the two. Considerable decline in SSE in type III response may show a better fitness of data to this model. The triplet and quadruplet wasps also revealed a type I response with a constant attack rate in lower densities. A decrease in searching time as well as an increase in handling time was obvious by increasing superparasitism intensity (singleton females to quadruples).

Key words: Searching time, Handling time, Functional response, Sunn pest, Egg parasitoid, *Ooencyrtus fecundus*

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0102. Isolation of entomopathogenic nematodes from soil of olive orchards and their evaluation in biological control of the olive scale, *Parlatoria oleae* Clove. (Homoptera: Diaspididae) in Al Jouf region, Saudi Arabia

Magdy El-Kholy¹, Hany Abdelzaher¹,

¹Al Jouf University, Department of Biology, College of Science, , Sakaka, Al Jouf, Saudi Arabia

Soil samples were collected from olive orchards at Al Jouf region, Saudi Arabia to isolate and identify entomopathogenic nematodes (EPNs). EPNs were extracted by greater wax moth, *Galleria mellonella* L. larvae baiting technique. In two samples *Heterorhabditis* spp. (Ord. Rhabditida: Fam. Heterorhabditidae) and in one sample *Steinernema* spp. (Ord. Rhabditida: Fam. Steinernematidae) were identified. The soil acidity (pH) in the samples ranged between 7.6-7.9. Most isolates were found in olive orchards where drip irrigation was used. This finding indicates the role of this type of irrigation in the distribution of entomopathogenic nematodes, most likely due to appropriate soil moisture ventilation and the ease of nematode spread. The pathogenicity of these nematode isolates was tested on the olive scale, *Parlatoria oleae* under laboratory conditions. The aim of this work was to determine if the tested nematodes could reach and kill the pest nymph inside the scale. Water suspensions of different nematodes were prepared and sprayed on the infested leaves and branches. Doses of 100, 200, 400, 800, 1200 infective juveniles (IJs) nematodes per/ml. were applied; leaf disks and branches were sprayed with 1 ml (0.5 ml/side) of different concentrations of a nematode suspension. A handheld aerosol sprayer was used to apply the spray. Sprayed leaves were left for several minutes to avoid water condensation. Doses used showed a highly positive response. The nymphal mortality was more than that of the adults when Oleyl-polypeptide (wax remover) was added in the nematode solution. *Heterorhabditis* spp. achieved the highest mortality (76%) at the dose of 1200 IJs/ml. The mortality rates increased with the increase of nematode concentration.

Key Words: Isolation, *Steinernema*, *Heterorhabditis*, Homoptera, Diaspididae Biological control, Olive, *Galleria mellonella*, *Parlatoria oleae*

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0103. Functional and numerical response of *Ooencyrtus telenomicida* (Hym.: Encyrtidae) against sunn pest *Eurygaster integriceps* (Hem.: Scutelleridae) eggs

Shahzad Iranipour¹, Ashkan Rafat², Seyed Ali Safavi²,

¹Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran,

²2. Department of Plant Protection, Faculty of Agriculture, Urmia University, Urmia, Iran

Sunn pest, *Eurygaster integriceps* Puton is the most important pest of wheat in Iran. It has numerous egg parasitoids from Scelionidae and Encyrtidae. *Ooencyrtus telenomicida* Vassiljev is one of the most widely distributed of them. Functional and numerical responses of the wasp were studied in different density levels of the host (5, 10, 20, 50 and 100) at four levels of the parasitoid densities (1, 2, 4 and 8) in 10 replications. Experiments were conducted at 25 ± 1 °C, $60\pm5\%$ RH and 16: 8 (light: darkness) photoperiod in 1.5×10 cm glass vials for 24 h. Both host and parasitoid densities affected the results in terms of parasitism rate and superparasitism. Maximum fecundity was averaged 21.0/female, so theoretically no resource limitation will be expected until the rate of host: wasp (H: P) remains $\geq 20: 1$. This was true with one exception of the treatment 50: 2 (H: P). On the other hand, $\approx 100\%$ host parasitism was recorded until resource limitation was present. Only in the treatment 10: 1, parasitism rate was a little lower (92%). Maximum progeny/ host egg was four; however no entire exploitation was occurred even in the lowest H: P ratio *i.e.* 5: 8. Superparasitism increased when this ratio declined. In no resource limiting ratios, superparasitism rate was ranged from 1.147 to 1.294/ host. The superparasitism rate approximately remained unchanged until the ratio was ≥ 10 but a sudden increase was occurred in lower ratios and maximum superparasitism (3.06/ host) was occurred in the lowest ratio. Therefore superparasitism could not completely compensate the host deficiency even when resource limitation is moderate. Apparently the wasp responds the resource limitation by decreasing fecundity rather than increasing superparasitism. Finally both number of hosts available (multiplied by four because each host supports four parasitoid's development) and number of progeny emerged was divided to Pt (number of parasitoid) for converting counts to *per capita* parasitism rate; then functional response parameters were estimated. The parasitoid response was type II and handling time and searching rate were 1.2150 ± 0.0179 h and 0.0654 ± 0.0035 / h respectively based on all experiments. Maximum daily attack rate also was 19.75.

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0104. Population dynamics of whitefly on green gram, *Vigna radiata* in Indo-Gangetic region of Uttar Pradesh, India

Gholamhossein Gharekhani¹, Hamideh Salek-Ebrahimi¹,

¹University of Maragheh, Maragheh, Iran

Green gram is a major pulse crop of India which is attacked by about 64 species of insect pests from seedlings to pod formation stage. Among them whitefly is most important which cause economic damage by sucking cell sap as well as transmit the yellow vein mosaic (YMV) disease. Therefore, a study was taken up to understand the seasonal incidence and role of various abiotic factors in population build up of whitefly. The seasonal incidence of whitefly, *Bemisia tabaci* (Genn.) was studied at Agricultural Research Farm, Banaras Hindu University, Varanasi, India during 2010. The population of whitefly ranged from 0.2 to 5.2/cage/plant. The incidence of whitefly started in 32 standard weeks with 0.2/cage and active up to 40 standard weeks with 1.4/cage/plant. The peak population of whitefly (5.2/cage/plant) was recorded during 37 standard weeks. The correlation of whitefly against abiotic factors showed that the population of whitefly had significant negative correlation with maximum temperature and average temperature and positive significant correlation with age of crop, where as other factors showed non-significant effect on whitefly population.

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0105. Evaluation of the survival rate, fecundity and life expectancy of *Tutaabsoluta* (Meyrick) (Lep: Gelechiidae) on two tomato cultivars under laboratory condition

Gholamhossein Gharekhani¹, Hamideh Salek-Ebrahimi²

¹Assistant Prof. Department of Plant protection, Faculty of Agriculture, University of Maragheh, Maragheh- Iran. Msc. Student.

² Department of Plant protection, Faculty of Agriculture, University of Maragheh, Maragheh- Iran.

Tomato leaf miner *Tutaabsoluta* (Meyrick)(Lep: Gelechiidae) is one of the serious pests of tomato. In Europe, it was first detected in Spain in 2006 and afterward it rapidly spread to several countries becoming a key pest due to its behaviour and ecology. It was a quarantining pest for Iran up to 2010. It is detected for the first time in Urmieh in North-West of Iran in 2010 as well as identified in more than 20 regions of Iran up to June 2011. Current study carried out using at least 100 one-day old eggs under laboratory conditions ($25\pm 2^{\circ}\text{C}$, $65\pm 5\%\text{RH}$ and 16L:8D photoperiod) and aimed to determine daily mortality, survival rate, fecundity and life expectancy of different development stages of *T. absoluta*, on two traditionally cultured tomato cultivars (ATABAY and CLUSE). Survival rate of larva, pupa, female and male was 0.90, 0.70, 0.17 and 0.29 respectively on ATABAY in contrast with 0.86, 0.65, 0.13 and 0.24 on CLUSE cultivar. Life expectancy in first days of experiment was 26.45 and 23.79 on ATABAY and CLUSE cultivars respectively. Mean fecundity, mean adult female's pre-oviposition period (APOP) and mean total pre-oviposition period (TPOP) obtained 92.13 ± 7.80 , 0.33 ± 0.12 and 21.47 ± 0.43 respectively on ATABAY cultivar in contrast with 77.18 ± 6.44 , 0.18 ± 0.12 and 20.64 ± 0.52 on CLUSE. These results indicated that CLUSE cultivar influenced herbivore life table parameters more negatively than ATABAY cultivar as well as it could be considered as a relatively resistant host for *T. absoluta*.

Key words: *Tutaabsoluta*, survival rate, fecundity, oviposition period, life expectancy, tomato

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0106. Trunk Injection: A Discriminating Delivering System for Insect Control in Tree Fruit IPM

John Wise¹, Raja Zalinda Raja Jamil¹, Anthony Van Woerkom¹,

¹Michigan State University, East Lansing, Michigan, United States Minor Outlying Islands

While the integration of biopesticides and reduced-risk insecticides into tree fruit integrated pest management (IPM) has progressed greatly in the past several decades, the means by which materials are delivered to their target remains relatively inefficient. Trunk injection represents an alternative delivery system for crop protection materials, with the potential to limit worker exposure to pesticides, eliminate spray drift, and reduce negative impacts on beneficial organisms. In this study we tested trunk injection for its effectiveness in protecting apple trees from direct and indirect insect pests. Insecticides were injected in apple trees shortly after the petal fall stage of apples. Field survey and bioassay techniques were used to evaluate the control of an array of apple arthropod pests. Leaf and fruit samples were taken for residue analysis post injection. This method of insecticide delivery may prove to be an economical and environmentally safe alternative to ground sprayers

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0107. Effect of colour and height of traps in attraction of onion thrips, *Thrips tabaci* (Thysanoptera: Thripidae) and predator thrips of family Aeolothripidae on garlic

Gholamhossein Gharekhani¹, Saeed Ghorbansiahi¹,

¹University of Maragheh, Maragheh, Iran

Regard to the importance of the garlic cultivation in East Azarbaijan (North-West Iran) and limitation function of the onion thrips on garlic production, current study aimed to study the efficiency of the different coloured sticky traps located at different heights. Studies carried out in a 0.15 ha garlic field in Mamaghan (North-West of Iran) using four replicates of yellow, blue and white coloured sticky traps located randomly at 30, 70 and 100 cm heights. Sticky traps were replaced weekly. Data were analysed using SAS software, GLM procedure. The effect of the traps height and colour was significant ($F=7.47$, $P<0.0001$ and $F=78.84$, $P<0.0001$ respectively) for pestiferous thrips. In contrast for the predator thrips the effect of the trap height was significant ($F=2.96$, $P=0.05$) and the effect of the trap's colour was non-significant ($F=0.23$, $P=0.80$). Mean comparison using Duncan test indicated that the yellow and blue coloured traps attracted significantly more adult pestiferous thrips than white coloured one. Additionally, mean comparison showed that the pest attracted to traps at 70 and 100 cm height more than 30 cm located traps. Predatory thrips indicated non-significant reaction both for the trap's height and colour. Results of the present study may facilitate management of the onion thrips through non-chemical and environmental friendly methods.

Key Words: *Thrips tabaci*, Sticky traps, Aeolothripidae, trap colour, trap height

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0108. Evaluation of the survival rate, fecundity and life expectancy of *Tuta absoluta* (Meyrick) (Lep: Gelechiidae) on two tomato cultivars under laboratory condition

Gholamhossein Gharekhani¹, Hamideh Salek-Ebrahimi⁰,

¹University of Maragheh, Maragheh, Iran

Tomato leaf miner *Tuta absoluta* (Meyrick) (Lep: Gelechiidae) is one of the serious pests of tomato. In Europe, it was first detected in Spain in 2006 and afterward it rapidly spread to several countries becoming a key pest due to its behaviour and ecology. It was a quarantining pest for Iran up to 2010. It is detected for the first time in Urmiyeh in North-West of Iran in 2010 as well as identified in more than 20 regions of Iran up to June 2011. Current study carried out using at least 100 one-day old eggs under laboratory conditions (25±2°C, 65±5% RH and 16L:8D photoperiod) and aimed to determine daily mortality, survival rate, fecundity and life expectancy of different development stages of *T. absoluta*, on two traditionally cultured tomato cultivars (ATABAY and CLUSE). Survival rate of larva, pupa, female and male was 0.90, 0.70, 0.17 and 0.29 respectively on ATABAY in contrast with 0.86, 0.65, 0.13 and 0.24 on CLUSE cultivar. Life expectancy in first days of experiment was 26.45 and 23.79 on ATABAY and CLUSE cultivars respectively. Mean fecundity, mean adult female's pre-oviposition period (APOP) and mean total pre-oviposition period (TPOP) obtained 92.13±7.80, 0.33±0.12 and 21.47±0.43 respectively on ATABAY cultivar in contrast with 77.18±6.44, 0.18±0.12 and 20.64±0.52 on CLUSE. These results indicated that CLUSE cultivar influenced herbivore's life table parameters more negatively in comparison with ATABAY cultivar as well as it could considered as relatively resistant host for *T. absoluta*.

Key words: *Tuta absoluta*, survival rate, fecundity, oviposition period, life expectancy, tomato

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0109. The Diversity of Dragonfly and Damselfly (Odonata) in Mangrove Ecosystem of Pasir Mendhit, Kulon Progo, Yogyakarta, Central Java, Indonesia

Fauziatul Fitriyah¹, Mita Lutviana¹, Mukhlis Jamal Musa Holle¹, R.C.Hidayat Soesilohadi¹,

¹Universitas Gadjah Mada, Yogyakarta, Indonesia

Mangroves are important in decreasing erosion from tropical storm and reduce water pollution in lower course. Mangroves also build up the shoreline by trapping mud and adding organic matter. The best development of mangroves is on muddy shore in the intertidal zone. Pasir Mendhit is the only potential coastal area of mangroves in Yogyakarta, Indonesia. Dragonflies and damselflies (Odonata) occupy an important position in the ecological balance. They are able to act as a predator in the balance of food webs and bio-indicator for environmental pollution. The aim of this study is to determine the diversity of Odonata in mangrove ecosystem of Pasir Mendhit, Indonesia. The study was conducted in three variety types of habitat according to the vegetation and water sources. This research held on March-May 2013. The samples were collected in the morning until early evening at 8:00 am to 5:00 pm using sweep net. Observation and collection are preferred in adult than in nymph stage. The results obtained 6 species of Anisoptera and 2 species of Zygoptera in site 1; 3 species of Anisoptera and 1 species of Zygoptera in site 2; 6 species of Anisoptera and 1 species of Zygoptera in site 3.

Key words: Odonata, Diversity, Mangrove ecosystem

0110. Butterfly Species (Lepidoptera: Rhopalocera) Inventory in Universitas Gadjah Mada Campus Area, Yogyakarta, Indonesia

Fahmi ginanjar¹, mita lutviana¹, suryadi islami¹, meylida ichsyani¹, RC. Hidayat Soesilohadi¹,

¹Universitas Gadjah Mada, Yogyakarta, Indonesia

Universitas Gadjah Mada (UGM) campus area has 30% green area with the diversity of animal and plant. One of most interesting animal in this area is butterfly (Lepidoptera: Rhopalocera) which has been never inventoried. Environmental changes can decrease the diversity of butterfly species. Butterfly can be used as environment healthy indicator which is cheap and practical. The objective of the research was to inventory species diversity Rhopalocera in UGM campus area.. This study was research in UGM campus area with scan sampling method, from March to June 2013. Butterfly was caught by sweeping net and baiting trap. There were 38 species, five families belong to Rhopalocera. The families were Papilionidae, Nymphalidae, Pieriidae, Lycaenidae, and Hesperidae. Host plant families of the species member of Rhopalocera were Morataceae, Magnoliaceae, Rubiaceae, Annonaceae, Amarathaceae, Euphorbiaceae, and Graminae. Most of the hostplant were found in the eastern part of UGM campus area.

Key words : diversity, butterfly (Lepidoptera : Rhopalocera), UGM campus area

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0111. Understanding of Ayurvedic Treatment Principles in The Management of Neuromuscular Problems in Endosulfan Victims

Prashanth A.S.

Department of Post Graduate Studies in Panchakarma Ayurveda Mahavidyalaya,
Hubli – 580024, Karnataka, India

Since mid 1970s, the pesticide Endosulfan has been aerially sprayed on Cashew nut plantations covering several villages in Dakshina Kannada of Karnataka and Kasargod District, Kerala State, India. People residing in the villages within this plantation have been afflicted with different kinds of illnesses which, according to the villagers, after the Cashew nut plantation people started their spraying operations. Villagers also noticed the death of fishes, honeybees, frogs, birds, chicken and even cows. In 1979, a farmer began to suspect that the pesticides being aerially sprayed in the plantation might have caused the deformities and stunted growth, which, he observed in three of his calves. A journalist reported the story warning that Endosulfan, the pesticide used in the aerial spraying, might have been the cause. The story raised awareness among the people who started voicing out their complaints about the health problems and environmental damage.

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0112. Comparison among different stage-frequency data analysis models for estimating number entering a stage

Valeh Ebrahimi¹, Shahzad Iranipour¹, Roghayeh Karimzadeh¹,

¹Tabriz university, Tabriz, Iran

The conversion of stage-frequency data to life budgets is one of the most basic problems in the study of insect population dynamics. There are various methods invented for collecting required information to construct a life budget from stage-frequency data. The differences between these methods lies on the assumptions and number of parameters estimated. The common point of all these methods is being estimation of number entering successive life stages. Each method has advantages and disadvantages which arise from its assumptions. These assumptions cause bias and computational limits with respect to real data. The aim of this study is comparing different methods of stage-frequency data analysis to find a method with minimum bias. Stage frequency data were obtained by simulation as well as rearing insects in laboratory. Microsoft Excel was used to simulate stage frequency of six insect populations containing individuals passing through stages. The data simulation was based on information available by Iranipour *et al.* (2011) obtained on sunn pest, *Eurygaster integriceps* Puton (Hem., Scutelleridae). Different stage mortalities (10, 25, 50, 75, 90 and 99%) with constant daily rates were processed in the simulations. Laboratory data also obtained by rearing *E. integriceps* (Hem.: Scutelleridae), Colorado Potato Beetle, *Leptinotarsa decemlineata* (Say) (Col.: Chrysomelidae) and Cotton Bollworm, *Helicoverpa armigera* Hübner (Lep.: Noctuidae). This was done in order to be able to compare five methods of stage-frequency data analysis (Richards and Waloff, 1954; Richards *et al.*, 1961; Southwood and Jepson, 1962; Kiritani-Nakasuji-Manly, 1985; Sawyer and Haynes, 1984). We attempted to estimate bias and correct the method by considering different stage mortalities (10, 25, 50, 75, 90 and 99%) with constant daily rates. As a conclusion, the Southwood and Jepson graphical method carried less bias in compare with the others. Also minor corrections was done in this method to reduce bias.

Key words: Stage-frequency data, Simulation, Stage Mortality,

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0113. The Genetic Relatedness between the Populations of the Groundnut Leaf Miner Collected from South Africa, Mozambique, India and Australia

Makhosi Buthelezi¹, Desmond Conlong², Godfrey Zharare³,

¹Mangosuthu University of Technology, KwaZulu-Natal, South Africa,

²South African Sugarcane Research Institute, KwaZulu-Natal, South Africa,

³University of Zululand, KwaZulu-Natal, South Africa

Groundnut leaf miner (GLM) has recently emerged as a serious pest for groundnut and soya bean in Africa around 2000 even though reports around 1950's report the presence of the moth at that time as a pest of non-economic importance. The origin of the pest is uncertain. Early reports on its status as a pest assumed that it was an invasion of *Aproaerema modicella* from the Asian continent, but subsequent mitochondrial DNA (COI gene) fingerprinting matched it to *Aproaerema simplexella* sampled from Australia. Mitochondrial gene (COI) was sequenced from 44 specimens collected from 4 different areas in South Africa, 5 from Mozambique, 3 from Australia and India. We compared mitochondrial gene COI of all the specimens with the aim of determining the relatedness of the specimens from the four countries, representing three continents. The mitochondrial gene COI sequences were compared with those in the BOLD and NCBI gene banks in addition to DNA analyses that sought to compare the relatedness of the specimens amongst themselves. The specimens did not match with any sequences in NCBI gene bank. On the BOLD system, the majority (65%) of the specimens analyzed matched >99% to 100% with *A. Simplexella* sequences from Australia including all three specimens from India and Australia. In the rest of the specimen (35 %), the matching was from >98 to 99% with *A. Simplexella* sequences in the BOLD gene bank. There were no systematic differences in the sequences of the specimens in the phylogenetic tree. It was concluded that the groundnut leaf miners occurring from this countries is the same species.

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0114. The pest control role of NCPMS, National Crop Pest Management System, in the Republic of Korea

**Myung-Kyu Song¹, Ki-Yeol Lee¹, Seong-taek Hong¹, SiDong Kim¹, Guang-Jae Lee¹,
Segu Hwang¹, Hong-Hyun Park², Gil-Hah kim³,**

¹Agricultural Research and Extension Service, Cheongwon-Gun, ChungChungBuk-do,
Republic of Korea,

² Rural Development Administration, Suwon-si, Gyeonggi-do, Republic of Korea,

³Chungbuk National University, CheongJu-si, ChungChungBuk-do
Republic of Korea

A web GIS based online information system known as National Crop Pest Management System (NCPMS) for integrated pest management (IPM) has been providing the pest control information in Korea. NCPMS provides the information on crop protection of rice, barley, bean, red pepper, apple, pear, grape, citrus, and persimmon. Users of NCPMS can continuously monitor the real-time occurrence of crop disease and insect pest(CDP) and utilize the monitoring information for control. In addition, thirty forecasting models of CDP occurrence, including rice leaf blast, in rice, apple, pear, citrus and hot pepper were built in NCPMS and users are able to check the potential degree of CDP risk in local web GIS(Geographic Information System). Farmers can also identify the CDP by themselves with illustrated guides to plant pathogens, insects and weeds loaded in NCPMS. If farmers could not ascertain CDP species by themselves, they can ask identification of the CDP to taxonomists who registered in NCPMS. We developed two applications for smart phone and tablet computer to input the CDP occurrence data and to search illustrated guides to CDP.

Lycorma delicatula had been found in Korea in 2004. The discovered area of *L.delicatula* increased rapidly from 91ha in 2008 to 751.1ha in 2009. So there were social problems. Since 2010, *L. delicatula* in vineyard had been investigated as the program of NCPMS. So the density of *L. delicatula* had been stable 1 per vine tree in mid-June 2010, but 62 per vine in mid-June 2009.

By carrying out research projects and Control program of NCPMS, the outbreak insect pest had been control.

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0115. Insect Pest of *Neolamarckia cadamba* Plantation in Sarawak, Malaysia

Doreen Chai¹, Marfaisal Marzuki²,

¹Sarawak Forestry Corporation, Kuching, Sarawak, Malaysia,

²Forest Department, Kuching, Sarawak, Malaysia

Neolamarckia cadamba, locally known as Kelampayan, is of economic importance as timber and as source of non-timber products. Due to its growth characteristics, this species had caught the attention of the government and private sectors for reforestation and has been introduced as a potential fast growing tree species for forest plantation establishment in Sarawak since 2003. To date, about 20,000 hectares were planted with this species. However, pest problem in the established *N. cadamba* plantation was widespread especially for stem borers and defoliators. The incidence of insect pests could have an impact on degradation of the wood quality and results in the loss of the timber value.

Arthroschista hilaralis was found the most abundant defoliator of *N. cadamba*. Defoliation of young *N. cadamba* seedlings stunted the growth of the trees. Factors observed triggering *A. hilaralis* outbreaks in the local plantations are discussed. A study conducted to evaluate stem borer infestation in Sarawak showed about 70% was found in several major local forest plantations. The density of past and present attacks per tree ranged from 0.22-1.83 and 0-0.70, respectively. The densities of past attacks increased as the tree diameter increased. Infestation was concentrated at the lower part of the trunk, less than 1 m from the ground level. The tunnels created by the stem borer were observed to be generally about 15-30 cm deep with diameter of around 1-2 cm. Preliminary observations suggest that intensive silvicultural practice reduced the susceptibility of stem borer attack

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0116. Present status of plant extracts for management of pest in organic rice farming

Doi-ik Kim¹, sug-ju Ko¹, duck-soo Choi¹, beom-ryong Kang¹,

¹Environment-friendly, Naju, Republic of Korea

This study was carried out to analyze occurrence and management of plant pathogen and insect pest, to investigate effect of plant extracts from farmers- made against brown plant hoppers(BPH) and smaller brown plant hopper(SBPH). Any rice production area where *Gibberella fujikuroi* (bakanae strains) have been confirmed to occur. Organic farmers use warm water to manage of bakanae disease instead of chemicals which soak dried rice seed at 60~65°C for 10 minutes. Some farmers mixed sulphur in warm water. It could manage bakanae over 99% control value. Organic farmers made botanical pesticides which main materials were oriental medicinal plants. Plants were extracted by ethanol (56.1%), carbonization (28%), vinegar (4.7%), salt (6.5%), and hot water (4.7%). The infection rates of rice leaf blast and sheath blight were very low in early stage season but that of rice neck blast and bacterial blight was very serious. To control rice blast, crude ethanol extracts effected in root of *Eisenia bicyclis*, bark of *Camellia japonica*. Plant hoppers including BPH, SBPH, Whitebacked brown planthopper(WBPH) were occurred every season. Rice water weevil occurred in early season and rice leaf folder in late season. Recently, rice black bug (*Scotinophara lurida*) appeared from late July. It is very difficult to control for organic farming system. To control BPH, we selected several plant extracts of cinnamon, angelica root, aconite root from ethanol, china mulberry from water and ginko leaf from salt. In case of SBPH, there were cinnamon, china mulberry from ethanol, wormwood from salt, and turmeric from vinegar. In the paddy field plant extracts sprayed at 7 days intervals with three times, which suppressed the density of BPH as 93.3%. Organic farmers sprayed plant extracts six times during the growth season on late June and on early August at 7 days intervals with three times, respectively.

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0117. Development of environment-friendly control material for *Meloidogyne* sp. using plant extracts

Duck-soo choi¹, Do-ik Kim¹, Sug-ju Ko¹, Beom-ryong Kang¹,

¹Agricultural research institute, Naju, Jeonnam, Republic of Korea

About 80 species of Root knot nematodes was known in the world. Among them, *Meloidogyne incognita*, *M. javanica*, *M. arenaria* and *M. hapla* was the most dangerous species. In Korea, most of vegetable culturing in greenhouse such as cucumber, watermelon, oriental melon, melon, pumpkin, eggplant, pepper, tomato and strawberry was damaged seriously by Root knot nematodes. We developed the environment-friendly control material to *Meloidogyne* spp. using plant extracts. The source plants for extract was fruit of Korean honey locust (*Gleditsia japonica*), fruit of tea plant (*Camellia sinensis*), leaf of cinnamon (*Cinnamomum cassia*) and lantana (*Lantana camara*). In vitro, the nematocidal effects of extracts from 20 oriental medicine plants (total 32 samples) against *Meloidogyne hapla* were tested using the dipping method. At 1,000 ppm, extracts of locust 4 produced > 80% mortality in J2 juveniles. The manufacturing process was following as : The 4 materials measured as weight rate of Korean honey locust 50%, fruit of tea plant 20%, leaf of cinnamon 20% and lantana 10%. The mixed material was extract during 72 hours at 60°C with distilled water and re-extract during 120 hours at 70°C with alcohol for extract for essential oil component. The next time we added 5 % of cyclodextrin at extracted liquid and concentrate during 3~4 days at 60°C. Lastly added 20% of emulsifying agent, Polyoxyethylene monooctadecyl ether at the final products. In greenhouse, the nematode showed high mortality at different concentration of trial manufactured goods. When it treated 2,000 application, 98.3% of nematode was died and 4,000 application was died 84.8%. These results indicate that the product could be used as an environmental friendly control agent of *M. hapla* by drip-watering system on greenhouse.

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0118. Taxonomy of *Diachasmimorpha* Viereck (Braconidae: Opiinae) from Malaysia, with description of a new species *Diachasmimorpha albicans*, sp. n. and some information on their host preferences and DNA Barcode data.

Yaakop, S., Ibrahim, N. J., Shariff, S., Aman, A. Z., and Wee, S. L.

School of Environmental and Natural Resource Sciences, Faculty of Science and Technology,
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

A new species, *Diachasmimorpha albicans*, sp. n. is described and illustrated, while several other *Diachasmimorpha* species from Malaysia, namely *D. albopalteata* (Cameron), *D. dacusii* Cameron and *D. longicaudata* (Ashmead), have been re-described in this paper. The effectiveness of molecular data of barcoding marker, *COI* has been used to construct a phylogeny of Malaysian *Diachasmimorpha* by using Maximum Parsimony (MP) and Bayesian Inference (BI) analyses. The coloration of the first metasomal tergite and propodeum was found and reconfirmed to be the important character for classifying species among *Diachasmimorpha* that has been successfully used in the key of species. Additionally, host preference data of several species of *Diachasmimorpha* has been provided and reconfirmed by rearing larvae of the host, *Bactrocera* species (Diptera: Tephritidae), under laboratory conditions until emergence of *Diachasmimorpha* species.

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0119. Demography of small walnut aphid *Chromaphis juglandicola* (Hem., Aphididae) on walnut trees in northwest of Iran

Hossein Mahdavi¹, Shahzad Iranipour², Ali Mehrvar³, Roghayeh Karimzadeh²

1. Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran

2. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

3. Department of Plant Protection, Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz, Iran

Small walnut aphid (SWA) *Chromaphis juglandicola* (Kaltenb) has a continuous occurrence in walnut orchards of Azerbaijan region, northwest of Iran. Demographic studies are essential for predicting future population levels and provide a strong framework in decision makings in IPM programs. Two kinds of life tables were studied in this research. First the time-specific life tables for natural populations and the second age-specific reproductive life tables for confined populations in natural habitats upon young seedlings grown in pots. Stable structure of natural populations consisted of 67.5% first plus second instar nymphs, 22% third plus fourth instar nymphs and 10.5% alata females (averaged for 16 samples with overlapped stages). In this regards a total 85% immature mortality divided to 67.4% young nymphs followed by 52.3% old ones. Maximum instantaneous growth rate of population was 0.158 and 0.286 per day and generation time was 12.5 and 7.8 days in spring and summer cohorts of confined populations respectively and net replacement rate was <10 females per generation in both. This may show strict effects of physical conditions particularly temperature in outbreaks of SWA. Natural population changes were different with confined populations as a decreasing trend was present during summer. This may show a bottom-up effect. In other words the host plant quality was different between adult trees and potted seedlings.

Key words: life history, time-specific life table, age-specific life table, walnut, aphid.

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0120. Insecticide Resistance in Diamondback Moth, *Plutella xylostella* (Linnaeus) in Different Locations of the Indian Punjab

Kamaljeet Singh Suri¹, Pratik G Mhapankar¹, Gursharan Singh¹.

¹Punjab Agricultural University, Ludhiana, Punjab, India

The diamondback moth (DBM), *Plutella xylostella* (Linnaeus), (Lepidoptera: Plutellidae) is one of the most destructive insect pests of cruciferous vegetables in the world. Attack of this pest may lead to total destruction of crop. Losses to the tune of \$ 16 million have been estimated on the basis of its 2.5 percent damage. Indiscriminate use of insecticides and the year-round availability of host crops, particularly cabbage, cauliflower and broccoli, have contributed to the development of resistance in this pest to almost all kinds of insecticides including *Bacillus thuringiensis* based products and acylurea compounds. With the steady proliferation of new insecticides and their increasing use in insect control programmes, the number of documented cases of insecticide resistance has increased at an exponential rate encompassing *P. xylostella* amongst the top 20 most resistant insect species reported so far. Monitoring of insecticide resistance in insects has to be a continuous process since it provides useful information about the efficacy of an insecticide in the field. The present study was therefore, conducted to monitor the development of resistance in *P. xylostella* to some of new insecticides viz emamectin benzoate, spinosad, indoxacarb, chlorantraniliprole, dipel and cartap hydrochloride against susceptible (maintained for over 30 generations) and field populations of DBM collected from vegetable growing areas of Punjab to monitor susceptibility of *P. xylostella* against them and to determine the location specific variations as regards toxicity of these insecticides. Based on the LC₅₀ values, the susceptible population showed highest sensitivity to emamectin benzoate (LC₅₀= 0.00003%) while least for cartap hydrochloride (0.00145%). Chlorantraniliprole was the most toxic molecule against the field populations tested with LC₅₀ values ranging from 0.00012 - 0.00027 per cent followed by emamectin benzoate (0.00154 - 0.00336%) while cartap hydrochloride was the least effective (LC₅₀ value ranged from 0.03819 to 0.07662%). DBM population collected from district Amritsar was found to be the most resistant one for all the test insecticides except indoxacarb, where Ludhiana population lead in resistance. Field populations of *P. xylostella* showed maximum resistance against emamectin benzoate (51.3 to 112-fold) followed by cartap hydrochloride (26.33 to 52.84-fold) while minimum against chlorantraniliprole (2.4 to 5.4-fold). In order to realize the full potential and to ensure the long term use in effective IRM strategies, these new generation compounds need to be used very judiciously with proper rotations.

Kew Words: Diamondback Moth, *Plutella Xylostella*, Insecticide Resistance, Toxicity

0121. Spatio-temporal dynamics of *Chromaphis juglandicola* (Hem., Aphididae) in walnut orchards of northwest of Iran

Shahzad Iranipour¹, Hossein Mahdavi², Roghayeh Karimzadeh¹, Ali Mehrvar³

¹. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

². Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran

³. Department of Plant Protection, Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz, Iran

Small walnut aphid (SWA) *Chromaphis juglandicola* (Kaltenb) is a pest of walnut trees in many regions. Population fluctuations as well as spatial dynamics of SWA was studied in Mamaghan (East Azarbaijan province, Iran) walnut orchards during season 2012. Those factors that supposed may cause tendency including height (at two levels of top and bottom of canopy), geographical orientations of canopy (at four levels) and elongation of branch (basal and distal ends) were investigated in regards of their impact on population of SWA as a 4×2×2 factorial design on the basis of completely randomized design (CRD) upon eight randomly selected trees. Sampling unit was a cluster of five leaves that a total 128 samples were weekly chosen from each stratum 30 times during the season. The first individuals of SWA were recorded at early May that consisted of first instar larvae and alata females. Population increased slowly at first few weeks, but a sudden increase occurred at mid-May while complete overlap of all stages first time observed at late-May. Therefore, it seems that the first generation has taken a month. Maximum 50 aphids/ leaf dominantly consisted of first and second instars (65%) occurred at early June. Outbreak continued three weeks later then a sudden decline occurred at late June. Decrement continued for two months but never reached to zero. Minimum amount of aphid density occurred at mid-September followed by a small peak at early October. Early November was the end point of seasonal activity of the SWA. A partial tendency was observed downward, toward north of canopy tending to basal half of branches. It seems that more temperate and humid microclimate of these shaded strata is the reason of this tropism. However these tendencies were not strict and permanent as more than half samples did not present any tendency. Overwintering stages of SWA in the region were predominantly developed stages (third and fourth instars as well as pre-reproductive winged females). This is in contrast to previous reports of other scientists.

Key words: walnut, aphid, canopy, overwintering stage, population dynamics

0122. Patterns of colonization, crowding and disappearance of *Chromaphis juglandicola* (Hem.: Aphididae) colonies in northwest walnut orchards of Iran

Hossein Mahdavi¹, Shahzad Iranipour², Ali Mehrvar³, Roghayeh Karimzadeh¹

Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran

2. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

3. Department of Plant Protection, Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz, Iran

Spatial pattern of distribution of small walnut aphid (SWA) was studied during season 2012 by weekly samplings. Sampling program was conducted for about six months from late April to November. All stages of aphid were count separately on 128 clusters of leaves collected from eight walnut trees. Discrepancy of the sampling data from whether Poisson (random) or negative binomial (aggregation) statistical distributions was investigated by Pearson's Chi square test. Disregarding stages of SWA, goodness of fit tests were carried out with total populations. Density in the first sampling was low enough to prevent running Chi square tests. Second week was the first time that there was enough category to study fitness only with Poisson distribution that no discrepancy was observed. In all later samplings from 10 May to 10 August, data fitted to negative binomial distribution only with two exceptions. In contrast data revealed discrepancy with Poisson distribution up to early July. Afterward population deeply declined and well fitted to random pattern up to 20 September while in five sequential dates few number of the aphid did not allow fitness do study to clumped pattern. Relative increase of population in late season was lead to a tendency to aggregation once again. As a conclusion, SWA colonization begins as random; aggregation occurs following on site reproduction of females and finally random situation returns following depletion of patches. A second aggregation occurs late in the season when autumnal natality regains.

Key words: aggregation, negative binomial, Poisson, goodness of fit

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0123. Antibiosis of four Iranian varieties of tomato against *Helicoverpa armigera* (Lep. Noctuidae)

Mehrnaz Tankhahi¹, Shahzad Iranipour², Manizheh Jamshidi¹, Nahid Vaez², Esmail Alizadeh³

1. Department of Plant Protection, Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Tabriz, Iran
2. Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran
3. West Azerbaijan Research Center of Agriculture and Natural Resources, Urmia, Iran

Plant resistance is one of the safest methods of pest control. The antibiosis resistance of four commercial varieties of tomato commonly planted in West Azerbaijan province of Iran, "Super Beta", "Super Luna", "Super Chief" and "KJN3" were studied against the fruit worm *Helicoverpa armigera* Hubner. A no-choice experiment was conducted as RCBD in 10 replications. Ten third instar larvae of the pest per plant were simultaneously released in fruiting stage. Number of live pupae, development time of larvae from third instar to pupa and weight of pupae were measured as antibiosis indices. Duncan's multiple range test was used for comparison of means in circumstances that ANOVA was significant. Forty seven to 55% of larvae in different varieties developed to pupate. Maximum difference among varieties in development time of larvae was one day, but this small difference was significant. No significant difference was observed in pupa body weight. As a conclusion, there was no considerable difference among the varieties in terms of resistance against the pest.

Key words: Resistance, Tomato fruit worm, *Helicoverpa*

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0124. A Comparative Study on Life Cycle of Red Palm Weevil, *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) on Coconut Cabbage and Sago Palm

**Wahizatul Afzan Azmi¹, Nursyafida Abdul Karim¹, Arfatin Shafizah Arshad¹,
Nurul Ain Aqilla Wan Mustaffa¹,**

¹Universiti Malaysia Terengganu, Kuala Terengganu, Terengganu, Malaysia

Rhynchophorus ferrugineus Olivier (Coleoptera: Curculionidae) or commonly known as Red Palm Weevil (RPW) is a major pest of coconut palm in the east coast of Peninsula Malaysia and sago palm in Sarawak. In the present study, the life cycle of RPW reared on coconut cabbage and sago stem were studied under laboratory conditions. Two hundred eggs of RPW were used to determine and compare the hatchability of eggs, larval period, pupal period and adult emergence for each food diet. Out of 400 eggs, only 241 eggs were successfully hatched for both food diets. Significantly higher percentage of eggs hatchability was obtained from eggs reared on sago diet (76%) compared to eggs reared on coconut diet (44%). The hatching period ranged from 2.65 days on sago diet to 3.45 days on coconut diet. Interestingly, the larval period of coconut diet which was 88.35 days was significantly shorter than the sago diet which took about 113.9 days to complete the larval stage. However, no significant difference in the average width of head capsule of larvae reared on coconut diet (2.92 ± 2.01 mm) and larvae reared on sago diet (2.88 ± 2.06 mm) was observed. The mean body weight of seventh instar larvae reared on sago diet was significantly greater (3.14 ± 0.28 g) compared with larvae reared on coconut diet (1.81 ± 0.57 g). Shorter period of pupal development was observed from larvae reared on sago diet (25.5 days) than on coconut diet (33.2 days). Fifteen adults were successfully emerged from sago diet and only 12 adults were from coconut diet. All adults emerged were females but the body length were slightly smaller than adults collected from field. Overall, the life cycle of RPW on coconut diet was shorter (124 days) than on sago diet (154 days). Nutritional content analyses show that coconut cabbage contain higher fibre, protein, fat, moisture and ash compared to sago stem. This study suggests that coconut cabbage provide shorter developmental time for RPW and more nutritional values compared to sago palm.

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0125. Epidemiological Basis and Chemotherapy of Bovine Tick Infestation in the River Ravi Region, Lahore (Pakistan)

**Muhammad Ijaz^{1*}, Sadaqat Ali¹, Aneela Zameer Durrani¹, Azhar Maqbool²,
Muhammad Muddassir Ali³ and Khalid Mehmood⁴**

¹Department of Clinical Medicine and Surgery; ²Department of Parasitology; ³Institute of biochemistry and biotechnology; University of Veterinary and Animal Sciences Lahore, 54000, Punjab, Pakistan;

⁴Department of Clinical Medicine and Surgery; University College of Veterinary and Animal Sciences; Islamia University of Bahawalpur (IUB), Pakistan

A total of 1258 bovines (n =726 cattle; n =532 buffaloes), positive for ticks, were included in the study to check determinants of tick infestation as well as efficacy of two acaricides was measured. *Hyalomma* was significantly ($P < 0.05$) the most prevalent tick genus 71.9% and 62.03%, followed by *Boophilus* 22.04% and 28.57%, and mixed infection 6.06% and 9.4%, in cattle and buffaloes, respectively. Mild tick infestation (1–20 ticks/animal) was found significantly ($P < 0.05$) high, followed by moderate (21–50 ticks/animal) and high tick infestation (>50 ticks/animal) in bovines. In cattle, crossbreds were significantly ($P < 0.05$) the most affected, followed by Sahiwal, Cholistani, Holstein Friesian and non-descript, respectively, while in buffaloes, non-descriptive breed was more affected than Nili Ravi. Females were significantly ($P < 0.05$) the most affected gender than males in bovines. Calves were significantly ($P < 0.05$) the most affected age group in both, followed by adult, young and old, respectively in cattle, while followed by young, adult and old, respectively in buffaloes. Udder was significantly ($P < 0.05$) the highest tick infested site in both, followed by inner thighs, perineum, legs and tail, and neck, respectively in cattle, while followed by neck, tail, perineum, inner thighs, legs, and back and ears, respectively in buffaloes. Summer was significantly ($P < 0.05$) the most tick favorable season, followed by winter, spring and autumn, respectively in bovines. The final efficacy of treatment with doramectin and ivermectin was 100% and 78.57%, respectively making doramectin the most effective.

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0126. Epidemiological Survey And Chemotherapeutic Trials Of Tick Infestation In Equines In And Around Lahore

Muhammad Ijaz^{1*}, Khadija Javed¹, Aneela Zameer Durrani¹, Azhar Maqbool²,
Muhammad Muddassir Ali³, Khalid Mehmood⁴
and Sadaqat Ali¹

¹Department of Clinical Medicine and Surgery; ²Department of Parasitology; ³Institute of biochemistry and biotechnology; University of Veterinary and Animal Sciences Lahore, 54000, Punjab, Pakistan;

⁴Department of Clinical Medicine and Surgery; University College of Veterinary and Animal Sciences; Islamia University of Bahawalpur (IUB), Pakistan

A total of 395 ticks infected equines (166 horses; 115 mules; 114 donkeys) were incorporated under study to determine different risk factors of tick's infestation from March 2012 to February 2013 in Lahore, Pakistan. *Hyalomma* species infestation was found 71.69% followed by *Boophilus* infestation 15.66% and mixed infestation 12.65% in horses. In mules, highest infestation was recorded of *hyalomma* 55.65%, followed by *Boophilus* 24.35% and mixed infestation 20%, while in donkeys highest infestation was 66.67% of *Hyalomma* species, followed by *Boophilus* infestation 21.93% then mixed infestation 11.40%. Mild tick infestation (1–20 ticks/animal) was found significantly high, followed by moderate (21–50 ticks/animals) and high tick infestation (>50 ticks/animal) in equines. Females were significantly more infested as compared to males in equines. Summer was significantly most tick favorable season, followed by autumn, spring and winter in horses. In mules most tick favorable season was spring followed by winter, summer and autumn whereas in donkeys most significantly ticks infestation were observed in winter followed by summer, spring and autumn. For chemotherapy 30 equines (Horse=10; Donkey=10; Mule=10) positive for ticks were divided into two groups A and B and was treated with ivermectin and doramectin respectively. The final efficacy of ivermectin and doramectin was 86.6 and 93.3% respectively; evidencing doramectin is most effective against tick infestation.

Kew words: *Boophilus*, *Hyalomma*, Infestation, Season and Efficacy.

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0127. Sustainable management of spotted pod borer, *Maruca vitrata* (Geyer) in early pigeonpea

S D Mohapatra¹, S K Singh², Farindra Singh²,

Central Rice Research Institute, Cuttack, Odisha, India,²Indian Institute Of Pulses Research, Kanpur, Uttar Pradesh, India

Development of high-yielding early pigeonpea cultivars has created a fresh opportunity for greater inclusion of legumes in rice-wheat cropping systems in India. Even though the realized yield of early pigeonpea is comparable with late maturing pigeonpea, there is big gap in realized and potential yield of early pigeonpea. The single most important biotic constraint in pigeonpea production is the insect pests feeding on flowers, pods and seeds. In recent years, with the introduction of early pigeonpea, spotted pod borer, *Maruca vitrata* (Geyer) has emerged as one of the major constraint because of the coincidence of high humidity and moderate temperature in September - October coinciding with the flowering of the crop in India. Control of spotted pod borer mainly relies on the use of chemical insecticides which is often ineffective as the larvae are well protected in floral parts and pods and farmers spray with mixtures of insecticides and at higher dosage and frequencies to achieve effective control. These problems have necessitated developing sustainable pest management strategies against *Maruca* in pigeonpea. Hence, the present studies aimed at the development of sustainable management strategies for spotted pod borer management through development of a suitable technique in laboratory for bioassays, studies on its biology and ecology and identification of alternatives to broad spectrum insecticides. The studies revealed that the occurrence of *Maruca* varied from 0.2 to 18.2 larvae plant⁻¹ with first peak (14.7 larvae plant⁻¹) during second week of September (37th SMW) and second peak (18.2 larvae plant⁻¹) during first week of October (40th SMW). Screening of 230 early pigeonpea genotypes based on level of pod damage revealed that the lowest damage was observed in P-241 (0.9%) followed by P-53 (1.2), S-32 (1.6) and R-7-2 (1.9%) where as the highest damage was recorded in EC 109916 (38.0) followed by UC 1463 (36.4) and UC 938 (33.3%). Intensive free-choice test of 12 pigeonpea varieties/ genotypes indicates that no varieties/ genotypes are free from *Maruca* attack. However, Pusa 855, ICPL 84031, Paras, GT 100 and ICP 12882 showed moderately susceptible reaction to *M. vitrata*. The toxicity of biorational insecticides revealed that the lowest mean pod damage (1.6%) was also recorded in DDVP 76EC - rynaxypyr 20EC treated plots followed by garlic bulb extract (1%) - rynaxypyr 20EC (2.4%) which are at par and significantly superior over untreated control (19.6%).

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0128. How to improve ecosystem services and biodiversity in agrosystems? The use of apparent competition for cereal aphid control.

Thierry Hance

¹Earth and Life Institute, UCL, Louvain-la-Neuve, Belgium

Agriculture represents the major way of land use throughout the world and its intensification is responsible of major losses in biodiversity. Moreover, the chemical control of pest crops speeds up this process and has major issues on human health and ecosystems. The question is thus how to improve the natural control of crop pest in the same time than reducing pesticide application and increasing local biodiversity. This challenge may be solved by management of the non-cultivated part of the agricultural landscape but also by the use of agri-environment scheme aiming at improving biodiversity. Here we present the influence of the settlement of grassy strips at the border of cereal fields on aphid control. We showed that the implementation of grassy strips in the agricultural landscape provides alternative aphid species allowing the building of aphid parasitoid populations. These alternative aphids have no economic importance in cereal crops and are present mainly on weeds. By comparison with non-managed fields, we showed that the level of aphid parasitism increased inside cereal fields in June and is correlated with the level of aphid parasitism in the grassy strips in the beginning of spring. Parasitoid diversity was also higher. Moreover, under the same conditions, the growth of the aphid population was well reduced in managed field compared to control field. This is one of the few well-documented cases on the role of apparent competition on pest control and how non-cultivated zone may provide ecosystem services useful for pest control in cultivated field.

Key words: conservation biological control, grassy strips, aphid parasitoids, apparent competition, alternative hosts

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0129. Assessment of Nesting Habitat of Stingless Bees (*Apidae: Meliponini*) in Selected Forest Reserves of Oyo State, Nigeria.

**Bridget Bobadoye¹, Joseph Adekola¹, Funmilayo Oyelami¹, Rhoda Obideyi¹,
Islamia Rafiu¹,**

¹forestry Research Institute Of Nigeria, Ibadan, Oyo State, Nigeria

A study was carried out to ascertain the presence of stingless bees which is a largely unknown and underutilized species of bees in Nigeria. *Meliponula* is a genus of stingless bees found in sub-Saharan Africa, with sizes ranging from 2mm to 8mm depending on the species and providing honey which is considered to have highly medicinal properties. These bees are important pollinators, and are adapted for feeding on nectar and pollen. They largely nest in trees which provide insulative and protective structures. Identification of tree species naturally preferred by these stingless bee species were found to be most abundant at Ijaye forest reserve and Olasheinde forest reserve of Oyo state, which was largely due to the peculiarity of being partially undisturbed. Results showed that the following tree species *Triplochiton scleroxylon* (13%), *Terminalia superba* (13%), *Gmelina aborea* (10%), *Azadirachta indica* (10%) and *Azela africana* (6.67%) had significantly higher ($P < 0.05$) nesting occurrence and abundance in Ijaye forest reserve than in Olasheinde forest reserve which had *Triplochiton scleroxylon* (10%), *Terminalia superba* (10%), *Gmelina aborea* (10%), and *Azadirachta indica* (10%) indicating that the stingless bee species distribution and nesting abundance is strongly dependent on the number and frequencies of occurrence of the identified trees. This shows that there is an indispensable relationship between nesting habitat, species distribution and abundance with the number of trees found within a particular habitat or ecosystem.

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0130. Population Genetic Structure of *Aedes albopictus* in Penang, Malaysia

Nur Zawani Mustafa Kamal¹, Darlina Md. Naim¹,

¹Universiti Sains Malaysia, Penang, Malaysia

The mosquito *Aedes albopictus* is indigenous to Southeast Asian and has been the vector for arbovirus diseases (dengue fever, chikungunya, yellow fever, etc.). Recently, *Ae. albopictus* has spread to other countries worldwide such as Africa, Europe and America and has become more increasingly important vector for dengue virus. Research on population genetics structure of *Ae. albopictus* has been carried out worldwide. However, there is no documented report or research has been carried out on the population genetic structure of *Ae. albopictus* in Malaysia, especially in Penang. Here we report a population genetic study of *Ae. albopictus* examined based on a 445 bp segment of the mitochondrial DNA cytochrome oxidase 1 (CO1) gene among 78 individuals from 9 localities that represent four regions (Seberang Perai Utara, Seberang Perai Tengah, North east and South west) of Penang. A total of 38 haplotypes were detected with 29 unique haplotypes. The other 9 haplotypes were shared among various populations. The sharing of these haplotypes reflects the weak population genetic structure of *Ae. albopictus*. The phylogenetic tree obtained showed low bootstrap value with no genetic structure and the result was supported by a minimum spanning network analysis. Analysis of mismatch distribution showed poor fit of equilibrium distribution and this was supported by a plot of transition and transversion versus genetic distance which indicated the high substitution saturation. Genetic distance showed low genetic variation while pairwise F_{st} values showed significant difference between all regions in Penang except for some localities. A pattern of high haplotype diversity and low nucleotide diversity was characterized for CO1 mtDNA in our datasets. Based on the results obtained, we can conclude that there is no population genetic structure of *Ae. albopictus* mosquitoes in Penang area.

Keywords: *Aedes albopictus*, arbovirus, CO1 gene, population structure, Penang

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0131. A Faunistic Survey On Twirler Moths Of Family Gelechiidae (Lepidoptera) From Jammu And Kashmir (India)

P. C. Pathania

Department of Entomology, Punjab Agricultural University, Ludhiana-141 004, Punjab: India

The aspects such as monitoring, conservation of biodiversity and sustainable development are being vigorously discussed at various fora, including various Earth Summits held at Rio-de Janeiro, 1992; New York, 1997; Johannesburg, 2002 and again at Rio-de Janeiro, 2012. After an introduction of the term “biodiversity” besides the first Earth Summit, one thing has clearly emerged that documentation of the biota be given more priority, particularly in the biodiversity rich biogeographical areas. Out of 30 insect orders, Lepidoptera (moths, butterflies and skippers) is the third largest order after Coleoptera and Hymenoptera in the class Insecta. There are about 2,00,000 species of this order enlisted from global basis, out of these, only 15,000 are butterflies and remaining moths (Holloway *et.al*, 1992). The family Gelechiidae (Superfamily Gelechioidea) includes minute sized moths (micros) and represented by more than 4,530 species of 507 genera worldwide. In India, only 729 species are present (Singh and Roonwal, 1954). The main characteristics of this family are vertex and frons covered with smooth scales, antennae smaller than 3/4th length of forewing, labial palis upturned, second segment long, acute, hindwing with veins R₁ and Sc united from base of wing or R₁ running into Sc beyond base of wing, discocellular perpendicular to long axis of wing or directed at 45 degree angle toward base of wing from M₂, termen excavated. Survey-cum-collection tours were undertaken from various localities such as Jammu, Domel, Udampur, Kud, Batote, Chanderkote, Ramban, Qazigund, Khanabal, Awantipur, Pampore, Gandabal, SKAUST Srinagar, Kunzer, Gulmerg, Anantnag, Mattan, Pehalgam and Betab Valley of state Jammu and Kashmir during different period. The adults of Gelechiid were collected during the night time (nocturnal) with the help of portable light traps. The collected moths were killed by using tetrachloro ethane or ethyl acetate and pinned (entomological pins), stretched and well preserved in insect show cases. Twenty-four (24) species belonging to 13 genera such as *Anarsia* Zeller (05), *Brachmia* Hubner (02), *Chelaria* Haworth (01), *Dichomeris* Hubner (03), *Helcystogramma* Zeller (02), *Hypatima* Hubner (02) *Hypelictis* Meyrick (02), *Pectinophora* Busck (01), *Phthorimaea* Meyrick (01), *Sitotroga* Heinemann (01), *Stegasta* Meyrick (02), *Stomopteryx* Heinemann (01) and *Thiotricha* Meyrick(01) of family Gelechiidae were collected and identified. The major pest's species viz, *Pectinophora gossypiella* (Saunders) and *Helcystogramma hibisci* (Stainton) of okra, *Anarsia ephippias* (Meyrick) of french beans, *Phthorimaea operculella* (Zeller) of potato and *Sitotroga cerealella* (Olivier) of stored grains were taxonomically studied. The other aspects on their geographical distribution, morphological and genitalic characters and field diagnostics tools for their identification and colored photographs of the adults and their damage will be discussed.

