

NBAII Newsletter



National Bureau of Agriculturally Important Insects
Indian Council of Agricultural Research



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Many insects still untold...



This quarter saw a flurry of activity at NBAII. On 10 October, the IV Meeting of National Advisory Board on Management of Plant Genetic Resources under the Chairmanship and Co-Chairmanship of Dr R.S. Paroda and Dr S. Ayyappan, respectively, met. There was a programme for horticultural farmers on 22 October addressed by the Director-General Dr S. Ayyappan and Deputy Director-General (Horticulture) Dr N.K. Krishna Kumar. On 23 October, Dr S.K. Datta, Deputy Director-General (Crop Sciences), declared open the Centre for Insect Bioinformatics at NBAII. The 13th Workshop of the IOBC Global Working Group on Mass Rearing and Quality Assurance from 6–8 November organised by us saw an excellent blend of ideas from India and abroad on mass rearing in biological control. On 7 December, an interface meeting between industries and NBAII saw more than 40 entrepreneurs vying for the 12 or more products of the Bureau.

In addition to these, there were two advanced training programmes on bioinformatics and biological control of soil arthropods. A significant number of post-graduate students visited the Bureau with their teachers. The Bureau always opens its doors to officials and students to advance their knowledge in entomology. With its collection of nearly 30,000 insect specimens 108 live insect cultures, over 80 entomopathogens, insect database backed by high-end supercomputing, a dynamic

molecular entomology laboratory and not forgetting a highly knowledgeable band of dedicated scientists, there is no better place for a student of entomology to assimilate modern insect science.

On 22 October, the Hon'ble Director-General Dr S. Ayyappan inaugurated our "Pollinator Garden". A 25-acre barren land has been transformed into abundant greenery, with over 150 species of flora besides cultivated agricultural and horticultural plants. The main pollinating visitors are the megachilids, formicids, xylocopids, etc. besides *Apis* spp.

If a new species of bird or mammal is discovered in India, it is quite an excitement not only in the country, but the world over. But this is commonplace in the Bureau. Sadly, with respect to insects there is no palpable excitement in the larger context, but the Bureau goes gaga over these discoveries, as a 'known' insect is a vital cog in the food chain that has been affecting biodiversity and ecology (hence agriculture directly or indirectly) without we being aware of. Pertinent to mention that the volume of to-be-discovered species of insects number over 70,000! Our task ahead, therefore, is huge! We are indeed deeply sensitised and committed to this challenge – of course with all the goodwill and support of the readers of this newsletter.

My staff and I wish you a happy and very meaningful New Year, and hope it will be a research- and farmer-focused 2014.

Abraham Verghese
Director



National Advisory Board Meeting



Inauguration of 'Pollinator Garden'



Inauguration of Bioinformatics Centre

New Research

Some exciting new species discoveries!

The genus *Mantibaria*, an endoparasitoid of Mantidae (praying mantises), is represented by just three species worldwide, viz. *Mantibaria mantis*, *M. seefeldiana* and *M. solygiae*. A new species, *Mantibaria kerouaci* sp. nov. Veenakumari & Rajmohana (Fig. 1), has now been reported for the first time from the Indian subcontinent.



Fig. 1: *Mantibaria kerouaci*: (a) Male; (b) Female

Three new species of parasitic wasps (Hymenoptera: Braconidae: Microgastrinae) from southern India have been described. *Glyptapanteles clanisae* Gupta (Fig. 2), a remarkable gregarious endoparasitoid, was bred from the caterpillar of the sphingid moth *Clanis phalaris* found on *Pongamia pinnata* along with a hyperparasitoid, *Eurytoma* sp. *Glyptapanteles trilochae* Gupta (Fig. 3), was reared from parasitised caterpillar of *Trilocha varians*, a lepidopteran occurring on *Ficus racemosa*, along with a hyperparasitoid, *Paraphylax* sp. (Fig. 4). The third species, *Buluka horni* Gupta (Fig. 5), was collected from solitary cocoons of an indeterminate caterpillar feeding on mango leaves. This study also confirms the host range extension of Indian species of *Glyptapanteles* to Bombycidae and Spingidae.



