ICAR- National Bureau of Agricultural Insect Resources
P.B.No.2491, H.A. Farm Post, Bellary Road, Bengaluru - 560 024
Tel: +91-80-23086261, Fax: +91-80-23086261(Gen), E-mail: director.nbair@icar.gov.in
Website: http://www.nbair.res.in

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Annual Report 2025

ICAR- NATIONAL BUREAU OF AGRICULTURAL INSECT RESOURCES
Bengaluru - 560 024, India

Annual Report

2025

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Bengaluru - 560 024, India

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The Director
ICAR–National Bureau of Agricultural Insect Resources
P.O. Box 2491, H.A. Farm Post, Hebbal, Bengaluru 560024, India
Phone: +9180 2341 4220; 2351 1998; 2341 7930
E-mail: director.nbair@icar.org.in
Website: www.nbair.res.in

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Compiled and edited by

Kesavan Subaharan
Amala Udayakumar
Rachana R.R.
Ramya R.S.
David K.J.
Sampathkumar M.
Prabhulinga T.
Shivakumara K.T.
Ankita Gupta
Richa Varshney
Maruthi Mehanth
Sushil. S.N

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ICAR-NBAIR Building (courtesy: Mahendiran, G.)

PREFACE

The ICAR–National Bureau of Agricultural Insect Resources (NBAIR), Bengaluru, continues to play a pivotal role in advancing India's agricultural resilience through cutting-edge research on insect biodiversity, biosecurity, and sustainable pest management. The present Annual Report for 2025 reflects the Bureau's sustained commitment to addressing emerging challenges in crop protection through integrative approaches spanning taxonomy, genomics, biological control, and digital agriculture. During the year, extensive exploratory surveys conducted across diverse agro-climatic regions of the country significantly enriched our understanding of arthropod diversity.

The documentation of a vast number of insect taxa, including several economically important groups, underscores the importance of systematic biodiversity assessment in strengthening national bioresource repositories. Notably, the description of 58 new taxa across multiple insect orders, along with numerous new distributional and host records, highlights India's rich yet underexplored insect fauna and reinforces NBAIR's leadership in insect taxonomy and systematics.

The Bureau made substantial progress in the conservation and utilization of beneficial insects and microbial resources. The augmentation of entomopathogenic nematode collections and the identification of parasitoids and predators have expanded the repository of bioagents available for eco-friendly pest management. Field evaluations demonstrated the efficacy of several biological control agents and microbial consortia, achieving significant reductions in key pests. These efforts are aligned with national priorities to reduce dependence on chemical pesticides and promote bio-intensive integrated pest management strategies.

In the domain of genomic resources, NBAIR achieved several important milestones. The development of rapid molecular diagnostic tools for invasive pests, chromosome-level genome assembly of key natural enemies, and functional validation of genes through RNA interference represent significant advances toward next-generation pest management solutions. The identification of novel insecticidal genes from indigenous microbial strains and the development of field-applicable diagnostic assays further strengthen the Bureau's capabilities in translational research.

The integration of digital technologies has been another hallmark of the year. The development of GIS-based pest mapping systems, AI-driven pest identification tools, and mobile-based advisory platforms exemplifies NBAIR's commitment to leveraging data science and artificial intelligence for real-time decision support. These innovations are expected to enhance pest surveillance, forecasting, and farmer-centric advisory services across the country.

Research on semiochemicals, nanotechnology, and controlled-release systems has opened new avenues for precision pest management, and this demonstrate the Bureau's focus on developing scalable and environmentally sustainable technologies.

The achievements documented in this report are the result of the dedicated efforts of ICAR - NBAIR scientists, technical, administrative, finance and supporting staff. The continued support from ICAR, funding agencies and other stakeholders are acknowledged. The Bureau remains committed to advancing science-driven, environmentally responsible, and farmer-centric solutions to safeguard Indian agriculture.

I would like to express my gratitude to Dr M.L. Jat, Secretary (DARE) and Director General ICAR for his guidance and support. I am grateful to Dr D.K. Yadava, Deputy Director General (Crop Sciences), ICAR for his innovative ideas in research and guidance. I acknowledge the inspiration and support provided by Dr Poonam Jasrotia, Assistant Director General (Plant Protection and Biosafety), ICAR.

I express my sincere admiration to the editorial team for bringing out the annual report in time. I look forward to more productive years ahead.

The Annual Report is thus a compilation of our efforts and contributions in the area of basic research paving the way for applied research and technology commercialisation. I am confident that the contributions highlighted in this Annual Report will serve as a valuable resource for researchers, policymakers, and practitioners, and will further strengthen India's position in sustainable crop protection and biosecurity.

Bengaluru
17.02.2026

S.N. Sushil
Director

1. EXECUTIVE SUMMARY

ICAR-National Bureau of Agricultural Insect Resources

Germplasm Collection and Characterisation

Exploratory surveys conducted across India from January to December 2025 documented significant arthropod diversity. The collections comprised 162 species of scarabaeids representing 31 genera; 120 species of aphids and coccids; 63 species of Tephritidae across 27 genera; 47 species of leafhoppers; 38 thrips species under 24 genera; 6000 hymenopteran specimens belonging to 55 genera; 537 curculionid specimens; 590 trichogrammatid specimens; and 552 spider specimens. Sampling was carried out in Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya Nagaland, Odisha, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal.

Five species of *Heterorhabditis* and seven of *Steinernema* were recovered from the Western Ghats and incorporated into NBAIR's entomopathogenic nematode repository. In total, 120 isolates/species of *Steinernema*, *Heterorhabditis*, and *Oscheius* were maintained using wax moth larvae as hosts.

Fifty eight new taxa across the country were described: In Coleoptera, a new curculionid genus, *Spathaspina*, six curculionid new species, *Alcidodes erosa*, *Bagous obrieni*, *Hirsutopes saddlensis*, *Imera setauropsis*, and *Orsophagous indicus*, eight scarab species, *Cyphochilus kukriana*, *C. pentaphysia*, *Maladera judithae*, *M. silviae*, *Maladera* (*Hemiserica*) *subinaequalis*, *M. thandigudiensis*, *Neoserica berlineri*, and *Selaserica peechi*, and one cantharid species, *Ichthyurus antheraeanus*; in Hemiptera, two leafhopper genera, *Ramya* and *Shanaya*, and four leaf hopper species, *Ramya longiprocessus*, *R. megatrium*, *Shanaya abeeri*, and *S. spatulate*, five pentatomid species, *Axiagastus chandrashekarai*, *A. luteipes*, *A. prathapani*, *A. votypkai*, and *A. yeshwanthi*, and two scale insect species, *Leptopulvinaria harishi*, and *Pulvinarisca greeni*; in Hymenoptera, twenty two new species of parasitoids, *Aulacocentrum hunliensis*, *A. parotisae*, *Canalirogas multinigratus*, *C. oblongus*, *C. omninopallidus*, *C. subtransversus*, *Chrysopophthorus indicus*, *Diolcogaster confusus*, *D. pseudandamanensis*, *Heydenia longipetiolata*, *Iphitrachelus alpatanu, I. phenalus, I. vakratunda, Piestopleura ahalya*, *P. bhramari*, *P. daksha*, *P. kadruna*, *P. mahakaya*, *P. ulughbegi, Rogasodes indicus*, *Tuberidelus indicus*, and *Wesmaelia indoflavus*; five fruit fly species *Acroceratitis sachini*, *Euphranta goniothalami*, *E. undulata*, *Oedaspis freidbergi*, and *Rhochmopterum malaviyai*; and two thrips species, *Rhamphothrips laterocurvidentatus*, and *Stenchaetothrips subaequalis*.

Revisionary works include the revision of Indian members of three braconid genera *Aulacocentrum*, *Canalirogas*, and *Diolcogaster*; revision of the genus *Axiagastus*, involving the establishment of one new combination, four synonymies, and the designation of lectotypes for three species in Pentatomidae; exclusion of two lygaeid species, *Astacops occidentalis* and *Graptostethus nigriceps*, and one pentatomid species, *Halyomorpha halys* from the Indian fauna; redescriptions of three mealybug species, *Dysmicoccus brevipes*, *D. neobrevipes*, and *Rastrococcus iceryoides*, three pentatomid species, *Axiagastus rosmarus*, *A. cambelli*, and *A. mitescens*, one soft scale species, *Eulecanium tiliae*; one scale insect species, *Drosicha mangiferae*, and one aphid species, *Uroleucon pseudambrosiae* (Olive) in Hemiptera; two weevil pest species, *Barioscapus cordiae* and *Deporaus marginatus* with biological data on different life stages, along with molecular characterization; and one oxyopid spider species, *Oxyopes mirabilis*.

In Heteroptera, *Graptostethus nigriceps* from the Solomon Islands, *Gyndes pallicornis* from Thailand, and *Psacasta neglecta* from Greece were reported. New distributional records for India include three braconid genera, *Chrysopophthorus*, *Tuberidelus*, and *Rogasodes*; two soft scale genera, *Leptopulvinaria* and *Pulvinarisca*; and two curculionid genera, *Imera* and *Orsophagus*; three mealybug species, *Exallomochlus hispidus*, *Paraputo villosus*, and *Paracoccus evae*; two aphid species, *Uroleucon pseudambrosiae* and *Hyperomyzus pallidus*; five fruit flies, *Bactrocera gombokensis, Chaetellipsis alternata*, *Goniurellia persignata, Actinoptera reticulata* and *Terellia serratulae*; two braconid species, *Heydenia gibsoni*, and *H. Testacea*; one scarab beetle, *Cyphochilus tenzingyatsoi*; one terebrantian thrips species, *Rhamphothrips tenuirostris*, and two spider species, *Phlegra samchiensis* and *Gea jingdong*.

New distributional records for the union territories in India include three spider species, *Oxyopes mirabilis*, *Carrhotus sannio*, and *Portia labiate* from the Andaman and Nicobar Islands.

New distribution records for South India include a braconid genus, *Wesmaelia*, and two braconid species, *Aulacocentrum seticella* and *Heydenia kashmirensis*.

New state-wise distribution records include three thrips species, *Anaphothrips latis*, *Leucothrips nigripennis* and *Thrips alius*, two scale insect species, *Fistulococcus pokfulamensis* and *Pulvinaria urbicola*, and a mealybug, *Hypogeococcus pungens* from Kerala; three thrips species, *Tryphactothrips rutherfordii, Trichromothrips similis*, and *Ramphothrips pardus*, and one diaspidid species, *Lepidosaphes tokionis* from Karnataka; two diaspidid species, *Pseudaulacaspis pentagona* and *Pseudaulacaspis cockerelli* from Meghalaya; one mealybug species, *Dysmicoccus carens* from Andhra Pradesh; and one scale insect species, *Eulecanium tiliae* from Himachal Pradesh; three salticid spider species, *Stenaelurillus shwetamukhi*, *S. arambagensis* and *S. vyaghri* from Chhattisgarh; and two spider species, *Cheiracanthium melanostomum* and *Peucetia choprai* from Gujarat.

Diagnostic keys were published for several insect taxa: World species of the genera *Acroceratitis*, *Axiagastus, Euphranta*, *Leptopulvinaria, Pulvinarisca*, and *Rhochmopterum*; updated key to the genera of the tribe Mukariini from the Indian subcontinent, and world species of the genera *Shanaya* and *Ramya*; Indian species of the genera *Aulacocentrum*, *Canalirogas*, *Diolcogaster*, *Heydenia*, and *Rhamphothrips*; genera of the tribes *Coccini* and *Saissetiini*, and species of the genera *Coccus* and *Saissetia* from Kerala; aphids infesting *Sonchus arvensis*; and thrips species infesting chilli.

A monograph documenting 335 species of fruit flies from India was published. A checklist of the tribe Axiagastini was also published. Updated checklists of the spider fauna of Himachal Pradesh and the Andaman and Nicobar Islands were prepared. Distribution maps for 25 predominant white grub species were developed, 45 white grub species were digitized, and QR codes were generated for 40 economically important species. The general distribution of 25 phytophagous and economically important bug species was published, along with brief diagnostic characters, illustrations, and host plant information and/or bionomics.

Molecular characterization of white grub species using mt-COI and 16S rRNA generated 80 gene sequences.

Genetic diversity analyses of six *Anomala* species revealed the highest haplotype diversity in *A. communis* and *A. elata*, with intraspecific variation observed in *A. ruficapilla* and *A. communis*.

A total of 170 identification services were provided to researchers from agricultural universities, private companies and ICAR institutes.

Genomic Resources

Rapid and species-specific molecular diagnostic tools, including PCR, LAMP, and RPA assays, were developed and validated for major invasive whitefly species collected from different regions, thereby enhancing early detection systems and strengthening pest surveillance programs.

Molecular characterization of the desert locust, *Schistocerca gregaria*, was undertaken using four genetic markers mtCOI, 28S rRNA, ITS2, and 16S rRNA and species-specific markers are currently being designed to support future CRISPR-Cas based investigations.

A chromosome level, high contiguity genome assembly of *Chrysoperla zastrowi sillemi* was generated using a combination of Illumina short-read, PacBio long-read, and Hi-C sequencing technologies. The highly homozygous genome spans 597 Mb and was organized into six chromosomal pseudomolecules, representing 84% of the total genome length.

Reference genes were optimized and validated to ensure reliable gene expression analysis under diverse experimental treatments, including dsRNA exposure, in the mealybugs *Maconellicoccus hirsutus* and *Phenacoccus manihoti*.

In *M. hirsutus*, five Halloween genes associated with ecdysteroid biosynthesis were identified and characterized. Two of these genes were selected for RNA interference assays, which induced pronounced developmental defects and caused mortality rates reaching 84.4%. Additionally, 118 cuticular protein genes were identified in *M. hirsutus* and classified phylogenetically into five principal cuticular protein families.

In *P. manihoti*, a major gene involved in wax biosynthesis was identified, characterized, and functionally validated through RNAi experiments.

Silencing of this gene led to reduced wax production, stunted development, and mortality of up to 76.37%, underscoring its promise as a potential molecular target for pest management.

Spodoptera litura and *S. frugiperda* were collected and successfully reared in the laboratory, and microbial communities associated with soil and insects were isolated and evaluated for their biocontrol potential. Ten bacterial isolates (SFDL1–SFDL10) were recovered from naturally dead *S. litura* larvae, among which isolate SFDL5 produced 100% larval mortality within 72 hours in surface inoculation assays.

Ultrastructural examination of potato tuber moth eggs showed that they are oval in shape with bluntly rounded anterior and posterior ends, measuring 416.1 µm in length and 315.4 µm in width. A distinct micropylar rosette was present at the anterior pole, while aeropylar structures at the posterior pole were observed to facilitate respiration.

Behavioural investigations demonstrated that a single mating event was adequate to ensure oviposition in female potato tuber moths. Genome-wide analysis to support CRISPR/Cas9 applications revealed that the *tssk* gene contains a single exon, whereas the *osp* gene comprises 23 exons and 22 introns; exon 2 was selected for sgRNA design.

Extensive genomic characterization and bioefficacy evaluation of indigenous *Bacillus thuringiensis* strains led to the identification of novel *cry* and other insecticidal genes. Strains NBAIR BtAr, NBAIR BtAe, and NBAIR BtVGa1 exhibited strong toxicity against *S. frugiperda*, *Holotrichia serrata*, and *Galleria mellonella*, respectively.

Metabolomic analysis and genome mining of *Bacillus subtilis* NBAIR-BSWG1 uncovered a diverse array of cyclic lipopeptides that completely inhibited *Rhizoctonia solani*.

Rapid, colorimetric isothermal amplification assays were also developed for early, sensitive, and field-applicable detection of Thai sacbrood virus in *Apis cerana indica* and *S. frugiperda*.

A production and marketing license was secured from the Karnataka State Department of Agriculture (KSDA), Government of Karnataka, for the liquid formulation of *Bacillus thuringiensis* var. *kurstaki* strain NBAIR BtG4.

A detailed comparative transcriptomic study was carried out between insecticide-resistant and susceptible strains of *Trichogramma chilonis* to understand the molecular mechanisms underlying insecticide tolerance. Differential expression analysis revealed 559 significantly altered transcripts in the resistant strain, of which 260 were upregulated and 299 downregulated. Notably, genes associated with detoxification processes, xenobiotic transport, and metabolic waste management were significantly enriched.

Reference genes suitable for qRT-PCR normalization in *Chrysoperla zastrowi sillemi* were systematically evaluated under diverse experimental conditions, including temperature stress, developmental stages, starvation, insecticide exposure, and combined treatments. Stability of candidate genes was assessed using multiple statistical algorithms ΔCt, BestKeeper, NormFinder, geNorm, and RefFinder to ensure cross-validation. ARF2 and RAB1A emerged as the most stable reference genes across combined treatments, while additional condition-specific genes were identified for individual stress scenarios.

Chitinolytic bacteria isolated from shrimp waste were identified using 16S rDNA sequencing, followed by enzyme activity assays and bioefficacy testing against *S. frugiperda*. Selected isolates exhibited promising insecticidal potential.

A national GIS-based portal was developed for mapping insect pests and their natural enemies, facilitating real-time data entry and spatial decision support for managing invasive species.

A deep learning-based identification system was also established to recognize 20 major tomato pests and natural enemies with over 95% accuracy, trained on a dataset exceeding 61,000 images. In addition, a modular pest forecasting and alert platform for tomato was created to provide location- and crop stage-specific advisories. The "BIPM for Tomato Pests" mobile application was launched to promote bio-intensive pest management practices among farmers.

Division of Germplasm Conservation and Utilisation

Twelve exploratory surveys were undertaken across the Eastern Ghats of Karnataka, Andhra Pradesh, Tamil Nadu, and Odisha, as well as in Assam, Maharashtra, and the Andaman and Nicobar Islands. During these expeditions, nearly 320 samples of whiteflies and their associated natural enemies were collected and analyzed. The surveys led to the first record in India of the invasive nesting whitefly *Paraleyrodes pseudonaranjae* Martin on golden dewdrops, and the African whitefly *Aleurolobus graminicola* Bink-Moenen on vetiver. In addition, the aphelinid parasitoids *Eretmocerus queenslandensis* Naumann & Schmidt and an *Eretmocerus* species were recovered from *Bemisia breyniae* and *Aleurothrixus floccosus*, respectively, marking their first reports from the country. These observations establish important baseline data to support future biosecurity measures and pest management planning.

Three egg parasitoids; *Trichogrammatoidea armigera*, *Tr. bactrae*, and *T. chilonis* were recorded parasitizing eggs of *Lampides* sp. on sunhemp (*Crotalaria juncea*). Field studies evaluating *T. chilonis* against *Helicoverpa armigera* in menthol mint showed 20–64.2% egg parasitism, accompanied by a substantial decline in larval populations.

Studies on *Chelonus blackburni* comprised field surveys, laboratory investigations, and field-level assessments. Its biology and host suitability were evaluated on various lepidopteran hosts, with molecular identification confirmed through mtCOI markers. Preliminary field releases in maize yielded promising parasitism rates. Initiatives on mass production and farmer outreach facilitated wider distribution of the parasitoid and promoted the adoption of biological control approaches for sustainable pest management.

Three releases of *Blaptostethus pallescens* at 8–10 bugs per meter row led to a 68.67% reduction in *Thrips parvispinus* in capsicum under protected cultivation. Similarly, the predatory bug *Geocoris ochropterus*, released at two bugs per plant under cage conditions, reduced thrips populations from 10.6 to 1.5 per tap within 15 days of the first release. In tomato cage experiments, *B. pallescens* alone proved more effective against red spider mite than *Lecanicillium fusisporum* applied individually, and its performance was comparable to their combined application, highlighting its strong potential as a biocontrol agent against red spider mite.

Compatibility assessments showed that the antagonistic fungus *Trichoderma harzianum* was compatible with the entomopathogens *Beauveria bassiana*, *Metarhizium anisopliae*, and *Lecanicillium lecanii*. Moreover, *B. bassiana* was compatible with *M. anisopliae*, and *M. anisopliae* with *L. lecanii*. Light microscopy observations and laboratory bioassays further verified the compatibility of *Bacillus thuringiensis* with *Helicoverpa armigera* nucleopolyhedrovirus. A microbial consortium consisting of *Bacillus subtilis*, *B. thuringiensis*, *Pseudomonas fluorescens*, and *T. harzianum* demonstrated high efficacy in maize, reducing fall armyworm incidence by up to 75% and suppressing soil-borne diseases by as much as 76.66%.

Field evaluation of *Metarhizium anisopliae* ICAR-NBAIR-Ma35 oil formulation recorded 78.47 per cent reduction in invasive fall armyworm in maize, while an oil-based formulation of *Beauveria bassiana* ICAR-NBAIR-Bb5a recorded 74.2% decrease of diamondback moth in cabbage under field conditions.

The predatory mites *Cheletomimus berlesei* (Cheyletidae) and *Typhlodromus (Anthoseius) transvaalensis* (Phytoseiidae) showed strong potential as biocontrol agents. They exhibited no antagonistic interactions and tolerated prey scarcity well, supporting their combined use in IPM strategies. *C. berlesei* displayed a wide predatory range against spider mites, thrips, and other pests, contributing to reduced reliance on chemical pesticides. A liquid formulation of *Lecanicillium psalliotae* achieved more than 66% reduction in thrips populations in rose fields following the first application. Field evaluations integrating fungal pathogens (*L. psalliotae* and *Hirsutella thompsonii*) with *C. berlesei* indicated effective pest suppression, although repeated treatments were necessary under heavy infestations. Additionally, a streamlined PCR protocol was standardized to ensure reliable DNA amplification from a single mite specimen.

Ecological niche modelling of the black inchworm, *Hyposidra talaca*, showed strong predictive accuracy (ROC = 0.898), identifying temperature variability and annual precipitation as key factors shaping its distribution across India and Southeast Asia. DNA barcoding of 24 butterfly species achieved 100%

amplification success and precise species-level identification, enriching global genetic databases. An AI-driven YOLO v11 model enabled automated recognition of butterfly families with a mean average precision of 70%. Studies on thrips population dynamics revealed peak infestations at critical crop growth stages, supporting the formulation of timely, climate-informed pest management interventions.

Mealybug surveys conducted at 75 locations across 15 states documented specimens from 144 host plants spanning diverse agroecosystems. *Phenacoccus solenopsis* emerged as the dominant species (40.44%), followed by *Planococcus minor* (13.97%), *Pseudococcus longispinus* (12.50%), and *Ferrisia virgata* (8.08%). Additional species *Dysmicoccus neobrevipes*, *Planococcus lilacinus*, *Phenacoccus parvus*, *Dysmicoccus brevipes*, *Maconellicoccus hirsutus*, *Nipaecoccus viridis*, *Rastrococcus iceryoides*, *Planococcus citri*, *Phenacoccus manihoti*, and *Pseudococcus jackbeardsleyi* were observed at comparatively lower frequencies.

The pearl-banded bee, *Hoplonomia westwoodi*, showed a marked preference for sandy soils, with higher nest establishment rates, increased brood cells per turret, and greater adult emergence. Seasonal observations indicated peak adult emergence from March to mid-April, and the species was found to complete three to four generations per year.

Among the essential oils tested, rosemary oil demonstrated the highest toxicity, with the lowest LC_{50} value (90.22 ppm), outperforming eucalyptus (107.26 ppm), ajowan, and peppermint oils. Betel leaf oil elicited the strongest antennal (electrophysiological) response in weevils, while 0.1% concentrations of betel leaf, eucalyptus, citronella, and ajowan oils showed the greatest behavioural repellence. All essential oils significantly reduced oviposition compared to the control (14.60 eggs), with peppermint and eucalyptus oils being the most effective, lowering mean egg counts to 4.40 and 5.80, respectively. Eucalyptus oil consistently ranked among the top treatments across lethality, repellence, and oviposition inhibition, highlighting its promise as a multifunctional botanical pesticide.

Nano-urea particles (30–50 nm) were successfully synthesized and confirmed as biosafe using *Trichogramma chilonis* and *T. japonicum*. TEM, SEM, and stereo-zoom microscopy analyses showed no adverse effects on egg morphology or parasitoid emergence. Behavioural studies revealed a significant 10–20% increase in parasitization efficiency with nano-urea compared to conventional urea and untreated controls ($P < 0.0001$). "Shatpada" nanogel-based controlled-release semiochemical and pheromone technologies targeting fruit flies (*Bactrocera* spp.) and white grubs (*Holotrichia* spp.) were commercialized to support environmentally sustainable pest management.

During the year 2025, 149 research papers, 98 conference papers, 10 books, 13 book chapters, 4 technical bulletins, 4 training manuals, 14 training manual chapters, 5 popular articles were published. Fourteen technologies were licensed to private companies. One patent, one copyright and one design grants were obtained.

2. INTRODUCTION

ICAR–National Bureau of Agricultural Insect Resources (NBAIR), Bengaluru had a long history of changes in names and objectives to cater effectively to the changing needs of the farming community of our country. The Indian station of the CIBC was established at Bengaluru in 1957 with the express purpose of promoting and strengthening biological control of agricultural pests including weeds in various parts of the world. Recognising the need for a national programme on biocontrol, the All India Coordinated Research Project on the Biological Control of Pests and Weeds (AICRP–BC) was launched by the ICAR with funds from the Department of Science and Technology, New Delhi in 1977 to cater exclusively to conceive and implement pest management programmes using bioagents (both indigenous and exotic) in the context of Indian Agriculture.

Having gained over a decade of experience in the field of biological control, the AICRP–BC took over the Indian Station of CIBC in 1988. The biological control programme from then on was totally national in character. This programme was coordinated by the Project Coordinator stationed at Bengaluru but under the administrative control of the National Centre for Integrated Pest Management (NCIPM), Faridabad for a short while. However, in the VIII five-year plan, the Bengaluru Centre was elevated to the Project Directorate of Biological Control (PDBC) with effect from 19 October, 1993. Subsequently in 2009, in the XI plan, the PDBC was upgraded to the National Bureau of Agriculturally Important Insects (NBAII) to act as a nodal agency for collection, characterization, documentation, conservation, exchange and utilization of agriculturally important insect resources (including mites, spiders and related arthropods) for sustainable agriculture. In the twelfth five-year plan during September 2014, the Bureau was re-named as National Bureau of Agricultural Insect Resources (NBAIR) and the bureau's activities are undertaken under three divisions. It won best ICAR Institute award in 1998 and Sardar Patel Outstanding Institution Award during the year 2015. The Bureau does not have any regional centres.

NBAIR Museum has been designated by the Ministry of Environment & Forests as the "National Repository" under the Biological Diversity Act, 2002 on 12 September 2012 for agriculturally important insects, mites & spiders. The National Insect Museum now holds around 3,06,143 insect specimens which include 538 types. The Bureau has described nearly 500 new species in important insect groups such as Hymenoptera, Coleoptera, Diptera, Hemiptera, and Thysanoptera.

This is the only National Bureau under the National Agricultural Research System (NARS) that acts as the nodal agency for collection, characterisation, documentation, conservation, exchange, research and utilisation of agriculturally important insect resources (including mites, spiders and related arthropods) for sustainable agriculture. Most of the specimens in the collection are Indian, but there is a unique representation of exotic beetles, wasps, flies and moths from various countries, including Australia, Argentina, The West Indies, Japan and USA. The museum is also unique in having one of India's largest collections of economically important taxa, including various biological control agents, viz. parasitic Hymenoptera, Coleoptera (Coccinellidae), along with major collections of groups with members which are pests, viz. Coleoptera, Hemiptera, Diptera, Lepidoptera, Thysanoptera and Orthoptera. Besides holding the world's smallest insect, *Kikiki huna*, in its collection, the museum also holds many undescribed species, and some species not found in other collections in the world. Online web diagnostic portals/web pages are hosted in NBAIR domain. Presently there are 33 databases in the NBAIR website.

Vision

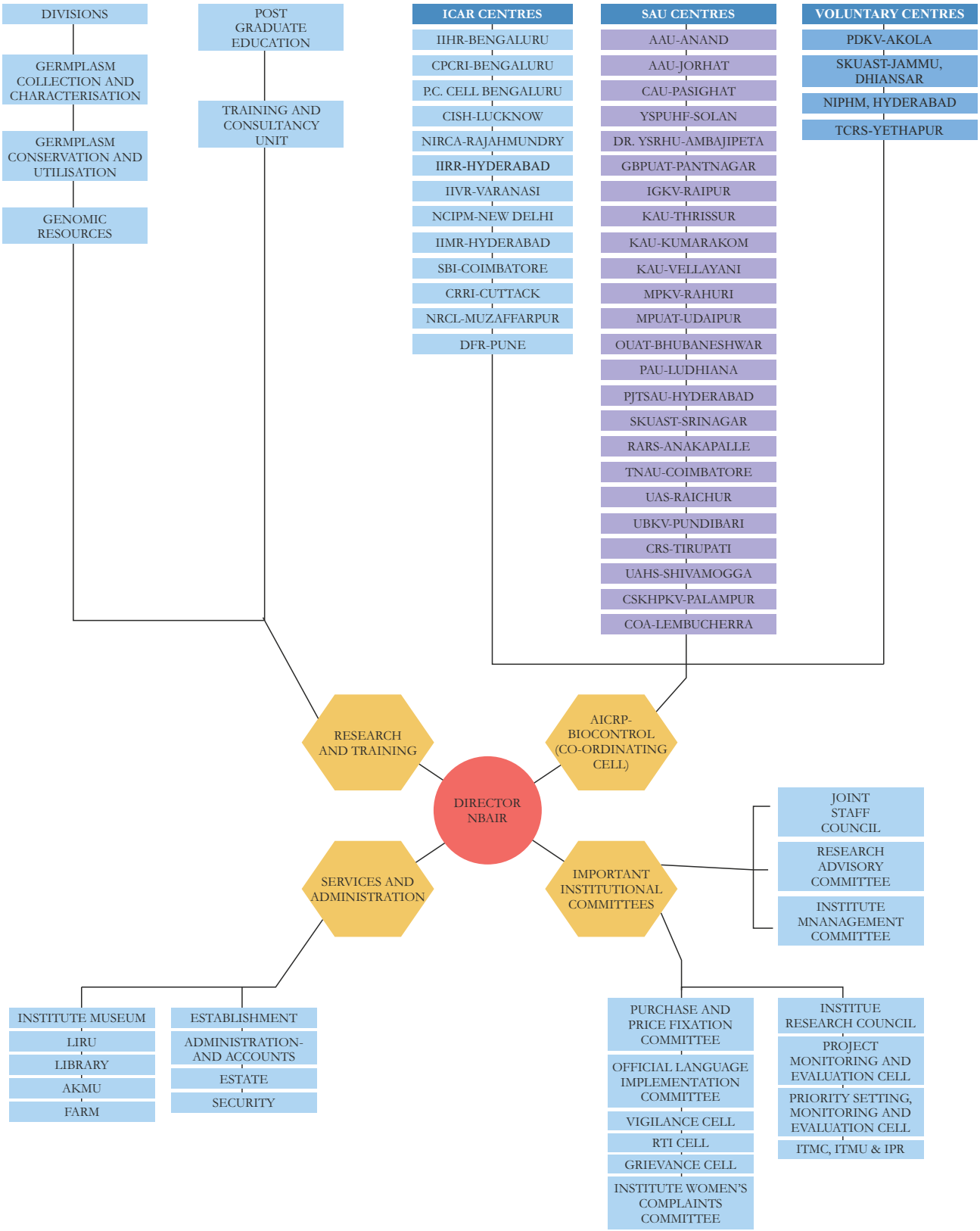
Catalogue, monitor, conserve and harness the biodiversity of agricultural insect resources, insect derived organisms and bioagents for sustainable agriculture ensuring biosafety, biosecurity and benefit sharing.

Mandate

To act as a nodal agency for collection, characterisation, documentation, conservation, exchange, research and utilisation of agriculturally important insect resources (including mites, spiders and related arthropods) and insect-derived resources for sustainable agriculture.

Capacity building, development of technologies for non-chemical pest management, dissemination of technologies and forging linkages with stakeholders.

ORGANOGRAM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DFR-PUNE
SAU CENTRES
AAU-ANAND
AAU-JORHAT
CAU-PASIGHAT
YSPUHF-SOLAN
DR. YSRHU-AMBAJIPETA
GBPUAT-PANTNAGAR
IGKV-RAIPUR
KAU-THRISSUR
KAU-KUMARAKOM
KAU-VELLAYANI
MPKV-RAHURI
MPUAT-UDAIPUR
OUAT-BHUBANESHWAR
PAU-LUDHIANA
PJTSAU-HYDERABAD
SKUAST-SRINAGAR
RARS-ANAKAPALLE
TNAU-COIMBATORE
UAS-RAICHUR
UBKV-PUNDIBARI
CRS-TIRUPATI
UAHS-SHIVAMOGGA
CSKHPKV-PALAMPUR
COA-LEMBUCHERRA
VOLUNTARY CENTRES
PDKV-AKOLA
SKUAST-JAMMU, DHIANSAR
NIPHM, HYDERABAD
TCRS-YETHAPUR
RESEARCH AND TRAINING
AICRP-BIOCONTROL (CO-ORDINATING CELL)
DIRECTOR NBAIR
SERVICES AND ADMINISTRATION
IMPORTANT INSTITUTIONAL COMMITTEES
JOINT STAFF COUNCIL
RESEARCH ADVISORY COMMITTEE
INSTITUTE MNANAGEMENT COMMITTEE
INSTITUTE MUSEUM
LIRU
LIBRARY
AKMU
FARM
ESTABLISHMENT
ADMINISTRATION-AND ACCOUNTS
ESTATE
SECURITY
PURCHASE AND PRICE FIXATION COMMITTEE
OFFICIAL LANGUAGE IMPLEMENTATION COMMITTEE
VIGILANCE CELL
RTI CELL
GRIEVANCE CELL
INSTITUTE WOMEN'S COMPLAINTS COMMITTEE
INSTITUE RESEARCH COUNCIL
PROJECT MONITORING AND EVALUATION CELL
PRIORITY SETTING, MONITORING AND EVALUATION CELL
ITMC, ITMU & IPR

FINANCIAL STATEMENT 2025	
ICAR-NATIONAL BUREAU OF AGRICULTURAL INSECT RESOURCES	
HEADS	**AMOUNT (Rs. In lakhs)**
Pay & Allowances	1648.58
TA	23.80
Other charges, including Equipment and Office Building	653..53
Information Technology	20.60
Works and Petty Works	185.51
HRD	3.21
Pension	145.18
Loan	0.00
Total	**2680.41**

All India Coordinated Research Project on Biological Control of Crop Pests

(INR in lakhs)

Name of the Centre	Salary	TA	RC	TSP	TOTAL
AAU, Anand	29.00	1.00	9.60	1.75	41.35
AAU, Jorhat	24.30	1.50	32.00	3.75	61.55
RARS-Anakapalle	14.30	1.20	13.30	4.50	33.30
PJTSAU, Telangana	10.00	0.50	6.80	3.00	20.30
DR YSPUH&F, Solan	28.40	1.20	9.50	3.75	42.85
GBPUAT, Pantnagar	18.60	1.50	9.90	9.0	39.00
KAU, Thrissur	15.70	0.50	7.80	00.0	24.00
MPKV, Pune	18.60	0.50	7.00	03.00	29.10
PAU, Ludhiana	34.50	1.00	8.00	0.00	43.50
SKUAST, Srinagar	28.40	1.00	3.00	4.50	36.90
TNAU, Coimbatore	28.86	0.80	9.00	0.00	38.66
MPUAT, Udaipur	0.00	0.50	1.80	9.00	11.30
OUAT, Bhubaneswar	0.00	0.40	1.25	0.00	1.65
CAU, Pasighat	0.00	1.00	3.00	3.75	7.75
UAS, Raichur	0.00	0.25	3.75	0.00	4.00
ICAR- CPCRI, Kayankulam	0.00	0.70	2.50	0.00	3.20
ICAR-IIHR, Bengaluru	0.00	0.60	1.70	0.00	2.30
ICAR-NBAIR P.C. CELL,Bengaluru	0.00	0.00	159.06	0.00	159.06
ICAR-IIRR, Hyderabad	0.00	0.50	1.25	0.00	1.75
ICAR-IIMR, Hyderabad	0.00	0.50	1.30	0.00	1.80
ICAR-IIVR, Varanasi	0.00	0.20	0.80	0.00	1.00
ICAR-NCIPM, New Delhi	0.00	0.70	0.40	0.00	1.10
IGKV, Raipur	0.00	0.70	1.60	7.50	9.80
KAU, Kumarakom	0.00	0.50	1.00	0.00	1.50
KAU, Vellayani	0.00	0.50	2.50	0.00	3.00
Dr YSRHU, Ambajipeta	0.00	0.70	4.10	1.50	6.30
UBKV, Pundibari	0.00	0.50	2.50	1.50	4.50
UAHS, Shimoga	0.00	0.40	1.70	0.00	2.10
SBI, Coimbatore	0.00	1.20	0.60	0.00	1.80
NIPHM, Hyderabad	0.00	0.45	0.35	0.00	0.80
SKUAST, Jammu	0.00	0.40	1.10	0.00	1.50
ICAR NRRI, Cuttack	0.00	0.60	0.80	0.00	1.40
NRC, Litchy	0.00	0.40	0.30	0.00	0.70
HPKV, Himachal Pradesh	0.00	0.00	0.90	0.00	0.90
TNAU, Yethapur	0.00	0.60	0.70	2.00	3.30
NISA, Rajamundry	0.00	0.40	0.40	0.00	0.80
YSRHU, Tirupathi	0.00	0.35	0.60	1.50	2.45
CISH,Lucknow	0.00	0.60	0.90	0.00	1.50
TOTAL	250.66	24.35	312.76	60.00	**647.77**

3. RESEARCH ACHIEVEMENTS

ICAR-National Bureau of Agricultural Insect Resources

Germplasm Collection and Characterisation

Surveys and explorations

Extensive surveys were carried out across Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal to document the diversity of insects, spiders, mites, and entomopathogenic nematodes.

These expeditions resulted in the collection of 162 scarabaeid species belonging to 31 genera; 120 species of aphids and coccids; 63 tephritid species across 27 genera; 47 leafhopper species; 38 thrips species under 24 genera; 6000 hymenopteran specimens representing 55 genera; 537 curculionid specimens; 590 trichogrammatid specimens; and 552 spider specimens.

Description of new genera

Two new genera of cicadellids, *Shanaya* Rajgopal *et al.* and *Ramya* Rajgopal, were described from India, with *Shanaya spatulata* Rajgopal *et al.* and *Ramya longiprocessus* Rajgopal designated as their respective type species. In addition, a new curculionid genus, *Spathaspina* Ramesha & Mahendiran, with *Spathaspina noohi* Ramesha & Mahendiran as its type species, was described from north-eastern India.

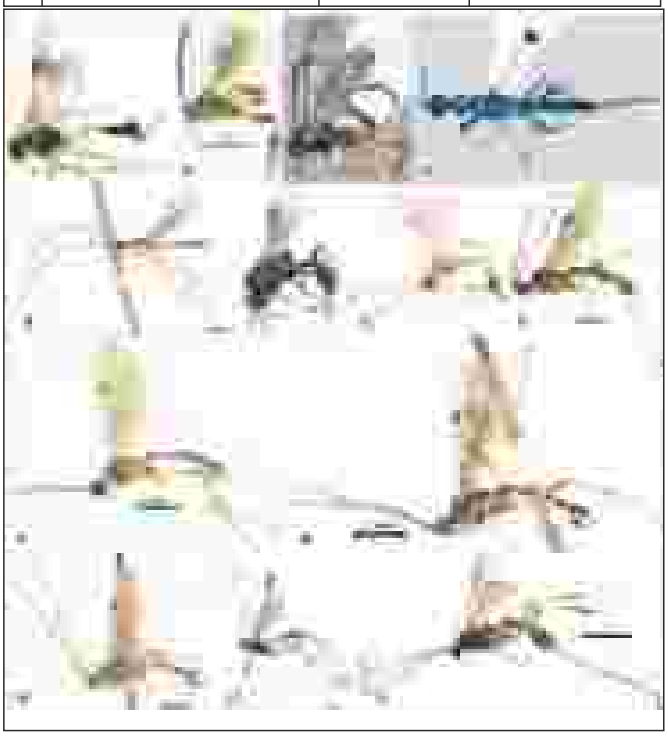
Description of new species

A total of 55 insect species representing the orders Coleoptera, Diptera, Hemiptera, Hymenoptera, and Thysanoptera were newly described. These comprised 12 species of Braconidae across seven genera; nine species of Platygastridae in two genera; eight scarab species in four genera; six curculionid species in six genera; five pentatomid species within a single genus; five tephritid species in four genera; and four cicadellid species in two genera. Additionally, two species each of Coccidae and Thripidae were described under two genera, along with one species each of Cantharidae

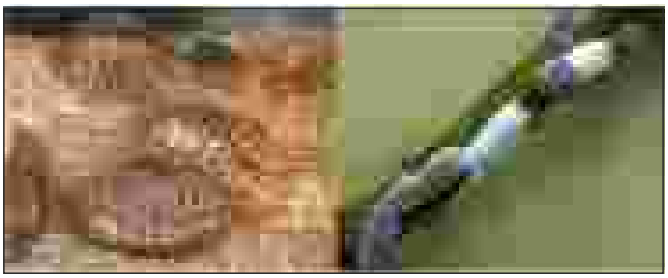
Sl. No	Scientific name	Family	Holotype deposited
	Coleoptera		
1	*Ichthyurus antheraeanus* Sreedevi, Reddy & Biffi	Cantharidae	NIM, ICAR-NBAIR, Bengaluru
2	*Alcidodes erosa* Mithun, Mahendiran & Pooja (Fig. 25)	Curculionidae	NIM, ICAR-NBAIR, Bengaluru
3	*Bagous obrieni* Mahendiran (Fig. 26)	Curculionidae	NIM, ICAR-NBAIR, Bengaluru
4	*Hirsutopes saddlensis* Mahendiran (Fig. 27)	Curculionidae	NIM, ICAR-NBAIR, Bengaluru
5	*Imera setauropsis* Mahendiran & Poornima (Fig. 28)	Curculionidae	NIM, ICAR-NBAIR, Bengaluru
6	*Orsophagous indicus* Mahendiran & Poornima	Curculionidae	NIM, ICAR-NBAIR, Bengaluru
7	*Spathaspina noohi* Ramesha & Mahendiran	Curculionidae	NIM, ICAR-NBAIR, Bengaluru
8	*Cyphochilus kukriana* Sreedevi, Sahoo & Sabatinelli (Fig. 30)	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
9	*Cyphochilus pentaphysia* Sreedevi, Sahoo & Sabatinelli (Fig. 29)	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
10	*Maladera judithae* Sreedevi & Ahrens	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
11	*Maladera silviae* Sreedevi & Ahrens	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
12	*Maladera* (*Hemiserica*) *subinaequalis* Sreedevi & Ahrens	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
13	*Maladera thandigudiensis* Sreedevi & Ahrens	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
14	*Neoserica berlineri* Sreedevi & Ahrens	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
15	*Selaserica peechi* Sreedevi & Ahrens	Scarabaeidae	NIM, ICAR-NBAIR, Bengaluru
	Diptera		
16	*Acroceratitis sachini* David, Hancock & Noor (Fig. 32)	Tephritidae	NIM, ICAR-NBAIR, Bengaluru
17	*Euphranta goniothalami* David & Hancock (Fig. 34)	Tephritidae	NIM, ICAR-NBAIR, Bengaluru

18	*Euphranta undulata* David & Hancock (Fig. 33)	Tephritidae	NIM, ICAR-NBAIR, Bengaluru
19	*Oedaspis freidbergi* David & Singh (Fig. 38)	Tephritidae	NIM, ICAR-NBAIR, Bengaluru
20	*Rhochmopterum malaviyai* Nikhil, David & Hancock (Fig. 37)	Tephritidae	NIM, ICAR-NBAIR, Bengaluru
	Hemiptera		
21	*Ramya longiprocessus* Rajgopal (Fig. 19)	Cicadellidae	NIM, ICAR-NBAIR, Bengaluru
22	*Ramya megatrium* Rajgopal (Fig. 20)	Cicadellidae	NIM, ICAR-NBAIR, Bengaluru
23	*Shanaya abeeri* Rajgopal *et al.* (Fig. 21)	Cicadellidae	NIM, ICAR-NBAIR, Bengaluru
24	*Shanaya spatulata* Rajgopal *et al.* (Fig. 22)	Cicadellidae	NIM, ICAR-NBAIR, Bengaluru
25	*Leptopulvinaria harishi* Joshi (Fig. 23)	Coccidae	NIM, ICAR-NBAIR, Bengaluru
26	*Pulvinarisca greeni* Joshi & Dubey (Fig. 24)	Coccidae	NIM, ICAR-NBAIR, Bengaluru
27	*Axiagastus chandrashekarai* Salini, Kment & Roca-Cusachs (Fig. 14)	Pentatomidae	NIM, ICAR-NBAIR, Bengaluru
28	*Axiagastus luteipes* Salini & Roca-Cusachs (Fig. 15)	Pentatomidae	NIM, ICAR-NBAIR, Bengaluru
29	*Axiagastus prathapani* Salini & Kment (Fig. 16)	Pentatomidae	NIM, ICAR-NBAIR, Bengaluru
30	*Axiagastus votypkai* Salini & Kment (Fig. 17)	Pentatomidae	NIM, ICAR-NBAIR, Bengaluru
31	*Axiagastus yeshwanthi* Salini, Kment & Webb (Fig. 18)	Pentatomidae	NIM, ICAR-NBAIR, Bengaluru
	Hymenoptera		
32	*Aulacocentrum hunliensis* Gupta (Fig. 12)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
33	*Aulacocentrum parotisae* Gupta (Fig. 11)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
34	*Canalirogas multinigratus* Gupta & van Achterberg (Fig. 10)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
35	*Canalirogas oblongus* Gupta & van Achterberg (Fig. 5)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
36	*Canalirogas omninopallidus* Gupta & van Achterberg (Fig. 9)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
37	*Canalirogas subtransversus* Gupta & van Achterberg (Fig. 13)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
38	*Chrysopophthorus indicus* Gupta (Fig. 1)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
39	*Diolcogaster confusus* Gupta (Fig. 2)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
40	*Diolcogaster pseudandamanensis* Gupta (Fig. 3)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
41	*Rogasodes indicus* Gupta & Pattar (Fig. 8)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
42	*Tuberidelus indicus* Gupta & Pattar (Fig. 7)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
43	*Wesmaelia indoflavus* Gupta & Pattar (Fig. 6)	Braconidae	NIM, ICAR-NBAIR, Bengaluru
44	*Heydenia longipetiolata* Hemanth & Gupta (Fig. 4)	Heydeniidae	NIM, ICAR-NBAIR, Bengaluru
45	*Iphitrachelus alpatanu* Veenakumari & Buhl	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
46	*Iphitrachelus phenalus* Veenakumari & Buhl	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
47	*Iphitrachelus vakratunda* Veenakumari & Buhl	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
48	*Piestopleura ahalya* Veenakumari,	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
49	*Piestopleura bhramari* Veenakumari	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
50	*Piestopleura daksha* Veenakumari	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
51	*Piestopleura kadruna* Veenakumari	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
52	*Piestopleura mahakaya* Veenakumari	Platygastridae	NIM, ICAR-NBAIR, Bengaluru

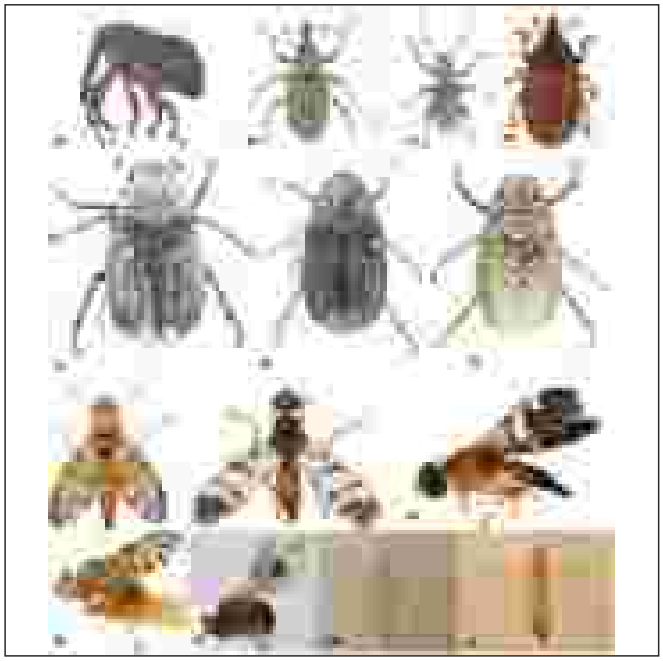
53	*Piestopleura ulughbegi* Veenakumari	Platygastridae	NIM, ICAR-NBAIR, Bengaluru
	Thysanoptera		
54	*Rhamphothrips laterocurvidentatus* Sujith *et al.* Fig. 36)	Thripidae	NIM, ICAR-NBAIR, Bengaluru
55	*Stenchaetothrips subaequalis* Rachana *et al.* (Fig. 35)	Thripidae	NIM, ICAR-NBAIR, Bengaluru



Figures 1–13. New taxa of Hymenoptera described from India. 1, *Chrysopophthorus indicus* Gupta; 2, *Diolcogaster confusus* Gupta; 3, *Diolcogaster pseudandamanensis* Gupta; 4, *Heydenia longipetiolata* Hemanth & Gupta; 5, *Canalirogas oblongus* Gupta & van Achterberg; 6, *Wesmaelia indoflavus* Gupta & Pattar; 7, *Tuberidelus indicus* Gupta & Pattar; 8, *Rogasodes indicus* Gupta & Pattar; 9, *Canalirogas omninopallidus* Gupta & van Achterberg; 10, *Canalirogas multinigratus* Gupta & van Achterberg; 11, *Aulacocentrum parotisae* Gupta; 12, *Aulacocentrum hunliensis* Gupta; 13, *Canalirogas subtransversus* Gupta van Achterberg



Figures 14–24. New taxa of Hemiptera described from India. 14, *Axiagastus chandrashekarai* Salini, Kment & Roca-Cusachs; 15, *Axiagastus luteipes* Salini & Roca-Cusachs; 16, *Axiagastus prathapani* Salini & Kment; 17, *Axiagastus votypkai* Salini & Kment; 18, *Axiagastus yeshwanthi* Salini, Kment & Webb; 19, *Ramya longiprocessus* Rajgopal; 20, *Ramya megatrium* Rajgopal; 21, *Shanaya abeeri* Rajgopal et al.; 22, *Shanaya spatulata* Rajgopal et al.; 23, *Leptopulvinaria harishi* Joshi; 24, *Pulvinarisca greeni* Joshi & Dubey.



Figures 25–38. New insect taxa described from India. 25, *Alcidodes erosa* Mithun, Mahendiran & Pooja; 26, *Bagous obrieni* Mahendiran; 27, *Hirsutopes saddlensis* Mahendiran; 28, *Imera setauropsis* Mahendiran & Poornima; 29, *Cyphochilus pentaphysia* Sreedevi, Sahoo & Sabatinelli; 30, *Cyphochilus kukriana* Sreedevi, Sahoo & Sabatinelli; 31, *Cyphochilus tenzingyatsoi* Sabatinelli; 32, *Acroceratitis sachini* David, Hancock & Noor; 33, *Euphranta undulata* David & Hancock; 34, *Euphranta goniothalami* David & Hancock; 35, *Stenchaetothrips subaequalis* Rachana et al.; 36, *Rhamphothrips laterocurvidentatus* Sujith et al.; 37, *Rhochmopterum malaviyai* Nikhil, David & Hancock; 38, *Oedaspis freidbergi* David & Singh

Revisions/redescriptions of taxa

The Indian representatives of the braconid genera *Aulacocentrum* Brues and *Canalirogas* van Achterberg & Chen were comprehensively revised, and the genus *Diolcogaster* Ashmead was critically reviewed. Within Pentatomidae, the genus *Axiagastus* Dallas was revised, and a new combination, *Axiagastus klossi* (China), was proposed. Four new synonymies were established: *Indrapura* China under *Axiagastus* Dallas; *Picromerus orientalis* Rishi & Abbasi under *P. griseus* (Dallas); *Piezodorus brevis* Hassan, Shree & Kumar under *P. hybneri* (Gmelin); and *Acesines bambusana* Distant under *Acesines breviceps* Stål. Lectotypes were designated for three pentatomid species *Axiagastus marmoratus* (Montrouzier), *A. cambelli* Distant, and *A. rosmarus* Dallas.

Two lygaeid species, *Astacops occidentalis* Distant and *Graptostethus nigriceps* Stål, along with one pentatomid species, *Halyomorpha halys* (Stål), were excluded from the Indian fauna. In Hemiptera, detailed redescriptions with photomicrographs were provided for three mealybug species (*Dysmicoccus brevipes*, *D. neobrevipes*, and *Rastrococcus iceryoides*), three pentatomid species (*Axiagastus rosmarus*, *A. cambelli*, and *A. mitescens*), one soft scale (*Eulecanium tiliae*), one scale insect (*Drosicha mangiferae*), and one aphid (*Uroleucon pseudambrosiae*).

Two weevil pests, *Barioscapus cordiae* (Marshall) and *Deporaus marginatus* (Pascoe), were also redescribed, incorporating biological information across life stages along with molecular characterization. In addition, the oxyopid spider *Oxyopes mirabilis* Zhang, Yang & Zhu was redescribed, accompanied by a global distribution map.

Figure 39. *Oxyopes mirabilis*

New distributional records

In Heteroptera, Graptostethus nigriceps Stål (Lygaeidae) from the Solomon Islands, *Gyndes pallicornis* (Dallas) (Rhyparochromidae) from Thailand, and *Psacasta neglecta* (Herrich-Schäffer) (Scutelleridae) from Greece were reported. New distributional records for India include three braconid genera, *Chrysopophthorus* Goidanich, *Tuberidelus* Chen & van Achterberg, and *Rogasodes* Chen & He; two soft scale genera, *Leptopulvinaria* Kanda and *Pulvinarisca* Borchsenius; and two curculionid genera, *Imera* Pascoe *Orsophagus* Roelofs.

