# Proceedings of Sixth National Conference on Biological Control: Innovative Approaches for Green India held from 3 to 5 March 2021 at ICAR-National Bureau of Agricultural Insect Resources, Bengaluru.

Sixth National Conference on Biological Control was organized at ICAR–National Bureau of Agricultural Insect Resources, Bengaluru from 3 to 5 March 2021 jointly by Society for Biocontrol Advancement and ICAR–National Bureau of Agricultural Insect Resources, Bengaluru. Dr. N. Bakthavatsalam, Director, ICAR–National Bureau of Agricultural Insect Resources (NBAIR), Bengaluru welcomed the participants of the meeting. Dr. B.V. David and Dr.T.M.Manjunath eminent entomologists gave their valid remarks on Biological Control. Dr. S. C. Dubey, Assistant Director General (PP&BS), ICAR, New Delhi stressed that the biopesticides would play a major role in the management of insect pests and disease. He also emphasized the exploitation of native strains of biocontrol agents for the management of pests and diseases of crop plants. Dr. T R Sharma, Deputy Director General (Crop science), ICAR, New Delhi, pointed out the significance in using local isolates of bioagents and emphasized that the impact of the local isolates in biological control needs to be studied. He also stressed on the need to conduct research on plant-pest-microorganism interactions and host range of bioagents. He had advised to generate the finger print data of indigenous strains of biocontrol agents to facilitate for registration as a biopesticides. Eminent biocontrol workers were felicitated in the inaugural function. Various awards were distributed in the function. Dr. T. Venkatesan, Chief organizing Secretary proposed vote of thanks. Around 150 people participated the conference.


**Dr. N. Bakthavatsalam, Director, ICAR–National Bureau of Agricultural Insect Resources, Bengaluru welcomed the participants**

Dignitaries lighting the lamp


Releasing the abstract book of 6th NCBC

Eminent entomologist Dr. B. V. David addressing the audience


Dr.S.C.Dubey, Assistant Director General (PP&BS), ICAR,New Delhi addressing the audience

Dr. T R Sharma, Deputy Director General (Crop science), ICAR, New Delhi addressing the audience

Eminent entomologist Dr.Chandish R. Ballal was honoured


Dr. M. Mohan awardee was honoured


Dr. Richa Varshney awardee was honoured


Dr.Y.Lalitha  awardee was honoured


Best Ph. D. Thesis  awardeesDr.Kariyanna and Dr Sowmya were honoured

## Recommendations and Conclusions of Technical sessions

## Technical Session-1: Biodiversity and Biosystematics of Natural Enemies

Chairman:Dr.V.V. Ramamurthy, former Professor , ICAR-IARI, New Delhi

Co-Chairman:Dr. V.V. Belavadi, former Professor and Head, GKVK, Bengaluru

Convenors: Dr Ankita Gupta ,Senior Scientist, ICAR-NBAIR, Bengaluru

Dr. K. J. David, Scientist-SS, ICAR-NBAIR, Bengaluru

Dr. S. Salini ,Scientist- SS, ICAR-NBAIR. Bengaluru

Two lead talks were presented by Dr J. Poorani, PrincipalScientist, ICAR-NRC Banana, Trichy and Dr Rajmohana, K. Scientist E, ZSI, Kolkata Dr Poorani provided an excellent overview on the status of Indian insect taxonomy andprojected the integral role of taxonomists in entomology and pest management in general. DrRajmohana expressed her views on Indian parasitic Hymenoptera. There were altogether eight oral presentations- three online and five physical and 18 poster presentations (allonline).

### Recommendations:

- Network Project on Insect Biosystematics which had helped immensely in thedocumentation of Biodiversity in India and in capacity building needs to be revived in orderto strengthen Indian insect taxonomy.