Keywords: Faunistic, Gelechiidae, Jammu and Kashmir, Lepidoptera, Survey

0132. Preliminary Genetic Studies of *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) in Selected Areas of Terengganu, Malaysia Utilising the Mitochondrial Cytochrome Oxidase 1 (CO1) Marker

Nur Zawani Mustafa Kamal¹, Darlina Md. Naim¹,

¹Universiti Sains Malaysia, Penang, Malaysia

The Red Palm Weevil (RPW), *Rhynchophorus ferrugineus* is a new invasive coconut pest in Malaysia which had spread to 858 localities of coconut plantations in all seven districts of Terengganu, Malaysia in 2011. However, very limited information about the genetic variation of *Rhynchophorus ferrugineus* is available, especially in Malaysia. In this study, a total of 25 individuals from five different RPW morphs with five individuals representing each morph were chosen to compare genetic variation within RPW morphs using partial sequences of *cytochrome c oxidase* subunit 1 (CO1) mitochondrial gene. Results showed that morph 1, 2 and 3 did not show any differences but variables in nucleotide bases were detected among morph 4 individuals (1.49% variation) and morph 5 (0.37% variations). This may be due to the certain natural factors such as the environment, adaptation and mutation event which produce certain variation among these different morphs. Due to similarities in the COI gene with other RPW morphs previously studied and the small percentage of variable bases between the five different morphs, it is believed that the different RPW morphs were genetically similar and originated from the Mediterranean area.

Keywords: Red Palm Weevil (RPW); *Rhynchophorus ferrugineus*; genetic variation; *cytochrome c oxidase* subunit 1 (CO1); Malaysia

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0133. Comparison of genome-wide DNA methylation pattern between queen larvae and worker larvae in the European honeybees, *Apis mellifera*

Hironori SAKAMOTO¹, Miho SUZUKI², Tetsuhiko SASAKI¹,

¹Tamagawa Univ, Tokyo, Japan, ²National Institute for Basic Biology, Aichi, Japan

Differentiation between reproductive caste (queen) and non-reproductive caste (worker) in honeybees is determined by the difference of larval foods. A female larva up to 3 days after hatching can grow into either queen or worker, and the fate of larva is irreversibly-determined on the 4th day after hatching. To clarify the epigenetic control of caste determination, genome-wide DNA methylation pattern were compared between queens and workers on the 4th day after hatching by next generation sequencing technology. We found 96,637 and 68,732 significantly methylated CpG sites in workers and queens, respectively. These results show that worker genome is more methylated than queen genome. There were 1,717 differently methylated CpG sites, located on 489 genes, between queens and workers. We chose eight differently methylated regions (DMRs) including 48 CpG sites and investigated the temporal changes of the methylation state during caste-determining larval stage (3, 4 and 5 days old) by the amplicon sequencing analysis.

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0134. Problems with maize arthropods in Poland – current status and forecast hazard

Paweł K. Bereś¹, Halina Kucharczyk² and Marek Kucharczyk³

¹Institute of Plant Protection-NRI, Regional Experimental Station, Rzeszów, Poland

^{2,3}Maria Curie-Skłodowska University, Department of Zoology², Department of Nature Protection³, Lublin, Poland

Maize (*Zea mays* L.) is one of the major cereals grown in the world, and in Poland the acreage of its cultivation is about one million hectares. Agrophages create danger to the yield and quality of maize crops, and the economic impact of pests continues to increase. In Poland studies on maize pests have been carried out since the 1950s. It has been estimated that in Poland pests directly cause a 20% decrease in grain yield, and a 10% decrease in the yield of silage and CCM. Additional loss is associated with the infestation of damaged plants by pathogens, including fungi producing mycotoxins. So far, over 50 species of insects causing damage to above-ground and underground plant parts have been identified in maize fields in Poland. This number is gradually increasing as new alien species continue to emerge, and others, previously classified to lower ranks, are successfully identified. Currently, major pests of *Zea mays* in Poland include the *Ostrinia nubilalis* Hbn., the *Oscinella frit* L., species from the families of Thripidae (e.g. *Frankliniella tenuicornis* Uzel, *Haplothrips aculeatus* F.), Elateridae (e.g. *Agriotes obscurus* L., *Hemicrepidius niger* L.), Noctuidae (e.g. *Agrotis segetum* Den. & Schiff., *Agrotis exclamationis* L.) and Aphididae (e.g. *Rhopalosiphum padi* L., *Metopolophium dirhodum* Walk.). Over the last ten years maize has been infested by a growing number of new pests causing damage to plants. This is partly attributed to the increasing acreage of maize, the use of simplified soil preparation techniques and specific plants (especially long-term monocultures), and the presence of weather conditions facilitating the development of pests. New species found on maize fields include the *Diabrotica virgifera* LeConte, *Helotropha leucostigma* Hübner, *Helicoverpa armigera* Hübner, *Acronicta rumicis* L., *Simyra albovenosa* Goeze, *Tetraneura ulmi* L., *Philaenus spumarius* L., *Orgyia antiqua* L. *Tettigonia viridissima* L. In the forthcoming years a further increase in the harmfulness of species currently causing economic loss in maize yields is forecast, particularly with respect to *O. nubilalis*, *D. virgifera* and Noctuidae caterpillars. Aphids and thrips may also be significant pests as they can additionally play the role of vectors for viruses infesting maize plants.

Key words: harmful entomofauna, maize, plant protection, Poland

0135. Larvicidal action of *Bacillus subtilis* and its parasporal inclusions on the mosquito, *Culex quinquefasciatus*

Ganesh Arumugam¹, Veeramani Velayutham¹, Chitra Somu¹, Sakthivelkumar Shanmugavel¹, Janarthanan Sundaram¹,

¹University of Madras, Chennai, Tamilnadu, India

Bacillus subtilis is a rod-shaped, aerobic, endospore-forming bacterium commonly found in soil, water sources and in association with plants. *B. subtilis* is known to have potential insecticidal activity. In the present study, the *B. subtilis* strain was isolated from the soil and tested its ability to infect the larvae of mosquito, *Culex quinquefasciatus*. The LD₅₀ value of *B. subtilis* against the third instar larvae of *C. quinquefasciatus* was 10⁵ cells.ml⁻¹ for 24 hours. During nutritional starvation, the growth of *B. subtilis* come to a halt and initiate responses such as induction of motility, chemotaxis and production of macromolecules to restore the growth by increasing metabolic diversity. Sporulation is thus a distressed response to starvation. During sporulation, this bacterium synthesises a cytoplasmic parasporal inclusion bodies or crystals. These parasporal inclusion bodies were isolated from *B. subtilis* and tested for their toxicity against the third instar larvae of mosquito *C. quinquefasciatus*. The LD₅₀ value of parasporal inclusions was 58.2 µg.ml⁻¹ for 24 hours. Further work is essential to characterize these inclusion bodies and their mode of action on mosquito larvae to develop this microbial candidate as a biological control agent.

Keywords: *Bacillus subtilis*, Parasporal inclusions, larvicide, *C. quinquefasciatus*

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0136. The Balbiani body in the female germline cells of *Thermobia domestica* (Insecta, Zygentoma)

Waclaw Tworzydło¹, Jakub Drożdż¹, Elzbieta Kisiel¹,

¹Institute of Zoology, Jagiellonian University, Krakow, Poland

The female reproductive system of *Thermobiadomestica* is composed of paired ovaries that are composed of 5 elongated ovarioles of panoistic type. In the individual ovariole three discernible elements can be distinguished: a terminal filament, germarium and vitellarium. The most apical part of the germarium is filled with relatively small germline cells with nuclei surrounded by a narrow rim of a cytoplasm. All the organelles within a cytoplasm are distributed approximately uniformly. The “older” oocytes are larger and are located more posteriorly. Their nuclei are spherical and comprise heterochromatin aggregations and small nucleoli. In the cytoplasm, numerous ribosomes, elements of RER and mitochondria are present. In addition to these organelles, in each oocyte single aggregate of mitochondria and Golgi stalks is present. Similar aggregates are characteristic for young oocytes of many animal species and are referred to as Balbiani bodies or mitochondrial clouds. In *Xenopus laevis*, the Balbiani body plays a crucial role in establishing the polarity of the oocyte by transporting germ plasma and its germinal granules to a vegetal oocyte pole. It is possible that prominent Balbiani bodies found in germline cells of *Thermobiadomestica* play a similar role in determining oocyte and future embryo axes. The study was supported by a research grant IP2011 057171 from the Ministry of Science and Higher Education under a program Iuventus Plus.

Key words: oogenesis, ovaries, Balbiani body, *Thermobiadomestica*.

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**0137. Ovary and ovariole morphology support paraphyly of
Spongiphoridae (Insecta, Dermaptera)**

**Szczepan Bilinski¹, Petr Kocarek², Elzbieta Kisiel¹, Ada Jankowska¹, Wacław
Tworzydło¹,**

¹Institute of Zoology, Jagiellonian University, Krakow, Poland, ²Faculty of Science,
University of Ostrava, Ostrava, Czech Republic

The Dermaptera is a small insect order with about 2000 described species that are classified in 11 families. Interestingly, recent morphological and molecular data suggest that at least three of those families (Diplatyidae, Pygidicranidae and Spongiphoridae) are paraphyletic. The results of histological analyses of ovaries and ovarioles in two representatives of Spongiphoridae: *Chaetospaniaborneensis* and *Irdexchapmani* are presented. We show that both the ovaries and ovarioles in studied species are morphologically disparate. The ovaries of *Chaetospaniaborneensis* consist of shortened ovarioles with small germaria filled with 2-cell germline cyst only. The ovarioles are attached to elongated lateral oviducts and are apparently similar to the ovaries described previously in representatives of the most derived dermapteran taxa, the Endermaptera. In contrast, *Irdexchapmani* share all important ovarian characters with more basal earwig groups, i.e. Anisolabididae and Labiduridae. Briefly, its ovarioles are elongated and consist of several ovarian follicles; the germaria are large and consist of 8-cell germline cysts. The ovarioles are attached by means of prominent ovariole pedicels to shortened lateral oviducts. All these findings lend additional support to the paraphyly of Spongiphoridae.

Key words: Dermaptera, Spongiphoridae, phylogeny, ovaries, ovarioles.

**0138. A novel type of viviparity occurs in parasitic dermapteran
*Arixenia esau***

Waclaw Tworzydło¹, Kisiel Kisiel¹, Szczepan Bilinski¹

¹*Institute of Zoology, Jagiellonian University, Krakow, Poland*

Three main reproductive strategies have been described among insects: oviparity, ovoviviparity and viviparity. The vast majority of insects is characterized by the oviparity. Females of oviparous species lay down eggs in a safe habitat where embryogenesis takes place. During development, the embryos use the reserve materials (yolk proteins and lipids) stored during oogenesis in the oocyte cytoplasm, and are surrounded by protective coverings, the vitelline envelope and the chorion. The second strategy, i.e. viviparity, is relatively rare among insects. In this reproductive mode, the embryonic development takes place within the mother's body which provides gas exchange and, what is more important, nourishments for the embryos. In some insect groups, less advanced reproductive mode, the ovoviviparity has been reported. In this case, the embryos develop inside eggs that are retained in the mother's body until they are ready to hatch.

Arixeniaesau is an ectoparasitic earwig living on bats in Indonesia, Malaysia and Philippines. This species is viviparous. It was suggested that viviparity evolved to provide nymphs with an immediate contact with the preferred host and to accelerate the life cycle. In the studied species the embryonic development consists of two "physiological phases" that take place in two clearly disparate compartments, i.e. the terminal ovarian follicle and the uterus. In both compartments the embryos are associated with synthetically active epithelial cells. We suggest that these cells are involved in the nourishment of the embryo. Our results indicate that viviparity in *Arixenia* is more complex than previously considered. We propose the new term "pseudoplacento-uterotrophicviviparity" for this unique two-phase reproductive strategy.

Key words: Dermaptera, *Arixeniaesau*, viviparity, embryo development

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0139. The structure of the palaearctic genus *Mellicta* Billberg, 1820 (Lepidoptera, Nymphalidae)

Margarita Bush¹,

¹All-Russian Plant Quarantine Center, Moscow oblast, Bykovo, Russia

Mellicta Billberg, 1820 is a small palaearctic genus of Nymphalidae family. According to different prognoses the genus includes about 18 species. This genus is one of the most difficult groups of butterflies for research. Because of the wing pattern variability, species are usually identified by analyzing male genitals. The taxonomic status of some populations until remains unclear that makes the study of male genitals variability important. Our study is based on specimens collected in nature, also specimens from collections of Zoological museum of Lomonosov Moscow State University and Zoological Institute of Russian, collected in different region of Russia, West Europe, Mongolia, China, Korean peninsula and Japan). We analyzed about 1000 genitals. We consider as species the following taxons: *M. varia* (Meyer-Dür, 1851); *M. parthenoides* (Keferstein, 1851); *M. asteria* (Freyer, 1828); *M. aurelia* (Nickerl, 1850); *M. menetriesi* (Caradja, 1895); *M. rebeli* (Wnukowsky, 1929); *M. alatauica* (Staudinger, 1881); *M. rhea* Churkin et Devyatkin, 2005; *M. athalia* (Rottenburg, 1775); *Mellicta celadussa* (Fruhstorfer, 1910); *M. caucasogenita* (Verity, 1930); *M. ambigua* (Menetries, 1859); *M. britomartis* (Assman, 1847); *M. deione* (Geyer, 1832) and *M. plotina* (Bremer, 1861). Some authors regard *M. centralasiae* (Wnukowsky, 1929) as bona species. However we consider it as a subspecies of *M. menetriesi*, because reliable differences of genital structures were not found. Also taxon *M. elenae* Yakovlev, 2007 we consider as subspecies of *M. britomartis*. The taxonomic status of *M. westsibirica* Korshunov, 1998 remain unclear and requires more research. Some authors regard *M. rebeli* as a subspecies of *Mellicta menetriesi*. According to our results these two taxons have reliable differences of wing pattern and genitals and so we regard *M. rebeli* as bona species. Thus we offer a fresh point of view on the structure of genus *Mellicta*

Key words: *Mellicta*, Lepidoptera, Nymphalidae, taxonomy, Palaearctic, male genitals. ●

0140. Control Thresholds (CTs) of *Oides decempunctatus* (Coleoptera: Chrysomelidae) on Campbell early variety at the vineyard.

Sun-Kook Kim¹, Seok-Ho Lee¹, Yun-Sang Lee¹, Jae-Woong Lee¹, Eu-Yeon Hong¹, Gil-Hah Kim²,

¹ARES Grape Research Institute, Okcheon, Chungbuk, Republic of Korea,

²Department of Plant Medicine, Chungbuk National University, Cheongju, Chungbuk, Republic of Korea

This study was conducted to estimate the control thresholds (CTs) at different larval densities of *Oides decempunctatus* Billberg (Coleoptera: Chrysomelidae) of Campbell early in the vineyard and investigated life cycle. Each stage of *O. decempunctatus* was sampled 18 times from May to September in 2010~2012. The seasonal occurrence of *O. decempunctatus* showed the highest peak in mid-late June and mid-late August. Overwintered *O. decempunctatus*'s eggs were hatched from late May to early June. Larva period was from late May to mid July and adults appeared in mid July.

The percentage of leaf damage (Y) of Campbell early inoculated by different densities of *O. decempunctatus* (X, no. of larvae/fruiting mother branch) for six weeks was estimated by $Y=0.498X+2.04$ ($R^2=0.988$) during vegetation period. The decreasing rate of soluble solid (Y) after grape harvest of Campbell early damaged by different densities of *O. decempunctatus* (X) was estimated by $Y= -0.046X+15.3$ ($R^2=0.085$). Based on the relationships between the densities of *O. decempunctatus* larvae and the index of reducing soluble solid of Campbell early, the number of larvae (2nd to 3rd instar) which decreased less than 15°Bx loss of soluble solid was determined as the injury level of 7/fruiting mother branch. Control value against five insecticides (clothianidin, bifenthrin, acetamiprid, lambda-cyhalothrin, dinotefuran) showed more than 97% on *O. decempunctatus* adults and larvae in the field test.

0141. DNA barcoding on insect pests of commercial crops in Malaysia

Siti Zafirah Ghazali¹, Salmah Yaakop¹,

¹Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, Malaysia

Identification on dominant insect pests of commercial crops species is very important and known as a fundamental study for managing and maintaining high products and yields of local fruits and plants. It is because, many of insect species has become invasive and cause severe damage to local crops in Malaysia. DNA barcoding provides a new and efficient method for identification up to species-level. In this study, we apply DNA barcoding technique for dominant pest species in Malaysia to provide the taxonomic tags for rapid and efficient identification. We have successfully sequenced a 715bp of cytochrome oxidase subunit I (COI) from 35 specimens of 11 commercial crops species in Malaysia viz. oil palm, rubber, rice, vegetables, fruits, coconut, rubber, cocoa etc. The identity of each insect species has been confirmed by comparing the sequences against database sequences of identified specimens using Barcode of Life Database (BOLD) and Basic Local Alignment Search Tool (BLAST).

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0142. Hierarchy-Dependent Non-Consumptive Effects In Ants.

Hellena Binz¹, Roman Bucher², Martin H. Entling², Florian Menzel¹,

¹University of Mainz, Department of Evolutionary Biology, Mainz, Germany, ²University of Landau, Ecosystem Analysis, Landau, Germany

Within ecosystems, communities are shaped by inter- and intraspecific competition for food sources and territories. To coexist, species can either occupy different niches (e.g. different activity patterns, different food sources) but also establish various dominance hierarchies. In ants generally the most numerical or aggressive species are dominant towards submissive species which subordinate to the dominants. When dominant ant species have found a promising food source, they recruit additional workers by leaving species specific trail pheromones and indirectly, cuticular hydrocarbons (CHC) along the way. For other scouting ant species, those chemical cues (kairomones) could elicit non-consumptive effects like the avoidance of those food sources (indirect exclusion) or an attraction to follow the trail.

Non-consumptive effects are assumed to play an important role in shaping ant communities but have not been investigated for temperate ecosystems. Here we set out to test for non-consumptive effects between five ant species of two different habitats. We use a combination of behavioral observations and Y-maze choice experiments to score between species dominance ranks. Our results give new insights into the role of an established dominance hierarchy in an ant community and its influence on competition trade-offs as well as their ecosystem functions.

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0143. Białowieża Primeval Forest as a refuge of mycophagous thrips species (Thysanoptera: Phlaeothripidae)

Halina Kucharczyk¹, Marek Kucharczyk² and Lukasz Wyrozumski¹

¹Department of Zoology, ²Department of Nature Protection

Maria Curie-Skłodowska University, Akademicka 19 Str., 20-033 Lublin, Poland

Białowieża Primeval Forest is located on the Polish-Belarusian borderland. In both countries parts of this area are protected as national parks. The transboundary Biosphere Reserve and World Heritage site were established on the most valuable pieces of woods, protected for centuries by Polish kings and Russian tsars. Białowieża National Park (BPN) established in 1932 is known around the world because of the natural refuge of European bison (*Bison bonasius* (Linnaeus 1758) and many other species, both relicts and living at the limit of their distribution, and typical for deciduous and mixed forest of European lowlands. The unique element of BNP is large accumulations of dead wood and very old trees, where many species, especially cambio-, xylo- and mycophagous, have found favorable conditions for development. A large concentration of rare species in a limited area testifies to its great importance for biodiversity conservation.

The order Thysanoptera is one of the least known group among the 9000 species of insects found in this forest. To date 226 thrips species are known from Poland and 59 from BPN, among them 15 species of the suborder Tubulifera feed on different species of fungi covered decaying wood. Fungivorous thrips live gregariously but they are highly dispersed, for this reason it is very difficult to find them in environment. Window traps and Moericke traps were the most effective methods to collect thrips during their migration. The other method which also give possibility of breeding thrips is collecting fungal infested branches.

During the monitoring studies conducted in BPN between 1988 and 2002 seven fungivorous thrips species new to the Polish fauna have been caught into traps, among them such rare European species as: *Hoplothrips caespitis* (Uzel 1895), *H. carpathicus* Pelikan 1961, *H. polysticti* (Morison 1949), *H. unicolor* (Vuillet 1914), *Hoplandrothrips williamsianus* Priesner 1923 and *Phlaeothrips annulipes* Reuter 1880.

Key words: Bialowieza Primeval Forest, Poland, Thysanoptera, Phlaeothripidae, mycophagous species

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0144. An analytical method for the determination of a residue amount of azadirachtin, berberine and oleandrin from rice samples

Joon-Seong Park, Hyo-Song Nam, Sun-Am Kim, Boung-Jun Oh
Jeollanam-do BioControlCenter, Jeonnam 516-944, South of Korea

Plant-derived pesticides have widely used for sustainable agriculture. Azadirachtin, berberine and oleandrin have diverse activities such as insecticidal, nematocidal, and antimicrobial properties against pests and pathogens. In this study, we focused on azadirachtin, berberine and oleandrin which extracted from *Melia azedarach*, *Coptis chinensis* and *Nerium oleander*, respectively. We sprayed three plant extracts to rice fields. After that, we measured a residue amount of azadirachtin, berberine and oleandrin residues from the rice samples, respectively. The analytes from the rice samples were measured by liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS). The method was validated considering its good linearities ($r^2=0.995-0.999$), specificity and recoveries. The limit of detection and quantification were 0.01 and 0.033 mg/kg for all of the target compounds, respectively. Recoveries were 79.3-118.3% spiked at 0.1 mg/kg concentration level and 75.2-111.3% spiked at 0.5mg/kg concentration level. The residue level is below 0.03mg/kg for azadirachtin, 0.32 mg/kg for oleandrin and 1.46 mg/kg for berberine.

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0145. Molecular Ecology and Population Genetic Structure of Subterranean Termite, *Reticulitermes flavipes* (Kollar)

Abdul Hafiz Ab Majid

School of Biological Sciences, Universiti Sains Malaysia, Penang, Malaysia

The Eastern subterranean termite, *Reticulitermes flavipes* (Kollar) is the most economic important termite species infesting urban structures. Genetic markers have been widely used to understand the breeding structure and population genetics of subterranean termites. Ten workers from each site were genotyped at seven microsatellite loci. Samples were genotyped on a Beckman Coulter CEQ 8000 Genetic Analysis System using GenomLabTM Fragment Analysis Protocol. All seven microsatellites were polymorphic with 1-6 alleles per locus with the frequency of most common allele within 0.11-0.60 which indicated high levels of genetic variability on a local scale. Data from natural population show 62.5% of the termite colonies are mixed families, meanwhile data from urban structure indicate 85% of the termites colonies are simple families. The analyses of F- statistics and relatedness coefficients indicated that the colonies were often inbred, suggested they contained neotenic reproductive.

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0146. Control effect using insecticides and environmental-friendly agricultural materials against spot clothing wax cicada , *Lycorma delicatula*(Hemiptera: Fulgoridae) at the vineyard

Eu-Yeon Hong¹, Sun-Kook Kim¹, Seok-Ho Lee¹, Yun-Sang Lee¹, Jae-Woong Lee¹, Gil-Hah Kim²,

¹ARES Grape Research Institute, Okcheon, Chungbuk, Republic of Korea,

²Department of Plant Medicine, Chungbuk National University, Cheongju, Chungbuk, Republic of Korea

This study was carried out to investigate the toxicities of five registered insecticides, 10 environmental-friendly agricultural materials (EFAM) and seasonal occurrence at the vineyards to the *Lycorma delicatula*. *L. Delicatula* nymphs occurred from late May to late August the highest early June (1st nymph) while adults occurred from late July to November with the highest peak of early October (preovipositing female) in 2012. Total population density of *L. delicatula* was the highest in early June.

For the 3rd nymphal instars and adults, etofenprox+diazinon, chlorpyrifos, etofenprox, dinotefuran and imidacloprid showed perfect insecticidal activity. The systemic effects of dinotefuran and etofenprox+diaxon of grape roots at half concentration were showed the adult mortality of 82.2% and 84.4%, respectively. Chlorpyrifos at recommended concentration was showed mortality of 86.0%. The leaf systemic effects at recommended and half concentrations of all insecticides except dinotefuran were lower than 65% but the mortality at double concentration of chlorpyrifos, dinotefuran, etofenprox were more than 82%. The residual effect between etofenprox+diaxon and dinotefuran at recommended and double concentrations were all 4.0% at 44 days after treatment, the other insecticides have low efficacy. All the four insecticides showed 87% control value on nymphs in the field test and adults appeared more than 96% control value against dinotefuran, etofenprox+diaxon, however, the other insecticides decreased to 59.1% and 61.2%. Therefore, dinotefuran and etofenprox+diaxon showing high systemic effects to roots and long residual effects to leafs have high control efficacies. For the 3rd~4th nymphal instars and adults, EFAM(Spider, Jindikap-plus and Byejin-) showed perfect insecticidal activity 2 hour after treatment. Seoncho showed insecticidal activities 96.7% within 48 hour. Residual effects between EFAM showed 55.5% Spider at 7 days after treatment (DAT), the other EFAM had low efficacy. Jindikap-plus and Spider showed 99% control value on nymphs in the field test at 3DAT, appeared control value more than 90% at 7DAT.●

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0147. Intraspecific competition and experience affect oviposition in a leaf beetle

Stephan JG, Stenberg JA, Björkman C

Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden

Insect herbivores need to consider lateral effects of conspecifics during oviposition in order to secure food provision and minimize risk of predation for their offspring. Here we studied how leaf beetle females (*Phratora vulgatissima*; Coleoptera; Chrysomelidae) respond to the presence of other females and if these responses depend on the host plant (willow) species. In a first experiment single females were allowed to oviposit on standardized shoots for four days, then removed from the shoots and all distances between all egg clutches determined. The same female or a new naïve female were then released on the same shoots. Distances between the new and between the old and new clutches were determined. Largest distances were found between old and new clutches from the same female on both host plant species; *Salix dasyclados* and *Salix viminalis*. On *S. viminalis*, females re-released on the same plant also established larger distances between their new clutches than between their old clutches previously oviposit on that plant. The results show that females try to avoid intraspecific exploitative competition of hatching larvae by increasing distances between clutches (as a measure of aggregation). Females re-released on the same plant probably also have the advantage of “knowing the egg situation” on the plant in comparison to females that encounter that plant the first time and only rely on instantly perceived cues. In a second experiment we aimed to see if females account for the number of eggs on a plant and the number of female those eggs came from with three treatments. We daily released naïve females, re-released the same female or applied an intermediate release pattern (re-releasing of same altering with release of naïve female) on each plant for nine days. Females laid more eggs and bigger clutches on host plants of higher quality and also in the intermediate release pattern. This indicates that this gregarious species provides for its offspring by avoiding unsuitable hosts and has an optimal level of aggregation. On the more suitable host plant, *S. viminalis*, we also investigated if properties of the host plant affect oviposition by relating clutch size to leaf area and vertical position on the shoot. No effect of leaf area on clutch size could be found, but females preferred to oviposit in the lower part of the shoot, whereas feeding preferentially occurred in the upper part and on bigger leaves.

Key words: bottom up, clutch size, egg clustering, aggregation, exploitative competition, *Salix*

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0148. Ticks of Romania

Andrei D. Mihalca, Mirabela O. Dumitrache, Călin M. Gherman

University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Calea Mănăştur
3-5, 400372, Cluj-Napoca, Romania

Tick surveillance is important mainly from medical point of view because of their role as vectors for significant number human and veterinary pathogens. Knowledge on the distribution and host spectrum of ticks is important from epidemiologic point of view. A comprehensive study was conducted between 2010 and 2013 in order to identify the tick species of Romania, their geographical distribution and hosts on which they feed. During this period, 14,041 ticks were collected by flagging and 5108 ticks collected from hosts (reptiles, birds and mammals) were examined. Twenty-five tick species were identified: 11 *Ixodes*, 5 *Haemaphysalis*, 2 *Dermacentor*, 4 *Rhipicephalus* and 3 *Hyalomma*. Eleven species of ticks were collected by flagging and 19 specie from hosts, with 58 new associations. *Ixodes ricinus* was the dominant questing tick in Romania and had, also, the broadest host spectrum represented by 63 species. In rodents, 423 animals were examined (12 species) and 483 ticks were collected, eight species being identified: *Ixodes ricinus* (20.57%), *I. redikorzevi* (7.09%), *I. apronophorus* (0.47%), *I. trianguliceps* (0.24%), *I. laguri* (0.24%), *Dermacentor marginatus* (0.24%), *Rhipicephalus sanguineus* (0.47%) and *Haemaphysalis sulcata* (0.24%). In 57 hedgehogs examined 962 ticks were identified belonging to 6 species: *I. ricinus* (82.75%), *D. marginatus* (3.45%), *R. sanguineus* (3.45%), *R. rossicus* (3.45%), *Hyalomma marginatum* (3.45%) and *Haemaphysalis punctata* (3.45%). In foxes, 357 animals were collected from all Romanian ecoregions and 6 species were identified: *I. hexagonus* (72.44%), *I. ricinus* (28.84%), *I. crenulatus* (7.7%), *D. marginatus* (7.05%) and *H. punctata* (0.64%). In birds, 51 species of wild birds were examined and 5 species of ticks identified: *I. ricinus* (77.2%) in 12 host species, *I. arboricola* (13.04%) and *I. redikorzevi* (7.6%), both in 7 hosts, *R. sanguineus* (1.08%) and *H. marginatum* (1.08%). In 45 spur-thighed tortoises, *Testudo graeca*, 448 *H. aegyptium* ticks were identified. From 275 human patients a total number of 308 ticks were collected four species being identified: *Ixodes ricinus* (96.1%), *Dermacentor marginatus* (3.3%), *Haemaphysalis concinna* (0.3%) and *H. punctata* (0.3%).

Keywords: ticks, Romania, flagging, hosts, rodents, hedgehogs, foxes, birds, tortoises, humans

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0149. A survey of roadside soil arthropod communities from three elevations during summer in Mauritius

¹Zaynab Jawaheer, ¹Harinder Rai Singh, ²Seelavarn Ganesan

¹Faculty of Applied Sciences, Universiti Teknologi MARA, 40450 Shah Alam Selangor, Malaysia

²Mauritius Sugar Industry Research Institute, Réduit, Republic of Mauritius

This study was carried out in Mauritius during summer from November 2012 to April 2013. The objectives of this study were to quantify the species richness and diversity, abundance and biomass of soil arthropod from roadside trees found at three different elevations in Mauritius. Soil arthropods were collected utilizing pitfall traps made of plastic cups at three different elevations (Flic en Flac, 5m; Rose-Hill, 221m; and Mare aux Vacoas, 569m). Traps were placed among *Casuarina equisetifolia* (5m), *Dictyosperma album* (221m) and *Pinus sylvestris* (569m) trees. A total of 18422 arthropods were sampled of which 10681 individuals were sampled at 5m, 5216 individuals at 221m and 2525 individuals at 569m. The abundant soil arthropods were Hymenoptera (Formicidae) (54.0%) and Coleoptera (Nitidulidae) (32.7%). The alpha diversity of soil arthropods varied between elevations [(5m, 0.907), (221m, 0.727), (569m, 1.54)]. Soil arthropod species evenness was highest at 221m (0.77) followed by 5m (0.69) and lowest at 569m (0.53). Formicidae was abundant at 221m (91.4%.) while Anisolabidae (38.6%) was abundant at 569m. Significant difference in weight between elevation ($p < 0.05$) and significant differences in weight and abundance with bait types ($p < 0.05$) was observed. This study can be useful in determining soil arthropods and their plant host specificity as such data has implications for biological control as well as for collection of specific insects. Moreover, this study also has implications for town planners with respect to planting roadside trees and their ensuing edaphic communities for managing insect pests.

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0150. Identification methods for quarantine insect pests used in the Russian Federation

M.G. Bush, I. O. Kamayev, Yu. A. Lovtsova

¹All-Russian Plant Quarantine Center, Moscow oblast, Bykovo, Russia

Over the last years, the Russian Federation (RF) has significantly enhanced the volume of imports of plants and plant products, i.e. plants and plant products are now imported from virtually all continents. This has increased the risk of quarantine pests being introduced into the RF which may cause significant economic damage. To prevent the introduction of such pests, detection and identification of insect pests are given particular emphasis. Several methods for pest detection are used based on the type of plant samples, i.e. bulk samples, live plant samples, fresh fruit and vegetable samples, wood samples, and samples collected during phytosanitary monitoring. One of the most commonly used methods for pest detection in bulk samples is a hand sampling technique using optic equipment. A white sheet paper technique is also used. This detection method is based on the fact that when disturbed insects tend to move from the surface deeper into the sample and reach the sheet of paper and stay there. To detect pests in powder products (flour etc.), a trace method is used: a moving insect pest leaves a visible trace. A sieving method is used when the products display symptoms of infestation. It is difficult to detect small insects in large samples. In this case a Berlese funnel is used. To test bulk samples of fine-dispersed nature as well as sweeping samples, the floatation method is applied, i.e. immersion of samples into water or salt solution. To detect grains with entrance holes of insects that remain hidden, a staining method is used. For pest detection in live plants, a plant is shaken over a white sheet of paper which is later studied using optical equipment. In case of latent infestations, plant dissecting is used. If a pest is detected on the preimaginal stage, its maturation to adult stage is induced, or PCR-method is used. Samples of fresh fruits and vegetables are tested by visual inspection of each individual fruit or vegetable. To test for latent infestation, fruits and vegetables are inspected by cutting. Testing of wood products is performed by sawing. Detection surveys in storage and processing facilities are performed using trapping with food-baited traps and sampling of sweepings. To detect various quarantine pests, pheromone or light traps are used. Color traps based on color perception characteristics of a pest are also put to use. There are various detection methods. The choice of the most appropriate pest detection method enables to prevent pests from entering the RF.

Key words: quarantine insect pests, Russian Federation, identification methods

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0151. The Recent outbreak of Chikungunya Fever in India: Implications for Major Challenges and Opportunities

**Kalumuthu Kovendan^{*1}, Kaliyaperumal Karunamoorthi², Kadarkarai Murugan¹, and
Savariar Vincent³**

¹Division of Entomology, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore - 641 046, Tamil Nadu, India.

²College of Public Health & Medical Sciences, Jimma University, Ethiopia.

³Centre for Environmental & Research, P.G. Research & Department of Advanced Zoology and Biotechnology, Loyola College, Nungambakkam, Chennai – 600 034, Tamil Nadu, India.

This modern advancement has imposed a serious negative impact on human public health concern, by means of spreading many communicable diseases more rapidly, particularly vector-borne diseases. Over the past five decades, the unplanned urbanization, uncontrolled population growth, deforestation, misuse or over use of natural resources and global warming related climate change, have fuelled the emergence and resurgence of many mosquito-borne diseases in the developing countries. It is important to note that these countries are often struggling to provide better public health care, to the needy people, due to the limited resources, in terms of skilled personnel, drugs and health facilities. Therefore, the purpose of the present scrutiny is to address the emergence and resurgence of Chikungunya virus disease or Chikungunya fever in the southern part of India. It is a viral illness that is spread by the bite of infected mosquitoes. It is primarily found in urban/peri-urban areas and the most striking issue is that there is no specific treatment for this illness too. In India, the first outbreak of Chikungunya was reported in 1963 in (Calcutta) West Bengal and in 1964 in (Chennai), Tamil Nadu. Again now, it has re-emerged as one of the recent public health issue in India. The recent first outbreak of Chikungunya has been reported in Vellore on 20th March 2006 and thereafter spread to other parts of Tamil Nadu. The worst affected districts are Vellore, Namakkal, Dharmapuri and Krishnagiri districts. Nearly 64,500 cases have been reported until October 2006. However, the actual number of cases would certainly be much higher than the official data suggested, due to the under-reporting of hospitalizations. In this context, the present report shall provide an insight into the transmission dynamics in relation to several compounding factors (biotic and abiotic) as well as existing major challenges and opportunities. Besides, it can also provide some baseline information to the policy-makers, to design and implement appropriate prophylactic control measures in the future.

Keywords: Emergence and resurgence of infectious diseases; Mosquito-borne Diseases; Chikungunya fever.

0152. Larval Identification of Internal Lepidopteran in Apples by DNA Barcoding

**Annabelle Firlej¹, Jean-Philippe Légaré², Jean-François Landry³, Richard Hogues¹,
Gérald Chouinard¹, Daniel Cormier¹,**

¹Research and Development Institute for the Agri-Environment, St-Bruno-de-Montarville, Canada, ²Quebec Department of Agriculture, Fisheries and Food, Quebec, Canada,

³Agriculture and Agri-Food Canada, Ottawa, Canada

The identification of Lepidoptera larvae could be problematic when different species occur at the same time in crops and when their identifications require dissection or laboratory rearing. In Quebec, this is the case for internal lepidopteran feeders present simultaneously on apples as the codling moth (*Cydia pomonella* (L.)), the lesser appleworm (*Grapholita prunivora* (Walsh)) and the oriental fruit moth (*Grapholita molesta* (Busck)). The codling moth larvae can be distinguished from the two other species by its large size and the absence of anal comb, but larvae of lesser appleworm and oriental fruit moth are hardly distinguishable. The objective of our study is to validate a method of molecular identification for major lepidopteran larval pest insects in apple orchard of Quebec by using DNA barcoding. This molecular method uses primers common to all Lepidoptera that target gene sequence of 658 pb coding for cytochrome oxydase I, which are specific to each lepidopteran species. 140 adult moths of the three species were collected in 2011 from 6 regions of apple production in Quebec to establish a DNA sequence library that would be included in the “Barcode of Life Data Systems”. Lepidoptera larvae have been sampled in 2012 summer season in orchards of Quebec to validate the efficiency of the molecular method for larval identification. When validated, this method will become a useful identification tool for the different laboratories specialized in plant pest identifications.

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0153. Detection of the *kdr* mutation in *Anopheles gambiae* in the Sahelian urban environment of Niger

**Rabiou Labbo¹, Amadou Soumana¹, Fatouma Amadou Djibo¹,
Thierry Fandeur^{1,3}, Odile Ouwe Missi Oukem¹ and Karin Eiglmeier²**

¹ Medical and Sanitary Research Centre (CERMES), Niamey, Niger;

² Institut Pasteur, Génétique et Génomique des Insectes Vecteurs - CNRS URA3012, Paris, France; ³ CIRMF, Franceville, Gabon

Malaria is a major concern of public health in Niger. Ten percent of all malaria cases in Niger are registered in its capital, Niamey (13°31'N, 2°26' E) and its sub-urban areas. Niamey is situated in the Sudano-sahelian area and extends about 250 km² along the river Niger. During the rainy season, temporary pools that can persist until late into the dry season and constitute important mosquito breeding sites. In addition, agricultural activities have increased in Niamey's suburbs, creating additional temporary breeding sites for malaria vector populations. The government of Niger initiated a campaign of active vector control at the end of 2005, including the nationwide free distribution of long-lasting insecticide-treated nets (LLINs). Pyrethroid insecticides, recommended for impregnation of bed nets, are also commonly used in agriculture for crop protection. The exposition of mosquitoes to pyrethroid treated bed nets and the increasing use of pesticides in agriculture or in the domestic environment could lead to the selection of insecticide resistant malaria vectors. Certain point mutations in the voltage-gated sodium channel of *A. gambiae* (*kdr*), the common target site of DDT and pyrethroids, result in knockdown resistance to these insecticides. We studied the distribution of the L1014F knockdown resistance mutation (*kdr-w*) in *A. gambiae* mosquitoes from different localities in Niamey. Mosquitoes were sampled over the period from 2008-2012, either as larvae and grown to adults in the laboratory or obtained from indoor insecticide spraying and aspirator collections. Females of the *A. gambiae* complex were identified to species level and molecular analyses were performed to characterize their molecular form (M or S) and the type of the 2L chromosomal inversion. In total, we analyzed 727 specimens, with *A. gambiae* and *A. arabiensis* being sympatric and present in different proportions in the collections. All *A. gambiae* were of the M molecular form and had the inverted 2La^a chromosome arrangement. We did not find mosquitoes of the S form in our sample set. The frequency of *kdr-w* mutation varied in the different sample collections, with the highest *kdr* frequency observed in mosquitoes captured as larvae in Niamey (75,9% of the mosquitoes had at least one *kdr-w* allele). Our results are of prime importance for the Niger national malaria control programs, suggesting that the present high frequency of the *kdr-w* allele in the *A. gambiae* population threatens to undermine the success of pyrethroid treated bed nets and could lead to failure of insecticide-dependent control programs.

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0154. Studies On The Seasonal Population Dynamics Of Soil Microarthropods Along The Bank Of River Benue In Adamawa State North-Eastern Nigeria

¹Mafuyai, H.B, ² Njila, H.L and ¹*Mwansat, G. S

1. Department of Zoology, University of Jos, P.M.B. 2084 Jos, Nigeria.
2. Department of Science Laboratory Technology, University of Jos, P.M.B. 2084, Jos, Nigeria.

The seasonal population dynamics of soil microarthropods along the bank of River Benue in Adamawa State, North-eastern Nigeria was undertaken to investigate the abundance, diversity and distribution in relation to season, habitat, litter composition and soil physicochemical factors. Soil samples were collected from three Local Government Areas designated as sampling stations. Six villages situated by the river bank in each sampling station were used as sampling sites based on the degree of disturbances such as intensive agriculture, grazing and burning of vegetation. Soil samples were taken from 0-10cm soil depth during the dry and wet seasons from three habitat types: Natural vegetation, cultivated vegetation and free river bottom using a soil corer of size 50cm². The dry behavioural extraction method, using the Berlese-Tullgren Funnel was used to extract microarthropods from soil and litters. A total of 5,991 microarthropod individuals were extracted from 270 soil samples. Out of which 3,208 microarthropod individuals representing 53.55% of the total were collected during the dry season, whereas 2,783 microarthropod individuals representing 46.45% were collected during the wet season. There were significantly more microarthropods in the natural vegetation compared to cultivated vegetation and free river bottom (Kruskall-Wallis test: df =2, $\chi^2=18.26$, $P=0.001$). The distribution of microarthropod taxa depicted 61.04% Insecta, 34.08% Acarina, and 23.64% Oribatidae as most abundant microarthropod Class, Order and Family. There was a significant difference in the abundance of juvenile and adult stages of microarthropods during the dry and wet seasons (Independent sample t-test: $t= 2.577$, $df=337$, $P=0.010$). The Shannon diversity index (H) differs significantly between different species across the habitat types. Although physicochemical factors affects species diversity and abundance, habitat type had a significant effect (GLM, $F_{2, 12}=39.40$, $P<0.001$) suggesting that species diversity and abundance is more a function of habitat than physiochemical factors. The species diversity and abundance were significantly lower with increasing habitat disturbances. Microarthropod species diversity and abundance varied significantly across the different litter categories (Kruskall-Wallis test: $df=4$, $\chi^2=0.26$, $P=0.036$). There was no significant difference in microarthropod abundance with respect to plant phenological stages (Kruskall-Wallis test: $df =2$, $\chi^2= 0.42$, $P=0.808$). A significantly high species diversity and abundance along the bank of river Benue in Adamawa State is not unexpected, due to the intensive agricultural and anthropogenic activities going on along the river bank. It is therefore recommended that unsustainable anthropogenic activities such as indiscriminate burning of vegetation and pesticides application should be discouraged and conservation/augmentation of species identified as possible biological control agents and indicators of soil health should be encouraged.

Keywords: microarthropod, soil, abundance, season, diversity, species, vegetation

0155. Investigation of Insect-Inspired Wing Selection for Micro Air Vehicles (MAVs)

Onder ALTUNTAS¹, A. Yavuz KILIC²

1 Faculty of Aeronautics and Astronautics, Anadolu University, TR-26470 Eskisehir,
Turkey,

2 Faculty of Science, Department of Biology, Anadolu University, TR-26470 Eskisehir,
Turkey,

Micro Air Vehicles (MAV), a new type of remotely controlled aircraft (significantly small scaled Unmanned Aerial Vehicle (UAV)), have been increasingly constructed different type, mission and profile for aerospace and defense industry in all world. Beside the all design parameters, it is important to achieve the best. Original design principles are not enough for usual MAV design procedures, beside design of bio mimicry and inspiration from nature are important for selection the best. Inspiration from nature, also insects, is a very effective way to achieve a perfect MAV design for the most adequate solution. In this study, insect-inspired wing selection will be held and discussed for a model insect [*Tabanusbromius* L. (Diptera: Tabanidae)] in Turkey.

Keywords: Nature inspiration, UAV, Bio mimicry, Insect.

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0156. Influence of some plant extracts on the oviposition behavior of *Aedes fluviatilis* and *Culex quinquefasciatus* in the laboratory

EL.Maghrbi, A.A.

Department of Microbiology and Parasitology, Faculty of Veterinary Medicine.
University of Tripoli – Libya. P. O Box 13662

The control of mosquitoes based on the application of chemical insecticides but due to its adverse effect on the environment and due to development of resistance by most of species of mosquitoes including vectors of important diseases as malaria, *Bancroftian filariasis* and yellow fever. It's necessary to research other methods of the specific effective against mosquitoes. Ethanol and acetone extracts of nine species of plants (*Allium tuberosum*, *Apium leptophyllum*, *Carica papaya*, *Cymbopogon citratus*, *Euphorbia cotinofolia*, *Melia azedarach*, *Ocimum canum*, *Ricinus common* and *Tagetes erecta*) were tested in respect of their influence on the oviposition behaviour of *Aedes fluviatilis* and *Culex quinquefasciatus* in concentration 100, 10 and 1mg/L. Extracts were prepared by agitating the dried and ground plant in ethanol and acetone separately for 24 hours, followed by filtration and later recuperation of solvent using rotavapor. Thirty six experiments, three replications were conducted in each case. For each replication 1000 male and 1000 female of the species (4 and 5 days old) were put in to cages (40X40X40cm) containing 5% honey solution. Three days after females of *Ae.fluviatilis* and *Cx.quinquefasciatus* had sucking blood on anaesthetized mice (*Mus musculus*) and pigeon respectively, experimental and control dishes were placed into cages for 24 hrs, number of eggs laid in each dish was counted. Ethanol and acetone extract of *C.papaya*, *C.citratus* and *T.erecta* at 100 mg/L, ethanol extract of *E.cotinofolia* and *O.canum* at 100 and 10mg/L were repulsive for oviposition of *Ae.fluviatilis*; acetone extract of *A.tuberosum* and *M.azedarach* at 100 and 10mg/L. Also, *A.leptophyllum*, *O.canum*, *E.cotinofolia* and *R.communis* at 100 mg/L produced same effect on oviposition behaviour of *Ae. fluviatilis*. Ethanol extracts *E.cotinofolia*, *R.communis* (100mg/L) and *M.azedarach* (100 and 10mg/L) were attractive to *Cx. Quinquefasciatus*. Five acetone extracts (*A. tuberosum*, *A. leptophyllum*, *C. papaya*, *C. Citrates* and *M.azedarach*) were repulsive for oviposition at 100mg/L. Acetone extract of *A.tuberosum* and *M.azedarach* at 10 and 1% and acetone extracts of *C.citratus* at 10 mg/L maintained the same properties. Our results indicate that each extract of the plant have potential to control oviposition behavior of mosquito. Different responses obtained could be as indecent of variety, stimulation for deeper research to isolate the active principle for its potential use to mosquito control program.

Key words: *Ae.fluviatilis*; *Cx. quinquefasciatus*; plant extract; oviposition behavior.

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0157. Response of cotton mealybug, *Phenacoccus solenopsis* Tinsley (Sternorrhyncha: Pseudococcidae) to biological, bio-chemical and chemical control tactics under semi-field and field conditions

Muhammad M.U. Rashid^a, K. Abdullah^b and M. Tariq^c

^aDepartment of Entomology, Gomal University, Dera Ismail Khan 29220, Pakistan

^bMinistry of Textile Industry, 2nd Floor, FBC building, Sector G-5/2, Islamabad, Pakistan

^cEntomology Department, Pir Mehr Ali Shah, Arid Agriculture University,
Rawalpindi, Pakistan

Two trials were carried out under field and semi-field conditions to evaluate the compatibility of native predators, *Chrysoperla carnea* larvae and adults of *Brumussuturalis* and the exotic predator *Cryptolaemus montrouzieri* with neem oil for the control of *Phenacoccus solenopsis*. The assessments were based on mealybug control (scale 0-9) and percent recovery of predators at the end of the experiment showing conservation and colonization capability of the predator to local conditions. Both native predators, *C. carnea* and *B. suturalis* showed better control of the mealybug under semi-field and field conditions over the control and were also recovered at the end of the trials. In contrast to these, exotic predator *C. montrouzieri* though proved to be the most efficient predator of *P. solenopsis* under semi-field conditions but it failed to establish under field conditions and reducing mealybug populations. No recoveries were made of the predator in either of the treatments under field conditions. Maximum reduction in the population of mealybug was noticed in the insecticide treated plants. The present study showed that application of neem oil followed by release of *C. carnea* larvae and *B. suturalis* adults can be swapped to synthetic insecticides for the safer management of mealybug on cotton crop.

Key words: *P. solenopsis*, *C. carnea*, *B. suturalis*, *C. montrouzieri*, neem oil

0158. Impact of Insecticide Resistance Management Strategies in cotton ecosystems in North India

Rishi Kumar¹, Dilip Monga¹, K.R. Kranthi², Vijay Kumar³, K.K. Dahiya⁴, Kuldeep Singh¹, Alka Choudhary¹, Naresh Kumar⁴,

¹Central Institute for Cotton Research, Regional Station, Sirsa(Haryana), India, ²Central Institute for Cotton Research, Nagpur(Maharashtra), India, ³Punjab Agricultural University, Ludhiana(Punjab), India, ⁴CCS Haryana Agricultural University, Hisar(Haryana), India

Cotton is cultivated in 11.0 to 12.0 M hectares in India. Cotton is cultivated in about 1.5 M hectares in the three north Indian states, Punjab, Haryana and Rajasthan. Bt cotton occupies more than 95.0% of the area and has been effective in controlling bollworms but non-toxic to sap-sucking insect pests, predators and parasitoids in the cotton ecosystem. Insecticide usage on cotton sucking pests in India increased from 2374 M tonnes in 2006 to 6372 M tonnes in 2011. The reasons ascribed were mainly, the increase in the levels of insecticide resistance in sap-sucking insect pests and the replacement of sucking-pest resistant varieties with the several hybrid cotton varieties. The strategies rely on varieties resistant to sap-sucking pests, bio-pesticides, spot application methods for systemic insecticides, sequential deployment of insecticides with different modes of action and that cause the least disturbance to the crop ecology, in consonance with the integrated pest management (IPM) practices. The strategies were disseminated in 10,000 hectares of 9000 farmers in about in five main cotton growing districts of Punjab and Haryana during 2010, 2011 and 2012. Implementation of the IRM strategies resulted in effective pest management, yield enhancement and reduction in number of insecticide sprays. The average population of sucking pests i.e. leafhopper, whitefly and thrips per three leaves, in IRM villages of Haryana was 2.72, 5.90, and 5.93 in comparison 3.16, 6.72, 6.51, during the three years respectively in non IRM fields. Similarly the average population of leafhopper, whitefly and thrips in IRM villages of Punjab were 0.84, 2.17 and 0.65 in comparison to Non IRM fields i.e. 1.69, 3.39, 1.07 during the three years respectively. The Average number of sprays applied for major sucking insect pests was 2.80 and 5.09 in IRM and 4.03 and 6.55 in Non IRM villages of Haryana and Punjab, respectively. Pest management in the IRM fields was mainly based on neem preparations, entomopathogens and insecticides with a relatively safer rating of WHO classification, in place of the conventional organophosphate, synthetic pyrethroid and neonicotinoid group of pesticides or their mixtures. The overall reduction in usage of synthetic chemicals through a rational approach such as IRM resulted in significant ecological and socio-economic benefits in North India.

0159. Discussions about guidelines for insect quarantine facilities to assess the risk of industrial insects.

Seung-Phil Chun¹, Myoung-Chul Kim¹, Jhon-Kook Lee¹, Tae-Ho Ro², Hae-Chul Park³,

¹SOKN Institute of Ecology & Conservation, Seoul, Republic of Korea,

²Korea Environment Institute, Seoul, Republic of Korea,

³National Academy of Agricultural Science, Suwon-si, Kyounggi-do, Republic of Korea

Precautionary measures are cost-effective for the introduction and management of industrial insects. However, the Influx of exotic pests has not been managed very well in Korea, because of the system problems such as the lack of quarantine facilities. Additionally, there is no managing facilities or regulations for their installation according to the categories about industrial insects in Korea. Firstly, we studied the foreign guidelines for arthropod containment system such as ACLs(Arthropod Containment Levels) and the applicable guidelines for insect quarantine facilities in Korea. Secondly, we classified the types of industrial insects by their characteristics and considered the practicable guidelines for installation of quarantine facilities according to the industrial insect types. Lastly, with the related references including the details about installation and management for LMO(Living genetically Modified Organism) research facilities, we discussed appropriate guidelines for installation and management of pest quarantine system in Korea.