Three mealybug species, *Exallomochlus hispidus* (Morrison), *Paraputo villosus* (De Lotto), and *Paracoccus evae* Williams; two aphid species, *Uroleucon pseudambrosiae* (Olive) and *Hyperomyzus pallidus* Hille Ris Lambers were reported in Hemiptera. In Diptera, five fruit flies, *Bactrocera gombokensis* Drew & Hancock, *Chaetellipsis alternata* (Zia), *Goniurellia persignata* Freidberg, *Actinoptera reticulata* Ito and *Terellia serratulae* (Linnaeus) were recorded. Two braconid species, *Heydenia gibsoni* Sureshan, and *H. testacea* Yang were recorded in Hymenoptera. A scarab beetle, *Cyphochilus tenzingyatsoi* Sabatinelli, and a terebrantian thrips species, *Rhamphothrips tenuirostris* (Karny) were also reported new to the country. Two spider species, *Phlegra samchiensis* (Salticidae) and *Gea jingdong* (Araneidae) (Fig. 40) were new reports for India. Regarding new distribution records for a Union Territory; the oxyopid spider *Oxyopes mirabilis* Zhang, Yang & Zhu and two salticid spiders, *Carrhotus sannio* (Thorell) and *Portia labiata* Thorell were reported from the Andaman and Nicobar Islands. New distribution records for South India include a braconid genus, *Wesmaelia* Foerster, and two braconid species, *Aulacocentrum seticella* van Achterberg & He and *Heydenia kashmirensis* Sureshan & Khanday. New state-wise distribution records include: three thrips species, *Anaphothrips latis* Bhatti, *Leucothrips nigripennis* Reuter and *Thrips alius* Palmer, two scale insect species, *Fistulococcus pokfulamensis* Hodgson & Martin and *Pulvinaria urbicola* Cockerell, and a mealybug, *Hypogeococcus pungens* Granara de Willink from Kerala; three thrips species, *Tryphactothrips rutherfordii* (Bagnall), *Trichromothrips similis* (Ananthakrishnan), and *Ramphothrips pardus* (Bhatti), and one diaspidid species, *Lepidosaphes tokionis* (Kuwana) from Karnataka; two diaspidid species, *Pseudaulacaspis pentagona* (Targioni Tozzetti) and *Pseudaulacaspis cockerelli* (Cooley) from Meghalaya; one mealybug species, *Dysmicoccus carens* Williams from Andhra Pradesh; and one scale insect species, *Eulecanium tiliae* L. from Himachal Pradesh. In addition, three salticid spider species, *Stenaelurillus shwetamukhi* Marathe, Sanap, & Maddison, *Stenaelurillus arambagensis* (Biswas & Biswas) and *Stenaelurillus vyaghri* Sanap, Joglekar & Caleb from Chhattisgarh; two spider species, *Cheiracanthium melanostomum* (Thorell) and *Peucetia choprai* Tikader from Gujarat were documented as new distributional records.

Figure 40. *Gea jingdong*

New host records/pest records

Four thrips species, *Thrips florum* Schmutz, *Thrips hawaiiensis* (Morgan), *Thrips orientalis* (Bagnall) and *Psephenothrips machili* (Priesner) were reported infesting *Michelia champaka* flower buds in the western Maharashtra region. All four species were found together as mixed populations, with *P. machili* being the most abundant; both larvae and adults were observed feeding on the buds. The braconid wasp *Heydenia longipetiolata* Hemanth & Gupta was described as solitary larval parasitoid of *Agrilus* spp. (Buprestidae) infesting branches of *Villebrunea integrifolia* Gaud. (Urticaceae) and *Albizia amara* (Roxb.) Boivin. (Fabaceae), representing the first record of Buprestidae as hosts for *Heydenia* species. *Aulacocentrum parotisae* was recorded as a solitary endoparasitoid of *Parotis* sp. (Crambidae) caterpillars feeding on *Psydrax dicoccos* Gaertn. (Rubiaceae). The tephritid fly, *Euphranta goniothalami* was found infesting seeds of *Goniothalamus keralensis* E.S.S. Kumar et al., an endemic species of the Western Ghats, while *Rhochmopterum malaviyai* was reared from infested flowers of *Vernonia cinerea* (L.) Less (Asteraceae). Cashew was recorded as a new host plant for the scale insect *Ceroplastes ceriferus* (Fabricius) and the diaspidid species *Lepidosaphes laterochitinosa* Green. Scale insect species, *Rastrococcus iceryoides* Green was recorded on coconut and *Drosicha mangiferae* (Stebbing) on litchi. Cardamom and pea were documented as new host plants for the mealybug species, *Formicococcus polysperes* Williams and *Dysmicoccus brevipes* (Cockerell), respectively. The intercepted hemipteran pests were identified and are summarized in Table 2.

Table 2: Identification of intercepted samples by Directorate of Plant Protection Quarantine & Storage

DPPQ&S Station	Date of interception	Fruit/plant imported	Country from which imported	Identified / intercepted insect
Mumbai	March 2025	Date palm	UAE	*Pseudaspidoproctus graminius* Jashenko & Denzing*
		Olive	Spain	*Parasaissetia nigra* (Nietner), *Aonidiella aurantii* (Maskell), *Hemiberlesia lataniae* (Signoret)
		Ficus	Taiwan	*Pseudococcuss* sp.
	June 2025	Dragon fruit	Vietnam	*Pseudococcuss* sp.
		Ficus	Spain	*Planococcus ficus* (Signoret)

*Reported for the first time from India. The sample was destructed after identification, preventing further spread.

Development of diagnostic keys/tools/websites/ monographs/checklists/distribution maps

Diagnostic keys to the following taxa have been published

- World species of the genera *Acroceratitis* Hendel, *Euphranta* Loew and *Rhochmopterum* Speiser.
- World species of the genera *Leptopulvinaria* Kanda and *Pulvinarisca* Borchsenius.
- World species of the genus *Axiagastus* Dallas.
- Updated key to the genera of the tribe Mukariini from the Indian subcontinent, and world species of the genera *Shanaya* Rajgopal *et al.* and *Ramya* Rajgopal.
- Indian species of the genera *Aulacocentrum* Brues, *Canalirogas* van Achterberg & Chen, *Diolcogaster* Ashmead, and *Heydenia* Förster.
- Indian species of the genus *Rhamphothrips*.
- Genera of the tribes *Coccini* Fallen and *Saissetiini* Hodgson, and species of the genera *Coccus* Linnaeus and *Saissetia* Deplanche from Kerala.
- Aphids infesting *Sonchus arvensis* L.
- Thrips species recorded on chilli.

A monograph documenting 335 species of fruit flies belonging to 97 genera, 22 tribes, and five subfamilies from India was published. A checklist of the tribe Axiagastini was also published. An updated checklist of the spider fauna of Himachal Pradesh documented 129 species across 77 genera and 25 families from various districts of the state. An updated checklist of spider biodiversity from the Andaman and Nicobar Islands was also prepared, comprising 51 species belonging to 33 genera and 15 families. Distribution maps for 25 predominant white grub species, belonging to the subfamilies Sericinae, Melolonthinae, and Rutelinae (Scarabaeidae) across India, were prepared. Digitization of 45 white grub species was carried out, which can serve as a reference source. QR codes containing passport details were generated for 40 economically important white grub species. Brief diagnostic characters, along with illustrations, host plant information and/or bionomics, and general distribution of 25 phytophagous and economically important bug species were published.

Molecular charecterization

Molecular characterization of predominant white grub species was carried out using two DNA markers, mt-COI and 16S rRNA, yielding approximately 80 gene sequences. These sequences were submitted to the NCBI database, of which nearly two-thirds represent first-time depositions. DNA barcodes were generated for 45 species of phytophagous Scarabaeidae. Genetic diversity and population structure analyses of six predominant species of *Anomala* revealed the highest haplotype diversity in *Anomala communis* and *Anomala elata*. Intraspecific variation among different populations of *Anomala ruficapilla* and *Anomala communis* (subfamily Rutelinae) was examined using two DNA markers.

Phylogenetic analysis of bamboo-shoot fruit flies based on the mt-COI marker revealed the monophyly of the genus *Acroceratitis*.

Division of Genomic Resources

Rapid Molecular Identification of Invasive Whiteflies

Molecular detection of the solanum whitefly, *Aleurotrachelus trachoides*, and Bondar's nesting whitefly, *Paraleyrodes bondari*, was successfully achieved using isothermal amplification methods Recombinase Polymerase Amplification (RPA) and Loop-mediated Isothermal Amplification (LAMP).

Accurate identification of whiteflies based solely on morphology is often difficult because of their minute size, cryptic characteristics, and sessile immature stages. This highlights the need for rapid and reliable molecular diagnostic tools to support effective pest surveillance and timely biological control measures.

Alongside *A. trachoides* and *P. bondari*, nine other economically significant invasive whitefly species were collected: spiraling whitefly (*Aleurodicus dispersus*), rugose spiralling whitefly (*Aleurodicus rugioperculatus*), legume whitefly (*Tetraleurodes acaciae*), nesting whitefly (*Paraleyrodes minei*), palm whitefly (*Aleurotrachelus atratus*), woolly whitefly (*Aleurothrixus floccosus*), annona whitefly (*Aleurotrachelus anonae*), and nesting whitefly (*Paraleyrodes pseudonaranjae*). Species-specific primers were developed based on multiple sequence alignment of the mitochondrial cytochrome c oxidase subunit I (mtCOI) gene, enabling the identification of unique target regions for primer design.

The PCR, LAMP, and RPA primers were assessed for specificity under various reaction combinations using a dry bath, including negative control species and no-template controls to rule out cross-amplification. The findings confirmed that the LAMP and RPA primers selectively amplified *A. trachoides* and *P. bondari*, without cross-reactivity with other whitefly species tested. Amplification results were detected visually through colorimetric changes using hydroxynaphthol blue (HNB) in LAMP assays and SYBR Green I dye in RPA assays.

Molecular Characterisation of Desert Locust

Molecular characterization of the desert locust, *Schistocerca gregaria*, was carried out using four genetic markers: mtCOI, 28S rRNA, ITS2, and 16S rRNA. The generated sequence data are being employed to design species-specific markers to support future CRISPR-Cas–based investigations.

Whole genome sequencing of green lacewing, *Chrysoperla zastrowi sillemi*

The whole genome of the green lacewing, *Chrysoperla zastrowi sillemi*, was sequenced using a combination of PacBio long-read and Illumina paired-end short-read technologies.

Transcriptome sequencing was also undertaken to enhance gene prediction accuracy. K-mer analysis estimated the genome size to be approximately 566 Mb and suggested a highly homozygous genome.

Assembly using the hifiasm assembler yielded a haplotype-resolved genome of 597 Mb with a scaffold N50 of 30.4 Mb. The assembly was organized into six chromosomal pseudomolecules representing 84% of the genome, with pseudochromosome sizes ranging from 29.37 Mb to 170.05 Mb and a cumulative length of 502 Mb. Comparative genomic analysis with 11 insect species across major orders clustered 263,765 genes into 21,559 gene families, including 61 conserved single-copy orthogroups shared among all species. Phylogenetic analysis indicated that Neuroptera is a sister lineage to Coleoptera. The divergence between *Tribolium castaneum* (Coleoptera) and the Neuropteran species *C. zastrowi sillemi* and *C. carnea* was estimated at approximately 364.3 million years ago, providing robust genome-scale evidence for this evolutionary relationship.

Synteny analysis demonstrated strong genomic collinearity between *C. zastrowi sillemi* and *C. carnea*. Gene family evolution analysis using CAFE identified 212 expanded and 2,005 contracted gene families in *C. zastrowi sillemi*, compared with 1,138 expansions and 322 contractions in *C. carnea*. This genomic resource offers a strong platform for selective breeding initiatives and advances understanding of life-history traits, predator prey dynamics, and ecological adaptations.

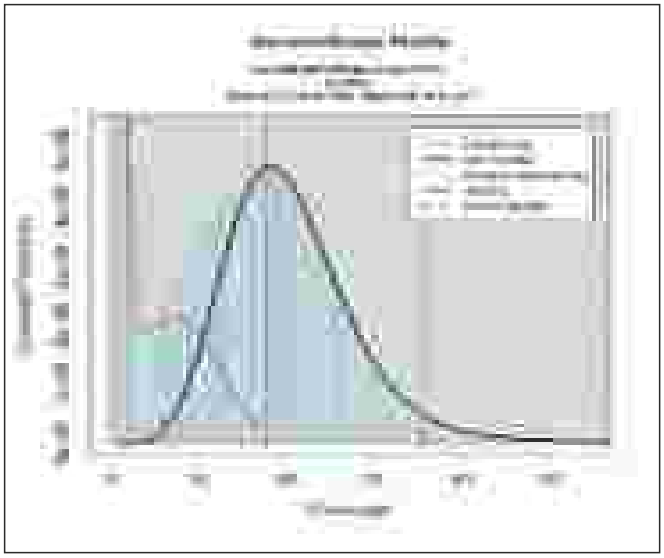
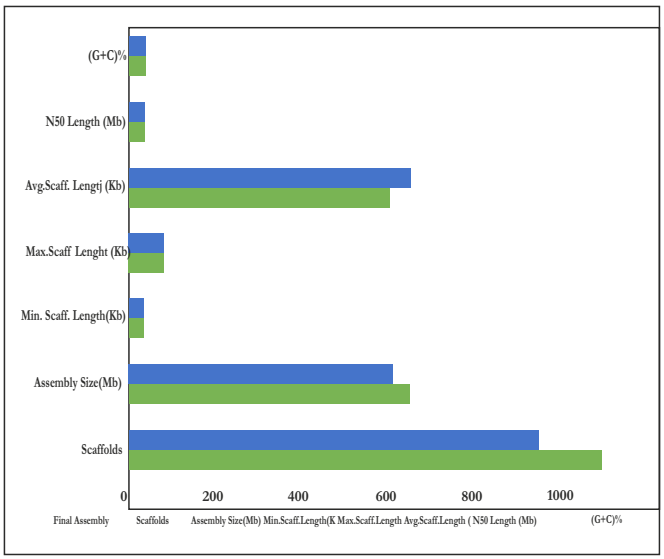


Figure 41. k-mer frequency distribution plotted using GenomeScope from Illumina short-read data for estimation of the genome size of *Chrysoperla zastrowi sillemi*. The distribution was generated using Jellyfish with a k-mer size of 21. The highly homozygous nature of the genome is indicated by the absence of a distinct heterozygous *k*-mer peak.



Final Assembly	934	597.969657	12.475	78.291533	640.224	30.409389	28.82
Primary Assembly	1071	635.207614	12.475	78.291533	593.097	29.38561	28.81

Figure 42. Scaffold-level genome assembly statistics of *Chrysoperla zastrowi sillemi*

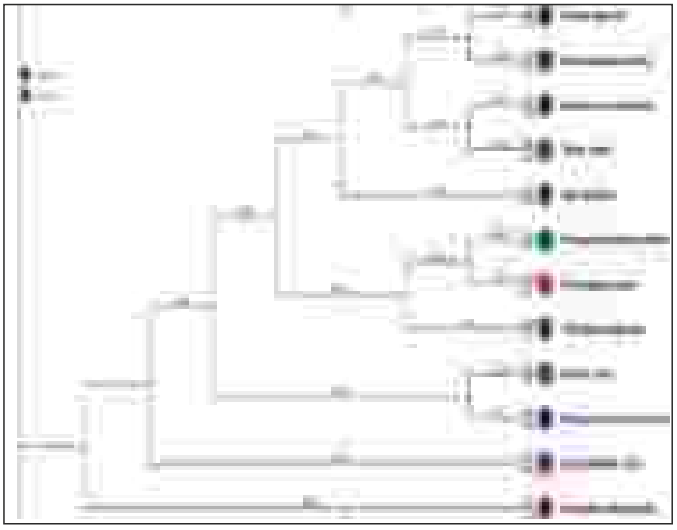


Figure 43. Computational analysis of gene family evolution using CAFE in *Chrysoperla zastrowi sillemi* in comparison with other insect species. Gene family expansions and contractions are indicated at the tips of the nodes. Violet and blue colours denote gene family expansion and contraction, respectively.

RNA Interference Studies in Mealybugs

Reference genes were standardized for multiple experimental conditions including dsRNA treatments in the mealybugs *Maconellicoccus hirsutus* and *Phenacoccus manihoti*, ensuring reliable assessment of gene expression levels and fold-change analysis following RNAi exposure.

Five Halloween genes *spook (spo)*, *spookiest*, *disembodied (dib)*, *shade (shd)*, and *shadow (sad)* were identified and characterized in the pink mealybug, *M. hirsutus*. Two genes involved in the terminal steps of ecdysteroid biosynthesis were selected for RNA interference studies, as they mediate the conversion of dietary cholesterol into the active moulting hormone, 20-hydroxyecdysone (20HE). Double-stranded RNA was successfully introduced into nymphs via microinjection. Treated individuals exhibited marked suppression of *MhGene1* and *MhGene2* expression, leading to developmental defects such as abnormal moulting and growth arrest. Mortality rates reached 62.5% for *MhGene1* and 84.4% for *MhGene2*, indicating that *MhGene2* represents a particularly promising target for managing pink mealybug populations.

Cuticular protein genes in *M. hirsutus* were identified using the CuticleDB and CutProtFam databases. 118 unique cuticular protein genes were catalogued and grouped into five principal families based on comparisons with *Bombyx mori* and *Drosophila melanogaster*. The CPF/CPCFC family comprised six genes, while the CPAP family included two subgroups: CPAP1 (one gene) and CPAP3 (five genes). The largest group, CPR, encompassed 90 genes, further classified into RR-1 (41 genes) and RR-2 (49 genes), along with 16 additional members. RR-1 proteins are typically associated with flexible cuticle regions, whereas RR-2 proteins contribute to rigid cuticle structures. CPAP proteins are essential for maintaining cuticular integrity, and CPF/CPFL proteins are involved in forming the outer layers of pupal and adult cuticles.

Table 3 List of cuticular protein families, subfamilies, and total number of genes in *Maconellicoccus hirsutus*

Cuticular protein family	Subfamily	Number of genes
CPF/CPCFC	-	6
CPAP	CPAP1	1
	CPAP3	5
CPR	RR-1	41
	RR-2	49
Other genes	-	16

A major wax biosynthesis gene, **PMGene1-WxBsy**, was identified in *Phenacoccus manihoti*. Its functional role was confirmed through RNA interference (RNAi) experiments. Oral delivery of dsRNA targeting **PMGene1-WxBsy** led to a marked decrease in gene expression, achieving 62.3% knockdown at 24 hours and 54% at 48 hours after feeding compared to sucrose-fed controls. However, by 72 hours, transcript reduction declined to 39% and was no longer statistically significant.

Although the gene silencing effect was temporary, mortality among dsRNA-treated mealybugs reached 76.37% by the fifth day. These findings indicate that even short-term suppression of **PMGene1-WxBsy** significantly impairs survival, underscoring its promise as a molecular target for pest management strategies.

Ultrastructural Characterisation of Potato Tuber Moth (*Phthorimaea operculella*) Eggs

Ultrastructural examination of potato tuber moth (*Phthorimaea operculella*) eggs was conducted using scanning electron microscopy (SEM) to determine egg dimensions and to describe distinguishing features of the anterior and posterior poles, including the micropylar and aeropylar regions important for microinjection. Eggs were mounted horizontally and vertically on double-sided carbon tape and coated with a thin layer of gold using a Quorum SC7620 sputter coater to improve conductivity. The prepared samples were observed under an EVO 18 Research SEM (Carl Zeiss, Germany) fitted with a tungsten emission source, operating at an accelerating voltage of 0.2–30 kV and a probe current of 0.5 pA to 5 µA. The eggs were oval with bluntly rounded anterior and posterior ends, measuring approximately 416.1 µm in length and 315.4 µm in width. The chorion appeared smooth and largely unornamented, except for the presence of microscopic cellular structures at both poles, which were more distinct at the anterior end. The anterior pole featured a well-defined micropylar rosette, consisting of a central micropylar plate cell encircled by 5–9 primary rosette cells. This circular micropylar plate cell was typically situated at the anterior tip. A secondary rosette formed the micropylar zone, extending slightly beyond its boundary, while the remaining chorionic surface remained smooth except near the posterior pole. Cells within the secondary rosette displayed closed, lattice-like arrangements, generally pentagonal or polygonal in shape, with variation in number and configuration both between different eggs and within the same egg. The posterior pole contained the aeropyle, identifiable by minute surface perforations that facilitate respiration and gas exchange (Figs 44, 45, 46, 47, 48, 49).

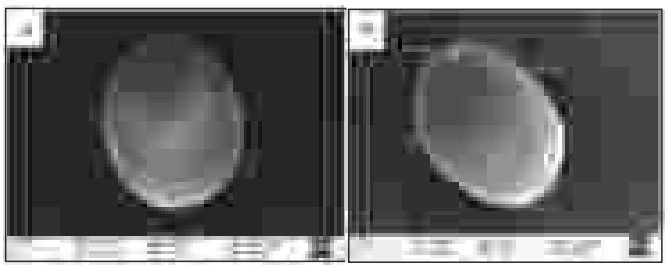


Figure 44. (A) Ultrastructural view of the potato tuber moth (*Phthorimaea operculella*) egg; (B) measurement of egg length and diameter.

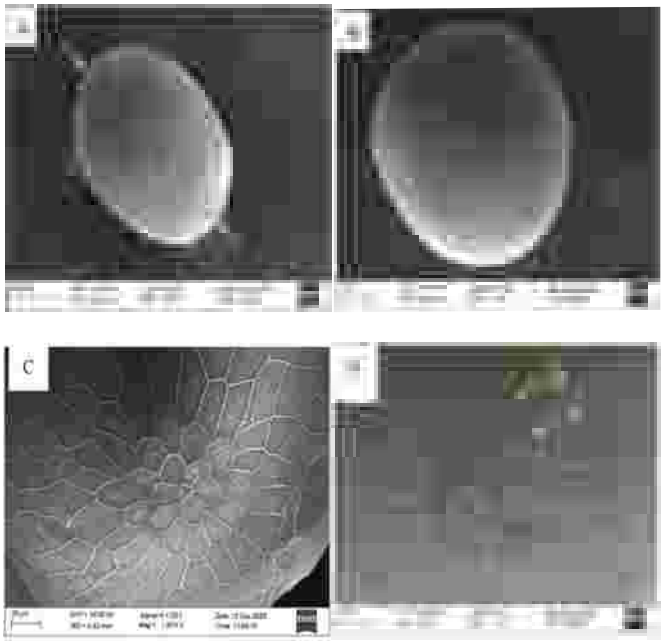


Figure 45. Micropylar architecture and surface organisation of the potato tuber moth (*Phthorimaea operculella*) egg. (A) Whole-egg view showing the anterior (yellow arrow) and posterior (white arrow) poles; (B) anterior pole of the egg showing the micropylar region; (C) micropyle and associated rosette cells; (D) enlarged view of the micropylar region illustrating the arrangement of cells: (a) micropylar plate cell and (b) micropylar rosette cell.

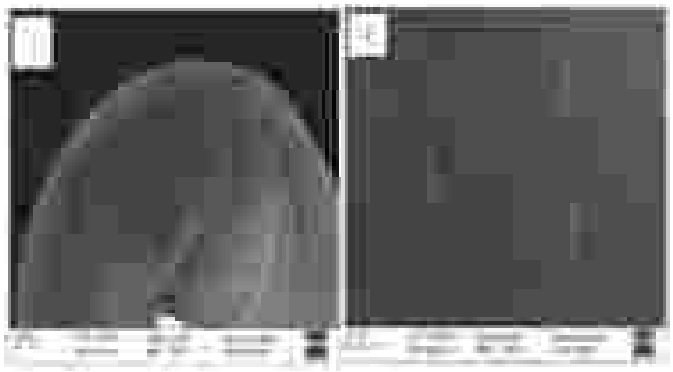


Figure 46. Posterior pole of the potato tuber moth (*Phthorimaea operculella*) egg. (A) Posterior region of the egg showing the aeropylar region; (B) aeropyle indicated by arrows.

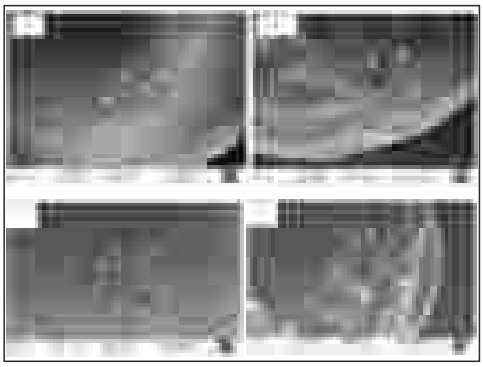


Figure 47. Different numbers and shapes of micropylar rosette cells (5–9 cells). (a) Six cells; (b) seven cells; (c) nine cells; and (d) five cells.

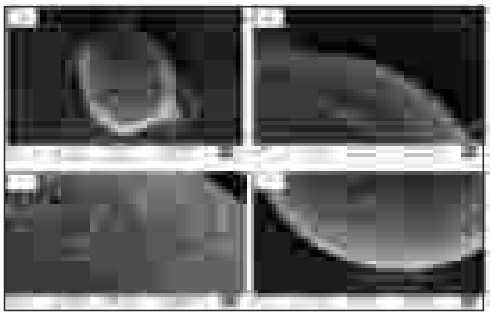


Figure 48. Arrangement of different rosettes of cells on the surface of the potato tuber moth (*Phthorimaea operculella*) egg chorion. (A, B) Overview of chorionic cells; (C) individual cell (dorsal view); and (D) lateral view of cells adjacent to the micropylar region.

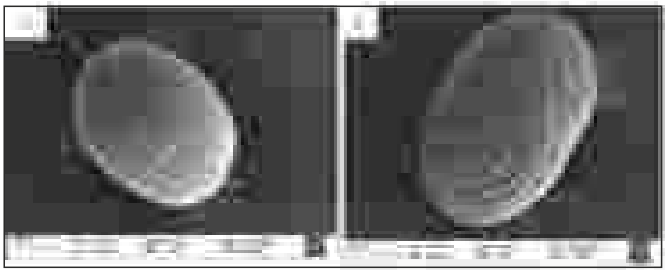


Figure 49. Adherence of the potato tuber moth (*Phthorimaea operculella*) egg to the oviposition substrate. (A) dorsal view of the egg showing the micropyle (white arrow) and aeropyle (yellow arrow); (B) horizontal adherence of the egg to plant tissue, with the yellow arrow indicating surface tension between the egg and the substrate

CRISPR/Cas9 Target Identification and sgRNA Design in *Phthorimaea operculella*

CRISPR/Cas9-based genome editing was employed to examine the functional significance of selected genes in *Phthorimaea operculella*.

A genome-wide assessment was conducted to identify candidate genes, define exon–intron organization, and determine appropriate target regions for designing single guide RNAs (sgRNAs) for gene knockout. The eye pigmentation gene, tryptophan 2,3-dioxygenase (TO), was chosen as the primary target because its disruption produces a clearly observable phenotype, making it a reliable marker for evaluating editing efficiency. The TO gene contains nine exons and eight introns, and exon 3 was selected for sgRNA design. Amplification of the exon 3 region produced a 580 bp fragment, and Sanger sequencing confirmed its sequence identity with the reference genome. Potential guide RNA target sites were identified using the CRISPR platform, and sgRNA assembly was validated using Phusion Flash High-Fidelity PCR Master Mix. Beyond the pigmentation marker, two genes linked to reproductive function were targeted to explore their potential in population suppression strategies. The testis-specific serine/threonine kinase (*tssk*) gene, essential for spermatogenesis and sperm motility, and the ovarian serine protease (*osp*) gene, which plays a role in ovarian development and embryogenesis, were selected for investigation. Gene sequences were obtained from genomic databases, and structural maps were generated to identify suitable exonic regions for amplification and editing. The *tssk* gene consists of a single exon, while the *osp* gene comprises 23 exons and 22 introns; exon 2 of *osp* was chosen for sgRNA design. Specific and efficient sgRNA primers were designed and validated for both *tssk* and *osp* genes.

Multiple Mating Behaviour in *Phthorimaea operculella*

An experiment was carried out to examine the multiple mating behaviour of female potato tuber moths. Two experimental setups were designed to evaluate female mating patterns. In the first setup, a single female was maintained while different males were introduced sequentially within the same scotophase, providing an opportunity for multiple matings during one night. In the second setup, the same female was retained, but different males were introduced on successive scotophases, allowing mating opportunities across multiple nights.

The results indicated that under the first condition, females mated only once within a single scotophase and did not accept additional males thereafter. In the second condition, repeated mating across different scotophases occurred only in a few instances, suggesting that such behaviour is not consistent. Overall, the findings demonstrate that a single successful mating is sufficient for oviposition in female potato tuber moths, as sperm received during the initial copulation effectively supports fertilisation and subsequent egg laying.

Bioprospecting of microbial metabolites in pest management

Larvae of *Spodoptera litura* and *Spodoptera frugiperda* were collected from Mallohalli, Doddaballapur (13.22° N, 77.45° E), Bengaluru. The species identity of the laboratory cultures was confirmed through molecular characterization of the cytochrome c oxidase subunit I (COI) gene.

Bacterial isolates obtained from the gut of black soldier fly larvae (SF4-4, BSFK7, and NSFK9), rhinoceros beetle larvae (RB 1 and RB 3-16), and white grubs (WGM1) were evaluated for their biocontrol efficacy against *S. litura* under in vitro conditions. Castor leaves were immersed in bacterial cell suspensions for 30 minutes and then offered to third-instar larvae. Mortality observations were recorded at 24, 48, 72, and 144 hours post-treatment.

In addition, dead *S. litura* larvae collected from maize fields were used to isolate associated bacterial and fungal microflora. Ten bacterial isolates (SFDL1–SFDL10) were screened for pathogenicity using standard surface inoculation assays under laboratory conditions,at 24, 48, 72, and 144 hours. Among these, isolate SFDL5 was identified as highly virulent, inducing 100% larval mortality within 72 hours.

Genomic Characterisation of *Bacillus thuringiensis*

Whole-genome sequencing coupled with in silico analysis led to the discovery of novel *cry* genes along with several insecticidal toxin associated genes in indigenous *Bacillus thuringiensis* strains, including NBAIR BtAr and NBAIR BtAe (Figs. 50, 51, 52).

These strains demonstrated high larval mortality against invasive pests such as *Spodoptera frugiperda* and *Holotrichia serrata*, respectively. The functional significance of the identified genes was further supported through PCR validation and protein structural modelling.

In addition to *cry* genes, the detection of other insecticidal factors such as *enhancin*, *chitinase C*, *inhA*, *spp1Aa*, and zwittermicin-related gene clusters underscores the diverse and synergistic modes of insecticidal action exhibited by these strains. Plasmid profiling of *B. thuringiensis* strain NBAIR BtVGa1 revealed a wide array of insecticidal gene determinants effective against *Galleria mellonella*, while also confirming its safety toward non-target organisms, including honeybees.

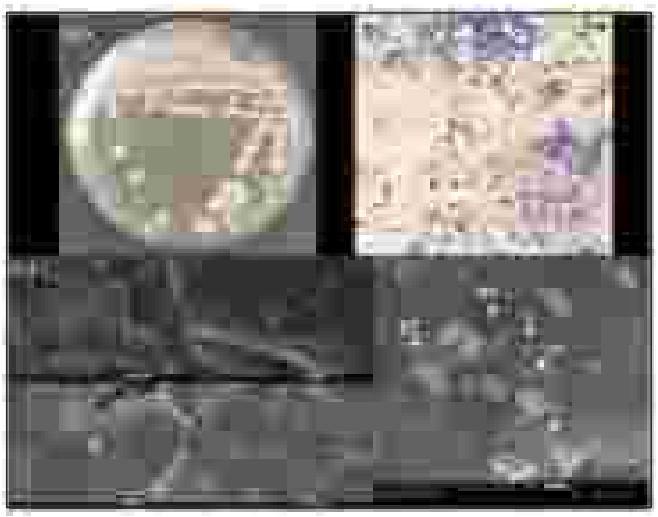


Figure 50. (a) Colony morphology of *Bacillus thuringiensis* strain NBAIR BtAe; (b) light microscopy image of *Bacillus thuringiensis* strain NBAIR BtAe at 100× magnification, showing spores (S) and crystals (C); (c) scanning electron micrograph of the NBAIR BtAe strain showing diverse parasporal crystal morphologies.

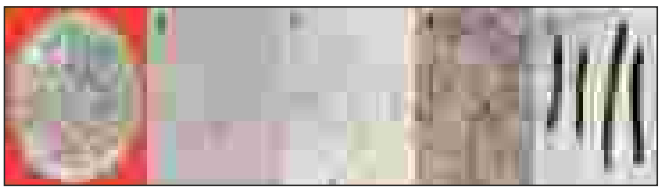


Figure 51. (a) Colony of *Bacillus thuringiensis* strain NBAIR BtVGa1 isolated from *Galleria mellonella*; (b) NBAIR BtVGa1 visualised by Gram staining; (c) NBAIR BtVGa1 visualised by endospore staining; (d) NBAIR BtVGa1 visualised by crystal staining; and (e) cadavers of *Galleria mellonella* following infection with NBAIR BtVGa1 formulations.

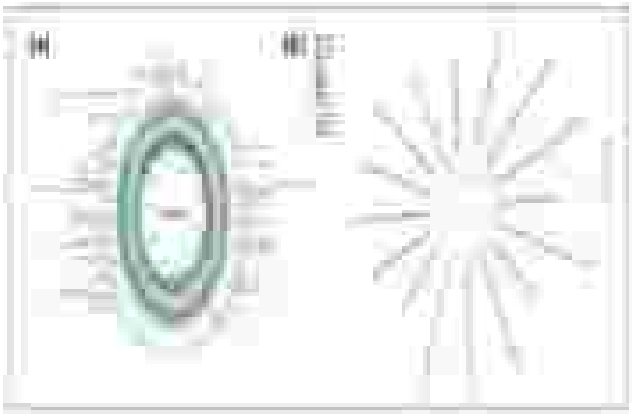
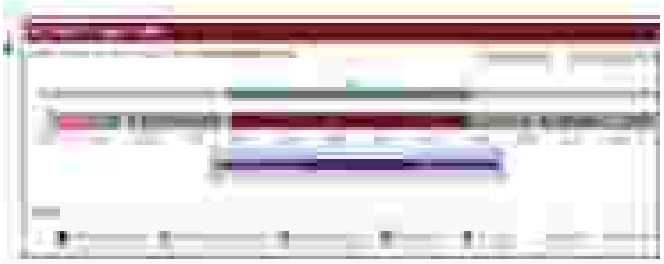


Fig. 52. (a) Circular genome map of *Bacillus thuringiensis* strain NBAIR BtAe visualised using the Proksee tool. The circular genome illustrates the distribution of concentric rings from the inner to the outer regions: rings 1 and 5 represent protein-coding genes; ring 2 represents GC skew; ring 3 represents GC content; and ring 4 represents contig boundaries along with the mapping of 14 pesticidal and virulence genes. (b) Maximum-likelihood phylogeny showing the evolutionary relationship of *Bacillus thuringiensis* strain NBAIR BtAe (highlighted in red) with reference genomes of *Bacillus* species and *Bacillus thuringiensis* subspecies retrieved from the NCBI RefSeq database (indicated by their respective GCF/GCA accession numbers).

Antifungal Potential of *Bacillus subtilis* NBAIR-BSWG1

Bacillus subtilis strain NBAIR-BSWG1 was investigated for its antagonistic activity against *Rhizoctonia solani*. Metabolomic profiling using liquid chromatography–mass spectrometry (LC–MS), coupled with genome mining, revealed the production of diverse cyclic lipopeptides, including surfactin, fengycin, iturin, and several novel compounds (Fig. 53). These metabolites exhibited complete inhibition of *R. solani*, demonstrating strong antifungal activity and highlighting the role of secondary metabolites in biological disease suppression.



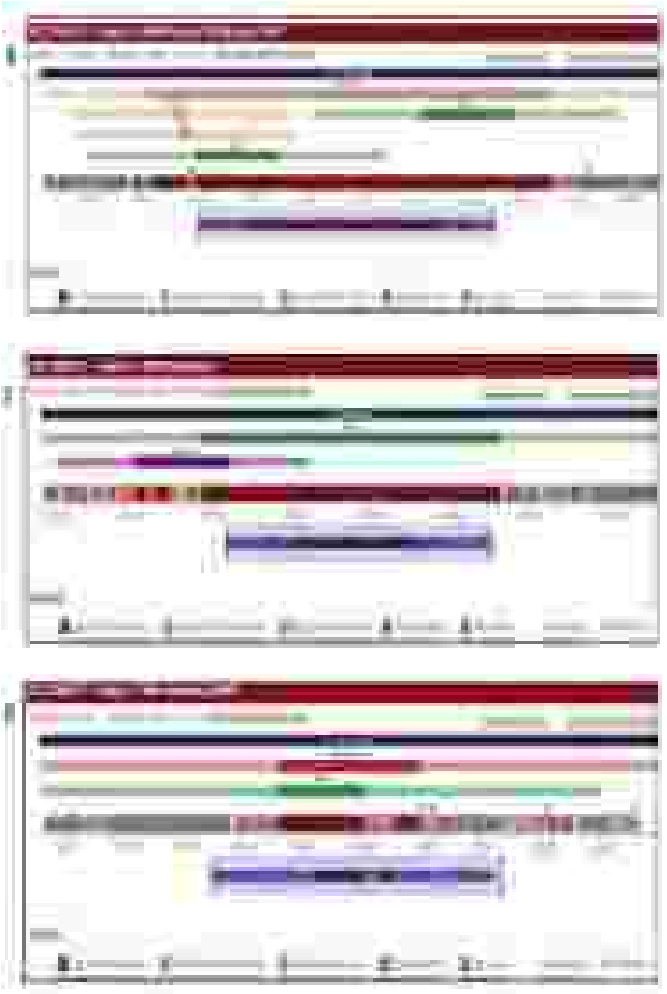


Figure 53. Secondary metabolite gene clusters responsible for antimicrobial compound production in *Bacillus subtilis* strain NBAIR-BSWG1, identified using antiSMASH (version 6.0). Each panel depicts the genomic organisation and coding sequences of the clusters encoding (A) surfactin (NRPS), (B) bacillaene (NRPS–PKS-like, T3PKS, trans-AT-sPKS), (C) fengycin (NRPS, β-lactone), and (D) bacillibactin (NRP-metallophore, NRPS).

Molecular Diagnostics for Pest and Pathogen Detection

Colorimetric isothermal amplification assays (RT-PCR, RT-LAMP, and RT-RPA) were developed for Thai sacbrood virus affecting *Apis cerana indica* (Fig. 54) and for *S. frugiperda* (Fig. 55). These assays achieved femtogram-level sensitivity, required minimal equipment, and provided rapid turnaround times, thereby enabling on-site diagnosis and early intervention.

Figure 54. (A) Schematic representation of the unique polyprotein region specific to Thai sacbrood virus (TSBV) and the primer sets designed for RT-PCR, RT-LAMP, and RT-RPA assays. (B) Specificity analysis of RT-PCR, RT-LAMP (hydroxynaphthol blue, HNB), and RT-RPA (SYBR Green I) assays, showing amplification exclusively in TSBV-infected samples. Lanes: M, 100 bp DNA ladder; 1–5, TSBV-infected larvae; 6, *Paenibacillus larvae*; 7, healthy larva; 8, no-template control. (C) Sensitivity analysis of RT-PCR, RT-LAMP, and RT-RPA assays using 10-fold serial dilutions of cDNA from infected larvae. Lanes 1–9 represent dilutions from 10^{-1} to 10^{-9}; M, 100 bp DNA ladder; 10, positive control; 11, negative control; 12, no-template control. (D) Validation of RT-PCR, RT-LAMP, and RT-RPA assays using field-collected samples. Lanes: M, 100 bp DNA ladder; 1–8, infected samples; 9, positive control; 10, negative control; 11, no-template control.

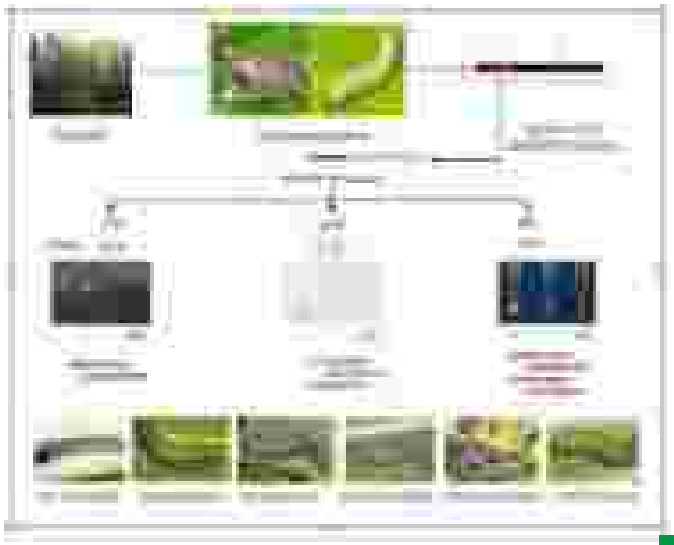


Figure 55. Development of isothermal nucleic acid-based assays for rapid and accurate detection of *Spodoptera frugiperda* larvae under field conditions.

Development of insecticide tolerant strain of *Trichogramma chilonis*

A detailed comparative transcriptomic study was undertaken to understand the molecular mechanisms underlying emamectin benzoate resistance in *Trichogramma chilonis*. De novo RNA sequencing of resistant and susceptible strains produced approximately 35 million raw reads per replicate, leading to the assembly of a high-quality transcriptome comprising 41,691 non-redundant transcripts, with an N50 of 2,585 bp and a GC content of ~41%. BUSCO analysis confirmed the completeness of the assembly, showing 94.9% completeness against the Insecta dataset and 81.1% against Hymenoptera, indicating a reliable and nearly complete transcriptomic resource (Figs. 56, 57).

Functional annotation of predicted coding sequences demonstrated broad representation across multiple databases, with more than 12,000 proteins successfully annotated. Gene Ontology classification revealed significant involvement in diverse biological processes, molecular functions, and cellular components. Differential expression analysis identified 559 transcripts that were significantly altered between resistant and susceptible strains, including 260 upregulated and 299 downregulated genes in the resistant population.

Resistance was notably linked to altered expression of genes associated with detoxification pathways, including Phase I and Phase II metabolic enzymes, transporters mediating xenobiotic efflux, and genes involved in waste metabolism. Additionally, significant changes were observed in genes related to transcriptional regulation, protein homeostasis, kinases, and phosphatases, suggesting coordinated adjustments in gene regulation, proteostasis, and cellular signalling in response to insecticide selection pressure.

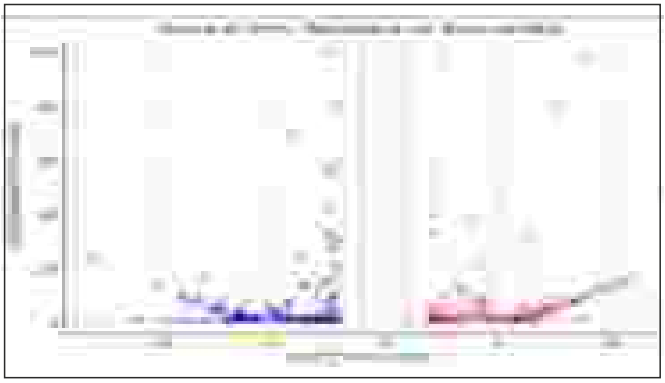


Figure 56. Volcano plot showing differential gene expression between emamectin benzoate–resistant and susceptible strains of *Trichogramma chilonis*.

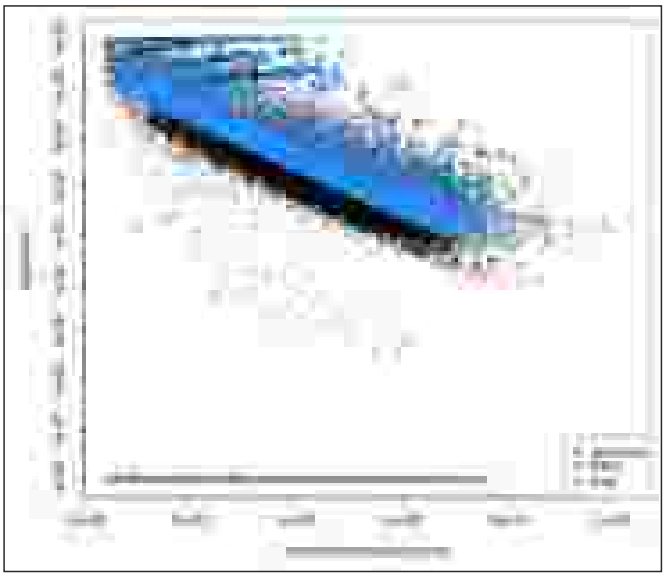


Fig. 57. Dispersion estimates for normalized read counts obtained from the comparative transcriptome analysis of emamectin benzoate–resistant and susceptible strains of *Trichogramma chilonis*.

Selection of suitable reference genes in *Chrysoperla zastrowi sillemi*

A systematic study was undertaken to identify stable reference genes for accurate qRT-PCR–based gene expression analysis in *Chrysoperla zastrowi sillemi* under diverse biological and stress conditions. Candidate reference genes were experimentally validated across temperature stress, developmental stages, starvation, insecticide exposure, and combined treatments. Primer efficiency (92–105.5%) and melt curve analysis confirmed high amplification efficiency and specificity for all genes evaluated. Gene expression stability was rigorously assessed using multiple statistical approaches, including ΔCt, BestKeeper, NormFinder, geNorm, and RefFinder, ensuring robust cross-validation of results.

The analysis revealed that ARF2 and RAB1A were the most consistently stable reference genes across combined treatments, while stability rankings varied depending on specific experimental conditions. Context-specific optimal reference genes were identified for temperature stress, developmental stages, starvation, and insecticide exposure, highlighting the necessity of condition-dependent normalization strategies.

Chitinolytic bacteria from shrimp waste and their insecticidal potential

Molecular characterization of chitinolytic bacteria isolated from shrimp waste indicated the dominance of *Bacillus* species within this ecosystem (Fig. 58). Endo-chitinase activity was assessed in 15 selected isolates, among which eight isolates NBAIR SW-36, SW-38, SW-44, SW-50, SW-68, SW-69, and SW-78 demonstrated high levels of enzyme activity.

These chitinolytic isolates were further evaluated for their insecticidal efficacy against *S. frugiperda*. Fifteen selected isolates were subjected to bioassays to determine their biocontrol potential against larval stages of *S. frugiperda*. Larval mortality was observed in treatments with isolates NBAIR SW-1, SW-7, SW-38, SW-42, SW-44, SW-50, SW-65, SW-68, and SW-78. Among these, isolates NBAIR SW-7, SW-42, SW-44, SW-68, and SW-78 produced the highest levels of larval mortality.

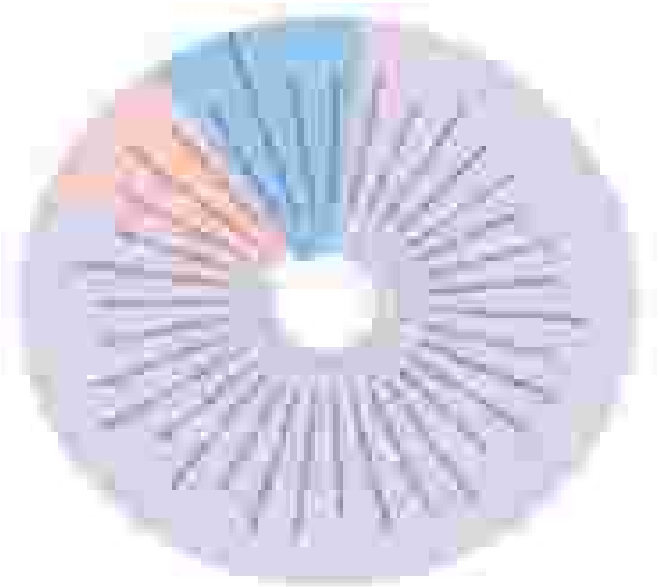


Figure 58. Phylogenetic tree of chitinolytic bacteria isolated from shrimp waste.

Geo-Mapping and Digital Decision Support Systems for Insect Pest Management

A GIS portal for insect pests and their natural enemies in India was developed and updated with occurrence data on white grubs and whiteflies (Fig. 59). Distribution data of the invasive pest cassava mealybug, *Phenacoccus manihoti*, along with its natural enemies, *Ferrisia virgata*, *Acerophagus papayae*, *Hyperaspis maindroni*, *Menochilus sexmaculatus*, *Spalgius epius*, *Cryptolaemus montrouzieri*, and *Scymnus* sp. from India were uploaded to the portal.

The portal allows users to submit occurrence data on insect pests and their natural enemies through a data input form and generate dynamic distribution maps. The GIS portal is accessible at:

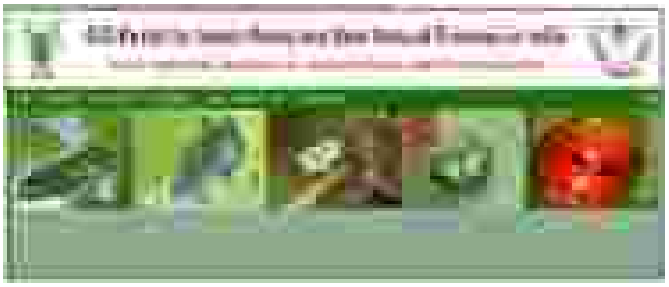


Figure 59. Home page of the GIS Portal for insect pests and their natural enemies in India

An artificial intelligence and machine learning powered insect detection and classification system for tomato crops was developed using deep learning neural networks. The model is capable of classifying tomato pests and their natural enemies, including: (1) *Phthorimaea absoluta*, (2) *Helicoverpa armigera*, (3) *Liriomyza trifolii*, (4) *Bemisia tabaci*, (5) *Spodoptera litura*, (6) *Trichogramma* spp., (7) *Chrysoperla zastrowi sillemi*, (8) coccinellid spp., (9) spider spp., (10) *Tetranychus* spp., (11) Braconidae, (12), Ichneumonidae, (13) *Nesidiocoris* spp., (14) *Encarsia* spp., (15) *Diglyphus* sp., (16) *Telenomus* spp., (17) mirid bugs, (18) praying mantis, (19) thrips, and (20) mealybugs. The image dataset comprised 61,013 images. The model achieved classification accuracy exceeding 95%. Results of pest and natural enemy identification are illustrated in Fig. 60.

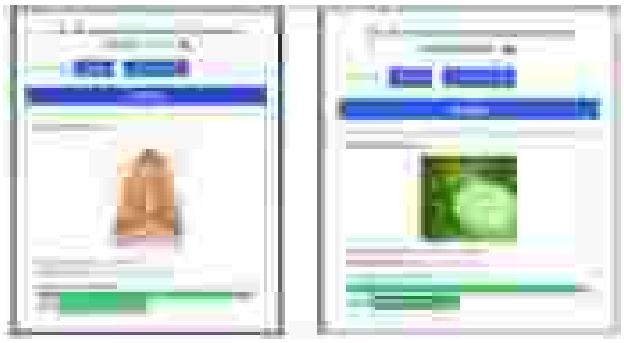


Figure 60. AI-based detection and classification of tomato pests and natural enemies

A tomato pest prediction and alert system was developed based on a layered modular architecture . The user interface allows farmers or users to input location, crop age, and observed damage symptoms. The pest prediction module processes these inputs, compares them with a knowledge base of tomato pests, and generates pest management advisories.

A mobile application titled "BIPM FOR TOMATO PESTS" was developed for knowledge dissemination on tomato pests and their management . The application provides information on major tomato pests such as *P. absoluta*, *L. trifolii*, *H. armigera*, *S. litura*, *B. tabaci*, *Ferrisia virgata*, *Tetranychus* spp., *Thrips tabaci*, *Frankliniella schultzei*, and others, along with bio-intensive pest management strategies. The mobile application is accessible at:
https://mobileapptomato.nbair.res.in

Germplasm Conservation and Utilisation

Successful Establishment and Impact of *Anagyrus lopezi* in the Biological Control of Cassava Mealybug (*Phenacoccus manihoti*) in India

By 2025, the classical biological control programme had resulted in sustained and effective suppression of the cassava mealybug, *Phenacoccus manihoti*. Parasitism levels remained consistently high across release locations (66–80%), with Yethapur, Poonachi, and Palacode in Tamil Nadu showing the most stable control. Even in newly monitored areas such as Modakurichi and Pappireddipatti in Tamil Nadu, parasitism reached approximately 66%, demonstrating the strong dispersal ability and persistence of *A. lopezi* beyond the original release sites. Consequently, mealybug populations declined

substantially, allowing healthy cassava crop recovery with minimal pest damage and confirming the long-term success of the classical biological control intervention.

Field surveillance conducted between 2022 and 2025 further verified the successful establishment and expansion of *A. lopezi* in India (Table 4). During the initial phase in 2022, parasitism averaged only 2.93%. However, parasitism increased markedly to 23.93% in 2023, coinciding with rapid geographic spread. It subsequently rose to over 58% in 2024 and exceeded 73% in 2025 across all monitored sites, reflecting progressive establishment and enhanced control efficiency over time.

Table 4: Observed mean parasitism of cassava mealy bug by *A. lopezi* over the years

Year	No. of Sites Monitored	Mean Parasitism (%)	Range (%)	Pest Status
2022	106	2.93	0.00 - 6.5	Establishment phase
2023	123	23.93	19.9 - 28.7	Rapid build - up
2024	98	58.50	46.4 - 74.6	Stable suppression
2025	79	73.12	66.0 – 80.3	Stable suppression

Monetary/Economic Benefits of Classical Biological Control of Cassava Mealybug in India

Cassava productivity rebounded markedly, increasing from 5–12 tonnes/ha during the outbreak period to 35–40 tonnes/ha, thereby restoring yields to pre-infestation levels. Farmers reported a 90–100% reduction in pesticide applications, resulting in healthier crops and considerable savings in input costs.

The introduction of *Anagyrus lopezi* for the control of cassava mealybug (*Phenacoccus manihoti*) in India delivered substantial economic gains. The Benefit Cost Ratio improved from 0.857 to 1.525, indicating enhanced profitability from the intervention. The programme is estimated to have generated an annual economic impact of approximately ₹3,480 crores, along with additional yearly savings of around ₹286 crores due to reduced reliance on chemical pesticides. These outcomes highlight the significant economic and ecological benefits of classical biological control in revitalising the cassava sector in India.

Field surveys were undertaken in farmers' fields to collect *Chelonus* spp., and the biology of *C. blackburni* was investigated using *Corcyra cephalonica*, *Earias vittella*, and *Helicoverpa armigera* as hosts. A preliminary field evaluation of *C. blackburni* against fall armyworm (FAW) was conducted in fodder maize at the Krishi Vigyan Kendra, Ramanagara, where parasitism ranged from 15% to 30%. The parasitoid was successfully maintained and mass-reared, and a total of 57,500 adult parasitoids were distributed to farmers through various outreach programmes.

New record of Invasive Nesting Whitefly (*Paraleyrodes pseudonaranjae* Martin) in India

In February 2025, the invasive nesting whitefly, *Paraleyrodes pseudonaranjae* Martin (Hemiptera: Aleyrodidae), was documented for the first time in India on golden dewdrop (*Duranta erecta*) in Bengaluru (Fig. 61). The species was identified based on detailed morphological examination of puparia, supported by molecular characterization. Native to the Neotropical region, particularly Brazil, this highly polyphagous pest is known to infest coconut, arecanut, guava, mango, citrus, custard apple, and various ornamental plants.

