NBAIR Newsletter

ICAR–National Bureau of Agricultural Insect Resources

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On top of Leh, and DDT to avermectin

On the 14th of September, I was atop 11,000+ feet above sea-level at Leh, Ladakh. This cold mountain 'desert' with its rolling Himalayan terrain, and snow-capped mountains, is a treat to be in. It draws tourists in large hordes, but entomology here is largely unexplored. The potential to find insects adapted to extreme cold, thin air with low oxygen, surviving on spring crops and rest of the time aestivating or diapausing, is indeed challenging.

My trip was exploratory and to see the areas in agricultural entomology. Interestingly, at the summit with Dr Sajad Mohi-ud-din (our co-researcher in biological control) and the staff at the SKUAT's research station at Leh, we found several poplar trees infested with borers (Cerambycids?) and with severe dieback. We did a demonstration of our trial-product organic healer-cum-sealer, and hopefully the poplar would survive. The KVK here is promoting trench vegetable cultivation on which mites and sucking insects are serious pests. The scope for biological control is very high as insecticides are not available here! Good for AICRP Biocontrol and for the environment — Cheers!

We have come a long way from 1948 when the Nobel Prize in physiology and medicine was given to Paul Hermann Müller for his discovery of DDT. Now in 2015, Satoshi Ōmura and William C. Campbell won the Nobel Prize for their discovery of avermectin, a derivative from a soil actinomycete that works against roundworm parasites.

According to Wikipedia, avermectins are a series 16-membered macrocyclic lactone derivatives, also with insecticidal properties, and one example is the abamectin. I am thrilled to write that we too have naturally derived molecules in the pipeline from our semiochemical efforts to control plant and veterinary pests. You will soon hear about some.

Avermectins are far less toxic as compared with DDT, and surely from one Nobel to the other it has been a long way, and one hopes that the threatening of "silence" in spring (see Rachel Carson's *Silent Spring*) would give rise to increased cacophony of sounds in nature (insects included).

Abraham Verghese
Director

NBAIR at Motihari exhibition

Director-General at the stall

NBAIR set up a stall at the "Agriculture Exhibition" held in Motihari, Bihar, during 20–21 August 2015. Shri Radha Mohan Singh, Union Minister for Agriculture & Farmers' Welfare, inaugurated the exhibition, which attracted farmers from nearby districts. The farmers visiting NBAIR stall took advantage of the opportunity to get detailed information on various biocontrol technologies suitable for their region. Dr S. Ayyappan, Secretary (DARE) & Director-General (ICAR), visited our stall.

NBAIR's exhibition in Cubbon Park

On 27 September 2015, NBAIR organised an exhibition-cum-demonstration in Bengaluru's Cubbon Park to familiarise common people with insect pests and useful insects. The programme, coordinated by the Department of Horticulture, Government of Karnataka, was a grand success with thousands of nature enthusiasts and citizens interested in kitchen-gardening showing keen interest in insects. Trichogrammatids, chrysopids, coccinellids, entomopathogenic fungi and entomopathogenic nematodes were some of the biocontrol agents shown to the visitors.

Research Highlights

A new braconid from Karnataka

A new species, *Cassidibracon repens* Gupta (Fig. 1), has been described and illustrated from Karnataka. The species was reared from a pyralid caterpillar, which is a new host record for *Cassidibracon*. A revised key to the Oriental species of *Cassidibracon* has recently been published.

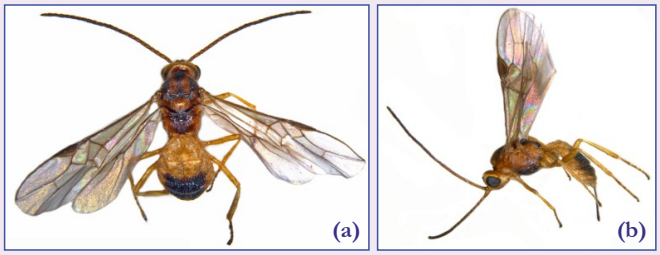

Fig. 1: *Cassidibracon repens* female: (a) Dorsal view; (b) Lateral view

New taxa described and new synonyms proposed in Tephritidae

Seven new species of fruit flies (Diptera: Tephritidae) have been described from India : *Acroceratitis parastriata* David & Hancock; *Acroceratitis breviscapa* David, Ramani & Hancock; *Acidoxantha galibeedu* David & Ramani; *Philophylla lachung* Singh & David; *Euphranta wrightiae* David & Singh; *Euphranta pseudocassiae* David & Singh (Fig. 2); and *Magnimyiloia perennifascia* Singh & David.