0160. Ovicidal and larvicidal properties of six reduced-risk insecticides to codling moth, *Cydia pomonella*

Francine Pelletier¹, Gaëlle Charpentier², Gérald Chouinard¹, Daniel Cormier¹,

¹Research and Development Institute for the Agri-Environment, St-Bruno-de-Montarville, Canada, ²Agropomme, Saint-Joseph-du Lac, Canada

An interactive bio-climatic model for the development of codling moth, *Cydia pomonella* (L.) (Lepidoptera: Tortricidae) was recently developed in Quebec, Canada, to help predict the timing of oviposition and hatching of this apple pest. A module allows the user to visualize the predicted impact on codling moth populations of a specific insecticide treatment applied on a given day. However, little data on the field toxicity of the insecticides currently used by apple growers is available to complement this module. The goal of this research was to generate efficacy data of some of these reduced-risk insecticides, for various life stages of the codling moth. Insecticides tested included novaluron, methoxyfenozide, thiacloprid, acetamiprid, spinetoram and chlorantraniliprole. Toxicity on topically-treated eggs and larvae was evaluated under field and laboratory conditions. Acetamiprid and thiacloprid showed the highest activity when applied to eggs. Among the others insecticides evaluated, only methoxyfenozide and novaluron also caused significant egg mortality but only for eggs deposited on fruit. When apples infested by young larvae were exposed to a topical spray, spinetoram exhibited the highest larvicidal activity followed by methoxyfenozide. All other insecticides, except novaluron, also showed significant larvicidal toxicity. Better knowledge of the relative toxicity of these new insecticides to various life stages will help determine optimal timing for application of these compounds and will help growers to introduce them in their control programs.

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0161. Biodiversity of Insect Pests of Groundnut Ecosystem in Tamil Nadu, India

Radhakrishnan Vaithiyanathan¹, Ramamoorthi N¹,
Tamilnadu Agricultural University, Tamil Nadu, India

Groundnut is the major oilseed crop of India and ranked second in production and consumption. In India, Gujarat, Andhra Pradesh and Tamil Nadu are the major producers of groundnut. The total area of groundnut in India was 5.19 Million hectares with a production of 6.94 Million tonnes with productivity of 1337 kg/hectare during 2011-12. The production and productivity is restricted by various factors. Of which pests play a major role in reducing the productivity. With this view, the present research has been framed to study the diversity of groundnut pest at Oilseeds Research Station, Tamil Nadu, India. Surveys of insects were conducted in different seasons viz., Kharif 2010 (June- July), Rabi 2010 (December - January) and Kharif 2011 in TMV (Gn) 13 variety to understand the insect pests. Among them, the damage caused by different insect pests viz., *Aphis craccivora* Koch, *Scirtothrips dorsalis* Hood, *Empoasca* sp., *Aproaerema modicella* Deventer, *Spodoptera litura* Fab. and *Helicoverpa armigera* Hub. were recorded under protected (Insecticide spraying was given) and unprotected condition (without insecticide spraying) in groundnut ecosystem at Oilseeds Research Station, Tamil Nadu. Besides, the natural enemies viz., lady bird beetle, green lace wings, syrphids, *Trichogramma* sp., *Chelonus* sp., *Goniozus* sp. and *Brachymeria* sp. were also recorded. The taxonomic identity was done based on the available literature as well as the expert's comments. Diversity indices were used to measure the diversity of species within a community or habitat. Six types of insect pests were recorded and showed higher richness (Margalef) in *Empoasca* sp. during rabi 2010 under protected condition and *A. modicella* Deventer during rabi 2010 under unprotected condition. Diversity index (Shannon-Wiener) was dominated in *Empoasca* sp. during kharif 2010 and 2011 in both the conditions. Evenness (Equitability J) were showed higher population (*Empoasca* sp.) during kharif 2010 under protected condition and *Scirtothrips dorsalis* during kharif 2011 in unprotected condition. Richness index of natural enemies were higher in *Chelonus* sp. (1.6743) during kharif 2010 and syrphids (1.0189) during kharif 2010 under protected and unprotected conditions, respectively. The diversity and evenness was maximum in *Trichogramma* sp. under protected and *Chelonus* sp., in unprotected condition.

Keywords: Groundnut, pest biodiversity, Richness index, Evenness

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0162. Lethal effects of two reduced-risk insecticides on aphidophagous predators in apple orchards

Paula Cabrera¹, Marc Fournier¹, Daniel Cormier², Éric Lucas¹,

¹Université du Québec à Montréal, Montréal, Canada,

²Research and Development Institute for the Agri-Environment, St-Bruno-de-Montarville, Canada

Novaluron and chlorantraniliprole (Rimon® EC 10 and Altacor® 35 WG formulations respectively) are two reduced-risk insecticides used to control codling moth, *Cydia pomonella* (Lepidoptera: Tortricidae) populations in Quebec. The aim of this study was to evaluate the effects of these insecticides on eggs and larvae of five aphidophagous predators commonly found in apple orchards in south eastern Canada: *Adalia bipunctata* L., *Coleomegilla maculata* (De Geer), *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae), *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) and *Syrphus sp.* (Diptera: Syrphidae). Field rates used in Quebec (1L Rimon/ha and 145g Altacor/ha), were tested against the predators in laboratory conditions through direct contact and the mortality was recorded during 6 days. None of the specie's eggs were sensitive to the insecticides (hatching rates varied between 69% and 100%). However, novaluron was toxic to *H. axyridis*, *A. bipunctata*, *C. carnea*, and *Syrphus sp.* (mortality rates were 84%, 64.4%, 95.6%, and 100% respectively). Our results show that chlorantraniliprole could be a suitable insecticide for IPM programs in apple orchards. However several tests are still being conducted to examine lethal and sub lethal effects on several aphidophagous predators after ingestion of contaminated prey.

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0163. New record of mesostigmatid mites associated with stingless bee, *Trigona irridipennis* (smith) (Apidae: Hymenoptera) colonies from Tamil Nadu, India

Radhakrishnan Vaithianathan¹, Ramaraju Kunjithapatham¹,

¹Tamilnadu Agricultural University, Tamil Nadu, India

The major economically important honey bee species occur in India includes Indian bee, *Apis cerana indica* Fab., Italian bee, *Apis mellifera* L., Stingless or dammer bee, *Trigona irridipennis* (Smith), rock bee, *Apis dorsata* Fab. and little bee, *Apis florea* Fab. Stingless honeybees (Family: Apidae) are small to medium sized bees with a vestigial sting and are distributed in most tropical and subtropical regions of the world, with 7 species recorded from India (Bingham, 1897). The nests of social insects harbour a variety of arthropods, the most numerous and also least studied of which are the acari. Most mites occurring in honeybee nests are facultative visitors and obligatory associates are only a small fraction. Dejong *et al.* (1982) classified the mites infesting honeybees and their nests into three groups as parasites, phoretic and house guests. Besides these parasitic mites, several mesostigmatic mites are having phoretic association with honeybees. Among parasitic bee mites, *Varroa jacobsoni* Oudemans, *V. destructor* Anderson and Trueman, *Acarapis woodi* (Rennie), *Tropilaelaps clareae* Delfinado and Baker and *Euvarroa sinhai* Delfinado and Baker are the primary problem causing mites. Earlier studies have been conducted on the biology and behaviour of stingless bees in India. But, reports related to the mites associated to stingless bee are scanty. Hence, this study was conducted to survey the nests of the stingless honeybee in a selected area of the Tamil Nadu Agricultural University (TNAU) and to record the mites associated with the colony. Studies were conducted to identify the mites associated with stingless bee colonies in TNAU campus, Coimbatore, Tamil Nadu, India. An extensive survey was conducted in different places of the campus to locate the stingless bee colonies. Three stingless bee colonies were identified and observed in the cracks and crevices of old demolished buildings. The presence of mites was identified from the stingless bee colonies, brood and sealed brood using a hand lens (10x). The association of two mesostigmatid mite genera viz., *Fuscuropoda* sp. and *Blattisocius* sp. (Acari: Mesostigmata) with the stingless bees, *Trigona irridipennis* (Smith) (Apidae: Hymenoptera) colonies from Tamil Nadu, India was recorded for the first time. Their relationship presumed to be phoretic. Among the two genera, *Blattisocius* sp. was the most predominant one

.Keywords: *Fuscuropoda* sp. , *Blattisocius* sp. , stingless bees.

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0164. The assessment of macroecological and macroevolutionary patterns in butterfly-hostplant associations at a global scale

**José R. Ferrer-Paris¹, Ada Sánchez-Mercado¹, John Donaldson²,
Angel L. Vilorio⁴,**

¹Instituto Venezolano de Investigaciones Científicas, Maracaibo, estado Zulia, Venezuela,

²South African National Biodiversity Institute, Cape Town, Western Cape, South Africa,

³University of Cape Town, Cape Town, Western Cape, South Africa, ⁴Instituto Venezolano de Investigaciones Científicas, Caracas, Venezuela

Plant-animal associations have been studied in many different contexts in the past, and a great amount of local knowledge has accumulated in several sources and over decades of research. Here we show how available on-line resources facilitate the integration of this knowledge with modern analysis tools in order to improve our understanding of macroecological and macroevolutionary patterns in biotic associations. We focus our analysis on the seven families of butterflies (Papilionoidea), one of the best known groups of insect herbivores. We found a total of 50,969 records of butterfly-hostplant associations in on-line databases, open-access literature and biodiversity portals, and validated 86% of them with taxonomic and bibliographic tools. The final compilation includes information from 5,152 butterfly species (28.6% of worldwide species of Papilionoidea) and 1,193 genera (66.3%), associated with 6,008 host plant species, from 2,289 genera and 212 families. We summarized the information in association matrices at different taxonomic and geographic levels, and calculated diet breadth and phylogenetic dissimilarity in host species. We used consensus butterfly and plant phylogenies for macroevolutionary analysis, and summarized distribution records for all butterfly species, plant species and genera in our compilation. We found evidence of congruent associations along butterfly and angiosperm phylogenies, specially between Papilionidae and magnoliids, Hesperidae and monocots, and the remaining subfamilies with the eudicots (mostly fabids and malvids), these were also recovered as the most probable ancestral states in each node using maximum likelihood methods, with a higher transition rate from basal plant groups to eudicots. We found a significant and strong correlation between host plant diversity and butterfly species diversification at the subfamily level, but there are extreme examples of generalization and specialization at higher taxonomic level. The Fabales is used more frequently than any other plant order: 1,007 spp. from all seven butterfly families and most subfamilies. Poales, the second most frequently used order, is mostly restricted to two species-rich subfamilies: Hesperinae (56.5% of all Hesperidae), and Satyrinae (42.6% of all Nymphalidae).

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0165. A mega-diverse water beetle genus (Coleoptera: Hydraenidae: *Hydraena*) commonly overlooked in Southeast Asia and its potential use for environmental biomonitoring

Hendrik Freitag¹,

¹Ateneo de Manila University, Department of Biology, Quezon City, The Philippines

The Polyphaga family Hydraenidae is one of the most diverse, but least studied groups of predominantly aquatic and semi-aquatic beetles. Its largest genus, *Hydraena* KUGELANN, 1794, comprises about 900 described species. While the Palaearctic and the Australian regions are quite well studied in regard to their hydraenid fauna, most islands and the continental areas of SE Asia have received little attention yet. Results of recent taxonomic studies of *Hydraena* in the Philippines by the AQUA Palawana Program and surveys on the islands of Luzon and Mindoro have revealed a high number of new species, most of them endemic to one or a few islands. All species recorded belong to the subgenus *Hydraenopsis* JANSSENS, 1972. Taxonomic key characters and biogeographic lineages present in the Philippines are briefly discussed and an updated species list of the Philippines is presented. Numbers of known species, projected numbers of species and endemism rates of the Philippine Islands and central European countries are compared. The habitat requirements of Philippine *Hydraena* species are deduced based on their dispersal patterns. The consequences of these patterns for their potential usefulness as bioindicators and monitoring organisms for conservation endeavours are discussed. The results suggest that species numbers and absence or presence of certain morphological species groups in an area allows conclusions on the extent of disturbance of a habitat.

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0166. Evaluation of *Metarhizium anisopliae* Metschnikoff and *Isaria fumosorosea* Wize in Controlling *Cochlochila bullita* Stål

Li Peng Tan¹, Ahmad Said Sajap¹, Han Jeen Lee¹, Hooi Yen Khaw¹,

¹Universiti Putra Malaysia, Selangor, Malaysia

Cochlochila bullita is recently found to be a potential pest on one of the well known medicinal plant, *Orthosiphon aristatus* in Malaysia. In concern with the chemical residual on this edible plant, biological control by using fungus could be an alternative option to control this pest. A total of nine isolates of *Metarhizium anisopliae* and eight isolates of *Isaria fumosorosea* were screened by spraying the bugs that settled on *O. aristatus* leaf within the petri dish with each isolate suspension at the concentration of 1×10^7 conidia/ml in the laboratory in order to select the most effective isolates that against *C. bullita*. *M. anisopliae* (HSAH) was the most virulent isolate with 100% of mortality within 3 days and with 1.65 ± 0.06 of LT_{50} ; while *I. fumosorosea* can also caused 100% of mortality within 6 days and with 3.02 ± 0.06 of LT_{50} . This result suggested that *M. anisopliae* and *I. fumosorosea* can practically become the biocontrol agents for controlling *C. bullita* that often found to be the pest of several culinary and medicinal plants.

Keywords: Biocontrol; *Cochlochila bullita*; *Isaria fumosorosea*; *Metarhizium anisopliae*; *Orthosiphon aristatus*; Screening.

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0167. Differences Of Food Plants Selections And Morphology Of Mouthparts, Salivary Gland And Digestive Tract Of *Prisomera Repudiosa* (Phasmatodea: Heteroneimiidae) And *Abrosoma Giberrum* (Phasmatodea: Pseudophasmatidae)

**Nurul Wahida Othman¹, Faszly Rahim¹, Azman Sulaiman¹, Nur Shuhada Ahamad¹,
Nur Ain Ismail¹,**

¹Centre for Insects Systematics, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia

The purpose of this study is to describe the morphology of the mouthparts, salivary glands and digestive tract of two species of the stick insects, *Prisomera repudiosa* and *Abrosoma giberrum* based on in-situ and ex-situ observations. With the description of the mouthpart and its digestive system, we relate it with food plants selections of these species that have different food preferences. Based from the observations of various samplings, *P. repudiosa* is a specialist feeder that feed on fern especially from *Dicranopteris linearis* species while *A. giberrum* is usually found feed on *Melastoma*. Observations for mouthpart were recorded using Scanning Electron Microscope (S.E.M). The gross morphology of the internal organs were visualized through the use of an Image Analyzer Microscope that was connected directly to Stereo microscope (*Carl Zeiss Stemi 2000*). Histology of the cells of salivary gland and digestive tract were also determined from this study using light microscope (Olympus BX43) that was connected to the Olympus Camera DP72. Based on our observations, both species exhibit a mouthpart of the chewing type, consist of a pair of mandible and maxillae, with different segments of maxillae palp and labial palp. Numerous setae are found present on the maxillary and labial palp. *P.repudiosa* and *A. giberrum* portray an alveolar-type of salivary gland which made up of a bunch of small globules and digestive tract that is clearly divided into three main regions, fore-gut, mid-gut and hind-gut with long-lined chitin of proventriculus on the foregut area. Ventriculus in the midgut area is quite large. The hindgut for *P. repudiosa* is straight and short regardless of its size as compared to *A. giberrum*.

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0168. True bugs (Insecta: Heteroptera) of intertidal zones in the Philippines with records of new species from Mindanao and Mindoro

Clister Pangantihon¹, Herbert Zettel², Hendrik Freitag¹,

¹Ateneo de Manila University, Department of Biology, Quezon City, The Philippines,

²Natural History Museum Vienna, Entomological Department, Vienna, Austria

True bugs in the marine intertidal zone are somehow unique as Hemiptera are usually terrestrial or freshwater insects. The poster aims to presents new records and newly discovered Philippine seashore dwellers of Gerromorpha and Leptopodomorpha, infraorders whose representatives are predominantly associated with freshwater environments. Three velvet bug species (Hebridae: *Hebrus*) were found restricted to intertidal mangrove habitats in the Oriental Region. They survive in small air-filled holes in submerged wood during high tide. In contrast to most congeners, all intertidal *Hebrus* are flightless; *H. murphyi* from the Central Philippines is completely wingless. Their completely reduced ability to fly corresponds with other Gerromorpha genera that are restricted to marine environments, including sea skaters (*Halobates*) and coral bugs (*Halovelgia*), both commonly observed at Philippine shorelines.

Hermatobates marcheii COUTIÈRE & MARTIN, 1901 (Hermatobatidae; coral treaders) has been newly recorded from intertidal corals of several Philippine islands. Two species each of the rare leptopodomorphan genera *Corallocoris* (Omaniidae; intertidal dwarf bugs) and *Salduncula* (Saldidae; shore bugs) were recorded from coral rocks in the Philippines. One *Salduncula* species from Mindanao was most recently described by the poster authors. Ongoing studies in southern Mindoro revealed the presence of a further new species of the genus *Xenobates* that was recorded from brackish waters. It is still undescribed.

Regional distribution maps and checklists of the treated genera are provided. Several taxa and their habitats are illustrated. Endangering threats for intertidal bugs such as sea shore pollution and fire wood collection in mangroves are briefly discussed.●

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0169. Comparative Toxicity and Efficacy of Two Entomopathogenic Fungi Against Cowpea bruchid, *Callosobruchus maculatus*(F) (Coleoptera : Bruchidae)

Radha Rajamma

P.S.G.R Krishnammal College for Women, Coimbatore, Tamilnadu, India

The efficacy of two entomopathogenic fungi *Metarhizium anisopliae* (Deuteromycotina: Hyphomycetes) and *Beauveria bassiana* (Ascomycota: Hypocreales) formulations were assessed against cowpea bruchid, *Callosobruchus maculatus*. Five different concentrations of each formulation were used against each pest under investigation and compared with control insects. In liquid formulation of *Beauveria bassiana* against *Callosobruchus maculatus*, the percentage of adult mortality was 96 % in 5×10^6 conidial concentrations at 96 hours interval and LT_{50} value was only 1.24 %. Comparison of LC_{50} , LT_{50} values and mortalities indicated that in both assays, *B. bassiana* was consistently more virulent to bruchids than *M. anisopliae* because it had lower LC_{50} and LT_{50} and caused the highest mortality (96%) in treatment by suspensions containing 5×10^6 conidia/ml. *B. bassiana* had higher virulence than *M. anisopliae* against adult of cowpea weevil.

Key Words: entomopathogenic fungi, *Metarhizium anisopliae*, *Beauveria bassiana*, *Callosobruchus maculatus*, mortality.

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0170. Laboratory Evaluation of the Biochemical Parameters in the Haemolymph of the Lepidopteran Larvae before and after Stinging by the Potter Wasp, *Eumenes conica* (Insecta: Hymenoptera)

Susheela Somasundaram,

P.S.G.R Krishnammal College for Women, Coimbatore, Tamilnadu, India

The present study was conducted to determine the biochemical parameters in the haemolymph of the lepidopteran larvae before and after stinging by the wasp, *Eumenes conica*. The parasitization of the wasp affect the nutritional physiology of the larva and cause a reduced uptake of food and an increase in the concentration of free sugars in the haemolymph and of glycogen in whole body. The parasitoid larva causes a reduction of proteins in the host's plasma and an accumulation of lipids in whole body. Dilution of host haemolymph led to a reduced concentration of lipid in parasitoid larvae and a reduced survival rate. Thus, a sufficient concentration of nutrients in the host's haemolymph appears to be crucial for successful parasitoid development. Thus, this research gives a justification that a sufficient concentration of nutrients in the host's haemolymph appears to be crucial for successful parasitoid development.

Keywords: Eumenidae, haemolymph, *Eumenes conica* , cholesterol, hospholipids, globulin.

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0171. Host selection and parasitism rate of *Aphidus colemani*, *Lysiphlebus testaceipes* and *Lysiphlebus fabarum* on sugar beet.

Loulou Albittar and Thierry Hance

Earth and Life Institute, Biodiversity Research Centre, Université catholique de Louvain, Belgium.

Aphis fabae Scopoli and *Myzus persicae* Sulzer (Hemiptera: Aphididae) are the most important insect pests of sugar beet crops. They are responsible of viral diseases transmission such as BYV and BMV, and consequently cause yield losses in beets. Three parasitoids species *Aphidius colemani* (Viereck), *Lysiphlebus testaceipes* (Cresson) and *Lysiphlebus fabarum* (Marshall) (Hymenoptera: Aphididae) were recorded on these aphids as biological control agents. Before implementing of any biological control program, it is important to understand the host selection behaviour of these parasitoids. We investigated here the host preference, oviposition behaviour (number of antennal contacts and number of stings) and parasitism for these three aphid parasitoid species. We also analysed the effect of the host plant on the host preference of the parasitoid *L. fabarum*. Fifteen females of each parasitoids species were exposed for 15 minutes to 20 aphids of *A. fabae* or *M. persicae* or to a mix of the two aphids species. In the host preference test, the number of stings and the parasitism rate of *A. colemani* were high on both aphid species representing respectively 61 and 59 % on *A. fabae* and 40 and 51% for *M. persicae*. In contrast, number of stings and parasitism rate of *L. testaceipes* were 79 and 92 % on *A. fabae* and 21 and 8% on *M. persicae* respectively, underlying a strong preference for the first aphid species. This preference is even more clear for *L. fabarum* with 89 % of the aphid stung and 52 % parasitized for *A. fabae* against 11 and 2% for *M. persicae* respectively. In switching plant test, the host plant choice (beet and bean) did not affect the preference of *L. fabarum*. In conclusion, *A. colemani* presented high oviposition behaviour comparing with other parasitoids. *A. colemani* did not show any difference in host preference response to aphid species, whereas *Lysiphlebus* parasitoids accepted and attacked more *A. fabae* than *M. persicae*. Preferences were not related to host plant.

Keywords: Aphid, sugar beet, host preference, aphid parasitoids, *A. colemani*, *L. fabarum*, *L.*

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0172. Efficacy of entomopathogenic fungus *Verticillium lecanii* (Zimmermann) against two cereal aphid species and the predator, *Coccinella undecimpunctata* L.

Mohamed A. A. Abdel-Rahman¹, Abdel-Aal H. Moubasher², Ahmed Y. Abdel-Mallek² and Gamal H. A Hammam¹

¹Plant Protection Research Institute, A.R.C., Egypt, Email:

²Botany Department, Faculty of Science, Assiut University, Egypt

Efficacy of *V. lecanii* against two cereal aphid species (oat bird-cherry aphid, *Rhopalosiphum padi* and the greenbug, *Schizaphis graminum*) and the predator, *Coccinella undecimpunctata* L. was evaluated in laboratory. Six isolates of the fungus (AUMC. NO 4927, 4928, 4929, 4930, 5054, and 5055) were tested. Mortality increased as conidial concentration increased. Isolates (AUMC Nos. 4930, 4929 and 5055) were much aggressive against *R. padi* than the others as indicated by their lower values of LC₅₀ and LC₉₅. Data showed also that isolates (AUMC. NOs 4928, 4930 & 5055) were more virulent against *S. graminum* than the remaining 4 isolates as indicated by lower values of LC₅₀ and LC₉₅. On contrary, data showed that the ladybird predator, *C. undecimpunctata* was not affected by either of those isolates at all concentrations.

Key words: Entomopathogenic fungi, Cereal aphids

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0173. Infection dynamic of *Serratia symbiotica* in *A. pisum* (Homoptera, Aphididae) after oral infection

François RENOZ, Vincent Foray & Thierry Hance

Earth and Life Institute, Université catholique de Louvain, Bâtiment Carnoy
Croix du Sud 4-5 bte L7.07.04, 1348 Louvain-la-Neuve, Belgium

Symbiosis is a common feature in insects which can harbor symbiotic bacteria in their tissues and cells. Among insects, symbionts in aphids are perhaps the best described. These insects harbor a well-known obligate symbiont, *Buchnera aphidicola*, as well as facultative symbionts such as *Serratia symbiotica*. Resulting from more recent interaction, facultative symbionts are not vital but are associated to beneficial effects for their host such as protection against predators and heat stress. Unlike obligate symbionts which are only transmitted in a vertical way from mother to offspring, facultative symbionts experience horizontal transfers and have retained their ability to colonize and persist in novel hosts. Plants, parasitoids and other environmental sources are potential vectors for horizontal transfers of symbionts. Once introduced, immune responses become for the newly acquired symbiotic bacteria the main obstacles for colonizing and persisting in the new host. Evasion of the immune responses and invasion of insect tissues is facilitated by mechanisms such as virulence factors and toxins that symbionts have preserved from pathogenic ancestors. In aphids, host invasion could be eased by a limited host humoral immune response. Bacteriocytes may also provide a refuge from immune response. Unlike obligate symbionts, facultative partners show irregular distributions among host tissues: they can reside in specific cells as well as extracellularly in the hemolymph. Despite studies related to their localization in stable infection, it remains unclear how facultative symbionts obtained from an environmental source are welcomed at the early stages of infection. Using the oral infection route, we described the infection dynamic of a recently isolated free-living form of *Serratia symbiotica* strain in an initially uninfected aphid host. We monitored the infection dynamic during the whole-life of the pea aphid *A. pisum*. Infection is persistent during the whole aphid life-span. Genetic analyses suggest that a latency period is needed for the transmission of the newly acquired symbiont from mother to offspring. Cellular tropism and symbiont density evolution have been described using qPCR and fluorescence techniques.

Key words: *Acyrtosiphon pisum*- *Serratia symbiotica*-Facultative symbionts - Horizontal transmission - Immune responses

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0174. Development of Compatibility of a bio-control agent , growth regulator and new generation insecticides in controlling brown plant hopper, *Nilaparvata lugens* (STAL) in Bangladesh

Mahbuba Jahan¹, Khandakar Shariful Islam¹,

¹Bangladesh Agricultural University, Mymensingh, Bangladesh

Extensive trials were carried out in the laboratory and field on the use of some indigenous natural enemies, biorational and synthetic pesticides to develop an eco-friendly module for the management of brown planthopper (BPH), *Nilaparvata lugens* which has emerged as threat to rice production in Bangladesh. Predation performance and functional response of three predatory Spiders namely *Lycosa pseudoannulata*, *Oxyopes javanus* and *Phiddipus sp* were determined on different instars of BPH. All the three spiders were found to follow the Type-11I Holling model (Sigmoid). Their utility and cost-effectiveness have been demonstrated in small-scale field experiments i at Bangladesh Agricultural university farm.. The release of the spider *Lycosa* in combination with Buprofezin, a growth regulator, resulted a good control of plant hopper in the field. Application of the combination of Actara 25 WG and Nico neem (5%) was found very effective in eliminating plant-hopper totally is less than half the cost of 3 to 4 sprays of pesticides.

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**0175. Temperature dependent bio-ecology of Cucurbit fruit fly,
Bactrocera cucurbitae (Coquillett).**

Khandakar Shariful Islam¹, Mahbuba Jahan¹,

¹Bangladesh Agricultural University, Mymensingh, Bangladesh

The Cucurbit fruit fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) poses a severe economic threat for the commercial cucurbit growers in Bangladesh. Therefore, to develop a better understanding of IPM a detailed observation on the biology were studied at different diet and different constant temperature regimes throughout cropping seasons that showed the patterns of occurrence which was facilitated in adopting the management steps to be taken. The observations were made on the life history of Cucurbit fruit fly, *B. cucurbitae* on artificial diet at four different constant temperatures (20, 25, and 30, 35 degrees C) with three host plants (Bitter melon, pumpkin, and white melon). The results led to the conclusion that *B. cucurbitae* had a faster egg incubation time in Bitter melon at 30°C temperature and preimaginal instars developed significantly faster than those of other diets and hosts. *B. cucurbitae* had more or similar mean preoviposition duration and egg hatching success at other hosts. Fecundity was significantly higher for the Bitter melon, white melon and lower on pumpkin. Two distinctly different life-history patterns were evident: (1) later onset of reproduction, longer oviposition time, longer life span, and lower fecundity (*B. cucurbitae*) at artificial diet composed of yeast, sugar, antifungal agents (sodium benzoate and nipagen), citric acid, and distilled water (2) early reproduction, lower oviposition time, shorter life span, and higher fecundity at bitter melon. Larval rearing of *B. cucurbitae* on this diet resulted in 20% less pupal production and 10% lighter pupal weight than from the control diet, whereas pupal density, adult emergence, and egg.

0176. Control of Aphid, *Aphis gossypii* (Glover) using *Metarhizium anisopliae* (Metschnikoff)

Norhelina L, Sajap AS, Omar D and Radhiah R

Universiti Putra Malaysia, 43400 UPM Serdang,
Selangor Darul Ehsan, Malaysia

In Malaysia, *Aphis gossypii* (Glover) usually found colonizing and responsible for significant crop losses in Solanaceae for example chilli, potato and brinjal. *Metarhizium anisopliae* (Metschnikoff) have been reported for their pathogenicity to control various insect pests. In concern of hazardous chemical pesticides that competent to destruct biodiversity, develop resistance and deplete beneficial insect, improvement of fungi as significant tools of biological control could be used as alternative to control this pest. The aim of this study was to screen for virulence of *M. anisopliae* isolates on aphid, *A. gossypii* and to determine the dosage response of the selected isolates. The virulence of five isolates of fungi, *M. anisopliae* PR1, GT2, TFFH3, GJ4 and HSAH5 was screened against the aphid infecting brinjal. Dosage response assays on nymphal mortality were conducted with four concentrations of the most virulent isolate (10^7 , 10^5 , 10^3 and 10). The result shows that isolate PR1 was the most virulent isolate of *M. anisopliae* against *A. gossypii* with the lowest LT_{50} (2.93 days; 3.32 days) on two day and four day nymphs respectively, indicating that it was the most virulent strain of the five strains tested. The LT_{50} for two day and four day nymph not significant different with the 95% confidence limit overlapped (2.62 - 3.24; 3.07 – 3.58). Estimates of the median lethal dose (LD_{50}) computed for *M. anisopliae* PR1 on two day nymphs (2.0×10^6 conidia ml^{-1}) was significantly lower than that of PR1 on four day nymphs (5.9×10^6 conidia ml^{-1}). PR1 was more infective on two day nymphs of *A. gossypii*, being 3 times more pathogenic against two day nymphs than four day nymphs. Result of this study suggested that *M. anisopliae* strain PR1 is suitable to infect the aphid in laboratory condition and has potential for controlling the aphid in the field.

Keyword: *Aphis gossypii*, *Metarhizium anisopliae*, biological control

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0177. Phylogenetic reconstruction of orthoptera Based on Continuous Morphological Data

Maryam Yasemi¹, Mohsen Mofidi-Neyestanak², Alimorad Sarafrazi²

¹ Science and Research Branch, Islamic Azad University; Tehran; Iran

² Iranian Research Institute of Plant Protection, Department of Insect Taxonomy; Tehran, Iran

The phylogenetic tree among some taxa within the Order Orthoptera were unclearly until now. In this study, phylogenetic tree of them reconstructed using 17 families and subfamilies belonging to this order as taxa and 41 continuous data as morphological characters that measured absolutely. Also the mantid *Iris oratoria* (Mantidae: Dictyoptera) was selected as outgroup and Parsimony analyses were conducted via TNT Ver. 1.1 without weighting of any of the characters. The robustness of the clades was examined via bootstrapping test (1000 rep and 50% Del). Consequently, the monophyly of Ensifera and Caelifera is supported. The single most parsimonious tree obtained was supported monophyly of Acridini and Truxalini tribes with 100 robustness. Also the results shows that the subfamilies Teratodinae, Calliptaminae and Eyprepocnemidinae are grouped together in a clade. In this evolutionary tree 2 subfamilies Pamphaginae and Tropidaucheninae are supported as a sister group with 97 robustness. Moreover, This topology supports a basal split between monophyletic Grylloidea and monophyletic Tettigonioidea; Support was also found for a monophyletic Tettigoniidae and for a monophyletic Stenopelmatoidea including Lezininae and Stenopelmatinae. Therewith, Trigonidiinae supported as monophyletic with sister group of Gryllinae-Oecanthinae.

Keywords: Phylogeny; Orthoptera ; Continuous morphological data

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0178. Prospects of utilization of coconut shell oil for the protection of wood against termite attack in Indian conditions.

Shiny K S¹ and Remadevi O K¹,

¹IWST, Bangalore, India

Termites are the most damaging wood pests in tropical and subtropical regions of the world. Ecofriendly termite management using botanical products is being tested worldwide. Coconut trees are grown in many parts of India and coconut shells yield oil during pyrolysis. This paper reports and discusses the use of coconut shell oil as a potential wood protectant. Different concentrations of coconut shell oil (100%, 50% and 20%) in commercial grade methanol were tested against termite attack of rubber wood as per BIS Standard- IS 4833:1993. 40.8% control stakes were found destroyed after six months of field exposure. 100% Coconut shell oil offered significant protection of wood against termites while 50% and 20% offered moderate protection. As far as the treatment methods were concerned, pressure treatment was found to be most effective followed by dip treatment and brush coating. The results of the present investigation indicated that coconut shell oil is a promising new biodegradable compound which has the potential to replace synthetic termiticides. As coconut shell oil is a waste by product of coconut shell charcoal industry, its utilization as a wood preservative will expand the economic returns from such industries.

**

0179. Parentage assignment of wild strains *Aedes aegypti* (Diptera: Culicidae) using ten DNA microsatellite markers

**Marcela Pimid¹, Abu Hassan Ahmad¹, Darlina Md Naim¹,
Hamdan Ahmad¹,**

¹Universiti Sains Malaysia, Minden, Penang, Malaysia

Aedes aegypti is a principal mosquito vector of dengue disease. Genetic markers have been widely applied to genotype *Ae. aegypti* and other arthropod disease vectors to study reproductive success, dispersal pattern and gene flow, in order to develop a better vector control strategy. Parentage assignment of wild strains *Ae. aegypti* were conducted using ten DNA microsatellite markers to assign first generation offspring to their respective parents. In this study, ten adult females were allowed to mate with ten adult males in a cage for three consecutive days. Subsequently, DNA extraction and PCR amplification were carried out using the wild adults and their offspring. Using parentage analysis software, we matched the offspring to their respective parents. We also described and discussed number of alleles, observed heterozygotes, Hardy-Weinberg equilibrium, null alleles, linkage disequilibrium and fitness of mating of the wild adults and their offspring. Our finding demonstrated the utility of microsatellite analysis to study the mating system of this mosquito species.

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0180. Three New Records of Subfamily Ichneumoninae (Hymenoptera: Ichneumonidae) from Malaysia

Norhafiza Ahmad Fazili¹, Idris Abd. Ghani¹,

¹National University of Malaysia, Bandar Baru Bangi, Selangor, Malaysia

Three species from different genera and tribes are presented. *Cratojoppa maculata* Cameron, *Imeria albomaculata* Cameron and *Chiaglas nigripes* Cameron, housed in the Centre for Insect Systematics (CIS) National University of Malaysia are new records for the subfamily Ichneumoninae of Malaysia. Notes of character, distribution map and photographs are given.

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0181. Effects of Indol-3-Acetic Acid on the Biological Parameters of *Galleria mellonella* and *Pimpla turionellae*

Fevzi Uçkan¹, Rabia Özbek¹, Hülya Altuntas²,

¹Department of Biology, Faculty of Science-Literature, Kocaeli University, Izmit, Kocaeli, 41300., Turkey,

²Department of Biology, Faculty of Science, Anadolu University, Eskisehir, 26470, Turkey

The effects of varied doses (50, 500, 1000, 5000, 10000 ppm) of indol-3-acetic acid (IAA), a plant growth regulator, on biological parameters of second generation (F2) of host *Galleria mellonella* L. (Lepidoptera: Pyralidae) and endoparasitoid *Pimpla turionellae* L. (Hymenoptera: Ichneumonidae) were investigated. The results revealed a significant increase at 1000 and 10000 ppm in egg-hatching time and at 500 and 5000 ppm in larval development time of F2 of *G. mellonella* and at 1000 ppm in male immature development time of *P. turionellae* in comparison to control. Additionally, a significant decrease at 1000 and 10000 ppm in pupal development time, at 500 ppm in adult first weight of F2 of *G. mellonella* and at 1000 ppm in male and at 1000 and 10000 ppm in female adult longevity of *P. turionellae* was found. However, adult emergence time of *G. mellonella* fluctuated among treatment doses was significantly decline at 1000 and 10000 ppm and increases at 50 and 500 ppm respect to controls. On other hand, no significant alteration was observed in adult longevity, adult size, female ratio of F2 of *G. mellonella*, female immature developmental time, male and female adult first weight and adult size of *P. turionellae* comparing to control. Consequently, in the present study, it has been found that varied doses of IAA led to changes in the host and parasitoid development and survival due to possible metabolic, hormonal and nutritional deficiencies.

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0182. Role of predatory mite, *Neoseiulus longispinosus* for the management of two spotted spider mite along with other bio-pesticides on Capsicum crop under polyhouse conditions

Usha Chauhan,

Deptt of Entomology Dr.YS Parmar University of Horticulture and Forestry,Nauni- Solan,
HP, India

In India the protected cultivation has gained momentum in the recent past. Sweet pepper (*Capsicum annuum*) is an important vegetable grown under protected conditions. Two spotted spider mite *Tetranychus urticae* (Koch) is one of its major pest. Indiscriminate use of pesticides against this pest has led to development of resistance and creating pesticide residues, which are harmful to the human health and causing environmental pollution. Keeping in view the adverse effects of these chemicals and to reduce their use, the best available safe cost effective and ecofriendly option for exploitation is the use of botanicals alone or in combination with natural enemies. So in the present study, role of predatory mite, *Neoseiulus longispinosus* (Evans) was evaluated alone and in combination with bio-pesticide in five modules against this pest on Capsicum variety Solan Yellow during 2008 and 2010 at both high and low population level of prey mite. The initial count of the prey mite per leaf ranged 80.4 to 92.8 during 2008 and 7.91 to 9.21 during 2010, which was statistically at par with one another in each year. In total, five modules were tested with three treatments at one week's interval in each module by using predatory mite alone and with combination of bio-pesticides for the management of prey mite and compared with chemical pesticide. These modules were as follows: 1 Module: First two treatments of Econeem(0.004%) and third of predator(1:30, Predator to prey ratio), 11nd Module: first treatment of Melia extract(1.0%), 2nd treatment of Econeem and third treatment of Predator, 11rd Module: all the three treatments of predator, 1Vth Module: first two treatments of melia extract and third treatment of predator and Vth Module : all the three treatments of chemical pesticide, profenophos(0.15%). It was found that in both the years, Module 1(in which first two treatments were of econeem and third was of predator) and Module 11(where predatory mite was used alone)proved superior and at par with profenophos, Module V in controlling the prey mite. It was concluded from these experiments that the predatory mite alone or in combination with bio-pesticide proved more effective in reducing the mite population if the treatments were started at low initial mite population level (below 10 mites/leaf)

Key Words: *Neoseiulus longispinosus*, *Tetranychus urticae*, Bio-pesticide, Econeem, Melia extract

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0183. Impact Of Abiotic Factors On The Population Dynamics And Biology Of Two Spotted Spider Mite (*Tetranychus Urticae* Koch) In Egg plant

Vinoth Kumar, S., C. Chinniah and C. Muthiah

Department of Agricultural Entomology,
Tamil Nadu Agricultural University, Coimbatore-641 003, India

To study the influence of weather parameters on the population dynamics/temporal distribution of two spotted spider mite on eggplant. A field study was conducted to determine the influence of weather parameters on population dynamics and temporal distribution of two spotted spider mite (*Tetranychus urticae* Koch.) on eggplant (*Solanum melongena* L.). The occurrence and the population fluctuation of mites were observed at weekly intervals. Maximum temperature; minimum temperature, relative humidity, rain fall, wind velocity, and hours of sun were recorded daily. The two spotted spider mite population was positively correlated with maximum temperature and negatively correlated with relative humidity and rainfall. Minimum temperature, wind velocity and sunshine hours had no significant effect on the population dynamics of two spotted spider mite. Environmental conditions may be used to develop prediction models for two spotted spider mite infestation. Lab studies were conducted at 20°C, 30°C, 40°C temperature with a combination of 80%, 70%, 60% relative humidity respectively. The study revealed that, three different temperature and relative humidity highly influence the life cycle of the *T.urticae*. High temperature and low humidity drastically reduce its life cycle up to 2 – 3 days. This type of impact will increase the number of life cycle at a particular period in the mean time production and productivity will also reduce.

Keywords: *Solanum melongena*, *Tetranychus urticae*, population dynamics, weather and temperature fluctuation

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0184. Effect of selected *Aglaia* spp (Meliaceae) plant extracts against *Epilachna indica* Mulsant (Coleoptera: Coccinellidae: Epilachninae)

Radhiah Rajimin¹, Ahmad Said Sajap¹, Maznah Muning¹, Norhelina Latiff², Dzolkhifli Omar², Aspollah Sukari³,

¹Faculty of Forestry, UPM, Selangor, Malaysia, ²Faculty of Agriculture, UPM, Selangor, Malaysia, ³Faculty of Science, UPM, Selangor, Malaysia

Crude plant extracts of *Aglaia* spp (Meliaceae) were investigated for insecticidal potential activities against *Epilachna indica* Mulsant, the twelve spotted lady bird beetle which was one of the pest for eggplant. The objectives of this research was to observe the insecticidal properties of *Aglaia odoratissima* and *Aglaia variisquama* plant extracts towards *E. indica* using three different solvents; hexane, chloroform and methanol against the larvae of *E. indica*. Leaves of *Aglaia odoratissima* plant were undergoing air-dried method and ground into powder. These samples next were soaking with hexane, chloroform and methanol respectively over three days by conventional soaking. The extracts were concentrated using vacuum filter and reduced in vacuo using a rotary evaporator to obtain the crude extract. Next, 100 mg of crude extract was first dissolved in 10 ml of ethanol as a 1% stock solution. From these stocks, different concentrations ranging from 1%, 0.5% and 0.25% were prepared. Larvae mortality was observed after 24, 48 and 72 hour of exposure. The results show that the larvae responded differently with varying concentrations of the leaf extracts. The highest larval mortality was recorded in *A. odoratissima* hexane extracts and all extracts significantly affected the larval mortality. The mortality rates for *A. odoratissima* ranged from 80% in hexane, 60% in chloroform extracts and 45% in methanol extracts. Meanwhile, for *A. variisquama*, the mortality ranged from 50% in hexane, 65% in chloroform extracts and 75% in methanol extracts. The mortality rates from the controls in all treatments were less than 10%. These findings indicate that leaf extracts of *A. odoratissima* and *A. variisquama* contained biologically active compounds that effect the survival of *E. indica*. They have the potential to be developed as biopesticides and more comprehensive studies are required.

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0185. Forest Health Measurement through Biodiversity Index of Insect Distribution

**Achmad Solikhin¹, Aulia Rajhman², Cindhya Ade Hapsari³,
Annam Adam Prakoso¹,**

¹Undergraduate student of Faculty of Forestry, Bogor, West Java, Indonesia,

²Undergraduate student of Faculty of Agriculture, Bogor, West Java, Indonesia,

³Undergraduate student of Faculty of Mathematics and Natural Sciences, Bogor, West Java, Indonesia,

⁴Undergraduate student of Faculty of Agricultural Technology, Bogor, West Java, Indonesia

Forest Health Measurement is a method used to valuate the forest condition, containing forest stand growth and structure, crown indicator, site quality indicator, tree damage indicator and biodiversity indicator. From the above, it is very imperative to valuate the distribution of insect which influences the health of forest. The objective of this research is to measure the biodiversity index and the distribution of insect in fores. This research was conducted in arboretrum of Forestry Faculty, Bogor Agricultural University. Data were collected by field observatory and analyzed to the index of richness, diversity and eveness. There were commonly four species of insects, including termite, black ant, *belang* ant and *rang-rang* ant. The total of insects were 56, comprising 15 of termites, 4 of black ants, 7 of *belang* ants, and 30 of *rang-rang* ants. The richness, diversity and eveness index of insects were respectively 0.745, 1.136, and 0.819. In that arboretrum, the condition of the species was stable and very rich, although the diversity is medium.

Key words : Forest, biodiversity, insects, richness, diversity, eveness.

**

**0186. Physiological Mechanisms Of Adaptation Of *Aporia Crataegi* L.
To Extreme Low Winter Temperatures And Seasonal Low Water
Availability In Yakutia (Eastern Siberia, Russia)**

Natalia Li,

Institute for Biology Research, SD RAS, Yakutsk, Republic Sakha(Yakutia), Russia

Forest Health Measurement is a method used to valuate the forest condition, containing forest stand growth and structure, crown indicator, site quality indicator, tree damage indicator and biodiversity indicator. From the above, it is very imperative to valuate the distribution of insect which influences the health of forest. The objective of this research is to measure the biodiversity index and the distribution of insect in fores. This research was conducted in arboretrum of Forestry Faculty, Bogor Agricultural University. Data were collected by field observatory and analyzed to the index of richness, diversity and eveness. There were commonly four species of insects, including termite, black ant, *belang* ant and *rang-rang* ant. The total of insects were 56, comprising 15 of termites, 4 of black ants, 7 of *belang* ants, and 30 of *rang-rang* ants. The richness, diversity and eveness index of insects were respectively 0.745, 1.136, and 0.819. In that arboretrum, the condition of the species was stable and very rich, although the diversity is medium.

Key words : Forest, biodiversity, insects, richness, diversity, eveness.

**

0187. On The Question Of Parameters For Evaluating Of Insect Cold Hardiness Potential

Natalia Li,

NEFU name Ammosov Institute of Health, Yakutsk, Republic Sakha (Yakutia), Russia

The SCP is a useful parameter for describing the ability of species to survive freezing but its value as a predictor of overwintering survival, or in estimating the probability of a species surviving under new conditions in their overwintering habitats, is limited (Turnock& Fields, 2005). The SCP is influenced by such factors as polyol and protein concentrations in the hemolymph, therefore it can be lower in winter than in spring. Nevertheless, the quality of ice nucleating process is higher in winter insects. The depletion of polyols in the spring causes increase of SCP. Unlike in the autumn, when an increase in SCP is associated with development of freeze tolerance, spring changes in SCP for the insects occur simultaneously with the loss of cold tolerance. The present study on the freeze-tolerant insects inhabiting central Yakutia (Eastern Siberia, Russia) shows that a specific ice nucleating activity rather than SCP should be used for evaluating of insect cold hardiness potential.

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0188. Bioefficacy Of Certain Newer Insecticide Molecules Against Stalk Borer, *Chilo Partellus* Swin. On Maize, *Zea Maize* L.

Ramasamy, K., C. Chinniah, S. Vinoth Kumar and C. Muthiah

Department of Agricultural Entomology,
Agricultural College and Research Institute, Madurai.

A field study on evaluation of some selective new insecticide molecules for their Bioefficacy to suppress the stalk borer *Chilo partellus* Swin infestation on maize revealed that the Endosulfan 35 EC is the standard check and the new molecules viz., Imidachlopid 75 WG @ 10g/kg of seeds, Abamectin 1.8 EC @ 45g a.i/ha, Spinosad 240 SC @ 100g a.i/ha, Indoxacarb 4.5 SC @ 75g a.i/ha, Flubendiamide 480 SC @ 48g a.i./ha and Thiamethoxam 25 WG @ 75g a.i./ha are very effectively controlled the stalk borer infestation (68% reduction over untreated control) and these were statistically on par interms of Bioefficacy, grain yield and cost benefit ratio. However the standard check Endosulfan 35 EC @ 375g a.i. /ha was the best in reducing the stalk borer population with increased yield.

Key words: stalk borer, *Chilo partellus*, Chemical pest management, Insecticide evaluation, Maize pests.

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0189. Integrated Management Strategies For Stalk Borer *Chilo Partellus* (Swin Hoe). A Key Pest Of Maize, *Zea Maize* L.

Ramasamy, K., C. Chinniah, S. Vinoth Kumar and C. Muthiah

Department of Agricultural Entomology,
Agricultural College and Research Institute, Madurai – 625 104,

A field study was conducted to evolve an effective IPM module integrating the IPM component viz., seed treatment, inter cropping, release of biocontrol agents and need based application of insecticides, which are newer molecules viz., Imidacloprid, Abamectin, Spinosad, Indoxacarb and foliar application of certain entomopathogenic fungal formulation viz., *Beauveria bassiana*, *Bacillus thuringiensis var kurstaki*. Release of biocontrol agents like., *Trichogramma chilonis*, *Chrysoperla carnea* for the management of stalk borer *Chilo partellus* on maize. The study revealed that IPM module viz., seed treatment with Imidacloprid + cowpea as intercrop + foliar application of Abamectin @ 45g a.i/ha (need based application) + field release of the parasitoid *Trichogramma chilonis* @ 2.5cc/ha and *Chrysoperla carnea* @ 10,000/ha recorded the highest mean per cent reduction of dead heart (56.30) found to be very effective in suppressing the stalk borer population up to 75% with a corresponding increase in grain yield (48%) coupled with higher cost benefit ratio.

Key words: stalk borer, *Chilo partellus*, Ecofriendly management, Biorational pest management and pests of maize

**

**0190. Effect of Ethanolic Extract *Marchantia* sp.
to Life Cycle of the Mosquito *Aedes aegypti* L (Diptera : Culicidae)**

**Imam Fathoni¹, Isnawan Ibnu Ikrandita¹, Eza Darisqi¹,
Soenarwan Hery Poerwanto¹,**

¹*Universitas Gadjah Mada, Yogyakarta, Indonesia*

Dengue Hemorrhagic Fever (DHF) is a dangerous disease that can cause death. The disease is transmitted through mosquito vector called *Aedes aegypti*. Medication to eradicate the virus and the vaccine to prevent Dengue Hemorrhagic Fever is not available till today. Therefore, the right way to tackle this disease is to eradicate the vector-borne use of synthetic chemical insecticides. A long term use of synthetic chemical insecticides can lead to resistance and adverse effects for humans. *Marchantia* sp. has bioactive compounds such as alkaloids, flavonoids and terpenoids which can be used as an alternative control vector causing Dengue Hemorrhagic Fever chemically and environment-friendly vegetable. The purpose of this study was to determine the effectiveness of bioactive compounds and ethanolic extracts *Marchantia* sp. The Dengue vector control was tested on eggs stages till completed stages and determined the concentration of effective use of the extract.

Samples were obtained from the moss around Grojogan Sewu, Tawangmangu, Karanganyar, Indonesia. Samples were washed, dried for two weeks, then extracted with 70% ethanol solvent. Testing was done using egg with concentration 0,01%; 0,02%; 0,025%; 0,03%; 0,035%; 0,04%; 0,045%; 0,05%. Controls used in this reasearch were water wells and a mixture of water with DMSO as many as 3 replicates. Enviromental parameters such as temperature and pH was monitored every day. The results showed that there was an influence of ethanolic extract *Marchantia* sp. with the life cycle of *Ae. aegypti*. The highest concentration of effect on egg hatchability was 0,05% which all the larva die at the 4th day. Only at concentration 0,01% and 0,02 % the mosquito can survive till imago and produce egg. There is significant difference between control and treatment.

Keywords: Dengue Hemmorhagic Fever, *Aedes aegypti*, Bioactive Compounds of *Marchantia* sp.

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0191. A review of the taxonomy and diversity of Platygastroid parasitoids (Hymenoptera) attacking Hemiptera in India

Rajmohana Keloth¹, Abhilash Peter¹,

¹Zoological Survey of India, Calicut-673006, Kerala, India

The parasitic Hymenopteran wasps under family Platygastriidae (Superfamily: Platygastroidea) play a vital role as natural enemies of arthropods in terrestrial ecosystems and also to a lesser extent in aquatic systems. With high searching abilities and reproductive rates and also lacking hyperparasitoids, they have a high potential as biocontrol agents. Along with other insect orders, their hosts include hemipterans too, of which most of them, for instance, *Leptocoris* spp., *Nezara* spp., *Helopeltis* spp., *Eurygaster* spp., *Scotinophara* spp., *Bagrada* spp., *Megacopta* spp., *Hyalomorpha* spp., *Cletus* spp., *Clavigralla* spp. etc. are pests of considerable economic importance in agriculture and forestry. Taxonomy and diversity of Platygastroid parasitoids of Hemiptera in India is hereby reviewed.

In India 51 species in 15 genera of Platygastriidae are known to attack Hemiptera - *Psix* Kozlov and Le(9), *Telenomus* Haliday(5), *Trissolcus* Ashmead(8), *Protelenomus* Kieffer(1), *Paratelenomus* Dodd(3) and *Eumicrosoma* Gahan(2) (6 genera in Telenominae) *Titta* Mineo, O'Connor, & Ashe(1), *Dyscritobaeus* Perkins(1), *Gryon* Haliday (12), *Tiphodytes* Bradley(3), *Microthoron* Masner(2), *Narendraniola* Rajmohana(1), *Tanaodytes* Masner(1) (7genera in Scelioninae), *Amitus* Haldeman (1) and *Allotropia* [Förster](#) (1) (2 genera in Sceliotrachelinae). Except the massively diverse *Telenomus*, all the 5 Telenomine genera and all the Scelioninae listed above are exclusively endoparasitoids of hemipteran eggs. Both the genera of Sceliotrachelinae have been recorded upon the less mobile life-stages of Aleyrodidae and Pseudococcidae respectively.

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0192. Investigation of pheromone gland cells of *Mamestra brassicae* by microscopy and scattering methods

Kitti Sipos¹, Adrien Fónagy¹, Renáta Ünnepe², Gergely Nagy³, Márton Markó^{3,2}

1: Plant Protection Institute, Centre for Agricultural Research of Hungarian Academy of Sciences, Hungary

2: Wigner Research Centre for Physics, Hungarian Academy of Sciences, Hungary

3: Laboratory for Neutron Scattering, Paul Scherrer Institut, Switzerland

The sex pheromone biosynthesis in insects is intensively studied from both basic and applied aspects. However, knowledge about the structure and functions of organelles in the pheromone gland cells is rather limited. We investigated the physiological processes of pheromone biosynthesis and its release in *Mamestra brassicae*. We studied the changes of organization and structure of the gland cells during pheromoneogenesis a wide range of length scales using microscopic methods and small angle neutron scattering (SANS).

