

NBAII Newsletter



National Bureau of Agriculturally Important Insects



Vol. VI (1)

March 2014

Insectarium, Sir C.V. Raman and butterflies



Anyone transiting through Singapore's Changi Airport is invariably drawn to the Butterfly Garden at the new Terminal 3 which offers a treat of several butterflies of varied hues and colours. Singapore, though commerce-minded, offers this fare absolutely free, to tell the world that it cares for its butterflies, and wants people to enjoy watching them. At NBAII, we too took a plunge in this direction, by experimenting with an 'Insectarium' (defined as a 'live insect zoo' by Wikipedia). What better day than 28 February – the National Science Day, commemorating Sir C.V. Raman's discovery of the "Raman effect" – to declare it open, for Raman himself was an ardent butterfly lover with collections of beetles and butterflies housed in the museum he founded at the Raman Research Institute in Bangalore. It is said that Raman had a fascination for colours and so collected insects besides his favourites, minerals and gems! Surely, this fascination can be kindled in our children. And on the very day of its

opening, NBAII's walk-in insectarium saw more than 400 enthusiastic high schoolers, experiencing the colours and vibrancy of live Indian insects. They were awe-inspired at the diversity that existed in the insect world otherwise unknown to them.

I especially congratulate Dr Prashanth Mohanraj and Dr Sunil Joshi, our scientists, who set up an array of live displays of antlions, wild silk moths, lac insects, drosophilids, several aquatic insects, predators, parasitoids, etc. coupled with helpful posters and visual aids. This insectarium also has museum beetles and other insects to augment the knowledge of the insect world. With the addition of useful biocontrol agents, the insectarium not only caters to the students and lay public but also to our farmer friends. May I also add that this is the first declared insectarium of India and all your goodwill and support will augur well for its continuance and success in the days to come.

Abraham Verghese
Director

Insectarium at NBAII

The newly established 'Insectarium' at NBAII was formally inaugurated by Dr P.K. Chakrabarty, Assistant Director-General (Plant Protection), ICAR, on 1 March 2014. Members of the Research Advisory Committee (RAC), including Professor C.A. Viraktamath, Chairman, graced the occasion. This facility features 21 species of live insects and other arthropods, three boxes of fruit flies, dung beetles and butterflies as well as posters highlighting interesting aspects of insect life. Several aquatic insects, including the not-often-seen nymphs of dragonflies, water scorpions, back swimmers and water skaters are of special interest.



Research Highlights

New species from Andamans

A new species of the cosmopolitan genus *Phanerotoma* (Fig. 1) has been found in the Andaman Islands. A comparative analysis of this new species with other Oriental species is under way.

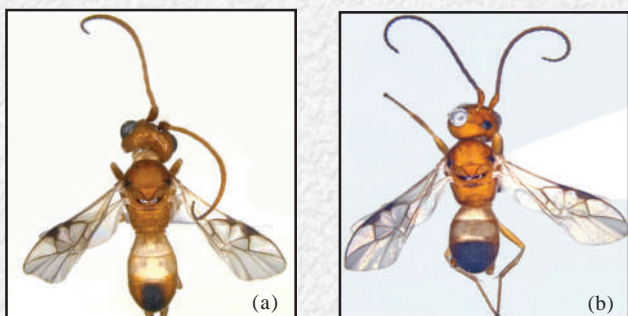


Fig. 1: *Phanerotoma* sp. from Andamans: (a) Female; (b) Male

A predator for BPH and GLH

Amphiareus constrictus (Fig. 2), an anthocorid predator, was collected from sugarcane crop in Mandya, Karnataka. It was earlier reported as a potential predator of brown planthopper (BPH) and green leafhopper (GLH) infesting rice. A protocol has been developed to mass multiply this predator on *Corcyra cephalonica* eggs.

