

NBAIR Newsletter

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ICAR-National Bureau of Agricultural Insect Resources



Harnessing the power of women – to serve, strive and succeed!

International Women's Day (IWD) is celebrated on 8 March, a global day celebrating the social, economic, cultural, career and political achievements of women — a day which belongs to all groups of women in any part of the universe, irrespective of age, career, social standing or economic status. We are celebrating the 109th anniversary of IWD on 8 March 2020. The theme of IWD2020 is “Each for Equal”, emphasising the (not so) much accepted fact that an equal world is an enabled world. I dedicate the March issue of this newsletter to the strong multitasking women of NBAIR/PDBC who over the years have dedicated their might for the growth of this organisation.

¹**Dr K. Veenakumari:** an acclaimed Platygastroidea taxonomist with a whopping 113 new species to her credit; ²**Dr J. Poorani:** a coccinellid taxonomist of repute, who initiated the much acclaimed insect databases with awe-inspiring images; ³**Dr M. Pratheepa:** a competent computer scientist who prepared the first insect germplasm registration platform, AGIS, and provides a regular face-lift for our website; ⁴**Dr Deepa Bhagat:** an adept organic chemist known for her nanotechnology patents; ⁵**Dr Kolla Sreedevi:** an accomplished white grub taxonomist and an equally adept insect ecologist, a respected teacher amongst students; ⁶**Dr R. Gandhi Gracy:** an energetic entomologist with expertise in barcoding and

bioinformatics, also the most popular trainer; ⁷**Dr S. Salini:** a highly dedicated pentatomid taxonomist, responsible for bringing out a monograph, considered as a ‘must refer’ for future taxonomists; ⁸**Dr Ankita Gupta:** a well-recognised ichneumonid taxonomist who while relentlessly striving to double or treble the museum collections, excels in her outstanding publications; ⁹**Dr U. Amala:** an ever-enthusiastic entomologist, who has succeeded not only in *in situ* conservation of pollinators, but also in inciting the taste buds of fishes with insects; ¹⁰**Dr Richa Varshney:** a diligent biocontrol worker with an enviable skill to search and nurture the hard-to-find novel bioagents; ¹¹**Dr R.R. Rachana:** a young entomologist, yet much more than a budding thrips taxonomist; ¹²**Dr R.S. Ramya:** a highly conscientious scientist, an expert in insecticide resistance studies with exceptional writing skills; ¹³**Ms B.S. Hema Malini (retd):** a humble and meticulous Librarian; ¹⁴**Ms Shashikala S. Kadam (retd):** a meticulous officer with special skills for uninterrupted production and supply of quality pest and predatory insects; ¹⁵**Ms S.K. Rajeshwari:** the most dependable insect collector and museum curator; ¹⁶**Dr Y. Lalitha:** a sincere officer with a unique ability to maintain pure cultures of more than 90 strains/species of trichogrammatids; ¹⁷**Ms B.L. Lakshmi (retd):** a versatile officer equally efficient in live insect rearing and dead insect mounting; ¹⁸**Ms L. Lakshmi:** highly efficient in convincing the farmer on adopting the right technologies by speaking to him using the perfect tone and right language.



It is evident that behind every successful woman is a tribe of successful women. The NBAIR women in science have always received the unstinted support of a brilliant team in the administration and finance sections. We salute the sincere contributions made by: the dynamic and steadfast Administrative Officer ¹⁹**Ms I.M. Dautie (retd.);** tenacious and well-informed ²⁰**Ms S. Rama (former Senior Administrative Officer);** highly focussed and sharp ²¹**Ms Dipanwita Deb;** sincere and dedicated ²²**Ms S. Kaveriamma;** most dependable and astute ²³**Ms M.S. Uma;** insightful and alert ²⁴**Ms Naziya Anjum;** ever-enthusiastic and resourceful ²⁵**Ms P. Anitha;** and young

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and bright ²⁶Ms Sanjeevini Desai. Let us acknowledge this team for the invaluable services. The industrious and competent women students, research fellows, young professionals and skilled staff of NBAIR deserve to be applauded for their remarkable contributions.

IWD2020 is giving us an opportunity to introspect on how far we have come and how far we can go to harness the power of women. It is said: “Each time a woman stands up, she stands up for all women”. Let us stand up together and celebrate!