SANS study gives information about the structure in the length scale of 1-100 nm. The differences between the scattered spectra obtained from cells at various states (pheromone production phase, rest phase) helps to identify the pheromone producing organelles. The study of the structural changes with this method contributes to a better description and understanding of the pheromone production mechanism. Since SANS measurement is a completely novel investigation approach in this field, we also developed a new method focusing on the studying of the nanostructure of pheromone production organelles of moths.

In this presentation, we demonstrate the results of our investigations and the role of the scattering method for an in-depth understanding of the pheromone production and release.

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0193. A three generational study of genetically modified cottonseeds on histological parameters of kidney from albino rat

Megha Kansal¹, Gurinder Kaur Sangha¹,

¹Punjab Agricultural University, Ludhiana, Punjab, India

There is an ongoing international debate as to the necessary length of mammalian toxicity studies in relation to the consumption of genetically modified (GM) plants including regular metabolic analyses. The present study was designed to evaluate the impact of feeding a line of genetically modified cotton seeds (Bt cotton seeds) to that of standard diet and reference diet (Non-Bt cotton seeds) on kidney in albino rats. Non-Bt and Bt cotton seeds were incorporated into the diet of the albino rats at a concentration of 20% continuously for three generations. Light microscopic observation of the kidney sections of cottons seeds fed female and male rats showed some variable histo-pathological changes. Light micrographs of kidney showed vascular degenerative changes in the lining epithelial cells of the renal tubules at the cortical portion and distortion in the renal architecture, shrunken of glomeruli, invaginated by fatty globules, swelling in the lining epithelium of the renal tubules with narrow lumen and the presence of inflammatory cellular infiltration in Bt treated male and female rats. The effect of Bt cotton seeds on kidney was more evident in females as compared to male rats in all the three generations. A statistically significant increase in the glomerular diameter was observed in cottonseeds fed rats, although caused no threat on the metabolism of the rat. The studies reviewed present evidence to show that GM plants are nutritionally equivalent to their non-GM counterparts and can be safely used in food and feed.

Keywords: Bt cottonseeds, Kidney, Histology, Albino rat

0194. Insect Pest Management in Rice: Impact and Challenges

Dulcha Singh Brar¹, Kamaljeet Singh Suri¹,

¹Punjab Agricultural University, Ludhiana, Punjab, India

Rice, the staple food of at least half of the world's population, is grown under diverse agro-climatic conditions in about 161 million ha of land globally. The crop is ravaged by more than 100 insect pests' species. The insect pests' cause enormous grain yield losses, varying from 20-50 per cent, if not managed in time. With reducing land availability and increasing demand for food production, rice cultivation is being intensified through higher fertilizer inputs and increasing cropping intensity. Such intensifications in turn, are increasing insect pest intensities and demand for more insecticides. The indiscriminate use of pesticides is resulting in decimation of natural enemies along with other undesirable side effects like precipitation of insecticide resistance, induction of insect resurgence, higher levels of pesticide residues in grains and contamination of environment. The solution to the pesticide externalities lies in the implementation of an integrated pest management (IPM), a holistic system of tackling pests, based on environment-friendly, economically viable and socially acceptable principles. In India, the first IPM programme was started as an Operational Research Project (ORP) covering an area of about 1000 ha at Cuttack (Orissa) in 1975, followed by initiation of 6 more ORPs by the Indian Council of Agricultural Research in Andhra Pradesh and Kerala. The adoption of IPM practices resulted in increase of rice yield from 34.88 to 49.83 q/ha while decrease in insecticide sprays from 4-6 to an average of 2 per crop. The above concept was based on the 'prescriptive approach' wherein technologies appropriate to farmers' conditions were developed in the research institutes and transferred to the farmers for implementation. The National Centre for Integrated Pest Management (NCIPM) conducted on-farm trials in Panipat (Haryana) during 2002-03 which resulted in higher cost benefit ratio (1:3.50) in IPM fields. The adoption of IPM module developed by the Punjab Agricultural University, Ludhiana in three districts of the Punjab during 2008-10 has also resulted in 39.6 to 49.2 per cent reduction in insecticide sprays with an additional profit of Rs 12210 to 14667 per ha to the farmers in IPM villages. This programme is being further extended to cluster village approach comprising of 25 villages per cluster, in two districts of the Punjab during 2013-15. Host plant resistance deployed with location-specific cultural practices (aiming at natural enemies' conservation to the possible extent) remains the basis for sustainable, low-cost and ecologically sound IPM in rice. Large-scale implementation of successful IPM needs coordination of the government agencies, the NGOs, the pesticide industry and the farmers.

Key Words: IPM, Impact, insect pests

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0195. INSECTS AS HIGHLY EFFECTIVE PRODUCERS OF RENEWABLE ANIMAL ORGANICS

Shukhrat Madyarov¹,

¹Institute of Gene Pool of Plants and Animals. Uzbek Academy of Sciences, Tashkent, Uzbekistan

Class of insects (*Insecta*) is a widespread and most numerous by species group of ancient animals at the present stage using biotechnological approaches can be an alternative source of new consumer goods for progressively increased population of Earth. The insects having a high biogenic potential as compared with other animals formed during 0.4 billion years of existence the unique mechanisms and means of protection, survival and development. They could be the renewable sources of valuable animal organics: food products, pharmaceuticals, bioinsecticides and many other materials. For standardization and control of demanded bioregulators biosynthesis and for industrialization of insect biotechnology processes the artificial diets for mulberry silkworm and other insect phytophages meantime solving waste's utilization problems have been developed. Methods of insect mass rearing on them, methods of complex biotechnology processing, fractionation of obtained biomass and isolation of demanded products was developed too. Assortment of native natural products including biologically active compounds from insects can be significantly expand using developed bioprotective method of suffocating and drying of insects, their organs and biological liquids. Silkworm as economically important insect rearing by artificial diets apart sericulture could be used in biotechnology of high-quality protein, lipids, carbohydrates, biologically active substances and means of untraditional medicine as well as in gene engineering, epidemiological studies, as sensitive test animal in extreme environment monitoring - in space experiments, in zones of anthropogenic catastrophes, of contamination by pathogens, weed- and pest-killer chemicals, exhaust gases, highland, mines and other objects. The data of nutritive value of protein, carbohydrate and lipid isolates, stimulating and biological activity of pupae, fibroin and sericin hydrolyzates, isolated enzymes, inhibitors and methods of sericulture and silk technology wastes utilization into new biomedical and nanotechnological products are represented in the study.

Key words: insects, silkworm, artificial diet, biotechnology, renewable organics, food products, pharmaceuticals, bioinsecticides, sericulture, wastes, utilization

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0196. Study on immunological parameters in the serum of chlorpyrifos immunized rabbits (*Soviet chinchella*)

Prabha Parmar¹, Devinder Kaur Kocher¹,

¹Punjab Agricultural University, Ludhiana, Punjab, India

Commercially available chlorpyrifos (eldrin-20) was firstly made immunogenic by synthesizing its hapten. Prepared chlorpyrifos antigen (200 μ g) was emulsified with complete freunds adjutants(CFA) and was injected interdermally at multiple sites into experimental rabbits (*soviet chinchella*).Booster injections were given at fortnightly intervals, first with incomplete freunds adjuvant (IFA) and second without adjuvant intramuscularly. Animals were bled from the heart at 0 DPI (Day post immunization) upto 15,30,45,60 and 75 DPI. Blood serum from all the rabbits of different groups i.e. control, vehicle and immunized were collected and the level of immunoglobulin's (Ig,% of total proteins) and circulating immune complex (CIC,% of total protein) were biochemically estimated. Serum Ig level in the immunized rabbits showed a normal distribution curve i.e. initially a slow increase in the level of Ig which got significantly increased at 30 DPI(8.26 mg /10 μ l),thereafter a gradual decrease was observed reaching at (1.46 mg /10 μ l) at 75DPI.Similar trend was observed in the case of CIC level showing a peak at 30DPI (6.28 mg /10 μ l)and gradual decline at 75DPI(1.29 mg /10 μ l).

Keywords: Antigen, circulating immune complex, chlorpyrifos, Immunoglobulin's.

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0197. Entomological And Sociological Investigations In An Urbanized, High Risk Area For Dengue Transmission In Kurunegala District, Sri Lanka.

M. R.S.S. Bandara¹, D. R. Widanapathirana¹, P. G. Amarasinghe², S. D. Darmarathne², A. S.B. De Alwis³

¹ *Regional Office, Anti-Malaria Campaign, Kurunegala, Sri Lanka*

² *Faculty of Medicine, University of Peradeniye, Sri Lanka*

³ *Education, Training and Research Unit, Ministry of Health, Sri Lanka.*

BACKGROUND: Frequent outbreaks of dengue fever in urbanized, Kurunegala Municipal Council (KMC) area, Sri Lanka had high dengue vector breeding-sites and indicated an urgent need to investigate the entomological and sociological key factors for disease transmission.

OBJECTIVES: To investigate the key breeding-sites and sociological factors associated with breeding of dengue vectors (*Ae.aegypti* and *Ae.albopictus*) in an-urbanized area in Kurunegala in 2009.

METHODS: Two hundred serologically confirmed, indigenous dengue cases which were reported to Medical Officer of Health in KMC were selected. Entomological surveys were conducted targeting each case using standard methods. A sociological survey was conducted using a pre-tested, structured, interviewer administrated questionnaire.

RESULTS: Nine hundred and forty dengue larval positive breeding-sites were found in 654 premises. Four major breeding-sites were identified. High significance were found for artificial ($p=0.004$) than natural and for outdoor ($p=0.008$) than indoor breeding-sites. Removable larvae-infested containers (79%) were more than permanent containers (21%). Middle-income houses were more vulnerable for dengue breeding (67%). Number of residents in a house affected the prevalence of breeding-sites. Houses with more than three residents engaged in occupations had two-fold higher dengue breeding prevalence. Houses without residents and bare lands had high prevalence of breeding-sites (38%). The government and non-government institutions had more vector breeding-sites than domestic households.

CONCLUSIONS: The dengue vector control efforts needs to be more concentrated on removal of key breeding-sites and targeting the key premises which can be more effective in an urbanized area.

Keywords: Dengue vectors, Entomological and sociological key factors, urbanized area.

0198. Effect of *Watermelon silver mottle virus* on the life history and feeding preference of *Thrips palmi* Karny

Chien-Hao Tseng¹, Wei-Te Chen¹, Chi-Wei Tsai¹,

¹National Taiwan University, Taipei, Taiwan

Thrips palmi is not only a pest on cucurbit crops but also a vector that transmits tospoviruses, for example *Watermelon silver mottle virus* (WSMoV). Although WSMoV-incited disease is a serious problem in the fields, few studies on thrips-virus interaction are available. In this study, the effect of WSMoV infection on the survival rate and developmental time of *T. palmi* larvae was examined. The survival rate and developmental time of WSMoV-infected *T. palmi* larvae were not different from those of healthy thrips. When *T. palmi* fed on the WSMoV-infected plants, either healthy thrips or virus-infected thrips grew faster than thrips fed on healthy plants. These results imply that WSMoV does not directly affect *T. palmi*, but WSMoV infection affects the development of *T. palmi* indirectly through the virus-infected plant. In feeding preference test of *T. palmi* adults, both male and female thrips preferred thrips-damaged plants. More males stayed on WSMoV-infected watermelon seedlings than healthy plants, but females did not show preference. These results indicate *T. palmi* is attracted by thrips damage and WSMoV infection. Detailed knowledge of the interrelationship between thrips and tospoviruses may be able to help us develop novel strategies to protect crops from tospovirus-incited diseases

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0199. Experiences in Coconut FFS for seedling pest management

Sivakumar T¹, Muralidharan P², Anithakumari P², ¹

College of Agriculture, Trivandrum, Kerala, India, ²CPCRI, Kayamkulam, India

The concept of Farmer Field School (FFS) was developed and successfully tested for knowledge empowerment among rice farmers during 1989 in Indonesia. Even though it was developed for rice farming situation, later modified versions were developed for other crops and livestock. Coconut (*Cocos nucifera*) is an oil, food and fuel yielding palm cultivated in many Asian as well as Caribbean and Pacific Islands. FFS as an innovative tool in technology transfer for pest management was tested for the first time among coconut growing community in Kerala, Southern State in India who were fed up with multiple and combined attack of pests and diseases. Coconut, cultivated as a homestead crop in Kerala supported nutritional, fuel, and industrial requirements. As a farmer participatory appraisal revealed heavy losses of coconut at their seedling stage, focus was given on technologies to protect seedlings. The FFS was designed with the participation of thirty selected farm families and two hundred coconut palms. Subject experts from technology refining and assessing organisation called Farm Science Centre (*Krishi Vigyan Kendra*) acted as facilitators/key players, active involvement of participants were ensured in every phase of the programme. The activities of FFS were organized on every alternate Saturdays. Field observations were recorded and analysed in a participatory mode. Pre and post programme score on different aspects on knowledge and skill of the participants in pest identification improved from 14.3 to 100 per cent on different pests. Skill in identifying different stages of pests, an essential component in pest management, was increased to 100 per cent from 18.8 per cent among participants. Pest incidence also registered low trend due to increased awareness and action related to pest attack and management. Community leaders with training skills were identified and developed through the programme who served as the master trainers. These participatory efforts through FFS by converging action of different agencies were fruitful in bringing down seedling loss due to pest attack in coconut.

Key Words: Coconut, pest management, FFS, participatory extension

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0200. Two new species of genus *Blacus* Nees (Hymenoptera: Braconidae: Blacinae), from India

Mohammad Shamim

Section of Entomology, Department of Zoology, Aligarh Muslim University, Aligarh 202002
U. P., India

Two new species of the Braconidae belonging to the genus *Blacus* Nees of the subfamily Blacinae. i.e. *Blacus (Blacus) etawahiana* Shamim sp. nov. and *Blacus (Ganychorus) sharifi* Shamim sp. nov. are described and illustrated and also These species are compare with its nearest allied species

Key words: Hymenoptera, Braconidae, Blacinae, *Blacus* subgenus, *Ganychorus* new species, India.

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0201. Effect Of Different Diets On Biology Of *Coccinella Septempunctata* Linneous Under Lab Condition

Bukero, A; Rustamani, M.A.; Nizamani, M.A.; Lanjar, A. G.; Nizamani; Talpur, M.A. and Nizamani, M.I.

Faculty of Crop Protection, Sindh Agriculture University, Tandojam

A laboratory experiment was carried out to determine the effect of different diets on biology of *Coccinella septempunctata* Linneous, in the Department of Plant protection, SAU, Tando Jam during-2011-12 at (Temp: 28 ± 2 °C and R.H. $65 \pm 5\%$). The result depicted that the biology of predator, *C. septempunctata* reared on safflower aphid. The pre-oviposition, oviposition and post-oviposition period was 3.6 ± 0.34 , 31.0 ± 1.02 and 7.7 ± 0.60 days respectively. The average fecundity of *C. septempunctata* 590.0 \pm 34.06 was observed, whereas, the egg incubation period, hatching and mortality were 4.4 ± 0.43 days, 81.4 ± 1.19 % and 15.60 ± 0.60 % respectively. The results further revealed that the average pupation 70.40 \pm 2.20 % and larval cannibalism was seen 29.60 \pm 2.40 % on same prey specie. Similarly adult emergence was significantly different in male and female 38.81 \pm 1.39 and 54.60 \pm 1.76 % respectively. The result further revealed that total larval developmental period was recorded 8.0 \pm 0.72 and 7.80 \pm 0.69 days on grain moth eggs and safflower aphid respectively. There was no significant difference between pre-pupal and pupal period of *C. septempunctata* feeding on grain moth egg and safflower aphid respectively. The adult longevity of male and female was significantly different 43.10 \pm 1.04 and 56.50 \pm 1.61; 36.07 \pm 0.24 and 42.50 \pm 0.69 days respectively on grain moth eggs and safflower aphid. The result further indicated that the larval instars not survived on prepared artificial diet but only adult survived without fecundity. The adult longevity of male and female was significantly different 68.50 \pm 2.03 and 72.90 \pm 2.07 days respectively. Furthermore, the measurement was varied significantly in length and breadth (mm) of larval instars, pupa and adults (male & female) of *C. septempunctata* feeding on grain moth eggs and safflower aphid.

Key Words: Biology, *C. septempunctata*, Safflower aphid and Grain moth eggs

0202. Impact of Transgenic Cotton Genotypes on Food Consumption and Utilization Indices of Spotted Bollworm, *Earias Vittella* (Fabricius)

P.S. Shera¹, Ramesh Arora¹,

¹Punjab Agricultural University, Ludhiana, India

The studies on food consumption and utilization efficiency of spotted bollworm, *Earias vittella* were conducted on four transgenic Bt cotton hybrids, one each from different transgene events viz. MRC 6304 Bt (*cry1Ac* gene), JKCH 1947 Bt (modified *cry1Ac* gene), NCEH 6R Bt (*cry1Ab/cry1Ac* fused gene) and MRC 7017 BG II (*cry1Ac* and *cry2Ab* genes) in comparison to the respective isogenic non-Bt cotton under laboratory conditions at $27 \pm 2^{\circ}\text{C}$ temperature and 70 ± 5 per cent relative humidity. The fruiting bodies, i.e. squares and bolls of each cotton genotype were collected from the crop raised in the field at 90, 120 and 150 days of crop age. They were pre-weighed before putting them in individual plastic vials. The four hour starved and weighed ten 4th instar larvae were released individually in each plastic vial. After 2 days of feeding, weight of larvae, uneaten food and faecal matter were weighed. Various consumption and utilization indices, viz. consumption index (CI), approximate digestibility (AD), relative growth rate (RGR), efficiency of conversion of digested food (ECD) and efficiency of conversion of ingested food (ECI) were worked out. The concentration of Cry protein was also estimated in squares and bolls of selected Bt cotton hybrids using Enzyme Linked Immuno Sorbent Assay (ELISA) quantification kits. All the Bt hybrids significantly reduced the food consumption and utilization indices, viz. CI, AD, RGR, ECI and ECD of 4th instar *E. vittella* larvae as compared to their isogenic non-Bt genotypes when fed on squares and bolls of 90, 120 and 150 days crop age. Further, the MRC 7017 BG II hybrid was found to be less suitable and recorded significantly lower values for all the above given indices followed by NCEH 6R Bt, MRC 6301 Bt and JKCH 1947 Bt. Despite the fact that, the differences between Bt and their isogenic non-Bt genotypes decreased with increasing age of the crop but still Bt cottons were significantly inferior as insect food as compared to the non-Bt genotypes even at the later stages of the crop growth. The expression of Cry1Ac toxin varied significantly in squares and bolls and also among selected crop ages. The expression of Cry1Ac was maximum in NCEH 6R Bt followed by MRC 6301 Bt and JKCH 1947 Bt and was minimum in MRC 7017 BG II. However, the expression of Cry2Ab was 8.0 to 9.7 fold more than Cry1Ac in MRC 7017 BG II genotype. Among selected crop ages, the mean expression was higher in 90 days old crop and it declined significantly irrespective of the hybrids and was lower in 150 days old crop. Between fruiting bodies, both Cry1Ac and Cry2Ab toxins were more in squares as compared to those recorded in bolls.

0203. Harnessing Natural Silk Fibre From Cocoons of African Wild Silk Moth, *Argema Mimosae* Boisduval (Lepidoptera: Saturniidae)

**Boniface M. Ngoka^{1*}, Esther N. Kioko³, Suresh K. Raina¹,
and Jones M. Mueke²**

¹ICIPE—African Insect Science for Food and Health, 30772-00100, Nairobi, Kenya

²Department of Biological Sciences, Kenyatta University, 43844, Nairobi, Kenya

³National Museums of Kenya, 40658, Nairobi, Kenya

Overexploitation of natural resources and forest destruction for better livelihood by local communities has led to decline in the African biodiversity. Beneficial insects like wild silkmoths exist in the eco-system, and can be integrated in biodiversity conservation and income generating micro enterprises. This study focuses the potential of utilizing African wild silkmoth in the sericulture industry. Cocoons of African wild silkmoth *Argema mimosae* Boisduval were collected from Arabuko sokoke forest, Kenya (3° 20'S, 39° 55'E). A sample of old cocoons was collected from the wild between 2005 and 2007 while fresh samples were obtained after semi-captive rearing of the silkmoth larvae in 2008 and 2009. The cocoons were boiled in a solution of 5gms/ltr of sodium carbonate at different time intervals to soften them for silk extraction and in distilled water as a control treatment. Silvery brown floss was extracted from cocoons boiled in sodium carbonate solution but not in those boiled in distilled water only. Deflossing was done manually when the cocoons were semi-dry and the floss obtained spun with wooden hand spinning wheel. The cocoons could not be reeled because they have an opening at the front tip which breaks continuity of the filament. Fresh cocoons produced relatively more silk fibre than the old cocoons at the different boiling time intervals. The study discusses the distinctive characteristics of the *A. mimosae* cocoons and a simple silk extraction process to outline its potentiality in silk industry.

Key words: African wild silkmoth, *Argema mimosae*, Cocoons, Silk fibre.

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0204. Economic Potential of *Anaphe Panda* (Boisduval) (Lepidoptera: Thaumetopoeidae) Wild Silkmoth in Kenya

Everlyn Nguku¹, Boniface Ngoka¹, Suresh Raina¹,

¹*International Centre of Insect Physiology and Ecology, Nairobi, Kenya*

The superiority of silk as a textile fibre has been recognized from time immemorial and its demand is constantly increasing in the world market. This provides excellent opportunities for any producer country to diversify and optimize any source of production. Various studies have been carried out on the ecology and economic potential of wild silkmoth *Anaphe panda* (Boisduval) which occurs in the Kakamega Forest, western Kenya. The highest diversity of the African wild silkmoths is in the family Lasiocampidae and earlier surveys on the diversity in East Africa recorded about 33 species in 17 genera of this family. Despite this high diversity, only a few of these species have so far been utilized for wild silk production in East Africa. Wild silk production is an eco-friendly, agro-based enterprise with great potential to conserve the environment, create employment and make economic gains. This paper therefore analyses the economic potential of wild silkmoth *A. panda* with the aim of enhancing the conservation of *A. panda* silkmoth and their habitats for silk production, and thus enhance the conservation and utilization of a biodiversity resource.

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**0205. Suitability of some date fruit varieties to the almond moth,
Ephestia cautella Walker (Lepidoptera: Pyralidae)**

Nihal M. Bagy¹, Refat M. Abdel Shafi¹ Youssef A. Darwish² and Abdel-Wahab M. Ali²

¹Plant Protection Research Institute, ARC, Egypt

²Plant Protection Department, Faculty of Agriculture, Assiut University, Egypt

The almond moth, *Ephestia cautella* Walker is an important pest of date fruits in storage in Egypt. The objective of this study was to determine the effect of some date varieties on the development and reproductive potential of *E. cautella* in the laboratory. The tested date varieties were Sakkoti (dry) and Saidy (semi-dry). Results indicated that the duration of the immature stages (egg, larva, pupa) on the dry dates was about 54 days, whereas, it was about 43 days on the semi-dry dates. The survivorship during the period from egg to adult was 55.57% of the pest reared on the dry date (Sakkoti) whereas; it was 29.58% on the semi-dry (Saidy). Our results also showed that the highest index of efficacy of the pest was observed on dry-dates, whereas the lowest was recorded on the semi-dry date. Based on the results of life table statistics, the highest GRR, R_0 , r_m and λ (35.48, 34.33, 0.064 and 1.066) occurred on the dry, whereas, the lowest (16.78, 14.62, 0.060 and 1.062) occurred on semi, respectively. It is clear that dry-date variety was the most favorable host for development and reproduction of the almond moth.

Key words: Almond moth, Suitability, Date varieties

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0206. Genes and Behaviour in Leaf-cutting Ants

Sze Huei Yek¹, Jacobus J Boomsma², Morten Schiott²,

¹University of Pretoria, Pretoria, South Africa, ²University of Copenhagen, Copenhagen, Denmark

Leaf-cutting ants have increased selection pressures on their innate immune system due to their social lifestyle and monoclonality of the symbiotic fungal cultivar. As this symbiosis is obligate for both parties, prophylactic behavioural defences against infections are expected to increase either ant survival or fungus-garden survival, but also to possibly trade off when specific infections differ in potential danger. We examined the effectiveness of prophylactic behaviours and modulations of innate immune defences by a combination of inoculation bioassays and genome-wide transcriptomic studies (RNA-Seq), using an ant pathogen and a fungus-garden pathogen, and administering inoculations both directly and indirectly. Upon detection of pathogen conidia, ant workers responded by increasing both their prophylactic behavioural activities and gene expressions. In contrast, direct inoculation of fungus-garden pathogen induced an overall down-regulation of ant gene expression, suggesting that increased activity of ants to remove their symbiotic fungus-garden pathogen is costly and involves trade-offs with the activation of other physiological pathways.

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0207. The effects of juvenile hormone analogue pyriproxyfen on the egg production and ovary development of the Pharaoh ant, *Monomorium pharaonis* (Hymenoptera: Formicidae)

Tay Jia Wei and Lee Chow Yang

Urban Entomology Laboratory, Vector Control Research Unit, School of Biological Sciences, Universiti Sains Malaysia, 11800 Penang, Malaysia.

The effects of juvenile hormone analogue pyriproxyfen on the egg production and number of ovarioles have been examined in queens of *Monomorium pharaonis* (L.) under different concentrations of 0.1, 0.5 and 1%. The eggs of treated and untreated queens were counted weekly. Colonies treated with pyriproxyfen showed significant decline in egg production in queens at 3 weeks after treatment. Mean egg production decreased to 23.6 ± 2.3 , 16.9 ± 2.4 and 18.4 ± 2.9 eggs/queen/day, in colonies subjected to 0.1, 0.5 and 1% of pyriproxyfen, respectively compared with 38.9 ± 1.5 eggs/queen/day in control colonies at 3 weeks after treatment. After 8 weeks, all the ovaries were dissected out from all the queens. The effects of pyriproxyfen on the ovaries were observed while the numbers of ovarioles were recorded. Pyriproxyfen affected ovarian development in all treated colonies. Compare to large ovaries in untreated queens, the ovaries of queens in treated colonies were reduced in size. Significant lower number of ovarioles was found in the ovaries of all pyriproxyfen-treated queens. Histological studies of the queen's ovaries revealed that pyriproxyfen causes oocyte lack of nurse cell. The results indicated that pyriproxyfen reduced egg production and induced morphological changes in ovaries of queens in *M. pharaonis*.

Keywords: *Monomorium pharaonis*, juvenile hormone analogue, egg production, ovary development, pyriproxyfen

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0208. Biological Control of Bagworm; Enhancement of Parasitism Activity Through Supplementation of Beneficial Plants on Oil Palm Plantation

Yusdayati Rashid¹ Che Salmah Md Rawi² Abu Hassan Ahmad² & Noor Hisham Hamid¹

¹Pusat Penyelidikan Pertanian Tun Razak, Beg Berkunci No 3, 26400 Bandar Jengka, Pahang.

²School of Biological Sciences, 11800, Universiti Sains Malaysia, Pulau Pinang.

Natural enemies, parasitoid and predator play an important role in reducing bagworm, *Metisa plana* (Lepidoptera: Psychidae) population in oil palm plantation. Abundance and diversity of natural enemies and impact on their host population are influenced by the availability of food resources (nectar) from beneficial plants in their surroundings. In this study, two species of beneficial plants; *Cassia cobanensis* and *Turnera ulmifolia* were planted (100m *Cassia cobanensis* and 200m *Turnera ulmifolia*) along one side a subsidiary road in oil palm plantation of FGVP Besout 6 Sungkai, Perak as food source for adult parasitoids of bagworms. Parasitism on bagworms was assessed before and after planting of the plants. Percentage of parasitism had increased and was significantly higher after than before the beneficial plants were planted in the study area (t test, $t=-5.518$, $p=0.005$). Higher parasitisation on bagworms was recorded on rows of oil palm closest (4m) to the plants. Some parasitism activity was observed up to 180m (20th row of palm trees) away from the plants. This results indicated that food supplement from the beneficial plants was important for enhancement of parasitoids population in the plantation. In a large scale practice, continuous supplement of beneficial plants every 20 rows of palm trees would maintain parasitisation of bagworms infesting all palm trees in oil palm plantations.

Keywords: Natural enemies, parasitoids, biological control, beneficial plant, bagworm.

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0209. Laboratory Evaluation of Insecticidal Potential of Some Aqueous Plant Extracts Against Cotton Strainer, *Dysdercus Superstitious* (Herrich Schaffer) (Hemiptera: Pyrrhocoridae)

Jacobs Mobolade Adesina¹, Lawrence Adebayo Afolabi²,

¹Department of Crop, Soil & Pest Management Technology, Rufus Giwa Polytechnic, P. M. B. 1019, Owo, Ondo state, Nigeria, ²Dean's Office, Faculty of Agricultural Technology, Rufus Giwa Polytechnic, P. M. B. 1019, Owo, Ondo state, Nigeria

Cotton stainer, *Dysdercus superstitionus* (Herrich Schaffer), (Heteroptera: Pyrrhocoridae) is a serious pest in many parts of Nigeria attacking cotton and okra plants. In light of recent interest in plant based secondary chemistry into products suitable for integrated pest management, the objective of the present study was to investigate the insecticidal efficacy of *Bridelia micrantha*, *Chasmanthera dependens* and *Veronia cinera* under ambient laboratory conditions in the management of *D. superstitionus*. One (1kg) barks of *B. micrantha*, *C. dependens* and leaves of *V. cinera* were pounded and soaked for 24 h in cold water and filtered using muslin cloth. Four dosage rates of the aqueous extracts: 0.5ml, 1.0ml, 1.5ml and 2.0ml were made in three replicates each and arranged in Complete Randomised Design (CRD). The incidence of each aqueous extracts on *D. superstitionus* for repellency and mortality was monitored at 24 hours interval for 4 days, while nymph emergence was monitored and recorded. The result indicated that *D. superstitionus* repellency, mortality and nymph emergence were concentration (dosage) and exposure time dependent. Across treatment, dishes treated with 2.0ml extract significantly influenced the bioactivity of the insects in treated surface compared to untreated surface. While, 24 and 48 exposure time significantly exerted greater adult repellency, mortality and nymph emergence was also suppressed greatly. Among the three tested plants *B. micrantha* gives the best effective values followed by *C. dependens* and *C. cinera* respectively in significantly repelling the insect from treated surface, caused adult mortality and inhibited nymphs emergence. Therefore, it is evident from the study that *B. micrantha* could be used to suppress cotton stainers infestation on okra or cotton plants.

Keywords: bioactivity, efficacy, exposure time, infestation, mortality, nymphs emergence

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0210. Exploration of beneficial gut microflora in select Lepidopteran insects

Subramanian Sabtharishi and Sakshi Gandothra
Indian Agricultural Research Institute, New Delhi – 110 012

Insect gut is inhabited by a diverse group of microorganisms which are implicated in several physiological functions including nutritional contribution, colonization resistance to invading pathogens and synthesis of semiochemicals . Nutritional contribution is considered as the foremost beneficial aspect of gut microbes as it increases the survival value of the insects especially under suboptimal dietary conditions. The role of gut symbionts in in Lepidopteran insects has long been hypothesized to be limited owing to simple digestive tract and absence of any specialized anatomical features in their intestinal tracts. However, the recent studies have unraveled the nutritional role of gut bacteria of Lepidopteran insects, a dominant group of crop pests and beneficial insects. In this study, three different Lepidopteran insects viz., cotton bollworm, *Helicoverpa armigera*, diamond backmoth, *Plutella xylostella* and Muga silkworm, *Antheraea assamensis* have been examined for the diversity of gut bacteria and their possible role in insect nutrition by assessing the enzymatic activity of digestive enzymes. Gut bacterial strains isolated from these insect species have been assayed for cellulolytic, lipolytic and amylase and gelatinase enzyme activities by qualitative and quantitative assays. The results of the study indicated the presence of strains with high lipase activity (12), strong β -glucanase activity (14) and good amylase activity (7) among 50 gut bacterial isolates from *H.armigera*. Analysis of 41 gut bacterial isolates from *P.xylostella* revealed that that six isolates having strong lipase activity, five having good β -endoglucanase activity and three isolates with strong amylase activity. Biochemical characterization of about 150 gut bacterial isolates from *A.assamensis* has identified strains with strong lipase (18), β -glucanase (39), amylases (32) and gelatinase (2) activities. The digestive enzyme activity from the gut symbionts were distinct and different from that of the host insects. This finding provides the support for potential role of gut symbionts in nutritional contribution in these Lepidopteran insects .

Keywords: *Helicoverpa armigera*, *Plutella xylostella*, *Antheraea assamensis*, gutbacteria

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0211. Impact of entomopathogenic bacterial symbionts, *Photorhabdus luminescens*, and *Bacillus thuringiensis* subsp. *tenebrionis* on management of red palm weevil, *Rhynchophorus ferrugineus* (Olivier) in Egypt

A.S. Abdel-Razek, H.S. Salama

National Research Centre, Department of Pests and Plant Protection, El-Tahrir Street,
Dokki 12622, Cairo, Egypt

The red palm weevil, *Rhynchophorus ferrugineus* (Olivier), is considered to be one of the most lethal pests affecting date palms in Egypt, where the average rate of annual infestation is about 2.5. After its detection in the Egyptian palm area at 1992, it spread quickly to different governorates in the country. Currently, red palm weevil, *Rhynchophorus ferrugineus* (Olivier) management in Egypt is mainly based on chemical treatments. Nonetheless, special emphasis is being developed on implementing environmentally safe strategies. Commercial formulates based on *Bacillus thuringiensis* ssp. *tenebrionis* (*Btt*) strain NB-176 and the bacterial symbionts, *Photorhabdus luminescens*, which we have isolated from the entomopathogenic nematode, *Heterorhabditis bacteriophora* strain HP88, showed to be a good alternative, as they have been used to control other coleopteran insect pests successfully. The laboratory and open-field experiments presented in this work are evidence that the cumulative effect of both bacterial insecticides is highly efficient in controlling red palm weevil. The first instar larvae were the most susceptible in the laboratory studies, while susceptibility was lower in second, third instar larvae and adults. Our results also, showed that the impact of *Rhynchophorus ferrugineus* (Olivier) can be greatly reduced in the field by spraying and injecting the date palms with a lethal doses of both *Bacillus thuringiensis* ssp. *tenebrionis* (*Btt*) strain NB-176 and *Photorhabdus luminescens* formulates, at weekly intervals. This technology could reach to 60-80% recovery of date palms, with no need for chemical insecticides. Furthermore, the integration of this technology with other biological control methods such as, predators or parasitoids could reduce the number of bacterial pathogens treatments with the consequent increase in date palm produce.

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0212. Natural Enemies of Invasive Gall Wasp, *Quadrastichus erythrinae* Kim

S. H. Ramanagouda and A. S. Vastrad

Department of Agricultural Entomology, College of Agriculture, University of Agricultural Sciences, Dharwad - 580 005 Karnataka (INDIA)

Coral trees (Fabaceae: *Erythrina* spp.) in India, farmers used as shade plants in coffee and cacao and as standard trelling plant in betel nut, black pepper, vanilla and yam plantations. Severe outbreak of the invasive Erythrina Gall Wasp (EGW), *Quadrastichus erythrinae* Kim resulted in complete/partial replacement of coral trees with less suitable alternatives like *Sesbania* sp. and silver oak, *Grevillea robusta* A In India it was first recorded on *Erythrina* spp. from Kerala and its occurrence was simultaneously reported from Pune, Satara, Sangli and Kholapur districts in Maharashtra and Belgaum and Dharwad districts in Karnataka. Recently, several species of chalcidoids associated with Erythrina galls in West and East Africa have been reported from South Africa by Prinsloo & Kelly during 2009 and identified five new tetrastichinae species viz., *Quadrastichus ingens* Prinsloo & Kelly, *Q. gallicola* Prinsloo & Kelly, *Q. bardus* Prinsloo & Kelly, *Aprostocetus nitens* Prinsloo & Kelly and *A. tritus* Prinsloo & Kelly in association with erythrina galls. Similarly, *Eurytoma erythrinae* Gates & Delvare from South Africa, Tanzania and Ghana and *A. exertus* La Salle from Tanzania have been described. Some of these are being considered for classical biological control of EGW in Hawaii. We noticed several *Erythrina cristagalli* L. trees severely affected by EGW in Dharwad district of Karnataka (India) during January 2012. Galled samples (leaf and stem) were collected and brought to the laboratory and kept in a pin holed polythene bag for adult emergence. Adults that emerged from the samples included both the pest and their parasitoids. These parasitoids were got identified with the help of Prof. T.C. Narendran Trust for Animal Taxonomy, Calicut, Kerala (India). Three parasitoids belonging to two super families (Chalcidoidea and Ichneumonoidea) viz., *Aprostocetus* sp. (Eulophidae), *Gonatocerus* sp. (Mymaridae) and an unidentified Braconid emerged from the stem and leaf galls of *E. cristagalli*. Combined parasitization by these natural enemies ranged from 10-15 per cent. This is the first record of parasitoids on Erythrina Gall Wasp, *Q. erythrinae* from India. These native parasitoids need to be studied further to ascertain their potential to combat the menace of EGW. Native parasitoids have been successfully used to manage another invasive gall wasp, *Leptocybe invasa* Fisher & La Salle on eucalyptus in India.

Keywords: Coral tree, Erythrina gall wasp (EGW), Native parasitoids

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0213. Dissemination of “Integrated Productivity Management in Cotton Wheat Cropping System” in Indian Punjab

Baljinder Singh, G. S. Chahal, A. S. Sohi and I. M. Chhibba

¹Reviving Green Revolution Cell (Sir Ratan Tata Trust), Ludhiana, India

Reviving Green Revolution Cell (Sir Ratan Tata Trust), Ludhiana in partnership with Department of Agriculture, Punjab, disseminated “Integrated Productivity Management technology in Cotton-Wheat Cropping System” in 100 villages in four districts during 2012-13 integrating the gains of IPM technology with other resource conservation technologies to increase productivity. After demonstration of Scout model (village having one trained youth) between 2007-2012, a need was felt to shift from ‘Scout model’ approach to ‘Cluster village’ approach (a cluster of 25 villages) as a unit for demonstration. In total, over 26,000 farming families covered 143,066 acres under cotton and 245,132 acres under wheat. The Cluster-incharges, Sub-Cluster Incharges and the volunteer scouts were initially trained for 4-days at PAU and then three times during each crop season by Experts from RGR Cell. Village information Centers were established in each village equipped with all information related to crop productivity. In adopted villages 55% area was sown in recommended time. The basal doses of DAP, MOP, and zinc sulphate were applied by 69.4, 32.0 and 27.3 % farmers. The foliar application of potassium nitrate was carried out by 65-70 % farmers. The use of insecticides depended upon ETL. The participating farmers on an average gave 4.6 sprays/acre compared to 5.7 by non-participating farmers (19.3 per cent reduction). Similarly due to advisory follow-up a cost reduction of 18, 6 and 21 per cent was observed on seed & sowing, fertilizers and weed management costs respectively by participating farmers. An increase of 11.8 per cent in seed cotton yield/acre earned a net profit of Rs. 19071/acre which was 35 per cent higher than the non- participating farmers. Wheat varieties recommended by PAU were sown on 75.92 % area by farmers in project villages and 55.7 % sowing of wheat was completed from October to November and 44.21 per cent was sown during December. Seed treatment with Chlorpyrifos and Raxil was carried out by 1.35 and 23.72 % farmers while the use of fertilizers varied from farmer to farmer. The wheat rust was managed through fungicides. Based on advisory by experts, the participating-farmers on an average gave 2.68 sprays/acre in comparison to 2.96 sprays/acre by non-participating farmers. On an average the participating farmers spent about Rs. 487/acre on pesticides sprays compared to Rs. 588/acre by the non- participating farmers. Having reaped 0.89 q/acre higher wheat yield, the participating farmers earned Rs. 1964/acre more than the non-participating farmers.

Key words: Integrated Productivity management, Village information centres, Cotton, wheat

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0214. Occurrence and Diversity of Entomopathogenic Fungi from Selected Area in Peninsular Malaysia

Mohd Masri, S¹., Tosiah, S²., Siti Rahidah¹., Nur Sakinah, A.L¹.

¹ Arthropod Research Unit, Bioresource Management & Utilization Programme, Strategic Resource Research Centre

² Microbiology Research Unit, Bioresource Management & Utilization Programme, Strategic Resource Research Centre

Heavy use of chemical pesticides had brought many problems such as resistant of the target insects and also harms human and animal health. Myco-biocontrol offers an attractive alternative to the use of chemical pesticides. Myco-biocontrol naturally occurred in the environment and also less damaging to human and animal. Entomopathogenic fungi can be used to control harmful insect pests without affecting beneficial insect predators and nonharmful parasites. Surveillance has been conducted for a period of one year from 2012 to 2013 at selected area in Peninsular Malaysia to explore the occurrence and diversity of entomopathogenic fungi. Soil samples, dead insects and insects' pest from agriculture area were collected and brought back to the laboratory. Entomopathogenic fungi were isolated from different soil samples by baiting techniques with mealworms. The major entomopathogenic fungi recovered from the sample are *Metarhizium anisopliae*, *Beauveria bassiana*, *Aspergillus sp*, *Cordyceps sp.*, *Nomurea rileyi*, *Entomophaga grylli* and *Fusarium sp.*. Entomopathogenic fungi collected could potentially be used as biopesticide to control insect pest through augmentation. Past research has shown some promise of the use of fungi as a selective pesticide. Further studies are currently conducted using molecular technique in order to identify the species of the fungi and the toxicity against target insect pest.

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0215. Molecular characterization of Seven species of Butterflies (Lepidoptera: Insecta) by RAPD-PCR.

M.S.Thakur

1. Department of Biosciences, Himachal Pradesh University Shimla-171005, India.

Molecular characterization of seven butterflies was carried out using five RAPD markers. Total 91 bands were scored with five decamer primers of which 91 were polymorphic and the percentage of polymorphism was 100%. Genus specific bands have been observed i.e. 1142bp with primer 1, 1166bp, 658bp, 570bp with primer 2, 1027bp with primer 12 & 428bp with primer OPP-5. Dendrogram based on average similarity coefficient of five primers grouped seven butterfly species in to three clusters. Cluster-I comprises of five species viz. *Dodona eugens*, *Lycaena phlaeas*, *Heliophorus sena*, *Celastrina cardia* & *Celastrina hugelii*. Cluster-II & Cluster-III comprises of one species each i.e. *Aricia astrarche* & *Lampides boeticus* respectively. Cluster –I is subdivided in to two, sub-cluster-I consists of only *Dodona eugens*, sub-cluster-II consisting of *Lycaena phlaeas*, *Heliophorus sena*, *Celastrina cardia* & *Celastrina hugelii*. Su-cluster-II is further divided in to two sub-sub-clusters, sub-sub cluster-I comprises of *Lycaena phlaeas* & *Heliophorus sena* and sub-sub cluster-II comprises of *Celastrina cardia* & *Celastrina hugelii*.

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0216 . Occurrence, Abundance and Control of the Major Insect Pests Associated with Amaranths in Ibadan, Nigeria

Ismaila Aderolu¹, Adebayo Omoloye², Feyisara Okelana¹,

¹Cocoa Research Institute of Nigeria (CRIN), Ibadan, Oyo State, Nigeria, ²University of Ibadan, Ibadan, Oyo State, Nigeria

Beetworm Moth (BM), *Hymenia recurvalis* F. is a major defoliator of *Amaranthus* species causing severe yield loss. Control with synthetic insecticide is being discouraged for its adverse effects. Information on sustainable management of BM with ecologically friendly methods is scanty. Three *Amaranthus* species: *A. cruentus*, *A. blitum* and *A. hybridus* were evaluated for insect diversity and abundance during wet and dry seasons of two years following standard procedures. Data collected were Leaf Area Damage (LAD) (cm²); Infestation per plant (I) and Field Abundance (FA). Three neem extracts: 0.125g Aqueous Neem Leaf (ANL) w/v; 0.125g Aqueous Neem Bark Ash (ANBA) w/v and Aqueous Modified ANL+ANBA (AMAN) (1:1) all at 3l/25m² were bioassayed against BM using λ -cyhalothrin at 2.5ml/25m² and water as controls. Data collected were analysed using descriptive statistics, ANOVA at P>0.05, Shannon index (H), Simpson index (1-D) and evenness. Sixty insect species from 29 families and 12 orders; comprising 31 defoliators, 12 predators, one pupa parasitoid (*Apanteles hymeneae*) and 16 non-economic species were encountered on *Amaranthus* species. The BM was the most damaging causing 69.4±0.16% loss of foliage compared to control. The species abundance in both seasons was BM (2916.8±138.83)>**Hypolixus truncatulus** (2262.7±94.1)>*Lixus truncatulus* (2088.7±36.4). Shannon (3.52), 1-D (0.96) and evenness index (0.65) of diversity were high with few dominant species. The AMAN at 3l/25m² w/v extract caused significant reduction of leaf damage (72±0.05%) and field infestation (78±0.06%) compared to the untreated control; but comparatively less effective by only 5% to λ -cyhalothrin; implying suitability as environmentally safe control measure.

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0217. Cold storage of predatory mites *Neoseiulus californicus* is improved by pre-storage feeding on diapausing spider mites *Tetranychus urticae*

Noureldin Abuelfadl Ghazy¹, Katsumi Ohyama², Hiroshi Amano³, Takeshi Suzuki⁴
, ¹Mansoura University, El-Mansoura, Egypt, ²Kyoto University, Kyoto, Japan, ³Chiba University, Chiba, Japan, ⁴Kyoto University, Kyoto, Japan, ⁵Ibaraki University, Ibaraki, Japan

Low air temperature accompanied with vapor-saturated condition has shown to be effective in long-term cold storage of the predatory mite *Neoseiulus californicus* (McGregor) (Acari: Phytoseiidae). To improve this storage method, the effect of pre-storage nutrition on the survival during storage and post-storage quality in terms of the survival, oviposition, and progeny viability were investigated. The predatory mite was fed from the egg to adult stage on diapausing two-spotted spider mites (TSSM) *Tetranychus urticae* Koch (Acari: Tetranychidae), non-diapausing TSSM, or Japanese pear pollens. Newly emerged *N. californicus* adult females and males were mated, and then both were stored at 7.5°C and water vapor pressure deficit (VPD) of 0.0 kPa for various durations. Significant improvements in the survival during storage and post-storage quality were obtained when the diapausing TSSM diet was used in comparison with the other diets. No effects on the survival and sex ratio of the progeny produced from the stored adults were observed regardless of the types of diet and storage durations. These results indicate that providing diapausing TSSM as a pre-storage diet significantly improves the long-term storage method for *N. californicus*. The possibility that the ingestion of cryoprotectants, antioxidants, and energy reserves which are rich in the diapausing TSSM, has mitigated the chilling injury is discussed.

Keywords: Antioxidants, Cryoprotectants, Natural enemies, Oviposition, Pollen, Survival, VPD

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0218. Genetics of Resistance to Xenobiotics in Insects

Sonai Rajan Thangaraj¹,
TNAU, Coimbatore, Tamil Nadu, India

Resistance is a change in the sensitivity of a population which is reflected in repeated failures of a product to achieve the expected level of control, when used according to the label recommendations for that pest species. (IRAC, 1993). Resistance of insects to xenobiotics, which include naturally occurring plant allelochemicals and synthetic insecticides. Xenobiotic is a chemical that is found in an organism but which is normally produced or expected to be present; can also cover substances that are present in unusually high concentrations. In insects, plant –defence chemicals, pesticides, drugs and pollutants are considered to be xenobiotics”. Genetical studies on resistance now seem to concentrate mainly on inheritance of particular forms of resistance, genetical aspects of cross – resistance or multiple resistance and genetics of biochemical properties causing or related to resistance. Genetic inheritance of traits through mutation resulting in genomic changes that lead to amplification, over expression, and/or altered coding sequence of major groups of genes for the three pertinent enzymes responsible for developing resistance to a group of insecticides, is the sole cause of genetic resistance. Evolution of insecticide resistance mostly comes from target site mutations in many species of insects involving genes/regulatory elements (Plapp 1986), such as *AChE-R*—altered *AChE* gene, *ace* (*acetylcholinesterase* gene), *dld-r* (cyclodienes), *kdr* (DDT and pyrethroids) low-level (*kdr*) and high-level (super *kdr*) alleles, *pen* (reduce uptake), *ace-1* is responsible for propoxur resistance in mosquitoes, Barbie Box”—it allows induction of insecticide-detoxifying oxidase and esterase resistance genes and IIS6 membrane-spanning region of the sodium channel gene. It confers target-site DDT-pyrethroid resistance. Plant allelochemicals and associated resistance mechanism in insects viz., alkaloids cause resistance mechanism of modification of nicotine synthesis by salivary glucose oxidase in *Helicoverpa zea* Insects that are resistant to plant toxins usually combine several resistance traits (e.g. behavioral and metabolic) (Laurence *et al.*, 2007). Avoidance mechanism can be genetically determined (e.g. Oviposition behavior prevents females from laying eggs on unsuitable plants). The gene encoding UGT (BmUGT), which is involved in the degradation of flavonoids and cytochrome (Luque, 2002)

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0219. Whiteflies in Saudi Arabia: Current Status and Ongoing Research Efforts

Mohammad Aldeghairi¹, Nagdy Abdel-Baky¹,

¹Qassim University, Buraydah, Qassim, Saudi Arabia

Although with the extreme seriousness of *Bemisia tabaci* Genn., world-wide, this pest has not received a great interest in Saudi Arabia. Recently, there are attempts to study the insect specially its status in some parts of Saudi Arabia. In Saudi Arabia, farmers suffer from multiple problems facing vegetable crops cultivated either under greenhouses or in the open field and its consequent problems as a result of the invasion of the pest. There are 3 species of whiteflies in Qassim region namely; the castor bean whitefly, *Trialeurodes ricini* (Misra) on the castor plants, the spiraling whitefly, *Aleurodicus dispersus* (Russell) on the wild lettuce and the sweetpotato whitefly, *Bemisia tabaci* on many vegetables and is a dominant species of whiteflies. At the Moment, *B. tabaci* is considered the most dangerous whitefly species that exist in Saudi Arabia. DNA analysis of *B. tabaci* indicates the existence of B-like biotype in Qassim entomo-funa. This is the 1st record that announces the presence of this new biotype of *B. tabaci* in this area which differs from the dominant biotype in the Middle East. Therefore, this study will shade some lights on the pest current status, distribution, their host plants, and bio-control agents that naturally controlling *B. tabaci* in Qassim region.

Keywords: *Bemisia tabaci*, Whitefly, Qassim, Saudi Arabia, Biological Control

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0220. Pathophysiological Changes in the Haemolymph of *Helicoverpa armigera* (Hubner) Larvae Infected with *Helicoverpa Armigera* Nuclear Polyhedrosis Virus (*HaNPV*)

Vinod Kumari and N.P. Singh

Department of Zoology, University of Rajasthan, Jaipur (Raj), India.

Bioefficacy of nuclear polyhedrosis virus (NPV) as a biopesticide and its mode of action in causing death of insect are well known (Granados, 1980). But there has been little documentation on variations in biochemical composition of haemolymph in virus infected insects, therefore there is a dire need of study on variations in biochemical alterations in the haemolymph of infected and uninfected larvae during development of *Helicoverpa armigera* (Hub.), a gram pod borer, which is a serious polyphagous pest of several important crops (Cunningham, 1995). 5, 8 and 10 days old larvae were selected from the culture of *H. armigera* reared on castor (*Ricinus communis*) leave at 27 ± 1 °C and 70 ± 5 percent relative humidity (R.H) A group of 100 larvae (pre starved for 2 hrs.) of 5, 8 and 10 days old larvae each and were fed for a period of 24 hrs. on the castor leaves treated with control group. Haemolymph was obtained by cutting prolegs at its base and collected through micropipette and stored in a vial containing 0.1 ml of extraction buffer and kept in crushed ice. After centrifugation of haemolymph, plasma so obtained were used for biochemical estimations. Total protein content was estimated by Bradford's method (1976). The carbohydrate content was determined by Anthrone reagent (Roe, 1955). Daily changes in the uric acid content were studied by using colorimetric techniques of Caraway (1955) and lipid was determined with chloroform- methanol mixture (2:1) by Bligh and Dyer (1959). The infection resulted in significant changes in various biochemical parameters of haemolymph. Protein, carbohydrate, uric acid and lipid contents were higher in treated larvae as compared to untreated control. The increase was maximum for 5 day old larvae at 72 hr post infection in case of protein, carbohydrate and lipid and for 8 day old larvae at 48 hr post infection in case of uric acid.

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0221. Effect of abiotic stress on cotton mealybug, *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) and its parasitoid, *Aenasius bambawalei* Hayat (Hymenoptera: Encyrtidae)

K Shankarganesh¹, Mohammad Muslim,
Indian Agricultural Research Institute, New Delhi, India

In India, cotton crops being affected by two different mealy bugs, viz. *Phenacoccus solenopsis* and *Maconellicoccus hirsutus*. Among these, cotton mealy bug *P. solenopsis* found to cause serious damage and yield loss. *Aenasius bambawalei* is the predominant primary parasitoid on *P. solenopsis*. The study was aimed to find out the efficacy of thiodicarb, profenofos and imidacloprid on *P. solenopsis* and *A. bambawalei* collected from five different locations viz. Delhi, Punjab, Haryana, Gujarat, Tamil Nadu, India and the effect of various temperature regimes on sex ratio of *A. bambawalei* was studied.

