NBAIR Newsletter

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ICAR–National Bureau of Agricultural Insect Resources

Microbial biopesticides – a panacea?

Do we see a gradual yet clear shift from the concept "chemical pesticides – a panacea" to "Microbial biopesticides – a panacea"? Currently, 15 microbial control agents are registered for use in India under the Insecticide Act, and there are 970 registered microbial biopesticides in the Indian market, yet this is a dismal number compared with the large number of chemical pesticides.

NBAIR holds a strong repository of potential microbial biopesticides, which includes 210 isolates of entomopathogenic fungi, 284 isolates of *Bt*, 119 isolates of entomopathogenic nematodes (EPNs) and six insect viruses. Armed with these resources and the technical expertise on production and formulation technologies for microbial biopesticides coupled with a very clear demand from farmers and commercial entrepreneurs, NBAIR is striving to reach farmers with sustainable "green" solutions for pest problems.

The "SAARC Regional Consultation on Facilitating the Use of Microbial Pesticides in South Asia", held at NBAIR from 21–23 August 2017, provided a platform to project our strength in the field of microbial biopesticides, and what we could offer to other SAARC countries. Country representatives from Afghanistan, Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka focused on the hurdles faced in their respective countries, viz. over-reliance on chemical insecticides, lack of awareness amongst farmers and stakeholders, lack of expertise in isolation and identification of local microbial isolates and production and formulation technologies, facilities and trained manpower. It emerged that though Indian researchers have succeeded in isolating and identifying

pest- and region-specific microbial biopesticides, several of them sit neglected on the shelf due to the stringent registration procedures and thus have not reached the farming community. The need was felt for a separate legislation with less stringent registration requirements for microbial biopesticides, thus categorically separating them from the chemical pesticides. As EPNs are exempted from CIB registration requirements, NBAIR has successfully transferred the EPN technology to 16 entrepreneurs.

Active public–private partnerships are also essential for popularisation of biocontrol modules. It is encouraging to observe that there is a definite move to popularise biocontrol strategies in the other SAARC countries. Bhutan is aspiring to be 100% organic and does not allow manufacturing of chemical pesticides. In Bangladesh, four microbial biopesticides are under development, one has been registered and is awaiting licensing and commercialisation. Nepal is also following organic agriculture to a large extent and there are community resource centres producing biopesticides. Though Sri Lanka is largely dependent on chemicals, exemptions and waivers are offered by the Sri Lankan government for registration of microbial biopesticides. At this juncture, focus should be on development of sturdy linkages among SAARC countries.

India is expected to don the role of a forerunner and facilitator to provide training and help in isolating and identifying indigenous isolates, developing and strengthening laboratory facilities and creating trained manpower in other SAARC countries. There is a dire need to catalogue, map, conserve and create a national repository of microbials as a national wealth for posterity in all SAARC countries. Joint ventures between countries to establish local biopesticide production units, creation of an inventory of registered available biocontrol products in each country and bilateral exchange of bioagents could all benefit the global farming community.

Chandish R. Ballal
Director

Research Highlights

Egg parasitoid of banana skipper

The banana skipper, *Erionota torus*, has recently emerged as a serious pest of banana. For the first-time, *Ooencyrtus pallidipes* (Fig. 1) has been identified as an egg parasitoid of this pest. The natural parasitism observed was 80–82% in a banana field located at Komanal, Shivamogga district, Karnataka. Since this parasitoid has served as an effective biological control agent for *E. torus* in Mauritius and Taiwan, it can potentially be used as a biocontrol agent in India as well.

Fig. 1: ***Ooencyrtus pallidipes***

New thrips species

A new terebrantianthrips species, *Bregmatothrips ramani* Rachana & Varatharajan (Fig. 2) has been described and illustrated from the Andaman islands. This is the third member of the genus *Bregmatothrips* with forked sense cones on antennal segments III and IV.

Fig. 2: ***Bregmatothrips ramani***

Intraguild predation of *Geocoris ochropterus*

The role of intraguild predation by the geocorid *Geocoris ochropterus* on *Trichogramma chilonis* developing on eggs of *Helicoverpa armigera* and *Corcyra cephalonica* was evaluated. In choice experiments, both the fifth instar nymph and adult of *G. ochropterus* preferred to predate on unparasitised eggs of *H. armigera* and *C. cephalonica* over parasitised eggs. In no-choice experiments, *G. ochropterus* nymph consumed 58% and 67% of unparasitised *H. armigera* and *C. cephalonica* eggs, respectively, compared with 3.33% and 7.38% parasitised eggs of *H. armigera* and *C. cephalonica*, respectively. A similar trend was observed in no-choice experiments with the adult predator.

Capacity Building Programme on Entomopathogenic Nematodes

A "Capacity Building Programme on Technologies for Utilisation of Entomopathogenic Nematodes for Sustainable Management of Soil Insect Pests" was organised at NBAIR during 28 August–1 September 2017. Seven participants, representing Gujarat, Jammu & Kashmir, Karnataka and Tamil Nadu, were trained on scale-up techniques, quality control, assessment, intellectual property rights, product registration and biosecurity issues related to entomopathogenic nematodes. Visits were arranged to commercial biocontrol production units that have been licensed by NBAIR to make high-quality products available to farmers. Drs M. Nagesh, Mahesh Yandigeri and Jagadeesh Patil managed the programme.