Both adults and nymphs colonize the abaxial surface of leaves, feeding on plant sap and producing copious amounts of wax and honeydew. This leads to the development of sooty mould, reduced photosynthetic efficiency, and overall plant decline. Field observations indicated moderate infestation levels and frequent co-occurrence with other invasive whiteflies, namely *Paraleyrodes bondari* and *Aleurotrachelus trachoides*, suggesting a possible simultaneous introduction of *Paraleyrodes* species into India. Given its broad host range and invasive capacity, *P. pseudonaranjae* represents a significant threat to economically important crops. Its detection underscores the urgent need for intensified surveillance, strengthened quarantine measures, and timely management strategies to limit further spread within the country.

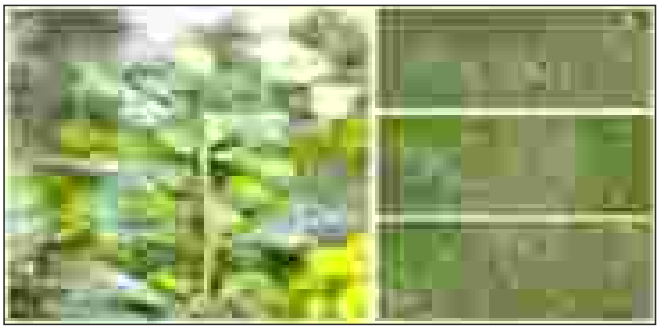


Figure 61. Symptoms and coexistence of *Paraleyrodes pseudonaranjae* on golden dewdrops: a. infested *Duranta erecta*; b. & c. *P. pseudonaranjae* different stages; d. Co-existence with *A. trachoides* adults.

First report of the aphelinid parasitoid, *Eretmocerus queenslandensis*

The occurrence of the exotic parasitoid, *Eretmocerus queenslandensis* Naumann & Schmidt (Hymenoptera: Aphelinidae) is reported for the first time in India parasitising the whitefly *Bemisia breyniae* (Singh) (Hemiptera: Aleyrodidae) (Fig. 62). This parasitoid is a solitary, primary ecto-endoparasitoid, with a natural parasitism rate of 40-95% across different host plants and locations. The present discovery of *E. queenslandensis* parasitising *B. breyniae* signified a potential biocontrol opportunity in India for the management of *B. tabaci*, thereby expanding its known geographic distribution and host range.

Figure 62. *Eretmocerus queenslandensis* a) round emergence hole; b) adult parasitoid.

First Record of an Exotic Whitefly on Vetiver in India

A moderate infestation of whitefly was recorded on vetiver (*Chrysopogon zizanioides*) during July–September 2024 in Sitapur district, Uttar Pradesh. Specimens collected by CSIR-CIMAP, Lucknow were identified at the Bureau as *Aleurolobus graminicola* Bink-Moenen (Fig. 63) (Hemiptera: Aleyrodidae) based on morphological characters of puparia and original taxonomic descriptions. This is the first report of this African species from India and the Oriental region. Molecular characterisation was carried out by sequencing the partial mitochondrial cytochrome c oxidase I (COI) gene region, and sequences were submitted to NCBI for the first time (Accession Nos. PV035890 and PV088603). Voucher specimens (puparial slides) are

Figure 63. African whitefly, *Aleurolobus graminicola* on vetiver

Seasonal parasitism of trichogrammatids on *Lampides* species infesting *Crotalaria juncea*

Seasonal parasitism by trichogrammatids on eggs of *Lampides* sp. infesting sunhemp (*Crotalaria juncea*) was assessed during the kharif and rabi seasons. Parasitism differed significantly between seasons ($t = 2.550$, df = 11, $P = 0.027$), with higher parasitism in rabi (27.14%) than in kharif (21.52%). Three species, namely, *Trichogrammatoidea armigera*, *Tr. bactrae*, and *T. chilonis* were recorded parasitizing *Lampides* eggs. *Tr. armigera* showed higher occurrence during 23–24 MW in kharif and 43 MW in rabi, while *T. bactrae* peaked at 32 MW (46.15%) in kharif and 39 MW (66.67%) in rabi. *T. chilonis* was observed only in rabi, with a maximum occurrence of 33% at 38 MW. Additionally, the occurrence and parasitism of trichogrammatids varied significantly among species during both kharif and rabi seasons, while seasonal variation did not significantly influence species occurrence.

Field evaluation of *Trichogramma chilonis* against *Helicoverpa armigera* in menthol mint

The field efficacy of *Trichogramma chilonis* against *Helicoverpa armigera* was evaluated in transplanted menthol mint (*Mentha arvensis*) using six weekly releases in Lucknow, Uttar Pradesh.

Egg parasitism increased with successive releases, ranging from 20 to 64.2% in the released field. Weekly releases of *T. chilonis* significantly ($F = 72.48$; df = 5,114; $P < 0.0001$) reduced the larval population of *H. armigera*, reaching 0.32 larvae per plant after six releases (Fig. 64).

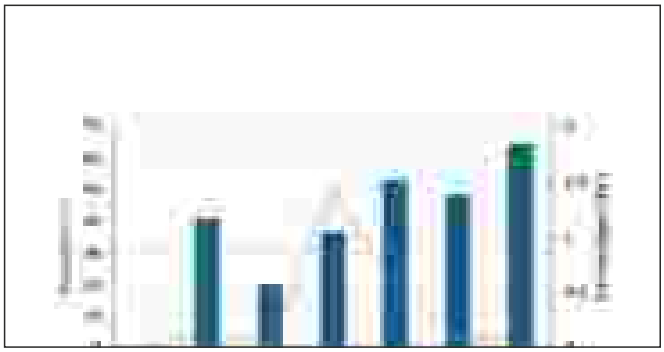


Figure 64. Percentage of egg parasitism and larval population after six releases of *T. chilonis* in menthol mint

Evaluation of *Blaptostethus pallescens* against *Thrips parvispinus* in Capsicum (protected cultivation)

Blaptostethus. pallescens was evaluated for the management of *Thrips parvispinus* infesting capsicum in greenhouse at Hosur. Three releases of *B. pallescens* @ 8-10 bugs per meter row caused 68.67 percent reduction of *T. parvispinus* (Fig. 65). Release of *B. pallescens* combined with one spray each of *Beauveria bassiana* and *B. albus* resulted in an average percent reduction in thrips increased to 76.24%.

Evaluation of Geocorid bug against *Thrips parvispinus* in chilli

Geocoris ochropetrus, a geocorid bug, was found associated with chilli and feeding on insect pests. Adults and fifth instar fed a greater number of *T. parvispinus* compared to other immature stages (Fig. 66). Two releases of two bugs per plant at weekly intervals in caged conditions resulted in a significant reduction in thrips population from 10.6 thrips/tap to 1.5 thrips/tap after 15 days of the first release (Treatment: $F(1, 18) = 68.09$; $P<0.0001$; week: $F(2, 36) = 0.6317$, $P=0.5375$).

Figure 65. *Geocoris ochropterus* adult female predating on adult *Thrips parvispinus*

Figure 66. *Geocoris ochropterus* fifth instar nymph predating on adult *Thrips parvispinus*

Evaluation of combined application of *Blaptostethus pallescens* and *Lecanicillium fusisporum* for the management of red spider mites in tomato

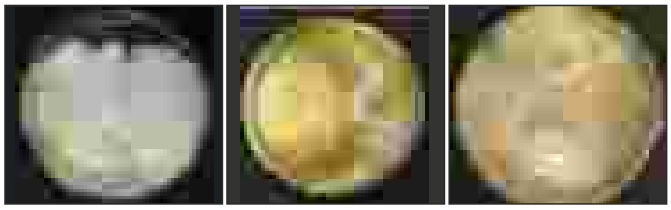
Blaptostethus pallescens and *Lecanicillium fusisporum* were evaluated against red spider mites in tomato. Two releases of *B. pallescens* were made @ 2 pairs per plant recorded 80.63% reduction in the population of two spotted spider mites 15 days after treatment in tomato. However, it was not significantly different from treatment where one spray of *L. fusisporum* @ 5 gm/lire followed by one release of *B. pallescens* @ 2 pairs/plant (76.86%). Both the treatments were found better than *L. fusisporum* (2 sprays @ 5gm/litre) alone (67.06 %). Moreover, the nymphs of *B. pallescens* were observed in the treatments released with *B. pallescens*.

Compatibility studies among the entomopathogenic and antagonistic fungi

Compatibility stuides among the entomopathogenic and antagonistic fungi through dual culture technique revealed that the antagonistic fungus *Trichoderma harzianum* is compatible with all three entomopathogens i.e *Beauveria bassiana*, *Metarhizium anisopliae*, *Lecanicillium lecanii*. *Beauveria bassiana* and *Metarhizium anisopliae* are compatible. *Metarhizium anisopliae* and *Lecanicillium lecanii* are compatible (Table 5 & Fig. 67).

Table 5. *In vitro* compatibility testing among the entomopathogenic and antagonistic fungi

Microbial isolates	*Trichoderma harzianum*	*Beauveria bassiana*	*Metarhizium anisopliae*	*Lecanicillium lecanii*
Trichodermaharzianum	-	√	√	√
Beauveriabassiana	√	-	√	-
Metarhiziumanisopliae	√	√		√
Lecanicilliumlecanii	√		√	-



T. harzianum+B. bassiana *T. harzianum+M. anisopliae* *T. harzianum+L. lecanii*

M. anisopliae+L. lecanii *M. anisopliae+ B. bassiana*

Figure 67. Compatibility among entomopathogens and antagonistic fungus

Compatibility testing among *Bacillus thuringiensis* (Bt) and *Helicoverpa armigera* nucleopolyhedrovirus (HearNPV)

Compatibility between *Bacillus thuringiensis* (*Bt*) and *Helicoverpa armigera* nucleopolyhedrovirus (HearNPV) was evaluated using light microscopy and laboratory bioassays. Microscopic observations confirmed that Bt was compatible with HearNPV. Bioassays were conducted at standard concentrations of *Bt* and HearNPV, individually and in combination, using the diet contamination method against the chickpea pod borer, *H. armigera*.

Larval mortality data were used to calculate LT_{50} values. The LT_{50} for *Bacillus thuringiensis* NBAIR BtG4 was 56.42 hours, while *H. armigera* nucleopolyhedrovirus HearNPV NBAIR1 recorded an LT_{50} of 125.56 hours. In contrast, the Bt + NPV combination exhibited a lower LT_{50} of 50.34 hours, which was considerably shorter than that of either agent alone (Table 6). The reduced LT_{50} of the combined treatment indicates that the Bt and NPV mixture is compatible and more effective than the individual cultures.

Table 6. Bioassay of *Bacillus thuringiensis* NBAIR *Bt*G4 and *Helicoverpa armigera* nucleopolyhedrovirus HearNPV NBAIR1 against *H. armigera*

Organisms	Lt_{50} (Hours)
Bacillus thuringiensis BtG4 NBAIR	56.42
Nucleopolyhedrovirus HearNPV NBAIR1 Sol.	125.56
BtG4+ HearNPV NBAIR1	50.34
SEd	0.051
CD (P=0.05)	0.108

Table 7. Field evaluation of microbial consortium against maize fall armyworm

Field evaluation of microbial consortium against maize fall armyworm

The field efficacy of a microbial consortium and individual microbial agents against maize fall armyworm was assessed during 2025–26. All tested bacterial and fungal treatments significantly reduced fall armyworm incidence under field conditions (Table 7).

The consortium comprising *Bacillus subtilis*, *Bacillus thuringiensis*, *Pseudomonas fluorescens*, and the fungus *Trichoderma harzianum* proved to be the most effective, achieving up to 75% reduction in fall armyworm incidence. In contrast, individual microbial treatments resulted in reductions ranging from 45% to 66%. Among the single agents, *B. thuringiensis* and *P. fluorescens* were equally effective, recording maximum reductions of 66.66% and 63.33%, respectively, compared to the untreated control.

Treatment (spray and drench of microbe /microbial consortia/ chemicals twice at 20 &35 days after sowing)	Fall armyworm infestation before imposing the treatments		Fall armyworm infestation after imposing the treatment		Percentage of reduction in pest incidence
	Infested plants	Plant infestation (%)	Infested plants	Plant infestation	
Bacillus subtilis (1 x 10^8cfu/ml) @10ml/L	60	100	25	41.66	58.33
Bacillus thuringiensis (1 x 10^8cfu/ml) @10ml/L	58	96.66	20	33.33	66.66
Pseudomonas fluorescens (1 x 10^8cfu/ml) @10ml/L	60	100	22	36.66	63.33
Trichoderma harzianum (1 x 10^8 spores/ml) @10ml/L	58	96.66	33	55.00	45.00
Bs+Bt+Pf (1 x 10^8cfu/ml) @10ml/L	59	98.33	18	30.00	70.00
Bs+Bt+Pf+Th (1 x 10^8cfu/ml) @10ml/L	59	98.33	15	25.00	75.00
Chemical Control (Emamectin benzoate @ 2 ml/L + Carbendazim1 g/L	58	96.66	9	15.00	85.00
Control	60	100.00	60.00	100.00	0.00
SEM	NS	NS	0.187	0.245	2.01
CD (P= 0.05)	NS	NS	0.578	0.789	5.99

Field evaluation of microbial consortium against soil borne diseases of maize

The bio-efficacy of microbial consortium as well as individual microbes was evaluated against soil-borne diseases of maize under field conditions during the period 2025-26. Individually, all bacteria and fungi were found to be effective in reducing the incidence of soil-borne diseases of maize under field conditions (Table 8). The microbial consortium containing *Bacillus subtilis, Bacillus thuringiensis,* and *Pseudomonas fluorescens* and the fungus *Trichoderma harzianum* was found highly effective in suppressing the soil-borne diseases (banded leaf and sheath blight, dry root rot, stalk rot) with a maximum of 76.66 % reduction in disease incidence as compared to the individual microbes, where the reduction in disease incidence was from 56.66 to 66.66%. Among the individual microbes, *Trichoderma harzianum* was found effective in the reduction of disease incidence (66.66%) followed by *Pseudomonas fluorescens* (63.33%) and *Bacillus subtilis* (61.66%).

Table 8. Field evaluation of microbial consortium against soil borne diseases of maize

Treatment (spray and drench of microbe / microbial consortia/ chemicals thrice at 20,35,50 days after sowing)	Disease incidence before imposing the treatments		Disease incidence after imposing the treatments		Percentage of reduction in disease incidence
	Infected plants	Disease incidence (%)	Infected plants	Disease incidence	
Bacillus subtilis (1 x 10^8cfu/ml) @10ml/L	58	96.66	23..00	38.33	61.66
Bacillus thuringiensis (1 x 10^8cfu/ml) @10ml/L	58	96.66	26.00	43.33	56.66
Pseudomonas fluorescens (1 x 10^8cfu/ml) @10ml/L	58	96.66	22.00	36.66	63.33
Trichoderma harzianum (1 x 10^8 spores/ml) @10ml/L	59	98.33	20.00	33.33	66.66
Bs+Bt+Pf (1 x 10^8cfu/ml) @10ml/L	60	100	16.00	26.66	73.33
Bs+Bt+Pf+Th (1 x 10^8cfu/ml) @10ml/L	60	100	14.00	23.33	76.66
Chemical Control (Emamectin benzoate @ 2 ml/L + Carbendazim1 g/L	58	96.66	13.00	21.66	78.33
Control	60	100	60	100.00	0.0
SEM	NS	NS	0.474	0.987	2.04
CD (P= 0.05)	NS	NS	1.012	1.994	6.17

Isolation, purification and characterization of entomopathogenic fungus

Surveys were undertaken in three locations; Raipur, Umiam, and Meghalaya to collect rhizosphere soil samples for the isolation of entomopathogenic fungi. From these samples, *Metarhizium anisopliae*, *Beauveria bassiana*, and *Isaria fumosorosea* were isolated.

Subsequent purification using single-conidium isolation techniques, followed by PCR amplification and sequencing of the internal transcribed spacer (ITS) region, confirmed the strains of *M. anisopliae*, two strains of *B. bassiana*, and one strain of *I. fumosorosea*.

Potential efficacy of *Metarhizium anisopliae* NBAIR-Ma35 oil formulation against fall armyworm under field conditions

M. anisopliae NBAIR-Ma35 oil formulation recorded 78.47 per cent decrease of fall armyworm incidence over the control. *M. anisopliae* NBAIR-Ma35 talc formulation and *B. bassiana* NBAIR-Bb5a oil formulation recorded 71.48 and 68.59 per cent decrease of fall armyworm. Mycosed larvae of fall armyworm by *M. anisopliae* and *B. bassiana* treated plots were recorded (Fig. 68).

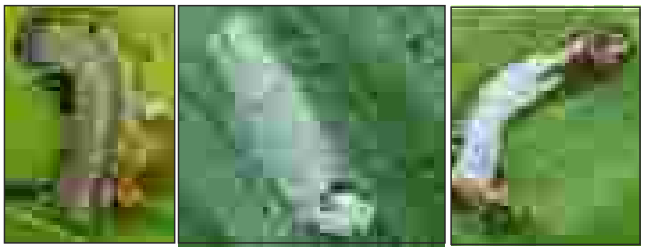


Figure 68a. FAW larva on untreated control maize plots, **b.** *M. anisopliae* NBAIR-Ma35 treated plots showed mycosed FAW and **c.** *B. bassiana* NBAIR-Bb5a treated plots showed mycosed FAW (right).

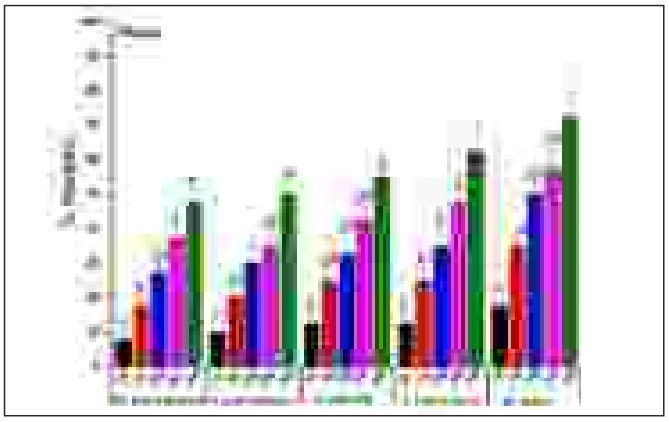
Management of Diamondback moth (DBM), *Plutella xylostella* infestation on cabbage under open field cultivation

B. bassiana NBAIR-Bb5a oil formulation recorded 74.2 per cent reduction in DBM population over the control followed by (68.30 per cent) and talc-based formulation (64.20 per cent) of *B. bassiana* NBAIR-Bb5a showed effective control of DBM and increased cabbage yield under field condition (Fig. 69).

Figure 69 Severe infestation of cabbage by DBM in untreated control plots (left) and *Beauveria bassiana* NBAIR-Bb5a oil formulation-treated cabbage (right).

Virulence of entomopathogenic nematode *Steinernema indicum* against *Agrotis ipsilon*

The virulence potential of newly discovered EPNs, *S. indicum* and other indigenous nematode species, against the larval and pupal stages of *A. ipsilon* was assessed. In the laboratory assays, *Heterorhabditis indica* caused significantly higher mortality rates in the third instar (47.5–100.0 %) and the fourth instar (40.0–100.0 %) larvae. Similarly, *H. indica* caused significantly higher mortality (72.5 %) in pupae (Figure 70), followed by *Steinernema carpocapsae* (62.5 %) and *S. indicum* (55.0 %). Larvae of *A. ipsilon* were more susceptible than pupae. Since the efficacy of EPN mainly depends on soil moisture, we also studied the effect of soil moisture on EPN efficacy against the larvae of *A. ipsilon*. All the nematode species tested in this study caused higher mortality in larvae at 13.0 % soil moisture content. Field experiment findings indicated that the application of *H. indica* and *S. indicum* at a rate of 2.5×10^8 IJ/ha resulted in an 85.0 % and 70.0 % reduction in the larval population of *A. ipsilon*, respectively (Fig. 71). Therefore, we conclude that *H. indica* or *S. indicum* are viable alternatives to chlorpyrifos for the management of *A. ipsilon* in potatoes.



Bars with different alphabets on error bars top depicts statistically significant difference for IJ concentrations within the nematode species ($P < 0.05$, Tukey's test). (n = 40.0).

Figure 70. Mortality (mean % ± SE) of *Agrotis ipsilon* pupae exposed to different concentrations of *Heterorhabditis indica* NBAIIH38, *H. bacteriophora* NBAIRH75, *Steinernema carpocapsae* NBAIRS59, *S. indicum* NBAIRS58, and *S. pakistanense* AAU-A MK491792 at 12 days after treatment under laboratory conditions

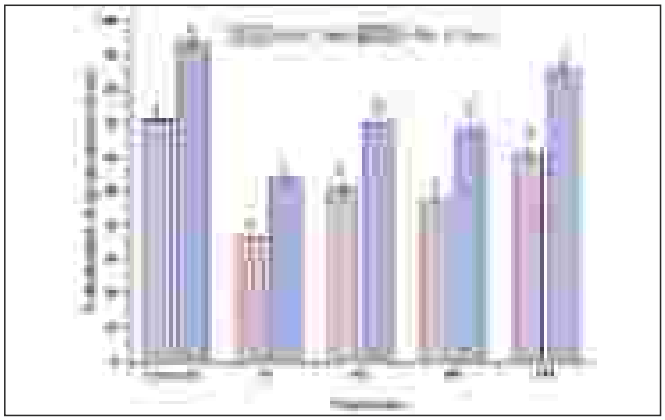


Figure 71. Percentage reduction of *Agrotis ipsilon* larvae in potato field with different treatments at seven and fourteen days after application at Chikballapur district of Karnataka, India. Bars with different alphabets on error bars top depicts statistically significant difference for different treatments ($P < 0.05$, Tukey's test) and Si, *S. indicum* NBAIRS58; Hi, *Heterorhabditis indica* NBAIIH38; 1 = 1.25×10^8 IJ ha^{-1}, 2 = 2.5×10^8 IJ ha^{-1}, and Chlorpyrifos (20.0% EC-emulsifiable concentrate) was used at the rate of 1000.0 ml ha^{-1} as a drench

Evaluation of predatory mites against chilli thrips

Two predatory mites viz., *Cheletomimus berlesei* (Cheyletidae), noted for its dual strategies of active searching and ambush predation, and *Typhlodromus* (*Anthoseius*) *transvaalensis* (Phytoseiidae), valued for its ability to suppress thrips and other small arthropods were evaluated on thrips. Across all the experiments conducted, no antagonistic interaction was detected between *C. berlesei* and *T.* (*A.*) *transvaalensis*. Both predators were able to withstand prey scarcity, surviving for up to 10 days without food, which underscores their resilience under resource- limited conditions. The lack of interference between the two species is particularly significant, as it indicates compatibility in shared environments, suggesting they can be deployed simultaneously in integrated pest management programmes. By combining both species\ wherever possible, pest suppression can be broadened and sustained, reducing reliance on chemical interventions.

Cheletomimus berlesei showed an interesting life history, intriguing predatory behaviour and an indeterminate prey range. Continued investigations on its biological

Tyrophagus putrescentiae and the spider mite *Tetranychus urticae*, indicated that its average lifespan varies significantly depending on the prey. It preyed on the larval, nymphal and adult stages of various spider mites, as well as on *Polyphagotarsonemus latus*, *Raoiella indica* and early-instar thrips. By preying on pests like spider mites, whiteflies and thrips in agricultural and horticultural ecosystems, it could reduce the need for chemical pesticides, mitigating environmental risks.

Evaluation of entomopathogenic fungus against rose mites and thrips

A liquid formulation of *Lecanicillium psalliotae* [ICAR–NBAIR–MF(Ag)22] has been developed for use against phytophagous mites and thrips. Its effectiveness was tested against a complex of three thrips species (*Scirtothrips dorsalis*, *Thrips parvispinus* and *Frankliniella occidentalis*) infesting rose in a farmer's field in Hoskote taluk, Bengaluru Rural district, Karnataka. Three applications of *L. psalliotae* at weekly intervals reduced the pest population on leaves, flowers and shoots was reduced by 66.0%, 67.4% and 69.2%, respectively. The fungus continued to provide control of the thrips for a further few months into the trial, after which another round of the fungal application was warranted.

In another attempt to manage *S. dorsalis* in rose, two fungal pathogens, *L. psalliotae* [ICAR–NBAIR–MF(Ag)22] and *Hirsutella thompsonii* [ICAR–NBAIR–MF(Ag)66], together with the predatory mite *C. berlesei*, were evaluated in a farmer's field in Anekal taluk, Bengaluru Urban district, Karnataka. The trial involved three applications of the biocontrol agents at weekly intervals. Owing to the high level of infestation prior to treatment, pest suppression by the end of the first round of applications was limited to a maximum of 50%. In continuation of the trial, the pest load started diminishing, but only when intervened with another round of fungal applications.

Modelling the distribution of the black inchworm, *Hyposidra talaca* (Geometridae: Lepidoptera)

The black inchworm, *Hyposidra talaca* (Walker) (Geometridae: Lepidoptera), has emerged as a significant defoliator of various crops in India. It is broadly distributed across the lowland forests of the Indo-Australian tropics, including countries such as Indonesia, Japan, China, Hong Kong, Java, Thailand, Malaysia, Papua New Guinea, South Korea, Bangladesh, and Nepal. In India, *H. talaca* is regarded as a highly destructive and polyphagous pest, capable of causing extensive defoliation in multiple cropping systems.

Its potential habitat suitability was assessed using ecological niche modelling. A dataset comprising 1,012 occurrence records was analysed against seven major bioclimatic variables: bio1 (annual mean temperature), bio2 (mean diurnal temperature range), bio3 (isothermality), bio6 (minimum temperature of the coldest month), bio12 (annual precipitation), bio13 (precipitation of the wettest month), and bio18 (precipitation of the warmest quarter). The model exhibited strong predictive reliability, achieving a high Receiver Operating Characteristic (ROC) value of 0.898, indicating excellent accuracy.

Jackknife analysis identified bio2 (mean diurnal temperature range) as the most influential variable based on gain values. Nevertheless, annual precipitation (bio12) made the largest overall contribution to the model (48.1%), highlighting the critical role of moisture availability in the survival and spread of the pest.

The predicted distribution indicates that *H. talaca* thrives in tropical and subtropical regions with warm temperatures, high humidity, and continuous vegetation cover. Large areas of peninsular, eastern, and northeastern India, as well as Bangladesh, Myanmar, Thailand, Vietnam, and southern China, show moderate to high habitat suitability, suggesting favourable conditions for establishment and persistence. In Southeast Asia, suitable habitats extend across Malaysia, Indonesia, and the Philippines, although their distribution is relatively fragmented due to island geography and environmental variability (Fig. 72).

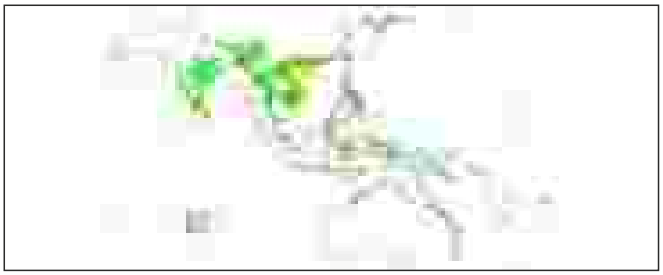


Figure 72. Potential distribution of *H. talaca* under the current climate

Documentation and molecular characterization of butterfly species

A total of 24 butterfly specimens representing 24 distinct species across major families of Papilionoidea were successfully processed for molecular characterization. Genomic DNA extraction from leg or tissue samples yielded DNA of sufficient quality and quantity. Amplification of the mitochondrial cytochrome oxidase subunit I (mtCOI) gene using the universal primers LepF1 and LepR1 was successful for all 24 samples, resulting in a 100% amplification success rate.

Agarose gel electrophoresis (1%) revealed clear, single bands for each sample, with amplicon sizes corresponding to the expected ~658 bp region of the COI gene. All amplified products were subjected to Sanger sequencing. Forward and reverse sequences were successfully aligned, and contiguous consensus sequences were generated for each of the 24 specimens without ambiguity.

The final COI sequences ranged from approximately 650 to 658 base pairs. BLAST analysis against the NCBI GenBank database revealed high similarity scores, with sequence identity ranging from 98% to 100% relative to the reference sequences. All 24 validated COI sequences were successfully submitted to the NCBI GenBank database and were assigned unique accession numbers.

AI-Based Butterfly Detection Model

An Artificial Intelligence (AI)–based object detection model was developed for the automated identification of butterflies at the family level using deep learning techniques. A curated dataset comprising 263 labelled butterfly images representing multiple families was prepared for model development. The images were annotated with bounding boxes and family-level class labels following standard object detection protocols. The dataset was divided into training, validation, and testing subsets to ensure robust model evaluation and to minimise overfitting. The YOLO v11 (You Only Look Once, version 11) object detection framework was employed. The model was trained to simultaneously localise butterflies within images and classify them into their respective families. The trained YOLO v11 model achieved a mean Average Precision (mAP@50) of 70.0%, indicating reliable detection accuracy at an Intersection over Union (IoU) threshold of 0.5. The model recorded a precision of 73.4%, reflecting a low false-positive rate, and a recall of 66.1%, demonstrating its ability to correctly detect the majority of butterfly images.

Population dynamics of thrips on horticultural crops

The population dynamics of thrips on chilli, chrysanthemum, and field bean were studied. In chilli, thrips infestation began around Standard meteorological week (SMW) 45 and increased steadily during SMW 46–47, coinciding with favourable weather conditions and active vegetative growth of the crop. The population reached a distinct peak during SMW 47 with 9.73 thrips/tap, indicating high suitability of chilli for thrips multiplication during flowering and early fruiting stages. In chrysanthemum, thrips incidence was initially low during SMW 45–46, reflecting delayed establishment. However, a gradual and consistent increase was observed from SMW 47 onwards, with a moderate peak around SMW 48 with 4.4 thrips/tap. The presence of tender leaves and developing flower buds supported sustained thrips populations.

Collection and characterization of mealybug infesting different crops

Around 136 mealybug specimens have been collected from 15 states comprising of 75 different locations and 144 various host plants of different crop ecosystems. The morphological and molecular identification confirmed that the collected specimens belonging to 14 different mealybug species. Among them, the majority of the identified specimens are attributed to *Phenacoccus solenopsis* (40.44%) followed by *Planococcus minor* (13.97%); *Pseudococcus longispinus* (12.50%), and *Ferrisia virgata* (8.08%). Remaining species viz. *Dysmicoccus neobrevipes*, *Planococcus lilacinus*, *Phenacoccus parvus*, *Dysmicoccus brevipes*, *Maconellicoccus hirsutus*, *Nipaecoccus viridis*, *Rastrococcus iceryoides*, *Planococcus citri*, *Phenacoccus manihoti* and *Pseudococcus jackbeardsleyi* were found to be in less abundant. Among the 144 host plants of mealybugs the highest number of host plants belong to the family Malvaceae and Solanaceae.

Among the mealybug species, *P. solenopsis* was noticed as the most dominant species which observed on 24 species of different host plants.

Pineapple mealybug, *Dysmicoccus brevipes* is reported for the first time from garden pea from Ranchi, Jharkhand and it is identified through morphological characters and with molecular characterization using partial (658 bp) mitochondrial cytochrome oxidase 1 (mtCO1) based mealybug specific primers, PCOF1 and LepR1. The maximum infestation of 45% was recorded with root colonization of *D. brevipes* on garden pea.

Bio-efficacy of Essential Oils (EOs) against *Sitophilus oryzae*

On the toxicity of Essential oils (Eos) the essential oils demonstrated a wide range of LC_{50} values, Among the tested EOs, Rosemary oil was found to be the most effective, exhibiting the lowest LC_{50} value of 90.22 ppm (Fiducial Limits: 82.70–98.50 ppm), followed by eucalyptus oil LC_{50} of 107.26 ppm, Ajowan and Peppermint oils with LC_{50} values of 194.95 ppm and 200.86 ppm, respectively.

Electrophysiological response of EOs to *S. oryzae*

The differential antennal activity between the sexes when exposed to the essential oil stimuli was assessed. Among the oils tested, betel leaf oil caused the highest antennal neuronal response, followed by eucalyptus oil and cumin seed oil. When subjected to behavioural assay, the EOs at 0.1% of betel leaf, eucalyptus, citronella and ajowan caused the highest repellence to *S. oryzae*.

Oviposition inhibitory response of EOs to *S. oryzae*

Oviposition inhibition assay revealed that all essential oils tested significantly reduced the oviposition rate compared to the untreated control group. The control group exhibited the highest mean number of eggs laid, approximately 14.60 eggs, indicating a baseline for normal reproductive activity without interference. Essential oils of peppermint and eucalyptus showed the highest inhibitory potential, resulting in the lowest mean egg counts of approximately 4.40 and 5.80,respectively and both the treatments were statistically similar. This was followed by sweet basil (~6.00), ajowan (~6.20), and betel leaf (~6.60), which demonstrated intermediate levels of inhibition and were at par.

Electrophysiological and behavioural response of Pulse Beetle (*Callosobruchus maculatus*), Brinjal Shoot and Fruit Borer (*Leucinodes orbonalis*) to microbial volatile, Azulene

Electroantennogram (EAG) assays were conducted to evaluate the antennal sensitivity of the pulse beetle (*Callosobruchus maculatus*), the gram pod borer (*Helicoverpa armigera*), and the brinjal shoot and fruit borer (*Leucinodes orbonalis*) to the microbial volatile compound azulene at different concentrations. The EAG response increased progressively with increasing concentrations of azulene, indicating a clear dose-dependent sensitivity in all the tested insect species. Higher concentrations elicited significantly stronger antennal depolarization compared to lower concentrations and the solvent control. Overall, azulene derived from microbial formulations induced pronounced electrophysiological responses in *C. maculatus*, *H. armigera*, and *L. orbonalis,* suggesting its bioactive potential against these economically important insect pests (Fig. 73).

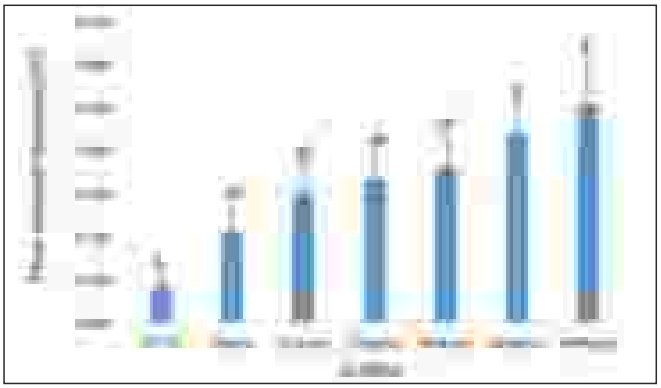


Figure 73. EAG response of *C. maculatus* to azulene

Effect of nanoformulations on the parasitisation efficiency of *Trichogramma* sp.

Nano-urea (30–50 nm) was synthesized and characterized and evaluated using *Trichogramma chilonis* and *Trichogramma japonicum* as low-cost biological biomarkers. Transmission Electron Microscopy (TEM) confirmed near-spherical nanoparticles, while SEM and stereo-zoom analyses demonstrated that nano-urea does not compromise egg morphology or parasitoid emergence, validating its biosafety.

Behavioural studies using an eight-arm olfactometer, Y-dual choice, and no-choice assays revealed that nano-urea significantly enhanced the parasitisation (10–20%) compared to conventional urea and control treatments. These findings provide strong experimental evidence that nano-formulations can improve the parasitoid host-finding efficiency while remaining compatible with biological control agents.

Parallel to biosafety research, Shatpada nanogel-based controlled-release semiochemical formulations, enabling sustained and uniform release of pheromones and kairomones for effective insect pest management and Shatpada" pheromone-based pest management technologies targeting fruit flies (*Bactrocera* spp.) and white grubs (*Holotrichia* spp.) were commercialised.

Nesting preference of the pearl banded bee, *Hoplonomia westwoodi*

Pearl banded bee, *Hoplonomia westwoodi* (Nomiinae: Halictidae) is an efficient buzz pollinator of crops belonging to the family Solanaceae with a unique 'poricidal anther' in flowers. A study was conducted to investigate the nesting activity, soil preference and nest reuse by *H. westwoodi*. The nest burrowing activity was highest during October (12.67±1.15 burrowing events/month), and least during February (1.03±0.11 burrowing events/month). The number of pollen flights was maximum between 10.00 and 12.00 hrs in the active nesting period. The mean number of active turrets per nest was significantly higher in pots with a plant (17.17±2.63 active turrets/pot) compared to pots without any plant (8.01±1.54 active turrets/pot). Significantly higher rate of acceptance (63.2%) of sandy soil for nest construction by *H. westwoodi* was observed, with the highest number of brood cells/turret (13.25±2.22 brood cells/turret) and adult emergence (95%). The percentage re-use of old turrets for nest construction during the years 2021 and 2022 was 8.33% and 16.67%, respectively. The mean number of cells built by *H. westwoodi* in the reused and fresh turrets was 5.90±1.29 and 7.40±0.97 cells, respectively. The mean number of adult bees that emerged from the reused and fresh turrets was 3.80±1.01 bees/turret and 7.40±0.97 bees/turret, respectively. The studies indicated a possible domiciliation of *H. westwoodi* in portable pots with sandy soil and plants for utilisation for managed pollination under protected cultivation.

Nesting calendar of *Hoplonomia westwoodi*

Observations on the nesting calendar of *H. westwoodi* in the nesting site revealed that the emergence of adult bees during March to mid-April. The adult bees, upon emergence, were engaged in foraging bouts. Soil digging activity by the adult female bees was observed during June, with active pollen foraging trips. The bees repaired their collapsed turrets during peak rainy days in June and July. The emergence of the adult bees was observed 14.40±2.07 days after seeding the broods. Adult bees initiated the foraging bouts at 1.61±0.65 days after emergence. The mean number of pollen foraging bouts lasted for 3.20±0.84 days with 7.80±1.09 trips per day. There were three generations per year. There was no active construction of new nests and soil digging activity in the observational pots during November to January. At the end of February, adult bees were observed to seek nest-building sites by making flights around the observational pots.

All India Coordinated Research Project on Biological Control of Crop Pests

Rice

Field experiments demonstrated that planthoppers and earhead pests in rice were effectively controlled by spraying *Beauveria bassiana* NBAIR Bb5a @ 5 ml/L, resulting in a 65–68% reduction in planthopper population and a 71–72% reduction in earhead pest incidence. Seed treatment of rice with *Trichoderma asperellum* NBAIR TATP (1×10^8 cfu/ml) @ 10 ml/kg of seed significantly reduced soil-borne diseases.

Maize

In maize, plots treated with *Metarhizium anisopliae* NBAIR Ma35 @ 5 ml/L recorded a 69–72% reduction in stem borer and pink borer populations, followed by 65–69% reduction in plots treated with *M. anisopliae* TNAU-MA-GDU.

Sorghum

Application of *Pseudomonas fluorescens* NBAIR-PFDWD (1×10^8 cfu/ml) as seed treatment @ 10 ml/kg for 12 hours, followed by soil drenching @ 5 ml/L and foliar spray @ 5 ml/L, reduced sorghum anthracnose incidence from 59% to 12%.

Chickpea

Spraying *Bacillus thuringiensis* NBAIR Bt25 (1×10^8 cfu/ml) @ 5 ml/L during the flowering and pod formation stages resulted in a 69% reduction in chickpea pod borer population. The lowest Fusarium wilt incidence (12%) in chickpea was observed in plots treated with *Trichoderma asperellum* PAU Ta1 @ 5 ml/L.

Sugarcane

Application of *Lecanicillium fusisporum* NBAIR Vl8 @ 5 ml/L effectively controlled sugarcane whitefly. In cotton, 69% reduction in pink bollworm was achieved through timely sowing followed by application of gossyplure 4% (7,11-hexadecadienyl acetate) paste formulation @ 125 g/acre as peanut-sized dollops.

Tobacco

Soil application of *Bacillus subtilis* and *Trichoderma asperellum* in combination @ 20 ml/plant at planting, 30 DAP, and 45 DAP effectively suppressed Fusarium wilt in tobacco.

Brinjal

Release of *Trichogramma chilonis* @ 100,000/ha at weekly intervals (four releases), followed by alternate sprays of *Beauveria bassiana* NBAIR-Bb5a @ 5 ml/L, reduced 68% of brinjal shoot and fruit borer population.

Chilli

Three sprays of a bacterial consortium (*Bacillus albus* NBAIR-BATP + *Pseudomonas fluorescens*) @ 5 ml/L reduced 72% population of chilli black thrips.

Gladiolus

Reduced Fusarium wilt incidence in gladiolus was recorded with *P. fluorescens* NBAIR-PFDWD applied as bulb treatment @ 10 ml/L followed by soil application @ 5 ml/L.

Banana

Spraying *Beauveria bassiana* CISH (1×10^8 cfu/ml) @ 5 ml/L was effective in reducing banana scarring beetle infestation.

4. GENBANK/BOLD ACCESSIONS

Sl. No.	ORGANISM	ACCESSION NUMBER
COLEOPTERA		
1	*Abscondita perplexa*	Pv121130
2	*Adoretus bicaudatus*	Px848761
3	*Adoretus bicolor*	Pv944122
4	*Adoretus costopilosus*	Px400635
5	*Adoretus decanus*	Px734133
6	*Adoretus lasiopygus*	Px397520
7	*Adoretus stoliczkae*	Px400299
8	*Adoretus versutus*	Pv942368
9	*Adorrhinyptia fusca*	Px848762
10	*Anomala bengalensis*	Px726413
11	*Anomala blanchardi*	Px097050
12	*Anomala communis*	Px097188
13	*Anomala dorsalis*	Px726811
14	*Anomala elata*	Pv942370
15	*Anomala ruficapilla*	Px397535
16	*Anomala varians*	Pv915595
17	*Anomala varicolor*	Px249858
18	*Apogonia kombirana*	Pv915638
19	*Apogonia rauca*	Pq585667
20	*Brahmina mysorensis*	Pv915637
21	*Callistethus maculatus*	Pv247061
22	*Cheilomenes sexmaculata*	PV225540, Pv649921
23	*Diaphanes ellioti*	*Pv698364*
24	*Holotrichia ohdena/reynaudi*	Px400211
25	*Holotrichia fissa*	Px726947
26	*Holotrichia nagpurensis*	Pv915520
27	*Holotrichia rufoflava*	Pv942371
28	*Hypothenemus hampei*	*Px674679*
29	*Lasioderma serricorne*	Pv24864
30	*Leucopholis coneophora*	Px397516
31	*Maladera bombycina*	PV942374, Px381223
32	*Maladera burmeisteri*	Px754961
33	*Maladera insanabilis*	Px765934
34	*Maladera lugubris*	Px754958
35	*Maladera paraprochangana*	Px781744
36	*Maladera pseudolonghangiua*	Px781746
37	*Maladera rufocuprea*	PX726401, Pv942375
38	*Maladera sitina*	Px726403
39	*Megistophylla octobrachia*	Px098302
40	*Mimela xanthorhina*	Pq585665
41	*Miridiba coromandeliana*	Pq579835
42	*Miridiba koreli*	PX111445
43	*Phyllognathus dionysius*	Px735249
44	*Popillia schizonycha*	Pv916627
45	*Protaetia alboguttata*	Px780642
46	*Rhyzopertha dominica*	Pv246039
47	*Schizonycha ruficollis*	Px754899
48	*Sophrops karschi*	PQ585666
DIPTERA		
49	*Acletoxenus indicus*	Pv249310
50	*Bactrocera diversa*	Px664544
51	*Bactrocera dorsalis*	PX664545, Px568622
52	*Bactrocera carambolae*	Px568595
53	*Bactrocera caryeae*	Px568034
54	*Dacinamra mali*	Px112642
55	*Tabanus rubidus*	PX533047, Px533048
56	*Tabanus* sp.	Px533049
57	*Tabanus dorsiger*	PX533050, Px533051
58	*Stomoxys calcitrans*	PV336086
HEMIPTERA		
59	*Aleurodicus dispersus*	Pv650348, PV650355, PX492147, PV891898
60	*Aleurodicus rugioperculatus*	Pv000767, PV163870, PV650601, PV650604, PV650606, PX458575, PX458605, PX492156, PV849240,
61	*Aleurotrachelus anonae*	Pv918676
62	*Aleurotrachelus atratus*	Pq999823, PQ999829, PQ999830, PX458564, PX458573, PX022593
63	*Aleurolobus graminicola*	Pv037550, PV037557
64	*Aleurolobus marlatti*	Pv163874, PV163890, PV650454, PV658887, PX519102
65	*Aleurothrixus floccosus*	Pv851450
66	*Aleurotrachelus trachoides*	Pv973020, PV987802, PV987803, PX588011, PX619219, PX619220, PX619221, PX619315, PX619316, PX619317, PV659706, Pv682656, PV918679, PV688043, PV688420, PV682667, PV871384, PV687708, PV682664, PV688417, PV688424, Pv871380, PV871381, PV688413,

Sl. No.	ORGANISM	ACCESSION NUMBER
67	*Aleyrodes shizuokensis*	Pq867180, Pq867182
68	*Aphis citricidus*	Pv649874
69	*Aphis verbasci*	PX210525
70	*Bemisia breyniae*	Pv000718, PV000777, Pv163951
71	*Bemisia tabaci*	Pv450590, PV474288, PX458598, PQ902009, PV849223
72	*Ceroplastes ceriferus*	PV763165.1, PV491613.1
73	*Ceroplastes cirripediformis*	PV523834.1
74	*Ceroplastes floridensis*	PV856259.1
75	*Dysmicoccus brevipes*	Oq924104, OQ942254, OQ955830, OQ992639,
76	*Dysdercus cingulatus*	Pv649873
77	*Ceroplastes rubens*	PV491623.1
78	*Ceroplastes rusci*	PV694992.1
79	*Ceroplastes stellifer*	PV593546.1
80	*Coccus formicarii*	PV751008.1
81	*Drepanococcus chiton*	PV778046.1
82	*Dysmicoccus neobrevipes*	OQ942202, PP442572, PQ541519, PV013604, PV207633, PV207852, PV523546, PV688439, PV777661, OQ942202, OQ955830.1, OQ942254.1, OQ942202.1, OQ924104.1, OQ992639.1
83	*Fistulococcus pokfulamensis*	PV765913.1, OR515185.1
84	*Ferrisia virgata*	OR068143, OR068144, PQ368691, PQ583145, PQ583146, PQ583147, PQ839667, PV482924, PV482925, Pv529138
85	*Formicococcus polysperes*	PV768219.1, PV768220.1, PV768221.1
86	*Maconellicoccus hirsutus*	PP442574, PP442575, PP442576, PQ839668, PQ857712, PQ85771, PQ849828, PQ849829, PQ849830, PQ849831, PQ849832, PQ851060
87	*Nipaecoccus viridis*	PP297270

Sl. No.	ORGANISM	ACCESSION NUMBER
88	*Paraleyrodes bondari*	Pv163877, PX501045, PV225632, PX090914, PX498033, PV856395, PX498034, PV770868, PV770854, PX090917, PV798891, PV798892, PV798890, PV798894, PV799303, PV804222, PV804732, PV810593, PV810702, PV864790, PV855735, PV902312, PV902313, PV902324, PX090915, PV776405, PV639084, PV643221, PX090921, PX205377, PX096189, PX205354, PV643435, PV636495, PV770972, PV856396, PV902361
89	*Paraleyrodes minei*	PV865304, PV849229,
90	*Paraleyrodes pseudonaranjae*	Pv035890, PV088603, PV765416
91	*Phenacoccus manihoti*	Pv213462, PV388900, PX521480, PX521481, PX521482, PX521483, PV661917, PV661918, PV661919, PV664570, PV661920, PV661921, PV661922, PV661923
92	*Phenacoccus parvus*	OQ992637
93	*Phenacoccus solenopsis*	OR085908, OR105913, OR659463, OR659467, OR978585, OR978586, OQ981242, OQ981243, OQ992638, OQ992640, PP066834, PP297250, PP297268, PP379085, PP379086, PP379087, PP379088, PP379089, PP379090, PP379091, PP442568, PP442569, PP442570, PP442571, PP442573, PQ541517, PQ541518, PQ541521, PQ583148, PQ583149, PQ583150, PQ583151, PQ583152, PQ583153, PQ583154, PQ583155, PQ839669, PQ839670, PQ839671, PQ839672,

Sl. No.	ORGANISM	ACCESSION NUMBER
		PV013600, PV094875, PV213461, PV370027, PV395540, PV404224, PV464444, PV464445, PV464446, PV464447, PV482926, PV490699, PX408713, PX412383, PX412384, PV639511,
[illegible]	*Planococcus citri*	PV018668, PV366854
[illegible]	*Planococcus lilacinus*	OQ909528, PP442577, PP442578, PQ541520, PV750874, PX412382
[illegible]	*Planococcus minor*	PP297269, PV018691, PV156101, PV163879, PV213460, PV366864, PV400856, PV488749, PV488761, PV523521, PV523537, PV688442, PV688443, PV688475, PV776408, PV776621, PV778113, PX457628, PX614130
[illegible]	*Peppinocapsidus bharatensis*	PV802567
[illegible]	*Pulvinaria aligarhensis*	PV593545.1
[illegible]	*[illegible]* sp.	PX354549
[illegible]	*[illegible]* sp.	Px363531
[illegible]	*Pseudococcus jackbeardsleyi*	Pv930388, PX614129, PX619654
[illegible]	*Pseudococcus longispinus*	PV088214, PV094876, PV157505, PV213459, PV370028, PV370029, PV370030, PV395541, PV404225, PV404226, PV490701, PV528709, PV705700, PV706187, PV777467, PV935588, PX619649
[illegible]	*Rastrococcus iceryoides*	PP272412
[illegible]	*Saissetia coffeae*	PV820695.1
[illegible]	*Scaphoideus bangarensis*	PX512502, PX503240, PX503241
[illegible]	*Scaphoideus coloratus*	PX512503
[illegible]	*Scaphoideus viraktamathi*	PX460966
[illegible]	*Tetraleurodes acaciae*	PX533100, PX022604
HYMENOPTERA		
[illegible]	*Apanteles* sp.	PX109666
[illegible]	*Chelonus blackburni*	PV945895.1
[illegible]	*Chelonus formosanus*	PV945910.1, PV945897.1

Sl. No.	ORGANISM	ACCESSION NUMBER
[illegible]	*Encarsia adrianae*	PV649947, PV650437
[illegible]	*Encarsia sophia*	PV055140
[illegible]	*Encarsia* sp.	PV055141, Px625555
[illegible]	*Eretmocerus queenslandensis*	PX458188
[illegible]	*Eretmocerus* sp.	PV649872
[illegible]	*Trichogrammatoidea bactrae*	XYE83122.1, XYE83123.1
LEPIDOPTERA		
[illegible]	*Ancistroides folus*	PV592652
[illegible]	*Ariadne merione*	PV592277
[illegible]	*Ariadne merione*	PV592651
[illegible]	*Ascotis selenaria*	PQ867111
[illegible]	*Biston suppressaria*	PQ844835
[illegible]	*Corcyra cephalonica*	PV802539
[illegible]	*Catopsilia pomona*	PV592276
[illegible]	*Danaus chrysippus*	PV592281
[illegible]	*Danaus chrysippus*	PV592646
[illegible]	*[illegible]*	PV739491
[illegible]	*Euploea core*	PV592279
[illegible]	*Euploea [illegible]*	PV592280
[illegible]	*Eurema brigitta*	PV646652
[illegible]	*Eurema hecabe*	PV592278
[illegible]	*Eurema mandarina*	PV646653
[illegible]	*Graphium agamemnon*	PV592284
[illegible]	*Graphium doson*	PV592283
[illegible]	*Haritalodes derogata*	PX112636
[illegible]	*Helicoverpa armigera*	PV243316
[illegible]	*Junonia atlites*	PV592286
[illegible]	*Junonia iphita*	PV592285
[illegible]	*Junonia iphita*	PV592647
[illegible]	*Junonia lemonias*	PV592649
[illegible]	*Junonia orithya*	PV592654
[illegible]	*Leucoptera malifoliella*	*PX491887*
[illegible]	*Maruca vitrata*	*PX624094*
[illegible]	*Mycalesis mineus*	PV592287
[illegible]	*Mycalesis mineus*	PV592648
[illegible]	*Neptis hylas*	PV592650
[illegible]	*Papilio demoleus*	PV646649
[illegible]	*Papilio polytes*	PV592275
[illegible]	*Papilio polytes*	PV592282
[illegible]	*Parotis marinata*	PV592289
[illegible]	*[illegible] picta*	PQ867109

152	*Phthorimaea operculella*	PQ651453, PQ651454
153	*Spodoptera litura*	PV055140
154	*Encarsia* sp.	PV646650
155	*Ypthima huebneri*	PV592288
	ORTHOPTERA	
156	*Scistocerca gregaria*	PV802536
	THYSANOPTERA	
157	*Franklinothrips vespiformis*	PX533066
158	*Gynaikothrips uzeli*	PX578206
159	*Megalurothrips usitatus*	PV300399
160	*Neohydatothrips samayunkur*	PQ857711
161	*Retithrips syriacus*	PV029932
162	*Scirtothrips dorsalis*	PX674664, PQ857714
163	*Selenothrips rubrocinctus*	PQ857710
164	*Thrips florum*	PX674660, PV639245, PV639511, PQ857762
165	*Thrips palmi*	Pq857731
166	*Thrips parvispinus*	Px694676
167	*Thrips tabaci*	Pv643445
	BACTERIA	
168	*Bacillus altitudinis*	PX599725
169	*Bacillus cereus*	Px599640, PX599642, PX599697, PX599707, PX599710, PX599713, PX599718, PX599720, PX599719, PX599770, PX599998, Px363089
170	*Bacillus pacificus*	PX599729
171	*Bacillus paranycoides*	PX599693, PX599699, PX599701, PX599702, PX599712, PX599999, PX600002
172	*Bacillus paranthracis*	PX599706
173	*Bacillus safensis*	PX599708
174	*Bacillus subtilis*	PX599635
175	*Bacillus thuringiensis*	PX599687, PX599711, PX599714, PX600000, PV123243, PV123244, PV123246, PV123249, PV123250, PV123251, PV123252, PV123253, PV123254, PV123255, PV123256, Pv123257, Pv123258, PV123260, PV123261, PV123265, PV123266, PV123818, Pv123820, PV123821, PV123822, PV123824, PV123825, PV123828, PV123829, OR054274, PV815644, PV815686, PV815687, PV815703, PV815702, OR073815, PV874240, PV874246
176	*Bacillus xiamenensis*	PX599772
177	*Enterobacter asburiae*	PX363088
178	*Lysinibacillus capsici*	PX061898
179	*Lysinibacillus macroides*	PX599769
180	*Lysinibacillus sphaericus*	PV123687, PV123688, PV123795, PV123804, PV123805, PV123806, PV123808, PV123809, PV123810, PV123811, PV123812, PV123813, PV124040, PV124043, PV124073, PV125420, PV129912, PV130051, PV130054, PV130059, PV130173, PV130182, PV130369, PV130370, PV130380, PV130450, PV130451, PV130508, PV133515, PV133517, PV133526, PV147351, PV147371, PV147372, PV147373, PV147376, PV147746, PV147753, PV147756, PV147757, PV147768, PV147848, PV147849, PV147850, PV153704, PV195006, PV195020, PV195022, PV203208, PV848776, PV848778, PV848779, PV848780, PV848875, PV848874, PV848876, PV848878, PV848877, PV848880, PV848879, PV848881, PV848882, PV848883, PV848884, PV848885, PV848886, PV848887, PV848888, PV848901, PV848902, PV848903, PV848914, PV848915, PV848916, PV878061, PV878062, PV878073, PV878074, PV878581