Under laboratory condition, irrespective of the population, profenofos found to be more toxic and thiodicarb found to be less toxic to 10 day old mealy bug. Among the five populations, Punjab and Delhi population found to be more tolerant, whereas Gujarat, Tamil Nadu and Haryana populations were more susceptible. The LC₅₀ value varies from 0.1% (thiodicarb, Delhi populations) to 0.0005 % (Tamil Nadu, profenofos). It was observed that field recommended doses were failed to control cotton mealy bug. The effect of these three insecticides on survival of *A. bambawalei*, found that the thiodicarb found to be less toxic and profenofos found to be more toxic. Among three different temperature regime i.e. 27°C, 32 °C and 37 °C; 32 °C is ideal for mass multiplication at 70% RH. The increase in temperature favors the male off spring than female.

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0222. A Comparative Study of Silica Nanoparticles and *Pseudomonas Fluorescens* for the Control of *Aedes Aegypti* for the Eradication of Dengue

Vani C¹, Lydia Priyadarshini¹,

¹Karunya University, Coimbatore, Tamilnadu, India

Aedes aegypti is the principle vector causing dengue and dengue haemorrhagic fever, the most important arboviral disease of human. Hence there is a critical need for controlling this mosquito and it has been reported that the mosquitos are most effectively targeted in their aquatic stage. Owing to their small size and large surface area nanoparticles are considered best method in controlling dengue vector. *Pseudomonas fluorescens* contains mosquitocidal toxin and their mode of action is possibly through cuticular region. Thus a comparison is made between nanoparticle and bacterial toxins to find the most efficient method. Silica nanoparticles were synthesized in stober's sol-gel method and also by varying the parameters. Characterization using SEM showed its spherical shape; XRD confirmed its amorphous nature; UV confirmed the prescens of silica and Particle size analyser showed the size of silica nanoparticles ranging from 50 to 500 nm. Different concentrations (100,150,300,450,600,750 and 900ppm) of nanosilica synthesized were treated against the larvae of *Aedes aegypti*. The nanosilica synthesized using the surfactant SDS was found to be effective at concentration of 300ppm and 600ppm. mortality of larvae was highest with 94% in 72 h treatment at the concentration of 600 ppm. The concentration at which the rate of mortality was highest was recorded in 300ppm compared to the control. In 48h the mortality percent when treated with *Pseudomonas fluorescens* increased in all the concentration especially in 20 and 40µg/mL. It reached nearly 100% at 40µg/mL in 48h culture and the mortality was less for 20µg/mL of 24h culture. In 72h 100% mortality was observed.

Key Words: Silica nanoparticles, *Aedes aegypti*, *Pseudomonas fluorescens* and

0223. Life tables for Colorado potato beetle, *Leptinotarsa decemlineata* (Say) (Coleoptera: Chrysomelidae), on four potato varieties in Iran

Iranipour S.¹ Esfandi K.², Kazemi, M.H.^{2, 3}, Michaud, J.P.³

²Department of Plant Protection, College of Agriculture, University of Tabriz, Tabriz, Iran.

¹College of Agriculture, Islamic Azad University, Tabriz branch, Tabriz, Iran.

³Agricultural Research Center-Hays, Department of Entomology, Kansas State University, Hays, Kansas, USA.

Colorado potato beetle (CPB), *Leptinotarsa decemlineata*, is the most important insect pest of potato in Iran. If local potato varieties vary in susceptibility to the pest, host plant resistance may provide management benefits to potato growers. A life table study was carried out to determine the relative suitability of four common potato varieties (Agria, Marfona, Sabalan and Satina) for CPB development and reproduction in Northwest Iran under laboratory conditions (23 ± 3 °C, $62 \pm 10\%$ RH, and natural photoperiod). Development time of CPB was longest on Sabalan (31.07 ± 0.48 d) and shortest on Agria (27.8 ± 0.65 d). Juvenile mortality was highest (47.5%) on Satina and lowest (22.5%) on Marfona. Most juvenile mortality on Agria and Marfona occurred in the fourth instar, whereas a greater proportion of mortality occurred in early instars on Satina and Sabalan. Intrinsic rates of increase (r_m) were 0.129 ± 0.005 , 0.127 ± 0.005 , 0.129 ± 0.006 and 0.104 ± 0.004 , on Agria, Marfona, Satina and Sabalan, respectively, that on Sabalan being significantly lower than the others. The highest net reproductive rate was 145.26 ± 25.23 on Marfona and the lowest was 81.18 ± 2.71 on Sabalan. The longest generation time was 42.72 ± 0.71 d on Sabalan and the shortest was 35.99 ± 0.8 d on Agria. Thus, the Sabalan cultivar demonstrated the highest level of antibiosis against CPB, resulting in the poorest overall biological performance of the beetle, but the level of resistance did not appear sufficient to negate the need for other control methods.

Key words: Colorado potato beetle; potato variety; life table; mortality

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0224. Impact of constant temperatures on the progeny production of *Trichopria* sp.

Veena. N*¹ and Manjunath D²

1. Forest Wood Protection Division, Institute of Wood Science and Technology,
Malleswarm, Bangalore-560 003 (India).

2. Department of Studies in Sericulture Science, University of Mysore, Manasagangotri,
Mysore-570 006 (India)

Trichopria sp. is an indigenous, gregarious, endo-puparial parasitoid of the tachinid fly, *Exorista bombycis* (Louis) (Diptera: Tachinidae). Preliminary laboratory investigations on the biology and behavior of the parasitoid have indicated that it has the potential to serve as a biocontrol agent of *E. bombycis*. Currently, the parasitoid causes 10-20% reduction in yield of cocoons produced by the silkworm, *Bombyx mori*, following parasitism of the host larvae in the south Indian states of Karnataka, Andhra Pradesh and Tamil Nadu. The current investigation was taken up to understand the impact of constant temperatures on the progeny production of *Trichopria* sp. by allowing 2 day-old (2D) parasitoid females to parasitize 3D puparia of *E. bombycis* at a wasp:host ratio of 1:4 at 10-35°C at an interval of 5°C. Attempts were also directed to estimate the minimum and maximum threshold temperatures as well as the optimum temperature required for the parasitoid development. After eclosion of the parasitoid adults, data on the rate of parasitism, developmental period, brood allocation, progeny production, and sex ratio were recorded. The results showed that no parasitism of host puparia was observed at 10, 15, and 35°C as evidenced by non-emergence of the parasitoid progeny. The rate of parasitism was identical at 20, 25, and 30°C. The parasitoid developmental duration decreased with increase in temperature from 20 to 30°C and it varied significantly among the treatments. The parasitoid progeny produced at 25°C was significantly higher than that at the rest of the treatments where the results were comparable. There was a significant variation in the progeny sex ratio among the treatments, which was maximum at 25° C. The estimated minimum and maximum threshold temperatures and the optimum temperature required for the development of *Trichopria* sp. stood at 17.4°C, 31.44°C, and 24.80°C, respectively.

Key words: *Exorista bombycis*, Parasitism, Progeny production, Sex ratio, Temperature, *Trichopria* sp.

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0225. Survey of mosquito larvae and copepods from different standing water bodies of Punjab, India

**Megha Kansal¹, Devinder K Kocher¹, Shreya Jamwal¹,
Dapinder K Bakshi²,**

¹Punjab Agricultural University, Ludhiana, Punjab, India, ²Punjab State Council for Science & Technology, Chandigarh, India

Mosquitoes act as vectors for several diseases including malaria, yellow fever, dengue, filariasis and chikungunya, to name a few. Standing water bodies like ponds, marshes, paddy fields and man-made reservoirs are such aquatic systems which act as breeding grounds of mosquitoes and thus responsible for the spread of mosquito borne diseases. Continued use of pesticides for mosquito control is a common practice, but it tends to generate chemical resistance in addition to seriously harming the environment. Certain controphic species like copepods (a type of zooplankton) are capable of reducing the mosquito larval population effectively by predation. So as to find out the occurrence of such copepod species co-existing with mosquito larvae in the local environment, a survey was conducted at three districts of Punjab namely Bathinda, Muktsar and Ludhiana (three villages from each district). The water samples were collected from village ponds, fish ponds and paddy fields at all these selected locations and were analyzed for the presence of copepods and mosquito larvae. Only one type of mosquito larvae i.e. *Culex* was found in water samples collected from all the standing water bodies during the months of June and July, 2013. Maximum number of *Culex* larvae were observed in water samples collected from fish ponds > village ponds > paddy fields. Three orders of copepods were observed from water samples i.e. Calanoida, Cyclopoida and Harpacticoida and the copepod count was found to be maximum in fish ponds followed by paddy fields, however no copepods were observed in the village ponds. Present study revealed the co-existence of copepods and mosquito larvae in the same habitat i.e. in fish ponds and paddy fields under local conditions of Punjab and further testing of predatory potential of these copepods against mosquito larvae needs to be carried out in the state in future.

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0226. Interruption of malaria transmission with selective and targeting introduction of Long-Lasting Insecticidal Nets (LLINs) in a low malaria transmission area in Sri Lanka.

**M. R.S.S. Bandara¹, D. R. Widanapathirana¹, P. G. Amarasinghe², S. D. Darmarathne²,
A. S.B. De Alwis³**

¹ *Regional Office, Anti-Malaria Campaign, Kurunegala, Sri Lanka*

² *Faculty of Medicine, University of Peradeniye, Sri Lanka*

³ *Education, Training and Research Unit, Ministry of Health, Sri Lanka.*

BACKGROUND :

Interruption of malaria transmission in areas with low-transmission is a challenge for malaria control. This study aimed to assess the impact of selective and risk-targeting use of LLINs on malaria transmission in Medical Officer of Health area, Polpithigama, Kurunegala District, Sri Lanka.

METHODS:

A community-based survey was conducted to investigate the LLIN acceptance and usage. The proximity of houses to the vector breeding source was found as the major risk factor for malaria transmission. The family size LLINs treated with 5% Deltamethrin (Permanet[®]) were distributed in 880 houses in 2005. A river, running across the area was the major vector breeding site. A simulation study was performed based on the pre-intervention Malaria Incidence Rates (MIR) for giving LLINs to only houses located within 500 m from the river. Indoor and outdoor Human Landing Collection Rates (HLCRs) were carried out during the study.

RESULTS:

The malaria risk is 2.7 times higher in houses located within 500 m to the water source than houses located further away. The community acceptance for LLINs was 91% and the average usage was 80.3%. The reduction of MIR was 73.4% in the total study area after one year use of LLINs. The simulation study showed that if LLINs were distributed only to houses located within 500 m to the river, the reduction of MIR would have been by 72.5%. Net saved percentage with the simulation was 32%. The HLCR was significantly ($P < 0.05$) reduced in the study area.

CONCLUSION:

The selective and targeting introduction of LLINs has an encouraging impact on LLIN acceptance, usage and a vector control strategy when resources are limited.

KEY WORDS: Long-Lasting Insecticidal Nets, Selective & targeting introduction, Low malaria transmission

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0227. Feeding performance of *Leptinotarsa decemlineata* (Say) (Coleoptera: Chrysomelidae) on different potato cultivars

Forough Bidar, Bahram Naseri and Gadir Nouri Ganbalani

Department of Plant Protection, Faculty of Agricultural Sciences,
University of Mohaghegh Ardabili, Ardabil, Iran.

The Colorado potato beetle, *Leptinotarsa decemlineata* (Say), is one of the key pests of potato in Iran and many other parts of the world. Feeding performance of the last instar larvae of *L. decemlineata* was studied, according to the wet weight, on six potato cultivars including Khavaran, Savalan, Luta, Santa, Sante and Aula under laboratory conditions ($25 \pm 1^\circ\text{C}$, $65 \pm 5\%$ RH, and a 16:8 h light-dark photoperiod). The larval weight of *L. decemlineata* was the highest on cultivar Luta (0.182 ± 0.002 gr) and lowest on cultivar Khavaran (0.129 ± 0.003 gr). The highest efficiency of conversion of ingested and digested food was on cultivar Luta (33.13 ± 4.53 and 43.44 ± 5.99 %, respectively) and lowest was on cultivar Sante (10.21 ± 1.07 and 10.27 ± 1.08 %, respectively). The value of relative growth rate was the highest on cultivar Luta (0.044 ± 0.001 gr/gr/day) and lowest on cultivar Sante (0.030 ± 0.001 gr/gr/day). The results indicated that Sante was the most unsuitable cultivar for *L. decemlineata* feeding as compared to the other cultivars.

Key words: *Leptinotarsa decemlineata*, feeding indices, potato cultivar

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0228. Taxonomy of Tree Termite *Nasutitermes matangensis* Haviland (Isoptera: Termitidae) Based on Morphological Characters and Enteric Valve Armature in Sebesi Island

Eko Kuswanto¹,

¹IAIN Raden Intan Lampung, Bandar Lampung, Indonesia

Termite surveys in Sebesi Island, Lampung Province, Indonesia (5°56'50" South and 105°29'15" East) yielded 174 nests of tree termite *Nasutitermes matangensis* Haviland (Isoptera: Termitidae). This higher termite species hosted and builded their nests on 19 species of trees. Measurements on morphological characters of imago (reproductive caste) of *N. matangensis* showed data as follow: head length to tip of labrum 1.60 – 1.67 mm, head length to side base of mandibles 1.21 – 1.29 mm, head width (with eyes) 1.60 – 1.67 mm, long diameter of eye 0.56 – 0.59 mm, shor diameter of eye 0.53 mm, eye from lower margin of head 0.09, ocellus length 0.10 – 0.13 mm, ocellus width 0.19 – 0.21 mm, ocellus from eye 0.06 mm, pronotum length 0.67 – 0.76, and pronotum width 1.29 – 1.30 mm. Morphological characters of soldier caste of *N. matangensis* showed data as follow: head length with rostrum 1.62 – 1.86 mm, head length without rostrum 0.87 – 1.03 mm, rostrum length 0.62 – 0.91 mm, rostrum-head index 0.62 – 0.98 mm, head width 1.12 – 1.24 mm, head height 0.72 – 0.83 mm, pronotum length 0.21 – 0.26 mm, and pronotum width 0.56 – 0.61 mm. Observation on enteric valve armatures of worker castes showed its shape irregularly and spiny

0229. Taxonomy, Distribution, and Notes on Termites (Isoptera: Kalotermitidae, Rhinotermitidae, Termitidae) from Urban Environment of Bandung City

Eko Kuswanto¹, Rudolf H. Scheffrahn², Intan Ahmad¹, Ramadhani E. Putra¹, Idham S. Harahap¹, Amran Amran¹, Sobri Sobri¹,

¹School of Life Sciences and Technology, Institut Teknologi Bandung, West Java, Indonesia,

²Fort Lauderdale Research and Education Center, University of Florida, Florida, USA,

³Department of Plant Protection, Institut Pertanian Bogor, West Java, Indonesia

Termite surveys of 30 districts in urban environment in Bandung City from March to December 2012 yielded 163 of 425 spots attacked by termites. Five species from three families and five genera were recorded as follows: *Cryptotermes dudleyi* Banks (Kalotermitidae); *Coptotermes gestroi* Wasmann (Rhinotermitidae); dan *Ancistrotermes pakistanicus* Ahmad, *Macrotermes gilvus* Hagen, and *Odontotermes javanicus* Holmgren (Termitidae). *Cr. dudleyi* is described from soldier and imago. Four another species are described from soldier and worker. Worker from three species of Temitidae also were observed the enteric valve armatures. *Cr. dudleyi* and *M. gilvus* is distributed widely in urban environment of Bandung City and become a potential pest to buildings. *Co. gestroi* is only found in one district (Kecamatan Lengkong) but for future it would be potential pest to the other districts.

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0230. Physiological and Biochemical evaluation of *Jatropha curcas* for high yield and oil quality in Assam environment

S. P. Saikia¹, S. Mapelli², P. R. Bhattacharyya¹,

¹CSIR-North East Institute of Science & Technology, Jorhat - 785 006, Assam, India,

²CNR-Institute of Agricultural Biology and Biotechnology, 20133, Milan, Italy

Jatropha curcas, is a soft wooded shrub with high adaptability due to its phenotypic plasticity and potential to grow under arid and semi-arid conditions. In pharmaceutical, industrial or agricultural perspective, similar to other oil seed plants, *J. curcas* are also rich sources of phytochemicals. In India, *J. curcas* had also recently promoted interest as one of potential source to reduce dependence on crude oil. However, knowledge concerning genotype, phenotype and environmental interaction are limited. In the present study the magnitude of phenotype growth, oil yield and quality of promising jatropha sources from India growing belt has been evaluated under Jorhat condition in Assam. After 36 months of field planting, significant differences were noticed among all accession tested in agronomical and physiological parameters. All those data let to reduce the number of jatropha accessions to continue the evaluation of genotypes suitable for local climate and environment. The yield and oil quality of accessions selected on the phenotype and agronomic performance have been evaluated. Free fatty acids (FFAs), triglyceride acid composition as well as the presence of phorbol esters and tocopherols are basic components indicating the oil quality. The oil yield varied between 22-35% of seed weight and, in general, the heaviest seeds have higher oil content. Oils are also characterized by different color, from light yellow to dark orange, probably reflecting different oxidative process or presence of different pigments. Indeed hexane extracted oil fraction shows a wide range, from 2 to 38%, of FFAs content and a low content of tocopherols. As expected also the phorbols are present in all oil samples in the range reported for jatropha. In triglyceride the polyunsaturated fraction is relatively modest and in general the FAs composition doesn't show wide changes between the jatropha accessions tested. The triglyceride composition doesn't seem to be the main factor that influences the oil value. Free FAs and phorbols seem to be more important factors for selection of better accessions. Furthermore a first integration of biochemical with physiological and agronomical data shows that, under the climatic condition of Jorhat, the accessions expressing the best performance in the field are also the best in oil yield and quality.

Key words: Genetic improvement, physiological–biochemical parameters, *Jatropha curcas*•

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0231. Taxonomy and biodiversity of lantern-flies (Hemiptera: Fulgoridae) in Vietnam

Pham Hong Thai^{1,*}, Jerome Constant²

¹Department of Insect Systematics, Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology (VAST), 18 Hoang Quoc Viet St, Hanoi, Vietnam

²Royal Belgian Institute of Natural Sciences, Department of Entomology, Vautier street 29, B-1000 Brussels, Belgium

The researching on taxonomy and biodiversity of lantern-flies in Vietnam is in its primary stage. The Vietnamese lantern-flies fauna and its distributional pattern in relation to forest ecosystems and environmental conditions are still poorly studied. Past research has just documented a list of about 24 species of lantern-flies from Vietnam. The present study aims to provide the available information on the taxonomic review of Vietnamese lantern-flies. According to previous reports, the number of lantern-flies species known from Vietnam is 28; these represent 8 genera. Five additional species are here recorded for the fauna of Vietnam for the first time: *Aphaena aurantia* (Hope, 1840), *Aphaena submaculata* (Hope, 1840), *Limois westwoodi* (Hope, 1843), *Pyrops atroalba* (Distant, 1918), *Pyrops itoi* (Saito & Nagai, 1994). There are three species known only from Vietnam: *Polydictya johannae* Lallemand, 1956, *Polydictya vietnamica* Constant & Pham, 2008, *Pyrops condorina* (Lallemand, 1960). Areas of high lantern-flies diversity in Vietnam can be determined from the summary showing collection records at the species level. Table 1 shows that 13 species (46.43%) have been found almost exclusively in forests from the North to the South; 7 species (25%) occur in the North but not in the other areas; 1 species (%) occur in Central but not in the other areas; 6 species (%) occur in South but not elsewhere; and 1 species (3.57%) are widely distributed in the North and Central. The species *Lycorma delicatula* (White, 1845) recorded only as from Indochina and we consider the locality information specifically.

Key words: Hemiptera, lantern-flies, fauna, distribution, Vietnam.

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0232. Identification of long noncoding RNAs (lncRNAs) involved in immune response during baculoviral infection in *Bombyx mori*

Satyavathi Valluri¹, Srividya Subramanian¹, Rupam Ghosh¹,

¹Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India

The silk production worldwide is hampered by *B. mori* nucleopolyhedrovirus (BmNPV) which causes up to 50% silk cocoon crop loss. Effective treatment against the virus has been elusive due to its sturdy nature and the lack of control strategies. Long noncoding RNAs (lncRNAs) are emerging as key regulators of many basic cellular pathways during viral infection. Several lncRNAs are found to be selectively expressed in silkworm upon BmNPV infection, but little is known about their functional role. In this study, we identified putative lncRNAs from cDNA libraries derived from midgut and fat body tissues of BmNPV infected fifth instar larvae of resistant (SBNP1) and susceptible (CSR2) silkworm strains using bioinformatic tools. Semi-quantitative RT-PCR indicated differential expression of some lncRNAs. Out of lncRNA1, lncRNA3 and lncRNA4, lncRNA4 has been detected only in CSR2 strain which showed high expression at 48 and 96 hpi. We observed that the expression of lncRNAs and immune genes (*Tolls* and *Serpins*) followed a similar trend. Further work involving FISH and RNA interference mediated knockdown assays to establish the role of lncRNAs in regulation of immune genes in silkworm will be discussed.

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**0233. TAXONOMY OF PHILIPPINE STINGLESS BEES OF THE
GENUS *TETRAGONULA* MOURE (HYMENOPTERA:
APIDAE: MELIPONINI)**

AMELIA R. NICOLAS

Department of Entomology, Crop Protection Cluster, College of Agriculture, University of
the Philippines Los Baños (UPLB), Los Baños, College, Laguna 4031

Despite the apparently high ecological, environmental and economic potential of many stingless bee species, taxonomists have given less attention to this insect group over the years and thus only a few of its genera are relatively well-known. In the Philippines, the largest and most diverse genus *Tetragonula* Moure has not been studied and reviewed for more than half a century now, hence, this study. Eight new species are described; 2 new records are reported; and 1 previously recorded species is re-described using workers and their queens are described for the first time. Descriptions of 4 other old records have been improved by using new morphological characters of taxonomic importance in the recognition and separation of these species. The number of known species has increased from 5 to 15. The species in the said genus are revised and descriptions as well as identifications keys are provided. Phylogenetic models based on cladistic analysis of morphological characters are constructed. The genus is further confirmed as a monophyletic group and three species groups are formed. A classification system based on morphometric data including nest morphology is established. The results of both morphometric study (phenogram) and cladistic analysis (cladogram) are generally consistent with previous studies using molecular approach. The present study is the pioneering and comprehensive work on meliponines in the country.

Key words: *Tetragonula*, stingless bees, pioneering, monophyletic, nest morphology, phenogram, cladogram

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0234 . Species diversity indices of insects associated with stored cocoa beans in Southwestern Nigeria

¹Oyedokun A.V. and ²A.A. Omoloye

¹Entomology Section, Cocoa Research Institute of Nigeria

²Department of Crop Protection and Environmental Biology, University of Ibadan, Nigeria

Cocoa bean is the main component of chocolate and other cocoa-based candies. The flavor and other quality parameters of cocoa can be reduced by insect infestation. Hence, this study assessed the insect species diversity of stored cocoa beans at ninety days in store.

Sixty-four warehouses/storage bins from sixteen randomly selected cocoa producing communities in four Southwest States, Nigeria were surveyed for insects associated with stored cocoa beans in two years using standard indices to identify species diversity and Evenness (E). The experimental design was a Completely Randomized Design with four replications, and at tropical ambient temperature $27\pm 3^{\circ}\text{C}$ and $70\pm 5\%$ relative humidity. Eleven insect species comprising five primary insect pests- *Ephestia cautella* and *Coccyra cephalonica*, *Lasioderma serricorne*, *Ahasverus advena* and *Carpophilus obsoletus*, one secondary insect pest-; *Tribolium castaneum*, one egg predator – *Tapinoma melanocephano*, and five parasitoids – *Habobracon hebetor*, *Theocolax elegans*, *Chelonus oculator* and *Bracon sp.* were found to be associated with stored cocoa beans in Southwest Nigeria. *Ephestia cautella* was the most persistently occurring (6.00 ± 0.82 - 28.00 ± 3.43) across locations while *T. castaneum* was the most abundant (8.00 ± 1.83 - 46.50 ± 4.32) at 90 days in store. The species diversity indices of all the emerged insect species from the studied sites at 90 Days after Sample Collection (DSC) showed that there were minimum six taxa of different species with varied number of individuals per location. The level of dominance (D) ranged between 0.31 and 0.52 while evenness ranged between 0.79 and 0.99 from across locations, indicating that the number of individuals encountered was not evenly distributed among the species. Diversity indices of the species of insects also showed Shannon index ranged between 0.67 and 1.07 from all locations indicating a low degree of predictability of the next organism to emerge with chances of species crossing path very high and sparse distribution of the species in Southwestern Nigeria at 90 DSC. Stored cocoa beans require pre-export treatment to rid the produce of these insect species that can reduce the quality and quantity of cocoa beans for export and thereby reducing earnings in cocoa value chain

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0235. Palm Borers in the Iraqi Environment

Mohammed Zaidan Khalaf¹, Mohammed Mahdi Mazaal Al-Derawie²,
FalahHnash Naher¹, HussainFadhel Al-Rubeae¹ and Shaker Al-Zaidi³

¹Agricultural Research Directorate, Ministry of Science & Technology,
P.O.Box765,Baghdad, Iraq

²Basra Agriculture Directorate, Basra, Iraq³Russell IPM Ltd, United Kingdom

Field surveys were conducted to investigation about palm borers types in Iraqi environment during 2011-2013. Which included palm orchards in Baghdad, Wasit, Middle Euphrates and Basra provinces. We used for this purpose : Hand collection, light traps, Pheromone traps and dissect palm trees using saw robot. Results of field surveys and classification by AngleaMarmont Centre for UK Biodiversity, British Natural History Museum were presence six borers attacking date palms in Iraq and caused highly damage, These borers included the following types:

- 1- Frond borer, *Phonapatefrontales*
- 2- Long horn stem (trunk) borer, *Jebusaeaeammerschmiditi* Reich.

And four borers belonging to genus *Oryctesspp*

- 1- Fruit stalk (bunch borer), *Orycteselegans*Prell
- 2- Root borer, *Oryctesagamemnon*Burmeister(First record in Iraq)
- 3- Arabian rhinoceros beetle, *Oryctesagamemnonarabicus*Fairmaire
- 4- *Oryctesagamemnonmatthiesseni*Reitter

The presence variation of these species and population density by planting area and spread of date palm trees in Iraq. Results of this study will be reflected on all future research and control programs of date palm borers.

Key words: Borers, Date palms, Field survey, Classification, Iraq

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0236. Photosynthetic activity of delayed sown canola, *Brassica napus* L. varieties under the aphid infested and aphid free conditions in Southern Punjab, Pakistan.

Muhammad Razaq¹, Gul Abbas¹, Muzammil Farooq¹, Muhammad Aslam², Habib-ur-Rehman Athar¹,

¹Bahauddin Zakariya University, Multan, Pakistan, ²COMSATS Institute of Information Technology, Mailsi Road, off Multan Road, Vehari, Pakistan

Canola, *Brassica napus* L. is an important oil seed crop of the world as well as Pakistan. The crop is attacked by a number of insect pests among which cabbage aphid, *Brevicoryne brassicae* L. and turnip aphid, *Lipaphis erysimi* (Kalt.) are responsible for causing heavy yield losses, especially in Southern Punjab of Pakistan. We determined seasonal activity of aphids and their effects on different photosynthesis parameters including photosynthetic rate, water use efficiency transpiration rate, total internal CO₂ and chlorophyll contents on five cultivated varieties in Multan during 2010-11. Five canola varieties viz. Shiralee, Parola, Dunkland, Punjab and Rainbow were sown on 26th November 2010 using recommended seed rate. Treatments (varieties) were arranged in a randomized block design with three replications. Each treatment was divided in to two parts, imidacloprid was applied on one part on weekly basis from initiation of aphids for keeping the crop aphid free while other part was left untreated to observe aphid infestation under natural conditions. Aphid population was noted at weekly intervals starting from appearance of aphid on the crop until the maturity. Peak aphid population was observed on the 12th March, 2011. Numbers of aphids were significantly different on two sampling dates out of five in the tested varieties. Aphid infestation reduced chlorophyll contents but did not result in significant reduction in photosynthetic rate, water use efficiency transpiration rate and total internal CO₂. No differences were observed across the varieties for all photosynthetic parameters in aphid infested as well as aphid free treatments, except that of chlorophyll contents were significantly higher in aphid protected plants of Parola and Punjab varieties.

0237. Preferential landing and engorging sites of *Culicoides* species on a bait horse

A.M.Rashed

Department of parasitology, University of Tripoli, Libya

As a part of a project examining the aetiology of sweet itch ,a study on landing and engorging sites of midges was made. A total of 7696 midges were collected throughout the study. Ten species landed of which eight engorged. Although landing and engorging occurred in the three regions studied, the dorsal region was the most attractive. Species belong to the obsoletus group were the most numerous species representing 85.68% of those landing and 81.46% of midges engorging. *Culicoides pulicaris* represents 9.82% of the midges attracted to the bait and 13.35% of those engorged. It was found that 49.6% of midges landed engorged.

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0238. Role of Adsee AB 650 in management of sucking pests in cotton crop

Dewa Ram Bajya¹, Hemant S Baheti¹, S K Raza¹,
Institute Of Pesticide Formulation Technology, Gurgaon, India

After introduction of transgenic cotton in India, sucking pests have gained significant importance and are major limiting factors in cotton production. The field experiment was conducted during *Kharif* 2012-13 at research farm of Institute of Pesticide Formulation Technology, Gurgaon, to check the role of adjuvant (Adsee AB650) an improving insecticidal activity of imidacloprid 17.8SL and thiamethoxam 25WG for management of sucking pests in cotton crop. The experiment was laid in randomised block design (RBD) with nine treatments viz., imidacloprid 17.8 SL at 25.0 g a.i. ha⁻¹, imidacloprid 17.8 SL+ Adsee AB 650 at 25.0 g a.i. ha⁻¹+5.0 ml/ 15 litre of water, imidacloprid 17.8 SL+ Adsee AB 650 at 25.0 g a.i. ha⁻¹+10.0 ml/ 15 litre of water, thiamethoxam 25 WG at 25.0 g a.i. ha⁻¹, thiamethoxam 25 WG+ Adsee AB 650 at 25.0 g a.i. ha⁻¹+5.0 ml/ 15 litre of water, thiamethoxam 25 WG+ Adsee AB 650 at 25.0 g a.i. ha⁻¹+10.0 ml/ 15 litre of water, Adsee AB 650 at 5 & 10 ml/15 litres of water and untreated control, replicated thrice, using variety RCH 317 of cotton. The insecticides with adjuvant (Adsee AB650) recorded lower population of whitefly (3.67 adults per three leaves per plant) and jassids (1.34 nymphs per three leaves per plant) as compare to imidacloprid 17.8SL alone (5.00 adults per three leaves per plant and 2.20 nymphs per three leaves per plant respectively). Similarly, thiamethoxam 25WG with Adsee AB 650 also recorded significantly lower population of sucking pests as compared to thiamethoxam 25WG alone. Whereas, Adsee AB650 alone was at par with untreated control indicating that there was no insecticidal activity of Adsee AB 650. T₂ and T₃ recorded 17.08 & 22.17 per cent more yield as compare to T₁ (14.34 q ha⁻¹). Further, T₅ & T₆ also recorded 14.73 & 24.94 per cent increase in yield over T₄ (13.91 q ha⁻¹). It is therefore, revealed that Adsee AB650 has synergetic effect when mixed with chemical pesticide.

Key words: Adjuvant, chemical control, management, sucking pests, cotton

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0239. Effectiveness of the Triple-Layer Hermetic Bag in Controlling *Prostephanus Truncatus* (Horn) (Coleoptera: Bostrichidae) and *Sitophilus Zeamais* (Mot) (Coleoptera: Curculionidae) on Stored Maize

**Jacob Paarechuga Anankware¹, Daniel Obeng-Ofori², Kwame Afreh-Nuamah²,
Francisca Aba Ansah²,**

**Kwame Nrumah University Of Science And Technology, Kumasi, Ghana, ²university Of
Ghana, Legon, Accra, Ghana**

Studies were carried out under laboratory conditions of 32 ± 2 °C and 58-88% r.h. to determine the effectiveness of the triple-layer hermetic bag against the Larger Grain Borer, *Prostephanus truncatus* (Horn) and the maize weevil, *Sitophilus zeamais* (Mot) on stored maize. Three storage bags (Triple-layer hermetic bag, Jute and Polypropylene) and three maize varieties (Obatanpa, Abrodenkye and Kamangkpong) widely cultivated in Ghana were used in the study. A factorial experiment was conducted involving 5 kg of each maize variety with moisture content between 12.5-14%. These were stored in the various bags and a destructive sampling of 54 bags (27 bags for each insect species) was done each month for a 6 month storage period. Percentage damage, weight loss, Oxygen depletion rate, mean development periods and insect numbers were determined. Frass produced and weight losses of the grains were used to determine the susceptibility of the various maize varieties to the insects. Viability tests were conducted to ascertain the particular type of bag that prolonged seed viability despite infestation by these destructive insect pests. Data loggers were used to continuously measure temperature, dew point and relative humidity in the various bags. Moisture content of each maize variety in each storage bag was also determined at each sampling time. The results revealed that both *S. zeamais* and *P. truncatus* could feed and breed on all three maize varieties. Mean grain damage and weight loss were significantly different ($p < 0.001$) in the different storage bags. The triple-layer hermetic bag recorded the least mean weight loss of 2.94% while jute and polypropylene bags recorded higher mean values of 19.55% and 23.65% respectively.

0240. Studies on mechanism of destruxin A against silkworm's hemocytes

Jiqiao Fan ¹, Xiurun Chen ¹, Chenglan Liu ¹, Liang Gong ¹,
Fengliang Jin ¹, Qiongbo Hu ^{1*}

South China Agricultural University, Guangzhou, China

Destruxin A, an important pathogenic factor isolated mainly from entomopathogenic fungus *Metarhizium anisopliae*, is a kind of cyclodepsipeptide compound and 39 analogues of destruxins have been found to date. Destruxin A has excellent insecticidal activity and pharmaceutical potency. To understand the molecular mechanism, we investigated the performance of destruxin A to silkworm (*Bombyx mori*) hemocytes and lymph by means of cell biological, proteomic and gene expression analysis technology. The results indicated that destruxin A was toxic to silkworm's hemocytes in vitro although in an extreme low concentration of 0.25 µg/mL hemolymph. After 24 h treated with destruxin A, 47 proteins in silkworm hemolymph were found significantly different expression, among them, 8 immunity-related proteins were up-regulated (C-type lectin 10 precursor, serine proteinase-like protein, paralytic peptide, PPO-1 and PPO-2) or down-regulated (antitrypsin isoform 3, p50 protein and calreticulin precursor). Furthermore, at 1, 4, 8, 12 and 24 h post-treatment, 10, 20, 18, 74 and 8 genes were recorded as significant up-regulation, while 0, 1, 8, 13 and 3 genes were found significant down-regulation. These genes were annotated functions as immunity, resistance, cell apoptosis and signal transduction, etc.

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0241. Behavioral responses of whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae) on chilli plant affected by previous infestation and sexes

Khalid A. Saad¹, Mohamad Roff, M. N², Mohd Shukri ², Razali Mirad², Mansour, S.A.A¹, Ismail Abuzid¹, Mohd Anifah. Y², and Idris, A. B¹

¹ Schools of Environmental and Natural Resource Sciences, Faculty of Science and Technology, National University Malaysia

²Horticulture Research Centre, MARDI Headquarters, Malaysia

The whitefly *Bemisia tabaci* (Gennadius) (Homoptera:Aleyrodidae) is important worldwide pest of vegetables. It is major vector of plant viruses that cause serious crop yield losses. Studies were conducted using Y-tube olfactometer assays to examine the behavioral responses of male and female *Bemisia tabaci* to the chilli plants previously infested by the same, opposite or mix sexes. Our results indicated that WF females was found to be significantly prefer the uninfested chili plants over previously infested chili either by their same or opposite sex. However, no significantly different in the number of males responded to the chili plant previously infested by same, opposite or mix sex, as compared with uninfested plants. This behavioral responses clearly explain that the female WF will try to lay egg only on uninfested host plant that provide more food than those previously infested hosts. Whilst, the male seem to visit host at random. The implication on IPM of WF is discussed

Key words: *Bemisia tabaci*; Chili; Y-tube olfactometer, sex, IPM

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0242. Domestication of Stingless bee: Best management practices in Taman Tropika Kenyir

Mohd Fahimee J³ Roziah G.² Muhammad Radzali M¹

, ¹MARDI, Serdang, Selangor, Malaysia, ²UMT, Terengganu, Malaysia

The pollen collected by species of *Trigona*; *T. itama*, *T. aripes*, and *T. collina* were studied at the Taman Tropika Kenyir Tasik Kenyir, from January to July 2013. The objectives of these study are to compare the domestication species of stingless bee and existing species in Taman Tropika Kenyir. Pollen loads were sampled from bee baskets of forager bees returning to their colonies using a random sampling. Pollen samples were prepared for analysis by acetolysis and some of the pollen identified using the microscope. In total, 813 pollen loads from bee baskets of forager bees were identified into 18 plant species of domestication tree such as *Lepisanthes fruticosa* and 37 plant of existing tree. *T. collina* was by far the most polylectic species collecting 29 plant species, while *T. aripes* foraged on 20 and *T. aripes* only 16. This suggests that the small *T. collina* is the most important pollinator among the existing species. However domestication of stingless bee (*T. itama*), showed the best pollinator for planted tree in Taman Tropika Kenyir.

Keywords: *Trigona itama*, food security, pollination

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**0243. A Preliminary Checklist of Pollen Collected by Stingless Bees
(Hymenoptera: Apidae: *Heterotrigona Itama*) In Taman Tropika Kenyir
(Ttk), Terengganu, Malaysia**

**Roziah Ghazi¹, Mohd Fahimee Jaafar², Wahizatul Afzan Azmi¹, Nurol Badriah
Hassan³,**

¹Department of Biological Sciences, Faculty of Science and Technology, Universiti Malaysia
Terengganu, 21030 Kuala Terengganu, Terengganu, Malaysia,

²Strategic Resources Research Centre, MARDI Headquarters, Serdang, PO Box 12301,
50774, Kuala Lumpur, Malaysia,

³Pharmacology and Pharmacy Departments, Universiti Sains Malaysia, 16150 Kubang
Kerian, Kelantan, Malaysia

Currently, the numbers of the most common pollination agent, *Apis mellifera* are declining rapidly, causing global concern for pollination services. Fortunately, Malaysia is also rich with native pollinators such as stingless bees. Stingless bee is one of the most important pollinators in tropical and subtropical regions which forage on plants such as forest trees, herbs, grasses and plantation trees. The main objective of this study was to identify the pollen collected by stingless bees (*Heterotrigona itama*) from April to July 2013 in the island called Taman Tropika Kenyir (TTK), Kenyir Lake Terengganu. From the current study, a total of 23 species of the pollens were successfully identified. The identified pollen were *Muntingia calabura*, *Averrhoa bilimbi*, *Averrhoa carambola*, *Bauhinia* sp., *Syzygium* sp., *Passiflora edulis*, *Rhodomyrtus tomentosa*, *Melastoma malabathricum*, *Garcinia pruriens*, *Erioglossum rubiginosum*, *Capsicum* sp., *Mimusops elengi*, *Cosmos caudatus*, *Coffea* sp., *Cleome* sp., *Ruellia* sp., *Neomarica longifolia*, *Ardisia elliptica*, *Baccaurea lanceolata* and *Ameschotolype graefthii*. This study shows that stingless bees are one of the important pollination agents for tropical rainforest.

Keywords: *Heterotrigona itama*, pollination agent, tropical rainforest, Taman Tropika Kenyir.

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0244. Evaluation Of Effect Of Consumption Of Termites (*Macrotermes Subhylanus*) On Biochemical And Haematological Profile Of Male Albino Wistar Rats.

Oguwike Francis N

Department of Physiology, Anambra state University Uli, Anambra State.

Regardless of their well known role as pest, termites (*Macrotermes subhylanus*) are consumed as part of traditional diet (Kinyuru 2009) in Igbo region of Nigeria West Africa. The haematological and biochemical response to the administration of salt seasoned fried termites were evaluated. Sixty male albino rats of weight (180g-200g) were used in the study. They were randomly divided into three groups viz A, B, and C. Group A animals served as the control group. Group B were fed with high dose of the termites while group C were fed with low dose. All treatments were for twenty-eight days acute study. Biochemical and haematological analysis were performed with blood samples collected from the animals with cardiac puncture. Results showed that *M. subhylanus* increased. Haematological concentration (14.8 ± 2.05), packed cell volume (44.0 ± 4.2) platelet count ($220 \pm 65 \times 10^9/l$) and WBC total count ($5,200 \pm 160/mm^3$) in test animals compared with their corresponding controls. The biochemical analysis also showed increased levels in protein ($51 \pm 1.0\%$) iron ($13.06 \pm 0.6mg/100ml$) and lipid content ($66.50 \pm 0.22\%$) in test animals compared with their corresponding controls. It could be deduced from this study that the salt seasoned fried meal of *M. subhylanus* (termites) encourages selective haemopoiesis and is well tolerated

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0245. Mosquito Fauna, Abundance, Distribution and Seasonal Activity of the Genus *Anopheles* (Diptera: Culicidae) in Aligoudarz County (Luristan Province, Western Iran)

Hamid Amani¹, Mohammad-Reza Yaghoobi Ershadi², Hamid Kassiri³,

¹Luristan University of Medical Sciences, Azna Health Center, Azna, Luristan, Iran,

²Tehran University of Medical Sciences, Health School, Tehran, Tehran, Iran,

³Ahwaz Jundishapur University of Medical Sciences, Health School, Ahwaz, Khuzestan, Iran

Mosquito – borne diseases are a major public health threat in the world, including Iran. Considering the role of *Anopheles* in transmission of the malaria, this investigation was undertaken to determine fauna, distribution, frequency and monthly activity of *anopheline* larvae in Aligoudarz county. To study anopheline mosquitoes fauna and ecology in seven rural districts, namely, Zellaghi – Sharghi, Zez – Sharghi, Farsesh, Pishkoh – Zellaghi, Mahrou, Pachelak – Sharghi and Borbrood – Sharghi, this descriptive research was carried out during April to December 1997. Sampling for anopheline Larvae was done using standard dipping method. The mosquitoes Larvae were caught from Larval habitats every fifteen days. The Larvae for each habitat were placed separately in test – tubes and transferred to the Laboratory. All III and IV instars of Anophelinae subfamily were preserved in Lactophenol solution and later identified into species using a Microscope. In total, 9620 mosquito specimens from 115 breeding sites in 22 villages were collected. Eight species were identified: *Anopheles superpictus* (93.18%), *A. turkhudi* (2.84%), *A. maculipennis* (1.99%), *A. marteri sogdianus* (0.61%), *A. dthali* (0.45%), *A. Sacharovi* (0.35%), *A. claviger* (0.29%), *A. stephensi* (0.24%) and *A. apoci* (0.05%). *A. maculipennis*, *A. sacharovi*, *A. stephensi* and *A. dthali* are reported for the first time in this county. *A. superpictus* was the most frequent and distribution anopheline mosquito collected at the Aligoudarz. Anopheline larvae started to appear in late May or mid June and ended in mid November in the breeding places of Zallaghi – Sharghi and Zez – Sharghi districts. The curve of activity has only one peak in the second half of August

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0246 . **Effect Of Plant Leaves On Red Flour Beetle**

Md. Mizanur Rahman¹,

¹The Office of Upazilla Nirbahi Officer, Mongla, Bagerhat, Bangladesh

Sustainable agriculture means a productive agriculture that uses and conserves natural resources. We need to be proactive against the use of toxic chemicals. Foliages of some plant species having insecticidal properties can be used for storing the grains like rice without being toxic to pets and humans. Dried leaves of ten plant species: Neem (*Azadirachta indica*), Malabar Nut (*Adhatoda zeylanica*), Knotweed (*Hydropiper polygonum*), Chaste Tree (*Vitex Negundo*), Jimson Weed (*Datura stramonium*), Pennywort (*Centella asiatica*), Bush Morning Glory (*Ipomoea carnea*), Onion (*Allium Cepa*), Garlic (*Allium sativum*) and Turmeric (*Curcuma longa*) were tested against Red Flour Beetle (*Tribolium castaneum*). The results showed that all of the tested leaves had repellent and lethal effects against this pest comparing to untreated rice. In every case 5-cm thick layer of dried leaves were kept on the uppermost surface of the pots. Neem leaf was the most effective in terms of mortality and repellency against the insect, where turmeric leaf was the least. Uses of plant leaves for organic agriculture can be considered a new paradigm in agriculture sector.

Key words: Rice, toxic, lethal, repellent, mortality

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0247. The Ecology and Larval Habitats Characteristics of Anopheline Mosquitoes (Diptera: Culicidae) in Aligoudarz County (Luristan Province, Western Iran)

Hamid Amani¹, Mohammad-Reza Yaghoobi Ershadi², Hamid Kassiri³,

¹Luristan University of Medical Sciences, Azna Health Center, Azna, Luristan, Iran,

²Tehran University of Medical Sciences, Health School, Tehran, Tehran, Iran,

³Ahwaz Jundishapur University of Medical Sciences, Health School, Ahwaz, Khuzestan, Iran

In throughout the world as well as Iran. Some of the *Anopheles* mosquitoes are vectors of malaria disease. Thus, bionomics data are significant to control the disease. This study aims to determining ecology and characteristics of the larval habitats of the genus *Anopheles* (Diptera: Culicidae) in Aligoudarz County. This descriptive cross-sectional research was carried out to study the anopheline larvae ecology in seven rural districts, Aligoudarz county, during April – December 1997. Larvae were captured using the dipping method. Larval breeding places characteristics were noted according to water situation (turbid or clean, stagnant or running), substrate type, site type (man – made or natural), sunlight situation, site situation (transient or permanent, with or without vegetation). A total of 9620 3th and 4th instar larvae of *Anopheles* from 115 breeding places in 22 villages were hunted, which belonged to the following species: *A. stephensi*, *A. dthali*, *A. apoci*, *A. superpictus* (types A and B), *A. marterii* sogdianus, *A. turkhodi*, *A. maculipennis* S.L and *A. claviger*. *A. maculipennis* S.L, *A. stephensi* and *A. apoci* were collected for the first time in this county. *Anopheles superpictus* (93.18%) was the most prevailed one and dispersed over the entire region. Larval habitats consisted of nine natural and three artificial larval habitats. The most important Larval habitats were river edges (54.8%), rice fields (12.2%) and grassland (8.7%) with permanent or transient, stagnant or running and clean water, with or without vegetation, sand or mud substrate in full sunlight area. In this article, the larval habitat characteristics of each species have been discussed.

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0248. Relationship Trend Analysis of of Cutaneous Leishmaniasis Prevalence and Climatological Variables in Shush County, South – West of Iran (2003 – 2007)

Hamid kassiri¹, Babak Shakarami², ¹Ahwaz Jundishapur

¹University of Medical Sciences, Health School, Ahwaz, Khuzestan, Iran,

²Ahwaz Jundishapur University of Medical Sciences, Shush Health Center, Shush, Khuzestan, Iran

Cutaneous leishmaniasis (CL) is a main health problem in different parts of Iran, which exists both in zoonotic and anthroponotic forms in various foci of the country . It is a vector borne disease transmitted by the bite of female sand flies (Diptera : Psychodidae) . The province of Khuzestan is one of the oldest foci for CL in Iran that has been located in the south-western part of Iran. The present survey was focused to find out the epidemiology of CL in Shush County between 2003 and 2007. The data of this descriptive-analytical cross-sectional study consisted the existing data regarding the prevalence of CL in different seasons, years, climatological factors and genders based on clinical symptoms and presence of amastigotes in Giemsa-stained smears which were registered in Shush County Health centers between 2003 and 2007

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0249. A Study on Prevalence of Scorpion Stings in Mahshahr County Khuzestan Province, Southwestern Iran

Hamid Kassiri¹, Mohammad Abdpanah¹,

¹Ahwaz Jundishapur University of Medical Sciences, Health School, Ahwaz, Iran, Iran,

²Ahwaz Jundishapur University of Medical Sciences, Health School, Ahwaz, Iran, Iran

Scorpion sting is one of the major health problems in some parts of Iran, especially Khuzestan province, southwest Iran. It is necessary to conduct more complete studies on all aspects of this problem particularly epidemiology and treatment. This work was conducted to study the epidemiology of scorpion envenomation in Mahshahr County, southwestern Iran. This descriptive cross-sectional study was a case series research conducted during 2008-2009. Location of the study was Mahshahr County of Khuzestan province. All cases that came to the health services centers were entered to the study. Statistical analysis was performed using SPSS software. Around 135 cases were found in this county, during the study period. Nearly 65.1% of scorpion stings were male and 34.9% female. Most stings were occurred during seasons of summer (45.7%) and fall (39.5%). Most of the patients were in October (24.7%) and August (17.8%). The incidence of scorpion stings was found to be higher among those over 20 years. The highest victims were in age group of 21-30 years old (37.8%). This directs the attention to outdoor stings. Housewives were under high risk for envenomation (28.3%) than those of farmers and workers (26.5%). Based on the results of this research, scorpionism is of clinical importance in this area, and public awareness and physician readiness along with the accessibility to effective antivenom significantly reduce scorpionism in this area.

Key words: Epidemiology, Prevalence, Scorpion Sting, Iran.

0250. Scorpion Sting Envenomation in Gotvand County, Southwestern Iran

Hamid kassiri¹, Rahele Veis-Behbehani¹,

¹Ahwaz Jundishapur University of Medical Sciences, Health School, Ahwaz, Iran, Iran,

²Ahwaz Jundishapur University of Medical Sciences, Health School, Ahwaz, Iran, Iran

Painful scorpion stings are common throughout the tropics; however , fatal envenoming is frequent only in Mexico , Brazil ,Trinidad, parts of north Africa and the Middle East , and in India. In Khuzestan Province , a southwestern province of Iran , evenomation by scorpion sting is a major public health problem. This study was conduted to study epidemiological survey of scorpion envenomation in Gotvand County , during 2006 to 2009. In this study, data *were collected from health centers'* files in Gotvand region. A special scorpion sting sheet was prepared . This sheet contained information about the site of scorpion stung , the data and place of the accident , the age and sex of the injured , possible known species of the scorpion and etc. Data were analyzed using a SPSS computer Pacage. Cases were collected from health centers' *files* over 3 years. There were 1067 scorpion victims,44.1% of whom were from rural areas. Stings mainly occurred in summer (35.3%) and spring (32.2%) , respectively.The incidence rate of human scorpion sting in the county was 5.6/1000 inhabitants. The scorpions , responsible for the majority of stings in Gotvand County of Khuzestan Province were identified as 67.3% yellow and 20.2% black and 12.5% unknown colors. Most stings occurred throughout the year,however , the highest and lowest frequency occured in August (12.5%) and February (1.9%) , respectively. Around, 41.9% of stings were on the feet and 38.8% on the hands. Scorpionism in Gotvand County of Khuzestan province is a public health problem , which needs to be monitored carefully by the government.

Key Words: Scorpion Sting, Epidemiolog, Incidence Rate, Iran

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0251. Taxonomic Study Of *Nadranabaly*, 1865 (Coleoptera: Hrysomelidae: Galerucinae) From Sundaland

Zulfadli Mahfodz¹ and IzfaRiza Hazmi^{1,2}

¹Centre for Insect Systematics, Faculty of Science & Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor

²School of Environmental & Natural Resources Science, Faculty of Science & Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor

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Taxonomic study of the genus *Nadrana* (Coleoptera: Chrysomelidae: Galerucinae) were carried out by using 159 specimens from seven species. These specimens were examined from existing collections in the Centre for Insect Systematics, UKM and borrowed from other repositories named BMNH, CJB and NHRS. The specimens were collected from several areas in Peninsular Malaysia, Sabah, Sarawak and Indonesia. The two aims of this study were to study the taxonomic status based on morphology and genitalia characters; and to determine the species limit, provide a checklist and geographic distribution for all species of *Nadrana* Baly, 1865 from Sundaland. The morphological studies involve the morphometric measurements, inspection of the structure and colour of the head, thorax and abdomen. The male and female genitalia were examined as well. A set of figure was given for each of the species which encompasses the structure of habitus; male and female genitalia; and geographical distribution map. Description and key to species were provided from the characters examined. There was no major different in terms of the total body size, antenna, elytra and pronotum for all species; only colour variations were detected in those species. The structure of male and female genitalia from all the specimens examined showed moreless the same characters. This study has proved that all species remained under this genus and need not to be transferred to any other genus; thus answering the question from Wilcox (1973) about the taxonomic status of *Nadrana*. The taxonomic study of *Nadarana* that elaborating the genetalic characters in details has not been studied before. Therefore, it is hoped, this study would be a guideline and fundamental reference for further studies of *Nadrana* in the future.

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0252. Morphological Variability Of *Helicoverpa Armigera* Occurring In Different Regions Of Punjab, India

Arshdeep Kaur Gill¹, Ramesh Arora¹,

¹PAU, Ludhiana, India

In India *Helicoverpa armigera* is emerging as serious agent in restraining crop productivity as it occurs as a major pest in many economically important crops. The genetic plasticity of *H. armigera* is apparent in their ability to detoxify many synthetic insecticides in addition to the secondary plant metabolites present in their wide array of host plant species. Understanding the morphological and genetic variation among the *Helicoverpa/Heliothis* spp. populations occurring in different geographical conditions has become essential to understand the variation in their susceptibility to different insecticides and also to predict their spatial and temporal occurrence, as well as to devise effective management strategies. The present studies were undertaken to find out morphological variations in different populations of *H. armigera*/ *H. punctigera* infesting Egyptian clover in different regions of Punjab namely Gurdaspur, Ludhiana and Abohar. Sufficient number of larva, pupae and adults of different populations of *Helicoverpa armigera*/*H. peltigera* infesting Egyptian clover were collected from field and reared for one generation. Larvae, pupae and genitalia were examined under stereoscopic binocular microscope. Morphometry of the above structures was done by using ocular and stage micrometer. Data was statistically analysed using Mean \pm SD. Mean larval weight was found to vary from 232.9 to 475.1 mg across different regions. Ludhiana population recorded significantly heavier larvae and lighter in case of Abohar population. Details on their different aspects like larval weight, pupal weight and external male genitalia will be highlighted in the conference.

