

Winter school on “Molecular mechanisms involved in conferring abiotic stress tolerance to the biological control agents *Chrysoperla*, *Trichogramma*, *Trichoderma* and *Pseudomonas*” was organized from 01.12.11 to 21.12.11 as a component of basic and strategic research under the NAIP project. The participants were given hands on training in basics of molecular mechanisms using PCR

techniques such as identification of abiotic stress tolerance traits, 16s rDNA / ITS sequence analysis, RAPD / RFLP analysis, DNA barcode generation, Allele mining, bioinformatics tools, primer designing, proteomics and electrophoresis techniques. Dr. R. Rangeshwaran, Senior Scientist was the course director.



Welcome



Ms. S. Salini, Scientist (Agricultural Entomology) joined NBAIL on 28-12-2011 on transfer from National Research Centre for Grapes, Pune. Ms. Salini did her M. Sc in Agricultural entomology from University of Agricultural Sciences, Bangalore and joined ARS on 21-4-2009. Her field of specialization is biosystematics of heteropteran bugs. NBAIL will be utilizing her expertise in the Biosystematics on pentatomid bugs.

Mr. K. J. David, Scientist (Agricultural Entomology), joined NBAIL on 28-12-2011 on transfer from Central Institute of Cotton Research, Nagpur. Mr. David completed his M. Sc. from University of Agricultural Sciences, Bangalore and joined ARS on 21-4-2009. His field of specialization is fruit fly taxonomy and presently he will be working on the Biosystematics of fruit fly.

NBAIL family welcomes Ms. Salini and Mr. David.



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NBAIL in the Service of Farmers



Wish you all a happy and prosperous new year.

The National Bureau of Agriculturally Important Insects is making inroads into cutting edge research in a number of fields such as insect genomics, molecular systematics, entomopathogenic nematodes, management of alien invasives, quality assurance and mass production of biocontrol agents. Besides serving as an insect reference collection and human resource development centre for training in insect systematics and allied disciplines, a number of very important meetings in the last few months such as “Agricultural Entomology for the 21 century: The way forward”, “Brain Storming Session on Insect Genomics”, etc. were organised which culminated in significant recommendations that will be implemented in the XII plan. Though, being a national bureau with fundamental

research as its mandate, we were able to successfully commercialise technologies such as novel insecticidal wettable powder formulation of *Heterorhabditis indica* (strain NBAIL Hi1) for the biological control of white grubs and other insect pests, and the methods for their preparation and use. The strain of *Trichogramma chilonis* (TcT1E) resistant to endosulfan was commercialised and the technology was transferred to M/s. Excel Crop Care, Mumbai, during 2011-12 for Rs.1.50 lakh. The strain was used in various vegetable crops and rice on very large scale. A multiple insecticide resistant strain of *Chrysoperla zastrowi sillemi* (PTS8), an effective predator of sucking pests was commercialised to M/s. Excel Crop Care, Mumbai, during 2011-12. The strain is resistant to endosulfan, acephate and fenvalerate and was sold for Rs.5.00 lakh. The strain was used in vegetable on a very large scale.

NBAIL under tribal subplan conducted a training programme on bee keeping for the tribal farmers at Yellapur, Uttara Kannada and also distributed bee hives for taking up apiculture. Two winter schools on “Molecular mechanisms involved in abiotic stress tolerance of natural enemies, *Trichogramma*, *Chrysoperla*, *Trichoderma* and *Pseudomonas*” and “Introduction to Biosystematics of insects, mites, spiders and their biodiversity” were organised and the response was overwhelming. Further, a special training by Bayer crop science on management of sucking pests was also organised. With pride, we wish to inform that the NBAIL was a meeting point of all entomologists for the development of network/platform on insect borers affecting various agricultural and horticultural crops. The Coffee Board, similarly, requested the NBAIL to harness the scientific wisdom of persons working across the country for the management of the notorious coffee stem borer, *Xylotrechus quadripes*.

The Bureau has gained strength by the addition of two excellent insect taxonomists and it is our endeavour to serve this cause with greater zeal. The brainstorming meet on entomopathogens in biocontrol, ecological and economical analysis of success of biological control of papaya mealy bug, management of stored grain pests, vector dynamics and exposition of virus/mycoplasma diseases affecting agricultural and horticultural crops, fruit flies as pests and quarantine problems and invasive insect pests are all being planned. I am sure slowly, but surely, the bureau is extending its activities, receiving excellent support from all the coordinating centres on biological control and the results will be visible in the years to come.