181	*Myroides odoratus*	PX599724, PX599768
182	*Niallia nealsonii*	PX599731
183	*Paenibacillus alvei*	PX599695
184	*Priestia megaterium*	PX363090
185	*Pseudochrobactrum asaccharolyticum*	PX599730
186	*Solibacillus isronensis*	PX599717
FUNGUS		
187	*Rhizoctonia solani*	PV032477
MITE		
188	*Tyrophagus putrescentiae*	PV243996
GENOME SEQUENCING		
189	*Lysinibacillus capsica*	Bioproject ID: PRJNA1346315 Biosample Accession: SAMN52831403 SRA Accession: SUB15716040
NAIMCC ACCESSION NUMBER		
190	*Bacillus subtilis* Wg25	NAIMCC-B-04740
191	*Bacillus subtilis* Rb1	NAIMCC-B-0474l
192	*Bacillus subtilis* SE 4-4	NAIMCC-B-04742
193	*Bacillus cereus* BSFK7	NAIMCC-B-04743
194	*Bacillus velezensis* RB3-16	NAIMCC-B-04744
195	*Chryseobacterium* sp. WGHS19	NAIMCC-B-04745
196	*Priestia megaterium* BSFK6	NAIMCC-B-04746

5. IDENTIFICATION SERVICES

Dr Sunil Joshi			
Sl. No.	**Taxon/taxa identified**	**Group/Family**	**Service provided to**
1.	*Greenidea artocarpi, Aphis craccivora, Aphis gossypii* (2) *Coccus hesperidum, Megapulvinaria maxima* *Rastrococcus iceryoides*	Aphididae Coccidae Pseudococcidae	Kerala Agricultural University, Integrated Farming System Research Station, Karamana, Thiruvananthapuram
2.	*Ferrisia virgata* (3)	Pseudococcidae	ICAR- Directorate of Floricultural Research, Vemagiri, Andhra Pradesh
3.	*Aphis craccivora, Aphis gossypii* (9), *Aphis odinae, Hyadaphis coriandri, Cerataphis brasiliensis*(4), *Pseudoregma bambucicola, Aphis* sp. *Eucalymnatus tessellatus, Coccus hesperidum*(2), *Antecerococcus* sp., *Saissetia coffeae*(2) *Synonycha grandis* *Parlatoria pergandii, Aonidiella orientalis, Hemiberlesia lataniae* *Phenacoccus divaricatus*(3), *Pseudococcus longispinus*(16), *Ferrisia virgata*(55), *Planococcus* sp.(14), *Maconellicoccus hirsutus*(5), *Phenacoccus manihoti*(2), *Dysmicoccus neobrevipes*(7), *Pseudococcus jackbeardsleyi*(4), *Paracoccus marginatus*(32), *Planococcus citri*(2), *Rastrococcus iceryoides*(2), *Nipaecoccus viridis*(5), *Planococcus lilacinus*(2), *Phenacoccus madeirensis, Phenacoccus solenopsis*(13), *Coccidohystrix insolita*(2), *Pseudococcus bambusae, Dysmicoccus* sp., *Dysmicoccus brevipes, Pseudococcus* sp.(3), *Palmicultor palmarum, Planococcus minor*(4), *Pseudococcus ?cryptus*(2), *Paraputo* sp.	Aphididae Coccidae Coccinellids Diaspididae Pseudococcidae	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
4.	*Parasaissetia nigra* *Aonidiella aurantii, Hemiberlesia lataniae* *Pseudaspidoproctus gramineus* *Pseudococcus* sp. (2), *Planococcus ficus,* (*Exallomochlus hispidus, Planococcus minor, Pseudococcus jackbeardsleyi, Dysmicoccus neobrevipes*)	Coccidae Diaspididae Monophlebidae Pseudococcidae	Directorate of Plant Protection Quarantine & Storage, Regional Plant Quarantine Station, Haji Bunder Road, Sewri, Mumbai
5.	*Dysmicoccus neobrevipes*(4)	Pseudococcidae	College of Agriculture, Pune
6.	*Lipaphis pseudobrassicae*(12), *Aphis gossypii* (5), *Macrosiphum sanborni*	Aphididae	Anand Agricultural University, Anand, Gujarat
7.	*Brevicoryne brassicae* (10), *Eriosoma lanigerum, Myzus persicae*	Aphididae	ICAR-Indian Agricultural Research Institute, New Delhi
8.	*Protopulvinaria longivalvata, Ceroplastes* sp., *Coccus hesperidum* *Aspidiotus destructor, Pseudaulacaspis cockerelli* *Icerya seychellarum*	Coccidae Diaspididae Monophlebidae	Cardamom Research Station, Pampadumpara, Idukki, Kerala

9.	*[illegible]*, *[illegible]*, *Nipaecoccus viridis*, *Ferrisia virgata*, *Maconellicoccus hirsutus*	Diaspididae Pseudococcidae	College of Agriculture, University of Agricultural Sciences, Bangalore
10.	*Aphis gossypii*, *Myzus persicae*, *Hysteroneura setariae*	Aphididae	Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat
11.	*Lepidosaphes [illegible]* (7)	Diaspididae	Mahatma Phule Krishi Vidyapeeth, Rahuri
12.	*Aphis craccivora* (1), *Aphis fabae* (2), *Aphis gossypii* (3) *Ceroplastes floridensis* *Aonidiella orientalis* (3) *Icerya purchasi* (3) *Phenacoccus solenopsis*	Aphididae Coccidae Diaspididae Monophlebidae Pseudococcidae	Dr. B. R. Choudhary Agricultural Research Station, Agricultural University, Jodhpur, Rajasthan
13.	*Aphis craccivora* (2), *Aphis gossypii* (4), *Aphis aurantii* *[illegible]*, *[illegible]* (2), *[illegible]*, *[illegible]* *[illegible]* (2), *[illegible]*, *[illegible]*, *[illegible]*, *[illegible]*, *[illegible]* *Icerya* sp. (2), *Icerya aegyptiaca* (4), *Drosicha* sp., *Icerya seychellarum* *Nipaecoccus viridis*, *Dysmicoccus [illegible]*, *Planococcus citri*, *[illegible]* (3), *[illegible]* (2), *Planococcus [illegible]* (2), *Ferrisia virgata* (4), *Rastrococcus iceryoides*	Aphididae Coccidae Diaspididae Monophlebidae Pseudococcidae	College of Agriculture, Vellanikkara, Kerala Agricultural University, Thrissur, Kerala
14.	*Planococcus citri*	Pseudococcidae	Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani University at Parbhani, Maharashtra
15.	*[illegible]* (2), *Aphis gossypii* (6), *Aphis craccivora* (2), *Aphis fabae*, *[illegible]*, *[illegible]*, *[illegible]*, *Aphis [illegible]*, *Myzus persicae* *[illegible]*	Aphididae Pseudococcidae	Kumaun University, Nainital
16.	*Aphis gossypii* (3), *Aphis [illegible]*, *Myzus persicae*, *[illegible]* *Rastrococcus iceryoides*, *Planococcus [illegible]*, *Planococcus [illegible]*	Aphididae Pseudococcidae	ICAR-Indian Institute of Horticultural Research, Bengaluru
17.	*Thrips [illegible]*	Diaspididae	College of Agriculture, Maharashtra

18.	*Parasaissetia nigra* (2) *Aulacaspis madiunensis* *Icerya aegyptiaca*	Coccidae Diaspididae Monophlebidae	Regional Agricultural Research Station, Ambalavayal, Wayanad
19.	*Ceroplastes cirripediformis* *Dysmicoccus neobrevipes, Pseudococcus jackbeardsleyi, , Phenacoccus manihoti, Phenacoccus solenopsis, Paracoccus marginatus*	Coccidae Pseudococcidae	College of Agriculture, Vellayani, Trivandrum, Kerala Agricultural University, Kerala
20.	*Aulacaspis tubercularis*(2), *Pseudaulacaspis cockerelli, Aspidiotus destructor* (2)	Diaspididae	Mango Research Station, Nuzivid
21.	*Aphis gossypii* (5), *Aphis craccivora*(5), *Aphis aurantii, Aphis citricidus*(12), *Aphis spiraecola, Brachycaudus helichrysi*(2), *Greenidea psidii*(3), *Brevicoryne brassicae, Chaitoregma tattakana, Rhopalosiphum maidis, Hysteroneura setariae, Aphis* sp .(2), *Eriosoma lanigerum*(2), *Lipaphis pseudobrassicae* *Antecerococcus indicus* *Ceroplastes* sp., *Parasaissetia nigra* *Lepidosaphes beckii* *Icerya ?purchasi* *Nipaecoccus viridis, Planococcus* sp., *Pseudococcus baliteus, Pseudococcus longispinus*(3), *Phenacoccus parvus* (2)	Aphididae Cerococcidae Coccidae Diaspididae Monophlebidae Pseudococcidae	College of Horticulture & Forestry, Pasighat, Arunachal Pradesh
22.	*Rhopalosiphum nymphaeae*	Aphididae	College of Agriculture, Padannakkad, Kasargod, Kerala
23.	*Patchiella reaumuri*	Aphididae	ICAR-Research Complex for North Eastern Hill Region, Umiam, Meghalaya
24.	*Rhopalosiphum padi* (2), *Sitobion* sp., *Lipaphis pseudobrassicae, Aphis craccivora, Aphis gossypii, Rhopalosiphum maidis*	Aphididae	Rajasthan Agricultural Research Institute (Sri Karan Narendra Agricultural University) Jaipur, Rajasthan
25.	*Paracoccus marginatus* (2), *Ferrisia virgata* (8), *Pseudococcus jackbeardsleyi* (2), *Phenacoccus manihoti*	Pseudococcidae	Coconut Research Station, Balaramapuram, Thirivanathapuram, College of Agriculture, Vellayani, Kerala
26.	*Brachycaudus helichrysi*(3), *Aphis craccivora, Myzus persicae, Rhopalosiphum padi, Hyalopterus pruni, Eulecanium tiliae* (2) *Coccinella septempunctata*	Aphididae Coccinellids	Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar, Srinagar, Kashmir
27.	*Ceroplastes cirripediformis, Ceroplastes rusci*	Coccidae	Indian Cardamom Research Institute, Mailadumpara, Idukki, Kerala
28.	*Dysmicoccus finitimus* *Coccus hesperidum*	Pseudococcidae Coccidae	College of Agriculture, Indore, Madhya Pradesh
29.	*Drepanococcus cajani, Saissetia oleae*	Coccidae	CSIR- Central Institute of Medicinal and Aromatic Plants, Crop Production & Protection Division, Lucknow

30.	*Coccus longulus, Coccus viridis* *Pinnaspis* sp., *Aspidiotus destructor*	Coccidae Diaspididae	Indian Institute of Sciences, Bengaluru
31.	*Myzus* sp., *Aphis* sp., *Rhopalosiphum maidis*	Aphididae	Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodha, Uttar Pradesh
	Aonidiella orientalis *Drosicha mangiferae, Icerya* sp., *Icerya ?purchasi, Icerya aegyptiaca* (2), *Perrisopneumon* sp. (3), *Drosicha* sp. *Phenacoccus solenopsis, Nipaecoccus viridis, Rastrococcus iceryoides*(3), *Phenacoccus solenopsis*(3), *Planococcus citri, Paracoccus marginatus,*	Diaspididae Monophlebidae Pseudococcidae	
32.	*Ceroplastes rusci, Ceroplastes floridensis* *Drosicha mangiferae* (2), *Drosicha* sp. *Maconellicoccus hirsutus*	Coccidae Monophlebidae Pseudococcidae	Punjab Agricultural University, Ludhiana
33.	*Ferrisia virgata*	Pseudococcidae	Acharya N.G. Ranga Agricultural University, ICAR-Krishi Vigyan Kendra, Kalkiri, Andhra Pradesh
34.	*Ceroplastes cirripediformis* (2), *Saissetia coffeae, Fistulococcus pokfulamensis* *Lepidosaphes ?tokionis, Lepidosaphes* sp. *Ferrisia virgata*	Coccidae Diaspididae Pseudococcidae	Dr. Abraham Varghese
35.	*Aphis craccivora*	Aphididae	ICAR- National Research Institute for Integrated Pest Management, Rajpur Khurd, Mehrauli, New Delhi
36.	*Pseudococcus jackbeardsleyi*	Pseudococcidae	Directorate of Plant Protection Quarantine & Storage, Regional Plant Quarantine Station, Hebbal, Boopsandra, Bengaluru
37.	*Aphis* sp., *Rhopalosiphum nymphaeae* *Coccinella transversalis* (5), *Cheilomenes sexmaculata*(4), *Illeis cincta, Aneglies cardoni* (2) *Pinnaspis aspidistrae, Pseudaulacaspis cockerelli, Chrysomphalus dictyospermi* *Phenacoccus solenopsis, Maconellicoccus hirsutus*	Aphididae Coccinellids Diaspididae Pseudococcidae	Keladi Shivappa Nayaka University of Agricultural & Horticultural Sciences, Shivamogga
38.	*Aspidiotus destructor, Pseudaulacaspis cockerelli*	Diaspididae	Krishi Vigyana Kendra – Periyavaram, Tirupathi, Andhra Pradesh
39.	*Aphis spiraecola, Rhodobium porosum* *Pinnaspis strachani* *Paracoccus marginatus, Phenacoccus solenopsis, Planococcus minor, Ferrisia virgata*	Aphididae Diaspididae Pseudococcidae	ICAR – Directorate of Floricultural Research, Pune
40.	*Aphis gossypii*	Aphididae	Arunai Marketing, Coimbatore
41.	*Aphis gossypii* *Dysmicoccus neobrevipes, Planococcus minor*(3), *Pseudococcus jackbeardsleyi, Paracoccus marginatus, Dysmicoccus triadus*	Aphididae Pseudococcidae	Centre for Research, Jamal Mohamed College, Tirichirappalli, Tamil Nadu
42.	*Eriosoma lanigerum, Panaphis juglandis, Aphis spiraecola* (4), *Aphis gossypii, Myzus persicae*	Aphididae	Veera Chandra Singh Garhwali Uttarakhand University of Horticulture & Forestry,

43.	[illegible]	[illegible]	[illegible]
44.	[illegible]	[illegible]	[illegible]
45.	[illegible]	[illegible]	[illegible]
46.	[illegible]	[illegible]	[illegible]
Dr Kolla Sreedevi			
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]

6	*Lasioderma serricorne*	Ptinidae	HSEQR, IMCD, Maharashtra
7	*Necrobia rufipes*	Chrysomelidae	Institute of Agricultural Sciences, Banaras Hindu University, Uttar Pradesh
8	*Melolontha sp.* Carabid beetle Flea beetle	Scarabaeidae Carabidae Chysomelidae	Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Kashmir
9	*Anomala bengalensis, Holotrichia serrata, Phyllognathus dionysius* *Stromatium barbatum, Celosterna scabrator,Hoplocerambyx* sp.	Scarabaeidae Cerambycidae	Vijayapura, Karnataka
10	*Paederus fusciceps*	Staphylinidae	Gangavati, Dharwad, Karnataka
11	*Eucolliuris fuscipennis, Ophionea indica, Drypta lineola* *Paederus fusciceps*	Carabidae Staphylinidae	University of Agricultural Sciences, Raichur, Karnataka
12	*Gonocephalum* sp. *Holotrichia serrata, Anomala ruficapilla, Schizonycha ruficollis, Brahmina mysoreensis, Heteronychus lioderes*	Tenebrionidae Scarabaeidae	Krishi Vigyana Kendra, Kalikiri, Andhra Pradesh
13	*Luprops* sp.	Tenebrionidae	ICAR-National Bureau of Soil Survey & Land Use Planning, Hebbal Bengaluru
14	*Holotrichia serrata, Holotrichia rufoflava, Holotrichia reynaudi, Brahmina mysoreensis, Schizonycha ruficollis, Apogonia aerea, Maladera bombycine, Maladera rufocuprea, Anomala bengalensis, Anomala dorsalis, Anomala ruficapilla, Anomala* sp., *Adoretus versutus, Adoretus lasiopygus*	Scarabaeidae	Regional Agricultural Research Station, Tirupati, Andhra Pradesh
15	*Onitis* sp., *Holotrichia* sp., *Holotrichia serrata, Holotrichia rufoflava, Schizonycha ruficollis, Schizonycha fuscescens, Schizonycha* sp.1, *Apogonia kombirana, Adoretus bicolor*		Zonal Agricultural and Horticultural Research Station, Brahmavar, Udupi, Karnataka
16	Ladybird beetle	Coccinellidae	Anand, Gujarat
17	*Heteronychus lioderes Heteronychus sublaevis Heteronychus* sp., *Alissonotum* sp.	Scarabaeidae	Sugarcane Research Institute, Dr. Rajendra Prasad Central Agricultural University, Bihar
18	*Altica cyanea, Monolepta signata, Carpophilus* sp.	Chysomelidae Nitidulidae	Shivammogga, Karnataka
19	*Callosobruchus chinensis, Callosobruchus theobromae*?	Bruchidae	Agricultural College, Vijayapura, Karnataka
20	*Anomala* sp., *Anomala bengalensis, Anomala elata, Anomala ruficapilla, Holotrichia serrata, Holotrichia* sp.1, *Holotrichia* sp.2, *Schizonycha* sp.	Scarabaeidae	Horticulture College and Research, Trichy, Tamil Nadu

18	*Altica cyanea, Monolepta signata, Carpophilus* sp.	Chysomelidae Nitidulidae	Associate Director of Research and coordinator, Shivammogga, Karnataka
19	*Callosobruchus chinensis, Callosobruchus theobromae*?	Bruchidae	Agricultural College, Vijayapura, Karnataka
20	*Anomala* sp., *Anomala bengalensis, Anomala elata, Anomala ruficapilla, Holotrichia serrata, Holotrichia* sp.1, *Holotrichia* sp.2, *Schizonycha* sp.	Scarabaeidae	Horticulture College and Research, Trichy, Tamil Nadu
21	*Ochrus grammoderus*	Cerambycidae	Deputy Director, Kandla, Gujarat
22	*Bruchidius sp.*	Bruchidae	ICAR-National Institute of Seed Science and Technology, Regional Station, Bengaluru, Karnataka
23	Pin hole borer	Curculionidae	CPRO, Dr.YSR Horticulture University, Andhra Pradesh
24	Nitidulid beetle	Nitidulidae	Biocontrol Research Laboratory, Anand Agricultural University, Anand, Gujarat
25	*Holotrichia* sp., *Schizonycha fuscescens*, *Adoretus versutus*, *Maladera* sp.	Scarabaeidae	ICAR-Sugarcane Breeding Institute, Coimbatore, Tamil Nadu
Dr Ankita Gupta			
1	*Habrobracon brevicornis* (Wesmael)	Braconidae	Regional Crop Protection Center, Regional Field Office - IVA- Calabarzon, Department of Agriculture, Marawoy, Lipa City, Batangas, the Philippines
2.	*Microplitis maculipennis* Szépligeti	Braconidae	University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka
3.	*Distatrix papilionis* (Viereck), *Parapanteles eros* Gupta, *Philomacroploea* sp., *Cotesia* nr. *effrenus, Ooencyrtus papilionis* Ashmead, *Ooencyrtus* sp., Female *Telenomus* sp. Male *Telenomus* sp., Indet. genus Ichchneumonidae	Braconidae, Encyrtidae, Platygastridae Ichneumonidae	Shivaji University, Kolhapur
4	*Aulacocentrum* sp. *Chrysopophthorus* sp.	Braconidae	College of Horticulture and Forestry, Central Agricultural University (Imphal), Pasighat, Arunachal Pradesh

5.	*Chrysoperla zastrowi sillemi* (Esben-Petersen)	Neuroptera	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
6	*Coccygidium transcaspicum* (Kokujev) *Metopius ufus* Ashmead	Hymenoptera Braconidae) (Ichneumonidae)	University of Agricultural Sciences, Bangalore
7	*Brachymeria lasus* (Walker) *Amyosoma chinense* (Szépligeti) *Temelucha* sp.	(Chalcididae) (Braconidae) (Ichneumonidae)	Punjab Agricultural University, Ludhiana
Dr G. Mahendiran			
1.	*Sinoxylon analae* Lesne	Bostrichidae	ICFRE - Institute of Wood Science and technology, Bengaluru
2.	*Hypera postica* Gyllenhal	Curculionidae	Chaudhary Charan Singh Haryana Agricultural University, Hisar
3	*Heterobostrychus pileatus* Lesne	Bostrichidae	ICAR-Research Complex for Eastern Region, Ranchi
4	*Lepropus femoralis* (Fahraeus), *Myllocerus andrewesi* Marshall, *Myllocerus* sp., *Myllocerus fabricii* Guerin-Meneville	Curculionidae	College of Agriculture, Kerala Agricultural University, Vellanikkara
5	*Sitophilus oryzae* (Linnaeus)	Curculionidae	Kerala Agricultural University, Vellayani
6	*Cyphicerni*	Curculionidae	College of Agriculture, Shivamogga
7	*Myllocerus undecimpustulatus* Faust	Curculionidae	College of Agriculture, Vijayapura (University of Agricultural Sciences, Dharwad)
8	*Tanymecus tetricus* Faust	Curculionidae	Professor Jayashankar Telangana Agricultural University, CoA, Rajenderanagar, Hyderabad
9	*Xylosandrus compactus* (Eichhoff), *Hypothenemus hampi* (Ferrari)	Scolytinae	College of Agriculture, Shivamogga
10	*Crinorrhinus approximanus* Marshall	Curculionidae	Krishi Vigyan Kendra, Agricultural Research Station, Mudigere
Dr David K. J.			
1.	*Drosophila melanogaster* Meigen, *Zaprionus indianus* Gupta	Drosophilidae	Regional Plant Quarantine Station, Mumbai
2.	*Melanagromyza obtusa* (Malloch)	Agromyzidae	Anand Agricultural University, Gujarat
3.	*Bactrocera zonata* (Saunders), *Bactrocera dorsalis* (Hendel), *Bactrocera correcta* (Bezzi)	Tephritidae	ICAR-Central Citrus Research Institute, Nagpur, Maharashtra

5	*Sphaeniscus quadrincisus* (Wiedemann) *Bactrocera correcta* (Bezzi)	Tephritidae	Sardarkrushinagar Dantiwada Agricultural University, Gujarat
6	*Bactrocera correcta (Bezzi)*	Tephritidae	Agricultural College, Vijayapura
7	*Eristalinus aeneus* (Scopoli), *Paragus auritus* Stuckenberg, *Ischiodon scutellaris* (Fabricius) *Odontomyia* sp. *Physiphora* sp.	Syrphidae Stratiomyiidae Ulidiidae	Acharya N. G. Ranga Agricultural University, Agricultural College, Bapatla
8	*Bactrocera syzygii* White & Tsuruta	Tephritidae	Regional Agricultural Research Station, Pattambi, Palakkad, Kerala
9	*Zeugodacus cucurbitae* (Coquillett), *Bactrocera dorsalis* (Hendel)	Tephritidae	Dr. Y.S.R. Horticultural University -Regional Horticultural Research Station, Tirupati
10	*Hercostomus* sp., *Condylostylus* sp. *Melanagromyza* sp. *Atherigona* sp.	Dolichopodidae Agromyzidae Muscidae	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
11	*Chrysomya* sp. *Physiphora* sp. *Anthomyia* sp. *Megaselia* sp.	Calliphoridae Ulidiidae Anthomyiidae Phoridae	Soundarya Institute of Management and Science, Siddedahalli, Hessaraghatta Main Road
12	*Bactrocera dorsalis, Bactrocera nigrofemoralis, Zeugodacus caudatus, Zeugodacus cucurbitae, Bactrocera zonata, B. correcta*	Tephritidae	College of Sericulture, University of Agricultural Sciences Bangalore, Chintamani
13	*Zeugodacus cucurbitae, Bactrocera zonata, Carpomya pardalina* Bigot	Tephritidae	Banda University of Agriculture and Technology, Banda, Uttar Pradesh.
14	*Bactrocera abbreviata* (Hardy), *Bactrocera correcta* (Bezzi), *Bactrocera dorsalis* (Hendel), *Bactrocera latifrons* (Hendel), *Bactrocera sp., Dacus discophorus* (Hering), *Dacus longicornis* Wiedemann, *Dacus nagarathnae* Abhishek, David and Hancock, *Dacus* sp., *Zeugodacus cucurbitae* (Coquillett), *Zeugodacus scutellaris* (Bezzi), *Zeugodacus tau* (Walker).	Tephritidae	College of Horticulture and Forestry, Pasighat, Arunachal Pradesh
15	*Bactrocera bhutaniae* Drew & Romig, *Bactrocera dorsalis* (Hendel), *Bactrocera gombokensis* Drew and Hancock, *Bactrocera lombokensis* Drew and Hancock, *Bactrocera nigrifacia* Zhang, Ji & Chen, *Bactrocera rubigina* Wang and Zhao, *Bactrocera* sp, *Bactrocera thailandica* Drew and Hancock, *Bactrocera tuberculata* (Bezzi), *Bactrocera zonata* (Saunders), *Dacus vijaysegarani* Drew and Hancock, *Zeugodacus cucurbitae* (Coquillett), *Zeugodacus diaphorus* (Hendel), *Zeugodacus Zeugodacus scutellaris* (Bezzi), *Zeugodacus* sp, *Zeugodacus tau* (Walker).	Tephritidae	College of Horticulture, Central Agricultural University (Imphal), Thenzawl, Mizoram.

16	*Delia platura* (Meigen)	Anthomyiidae	Horticultural Research Station, Ooty, Tamil Nadu
17	*Zeugodacus caudatus* (Fabricius)	Tephritidae	Rashvee International phytosanitary research and services, Bengaluru
Dr Salini S.			
1.	*Eurydema pulchra* (Westwood), *Eurydema ?liturifera* (Walker), *Eysarcoris montivagus* Distant, *Saceseurus* sp. *Microdeuterus* sp. *Cletus* sp., *Urochela* sp.	Pentatomidae Acanthosomatidae Coreidae Urostylidae	Dr Ajaykumara K. M. Central Agricultural University, Pasighat, Arunachal Pradesh
2	*Physomerus centralis* Mukherjee, Hassan & Biswas, 2016	Coreidae	Dr D. S. Yadav, Senior Scientist, National Research Centre for Grapes, Pune, Maharashtra
3.	*Dysdercus koenigii* (Fabricius)	Pyrrhocoridae	Dr. D. B. Sisodiya Dept. of Agricultural Entomology B. A. College of Agriculture, Anand Agricultural University, Gujarat
4.	*Antestiopsis* sp., *Dalpada* sp. *Degonetus* sp., *?Lodosocoris* sp., *Eurydema* sp., *Eurysaspis* sp. *Gynenica* sp., *Halyomorpha* sp., *Hermolaus* sp., *Menida* sp., *?Sarju* sp., *Carbula* sp., *Hoplistodera* sp., *Scotinophara* sp., *Cahara/ Sarju, Bolaca* sp., *Udonga* sp., *Zicrona* sp., *Microdeuterus* sp., *Hoplistodera recurva* Distant, *Sarju* sp., *Udonga montana* (Distant), *Carbula aliena* Distant, *Caystrus* sp., *Meridindia magnolia* Salini, *Eurydema ?dominulus* (Scopoli), *Halys* sp., *Dalpada occulata* (Fabricius), *Scotinophara lurida* (Burmeister), *Halyomorpha picus* (Fabricius), *Eupaleopada concinna* (Westwood), *Bolaca unicolor* (Walker), *Halyomorpha murrea* Distant *Alphocoris Hermolaus typicus* Distant, *Amauropepla* sp. *Microdeuterus* sp., *Priassus exemptus* (Walker), *Scotinophara coarctata* (Fabricius), *Dorpius* sp. *Piezodorus hybneri* (Gmelin) sp. *Laprius* sp.	Pentatomidae Scutelleridae Acanthosomatidae	Dr. Swaminathan Iyer Udaipur, Rajasthan
5.	*Antilochus ?coquebertii* (Fabricius)	Pyrrhocoridae	Mr. P.N. Chaudhary Anand Agricultural University, Anand
6	*Nezara viridula* (Linnaeus)	Pentatomidae	Dr. Sunitha N. D. Dept. of Entomology Agricultural College Vijayapura

7	*Gralliclava* sp. *Graptostethus nigriceps* Stål, *Acrosternum gramineum* (Fabricius), *Piezodorus hybneri* (Gmelin), *Nezara viridula* (Linnaeus) *Hyalymenus* sp.	Coreidae Lygaeidae Pentatomidae Alydidae	Agricultural Research Station, Bapatla
8	*Eysarcoris ?ventralis*	Pentatomidae	CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow
9	*Dieuches* sp. *Cletus* sp. *Dolycoris indicus* Stål, *Eysarcoris* sp., *Nezara viridula* (Linnaeus)	Rhyparchromidae Coreidae Pentatomidae	College of Agriculture, Shivamogga, Karnataka
10	Miridae Rhopalidae	Miridae Rhopalidae	Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir.
11	*Leptocorisa lepida* Breddin, *Riptortus linearis* (Fabricius) *Piezodorus hybneri* (Gmelin), *Zicrona caerulea* (Linnaeus), *Agonoscelis nubilis* (Fabricius)	Alydidae Pentatomidae	Dept. of Entomology Zonal Agricultural & Horticultural Research Station, Bramavar-576213
12	*Riptortus pedestris* (Fabricius), *Riptortus linearis* (Fabricius) *Nezara viridula* (Linnaeus), *Plautia crossota* (Dallas), *Halyomorpha picus* (Fabricius), *Dolycoris indicus* Stål, *Erthesina* sp. *Anoplocnemus* sp., *Gralliclava* sp. *Megacopta cribraria* (Fabricius) Cydnidae Reduviidae *Geocoris* sp.	Alydidae Pentatomidae Coreidae Plataspidae Cydnidae Reduviidae Geocoridae	College of Agriculture, Shivamogga
13	*Dolycoris indicus*, *Nezara viridula*	Pentatomidae	Chaudhary, Palampur, Himachal Pradesh
14	*Riptortus pedestris* (Fabricius 5) *Nezara viridula* (Linnaeus), *Eysarcoris* sp., *Piezodorus hybneri* (Gmelin) *Anoplocnemis phasiana* (Fabricius) *Lygaeus* sp. *Leptocorisa* sp. *Megacopta cribraria* (Fabricius), *Coptosoma* sp.	Coreidae Pentatomidae Coreidae Lygaeidae Alydidae Plataspidae	Kerala Agricultural University

Dr. Sampath Kumar			
1	*Argiope* sp. (2) *Tetragnatha* sp. (3) *Pardosa* sp. (2) *Larinia* sp. *Thanatus* sp. *Bianor balius* (3) *Oxyopes hindostanicus* *Tetragnatha ?nitens* *Neoscona* sp. (2) *Bionor angulosus* *Cyrtophora* sp. (2) *Neoscona theisi*	Araneidae Tetragnathidae Lycosidae Araneidae Philodromidae Salticidae Oxyopidae Tetragnathidae Araneidae Salticidae Araneidae Araneidae	University of Agricultural Sciences, Raichur
2	*Myrmarachne* sp. *Araneus* sp. *Neoscona* sp. *Chorizopes* sp. *Hyllus semicupreus* *Pardosa* sp.	Salticidae Araneidae Araneidae Araneidae Salticidae Lycosidae	College of Agriculture, Navile, Shivamogga
3	*Oxyopes hindostanicus* (4) *Cheiracanthinum* sp. *Carrhotus* sp. *Oxyopes* sp. (8) *Peucetia* sp. *Thyene* sp. *Argiope* sp. *Neoscona* sp. (2)	Oxyopidae Cheiracanthiidae Salticidae Oxyopidae Oxyopidae Salticidae Araneidae Araneidae	Agrobiodiversity project, ICAR - National Bureau of Agricultural Insect Resources, Bengaluru
4	*Tetragnatha* sp. (5) *Tetragnatha keyserlingi* (2)	Tetragnathidae Tetragnathidae	Zonal Agricultural & Horticultural Research Station, Bramavar
5	*Neoscona vigilans* *Cheiracanthium melanostomum* *Cheiracanthium ?melanostomum* *Cheiracanthium* sp. (3) *Peaucetica ?choprai* *Peaucetica* sp. *Heteropoda* sp. *Argiope* sp. *Thomisus ?telanganaensis* *Epocilla aura* *Menemerus bivittatus* *Clubiona* sp.	Araneidae Cheiracanthiidae Cheiracanthiidae Cheiracanthiidae Oxyopidae Oxyopidae Sparassidae Araneidae Thomisidae Salticidae Salticidae Clubionidae	Centre for Oilseeds Research, Sardarkrushinagar Dantiwada Agricultural University, Gujarat, Sardarkrushinagar
6	*Bianor punjabicus* (2) *Neoscona* sp. *Neoscona ?theisi* *Oxyopes* sp. (2) *Cheiracanthium ?punjabense* *Thyene imperialis* (2)	Salticidae Araneidae Araneidae Oxyopidae Cheriacanthiidae Salticidae	Punjab Agricultural University, Ludhiana

Dr. Rachana R. R.			
1	*Thrips palmi* Karny (2), *Scirtothrips dorsalis* Hood (2)	Thripidae	University of Agricultural Sciences, Dharwad
2	*Thrips palmi* Karny (4), *Scirtothrips dorsalis* Hood (2), *Thrips tabaci* Lindeman, *Frankliniella schultzei* (Trybom)	Thripidae	Punjab Agricultural University, Ludhiana
3	*Thrips tabaci* Lindeman (3), *Thrips hawaiiensis* (Morgan)	Thripidae	University of Horticultural Sciences, Bagalkot
4	*Scirtothrips dorsalis* Hood	Thripidae	University of Agricultural Sciences, Dharwad
5	*Microcephalothrips abdominalis* (D. L. Crawford), *Gynaikothrips uzeli* (Zimmermann)	Thripidae Phlaeothripidae	Punjab Agricultural University, Ludhiana
6	*Anaphothrips sudanensis* Trybom	Thripidae	BASF Pvt. Ltd., Pune
7	*Thrips parvispinus* (Karny) (6), *Thrips hawaiiensis* (Morgan) (3)	Thripidae	University of Agricultural Sciences, Raichur
8	*Thrips parvispinus* (Karny) (134)	Thripidae	ICAR -Indian Institute of Horticultural Research, Bengaluru
9	*Thrips parvispinus* (Karny) (2), *Thrips hawaiiensis* (Morgan), *Thrips palmi* Karny	Thripidae	Directorate of Plant Protection Quarantine and Storage, Bengaluru
10	*Thrips parvispinus* (Karny)	Thripidae	Directorate of Plant Protection Quarantine and Storage, Telangana
11	*Thrips parvispinus* (Karny) (2)	Thripidae	Krishi Vigyan Kendra, Rajendranagar
12	*Thrips parvispinus* (Karny) (2) *Thrips palmi* Karny (2)	Thripidae	College of Horticulture, Mojerla
13	*Thrips parvispinus* (Karny) *Thrips hawaiiensis* (Morgan)	Thripidae Thripidae	University of Horticultural Sciences, Bagalkot
14	*Thrips parvispinus* (Karny) (2)	Thripidae	Directorate of Plant Protection Quarantine and Storage, Andhra Pradesh
15	*Thrips parvispinus* (Karny) (2) *Thrips hawaiiensis* (Morgan) (2) *Thrips florum* Schmutz	Thripidae	Vegetable Research Station, Rajendran nagar
16	*Thrips parvispinus* (Karny) (2) *Thrips hawaiiensis* (Morgan)	Thripidae	Syngenta Pvt. Ltd., Aurangabad
17	*Thrips parvispinus* (Karny) *Thrips hawaiiensis* (Morgan) *Frankliniella occidentalis* (Pergande) *Frankliniella schultzei* (Trybom)	Thripidae	Corteva agriscience Pvt Ltd., Telangana

18	*Thrips palmi* Karny (2) *Frankliniella schultzei* (Trybom) *Microcephalothrips abdominalis* (D. L. Crawford) *Thrips atactus* Bhatti	Thripidae	Corteva Agriscience Pvt Ltd., Telangana
19	*Rhipiphorothrips cruentatus* Hood *Rhipiphorothrips pulchellus* Morgan *Scirtothrips dorsalis* Hood *Megalurothrips usitatus* (Bagnall)	Thripidae	ICAR-Indian Institute of Natural Resins and Gums, Ranchi
20	*Scolothrips rhagebianus* Priesner	Thripidae	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
21	*Thrips palmi* Karny	Thripidae	University of Horticultural Sciences, Shivamogga
22	*Pseudodendrothrips bhattii* Kudo (2) *Pseudodendrothrips mori* (Niwa) (2) *Bathrips melanicornis* (Shumsher)	Thripidae	Central Silk Board, Bengaluru
23	*Thrips parvispinus* (Karny) *Thrips hawaiiensis* (Morgan)	Thripidae	BASF Pvt. Ltd., Pune
24	*Scirtothrips dorsalis* Hood (3) *Thrips palmi* Karny *Microcephalothrips abdominalis* (D. L. Crawford)	Thripidae	*Central Institute of Medicinal and Aromatic Plants, Bengaluru*
25	*Thrips parvispinus* (Karny) (9) *Scirtothrips dorsalis* Hood (3) *Thrips hawaiiensis* (Morgan) *Frankliniella schultzei* (Trybom) *Haplothrips* (*Haplothrips*) *gowdeyi* (Franklin) *Franklinothrips vespiformis* (Crawford, D.L.) (2)	Thripidae Phlaeothripidae Aeolothripidae	HM Clause Pvt Ltd., Bengaluru
26	*Megalurothrips usitatus* (Bagnall) (3) *Megalurothrips distalis* (Karny) (3) *Scirtothrips dorsalis* Hood	Thripidae	ICAR-Indian Institute of Pulses Research, Kanpur
27	*Thrips palmi* Karny (4) *Thrips hawaiiensis* (Morgan)	Thripidae	HM Clause Pvt Ltd., Bengaluru
28	*Thrips florum* Schmutz *Thrips hawaiiensis* (Morgan) *Scirtothrips dorsalis* Hood	Thripidae	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
29	*Indothrips bhushani* Bhatti *Scirtothrips dorsalis* Hood	Aeolothripidae Thripidae	University of Agricultural Sciences, Raichur
30	*Thrips florum* Schmutz *Thrips hawaiiensis* (Morgan) *Scirtothrips dorsalis* Hood *Megalurothrips* sp.	Thripidae	University of Agricultural Sciences, Bengaluru
31	*Scirtothrips dorsalis* Hood (2) *Thrips palmi* Karny *Thrips tabaci* Lindeman	Thripidae	Punjab Agricultural University, Ludhiana

32	*Thrips florum* Schmutz (2), *Thrips hawaiiensis* (Morgan) (2), *Thrips orientalis* (Bagnall)	Thripidae	University of Horticultural Sciences, Shivamogga
33	*Frankliniella schultzei* (Trybom), *Anascirtothrips arorai* Bhatti (2), *Thrips palmi* Karny (2), *Thrips tabaci* Lindeman, *Scirtothrips dorsalis* Hood *Scirtothrips dorsalis* Hood	Thripidae	ICAR-National Research Centre on Seed Spices, Ajmer
34	*Thrips palmi* Karny (9) *Scirtothrips dorsalis* Hood (10), *Frankliniella schultzei* (Trybom) (3), *Frankliniella occidentalis* (Pergande) (2), *Thrips florum* Schmutz (2), *Thrips hawaiiensis* (Morgan) (2) *Scirtothrips dorsalis* Hood (2) *Frankliniella schultzei* (Trybom) *Thrips palmi* Karny (2) *Thrips hawaiiensis* (Morgan) *Haplothrips* (*Haplothrips*) *gowdeyi* (Franklin)	Thripidae Phlaeothripidae	Corteva agriscience Pvt Ltd., Telangana
35	*Thrips palmi* Karny *Scirtothrips dorsalis* Hood (3) *Frankliniella schultzei* (Trybom)	Thripidae	University of Agricultural Sciences, Raichur
36	*Frankliniella schultzei* (Trybom) *Thrips palmi* Karny *Thrips florum* Schmutz (9), *Thrips hawaiiensis* (Morgan) (8)	Thripidae	Krishi Vigyan Kendra, Guntur
37	*Thrips florum* Schmutz *Thrips hawaiiensis* (Morgan) *Scirtothrips dorsalis* Hood (4) *Thrips palmi* Karny *Diarthrothrips nimbus* (Ananthakrishnan) *Thrips florum* Schmutz (3) *Thrips hawaiiensis* (Morgan) (3)	Thripidae	ICAR-Indian Institute of Horticultural Research, Bengaluru
Dr Omprakash Navik			
1	*Trichogramma chilonis* (1)	Trichogrammatidae	Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, Uttarakhand
2	*Trichogramma chilonis* (8)	Trichogrammatidae	Meghalaya State Biocontrol Laboratory, Upper Shillong, Meghalaya
3	*Trichogramma chilonis* (8)	Trichogrammatidae	ICAR-Central Institute for Cotton Research (CICR), Nagpur
4	*Trichogramma chilonis* (8)	Trichogrammatidae	Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh
5	*Trichogramma achaeae* (2) *Trichogramma chilonis* (2)	Trichogrammatidae	CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow, Uttar Pradesh

Dr Rajgopal N.N.			
1.	*Balclutha incisa* (Matsumura), *Cicadulina bipunctata* (Melichar), *Exitianus* sp., *Maiestas* sp., *Sogatella* sp.	Deltocephalinae: Cicadellidae	S. D. Agricultural University, Sardarkrushinagar, Gujarat
2.	*Petalocephala uniformis* Distant *Nephotettix virescens* (Distant), *Nephotettix nigropictus* (Stål), *Cofana* sp., *Cicadulina* sp., *Nilaparvata* sp., *Maiestas variabilis* (Dash & Viraktamath)	Ledrinae: Cicadellidae Deltocephalinae: Cicadellidae	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
3.	*Nephotettix virescens* (Distant), *Nephotettix nigropictus* (Stål), *Cofana* sp.	Deltocephalinae: Cicadellidae	Department of Entomology Zonal Agricultural & Horticultural Research Station, Brahmavar

6. EXTENSION ACTIVITIES

ICAR-NBAIR demonstrations on Agri-drone based delivery of biopesticide in Coconut

ICAR-National Bureau of Agricultural Insect Resources, Bengaluru has been selected as one of the ICAR Institutes for "Drone Technology Demonstration" under the Sub Mission on Agricultural Mechanization to popularize the Agri-drone among farming communities. In this direction, the Bureau has been making efforts to develop Standard Operating Procedures (SOP) for precise delivery of oil-based formulation of biopesticides in different crops for the effective management of insect pest and diseases. Further, the Bureau has taken efforts in popularizing agri-drone among different stakeholders including farmers through regular demonstration.

Demonstration of application of biopesticides in Maize by drone

In this direction ICAR-NBAIR conducted about 20 biopesticides spraying demonstrations in five clusters (5 demonstration /cluster) using oil-based formulation of various biopesticides carried out in Hassan, Chamarajnagar, Tumkur and Mysuru districts of Karnataka.

Demonstrations were conducted in turmeric, tomato, banana, cabbage, sugarcane, avocado, coconut, potato and maize to create farmers' awareness and promotion of drone technology especially in crop protection. About 600 progressive farmers, line department officials, farmers producing organization (FPOs) officials, women shelf help groups (SHGs), custom hiring centers (CHCs), RAWE students of College of Agriculture, Hassan, Department of Agriculture, Chikkanayakanahalli and other stakeholders were participated and benefitted.

During the demonstration, the various advantages of agri-drone spray for farming community over the conventional spray were explained to the farmers. Government subsidy schemes for procurement of agri-drone to different target groups like government institutions, ICAR-Krishi Vigyan Kendras, Line departments, Farmer Producer Organisations, Self Help Groups and Custom Hiring Centres (CHCs). These entire demonstration programmes were widely covered in print and media in regional language (Kannada) for the benefit of different stakeholders.

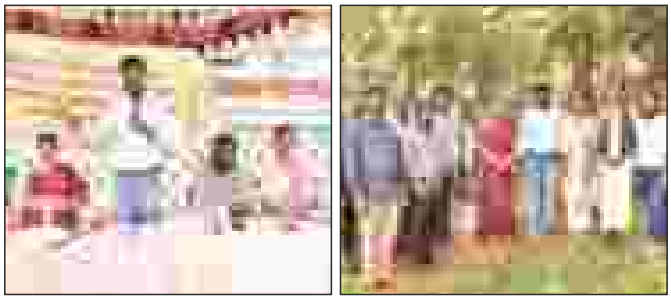
Demonstration of drone-based application of biopesticide in Coconut

Demonstration of drone application of biopesticides to the students

Demonstration of Agri-drone for biopesticides application to farmers

Training cum demonstration programme at Ranasthalam, Srikakulam district, Andhra Pradesh

Training cum demonstration on "Biocontrol strategies for Management of Invasive whiteflies in Coconut" was conducted on 9 January, 2025 at Ranasthalam, Srikakulam district, Andhra Pradesh. Officials of Regional Research Station, Anakapalle, ICAR-Krishi Vigyan Kednra, Srikkulam, Dr Reddy Foundation and Department of Horticulture were participated in the programme. Initially few whiteflies affected gardens visited along with farmers and monitoring the natural parasitism activity. Off late interacted with farmers and got feedback about the programme. Infestation of RSW is under control and however, infestation of Banders nesting whiteflies was moderate to severe where foliar application of *Isaria fumosorosa* advocated for the farmers.



Awareness programme on biological control of whiteflies

In the technical session, Dr. K. Selvaraj, Senior Scientist (Entomology) briefed about the diversity of invasive whiteflies, nature of damage, population dynamics, biocontrol management strategies to farmers. Biocontrol agents such parasitoid, *Encarsia guadeloupae* and oil-based formulation of entomopahogenic fungus, *Isaria fumosorosea* distributed to farmers for the augmentation in coconut. Later, conducted demonstration on different release techniques for *Encarsia guadeloupae* and preparation and foliar application strategies for *Isaria fumosorosea* were explained to farmers. About 120 farmers participated and benefitted the programme and widely covered in local daily (English and Telugu) newspapers and media in for the benefit of the farmers and other stakeholders. Biocontrol agents were supplied to farmers for their augmentation against invasive whiteflies in coconut.

Field Diagnostic Visit as Part of the Programme

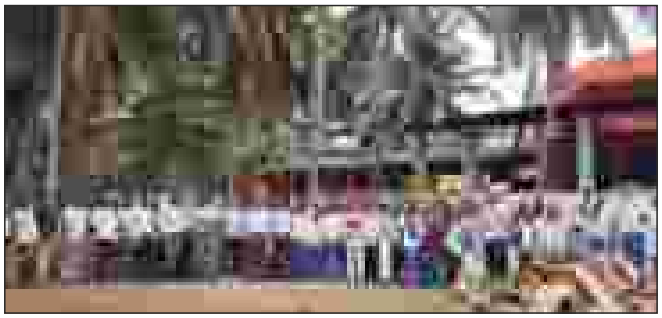
ICAR-NBAIR organized Biocontrol strategies for Management of Invasive whiteflies in Coconut

ICAR-National Bureau of Agricultural Insect Resources, Bengaluru organised farmer training cum demonstration on "Biocontrol strategies for Management of Invasive whiteflies in Coconut at Yediyur, Kunigal taluk, Tumkur on 05 March, 2025 in collaboration with Kunigal farmer producing organization. Around 120 farmers participated in the programme. Biocontrol strategies for management of whiteflies in coconut were explained to the farmers and agri-drone for biopesticides application in coconut was demonstrated.

Awareness Programme on Biocontrol Strategies for Management of Invasive Whiteflies in Coconut

Training Programme at Kandikere, Chikanayakanahalli, Tumakuru District

Conducted training on "Biocontrol strategies for Management of Invasive whiteflies in Coconut" at Kandikere, Chikanayakanahalli, Tumkur district on 26th March, 2025 and reached by 10:30 Am same day. Shri Suresh Babu, MLA, Ckikkanayanahalli is inaugurated programme. Dr. A.N. Shylesha, Principal Scientist, Dr. C. Manjunatha Scientist (Plant Pathology), Kavya G.A. (JRF) briefed about briefed invasive whiteflies origin, mode of dispersal, distribution, other different host plants, life cycle, nature of damage, management strategies to farmers in coconut and areca nut. About 150 farmers participated and benefitted. In the technical session, Dr. Selvaraj, K conducted demonstration on biocontrol agents such as *Encarsia guadeloupae* (release techniques) and *Isaria fumosorosea* (preparation and foliar application) and drone spray also explained to farmers in the nearby coconut garden. This training organized under project on "Generation of toxicological data for registration of *Isaria fumosorosea* in CIBRC and demonstration of biocontrol agents for management of Invasive Whiteflies in Coconut" sponsored by Coconut Development Board, Kochi.



Demonstration of Agri-drone based delivery of biopesticide in coconut

Tribal Sub-Plan Extension and Awareness Programmes in Tamil Nadu

Successfully organizing two tribal sub plan programmes in Tamil Nadu, one was in collaboration with ICAR-KVK Namakkal on 25 March 2025 and other one in collaboration with TNAU- Regional Research Station, Paiyur on 28 March 2025.

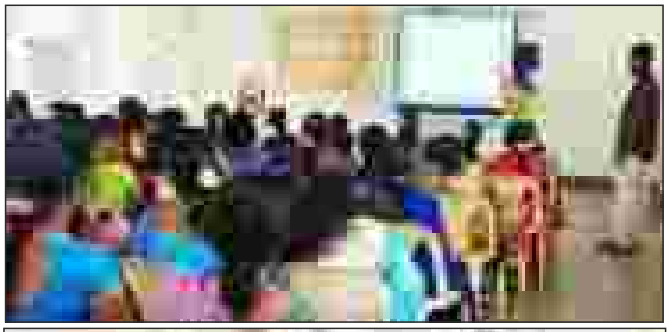
ICAR-NBAIR sponsored TSP program in Dantewada district and Sukma district of Chhattisgarh.

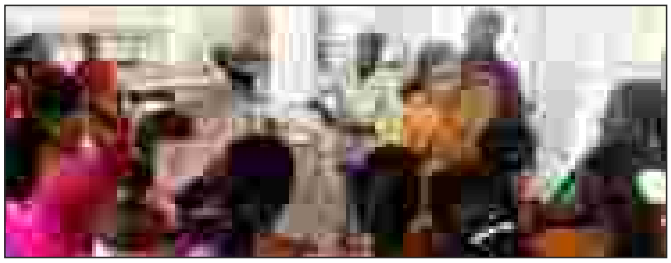
More than 300 tribal farmers participated in this program and ICAR-NBAIR distributed biopesticides, macrobials, pheromone traps and small farm implement to the tribal farmers. Participated and created awareness to the tribal farmers in Dantewada district, Chhattisgarh about the usage of biopesticides, macrobials and pheromones in pests and diseases management.

Awareness creation among tribal farmers on the use of biopesticides, macrobial biocontrol agents, pheromone traps

ICAR-NBAIR, Bengaluru promoted 'Stingless bee village concept' in the tribal areas of Chamarajanagar district, Karnataka

efforts with the funding of National Bee Board (NBB), New Delhi has launched a project on 'Development of Stingless Bee village in the tribal regions of Chamarajanagar district of Karnataka'. As a first phase of the programme, 59 tribal women from five tribal villages viz., Kombudakki, Mendare, Indiganatta, Gorasane and Keeranahola were selected. The women were trained for stingless bee keeping practices. The participants were imparted practical training on handling of stingless bee colonies, colony division, identification of queen, drone and workers. The trainees were appraised with necessary information on the seasonal colony management practices, requeening techniques and honey extraction methods. Stingless bee colonies were distributed to the participants.

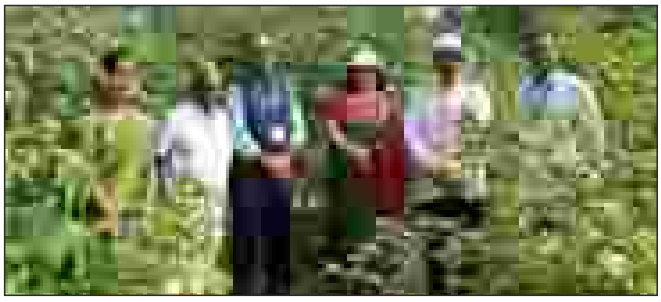




Training on Meliponiculture under Bee village programme to the tribal women

Cassava Field Day at Rasipuram, Tamil Nadu

Organized the "Cassava Field Day" in a grand manner on 13 November 2025 at Rasipuram, Namakkal District, Tamil Nadu. The event marked India's remarkable success in the biological control of the cassava mealybug (*Phenacoccus manihoti*) through the introduction of its efficient parasitoid, *Anagyrus lopezi*. The programme attracted more than 500 participants, including farmers, scientists, policymakers, and representatives from industries, and showcased how scientific innovation and farmer participation together revived cassava cultivation in South India after a devastating pest outbreak. The event was graced by the presence of Sh. V. S. Matheswaran, Hon'ble Member of Parliament (Namakkal Constituency); Sh. K. R. N. Rajeshkumar, Hon'ble Member of Parliament (Rajya Sabha); Dr. V. S. Mathiventhan, Hon'ble Minister for Adi Dravidar Welfare, Government of Tamil Nadu; Sh. A. K. P. Chinraj, Ex-MP (Namakkal Constituency); and Dr. Poonam Jasrotia, ADG (PP&B), ICAR, New Delhi. Senior officers from the Department of Horticulture and Plantation Crops, Department of Agriculture, Government of Tamil Nadu, Central Integrated Pest Management Centre (CIPMC), State Agricultural Universities, and Krishi Vigyan Kendras also participated in the event.