Keywords: *Helicoverpa*, larval weight, morphometry, male genitalia, variability

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0253. Prevalence of some medical insects and arachnids (lice, scabies) depending on records from the Ministry of Health in Kurdistan Region- Iraq.

Shamall Abdullah¹, wand Ali¹, Qaraman muhammed¹,

¹Salahaddin university, Erbil, Iraq

Health records from three governorates (Erbil, Sulaymaniyah and Dohuk) in Kurdistan region- Iraq were used to obtain the required data for pediculosis and scabies during 2009 from 86076 patients in which a total 5995 (6.96%) and 9828 (11.41%) patients were infected with pediculosis and scabies respectively. The overall prevalence with pediculosis and scabies in Erbil, Sulaymaniyah and Dohuk governorates were (14.28% and 14.66), (2.01% and 2.14%) and (1.47% and 20.94%) respectively. the infestation with *Pediculus humanus capitis* and *Sarcoptes scabies* showed monthly fluctuations, the *P. humanus* ectoparasite infestation appears in most months of the year ranged between 9.02% to 16.90% during May and December respectively, while the rates of infestation with the *S. scabies* was ranged between 11.31% to 16.40% during April and March respectively.

Key Words: prevalence, *Pediculus humanus capitis*, *Sarcoptes scabies* Kurdistan region, Iraq.

0254. Aspects of Biology and Control of *Cephonodes hylas* (Lepidoptera: Sphingidae) on *Coffea canephora*

Okelana, F.A., ¹A.V. Oyedokun, ²J.C. Anikwe and ¹O.M. Azeez

¹Entomology Section, Cocoa Research Institute of Nigeria, P.M.B.5244, Ibadan, Nigeria

²Department of Zoology, University of Lagos, Akoka, Lagos, Nigeria

The Oriental bee-hawk moth *Cephonodes hylas* L. is one of the major insect defoliators of robusta coffee, *Coffea canephora* in Nigeria causing quantitative damage to coffee plants. The larva stages of *C. hylas* is the economic stage that feeds massively on coffee leaves, tender shoot tips and new flushes, thereby stripping the coffee plants of the photosynthetic parts resulting in an immediate and direct yield reduction of coffee. This study assessed the developmental biology of *C. hylas* on coffee and some Rubiaceae plants as potential trap plants in control and management of *C. hylas*. Also some phytochemical profiles of coffee and the potential trap plants were evaluated as a basis for susceptibility of the hosts. Five other plants comprising *Gardinia ellis* and four *Ixora* species were identified as alternate host plants of the pest. Out of these plants, *C. hylas* completed its development only on *G. ellis* and its development and the larval sizes on it compared favourably well with those on robusta coffee. The mineral constituents of coffee and *G. ellis* followed the same trend whereas the *Ixora* species varied significantly ($P < 0.05$). Similarly, coffee and *G. ellis* had highest composition of Vitamin A compared to other Rubiaceae plants. *G. ellis* was therefore found to be the true alternate host plant of *C. hylas* while the four *Ixora* species fortuitous host plants.

Key word: *Oriental bee-hawk; defoliators; phytochemical; alternate host; fortuitous host*

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0256. “Valanga Nugget” High Protein, As An Alternative Animal Protein Society Fulfillment

Anti Ahsanti¹, Ridho Andika¹, Azizatul Ulfa¹

¹Universitas Gadjah Mada, Yogyakarta, Indonesia

Food and nutrition are closely linked with efforts to improve human resources. Availability of sufficient food for the entire population in an area can not be used as collateral will be avoiding the population of food and nutrition issues. It is because the aspect of consumption patterns or the balance between the contribution in kind of food consumed was also considered

Therefore an increase in protein consumption should be encouraged to be insufficient protein intake of the poor, one through diversification of high protein food. High protein food diversity can be developed by exploring the local potential in Indonesia, namely the processing of locusts. Most Indonesian people would be familiar with this food, in Gunungkidul example, people meet their protein requirements by eating grasshoppers. In addition to affordable, locusts are very easy to obtain in certain seasons. One of the products that can be processed is developed with the basic ingredients of locusts are grasshoppers nugget.

Grasshopper have nutritional composition per 100 grams of edible body parts include: energy of 170 kcal in raw grasshopper, grasshopper 420 on dry. Water content of as much as 62.7% on raw grasshoppers and locusts 7.0% on dry. Protein, fat, carbohydrates and fiber in raw grasshopper consecutive 26.8%, 3.8%, 5.5%, 2.4%. The content of protein, fat, carbs and fiber on dry grasshopper consecutive 62.2%, 10.4%, 15.8% and 2.4%. This component of much larger when compared to broiler meat. Based on data from the Center for Agricultural Products Industry (1983) broiler chicken meat contains protein, 23.40%, fat at 1.90% and 73.70% water.

Keywords: Grasshopper, Nugget, Protein,

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0257. The Toxicity of Organic Insecticides to Blackheaded Fireworm, *Rhopobota naevana* (Hbn) (Lepidoptera: Tortricidae) in Laboratory and Cranberry Fields

Franz Vanoosthuyse¹, Jean-Pierre Deland², Gérald Chouinard¹, Daniel Cormier¹,

¹Research and Development Institute for the Agri-Environment, St-Bruno, Quebec, Canada,

²Club environnemental et technique atocas Québec, Notre-Dame-de-Lourdes, Quebec, Canada

Blackheaded fireworm (BHFw) is the most important pest of organic cranberries, causing up to 95% harvest losses. BHFw control strategy in organic cranberries is solely based on the use of spinosad. In order to propose an alternative and to slow down the development of resistance to this insecticide, we estimated in laboratory and field conditions the efficacy of three insecticides approved for use in organic production: azadirachtin (AZA), *Bacillus thuringiensis* subspecies *kurstaki* (Btk) and, pyrethrin. Eight treatments were compared: 1) Btk (50.8 MUI/ha); 2) spinosad (87.4 g a.i./ha); 3) pyrethrin 30 (30 g a.i./ha); 4) pyrethrin 60 (60 g a.i./ha); 5) AZA 24 (24 g a.i./ha); 6) AZA 48 (48 g a.i./ha); 7) AZA 72 (72 g a.i./ha); 8) control (distilled water). In laboratory, insecticides toxicity was estimated on young (1st instar), medium (instars 2-3) and old (instar 5) larvae by providing them shoots dipped in insecticides. Mortality was observed 24 and 72 hours after treatments. In fields, three successive applications of each treatment were made with a manual pump back-pack boom sprayer at 6 - 9 days intervals. The BHFw population density was measured before treatment and the evaluation of fruit damage was done in mid-August. Laboratory and field trials gave similar results: spinosad and pyrethrin were the most toxic to all age groups of larvae in laboratory and resulted in the lowest damage rates in the field. Either in laboratory or in field, no difference was observed between pyrethrin 30 and pyrethrin 60. The results obtained with AZA 72 in the field were similar to those obtained with spinosad. The lack of efficacy of Btk to kill BHFw and reduce fruit damage is contradictory with its efficacy against other Lepidoptera. The difference between obtained and expected results deserves a more thorough investigation.

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0258. Comparison of pheromone lures with ethyl acetate and trap design for their attraction to red palm weevil, *Rhynchophorus ferrugineus* Olivier.

Saleh A. Aldosari and Polana S.P.V. Vidyasagar

Chair of Date Palm Research, College of Food and Agriculture Research, King Saud University, Riyadh, Saudi Arabia

The red palm weevil, *Rhynchophorus ferrugineus* Olivier is the key pest of date palm in Saudi Arabia for more than two decades. Among the important control methods is the use of food baited pheromone trapping to attract and kill both male and female adult weevils. The efficacy of two kinds of lures with and without ethyl acetate, a known kairomone was field tested. Ferrolure+ of Chem Tica with and without ethyl acetate captured an average of 4.4 and 11.6 weevils per trap per week, while Alpha lure with and without kairomone attracted 5.4 and 9.4 weevils/trap/week respectively. The addition of ethyl acetate significantly improved the weevil catch but there was no difference in the rate of attraction between the lures. In another field experiment, standard Saudi pheromone trap was compared with a date stump trap for a period of five months. A total of 430 weevils @ 7.17 weevils per trap per month were caught by standard Saudi pheromone trap but, the date stump trap captured a total of 654 weevils @ 10.9 weevils per trap per month. This study clearly indicated the superiority of date stump trap and addition of ethyl acetate for improving ecologically sound mass trapping protocols for red palm weevil

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0260. Seasonal occurrence and infestation patterns of fruit flies invading guava orchards in upper Egypt.

Eman M. M. El-Kousy¹ ; F.A. Abdel-Galil²; M.A. Amro³; Doaa S. Mohamed¹ and (Late, M. H. A. Shafey¹)

1- Zoology Department, Faculty of Science, Assiut University.

2- Plant Protection Department, Faculty of Agriculture, Assiut University.

3-Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

The seasonal occurrence of the peach fruit fly *Bactrocera zonata* (Saunders) (PFF) and infestation patterns of the peach and Mediterranean fruit flies were examined in guava orchards in three areas of Manfalut province, Assiut Governorate, Upper Egypt, during 2010 and 2011 seasons. The (PFF) exhibited gradual increase in numbers and showed annual peak, with an average of 58.63 and 110.86 individuals/lure trap in October of both 2010 and 2011 seasons, respectively. Peaks of the pest coincided with the ripening period of guava fruits in both seasons. The pest incidence showed highly significant difference among the examined areas. Infestation patterns of the fruit flies in guava orchards showed that most of the ripening and/or fallen guava fruits were infested by the pest. Mean number of the emerged adults equal 75.79% of the collected pupae. The emerged flies of *B. zontata* were 6.71 fold that of *C. capitata*.

Keywords: *Ceratitis capitata* (Wiedemann), *Bactrocera zonata* (Saunders), guava (*Psidium guajava* L.), seasonal occurrence and infestation patterns.

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0261. Evaluation Of Intercropping And Organic Soil Ammendments Against Okra Flea Beetles, Podagrica Spp

Oladele Onunkun

Department of Agricultural Science, Adeyemi College of Education, Ondo,
Ondo State, Nigeria.

Sustainable production of food is rooted in maintaining the integrity of plants by making use of natural and organic methods to control pests. This study was conducted to evaluate four intercropping modules and three soil amendment methods in Nigeria between 2007 and 2008 for the management of okra flea beetles. The intercropping modules were sole okra, okra and pepper intercrop, okra + amaranth intercrop, okra + pepper + amaranth intercrop, while the second factor, soil amendments, were in three modules - Farm yard manure(FYM) at 10 t/ha, poultry manure(12 t/ha) and palm bunch ash(4 t/ha). All the experiments were arranged in a randomized complete block design in four replications. There was main effect of intercropping as population of flea beetles was found to be significantly lower on plots where there were intercrops compared with the control (sole crop). The results on population of flea beetles also indicated a main effect of organic soil amendment as FYM at 10 t/ha was found to be the best treatment followed by poultry manure (12 t/ha) and palm bunch ash(4 t/ha). The number of flea beetles was significantly low in plots with combination of okra + pepper + amaranth intercrop and FYM. The results did not show significant interaction in the other combinations. The yield of okra recorded in okra + pepper + amaranth intercrop (4.85 t/ha) was significantly ($p < 0.05$) higher compared to control (1.72 t/ha). It is concluded that crop diversity leads to low density of insect pests in okra and increased yield of the crop.

Keywords: Intercropping, Farm yard manure, palm bunch, flea beetle.

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0262. Screening the excito-replency effects of *Salvia sclarea* L. (Lamiaceae) extracts against adult house flies, *Musca domestica* L. (Diptera: Muscidae)

Mohammad Reza Fakoorziba¹, Kourosh Azizi¹, Mohammad Djaefar Moemenbellah-Fard¹, Heshmatollah Shekarpoor¹, Hamzeh Alipoor¹,

¹*Department of Medical Entomology, Research Centre for Health Sciences, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran*

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0263. Application of Entomology in Forensic Science

Saleh Eifan¹, Saleh Eifan², Ahmed Ibrahim¹,

¹Department of Biology, College of Science and Humanity Studies, Salman bin Abdulaziz University, Alkharij, Saudi Arabia,

²Department of Botany and Microbiology, College of Science, King Saud University, Riyadh, Saudi Arabia

Forensic entomology is a branch of biological science which is concerned with entomology (the study of insects) and investigation of facts related to criminal law. Among insects, biting insects like mosquitoes are found everywhere. During crimes, an insect may suck blood from either the victim or the offender. Blood sucked by the fly can be analyzed and supplies information for investigating the crime. Drug abuse affects personal behavior and consciousness causing the addict to do illegal activities. This research aims at detection of several drugs and alcohol in the abdomen of the mosquito *Culex sp* (Diptera : Culicidae) after feeding on a human blood containing different concentrations of ethyl alcohol, codeine, benzodiazepine which can be indicator for the physical and mental status of a suspected person at the time of a crime because these drugs cause loss of consciousness for people addicting them. To this end, a human blood is mixed with different concentrations these drugs and incubated for 5 minutes with starved mosquitoes under laboratory condition and cultured for 1, 2, 4, 8, 16, 24, 48 hours at different temperature (40 ° C corresponding to summer time in Saudi Arabia and 10 ° C corresponding to winter time) followed by chemical analysis to detect these drugs in the ingested human blood at different time and temperature using GC/MS. Furthermore, we study the effect of different concentration from ethyl alcohol, codeine, benzodiazepine on the integrity of human DNA for short tandem repeats (STR) analysis. Different concentration of these drugs are mixed directly with human blood and incubated with starved mosquito for 5 minutes. Blood samples are collected from mosquito dissected abdomen and subjected to STRs analysis.

Keywords: Mosquito; Forensic Science; Entomology; Drugs

0264. The dynamics of fig tree pollination in a highly seasonal environment

S.G. Compton^{1,2}, J. Jaurhalina², Y. Chen³ & R.J. Quinnell²

¹ Department of Zoology & Entomology, Rhodes University, Grahamstown 6140,
South Africa

² School of Biology, University of Leeds, Leeds LS2 9JT, UK

Small insects such as the short-lived fig wasps (Hymenoptera, Agaonidae) that pollinate fig trees can be transported long distances by the wind. We investigated the dynamics of a fig wasp (*Elisabethiellabaijnathi*) population associated with an apparently isolated population of the temperate fig tree *Ficus burtt-davyi* in South Africa. Winter and summer temperatures varied strongly. Fig crop sizes were highly variable and independent of season. In winter, few new fig crops were initiated, fewer mature crops released pollinators, and crop development times were longer. This resulted in higher weekly rates of release of adult pollinators in summer. Pollinators were captured on sticky traps positioned away from the fig trees during almost every week of the year, at densities that largely corresponding with the numbers being released locally. Fig wasps were nonetheless also trapped in weeks when none were released from the local trees, showing that some fig wasps were being transported from trees growing elsewhere. Most figs are probably pollinated by fig wasps released in their local area, but long distance movements of the pollinators allow figs to be pollinated even when no nearby trees are releasing wasps.

Key words: Agaonidae, Dispersal, Fig wasp, Phenology, Pollination

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0265. Fauna of Termites in maidan, semi-malnad and Western Ghat segment of Shimoga District, Karntaka, India

Kalleshwaraswamy, C.M., Sathisha, G.S., Navina, N.L. and Vidyashree, A.S.

Department of Entomology, College of Agriculture,
University of Agriculture and Horticultural Sciences, Navile, Shimoga-577 225

Termites are social, polymorphic, exopterygotan insect group, belonging to the order Isoptera. They occur in tropical, subtropical and temperate regions. They are considered as both beneficial and harmful insects. Diversity and distribution of termites is influenced by various ecological factors. The present work was aimed at faunistic and taxonomic survey of termites representing different ecological habitats of Shimoga district and developing a data base on the species richness and distribution. The district has 3 distinct agro-ecological areas such as (i) maidan area, which is in eastern part of the district, mostly consist of various field and plantation crops with irrigation facility from Thunga and Bhadra river (ii) semi-malnad zone of Western Ghats with occasional chains of hills covered with semi-deciduous vegetation and few plantation crops. This forms the central part of Shimoga. One known fact about this semi-malnad is that the forest land existed in the past is now mostly a mosaic of degraded forest habitats interspersed with pastures, plantations and occasional pockets of undisturbed evergreen forests, and the third, (iii) complete evergreen rain forest cover without appreciable cropped area. This forms the western part of Shimoga and is a part of one of the biodiversity hot spots. These three zones thus provides a good opportunity to study the effect of topography, cropping pattern, human disturbance on the termite fauna, thereby acquiring accurate baseline information for conservation decision making. Sampling for termites was done by all out search in all the habitats and by using baits in each of 3 different agro-climatic areas across Shimoga. Termites collected were directly transferred to a vial containing 70% ethyl alcohol and labelled. A total of 21 species were recorded from the study area which belongs to 2 families. The species recorded from maidan area were *Odontotermes obesus*, *O. horni*, *O. feae*, *O. redemanni*, *O. bellahunisensis*, *Microtermes obesi* and *Trinervitermes biformis*. In addition to aforesaid 7 species, *O. wallonensis*, *O. ceylonicus*, *O. anamallensis*, *O. wallonensis*, and *O. assmuthi* were recorded from semi-malnad region. However, highest number of species were recorded from evergreen rain forest area. Those species were *O. obesus*, *O. horni*, *O. feae*, *O. wallonensis*, *O. assmuthi*, *O. brunneus*, *M. obesi* and *T. biformis*, *Nasutitermes* sp., *Speculitermes sinhalensis*, *Eurytermes buddha*, *Labiocapritermes distortus*, *Microcerotermes fletcheri*, *M. pakistanicus*, *Heterotermes malabaricus* and *Coptotermes ceylonicus*. The study indicated variation in the species richness among the 3 zones. The influence of anthropogenic disturbance, cropping pattern, topography on the termite species richness is discussed.

Key words: Biodiversity, termite taxonomy, species richness, shimoga, Western Ghats

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0266. Biological characteristics of *Cucurbit chlorotic yellows virus* and its vector, *Bemisia tabaci*

Shiori Okuda¹, Mitsuru Okuda², Mitsuhiro Sugiyama³, Yoshiteru Sakata⁴, Minoru Takeshita⁵, Hiroshi Ikeda⁴, Hisashi Iwai¹,

¹The United Graduate School of Agricultural Sciences, Kagoshima University, Kagoshima, Japan, ²National Agriculture and Food Research Organization, Tsukuba, Japan,

³National Institute of Vegetable and Tea Science, Tsu, Japan,

⁴National Agriculture Research Center for Kyushu Okinawa Region, Kurume, Japan,

⁵Faculty of Agriculture, Kyushu University, Fukuoka, Japan

Cucurbit chlorotic yellows virus (CCYV; gene *Crinivirus*, family *Closteroviridae*) causes chlorotic yellows on cucumber (*Cucumis sativus*) and melon (*Cucumis melo*) and is transmitted by *Bemisia tabaci* biotype B and Q white flies. The pattern of relative accumulation of CCYV RNA has been analyzed in susceptible accession of melon (commercial variety, 'Earl's Seine'). CCYV was inoculated using whitefly biotype Q and they were subjected to quantitative RT-PCR to analyze relative accumulation of CCYV RNA. Throughout growth stages, relative accumulation of CCYV RNA peaked on asymptomatic or slight symptomatic leaves and they decreased with their symptom development. Fifty-one melon accessions that originated from India, Pakistan and Bangladesh were evaluated for resistance to CCYV. Accessions, JP 138332, JP 216154, JP 216155, JP 216751 and JP 91204, showed no or faint symptoms, although CCYV was detected from the non-inoculated upper leaves by reverse transcription-polymerase chain reaction (RT-PCR). The five accessions were subjected to quantitative RT-PCR to analyze relative accumulation of CCYV RNA. All accessions except JP 138332 had levels of CCYV RNA accumulation comparable to the commercial variety, 'Earl's Seine', which was used as a control. JP 138332 showed a much lower CCYV RNA accumulation. Numbers of *B. tabaci* biotype Q on JP 138332 did not differ from 'Earl's Seine', in preference tests, and the result suggested the resistance to CCYV was due to preference. Consequently, five accessions are of interest for development of resistant varieties. In particular, JP 138332 possesses a promising resistant trait for CCYV, which might be associated with inhibition of virus multiplication.

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0267. Protecting New Zealand from unwanted exotic pests

**Disna N. Gunawardana, Sherly George, Lalith Kumarasinghe
and Alan Flynn**

Plant Health and Environment Laboratory, Ministry for Primary Industries, PO Box 2095,
Auckland 1140, New Zealand

Invasive exotic organisms are considered a significant ecological and economic threat to New Zealand and are commonly intercepted at the border. As increased international trade and travel increases the risk of exotic species arriving and establishing in New Zealand increases. The Ministry for Primary Industries (MPI) runs both active and passive surveillance programmes for early detection of invasive exotic organisms, such as pest fruit flies, forestry pests, arbovirus vectors, invasive ants and exotic honey bee pests. MPI's Plant Health and Environment Laboratory (PHEL), which is accredited to the international ISO 17025 standard, is the main service provider of diagnostics for suspected exotic, new and emerging pests affecting plants and the environment including organisms intercepted at the border or in quarantine during MPI inspections. 70% of intercepted invertebrates on fresh produce are detected alive and 73% of these are regulated organisms in New Zealand. Both morphological and molecular techniques are used in the diagnostic process. Recently PHEL deployed a simple remote microscopy diagnostic system using new communication and image capturing technology, which enables connection with expertise for rapid identification. As the highest numbers of interceptions are recorded on produce from Pacific Island countries, PHEL provided a comprehensive training programme to enhance the diagnostic capabilities of Pacific Island quarantine inspectors and is continuing the support and develop these skills. This paper will discuss New Zealand interception records for the past 12 years, the diagnostic tools developed to identify these organisms and the training programmes conducted in the Pacific.

Key words: Plant Health Environment Laboratory, New Zealand border interceptions, surveillance programmes, remote microscopy diagnostic, Pacific Island countries.

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0268. Sugarcane Insect Pest Management In Sub-Tropical Part Of India

Rajinder Kumar, Bipen Kumar and Karanjeet Singh Thind

Punjab Agricultural University, Regional Research Station, Kapurthala, Punjab (India)

Sugarcane is an important cash crop in tropical and sub-tropical countries. Sugarcane industry is the second largest agro-based industry next only to textile in India, which accounts for two per cent of the gross domestic product (GDP) of our country. Sugarcane is the major source of white sugar in the country. Its cultivated over more than 20 million hectares in tropical and sub-tropical regions of the world. In India it is grown in around 4.5 million hectares. Agricultural production continues to be constrained by a number of biotic factors. In sub-tropical regions sugarcane crop requires hot and humid climate for its development, which is also conducive for the development of insect pests. A number of insect pests viz. early shoot borer, top borer, stalk borer, leaf hopper, whitefly and black bug cause considerable losses, approximately (15-20 per cent loss in terms of yield and quality). To increase sugarcane productivity, management of insect-pests is of great significance. Sugarcane crop is most vulnerable to insect pests due to its year round availability in the field. Due to diversity in agro-ecological conditions, a clear management strategy should be adopted accordingly. Early shoot borer *Chilo infuscatellus* appears from April to June and causes dry dead-hearts which can be easily pulled out. To control it, plant the crop early, i.e. before the middle of March. Apply 10 kg Regent 0.3 G (fipronil) before the setts are covered with soil by planking. Use Tricho-card having 20,000 eggs of *Corcyra cephalonica* parasitized by *Trichogramma chilonis* per acre at 10 days interval from mid-April to end-June. Top borer *Scripophaga excerptalis* pest appears from March to October and causes severe damage during July-August. The central leaf of the cane top dries up and turns dark. The other typical symptoms are the shot-holes in the leaf, white streaks on the upper side of the leaf midrib and bunchy tops from July onwards. To control it, collect and destroy the egg-clusters. Cut the attacked shoots at the ground level from April to June. Apply 10 kg Ferterra 0.4G (chlorantraniliprole) or 12 kg Furadan 3G (carbofuran) or Thimet 10 G (phorate) at the base of the shoots in the last week of June or in the first week of July only if the top borer damage exceeds 5%. Use Tricho-card having 20,000 eggs of *Corcyra cephalonica* parasitized by *Tricogramma japonicum* per acre at 10 days old interval from mid-April to end-June. Stalk borer *Chilo auricilius* is active throughout the year and highest incidence occurs during October-November. The typical damage symptom of this pest is the entrance or exit holes on the attacked canes. The cane yield and sugar recovery are adversely affected in the case of serious attack. The control measures are: Do not use the cane-seed from the infested field. Staple 40 Tricho-cards hard paper piece glued with 7 days old eggs of *Trichogramma chilonis* to the under-side of sugarcane leaves from July to October at 10 days interval. In sucking pest: leaf hopper *Pyrilla perpusilla* adult is straw coloured, soft bodied and head is projected forward into a snout. Management of this pest by *Epiricania melanoleuca*, a nymph and adult parasitoid, plays an important role in its suppression. Whitefly *Aleurolobus barodensis* damaged crop looks pale during August-October. The leaves turn black owing to the development of a fungus. The underside of the leaves is full of nymphs and pupae which suck the sap from the leaves. To control it by spray the crop with 40 ml Confidor 200 SL (imidacloprid) 600 ml Hostathion 40 EC (triazophos) in 150 litres of water per acre with a manually operated sprayer. Black bug *Cavelerius sweeti* attacked crop looks pale. The black adults and pink young nymphs suck the sap from the leaf-sheaths. This pest is active during April to June. To control this pest spray the crop with 350 ml of Dursban 20 EC (chlorpyrifos) in 400 litres of water per acre. Integrated pest management viz. biological control and new chemistry are the way to manage the sugarcane insect pest.

Keywords: sugarcane, insect, management

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0269. Laboratory bioefficacy of imidacloprid gel bait against the American cockroach, *Periplaneta americana* (L.) (Dictyoptera : Blattidae)

Othman Wan-Norafikah¹, Han Lim Lee², Mohd Sofian-Azirun³, Abdul Halim Nura-Muna³, Chee Dhang Chen³,

¹Faculty of Medicine, Universiti Teknologi MARA (UiTM), Sungai Buloh Campus, Jalan Hospital, 47000 Sungai Buloh, Selangor, Malaysia,

²Medical Entomology Unit, Infectious Diseases Research Centre (IDRC), Institute for Medical Research (IMR), Jalan Pahang, 50588 Kuala Lumpur, Malaysia

, ³Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

A 2.15% imidacloprid gel bait was evaluated for its effectiveness against laboratory strain American cockroach, *Periplaneta americana* in the laboratory. Two tests: direct exposure and secondary poisoning were conducted. Complete mortalities were achieved in adult male, adult female and nymph of *P. americana* within 10 days of direct exposure. *P. americana* adult male was the most susceptible towards imidacloprid (LT₅₀ = 0.47 h; LT₉₅ = 5.24 h), followed by adult female (LT₅₀ = 1.71 h; LT₉₅ = 19.76 h) and nymph (LT₅₀ = 5.27 h; LT₉₅ = 22.91 h). Similar trend of susceptibility was observed in secondary poisoning. Nevertheless, only *P. americana* adult male (LT₅₀ = 100.63 h) achieved 50% mortality within the 10-day secondary poisoning. None of any stages of *P. americana* demonstrated complete mortalities by the tenth day of secondary poisoning. Hence, imidacloprid gel bait tested was able to cause total mortalities of nymph, adult male and adult female of laboratory strain *P. americana* within 10 days of direct exposure but not in the 10-day secondary poisoning.

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0270. Fauna of fleas in Dasht-arjan region, Fars, Iran

H. Alipour*, N. Dinparast Djadid**

* Department of Medical Entomology. College of Health , Shiraz University of Medical Sciences, Shiraz, Iran and PhD Student in Biotechnology Research Centre, MVRG, Pasteur Institute of Iran. Tehran, Iran

** Biotechnology Research Centre, MVRG, Pasteur Institute of Iran. Tehran, Iran.

Introduction and Objectives: fleas transmit pathogens of numerous diseases that affect man and domestic animals. They are normally limited to hosts with nests or lairs as this can provide conditions for the completion of their life cycle. The aim of this study was to determine fauna of fleas in dasht-arjan region, Fars, Iran. Materials and methods: this study was carried out in Dasht-arjan region, Fars, Iran (2011). collected fleas were placed in labelled jars containing 70% ethanol; fleas were subsequently examined by stereoscopic microscope according to the identification keys. Results: the fleas including: *Pulex irritants* (69%), *Xenopsylla ceopis*(12%), *Cetenocephalo canis*(19%). *Pulex irritans* was found in all places. The most prevalence of infested was found in sheep and goat. Discussion: the results showed that the main flea infesting livestock was *Pulex irritans* and some of people were attractive to fleas and most often, their legs and ankles had been bitten and it seems that they may play an important role in occurring of zoonotic infestation in area.

Keywords: *Flea, Fauna, Fars, Iran*

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0271. Black Soldier Fly, *Hermetia illucens*, as a Potential Biological Functional Agent in Organic Farm

Mohd Yusri Zainudin¹, Mohd Masri Saranum¹, Mohd Shahhizal Abd. Wahid¹, Mohd Fahimee Jaapar¹, Mohd Zakaria Ismail¹,

¹MARDI, Selangor, Malaysia

Organic agricultural products are becoming the choice of consumers because of safety and good quality. In addition, organic farming practices implement environmental friendly system such as free usage of pesticides and chemical fertilizers. Besides, the farming system is also practicing the concept of intensive recycling of waste materials to be used as an energy source or biological function. One of the methods that is being developed to improve the production of organic farms is through the use of insect species as farm waste decomposers. In MARDI, a study involving the use of fly species, *Hermetia illucens*, as decomposer for organic farm waste is currently on-going. This species can be found easily on the rotten fruits such as jackfruit and durian. Based on preliminary studies, it was found that *H. Illucens* has a percent of higher decomposition rate compared to other insect species that is cricket, *Acheta domesticus*, mealworm, *Zophobas morio*, and maggot fly, *Chrysomya megacephala*. Waste that was rendered became more friable and suitable as compost. Larval of *H. Illucens* in the final stage can be harvested and be used for processing as animal feed as it contains high percentage of protein (40%). In addition, it was indicated that the presence of eggs and larvae of *H. Illucens* were able to reduce the population of housefly, *Musca domestica* and blowfly, *Calliphoridae* species that usually become disease vectors for livestock. The method used in this study is a two-pronged acting, beside as waste decomposer agent, the fly acted as bio-control agent for livestock in organic farm. It is hoped from this research, a proper and systematic mechanism of *H. illucens* as biological functional agent in organic farms can be developed

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0272. A taxonomic review of the genus *Myzia* Mulsant, 1846 (Coleoptera: Coccinellidae: Coccinellinae) from Korea, with description of a new recorded species

Mi Jin Lee¹, Hyeok Yeong Kwon¹, Jong Eun Lee¹,

¹Andong National University, Andong-si, Republic of Korea

Lady beetles of the genus *Myzia* Mulsant, 1846 are easily identified by following representative characters: apex of middle and hind tibia each with 2 spurs, tarsal claw cleft. The world-widespread genus *Myzia*, within subfamily Coccinellinae and family Coccinellidae, is presented 2 species in Palaearctic region. Until now, only one species, *M. oblongoguttata*, has been reported in South Korea, and we added one more species, *M. gebrei* as a new recorded species. In this study, we report the taxonomic key to the genus *Myzia* of Korea, and morphological description of *M. oblongoguttata* and *M. gebrei*.

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0273. First record of *Neocrepidodera ohkawai* Takizawa (Coleoptera: Chrysomelidae) from Korea

Mijin Lee¹, Seng Ho Kang¹, Jong Eun Lee¹,

¹Andong National University, Andong-si, Republic of Korea

The alticine beetle *Neocrepidodera ohkawai* Takizawa, 2002 is reported from Korea for the first time. The sense of the alticine genus *Neocrepidodera* Heikertinger, 1911 (Coleoptera: Chrysomelidae: Alticinae) was recently enlarged to include *Asiolestia* Jacobson, 1925, formerly accepted as a distinct genus by Konstantinov and Vandenberg, in 1996. The genus *Neocrepidodera* has been represented by 4 species in South Korea.

This new recorded species, *N. ohkawai*, is easily distinguished from other species of the genus *Neocrepidodera* by combination of following characters: pronotum densely punctured along basal impression; each legs with first tarsal segment distinctly dilated, and aedeagus produced into a triangular lobe apically in male; first tarsal segment not dilated in female.

N. ohkawai was collected on sandy places in a bed of Gilan stream where was covered with a kind of reed, *Phragmites japonica*. In this study, we provide not only a redescription of *N. ohkawai* Takizawa with detail illustrations of male aedeagus and other appendages, but also taxonomic keys to adults of Korean *Neocrepidodera*.

0274. The amount of fed prey and growth ratios in each instar larval stages of *Luciola lateralis* Motshulsky (Lampyridae: Coleoptera) from Korea

Hyeok Yeong Kwon¹, Mi Jin Lee¹, Jong Eun Lee¹,

¹Andong National University, Andong-si, Republic of Korea

We studied the amount of fed prey by Korean firefly, *Luciola lateralis*, and their growth ratios in each instar larvae. The used preys were 2 species of aquatic Mollusca, *Semisulcospira libertina* and *Physa acuta*. To estimate the amount of fed prey, we calculated the regression equation about 'shell diameter-shell free weight' of the preyed 2 species. The average amounts of fed prey, fed by an individual of firefly from hatching, were 0.014±0.001g to first instar larva, 0.048±0.021g to second instar larva, 0.369±0.047g to third instar larva, 1.391±0.158g to fourth instar larva, and 1.902±0.307g to last instar larva. From first to last instar larval stage, *L. lateralis* was totally fed 2.056±0.236g of *S. libertina*, or 1.620±0.204g of *P. acuta*. There was no dedicated difference in growth ratios and period according to the preyed species. Therefore, if *L. lateralis* have full prey, regardless of preyed species, they will not have influence to their growth.

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0275. Prey preference in larvae of *Luciola lateralis* Motshulsky (Lampyridae: Coleoptera) and macroinvertebrate fauna around their habitat from Korea

Hyeok Yeong Kwon¹, Mi Jin Lee¹, Jong Eun Lee¹,

¹Andong National University, Andong-si, Republic of Korea

The larvae of firefly, *Luciola lateralis* Motshulsky, live in fresh water, especially in paddy field, occasionally in mountainous stream or river. We studied their prey preference to the 4 species of edible prey (*Semisulcospira libertina*, *Radix auricularia*, *Physa acuta*, and *Hippeutis cantori*), after survey of macroinvertebrate fauna in firefly habitat. Totally 44 and 89 species in paddy field and river habitat, respectively. To survey the prey preference of *L. lateralis*, we provided fresh and crushed prey to larvae of *L. lateralis*.

L. lateralis preferred 3 species of basommatophoran species (*R. auricularia*, *P. acuta*, and *H. cantori*), when we provide crushed prey. When we provide freshly live prey, first and second instar larvae preferred *H. cantori*, and third, fourth, and fifth instar larvae preferred *R. auricularia* and *P. acuta*.

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0277. Population Dynamics Of Tiger Butterflies At Bishop Heber College, Tiruchirappalli, India

Carlton Relton¹, Ravichandiran Chandrahasan¹, Daisy Arockiasamy¹,
Bishop Heber College, Tiruchirappalli, India

The present study aims to find the population dynamics among four species of tiger butterflies at Bishop Heber College Campus. It was accomplished by surveying the population trend of Plain tiger (*Danauschrysippus*) Blue tiger (*Tirumalalimniace*) Dark blue tiger (*Tirumalaseptentrionis*) and Striped tiger (*Danausgenutia*) for one year (January 2009 to December 2009) by applying perambulation method. The data were analysed and interpreted.

The study found that there was variation in population in different months of the year and this was correlated with rainfall pattern and seasons. The results are analysed and discussed. The population was higher NE monsoon season and SW monsoon season. The study reveals that the site is a part of the migratory path and need to be explored further. Hence this basic study could be used as a basis for future studies pertaining to conservation and migration.

Keywords: population dynamics, tiger butterflies, migration, monsoon

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0278. Biological control of rice leaf folder, *Cnaphalocrocis medinalis* Guenee (Pyraustidae: Lepidoptera) with mycoinsecticide based on an indigenous isolate of *Beauveria bassiana* (Balsamo) Vuillemin (BbCm KKL 1100) in Tamil Nadu, India

V.Ambethgar¹, M.Swamiappan², R.Rabindran² and R.J. Rabindra³

¹Anbil Dharmalingam Agricultural College and Research Institute, Trichy-620 009, Tamil Nadu, India, ² Centre for Plant Protection Sciences, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu, India, ³National Bureau of Agriculturally Important Insects, Bangalore-560 024, Karnataka, India.

The rice leaf folder, *Cnaphalocrocis medinalis* Guenee (Pyraustidae: Lepidoptera) earlier considered as a minor pest of rice in many Asian countries appears to have become increasingly important with the spread of high yielding rice varieties and accompanying changes in cultural practices. The pest infestation usually occurs during late growth stages of the rice crop. The larvae fold the leaves and scrap the chlorophyll content of the leaves from within and cause scorching and leaf drying resulting considerable reduction in yield and quality of grains. The pest is mainly controlled using chemical insecticides. Advent of IPM has created a niche for the promotion of microbial control agents to slash down chemical pesticidal usage. The fungal entomopathogen *Beauveria bassiana* (Balsamo) Vuillemin has shown considerable potential for the management of wide range of rice pests. Three mycoinsecticide formulations based on a native isolate of *B. bassiana*: BbCm KKL 1100 viz., water dispersible powder (WDP), oil-in-water emulsion (OWE) and crude conidial suspension at 12×10^{11} conidia L⁻¹ were evaluated for their efficacy against rice leaf folder. Results of the bioassay experiments showed that the OWE and WDP formulations were superior than the unformulated crude fungus suspension indicating no adverse effect of constituents of formulations on the virulence of mycoinsecticide. Among the formulations, OWE was found to be more effective in terms of LC₅₀ value and it was more stable even after 6 months of storage period as compared to WDP formulation and unformulated fungus. Field trials conducted during *Kharif* and *Rabi* seasons in two locations for two successive years have demonstrated that the oil-in-water emulsion @ 12×10^{11} conidia L⁻¹ effectively controlled the leaf folder populations especially during *Rabi* season. Water dispersible powder formulation and unformulated crude fungus were next in terms of field efficacy and persistence. Yield of grain was similar in chlorpyrifos and OWE formulation treated plots. Since the leaf folder pest activity aggravates with the environmental conditions prevailing during *Rabi* season, application of mycoinsecticide synchronizing with humid weather period will be an ideal option for suppressing leaf folders in fields. The mycoinsecticide can be applied using conventional techniques and it does not pose problems associated with residues. Both laboratory and field studies have confirmed the safety of mycoinsecticide to the natural enemies of rice pests. Out of the present research, a new vista in the biological control programme is opened for further promotion of mycoinsecticide based *B. bassiana* in the IPM of rice insect-pests.

**0279. Bishop Heber College, Tiruchirappalli –A Migratory Path
Of *Euploeacore***

A.Daisy Caroline Mary, Carlton.R and Dr.A.Relton

Department of Environmental Sciences, Bishop Heber College, Tiruchirappalli, India

Department of Environmental Sciences, Bishop Heber College, Tiruchirappalli, India

Department of Social Work, Bishop Heber College, Tiruchirappalli, India

In India butterflies migrate north-south as well as east-west. Butterfly migrations in southern India have been less explored. The present study aims to find the population trend of *Euploeacore* (Common Indian Crow) in relation to migration at Bishop Heber College Campus. It was accomplished by surveying the population dynamics of *Euploeacore* for two years (January 2009 to December 2010) by applying perambulation method. The data are analysed and interpreted. The study found that there was variation in population in different months of the year and this was correlated with rainfall pattern and seasons. The population was higher in summer followed by SW monsoon season. Monthwise analysis showed high population in April followed by July. The peak in population is correlated to migration. The results are analysed and discussed. The study reveals that the site is a part of the migratory path and need to be explored further. Hence this basic study could be used as a basis for future studies pertaining to conservation and migration.

Keywords: *Euploeacore*, population dynamics, migration, monsoon.

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0280. The cold tolerant strategy of overwintering *Sesamia inferens* (Walker)

Meng Sun¹, Mingxing Lu¹, Yuzhou Du¹,

¹College of Horticulture and Plant Protection & Institute of Applied Entomology,
Yangzhou University, Yangzhou, China

The pink borer, *Sesamia inferens* (Walker), is a major insect pest of rice in Asia. It overwinters as full larvae. Low temperature during winter is a major environmental constraint on the survival of most insect species. However, the study is lacking on the mechanism of cold resistance of *S. inferens* during winter. In this study, we demonstrated the characteristics of cold resistance of *S. inferens* collected from the field from October 2012 to April 2013. The results indicated that the SCPs (super-cooling point) of larvae were varied insignificantly, from -8.9°C to -5.5°C. However, cold tolerance of overwintering larvae possessed significant differences. Maximum cold tolerance of *S. inferens* was observed in larvae collected on January 30, 2013. Before March 9, 2013, water content of larvae decreased, but subsequently it elevated significantly. The trehalose in the larvae decreased, however the glycerinum exhibited inverse trend. In conclusion, *S. inferens* of Yangzhou population is a freeze tolerant insect.

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0281. Distribution And Impact Of *Busseola Fusca* (Fuller) (Lepidoptera: Noctuidae) And *Chilo Partellus* (Swinhoe) (Lepidoptera: Crambidae) On Sorghum In Northeastern Ethiopia

¹Asmare Dejen, ²Emana Getu, ³Ferdu Azerefegne and ⁴Amare Ayalew

¹ Department of Plant Science, Wollo University, P.O. Box 1145, Dessie, Ethiopia,

² Department of Biology, Addis Ababa University, P.O. Box 1176, A.A., Ethiopia

³ Department of Plant Science, Hawassa University, P.O. Box 05, Awassa, Ethiopia,

⁴ Department of Plant science, Haramaya University, P.O. Box 138, Dire-Dawa, Ethiopia

Correspondent Author: Asmare Dejen (PhD), Entomologist

An assessment was carried out during the long and short rainy cropping seasons of 2010/2011 across different agro-climatic zones (ACZs) with the objective determination of the distribution, species composition and damage levels of important stemborer species in northeastern Ethiopia. Data were collected from 21 localities of six districts, four fields in each locality, and a total of 84 fields were assessed. *Busseola fusca* composed of 16-100% of the population of stem borer species and causing damage levels of 3-60% in South Wollo zone at the elevation ranging from 1750 to 2338 m. Moreover, *C. partellus* composed of 7-100% of the population of stem borer species and causing a damage of 1-100% in the same zone at the elevation ranging from 1492 to 2084 m. Similarly, in North Wollo zone, *B. fusca* shared 69-88% of the total population of stem borer species and causing damage levels of 5-53% of the elevation ranging from 1850 to 2044 m, while *C. partellus* composed of 12-31% and caused damage by 2-26%. In the Oromia administrative zone, which falls at the elevation of 1400-1669 m, 100% of the stem borer population was *C. partellus* and caused a damage level of 84-99%. The result indicated that *C. partellus* widened its distribution and extent of damage from the previous report of 1900 m up to 2044 m. The two stemborers were found in elevation ranging from 1750 to 2044 m. but their level of distribution, compositions and damage varied between elevations. In conclusion, *C. partellus* widened its distribution and might have replaced the indigenous species, because it was recorded up to 2044 m, which was not reported in the previous decades.

Key words: stemborers, elevation, agro-ecology, composition

0282. Integrated Pest Management of Cashew Stem and Root Borer, *Plocaederus ferrugineus* L. (Cerambycidae: Coleoptera) in India

V.Ambethgar, T.Senguttuvan and G.Gajendran

Tamil Nadu Agricultural University

Department of Plant Protection

Anbil Dharmalingam Agricultural College and Research Institute

Trichy-620 009, Tamil Nadu, India

Cashewnut is a major foreign exchange earning industrial crop grown in more than 50 countries across the world. In India, the productivity of cashewnut is threatened by the Cashew Stem and Root Borer (CSRB), *Plocaederus ferrugineus* L. (Cerambycidae: Coleoptera), a deadly tree killer pest causes capital loss to the growers in maintaining the optimum tree population in all cashew growing zones. The adults of *P. ferrugineus* are chestnut reddish brown in colour; their body length varies ranges from 40-45 mm. The gravid females lay their eggs in the crevices of loose bark of the trunk and exposed roots. The emerging neonate grubs bore into the living bark and remain feeding in concealed condition in the interface of bark and sapwood. The developing grubs inflict significant damage to the vascular system by tunnelling the inner layer of vital bark of stem and primary roots which impair the flow of plant sap, leading to premature senescence of canopy, gradual shedding of leaves and drying of the twigs followed by quick death of infested cashew trees. The pest kills about 6-10% productive trees annually, leading to substantial reduction in cashewnut productivity. Considering the gravity of pest problem in the country, a number of field trials were conducted under All India Coordinated Research Project (AICRP) on Cashew at the TNAU-Regional Research Station, Vridhachalam in Tamil Nadu from 2003 to 2012 to determine the effectiveness of various IPM modules against CSRB in comparison with existing farmers' practices. As many as six IPM modules comprising of prophylactic and curative treatments were selected and evaluated sequentially in replicated trails adopting standard application methods. The investigation revealed that the IPM module comprising (1) Monitoring and detection of borer infestation at monthly intervals, (2) Phytosanitation by uprooting and clearing of borer infested dead cashew trees from the plantations during monsoon periods, (3) Manual collection and destruction of borer's bio-stages from the affected cashew trees, (4) Prophylactic localized trunk spray with Neem oil emulsion 3% during nut collection periods, (5) Post-prophylaxis spot-drenching of Chlorpyrifos 20 EC 0.5% after careful chiselling of bark and removal of grubs from early stage infested trees, and (6) Soil application of fungal consortia in enriched farm yard manure were most effective in controlling the pest at various phases of plantation maintenance, with 60-65% reduced infestation over farmers' practices and untreated control. The present investigation provided new adaptable IPM approaches for containing CSRB problem in India.

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0283. Aquatic insects in water-filled tree holes, from a Sub-tropical Rain forest, India

Anoop Das¹, Nishadh K.A²,

¹Wildlife Research and Conservation Trust, Kerala, India, ²M.E.S Mampad College, Kerala, India, ³Salim Ali Center for Ornithology and Natural History, Tamil Nadu, India

Water filled tree holes forming as a permanent or ephemeral freshwater aquatic habitats occupied by an array of invertebrates largely shared by aquatic insects. The baseline data on community diversity and its functionality in these habitats is essential for conservation of this unique habitat. The study was carried out in Silent Valley National Park (SVNP) and New Amaramblam Reserved Forest (NARF) of the Western Ghats, Kerala during December 2009 to September 2010. The sampling effort comprised of searching for water filled tree holes in the study area. An investigation in 150 tree hole aquatic habitats shows that occurrence of 28 different species with an average of 3-5 species in a tree hole. Most of the recorded organisms (96.8%) belong to order Odonata, Heteroptera, Diptera, Coleoptera, Trichoptera. Altogether, 7505 macrofauna individuals were recorded from 150 tree hole aquatic habitats of SVNP and NARF. Aquatic insects belonging to the orders Coleoptera, Diptera, Trichoptera, Heteroptera, and Odonata together comprised of 96.8% of entire collection. The remaining 3.2% were the representatives of the taxa from Dermaptera, Annelid, Collembola, Gastropoda, Diplopoda, Geckonidae and Anura. Larvae of Scritidae beetle was the most abundant taxa, which occurred in 83.3% of all the tree holes sampled with average abundance of 28.5 ± 56.6 individuals per tree hole at Sairandhri, 27.9 ± 42.6 at Poochipara, 20.08 ± 20 at Walakkad and 10.84 ± 13.13 at Panapuzha. It was followed by larvae of Trichoptera (62.6%) with highest abundance of 17.3 ± 42.6 individuals at Sairandhri, 7.9 ± 15.3 individuals at Poochipara, 2.1 ± 3.7 individuals in Walakkad. Trichoptera was completely absent in the tree holes sampled at Panapuzha. The taxa richness shows that a typical tree hole in SVNP harbors 4 ± 1.7 taxa with a range of one to 11 different taxa per tree hole whereas Panapuzha of NARF harbors 3.6 ± 1.3 taxa with a range of 1 to 6 different taxa per tree hole. Out of 16 aquatic insect taxa recorded, nine were Dipterans, four Coleopterans and one each from order Trichoptera, Heteroptera, and Odonata. About 13 aquatic insect taxa in the tree hole aquatic habitat found in their larval stage and 3 aquatic insects such as Hydrophilidae, Dytiscidae of Coleoptera and Heteroptera were found in adult stage. It is observed that water filled tree holes which are persistent are having high species diversity and longer foodweb.

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0284. Performance of *Bt* cotton of different events under IPM umbrella

Patil, S. B., Badiger Hareesha and Bhosle, B. B.

University of Agricultural Science, Dharwad -580007
Karnataka, India

Through the *Bt* cotton offers inherent toxicity to bollworms, the variation in the expression of Cry 1 Ac among the cultivars have been correlated to survival of lepidopteron pests indicated that cultivars do not provide the same level of control. The spatio temporal variations in eight Indian cultivars have been reported by kranthi, et.al (2005). The feedback since the commercialization of *Bt* cotton indicated that technology is not a panacea for all the pests instead integrated approach would be necessary to draw maximum benefits and to sustain the technology. Hence effort has been made to evaluate performance of *Bt* cotton developed through different events under IPM umbrella at farmers field. Field experiment was carried out at Agricultural Research Station, Dharwad Farm, Karnataka, India during 2010-11 to evaluate the performance of *Bt* cotton hybrids developed from different *Bt* events viz., MON-531 (Cry1Ac), MON-15985 (Cry1Ac + Cry2Ab), Event-1 (Cry1Ac) and GFM event (Cry1Ab-Cry1Ac) under IPM practices. The results revealed that IPM block registered lower population of sucking pests owing to the integration of ecofriendly approaches. Among the genotype in IPM, Banny BG-II recorded lower population of aphids, thrips, leaf hopper / 3 leaves and mirids/ 25 squares (3.94, 9.09, 2.07/ 3 leaves and 3.10/25 squares, respectively) followed by Bunny BG-I (4.44, 9.74, 2.26/3 leaves and 3.12/25 squares, respectively). On the other hand, J.K.Durga harboured more sucking pests (6.55, 10.83, 3.42/3 leaves and 4.71/25 squares respectively) However, nonsignificant variation among the genotypes was observed in IPM. The present finding are in accordance with the results of patil, et.al 2011 and Badiger, et.al, 2012 who elucidated effectiveness of IPM. Irrespective of the modules, bollworms population was not observed in any of the *Bt* cotton genotypes. Although the larval population of *Helicorepa* was recorded in Non *Bt* cotton, the population was considerably low in IPM block (0.98/ plant) compared to farmers practice (1.96/plant) due to integration of target specific interventions which reduced the larval population to an extent of 49.49 per cent over FP. Negligible level of fruiting body damage was registered by the *Bt* cotton genotypes. Among the cultivars, Bunny BG-II registered lower fruiting body damage (0.08%) followed by nathbaba (0.40%). The lower incidence of bollworms among the *Bt* cotton genotypes in IPM, convinced their suitability as critical component of IPM. The better performance of *Bt* genotypes under IPM are in accordance with the findings of venugopal (2002) and patil, et.al (2011). Further *Bt* genotypes under the IPM registered higher population of beneficial fauna due to ecofriendly components. The response of *Bt* genotypes as a component of IPM was found to be appreciable in terms of yield. Among the genotypes integrated in IPM, Bunny BG-II registered higher seed cotton yield (25.209/ha) followed by nathbaba (24.57 g/ha) with more net profit compared to *Bt* genotypes with farmers practice. These results are comparable with the findings of Bambawale, et.al (2004) and Patil, et.al (2011) who reported higher seed cotton yield in *Bt* IPM with more profit compared to *Bt* RPP and Non *Bt* IPM. Hence it is evident from the results that the performance of Bunny BG-II was found to be better as indicated by lower infestation and higher seed cotton yield under IPM practices.

Key words: *Bt* events, Transgenic cottons, IPM, Sucking pests, bollworms and performance.

0285. Sustaining The Population Density Of Fireflies (Coleoptera: Lampyridae) In Mukah, Sarawak, MALAYSIA

Het Kaliang

Sarawak Forestry Corp. Sdn. Bhd., Kuching, Malaysia

Fireflies are an attraction for eco-tourism industry in Malaysia. Mukah used to have an abundance of fireflies' aggregations flashing on the mangrove vegetation along the main river towards the township, which is located in the coastal area. A preliminary survey on fireflies has been conducted in mangrove ecosystem in Mukah, Sarawak, where there is a lack of previous records on fireflies population and density. Five spots of fireflies' congregations were identified with most assemblages found at 3m and above from ground level. Low population densities were obtained within the developed areas. The significance of the findings will be discussed in the paper.

Keywords: Mukah, fireflies, Lampyridae, mangrove ecosystem, populations, density.