- One day brainstorming session on Parasitic Hymenoptera and Coccinellidae should beconducted to evaluate the progress made and address the gaps, if any.3. Taxonomists should be given deserving recognition in technologies related to IPM wherespecies identification is involved.
- Journals should give utmost care to check whether identification was done by a reliabletaxonomist if it is a report of invasive species or new record for India.
- Diversity of insects in Central and Northwest India is poorly documented; henceexplorative trips have to be undertaken in unexplored areas.
- Traditional taxonomic research papers should try to include molecular characterisation,ecology, behaviour and biology of the species dealing with to make the research publicationmore comprehensive.
- Utmost care should be taken at the time of sequence submission of any species in NCBIdatabase as it leads to lots of confusion- the species identity should be taken from the subject taxonomy

## Technical Session-II: Biological control of pests

Chairman :Dr.Chandish R. Ballal , Former Director, ICAR-NBAIR, Bengaluru

Co-Chairman :Dr. A. N. Shylesha , Principal Scientist, ICAR-NBAIR, Bengaluru

Dr. Rev. Fr. MariyaPackiam, Director, Entomology Research Institute, Loyola College, Chennai

Convenors: Dr. Richa Varshney, Scientist, ICAR-NBAIR, Bengaluru

Dr. Omprakash Navaik, Scientist, ICAR-NBAIR, Bengaluru

Two lead talks and eight oral presentations were presented during this session. Thirty-two poster presentations were made in a parallel online session.

Dr. Chitra Shanker lead speaker presented on Habitat management strategies for conservation biological control in rice. She highlighted the importance of conservation biological control in rice and shared her experience and views on the ecological engineering concept in management of planthoppers in rice.

Dr Vimala Devi in her lead lecture on entomopathogens for the management of crop pests, expressed her views on microbial management of insect pests and the important role of microbial formulations in achieving the desired efficacy for management of insect pests. She also shared her experience in registration of DOR *Bt*-1 formulation under 9(3b) section of Central Insecticides Board. She narrated her experience in taking the DOR *Bt* from isolation to its commercialization to more than 40 companies.

**Recommendations**

- NBAIR should expedite getting the mealy bug parasitoid, *Anagyruslopezi* from Benin/ Thailand and immediately start the host specificity studies.

- Ecological engineering concept of biocontrol-based pest management needs to be focussed
- A brainstorming meeting involving experts in the field of entomofungal pathogens can be conducted to fine tune the mass production of *Metarhizium (Nomuraea) rileyi*, especially for management of FAW. Experts like Dr Vimala Devi and Dr Ramanujam can be invited for discussions with the scientists at NBAIR.

## Technical Session-III: Biological control of Plant Diseases

Chairman :Dr. P. K. Chakrabarthy, Member,ASRB,New Delhi

Co-Chairman :Dr. Gururaj Sunkad, Associate Director of Research, UAS, Raichur

Dr. P. Sreerama Kumar, Principal Scientist, ICAR NBAIR, Bengaluru

Convenors:Dr. R. Rangeshwaran, Principal Scientist, ICAR NBAIR, Bengaluru

Dr. A. Kandan, Principal Scientist, ICAR NBAIR, Bengaluru

Dr. C. Manjunatha, Scientist, ICAR NBAIR, Bengaluru

Three lead talkswere there in this session. Dr.S. Sriram, ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru presented on "Inducedsystemic resistance by Trichoderma species". Dr. S. Nakkeeran, Professor (Plant Pathology),Department of Plant Pathology, Tamil Nadu Agricultural University (TNAU), Coimbatore presented on "Bacterial endophytes mediated immune response

for the management of plant pathogens. Dr. Gururaj Sunkad, Associate Director of Research and Head, Organic farming Research Institute, and Professor & Head, Department of Plant Pathology, UAS, Raichur presented on "Approaches of Plant Growth Promoting Rhizobacteria for the management of Plantdiseases. Nine oral and eight posters were presented in this session .

**Recommendations**

- Focus to be given to develop smart formulation by translating global genomic data
- CIBRC should form the registration guidelines for the consortia of bioformulation for the management of pest and diseases
- Gazette notification of bio-stimulants should be strictly followed

## Technical Session IV: Biointensive IPM

Chairman :Dr. T.M. Manjunath, Former Director, Monsanto Research Centre, Bengaluru

Co-Chairman :Dr. M. Mani , Former Principal Scientist, ICAR-IIHR , Bengaluru

Convenors :Dr. R.R. Rachana,Scientist, ICAR NBAIR, Bengaluru

Dr. K. Selvaraj, Scientist, ICAR NBAIR, Bengaluru

Dr M. Mani, Former Principal Scientist, ICAR-IIHR delivered a lead talk on "Recent trends in the biological suppression of mealybugs inagricultural and horticultural crops in India" . He had emphasized the use of indigenous and exotic parasites and predators for the suppression of the mealybugs in various ecosystems. Three oral and four posters were presented in this session.