Chandish R. Ballal
Director

Research Highlights

New species of fruit flies

A new species of *Acrotaeniostola*, *A. connexa* David, Sachin & Hancock (Fig. 1) of tribe Gastrozonini, infesting bamboo sprouts, was described from Kerala. Two new species of genus *Dacus*, *D. jacobi* David & Sachin (Fig. 2) and *D. viraktamathi* David & Hancock (Fig. 3), were described from Kerala and Himachal Pradesh, respectively. Three new distributional records for the country include *Ceratitella sobrina*, *Acroceratitis incompleta* and *Dacus maculipterus*.



Fig. 1: *Acrotaeniostola connexa*



Fig. 2: *Dacus jacobi*



Fig. 3: *Dacus viraktamathi*

Apochrysa evanida, a predator of rugose spiralling whitefly

Delicate green lacewings in the genus *Apochrysa* were reviewed and a key to world species was published. The genus *Apochrysa* was reported for the first time from India with *A. evanida* (Fig. 4) as a natural predator of the invasive rugose spiralling whitefly, *Aleurodicus rugioperculatus*, in southern India.



Fig. 4: *Apochrysa evanida*

Coccygidium transcaspicum, a hymenopteran parasitoid of fall armyworm

The parasitoid *Coccygidium transcaspicum* (Fig. 5) was reared from the fall armyworm, *Spodoptera frugiperda*. The study confirmed the first report from India and from the Oriental region, provided morphological identification details of *C. transcaspicum* and comparison notes from its closely allied species *C. melleum*, which is basically an Afrotropical species.



Fig. 5: *Coccygidium transcaspicum*

First report of an egg-larval parasitoid of fall armyworm

An egg-larval parasitoid, *Chelonus formosanus* (Fig. 6), was documented from the maize fields infested with *S. frugiperda* in Karnataka. This was the first report of *C. formosanus* parasitising *S. frugiperda* in India under natural field conditions. It is amenable to mass production in the laboratory.



Fig. 6: *Chelonus formosanus*

Maladera rufocuprea as a pest of guava

Recently, adult beetles of phytophagous Scarabaeidae comprising the subfamilies Melolonthinae, Rutelinae, Dynastinae and Cetoniinae were found infesting a wide range of horticultural crops resulting in considerable damage to the foliage, thereby affecting the yield adversely. The damage to several crops is usually inflicted by the immature stages, i.e. larvae of the subfamilies Melolonthinae, Rutelinae and partly Dynastinae. *Maladera rufocuprea* adults were found feeding voraciously on guava leaves in Pune, Maharashtra. This insect occurred in large numbers and can become a potential threat to guava crop. Regular monitoring and surveillance is warranted for the timely management of the pest.



Maladera rufocuprea on guava

Union Minister of State Mr Parshottam Khodabhai Rupala visits NBAIR

Honourable Union Minister of State for Panchayati Raj, Agriculture and Farmers' Welfare, Mr Parshottam Khodabhai Rupala, visited NBAIR on 1 January 2020. Director Dr Chandish R. Ballal and the staff of the bureau welcomed the dignitary. Mr Rupala started his visit by planting a sapling in the NBAIR garden, followed by a visit to the recently inaugurated insect museum and various laboratories. The minister showed keen interest in the technologies developed by the bureau. He interacted with the heads of ICAR institutes located in Bengaluru, as well as the staff of NBAIR, and gave valuable suggestions for improved functioning of the institutes. He emphasised that NBAIR should commercialise and popularise biocontrol technologies, especially biopesticides to target the recent invasive on maize, the fall armyworm.



NBAIR celebrates New Year 2020

NBAIR celebrated the New Year on Yelahanka campus on 1 January 2020. Former Head of Division Dr S.K. Jalali was the chief guest. Director Dr Chandish R. Ballal wished the staff of the bureau and exhorted them to achieve more laurels in the new year. The chief guest apprised the achievements of the bureau over the recent past and urged everyone to promote biocontrol technologies for the benefit of farmers. The staff of the bureau sang songs and delivered speeches to celebrate the day.