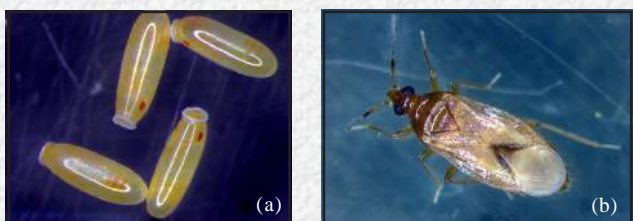


Fig. 2: *Amphiareus constrictus*: (a) Eggs; (b) Adult

Bacterium could degrade acephate

Enterobacter cancerogenus, an endosymbiotic bacterium of the parasitoid *Cotesia vestalis*, could degrade acephate. Liquid chromatography-mass spectrometry (LC-MS) assay confirmed degradation of this organophosphate insecticide (183.16 g/mol) to des-O-methyl acephate (143.2 g/mol).

Barcodes of biocontrol agents

Some important predators have been molecularly characterised and barcodes produced during this quarter: dipteran larval predator *Cacoxenus* sp. (KF938925); tolymid seed-feeder *Megastigmus* sp.

(KF938926); predatory coccinellid *Cheilomenes sexmaculata* (KF998579); and aphelinid parasitoid *Coccophagus* sp. (KF938924).

Phytoplasma detected in Nirvana pallida

For the first time, phytoplasma DNA was detected through qPCR in the leafhopper *Nirvana pallida* collected from sesame. Both SYBR Green and TaqMan methods gave positive results.

Endosymbionts

A culturable yeast was recently isolated from *Nilaparvata lugens*, the brown planthopper of rice. Molecular characterisation through 16S rDNA gene revealed the identity of the isolated yeast as *Filobasidium floriforme* (Fig. 3). The association of *Wolbachia* was detected in the leafhoppers *Amrasca biguttula biguttula* and *Bothrogonia* sp. through PCR amplification of *wsp* gene.

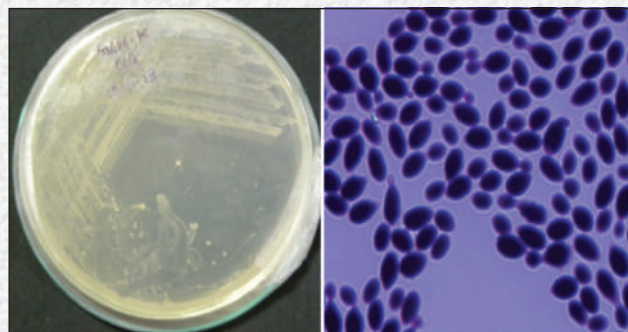
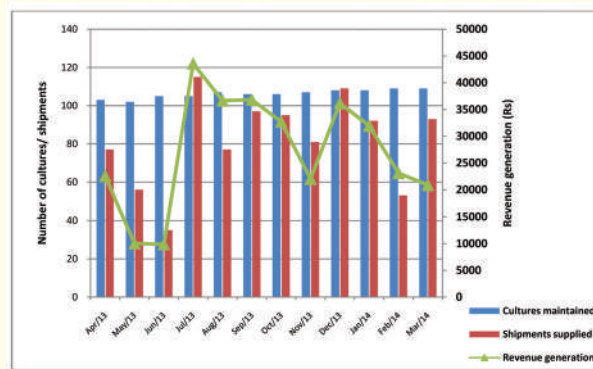


Fig. 3: *Filobasidium floriforme* from *Nilaparvata lugens*

Live insect culture maintenance and supply

During 2013-14, 109 live insect cultures were maintained and cultures were supplied to farmers, students, research organisations, KVKs and commercial production units (*see the accompanying chart*). A total of 980 consignments generated a revenue of Rs 3,26,353.



Stem-boring weevil of common balsam

Common balsam or garden balsam (*Impatiens balsamina*) is native to south Asia. Its flowers are in several hues and are highly preferred by bees, butterflies and other insects. Except for aphids, thrips and spider mites, balsam has no other major insects reported so far. A long-snouted weevil (*Metialma balsaminae*) was found feeding on the plant in Bangalore recently. The adult weevils are tiny with brown, white and rose-coloured markings on the body. They feed on the edges of leaves and scoop the stem and feed. A larval ectoparasite was also observed during the study and is to be identified. Although several species of *Impatiens* are grown in India, *I. glandulifera* is a highly invasive species. Efforts are being made to study the host range of this weevil to see if it can infest *I. glandulifera* also so that this insect can be a potential bioagent for tackling the invasive species in Europe or elsewhere.