The NBAIL specially congratulates Dr. K. L. Chadha, an eminent horticulturist under whom a number of scientists at NBAIL worked while the AICRP project on biological control was part of IIHR and the scientific fraternity congratulate him for having been awarded the prestigious PADMA SHREE by the Government of India. The scientific fraternity who worked under him is extremely proud that he was recognised for his outstanding contribution in the field of horticultural sciences. His knowledge, commitment, dedication and hard work are well known and there is no better person than him to deserve this coveted award. In the last five decades, horticulture has seen exponential growth and this has been possible because of Dr. Chadha's immense contribution to science and technology in the field of Horticulture. He has contributed largely to the nutritional security of the nation.

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Director

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Anagyrus loecki parasitizes other mealybugs

Anagyrus loecki Noyes & Menezes (Hymenoptera: Encyrtidae), an imported parasitoid for the control of the papaya mealybug, *Paracoccus marginatus* Williams and Granara de Willink (Hemiptera: Pseudococcidae) was found to parasitize other species of mealybugs such as *Phenacoccus madeirensis* Green (infesting *Lantana camara*), *Nipaecoccus viridis* (Newstead) (a polyphagous pest) and *Dysmicoccus brevipes* (Cockerell) (infesting ornamental palm). The studies will pave the way for developing easy rearing methods for *A. loecki*.



Phenacoccus madeirensis
Green



Dysmicoccus brevipes
(Cockerell)



Nipaecoccus viridis (Newstead)

A new anthocorid predator feeding on thrips

A new anthocorid predator *Montandoniola indica* Yamada, sp. nov., was recorded for the first time as a predator of *Gynaikothrips uzeli* Zimmermann infesting *Ficus retusa* in Karnataka. *M. indica* was also recorded as an efficient predator of gall-forming thrips, *Liothrips karnyi* Bagnall infesting black-pepper leaves in Kerala. This anthocorid predator is amenable to laboratory rearing on *Corcyra cephalonica* eggs.



Adult *Montandoniola indica* feeding on
Corcyra cephalonica egg

Wolbachia from Cotesia plutellae

The alpha proteobacterium *Wolbachia*, was detected in populations of *Cotesia plutellae* from different regions (Bangalore, Shillong, Tirupathi and Varanasi). PCR amplification of *wsp* gene was done and the sequences were submitted to Genbank (Accession numbers: 068831, 068832, 068833 and 068334, respectively). Role of

Wolbachia in enhancing the female progeny was assessed in these populations. The percentage female progeny was higher in all the populations where the bacteria was fed compared to those in which it was cured.

EPN for the management of grey weevil

Seven native EPN isolates were found to be pathogenic to grubs and pupae of grey weevil, *Mylocherus subfasciatus* at 40 IJs/cc soil in laboratory bioassays and significantly reduced the mean proportion of *M. subfasciatus* in 96 hours of incubation. Among the five soils, all the seven entomopathogenic nematode isolates under study were consistent in causing a minimum of 90 percent mortality of *M. subfasciatus* grubs in loamy sand, followed by organic (82-94% grub mortality) and alluvial (80-92% grub mortality) soils in 72 hours of application at a uniform dose of 40 IJs per cc soil.



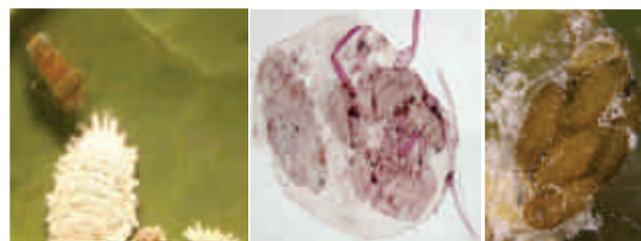
a. Healthy *M. subfasciatus* grub, b. *M. subfasciatus* grub infected with *Steinernema abbasi* isolate NBAll Sa01; c. Pupa *M. subfasciatus* infected with *Heterorhabditis bacteriophora* isolate NBAll Hb01; d. *M. subfasciatus* grub infected with *Steinernema carpocapsae* isolate NBAll Sg01 with active juveniles in haemolymph.

