

ICAR-NBAIR

Newsletter

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ICAR-National Bureau of Agricultural Insect Resources



Welcome!

Dr Satya Nand Sushil, Principal Scientist (Entomology) joined as the Director of ICAR-NBAIR on 12 October 2022.

Towards Genome Sequencing of Indian Insects: Where are we now?

Insects and mites of agricultural importance have evolved with a variety of genetic responses to stress. The size of their nuclear genomes vary over 100-fold in size, from 32 Mb in the tomato russet mite to over 21 Gb for some grasshopper species. Genome size reflects the proliferation of non-coding DNA like transposable elements, introns, and other repeats. The number of protein-coding genes also varies, typically from 9,000-25,000 in most insect species. Additional non-coding RNAs regulate gene expression. The comparison reveals core genes conserved widely in insects while others diversified in response to environmental stress.

Drosophila melanogaster the first insect genome, completed in the year 2000. The introduction of new long-read sequencing technologies led to a resurgence in genome sequencing projects. And now, a new species of insect has its genome assembly deposited in GenBank every 2-3 days. Presently more than 5000 species of insects have sequenced genomes that about 357 of them are annotated and published. This abundance of new genome information has facilitated various genetic and genomic studies and allowing comparative genomic analysis of evolution and function. Tools like CRISPR

also permit targeted editing of genes to analyze phenotypes or alter traits.

The genome basis of diversity and adaptation has been deciphered in four Indian insect species by ICAR-NBAIR. We identified many many novel gene families that arose early in the evolution of arthropods and during the diversification of insects into modern orders.

1. Brinjal shoot and fruit borer, *Leucinodes orbonalis*
2. Cotton leafhopper, *Amrasca biguttula biguttula*
3. Chilli broad mite, *Polyphagotarsonemus latus*
4. Green lacewing predator, *Chrysoperla zastrowii sillemi*

ICAR-NBAIR could make India the world leader in insect genome sequencing for their applications towards clean agriculture and pest control. In the past few years the institute has leapt to the forefront of genome sequencing with a bunch of papers in top-tier journals such as Nature Communications, Frontiers in Physiology, Scientific Reports etc. ICAR-NBAIR is aiming to tackle at least 100 species of insects and its microbial resources as part of an effort to create genomic resources for their future applications.



Whole genome sequencing of arthropod species undertaken by ICAR-NBAIR

Research Highlights

A new fruit fly genus

A new genus of fruit fly, *Dacimita* (Diptera: Tephritidae: Dacinae: Gastrozonini) was described from Meghalaya, India. The type species is *Dacimita curvifaciatus* (Fig. 1). Flies were collected from the leaves of tiger grass, *Thysanolaena*, adjacent to the bamboo clump. Even though it resembles taxa of tribe Dacini in possessing reduced chaetotaxy, petiolate abdomen and hyaline wing (wasp mimicry characters); presence of large male proctiger larger than epandrium, unmodified cells bm and cua in the wing, its suspected host association with bamboo and evidences based phylogenetic analysis using morphological and molecular markers revealed it to be best placed in Gastrozonini.



Fig. 1: Habitus (lateral) of male of *Dacimita curvifaciatus*

A new endoparasitoid species of chrysomelid beetle

Members of the genus *Streblocera* (Hymenoptera:) are koinobiont endoparasitoids of adult chrysomelid beetles. The first species from southern India (peninsular region), *Streblocera (Eutanycerus) breviflagellata* (Fig. 2) was described and illustrated and compared with allied species from the Oriental region.