**Recommendations**

1. Efforts may be made to mass produce the potentialnatural enemies of mealybugs for suppression of the mealybugs along with other inputs.

2. Efforts may be made to scale up the potentialentomopathogenic fungus, *Lecanicilliumlecanii*and to be made available to the farmers for large scale applications.

3. Cost-benefit ratio to be worked out for the BIPM over the recommended control practices.

## Technical Session V: Biocontrol compatible approaches

Chairman :Dr. S. Sithanantham, Director, Sun Agro Biotech, Chennai

Co-Chairman **:**Dr. T.M. Shivalingaswamy, Principal Scientist, ICAR-NBAIR , Bengaluru

Dr. K. Subaharan, Principal Scientist, ICAR-NBAIR , Bengaluru

Convenors :: Dr. K. Sreedevi,Principal Scientist, ICAR NBAIR, Bengaluru

Dr. U. Amala, Scientist, ICAR NBAIR, Bengaluru

Dr. S. Sithanantham delivered a lead talk on "Scope for optimizing insect pheromones impact in Biologicalcontrol".Dr. K. Subaharan, Principal Scientist (Entomology), ICAR-NBAIR delivered a lead talk on "Semiochemical driven pest management system".Ten oral and eighteen posters were presented in this session.

**Recommendations**

- Future Research and Development on insect pheromones may focus more on maximizing the synergyimpact of mass trapping as key component of biocontrol-focus IPM, besidesoptimizing the trap type-lure-formulation attributes.
- Policy support to leverage wider pheromone usage as cost-effectivealternative to hazardous chemical insecticides and so promote farm-levelbiodiversity conservation and more sustainable farming.

## Technical Session VI: Molecular Biology & Bioinformatics approaches in pest management

Chairman :Dr. M. Nagesh, Principal Scientist , HOD, ICAR-NBAIR, Bengaluru

Co-Chairmen :Dr. Subramanian, Principal Scientist, ICAR IARI, New Delhi

Dr.T.Venkatesan, Principal Scientist , ICAR-NBAIR, Bengaluru

Convenors :Dr. Gandhi Gracyand Dr. Ramya, RS,ICAR-NBAIR, Bengaluru

**Recommendations**

- More emphasis to be given on integrative taxonomic approaches, including more molecular markers for the fast identification of insect species including invasive species.
- Molecular profiling of museum specimens needs to be done and database to be created for the same.
- Whole genome sequencing and transcriptome sequencing of important biological control to be done and the key genes are to be identified.

- We need to strengthen the trained manpower in the field of insect molecular biology, A state of art facility can be created at ICAR-NBAIR for the same reason, fund can be availed from ICAR and other State funding agencies.

## Technical Session VII: Biocontrol and Allied Industry

Chairman:Dr. N. K. Krishna Kumar, Former DDG (HS) – ICAR, NewDelhi

Co-Chairmen:Dr. Sanjeev Panwar, Principal Scientist, ICAR, New Delhi

Dr. M. Nagesh, Principal Scientist , HOD, ICAR-NBAIR, Bengaluru

Convenors :Dr. Deepa Bhagat, Dr. Mahesh YandigeriDr. Jagadeesh Patil

Dr. S. J. Rahman, Professor, ANGRAU, Hyderabad delivered a lead talk on Scope and uptake of biocontrol agents in plant protection, regulatory requirements and levels of compliance.Dr.Markandeya Gorantla, Chairman and Managing Director ATGC Biotech Pvt. Ltd., Dr.Markandeya Gorantla, Chairman and Managing Director ATGC Biotech Pvt. Ltd.,Hyderabad, delivered a lead talk on New Semiochemical technology for a cleaner planet and sustainable food supply.Dr. A. John Peter, Chairman and Managing Director, Varsha Bioscience Tech Pvt Ltd delivered a lead talk on "Break the barriers with PPP for a robust biological control program.

**Recommendations**

- Commercial production and supply of macrobials (parasitoids and predators) should be given special attention
- Genetic options to be explored to introduce certain beneficial traits like temperature tolerance (high/low), host-searching, high fecundity etc. in parasitoids and predators
- Biological management of destructive insect pests using microbial pathogens should be strengthened to have a greater impact.