Gene expression analysis of Pseudomonas putida

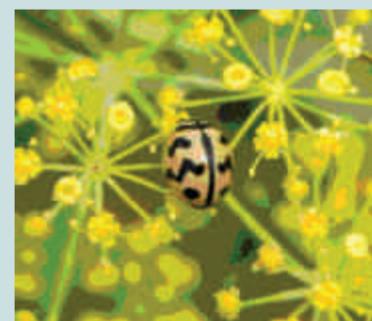
One color microarray based gene expression analysis of *Pseudomonas putida* was done during normal, heat shock and saline shock. RT-PCR results showed variation in the expression level of different genes in saline and heat shock and 25 proteins were validated.

Adaptive superparasitism in Acerophagus papayae

Acerophagus papayae, the successful parasitoid imported for the management of papaya mealy bug, *Paracoccus marginatus* was found to be parasitizing the second instar of *P. marginatus*. A laboratory study has demonstrated that under the circumstances of low host availability, the parasitoid shows the tendency of super parasitism and oviposits on the available food source, thus, yielding 1-8 parasitoid per host depending on the size of the mealybug. Oviposition was also observed in different instars thus, showing the adaptive efficiency of the parasitoid and the probable reason for early success of this parasitoid as a classical biocontrol agent.



Coriander as refugia crop



Many native crops and flora act as refugia supporting the development and survival of pollinators and natural enemies by providing food and shelter. Coriander is one such important bee-friendly spice crops cultivated in India. Coriander during full bloom, attracts a wide range of pollinators (bees, wasps and flies) and natural enemy fauna (lady bird shown in the picture) and ensures pollination insurance and enhances the productivity by reducing the pest pressure on other crops

Publications

Veenakumari, K. Prashanth Mohanraj and R. Peigler. 2011. First description of a female of *Antheraea meisteri* Brechlin and notes on some pre-imagines of three recently described species of Saturniidae (Lepidoptera) from the tropical moist forests of the Andaman Islands. *Journal of the Lepidopterists' Society* 65(2): 94-100.

Prashanth Mohanraj and Veenakumari, K. 2011. Butterflies of the Andaman and Nicobar islands: History of collection and checklist. *Zootaxa*. 3050: 1-36.

Gupta, T., Ballal, C. R. and Joshi, S. 2011. Preferential feeding of an anthocorid predator *Blaptostethus pallescens* Poppius on different stages of cotton mealybug. *Journal of Environmental Entomology*, 33(4): 423-428.

Srinivasa Murthy, K., Rajeshwari, R., Venkatesan, T. and Nesil Liz Baby. 2011. Detection and characterization of *Wolbachia* in *Cotesia plutellae* Kurdjumov (Braconidae: Hymenoptera), a parasitoid of the diamond back moth *Plutella xylostella* (Linn.). *Journal of Biological Control*, 25(3): 213-216.

Srinivasa Murthy, K., Rajeshwari, R., Venkatesan, T. and Nesil Liz Baby. 2011. Host searching efficiency of *Cotesia flavipes* Cameron (Hymenoptera: Braconidae) an important parasitoid of the maize stem borer *Chilo partellus* Swinhoe. *Indian Journal of Fundamental and Applied Life Sciences*, 1(3):71-74.

Conferences attended

Dr (Ms) Chandish R. Ballal, Principal Scientist, attended the International Symposium on Mass Production and Commercialization of Arthropod Biological Control Agents (ISMC 2011) (21st to 25th October, 2011) held at Beijing, China and presented a research paper on "Production protocol for and storage efficacy of an anthocorid predator *Cardiastethus exiguus* Poppius".

Dr. (Ms). Deepa Bhagat, attended IOBC VI International conference held at ChiangMai, Thailand from 11.12.2011-16.12.2011 and delivered invited lecture "Characterization, functionalization of zinc oxide based nanowires and their application as pheromone sensors for pest management".

Training courses conducted

A ten days short course on Introduction to Biosystematics of insects, Mites, Spiders and their Biodiversity was conducted between the 14th and 23rd November, 2011 as a part of the capacity building initiative of this Bureau. Twenty three participants attended from different parts of the country. The participants were exposed to the taxonomy of various groups of insects of agricultural importance as well as techniques to construct keys, the use of e-resources in insect identification, molecular characterization and DNA barcoding in addition to the methods of collection, curation and preservation of arthropods. Dr. K. Veenakumari was the course director.