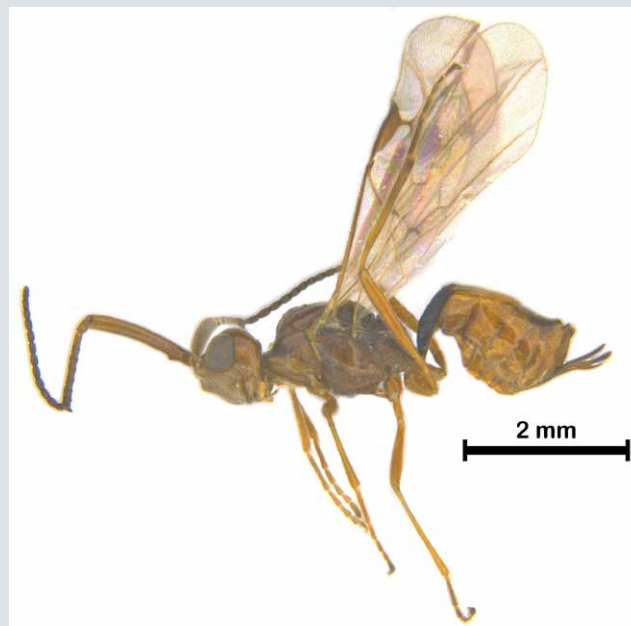


Fig. 2: *Streblocera (Eutanycerus) breviflagellata* female

A new thrips species

A new terebrantian thrips species of the genus *Hydatothrips* (Thripidae: Sericothripinae) was described from India, *Hydatothrips initium* (Figs 3 & 4). A key to the ten species of *Hydatothrips* recorded from India was also provided.



Fig. 3: *Hydatothrips initium* female



Fig. 4: *Hydatothrips initium* male

ICAR-NBAIR conducted Survey on diversity of insect pests in natural farming systems at Araku valley

A team of scientists from ICAR-NBAIR documented the insect diversity in the natural farming system in the tribal villages viz. Kulluba and Sirsapalli in Araku Valley, Vizhakapatnam district at Andhra Pradesh during 12–14 July 2022. The team visited the Sarada Valley Developmental Samithy (SVDS), Santhabayalu field office located at Paderu and interacted with the tribal women entrepreneurs. The team visited the Jackfruit seed powder production unit and interacted with the unit workers. The measures of using the air dryers to retain the nutritional content of the fruit and seed powder was discussed. In the natural farming areas at Kulluba and Sirsapalli, the farmers practiced mulching in ginger with dry straw and mango leaves and this enabled in suppression of weeds in the mulched field. The local farmers' practice spraying 'Neemashtra' (a mixture of cow dung + cow urine+ water and fermented for two days) on crops to ward off insect pests. In the areas where natural farming were practiced, presence of *Zygogramma bicolorata* on parthenium was noticed. The farmers in the region-maintained honeybee, *Apis mellifera* colonies and they were encouraged to maintain good floral source to hasten the brood development with good pollen and honey storage.



ICAR-NBAIR organised three days training programme on “Skill Development Programme on Biomass Production of Bio-inputs”

ICAR-NBAIR in collaboration with School of Crop Protection, College of Post Graduate Studies in Agricultural Sciences, Central Agricultural University (Imphal), Umiam, Meghalaya and Tea Research Association (TRA), Nagarkata conducted three days training programme on 'Skill Development Programme on Biomass Production of Bio-inputs for Officers, Farmers Producer Organisation members and progressive farmers' at College of Post Graduate Studies in Agricultural Sciences, CAU (I), Umiam, Meghalaya from 17–19 August 2022. The participants were trained on the method of preparation of Trichocards, rearing of various natural enemies like Anthocorids, *Chelonus blackburni*, Chrysopids, and predatory mites. Dr Richa Varshney, Scientist (Entomology), ICAR-NBAIR demonstrated the release of trichocards in paddy fields and release of predators viz. chrysopids, anthocorid bugs and predatory mites. Dr Pranab Dutta (PI and Hub coordinator), Dr D. Thakuria (Co-PI) from CAU, Umiam Meghalaya; Dr Richa Varshney, Scientist, ICAR-NBAIR Bengaluru (PI of Collaborating Institute) and Dr Abhay Pandey, Scientist, TRA, Nagarkata (PI of Collaborating Institute) jointly organised the training programme.