Metialma balsaminae: (a) Adult; (b) Grub; (c) Ectoparasite on grub; (d) Emergence hole

NBAII-NAIP field day in Tamil Nadu

As part of the National Agricultural Innovation Project (NAIP), NBAII arranged a field day on 22 February 2014 for farmers at Papparapatti village in Dharmapuri district of Tamil Nadu. The objective of the programme was to introduce the utility of stress-tolerant natural enemies in biological control of tomato, brinjal and cotton pests. More than 100 progressive farmers enthusiastically participated in the field day. Talks were given by scientists on various aspects of biocontrol of crop pests, and queries from farmers were suitably answered. English and Tamil versions of the folder on “Biological control of pests of crops using stress tolerant natural enemies” were released on the occasion. Besides, demonstration kits containing improved strains of two insect biocontrol agents (*Trichogramma chilonis* & *Chrysoperla zastrowi sillemi*) and two plant disease antagonists (*Trichoderma harzianum* & *Pseudomonas fluorescens*) were distributed to the farmers. Dr Sudhir Kochhar, National Coordinator of NAIP, was the chief guest. Dr Abraham Verghese (Director, NBAII), Dr N. Tamilselvan (Head, KVK, Dharmapuri), the Joint Director of Horticulture, and NBAII scientists were also present. Dr S.K. Jalali and his NAIP team members were felicitated with a “Team Award” in recognition of their work on the development and adoption of technologies for stress-tolerant natural enemies, by the Society for Biocontrol Advancement.



NBAII at Bijapur and Nagpur exhibitions

NBAII participated in the exhibition set up during the “Krishi Mela” at the College of Agriculture, Bijapur, from 5–6 January 2014. Mr S.R. Patil, Honourable Minister for IT, BT and Science & Technology, Government of Karnataka, was briefed about biological control research and development by staff of NBAII when he visited our stall. The minister expressed happiness about NBAII’s contribution towards biological control of sugarcane woolly aphid and papaya mealybug, which are major concerns of farmers from that area.



Bijapur



Nagpur

NBAII was also present at the “Krishi Vasant” exhibition (9–13 February 2014) in Nagpur. Farmers from far and wide were delighted to learn about the variety of biocontrol agents on display at the NBAII stall. Dr S. Ayyappan, Secretary (DARE) & Director-General (ICAR), was among the several notable visitors who were hugely appreciative of biocontrol efforts by NBAII.

Biocontrol successes in Kerala

On 6 March 2014, Dr Abraham Verghese visited the rice growers of Thrissur, who have been successfully growing the crop solely depending on bioagents developed at NBAII, especially *Pseudomonas* and *Trichogramma*. The aquatic weed



Biocontrol in rice



Salvinia-free channel

Salvinia molesta, a major threat to waterways and irrigation channels, has now been reduced by more than 90%, thanks to the biocontrol intervention by NBAII through Kerala Agricultural University. Kerala is now at the forefront of biocontrol popularisation in India.

Selected Publications

- Joshi, S., Lokeshwari, D., Krishna Kumar, N.K., Manjunatha, H., Verghese, A. & Jalali, S.K. 2014. *Wahlgreniella nervata* (Hemiptera: Aphididae), a new pest of rose in India. *Florida Entomologist*, 97(1): 162–167.
- Pratheepa, M., Jalali, S.K., Silvester, A.R., Venkatesan, T., Nagesh, M., Panda, M. & Pattar, S. 2014. Insect Barcode Information System. *Bioinformation*, 10(2): 98–100.
- Ramya, S.L., Murthy, K.S., Venkatesan, T. & Jalali, S.K. 2013. Biochemical and molecular diversity analysis of culturable bacteria in *Cotesia plutellae* (Kurdjumov) (Hymenoptera: Braconidae), a parasitoid of diamondback moth *Plutella xylostella* (Linnaeus). *Journal of Biological Control*, 27(4): 260–267.
- Veenakumari, K., Buhl, P.N., Mohanraj, P. & Khan, F.R. 2013. Three new species of *Allotropa* Forster (Platygastridae: Sceliotrachelinae) from India. *International Journal of Environmental Studies*, 70: 222–231.

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Published by: Director, National Bureau of Agriculturally Important Insects, Hebbal, Bangalore 560 024, India

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Printed at: Precision Fototype Services, Bangalore 560 008