



A walk through 2017

As we move into 2018, this is the time to reminisce on our achievements in 2017, and on how we achieved what we did. Here are a few glimpses of NBAIR's journey through 2017:

The sanctioned EFC of NBAIR formalised new names for the three Divisions: Insect Systematics, Molecular Entomology and Insect Ecology Divisions were rechristened as Germplasm Collection and Characterisation (GCC), Genomic Resources (GR) and Germplasm Conservation and Utilisation (GCU), respectively. The scientists, with the able support of technical and administrative staff, tirelessly focussed on the committed mandate of NBAIR. The insect museum holds a rich collection of more than 1.7 lakh insect specimens of agricultural importance with 251 type specimens. The 11 databases developed on insect genetic resources meant for farmers, researchers, students and the public are being widely accessed nationally and internationally, and have till date recorded more than 5.24 lakh hits. The identification services provided by the NBAIR taxonomists is worth around ₹ 1 crore per annum (calculated based on the charges levied for identification services by the Natural History Museum, London).

The GR division has characterised 223 insects and their resources, and a total of 2,487 species have been characterised so far. Over 280 barcodes were generated during the year, totalling 600 barcodes. For the first time in the country, whole genome sequencing has been carried out for *Helicoverpa armigera* NPV and brinjal shoot and fruit borer, *Leucinodes orbonalis* and NCBI accession numbers were obtained. Transcriptome analyses were completed for five insect pests.

The GCU division has focussed on reaching out to the farmers with novel, farmer-friendly, non-chemical pest management technologies. Holding the largest live-insect and insect-derived resources repository with 129 live insect germplasm and 721 microbial isolates, NBAIR supplied 869 lakh live insects and 140 shipments of microbials during 2017, thus relentlessly serving researchers and the farming community.

Awareness on non-chemical modes of pest management was created either by directly interacting with the farmers in the 35 adopted villages or by licensing the NBAIR technologies to commercial entrepreneurs. Last year, NBAIR technologies were licensed to seven commercial entrepreneurs, 11 patents were filed and one patent grant was obtained. Training programmes were organised for 960 trainees in 110 batches. Scientific excellence was recognised at the national level through 11 awards bestowed on the NBAIR researchers. Our scientists published 98 research papers in peer-reviewed journals.



Networking was done at national and international levels to strengthen our research programmes. National meets were held focussing on themes related to biological control for pest and disease management, conservation strategies for management of invasives and chemoecological methods for pest management. The Regional Consultation on “Facilitating the Use of Microbial Pesticides in South Asia”, organised at NBAIR with eight SAARC countries participating in it, gave an added responsibility to NBAIR to be the forerunner in networking among SAARC countries to take up intensive work on developing region-specific potential microbial biopesticides.

What we achieved was through the joint efforts of 33 scientists, 14 technical staff, 9 administrative staff, 3 supporting staff and around 70 temporary staff. Last year marked the entry of the deadly invasive pest, the rugose spiralling whitefly (RSW). NBAIR identified the pest and its natural enemies and suggested pest management through conservation strategies by conducting large-scale awareness programmes. Though we look back with pride, we do not want to remain complacent. As we are moving into our silver jubilee year, we are setting a new benchmark for future performance, for which we have to make positive and constructive changes or rather we wish to “be the change” towards building a conducive and novel platform for institute–industry–farmer interface.

Chandish R. Ballal
Director

Research Highlights

New parasitic wasp

A new parasitic wasp species, *Unichypea similis* Gupta (Hymenoptera: Pteromalidae) (Fig. 1), reared from the leaf knots constructed by the coleopteran *Apoderus tranquebaricus* on the host plant *Grewia abutilifolia* has been described and illustrated. For the first time, the male of *Unichypea* was described and illustrated.



Fig. 1: *Unichypea similis*

Buzz pollinating bee enhances fruit and seed set in brinjal

The native bee *Amegilla violacea* (Fig. 2) was the major buzz pollinator observed in brinjal crop. There was higher fruit set in bee-pollinated flowers (76%) than in self-pollinated (bagged) flowers (32%). Similarly, the mean fruit weight and number of seeds per fruit were significantly higher in bee-pollinated flowers (63.5 g and $1,278 \pm 282$ seeds) than in self-pollinated flowers (35.6 g and 436 ± 151 seeds).



Fig. 2: *Amegilla violacea* visiting brinjal flowers

Expanded host range of RSW

Rugose spiralling whitefly (*Aleurodicus rugiopectulatus*), or RSW, is continuously expanding its host range and geographical distribution, especially on horticultural and ornamental plants mainly through the movement of planting materials from one place to another. Though the pest was initially noticed on coconut, banana, custard apple, sapota and a few ornamental palms, recent surveys indicated that RSW can also infest cashew and mango in Udupi district of Karnataka (Fig. 3) and oil palm in West Godavari district of Andhra Pradesh. Unfortunately, its predominant natural enemy (*Encarsia guadeloupaë*) was absent on oil palm. This is an alarming situation as it can lead to the uninterrupted and rapid multiplication of the pest and devastation of the crop. Redistribution of the natural enemy on infested oil palms is strongly recommended.



Fig. 3: RSW on leaves of cashew (a) and mango (b)

Insect expedition in northeast India

NBAIR scientists, Drs R. Gandhi Gracy, M. Sampath Kumar and U. Amala, went on an expedition to Arunachal Pradesh and Assam from 31 October to 7 November 2017 to collect the unique insect fauna in some less-explored agro-ecosystems. The collected species of the Sphecidae, Apidae, Halictidae, Megachilidae and



Araneae (spiders) will be added to the designated repository at NBAIR. The bumble bee, *Bombus* sp., which usually occurs in high-altitude temperate regions of India, was collected near Pasighat during the expedition.