ICAR-NBAIR organised brainstorming session on 'Tea Mosquito Bug menace and its management'

ICAR-NBAIR organised one day brainstorming session on 'Tea Mosquito Bug menace in Tea plantations and its management' at ICAR-ATARI, Bengaluru. Dr P.G. Chengappa, Former Vice-Chancellor & Consultant Director, Tata Coffee Ltd., Dr M.B. Ganapathi, Executive Vice-President, Tata Coffee Ltd., Mr P.B. Achaiah, General Manager, Tata Coffee Ltd., Dr P. Kurien Raphael, Head, Research & Development, Mr K. Mathew Abraham, Managing Director & CEO, Kanandevan Company Private Limited (KDHP), Mr J.B. Hudson, General Manager, KDHP, Mr Siby Mathew, Deputy General Manager, KDHP and Dr Shivaram Bhat, Retd. Principal Scientist, ICAR-Indian Institute of Horticultural Research, Bengaluru participated in the programme. The status of tea mosquito bug menace and its impact on industry was presented by the team. Dr M. Nagesh, Director (Acting), ICAR-NBAIR briefed upon the species complex, host plants, biocontrol and semichemical based action plan for the management of the insect.



ICAR-NBAIR organised 'Farmers training cum awareness programme on classical biological control of Cassava mealybug'

ICAR-NBAIR organised third 'Farmers training cum awareness programme on Classical biological control of cassava mealybug' on 23 September 2022 at the premises of SPAC-Starch Products India Pvt. Ltd., Poonachi village, Erode district of Tamil Nadu. More than 200 tapioca growing farmers attended and benefitted. Dr S.N. Sushil, Director, ICAR- NBAIR, Bengaluru, presided over the meeting and distributed the parasitoids to the farmers. The parasitoid wasps were mass produced and packaged by ICAR-NBAIR experts for the distribution to the farmers. Officials /experts from Tamil Nadu Agricultural University, Coimbatore, Agricultural Research Station, Bhavanisagar, SPAC-Starch Products India Pvt. Ltd., Central Integrated Pest Management Centre (CIPMC), Trichy and State Departments of Horticulture and Agriculture graced the event. The technical session on mass production and field release techniques was handled by Drs A.N. Shylesha, T. Venkatesan, G. Sivakumar, M. Mohan and M. Sampathkumar.



International Travel Support

Dr S. Salini presented a paper entitled "A systematic account of Halyini (Heteroptera: Pentatomidae: Pentatominae) with description of two new species from India" at the "Seventh meeting of International Heteropterists' Society", Barcelona, 4-8 July 2022. She received International Travel Support from the Science and Engineering Research Board of the Department of Science and Technology, Government of India.



Welcome!

Dr B. Gundappa, Scientist (Entomology) joined ICAR-NBAIR on 18 July 2022 on transfer from ICAR-Central Institute for Sub-tropical Horticulture, Lucknow.

Transfer of Technology

"Novel insecticidal WP formulations of *Heterorhabditis indica* ICAR-NBAIIHI101 and *H. bacteriophora* ICAR-NBAI-IHB105 for the biological control of white grubs & other soil insect pests" to M/s. Tejparas Agro Ltd., Jalgaon, Maharashtra.

"Novel insecticidal WP formulations of *Heterorhabditis indica* ICAR-NBAIIHI101 and *H. bacteriophora* ICAR-NBAI-IHB105 for the biological control of white grubs & other soil insect pests" to M/s. Tejparas Agro Ltd, Jalgaon, Maharashtra and M/s. Silver leaf Organics, Gujarat.

Publications

Ankita Gupta, Cornelis Van Achterberg, Rohit Pattar & Omprakash Navik. 2022. A new species of the genus *Streblocera* (Hymenoptera: Braconidae: Euphorinae) from peninsular India. *Zootaxa*. 5175 (4): 494-498.

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Sreerama Kumar, P., Sreedevi, K., Amala, U., Gupta, A. & Verghese, A. 2022. Shipment of insects and related arthropods into and out of India for research or commercial purposes. *Revue Scientifique et Technique/Office International des Épizooties*. 1: 158-164.

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