Fig. 2: *Glyptapanteles clanisae*



Fig. 3: *Glyptapanteles trilochae*



Fig. 4: *Paraphylax* sp.



Fig. 5: *Buluka horni*

Barcoding of insects

The mitochondrial cytochrome oxidase c subunit 1 (COI) gene of eight varied insect species was sequenced and deposited in GenBank: *Aprostocetus gala* (KF817576), *Amphiareus constrictus* (KF817577), *Sceliocerdo viatrix* (KF938928), *Chilocorus bangaloreans* (KF938927) *Apis florea* (KF817578), *Apis cerana indica* (KF861941), *Megachile anthracina* (KF861940) and *Teleonemia scrupulosa* (KF817579).

Biocontrol field update

On the biocontrol front, the control of the papaya mealybug is an undying success story, for the pest pressure is kept under check by the ever-present 'alert' parasitoids!. There is an interesting ecological see-saw happening. Each time the dreaded papaya mealybug raises its ugly head, the ever-present parasitoids- a tiny wasp-breeds furiously to contain the pest! The story is the same for the sugarcane woolly aphid and the eucalyptus gall wasp. My visits to Odisha and Maharashtra in December, confirmed these. When I visited Dhenkanal, about 70 km from Bhubaneswar, this quarter, it was heartening to see that a farmer Mr S. Naik was able to control the sugarcane borer in about 100 ha exclusively by using *Trichogramma chilonis* and *T. japonica*. I must congratulate Dr B.K. Mishra, Dean, OUAT, Bhubaneswar, for spearheading biocontrol campaign in Odisha and guiding farmers like Mr Naik. Elsewhere in Maharashtra, the same could be said of the entomologists Dr R.V. Nakat and Dr S.M. Galande of MPKV, Pune.

One important insect parasitoid we discovered this quarter is *Anagyrus amnestos* a new record to India and is perhaps the only natural enemy to contain the mealybug *Phenacoccus madeirensis*. This discovery is indeed exciting to us and should be to all of you as the only way to control a mealybug is through releases of natural enemies.

A.V.



IOBC Workshop report

The “13th Workshop of the IOBC Global WG on Mass Rearing & Quality Assurance (MRQA)” was held in Bangalore from 6–8 November 2013, under the theme of “Emerging opportunities for the mass production and quality assurance of invertebrates”. Seventy-five delegates from 10 countries participated in the event. The objectives of this workshop were to address the concept of quality and protocols of quality assessment, the production of invertebrates



for biological control and other emerging applications, and societal and legal issues associated with the mass rearing and use of invertebrates for integrated pest management. Four symposia, with 32 oral presentations and 16 posters, addressed the different aspects of arthropod and nematode rearing as it relates to quality assurance. Papers in these symposia served as a basis for discussion and exchange, with the final aim of expanding our awareness of the variety of applications and methods that utilize mass rearing of invertebrates, and improving collaboration among scientists, practitioners and regulators. Particular attention was given to the technical and socio-economic challenges faced by emerging economies in Asia and elsewhere related to the mass production, regulation and release of invertebrate biological control agents. Dr Chandish R. Ballal, Dr Sunil Joshi and Dr Y. Lalitha won awards for their respective presentations.

Bioinformatics training at NBAII

A training programme entitled “Bioinformatics: *In Vitro* to *In Silico* Approaches in Entomology” under the NAIP-NABG project was conducted from 18–30 November 2013 at NBAII. The course focused on some major application areas of bioinformatics such as computational biology, biological database, genomics, proteomics, gene expression, DNA barcoding, insecticide resistance and its management, etc. Participants were also exposed to various molecular biology wet-lab techniques. There were guest lecturers from the Indian Institute of Science (IISc, Bangalore), Kuvempu University, Indian Agricultural Statistics Research Institute (IASRI, New Delhi), Apsara Innovations-Bangalore and Labindia-Mumbai. An improvement of 80% in knowledge and skills of the 12 participants was perceived at the end of the course. Dr T. Venkatesan, Principal Scientist, directed the course in coordination with Dr S.K. Jalali, Principal Scientist, and Dr M. Pratheepa, Scientist (Senior Scale).