Celebration of Mahila Kisan Diwas

“Mahila Kisan Diwas” was celebrated at NBAIR. The day-long programme was inaugurated by the women employees of the institute with the lighting of lamp. Dr Chandish R. Ballal, Director, addressed the gathering and talked about the necessity for empowering and encouraging women farmers, and re-emphasised the role of NBAIR in recognising and supporting women in agriculture. Five women farmers from across Karnataka, namely, Ms Munithayamma from Bommanahalli, Ms Roopa from Kanathanahalli, Ms Shanthamma from Kattigehalli, Ms Mamatha from Mandya and Ms Bharathi from Bettahalsur, participated in the event. Earlier, Dr Y. Lalitha, Assistant Chief Technical Officer, welcomed the women farmers and introduced them to the audience. Dr A.N. Shylesha, Principal Scientist, shared his views on the topic and gave an overview of the importance of women’s empowerment in agriculture. Demonstration-cum-training on farm-level production of *Trichoderma harzianum*, a widely used biocontrol agent, was imparted to the visiting farmers. All the women farmers shared their farming experiences with the audience and gave feedback on the training imparted to them. The women farmers were felicitated by Dr Ballal and each was provided with a pressure cooker and a pure culture of *T. harzianum* to enable them to commence production and use of the fungus on their farms. The function was covered by Doordarshan.



Events and celebrations at NBAIR

Agricultural Education Day

NBAIR organised a series of events to mark the “Agricultural Education Day” on 17 November 2017. Pre-primary pupils of Mount Litera Zee School were invited to Yelahanka Campus of NBAIR, where the children were shown different types of live insects as well as specimens from museum collections. NBAIR Director, Dr Chandish R. Ballal, visited research stations of Kerala Agricultural University at Vellayani, Vellanikkara and Kumarakom and delivered talks to research scholars on use of bioagents for sustainable pest management.



Vigilance Awareness Week

“Vigilance Awareness Week” (30 October–4 November 2017) was observed at NBAIR by taking the pledge. Director Dr Chandish R. Ballal highlighted the importance of the week to the staff members.

World Soil Day

“World Soil Day” was celebrated by NBAIR on 5 December 2017 at Anupanhalli in Karnataka and Krishnagiri in Tamil Nadu. The procedure for collecting soil samples for analysis was demonstrated and pamphlets were distributed to farmers at Anupanhalli. A talk on the impact of soil insecticides in agriculture was delivered at the farmers’ meeting in Krishnagiri.



Foundation Day and Kannada Rajyotsava

“Foundation Day” of NBAIR and “Kannada Rajyotsava” were celebrated together at NBAIR on 22 December 2017. Dr Mruthyunjaya, former National Director of National Agricultural Innovative Project, New Delhi, was the Chief Guest of the event. He was felicitated by Dr Chandish R. Ballal, Director, NBAIR.

Technology transfer

NBAIR transferred the technology of entomopathogenic nematode production to two firms, Khandelwal Bio Fertilizer, Belagavi, Karnataka and Godavari Bio Fertilizer Industries, Nashik, Maharashtra.



Training report

A “Capacity Building Programme on Identification, Mass Production and Utilisation of Parasitoids, Predators and Entomopathogens for Sustainable Insect Pest Management” was organised at NBAIR on 4–10 December 2017. Participants were trained on various aspects of taxonomy of insects, mass production protocols and field application methods for microbial and microbial biocontrol agents. Dr Ankita Gupta directed the course in coordination with Drs Richa Varshney and Jagadeesh Patil.



Superannuation

Mr V. Anjanappa, Supporting Staff at NBAIR, superannuated from service on 31 December 2017. He was felicitated by the Director and staff members of NBAIR.



Foreign Visits

Dr Kolla Sreedevi, Senior Scientist, Division of Germplasm Collection and Characterisation, was deputed as Guest Researcher to work on “The phylogeny and biogeography of Indian sericine chafers” at Division of Arthropoda, Alexander Koenig Museum (ZFMK), Bonn, Germany, 17 September–14 December 2017.

Dr Y. Lalitha, Assistant Chief Technical Officer, Division of Germplasm Conservation and Utilisation, attended the “14th IOBC–MRQA Workshop on Mass Rearing High Quality Invertebrates for Multiple Purposes” in Mérida, Mexico, 14–17 November 2017.

Selected Publications

- Amala, U., Shivalingaswamy, T.M. & Veeresh Kumar. 2017. An unusual nesting site by leaf cutter bee *Megachile (Aethomegachile) laticeps* Smith. *Journal of the Kansas Entomological Society*, 90: 77–81.
- Joshi, S. & Blackman, R.L. 2017. A new bamboo-feeding species of *Kaochiaoja* Tao (Hemiptera: Aphididae) from India. *Zootaxa*, 4363: 569–575.
- Malathi, V.M., Jalali, S.K., Lyju, V.J., Gracy, R.G., More, R.P., Anandan, R., Thulasi, A. & Venkatesan, T. 2017. Associated bacterial diversity of insecticide-susceptible and -resistant brown planthopper, *Nilaparvata lugens* (Homoptera: Delphacidae) analyzed by culture-dependent and -independent methods. *Phytoparasitica*, 45: 683–693.

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