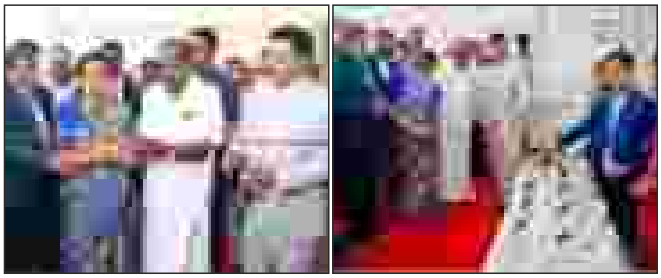
Cassava Field Day to Showcase the landmark Success in Biological Control of Cassava Mealybug at Rasipuram, Namakkal District, Tamil Nadu, 13 November 2025

Cassava Field Day to Showcase the landmark Success in Biological Control of Cassava Mealybug at Rasipuram, Namakkal District, Tamil Nadu, 13 November 2025

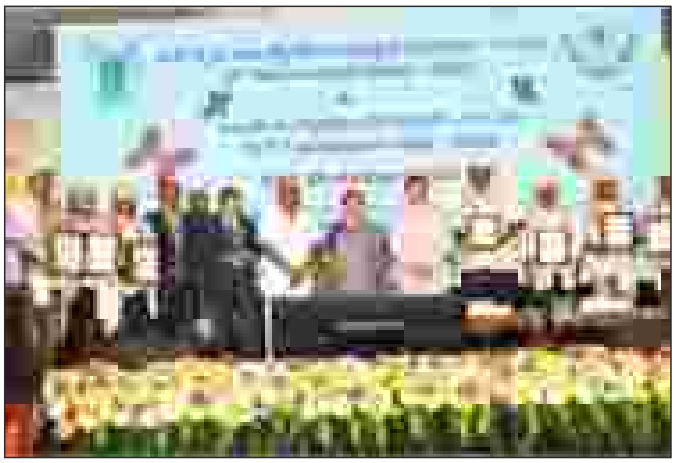
ICAR-National Bureau of Agricultural Insect Resources, Bengaluru, marked its 33rd Foundation Day with the successful organization of 3rd Biocontrol Expo 2025 at its Yelahanka campus. As the central agency for biological control research in India, the Bureau convened this event for the third consecutive year. The celebration was inaugurated by Shri H. D. Kumaraswamy, Hon'ble Union Minister of Heavy Industries and Steel, Govt. of India as Chief Guest in presence of Guest of Honours, Sushri Shobha Karandlaje, Hon'ble Union Minister of State for MSME and Labour & Employment, Govt. of India and Padma Shri Dr. C. N. Manjunath, Hon'ble Member of Parliament, Bengaluru Rural Constituency. agriculture.

In the foundation day lecture, Shri H. D. Kumaraswamy motivated farmers to follow biocontrol methods to reduce the pesticide load in various crops like coconut, maize, grapes, pomegranate etc. He also emphasised the role of various biocontrol strategies for the management of pests and thereby increasing the overall profit of farmers. Sushri Shobha Karandlaje advocated Krishi Vignana Kendra (KVK) to join hands with ICAR-NBAIR for helping farmers especially to differentiate harmful and beneficial insects apart from training and spread of research results from lab to land. Dr. C.N. Manjunath outlined the harmful effects of chemical pesticides on human and environment and advocated farmers to adopt biological control methods.

The event featured the felicitation of progressive farmers from both Karnataka and Maharashtra states and the distribution of agricultural inputs to Scheduled Caste and Scheduled tribe farmers under Scheduled Caste Sub Plan (SCSP) and Tribal Sub Plan (TSP) programme. The Expo recorded a footfall of over 4000 people including farmers, students, scientists, general public and 34 stalls showcasing innovative bio-control based technologies and agricultural products from ICAR-NBAIR, various ICAR institutes, industries and Krishi Vigyan Kendras (KVKs). The programme witnessed enthusiastic participation of farmers from various villages of Hassan, Mandya, Kolar, Chikkaballapura, Bengaluru Rural, Tumkur, Ramanagara districts of Karnataka and Latur, Solapur districts of Maharashtra.



Inauguration of Exhibition stalls during the 3rd Biocontrol Expo 2025 by the dignitaries



Felicitation of Farmers during the 3rd Biocontrol Expo 2025

ICAR–NBAIR organised Kisan Diwas

ICAR-National Bureau of Agricultural Insect Resources, Bengaluru, organized a live address by the Honourable Union Minister of Agriculture & Farmers Welfare Shri Shivraj Singh Chouhan and celebrated Kisan Diwas on December 23, 2025. The programme was held in the gracious presence of Dr. K. Sudhakar, Honourable Member of Parliament, Lok Sabha (Chikkaballapura Constituency). Dr S.N. Sushil, Director, ICAR-NBAIR, briefed the dignitaries and the participating farmers on the Institute's programmes and initiatives aimed at promoting eco-friendly and sustainable pest management practices to support farmers' livelihoods. Addressing the gathering, the Chief Guest, Dr. K. Sudhakar, highlighted the Viksit Bharat – Guarantee for Rozgar and Ajeevika Mission (Gramin) (VB-G RAM G) and emphasized the importance of key farmer welfare initiatives of the Union Government aimed at improving rural livelihoods and enhancing farmers' income. He underscored the need for soil testing, micro-irrigation, mixed cropping, and assured 125 days of guaranteed employment per year for the prosperity of farmers. He commended the Bureau's efforts in promoting natural farming, biological control, and eco-friendly technologies for producing safe food, fodder, and fibre, and encouraged the Institute to further expand its outreach.

Dignitaries visiting the NBAIR Exhibition stall during Kisan Diwas

Participants of Kisan Diwas programme with Dr. K. Sudhakar, Hon'ble MP, Chikkaballapur

Distribution of inputs to the Farmers during the Kisan Diwas

Tribal Sub-Plan Awareness and Capacity Building Programme

Organized a Tribal Sub-Plan (TSP) programme at Karumandurai tribal village, Salem District, Tamil Nadu, on 29 December 2025, focusing on awareness creation and capacity building of tribal farmers on biological control and eco-friendly pest management practices.

7. AWARDS AND RECOGNITIONS

Dr Satya Nand Sushil

Elected as a Fellow of the National Academy of Agricultural Sciences (NAAS), New Delhi, 5 June 2025

Received the "Life Time Achievement Award" from the Entomological Research Association, Udaipur, during the National Conference on "Advances in Sustainable Plant Protection under Changing Agriculture Scenario", 18–20 September 2025.

Served as Chairman for the 48th Research Advisory Committee meeting of Central Sericultural Germplasm Resources Centre (CSGRC), Central Silk Board, Ministry of Textiles, Government of India, Hosur, 25 July 2025

Delivered a plenary lecture on "Plant Protection in India: Strengths, Challenges & Way Forward" during the Entomology Students Conclave-2025 at Assam Agricultural University, Jorhat, on 15–17March 2025.

Dr S.N. Sushil, Director, ICAR-NBAIR received NAAS Fellow award

Dr T. Venkatesan

Served as Research Advisory Committee Member, Central Silk Board - Central Sericultural Germplasm Resources Centre, Hosur, Tamil Nadu.

Served as Chief Organising Secretary & Panellist for the International Satellite Symposium on Insect Multi-Omics: Molecular Insights meets pest management solutions held during Second International Conference on Biological Control, Radisson Blu Atria, Bengaluru,25–28 February 2025.

Served as an External Expert of the Advisory Committee Member of National Agricultural Science Fund, New Delhi for the project entitled Artificial intelligence enabled biotic & abiotic stress detection and advisory mobile application for crops, ICAR–Indian Agricultural Statistical Research Institute, New Delhi.

Served as an External Expert by Agri Innovate India Ltd, New Delhi to evaluate the Technology Proposals (TDF) developed by ICAR–Central Institute for Cotton Research, Nagpur.

Dr Kesavan Subaharan

Served as Department of Biotechnology-nominated member of the Institute Biosafety Committee, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru.

Served as an expert member for Entomology in the Staff Research Council of Central Coffee Research Institute, 17 February 2025

Served as a Member of the Career Advancement Scheme Assessment for Entomology Scientist at ICAR –Indian Institute of Groundnut Research, Junagadh, 17 September 2025.

Dr G. Sivakumar

Received Best Scientist Award from the Microbiologist Society of India in the International Conference on Microbial Innovations for Sustainable Agriculture and Medical Applications, Madurai Kamaraj University, Madurai, 16–17 December 2025.

Served as a Member, Research Advisory Committee, Seri Biotech Research Laboratory, Central Silk Board, Kodathi, Bengaluru

Dr M. Mohan

External Expert member in the Department of Entomology and Zoology, Faculty of Agriculture,

Institute of Agricultural Sciences, Banaras Hindu University, for the period 2025-26.

Selected as Department of Biotechnology nominee for the Institute Biosafety Laboratory committee of the University of Agricultural Sciences, Bengaluru, for the period 2023-25.

Dr K. Sreedevi

Received "Best Senior Scientist Award" by Asian PGPR Society at Tenth Asian PGPR National Conference, CSIR–Indian Institute of Integrative Medicine (IIIM) in Jammu, 15–17 September 2025.

Dr Deepa Bhagat

Received SBA – Dr M. Swamiappan Award for "Outstanding contributions in the field of Biointensive IPM" at the Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025) at Radisson Blue Atria, Bengaluru during 25–28 February 2025.

Received the Best Oral Presentation Award paper titled "Ecofriendly Pest Management: Innovations in Pheromone Formulations and Nanosensors for Sustainable Agriculture" at the Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025) at Radisson Blue Atria, Bengaluru, 25–28 February 2025.

Served as a Task Force Member of the Department of Biotechnology on Plant Biotechnology 2023 to till date.

Dr Mahesh Yandigeri

Awarded Associateship of Karnataka Science and Technology Academy, Department of Science and Technology, Government of Karnataka, 18 January 2025.

Received Best Oral Presentation for the paper titled, 'Insect Antimicrobial peptides: Possible alternatives for antimicrobial resistance' in the National Conference on Antimicrobial Resistance: Strategies for Prevention and Alternatives, Karnataka Science and Technology Academy, Bengaluru, 14–16 May 2025.

Dr R. Gandhi Gracy

Received ESI-Senior Entomologist Award-2024 by Entomological Society of India for the Life time achievements in the field of Molecular Entomology.

Serving Member, Review Committee on Genetic Manipulation, Department of Biotechnology, New Delhi (21 July 2025 to 20 July 2028).

Member, Board of Studies for Education- Annamalai University, Chidambaram.

Serving Member, Central Compliance Committee, Department of Biotechnology, New Delhi Member, Board of Studies for Education- Annamalai University from 20 February 2024 to 29 April 2025.

Dr B. S. Gotyal

Fellow of the Society for Applied Zoologists Research Association (AZRA), Odisha, Bhubaneshwar.

Dr Ankita Gupta

Received the Best oral presentation award for the paper titled "Drawing phylogenetic relationships between completely parasitic and entomo-phytophagous species of Braconidae with disparate morphologies and cross-taxon hosts" in the Second International Conference on Biological Control: Biocontrol contributions to one health, Radisson Blu Atria, Bengaluru, 25–28 February 2025.

Dr G. Mahendiran

Received the Best Scientist Award – 2025 during the 33rd Institute Foundation Day, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 19 October 2025.

Dr M. Sampath Kumar

Received Best oral presentation award to the research paper titled "Assessing the impact of the classical biological control agent *Anagyrus lopezi* against *Phenacoccus manihoti* in cassava plantations of India" in the Second International Conference on Biological Control: Biocontrol contributions to one health, Radisson Blu Atria, Bengaluru, 25–28 February 2025.

Dr K. J. David

Received Best Presentation Award (Third Prize) in the 110 hours Hackathon on Biodiversity Conservation and Climate Change in commemoration of 110 years of Zoological Survey of India, Western Ghat Regional Centre, Kozhikode, 27 May 2025.

Received Society for Biocontrol Advancement - Dr H. Nagaraja Memorial Award for Outstanding Contribution to Systematics of insects including mites and spiders during the Valedictory function, Second International Conference on Biological Control: Biocontrol contributions to one health, Radisson Blu Atria, Bengaluru, 25–28 February 2025.

Dr S. Salini

Recognised as a Life member of International Heteropterists Society, Washington DC, United Society of America.

Dr Jagadeesh Patil

Received Best rapid oral presentation for the paper titled "Indigenous entomopathogenic nematodes (Heterorhabditidae and Steinernematidae): efficient biological control agents against the cutworm, *Agrotis ipsilon* (Hufnagel) (Lepidoptera: Noctuidae), in potato cultivation", Second International Conference on Biological Control: Biocontrol Contributions to One Health, Radisson Blu Atria, Bengaluru, 25–28 February 2025.

Received Best rapid oral presentation for the paper titled "Ecological Characterisation of *Steinernema shori* (Nematoda: Steinernematidae) a warm-adapted", Second International Conference on Biological Control: Biocontrol Contributions to One Health, Radisson Blu Atria, Bengaluru, 25–28 February 2025.

Dr K. Selvaraj

Received Best Rapid Oral Presentation award (as co-author) for the paper titled, "Invasive whiteflies and their secret saviours in India on custard apple at Bengaluru, Karnataka, India" in the Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025), Radisson Blue Atria, Bengaluru, 25–28 February 2025.

Best Oral Presentation award (as co-author) for the paper on "Development of Species-Specific Marker for the identification of Solanum Whitefly (*Aleurotrachelus trachoides*)" in the Entomology Students Conclave 2025, Assam Agricultural University, Jorhat, 15–17 March 2025.

Received Best Poster Presentation Award for the paper on Integrative Taxonomy of Invasive Whiteflies and its Natural Enemies in India – a story of Decade in the Animal Taxonomy Summit 2025, Zoological Survey of India, Kolkata, 1–3 July 2025.

Best (Rapid Oral) Presentation award (as co-author) for the paper on "Conservation Biological Control for Rugose Spiralling Whitefly, *Aleurodicus rugioperculatus* Martin in Coconut" in the Virtual National Symposium on Technological Advancements: Emerging Trends in Entomology, Sher-e-Kashmir University of Agricultural Sciences & Technology (SKUST), Srinagar (Virtual), 9 October 2025.

Received The Professor T.N. Ananthakrishnan Award for Senior Scientist 2024-25 from Professor T.N. Ananthakrishnan foundation, Chennai, Tamil Nadu, 15 December 2025.

Dr U. Amala

Received SBA–T.M. Manjunath Young Scientist Award for Significant contributions for Biological Control Research in the Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025), Radisson Blue Atria, Bengaluru, 25–28 February 2025.

Received Best Oral Presentation Award for the paper titled, "Unravelling the potential of Aphid hunter solitary wasp, *Carinostigmus costatus* Krombein (Hymenoptera: Sphecidae) in the natural regulation of phytophagous aphids" in the Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025), Radisson Blue Atria, Bengaluru, 25–28 February 2025.

Dr S. D. Sagar

Received Applied Zoologist Research Association (AZRA) Young Scientist Award-2024, Bhubaneshwar, Odisha.

Received Society of Plant Research (SPR) Young Scientist Award 2025, Noida.

Received Karnataka Science and Technology Academy (KSTA) Associateship, Bengaluru.

Best Oral Presentation Award in Entomology Students Conclave-2025 held at Assam Agricultural University, Jorhat, Assam, 15–17 March 2025.

Best Poster Presentation Award (First Place) in Annual Post Graduate Students National Conference on Agri-Tech Nexus: Bridging Science, Sustainability and Food Security at S V Agricultural College, Tirupati, India, 22–23 April 2025.

Best Oral Presentation Award (First place) in International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025), Keladi Shivappa Nayaka Agricultural and Horticultural Sciences, Shivamogga, 27–29 November 2025.

Dr Gundappa

Selected as Fellow, Society for Biocontrol Advancement, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru

Awarded Associateship of Karnataka Science and Technology Academy, Department of Science and Technology, Government of Karnataka, 18 January 2025.

Dr Richa Varshney

Received the Entomological SI Young Scientist Award-2023 by the Entomological Society of India on 07.01.2025 at New Delhi.

Received Dr Chandish R Ballal team award for "Outstanding Extension Work in Biological Control" by the Society of Biocontrol Advancement, India in the Second International Conference on Biological Control: Biocontrol contributions to one health, Radisson Blu Atria, Bengaluru, 25–28 February 2025.

Received Best Oral Presentation Award for the paper titled "Multistage Predator, Multipest Solution: Unveiling the IPM Potential of *Geocoris ochropterus*" in the National Conference on Advances in Sustainable Plant Protection under Changing Agriculture Scenario, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, 18–20 September

Received Young Women Scientist Award for outstanding contribution in plant protection by the Entomological Research Association, Department of Entomology, MPUAT Udaipur in the National Conference on Advances in Sustainable Plant Protection under Changing Agriculture Scenario, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, 18–20 September 2025.

Dr C. Manjunatha

Received Young Agricultural Scientist Award-2024 from Dr B. Vasanthraj David Foundation, Chennai.

Received Rising Star Environmentalist Award-2024 from AVIAN Trust, Bengaluru .

Received Best Poster Award at National Conference on Plant Health for Food Security: Threats and Promises, organised by Indian Phytopathological Society and ICAR–Indian Institute of Sugarcane Research, Lucknow, 1–3 February 2025.

Dr R. S. Ramya

Best Oral Presentation Award for the paper titled "Cracking the code before the cut: optimising oviposition in *Spodoptera frugiperda* for efficient CRISPR/Cas9 genome editing" in the International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025) held at the College of Agriculture, Shivamogga, 27–29 November 2025.

Dr N. N. Rajgopal

Received Best Oral Presentation award for: Rajgopal, N. N., Ankita Gupta and S.N. Sushil. 2025. Leafhopper diversity in the Andaman and Nicobar Islands: Insights from the Preliminary Study. Second International Conference on Biological Control: Biocontrol Contributions to One Health at Radisson Blue Atria, Bengaluru during 25–28 February 2025.

Dr B. S. Manjunath

Received Best Oral Presentation award for the paper titled "Effect of pectinolytic and xylanolytic bacterial strains from termite gut for retting and quality fibre production from jute", Second International Conference on Biological Control: Biocontrol Contributions to One Health at Radisson Blue Atria, Bengaluru, 25-28 February 2025.

Dr K. T. Shivakumara

Received the Young Environmentalist Award by AVIAN TRUST, Bengaluru, 14 December 2025

Dr. S. N. Sushil, Director, ICAR-NBAIR Received the Rajbhasha Shield as the First Prize for the year 2024-2025 from Town Official Language Implementation Committee (O-2), Bengaluru

8. AICRP COORDINATION UNIT AND CENTRES

S. No.	Regular centres
1	Anand Agricultural University, Anand
2	Assam Agricultural University, Jorhat
3	Acharya N.G. Ranga Agricultural University, Anakapalle
4	Govind Ballabh Pant University of Agriculture and Technology, Pantnagar
5	Kerala Agricultural University, Thrissur
6	Mahatma Phule Krishi Vidyapeeth, Pune
7	Punjab Agricultural University, Ludhiana
8	Professor Jayashankar Telangana State Agricultural University, Hyderabad
9	Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar
10	Tamil Nadu Agricultural University, Coimbatore
11	Y.S. Parmar University of Horticulture and Forestry, Solan
	Voluntary centres
12	Central Agricultural University, Pasighat
13	Maharana Pratap University of Agriculture & Technology, Udaipur
14	Odisha University of Agriculture & Technology, Bhubaneswar
15	University of Agricultural Sciences, Raichur
16	ICAR-Central Institute of Subtropical Horticulture, Lucknow
17	ICAR-Central Plantation Crops Research Institute, Kasargod
18	ICAR-Indian Institute of Horticultural Research, Bengaluru
19	ICAR-Indian Institute of Millet Research, Hyderabad
20	ICAR-Indian Institute of Rice Research, Hyderabad
21	ICAR-Indian Institute of Vegetable Research, Varanasi
22	ICAR-National Centre for Integrated Pest Management, New Delhi
23	Dr. Y.S.R. Horticultural University, Ambajipeta
24	Indira Gandhi Krishi Vishwavidyalaya, Raipur
25	Regional Agricultural Research Station, Kumarakom
26	Regional Agricultural Research Station, Vellayani
27	Uttar Banga Krishi Viswavidyalaya,
28	Panjabrao Deshmukh Krishi Vidyapeeth, Pundibari
29	Sher-e-Kashmir University of Agricultural Sciences & Technology, Jammu
30	University of Agricultural & Horticultural Sciences, Shivamogga
31	Citrus Research Station, Dr. Y.S.R. Horticultural University, Tirupati
32	Sugarcane Breeding Institute, Coimbatore
33	Winter Nursery Centre, ICAR-Indian Institute of Millets Research, Hyderabad
34	National Institute of Plant Health Management, Hyderabad
35	College of Agriculture (CAU), Lembucherra, Agartala
36	National Rice Research Institute, Cuttack
37	Directorate of Floriculture Research, Pune
38	National Research Centre on Litchi, Muzafarpur
39	National Institute for Research on Commercial Agriculture, Rajahmundry
40	CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur
41	Tapioca & Castor Research Station (TNAU), Yethapur, Salem

9. ONGOING RESEARCH PROJECTS

A. Institute projects

DIVISION OF GERMPLASM COLLECTION AND CHARACTERISATION

1. Taxonomic studies on Coccoidea (Hemiptera) with special reference to Pseudococcidae, Coccidae, Diapsididae, Monophlebidae and Rhizoecidae (01.08.2022 to 28.02.2027) – Dr Sunil Joshi

2. Taxonomic studies on Indian Curculionids (Coleoptera) with emphasis on Dryophthorinae (01.08.2022 to 31.03.2027) – Dr G. Mahendiran

3. Taxonomic studies on Braconidae with special reference to Cheloninae, Microgastrinae and Braconinae with emphasis on host-parasitoid association in India (01.04.2021 to 31.03.2026) – Dr Ankita Gupta

4. Biodiversity and Systematic studies on entomopathogenic nematodes with a special reference to Western Ghats of India (16.05.2023 to 16.04.2028) – Dr Jagadeesh Patil

5. Taxonomic studies on Tephritoidea (Diptera) of India with special reference to Tephritidae, Platystomatidae, Ulidiidae and Pyrgotidae (01.04.2020 to 31.03.2025) – Dr K.J. David

6. Systematic studies on fruit flies (Diptera: Tephritidae) of India (01.4.2025 to 31.3.2030) – Dr K.J. David

7. Taxonomy of Pentatomoidea (Hemiptera: Heteroptera) of India with special reference to Pentatomidae and Tessaratomidae (01.04.2020 to 31.03.2025) – Dr S. Salini

8. Taxonomy of economically important generic groups in Pentatomoidae (Hemiptera: Heteroptera) of India (01.4.2025 to 31.3.2030)) – Dr S. Salini

9. Taxonomy of Indian jumping spiders (Salticidae: Araneae) with reference to crop agroecosystem (01.04.2016 to 31.03.2026) – Dr M. Sampath Kumar

10. Taxonomic studies on Thysanoptera of India with special reference to Tubulifera (01.04.2024 to 31.03.2029) – Dr R.R. Rachana

11. Faunal composition and diversity of Trichogrammatidae (Chalcidoidea: Hymenoptera) in cultivated and natural habitats (16.05.2023 to 16.04.2028) – Dr Navik Om Prakash Samodhi

12. Taxonomy and diversity of Indian leafhoppers (Hemiptera: Cicadellidae) with special reference to subfamily Deltocephalinae from South India (01.04.2025 to 31.03.2029) – Dr Rajgopal, N.N.

DIVISION OF GERMPLASM CONSERVATION AND UTILISATION

III. Biodiversity conservation, behavioural studies and maintenance and utilization of arthropod germplasm

1. Molecular diagnostics of Agriculturally Important Insects through DNA Barcodes. (01.04.2020 to 31.03.2025) – Dr T. Venkatesan

2. Development of field deployable molecular based diagnostic kits for rapid identification of economically important insect pests (01.4.2025 to 31.3.2030) – Dr T. Venkatesan

3. Genome analysis and gene knockout studies using genomic tools in selected insect species (16.05.2023 to 16.04.2027) – Dr M. Mohan

4. Geo Mapping of predominant insect pests and their natural enemies including invasive species in India (01.08.2022 to 31.03.2026) – Dr M. Pratheepa

5. Studies on black soldier fly and associated microorganisms for their utilization (01.04.2020 to 31.03.2025) – Dr Mahesh Yandigeri
6. Bioprospecting of microbial metabolites in pest management (01.4.2025 to 31.3.2030) – Dr Mahesh Yandigeri
7. Gene characterization, identification and validation of gene silencing approach against *Maconellicoccus hirsutus* and *Phenacoccus manihoti* (01.08.2022 to 31.03.2026) – Dr R. Gandhi Gracy
8. Molecular diversity of economically important mealybugs and their associated natural enemies in different ecosystems (01.08.2022 to 31.03.2026) – Dr B.S. Gotyal
9. CRISPR/Cas9 mediated gene editing in agriculturally important insect pests (01.04.2024 to 31.03.2029) – Dr Sagar, D
10. Molecular studies on the virulence of *Bacillus thuringiensis* against fall armyworm and root grubs (01.04.2021 to 31.03.2026) – Dr C. Manjunatha
11. Development and molecular studies of improved strains of selected natural enemies for insecticide resistance (01.08.2022 to 31.03.2026) – Dr R.S. Ramya
12. Prospects of chitinolytic bacteria from shrimps waste for lepidopteran pest management (01.04.2024 to 31.03.2027) – Dr Manjunatha BS

DIVISION OF GERMPLASM CONSERVATION AND UTILISATION

III. Biodiversity conservation, behavioural studies and maintenance and utilization of arthropod germplasm

1. Microbial volatilome for management of *Plutella xylostella* and *Phthroimaea (Tuta) absoluta* (01.04.2023 – 01.04.2028) – Dr K. Subaharan
2. Tailoring strategies to introduce acaropathogens and predatory mites for biological control in protected and open-field crops (01.08.2022 to 31.03.2027) – Dr P. Sreerama Kumar
3. Developing of microbial consortia for the management of crop pests. (17.05.2023 to 17.04.2028) – Dr G. Sivakumar
4. Nanomaterials and their effects on natural pest-control agents including parasitoids, predators, and beneficial insects (17.05.2023 to 17.04.2028) – Dr Deepa Bhagat
5. Controlled release Pheromone Formulations for management of the Plassey borer, *Chilo tumidicostalis* Hampson. and the Gurdaspur borer, *Acigona steniellus* Hampson. (17.05.2023 to 17.04.2028) – Dr Deepa Bhagat
6. Collection, characterization and development of suitable formulation for entomopathogenic fungi and under exploited entomogeneous bacteria for the management of major lepidopteran and coleopteran pests (01.10.2020 to 31.03.2026) – Dr A. Kandan
7. Standard operating procedures for delivery of Bioagents using drones (01.04.2023 to 31.03.2026) – Dr K. Selvaraj
8. Development of colony establishment techniques for subterranean nesting solitary bees with special emphasis on subfamilies Anthophorinae and Nomiinae (01.04.2024 to 31.03.2029) – Dr U. Amala
9. Bio-ecology and management of thrips complex in horticultural crops (1.10. 2022 to 31.03.2027) - Dr Gundappa

10. Ecology and biosystematics studies on emerging lepidopteran insect pests and their associates natural enemies (01.04.2023 to 31.03.2028)- Dr Gundappa

11. Investigation on interactions between the entomopathogenic microbes and natural enemies (01.10.2020 to 31.03.2026) – Dr Richa Varshney

12. Ecological studies and exploration of biocontrol potential of egg-larval parasitoids *Chelonus* Spp through olfactory condition (01.04.2024 to 31.03.2029) – Dr Prabhulinga, T.

ITMU

IV. Technologies developed and commercialised by the Bureau

1. ICAR under NAIF Component -1: Strengthening of the institutional mechanism to protect/manage innovations/intellectual properties (IPs) generated at ICAR-NBAIR (01.04.2020 to 31.03.2025) – Dr R. Gandhi Gracy

B. List of external funded projects

DIVISION OF GERMPLASM COLLECTION AND CHARACTERISATION

1. ICAR–National Fellow: Biogeography and biosystematics of whitegrub fauna (coleopteran: Scarabaeidae) of various agroclimatic zones of India (28.10.2022 to 28.10.2027) – Dr K. Sreedevi

2. ICAR under CRP Agrobiodiversity: Insect Biodiversity (2021-2026) – Dr K. Sreedevi

3. DST–ANRF: Biodiversity and systematic studies on weevils (Curculionidae: Coleoptera) with special reference to Eastern Ghats of India (10.02.2022 to 09.02.2025) – Dr G. Mahendiran

4. CABI: Biodiversity surveys on Indian native plant species to identify candidate biological control agents for use in other countries where those species have become invasive alien weeds following their accidental introduction (2024-2028) - Dr Ankita Gupta

5. DST–ANRF: Taxonomic studies on species complexes in selected parasitoids (Braconidae: Hymenoptera (10.02.2022 to 09.02.2025) – Dr Ankita Gupta

6. DST–ANRF: Community structure and dynamics of parasitoid wasps and their butterfly hosts in a complex ecological system (14.08.2023 to 13.08.2026) – Dr Ankita Gupta

7. DST–ANRF: Faunistic studies on bamboo-shoot fruit flies (Dipetera: Tephritidae) of western Ghats and Northeast India (14.08.2023 to 13.08.2026) – Dr K.J. David

8. Godrej Agrovet: To study the efficacy of fruit fly trap in attracting peach fruit fly, *Bacterocera zonata* (01.04.2023 to 31.03.2024) – Dr K.J. David

9. DST–ANRF: Taxonomy and diversity of Terebrantian thrips (Thysanoptera: Terebrantia) from south India with special reference to Western Ghats (10.02.2022 to 09.02.2025) – Dr R.R. Rachana

10.ICAR–DCR: Species complex of thrips infesting cashew, molecular characterization, and their management measures – Dr R.R. Rachana

DIVISION OF GENOMIC RESOURCES

11. CABin Network: Genome Manipulation for the management of important agricultural insect pests (01.04.2020 to 31.03 2026) – Dr T. Venkatesan

12. All India Network Project (AINP) on Emerging Pests: Management of Desert locust *Schistocera gregaria* (14.11.2024 to 31.03.2026)-Dr T. Venkatesan

13. ICAR-Corpus Fund for Vikshit Bharat Project: Novel Molecular Diagnostics and Biopesticides- An eco-smart tool for Management of Invasive whiteflies in major Horticultural Crops (2025-2028) -Dr T. Venkatesan

14. ICAR under CRP Genomics mode: Insect Genomics - Whole genome and transcriptome sequencing (01.04.2020 to 31.03.2026) – Dr M. Mohan

15. ICAR-IARI: Enhancing climate resilience and ensuring food security with genome editing tools (01.04.2023 to 31.03.2026) – Dr M. Mohan

16. Bioseed Research, Hyderabad: Toxicity and specific studies of *Bacillus thuringiensis* recombinant toxins (24.07.2024 to 23.01.2025) – Dr M. Mohan

17. Rasi Seeds, Salem: Baseline sensitivity studies of cotton bollworms to a novel insecticidal protein (27.9.2024 to 30.3.2026) – Dr M. Mohan

18. AMAAS: Exploitation of endosymbionts of insect pests for pest management (01.04.2017 to 31.03.2026) – Dr Mahesh S. Yandigeri

19. ICAR–NNP: Agri-Genomic Repository and Intelligent Analytical System (23.01.2024 to 23.01.2029) – Dr Gandhi Gracy

20. ICAR–IISS: Integrated approaches for the management of pulse beetle, *Callosobruchus* spp (01.8.2022 to 31.03.2026) – Dr R.S. Ramya

DIVISION OF GERMPLASM CONSERVATION AND UTILISATION

21. DBT: Controlled release of olfactory cues for management of lesser grain weevil, *Sitophilus oryzae* a stored product pest of rice (26.12.2023 to 26.12.2026) – Dr K. Subaharan

22. AINP: Non pesticidal approaches for the management of fall armyworm *Spodoptera frugiperda* (JE Smith) and their adoption in containing the pest spread in India (14.11.2024 to 31.3.2026) – Dr K. Subaharan

23. CSB: Profiling of lipid, protein and carbohydrate of mulberry mealybug *Maconellicoccus hirsutus* (Green) for its control (21.10.2023 to 31.03.2025) – Dr K. Subaharan

24. ICAR–NIBSM: Evaluation of nanoformulations of insect sex pheromones (01.7.2021 to 30.6.2026) -Dr. K. Subaharan

25. RKVY: Setting up of mass production unit for macrobials, microbials and pheromones: Advancing Eco- friendly pest management and strengthening farmers livelihood co-operation (28.4.2025 to 31.3.2027) -Dr K. Subaharan

26. Quad AI Engage initiative: Bridging Global Knowledge and Local Needs through AI for Enhanced Agricultural Production, Sustainability and Resiliency (01.10.2025 to 30.9.2028) -Dr K. Subaharan

27. BIAL: Ecofriendly measures to contain the pest incidence on garden plants (2025-2027) - Dr. P. Sreerama Kumar

28. AMAAS: Development of formulations of *Beauveria bassiana*, *Metarhizium anisopliae* and *Lecanicillium* spp. for the management of sucking pests in vegetable crops (01.04.2017 to 31.03.2026) – Dr A. Kandan

29. ICAR–DCR: Development of an eco-friendly and cost effective pest management strategy for cashew using plant and microbial-based pesticides –Dr A. Kandan

30. ICAR-DWR: Introduction of the new bio-agent *Megamelus scutellaris* and evaluation of *Neochetina* spp. Dynamics in *Eichornia crassipes* management (12.7.2024 to 30.6.2026)- Dr. M. Sampathkumar

31. ICAR–ATARI: Drone Technology demonstrations (20.06.2022 to 31.03.2025) - Dr K. Selvaraj

32. CDB: Generation of toxicological data for registration of *Isaria fumosorosea* in CIBRC and demonstration of biocontrol agents for management of Invasive Whiteflies in Coconut (01.12.2023 to 31.03.2025) – Dr K. Selvaraj

33. DST–ANRF: Integrative taxonomic studies on species diversity of whiteflies (Hemiptera: Aleyrodidae) and their potential natural enemies (19.02.2024 to 19.02.2027)-Dr K. Selvaraj

34. ICAR-Corpus Fund for National Priority Projects: Climate-responsive biosuppression of exotic whitefly invasion on coconut (2025-2028) -Dr K. Selvaraj

35. DST–ANRF: Enhancing the pollination in fennel (*Foeniculum vulgare* Mill.) by syrphid fly, *Ishchiodon scutellaris* Fabricius (10.02.2022 to 09.02.2025) – Dr U. Amala

36. NBHM: Quality nucleus stock development centre & trainings (Development of a model stingless bee villages in Chamrajanagar (23.7.2025 to 23.7.2027) – Dr U. Amala

37. Quad AI Engage initiative HARVEST: Holistic AI-powered Agricultural Response Validation and Early Prediction System across Territories (01.10.2025 to 30.9.2028) -Dr. Gundappa

10. PUBLICATIONS

Peer-reviewed articles

Aditya, K., Kotasthane, A. S., Manjunatha, C., Nanditha, S., Ramya, R. S., Shivakumara, K. T., Gotyal, B. S., & Sushil, S. N. (2025). Unveiling the insecticidal gene profile of novel antifungal *Bacillus thuringiensis* strain NBAIR BtAr. *Phytoparasitica*, *53*, 88.

Amal, P., Haseena, B., Rachana, R. R., Neena, L., & Abida, P. S. (2025). Thrips fauna (Thysanoptera: Terebrantia: Thripidae) associated with ornamental plants of Kerala. *Indian Journal of Entomology*, *88*(2), 379–386.

Amala, U., Shamappa, V. H., Tenguri, P., & Subaharan, K. (2025). 'Soil and Bee': Unravelling the nesting preference of the pearly-banded bee, *Hoplonomia westwoodi* (Nomiinae: Halictidae). *Animal Biology*, 75(3), 243–257.

Amala, U., Venu, H. S., Shivalingaswamy, T. M., Shylesha, A. N., Subaharan, K., & Sushil, S. N. (2025). A Unique foraging behaviour of honey bees on the fallen flowers of an Indian beech tree (*Millettia pinnata* L.). *Sociobiology*, *72*(3).

Amala, U., Venu, H. S., Shivalingaswamy, T. M., Subaharan, K., & Sushil, S. N. (2025). First report of nesting behaviour, pollen preference and seasonality of wood boring bee, *Lithurgus atratus* Smith in the reeds of *Ipomoea carnea* Jacq. *International Journal of Tropical Insect Science*, *45*, 339–347.

Anes, K. M., Patil, J., Babu, M., Aarthi, N., Gotyal, B. S., Joseph Rajkumar, A., Mhatre, P. H., Sajan, J. V., Gowda, M. T., Sushil, S. N., & Půža, V. (2025). *Steinernema keralense* n. sp., a new entomopathogenic nematode (Nematoda: Steinernematidae) from India. *Journal of Helminthology*, *99*, 1–16.

Ankitha, K. S., Radha, T. K., Ruqiya, S., Aditya, K., Lavanya, S. M., Kandan, A., Sivakumar, G., Ramya, R. S., & Manjunatha, C. (2025). Metabolomic profiling and genome-wide analysis of *Bacillus subtilis* NBAIR-BSWG1 reveals cyclic lipopeptides as key antagonists. *Journal of Basic Microbiology, 65*(7), e70007.

Arora, S., Ramya, R. S., Navik, O., Stanley, J., Patil, N., Adak, T., Jena, M., Srivastava, C., Gupta, J. P., & Pandey, D. (2025). Unmasking phosphine: Assessing its continued effectiveness on stored product insects in India across populations and life stages. *International Journal of Tropical Insect Science*, *45*(1), 159–172.

Arya, P., Rajna, S., Chander, S., Dey, D., Prabhulinga, T., Yele, Y., & Joni, K. (2025). Recognizing the importance of ecoinformatics in agricultural entomology. *Annual Research & Review in Biology*, *40*(1), 15–24.

Bandyopadhyay, S., Moitra, P., Bhagat, D., Biswas, P., Basumallick, N., Dey, T. K., Bandyopadhyay, S., & Bhattacharya, S. (2025). Bioengineering of long-period fiber grating for the selective detection of female sex pheromone of *Helicoverpa armigera*. *Analytical Sensors*, 1–11.

Banerjee, D., Venkitesh, V., Subaharan, K., & Dash, S. (2025). Impact dynamics of polymer and emulsion droplets on a nonwetting substrate. *Physics of Fluids*, *37*(8).

Bhagyashree, S. N., Timmanna, Rakshith, H. S., Ramesh, K. B., Gundappa, B., & Suroshe, S. S. (2025). Bionomics and two sex life table of *Coranus siva* (Kirkaldy): a new potential predator of fall armyworm, *Spodoptera frugiperda* (J. E. Smith). *Indian Journal of Agricultural Sciences*, *95*(11).

Calcetas, O. A., Gupta, A., Magdaraog, P. M., Mendoza, A. R., Virrey, M. A., Gatbonton, M. C. C., Doping, J. F. G., Sandoval, S. S., Soberano, M. A., Marasigan, P. F., & Adorada, J. L. (2025). First record of *Habrobracon brevicornis* (Wesmael) (Hymenoptera: Braconidae) as a larval parasitoid of *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae) in the Philippines: historical incidence and impact on *Trichogramma* spp. mass production systems. *Philippine Journal of Science*, *154*(5), 1101–1114.

Chandrashekhar, B. S., Prasannakumar, M. K., Aditya, K., Manjunatha, C., Pramesh, D., Karan, R., Swathi, S. P., & Sateesh, K. (2025). *Enterobacter cloacae*: A newly identified soft rot pathogen of radish with cross-species pathogenicity. *World Journal of Microbiology and Biotechnology*, *42*(1), 14.

Channappa, M., Venkatesan, T., Shivakumar, N., Shivakumara, K. T., Nishtha, N., Mohan, M., Gracy, G. R., Ramya, R. S., Kukreti, A., Karthik, C. M., Selvamani, S., Pathak, J., & Sushil, S. N. (2025). Recombinase polymerase amplification assay for sensitive and rapid detection of invasive fall armyworm, *Spodoptera frugiperda*. *Scientific Reports*, *15*, 18026.

Chandrashekhar, B. S., Prasannakumar, M. K., Aditya, K., Manjunatha, C., Pramesh, D., Karan, R., Swathi, S. P., & Sateesh, K. (2025). *Enterobacter cloacae*: A newly identified soft rot pathogen of radish with cross-species pathogenicity. *World Journal of Microbiology and Biotechnology*, *42*(1), 14.

Channappa, M., Venkatesan, T., Shivakumar, N., Shivakumara, K. T., Nishtha, N., Mohan, M., Gracy, G. R., Ramya, R. S., Kukreti, A., Karthik, C. M., Selvamani, S., Pathak, J., & Sushil, S. N. (2025). Recombinase polymerase amplification assay for sensitive and rapid detection of invasive fall armyworm, *Spodoptera frugiperda*. *Scientific Reports*, *15*, 18026.

Chethan, V. M., Shylesha, A. N., Nanditha, S., Aditya, K., Ruqiya, S., Vijaykumar, K. T., Venkatesan, T., Ramya, R. S., Selvababu, S., Sushil, S. N., Shivakumara, K. T., & Manjunatha, C. (2025). Development of a rapid, sensitive, colorimetric isothermal amplification detection assay for on-site detection of Thai sacbrood virus in Indian Honeybee, *Apis cerana* F. *Journal of Agriculture and Food Research*, *23*, 102240.

David, K. J., Hancock, D. L., Reshma, E. A., Jothish, P. S., Ningthoujam, K., Niladri, B. M., Abhishek, V., & Noor Mahammed, N. R. (2025). Two new species of *Euphranta* Loew (Diptera, Tephritidae, Trypetinae, Adramini) from India. *Deutsche Entomologische Zeitschrift*, *72*(2), 367–375.

David, K. J., Noor Mahammed, N. R., Hancock, D. L., Gracy, R. G., Ningthoujam, K., & Sushil, S. N. (2025). Taxonomic notes on Oriental bamboo-shoot fruit fly genus *Acroceratitis* Hendel (Diptera: Tephritidae: Dacinae: Gastrozonini), with description of a new species from India. *Zootaxa*, *5637*(1), 83–98.

Deepika, I., Singh, A., Kumar, I. K. G., Gnanasekaran, R., Dubey, H., Debnath, R., Shukla, P., Ponnuvel, K.M., Kumar, V., Arunkumar, K. P., Gadad, H., Sangannavar, P., Neog, K., Sivaprasad, V., Moorthy, S. M., Santhoshkumar, R., Sivakumar, G., Ghosh, S.,

Subramanya, H. S., & Subrahmanyam, G. (2025). Biological and genomic characterization of a cypovirus isolated from golden muga silkworm,*Antheraea assamensis* Helfer (Lepidoptera: Saturniidae). *Journal of Invertebrate Pathology*, DOI: 10.1016/j.jip.2025.108343.

Desai, K. C., Kambrekar, D. N., Naveen, V., Krishnaraj, P. U., Biradar, S., Sugandi, R., Chandrashekhar, S. S., Shivakumara, K. T. and Jepi, V. D. (2026). Investigations on sweet flag (*Acorus calamus* L.) based silver and zinc nanoparticles against *Sitophilus oryzae* L. in wheat. *Journal of Stored Products Research*, *116*, 102945.

Desavath Gouthami, D., Bhaskar, H., Joshi, S., Vidya, C. V., Deepthy, K. B., & Chellappan, M. (2025). Diversity and host range of the tribe Saissetiini (Hemiptera: Coccomorpha: Coccidae) in Kerala, India. *Pest Management in Horticultural Ecosystems*, *31*(1), 1–9.

Desavath Gouthami, D., Bhaskar, H., Joshi, S., Vidya, C. V., Deepthy, K. B., & Chellappan, M. (2025). Taxonomic note on the tribe Coccini in Kerala, south India and their hosts. *Indian Journal of Entomology*, *88*(3), 886–898.

Fand, B. B., Shah, V., Nagrale, D. T., Mahule, D. J., Gawande, S. P., Thube, S. H., Pandiyan, K., Ramteke, I., Kumar, R., Ramesh, K., & Prabhulinga, T. (2025). Field estimates of current and predicted cotton yield loss due to pink bollworm and boll rot in India. *Agricultural Systems*, *224*, 104246.

Firake, D. M., Joshi, S., Naveen Kumar, P., Saha, T. N., Dantuluri, V. S. R., & Prasad, K. V. (2025). Grey pineapple mealybug, *Dysmicoccus neobrevipes* Beardsley (Pseudococcidae: Hemiptera): an emerging pest of tuberose in India. *Current Science*, *128*(9), 946–950.

Gautam, V., Jambagi, S. R., & Mohan, M. (2025). Genome editing of detoxification gene repertoires in insects using clustered regularly interspaced short palindromic repeats (CRISPR): A systematic review and meta-analysis. *Pesticide Biochemistry and Physiology*, *215*, 106687.

George, A., Ramya, R. S., Raghavendra, D., Ramya, P., Manjanagouda, S. S., Shantharaja, C. S., Vanishree, G., Aruna, Y. R., Anandan, A.,& Sanjay Kumar. (2025).

Harnessing natural enemies for the biological management of seed-infesting pests. *Discover Applied Sciences*, *7*, 1441.

Gotyal, B. S., Choudhary, J. S., Joshi, S., Patil, J., Shivakumara, K. T., Gundappa, B., Ramya, R. S., Yandigeri, M. S., & Sushil, S. N. (2025). Pineapple mealybug, *Dysmicoccus brevipes* Cockerell (Hemiptera: Pseudococcidae): A new threat to garden pea, *Pisum sativum* L. in India. *International Journal of Pest Management*, DOI: 10.1080/09670874.2025.2561624.

Gracy, R. G., Reddy, K. V. N., Negi, N., Selvamani, S. B., Suman, T. C., Venkatesan, T., Samuel, D. K., & Sushil, S. N. (2025). The first report of Hibiscus latent Fort Pierce virus (HLFPV) from India and its first-ever insect association with the mealybug *Maconellicoccus hirsutus* (Green) (Hemiptera: Pseudococcidae). *Physiological and Molecular Plant Pathology*, *140*, 102854.

Gupta, A., Pattar, R., & Ajaykumara, K. M. (2025). First report of two Braconidae genera *Chrysopophthorus* Goidanich and *Tuberidelus* Chen & van Achterberg (Hymenoptera: Braconidae) with description of two new species from India. *Zootaxa*, *5642*(5), 485–492.

Gupta, A., Van Achterberg, C., Pattar, R., Ajaykumara, K. M., & Sushil, S. N. (2025). Revision of the genus *Aulacocentrum* Brues, 1922 (Hymenoptera: Braconidae: Macrocentrinae) from India with description of two new species and a key to the Indian species. *Biologia*, *80*, 1731–1745.

Gupta, A., Van Achterberg, C., Pattar, R., Hemanth Kumar, K. M., & Sushil, S. N. (2025). Revision of the genus *Canalirogas* van Achterberg & Chen (Hymenoptera: Braconidae) from India with description of four new species and a key to the Indian species. *Systematic Parasitology*, *102*, 19.

Halder, J., Karkute, S. G., Jose, A., & Mahendiran, G. (2025). Mango leaf cutting weevil (*Deporaus marginatus* (Pascoe)): Biology, incidence, biosystematics and molecular diversity. *Munis Entomology and Zoology*, *20*(2), 2281–2291.

Harish, J., Prasannakumar, M. K., Karan, R., Venkateshbabu, G., Vamsidharreddy, N., Pallavi, K. N., Patil, S. S., Devanna, P., Manjunatha, C., & Mahesh, H. B. (2025). *Trichoderma* spp. as a novel pathogen for maize post-flowering stalk rot in India. *Crop Protection*, *195*, 107255.

Hatwar, N. K., David, K. J., Hancock, D. L., Raghuraman, M., Gracy, R. G., & Srinivasa, N. (2025). A new species of *Rhochmopterum* Speiser (Diptera: Tephritidae: Tephritinae: Schistoperini) from India. *Zootaxa*, *5588*(1), 147–160.

Hemanth Kumar, H. M., Gupta, A., & Sharma, A. (2025). Description of a new species of *Heydenia* Förster, 1856 (Hymenoptera: Heydeniidae) from Southern India with two new distributional records. *Zootaxa*, *5711*(1), 93–113.

Jambagi, S. R., Mohan, M., Muralimohan, K., Venkatesan, T., & Sushil, S. N. (2025). Mass release of susceptible males dilutes Bollgard II® Bt resistance in pink bollworm: A semi-field validated strategy. *Biological Control*, *207*, 105822.

Jambagi, S. R., Mohan, M., Venkatesan, T., Muralimohan, K., Kambrekar, D. N., Mallapur, C. P., & Augustine, N. (2026). High levels of Bt cry toxin resistant allele frequency in South Indian populations of cotton pink bollworm, *Pectinophora gossypiella* Saunders (Gelechiidae: Lepidoptera). *Journal of Invertebrate Pathology*, *214*, 108452.

Jenifer, S. J., Selvababu, S., Venkatesan, T., Gracy, R. G., Subramanian, S., Menon, G., Sivakumar, G., & Manjunatha, C. (2025). Gut microbiota profiling of *Apis cerana indica* across biodiversity hotspots in the Western Ghats, India. *Molecular Biology Reports*, *53*, 35.

Jose, A., Samraj, M., Rachana, R. R., & Augustine, N. (2025). Pollinating Thysanoptera. *Indian Journal of Entomology*, *87*, 75–85.

Joshi, S., Dubey, A. K., Gupta, A., & Sushil, S. N. (2025). First reports of the soft scale insect genera *Leptopulvinaria* Kanda and *Pulvinarisca* Borchsenius (Hemiptera: Coccomorpha: Coccidae) from India, with descriptions of two new species and identification keys. *Zootaxa*, *5618*(4), 571–583.

Kandan, A., Swathi, H. D., Swapnapriya, Y., Rangeshwaran, R., Shylesha, A. N., Sivakumar, G., Amala, U., Manjunatha, C., Harish, M. N., Visalakshi, M., & Sushil, S. N. (2025).

Biocontrol potential of microbial biopesticides for management of invasive pest fall armyworm, *Spodoptera frugiperda* in maize. *Journal of Plant Diseases and Protection*, *133*(1), 6.

Karan, R., Prasannakumar, M. K., Harvinder, K. K., Harish, J., Vamsidharreddy, N., Venkateshbabu, G., Paramesh, P., Manjunatha, C., Palanna, K. B., & Raksesh, K. M. (2025). Molecular virulotyping and advancing the detection of *Magnaporthe oryzae* using a CRISPR-Cas12a-based diagnostic tool. *World Journal of Microbiology and Biotechnology*, *41*(5), 1–20.

Karan, R., Prasannakumar, M. K., Vamsidharreddy, N., Harish, J., Mahesh, H. B., Manjunatha, C., Pallavi, K. N., Devanna, P., Selvababu, S., & Sarangi, A. N. (2025). Rice-microbiome-metabolite crosstalk: Deciphering the defence signatures of traditional rice landraces against blast (*Magnaporthe oryzae*). *Plant Stress*, *18*, 101084.

Karthik, M. R., Gabriel, B., Hanamant, G., Ampi, B., Chodhary, N. B., Sushil, S. N., & Sreedevi, K. (2025). A new species of *Ichthyurus* (Coleoptera: Cantharidae: Chauliognathinae) preying on tasar silkworm, *Antheraea paphia* (Linnaeus) from India. *Zootaxa*, *5729*(2), 383–393.

Kaur, K., Chandel, M., Munikrishnappa, V. K. T., Kumar, P., Sahu, B. K., Ahamed, M., Manjunath, S., Gorantla, M., Olsson, S., Muthusamy, E., & Subaharan, K. (2025). Ecofriendly agriculture pest control using pheromone packed programed nanovolcanoes framed by graphene oxide. *Clean Technologies and Environmental Policy*, *27*(10), 5813–5823.

Kavin, P., Usharani, B., Jayanthi, P. D. K., Suresh, K., Gracy, G., & Singh, S. (2025). Insights into the morphometric and molecular characterisation of ber fruit fly (*Carpomyia vesuviana* Costa) infesting jujube ber, *Ziziphus mauritiana* (Lamk.). *Plant Protection Science*, *61*(4), 350–365.

Kment, P., Carapezza, A., Kóbor, P., Kondorosy, E., Rider, D. A., Roca-Cusachs, M., & Salini, S. (2025). Corrections to some recently published papers on Heteroptera (Hemiptera) II. *Journal of the International Heteropterists' Society*, *2*(4), 227–246.

Kumar, P., Swami, K., Tripathy, N., Urkude, R. R., Dadhich, A., Sharma, P., Singh, M., Subaharan, K., De Sarkar, A., & Shanmugam, V. (2025). Engineering single Pd atom in W18O49 nanowire for ultra-sensitive crop pest detection and remote data communication. *Chemical Engineering Journal*, 164854.

Lavanya, S. M., Manjunatha, C., Chandrashekar, K. S., Ramya, R. S., Radha, T., Divya, C., Raksha, S., Kavyaprabha, E., & Muthuraju, R. (2025). Characterization of indigenous *Bacillus thuringiensis* strains from the Western Ghats of Karnataka. *Mysore Journal of Agricultural Sciences*, *59*(4), 192–202.

Lavanya, S. M., Muthuraju, R., Ramya, R. S., Keerthi, M. C., Divya, C., Aditya, K., Sreedevi, K., Sushil, S. N., & Manjunatha, C. (2025). Unveiling the genomic landscape of NBAIR BtAe, a potential *Bacillus thuringiensis* strain against *Holotrichia serrata* F. *Letters in Applied Microbiology*, *78*(10), 117.

Mahendiran, G., Jose, A., Manu, B., & Sushil, S. N. (2025). Review of the genus *Hirsutopes* Pajni, 1990 (Curculionidae: Entiminae) with description of a new species from the Andaman Islands. *Oriental Insects*, *59*(3), 467–481.

Mahendiran, G., Poornima, G., Caldara, R., Manu, B., & Sushil, S. N. (2025). *Bagous obrieni* (Coleoptera: Curculionidae), a new species from India feeding on *Nymphoides indica* (L.) Kuntze. *Zootaxa*, *5633*(3), 583–592.

Mahendiran, G., Poornima, G., Chaithra, T. N., & Manu, B. (2025). *Imera setauropsis* and *Orsophagous indicus* (Curculioninae, Acalyptini), two new species from Tamil Nadu, India. *Annales Zoologici Fennici*, *62*, 13–19.

Mahendiran, G., Shankarganesh, K., Manivannan, A., Jose, A., Poornima, G., Chaithra, T. N., Gowtham, V., Priyatharsini, G., Prakash, A. H., Behere, G. T., & Sushil, S. N. (2025). Morphological and molecular characterization and note on the biology of cotton stem weevil, *Pempherulus affinis* (Faust) (Coleoptera:

Curculionidae). *International Journal of Tropical Insect Science*, *45*, 257–266.

Mahendiran, G., Venkatesh, Y. N., Jose, A., Manu, B., Ashajyothi, M., Sreedevi, K., & Sushil, S. N. (2025). Morpho-molecular identification of *Barioscapus cordiae* (Marshall) (Coleoptera: Curculionidae): a serious pest of *Cordia myxa* L. *Journal of Applied Research on Medicinal and Aromatic Plants*, *46*, 100638.