Igniting young minds

Around 87 students from St Mary's Public School, Bengaluru, visited the bureau on 20 January 2020. NBAIR staff explained about insect diversity and the amazing facts of insects. Live insects and preserved specimens of crop pests and beneficial insects (pollinators, parasitoids and predators) were exhibited in the insectarium. The students interacted actively and showed interest in understanding the various species of insects displayed there. The children also visited the insect photo-gallery to get an insight on the variety of insects.



Efforts towards international collaboration

Dr B.M. Prasanna, Director, CIMMYT's Global Maize Program and CGIAR Research Program on Maize, visited NBAIR on 25 January 2020. He spoke on the management strategies for the fall armyworm in the African region. He elaborated on CIMMYT's on-going research on breeding for resistance to the fall armyworm. He appreciated the bureau's active role in developing non-chemical management strategies for this invasive pest.



Capacity building programmes at NBAIR

An ICAR-sponsored winter school on “Novel Techniques in Mass Culturing of Smart Microbial Biocontrol Agents for the Development of Biopesticides” was organised during 3–23 December 2019. Twenty-five participants from the ICAR/SAU system participated in the training. Hands-on training on mass production of microbial biopesticides and formulations was provided to the participants. Drs G. Sivakumar, M. Mohan, A. Kandan, G. Mahendiran and Jagadeesh Patil coordinated the training programme.



Another ICAR-sponsored training programme on “Insecticide Resistance: Biochemical and Molecular Perspectives, and Strategies for Combating Resistance to Insecticides” was conducted during 8–28 January 2020. Twenty-five participants, including nine women candidates, from the ICAR/SAU system participated. Hands-on training was provided on biochemical and molecular methods of identifying insecticide resistance. Drs M. Mohan, T. Venkatesan, R. Gandhi Gracy and M. Sampath Kumar coordinated the training programme.

NBAIR organised a training programme on “DNA-Barcoding and Bioinformatics Applications in Entomology” from 25 February to 3 March 2020. Ten candidates from the ICAR/SAU system participated in the training. Hands-on training was imparted on the methods of DNA extraction; polymerase chain reaction techniques; NCBI database and its usage; sequence alignment; construction of molecular phylogeny; various BLASTs and Protein Data Bank; and protein structure prediction. Drs T. Venkatesan, M. Mohan, R. Gandhi Gracy and R.S. Ramya coordinated the training programme.



Republic Day at NBAIR

NBAIR celebrated the 71st “Republic Day” on 26 January 2020 with the hoisting of national flag and singing of national anthem by the staff at Hebbal. Director Dr Chandish R. Ballal addressed the staff and emphasised on the importance of positivity in the working environment. Dr T.M. Shivalingaswamy, farm in-charge, unfurled the national tricolour on the Yelahanka campus of NBAIR.



NBAIR organises a national workshop on Diptera

NBAIR and the University of Calicut, Kerala, jointly organised a “National Workshop on Diptera” during 9–22 January 2020 on the university campus at Thenjipalam. Dr K.J. David, Scientist, coordinated the workshop, which was attended by 20 students. The participants were trained on the identification aspects of different families of Diptera.



NBAIR organises training on taxonomy of white grubs

NBAIR and the All-India Network Project (AINP) on Soil Arthropod Pests organised a week-long training programme on “Taxonomy of White grubs” during 19–25 February 2020. Drs K. Sreedevi and G. Mahendiran coordinated the training. Twenty participants from SAUs participated in the training. The programme was inaugurated by Dr A.S. Baloda, Network Coordinator of the AINP. Hands-on training was provided on taxonomy; collection techniques; classification and diagnostics; diversity and distribution; species diversity analyses (including the programme developed at NBAIR); molecular taxonomy; variability and heritability of diagnostic characters; and larval taxonomy.



Participation of NBAIR in agricultural fairs

NBAIR participated in the following exhibitions to showcase various technologies developed at the institute:

1. “107th Indian Science Congress 2020” organised at the University of Agricultural Sciences, Bengaluru, 3–7 January 2020.
2. “Global Potato Conclave 2020” held at Mahatma Mandir, Gandhinagar, Gujarat, 28–31 January 2020.
3. “National Horticulture Fair 2020” organised at ICAR–IIHR, Bengaluru, 5–8 February 2020.