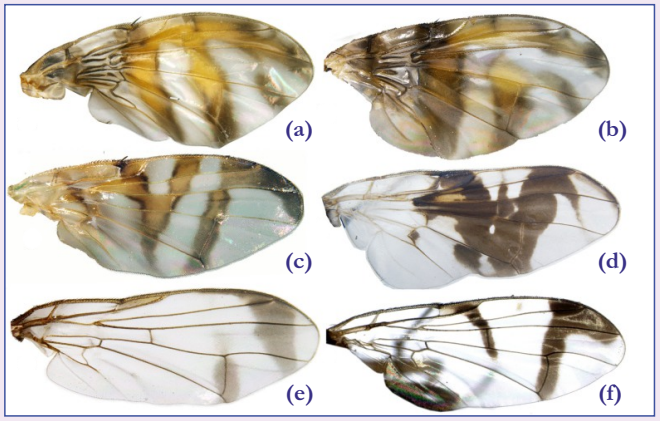

Fig. 2: New species of Tephritidae: (a) *Acroceratitis parastriata*; (b) *Acroceratitis breviscapa*; (c) *Acidoxantha galibeedu*; (d) *Philophylla lachung*; (e) *Euphranta wrightiae*; (f) *Euphranta pseudocassiae*

New records of Tephritidae for India

Four tephritid species, namely, *Acidoxantha totoflava*, *Acroceratitis histrionica*, *Ectopomyia baculigera* and *Ptilona confinis* (Fig. 3) were recorded for the first time from India.

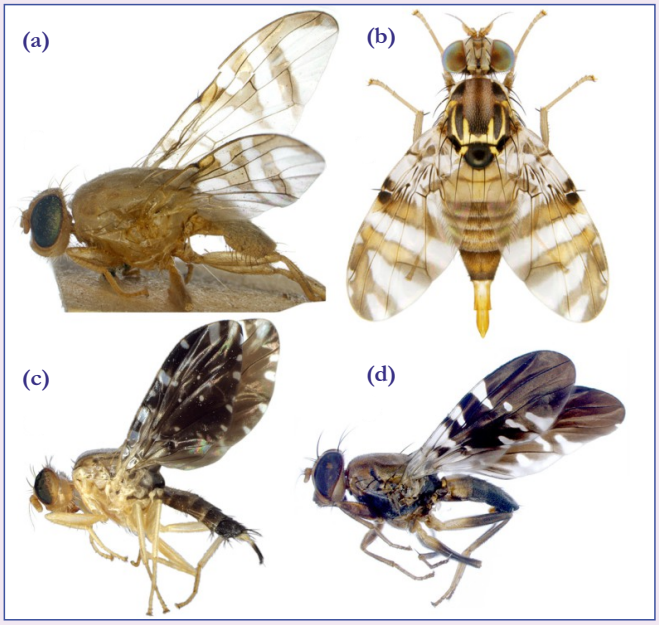

Fig. 3: New records of Tephritidae: (a) *Acidoxantha totoflava*; (b) *Acroceratitis histrionica*; (c) *Ectopomyia baculigera*; (d) *Ptilona confinis*

Identification and differentiation of trichogrammatids based on ITS2 and COI

Molecular techniques are quicker and more reliable than traditional methods in the identification of trichogrammatids. In a study to identify and distinguish different species based on ITS2 and COI regions, 19 trichogrammatids were subjected to DNA extraction, PCR amplification and sequencing. With the available sequences in public database, phylogenetic trees were built for a total of 82 (ITS2) and 71 (COI) trichogrammatid sequences to understand the evolutionary relationships among the species. A comparative assessment based on the Kimura-2-parameter (K2P) model suggested that ITS2 was the better molecular marker than COI due to the low intra-specific and high inter-specific evolutionary distances. Further, it provided correct identification in the respective clades, at both species and genus levels.

Host and host-plant associated diversity of yeast and bacterial microflora in *Trichogramma* species

The microflora associated with four *Trichogramma* species (*T. chilonis*, *T. pretiosum*, *T. achaeae* and *T. danausicida*) collected on 12 crops in 11 states were investigated. Out of a total of 53 microflora obtained, 9 yeasts and 8 bacterial species were identified. Among the yeasts, *Wickerhamomyces anomalus* was the most abundant, constituting 33.3% of the recorded species. The other important species were *Pichia anomala* (18%), *Metschnikowia reukaufii* (15.4%) and *Candida apicola* (10.3%). Among the bacteria, *Bacillus cereus* (28.6%) and *Stenotrophomonas maltophilia* (14.3%) were the most dominant.

Foundation Day celebrations at NBAIR

NBAII became NBAIR on 24 September 2014. This year's "Foundation Day" celebrations began on 23 September with several events on the campus. On the first day, an exhibition was also arranged for schoolchildren and farmers. Around 500 students from various schools of Bengaluru visited and evinced keen interest in the research activities of NBAIR. Director Dr Abraham Verghese honoured biocontrol-practising farmers on the occasion. He gave away *Awards of Excellence* to meritorious staff of NBAIR for their significant contributions. He also unveiled framed photographs of Dr V.G. Prasad and Dr S.P. Singh, former Project Coordinators of the All-India Coordinated Research Project on Biological Control of Crop Pests and Weeds. Competitions for staff members and cultural events were also organised. The event was covered by Doordarshan and telecast on the national channel.