Mahendiran, G., Venkatesh, Y. N., Jose, A., Manu, B., Sreedevi, K., & Sushil, S. N. (2025). Redescription and life history characteristics of *Cionus meleagris* Marshall (Coleoptera: Curculionidae) on its host plant, *Dolichandrone falcata* (Wall. Ex DC.) Seem. *Indian Journal of Entomology*, 1190–1194.

Mahesh, Y., Yalashetti, S., Mohan, M., Sivakumar, G., Manjunatha, B. S., & Sushil, S. N. (2025). Insecticide degradation potential of aphid associated bacteria. *Biocatalysis and Agricultural Biotechnology*, *68*, 103703.

Manohar, S., Patra, B., Sahoo, S. K., Chakraborty, D., Basak, P., Debnath, A., Bhattacharya, P. M., Reddy, S. A., & Sivakumar, G. (2025). Evaluation of different solid substrates for mass multiplication of an insecticides-compatible native strain of *Beauveria bassiana* (Balsam) Vuillemin. *AMA-Agricultural Mechanization in Asia Africa and Latin America*, *56*(9), 21536–21545.

Manoj, M., Tamilvendan, K., Chavan, M., Selvakumar, G., Nagaraju, K., & Manjunatha, C. (2025). Prospecting indigenous Bt isolates for bioinsecticidal efficiency against soil-borne white grub, *Holotrichia serrata* (F.) (Coleoptera: Scarabaeidae). *Journal of Asia-Pacific Entomology*, *28*(2), 102406.

Mithun, V., Pooja, P., Pradeep, N. S., Ranjith, A. P., Jose, A., & Mahendiran, G. (2025). *Alcidodes erosa* (Coleoptera: Curculionidae), a new species from India feeding on *Hopea erosa* (Bedd.) Slooten, a critically endangered tree species of the Western Ghats. *Zootaxa*, *5701*(4), 483–491.

Mohan, M., Basavaarya, B. R., Ashok, K., Malarvizhi, S., Aneesha, P. J., Gracy, G. R., Venkatesan, T., Ramya, R. S., & Sushil, S. N. (2025). Investigating imidacloprid resistance in *Amrasca biguttula biguttula* (Ishida) (Hemiptera: Cicadellidae): Insights from RNA-Seq and functional validation using RT-qPCR. *Comparative Biochemistry and Physiology Part D: Genomics and Proteomics*, *56*, 101630.

Mohan, M., Venkatesan, T., Selvababu, S., Aneesha, P. J., Ashok, K., Budhwar, R., Gracy, G. R., & Sushil, S. N. (2025). High-quality genome assembly of a cosmopolitan insect predator, *Chrysoperla zastrowi sillemi* (Esben-Petersen). *Scientific Data*, *12*, 281.

Mridha, N., Nayak, D., Yadav, A., Mondal, T., Ghosh, R. K., Bhowmick, M., Singha, A., Ray, D. P., Manjunatha, B. S., Das, A., Shakyawar, D. B., Paul, S., Mukherjee, S., & Kumar, R. (2025). Eco-friendly sustainable farming: enhancing summer tomato (*Lycopersicon esculemtum* Mill.) yield with jute non-woven agro textile mulch. *Heliyon*, *11*(2), e42039.

Muniappan, R., Subaharan, K., Selvaraj, K., Sampathkumar, M., & Sushil, S. N. (2026). Role of biological control in management of invasive exotic arthropod pests and weeds in India. *Insects*, *17*(1), 61.

Nagrare, V. S., Naikwadi, B., Fand, B. B., Naik, V. C. B., Tenguri, P., Gokte-Narkhedkar, N., & Waghmare, V. N. (2025). Seasonal population trend and relative occurrence of pests and their natural enemies among cotton species and cultivars in India. *Journal of Cotton Research*, *8*(1), 12.

Neeraja, B., Rao, N. B. V. C., Sivakumar, G., Rao, G., Anoosha, V., Kireeti, A., & Mutyalanaidu, M. (2025). Field evaluation of *Trichoderma reesei* (Drysrhu), an effective biocontrol agent against *Phytophthora* pod rot in cocoa. *Journal of Biological Control*, *39*(3), 283–288.

Negi, N., Ramasamy, G. G., Selvamani, S. B., Reddy, K. V. N., Suman, T. C., Rao, A. S., Venkatesan, T., Mohan, M., Dubey, V. K., & Sushil, S. N. (2025). Stability analysis of reference genes in *Maconellicoccus hirsutus* across various conditions including dsRNA treatment. *Scientific Reports*, *15*, 42614.

Nekkanti, A., Patil, J., Soni, S., Mhatre, P. H., Gowda, M. T., Gotyal, B. S., & Sushil, S. N. (2025). Comparative efficacy of the recently identified entomopathogenic nematode, *Steinernema indicum*, with other native nematodes against the black cutworm, *Agrotis ipsilon* (Hufnagel) (Lepidoptera: Noctuidae), in potato crops. *Biocatalysis and Agricultural Biotechnology*, *70*, 103873.

Nekkanti, A., Patil, J., Soni, S., Patidar, R. K., Mhatre, P. H., Gowda, M. T., Vijaykumar, R., Gotyal, B. S., & Sushil, S. N. (2026). The combined application of entomopathogenic nematodes and insecticides: A strategy for the management of *Holotrichia serrata* (Coleoptera: Scarabaeidae) in sugarcane. *Crop Protection*, *202*, 107496.

Nicky, R. F., Ashok, K., Venkatesan, T., Wertheim, B., & Mariana, B. (2025). Leveraging advances in RNAi and CRISPR for improved biological pest control. *Current Opinion in Insect Science*, *73*, 101453.

Nysanth, N. S., Yadav, V., Gambhir, S., Pooniya, V., Sagar, D., Lama, A., Pal, K. K., & Swarnalakshmi, K. (2025). Endophytic *Bacillus* strains promote chickpea growth and performance: Insights from controlled and field studies. *Antonie van Leeuwenhoek*, *118*, 186.

Pande, R., Vivek, S., Prabhulinga, T., Thube, S., Ghonge, P., Behere, G. T., & Prasad, Y. G. (2025). Evaluation of vegetable oil as oviposition deterrent for management of old-world bollworm, *Helicoverpa armigera* (Hübner) in cotton. *Journal of Plant Diseases and Protection*, *132*(4), 129.

Pandey, S., Sundria, M. M., Sreedevi, K., Tripathi, A., Veena, N. V., & Singh, R. (2025). Morphological and molecular identification and management of chafer beetle, *Protaetia terrosa* Gory & Percheron in clusterbean in Rajasthan. *Indian Journal of Experimental Biology*, *63*, 167–173.

Parvez, R., Sagar, D., & Pankaj. (2025). Biological traits of native Indian entomopathogenic nematodes against gram pod borer, *Helicoverpa armigera* (Hubner) infecting chickpea. *Journal of Environmental Biology*, *46*(6), 861–867.

Pathak, J., Selvamani, S. B., Srivastava, S., Gopal, A., Suman, T. C., Gracy, G. R., Venkatesan, T., Mohan, M., Sharma, A., Kumar, S., & Jha, G. K. (2025). miR-92a-3p regulates egg fertilization through ribogenesis in the invasive fall armyworm *Spodoptera frugiperda*. *International Journal of Biological Macromolecules*, *295*, 139637.

Pattar, R., & Gupta, A. (2025). New species of *Rogasodes* Chen & He and *Wesmaelia* Foerster (Hymenoptera: Braconidae) from India. *Zootaxa*, *5683*(3), 433–442.

Pavan, M., Mahajan, S., Saini, K. S., Ammayappan, L., Midha, V., Nageshkumar, T., & Manjunatha, B. S. (2025). The extraction of lignocellulosic fibre from a green manuring crop (*Sesbania aculeata*) for sustainable biocomposite products. *Biomass Conversion and Biorefinery*, *15*, 12609–12620.

Pavan, M., Samant, L., Nageshkumar, T., Ammayappan, L., Manjunatha, B. S., Suyambulingam, I., Selvam, A., & Senthamaraikannan, P. (2025). Cellulosic sunnhemp fibres and their role in polymer composites-A comprehensive review. *Macromolecules*, *339*(2), 149977.

Pradeep, C., Ashok, K., Vinaykumar, T. M., Babu, S. S., Subaharan, K., Nagesha, S. N., & Asokan, R. (2025). Integrative functional validation of pheromone binding proteins in *Spodoptera frugiperda* via in silico and RNAi approaches. *International Journal of Biological Macromolecules*, *331*(2), 148440. 148440.

Prasannakumar, N. R., Venkataravanappa, V., Ashok, K., Rachana, R. R., Sridhar, V., & Asokan, R. (2025). Molecular characterization and phylogenetic insights of the invasive *Thrips parvispinus* (Karny, 1922) (Thysanoptera: Thripidae) and its *Wolbachia* endosymbiont in India. *Biologia*, *80*, 1789–1802.

Praveenkumar, C., Ramasamy, S. V., Remani, R. R., Gracy, G., Subaharan, K., Gnanadhas, P., Senthil-Nathan, S., Saravanan, S., Goswami, S., Sampathrajan, V., & Chinnasamy, K. (2025). Integrative taxonomy of thrips infesting chilli in India: Morphological and molecular insights. *Phytoparasitica*, *53*(4), 75.

Praveenkumar, C., Ramasamy, S. V., Remani, R. R., Subaharan, K., Gnanadhas, P., Saravanan, S., Goswami, S., Udayakumar, A., Sampathrajan, V., Chinnasamy, K., & Sushil, S. N. (2025). Antennal sensilla architecture of *Thrips parvispinus* (Karny) and *Thrips subnudula* (Karny) infesting chillies, *Capsicum*

annuum L.: Insights from scanning electron microscopy. *Zoomorphology*, *144*(3), 64.

Prinila, A. S., Ravi, G., Anandham, R., & Manjunatha, C. (2025). Traditional insights into ITK and its delineation for sustainable crop protection. *Plant Science Today*, *12*(1), 1–7.

Prinila, A. S., Ravi, G., Preetha, G., Anandham, R., & Manjunatha, C. (2025). Farm profile attributes and adoption of indigenous technical knowledge (ITK) for crop management by rice-growing farmers in Tamil Nadu, India. *Journal of Scientific Research and Reports*, *30*(10), 148–157.

Rachana, R. R., Amarendra, B., Girish, K. S., Vanitha, K., Sujith, K. M., Safna, M., Gracy, R. G., Reddy, K. V. N., Jayalaxmi, N. H., Berin, P., & Sushil, S. N. (2025). First records of four Thysanoptera species in India and their putative host associations. *Oriental Insects*, *59*(3), 515–529.

Rachana, R. R., Amarendra, B., Sujith, K. M., & Sushil, S. N. (2025). *Stenchaetothrips subaequalis* (Thysanoptera, Thripidae), a new species with subequal ocellar setae pairs from the Western Ghats, India. *Annales Zoologici Fennici*, *62*, 149–153.

Rachana, R. R., Firake, D. M., Tyagi, K., Prasad, K. V., & Amarendra, B. (2025). First record of four thrips species damaging *Magnolia champaca* flower buds in India. *Entomological News*, *132*(4), 544–552.

Rachana, R. R., Sujith, K. M., & Varatharajan, R. (2025). Indian Thysanoptera: From 1980 to date. *Indian Journal of Entomology*, *87*, 55–65.

Rajgopal, N. N., Dey, D., & Meshram, N. M. (2025). A new leafhopper genus with description of two new species of Scaphoideini (Hemiptera: Cicadellidae: Deltocephalinae) from India. *European Journal of Taxonomy*, *1007*, 163–175.

Rajgopal, N. N., Ramaiah, M., Rai, S., Dey, D., Singaravel, M., & Meshram, N. M. (2025). *Shanaya*: A new leafhopper genus of the tribe Mukariini (Cicadellidae: Deltocephalinae) with two new species discovered and described from India. *Zootaxa*, *5637*(2), 383–393.

Rakhesh, S., Udikeri, S. S., Naik, V. B. C., & Prabhulinga, T. (2025). Natural incidence pattern of cotton pink bollworm, *Pectinophora gossypiella* (Saunders) larval parasitoids across India. *Journal of Environmental Biology*, *46*(1), 77–86.

Rakhesh, S., Udikeri, S. S., Naik, V. B. C., & Tenguri, P. (2025). Fitness costs and biological adaptability of Cry toxin-resistant field strains of Pink bollworm, *Pectinophora gossypiella* (Saunders) from India. *Scientific Reports*, *15*, 35067.

Ramesh, K. B., Gambhir, S., Gouda, M. N. R., Vinayaka, Sagar, D., & Sabtharishi, S. (2025). Differences in life history traits and demographic parameters of three Asian genetic groups of *Bemisia tabaci* (Aleyrodidae: Hemiptera). *Scientific Reports*, *15*, 35316.

Ramesha, B., Mahendiran, G., & Anooj, S. S. (2025). *Spathaspina* Ramesha and Mahendiran, a new genus of Ceutorhynchinae (Coleoptera: Curculionidae) from India. *Zootaxa*, *5642*(6), 592–596.

Rao, A. S., Reddy, K. V. N., Ramasamy, G. G., Reddy, N. V., Negi, N., Rana, D. K., Sampathkumar, M., Thiruvengadam, V., & Sushil, S. N. (2025). Reference gene identification and evaluation for accurate qPCR normalization in *Phenacoccus manihoti* Matile-Ferrero (Hemiptera: Pseudococcidae). *Molecular Biology Reports*, *52*, 838.

Reddy, D. S., Puspalatha, M., Jambagi, S. R., Gotyal, B. S., & Shivakumara, K. T. (2025). Biology and incidence of mango blossom midge, *Procontarinia mangiferae* (Felt): a potential pest of mango cultivation in India. *National Academy of Science Letters*, DOI: 10.1007/s40009-025-01812-1.

Reddy, N. V., Suman, T. C., Gracy, R. G., Pathak, J., Yadu, Y. K., Venkatesan, T., & Sushil, S. N. (2025). Apprehending siRNA machinery and gene silencing in brinjal shoot and fruit borer, *Leucinodes orbonalis*. *Archives of Insect Biochemistry and Physiology*, *118*(1), e70029.

Rohini, B. S., Joshi, S., & Kumari, S. (2025). First Record of *Uroleucon pseudambrosiae* (Olive) and *Hyperomyzus pallidus* Hille Ris Lambers (Hemiptera: Aphididae) from India with a Key to the aphids infesting *Sonchus arvensis*. *Indian Journal of Entomology*, *88*(3), 919–923.

Sagar, D., Ratnaprabha, & Singh, S. (2025). Genetically modified baculoviruses: An important resource for insect pest management. *Bhartiya Krishi Anusandhan Patrika*, DOI: 10.18805/BKAP876.

Sahana, N. B., Karan, R., Prasannakumar, M. K., Gopal, V., Harish, J., Swathi, S. P., Chandrashekar, B. S., Mahesh, S. B., Pramesh, D., Manjunatha, C., Vamsireddy, N., Pallavi, K. N., Aditya, N. S., Keerthi, V., & Gurumurthy, D. S. (2025). Unveiling *Fusarium falciforme*: Genome sequencing of a novel wilt causing pathogen in subabul (*Leucaena leucocephala* L.) in India. *Microbial Pathogenesis*, *200*, 107281.

Salini, S., Kment, P., Lemaître, V. A., Webb, M. D., & Roca-Cusachs, M. (2025). Revision of the Austro-Oriental shield-bug genus *Axiagastus* (Hemiptera: Heteroptera: Pentatomidae), with the description of five new species, and taxonomic notes on related genera. *Zootaxa*, *5603*(1), 1–82.

Salunkhe, M. B., Sampathkumar, M., & Sood, A. K. (2025). Diversity and distribution of spider fauna in the natural ecosystems of Kangra valley, Himachal Pradesh, India. *Indian Journal of Entomology*, *88*, 820–823.

Salunkhe, M. B., Sampathkumar, M., & Sood, A. K. (2025). Spider (Araneae) fauna in paddy ecosystem of Kangra Valley, Himachal Pradesh, India. *Journal of Threatened Taxa*, *17*(8), 27371–27377.

Salunkhe, M. B., Sampathkumar, M., Sood, A. K., & Kumar, S. (2025). An updated checklist of spider (Arachnida: Araneae) fauna of Himachal Pradesh, with a new record for India. *Journal of Biological Control*, *39*(4).

Samal, I., Choudhary, J. S., Joshi, S., Kumar, S., Kumar, V., Raj, A., Kumar, A., & Das, B. (2025). Incidence and identification of mango mealybug, *Drosicha mangiferae* (Stebbing) (Hemiptera: Coccomorpha: Monophlebidae) infesting Litchi in Bihar, India. *Annals of Applied Biology*, DOI: 10.1111/aab.70080.

Sanyal, S., Subba Rao, A. V. M., Timmanna, H., Baradevanal, G., Bal, S. K., Chandran, M. S., Shashank, P. R., Singh, V. K., & Ghosh, P. K. (2025). The global invasion risk of rice yellow stem borer *Scirpophaga incertulas* Walker (Lepidoptera: Crambidae) under current and future climate scenarios. *PLOS ONE*, *20*(3), e0310234.

Saravanan, S., Shanmugam, P. S., Subaharan, K., Murugan, M., Prakash, K., Ashok, K., Praveenkumar, C., Goswami, S., Srinivasan, T., Elaiyabharathi, T., & Vellaikumar, S. (2025). Integrating electrophysiology, behavioral response, and docking studies to decipher odorant-binding protein function in the brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee. *Journal of Comparative Physiology A*, DOI: 10.1007/s00359-025-01777-y.

Saravanan, S., Shanmugam, P. S., Subaharan, K., Murugan, M., Srinivasan, T., Elaiyabharathi, T., Vellaikumar, S., Pavithran, S., & Alagar, M. (2025). Unlocking the potential of semiochemicals: A comprehensive review of their current developments and future prospects in sustainable pest management. *Journal of Environmental Biology*, *46*(6), 773–782.

Selvaraj, K., Yadav, G. A. K., Vasundhara, J., Sumalatha, B. V., Sundararaj, R., & Sushil, S. N. (2025). Record of the invasive Annona whitefly *Aleurotrachelus anonae* (Corbett) (Hemiptera: Aleyrodidae) from India. *Current Science*, *128*(5), 512–518.

Selvaraj, K., Yadav, G. A. K., Vasundhara, J., Sundararaj, R., Sumalatha, B. V., & Sushil, S. N. (2025). Hidden within the complex: Integrative taxonomy unveils the presence of invasive nesting whitefly, *Paraleyrodes pseudonaranjae* Martin (Hemiptera: Aleyrodidae) in India. *Phytoparasitica*, *53*, 98.

Sharanabasava, H., Pramesh, D., Chidananda, N., Usha, I., Padma, P. D., Raghunandana, A., Pushpa, H., Prasannakumar, M. K., Manjunatha, C., Mahanthashivayogayya, & Sujay, H. (2025). Yield loss caused by false smut disease on popular rice cultivars. *Plant Archives*, *25*(2), 823–835.

Shivakumara, K. T., Divya, C., Polaiah, A. C., Keerthi, M. C., Udikeri, S. S., Manjunatha, C., & Selva Babu, S. (2025). Assessment of genetic diversity and haplotype analysis of *Aphis nerii* (Hemiptera: Aphididae) infesting on *Gymnema sylvestre* in India: Insights for sustainable crop production. *Phytoparasitica*, *53*, 103.

Shivakumara, K. T., Venkatesan, T., Udikeri, S. S., Keerthi, M. C., Sudha, T., Guruprasad, G. S., Rayar, S.

G., & Moger, N. (2025). Population dynamics of *Chrysoperla zastrowi sillemi* (Esben-Petersen) fed with different hosts: Prospects for mass rearing and augmentative release. *Pest Management in Horticultural Ecosystems*, *31*(1), 67–70.

Singh, A. K., Patil, J., Nekkanti, A., Paschapur, A. U., Bhat, S., Gouri, V., Verma, G., Jaiman, M., Mishra, K. K., & Kant, L. (2025). Isolation, morphological, and molecular characterization of a native *Heterorhabditis indica* strain from the Mid-Indian Himalayas with insights into biocontrol potential. *Frontiers in Plant Science*, *16*, 1576159.

Singh, S. K., David, K. J., Ramani, S., & Sachin, K. (2025). An updated checklist to fruit flies of India with new species and new distribution records. *Zootaxa Monograph*, *5607*(1), 1–71.

Sonia, S., Patil, J., Ganguli, J., & Ganguli, R. N. (2026). Effect of temperature and soil moisture on the infectivity of four species of entomopathogenic nematodes (*Steinernema* and *Heterorhabditis* spp.) to fall armyworm, *Spodoptera frugiperda* (Smith). *Indian Journal of Entomology*, *88*, 690–692.

Soujanya, P. L., Suby, S. B., Babu, S. R., Jat, S., Yathish, K. R., Sharma, R., Subaharan, K., Vinayan, M. T., Prasanna, B. M., Sekhar, J. C., & Jat, H. S. (2025). Integrating greener, sustainable management tactics to minimise fall armyworm *Spodoptera frugiperda* (JE Smith) damage in maize. *International Journal of Tropical Insect Science*, *45*(6), 3087–3102.

Sreedevi, K. (2025). Species diversity, dynamics and systematics of phytophagous scarab fauna (Coleoptera: Scarabaeidae) of India. *Indian Journal of Plant Protection*, *52*(3), 138–145.

Sreedevi, K., & Ahrens, D. (2025). Descriptions of new species and new records from southern India and Nagaland (Coleoptera: Scarabaeidae: Sericinae). *Zootaxa*, *5692*(1), 175–189.

Sreedevi, K., Sahoo, K. C., Ajaykumara, K. M., Boopathi, T., & Sabatinelli, G. (2025). Revision of the genus *Cyphochilus* Waterhouse, 1867 (Scarabaeidae: Melolonthinae) in India with descriptions of two new species. *Zootaxa*, *5693*(2), 201–222.

Sreerama Kumar, P., Rachana, R. R., Amarendra, B., & Sheela, N. (2025). Widening range of thrips in open-field rose cultivation: Three species newly identified as pests in southern India. *Research Square*, DOI: 10.21203/rs.3.rs-7928863/v1.

Sreerama Kumar, P., Sivaraj, N., & Holajjer, P. (2025). Predicting the climate niche of *Puccinia abrupta* var. *Partheniicola* using maximum entropy for strategic biological control of *Parthenium hysterophorus* in India. *Research Square*, DOI: 10.21203/rs.3.rs-8277700/v1.

Srivastava, S., Ashok, K., Suman, T. C., Selvamani, S. B., Ramasamy, G. G., Subaharan, K., Mohan, M., Selvaraj, K., Sagar, D., Sushil, S. N., & Venkatesan, T. (2025). RNAi-mediated effective gene silencing of multiple targets in the Asia-I genetic group of *Bemisia tabaci* G. (Hemiptera: Aleyrodidae) using double-stranded RNA through oral delivery. *Biocatalysis and Agricultural Biotechnology*, *69*, p.103742.

Sujatha, G. S., Rupali, J. S., Sagar, D., Kumar, H., Vidhya Madhuri, E., & Subramanian, S. (2025). Temperature stress induced phenotypic plasticity of *Spodoptera litura* (Lepidoptera: Noctuidae). *Journal of the Entomological Research Society*, *27*(1), 89–99.

Sujatha, G. S., Rupali, J. S., Sagar, D., Vidya Madhuri, E., Kumar, H., & Subramanian, S. (2024). Deciphering the impact of thermal stress on metabolic responses in *Spodoptera litura* (Fabricius). *Archives of Insect Biochemistry and Physiology*, *120*, e70110.

Sujith, K. M., Rachana, R. R., Hegde, J. N., & Vanitha, K. (2025). A new species and a new record of the genus *Rhamphothrips* Karny (Thysanoptera, Thripidae) from the Western Ghats, India. *Zootaxa*, *5719*(1), 126–132.

Sujithra, M., Prathibha, P. S., Madhu, T. N., Joshi, S., Gotyal, B. S., Daliyamol, M., & Joseph Rajkumar, A. (2025). Field identification and molecular characterization of mango mealybug, *Rastrococcus iceryoides* Green (Hemiptera: Pseudococcidae) on coconut, *Cocos nucifera* (L.) from India. *International Journal of Tropical Insect Science*. *45*, 1103–1109.

Sunil, K., Sotelo-Cardona, P., Kalenahalli, Y., Shivanna, A., Mohan, M., & Srinivasan, R. (2025). Non-targeted metabolomics reveals fatty acid and associated pathways driving resistance to whitefly and

tomato leafminer in wild tomato accession. *Scientific Reports*, *15*, 3754.

Sushil, S. N., Sampathkumar, M., Shylesha, A. N. and Subaharan, K. (2025). Invasive insect pest threats to Indian agriculture: present status, challenges and way forward. *Indian Journal of Plant Protection*, *52*(2), 73–90.

Suvetha, V., Ranjini, B., Aiswarya, A., Arthi, K., Velavan, V., Sabariswaran, K., Thirunavukkarasu, P., Rangeshwaran, R., Sivakumar, G. (2025). Biological functions of crystal toxin proteins and their secondary metabolites in targeting rugose spiralling whitefly, *Aleurodicus rugioperculatus, Current Microbiology*, *83*, 56.

Thavkar, S., Thube, S., Panchbhai, P., Lavhe, N., Pillai, T., Shah, V., Deshmukh, V., Pandian, T. R., Fand, B., Tenguri, P., & Nikoshe, A. (2025). Evaluation of bio-efficacy of *Metarhizium anisopliae* against the pink bollworm *Pectinophora gossypiella* (Saunders), with insights into its colonization potential and insecticide compatibility. *Journal of Cotton Research*, *8*(1), 8.

Varshney, R., & Budhlakoti, N. (2025). Evaluation of the potential of predatory mirid bug, *Dortus primarius* Distant as biocontrol agent of *Tuta absoluta* Meyrick. *Journal of Plant Diseases and Protection*, *132*, 1–8.

Varshney, R., & Budhlakoti, N. (2025). Performance of *Blaptostethus pallescens* (Hemiptera: Anthocoridae) preying on *Thrips parvispinus* (Thysanoptera: Thripidae) a major threat to chili cultivation in India. *Phytoparasitica*, *53*, 58.

Varshney, R., Sundaravalli, K., Kandan, A., & Sushil, S. N. (2025). Development and predation rate of *Dortus primarius*, a predatory mirid bug on *Frankliniella schultzei* larvae treated with a novel fungus *Lecanicillium fusisporum*. *Current Science*, *129*(5), 448–453.

Vasanth, V., Senguttuvan, K., Gracy, R. G., Priyadharsini, P., Ponnuvel, K. M., Jayakanthan, M., Ranjith Kumar, S., & Arasakumar, E. (2025). Genomic insights and adaptation mechanisms of silkworms (*Bombyx mori*) towards pesticide use. *Entomological News*, *132*(3), 406–413.

Vasanth, V., Senguttuvan, K., Priyadharsini, P., Gracy, R. G., Ponnuvel, K. M., & Jayakanthan, M. (2025). Impact of the insecticide chlorfenapyr on rearing efficiency of silkworms, *Bombyx mori* L. *Entomological News*, *132*(3), 325–334.

Vashisth, S., Joshi, S., Singh, S. J., Kumar, P., Rathor, M. S., & Verma, S. (2025). New report of *Eulecanium tiliae* L. infestation in apple orchards of the Western Himalayan cold desert: morphological and molecular insights. *Applied Fruit Science*, *67*, 41.

Veenakumari, K., Buhl, P. N., Girish Kumar, P., Kolla, S., Sushil, S. N., Khan, F. R., & Mohanraj, P. (2025). Review of the genus *Iphitrachelus* Haliday (Hymenoptera: Platygastridae: Platygastrinae) with descriptions of three new species from India. *Systematic Parasitology*, *102*, 38.

Veenakumari, K., Kolla, S., & Mohanraj, P. (2025). Genus *Pliestopleura* Forster, 1856 (Hymenoptera: Platygastridae) of the Indian region with descriptions of six new species. *Annales Zoologici*, *75*(3), 783–802.

Venkatesan, T., Gracy, R. G., Mohan, M., Sagar, D., Ramya, R. S., Suman, T. C., & Ashok, K. (2025). Insect genomics and its prospects in pest management in India. *Current Science*, *128*(3), 231–232.

Venu, H. S., Shylesha, A. N., Ruqiya, S., Shivakumara, K. T., Jagadeesh, P., Prasannakumar, M. K., Pramesh, D., Sushil, S. N., & Manjunatha, C. (2025). Unveiling the potency, safety, and genetic makeup of *Bacillus thuringiensis* NBAIR BtVGa2: A promising biocontrol agent against *Galleria mellonella* L. *Apidologie*, *56*(2), 1–18.

Venu, H. S., Shylesha, A. N., Ruqiya, S., Shivakumara, K. T., Nanditha, S., Gotyal, B. S., Ramya, R. S., Kandan, A., & Manjunatha, C. (2025). Plasmid profiling and bio efficacy of *Bacillus thuringiensis* NBAIR BtVGa1 on *Galleria mellonella* L. and its biosafety on *Apis cerana* F. *International Journal of Tropical Insect Science*, DOI: 10.1007/s42690-025-01583-8.

Vijayakumari, N., Shanthi, M., Anusha, N., Murugan, M., Paripoorani, S., Varanavasiappan, S., Jayakanthan, M., Gracy, R. G., & Mohan, M. (2025). Field evolved insecticide resistance in legume pod borer, *Maruca vitrata* F. (Lepidoptera: Crambidae). *Legume Research*, *48*(4), 674–682.

Yadav, G. A. K., Vasundhara, J., Sumalatha, B. V., Rameshkumar, A., & Selvaraj, K. (2025). Occurrence of exotic parasitoid *Encarsia cubensis* (Hymenoptera: Aphelinidae) on Neotropical woolly whitefly

Aleurothrixus floccosus and solanum whitefly *Aleurotrachelus trachoides* in India. *Phytoparasitica*, DOI: 10.1007/s12600-024-01219-6.

Yandigeri, M. S., Sampada, N., Solanki, M. K., Yalashetti, S., Mohan, M., Sivakumar, G., Manjunatha, B. S., & Sushil, S. N. (2025). Insecticide degradation potential of aphid associated bacteria. *Biocatalysis and Agricultural Biotechnology*, *68*, 103703.

Yele, Y., Chander, S., Suroshe, S. S., Tenguri, P., Sundaran, A. P., Pandi, G. G. P., Bhatia, A., & Patel, C. (2025). Physiological and demographic responses of *Nilaparvata lugens* to combined climate stressors: CO_2, temperature, and ozone. *Frontiers in Plant Science*, *16*, 1518361.

White Paper

Renee, M., Borges, Subaharan, K., Jayanthi, P. D. K., Venkatesan, R., Ramamurthy, V. V., Sushil, S. N., & Gorantla, M. (2025). Chemo-ecological methods for agriculture and horticulture pest management: a path forward for India. (White Paper). Indian Academy of Sciences, Bengaluru.

Books Edited

Gupta, A., Hemanth Kumar, H. M., Rajgopal, N. N., Joshi, S., & Sushil, S. N. (2025). *Annotated Catalogue of Type Specimens in ICAR–NBAIR Reference Collection* (2nd ed.). ICAR–National Bureau of Agricultural Insect Resources.

Gupta, A., Pattar, R., Varshney, R., & Sushil, S. N. (2025). *Identification Guide to Predominant Braconid Parasitoids (Hymenoptera: Braconidae) of Agriculturally Important Insect Pests*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, B. S., Prabhulinga, T., Navik, O., Varshney, R., Manjunatha, C., Amala, U., Gundappa, B., Rajgopal, N. N., Patil, J., Mahendiran, G., & Sushil, S. N. (2025). *Mass Production of Biocontrol Agents (Macrobials, Microbials And Pheromones) and Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Mohan, M., Sampathkumar, M., Joshi, S., Gupta, A., Shylesha, A. N., & Sushil, S. N. (2025). *Classical Biological Control of Cassava Mealybug in India: Economic Benefits and Impact*. ICAR–National Bureau of Agricultural Insect Resources.

Rajgopal, N. N., Ramya, R. S., Rachana, R. R., Sagar, D., Gundappa, B., Shashank, P. R., Nebapure, S. M., Rajna, S., Bhagyashree, S. N., Shivanna, B., Suroshe, S. S., & Sushil, S. N. (2025). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*. Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources.

Selvaraj, K., Sumalatha, B. V., Yadav, G. A. K., Kandan, A., Manjunatha, C., Hanumanthagowda, B., & Sushil, S. N. (2025). *Emerging Insect Pests and Diseases of Coconut and their Management*. ICAR–National Bureau of Agricultural Insect Resources.

Shukla, P. K., Adak, T., Gundappa, B., & Babu, N. (2025). *Agro-advisory Services in Horticulture: Strategies for Climate-Resilient and Profitable Production*. New India Publishing Agency.

Sreerama Kumar, P., Rachana, R. R., Ramya, R. S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T., & Sushil, S. N. (2025). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*. Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources.

Subaharan, K., Sampathkumar, M., Amala, U., Bhagat, D., & Sushil, S. N. (2025). *Nanotechnological Methods in Pest and Disease Management*. ICAR–National Bureau of Agricultural Insect Resources.

Venkatesan, T., Ashok, K., Mohan, M., Gandhi Gracy, R., & Sushil, S. N. (2025). *Insect Multi-omics: Molecular Insight to Crop Pest Management*. ICAR–National Bureau of Agricultural Insect Resources.

Book Chapters

Gandhi Gracy, R., Negi, N., Rao, A. N. S., Suman, T. C., Oshimath, C., Venkatesan, T., & Sushil, S. N. (2025). Understanding sex determination in insects:

advancing strategies for the pest suppression. In: Venkatesan, T. et al. (Eds). *Insect Multi-omics: Molecular Insight to Crop Pest Management*. ICAR–National Bureau of Agricultural Insect Resources.

Gandhi Gracy, R., Negi, N., Suman, T. C., Rao, A. N. S., Oshimath, C., Ashok, K., Venkatesan, T., Mohan, M., & Sushil, S. N. (2025). Transcriptomics application in insect biology & pest management. In: Venkatesan, T. et al. (Eds). *Insect Multi-omics: Molecular Insight to Crop Pest Management*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunath, B. S., Bindushree, C., Ashok, K., Rao, A. S., Selva Babu, S., Joseph, J. S., Rajgopal, N. N., Yandigeri, M. S., Gotyal, B. S., Gandhi Gracy, R., & Venkatesan, T. (2025). Epigenomics and pest adaptation: decoding molecular memory. In: Venkatesan, T. et al. (Eds). *Insect Multi-omics: Molecular Insight to Crop Pest Management*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, C., Aditya, K., Pramesh, D., Shreedevasena, S., Banakar, S. N., Patil, S. S., Parivallal, P. B., Nagaraju, N., & Prasanna Kumar, P. (2025). Multifaceted interaction between the endophytes and plant pathogens: present understanding and future prospects. In: *Apple Academic Press eBooks* (pp. 277–296).

Manjunatha, C., Aditya, K., Prasannakumar, M. K., Pramesh, D., Buella, P., Patil, S. S., Venkateshbabu, G., Harish, J., Karan, R., & Ramegowda, H. V. (2025). Isothermal amplification techniques: an emerging tool for on-site detection of phytopathogens in field conditions. In: *Methods in Molecular Biology* (pp. 47–64).

Ramya, R. S., David, K. J., Shivakumara, K. T., & Ranjith, M. (2025). Tachinid flies. In: Omkar (Ed.). *Flies: Agricultural and Public Health Perspectives* (pp. 123–149). CRC Press.

Ramya, R. S., Rachana, R. R., Shivakumara, K. T., Gotyal, B. S., Varshney, R., & Ranjith, M. (2025). Bio-rational approaches for pest management in organic farming. In: Naik, M. R. & Ramanjaneyulu, A. V. (Eds). *Glimpses of Indian Organic Farming* (pp. 136–150). New India Publishing Agency.

Selvaraj, K., Subaharan, K., Sushil, S. N., & Sumalatha, sustainable management strategies: challenges and the way forward. In: Rane (Ed.). *Technology Innovations and Sustainable Development of Date Palm* (pp. 59–77). Indian Society for Arid Horticulture.

Selvaraj, K., Yadav, G. A. K., Vasundhara, J., Sumalatha, B. V., & Rameshkumar, A. (2025). Identification and rearing technologies of parasitoids of whiteflies. In: Gupta, A. (Ed.). *Morphological and Molecular Identification, including Mass Production of Natural Enemies Associated with Economically Important Insect Pests of Indian Agro-Ecosystems* (pp. 170–178). ICAR–National Bureau of Agricultural Insect Resources.

Shukla, P. K., & Gundappa, B. (2025). Biotic stress management strategies in guava. In: *Innovative Biotic Stress Management Strategies in Crops* (pp. 330–341). CRC Press.

Somjith, P. K., Hima, A., Navik, O., & Kedar, S. C. (2025). Insect pollinators crisis: Ecological challenges and strategic responses. In: Khalid (Ed.). *Vanishing Biodiversity: Global Threats to Flora and Fauna* (pp. 263–280).

Sreerama Kumar, P. (2025). Management of the coconut mite with emphasis on biological control. In: Selvaraj, K. et al. (Eds). *Emerging Insect Pests and Diseases of Coconut and Their Management*. ICAR–National Bureau of Agricultural Insect Resources.

Yandigeri, M. S., Sampada N., Manjunatha B. S., Gundappa B. & Gotyal, B. S. (2025). Insects as industry catalysts: scientific insights and applications. In: Venkatesan, T. et al. (Eds). *Insect Multi-omics: Molecular Insight to Crop Pest Management*. ICAR–National Bureau of Agricultural Insect

Technical Bulletins/Folders

David, K. J., Ramani, S., Noor Mahammed, N. R., Salini, S., Joshi, S. S., & Sushil, S. N. (2025). An identification guide to common fruit flies (Diptera: Tephritidae) of India (Technical Bulletin No. 02/2025). ICAR–National Bureau of Agricultural Insect Resources.

Gundappa, B., Selvaraj, K., Yandigeri, M. S., Gotyal, B. S., Subaharan, K., & Sushil, S. N. (2025). Butterfly

garden: Hub for education and conservation (Technical Bulletin No. 11/2025). ICAR–National Bureau of Agricultural Insect Resources.

Salini, S., Ajaykumara, K. M., David, K. J., Mahendiran, G., Rajgopal, N. N., Joshi, S. S., & Sushil, S. N. (2025). Pentatominae fauna (Hemiptera: Heteroptera: Pentatomidae) of India- An illustrated guide to species of economic importance (Technical Bulletin No. 01/2025). ICAR–National Bureau of Agricultural Insect Resources.

Venu, S., Amala, U., Soujanya, N., Manjunatha, C., Prabhulinga, T., & Sushil, S. N. (2025). ನಸುರು ಜೇನುಸಾಕಾಣಿಕೆಯ ತರಬೇತಿ ಕೈಪಿಡಿ. ICAR–National Bureau of Agricultural Insect Resources.

Training Manuals

Gupta, A., Gandhi Gracy, R. G., Varshney, R., & Sushil, S. N. (2025). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. (ICAR–NBAIR Document No. 03/2025). ICAR–National Bureau of Agricultural Insect Resources.

Manjunath, B. S., Prabhulinga, T., Navik, O., Varshney, R., Manjunath, C., Amala, U., Gundappa, B., Rajgopal, N. N., Patil, J., Mahendiran, G., & Sushil, S. N. (2025). *Training Manual on Mass production of Microbials, Pheromones and Bee Pollinators for Crop Management* (ISBN 978-81-985383-0-7). ICAR–National Bureau of Agricultural Insect Resources.

Mohan, M., Ashok, K., Venkatesan, T., Gandhi Gracy, R. G., Sagar, D., & Sushil, S. N. (2025). *Laboratory Safety Manual* (1st ed.). ICAR–National Bureau of Agricultural Insect Resources.

Mohan, M., Ashok, K., Venkatesan, T., Gandhi Gracy, R. G., Sagar, D., & Sushil, S. N. (2025). *Manual for Containment, Operation and Maintenance of IBSL-1+ Facility at ICAR-NBAIR* (ISBN 978-81-985383-6-9). ICAR–National Bureau of Agricultural Insect Resources.

(2025). *Workshop Manual on Integrative Taxonomic Approaches for Identification of Whiteflies and its Associated Natural Enemies*. ICAR–National Bureau of Agricultural Insect Resources.

Training Manual Chapters

Gupta, A. (2025). Collection, curation and preservation of insects. (pp. 2–7). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Gupta, A. (2025). Exposure to International Code of Zoological Nomenclature and introduction to schools of taxonomy. (pp. 8–14). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Gupta, A. (2025). Exposure to species identification of natural enemies of fruit flies, whiteflies, thrips, mealybugs, scale insects, lepidopteran and coleopteran pests. (pp. 62–75). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Gupta, A. (2025). Relevance of Biodiversity Act, 2002 in the field of insect taxonomy. (pp. 56–59). In: *Training Manual on Diversity and Identification of White Grubs (Coleoptera: Scarabaeidae)* ICAR–National Bureau of Agricultural Insect Resources.

Gupta, A. (2025). Taxonomy of agriculturally important hymenopteran insects. (pp. 92–104). In: Chandran, N., Shashank, P. R., Ramaiah, M., & Loganathan R. (Eds). *Taxonomy of Agriculturally Important Insects: a Workshop Manual*. ICAR–Indian Agricultural Research Institute.

Gupta, A., Pattar, R., Kumar, H. M. H., & Sharma, A. (2025). Identification of major parasitic and predatory families of Hymenoptera. (pp. 48–61). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Ashwini, E., Vijayreddy, D., Manjunatha, C. & Sivakumar, G. (2025). Isolation, molecular characterization, and mechanism of entomopathogenic fungi for management of crop pests. (pp. 21–30). In: Manjunatha, B. S. et al. (Eds). *Training Manual on Mass Production of Macrobials, Microbials, Pheromones and Bee Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, B. S., Bindushree, C., Yandigeri, M., Manjunatha, C., Sivakumar, G., Kandan, A. & Venkatesan, T. (2025). Study of hidden microbial diversity and its functions through meta-genomic Approach. (pp. 308–323). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, C., Aditya K., Divya C., Kandan A., Sivakumar G. & Manjunatha B. S. (2025). Mass production of liquid formulation of entomogeneous bacteria. (pp. 39–42). In: Manjunatha, B. S. et al. (Eds). *Training Manual on Mass Production of Macrobials, Microbials, Pheromones and Bee Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, C., Aditya, K., Divya, C., Kandan, A., Sivakumar, G. & Manjunatha B.S. (2025). Isolation, characterization, and utilization of entomogeneous bacteria for insect pest management. (pp. 31–38). In: Manjunatha, B. S. et al. (Eds). *Training Manual on Mass Production of Macrobials, Microbials, Pheromones and Bee Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, C., Aditya, K., Divya, C., Kandan, A., Sivakumar, G. & Manjunatha B.S. (2025). Mass production of liquid formulation of entomogeneous bacteria. (pp. 39–42). In: Manjunatha, B. S. et al. (Eds). *Training Manual on Mass Production of Macrobials, Microbials, Pheromones and Bee Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, C., Aditya, K., Venkatesan, T., Shantharaja, C. S., Raksha, S., Divya, C., Ruqiya, S., & Lavanya, S. M. (2025). Recent advances in detection and diagnosis of seed-borne diseases. In: *Training Manual on Recent Innovations in Seed Production and Quality Control System*. ICAR–National Institute of Seed Science and Technology & NADCL.

Manjunatha, C., Kukreti, A., Adithya S., Ramya R. S., Shivakumara K. T. and Gotyal, B. S., 2025. Entomopathogenic bacteria for management of insect pests in coconut. (pp. 52–58). In: *Training Manual on Recent Advances in Good Agricultural Practices for Management of Emerging Insect Pests in Coconut*. ICAR–National Bureau of Agricultural Insect Resources.

Manjunatha, C., Venkatesan, T., Divya, C., Aditya, K., Lavanya, S. M., Ramya, R. S., Manjunatha, B. S., & Shivakumara, K. T. (2025). Isothermal DNA amplification techniques for the identification of the whiteflies. In: *Training Manual on Integrative Taxonomic Approaches for the Identification of the Whiteflies and their Associated Natural Enemies*. ICAR–National Bureau of Agricultural Insect Resources.

Rajgopal, N. N. (2025). Role of information and communication technologies (ICTs) in systematics. In: Sreedevi, K., Mahendiran, G. & Sushil, S. N. (Eds). *Training Manual on Diversity and Identification of White Grubs (Coleoptera: Scarabaeidae)*. ICAR–National Bureau of Agricultural Insect Resources.

Sagar, D., Pranita, R., Darshana, B., Gandhi Gracy, R. & Suman, T. C. (2025). Basic of molecular biology, designing primers and exploring bacterial symbiont diversity in whiteflies. (pp. 39–48). In: *Training Manual on Integrative Taxonomic Approaches for the Identification of the Whiteflies and their Associated Natural Enemies*. ICAR–National Bureau of Agricultural Insect Resources.

Sagar, D., Reddy, N. V. & Suman, T. C. (2025). Utilization of genomic tools for the sustainable insect pest management. (pp. 151–175). In: *Training Manual on Recent Pest and Disease Management Tools and Techniques for Horticultural Crops in Organic and Natural Farming through Hands-on Experience*, University of Agricultural Sciences, Dharwad.

Sagar, D., Suman, T. C., Gandhi Gracy, R. & Ramya, R. S. (2025). Basics of molecular biology. (pp. 247–261). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Sampathkumar, M., Mahendiran, G., & Gupta, A. (2025). Collection methods and processing of insect specimens. (pp. 11–18). In: Sreedevi, K., Mahendiran, G. & Sushil, S. N. (Eds). *Training Manual on Diversity and Identification of White Grubs (Coleoptera: Scarabaeidae)*. ICAR–National Bureau of Agricultural Insect Resources.

Sampathkumar, M., Mohan, M., Shylesha, A. N., Joshi, S., Gupta, A., & Venkatesan, T. (2025). Exposure to cassava mealybug and its parasitoid *Anagyrus lopezi* along with mass production of parasitoid. In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Sivakumar, G., Ramkumar, P., Kandan, A., Manjunatha, C., Mohan, M., Venkatesan, T., Richa, V., Subaharan, K., Mahesh, Y., Deepa B., Manjunatha, B. S. & Sushil, S. N. (2025). Baculoviruses: Potential pathogens of lepidopteran caterpillars. (pp. 52–62). In: Manjunatha, B. S. et al. (Eds). *Training Manual on Mass Production of Macrobials, Microbials, Pheromones and Bee Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Sreerama Kumar, P. (2025). Acaropathogens - recognition, scale-up and application. (pp. 224–226). In: Gupta, A. (Ed.). *ICAR Sponsored Winter School Training Manual on Morphological and Molecular Identification Including Mass Production of Natural Enemies Associated with Economically Important Insect Pests (Including Invasives) of Indian Agroecosystem*. ICAR–National Bureau of Agricultural Insect Resources.

Sreerama Kumar, P. (2025). Management of the coconut mite with emphasis on biological control. In: *Training Manual on Advances in Good Management Practices for Emerging Insect Pests and Diseases Suppression in Coconut*. ICAR–National Bureau of Agricultural Insect Resources.

Sreerama Kumar, P. (2025). Mass production and utilisation of predatory mites and pathogens for managing phytophagous mites. (pp. 104–107). In: Manjunatha, B. S. et al. (Eds). *Training Manual on Mass Production of Macrobials, Microbials, Pheromones and Bee Pollinators for Crop Management*. ICAR–National Bureau of Agricultural Insect Resources.

Extension Folders

Amala, U., Manjunatha, H. S., Manjunatha, C., Subaharan, K., & Sushil, S. N. (2025). Model bee village scheme: Sweet success through sustainable stingless beekeeping. *Agri Catalogues*, *1*(2).

Aneesa Rani, M. S., Sasi Kumar, K., Govindan, K., Senthil Kumar, P., Thilagam, Sampathkumar, M., & Mohan, M. (2025). *Organic pest management practices in vegetable crops (Folder in Tamil)*. Joint publication of TNAU–Regional research station, Paiyur and ICAR–National Bureau of Agricultural Insect Resources.

Aneesa Rani, M. S., Sasi Kumar, K., Govindan, K., Senthil Kumar, P., Thilagam, Sampathkumar, M., & Mohan, M. (2025). *Organic techniques of pepper cultivation (Folder in Tamil)*. Joint publication of TNAU–Regional research station, Paiyur and ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Rangeswaran, R., Amala, U., Rachana, R. R., Sivakumar, G., Manjunatha, C., & Sushil, S. N. (2025). Shatpada All Rounder–*Pseudomonas flourescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for *Thrips parvispinus* management. *Extension Folder No. 53/2025*.

ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Rangeswaran, R., Amala, U., Rachana, R. R., Sivakumar, G., Manjunatha, C., & Sushil, S. N. (2025). Shatpada All Rounder–*Pseudomonas flourescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for *Thrips parvispinus* management (Folder in Hindi). *Extension Folder No. 58/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Rangeswaran, R., Amala, U., Rachana, R. R., Sivakumar, G., Manjunatha, C., & Sushil, S. N. (2025). Shatpada All Rounder–*Pseudomonas flourescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for *Thrips parvispinus* management (Folder in Kannada). *Extension Folder No. 56/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Rangeswaran, R., Amala, U., Rachana, R. R., Sivakumar, G., Manjunatha, C., & Sushil, S. N. (2025). Shatpada All Rounder–*Pseudomonas flourescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for *Thrips parvispinus* management (Folder in Malayalam). *Extension Folder No. 57/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Rangeswaran, R., Amala, U., Rachana, R. R., Sivakumar, G., Manjunatha, C., & Sushil, S. N. (2025). Shatpada All Rounder–*Pseudomonas flourescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for *Thrips parvispinus* management (Folder in Tamil). *Extension Folder No. 55/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Kandan, A., Rangeswaran, R., Amala, U., Rachana, R. R., Sivakumar, G., Manjunatha, C., & Sushil, S. N. (2025). Shatpada All Rounder–*Pseudomonas flourescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for *Thrips parvispinus* management (Folder in Telugu). *Extension Folder No. 54/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Kedar, S. C., Navik, O., & Kumaranag, K. M. (2025). Integrated Management of Hadda Beetle in Ashwagandha (*Withania somnifera*): A Sustainable Approach. *Indian Horticulture*, *69*(4), 29–31.

Nebapure, S. M., Rajna, S., Divekar, P., & Sagar, D. (2025). Phosphine fumigation for stored-grain pest management. *Krushi Lok*, 5(3), 33–35.

Sivakumar, G., Manjunatha, C., Ramya, R. S., Rachana, R. R., Lavanya, S. M., Kandan, A., & Sushil, S. N. (2025). Shatpada Samagra (Folder in Malayalam). *Extension Folder No. 22/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Sivakumar, G., Manjunatha, C., Ramya, R. S., Rachana, R. R., Lavanya, S. M., Kandan, A., & Sushil, S. N. (2025). Shatpada Suraksha (Folder in Malayalam). *Extension Folder No. 17/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Yandigeri, M. S., Amala Udayakumar, Mohan, M., Mahendiran, G., Sampathkumar, M., & Patil, J. (2025). Kappu sainika nona (*Hermetia illucens*): Tyajya nirvahane mattu pashu aaharakkagi paryaya (Folder in Kannada). *ICAR-NBAIR Document No. 08/2025*. ICAR–National Bureau of Agricultural Insect Resources.

Popular Articles

Rupali, J. S., Impana, Sagar, D., Vidya Madhuri, E., Pranita Roy, & Ratna Prabha. (2025). Insights into role of non-coding RNAs in Insects. *AgriTech Today*, *3*(4), 14–17.

Selvaraj, K., Kavya Yadav, G. A., Anna Jose, Manu, B., & Ragothuman, G. (2025). Distribution and upsurge of invasive whiteflies on coconut in Odisha. *Indian Coconut Journal*, *69*(1), 14–17.

Shankar, C., Velmurugan, K., Alagudurai, S., Mohan, M., Sampathkumar, M., & Bharathi, K. (2025). *Organic cultivation of pepper (Folder in Tamil)*. Joint publication of ICAR–KVK, Namakkal and ICAR–National Bureau of Agricultural Insect Resources.

Thirupam Reddy, B., Rajgopal, N. N., & Selvakumar, T. (2025). Anar butterfly, *Deudorix isocrates* (Fab.) found feeding on kusum fruits. *Indian Entomologist*, *6*(1), 83–85.

Vidya Madhuri, E., Rupali, J. S., Sagar, D., & Ratna Prabha. (2025). Artificial Intelligence and Agriculture: Brief overview in Indian Context. *AgriTech Today*, *3*(3), 144–145.

Annual Reports

Gupta, A., Bhagat, D., Kumar, S., Udayakumar, A., Rachana, R. R., Ramya, R. S., David, K. J., Sampathkumar, M., Varshney, R., Mehanth, M., Subaharan, K., & Sushil, S. N. (2025). *ICAR–NBAIR Annual Report 2024 (Hindi version)* (pp. vi–157). ICAR–National Bureau of Agricultural Insect Resources.

Sivakumar, G., Venkatesan, T., Subaharan, K., Kandan, A., Varshney, R., Udayakumar, A., Sampathkumar, M., Selvaraj, K., Mahendiran, G., Navik, O., Manjunatha, C., Sagar, D., Gundappa, B., Rajgopal, N. N., Prabhulinga, T., Ramkumar, P., & Sushil, S. N. (2025). *Annual Progress Report 2024–25 of All India Coordinated Research Project on Biological Control of Crop Pests* (pp. viii–242). ICAR–National Bureau of Agricultural Insect Resources.

Subaharan, K., Udayakumar, A., Rachana, R. R., Ramya, R. S., David, K. J., Sampathkumar, M., Gupta, A., Varshney, R., Bhagat, D., Mehanth, M., & Sushil, S. N. (2025). *ICAR–NBAIR Annual Report 2024* (pp. vi–159). ICAR–National Bureau of Agricultural Insect Resources.

Video Documentaries

Sampathkumar, M., Mohan, M., Shylesha, A. N., Joshi, S., Gupta, A., Venkatesan, T., Subaharan, K., & Sushil, S. N. (Directors). (2025). *Classical biological control of cassava mealybug in India: Success story (Tamil)* [Video recording]. ICAR–National Bureau of Agricultural Insect Resources.

Sampathkumar, M., Mohan, M., Shylesha, A. N., Joshi, S., Gupta, A., Venkatesan, T., Subaharan, K., & Sushil, S. N. (Directors). (2025). *Tiny exotic parasitoid in action! Classical biological control of invasive cassava mealybug restores cassava productivity in India* [Video recording]. ICAR–National Bureau of Agricultural Insect Resources.

