NBAII Newsletter

National Bureau of Agriculturally Important Insects
Bangalore, India

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Dreaded invasive alien insects and mites

In the last three decades, at least 11 species of insect and mite pests have gained entry into our country: subabul psyllid, *Heteropsylla cubana* (1988); American serpentine leaf miner, *Liriomyza trifolii* (1990); coffee berry borer, *Hypothenemus hampei* (1990); spiralling whitefly, *Aleurodicus dispersus* (1994); coconut mite, *Aceria guerreronis* (1998); silver leaf whitefly, *Bemisia argentifolii* (1999); papaya mealybug, *Paracoccus marginatus* (2008); eucalyptus gall wasp, *Leptocybe invasa* (2008); Madeira mealybug, *Phenacoccus madeirensis* (2012); *Pseudococcus jackbeardsleyi* (2012); and *Phenacoccus solani* (2012). Due to change in the climate, change in the agricultural practices, introduction of *Bt* cotton and free movement of planting material, some insects flare up locally and cause considerable damage to our economy, like it happened with the sugarcane woolly aphid, *Ceratovacuna lanigera* (2004) and the cotton mealybug, *Phenacoccus solenopsis* (2007).

Problems caused by such invasive species in agricultural ecosystems, especially through accidental introductions, are manifold. These alien pests find the new habitat ideal and conducive for breeding and establishment without any restriction through natural regulating factors like natural enemies that keep these species under check in their native range. Managing such invasive species is ideally attempted through classical biological control involving introduction of effective exotic natural enemies from the native range of the introduced pests in order to re-establish the lost balance between the pests and the natural enemies.

In the coming years, many more alien insect pests are expected to find their way into India. These alien insects are already causing considerable losses to several crops in the neighbouring countries.

Despite the fact that dealing with these alien pests is a huge task, the entomologists at NBAII have so far successfully dealt with all the introduced alien pests. In the XII Plan, there is a need to recruit more entomologists at NBAII to successfully manage the alien pests which are likely to gain entry into India.

B.S. Bhumannavar
Director (Acting)