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**0286. Laboratory Mass-rearing Technique for *Atteva sciodoxa* Meyrick
(Lepidoptera: Yponomeutidae)**

**Mohd Shakhizal Abd Wahid¹, Nurin Izzati Mohd Zulkifli¹, Mohd Yusri Zainuddin¹,
Mohd Masri Saranum¹, Mohamed Rani Mat Yusoh¹,**

¹MARDI, Serdang, Selangor, Malaysia

Tiger moth, scientifically known as *Atteva sciodoxa* Meyrick (Lepidoptera: Yponomeutidae), is a serious pest in tongkat Ali, *Eurycoma logifolia* Jack. plantation. The moth destroyed the plants by feeding on the young and tender terminal shoots that caused stunted plants. In order to study the insect's behaviour, a mass-rearing technique was developed which facilitates large scale breeding in a laboratory. Over years, thousands of moths were successfully bred inside a container for pheromone research. Basically, the first and second instars' larvae were fed with tender shoots of tongkat ali. The container was placed at room temperature controlled at 27°C ± 2°C, 80±5% relative humidity with 12 h photoperiod. Subsequently, the third until the fifth instar's larvae were fed on semi-mature leaves. Newly emerged adults were released in a cylindrical transparent glass container (40 x 30 mm in diameter). The adults were fed with 10% honey. This paper described briefly on the method and equipments used for mass production of the tiger moth at laboratory scale

Key-words: Tiger moth, insect pest, mass rearing, tongkat ali

0287. Combination Efficacy of LED and Yellow trap for Monitoring Tobacco Whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae)

Ilkwon Yeon¹, Donggeun Kim¹,

¹Organic Agriculture Research Institute, Uiseong, Gyeongbuk, Republic of Korea

The photo-response of the tobacco whitefly to light-emitting diodes (LED) of different wavelengths in various intensities was tested in a greenhouse. The UV showed the highest attraction rate to *Bemisia tabaci*, followed by Blue, White, Green, and Yellow. In a combination with yellow trap (2.5YR, 8/14) with UV LED, the efficacy increased 158% compared to commercial Yellow trap (Koppert). These results suggest that the efficacy of commercial yellow trap could be enhanced further for environmentally friendly insect control.

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0288. Differences in performance of *Corythuchamarmorata* on novel and the original host plants

Satoshi Hasegawa and Morio Tsukada

Mie University, Tsu City, Mie Prefecture, Japan

Corythuchamarmorata is a lace bug native to North America and is an invasive species in Japan. In native range, they use only asteraceous plants as hosts. In Japan, however, there are some reports that *C. marmorata* uses sweet potato, *Evolvulus pilosus* and eggplant. This study tests performance of the lace bug on sweet potato, *E. pilosus*, eggplant and goldenrod, the original host plant. Offspring from wild lace bugs were reared individually on each of the four plants. Then survival rate, instar achievement, developmental period were recorded and head breadth and body length measured. Larvae reared on goldenrod showed significantly higher performance than larvae reared on the other plants did. In all measurements, there were no differences between larvae reared on sweet potato and on *E. pilosus*. No larvae grew up to adult on eggplant. These results suggest that three novel plants are less suitable than goldenrod for this lace bug. In area where *C. marmorata* uses novel plants, quality of the original host plants may be decreased due to extremely high insect density.

Key words: invasive species, lace bug, novel host plant, performance

0289. Efficiency of Biolep on the First Instar larvae of *Heliothis armigera* (Lepidoptera : Noctuidae) on Tomato in Bushehr-Iran

Seyed Reza Golestaneh¹, Mohammad taghi Fassihi¹, Fatemeh Gholamian¹,

Research center of Agriculture & natural resources, Bushehr, Iran

The cotton bollworm, *Heilothis armigera* (Lepidoptera : Noctuidae) is a major pest in cotton and one of the most polyphagous and cosmopolitant pest species. Nowadays, to reduce damage and control of pests use different sorts of chemical pesticides which is caused variety effects on human and ecosystem. On the other hand, using of microbial pesticides had no shows these effects. The bacteria *Bacillus thuringiensis* (Bt) is the most successful microbial pesticide to control insect larvae especially Lepidoptera order. The Bacterial spores, after entrance to digestive system cause holes in the intestinal wall of insect and finally kill them. The main purpose of this study was comparison between the efficacy of microbial toxin products BT (Biolep) with three common chemical pesticides (Avant, Sevin and Diazinon) against *H. armigera*. Initially, the larvae were collected from the nature. Then, they were reared in transparent plastic containers which were the cylindrical with 10 cm diameter and 12 cm height. Pesticides tested in a randomized complete block design with 5 treatments and 4 replications. Treatments were Biolep, Avant 15% SC, Sevin 75% WP, Diazinon 60% EC and the control sample (distilled water). In the experiments, the effects of pesticides on first instar larvae after 24, 48, 72 and 96 hours were recorded. Then All statistical analysis were performed using statistics software SPSS. All data were subjected to analysis of variance (One Way ANOVA), followed by comparison of means using Duncan's test. Results of the analysis of variance showed that the mortality rate for first instar larvae in treatments Biolep, Avant, Sevin and diazinon, after 96 hours were respectively, 87.50%, 92.50%, 92.50% and 95% .

Keywords: Efficiency, *Heilothis armigera*, Tomato, Biolep, Avant, Sevin,

0290 . Preliminary Study on Mosquitoes Diversity in a Flooding Lake Baringo Basin of Kenya

**Kabochi Kamau¹, John Mueke², George Michuki³, Samuel Muiruri⁴,
Irene Onyango¹, Geoffrey Lelenguyah¹, Philip Kangethe⁴,**

¹Department of Veterinary Services, NAIROBI, Kenya,

²Kenyatta University, Ruiru, Kenya,

³International Livestock Research Institute, Nairobi, Kenya, ⁴Division of Vector Borne Diseases, Nairobi, Kenya

Lake Baringo is located on the floor of the Great Rift Valley in Kenya. Two rivers, River Molo and River Perkerrra drain into the lake. Over the last two years, the lake has been undergoing a unique natural phenomenon with its water swelling and flooding the surrounding land and thousands of residents displaced. This study is set to investigate the changing mosquito dynamics in three ecological areas that lie within the L. Baringo Basin; the flooding lake shores; the riverine swampy; and dry hinterland with a manmade dam ecosystem. Mosquitoes were collected for 12 months covering dry and wet seasons. They were sorted and identified upto genus level using morphological features before packing them into pools of 50 for further analysis. Preliminary results indicate that stability of an ecosystem plays a role in influencing the differences and richness in the mosquito diversity in an ecosystem.

0291. Biological Control of *Bemisia tabaci* (Homoptera: Aleyrodidae) with *Isaria fumosorosea* (Hypocreales: Cordycipitaceae)

Jing Tian¹, Chi Hao¹, Li Liang², Rui-yan Ma¹,

¹College of Agriculture, Shanxi Agricultural University, Jinzhong, Shanxi, China, ²College of Life Sciences, Shanxi Agricultural University, Jinzhong, Shanxi, China

Bemisia tabaci B-biotype (Homoptera: Aleyrodidae), is a worldwide pest of many vegetables, ornamentals, and economical crops. In recent years, as greenhouse agricultural has developed rapidly, it has appeared in the north of China, such as Beijing, Hebei, Shanxi and other locations, and causes huge economic losses. *Isaria fumosorosea* (formerly *Paecilomyces fumosoroseus*) (Hypocreales: Cordycipitaceae) has a worldwide distribution and a relatively wide host range; it's one of the most important fungi for control of *B. tabaci*. We found an isolate and determined the effect of different insect states, host plant (cucumber, eggplant, tomato and bean), temperature (20, 23, 26, 29, 32°C) and relative humidity (53%, 65%, 75%, 85%, 95%) on the pathogenicity of *I. fumosorosea* against *B. tabaci*. The results indicated that all insect states could be infected by *I. fumosorosea*, the second instar of whitefly was the most sensitive stage to *I. fumosorosea*. The host plant significantly influenced the corrected mortality of second-instar nymphs of *B. tabaci*. Temperature and relative humidity also had significant effect on the cumulative corrected mortality. We also studied the culture conditions of *Isaria fumosorosea*, including solid culture and liquid culture, and found out the most suitable condition for mycelial growth and sporulation. The safety of *I. fumosorosea* had been studied. Toxicological test methods of pesticides for registration (GB15670-1995) were used to test acute toxicity of *I. fumosorosea*, including poisoning through mouth and skin, acute inhalation toxicity, acute eye irritation test and dermal sensitization. The results indicated that the acute oral toxicity, acute dermal toxicity and acute inhalation toxicity of *I. fumosorosea* are lower. There was no irritation to rabbit eye and skin, and it belonged to grade I weak sensitizing matter. Thus, *I. fumosorosea* has high potential to be a microbial pesticide to control *B. tabaci*.

Key words: *Bemisia tabaci*, *Isaria fumosorosea*, pathogenicity, culture conditions, safety

0292. Predicting the American bollworm; *Helicoverpa armigera* (Hub.) field generations as influenced by heat unit accumulation

G.A. El-Mezayyen and M.G. Ragab

Plant Protection Research Institute, Dokki, Giza, Egypt

This study was conducted in Beni-Suef governorate under field conditions during the seasons 2005 and 2006. Results indicated that the population of American Bollworm moths, *Helicoverpa armigera* (Hub.) had four peaks starting from the 3rd week of May until the 2nd week of September for the tested seasons. The highest number of moths was recorded during the end of July and all August (120 & 154 moth/trap) and 150 days after cotton planting in both seasons, respectively. The predicted peaks of generations could be detected when the accumulation thermal units 558.18 DD's. The predicted peaks for the four generations detected varied from +2 to -3 days from the observed peaks. For better prediction of the American bollworm the period between the observed and expected peaks to be positive and as short as possible when early preparation of pest control material are of great important, consequently it could be helpful when IPM control tactics are considered.

Key words: American bollworm, *Helicoverpa armigera*, peaks, predicting, generations, accumulations thermal units

0293. Taxonomic and Faunal study on the cicadas (Hemiptera: Cicadidae) from northern Vietnam

Pham Hong Thai

Institute of Ecology and Biological Resources (IEBR)

Vietnam Academy of Science and Technology (VAST)

18 Hoang Quoc Viet St, Hanoi, Vietnam

The number of cicada species known from north Vietnam is 74 species in 34 genera, 11 tribes, 2 subfamilies. Cicadettinae (12 species from 4 tribes and 6 genera) and Cicadinae (62 species from 7 tribes and 28 genera). Among them, two species (*Karenia hoanglienensis* Pham & Yang, 2012, *Chremistica sueuri* Pham & Constant, 2013) are new to science, one species (*Purana parvituberculata* Kos & Gogala, 2000) is new record for Vietnam. There are 11 species known only from north Vietnam: *Pycna indochinensis* Distant, *Gaeana vitalisi* Distant, *Terpnosia chapana* Distant, *Terpnosia rustica* Distant, *Terpnosia mesonotalis* Distant, *Haphsa conformis* Distant, *Sinapsaltria annamensis* Kato, *Mogannia aliena* Distant, *Huechys tonkinensis* Distant, *Euterpnosia cucphuongensis* Pham *et al.*, 2010, and *Karenia hoanglienensis* Pham & Yang, 2012. The north Vietnamese cicada species inhabit various environments, mainly tropical rain forests below the canopy layer of medium or high trees where large and colorful cicadas such as *Salvazana mirabilis* and *Angamiana vemaecula* gather. Cicadas that are small in size mainly inhabit virgin forests adjacent to rain forest such as *Mogannia conica* and *Huechys sanguinea*. Our research shows that most species of cicadas in Vietnam inhabit virgin forests as preserved in National Parks and Natural Reserves.

Key words: Hemiptera, cicadas, fauna, distribution, north Vietnam.

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0294. Application Of Pheromones For Plant Quarantine Monitoring of The Russian Federation

Abasov M.M.; Kamayev I.O.,

¹All-Russian Plant Quarantine Center, Moscow, Russia

Pheromone traps enable on-the-spot detection of quarantine pest outbreaks on vast territories as well as effective pest control and prevention of their spread. Use of pheromone traps minimizes the application of pesticides including environmentally undesirable use in urban areas, greenhouses, etc. Thus, pheromone traps facilitate ecologically clean crop production.

The All-Russian Plant Quarantine Center (FGBU VNIKR) offers a wide range of pheromones and ready-to-use pheromone traps for seventeen quarantine species of pest insects and over twenty pest species of stored products, forest and horticulture. Pheromones are synthesized at a specialized of FGBU VNIKR's Laboratory. The list of synthetic pheromones includes Apple maggot *Rhagoletis pomonella*, Asian long-horn beetle *Anoplophora glabripennis*, Bean (cowpea) weevil *Callosobruchus maculatus*, Fall webworm *Hyphantria cunea*, Gypsy moth *Lymantria dispar*, Khapra beetle *Trogoderma granarium*, Mediterranean fruit fly *Ceratitis capitata*, Mulberry scale *Pseudaulacaspis pentagona*, Oriental fruit moth *Grapholitha molesta*, Oriental leafworm moth *Spodoptera litura*, Peach fruit moth *Carposina niponensis*, Potato tuber moth *Phthorimaea operculella*, San Jose scale *Quadraspidiotus perniciosus*, Sawyer beetles *Monochamus* spp., Siberian silk moth *Dendrolimus sibiricus*, Western corn rootworm *Diabrotica virgifera*, Western flower thrips *Frankliniella occidentalis*, Bark beetle *Ips typographus*, Black arches moth *Lymantria monacha*, Codling moth *Cydia pomonella*, Cotton bollworm *Heliothis armigera*, Horse-chestnut leaf miner *Cameraria ohridella*, Indian meal moth *Plodia interpunctella*, Mediterranean flour moth *Ephesiakuehniella*, Pine-tree lappet *Dendrolimus pini*, Pink bollworm *Pectinophora gossypiella*, Tobacco moth *Ephesia elutella*, Tomato leafminer *Tuta absoluta* and others. The quality of pheromones has been tested and verified with the most advanced chemical and analytical methods, while its effectiveness has been proved in laboratory tests and field bioassays performed in Russia, Ukraine, Belarus, Bulgaria, Moldova, Kyrgyzstan, and Kazakhstan. Synthesized pheromones are used for the plant quarantine monitoring system in 61 regions of Russian Federation. The total number of pheromone traps being used increased by 4 times between 2009 and 2012. New outbreaks of pest quarantine insects were recorded due to the application of pheromone traps.

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0295. Utilization of females as attractants for trapping males of Arecanut white grubs, *Leucopholis lepidophora* (Scarabaeidae: Coleoptera)

Kalleshwaraswamy, C. M., Naveena, N. L., Adarsha, S. K., Latha, S. and Sharanabasappa

Department of Entomology, College of Agriculture, University of Agriculture and Horticultural Sciences, Shimoga, Karnata-577 225

Among the insect pests infesting arecanut, white grubs, particularly *Leucopholis lepidophora* (Order: Coleoptera; Family: Scarabaeidae) is reported to cause tremendous loss, sometimes up to 100%. They feed on roots (hence called root grubs) causing reduced number of roots, loss of anchorage, stem tapering, reduced number of fronds, yellowing, yield reduction and death of the plants. Various management practices are adopted to manage this pest. These includes larval collection by digging soil, flooding, soil application of bio control agents and insecticides, and adult collection during their emergence. Among the different management practices, adult collection is one of the most effective but is very difficult practice as they emerge only during night hours (6-8pm), fly at higher heights (20-25ft) and are not attracted to light. These behaviours make the farmers difficult to catch and leads to increased incidence. Innovative idea emerged during our field studies during July-August 2013 was the use of female beetles for attracting male beetles. Female adults were collected and placed individually in small pouches of nylon net and were tied to the areca palm at a height of 5ft. Trap containing a female beetle attracted male individuals for about 8-10 days. However, the frequency of attraction reduced as the days progressed. During the first day, on an average 8-10 male individuals, 2nd day - 8 to 10, 3rd day-6 to 7, 4th day-4 to 6, 5th day-3 to 4, 6th day-3 to 4, 7th day-3 to 4, 8th day-2 to 3, 9th day-1 to 2, 10th day-1 to 2. The attraction stopped almost from 11th day onwards, but the female lived up to 25-30 days. Only males were attracted to traps. When the males were kept in trap, females were not attracted. This indicates that sex pheromone released by females is effective in attracting male beetles. To our knowledge, this is the first report of utilizing females for attracting male adults of *Leucopholis lepidophora* infesting arecanut. The present study opens up a number of opportunities for researchers in exploiting pheromone technology for large scale attraction of adults. This includes identification of pheromone, synthesis, trap design *etc.* This may reduce the number of labours required for searching and collecting adults during night hours. However, at present situation this female based male attracting technique is a possible and effective method for managing arecanut root grubs to some extent.

Key words: *Leucopholis lepidophora*., white grubs, Arecanut, Pheromones, Karnataka

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0296. Taxonomic study of the subfamily Crambinae (Lepidoptera: Crambidae) from Iran

Shirin Roohigohar¹, Helen Alipanah², Sohrab Imani¹, Graziano Bassi³

1- Faculty of Agriculture and Natural Resources, Research & Science branch
Islamic Azad University

2- Insect Taxonomy Research Department, Iranian Research Institute of Plant Protection
(IRIPP), P. O. Box 1454, Tehran 19395, Iran.

3- Via Sant'Agostino 51, I-10051 Avigliana (TO), Italia.

The subfamily Crambinae with approximately 1987 known species from 174 genera distributed all around the world is one of the 13 subfamilies of the family Crambidae, and by far the largest subfamily after Spilomelinae (Nuss *et al.*, 2003-2013). According to Bleszynski (1965), as far as 370 species from 49 genera are distributed in the Palaearctic region, and considering the newly described species since then, these could be more than this. During the study of the crambine material collected from different parts of Iran since 1960, and preserved in the Lepidoptera collection of the Hayk Mirzayans insect Museum (HMIM) of the Iranian Research Institute of Plant Protection (IRIPP), 56 species from 17 genera were identified, among them the genus *Friedlanderia* Agnew, 1987 and seven species namely, *Euchromius superbellus* (Zeller, 1849), *Friedlanderia cicatricella* (Hübner, [1824]), *Agriphila tristella* (Denis & Schiffermuller, [1775]), *A. poliella* (Treitschke, 1832), *Catoptria dimorphella* (Staudinger, 1882), *Pediasia jucundellus* (Herrich & Schäffer, [1847]) and *Talis dilatalis* Christoph, 1887, were considered as new reports for the fauna of Iran. Hence, considering the species and genera previously reported from Iran (Amsel, 1949, 1950, 1959, 1968; Bleszynski, 1965; Mirzayans & Kalali, 1970; Ebert, 1973; Gutleb & Wieser, 2001; Alipanah, 2004) and are not present in HMIM, the total number of species distributed in Iran reaches to 74 from 20 genera.

Key word.: Lepidoptera, Crambidae, Crambinae, Iran, new record.

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0297. Isolation Of Antimicrobial Compounds From The Whole Body Extract Of *Zophobas Morio* Fabricius Larvae

Johan Ariff Mohtar¹, Faridah Yusof², Azura Amid³

^{1,2,3}Department of Biotechnology Engineering, Kuliyah of Engineering, International Islamic University Malaysia, 50728 Gombak, Kuala Lumpur.

Antibiotic resistance has become one of the leading factors in the failure of antibiotic efficiency. Antimicrobial peptides (AMPs) have been manipulated as alternative to common antibiotics for combating the resistance. AMPs cause membrane permeability destruction in many pathogens. We have successfully recovered antimicrobial compounds from the whole body extract of non-immunized final instar larvae of the supermealworm beetle, *Zophobas morio* using acidified isopropanol. The extract exhibited a strong antibacterial activity against *Klebsiella pneumonia*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* with *K. pneumonia* showing the highest susceptibility towards the extract based on the inhibition zones in the antimicrobial assay. The extract was also shown to be heat stable after exposure at 50 °C, 60 °C, 70 °C, 80 °C, 90°C for 60 min and 120 °C for 10 min. Incubation with trypsin at 37 °C for 30 min had no effect on the extract as judged from the formation of the inhibition zones.. Chemical stability test has shown that the extract was significantly affected by β -mercaptoethanol after incubation for 1 hour at 37 °C which resulted in smaller inhibition zones compared with that of EDTA, SDS and urea. Partial purification of the antimicrobial compounds by bioguided chromatography was performed. The fluid lipid-free extractant was subjected to gel filtration with the AKTA Purifier FPLC system equipped with a UPC-900 monitor, P-920 pump and Frac-950 fraction collector. The sample was injected to a SEPHADEX G-25 FINE column (1.5 cm \times 100 cm) initially equilibrated with three column volumes of 50 mM sodium phosphate buffer (pH 7). The fractions were eluted with 2 column volumes of the same buffer at a flow rate of 1 mL/min and auto-collected in 15 mL tubes (1 mL/tube). Five distinct peaks were identified in the chromatogram in which two peaks (fraction tubes from 114 to 137) showed strong antibacterial activity. This finding has a significant implication to discover novel antimicrobial peptides which can be utilized to improve the development of peptide-based antibiotics as they are more resistant to trypsin-like proteolytic attack. This work is supported by the Ministry of Higher Education through the fundamental research grant scheme (Grant No: FRGS 13-023-0264).

Keywords: Purification, antimicrobial peptides, whole body, extract, *Zophobas morio*

0298. Green apple aphid *Aphis pomi* (De Geer) resistance to insecticides used in apple orchards in various regions of Poland.

Michał Holdaj, Remigiusz W. Olszak, Damian Gorzka
Research Institute of Horticulture, Poland, 96-100 Skierniewice,
Pomologiczna 18 Poland

Poland is the leading producer of apples in the world. In 2012, apple production was 2.8 million tones. Plant protection against pests is one of the major problems for farmers. Green apple aphid (*Aphis pomi*) is a serious threat to apple orchards, especially young trees.

Recently, the selective pressure caused by the increase in the number of chemical treatments eliminating aphids reduces their effectiveness. This is a huge problem, both in Poland and the European Union.

With the financial participation of the National Science Centre in Krakow, we conduct research on green apple aphid resistance to insecticides since 2010. In this project we used two methods. One is a biotoxicological method. It involves the application of insecticide on the filter paper in a small box and introduction aphids to inside and observed their mortality. The second is a biochemical method (MFO activity). MFO system is responsible for detoxification of the insect and is involved in the metabolism of many chemical groups of insecticides such as pyrethroids organophosphates and neonicotinoids. This method consists of examining the level of enzyme activity. Experiments were conducted in 8 apple orchards located in different regions of Poland.

Results of biotoxicological and biochemical analysis shows that in some areas of Poland there are individuals green apple aphid resistant to neonicotinoid insecticides. Biological methods and enzyme assays are reliable methods for the verification of resistance to pests, but in our opinion biochemical method is faster and more accurate. With this method we can quickly modify the plant protection program, in places where the pest resistance to insecticides occurs.

Key words: *Aphis pomi*, green apple aphid, insecticides resistance, biological method, biochemical method

0299. The problem with limiting rosy apple aphid *Dysaphis plantaginea* (Passerini) (Homoptera: Aphididae) in different regions of Poland.

Michał Holdaj, Damian Gorzka

Research Institute of Horticulture, Poland, 96-100 Skierniewice,
Pomologiczna 18

Poland is the leading producer of apples in the world. It has long been known that the problem of pest resistance to insecticides is one of the most important in the plant protection. The monitoring carried out in different regions of the Poland show, that rosy apple aphid occurs in 75% of apple orchards. In most of these orchards, growers use three or more treatments eliminating this pest in season. This selection pressure may lead to the formation of a resistant pests to insecticides. Both of our observations and information from the growers, we know that are problems with the effectiveness of insecticides. Our research is intended to verify that in some apple orchards are resistant individuals of rosy apple aphids. For the investigation we choosed 5 apple orchards from different region of Poland. Individuals of aphid from these orchards have been subjected to biochemical and biological analysis. As a result of experience, we conclude that in the study populations occur aphids resistant to insecticides from neonicotinoid group.

Key words: insecticides resistance, *Dysaphis plantaginea*, rosy apple aphid

0300. Soil macroarthropods in forest-tundra ecosystems of the Khibiny Mountains

I.O. Kamayev, and L.B. Rybalov

¹The All-Russian Plant Quarantine Center (FGBU VNIKR), Moscow, Russia, ²Institute of Ecology and Evolution, Moscow, Russia

Soil arthropods were diverse and numerous that is not common for subarctic ecosystems under severe climatic conditions. The Khibiny mountain's ecosystems, the central part of Kola Peninsula, Russia (67°38' N, 33°39' E) differ from plain zonal communities by their unique conditions (higher amounts of precipitation, complex relief, higher plant species diversity with large share of herbaceous). All high-altitude zones including forest-tundra ecotones are present in the Vudjavrchorr mountain. Several types of ecosystems (2 tundra, 3 forests and forest-tundra) of this territory were studied. Soil macroarthropods were collected with hand-sorting of soil samples (25x25 cm) in August of 2009-2010. The lower number of taxa is observed in the lichen tundra and the higher number – in the spruce forest. We found 88 species of Aranei, 50 species of Staphylinidae, 11 species of Carabidae and others in the communities of the Vudjavrchorr mountain; the most part of them is wide-spread boreal. The total density of macroarthropods sequentially increased from lichen tundra to forests. This parameter ranged from 82 to 482 ex/m² in 1986 and from 104 to 798 ex/m² in 2009-2010. Composition of soil macrofauna depends on community type (table 4). The tundric ecosystems are characterized by lower abundances of taxa excluding spiders (Aranei). The higher abundance of Staphylinidae was recorded only in spruce forest (62-180 ex/m²). The forest-tundra ecotone is characterized by two complexes of macrofauna taxa. The most unstable density was recorded for dipterous larvae in tundric and some forest communities. Distribution of spiders in mountain ecosystems depends on green moss covering and moor humus in the first place. Density of spiders was higher in spruce and birch forests and tundra with green moss and powerful litter (136-168 ex/m² in 2009-2010) and this parameter was lower in birch forests without litter and green mosses.

0301. Effect of Maternal Photoperiod Experience on Diapause Incidence of *Cotesia plutellae*

¹Umsalama A.E.AHMED, ²SHI Zu-hua

¹Department of Biotechnology, Faculty of Science and Art, Taif University, khurma Branch, Khurma, Kingdom of Saudi Arabia

²Institute of Insect Sciences, Zhejiang University, Hangzhou 310029, China

Effect of maternal photoperiod experience on diapause incidence of *Cotesia plutellae* was examined in laboratory by exposing mother generation (G0) to 3 photoperiod regimes (8L:16D, 12L:12D and 16L:8D) at 25°C, and exposing their offspring (G1) to 2 photoperiod regimes (8L:16D and 11L:13D) at 4 temperatures (13, 15, 17 and 20°C). The results indicated that all three diapause-inducing factors, maternal photoperiod experience, offspring rearing temperature and photoperiod, had significant influence on diapause incidence of the parasitoid. Interactions between any two factors were significant. However, the integrated interaction among three factors was not significant. Long day-length experience in G0 lowered the critical temperature for diapause-inducing in G1. The photoperiod experience in G0 had least influence, even no influence on the incidence of diapause when G1 was reared at lower temperatures, but it had an obvious effect on the incidence when G1 was reared at relative higher temperatures.

0302. New Record of Soapbush (*Clidemia hirta* (L.) Don, 1823) as a host and the biology of Tea Mosquito Bug, *Helopeltis theivora* Waterhouse (Miridae: Hemiptera)

Gavas Ragesh^a, Sreekumar^b and P.B. Pushpalatha^c

^aAssistant Professor, Cashew Research Station, Kerala Agricultural University, Madakkathara (P.O), Thrisur, Kerala- 68065, India

^bScientist B, Forest Ecology & biodiversity conservation division, Kerala Forest Research Institute , Peechi (P.O), Thrisur, Kerala- 680653, India

^cProfessor & Head, Cashew Research Station, Kerala Agricultural University, Madakkathara(P.O),Thrisur,Kerala- 680651, India

Of the many species of insect pests reported to attack cashew crop, yield decline is mainly caused by the two major pests, Tea Mosquito Bug (TMB) and cashew stem and root borer (Devasahayam and Nair, 1986). TMB alone causes 30 – 50% yield loss, which during outbreak situations results in cent percent loss (Sunderaraju, 2004). Since the export of processed cashew kernels and other cashew products earns India nearly 3000 crore rupees annually, any tangible loss to the crop will reduce the product value and loss to India's exchequer. The damaging effects of *Helopeltis* spp. were documented over a century ago in India on tea plants and hence the common names “tea mosquito bug” or “Tea bug” were given to this mosquito like pest, which was later identified as *H. theivora* Waterhouse (Sundararaju and Sundarababu, 1999b). The genus *Helopeltis* belonging to the tribe Monaloniini of sub family Bryocorinae and family Miridae, can be distinguished from other genera of Bryocorinae by the elongate, cylindrical body, the large spine like process on the scutellum and the structure of the genital chamber of the female. Of the 41 recognized species of *Helopeltis*, 26 are restricted to Africa and 15 are distributed in Austro-Asian region (Stonedahl, 1991). The species complex of *Helopeltis* affecting cashew plantations in India, include *Helopeltis antonii* Signoret, *H. bradyi* Signoret, *H. theivora* Waterhouse (Sundararaju and Sundarababu, 1999a) and *Pachypeltis maesarum* Kirkaldy. However, *H. antonii* has been widely reported infesting the cashew plantations of Kerala. Both the nymphs and adults of *Helopeltis* spp cause damage by feeding on the tender parts resulting in discoloured necrotic area or lesion around the point of entry of the stylet into the plant tissue. The lesion can be elongate or spherical and becomes darker with age as the tissue around the stylet puncture dies, presumably in response to the enzymatic action of the insects salivary secretions (Stonedahl, 1991). These lesions gradually coalesce and ultimately results in shoot or blossom blight.

0303. Xenobiotic and Detoxification agents of *Coptotermes curvignathus*

Suliana Charles¹, Patricia-Jie Hung King¹, Joseph-Choon Fah Bong¹, Kian Huat Ong²,

¹Department of Crop Science, Faculty of Agriculture and Food Sciences, Universiti Putra Malaysia Bintulu Sarawak Campus, Bintulu, Sarawak, Malaysia, ²Department of Forestry, Faculty of Agriculture and Food Sciences, Universiti Putra Malaysia Bintulu Sarawak Campus, Bintulu, Sarawak, Malaysia

Coptotermes curvignathus (Cc) are subterranean termites which prefer healthy living-tree wood as their diet. Based on their diet preference, the food intake is surely of high cellulose, hemicelluloses and other plant cell component, such as lignin. After establishing RNA-seq of Cc digestome, we presume that lignin might be consumed as a xenobiotic compound and be transported out of Cc's body via xenobiotic and detoxification metabolism. This paper will highlight the potential enzymes that play a role in the metabolism and to give an idea on how this xenobiotic compound (lignin) will be eliminated through Cc. Transcriptomic data were generated from 200 Cc dissected gut using Sepasol Super G for RNA isolation, and Illumina's TrueSeq RNA sample Preparation Kit for library construction. Raw data was trimmed and assembled by SOLEXAQA and bowtie before loaded into Gene Ontology based data mining software, Blast2GO (B2G). Potential enzymes were identified using CAZymes analysis Toolkit and CAZy classification system. The result will showed that, enzymes which are divided into three component (phase I, phase II and phase III), and with the main enzymes highlighted as key role of this metabolism are Cytochrome P450s monooxygenases and glutathione S-transferase. Other enzymes that have been taken into account are UDP-glucuronyltransferases and N-acetyltransferase. Hence, through this metabolism pathway, there might be a potential important of Cc in future functional studies for lignin degradation.

Keywords: *Coptotermes curvignathus*, xenobiotic, detoxification, cytochrome P450, glutathione S-transferase.

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0304. A Comparative Study On Effectiveness And Acceptance Of The Use Of 1% Temephos Sand Granules (Abate ®) And Larvivorous Fish Against Dengue Vector Larvae In Kurunegala District, Sri Lanka.

**M. R.S.S. Bandara¹, P. G. Amarasinghe², M.S. Darmaratne², A. S.B. De Alwis³,
D.R.Widanapathirana¹**

¹ *Regional Office, Anti-Malaria Campaign, Kurunegala, Sri Lanka*

² *Faculty of Medicine, University of Peradeniye, Sri Lanka*

³ *Education, Training and Research Unit, Ministry of Health, Sri Lanka*

BACKGROUND: Outbreaks of dengue fever in a Medical Officer of Health (MOH) area in Rideegama, Sri Lanka due to high dengue vector breeding in Ground Level, Domestic, Cemented, Water Storage Tanks (GLDCWST), had pointed out the need of larval control measure.

OBJECTIVES: To compare the effectiveness and community acceptance for the use of 1% Temephos Sand Granules (TSG) and Larvivorous Fish (LF) (*Poecilia reticulata*), against dengue vector larvae (*Ae.aegypti*, *Ae.albopictus*) in GLDCWST, and to investigate the reasons for community acceptance for interventions.

METHODS: GLDCWST with high larval-index were selected for community based intervention study in Rideegama MOH area. Ninety GLDCWST were included and 1% TSG and LF were introduced as two interventions. Larval densities were monitored regularly for six months. Community acceptances, reasons for the acceptance of the interventions were investigated using pre-tested, structured, interviewer administered questionnaire.

RESULTS: In TSG treated GLDCWST, the Zero Larval Index (ZLI) was achieved in 24 hours and the residual effect lasted after 16 weeks. In LF introduced GLDCWST, the ZLI was achieved in 38 hours and maintained for six months. Community acceptance was significantly higher ($p<0.05$) for LF introduction (74%) than TSG use (26%). The most accepted reason for e LF intervention was its non-chemical nature (54%) and environmental friendliness (21%).

CONCLUSIONS: LF introduction for controlling dengue vector larvae was more effective and community acceptable method than TGS application for GLDCWST.

KEYWORDS: Dengue vectors, Temephose, Larvivorous fish

0305. Development of *Gossypium Hirsutum* Cotton Transgenic events with two Cry 1Ac genes and comparison for efficacy

**Manjula Maralappanavar¹, Sreekanth Patil¹, Siddharudha Patil¹,
Madhura Chandrashekhar¹, Raj Bhatnagar², Altosaar Illimar³,**

¹University of Agricultural Sciences, Karanataka, India, ²ICGEB, New Delhi, India,

³University of Ottawa, Ottawa, Canada

Cotton crop is subjected to severe attack of pests and diseases, which cause substantial yield losses. American bollworm, *Helicoverpa armigera*(Hubner) is the most prevalent and damaging pest of cotton. *Bacillus thuringiensis*(Bt) is a gram positive, aerobic, sporulating bacterium, which synthesise crystalline proteins which are highly insecticidal even at very low doses. The Bt technology has proven its worth in cotton in India. The whole country is monopolised by a single event. The present study reports the development of transgenic events for Bt genes, Cry 1Ac (Altosaar source) and Cry 1Ac with enhancer(ICGEB source) using three methods of co-cultivation of apical meristems, a) Without damaging meristem b) Slitting the meristem with knife and c) Needle prick to the meristem. This was followed by co-cultivation with agrobacterium carrying the Cry 1Ac genes. By slitting of the meristem with knife and co cultivation, it was possible to get positive transgenics successfully at the rate of 0.027 percent. This method necessitates the use of large number of explants co cultivation. From among the positive To events confirmed with PCR, RT-PCR, Southern Hybridization, ELISA and bioassay tests, four events with Cry 1Ac (Event Number-6, 10, 25, 32 and 50) and two with Cry 1Ac with enhancer (Event No.-76 and 78) were identified for further advancement. The comparison of these six events and the commercial Mon 531 event, it was found that Event No. 78 with Cry 1Ac with enhancer was the most efficient with respect to Cry protein synthesis and bioassay efficacy.

0306. Epidemiological pattern of Scabies and its social determinant factors in western Iran

Mansour Nazari¹,

¹Dept. of Medical Entomology, School of Medicine, Hamadan University of Medical Sciences,
Hamadan, Iran

Scabies has a different epidemiological distribution among different communities worldwide due to different social factors, management approaches and healthcare policies. The present study came to address outbreaks of scabies according to the social factors in western Iran. In a cross-sectional study and using the census sampling method, all consecutive patients with the primary diagnosis of scabies based on clinical manifestations referred to healthcare center throughout the two great provinces of Hamadan and Kermanshah at western Iran between March 2006 and February 2010 were enrolled into the study. The baseline characteristics were collected from recorded files at the healthcare centers or by interviewing with the affected patients. Among 3625966 subjects covered by the two studied provinces, 177 cases of scabies (170 cases in Kermanshah and 7 cases in Hamadan) were identified by medical staff at the healthcare centers according to clinical manifestations (85.3%) and laboratory microscopic assessments (14.7%). The highest and the lowest prevalence rates were specified to 2009 (58.2%) and 2008 (1.7%). Regarding gender distribution of disease, 53.1% of men and 46.9% of women suffered from scabies with no significant discrepancy. In respect to age distribution of disease, the highest rates of scabies were revealed in the ages ranged 17 to 30 years (31.6%), followed by younger than 17 years (30.5%). the prevalence of scabies was dependently associated with residency in rural areas, family history of scabies, lower educational level, household density, lower monthly income, low personal hygiene, the existence of livestock or rodents at home, seasonal conditions, and movement to contaminated areas. West region of Iran especially Kermanshah province faced with high prevalence and this high disease burden can be determined by some potential factors such as residency in rural areas, family history of scabies, lower educational level, household density, lower monthly income, low personal hygiene, the existence of livestock or rodents at home, seasonal conditions, and movement to contaminated areas.

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0307. Unusual but astonishing observations on the attempts of mating between *Aeolesthes holosericea* Fab and *Neoplocaederus obesus* Gahn (Coleoptera: Cerambycidae)

S. M. Gaikwad*, N. K. Patil, Y. J. Koli and G. P. Bhawane

Department of Zoology, Shivaji University, Kolhapur. Maharashtra, INDIA.

In the present paper efforts have been made to bring into focus the event of unusual mating attempt between female of *Aeolesthes holosericea* and a male of *Neoplocaederus obesus* when caged together unintentionally after collecting from their natural habitat under laboratory condition. The emergence of beetles of both the species reported during the period Feb - April, 2013. Accidentally, along with the females of *A. holosericea* one male of *N. obesus* was caged and surprisingly in absence of females of own species male of *N. obesus* got mounted on the back of female of *A. holosericea* and started mating. However, there was no any premating courtship behaviour is recorded. This isolated case of mating was observed and recorded during early morning hrs 5 am - 6 am. In this interspecific mating, frequent attempts for insertion of aedeagus into female genital chamber was made but it was not as recurred as the intraspecific mating between male and female of *A. holosericea* which lasts for 1 hr and occurred during night between 8 pm -10 pm. This observation indicates that interspecific mating seems to be attempted so as to prevent the incipient loss of gametes in the absence of opposite sex.

Key words: Mating, *Aeolesthes holosericea* , *Neoplocaederus obesus*

0308. The European red spider mite (*Panonychus ulmi*, Koch), resistance to METI acaricides analysed in selected Polish apple orchards.

Damian Gorzka¹, Michal Holdaj¹,

¹Research Institute of Horticulture, Skierniewice, Poland

Poland is the one of the biggest world producer of apples, but apple trees are inhabited by many herbivores and we should protect them against it. Among others pests, European red spider mite (*Panonychus ulmi*, Koch) is one of the most significant pests occurring in apple orchards in all regions of apple tree cultivation in Europe. For many years of chemical treatment, *Panonychus ulmi* developed resistance to different acaricides in many parts of world. One of current acaricides against motile forms of mites in Polish orchards is Ortus 05 SC (a.i. fenpiroximate) which belongs to the group of METI acaricides (Mitochondrial complex I electron transport inhibitors). Unfortunately, long-term and multiple spray formulations with the same mechanism of action as well as non-adherence to recommended doses of registered agent may cause the emergence of the phenomenon of spider mite resistance to acaricides. As we know from literature, there is available few tools to measure pesticide resistance. In our investigations bioassay tests were performed using Potter spray tower under (laboratory conditions). European red spider mite resistance was tested also by enzymatic activity tests of three complex: mixed function oxidases (MFO), glutathione transferases (GST), and esterases (EST). That enzymatic activities participate in mites and insects detoxification. For bioassay was used populations of *Panonychus ulmi* from 4 orchards located in different regions of Poland and untreated strain using us a control. Motile forms of pests was collected systematically during whole vegetative season of 2013. Fields populations and untreated population of European red spider mite (*Panonychus ulmi*, Koch) differences was found in bioassay and enzymatic activities tests also.

Key words: European red spider mite, *Panonychus ulmi*, insecticides resistance, biological method, biochemical method.

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0309. Biocontrol potential of Entomopathogenic nematodes for the management of Tea Mosquito Bug, *Helopeltis antonii* Signoret (Miridae: Hemiptera)

Gavas Ragesh^a, Deepak S. Poojary^b, Jainit George K^c, Mredhula Raghavan C^c, Daya G.R^c, Nirupa^c and P.B. Pushpalatha^d

^a Agricultural Entomology, Cashew Research Station, Kerala Agricultural University, Madakkathara (P.O), Thrissur, Kerala- 680651, India, ^b Department of Agricultural Entomology, College of Horticulture, Vellanikkara (P.O), Thrissur, Kerala- 680651, India, ^c RKVY Project, Cashew Research Station, Kerala Agricultural University, Madakkathara (P.O), Thrissur, Kerala- 680651, India, ^d Cashew Research Station, Kerala Agricultural University, Madakkathara (P.O), Thrissur, Kerala- 680651, India

Cashew (*Anacardium occidentale* L.) is one of the important foreign exchange earning plantation crops of the country. Several pests attack cashew, out of which Tea Mosquito Bug (TMB) is one of the most important pests of cashew (Devasahayam and Nair, 1986). TMB alone causes 30 – 50% yield loss, which during outbreak situations results in cent percent loss (Sunderaraju, 2004). Since the export of processed cashew kernels and other cashew products earns India nearly 3000 crore rupees annually, any tangible loss to the crop will reduce the product value and loss to India's exchequer. The damaging effects of *Helopeltis* spp. were documented over a century ago in India on tea plants and hence the common names "tea mosquito bug" or "Tea bug" were given to this mosquito like pest, which was later identified as *H. theivora* Waterhouse (Sundararaju and Sundarababu, 1999b). The genus *Helopeltis* belonging to the tribe Monalonini of sub family Bryocorinae and family Miridae, can be distinguished from other genera of Bryocorinae by the elongate, cylindrical body, the large spine like process on the scutellum and the structure of the genital chamber of the female. Of the 41 recognized species of *Helopeltis*, 26 are restricted to Africa and 15 are distributed in Austro-Asian region (Stonedahl, 1991). The species complex of *Helopeltis* affecting cashew plantations in India, include *Helopeltis antonii* Signoret, *H. bradyi* Signoret, *H. theivora* Waterhouse (Sundararaju and Sundarababu, 1999a) and *Pachypeltis maesarum* Kirkaldy. However, *H. antonii* has been widely reported infesting the cashew plantations of Kerala. Both the nymphs and adults of *Helopeltis* spp. cause damage by feeding on the tender parts resulting in discoloured necrotic area or lesion around the point of entry of the stylet into the plant tissue. The lesion can be elongate or spherical and becomes darker with age as the tissue around the stylet puncture dies, presumably in response to the enzymatic action of the insects salivary secretions (Stonedahl, 1991). These lesions gradually coalesce and ultimately results in shoot or blossom blight.

Management measures against the Tea Mosquito Bug (TMB) include rotational application of chemical pesticides, mostly high toxic insecticides of red category. Recommended chemical management option comprised of spraying of λ -Cyhalothrin (0.003%), quinalphos (0.1%) and carbaryl (0.1%) at flushing, flowering and nut-initiation stages respectively, which are the economically important phenological stages of cashew. Entomopathogenic nematodes have been utilized as very effective bio control agents against a wide range of insect pests. Their foraging nature, quick kill and ability to survive for long periods in soil makes them excellent candidates for bio control of soil borne pests. The present study was conducted to evaluate the potential of entomopathogenic nematodes as bio control agents of *Helopeltis antonii* Signoret, Tea Mosquito Bug of Cashew, a above ground pest.

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0310. Development of Grapevine Scale *Parthenolecanium persicae* (Fabricius) and Frosted Scale *Parthenolecanium pruinosum* (Cocquillet) (Hemiptera: Coccidae) on Grapevines in vineyards in the Canberra Wine Region

Nelson Simbiken¹, Paul Cooper¹, Kevin Powell²,

¹Australian National University, Canberra, ACT, Australia, ²Victoria Department of Primary Industry, Rutherglen, Victoria, Australia

Grapevine scale *Parthenolecanium persicae* and frosted scale *P. pruinosum* feed on a range of plants including several economic crops in both the temperate and sub-tropical regions. Persistence of these insects on wine grapes is a concern among the Australian vineyards. Development of both insects was monitored on Chardonnay, Riesling, Sauvignon blanc and Pinot Noir grapevines across three vineyards in the Canberra wine region in 2010 and 2011. Population density of both species was significantly lower on Pinot Noir variety, moderate on Sauvignon blanc and higher on Chardonnay and Riesling. Seasonal variation in population development was observed with higher population density appearing in summer and autumn months whereas declining to lower levels in the winter and spring months. This phenomenon was related to the distribution of different life stages where the first and second instar stages of both species occurred in summer and early autumn. The third instar stage of the grapevine scale and the second instar stage of frosted scale were predominant in the winter months while the adult stage occurred in spring and early summer. Both scale insects utilised grapevine stems and leaves for growth and survival however those reproducing on grapevine stems formed a critical mass for pest outbreaks. Intercropping of Pinot Noir could reduce field dispersal and infestation of grapevine scale however further work is necessary to characterise how Pinot Noir may act as a barrier crop. Integration of barrier crops and the timely application of insecticide may reduce residual populations below the economic threshold.

0311. Integrated Management of *Oligonychus sacchari* (Prostigmata: Tetranychidae) in Sugarcane Commercial Fields

Amin Nikpay^{1*2}, Masoud Arbabi³ & Peyman Sharafizadeh²

¹ Entomology Department, Islamic Azad University, Arak Branch, Arak, Iran ² Division of Plant Protection, Sugarcane & By-Products Development Company, Salman Farsi Unit, Ahwaz, Iran ³ Laboratory of Acarology, Department of Agricultural Research Zoology, Iranian Research Institute of Plant Protection, Tehran, Iran amin_nikpay@yahoo.com

*Corresponding author.

Sugarcane is grown extensively throughout the world including over 20 million hectares in Asia, Africa and Central and South America, and is attacked by a variety of mites. Worldwide, about 30 species of spider mites (Tetranychidae) distributed across eight genera have been recorded attacking sugarcane (*Saccharum* spp. hybrids) and its relatives such as the wild canes *Saccharum spontaneum*, *S. officinarum* and *S. barberi*. Most of these mites belong to the genus *Oligonychus* Berlese, primarily of the subgenus *Reckiella* Tuttle and Baker, and include such major pests as Banks grass mite, *O. pratensis* (Banks), and the sugarcane spider mite or cholam mite, *O. indicus* (Hirst) and *O. sacchari* (Mc Gregor). These mites feed on many grasses, including agricultural crops such as rice (*Oryza sativa*), maize (*Zea mays*), sorghum (*Sorghum bicolor*) and sugarcane, and sometimes attack other monocots, e.g., banana (*Musa* spp.) and coconut (*Cocos nucifera*) and several weeds. The most economically important species in Iran is *O. sacchari* (Acari: Tetranychidae). Populations may build up on wild or weedy grasses before moving to sugarcane fields, generally colonizing the underside of leaf. Usually in the summer months (from late May till late July), large out-breaks of spider mites can occur in sugarcane fields located in south west Khuzestan province. Possible options for controlling this pest rely on chemical and botanical miticides; using high pressure volume of water for washing leaves and creates a wet environment for reduce mite populations, covering the roads between fields by molasses for reducing scattering dusts, control of weeds around the fields, conservation of biological control agents (*Stethorus* spp.) and planting less susceptible cultivars (the main susceptible cultivar is CP57-614). One effective tactic is to treat spider mite "hot spots" - small areas with large pest populations - first with miticides sprays and then follow up with natural enemy releases in the hot spot. This approach can be especially efficient if miticides with low toxicity to predatory mites are used, e.g. Floramite, Oberon, Neem-Azal, GC-Mite and Biomite as predators can be attack to remaining spider mites or their eggs. In this paper, we discussed all available control options which can be use safely and practical in sugarcane fields against *O. sacchari* infestations.

Key words: Sugarcane Yellow Mite, Out-breaks, Miticides, Biological Control and *Oligonychus sacchari*.

0312. Democratizing Taxonomy for Human Well-being

Priyadarsanan Dharma Rajan

Ashoka Trust for Research in Ecology and the Environment (ATREE)

Royal Enclave, Srirampura, Jakkur Post, Bangalore - 560 064, India.

Equitable sharing or rather democratizing of knowledge is the important challenge humanity is facing today. To address this the scientific community should identify the needs of the common man, try to prioritize solving his issues and speak a language understandable to him. Academia should adopt a strong approach in solving societal issues actively engaging with policy makers, practitioners, students and wider public audiences. This paper examines how taxonomy is important for human well-being and can be practiced democratically- involving people of all walks of life. Taxonomy is generally embedded in every local cultural and social systems, and serves various social functions. Every language and dialect is rich with local taxonomic knowledge. These naming systems are vital information to survival -such as information on the fruiting patterns of trees and the habits of the pests and wild animals etc. This parallel system of orally transmitted folk taxonomy has not been documented properly. The folk and traditional taxonomy are systems of classifications largely based on the human use while modern taxonomy is based on observable characteristic or trait of an organism or phenotype. In Post Linnaean period, taxonomists in a rush to describe maximum species, the use values were often ignored. The power has the habit of the beholder being hesitant to share or delegate to the lower cadres and the deprived waiting for chances to revolt. The knowledge system being a also is not different. The beholder tries to monopolize. In the era of globalization, knowledge has become yet another commodity and the rich tend to behold the power of knowledge using the monetary power. In the cyber age, there is a strong movement to use internet as a suitable vehicle for free and equitable sharing of knowledge. Mean time in terms of preventing of biopiracy or establishing sovereign right of nations over the biological diversity several state restrictions coming into effect preventing the free flow of knowledge.

0313. Use of Botanicals Against Termites in Pakistan: Field Perspectives

FarkhandaManzoor

Department of Zoology, Lahore College for Women University, Lahore.

Nowadays, the use of bio-pesticides is the subject of many studies to protect environment and preserve wood from the decaying organisms like fungi and termites. Indigenous knowledge and use of traditional plant materials by local communities are the key areas that have yet to be adequately addressed in termite management (Chitere and Omolo. 1993) Keeping in view the importance of biopesticides, Studies have been carried out to explore the indigenous knowledge and the termiticidal activity of extracts of ethnobotanically important local plants of Pakistan . *Microtermesobesi* Holmgren and *Odontotermesobesus* (Rambur) are widely distributed in buildings and agricultural fields of Pakistan, and are considered to be the most notorious subterranean wood destroying termites in Pakistan (Manzoor, 2010). Present study was an attempt to assess the ethnobotanical importance of five local plants (*Ocimumtenuiflorum* L. (Tulsi), *Cistanchetubulosa* (Schrenk) Hook.f., *Azadirachta indica* A. Juss. (Neem), *Melia azedarach* L., *Salvia splendens* Sellow ex Roem. & Schultes (Sage) as promising source for the control of termites under field trials. For this purpose crude extracts of these plants in water and organic solvents (chloroform, methanol & petroleum ether) were tested against *Microtermesobesi* Holmgren and *Odontotermesobesus* (Rambur). Wooden blocks of poplar were treated by crude extracts and were tested in the fields of Changa Manga Plantation by mean visual rating and mean wood loss. The results showed that among all the tested aqueous extracts, only *Ocimumtenuiflorum* L. (Tulsi) showed moderate termiticidal activity while the organic extracts of almost all the plants showed termiticidal activity. Overall *Ocimumtenuiflorum* L. (Tulsi) emerged as most potent termiticidal plant.

Key words: *Ocimumtenuiflorum*, *Cistanchetubulosa*, *Azadirachta indica*, *Melia azedarach*., *Salvia splendens*, termiticide

0314. Morphometric Diversity Of Indigenous Honeybee, *Apis Dorsata* Indistrict Nankana And Sialkot Of Punjab, Pakistan

Iram Nasir, Um-e-habiba Zafar and Smina Qamer*

Department of Zoology, Wildlife and Fishers, Govt. College University, Faisalabad, Pakistan

The present research was designed to study different morphological characters of *A. dorsata* worker bees collected from 5-6 locations of two different districts (Nankana, and Sialkot) of Punjab, Pakistan to characterize this honey bee species population on geographical basis. At least 30 worker bees were collected by using smoke. All samples were preserved in 50% alcohol before analysis. Twenty characters were observed. Average body weight and length determined for bees of district Sialkot were 110.9 mg, 1.5cm and Nankana 80.50 mg and 2.1cm, respectively. An equal (13.1mm) forewing length was found for bees of both districts. In the same way, forewing width 4mm, 3.9 mm, Cubital index of left forewing 7.7 μ m, 8.7 μ m, right forewing 7.8 μ m and 8.8 μ m, no. of humuli 25.8, 24, foreleg length 8.9mm and 10.5mm, tibia length 3.2mm and 4 mm were measured for *A. dorsata* species from districts Nankana and Sialkot, respectively. Whereas, similar (10mm and 14mm) length of middle leg and hind leg, femur length (3mm), proboscis length (6mm), body width (5mm), abdominal segments (6), sub segments of antennae (10), simple eyes (3), length of hind wing (9mm) and length of antennae (5mm) were recorded from both areas. Significant variations have been noticed among foreleg length, tibia length, no of humuli and cubital index of worker bees of *Apis dorsata*. No of humuli and cubital index is one of the important taxonomic characters for the discrimination of similar populations of honey bee.

Keywords: Morphology, *A. dorsata*, cubital index, humuli, Pakistan

0315. Evaluation Of Intercropping And Organic Soil Ammendments Against Okra Flea Beetles, *Podagrica* Spp

Oladele Onunkun

Department of Agricultural Science, Adeyemi College of Education, Ondo,
Ondo State, Nigeria.