NBAIR organises demonstration-cum-training on rugose spiralling whitefly management

NBAIR and AICRP-BC, Anakapalle centre, jointly organised demonstration-cum-training programmes on farm-level production of the entomopathogenic fungus *Isaria fumosorosea* (NBAIR Pfu-5) during 4–7 February 2020 in Anakapalle in Visakhapatnam district, and at Koyyam and Venkataraoopeta villages in Srikakulam district. A field survey was conducted to assess the infestation of the rugose spiralling whitefly and establishment of the native parasitoid *Encarsia guadeloupae* on coconut in Ranasthalam mandal of Srikakulam district. Practical training on farm-level production techniques of *I. fumosorosea* was imparted to the farmers. About 200 coconut farmers, officials from Dr Reddy’s Foundation and Departments of Horticulture of Visakhapatnam, Vizianagaram and Srikakulam districts participated in the training.



NBAIR scientists deliver lead talks at AZRA conference

NBAIR scientists participated in the “XVII AZRA International Conference on Frontier Research in Applied Zoology and Insect Pest Management Strategies: A Way Forward for Food and Nutritional Security” at the University of Agricultural Sciences, Raichur, during 12–14 February 2020. Drs Chandish R. Ballal, B. Ramanujam, T. Venkatesan, G. Sivakumar, K. Subaharan, K. Sreedevi and Ankita Gupta delivered lead talks.

Promotion of Hindi

NBAIR organised a “Hindi Workshop” on 20 February 2020. Mr A.K. Jagadeesan, Assistant Director (Official Language), ICAR–IIHR, Bengaluru, delivered a lecture on “Use of Hindi language tools for administrative staff”. Administrative, technical and scientific staff of NBAIR participated in the workshop.



NBAIR and Loyola College jointly organise IDC 2020

NBAIR and the Entomological Research Institute at Loyola College, Chennai, jointly organised a national symposium on “Insect Diversity and Conservation 2020 (IDC 2020)” at Lawrence Sundaram Auditorium, Loyola College, Chennai, during 13–14 February 2020.



Workshops in the Northeast

NBAIR organised two workshops on “Biological Control of Crop Pests and Invasives and Utilisation of Insects as Food in Northeast Region of India” during 25–26 February 2020 at the College of Agriculture, Central Agricultural University, Imphal, Manipur; and during 6–7 March 2020 at the College of Post-Graduate Studies in Agricultural Sciences, Umiam, Meghalaya. Around 65 participants from Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura attended the workshops. The workshops aimed to address the promotion of biological control and utility of insect resources as food and feed for fish and poultry besides use of insects in safer disposal of farm and kitchen organic waste in the region. NBAIR experts delivered lectures on invasive insects and utilisation of macrobials and microbials for insect pest management. The experts emphasised upon the use of biological control for the management of crop pests in order to minimise the use of synthetic pesticides, utilise natural fauna of the region and provide awareness on entrepreneurship among the farming community of NEH region. Farm inputs like sprayers, honey bee boxes and neem-based insecticides were distributed to the progressive farmers. Poster presentations were conducted on the theme area of the training programme and the participants were rewarded. Drs Chandish R. Ballal, B. Ramanujam, N. Bakthavatsalam, M. Nagesh, A.N. Shylesha and K. Selvaraj coordinated the workshops.



Imphal



Umiam

International Women's Day at NBAIR

NBAIR celebrated the “International Women's Day”. Dr B. Meenakumari, former Chairperson, National Biodiversity Authority, was the chief guest. The programme started with the welcome address by Dr K. Sreedevi, Senior Scientist and Women's Cell In-Charge. Dr Meenakumari addressed the gathering on the challenges faced by women in personal and professional spheres, and motivated women to be confident and to work towards facing such challenges bravely.



Training programme for tribal farmers in Araku Valley

NBAIR organised a training programme for tribal farmers at Paderu village near Araku Valley in collaboration with RARS, ANGRAU, Anakapalle, and Krishi Vigyan Kendra, Kodempudi, on 11 March 2020. Around 250 farmers attended the training programme. Dr M. Nagesh, Principal Scientist and Head, Division of Genomic Resources, guided the farmers and scientists of KVK in procuring, packing and distributing biological control agents (*Pseudomonas fluorescens*, *Trichoderma viride*, *Azotobacter* and Trichocards). Seed materials of turmeric, ginger, drumstick, tomato and papaya were distributed to the farmers. Dr Y. Lalitha, Chief Technical Officer, explained about different biological control agents, release methods and simple on-farm production methods. Farmers' experiences in the diversified farming practices were shared and discussed intensively, and progressive farmers were honoured. Quiz programmes were organised for farmers and the winners were encouraged and felicitated.