Obituaries

Joshi, S. (2025). Professor Samiran Chakrabarti (January 5, 1946 – July 18, 2025). *Indian Entomologist*, *6*(2), 95–99.

Joshi, S., & Watson, G. W. (2025). Douglas J. Williams (1924–2025). *Current Science*, *128*(8), 842–843.

Newsletters

Sreerama Kumar, P. (Ed.). (2025). *IOBC–APRS Newsletter No. 17 (August 2025)*. International Organisation for Biological Control–Asia and Pacific Regional Section.

News article

Sreerama Kumar, P., Bhagat, D., & Sushil, S. N. (2025). Highlights of the Second International Conference on Biological Control: Biocontrol contributions to One Health (2ICBC2025). *IOBC–APRS Newsletter*, (17), pp. 5–6.

11. TECHNOLOGY, PRODUCTS AND PATENTS

Technologies Developed

1. Rapid diagnostic technique for accurate identification of Fall armyworm, *Spodoptera frugiperda*
2. Nanoemulsion composition for pest management
3. Bimodal porous carbon for controlled delivery of semiochemicals for insect pest management
4. Nanogels for the Slow Release of Semiochemicals
5. A Novel microbial consortium of entomopathogenic bacteria for the management of rasping-sucking pest, *Thrips parvispinus* in chilli
6. Rapid colorimetric Isothermal amplification assay of onsite detection of Thai Sac brood virus in Indian Honeybee (*Apis cerana* F)
7. A reusable controlled release pheromone formulation for the management of *Holotrichia consanguinea* and *Holotrichia setticollis*
8. Shatpada- High temperature tolerant *Steinernema shori* NBAIRS80 for the management of insect pests
9. Shatpada- *Helicoverpa armigera* lure-A Reusable Controlled Release Pheromone formulations for the management of *Helicoverpa armigera* (Hubner)
10. Shatpada fruit fly trap-a controlled release Semiochemical based solution
11. Shatpada- FAW.1: Population Suppression of fall armyworm *Spodopetra frugiperda* via SIGS-dsRNA targeting BOP1
12. Shatpada BTAB.1- Spray induced gene silencing via dsRNA formulation for the management of *Bemisia tabaci*
13. A composition to attract *Thrips parvispinus* (Karny) and preparation methods thereof

ICAR-NBAIR technologies certified by ICAR

1. Mass Production of Black soldier fly *Hermetia illucens* (L.) (Stratiomyidae: Diptera) for vegetable and fruit waste management
2. Recombinase Polymerase Amplification-based colorimetric detection technique for rapid identification of cassava mealybug, *Phenacoccus manihoti*
3. Rapid diagnostic technique for accurate identification of Fall armyworm, *Spodoptera frugiperda*
4. Controlled release dispenser for delivery of rice stem borer, *Scirpophaga incertulas,* citrus leaf miner, *Phyllocnistis citrella* diamond back moth, *Plutella xylostella*, fall armyworm, *Spodoptera frugiperda* and tomato pinworm, *Pthorimaea absoluta* pheromone.
5. Nanoemulsion composition for pest management

Patents granted

S. No	Technology/ Innovation	Date of Grant	Inventors	Patent Number
1.	Dorsa delta – an insect attractant trap for mango fruit fly	08-12-2025	Dr. N. Baktavatsalam et., al	575448

Copyrights granted

S. No	Technology/ Innovation	Date of Grant	Inventors	Granted Certificate number
1.	White grub fauna of India (Coleoptera: Scarabaeoidea: Scarabaeidae)	08-01-2025	K. Sreedevi, S.N.Suhsil	L-159521/2025

Design granted

S. No	Name of the Design	Date of Grant	Inventors	Design Number
1.	Nest hive for solitary leaf cutterBees	03-02-2025	U. Amala, T.M. Shivalingaswamy, K. Subaharan, S.N.Sushil	446567-001

Total Number technology commercialized

S No	Name of Technology/Know-How	Name of Contracting Party	Mode of Partnership**	Date	Revenue Earned (₹)
1	Liquid formulation of indigenous *Bacillus thuringiensis kurstaki* (Btk) isolates against lepidopteran pests	Peptech Biosciences Ltd., G-1, 636, RIICO Industrial Area, , Rajisthan-301019, India"	MOU	23-01-2025	5,00,000
2	Insect repellent formulation and methods thereof	Synergy Biotech, khatha no.40, Thirumalahatti village, Malur-563130	MOU	24-02-2025	75,000
3	Wettable powder formulation of *Heterorhabditis indica* strain NBAIIH38 for management of white grubs and fall armyworm	Advance Cropcare India Private Limited, Indore Trade Centre, Tukoganj, Indore – 452001. Madhya Pradesh	MOU	05-03-2025	4,00,000
4	Liquid formulation of indigenous *Bacillus thuringiensis kurstaki* (Btk) isolates against lepidopteran pests	Grow Indigo Pvt. Ltd, 19, Raj Mahal, 84 Veer Nariman Road, Mumbai-400020,India	MOU	08-04-2025	5,00,000

5	Powder based formulation of *Pseudomonas fluorescens* (NBAIR-PFDWD), an antimicrobial 2,4-diacetylphloroglucinol (DAPG) producing biotic and abiotic stress tolerant strain for diseases and thrips management	ICAR-Krishi Vigyan Kendra, BSS, Idukki	MOU	26-03-2025	5,00,000
6	Bioformulation of *Bacillus subtilis* strain NBAIR BS1 for growth promotion	ICAR-Krishi Vigyan Kendra, BSS, Idukki	MOU	26-03-2025	2,50,000
7	A volatile attractant for trapping uzi fly, *Exorista bombycis*, parasitoid pest on mulberry silkworm *Bombyx mori* based on pheromonal compounds	Sree Lakshni Janardhanaswamy Enterprises, site 37 Jakkur Amrutha Halli Main Road Navya Nagar, Bengaluru Urban-56006	MOU	22-05-2025	3,00,000
8	Nanogels for the slow release of Semiochemicals and Nanogels for encapsulation of Microbial Culture.	"M/s MICROPLEX (INDIA), a office at 36, Mohata Market, Main Road, Wardha, Maharashtra– 442001	MOU	09-05-2025	1,00,000
9	Liquid formulation of indigenous *Bacillus thuringiensis kurstaki* (Btk) isolates against lepidopteran pests	Bannari Amman Sugars Ltd., 1212 Trichy Road, Sungam, Coimbatore, Tamil Nadu-641018, India	MOU	11-07-2025	5,00,000
10	A volatile attractant for trapping uzi fly, *Exorista bombycis*, parasitoid pest on mulberry silkworm *Bombyx mori* based on pheromonal compounds	Anil Industries, Rajajinagar, Bangalore-560010	MOU	14-08-2025	3,00,000
11	Shatpada – High temperature tolerant *Steinernema shori* (NBAIRS80) for the management of insect pests	T. Stanes and Company Limited, 8/23-24, Race course Road, Coimbatore-641018	MOU	29-10-2025	4,00,000
12	Shatpada -Fruit fly trap-a controlled release Semiochemical	HSRP Agro Tech Private Limited,1377,10th main road, Vijaynagar,560040, Bengaluru	MOU	29-10-2025	1,00,000
13	Mass Production of Black Soldier Fly *Hermetia illucens* (L.) (Stratiomyidae: Diptera) for Vegetable and Fruit Waste Management	SAAMEE Bsf Farm, Building No./Flat No.: 52,Road/Street: Udaiyar Street, S.Kumarapuram, Marudadu, Cuddalore,Tamil Nadu, PIN Code: 607109	MOU	10-12-2025	5,00,000
14	Shatpada Whitegrubs Lure – Reusable Controlled-Release Pheromone Formulation	HSRP Agro Tech Private Limited, 1377,10th main road, Vijaynagar, 560040, Bengaluru	MOU	22-12-2025	2,00,000

Revenue Generated During 2025

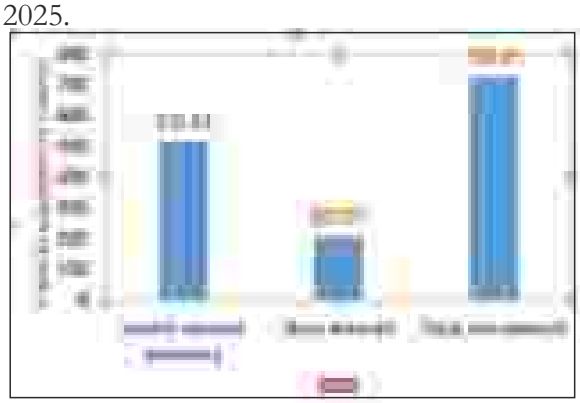
Total Revenue Generated: Rs.46,25,00/-

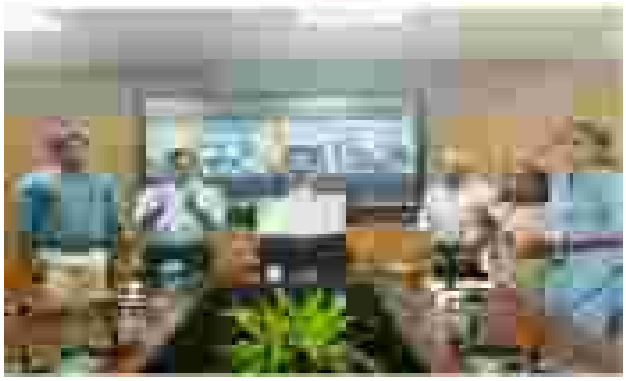
The total revenue generated was 1,32,64,658/- through the following activities:

Details	Revenue generated (₹ in lakhs)
Commercialization of technologies	46,25,000
Sale of pheromone	3,18,000
Sale of microbials	5369460
Sale of macrobials	8,52,708
Sale of farm produce	7,37,960
PG Cell activities	7,08,080
HRD activities	6,37,450
Insect identification services	16,000
Total	**1,32,64,658/-**

ICAR-NBAIR Supply of live insect cultures

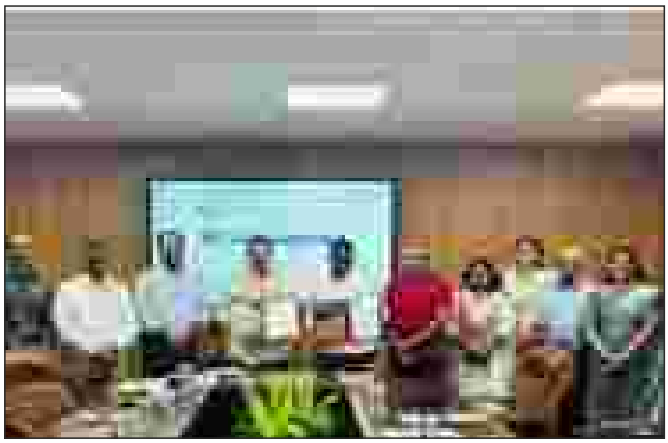
Total 726.21 Lakhs Insects (host insects: 207.97 lakhs and natural enemies: 518.24 lakhs) were supplied to different organizations. Total Rs. 8,52,708/- revenue was generated through sale of insect cultures during 2025.





Technology: "Liquid Formulation of indigenous *Bacillus thuringiensis* NBAIR BtG4 isolates against lepidopteran pests" MOU exchange between ICAR-NBAIR and HIL (India) Ltd, New Delhi

Technology: "Liquid Formulation of indigenous *Bacillus thuringiensis* NBAIR BtG4 isolates against lepidopteran pests" MOU exchange between ICAR-NBAIR and Grow Indigo, Mumbai



Technology: "A volatile attractant for trapping uzi fly, *Exorista bombycis*, parasitoid pest on mulberry silkworm *Bombyx mori* based on pheromonal compounds" MOU exchange between ICAR-NBAIR and Sree Lakshni Janardhanaswamy Enterprises, Bengaluru

Technology: "Mass Production of Black Soldier Fly *Hermetia illucens* (L.) (Stratiomyidae: Diptera) for Vegetable and Fruit Waste Management" MOU exchange between ICAR-NBAIR and BSF Farm, Tamil Nadu

Technology: "Liquid Formulation of indigenous *Bacillus thuringiensis* NBAIR BtG4 isolates against lepidopteran pests" MOU exchange between ICAR-NBAIR and Bannari Amman Sugars Ltd., Coimbatore, Tamil Nadu

Technology: "Shatpada Whitegrubs Lure – Reusable Controlled-Release Pheromone Formulation" MOU exchange between ICAR-NBAIR and MOU signed and technology transferred to: HSRP Agro Tech Private

Technology: "Shatpada -Fruit fly trap-a controlled release Semiochemical" MOU exchange between ICAR-NBAIR and HSRP Agro Tech Private Limited, Bengaluru

Industry Interface meet Conducted on 33nd Foundation Day & Biocontrol Expo 2025

12. CONFERENCE PAPERS

Abhishek, V., David, K. J., Pavana, J. K., Pradeep, S., & Noor, N. R. (2025). Integrative taxonomic studies on fruit flies of tribe Dacini across India. In: Shanthi, M. *et al* (eds), *Souvenir and Abstracts– International Conference on OHPGPR–2025*, 19–21 February 2025, TNAU, Coimbatore, India.

Abhishek, V., David, K. J., Pavana, J. K., Pradeep, S., & Noor, N. R. (2025). Taxonomic studies on fruit flies of tribe Dacini in India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Aditya, K., Anil, K. S., Manjunatha, C., Ruqiya, S., Lavanya, S. M., Divya, C., Raksha, S., Sivakumar, G., & Sushil, S. N. (2025). Genomic insights into an indigenous *Bacillus thuringiensis* strain with antifungal activity against *Sclerotium rolfsii*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Amala, U., Venu, H. S., Manjunatha, C., & Sushil, S. N. (2025). Bee-friendly Farming: Integrative Techniques for Sustainable Meliponiculture. In: *Book of Abstracts–National Conference on Challenges and New Frontiers in Agriculture, Sericulture and Allied Sectors*, 24 December 2025, College of Sericulture, Chintamani, India.

Aneesha, P. J., Mohan, M., Venkatesan, T., Gandhi Gracy, R., Ramya, R. S., Sagar, D., & Varshney, R. (2025). Genomic basis of host selection in *Goniozus nephantidis* (Hymenoptera: Bethylidae). In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Ashwini, E., Kandan, A., Amala, U., Manjunatha, C., Sivakumar, G., & Sushil, S. N. (2025). Development of thermotolerant *Metarhizium anisopliae* strain and its virulence against brinjal mite *Tetranychus urticae*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Bhagat, D. (2025). Smart and Sustainable Pest Management: Pheromones, Sensors, and Nanomaterials. In: *Book of Abstracts–International Conference on Agri-inputs for Sustainable Agriculture and Climate (AISAC–2025)*, 12–14 November, 2025, TERI Gram, Gurugram, India.

Darshana Brahma, Venkatesan, T., Selvaraj, K., Manjunatha, C., Sagar, D., Reddy, N. V., Raghavendra, A., & Roy, P. (2025). Development of species-specific marker for identification of *Aleurotrachelus trachoides*. In: *Book of Abstracts–Entomology Students Conclave–2025*, 15–17 March 2025, Assam Agricultural University, Jorhat, India.

Divya, C., Aditya, K., Ruqiya, S., Raksha, S., Lavanya, S. M., Sivakumar, G., Kandan, A., Manjunatha, C., & Sushil, S. N. (2025). Metabolic profiling and genome wide analysis of *Bacillus subtilis* NBAIR-BSWG1 reveals cyclic lipopeptides as key antagonists. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Durga, G., Kalleshwaraswamy, C. M., & Rachana, R. R. (2025). Diversity of thrips species across vegetable ecosystems of Karnataka. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Gandhi Gracy, R., Negi, N., Sunny Rao, A. N., Suman, T. C., Oshimath, C., Venkatesan, T., & Sushil, S. N. (2025). The tale of two genes and sex determination in *Maconellicoccus hirsutus*: Exploration for pest management via RNAi. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Gauthami, D., Bhaskar, H., Joshi, S., Rameshkumar, A., & Vidya, C. V. (2025). Soft scale (Hemiptera: Coccidae) fauna of Kerala and their associated natural enemies. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

George, A., Ramya, R. S., Ramya, P., Vanishree, G., Shantharaja, C. S., Aruna, Y. R., Manjanagouda, S. S., Anandan, A., & Kumar, S. (2025). Biocontrol of seed-infesting insect pests during storage: Do parasitoids have a justifiable role? In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Gotyal, B. S. (2025). Insects: fascinating creatures in the ecotourism. In: *Book of Abstracts–National Conference on Ecotourism: Harnessing Travel to Discover Nature, Promote Conservation and Support Sustainable Development*, 19–21 February 2025, Karnataka Science and Technology Academy (KSTA), Department of Science and Technology, Government of Karnataka, Karnataka, India.

Gotyal, B. S., Kolesik, P., David, K. J., Reddy, D. S., Ramya, R. S., Shivakumara, K. T., & Sagar, D. (2025). Record of *Asphondylia* gall midge (Diptera: Cecidomyiidae) as a new species damaging fruit of mango in India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Gundappa, B., Bhagyashree, S. N., Yandigeri, M. S., Gotyal, B. S., & Sushil, S. N. (2025). Biology, life table parameters, and feeding potential of the predator *Sycanus versicolor* Dohrn (Hemiptera: Reduviidae). In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Gundappa, B., Yandigeri, M. S., & Gotyal, B. S. (2025). Insect antimicrobial peptides: Possible alternatives for antimicrobial resistance. In: *Book of Abstracts–National Conference on Antimicrobial Resistance: Strategies for Prevention and Alternatives*, 14–16 May 2025, Karnataka Science and Technology Academy, Bengaluru, India.

Gupta, A., Gracy, R. G., & Pattar, R. (2025). Drawing phylogenetic relationships between completely parasitic and entomo-phytophagous species of

Braconidae with disparate morphologies and cross-taxon hosts. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Gupta, A., Sreedevi, K., Correya, J. C., & Gowri, M. (2025). Hymenopteran parasitoid assemblage showcasing enriched faunal diversity in *Cajanus cajan* (L.) Huth fields adopting natural farming. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Hatwar, N. K., David, K. J., Hancock, D. L., Raghuraman, M., Gracy, R. G., & Srinivasa, N. (2025). Postabdominal structures and molecular evidence reveal an undescribed species of *Rhochmopterum* Speiser (Diptera: Tephritidae: Tephritinae: Schistopterini) from India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Hemant Kumar, Sagar, D., Sweta Verma, & Subramanian, S. (2025). Transcriptomic evidence of heat stress-induced adaptive mechanisms balancing survival and reproduction in *Spodoptera litura*. In: *Book of Abstracts–Entomology Students Conclave–2025*, 15–17 March 2025, Assam Agricultural University, Jorhat, India.

Hemant Kumar, Sagar, D., Verma, S., & Subramanian, S. (2025). Insights into transcriptional changes in male accessory glands of *Spodoptera litura* (Fabricius) (Lepidoptera: Noctuidae) under heat stress. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Jenifer, S. J., Selvababu, S., Venkatesan, T., Gracy, R. G., Jyoti, P., Sabtahrishi, S., Gopalakrishnan, M., Sivakumar, G., Manjunatha, C., Amala, U., & Sushil, S. N. (2025). Deciphering the gut bacterial diversity associated with *Apis cerana indica* from the southern regions of Karnataka. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Jose, A., Samraj, M., Rachana, R. R., & Augustine, N. (2025). Pollinating Thysanoptera. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Jyoti, P., Selvababu, S. m, Subi Srivastava, Gracy, R. G., Venkatesan, T., Mohan, M., & Sushil, S. N. (2025). miR-X regulates egg fertilization through ribogenesis in the invasive fall armyworm, *Spodoptera frugiperda*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Kandan, A., Ashwini, E., Amala, U., Manjunatha, C., Sivakumar, G., & Sushil, S. N. (2025). Evaluation of promising entomopathogenic fungi of ICAR–NBAIR against sucking pests of bhendi. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Kavya Yadav, G. A., Vasundhara, J., Selvaraj, K., & Rameshkumar, A. (2025). Invasive whiteflies and their secret saviours in India on custard apple. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Kavya Yadav, G. A., Vasundhara, J., Selvaraj, K., & Sundararaj, R. (2025). Silent Extortioner: monocot-feeding whiteflies of the eastern ghats of India. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Lavanya, S. M., Muthuraju, R., Kandan, A., Ramya, R. S., Divya, C., Raksha, S., Aditya, K., Sushil, S. N., & Manjunatha, C. (2025). Molecular characterisation of biocontrol potential and plant growth promoting *Bacillus thuringiensis* strains isolated from the Western Ghats of India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Mahammed, N. R., David, K. J., Ningthoujam, K., & Abhishek, V. (2025). Taxonomy of Phytalmiinae (Diptera: Tephritidae) with notes on Biology and Mating Trophallaxis. In: Shanthi, M. *et al* (eds), *Souvenir and Abstracts– International Conference on OHPGPR–2025*, 19–21 February 2025, TNAU, Coimbatore, India.

Manjunatha, B. S., Bindushree, C., Gotyal, B. S., Singha, A., Mridha, N., Nageshkumar, T., Pavan, M., Das, A., Das, R., Mandal, J., & Shakyawar, D. B. (2025). Effect of pectinolytic and xylanolytic bacterial strains from termite gut for retting and quality fibre production from jute. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Manjunatha, C., Aditya, K., Ramya, R. S., Sivakumar, G., Subaharan, K., & Sushil, S. N. (2025). Unveiling the insecticidal potential of an indigenous *Bacillus thuringiensis* var. *tolworthi* strain NBAIR Bt25 through whole genome sequencing. In: *Book of Abstracts–International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025)*, 27–29 November, 2025, College of Agriculture, Shivamogga, India.

Manjunatha, C., Aditya, K., Rangeshwaran, R., Ramya, R. S., Sivakumar, K. T., Kandan, A., Sivakumar, G., & Sushil, S. N. (2025). Bioefficacy and genomic landscape of Shatpada Armour: A highly effective *Bacillus thuringiensis* var. *tolworthi* strain NBAIR: Bt25 for combating fall armyworm in India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Maruthi Mehanth, R., Sreerama Kumar, P., & Sheela, N. (2025). Deploying *Typhlodromus (Anthoseius) transvaalensis* against *Polyphagotarsonemus latus* and *Pseudodendrothrips darci* in mulberry. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Navik, O., Patil, J., & Prabhulinga, T. (2025). Recruitment of egg parasitoid *Trichogramma chilonis* Ishii for managing fall armyworm in maize: insight from a field study. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Navik, O., Prabhulinga, T., & Patil, J. (2025 Egg parasitoids of fall armyworm (*Spodoptera frugiperda* J.E. Smith) in maize ecosystem. In: *Book of Abstracts–International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025)*, 27–29 November, 2025, College of Agriculture, Shivamogga, India.

Negi, N., Gandhi Gracy, R., Selvamani, S. B., Karuppannasamy, A., Sunny Rao, A., Venkatesan, T., Mohan, M., & Dubey, V. K. (2025). Decoding the halloween genes: RNAi-based functional analysis of *shade* and *shadow* in *Maconellicoccus hirsutus*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Nekkanti, A., Patil, J., Gotyal, B. S., Gowda, M. T., & Sushil, S. N. (2025). Indigenous entomopathogenic nematodes (Heterorhabditidae and Steinernematidae): efficient biological control agents against the cutworm, *Agrotis ipsilon* (Hufnagel) (Lepidoptera: Noctuidae), in potato cultivation. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Nived, K. M., Gandhi Gracy, R., Selvamani, S. B., Negi, N., Sunny Rao, A., Reddy, N. V., & Venkatesan, T. (2025). *Identification and expression analysis of cytochrome P450 genes in Phenacoccus manihoti*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Patil, J., Nekkanti, A., Gowda, M. T., & Rangeshwaran, R. (2025). Efficacy of entomopathogenic nematodes and *Bacillus thuringiensis* combinations against invasive pest *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) in maize. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Pranita Roy, Sagar, D., Mohan, M., Jambagi, S. R., Shashank, P. R., Nandini, D., & Brahma, D. (2025). Stage-specific sex determination in potato tuber moth, *Phthorimaea operculella*. In: *Book of Abstracts–National Symposium on Innovative Approaches for Integrated Pest Management (IPM NEXUS 25)*, 10 October 2025, SRM College of Agricultural Sciences, Chengalpattu, India.

Pratheepa, M., Selvaraj, K., Gundappa, B., Gracy, G., Venkatesan, T., & Zinnith, V. M. J. (2025). Modern machine learning techniques for the detection and classification of pest and natural enemies in tomato crop. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Praveenkumar, C., Subaharan, K., Saminathan, V. R., Rachana, R. R., Gracy, R. G., Patil, J., Tamilselvan, R., & Saravanan, S. (2025). First report of *Thrips subnudula* Karny (Thysanoptera: Thripidae) on Chilli (*Capsicum annuum* L.) in India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Praveenkumar, C., Subaharan, K., Saminathan, V. R., Rachana, R. R., Gracy, R. G., Saravanan, S., Subrata, G., Preetha, G., Vellaikumar, S., Kavitha, C., Rachana, R. R., Sujith, K. M., & Varatharajan, R. (2025). Morphological and molecular identification of thrips complex on chilli. In: *Book of Extended Abstracts–International Conference on One Health Perspectives in Global Plant Protection Research,* 19–21 February 2025, Tamil Nadu Agricultural University, Coimbatore, India.

Rachana, R. R., Amarendra, B., & Sushil, S. N. (2025). Taxonomic notes on predatory thrips in India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Rachana, R. R., Sujith, K. M., & Varatharajan, R. (2025). Indian Thysanoptera: From 1980 to date. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Rajgopal, N. N., Gupta, A., & Sushil, S. N. (2025). Leafhopper diversity in the Andaman and Nicobar Islands: Insights from a preliminary study. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Raksha, S., Aditya, K., Divya, C., Ruqiya, S., Lavanya, S. M., Sivakumar, G., Kandan, A., Sushil, S. N., & Manjunatha, C. (2025). Unveiling the genomic landscape of NBAIR BSWG1, a potential *Bacillus subtilis* strain. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Ramya, N., Padala, V. K., & Sagar, D. (2025 Decrypting the reproductive behaviour in an invasive alien pest, *Spodoptera frugiperda*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Ramya, R. S., Kavya, M. H., Mohan, M., Manjunatha, C., Shivakumara, K. T., Venkatesan, T., & Sushil, S. N. (2025). Cracking the code before the cut: Optimizing oviposition in *Spodoptera frugiperda* for efficient CRISPR/Cas9 genome editing. In: *Book of Abstracts–International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025)*, 27–29 November, 2025, College of Agriculture, Shivamogga, India.

Ramya, R. S., Sagar, D., Bhavitha, P., Vinodhini, R. L., Neenu, A., Manjunatha, C., Shivakumara, K. T., Venkatesan, T., Divya, C., Kavya, M. H., & Sushil, S. N. (2025). Anchoring accuracy: Identifying stable reference genes for *Chrysoperla zastrowi sillemi* gene expression studies. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Rashmi, M. A., Verghese, A., David, K. J., & Gundappa, B. (2025). Innovative climate-resilient liquid lure and trapping system: Enhancing fruit fly (*Bactrocera* spp.) management as a biocontrol component. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Rupa, K., Kandan, A., & Sushil, S. N. (2025). Pathogenicity characteristics of the entomopathogenic fungus *Metarhizium anisopliae* to *Leucinodes orbonalis*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Rupali, J. S., Sagar, D., Subramanian, S., & Vidya Madhuri, E. (2025). Mating-induced transcriptomic changes in *Spodoptera frugiperda* female moths. In: *Book of Abstracts–Entomology Students Conclave–2025*, 15–17 March 2025, Assam Agricultural University, Jorhat, India.

Ruqiya, S., Nagaraju, K., & Manjunatha, C. (2025). Integrative genomic profiling of indigenous *Lysinibacillus sphaericus* NBAIR LS2 reveals lipopeptide-based antagonism against *Agrothelia rolfsii*. In: *Book of Abstracts– National Conference on Transforming Plant Health Management: Integrating Traditional Practices with Modern Innovations for Global Food Security*, Pondicherry, India.

Ruqiya, S., Nagaraju, K., Aditya, K., Venu, H. S., & Manjunatha, C. (2025). Loop-mediated isothermal amplification (LAMP): An innovative gene amplification technique for specific identification of *Lysinibacillus sphaericus*. In: *Book of Abstracts–National Conference on Transforming Plant Health Management: Integrating Traditional Practices with Modern Innovations for Global Food Security*, Pondicherry, India.

Ruqiya, S., Nagaraju, N., Biplab, D., Aditya, K., Shivakumar, K. T., Ramya, R. S., Kandan, A., Manjunatha, C., & Sushil, S. N. (2025). Multilocus sequence typing and development of a species-specific identification of *Lysinibacillus sphaericus*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sabitha, C., Sai Ram Kumar, D. V., Gandhi Gracy, R., Prasanna Kumari, V., & Manjunatha, B. S. (2025). Micro RNAs (miRNAs): Prospective targets for insect pest management. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological*

Control: Biocontrol Contributions to One Health, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sagar, D., Hemant Kumar, & Sweta Verma. (2025). Resilience or Reproductive Decline? A case study on the effects of acute and chronic heat stress in fall armyworm, *Spodoptera frugiperda*. In: *Book of Abstracts–International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025)*, 27–29 November, 2025, College of Agriculture, Shivamogga, India.

Sagar, D., Hemant Kumar, Verma, S., & Subramanian, S. (2025). Antioxidant armour against heat stress: preserving reproductive function under oxidative stress in *Spodoptera litura*. In: *Book of Abstracts–AZRA International Conference on Environmental Shift Impact on Animal Biota, Food, Feed & Nutritional Security and Human Health*, 11–13 November, 2025, Institute of Agricultural Sciences, Siksha-O- Anusandhan-Deemed to be University, Bhubaneswar, India.

Sagar, D., Mohan, M., Aneesha, P. J., Selvababu, S., Ashok, K., Suman, T. C., Suresh, R. J., Vijayakumari, N., Chandana, C. R., Gandhi Gracy, R., Venkatesan, T., Sushil, S. N., & Srinivasan, R. (2025). Decoding the genome of a pan-tropical leguminous insect pest, *Maruca vitrata* Fabricius (Lepidoptera: Crambidae). In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sampada, N., Yandigeri, M. S., Gundappa, B., & Manjunatha, B. S. (2025). White grubs (*Holotrichia serrata*) gut microflora in organic waste degradation. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sampathkumar, M., Mohan, M., Shylesha, A. N., Jayasekhar, S., Joshi, S., Gupta, A., Venkatesan, T., Sushil, S. N., & Goergen, G. (2025). Assessing the impact of the classical biological control agent, *Anagyrus lopezi* against *Phenacoccus manihoti* in cassava plantations of India. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sampathkumar, M., Shylesha, A. N., Joshi, S., Subaharan, K., & Sushil, S. N. (2025). Recent invasive insect pests of agroecosystems: Challenges and way forward. In: *Book of Abstracts– National Conference on Invasive Alien Fauna Threats and Challenges*, 25–26 March 2025, Kolkata, India.

Sankaran, K. V., Day, M. D., & Sreerama Kumar, P. (2025). Classical biological control of *Mikania micrantha* in the Asia–Pacific region: Current status and future prospects. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Selvaraj, K., Gundappa, B., & Kandan, A. (2025). Crop-specific Standard Operating Procedure for application of biopesticides with drones. In: *Book of Abstracts–National Conference on Comprehensive Crop Management through Drone Technology in Agriculture*, 30–31 October 2025, UAS Dharwad, India.

Selvaraj, K., Kavya Yadav, G. A., Subaharan, K., Vasundhara, J., & Sushil, S. N. (2025). Safeguarding India's date palm, *Phoenix dactylifera* L: pest scenario, IPM strategies, and future prospects. In: *Book of Abstracts–International Conference on Technology Innovations & Sustainable Development of Date Palm*, 29–30 June 2025, Bhuj, India.

Selvaraj, K., Kavya Yadav, G. A., Vasundhara, J., & Ramesh Kumar, A. (2025). Integrative taxonomy of invasive whiteflies and its natural enemies in India – a story of decade. In: *Book of Abstracts–Animal Taxonomy Summit*, 1–3 July, ZSI, Kolkata, India.

Selvaraj, K., Kavya Yadav, G. A., Vasundhara, J., Sumalatha, B. V., & Ramesh Kumar, A. (2025). Integrative taxonomy: a tool to unravel invasive whiteflies and their natural enemies. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Selvaraj, K., Sumalatha, B. V., Kandan, A., & Gundappa, B. (2025). Smart delivery systems for *Cordyceps (=Isaria) fumosorosea* for management of invasive whiteflies in coconut. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Shantharaja, C. S., Rajeshwari, Ch., Manjunatha, C., Vanishree, G., Anjitha, G., Aravindan, S., Manjanagouda, S. S., Gireesh, C., & Anandan, A. (2025). Endophytic microbes from rice landraces: A promising source for managing seed-borne diseases. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sheela, N., & Sreerama Kumar, P. (2025). *Cheletomimus berlesei (Oudemans)* (Acari: Cheyletidae): Interesting life history, intriguing predatory behaviour and an indeterminate prey range. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Shivakumara, K. T., Sunil, J., Polaiah, A. C., Venkatesan, T., Keerthi, M. C., Udikeri, S. S., Divya, C., Manjunatha, C., Ramya, R. S., & Gotyal, B. S. (2025). Detection and molecular phylogeny of soft scale insect, *Megapulvinaria maxima* (Hemiptera: Coccidae): a major pest of Madhunashini, *Gymnema sylvestre*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sivakumar, G. (2025). Role of microbial biopesticides for the sustainable management of crop pests in agriculture. In: *Book of Abstracts–International Conference on Microbial Innovations for Sustainable Agriculture and Medical Applications,* 16–17, December 2025, Madurai Kamaraj University, Madurai, India.

Sivakumar, G., Ramkumar, P., Kannan, M., Mohan, M., Venkatesan, T., Kandan, A., Manjunatha, C., Subaharan, K., & Yandigeri, M. S. (2025). Characterisation and field evaluation of indigenous nucleopolyhedrovirus infecting *Mythimna separata*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sonia, S., Patil, J., Ganguli, J., & Ganguli, R. (2025). Ecological characterisation of *Steinernema shori*, a warm-adapted entomopathogenic nematode. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S.,

Suman, T. C., Selvamani, S. B., Ashok, K., Gracy, R. G., Mohan, M., Sagar, D., Ramya, R. S., Peter, A., & Venkatesan, T. (2025). Identification of suitable reference genes for normalising gene expression of qPCR studies in the peach fruit fly, *Bactrocera zonata*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sundararaj, R., Selvaraj, K., & Kavya Yadav, G. A. (2025). An analysis on the diversity and host plants of Indian aleyrodids (Hemiptera: Aleyrodidae). In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sundaravalli, K., Varshney, R., & Kandan, A. (2025). Investigation on effect of *Metarhizium anisopliae* on mirid bug *Dortus primarius*, a predator of *Phthorimaea absoluta* in tomato. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Sunny Rao, A., Gandhi Gracy, R., Reddy, N. V., Negi, N., Nived, K. M., Rana, D. K., Sampathkumar, M., & Venkatesan, T. (2025). De novo transcriptome and gene expression analysis of *Phenacoccus manihoti* across developmental stages. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Tenguri, P., Fand, B. B., Thube, S. H., Varshney, R., & Navik, O. (2025). Abundance and diversity of insect natural enemies in the cultivated species of cotton. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Tenguri, P., Navik, O., Varshney, R., Amala, U., Sujithra, M., & Subaharan, K. (2025). Bioecology of egg-larval parasitoid *Chelonus blackburni* (Cameron) of maize fall armyworm. In: *Book of Abstracts–International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025)*, 27–29 November 2025, College of Agriculture, Shivamogga, India.

Totada, R. R., Naik, N. M., Prabhuraj, A., Yallappa, M., Yandigeri, M. S., & Mahadeva Swamy. (2025). Screening of antimicrobial activity of *Cassia sericea* plant extract on major food borne pathogens. In: *Book of Abstracts–National Conference on Antimicrobial Resistance: Strategies for Prevention and Alternatives*, 14–16 May 2025, Karnataka Science and Technology Academy, Bengaluru, India.

Vanitha, K., Rachana, R. R., Raviprasad, T. N., Rajashekara, H., & Mohana, G. S. (2025). Thrips species occurring on cashew in Puttur, Karnataka with new host records. In: *Book of Extended Abstracts–International Conference on One Health Perspectives in Global Plant Protection Research,* 19–21 February 2025, Tamil Nadu Agricultural University, Coimbatore, India.

Varshney, R. (2025). Working with tiny assassins: exploiting and popularizing insect biocontrol agents for insect pest management. In: *Book of Abstracts–National Symposium on Frontiers in Entomology–2025*, Entomological Society of India & Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi, India.

Varshney, R., Budhlakoti, N., Subaharan, K., & Sushil,

Unveiling the IPM potential of *Geocoris ochropterus*. In: *Book of Abstracts–National Conference on Advances in Sustainable Plant Protection under Changing Agriculture Scenario*, 18–20 September 2025, MPUAT Udaipur, Rajasthan, India.

Varshney, R., Kandan, A., Tenguri, P., Subaharan, K., & Sushil, S. N. (2025). Exploring *Blaptostethus pallescens* and its interactions with entomopathogens as a potential solution for thrips management. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Vasanta, M., Mohan, M., & Manjunatha, C. (2025). Toxicity of indigenous *Bacillus thuringiensis* isolates against *Spodoptera litura* (Lepidoptera: Noctuidae). In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Vasundhara, J., Kavya Yadav, G. A., Selvaraj, K., & Venkatesan, T. (2025). Non-destructive DNA extraction for whitefly and their natural enemies. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Vasundhara, J., Kavya Yadav, G. A., Selvaraj, K., Ramesh Kumar, A., & Venkatesan, T. (2025). Genomic workflow for whiteflies and their natural enemies systematics. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Veeramanikanta Reddy, N., Suman, T. C., Gracy, R. G., Yadu, Y. K., & Venkatesan, T. (2025). Developmental expression study and silencing of nuclear receptor E75A in brinjal shoot and fruit borer, *Leucinodes orbonalis*. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Venkatesan, T., Ashok, K., Gandhi Gracy, R., Mohan, M., Sagar, D., & Ramya, R. S. (2025). Redefining pest control through silent strike—The tale of RNAi from lab to land. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Venugopala, K. M., Venkatesan, T., Subaharan, K., Selvababu, & Raghavendra, A. (2025). Designing and validation of species-specific primers in stored grain pests. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Visalakshi, M., Hosmani, A., Kandan, A., & Varma, P. K. (2025). Efficacy of native *Metarhizium rileyi* isolates from field evaluation against fall armyworm in maize.

In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Yandigeri, M. S., & Sampada, N. (2025). Whole microbiome and metatranscriptome analysis of detritivorous insects, white grub and rhinoceros beetle. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Yandigeri, M. S., Sampada, N., Pavithra, S., & Gundappa, B. (2025). Antimicrobial activity of black soldier fly extracts. In: Rajgopal, N.N., Ramya, R.S., Rachana, R.R., Sagar, D., Gundappa, B., Shashank, P.R., Nebapure, S.M., Rajna, S., Bhagyashree, S.N., Shivanna, B., Suroshe, S.S. and Sushil, S.N. (eds). *Book of Abstracts–National Dialogue on Insects in Agriculture, Health and Environment*, 15–16 December 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

Zinnith, V. M. J., Cruz Antony, J., Sandhiya, B., & Pratheepa, M. (2025). Artificial Intelligence based large language model for mobile phone alerts to enhance biocontrol methods. In: Sreerama Kumar, P., Rachana, R.R., Ramya, R.S., Sampathkumar, M., Sagar, D., Kandan, A., Gandhi Gracy, R., Bhagat, D., Sreedevi, K., Sivakumar, G., Subaharan, K., Joshi, S., Venkatesan, T. and Sushil, S.N. (eds). *Book of Abstracts–Second International Conference on Biological Control: Biocontrol Contributions to One Health*, 25–28 February 2025, Society for Biocontrol Advancement & ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, India.

12. MEETINGS AND DECISIONS

A.XXIX Research Advisory Committee Meeting:

The Director General, ICAR has reconstituted the Research Advisory Committee of ICAR-National Bureau of Agricultural Insect Resources, Bengaluru, vide letter No. F.NO.CS15/5/2007-IA.III (e 17141), dated 24th January 2023, as per the provisions contained under 71 A (a) of the Rules and Bye-laws of the ICAR.

Dr B. V. Patil (Chairman, RAC)	-Former. Vice Chancellor, UAS, Raichur
Dr. S.C. Dubey (Member, RAC)i	-Assistant Director General (PP&B), ICAR, New Delhi
Dr V. V. Ramamurthy (Member, RAC)	-Former Principal Scientist, Division of Entomology, ICAR-IARI, New Delhi
Dr B. Sarath Babu (Member, RAC)	-Former Head, ICAR-NBPGR, RS, Hyderabad
Dr P. N. Sharma (Member, RAC)	-Former Head, CSK HPKV, Palampur, Himachal Pradesh
Dr S. Desai (Member, RAC)	-Former Principal Scientist & Head, ICAR-CRIDA; Dean, School of Agricultural sciences and Technology, NMIMS, Shirpur
Dr A. Sundaresan (Member, RAC)	-Prof & Chair, Chemistry and Physics of Material Unit, JNCSAR, Jakkur, Bengaluru
Dr S. N. Sushil	-Director, ICAR-NBAIR, Bengaluru
Dr M. Mohan (Member Secretary, RAC)	-Principal Scientist & Officer in-charge PME Cell, ICAR-NBAIR, Bengaluru

The XXIX meeting of the Research Advisory Committee (RAC) of the National Bureau of Agricultural Insect Resources was held on 21st April 2025

The following specific issues, emerging from the presentations and follow up discussions, were deliberated at length.

1.A backup of the insect repository (especially type specimens) at a distant place within India may be created to protect the specimens.

2.Develop a Museum of insects, with full-fledged facilities to be recognised as a repository on par with Natural History Museum of London and a proposal may be submitted under the DST-FIST programme to establish basic infrastructure that supports academic activities, particularly training and taxonomic research at the Bureau.

3.Create a "National Insect Taxonomy hub" at the Bureau by developing a network of working taxonomists across India.

4.Develop a module to provide transparency in the Identification Service of insects, spiders and mites in terms of processing time with time lines.

5.Research should focus on connecting cuticular protein genes in conferring insecticidal resistance at sublethal levels and the knockdown genes to be targeted for the insecticide resistance in insects.

6.Efforts should be made to develop a regulatory framework for insect genome-edited products.

7.More focus should be given to conservation and habitat management research.

8.Develop crop-specific success stories depicting the effectiveness of biocontrol strategies against major pests of different crops.

9. Mass multiplication protocols may be worked outfor the coccinellids and new parasitoids for the management of the economically important crop pests.

10.Prioritise the research on ecology and population dynamics of new insect pests.

11.Focus on precision and site-specific application of biopesticides and biocontrol agents by Agri-drones.

12.Efficacy of biocontrol agents in protected cultivation needs to be standardized on priority.

B.A. XLIX Institute Research Council Meeting:

The XLVII Institute Research Council Meeting of the ICAR-NBAIR, Bengaluru, was held on 21– 23 May 2025 and Institute Research Council Meeting on 21st July 2025 under the Chairmanship of Dr S.N. Sushil, Director, ICAR-NBAIR.

General comments to the Divisions

I.Division of Germplasm Collection and Characterization

- DPPQS intercepted insect collection sent for identification is to be maintained separately in the Museum.
- More external funded projects to be applied exploring opportunities from various funding organisations.
- A brainstorming session to be organised with all the taxonomists towards way forward in creation of a taxonomic hub at the Bureau.
- Division field survey calendar may be prepared outlining the surveys to be taken up.

I.Division of Genomic Resources

- Publish a book on crop specific success stories with the help of DKMA and ICAR.
- Management of *Parthenium* weed through rust fungus can be taken up in collaboration with DWR, Jabalpur.
- Success story of cassava mealybug management to be brought out.
- Dr. M. Sampath Kumar may propose a fresh project on invasive insect pests.

III.Division of Germplasm Conservation and Utilization

- Publish a book on crop specific success stories with the help of DKMA and ICAR.
- Management of *Parthenium* weed through rust fungus can be taken up in collaboration with DWR, Jabalpur.
- Success story of cassava mealybug management to be brought out.
- Dr. M. Sampath Kumar may propose a fresh project on invasive insect pests.

XLIX Institute Research Council Meeting, 21– 23 May 2025

13.PARTICIPATION OF SCIENTISTS IN MEETINGS

Dr S.N. Sushil	Inaugural Function of Regional Research Station of ICAR–Indian Institute of Groundnut Research, Anantapur, Andhra Pradesh, 4 January 2025 National Symposium on "Frontiers in Entomology-2025", ICAR–Indian Agricultural Research Institute, New Delhi, 6 January 2025 Workshop on Natural Farming & Input distribution to the SC farmers of the Idukki district. Inauguration of newly established Biocontrol Laboratory, ICAR–Krishi Vigyan Kendra, Idukki 12–13 January 2025 Monitored the progress of All India Coordinated Research Project on Biological Control Experiments and other activities at ICAR-National Research Institute for Integrated Pest Management, New Delhi, 16 February 2025 Launched ICAR-National Bureau of Agricultural Insect Resources (ICAR-NBAIR), Bengaluru Scheme on "Empowering ST & SC sugarcane growers in Marayoor, Idukki district: A capacity Building programme on Organic Farming through supply of healthy planting materials, Biofertilizers and bio-agents" and Farmers' Producers Interface Meeting, ICAR–Krishi Vigyan Kendra (KVK), Idukki, 07–09 March 2025 Entomology Students Conclave 2025 (ESC2025) at Assam Agricultural University, Jorhat, 15–17 March 2025 Tribal Sub-Plan programme in collaboration with ICAR-Krishi Vigyan Kendra (KVK), Namakkal for Tribal farmers at Kolli hills, Namakkal, Tamil Nadu, **24–**25 21st Meeting of Research Monitoring and Advisory Committee) (RAMC) of Zoological Survey of India (ZSI) at Ranthambore, Rajasthan, 23-26 April 2025 Annual Meet of Vice-Chancellors of Agricultural Universities and Director's Conference of ICAR Institutes on the theme "Convergence in Action: Shaping Vikshit Bharat@2047", 19–21 May 2025 Annual General Meeting / Foundation Day Programme of National Academy of Agricultural Sciences to receive Fellow award at National Academy of Agricultural Sciences (NAAS), New Delhi, 3–5 June 2025 Foundation Day of Zoological Survey of India and to deliver a special lecture during Animal Taxonomy Summit 2025, Kolkata 30 June–2 July 2025 97th ICAR Foundation Day Celebrations & Viksit Krishi Exhibition at National Agricultural Science Complex, New Delhi, 15–17 July 2025 Brain storming session in the Annual Group Meet of All India Coordinated Research Project (AICRP) on Rabi Pulses & Co-Chaired a session on Technical Programme Formulation – Plant Protection and also attended National Plant Health Initiative Meeting at New Delhi, 18–22 August 2025

	Brainstorming Meeting on "Microbial Solutions for Soil and Plant Health: Aligning Science with Policy Imperatives", jointly organized by ICAR– National Bureau of Agriculturally Important Microorganisms (NBAIM) and the Crop Science Division, National Agricultural Science Complex, New Delhi, 31 August – 2 September, 2025 National Conference on "Advances in Sustainable Plant Protection under Changing Agriculture Scenario", Maharana Pratap University of Agriculture & Technology (MPUAT), Udaipur, 17–19 September 2025 22nd meeting of Research Monitoring and Advisory Committee (RAMC) of Zoological Survey of India (ZSI) at Diamond Harbour, West Bengal, 17–11 November, 2025
Dr Sunil Joshi	DAPST scheme programme organized at All India Coordinated Research Project on Biological Control Centre and also to distribute biopesticides and other biocontrol inputs to tribal farmers, Yethapur, Tamil Nadu, 28–29 December, 2025
Dr K. Subaharan	Quarterly Official Language Implementation Committee meetings on 1 January 2025, 2 April 2025, 8 July 2025 and 8 October 2025 Meeting with Avvana Capital a funding company for Research activities at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, 11 November 2025
Dr K. Sreedevi Dr. Mohan M	Virtual Biodiversity sectional committee EED meeting as Principal Member on 6 January 2025 First Expert Committee Virtual Meeting for Review and Monitoring of EFC approved Project "Enhancing climate resilience and ensuring food security with genome editing tools", 8 December 2025 Eighth Annual Review Workshop ICAR–Consortium Research Platform on Genomics at ICAR–National Bureau of Fish Genetic Resources, Lucknow, 28 August 2025 Agri Expo–2025 and presented a lead talk on "Pests and Diseases Management in Sugarcane, Banana, Tapioca & Turmeric for pesticide free production organised by Department of Agriculture and Tamil Nadu Agricultural University (TNAU), Government of Tamil Nadu at Perundurai, Erode District, Tamil Nadu, 11–12 June, 2025
Dr. Mahesh Yandigeri	Brainstorming Meeting on "Microbial Solutions for Soil and Plant Health: Aligning Science with Policy Imperatives", jointly organized by ICAR-National Bureau of Agriculturally Important Microorganisms and the Crop Science Division, National Agricultural Science Complex, New Delhi, 1 September 2025 Virtual meeting on Viksit Krishi Sankalp Abhiyan (VKSA) with Secretary Department of Agricultural Research Education & Director General, Indian Council of Agricultural Research interaction with all the Deputy Director Generals, Assistant Director Generals, Directors and Nodal & Co-nodal Officers of VKSA, 26 November 2025

Dr B.S. Gotyal	Monitoring of All India Coordinated Research Project on Biological Control (AICRP-BC) experimental trials at Tamil Nadu Agricultural University (TNAU), Coimbatore, 13–14 November 2025
Dr R. Gandhi Gracy	"Maitri 2.0: India–Brazil Cross Border Agri-tech Incubators' Program" and Delivered talk on "Opportunities in Bio-Inputs in India" at ICAR–National Institute for National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) for the Brazil Delegates, 28 September 2025 EFC-2026-2031 Meeting for Plant Protection SMD and prepared the budget for ICAR-National Bureau of Agricultural Insect Resources (ICAR-NBAIR) and compiled the Plant Protection presentation Industry-Regulators Academia Interface meeting, 26 February 2025
Dr. Ankita Gupta	Viksit Krishi Sankalp Abhiyan at ICAR-Krishi Vigyan Kendra, Chamrajanagar from 29 May to 2 June 2025.
Dr G. Mahendiran	"Post Budget Webinar - Gene Bank for Crops Germplasm", organized by Department of Science & Technology, Government of India, New Delhi, 5 March 2025
Dr K. Selvaraj	National level Joint Inspection team to assess the Incidences of Rugose Spiralling Whitefly and Mealybug in Different parts of the Andaman & Nicobar Islands, 8 to 15 October 2025 Member of the Central Expert Team on Coconut pest and diseases in Karnataka constituted by Ministry of Agriculture and Farmers Welfare, Government of India to assess the whiteflies and diseases in Karnataka Lecture on "Invasive Pest of Agriculture and Horticulture Crops in India", at GPS Institute of Agricultural Management, Bengaluru, 24 January 2025
Dr Gundappa	Talk on: "Unlocking Innovation: A Guide to Intellectual Property Rights (IPR)" on the eve of World Intellectual Property Day, 30 April 2025
Dr Sagar D.	External Expert to evaluate PG students' presentations of Crop Protection group during PG Science Week-2025, University of Agricultural Sciences, Bengaluru, 11–14 August 2025 Association for Advancement of Pest Management in Horticultural Ecosystems (AAPHME) 145th Month's talk on "Heat stress vis a vis reproductive physiology in Insects", 29 August 2025 ANRF Sponsored workshop on Integrative Taxonomic Approaches for Identification of Whiteflies and its Associated Natural Enemies at ICAR-National Bureau of Agricultural Insect Resources, Bengaluru, 29–30 September, 2025

Dr Sagar D.	Monitoring and progress evaluation of All India Coordinated Research Project on Biological Control (AICRP-BC) and other AICRP-BC activities of Professor Jayashankar Telangana Agricultural University, Rajendranagar; National Institute of Plant Health Management (NIPHM); ICAR–Indian Institute of Rice Research Hyderabad (IIRR); ICAR–Indian Institute of Millets Research (IIMR), Hyderabad, 23–25 November 2025 ICAR–CAFT training program on "Influence of Invasive Insect Pests on Horticultural Crops Genetic Resources and Strategies for their Management" College of Horticulture, University of Horticultural Sciences Campus, Bengaluru, 18 December 2025
Dr Rachana R.R.	Boosting Bioprotection Uptake: A Campaign for Management of Southeast Asian Thrips Using CABI Digital Tools at Adarsh Hamilton Hotel, Bengaluru, 15 January 2025 National Conference on Challenges and New Frontiers in Agriculture, Sericulture and Allied sectors, College of Sericulture, Chintamani, 24 December 2025
Dr Amala U.	Kid's Bee Carnival programme to commemorate World Bee Day, 20 May 2025
Dr Richa Varshney	Meeting with Bengaluru International Airport Limited officials, 28 May 2025
Dr Navik Omprakash Samodhi	IPS Conference on Emerging Issues and Sustainable Strategies in Plant Health Management, Nagpur, 19–21 January 2025
Dr Prabhulinga T.	Monitoring of All India Coordinated Research Project on Biological Control (AICRP-BC) trials at voluntary centre, college of agriculture, Keladi Shivappa Nayaka University of Agriculture and Horticulture Sciences, Shivamogga, 27–29 November 2025
Dr B.S. Manjunatha	Monitored All India Coordinated Research Project on Biological Control trials at voluntary centre, College of Agriculture, Keladi Shivappa Nayaka University of Agriculture and Horticulture Sciences, Shivamogga, 27–29 November 2025
Dr N.N. Rajgopal	National Symposium on Challenges and Sustainable management of Mites in Agriculture, Horticulture and Sericulture, University of Agricultural Sciences (UAS), Bengaluru, 20–21 November 2025
Dr S.N. Sushil Dr T. Venkatesan Dr K. Subaharan Dr G. Sivakumar Dr Kolla Sreedevi Dr A. Kandan Dr R. Gandhi Gracy Dr Jagadeesh Patil Dr K. Selvaraj Dr Gundappa	XXXIV Annual Group Meeting of the All India Coordinated Research Project on Biological Control, Assam Agricultural University, Jorhat, 11–12 June 2025

Dr M. Sampath Kumar Dr Sagar D. Dr Richa Varshney Dr C. Manjunatha Dr Navik Omprakash Samodhi Dr Prabhulinga T.	
Dr S.N. Sushil Dr K. Subaharan Dr T. Venkatesan Dr M. Sampath Kuamr	Tribal Sub-Plan programme at Horticultural Research Station, Yercaud (Salem district) & also monitored the performance of *Anagyrus lopezi* released in cassava fields against cassava mealy bugs in Erode and Coimbatore districts, Tamil Nadu, 9–11 September 2025.
Dr S.N. Sushil Dr K. Subaharan Dr Ankita Gupta Dr M. Sampath Kumar	Cassava Field Day programme, "India's Success in Classical Biological Control of the Invasive Insect Pest, Cassava Mealybug" at Rasipuram, Namakkal District, Tamil Nadu, 13 November 2025
Dr S.N. Sushil Dr Sagar, D. Dr C. Manjunatha Dr R.S. Ramya	International Conference on Sustainable Management of Fall Armyworm (INCOFAW-2025) at Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, 26–27 November 2025
Dr Ankita Gupta Dr G. Mahendiran Dr U. Amala Dr Richa Varshney	Review meeting on Consortia Research Platform on Agrobiodiversity, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 13 September 2025
All the Scientists	Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025), 25–28 February 2025. Rajyabhasha Workshop at ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 21 March 2025. XXIX Research Advisory Committee (RAC) meeting, 21 April 2025. Online meeting on the Interaction meeting on Viksit Krishi Sankalp Abhiyan with the Honorable Union Minister for Agriculture & Farmers Welfare, 24 June 2025. Guest Lecture by Dr Y.G. Prasad, Former Director, ICAR–Central Institute for Cotton Research, Nagpur, 29 July 2025. Meeting with Union Minister of Agriculture and Farmers' Welfare, Shri Shivraj Singh Chouhan at ICAR-National Bureau of Agricultural Insect Resources, Bengaluru, 29 Augst, 20205. Live webcast of Pradhan Mantri Kisan Samman Nidhi 20th release instalment live programme and distribution of biocontrol inputs under tribal sub plan, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 02 September 2025

	Meeting with Shri Muktanand Agrawal, Joint Secretary (Plant Protection/ CEO-PMFBY) and Shri J.P. Singh, Plant Protection Adviser, Directorate of Plant Protection Quarantine & Storage, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 25 September 2025. Hindi Vigyanik Seminar, 24 September 2025. PM Dhan Dhaanya Krishi Yojana and Mission for Aatmanirbharta in Pulses by Honourable Prime Minister Shri. Narendra Modi Ji, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 11 October 2025. 3rd Biocontrol Expo-2025 and Institute Foundation Day, ICAR–National Bureau of Agricultural Insect Resources Yelahanka Campus, Bengaluru, 19 October 2025. Janjatiya Gaurav Diwas 2025 programme on the concluding day of the Janjatiya Gaurav Varsh Pakhwada 2025, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 15 November 2025. PM Dhan Dhanya Samman Nidhi, Live webcast of 'Pradhan Mantri Kisan Samman Nidhi (PM-Kisan) programme held, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, 19 November 2025. Kisan Diwas, ICAR–National Bureau of Agricultural Insect Resources, Yelahanka campus, 23 December 2025. National Dialogue on Insects in Agriculture, Health, and Environment, ICAR-National Bureau of Agricultural Insect Resources (ICAR-NBAIR), Bengaluru, 15–16 December, 2025.