NBAII celebrates the successful biocontrol of papaya mealybug

Dr S. Ayyappan addressing the gathering

Dr A.N. Shylesha being honoured

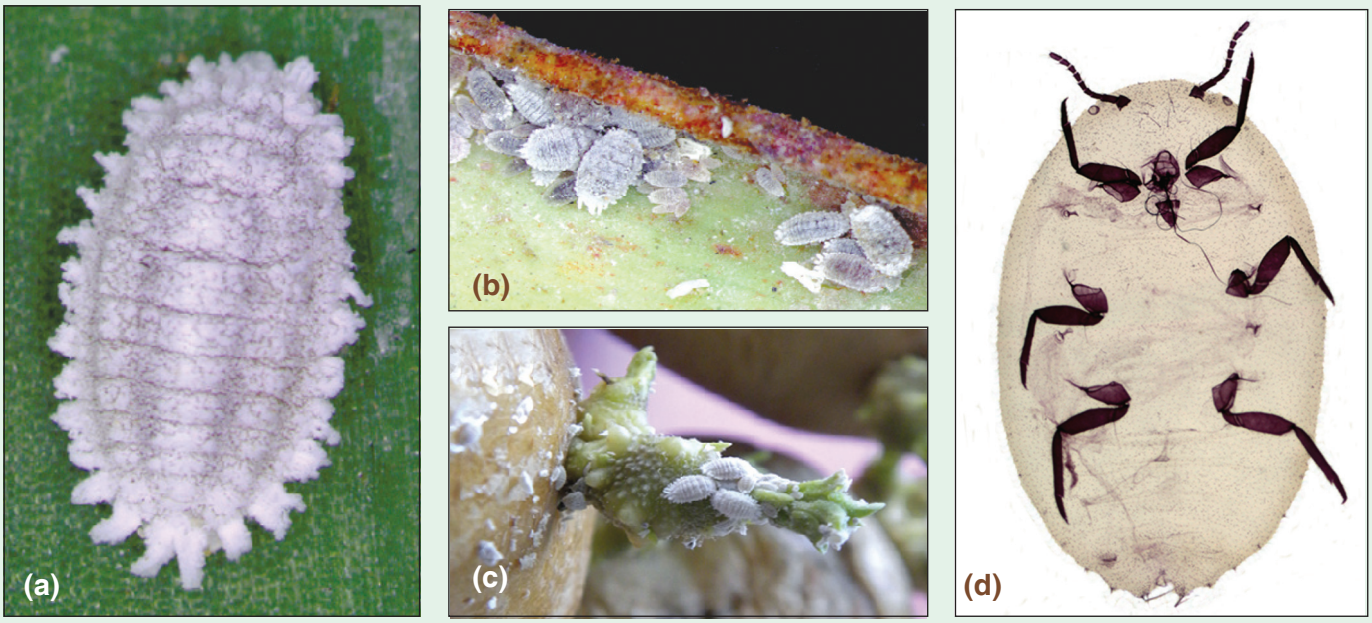
Dr Sunil Joshi being honoured

As part of the Foundation Day Celebrations, NBAII celebrated the successful classical biological control of the papaya mealybug, *Paracoccus marginatus*, on 20 October 2012. Biocontrol of this pest was initiated in July 2010 through collaboration with the United States Department of Agriculture (USDA). *Acerophagus papayae,* one of the three imported parasitoids, was able to bring down the population of the mealybug to negligible levels within six months of its release in the field. Dr S. Ayyappan, Secretary, DARE & Director-General, ICAR; Dr N.K. Krishna Kumar, Deputy Director-General (Horticulture), ICAR; Dr T.P. Rajendran, Assistant Director-General (Plant Protection), ICAR; Ms Deepa Dhankhar, USDA representative and several other dignitaries graced the occasion with their presence. Scientists, farmers and other stakeholders were felicitated on the occasion.

Pest alert!
Phenacoccus solani has entered India

Though widely distributed, *Phenacoccus solani* is known only from Singapore, Taiwan, Thailand and Vietnam in the oriental region. This species has for the first time been found occurring on several unidentified ornamental plants belonging to Liliaceae and Amaryllidaceae in India. It is known to be a serious pest of tobacco and stored potatoes in Zimbabwe, ornamentals in Florida, USA and sweet pepper in Israel.

Taxonomists were earlier of the opinion that *P. solani* and *P. solenopsis* (the cotton mealybug) were environmentally induced variants of a single species, and that both species were similar in characters like absence of quinquelocular pores, multilocular pores and oral collar tubular ducts on the dorsum. However, striking differences in the shapes of the circulus and dorsal setae, and differences in the distribution of ventral multilocular pores help separate these two species. Live specimens of these species also look extremely different. *P. solenopsis* has dark dorso-submedial bare spots on intersegmental areas of thorax and abdomen, forming a pair of prominent dark longitudinal lines on the dorsum. In *P. solani*, on the other hand, the bare spots are absent and it has a medial wax crest with faint submedial bare areas on the abdomen forming a pair of extremely faint longitudinal lines on the dorsum. Dr Sunil Joshi has all the other details.



***Phenacoccus solani*: (a) Adult female; (b) Natural colony; (c) Colony raised on a potato sprout in the laboratory; (d) Microscopic preparation of an adult female**

New Research

New record

A new species of *Parapanteles* (Hymenoptera: Braconidae: Microgastrinae) (Fig. 1) has been discovered in Maharashtra. This new wasp species, which is a gregarious endoparasitoid, was bred from the larvae of *Abisara echeria* (Lepidoptera: Riodinidae) on the host plant, *Embelia* sp. (Myrsinaceae). A key to the Indian species of *Parapanteles* (based on females) has also been constructed (Ankita Gupta *et al*., in press).

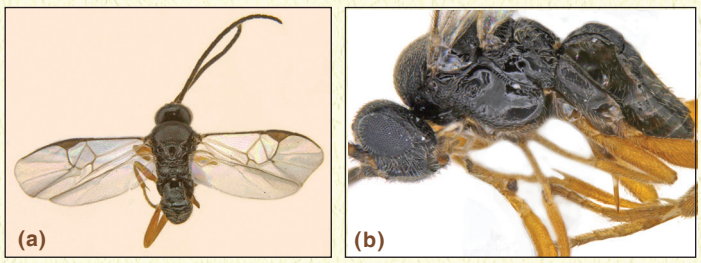


Fig. 1: New *Parapanteles* sp.: (a) Dorsal view; (b) Lateral view

Bt against coleopterans

Bacillus thuringiensis isolates from the Northeast and the Andamans were characterised for cry3 gene that is active against coleopteran pests. PCR identification of the cry3A gene was standardised using *Bt* subsp. *tenebrionis* (4AA1). Eight native *Bt* isolates showed the presence of cry3 gene and three of them produced diverse crystals (Table 1). The 951-bp cry3A gene product was identified in two Andaman and five Northeast strains. Partial sequences were generated and submitted to GenBank.