NBAIR's Initiatives Against COVID-19

NBAIR has taken the following initiatives to combat COVID-19 situation:

- Exemption from marking biometric attendance in Aadhaar-Based Biometric Attendance System (AEBAS).
- Restricted entry at the office entrance with use of thermal scanners.
- Closure of guesthouse and canteen.
- Disinfection of office premises.
- Display of posters at appropriate places to create awareness about the virus spread and infection.
- Avoidance of mass gatherings/seminars/conferences and contacts with foreign nationals.

NBAIR prepared a hand-sanitiser (as per WHO guidelines) and supplied to the staff, contractual workers and farmers to ensure hygiene in the workplace.



Awards and Recognitions

Dr K. Sreedevi

Elected as *Fellow of Royal Entomological Society of London* on 4 March 2020.

Received *Achiever Award* from Society for Advancement of Human and Nature (SADHNA), Dr Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan.

Dr S. Salini

Received funding from the Department of Science and Technology for the project entitled "Systematic studies on Pentatominae (Hemiptera: Heteroptera: Pentatomidae) from northeast India" (Co-PIs: Drs Romilo Akoijam, K.J. David and R. Gandhi Gracy).

Awards from Applied Zoologists Research Association at XVII AZRA International Conference on Frontier Research in Applied Zoology and Insect Pest Management Strategies: A Way Forward for Food and Nutritional Security, University of Agricultural Sciences, Raichur, 12–14 February 2020

Dr K. Sreedevi: *Fellow Award*

Dr Ankita Gupta: *AZRA Young Scientist Award*

Dr K. Selvaraj: *Best Oral Presentation Award*

New Technologies

Aqueous formulation of *Spodoptera frugiperda* nucleopolyhedrovirus NBAIR 1 (Spfr NPV NBAIR1) for the management of fall armyworm

Inventors: G. Sivakumar¹, M. Mohan¹, M. Kannan², T. Venkatesan¹, R. Rangeshwaran¹, Mahesh Yandigeri¹ & Chandish R. Ballal¹

¹NBAIR and ²Department of Nanoscience and Technology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu.

Bioformulation of *Bacillus subtilis* for the management of tea shot hole borer through the suppression of its symbiotic mutualistic microorganism *Fusarium ambrosium*

Inventors: G. Sivakumar¹, S.K. Jalali¹, M. Mohan¹, T. Venkatesan¹, R. Rangeshwaran¹, S.P. Mahendiran² & B. Radhakrishnan²

¹NBAIR and ²UPASI Tea Research Foundation, Tea Research Institute, Valparai, Tamil Nadu

Selected Publications

David, K.J., Sachin, K. & Hancock, D.L. 2020. A new species of *Acrotaeniostola* Hendel and new records of Gastrozonini and Ceratitidini (Diptera: Tephritidae) from India. *Zootaxa*, 4731(3): 425–432.

David, K.J., Sachin, K. & Hancock, D.L. 2020. Two new species and a new record of *Dacus* Fabricius (Diptera: Tephritidae) from India. *Zootaxa*, 4743(4): 553–560.

Gupta, A., Lalitha, Y., Varshney, R., Shylesha, A.N. & Achterberg, C.V. 2020. *Chelonus formosanus* Sonan (Hymenoptera: Braconidae) an egg-larval parasitoid of the invasive pest *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) amenable to laboratory mass production in India. *Journal of Entomology and Zoology Studies*, 8(1): 1521–1524.

Gupta, A., Soujanya, P.L., Achterberg C.V. & Sekhar, J.C. 2020. *Coccygidium transcaspicum* (Kokujev) (Hymenoptera: Braconidae) parasitizing larvae of invasive pest *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae) in India. *Zootaxa*, 4750(2): 293–297.

Liu, Z., He, J.H., Chen, X.X., Gupta, A. & Moghaddam, M. G. 2019. The ultor-group of the genus *Dolichogenidea* Viereck (Hymenoptera, Braconidae, Microgastrinae) from China with the descriptions of thirty-nine new species. *Zootaxa*, 4710(1): 1–134.

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