Sustainable production of food is rooted in maintaining the integrity of plants by making use of natural and organic methods to control pests. This study was conducted to evaluate four intercropping modules and three soil amendment methods in Nigeria between 2007 and 2008 for the management of okra flea beetles. The intercropping modules were sole okra, okra and pepper intercrop, okra + amaranth intercrop, okra + pepper + amaranth intercrop, while the second factor, soil amendments, were in three modules - Farm yard manure(FYM) at 10 t/ha, poultry manure(12 t/ha) and palm bunch ash(4 t/ha). All the experiments were arranged in a randomized complete block design in four replications. There was main effect of intercropping as population of flea beetles was found to be significantly lower on plots where there were intercrops compared with the control (sole crop). The results on population of flea beetles also indicated a main effect of organic soil amendment as FYM at 10 t/ha was found to be the best treatment followed by poultry manure (12 t/ha) and palm bunch ash(4 t/ha). The number of flea beetles was significantly low in plots with combination of okra + pepper + amaranth intercrop and FYM. The results did not show significant interaction in the other combinations. The yield of okra recorded in okra + pepper + amaranth intercrop (4.85 t/ha) was significantly ($p<0.05$) higher compared to control (1.72 t/ha). It is concluded that crop diversity leads to low density of insect pests in okra and increased yield of the crop.

Keywords: Intercropping, Farm yard manure, palm bunch, flea beetle.

0316 . Therapeutic Potentials of Nigerian Insect-propolis against the Malarial Parasite, *plasmodiumberghei* (Haemosporida: Plasmodidae)

**¹Olayemi, I.K. *; ¹Adeniyi, K.A.; ²Shittu, K. O.; ¹Busari, J.
and ¹Ukubuiwe, A. C.**

¹Department of Biological Sciences, Federal University of Technology, Minna,
Niger State, Nigeria.

²Department of Biochemistry, Federal University of Technology, Minna,
Niger State, Nigeria.

Chemotherapy remains the most viable tool for managing clinical condition of malarial. The success of this strategy is, however, short circuited by widespread development of resistance to available anti –malarial drugs by plasmodium parasite. The urgent need to therefore, explore non-botanical sources for alternative potent anti-plasmodia lead –agents, with inherent tendencies to delay parasite –resistance informed this study; which bio –assayed extract of the Nigerian honey-bee propolis against *P. berghei*. Methanolic extract of the propolis was prepared and tested for acute oral toxicity in mice, following standard protocols. For anti –plasmodia efficacy, 15 healthy mice of mean weight 20-22g, were experimentally infected with *P. berghei*, randomized into three groups (i.e, group I-III) of five Mice each. Then, the mice were intra-peritoneally injected daily (for five consecutive days post-infection), with 0.2ml/kg body weight (Group 1: Negative Control); 600mg/kg body weight (Group II: Test experiment); and 5mg/kg body weight (Group III: Positive Control). Thin blood smear was used to determine levels of parasitaemia while Erythrocyte Packed Cell Volume (PCV) was estimated prior to infection with berghei (i.e., Day 0), 72 hours post-infection (Day 4) and four days post-commencement of treatment (Day 7). The mice were monitored for duration of survival as well. The Results showed relative to negative control, the extract significantly ($P<0.05$) reduced level of parasitaemia in the treated mice, with its peak activity recorded on the last day of observation; a pattern distinctly different from the positive control. There was a general increase in PCV till Day 4 before dropping significantly, especially.

Key words: Chemotherapy, Propolis, Plasmodium, Intra-peritoneally, Parasitaemia.

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0317. Host Range And Role Of The Ectoparasitoid, *Choetospila Elegans* Westwood (Hymenoptera: Pteromalidae) In The Suppression Of Its Host Insect, *Sitophilus Oryzae* (L.)

Khandker Nesar Ahmed

Chief Scientific Officer, Zoology Section, Biological Research Division
BCSIR laboratories, Dhanmondi, Dhaka

Control of insect pests by biocontrol agents like beneficial insects, parasitoids, predators, pathogens etc. are essential elements of biological control. Success of using this parasitoid in bio-control programme usually depends not only on the availability of their insect hosts but sometimes on a complex system of other factors such as additional food sources, alternate hosts and shelter. The most favourable combinations of natural enemies would be those that tend to parasitize or prey on different stages of the host. The purpose of this study was to assess the suitability of the parasitoid, *Choetospila elegans* in controlling the noxious insect pest, *Sitophilus oryzae* infesting stored rice and wheat kernels in tropical conditions of Bangladesh.

The parasitoid *C.elegans* is a solitary ectoparasitoid on many coleopteran and lepidopteran larvae. In an insect, parasite or parasitoid sustenance of host is very important factor. Survival of a parasitoid depends on its hosts or host insects for completion of its life cycle. In the absence of a suitable and optimum sized host, a parasite is unable to continue its further generations. In many cases as the parasite matures, the host dies. The ultimate result is two-fold, a host is killed and a natural enemy survives. This phenomenon keeps the balance which is the essential element of biological control and also conservation of parasitic insect species in nature. Host range means many kinds of host insects or insect pests that can be parasitized by a particular parasitoid species. *C. elegans* has a multiple host range, it attacks a number of insect species which are major pests of stored grain or grain products such as *Sitophilus oryzae*, *S. zeamais*, *S. granarius*, *Rhyzopertha dominica* etc. A host plays most significant role in the life of a parasite. Because, if an adult mated female parasite does not find a suitable host stages or if there exists a scarcity of host, the next generation of parasitoid population becomes uncertain or the parasitoid population decreases to a greater extent. On the other hand, if a parasite has a wide range of hosts in nature, it can parasitize any host species available, even when one is lacking or in scarcity or in a meagre number. So, multiple host range always offers an advantage to a parasitoid for its better existence in nature.

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0318. Soil Microarthropods As Ecosystem Health Indicators Of Oil Pollution In A Secondary Rainforest, Rivers State, Nigeria

Gbarakoro T. N.¹, Okiwelu S. N.^{1,3}, Badedjo M. A.²

Department of Animal and Environmental Biology, University of Port Harcourt,
Port Harcourt, Nigeria.

Department of Zoology, Obafemi Awalowo University, Ile-Ife, Osun State, Nigeria

Comparisons were made of the species richness and densities of soil micro-arthropods (mites, collembolans) from an unpolluted secondary forest and a nearby area, where there had been an oil spill, approximately 1 year before the commencement of the 2yr study, May, 2007 to April, 2009. Soil samples were taken monthly with an 8.5cm diameter bucket-type auger. Extraction was by the Berlese-Tullgren funnel. Identification was undertaken with the aid of standard keys and comparisons were made with type specimens. Mean Total Hydrocarbon (THC) values were 630 mg/kg (43.0 to 1000.0) and 10 mg/kg at the polluted and unpolluted habitats respectively. Among the mites, Cryptostigmata (Oribatids) were dominant in both unpolluted (69.85%) and polluted (74.25%) habitats; the least abundant were the Prostigmatids. Within the *Oribatids*, *Scheloribates spp.*, *Galumna spp.*, *Parallonothrus nigeriensis* and *Bicrythermania nigeriana* were collected from both habitat types. In contrast, *Mixacarus sp.*, *Annecticarus sp.*, *Atropacarus sp.*, *Oppia sp.*, and species that belong to each of the families of Bellidae, Cephalidae, Basilobellidae, *Epilohmannia sp.*, *Mesoplophora sp.*, *Archeogozettes magnus* and *Northrus Iasebikani* were restricted to the unpolluted habitat. In the *Mesostigmata*, only species that belong to the families Parasitcidae and Rhodacaridae were found in both habitat types; species that belong to the families Polyaspididae, Uropodidae and *Asca sp.* were restricted to the unpolluted habitat. The Prostigmata, *Bellide sp.* were collected from unpolluted and polluted habitats. Among Collembolans, *Cryptophagus* and *Paranella* were found in both habitat types while *Hypogastura*, was restricted to the unpolluted habitat. Abundance and densities of mites and collembolans were respectively significantly reduced in the polluted habitat ($p < 0.05$; $df = 9$; $F = 20.5$; $p < 0.05$; $df = 9$; $F = 30.08$). These findings are discussed within the context of the use of monitor (tolerant) and indicator (sensitive) species in bio-monitoring and assessment of oil pollution.

Key words: Soil mites, collembolans, oil pollution, densities, monitor/indicator species, rainforest, Nigeria.

0319. Some studies on the taxonomic status of the genus *Aiolopus* Fieber (Acrididae : Acridoidea: Orthoptera) from Pakistan .

Barkat Ali Bughio, Riffat Sultana and Muhammad Saeed Wagan

Department of Zoology, University of Sindh. Jamshoro, Pakistan

At the present orthopteran fauna in agricultural fields of Pakistan were investigated. The large numbers of specimens have been collected from different provinces of Pakistan during the year 2011-2012. Three species namely *Aiolopus thalassinus thalassinus* , Fabricius, *A.thalassinus tumulus*, Fabricius, and *A.simulatrix simulatrix*, Walker, of subfamily Oedipodinae were came in collection. However, the most dominant and widely distributed species was *Aiolopus thalassinus thalassinus* its distribution has been reported throughout country. Besides this; some important characters of male and female genitalia have also been studied. All above studied species were recognized as severe pest of many valued crops in Pakistan. Present investigation has been carried out for the first time from this region.

Key Words: Orthopteran, *Aiolopus*, Pest, Genitalia, Distribution, Pakistan

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0320. Experience in the analysis of perennial records of Carabid beetles (*Coleoptera*, *Carabidae*) in the Barguzin mountain ridge (North Pribaikalye)

Ananina T.L.

Federal State Organization “Zapovednoe Podlemorye”

The research is based on the results of the quantitative records of carabid beetles in the Barguzin nature reserve, conducted in key plots of the eponymous ridge in the Davsha valley in 1988-2012 by the standard method of pitfall trapping.

To study rhythms of natural processes is the main task of biomonitoring in protected natural territories. To get statistically significant results and to look at the eco-system processes in new ways allows long-term observation by natural processes. Tasks that do not lend themselves to the study of traditional ways of processing biological data can be solved with the help of some statistical procedures. The discovery of the periodical component was subject of our attention in carabid`s long-term dynamics number.

Graphical representation of the data under analyzed helps better understand their localization and distribution pattern. Periodicity of natural phenomena is not strict. Interpretation of dynamic series charts complicated by the fact that the same type of state is repeated over different time intervals. Filting procedure makes values x-coordinate smoother. From a wide range statistical methods of time series I considered autocorrelation analysis, lineal and polynomial regression have chosen. Correlogramma allows to reveal short period of time, the polynom`s trend – long one.

87 dynamic series of 18 dominant species carabid beetles in 11 habitats were analyzed. Significant results in 35 dynamic series of 15 dominant species were obtained. If prolonged monitoring of population dynamics shows only wave character of the series, then the use of the autocorrelation function in our calculations makes it possible to indentify T periods and to determine their size. Short period $T = 2$ is marked in all the species of the genus *Carabus* (*C. odoratus* Shil., *C. loschnicovi* F.W., *C. henningi* F.W.) and *Calathus micropterus* Duft., *Pterostichus adstrictus* Esch., *Curtonotus aulicus* Panz., *Amara ovata* Fabr. Period $T = 3$ is recorded in *Pterostichus montanus* Motsc., *Pt. eximius* Mor.; $T = 4$ – in *Pt. dilutipes* Motsc., *Cicindela sylvatica* L.; $T=5$ – *Amara similata* Gyl. For the series species: *Pt. orientalis* Motsc., *Amara nitida* Sturn., *Am. quenseli* Sch., *Harpalus latus* L., all the autocorrelation coefficients were not valid. Periodic component was not detected.

Keywords: Barguzin range, carabid beetles, population, dynamics number, autocorrelation, polynomial regression, period.

0321. Study On The Combined Impact Of Henna And Pyridalyl Against *Spodoptera Exigua* (Hubner) (Lepidoptera: Noctuidae) Under Laboratory Conditions

Saghfi, M¹., Valizadegan, O²

1.Department of plant protection, Urmia University,Urmia, Iran

2.Assistant professor of plant protection, Urmia University, Urmia, Iran

Sugar beet is one of the strategic crops in Iran, and plays an important role in sugar production. In recent years, there is ample research works which are focusing on sanitation issues based on reduction of insecticide loads in environment and hazardous effect on non target natural enemies. One of the measures to achieve such a goal is getting benefit from combination of an appropriate insecticide with a non toxic adjuvant. In the present research, Henna as a wetting agent has been used in conjunction with pyridalyl against the pest in question. The LC₅₀ values of pyridalyl for first, second and third instars larvae were estimated 956, 1369 and 1403 ppm, respectively. The combination of pyridalyl with Henna increased the larval mortality rate up to 15%. Based on the data collected in the present research it could be concluded that combination of these two less hazardous chemicals is merit to be considered as a candidate control agent against *Spodoptera exigua*.

Key words: *Spodoptera exigua*, Pyridalyl, Henna, Bioassay

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0322. Brief Study On The Occurrence And Habitat Of Dwarf Honeybee, *Apis Florea* Collecting Honey From Sugarcane In Bangladesh

Khandker Nesar Ahmed

Chief Scientific Officer, Zoology Section, Biological Research Division
BCSIR laboratories, Dhanmondi, Dhaka

The dwarf honeybee, *Apis florea* Fabricius (Hymenoptera; Apidae) is one of the members of the Asiatic honeybee which has great potential for apiculture and development throughout tropical and subtropical Asian regions. *A. florea* is a small honeybee and it was encountered during September, 2007 nesting on the stem of Dholkalmi plant (*Ipomoea fistulosa* Mar.) adjacent to sugarcane field in Rajshahi, Bangladesh. The beehive of this pigmy honeybee was about 35 cm in length and 25 cm in diameter which remain suspended downwards. The beehive was tapering at the base and gradually swollen at the middle and it again become narrower at the distal end. After detaching beehive from the plant, honey was poured down and preserved for qualitative study. About 700 gm of honey was obtained from the wild nest (beehive) of *A. florea* . It was interesting to note that this honey was tasted as molasses because of the workers and drone honeybees collected honey from succulent stem and flowers of sugarcane plants. Generally, the broods in the beehive were not attacked by hymenopteran parasitoids. The wild nesting of this honeybee was encountered in thatched and bamboo-made houses and among bushy shrubs from different localities all over Bangladesh. The study on foraging behaviour, nesting habit, honey production etc. needs special attention to the apiculturists. Beekeeping might be a profitable cottage industry to the rural poor inhabitants of Bangladesh.

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0323. Poor Acoustic Perception of Gleaning Bats Yields Alternative Modalities of Prey Response in Terrestrial Crickets (*Teleogryllus* spp.)

Kibedi, J.⁽¹⁾, Zimbardi, K.⁽¹⁾, Kibedi, T.⁽²⁾ & G. Walter⁽³⁾

⁽¹⁾ School of Biomedical Sciences, The University of Queensland, Brisbane, QLD 4072;

⁽²⁾ Department of Nuclear Physics, Australian National University, Canberra, ACT 0200;

⁽³⁾ School of Biological Sciences, The University of Queensland, Brisbane, QLD 4072

Acoustic localisation of echolocating microbats is a challenging process for field crickets in the wild since attenuation of bat signals by environmental factors and inherent call design, alter the cues available for perception. Laboratory-based investigations have established thresholds of bat call parameters required to elicit responses from crickets, but we do not know just how audible these signals are to listening crickets in the wild. Moreover, bat ultrasound does not elicit avoidance behaviour when crickets are on the ground, despite the incidence of terrestrial encounters with echolocating bats that glean. Acoustic-based evasion by crickets in this setting is therefore questionable, but alternative modalities mediating escape from bats are unknown. Extrapolating from the neural audiogram of field crickets (*Teleogryllus oceanicus*), we determined the relative audibility of search, approach and buzz phase signals recorded in the field from two bat species foraging above a wild cricket colony. We then determined the critical distance at which crickets would first detect the search phase calls of these bats. Mean relative amplitude of all call phases from the aerial hawker *Scotorepens greyii* (little broad-nosed bat) and gleaning specialist *Nyctophilus gouldi* (Gould's long-eared bat) were below cricket auditory thresholds (< 70 dB SPL), but would be detectable if crickets were 1.37 m and 0.9 m closer, respectively, to these bats. For *S. greyii*, the critical distance of detection by crickets was 5 m, beyond the detection range of the bat, but only 0.86 m for calls from *N. gouldi*. During direct encounters with wild caught *N. gouldi* in an arena in the field, crickets did not show early detection or avoidance, despite long-eared bats echolocating consistently during testing. Crickets responded only upon contact by a bat, and always with a rapid, large leap away, suggesting a critical role for touch-evoked mechanisms (e.g. the cerci) in terrestrial evasion of bats. We describe for the first time, the authentic acoustic environment for field crickets listening to echolocating bats in the wild. Whereas bats are generally inaudible to terrestrial crickets, our findings provide field-based verification that echolocation call design from different bat guilds translates to differences in auditory perception by field crickets. Crickets appear to be ill-equipped for acoustic detection of the most potent threat (gleaners) on the ground. However, within the terrestrial context of interactions where crypsis is possible, late stage responses driven by touch-evoked mechanisms may be sufficient for field crickets to successfully evade predatory bats.

Key words: terrestrial, echolocation, bat, cricket, touch-evoked, acoustic

0324. Whitefly: As an Emerging Begomoviral Diseases Problem in Agro-ecosystems

M.S. Khan¹, S.K. Raj², A.K. Tiwari³, S.H. Ji¹, S.C. Chun¹

¹Department of Bioresources and Food Science, College of Life and Environmental Sciences, Konkuk University, Seoul, 143-701, Republic of Korea

²CSIR-National Botanical Research Institute, Rana Pratap Marg, Luvlnow, 206-001, India

³Center for Sugarcane Biotechnology, UP Council of Sugarcane Research, Shahjahanpur, 242-001, (U.P.) India

Whitefly (*Bemisia tabaci*) (Hemiptera: Aleyrodidae) was described in 1889 as a tobacco pest in Greece and named tobacco whitefly (Gennadius, 1889) and has since been recognized as one of the most important pests worldwide in tropical and sub-tropical agriculture as well as in greenhouse production systems. Economic losses are estimated in the hundreds of millions of dollars. It adapts easily to new host plants and has now been reported from all continents except Antarctica. It is generally considered to have originated from the Indian subcontinent, where more than 290 species in 57 different genera have been described (Brown *et al.*, 1995). Under suitable conditions, *B. tabaci* may develop 10 to 15 generations in one year. Females may lay 100-500 eggs over a period of 3 to 6 weeks. About 1300 whitefly species in over 120 genera have been described (Mound and Halsey, 1978). Such distinct populations have been termed 'biotypes' A to T (Perring, 2001; Demichelis *et al.*, 2005)

B. tabaci is a vector of 111 plant virus species in 7 distinct virus groups including geminiviruses, closteroviruses, carlaviruses, potyviruses, nepoviruses, luteoviruses and a DNA-containing rod shaped virus (Oliveira *et al.*, 2001; Jones, 2003). Of the whitefly-transmitted virus species, 90% belong to the *Begomovirus* genus, 6% to the *Crinivirus* genus and the remaining 4% are in the *Closterovirus*, *Ipomovirus* or *Carlavirus* genera. Begomoviruses are the most numerous of the *B. tabaci* transmitted viruses and cause crop yield losses of between 20% to 100% (Brown and Bird, 1992). In severe epidemics, the effect of the disease is near total loss of crops and annual damages range in the hundreds of millions of dollars (Nakhla *et al.*, 2005, Brown and Idris, 2008). Cassava, cotton, beans, cowpea, soybean, tobacco, tomatoes, peppers, okra, cucurbits, crucifers, melon, watermelon, lettuce, pea and papaya have been affected by begomoviral diseases. Symptoms include yellow mosaic, yellow vein, leaf curling, leaf rolling, vein thickening and stunting of infected plants. *African cassava mosaic virus* (ACMV), *Tomato leaf curl virus* (ToLCV), *Tomato yellow leaf curl virus* (TYLCV), *Cotton leaf curl virus* (CoLCV), *Bhendi yellow vein mosaic virus* (BYVMV), *Papaya leaf curl virus* (PLCV), *Mungbean yellow mosaic virus* (MYMV) and *Bean golden mosaic virus* (BGMV) are the major begomovirus causing destructive yield loss to related crops and other crop and non-crop species worldwide (Faquet and Stanley, 2005).

The increase on the incidence of begomoviruses is specifically associated with the explosion of *Bemisia* population especially the spread of the more fecund B-biotype (Perring, 2001; Seal *et al.*, 2006; Castillo-Urquiza *et al.*, 2008; Hanssen *et al.*, 2010). Populations of *B. tabaci*

in the Imperial Valley of California increased 300-fold from the mid-1970s to the mid-1980s, and 1600-fold from the mid-1970s to the mid-1990s (Wisler et al., 1998). In Israel, *Tomato yellow leaf curl virus* (TYLCV-Is) has emerged as a major constraint due to the introduction of biotype B. Over the last three decades in tropical and sub-tropical Americas, begomovirus epidemics has increased several folds due to the introduction and wide dissemination of biotype B (Ambrozevicius et al., 2002; Ribeiro et al., 2003). Ribeiro et al. (2003) described the emergence of some tomato infecting begomoviruses in Brazil due to the introduction of biotype B whitefly. In Jamaica due to the introducing of B biotype, a sharp increase in begomoviral diseases resulting in severe yield losses in several economic crops have been reported (Roya et al., 2003). In south India till early 1990s, tomato was not favoured as a host by indigenous *B. tabaci* populations but due to the introduction of B-biotype, *B. tabaci* numbers on tomato increased by approximately 1,000-fold at the last of the century (Banks et al., 2001).

However, hurricanes and/or prevailing winds are known to move viruliferous whiteflies long distances over water resulting in the spread of begomoviruses (McGlashan et al., 1994; Blair et al., 1995; Polston et al., 1998; Varma and Malathi, 2003; Loebenstein and Thottappilly, 2009). But trade route especially to lead to introduction of the B and Q biotypes (Ha et al., 2006; Ma et al., 2007) seems to be the major means of spread over long distances (Lyttle and Guy, 2004; Ha et al., 2006). Recently, the rapid dispersal of biotype Q in China (Zhang et al., 2005) and in New Zealand (Drayton et al., 2009) was found to be directly associated with the ornamental trades from other countries.

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0325. Laboratory bioefficacy of commercial available sample for mosquito repellent against *Aedes aegypti*

G.D.Hebbalkar

Entomology Section, National Chemical Laboratory
Pashan, Pune-411008, Maharashtra India

Personal protection is one of the established methods to prevent mosquito bites. Presently, repellents are currently available either in synthetic chemicals or plant based chemicals. In the present work three different mosquito repellents viz. Advanced Odomos (N, N Diethyl benzamide 12% w/w cream base with improved fragrance and vitamin E), Advanced Odomos naturals (N, N- Diethyl benzamide 12% w/w cream base with natural Citronella and Aloe vera) and Odomos Gel (N, N Diethyl benzamide 12% w/w gel) were evaluated for mosquito repellent activity against *Aedes aegypti*. Different concentration of test samples viz. 2.5, 5, 7.5 and 10mg/cm² was used for bioefficacy study. Maximum complete protection (100%) was achieved at 10mg/cm² in advanced Odomos natural. Further details of these findings are discussed in this paper.

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0326. Diversity pattern of Syrphidae family (Diptera) in different habitats in the eastern part of Zanzan province, Iran

Masumeh Naderloo, Shahrokh Pashaei Rad

Department of Zoology, Faculty of Biological Science, Shahid Beheshti
University Tehran, Iran

The Syrphidae family, commonly named as hover flies or flower flies with almost 225 genera and about 6000 species is one of the largest families of Diptera. The adult flies mainly feed on nectar and pollen. Therefore they are very important as natural pollinators of flowering plants. The larvae of many species of Syrphidae are natural enemies of many pests such as aphids, scales, thrips and caterpillars in agroecosystems and play an important role in biological control, especially those of the subfamily Syrphinae.

Diversity of hoverflies of eastern part of Zanzan province was studied in eight different habitats (Sayan, Taham, Kheir Abad, Amid Abad, Qale hosseinyeh, Gilvan, Sojas and Dehjalal) in 2008-2009. In total, 31 species belong to 16 species from 2 subfamilies with 1017 individuals were collected. Results indicated, Sayan with 19 species and Sojas with 6 species showed the highest and lowest degree of number species richness and species diversity, also Sayan and Amid Abad showed the highest and lowest species evenness respectively.

Key words: Syrphidae, Diversity, Zanzan, Iran.

0327. Plant Feeding Mites of Economic Plants of India

R. N. Singh and I N Mukherjee

Department of Entomology & Agricultural Zoology,
Institute of Agricultural Sciences, Banaras Hindu University, Varanasi 22 I 005

Several phytophagous mite species are becoming problem pests in the recent years due to intensive agriculture and high input production systems all over the country. In India only 5-8% mites are described in comparison to 30,000 described species of the world. The total expected un-described species of the mite are 20 times of the described species. A study on mite problem in Indian agriculture has gained momentum because of the awareness of farmers. The damage caused by many species is obvious but only a limited effort has been made to visualize the problem of detrimental species. The major plant feeding mites of families Tetranychidae, Tenuipalpidae, Eriophyidae and Tarsonemidae are described in the paper. The major pest species of tetranychid are *Tetranychus urticae*, *Tetranychus neocalidonicus*, *Tetranychus ludeni*, *Tetranychus macfarlanei*, *Eutetranychus orientalis*, *Eutetranychus hirsti*, *Oligonychus indicus*, *Oligonychus coffeae*, *Oligonychus mangiferus*, *Schizotetranychus andropogoni*. In this group *Panonychus citri* has been identified as emerging pest on apple in Himachal Pradesh. *Petrobia latens* has been identified as a serious pest for dry land agriculture on coriander and wheat in Rajasthan. Among tenuipalpid mite, *Larvacarus transitans* has been listed as a serious pest of *Ziziphus mauritiana* in Rajasthan. In eriophyid mite, *Aceria guerreronis* has been listed as mite of national importance. In tarsonemid group, *Polyphagotarsonemus latus* has been identified as serious pest on chilli. The knowledge on important detrimental species is necessary when our agriculture is continuously expanding. There is regular fall in stability and sustainability of useful species due to rapid change in cultural practices. Therefore, the aim of the present paper is to visualize the magnitude of the mite problems on important crop. The paper also suggest future thrust on use of bio-agents for integrated mite control (IMC), recognition of eco-friendly acaricide for IMC, problem of mite outbreak, acaricide resistance and its management.

Key Words: biodiversity of mites, integrated mite control, Tetranychidae, Tenuipalpidae, Eriophyidae and Tarsonemidae

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0328. Non Pesticidal management strategy for control of insects

S.G.Deshpande

Entomology Section, National Chemical Laboratory
Pashan, Pune-411008, Maharashtra, India

Stored grain insects (*Tribolium castaneum*, *Sitophilus oryzae*) and public health importance insects (*Periplaneta americana* and *Cimex lectularius*) have started to become resistant to various synthetic insecticides. However, there is a need for alternate method to control these insects. Dry ice (CO₂) can be used as effective method to control most of the adult and larval insects. The fumes from vaporizing dry ice (CO₂) are heavier than air and readily replace the existing air. An attempt was made to assess the laboratory bioefficacy of dry ice against adult of *Tribolium castaneum*, *Sitophilus oryzae*, *Cimex lectularius* and *Periplaneta americana*. Results suggest that bed bug, cockroach and Tribolium adult's exhibit significant (100%) mortality after 24 hrs exposure of dry ice. Persistence of this activity were studied up to 4 weeks. Further details of these findings are discussed in this paper.

0329. Butterfly Abundance and Species Diversity in Some Urban Habitats

Ashok Kumar

Department of Zoology, B.S.N.V. P.G. College (Lucknow University),
Lucknow, (U.P.), India.

Butterflies are important bioindicators which should be protected to conserve the biodiversity and environment. Different species of plants and habitats of Jhansi city attract wide variety of butterfly fauna, which play a vital role in pollination of various flowering plants besides a key component of food chain. The investigation on species diversity and abundance was carried out in some distinct habitat types; within the Jhansi viz. gardens, parks (Nagar Nigam, University, and Jhansi fort), green areas of medical college and engineering college, road sites and hilly areas. Regular survey was conducted from December 2010 to November 2011 during day time (7.00AM-11.00AM). Nine hundred and forty eight individuals of butterflies collected from various study sites, which include 38 identified species belonged to 29 genera and Six families viz., Nymphalidae-Brush-footed Butterfly family was the most dominant with 11 species followed by Pieridae-White and yellows (10), Lycaenidae-Blues (6), Danaidae-The tigers (4), Hesperidae-Skippers (4), Papilionidae-Swallotails (3). During work five urban habitats of Jhansi were selected for extensive sampling to determine the butterflies. The diversity was calculated by using diversity indices namely: Simpson's index (D), (1-D), (1/D), Margalef's index (d) and Shannon-Wiener index (H'). The calculated values of diversity indices showed that from district Jhansi the highest diversity was obtained from Jhansi fort and lowest diversity was obtained from Medical College. All sites were selected on the basis of their position in vegetation and accessibility.

Key words: - Butterfly population, Quantitative data, Urban habitats, Abundance, Species diversity,

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0330. Field Application of Oberon[®] and Envirdor[®] on Sugarcane Yellow Mite, *Oligonychus sacchari* (Prostigmata: Tetranychidae) and Its Predator *Stethorus gilvifrons*

Amin Nikpay^{1*2}, Masoud Arbabi³, Peyman Sharafizadeh² & Mahmood Poormahmood⁴

¹ Entomology Department, Islamic Azad University, Arak Branch, Arak, Iran ² Division of Plant Protection, Sugarcane & By-Products Development Company, Salman Farsi Unit, Ahwaz, Iran ³ Laboratory of Acarology, Department of Agricultural Research Zoology, Iranian Research Institute of Plant Protection, Tehran, Iran ⁴ Bayer CropScience Regional Representative, Ahwaz, Iran

*Corresponding author.

Sugarcane yellow mite, *Oligonychus sacchari* (Prostigmata: Tetranychidae) is the most destructive pests in sugarcane growing area in tropics and subtropics. They colonize on the lower surfaces of sugarcane leaves. Being sporadic in nature it is source of troubles for sugarcane crop in specific and local areas under sugarcane cultivation in Iran. Although the biological agent *Stethorus gilvifrons* is existed, but this predatory beetle cannot regulate the mite populations under Economic Injury Level (EIL). Because of high reproductive potential and multi-generation produced per year, this pest is a vulnerable candidate for developing pest resistance to conventional acaricides and this phenomenon can enter pressure to sugar industry as a high cost of application rate. Due to these reasons, experiments were conducted on chemical control of sugarcane yellow mite and the effect of these acaricides on predatory beetle *S.gilvifrons* using two commercial varieties CP48-103 and CP57-614 in sugarcane fields at Salman Farsi agro-industry unit in Ahwaz. Acaricide treatments were Oberon[®] (400 cc per hectare) and Envirdor[®] (300 cc per hectare). Oberon's active ingredient, Spiromesifen, belongs to a new class of chemicals called ketoneols. Oberon is a lipid biosynthesis inhibitor (LBI) and interferes with spider mite lipogenesis by preventing biosynthesis of fatty acids and subsequent biochemical derivatives, and Envirdor's active ingredient, Spirodichlofen, belong to class of chemicals called tetrionic acids and can affect endocrine system of mites and prevent production of energy. Each treatment was replicated three times for each commercial variety and control. The number of mites were recorded after 0 (before spraying), 3, 7, 15 and 30 days after application and predatory beetle were recorded after 10, 20, 30 and 40 days after treatments. The results revealed that there were significant difference between acaricides application and control. Oberon[®] and Envirdor[®] were effective treatments after 30 days, but the acaricidal efficacy of both miticides were reduced and this phenomenon was attributed to high temperature during the tests. There was no difference among acaricides on predatory beetle at 10, 20, 30 and 40 days after application, after 10 days we recorded predatory beetles on both treated varieties and the number of beetles were increased with extended time.

Key Words: Sugarcane Yellow Mite, *Stethorus gilvifrons*, Acaricides, Economic Injury Level.

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0331. Field Surveys of the Incidence of Sugarcane Stalk Borers *Sesamia* spp. in South West of Iran

Amin Nikpay^{1*2}, Peyman Sharafizadeh² & Hamid Kord²

¹ Entomology Department, Islamic Azad University, Arak Branch, Arak, Iran²
Division of Plant Protection, Sugarcane & By-Product Development Company,
Salman Farsi Unit, Ahwaz, Iran,

Sugarcane stalk borers are key pests of this crop world-wide because they feed directly on the vegetative tissues that store sucrose, allowing the introduction of micro-organisms that affect drastically yield and quality. Moth borers are the most damaging sugarcane pests in all cane growing countries and remain a major production constraint in the sugarcane production sites in Iran. Most of them are polyphagous and can readily attacking other gramineous crops (Corn, Rice and Sorghum) as well as weed grasses. The pink stalk borer *Sesamia* spp (Lepidoptera: Noctuidae) is the most important damaging pests in south western sugarcane industrial area especially during periods of moisture and salinity stress and over-use of nitrogen fertilizers in the fields. Damaged canes by this borer are not only decreases cane yields but also mitigates with negative efficient extraction of sugar in the factory and reduced sugar purity. During October 2011 to February 2012, field surveys were carried out for at least five commercial cultivars; CP57-614, CP48-103, CP69-1062, CP65-315 and SP70-1143. Surveys covered 75 fields at Salman Farsi sugarcane agro-industry, Ahwaz, Iran. *Sesamia* spp. surveys followed a standard procedure requiring examination of 200 stalk selected at random from each field. Stalks were split to identify those with tunnels and the numbers were converted to percentage stalk damage. This measurement was used to evaluate the severity of damage. In another measurement, number of internodes bored was investigated and this index was converted to reduction in sugar quality. The data showed that CP48-103 was more damaged by borer attack (34.3% in plant crop and 24.4% in ratoon crop of stalk damage, 2.6% and 1.6% of internodes bored in plant and ratoon crop respectively) but the lowest infestations were detected in CP57-614 cultivar (13.9% in plant crop, and 13.5 in ratoon crop of stalk damage, 0.8% and 0.7% of internodes bored in plant and ratoon crop respectively). The results showed that stalk borers are important pests of sugarcane and integrated control strategies must be used for *Sesamia* spp. in commercial fields.

Key words: Sugarcane stalk borer, *Sesamia* spp., stalk damage, internodes bored and commercial cultivars.

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0332. Wolbachia Infection In Some Insect Pests And Disease Vectors Of Agricultural Importance And Its Implications In Their Management

N. M. Guruprasad and S. K. Jalali

National Bureau of Agriculturally Important Insects (NBAIL)

Post Bag No. 2491, H.A. Farm Post, Bellary Road

Bangalore-560024. India

Pest and disease management poses substantial challenge for the agricultural and medical communities. In addition, public distress over pesticide use and additional strict environmental policy creates the need for new technologies. Bacterial symbiosis is common in arthropods that can be devastating pests and efficient disease vectors. In present study, *Wolbachia* infection was diagnosed by using *Wolbachia* gene specific primers in some insect pests and diseases vectors of agricultural importance, namely *Exorista sorbillans*, *Nilaparvata lugens*, *Bemisia tabaci*, *Sitophilus oryzae* and *Callosobruchus chinensis*. *Wolbachia* are able to invade and maintain themselves in the arthropod species through manipulation of the host's reproduction. *Wolbachia* manipulate host reproduction by using several strategies, one of which is cytoplasmic incompatibility (CI), can be used to suppress the pest populations. We removed the *Wolbachia* infection in *Exorista sorbillans* with antibiotic treatment up to seven generations and found there is drastic reduction fecundity up to 79% which cloud indicates that *Wolbachia* influence on reproductive fitness of *Exorista sorbillans*. This knowledge could be exploited for effective control strategies of the Uzifly, a serious menace of silkworm *Bombyx mori*. In addition, virulent *Wolbachia* strain *wMelPop* from *Drosophila melanogaster* offer a potential to control vector species by inhibiting virus replication. The *Nilaparvata lugens* and *Bemisia tabaci*, are vectors of rice ragged stunt virus and Begomavirus virus causing heavy yield loss in rice and horticultural crops. Our studies on molecular models of *Wolbachia* strain *wMelPop* and virus interactions observed, rice ragged stunt virus and Begomavirus provided useful functional basis of *Wolbachia*-mediated viral inhibition. These results facilitate the development of novel vector control methods for insect-borne pathogens are environmentally friendly and may replace chemical control methods.

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0333. A short term study on insect fauna associated with cluster beans *Cyamopsis tetragonoloba* in an agro-ecosystem near Jhunjhunu, Rajasthan, India

Sima Dheeraj Bhati and Meera Srivastava

Post Graduate Department of Zoology, Govt. Dungar College, Bikaner 334001
Rajasthan, India

The Guar or cluster bean (*Cyamopsis tetragonoloba*) is an annual legume and the source of guar gum. It grows well in arid to semiarid areas, but frequent rainfall is necessary. This legume is a very valuable plant within a crop rotation cycle, as it lives in symbiosis with nitrogen-fixing bacteria. In fact, agriculturists in semi-arid regions of Rajasthan follow crop rotation and use Guar as a source to replenish the soil with essential fertilizers and nitrogen fixation before the next crop. Guar as a plant has a multitude of different functions for human and animal nutrition but its gelling agent containing seeds (guar gum) are today the most important use. Demand is rising rapidly due to industrial use of guar gum in hydraulic fracturing (oil shale gas). About 80% of world production occurs in India and Pakistan. The present work was undertaken to study the diversity and abundance of insects in an agro-ecosystem near Jhunjhunu lying between 27°5'-28°5'N latitudes and 75°-76°E longitudes situated in the desert region of Rajasthan. Seasonal crops are cultivated in the field and the farm is irrigated by well water. The present paper deals with the entomo-fauna associated with only cluster beans *Cyamopsis tetragonoloba*, a major crop cultivated during April to October in the agriculture field. The insects were collected employing indigenously fabricated cage net and were transferred to killing bottles, killed, preserved and identified using pertinent literature. The count of insect fauna collected was expressed as No./m³.

In all, 51 insect species belonging to 7 orders (Coleoptera, Lepidoptera, Hemiptera, Hymenoptera, Diptera, Orthoptera and Odonata) and 27 families were noted on the crop of which based on number, 6 were dominant, 25 were frequent and 20 were rare forms. Maximum density as well as diversity of entomo-fauna was noted in the month of July while, October was the month which had minimum density and diversity of insects. Of the ten coleopteran species documented, two were dominant, seven were frequent and only one was a rare form. Among sixteen lepidopteran insects documented one was dominant, eleven were frequent and five were rare forms. Of the six hemipterans, one was observed as frequent and the other five were rare forms. Eight hymenopterans were noted on the crop, of which four were frequent and four were rare forms. Only three dipterans were reckoned on the crop of which two were dominant while one was a rare form. Among six orthopteran species documented, one was dominant, two were frequent and three were rare. Only two odonates were documented, both as rare forms.

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0334. Wild Fungus collection and its social implications in Nepal

Krishna Kaphle

Associate Professor, Department Head and Student Welfare Chief, Institute Of Agriculture and Animal Science, Tu, Rampur, Chitwan, Nepal

Forest covered land in Nepal is relatively more in terms of the total landmass. However, depletion of forest resources and its consequent natural disaster is a great concern. Forests have been an integral part of Nepalese community and those that have benefited from them have understood the need for sustainable harvesting. Concerns and exploitation are brought in by those greedy and quick rich wannabes that have bribed their way to grab natural resources. Fungus harvesting from forests and rangeland holds special place in Nepalese society and has been blessed with two categories of funguses that are crucial in the lifestyle of communities involved with them. The first to mention is the highland special fungus that is collected as *Cordyceps sinensis* or Yarsagumba is one of such highly valued fungal species of alpine region of Nepal and highland Himalayan range. Social life has been drastically affected by this miracle Himalayan treasure, fortunes are being made – and lives are being ruined in its reckless pursuit. Technically it is a rare hybrid of caterpillar and fungi that grows only in the high alpine meadows of Tibet, Nepal and India, it has been prescribed by traditional healers in Asia for centuries to treat lung and kidney diseases, build up bone marrow and stop hemorrhaging. But it is prized above all for its reputation as a powerful aphrodisiac famous for the nickname “*Himalayan Viagra*”. Probably it is the highest priced carbon bearing raw material after diamond and this renewable Walking Diamond is changing the fate of high-mountain people. Detail scientific study of this magic fungus is being undertaken and the author was a part of the team studying steroidogenic potentiality. Social implications of generated income, lost opportunities, shimmering tensions and concern for sustainability are being researched upon. The next fungi to be affected are collection and use of wild mushrooms from the jungle areas. Nepal have a pretty big percentage of land covered by protected forest areas that have human settlement at the periphery. Use of forest resources is a common daily routine and this season of the year is rush for harvesting of wild mushrooms. In spite of deaths due to mushroom poisoning and attacks by wild animals, wild mushrooms are becoming nutritionally and socially important. This paper aims to discuss the social importance of fungus in Nepalese society.

Keywords: Wild Fungus, Social implications, Nepal

0335. Isolation of plant-derived insecticides from leaves of *Lantana camara* for control of stored grain insect pests

Yallappa Rajashekar^{1*}, Honnaiah Vijay Kumar,² Nandagopal Bakthavatsalam³

¹Animal Bioresources Programme, Institute of Bioresources and Sustainable Development, DBT, Takyelpat, Imphal-795001, Manipur India

²Department of Organic Chemistry, Indian Institute of Science, Bangalore-560024, Karnataka, India

³Division of Insect Ecology, National Bureau of Agriculturally Important Insects, Bangalore-560024, Karnataka, India

Insect infestation control of stored grain is primarily achieved by the use of synthetic gaseous insecticides such as methyl bromide and phosphine. In several countries including India, mixing of any synthetic insecticide with stored grain is not permitted. Due to environmental concerns, health hazards to man and the evolution of resistance in insect pests, there have been constant efforts to discover newer insecticides both from natural sources and by chemical synthesis. Natural sources for novel molecules hold promise in view of their eco-friendly nature, selectivity and mammalian safety. We have isolated one natural bioactive molecule from the leaves of *Lantana camara* named Coumaran, based on various physical-chemical and spectroscopic techniques (IR, ¹H NMR, ¹³C NMR and mass). Coumaran is highly toxic and very low concentration is needed for control of stored product insects. Coumaran is selective insecticides with a average margin of safety to mammals and showed promise as novel fumigant candidate for grain protection.

0336. Foraging Ecology of Large Carpenter Bees, *Xylocopa Latipes* and *Xylocopa Pubescens* (Xylocopidae)

A. J. Solomon raju

Department of Environmental Sciences, Andhra University,
Visakhapatnam 530 003, India

Six tree and nine shrub species were selected for the study of relationships between these plants and carpenter bees. The tree species were *Tecoma stans* (Bignoniaceae), *Cassia fistula*, *C. siamea*, *Peltophorum pterocarpum* (Caesalpiniaceae), *Pongamia pinnata* (Fabaceae) and *Moringa oleifera* (Moringaceae). The shrub species were *Calotropis gigantea*, *C. procera* (Asclepiadaceae), *Cassia alata*, *C. occidentalis* (Caesalpiniaceae), *Crotalaria laburnifolia*, *C. verrucosa* (Fabaceae), *Hyptis suaveolens* (Lamiaceae), *Solanum carolinense* and *S. surattense* (Solanaceae). The flowering season, flower morphology, floral biology and floral reward types were examined in detail for all these plants. The females of *X. latipes* and *X. pubescens* collect pollen from *Cassia* and *Solanum* species, and also from *Peltophorum pterocarpum* indicating that they are oligolectic in pollen collection. Both female and male bees of these two species collect nectar from nine plant species which belong to seven families. The plants include *Calotropis* species (Asclepiadaceae), *Tecoma stans* (Bignoniaceae), *P. pterocarpum* (Caesalpiniaceae), *Crotalaria* species, *Pongamia pinnata* (Fabaceae), *Hyptis suaveolens* (Lamiaceae) and *Moringa oleifera* (Moringaceae). This list of nectar plants of carpenter bees indicates that male and female carpenter bees are polylectic in nectar collection. The nectar sugar concentration in all the plant species studied ranged from 19.48 to 43.45% suggesting that carpenter bees utilize the nectars with varying sugar concentrations. The nectar in *Calotropis*, *Tecoma*, *Peltophorum*, *Crotalaria*, *Pongamia* and *Peltophorum* is sucrose-rich while it is hexose-rich in *Hyptis* and *Moringa* flowers. Eight essential amino acids are found in the nectar of *Crotalaria verrucosa*, seven in *C. laburnifolia*, six each in *Peltophorum*, *Pongamia* and *Moringa*, five in *Hyptis* and four in *Tecoma* flowers. All these plants produce histidine in their nectar. Tryptophan is found only in *C. laburnifolia* and phenylalanine only in *Crotalaria* species. *Hyptis* flowers do not contain non-essential amino acids while all other plants contain 9-11 non-essential amino acids. The pollen analysis carried out for ten plant species shows that the pollen is a source of essential and non-essential amino acids. The protein-rich pollen species include *Tecoma*, *Cassia* and *Solanum* species whereas all other plants for which pollen was analyzed for protein content are protein-poor. All the protein-rich pollen species serve as important pollen sources for carpenter bees as well as other pollen collecting bees.

In *Calotropis* species, anthesis occurs throughout the day but foraging activity of carpenter bees increases gradually and reaches peak towards noon hours and then gradually decreases. Anthesis occurs twice in a day, during forenoon and afternoon in *Tecoma stans*; the carpenter bees exhibit peak foraging activity during these periods. In *Cassia* and *Solanum* species, the anthesis occurs during early morning hours but the carpenter bees show peak foraging activity during noon period which could be due to physical state of pollen grains, wet or dry. In *Peltophorum pterocarpum*, the fresh just open flowers are available during morning hours

and accordingly the carpenter bees show foraging activity reaching peak at noon hours. In *Crotalaria* species, the anthesis occurs during noon to evening hours but the carpenter bees collect forage throughout the day with more activity during anthesis and post-anthesis hours. In *Pongamia pinnata*, the anthesis begins from early to late morning hours and by the end of anthesis process. At that time, the carpenter bees concentrate their foraging and collect the nectar while honey bees collect both pollen and nectar simultaneously. In *Hyptis suaveolens*, anthesis occurs throughout the day with varying number of flower production rate. The carpenter bees and other bees consistently collect the forage but exhibit two peak activity periods, one during morning and the other during evening period. In *Moringa oleifera*, the anthesis occurs during morning hours but the carpenter bees and other insects do not show any definite pattern in relation to anthesis period.

The study concludes that *Xylocopa latipes* and *X. pubescens* are efficient foragers and in the process effect and promote cross-pollination in the flowers they visit. *Tecoma stans* and *Hyptis suaveolens* being exotics are providing ample forage and hence are sustaining the bees throughout the duration of their flowering. Further, all other plant species, whether planted or growing wild are important forage providers for carpenter bees. Such interactions between the bees and plants characterize mutualism. Therefore, the plant species utilized by large carpenter bees are to be allowed to grow or cultivated, especially in urban areas where floral resources are scarce for carpenter bees.

0337. Interdisciplinary Approach for the Conservation and Sustainable Utilization of Tropical Tasar Silkworm *Antheraea mylitta* Drury

**R.Manohar Reddy¹, K.Mohan Rao², J.Somi Reddy³, M.Ramesh Babu³
and B.S.Angadi³**

¹P₂ Basic Seed Farm, National Silkworm Seed Organization, Central Silk Board,
PARIGI - 515261, India,

²Central Silk Board, Ministry of Textiles, Govt. of India, BANGALORE - 560068, India

³National Silkworm Seed Organization, Central Silk Board, BANGALORE - 560068, India

The commercial tropical tasarculture is a forest based activity of growing tasar silk insect, *Antheraea mylitta* Drury (Lepidoptera: Saturniidae) on its host flora, besides collecting wild cocoons from insect habitat to produce vanya silk, unique to India. The activity provides livelihood to two and half lakh aboriginal families in Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, Uttar Pradesh and West Bengal states of the country. However, the over exploitation of tasar silkworm resources for monetary advantage, and the deforestation, urbanization induced rapid environmental change have depleted few important tasar wild ecoraces to the levels of extinction. So, there is an imperative need to alert local tribes on wild cocoon collection from nature and their effective conservation under *in-situ* to protect the tropical tasar silk-insect diversity. To recuperate the situation, the Sericulture, Forest, Rural and Tribal development departments and Non Government Organizations (NGOs) have involved the tasar practicing tribes for self help in tasar wild silk insect conservation and made them to understand the need of such conservation for its sustainable utilization. The self help concept as Tasar Resham Dooth System among tribes has contributed to safeguard the tasar diversity through successful production of tasar cocoons and make the activity commercially feasible. The support on inputs and training made the tasar rearers to succeed in diversity conservation with simultaneous sustainable utilization for their livelihood. Hence, this self help system has adoptable potential for tropical tasar silkworm conservation and rational commercial exploitation to attain socio economic improvement of tribes through tasarculture.

Key words: Biodiversity, Conservation, Resham Dooth System, Tasarculture, Vanya silk Parigi, India,

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0338. Conservation Agriculture: A potential Option to Conserve Pollinators and Natural enemies

Neelam Chaudhary*, Atishi Pandey and V Sivaram*****

^{*1}CIMMYT-India, NASC. Complex, DPS. Marg, New Delhi-110012 (India)

^{**} Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand (India)

^{***} Department of Botany, Bangalore University, Bangalore- 560056 (India)

¹ Present address: Directorate of Plant Protection, Quarantine & Storage, DAC, Ministry of Agriculture, Govt. of India

Pollinators provide an essential ecosystem service that contributes to the maintenance of biodiversity and ensures the survival of plant species including crop plants. Furthermore, the reproductive success in plants is often pollinator limited. Most of the vegetable crops are cross-pollinated i.e. the flowers of these crops need conspecific foreign pollen for pollination and seed set. Insect pollinators set a greater proportion of early flowers of the crop and increase quality and quantity of the seed yield. Heat, soil moisture/ water availability to the plants during drought periods are some major factors that decide the number of pollinators in the crop. "Conservation agriculture is a technology for maintaining soil quality, retaining soil moisture for longer period, reduces irrigation need of the fields optimises pesticide & fertiliser use and moreover helps in creating the natural habitats for the pollinators and natural enemies." Conservation technologies collectively helps in reducing the use of pesticides and fertilisers, better crop growth, and most important good population of pollinators and natural enemies in the fields.

Key words: Conservation agriculture, pollinators, natural enemies

0339. Effect of different solvents in Propolis extraction

Atishi Pandey*, Neelam Chaudhary and V Sivaram*****

^{*1}Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand (India)

^{**} Directorate of Plant Protection, Quarantine & Storage, DAC, Ministry of Agriculture, Govt. of India

^{***} Department of Botany, Bangalore University, Bangalore- 560056 (India)

¹ Present address: Directorate of Plant Protection, Quarantine & Storage, DAC, Ministry of Agriculture, Govt. of India

Propolis is one of the very important products of beekeeping, gathered by forager bees from resinous exude of trees. In the bee colony propolis is used by bees for sticking frames, sealing cracks and crevices in order to maintain the required temperature in the beehive and also to check the attack of enemies. Propolis has antimicrobial properties and also used as pain killer. It is commonly used in preparing ointments for treating cuts, wounds and abscesses in cattle. Propolis extraction was done by using different solvents to separate propolis from other impurities. The effect of different solvents like ethanol, glycol, mustard oil and water on propolis extraction was studied at different time interval. Among the various solvents used viz. ethanol, glycol, mustard oil and water; ethanol at 15 percent was most effective solvent for collection of pure propolis from crude propolis. In case of propolis purification, ethanol found to be most efficient solvent and showed proportionate maximum effect within three days.

Key words: Propolis, solvent, extraction

0340. Apicultural resources of Wynad region, Kerala state, India.

Roopa, P., Shubharani, R. and Sivaram, V

Laboratory of Biodiversity and Apiculture, Department of Botany,
Bangalore University. Bangalore- 560056, India.

Apicultural resources refers to the pollen analysis of 45 honey samples collected from three locations from Wynad region Kerala state, India. The honey samples were collected from the domestic bee hives of *Apis cerena* and wild bee hives of *Apis dorsata* from local honey hunters of forest regions during March 2011 to March 2013. Pollen analysis was performed using acetolysis method. The samples were subjected to both qualitative and quantitative analysis. Forty five honey samples were recorded as multifloral. Fabaceae, Asteraceae and Myrtaceae were most represented families. There was a dominance of tree species which are the most preferred and highest contribution for nectar and pollen source for honeybees in the study area. This study discusses the honey plant resources, floral calendar and potentialities for commercial beekeeping in Study area.

Key Words: Beekeeping, Honey plants, Melissopalynology, Pollen analysis

0341. NMR detection of *Melipona* and *Scaptotrigona* pot-honey from Mexico and Brazil

Elisabetta Schievano¹, Patricia Vit², Ileana Menegazzo¹, Stefano Mammi¹

¹Chemical Science Department, Università di Padova, Via Marzolo, 1, 35131, Padova, Italy;

²Food Science Department, Faculty of Pharmacy and Bioanalysis, Universidad de Los Andes, Mérida 5101, Venezuela

¹H-Nuclear Magnetic Resonance (NMR) spectroscopy was used to analyze *Melipona* and *Scaptotrigona* pot honey from Mexico and Brazil. For this purpose, 6g of each honey sample were treated with water and chloroform, and the organic extract dissolved in CDCl₃ was analyzed with a 600 MHz NMR instrument. This procedure was fast and not invasive, as no chemical modifications occurred on the compounds of the natural mixture. An NMR-based metabolomic approach, based on the multivariate statistical analysis of the NMR acquired data, was useful for the geographical and entomological discrimination. When restricted regions were considered, such as Mexico and Brazil honey origin, the entomological discriminant character became stronger and a clear differentiation was seen between honeys produced by different bees, by the first PCA component. The pot honeys produced by two genera of stingless bee were also well differentiated. Even if applied to a limited number of samples, the purposed method was an efficient tool to cluster the entomological bee origin of pot-honey from Mexico and Brazil.