Table 1: *Bt* isolates producing cry3 gene

Isolate	Crystal morphology
BTAN 4	Bipyramidal
BTAN 5	Bipyramidal + spherical
TRBT 10	Bipyramidal + flat square
TRBT 17	Bipyramidal + irregular
ASBT 20	Bipyramidal
ASBT 21	Bipyramidal
ASBT 24	Bipyramidal

Arthropod Germplasm Information System and Registration Facility

NBAII, which acts as a nodal agency for the collection, characterisation and conservation of arthropods for commercial and non-commercial purposes, has developed a database named the "Arthropod Germplasm Information System" (AGIS). The main aim of AGIS is to develop, maintain and exchange arthropod germplasm information; besides providing a platform for the registration of live arthropod germplasm. It documents all the live arthropod resources of agricultural importance being maintained by institutions across the country. This is the first time that a facility has been created for registering live arthropod germplasm maintained by different organisations in our country.

Currently it includes some of the pests of agricultural and veterinary importance, beneficial organisms, productive insects and factitious hosts (used in the mass multiplication of biological control agents), which are being cultured by different organisations.

The registered germplasm include: silkworm genetic resources maintained at the Central Sericultural Germplasm Resources Centre (CSGRC, Hosur); veterinary pests maintained in the Entomology Laboratory of Indian Veterinary Research Institute (IVRI, Bareilly); and host insects, parasitoids and predators maintained at NBAII. Each registered germplasm is given a unique identification number called the National Accession Number. The relevant passport information is also available in the database for all the germplasm accessions which are registered. The passport information for the silkworm germplasm includes voltinism, race name, donor, origin, class, parentage and other morphological parameters like egg colour, yolk colour, larval pattern, etc. Passport information for veterinary pests includes scientific name, systematic position, origin, common names of the pest and host animals and locality details. The passport information for the predatory and parasitic insects maintained at NBAII includes systematic position, target pest details, host plant, locality details and their utility in biocontrol. For the host insects, particulars such as the systematic position, common name, the stage of the insect that could be supplied, locality details, etc. are provided.

Researchers from all over the world can obtain information on the live arthropod germplasm accessions available in India through the link: http://202.141.78.173/germplasm/ or www.nbaii.res.in. Indian entomologists can register the live arthropod germplasm accessions maintained in their laboratories through the same link. AGIS can lead to future national and international collaborative projects on bilateral exchange of live arthropod resources. Drs Chandish R. Ballal, Sunil Joshi, M. Pratheepa and Y. Lalitha are administering the database.

Training programme on bioinformatics conducted

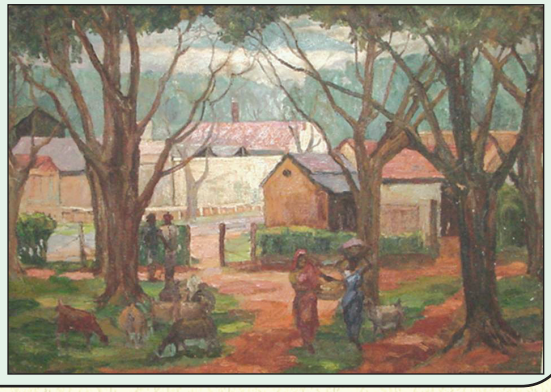
A training programme on "Bioinformatics: Methods and Approaches for Insect Research" was conducted from 19 November–1 December 2012 by NBAII under the NAIP-NABG project. This programme was devised to train researchers from various research organisations and universities on the major areas of application of bioinformatics in insect research. The sub-topics included computational biology, biological databases and their creation, genomics, proteomics, gene expression, DNA barcodes and insecticide resistance management. An educational tour was arranged for the participants to the Genomics and Proteomics Laboratory, Sericulture Department, University of Mysore. Thirteen participants from various states, including Meghalaya, Punjab and West Bengal, underwent the training. Pre- and post-evaluation tests for the trainees indicated an 80% improvement in their knowledge and skills. Dr S.K. Jalali managed the programme.