Training on entomopathogenic nematodes for managing soil-dwellers

Fifteen front-end officers of Agriculture and Horticulture Departments from several states underwent hands-on training on “Eco-friendly Management of Whitegrubs and Other Soil Arthropods Using Entomopathogenic Nematodes” from 6–13 December 2013 at NBAII. The trainees were imparted both theoretical knowledge and practical know-how. They were also shown commercial production and marketing systems of entomopathogenic nematodes and other biological control agents at two commercial companies, Multiplex and Bio-Control Research Laboratories (BCRL), to whom technologies were transferred and licensed by NBAII. Five external experts and ten in-house experts were involved in the training curriculum. Dr M. Nagesh, Principal Scientist, and Dr Jagadeesh Patil, Scientist, organised the programme.

NBAII-Industry Interface Meet held

The first-ever “NBAII-Industry Interface Meet” was successfully organised by the Institute Technology Management Unit (ITMU) in collaboration with the Zonal Technology Management - Business Planning and Development (ZTM-BPD) Unit, Kochi on 7 December 2013 in Bangalore. It served the purpose of showcasing and promoting commercially viable technologies from NBAII. Major biopesticide and agrochemical manufacturers and suppliers were in attendance at the meet. A descriptive brochure and a colourful calendar of technologies were also released. The meet also facilitated a B2B session between the entrepreneurs and inventors of the technologies. The Society for Biocontrol Advancement partially sponsored the event.

Schoolchildren at the ‘Pollinator Garden’

Around 70 pupils from a nearby high school visited the ‘Pollinator Garden’ at the Yelahanka Campus of NBAII on 6 November 2013. The children were taken around the garden and the farm, where they saw diverse crops in different stages of growth on which they observed bees, butterflies, praying mantises, ants, beetles and bugs at close quarters. Children enjoyed their trip and had a lot of innocent queries about insects, crops and so on, which were adequately answered by Dr T.M. Shivalingaswamy, In-Charge, Farm.



Superannuation

Mr N. Chandrashekhar retired as the Finance and Accounts Officer of NBAII on 30 November 2013 after decades of service in ICAR. Bureau staff members lauded his dedication and accomplishments in the befittingly arranged farewell party.

International Training Visits

Three scientists of our Bureau received advanced training in USA under the National Agricultural Innovation Project this quarter.

Dr M. Nagesh, Principal Scientist, obtained his training on “Genomics and transcriptomics” from Dr Amit Dhingra at the Washington State University, Pullman.

Dr M. Mohan, Senior Scientist, completed his research on “Molecular analysis of insecticide resistance genes from the model insect bedbug, *Cimex lectularius*” under the guidance of Dr Subba Reddy Palli at the University of Kentucky, Lexington.

Dr Mahesh S. Yandigeri, Senior Scientist, worked on the ‘Metagenome of *Wolbachia* endosymbiont associated with tomato psyllid using BAC libraries’ with Dr Richard Stouthamer at the University of California Riverside, Riverside.

Selected Publications

Gupta, A. 2013. Three new species of reared parasitic wasps (Hymenoptera: Braconidae: Microgastrinae) from India. *Zootaxa*, 3701(3): 365–380.

Rangeshwaran, R., Ashwitha, K., Sivakumar, G. & Jalali, S.K. 2013. Analysis of proteins expressed by an abiotic stress tolerant *Pseudomonas putida* (NBAII-RPF9) isolate under saline and high temperature conditions. *Current Microbiology*, 67: 659–667.

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