Schoolchildren at the exhibition

A farmer being honoured

Dance performance

Review meeting of the Network Project on Insect Biosystematics

The "Ninth Review Meeting of Network Project on Insect Biosystematics" was held on 3–4 September 2015 at NBAIR. This was the first meeting of the project after NBAIR took over as the coordinating centre from the ICAR–Indian Agricultural Research Institute, New Delhi. Dr Abraham Verghese, Director of NBAIR, welcomed the gathering and Dr P.K.Chakrabarty, Assistant Director-General (Plant Protection & Biosafety), ICAR, inaugurated the meeting. Dr Prashanth Mohanraj, Principal Scientist, NBAIR, reviewed the progress made in the project since its inception. The technical sessions had presentations from the 11 centres located throughout the country. Over 50,000 insects were collected and curated from 19 states and 3 union territories last year. Many new species, including many parasitoids, in the families Cicadellidae, Miridae, Acrididae, Aphelinidae, Trichogrammatidae, Encyrtidae, Mymaridae, Microgastrinae, etc. were collected and documented. New eriophyid, bdellid and phytoseiid mite species were also described.

Demonstration of WP formulation of EPN for sugarcane root grub control

Under the *Mera Gaon Mera Gaurav* programme, a "Field Demonstration on WP Formulation of the Entomopathogenic Nematode (EPN), *Heterorhabditis indica*", was organised by NBAIR in cooperation with the Department of Agriculture, Government of Karnataka, on 8–9 September 2015 at Hosur, Matolli, Ingalagi and Enagi villages in Belagavi district of Karnataka. Around 100 farmers participated in the programme. The inaugural meeting was chaired by Dr L.M. Hosamani, Assistant Director of Agriculture. In the open discussion with farmers, suggestions were mooted to adopt EPN under the package of practices for root grub management. Dr Jagadeesh Patil, Scientist, NBAIR, addressed the farmers and provided information on the occurrence, distribution and the damage root grubs can cause to sugarcane crop. He demonstrated the EPN application technology in sugarcane, cabbage and tomato fields infested with *Holotrichia serrata* and *H. consanguinea* grubs. NBAIR distributed 80 kg of the EPN formulation to the participating sugarcane growers.

Field day on monitoring and management of *Tuta absoluta*

A "Field Day on Monitoring and Management of Tomato Leaf Miner, *Tuta absoluta*" was organised by NBAIR in collaboration with the Department of Agriculture (Government of Tamil Nadu) and Dr Perumal Krishi Vigyan Kendra (KVK, Krishnagiri) on 11 August 2015 at Shoolagiri in Hosur taluk of Tamil Nadu. Over 100 farmers, agricultural college students and research scholars attended the event. The inaugural meeting was chaired by Dr Abraham Verghese, Director of NBAIR. He addressed the farmers and alerted them on the occurrence of *T. absoluta* in Tamil Nadu and the damage it could cause to tomato. He assured the farmers that management strategies developed by NBAIR scientists will help tide over the problems posed by this invasive pest. He informed that pheromone lures developed by the bureau are effective for monitoring and trapping the insect. Tamil and English folders on how to manage this pest were released during the meet. The group discussion between the farmers and scientists was moderated by Dr T. Sundarraj, Programme Coordinator of KVK, Krishnagiri. The farmers were also taken on a field visit to Medapalli village, where the pheromone lures developed by NBAIR were being evaluated.

"Hindi Pakhwada" celebrated at NBAIR

"Hindi Pakhwada" was celebrated at NBAIR under the chairmanship of Dr Abraham Verghese, Director, from 15–30 September 2015. Several events centering on Hindi were held during the fortnight, including an essay competition ('*Mera gaon mera gaurav*'), an extempore speech contest and a singing competition, in which many talented staff members participated. During the valedictory function, Dr Verghese gave away prizes and certificates to all those who enthusiastically participated in the competitions. The events were coordinated by Dr Ankita Gupta with assistance from Mr Satandra Kumar and others.

Eminent acarologist Dr S.K. Gupta feted

World-renowned acarologist Dr S.K. Gupta was felicitated by Dr Abraham Verghese, Director, NBAIR & President, SBA, on 10 July 2015 in a special meeting jointly hosted by NBAIR and the Society for Biocontrol Advancement (SBA). Dr Gupta, presently a Consultant Scientist at R.K. Mission's Medicinal Plants Research and Extension Centre in Kolkata, was on a consultancy visit to NBAIR. Dr Verghese lauded his contributions to the taxonomy of mites, especially the plant-associated species. Dr Gupta presented a well-received talk entitled "Mites as foes and friends in agriculture" during the event.

Superannuation

Mr S. Venkatachalam, Technical Officer (Electrical), superannuated on 30 September 2015. At the farewell function, NBAIR staff members wished him a peaceful and relaxing retirement.

Selected Publications

David, K.J. & Singh, S.K. 2015. Two new species of *Euphranta* Loew (Diptera: Tephritidae: Trypetinae) and an updated key for the species from India. *Zootaxa*, 3914(1): 64–70.

Jalali, S.K. & Venkatesan, T. 2015. Quantification of diversity of agriculturally important insects through DNA barcoding. *Genome*, 58(5): 231.

Salini, S. & Viraktamath, C.A. 2015. Genera of Pentatomidae (Heteroptera: Pentatomoidea) from south India — an illustrated key to genera and checklist of species. *Zootaxa*, 3924(1): 1–76.

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