Report on ICAR-sponsored Summer School

The 21-day-long ICAR-sponsored "Summer School on Current Techniques and Advances in Mass Culturing of Microbials for the Production of Biopesticides", conducted at NBAIR during 5–25 September 2017, attracted an overwhelming response. The 25 handpicked scientists/teachers from around the country were intensively trained on the recent techniques in isolation, characterisation, identification, culturing, mass production and application of microbial biopesticides, both theoretically and practically. Dr K. Narayana Gowda, former Vice-Chancellor, University of Agricultural Sciences, Bengaluru, addressed the trainees and gave away certificates during the valedictory function on the concluding day. Drs G. Sivakumar (Course Director), M. Mohan, Jagadeesh Patil and R. Gandhi Gracy (Course Coordinators) conducted the programme.

Independence Day at NBAIR

NBAIR celebrated the 71st "Independence Day" on 15 August 2017. After hoisting the National Flag, NBAIR Director Dr Chandish R. Ballal addressed the staff and exhorted them to contribute more to agricultural research and development.

Top officials of ICAR visit NBAIR

Mr Sunil Kumar Singh, Additional Secretary & Financial Advisor, DARE/ICAR, visited NBAIR on 12 August 2017. He went around the laboratories to get firsthand information on the research activities and later interacted with the personnel of the institute.

Mr Chhabilendra Roul, Additional Secretary (DARE) & Secretary (ICAR), visited NBAIR on 24 August 2017 to address and interact with the scientists of ICAR institutes based at Hebbal in Bengaluru. Director Dr Chandish R. Ballal took him around the facilities and explained the on-going research activities at NBAIR.

Hindi Diwas at NBAIR

NBAIR celebrated "Hindi Diwas" on 14 September 2017. With the aim of encouraging staff members to develop fluency in the national language, a debate and a singing competition were conducted. Dr Suraj Singh Rajput, member of Research Advisory Committee, NBAIR, graced the occasion as the chief guest.

Swachhta Hi Seva at NBAIR

"Swachhta Hi Seva" campaign was launched on 15 September 2017 at NBAIR. Taking a pledge on the occasion, the staff of NBAIR resolved to create a clean, healthy and new India. The entrance and the entire office premises of both the campuses were cleaned. As part of the "Sarvatra Swachhta Diwas", staff members of NBAIR took up a cleanliness drive on Nandi Hills, a famous tourist spot near Bengaluru.

Superannuation

Dr Prashanth Mohanraj, Principal Scientist and Head, Division of Insect Systematics, NBAIR, superannuated from Agricultural Research Service on 30 September 2017. Dr Mohanraj also served as NBAIR's Director (Acting) for a brief period in 2016. To commemorate his retirement, colleagues at NBAIR organised a farewell function and felicitated him.

Awards and Recognitions

Drs N. Bakthavatsalam, K. Subaharan and M. Mohan shared the DBT Biotechnology Industry Research Assistance Council's *BioInnovations Award 2016* with ATGC Biotech, Hyderabad, for the work on mating disruption using formulations developed by ATGC.

Dr S. Salini received the prestigious *Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2016* in Crop Protection category. The award consisted of an amount of ₹ 50,000, a citation and a gold-coated silver medal.

Dr Mahesh Yandigeri was recognised as *Scientist of the Year* for his contribution to microbiology, at the "National Conference on Doubling Farmers Income for Sustainable and Harmonious Agriculture (DISHA-2017)".

ICBC2018 update

The organisers of the "First International Conference on Biological Control (ICBC2018)" are pleased to announce that registration and abstract submission are open now. Abstracts have to be submitted using the online abstract submission system available through the conference website (www.icbc2018bengaluru.com).

Selected Publications

Ghosh, E. & Ballal, C.R. 2017. Effect of age dependent cold storage of factitious host *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae) for their continuous production and *Trichogramma chilonis* (Ishii) (Hymenoptera: Trichogrammatidae) rearing. *Journal of Asia-Pacific Entomology*, 20: 928–934.

Ghosh, E. & Ballal, C.R. 2017. Diapause induction and termination in Indian strains of *Trichogramma chilonis* (Hymenoptera: Trichogrammatidae). *The Canadian Entomologist*, 149: 607–615.

Rachana, R.R. & Varatharajan, R. 2017. A new species of the genus *Bregmatothrips* (Thysanoptera: Thripidae) from the Andaman Islands of India. *Zootaxa*, 4317(3): 597–600.

Sivakumar, G., Rangeshwaran, R., Mahesh, Y., Mohan, M., Venkatesan, T., Ballal, C.R., Ramanujam, B., Sanjay, Y., Kumari, S. & Verghese, A. 2017. Characterization and role of gut bacterium *Bacillus pumilus* on nutrition and defense of leafhopper (*Amrasca biguttula biguttula*) of cotton. *Indian Journal of Agricultural Sciences*, 87(4): 534–539.

Sreedevi, K., Sakshi, T. & Veena, S. 2017. Species diversity of white grubs (Coleoptera: Scarabaeidae) in the sub-Himalayan and northern plains of India. *Current Science*, 103(2): 1–8.

Compiled and edited by: **P. Sreerama Kumar, M. Sampath Kumar & Chandish R. Ballal**
Published by: Director, ICAR–National Bureau of Agricultural Insect Resources, Hebbal, Bengaluru 560 024, India
Phone: +91 80 2341 4220 ✦ Fax: +91 80 2341 1961 ✦ Website: www.nbair.res.in
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