Shri. Shivraj Singh Chouhan, Honourable Union Minister of Agriculture & Farmers Welfare and Rural Development interacting with scientists at ICAR- NBAIR, Bengaluru

Second International Conference on Biological Control: Biocontrol Contributions to One Health (2icbc2025), 25–28 February 2025

"PM Dhan Dhaanya Krishi Yojana' and "Mission for Aatmanirbharata in pulses", 11 October 2025

Live Webcast of 'Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)' and Distributes Biocontrol Inputs under Scheduled Caste Sub Plan, 19 November 2025

3rd Biocontrol Expo and 33rd Foundation day of ICAR-NBAIR Bengaluru, 19 October 20

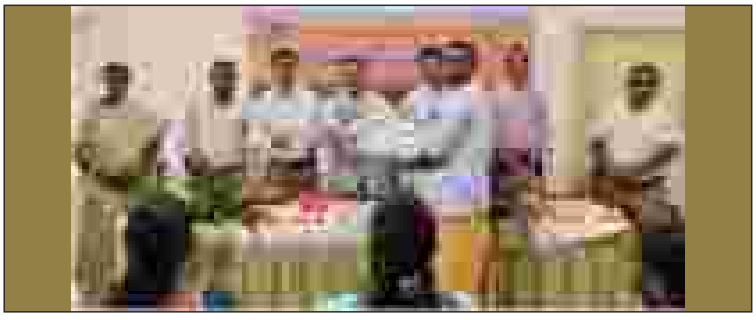
Janjatiya Gaurav Diwas 2025 on the concluding day of the Janjatiya Gaurav Varsh Pakhwada 2025 (JGVP), commemorating the 150th birth anniversary of the great freedom fighter Bhagwan Birsa Munda, 15 November 2025

PM-KISAN 20th Instalment Release live stream program organized at ICAR-NBAIR, Bengaluru on 02-08- 2025 being chaired by Sushri Shobha Karandlaje, Union Minister of State for Micro, Small, and Medium Enterprises and Labour and Employment, Government of India

National Dialogue on Insects in Agriculture, Health, and Environment, 15–16 December 2025

Shri. Shivraj Singh Chouhan, Honourable Union Minister of Agriculture & Farmers Welfare and Rural Development on 27 December, 2025

Farmers day programme cum input distribution to the ST farmers under DAPST programme, 23 December 2025



Tribal subplan and distribution of biocontrol agents at Karumandurai in Salem District, Tamil Nadu, 29 December 2025

14. Trainings conducted

S. No.	[illegible]	[illegible] of the training programme	Date(s)	Coordinator(s) [illegible]	No. of Participants	[illegible] (if any)
1	Scientists and Asst. Professors of ICAR/SAU Institutes	ICAR Sponsored Winter School on Morphological and molecular identification [illegible] of [illegible] insects associated with economically important insect pests including [illegible] of Indian agroecosystems	[illegible] to [illegible].03.2025	Dr. [illegible] Gupta Dr. Gandhi Gracy Dr. Richa Varshney Dr S. Salini Dr M. Sampath Kumar Dr M. Pratheepa Dr T. Prabhulinga	[illegible]	[illegible]
2	Karnataka state Department of Agriculture Officers	Mass production of macrobials, microbials, pheromones and bee pollinators for crop management.	17-19Feb. 2025	Dr. Manjunatha B.S. Dr K. Subaharan Dr G Mahendiran Dr Richa Varshney Dr Omprakash Navik Dr T. Prabhulinga	30	------
3	Scientists, project staff, and students of the [illegible]	[illegible] on [illegible] training programme on "Insect Genome Editing: Principles and Practical Applications of CRISPR/Cas Systems".	[illegible] Dec 2025	Dr. Ramya R. S.	[illegible]	—

4	Dept. of Agril.,					
5		Training programme on Diversity and Identification of white grubs	10-19 March 2025	Dr K. Selvaraj Dr G. Muthuraman Dr Ankita Gupta Dr M. Sampath Kumar		
6	SMS (Plant Protection) of KVKs under ICAR-ATARI, Guwahati (NEH region)	Training programme on mass production of biocontrol agents for the management of crop pests	06-10 January 2025	Dr G Sivakumar Dr K. Subaharan Dr B. S. Gotyal Dr Ankita Gupta Dr T. Prabhulinga	15	

Sl. No.	Trainee(s)	Particulars of the training programme	Date(s)	Coordinator(s) or resource person(s)	No. of Participants	Income generation if any (in ₹)
1	Officials from Jain Irrigation System, Tirpur Tq. Tamilnadu	Training on Advances in Good Management practices for emerging insect pests and diseases suppression in coconut	10-14 Feb. 2025	Dr K Selvaraj Dr Gundappa Dr R. S. Ramya Dr Richa Varshney	02	10,000
2						

3	Naveen Kumar R Scientist B Defence Research Lab (DRL), DRDO, Ministry of Defence, Govt of Tezpur, Assam	Mass Production of *Galleria mellonella*	13.1.2025	Dr. Jagadeesh Patil	01	1000
4	Ms. Deepa [illegible] Bajirh [illegible] Consultant (Equivalent to [illegible] Grade)	Bioconversion of farm and kitchen waste [illegible] by Black Soldier Fly	29 July-29 August, 2025	Dr Mahesh Yandigeri	01	[illegible]
5	Scientists and Asst. Professors of	Integrative Taxonomic Approaches for	29-30 September, 2025	Dr K. Selvaraj Dr B. S. Gotyal		
6	[illegible]	[illegible] beekeeping	[illegible]	Dr K. [illegible]		

[illegible]

Sl. No.	Trainee(s)	Particulars of the training programme	Dates	Coordinator (s) or resource person(s)	No. of Participants	Income generation, if any (in ₹)
1	Ms. Aarati Patil	Taxonomic identification of Hymenopteran parasitoids	9-12, June, 2025	Dr. Ankita Gupta	01	3000
2	Ms. Chilurupalli Bhanu Valli	Taxonomic identification of Thrips species	18.8.25 to 22.8.25	Dr. R.R. Rachana	01	---
3	Ms. Soorya Gayathri S M.Sc. student KAU, RARS, Pilicode, Kasargod, Kerala	Identification of whiteflies and associated natural enemies through morpho- and molecular technique	8-9 Dec, 25	Dr. K. Selvaraj	01	---

4	Ms. Kavya Muthathi, Pondicherry Hindu University,	Training on mealybug taxonomy	9-18 June 2025	Dr Sunil Joshi	III	
5.	Students of Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar Gujarat.	Online training program on slide preparation of mealybugs		Dr Sunil Joshi		
6	Ms Fiza Farooq, PhD scholar, University of Kashmir, Srinagar	Training on "Identification cum training programme on taxonomic diversity of honeybee with [illegible] of Kashmir"	6 June 2024 to 8th Jun 2025	Dr [illegible] Gupta	III	
7.	Ms. Y. Vani, II Year M.Sc. Zoology, Department of Biosciences & Sericulture, Sri Padmavati Mahila Visvavidyalam Women's University, Tirupathi	Industrial training provided on Common Apis and non-Apis pollinators of semi - urban habitats in around Bengaluru	5-26 May 2025	Dr. Ankita Gupta	III	11491

8	Ms. T. Vijaya, II Year M.Sc Zoology, Department of Biosciences & Sericulture, Sri Padmavati Mahila Visvavidyalam Women's University, Tirupathi	Industrial training provided on Quantification of Mango fruit Scale, Rastrococcus [illegible] Hofgeni & Martin (Hemiptera: Coccidae) infestation in horticultural crops and assessing the prey potential of coccinellid beetles for its management	5-28 May 2025	Dr. M. Sampath Kumar	01	11800
9	Mr. C. Dhanush Kumar Reddy Final B.E., Biotechnology, The Oxford college of engineering, Bengaluru	Internship project on Updating the checklist of spider fauna of Andaman and Nicobar Islands	10 February - 27 May 2025	Dr. M. Sampath Kumar	01	11800
10	Ms. Bhargavee, II Year M.Sc Zoology, Department of Biosciences & Sericulture, Sri Padmavati Mahila Visvavidyalam Women's University, Tirupathi	Internship training programme on "Fauna of Theni (Dt), Tamilnadu, Terebrantia	5th May-5th July 2025	Dr. R. S. Rachana	01	11800
11	Final year BSc (Agriculture) students, College of Agriculture, Hassan	Hands on training	27 October - 16 November 2025	Dr Omprakash Navik	17	
12	Final year BSc (Agriculture) students, College of Agriculture, Bangalore	Hands on training		Dr Omprakash Navik	17	

13	Students	Hands on training and experimental learning in Nanotechnology		Dr Deepa Bhagat	35	
14	Ms. Harshita, Ms. Phalguni, College of Horticulture, Mudigere	Hands on training on mass production techniques of insect biocontrol agents	18 August - 14 September, 2025	Dr T. Prabhulinga	02	
15	Mr. Vinay. O. L, UAS, GKVK, Bengaluru Ms. Pravin Mangalmukh, College of Agriculture, Hassan	Hands on training on mass production techniques of insect biocontrol agents	27 October - 13 November 2024	Dr. Richa Varshney Dr T. Prabhulinga	02	
16	Grade IX students, Vishwa Vidyapeeth,Bengaluru	Stingless beekeeping	14 July 2025	Dr U. Amala	60	
17	Ms. G. Jayasri, II Year M.Sc. Zoology, Department of Biosciences & Sericulture, Sri Padamavati Mahila Visvavidyalam Women's University, Tirupathi	Training on Techniques of rearing host insects and their natural enemies	5- 26 May 2025	Dr. Richa Varshney	01	11800

1	Tamil Nadu Farmers	Thenthalai Srirangam block, ATMA sponsored visit on IPM in all crops	18.08.2025	Dr. B.S. Gowd Dr. M. Sangeeth kumar	20	
2.	Farmers of Hadripura, Doddabelahongla, Doddaballapura	Training on biological control of crop pests	25.09.2025	Dr J Patil Dr Gundappa Dr K. Subaharan		
3.	Tamil Nadu Farmers from Karur district	ATMA sponsored training on IPM in all crops	31.10.25	Dr. B.S. Gowd Dr. M. Sangeeth Kumar	20	

4	Progressive farmers of Rajasthan	Mass production techniques of insect biocontrol agents	25-26 November 2025	Dr. Richa Varshney Dr T. Prabhulinga,		
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
6	Famers of Karnataka, Ibrasapura, Devanahalli,	Scientific Beekeeping	22-09-2025	Dr U. Amala	50	
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
8	Farmers from Andhra Pradesh , Srikakulam district,	Training cum demonstration on "Biocontrol strategies for Management of Invasive whiteflies in Coconut"	9 January, 2025,	Dr K. Selvaraj	150	
9	Farmers from Karnataka Yediyur, Kunigal taluk, Tumkur	Training cum demonstration on "Biocontrol strategies for Management of Invasive whiteflies in Coconut	5 March, 2025	Dr K. Selvaraj	120	

Sl. No	Category	Date(s)	Institute/company they belong to	Number of visitors
1	Final year B.Sc Horticulture	12.02.2025	TNAU, Coimbatore	(121+3staff)
2	[illegible]	[illegible]	[illegible]	[illegible]
3	Final year B.Sc Horticulture	03.03.2025	RVS Horticulture college, Coimbatore	(80+3 staff)
4	[illegible]	[illegible]	[illegible]	[illegible]
5	Final year B.Sc Horticulture	10.03.2025	CAU, Imphal	(21+2 staff)
6	[illegible]	[illegible]	[illegible]	[illegible]
7	Third year, B.Sc. (Agri.) students	22.04.2025	SRM college of Agricultural Science, Chennai	(6+1 staff)
8	[illegible]	[illegible]	[illegible]	[illegible]

9	B. Sc (Ag.) students	03.07.2025	Adhiyamaan College of Agriculture and Research, Hosur, Tamil Nadu	(187+4 staff)
10	[illegible]	[illegible]	[illegible]	[illegible]
11	B. Sc. (Ag.) students	11.07.2025	PGP college of Agricultural Sciences, TNAU, Namakkal, TN	(95+3 staff)
12	[illegible]	[illegible]	[illegible]	[illegible]
13	B. Sc (Ag.) Students	08.09.2025	Kalasilingam academy of Research and Education, (Agriculture), Krishnakoil, TN	(28+2 staff)
14	[illegible]	[illegible]	[illegible]	[illegible]
15	B. Sc (Ag.) Students	13.09.2025	Birsa Agricultural University	(47 students+3 staff)
16	[illegible]	[illegible]	[illegible]	[illegible]
17	CAPT trainees	19.12.25	CAPT trainees of UHS, Bagalkot	25
18	[illegible]	[illegible]	[illegible]	[illegible]

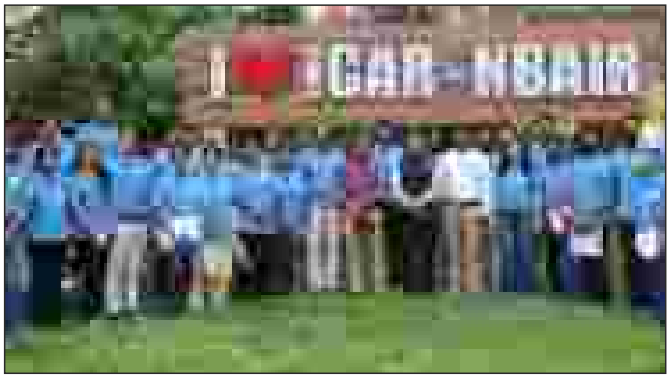
ICAR Sponsored winter school on morphological and molecular identification including production of natural enemies associated with economically important insect pests. (Including invasives) of Indian agroecosystem, 16 January 2025 – 05 February 2025

Training programme on mass production of biocontrol agents for the management of crop pests, 06-10 January 2025

Training on Mass production of macrobials, microbials, pheromones and bee pollinators for crop management, 17-19 February 2025

Coconut Development Board sponsored Training on Advances in Good Management Practices for Emerging Insect Pests and Diseases Suppression in Coconut, 10-14 February, 2025

Training programme on Diversity and Identification of white grubs (Coleoptera: Scarabaeidae), 10-19 March, 2025

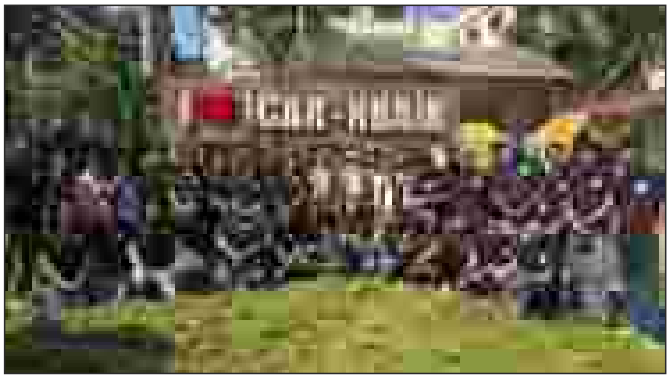


ANRF sponsored workshop on Integrative Taxonomic Approaches for Identification of Whiteflies and its Associated Natural Enemies, 29-30 September, 2025

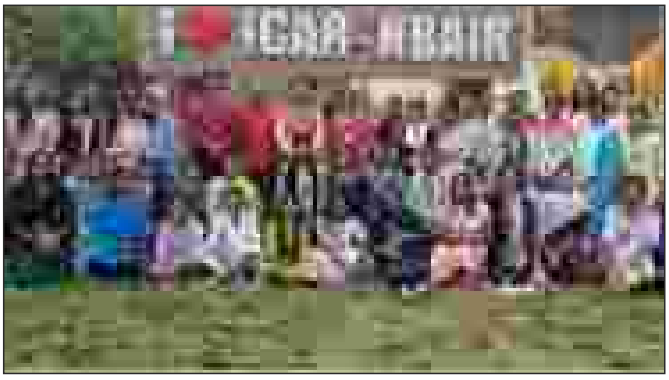
Training for Agricultural Officials of Andaman and Nicobar Administration on Mass Production of Biocontrol Agents, 8-10 December 2025

Tamil Nadu farmers visit to ICAR-NBAIR for training on IPM practices in all crops, 18 June 2025

Hands on Training on Stingless beekeeping to the trainees from the Tribal villages of Chamarajanagar district, 30-31 October 2025



Students of Rani Lakshmi Bhai Central Agricultural University, Jhansi, visit to ICAR-NBAIR on 11.12.25

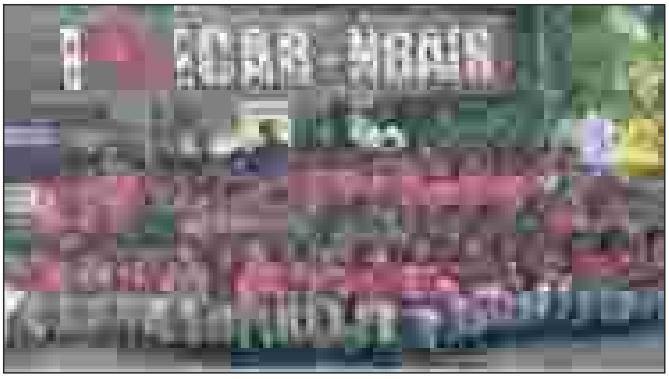


Students of Horticultural college, Trichy, TNAU, visit to ICAR-NBAIR on 13.2.2025

CAFT trainees of UHS, Bagalkot visit to Butterfly Garden, ICAR-NBAIR, Yelahanka campus on 19.12.25

VIBGOYR School students visit to Butterfly Garden, ICAR-NBAIR, Yelahanka campus on 19.8.25

Presidency School students visit to ICAR-NBAIR on 11.6.25



Visit of School Students from Vishwa Vidyapeeth at NBAIR Yelahanka Campus

School students participated in the World Bee Day celebration on 20 May 2025 at ICAR-NBAIR, Yelahanka campus

School students' exposure visit to ICAR-NBAIR, Yelahanka campus on 22 January 2025

15. DISTINGUISHED VISITORS

1. Shri Shivraj Singh Chouhan, Honourable Union Minister of Agriculture & Farmers Welfare and Rural Development, 29 August 2025
2. Dr M. L. Jat, Secretary, DARE and Director General, ICAR, New Delhi on 6 November 2025
3. Honourable Union Minister of Steel and Heavy Industries, Mr. H D Kumaraswamy, 19 October 2025
4. Padma Shri Dr. C. N. Manjunath, Honourable Member of Parliament, Bengaluru Rural Constituency, 19 October 2025
5. Dr. K. Sudhakar, Honourable Member of Parliament, Lok Sabha (Chikkaballapur Constituency), 19 November 2025 and 23rd December 2025
6. Sushri Shobha Karandlaje, Honourable Minister of State for MSME and Labour & Employment, 11 and 19 October 2025
7. Shri P.C. Vanlalruata, Minister for Agriculture, Irrigation, Water Resources, and Cooperation, Government of Mizoram, 24 January 2025
8. Shri Muktanand Agrawal, Joint Secretary (Plant Protection/ CEO-PMFBY), September 25 2025
9. Dr Sindura Ganapathi, Visiting Principal Scientific Advisor, Government of India, 16 September 2025
10. Sushri Alka Nangia Arora, Additional Secretary & Financial Advisor, Department of Agricultural Research & Education, 11 April 2025
11. Dr. Sandesh Mahadevappa, Director, Postal Services (Headquarter), Bengaluru, 28 November 2025
12. Dr. Poonam Jasrotia, Assistant Director General (Plant Protection & Biosafety), ICAR, New Delhi, 12 November 2025

Shri. Shivraj Singh Chouhan, Honourable Union Minister of Agriculture & Farmers Welfare and Rural Development visited the facilities at ICAR – NBAIR, Bengaluru

Sushri. Shobha Karandlaje, Union Minister of State for the Ministry of Labour and Employment and the Ministry of Micro, Small, and Medium Enterprises visiting ICAR NBAIR

Honourable Union Minister of Steel and Heavy Industries, Mr. H D Kumaraswamy, Padma Shri Dr. C. N. Manjunath, Honourable Member of Parliament, Bengaluru Rural Constituency, Sushri Shobha Karandlaje, Honourable Minister of State for MSME and Labour & Employment on the occasion of 33rd Foundation Day of ICAR-NBAIR and 3rd Biocontrol Expo, ICAR-NBAIR, Bengaluru

A visit by Sushri Shobha Karandlaje, Union Minister of State for Micro, Small, and Medium Enterprises and Labour and Employment, Government of India to ICAR-NBAIR, Yelahanka campus on 02-08-2025

Visit by Ms Alka Nangia Arora, Additional Secretary (DARE) & Financial Advisor (ICAR) to ICAR NBAIR

Visit by Dr.Bikas Mandal, ADG (IR) and Dr.D.Hemadri, ADG (Animal Health) to ICAR NBAIR on 24.10.25

Visit of Honorable Minister for Agriculture Government of Mizoram, Shri. P.C. Vanlalruata, 24 January 2025

Dr M. L. Jat, Secretary DARE & DG, ICAR visiting the exhibits display at ICAR-NBAIR, Bengaluru, on 6 November 2025

16. OTHER ACTIVITIES

ICAR-NBAIR organized Bee Smart: Student Awareness Programme on Meliponiculture

ICAR–National Bureau of Agricultural Insect Resources, Bengaluru, organized a one-day Beekeeping Awareness Programme on 14 July 2025 for sixty students from Vishwa Vidyapeeth, Yelahanka, Bengaluru, under the "Jai Jawan – Jai Kisan" initiative. Dr. S.N. Sushil, Director of I CAR-NBAIR, emphasized the vital role of bees in pollination and their significance as ecological indicators. He also outlined the Bureau's mandate in conserving beneficial insect fauna for sustainable pest management. Dr. K. Subaharan, Head, Division of Germplasm Conservation and Utilisation, spoke about the ease of domestication of stingless bees and introduced the concept of setting up a meliponiary as a hobby for producing high value honey. Dr. U. Amala, Senior Scientist (Entomology), educated the students on the identification, behaviour, biology, and production systems of stingless bees. As part of the hands-on experience, the students visited the meliponiary and received practical training in handling stingless bee colonies. To promote continued learning and engagement, three bee boxes will be installed within the school premises, with students taking responsibility for their upkeep and maintenance.

ICAR -NBAIR organized Training program on Biological Control of Insect Pests

ICAR-NBAIR organised a Training programme "Biological Control of Insect Pests" was organized on 25 September 2025 at Hadripura village, Doddabelahongala hobli, under the Rashtriya Krishi Vikas Yojana (RKVY), Government of Karnataka. The program was chaired by Shri Dhiraj Muniraj, MLA, Doddaballapura. Other dignitaries include Dr. S.N. Sushil, Director, ICAR-NBAIR, Bengaluru; Dr. Deepaja, Joint Director, RKVY Project; Dr. K. Subaharan, Head, DGCU ICAR-NBAIR; Mrs. Gayatri, DDA, Bengaluru Rural; Dr. Raghavendra, ADA, Doddaballapura; and Mr. Satish, President, Gram Panchayat. The meeting was attended by over 300 farmers. Lectures on biological control crop pests were delivered and bio-inputs for insect pest management were distributed to the farmers.

ICAR–NBAIR organised Swachhta Hi Sewa programme

ICAR-NBAIR organized Cleanliness drive under the theme "Transformation of cleanliness target Units", this activity was carried out inside and outside the farm campus on 18 September 2025. Target units like frontside of main gate, along the side of road, washbasin of lab was identified and cleaned the entire target units through brooming, removal of grass, debris and mold growth.

Engagement with School Children-Swachhata Quiz at School

The awareness on the Swachchata Hi Seva programme was organised in the Samsidh International School, Vidyaranyapura, Bengaluru for the grade 10 Students on 19 September 2025. In this programme, the students were sensitised about the Swachchata Hi Seva Programme. The quiz competition was held on the topic "Swachch Bharat Abhiyaan", in this quiz competition, many questions were asked, and prizes were given as a token of appreciation.

ICAR-NBAIR organized Safai Mitra Suraksha for preventive health check-ups benefit sanitation workers and their families, a cardiology health check-up on 21 September 2025.

Human Chain Initiative for Sanitation, Hygiene and Sustainable Practices

human chain initiative to create a visual representation of unity and collective commitment on 22 September 2025. The event was conducted to raise public awareness and showing a shared resolve to improve sanitation and hygiene within the community. The campaign promoted 'Reduce, Reuse, Recycle' activities.

Distribution of PPE Kits and Safety Gear to Sanitation Workers

ICAR-NBAIR, Bengaluru distributed PPE kits and safety gear - PPE kits to sanitation workers on 29 September 2025. Coats, PPE kits, and safety gear were given to the sanitation staff in order to protect them from occupational hazards.

Swachhotsav Waste to Art Exhibition at ICAR–NBAIR

As part of the Swachhta Hi Seva-2025 (SHS–2025) campaign (Theme: Swachhotsav), under the Waste into Art initiative action plan, a creative selfie point was set up at the ICAR–NBAIR, Yelahanka Campus on 27 September 2025. Disposed materials such as plastic water bottles, polythene covers, plastic spoons, dried leaves, sticks, and discarded bamboo poles etc. were artistically transformed into insect models and displayed near the farm products sale counter. The "selfie point" attracted the attention of the public, especially children, and effectively created awareness about the importance of transforming waste into art.

Clean Green Utsav: Eco-friendly and Zero-Waste Celebration Programme

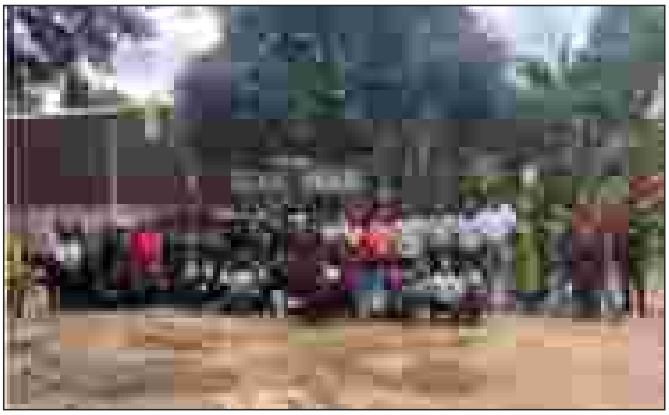
Clean Green Utsav, an eco-friendly and zero-waste celebration, was organized on 23 September 2025 with the objective of addressing Swachhata-related challenges through active citizen participation and collaboration with local bodies. During the event, fruit, vegetable, and agricultural farm wastes were collected and inoculated with Black Soldier Fly larvae for rapid biodegradation. Leaf litter collected from in and around the Yelahanka campus was pooled in composting bags and treated with Waste Decomposer solution to accelerate its conversion into organic manure.

Safai Mitra Samman Ceremony for Housekeeping Staff

ICAR-NBAIR organized Safai Mitra Samman ceremony, during which the institute's housekeeping staff were honored and felicitated on 2 October 2025. This recognition was an expression of gratitude for their invaluable, year-round services in maintaining the institute's cleanliness, hygiene, and neatness.

Organised open day for the students

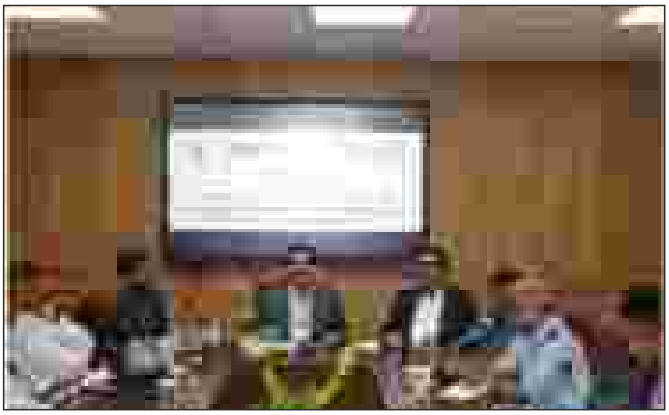
Organised open day for the students of Grade 6,7 & 8 (255 children accompanied by 5 teachers and 2 attendees) of Samsidh International School, Vidyaranyapura visited ICAR-NBAIR Yelahanka campus on 20 August, 2025 at 9.30 am. Scientists interacted with students and briefed them about beneficial insects and their role in agriculture.



राजभाषा गतिविधियां 2025

राजभाषा कार्यशाला

राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरू में 21 मार्च, 2025 को राजभाषा कार्यशाला आयोजित की गयी। इस कार्यशाला में मुख्य अतिथि के रूप में श्री अनिर्बान कुमार बिश्वास, उप निदेशक (राजभाषा कार्यान्वयन) गृह मंत्रालय, राजभाषा विभाग, भारत सरकार, बेंगलूरू और मुख्य वक्ता के रूप में श्री राज भवन, सदस्य सचिव, नराकास (का-4), केन्द्रीय विनिर्माणकारी प्रौद्योगिकी संस्थान, बेंगलूरू ने "राजभाषा हिन्दी के विभिन्न आयाम 'विषय पर अति महत्वपूर्ण जानकारी व्याख्यान के माध्यम से सम्मेलन कक्ष में उपस्थित प्रतिभागियों को विस्तार पूर्वक प्रदान की। राजभाषा कार्यशाला में ब्यूरो के समस्त वैज्ञानिकों, अधिकारियों और कर्मचारियों सहित भा.कृ.अनु.प.-भारतीय पशु-चिकित्सा अनुसंधान संस्थान बेंगलूरू केंद्र तथा भा.कृ.अनु.प.-राष्ट्रीय मृदा सर्वेक्षण एवं भूमि उपयोग नियोजन ब्यूरो बेंगलूरू केंद्र के वैज्ञानिकों, अधिकारियों और कर्मचारियों ने अपने-अपने विचार व्यक्त किए तथा सक्रिय रूप से कार्यशाला में भाग लिया।



एन.बी.ए.आई.आर.और आई.वी.आर.आई. द्वारा राजभाषा कार्यशाला का आयोजन

भा.कृ.अनु.प.- राष्ट्रीय कृषि कीट संसाधन ब्यूरो और भा.कृ.अनु.प.-भारतीय पशु चिकित्सा अनुसंधान संस्थान, बेंगलूरु ने, संयुक्त रूप से राजभाषा अधिनियम के तहत निर्धारित नियमों का अनुपालन करने के लिए, 23 जून, 2025 को, भारतीय पशु चिकित्सा अनुसंधान संस्थान, बेंगलूरु परिसर के संयुक्त निदेशक डॉ. पल्लब चौधरी की अध्यक्षता में एक दिवसीय राजभाषा हिंदी कार्यशाला का आयोजन किया। कार्यशाला का आयोजन राजभाषा अधिनियम के तहत नियमों और विनियमों का प्रसार करने और केंद्र सरकार के कार्यालयों में राजभाषा के उपयोग को बढ़ावा देने के उद्देश्य से किया गया। इस कार्यशाला में डॉ. एस.एन. महेश, सहायक निदेशक,राजभाषा विभाग, डीआरडीओ, रक्षा मंत्रालय, बेंगलूरु से मुख्य अतिथि एवं वक्ता के रूप में आमंत्रित किया गया। श्री सतेन्द्र कुमार, सदस्य सचिव, राजभाषा विभाग, भा.कृ.अनु.प.-राष्ट्रीय कृषि कीट संसाधन ब्यूरो और पदाधिकारियों ने इस कार्यशाला में भाग लिया। डॉ. चंद्र मोहन एस., प्रभारी, राजभाषा विभाग, भा.कृ.अनु.प.-भारतीय पशु चिकित्सा अनुसंधान संस्थान, बेंगलूरु परिसर और बेंगलूरू में स्थित अन्य भा.कृ.अनु.प. संस्थानों जैसेकि भा.कृ.अनु.प.-राष्ट्रीय मृदा सर्वेक्षण एवं भूमि उपयोग नियोजन ब्यूरो, क्षेत्रीय केंद्र(NBSS&LUP), भा.कृ.अनु.प.-राष्ट्रीय डेरी अनुसंधान संस्थान, क्षेत्रीय केंद्र (NDRI), भा.कृ.अनु.प.-राष्ट्रीय पशु पोषण एवं शरीर क्रिया विज्ञान संस्थान (NIANP) और भा.कृ.अनु.प.-भारतीय बागवानी अनुसंधान संस्थान (IIHR) संस्थानों से राजभाषा का कार्य देख रहे 40 पदाधिकारियों ने इस राजभाषा हिंदी कार्यशाला में भाग लिया।

राजभाषा पखवाड़ा समारोह का आयोजन

भा.कृ.अनु.प.–राष्ट्रीय कृषि कीट संसाधन ब्यूरो में, 14सितंबर से 29 सितंबर, 2025 तक "राजभाषा पखवाड़ा" समारोह का आयोजन किया। ब्यूरो में, 17 सितंबर, 2025 को "राजभाषा पखवाड़ा" समारोह कार्यक्रम का उदघाटन ब्यूरो के निदेशक महोदय, डॉ. एस. एन. सुशील; विभागाध्यक्षों, डॉ. टी. वेंकटेशन, विभागाध्यक्ष, जी. आर.विभाग एवं डॉ. सुनील जोशी, विभागाध्यक्ष, जी.सी.सी.विभाग; वरिष्ठ प्रशासनिक अधिकारी, श्री जे. मैथ्यू और वित्त एवं लेखा अधिकारी, श्रीमती सुमा एस., ने दीप प्रज्जवलित करके किया।

"राष्ट्रीय वैज्ञानिक संगोष्ठी" का आयोजन

एन.बी.ए.आई.आर., बेंगलूरु में, 24 सितंबर, 2025 को "विकसित भारत @2047 में कृषि अनुसंधान की भूमिका" विषय पर एक दिवसीय "राष्ट्रीय वैज्ञानिक संगोष्ठी" के अवसर पर बेंगलूरू में भा कृ अनु प के समस्त संस्थानों जैसे कि ,राष्ट्रीय पशुरोग जानपदिक एवं सूचना विज्ञान संस्थान (NIVEDI), राष्ट्रीय पशु पोषण और शारीरिकी संस्थान (NIANP), भारतीय बागवानी अनुसंधान संस्थान (IIHR), भारतीय पशु-चिकित्सा अनुसंधान संस्थान (IVRI), केन्द्रीय मीठाजल जीवपालन अनुसंधान संस्थान क्षेत्रीय अनुसंधान केंद्र (CIFA), केन्द्रीय अन्तर्स्थलीय मात्स्यिकी अनुसंधान संस्थान क्षेत्रीय केंद्र (CIFRI), राष्ट्रीय बीज विज्ञान एवं प्रौद्योगिकी संस्थान क्षेत्रीय अनुसंधान केंद्र (NISST), राष्ट्रीय मृदा सर्वेक्षण और भूमि उपयोग योजना ब्यूरो (NBSS&LUP) और ब्यूरो के वैज्ञानिकों ने भाग लिया इस संगोष्ठी में प्रवक्ताओं के रूप में ऑनलाइन माध्यम से डॉ. एस. के. सोम (पूर्व विभागाध्यक्ष आई.सी.एम. विभाग एवं प्रभारी संयुक्त निदेशक, नार्म, हैदराबाद; विषय:- "राष्ट्र विकास हेतु कृषि अनुसंधान एवं उद्यमिता का समायोजन"; डॉ. अरविन्द कुमार अहलावत, प्रमुख एवं वरिष्ठ वैज्ञानिक, कृषि विज्ञान केंद्र, फाजिल्का, पंजाब; विषय:- "स्वास्थ्य मृदा, स्वास्थ्य किसान : प्राकृतिक खेती एवं अनुसंधान का योगदान"; डॉ. फूल कुमारी, प्रमुख एवं वरिष्ठ वैज्ञानिक, कृषि विज्ञान केंद्र, दीमापुर आई सी ए आर रिसर्च कॉम्प्लेक्स फॉर एन ईएच रीजन, नागालैंड केंद्र मेडजीफेमा, नागालैंड; विषय:- टेक्नोलॉजी आधारित नवाचारों में कृषि विज्ञान केन्द्र की भूमिका तथा ऑफलाइन (सभागार में); डॉ. सुनील जोशी (विभागाध्यक्ष, जी.सी.सी.विभाग, एन.बी.ए.आई.आर., बेंगलूरु; विषय:-"कीटों की कहानी चित्रकारों की जुबानी"; डॉ. आर. बी. तिवारी, प्रधान वैज्ञानिक, आई.आई.एच.आर., बेंगलूरु, विषय:- देश में बढ़ती जनसंख्या हेतु खाद्य प्रसंस्करण प्रौद्योगिकी की भूमिका; डॉ. ए. के. नायर, प्रधान वैज्ञानिक, आई.आई.एच.आर., बेंगलूरु,

विषय:-बागवानी फसलों में रिजनरेटिव फार्मिंग (नवजीवी खेती) की उपयोगिता एक परिचय और डॉ. बी. पी. श्रीनिवास, प्रधान वैज्ञानिक, आई.वी.आर.आई., बेंगलूरु, विषय:- पशुरोग नियंत्रण और उन्मूलन में आई.वी.आर.आई. का योगदान विषयों पर व्याख्यान प्रस्तुत किये । इसके अतिरिक्त इस राष्ट्रीय वैज्ञानिक संगोष्ठी में प्रोफेसर (डॉ.) शोराज सिंह, आर एस एम कॉलेज, धामपुर, बिजनौर, उत्तर प्रदेश एवं डॉ. नरेंद्र सिंह पंवार, वरिष्ठ वैज्ञानिक, एन.बी.पी.जी.आर. के क्षेत्रीय केंद्र, रांची, झारखंड भी ऑनलाइन शामिल हुए।

कवि सम्मेलन का आयोजन

ब्यूरो में, 29सितंबर, 2025को "राजभाषा पखवाड़ा" आयोजन के तत्वाधान में एक कवि सम्मेलन आयोजित किया गया। इस कवि सम्मेलन का उदघाटन ब्यूरो के निदेशक महोदय, डॉ. एस. एन. सुशील, ब्यूरो की संस्थान प्रबंधन समिति के सदस्य, श्री पुट्टा स्वामी गौड़ा और आमंत्रित कविगणों ने दीप प्रज्जवलित करके किया । कवि सम्मेलन में डॉ. भक्त सच्चिदानंद, सेवानिवृत्त विभागाध्यक्ष, मृदा विज्ञान एवं कृषि रसायन शास्त्र विभाग, जवाहरलाल नेहरू कृषि विश्वविद्यालय, जबलपुर, मध्य प्रदेश; श्री ज्ञानचंद मर्मज्ञ, साहित्य साधक मंच बेंगलूरु के संस्थापक, साहित्यकार, लेखक एवं कवि; श्रीमती नर्मदा कुमारी, कार्यालय सी.ए.जी., प्रधान महालेखाकार, बेंगलूरु; श्री राजभवन, सी.एम.टी.आई., तुमकुर रोड, बेंगलूरु; श्री लोकेश मिश्र, उप मुख्य टिकट निरीक्षक, रेलवे विभाग, बेंगलूरु ने अपनी-अपनी कविताओं से ब्यूरो में श्रोताओं को आनंद विभोर कर दिया।

डॉ. एस. एन. सुशील द्वारा मुख्य अतिथि के रूप में प्रतिभागिता

ब्यूरो के निदेशक महोदय, डॉ. एस. एन. सुशील ने मुख्य अतिथि के रूप में भा.कृ.अनु.प. -भारतीय बागवानी अनुसंधान संस्थान (आई.आई.एच.आर.), बेंगलूरु में हिंदी पखवाड़ा के आयोजन के अवसर पर दिनांक 15 सितंबर, 2025 को सहभागिता की ।

ब्यूरो के निदेशक महोदय, डॉ. एस. एन. सुशील ने मुख्य अतिथि के रूप में केन्द्रीय विनिर्माणकारी प्रौद्योगिकी संस्थान (सी.एम.टी.आई.), भारी उद्योग मंत्रालय, भारत सरकार, तुमकुर रोड, बेंगलूरु में हिंदी दिवस के आयोजन के अवसर पर दिनांक २८ अक्टूबर, 2025 को सहभागिता की ।

राजभाषा कार्यशाला/ अभिमुखीकरण कार्यक्रम का आयोजन

.कृ.अनु.प.-राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरु में, नगर राजभाषा कार्यान्वयन समिति (का-2), बेंगलरू के तत्वाधान में दिनांक 28 नवम्बर, 2025 को राजभाषा कार्यशाला/ अभिमुखीकरण कार्यक्रम का आयोजन किया गया। इस कार्यक्रम का प्रारम्भ राष्ट्र गीत, भा.कृ.अनु.प. गीत के बाद, कार्यक्रम के मुख्य अतिथि डॉ. संदेश महादेवप्पा, निदेशक डाक सेवाएं, मुख्य पोस्टमास्टर जनरल कर्नाटक सर्किल एवं अध्यक्ष, नराकास (का.-2), बेंगलूरू; ब्यूरो के निदेशक डॉ. एस. एन. सुशील और और गणमान्य व्यक्तियों के द्वारा दीप प्रज्वलन के साथ किया गया।

अभिमुखीकरण कार्यक्रम के प्रथम सत्र में ,डॉ. मालतेश मैलार, सहायक निदेशक (राजभाषा), डी.आर.डी.ओ., बेंगलूरु ने "संसदीय राजभाषा समिति की संशोधित प्रश्नावली भरने पर चर्चा-परिचर्चा" विषय पर बहुत ही मुख्य और महत्वपूर्ण जानकारी सभा में उपस्थित 29 केन्द्रीय कार्यालयों के राजभाषा अधिकारियों/प्रतिनिधियों को प्रदान की ।

अभिमुखीकरण कार्यक्रम के प्रथम सत्र में ,डॉ. मालतेश मैलार, सहायक निदेशक (राजभाषा), डी.आर.डी.ओ., बेंगलूरु ने "संसदीय राजभाषा समिति की संशोधित प्रश्नावली भरने पर चर्चा-परिचर्चा" विषय पर बहुत ही मुख्य और महत्वपूर्ण जानकारी सभा में उपस्थित 29 केन्द्रीय कार्यालयों के राजभाषा अधिकारियों/प्रतिनिधियों को प्रदान की।

अभिमुखीकरण कार्यक्रम के द्वितीय सत्र में ,श्रीमती गीता प्रसाद, उप निदेशक (राजभाषा), इसरो, बेंगलूरु; विषय:-"राजभाषा कार्यान्वयन वार्षिक कलैंडर पर चर्चा-परिचर्चा" विषय पर बहुत ही मुख्य और महत्वपूर्ण जानकारी सभा में उपस्थित 29 केन्द्रीय कार्यालयों के राजभाषा अधिकारियों/प्रतिनिधियों को प्रदान की।

इस कार्यक्रम में बेंगलुरु में स्थित भारत सरकार के विभिन्न केंद्रीय कार्यालयों (29 कार्यालय) के राजभाषा अधिकारियों/प्रतिनिधियों (43 प्रतिभागी) ने भाग लिया राजभाषा कार्यशाला/ अभिमुखीकरण कार्यक्रम का धन्यवाद प्रस्ताव श्री सुशील कुमार गोयल, सदस्य सचिव, नराकास (का.-2), बेंगलूरू ने किया। अभिमुखीकरण कार्यक्रम का संचालन श्री सतेंद्र कुमार, सदस्य सचिव, राजभाषा कार्यान्वयन समिति ,ने किया । राजभाषा कार्यशाला/ अभिमुखीकरण कार्यक्रम का समापन सामूहिक राष्ट्र गान के साथ हुआ।

राजभाषा कार्यान्वयन समिति की त्रैमासिक बैठक

राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरू के निदेशक की अध्यक्षता में ब्यूरो में नियमित अंतराल पर राजभाषा कार्यान्वयन की त्रैमासिक बैठकें आयोजित की गईं।

राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरू की पहली तिमाही बैठक (जनवरी से मार्च, **2025**) **08/01/2025** को; दूसरी तिमाही बैठक (अप्रैल से जून, 2025) दिनांक **02/04/2025** को; तीसरी तिमाही बैठक (जुलाई से सितंबर, **2025**) **08/07/2025** को और चौथी तिमाही बैठक (अक्टूबर से दिसंबर, **2025**) **08/10/2025** को ब्यूरो के निदेशक की अध्यक्षता में आयोजित की गई

राजभाषा शील्ड पुरस्कार (प्रथम पुरस्कार)

आईसीएआर-राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरु को राजभाषा कार्यान्वयन के क्षेत्र में उत्कृष्ट कार्य के लिए नगर राजभाषा कार्यान्वयन समिति, बेंगलूरु से वर्ष **2024-25** के लिए प्रथम पुरस्कार के रूप में दिनांक **5**जनवरी **2026**को राजभाषा शील्ड और प्रशस्ति पत्र प्राप्त हुए । ये पुरस्कार और प्रशस्ति पत्र मुख्य पोस्टमास्टर जनरल कर्नाटक सर्किल एवं अध्यक्ष, नगर राजभाषा कार्यान्वयन समिति (का-**2**), बेंगलूरु के श्री के. प्रकाश से प्राप्त हुए।

निदेशक डॉ. एस. एन. सुशील को ब्यूरो में वर्ष **2024 - 25** के दौरान राजभाषा कार्यान्वयन के क्षेत्र में उत्कृष्ट कार्य करने के लिए प्रथम पुरस्कार के रूप में राजभाषा शील्ड प्रदान की गई

17. EXHIBITIONS

ICAR-NBAIR organised several exhibitions as a part of various events in the institute and also participated in various exhibitions/expo conducted across India to display a range of biological control technologies developed at the Institute to farmers, students, extension & research workers and other stakeholders. Details of the same are provided chronologically as below.

Sl. No	Exhibition	Date	Venue
1	"Emerging Issues and Sustainable Strategies in Plant Health Management"	19–21 January 2025	ICAR-Central Citrus Research Institute, Nagpur
2	Viksit Krishi Sankalp Abhiyan Programme	08 June 8 2025	ICAR-IIHR, Bengaluru
3	ICAR Foundation Day	16 July 16 2025	NASC complex, New Delhi
4	Pradhan Mantri Kisan Samman Nidhi 20th release instalment release	02 August 2025	ICAR-NBAIR, Bengaluru
5	Union Minister of Agriculture and Farmers' Welfare, Shri Shivaraj Singh Chouhan visit	29 August 2025	ICAR-NBAIR, Bengaluru
6	PM Dhan Dhanya Yojane	10 October 2025	ICAR-NBAIR, Bengaluru
7	Biocontrol Expo-2025	19 October 19 2025	ICAR-NBAIR, Bengaluru
8	PM-KISAN 21st instalment release of	19 November 2025	ICAR-NBAIR, Bengaluru
9	Secretary DARE and DG ICAR Visit	11 November 2025	ICAR-NBAIR, Bengaluru
10	Krishimela-2025	13-16 November 2025	University of Agricultural Sciences, Bengaluru
11	Kisan Diwas – 2025	23 December 23 2025	ICAR-NBAIR, Yelahanka Campus

ICAR-NBAIR, Bengaluru participated in Krish Mela, UAS, Bengaluru, 13-16 November 2025

18. PERSONNEL

S. No.	Name	Designation
	Director	
1.	Dr S.N. Sushil	Director
	Scientists	
	Division of Germplasm Collection and Characterisation	
2.	Dr Sunil Joshi	Principal Scientist (Agricultural Entomology) & Head of Division
3.	Dr Kolla Sreedevi	Principal Scientist (Agricultural Entomology)
4.	Dr G. Mahendiran	Senior Scientist (Agricultural Entomology)
5.	Dr Ankita Gupta	Senior Scientist (Agricultural Entomology)
6.	Dr S. Salini	Senior Scientist (Agricultural Entomology)
7.	Dr K. J. David	Senior Scientist (Agricultural Entomology)
8.	Dr Jagadeesh Patil	Senior Scientist (Agricultural Nematology)
9.	Dr M. Sampath Kumar	Senior Scientist (Agricultural Entomology)
10	Dr R.R. Rachana	Scientist (Agricultural Entomology)
11.	Dr Navik Omprakash Samodhi	Scientist (Agricultural Entomology)
12.	Dr N.N. Rajgopal	Scientist (Agricultural Entomology)
	Division of Germplasm Conservation and Utilisation	
13.	Dr Kesavan Subaharan	Principal Scientist (Agricultural Entomology) & Head of Division
14.	Dr A.N. Shylesha	Principal Scientist (Agricultural Entomology) (Superannuated on 31.05.2025)
15.	Dr Prakya Sreerama Kumar	Principal Scientist (Plant Pathology)
16.	Dr G. Sivakumar	Principal Scientist (Microbiology)
17.	Dr Deepa Bhagat	Principal Scientist (Organic Chemistry)
18.	Dr A. Kandan	Principal Scientist (Plant Pathology)
19.	Dr M. Sujithra	Senior Scientist (Agricultural Entomology) (Joined NBAIR on 26.06.2025)
20.	Dr K. Selvaraj	Senior Scientist (Agricultural Entomology)
21.	Dr U. Amala	Senior Scientist (Agricultural Entomology)
22.	Dr Richa Varshney	Scientist (Agricultural Entomology)
23.	Dr Gundappa	Scientist (Agricultural Entomology)
24.	Dr Prabhulinga, T.	Scientist (Agricultural Entomology)
	Division of Genomic Resources	
25.	Dr T. Venkatesan	Principal Scientist (Agricultural Entomology) & Head of Division
26.	Dr M. Mohan	Principal Scientist (Agricultural Entomology)
27.	Dr M. Pratheepa	Principal Scientist (Computer Applications)
28.	Dr Mahesh Yandigeri	Principal Scientist (Microbiology)
29.	Dr R. Gandhi Gracy	Principal Scientist (Agricultural Entomology)
30.	Dr B.S.Gotyal	Senior Scientist (Agricultural Entomology)
31.	Dr Sagar, D.	Senior Scientist (Agricultural Entomology)
32.	Dr C. Manjunatha	Scientist (Plant Pathology)
33.	Dr B.S.Manjunatha	Scientist (Agricultural Microbiology)
34.	Dr R.S. Ramya	Scientist (Agricultural Entomology)
35.	Dr K.T. Shivakumara	Scientist (Agricultural Entomology)
36.	Dr B.K. Chaubey	Chief Technical Officer (Superannuated on 31.01.2025)
37.	Mr Satendra Kumar	Chief Technical Officer
38.	Ms L. Lakshmi	Assistant Chief Technical Officer
39.	Mr H. Jayaram	Assistant Chief Technical Officer
40.	Dr A. Raghavendra	Senior Technical Assistant (Laboratory Technician)
41.	Mr M. Chandrappa	Senior Technical Assistant (Driver)
42.	Mr R. Narayanappa	Senior Technical Assistant (General Operator)
43.	Mr Umesh Kumar Sanjeev	Technical Assistant (Laboratory Technician)
44.	Mr R. Maruti Mehanth	Technical Assistant & Cashier (Laboratory Technician)
45.	Mr K.M. Venugopala	Technical Assistant (Laboratory Technician)
46.	Mr P. Madanathan	Technical Assistant (Driver)

Administrative Staff		
47.	Mr J. Mathew	Senior Administrative Officer
48.	Ms S. Kusuma	Senior Finance & Accounts Officer (Superannuated on 30.04.2025)
49.	Ms Suma Srinivas	Assistant Finance & Accounts Officer (Joined NBAIR on 28.04.2025)
50.	Ms S. Kaveriamma	Private Secretary to Director
51.	Ms Dipanwita Deb	Assistant Administrative Officer
52.	Ms M.S. Uma	Personal Assistant
53.	Ms Naziya Anjum	Assistant
54.	Ms P. Anitha	Upper Division Clerk
55.	Mr Yogesh Kaswan	Assistant
56.	Mr Utkarsh Sinha	Assistant
57.	Ms Shefali Seth	Assistant
58.	Ms Janshruthi Tokas	Assistant (Joined NBAIR on 10.01.2025)
Supporting Staff		
58.	Mr Ramakrishnaiah	Skilled Supporting Staff
59.	Mr P. Nagaiah	Skilled Supporting Staff
60.	Ms Sanjeevini Desai	Skilled Supporting Staff