NBAII at CoP11

NBAII showcased its activities and achievements by being a part of the ICAR stall at the exhibition held during the "XI Conference of the Parties (CoP11) to the Convention on Biological Diversity" organised by the Ministry of Environment and Forests, Government of India, in Hyderabad from 1–19 October 2012. This exhibition provided an excellent platform for our bureau to display the diversity of Indian insects as well as to publicise the biocontrol technologies to delegates from across the continents. Also benefitted were our own farmers and students, who flocked to the exhibition. Mr N. Kiran Kumar Reddy (***in the picture***), Chief Minister of Andhra Pradesh, showed keen interest in biocontrol. Messrs Satandra Kumar and P. Ramakrishna manned our stall.

Dr Nagaraja is no more...

Dr Hulickal Nagaraja (b. 12 August 1934), a preeminent insect systematist, passed away on 6 November 2012. His astonishingly self-taught speciality for over half-a-century was *Trichogramma* taxonomy, which he mastered, developed, nurtured and shared. Dr Nagaraja's brilliant career began at the erstwhile Commonwealth Institute of Biological Control (CIBC) in Bangalore and did not end till his last breath, as even after completing his tenure as an expert consultant at NBAII, he continued his investigations on *Trichogramma* at home. Not many knew that Dr Nagaraja was a connoisseur of classical music and that he was a gifted artist and painter (***see the two accompanying images of his paintings***) with an exceptional skill in life drawing. He is survived by his wife, a daughter and a son. Now, the question on every entomologist's mind is: Who is going to fill the void left by Dr Nagaraja?



Announcement of International Workshop

Emerging Opportunities for the Mass Production & Quality Assurance of Invertebrates
13th Workshop of the IOBC – MRQA (6–8 November 2013)

NBAII is hosting this joint meeting of the International Organisation for Biological Control (IOBC) Global Working Group on Mass Rearing & Quality Assurance (MRQA), International Biocontrol Manufacturers' Association (IBMA), Invertebrate Biocontrol Agents (IBCA) Professional Group, Indian Council of Agricultural Research (ICAR) and the Society for Biocontrol Advancement (SBA). The workshop will be held at the Mövenpick Hotel & Spa in Bangalore. The objective of the workshop is to address issues related to the rearing of entomophagous and phytophagous insects and mites; entomopathogenic nematodes; and principles and practices of quality assurance. All upcoming information on the programme, registration and accommodation will be available on the MRQA (www.amrqc.org), NBAII (www.nbaii.res.in) and ICAR (www.icar.org.in) websites.

Recognition

Dr Chandish R. Ballal, Principal Scientist (Agricultural Entomology), NBAII, was declared as a *Fellow of the Plant Protection Association of India* at the "International Conference on Plant Health Management for Food Security" held during 28–30 November 2012 in Hyderabad.

Prize

A scientific poster from NBAII with the title "Non-target effect of chitosan-alginate nanoparticles on the biology of aphid lion, *Chrysoperla zastrowi sillemi* (Esben-Petersen) (Neuroptera: Chrysopidae)", jointly authored by **Dr Deepa Bhagat,** Scientist (Senior Scale) (Organic Chemistry); **Dr N. Bakthavatsalam**, Principal Scientist (Agricultural Entomology); **Dr Chandish R. Ballal**, Principal Scientist (Agricultural Entomology); **Dr P. Krishnamoorthy**, Scientist (Senior Scale) (Veterinary Pathology), Project Directorate on Animal Disease Monitoring and Surveillance (PDADMAS, Bangalore); **Mr R. Srinivasa**, Junior Research Fellow; and **Mr G. Ramu**, Project Assistant, secured the third prize at the "5th Bangalore Nano" held from 6–7 December 2012 in Bangalore.

Promotions

Drs P. Sreerama Kumar, T. M. Shivalingaswamy, T. Venkatesan, K. Srinivasa Murthy, Sunil Joshi and **R. Rangeshwaran** of NBAII have recently been promoted to Principal Scientists.

Transfer

Dr S. Sriram, Senior Scientist (Plant Pathology), NBAII, has been transferred to the Indian Institute of Horticultural Research (IIHR, Bangalore). He joined IIHR on 12 December 2012.

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