

NBAIR Newsletter

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ICAR–National Bureau of Agricultural Insect Resources



Salute the MENTOR and the MENTEE...

September 5, the birth anniversary of former President and a great teacher Sri Sarvepalli Radhakrishnan, is a day dedicated to the hard work and importance of a teacher in our lives and is celebrated as Teachers' Day. A day earmarked to cherish the contributions of our dear teachers in making our lives better and shaping our behaviours according to societal prospects and to convey our gratitude. In a research organisation, for the growth of a scientist, a good teacher, or rather a MENTOR, plays a supreme role. A good mentor is one who provides support, advice and healthy criticism with total involvement to the MENTEE. An ideal mentee or protégé is one who believes in the mentoring relationship, trusts the guidance and is accountable to the mentor. Perfect mentor–mentee relationships form strong pillars of a research organisation, helping it to stand strong and steadfast and grow. Since the calendar does not mark a Mentors' Day, I am dedicating this editorial for the September issue of *NBAIR Newsletter* to a great mentor and a worthy mentee.

THE MENTOR

Late Dr Surinder Pal Singh, the founder director of Project Directorate of Biological Control (PDBC, now upgraded to the ICAR–National Bureau of Agricultural Insect Resources) and a doyen for promoting biocontrol research in India, has been a true mentor to several young researchers in PDBC and under the AICRP on Biological Control. When we narrate the history of biological control in India, the name of Dr Singh comes first and foremost. Some of his most significant contributions include documentation of the role of natural enemies in the suppression of citrus pests, formulation of the production and release technology for the mealybug predator *Cryptolaemus montrouzieri* and the mass rearing protocol for the exotic weed insect *Pareuchaetes pseudoinsulata*, to target the notorious invasive weed *Chromolaena odorata*. He was a pioneer in the successful transfer of biocontrol-based technologies to farmers under the Lab-to-Land programme. In 1984, when Dr Singh took over the reins of the All-India Coordinated Research Project on Biological Control of Crop Pests and Weeds (AICRP-BC) as the Project Coordinator, he could spearhead the national biocontrol programmes throughout the country for some of the most devastating pests. It was Dr Singh's vision in

the early '90s which led to the creation of PDBC and formulation of a clear and perfect strategy, wherein the responsibility of development of technologies rested on PDBC, the nodal centre for AICRP-BC, and the validation and spread of the technologies happened through the AICRP-BC centres in different parts of the country. He inspired scientists to work on taxonomy of agriculturally important insects, identification, production and evaluation of novel bioagents, development of stress-tolerant strains of bioagents and tritrophic interactions. Besides focussing on macrobials, he also created a strong team to work on microbial bioagents, and the first commercialisation of biocontrol technology happened during his tenure. Biocontrol researchers even today refer to his books – “Technology for Production of Natural Enemies” and “Fifteen Years of AICRP on Biological Control”. He encouraged young scientists to apply for projects and to organise national and international workshops, and gave them the total freedom to implement the same. Dr Singh nurtured with utmost care the Society for Biocontrol Advancement (SBA) as its President and brought the *Journal of Biological Control* (JBC) to prominence. Though a strict disciplinarian and a man of few words, this mentor never lost an opportunity to project the accomplishments of his mentees at appropriate fora. A large number of Indian biocontrol workers owe their existence to this great mentor.



P.T.O.



Dr S.K. Jalali explaining his research work to Dr R.S. Paroda, the then Director-General, ICAR, in the presence of Dr S.P. Singh (from PDBC archives)

THE MENTEE

Dr Sushil Kumar Jalali joined the Agricultural Research Service on 6 February 1985. As a young scientist, he started working in the biocontrol laboratory at the Indian Institute of Horticultural Research under Dr Singh's mentorship and later worked for his Ph.D. degree too under Dr Singh's guidance at PDBC. A dedicated and sincere researcher, Dr Jalali was the most trusted and dependant member of Dr Singh's team. His significant contributions include the identification of host and host-plant range of exotic and indigenous parasitoids; identification of the most suitable strains and species of *Trichogramma* to target specific pests attacking different crops; and developing superior strains of biocontrol agents and validating them in field conditions. Dr Jalali largely deserves the accolades that PDBC/NBAIR has received for the large-area coverage through releases of superior strains of bioagents, and the first instance of commercialisation of biocontrol technologies through the sale of multiple-pesticide-tolerant and temperature-tolerant strains of *Trichogramma*. He was always very prompt in publishing his research findings in high-rated journals, and proudly held the highest number of research publications amongst the biocontrol researchers in the country. A globally recognised biocontrol worker, in the latter part of his career, Dr Jalali very efficiently and smoothly shifted his focus to molecular entomology, developed expertise in this field and was selected as the Head of Division of Genomic Resources. The well-developed laboratories and smooth functioning of the well-planned institute- and lateral-funded projects in the division are thanks to Dr Jalali's leadership. Besides scientific excellence, he had great administrative and coordination capabilities, and thus ably



Dr S.K. Jalali receiving the NRDC Societal Innovation Award 2015 in New Delhi on 24 March 2017

Transfer of technology

NBAIR transferred the technology “Waste to Wealth: Technology on Black Soldier Fly-Mediated Bioconversion of Farm and Kitchen Wastes” to M/s Bio Therm Flavour and Fragrances, Bangalore Bioinnovation Centre, Bengaluru, on 6 September 2019.



Dr S.K. Jalali being felicitated by Dr Chandish R. Ballal on the day of his retirement. His wife, Ms Sarojini Jalali, is also seen

managed the programmes and experiments under the AICRP-BC as the cell in-charge for four years. Armed with these multifarious capabilities, it was but natural that all the directors turned to Dr Jalali for his wisdom and guidance. Also, as expected, this mentee became the mentor for several younger scientists, research fellows and students, both within and outside the institute. To continue Dr Singh's efforts in strengthening SBA, Dr Jalali wore the mantle of the Chief Editor of JBC and succeeded in escalating its NAAS rating. As imbibed from his mentor, Dr Jalali stood by his mentees, guided them, protected and projected them and would not rest till they established themselves in secure scientific positions. When he retired from active service on 31 October 2018, he left behind a dedicated team of mentees to continue the legacy. The mentor Dr Singh would definitely have felt a sense of fulfilment in the achievements of the mentee Dr Jalali. To quote Dr S.S. Hussaini, retired Principal Scientist, PDBC – “Many youngsters will emulate his (Dr Singh's) example of commitment, sincerity and hard work. He was a mentor par excellence, always supportive yet disciplined, the qualities he possessed which we and the younger generations need to emulate”. The above statement holds perfectly true for Dr Jalali, too.

Now, here is a perfect MENTOR-MENTEE relationship. Let us create an environment for healthy, intentional, deep-change, whole-life, transformational mentoring that seeks to develop more mentors and mentees, who will live in and out of all that they are designed to be and thus create great organisations.

Chandish R. Ballal
Director



Research Highlights

Taxonomy and biodiversity of Microgastrinae in Khuzestan province of Iran

A review of the Iranian species of genus *Iconella* (Hymenoptera: Braconidae: Microgastrinae) with description of two new species was published. In total, five species of *Iconella* were identified, of which two new species were described and illustrated: *Iconella mongashtensis* Zargar & Gupta (Fig. 1) and *I. similis* Zargar & Gupta (Fig. 2). One species, *I. meruloides*, was recorded for the first time in Iran and two species, *I. myeloenta* and *I. subcamilla*, were new provincial records for Iran. An identification key to all Iranian species of *Iconella* was published. This work by Mr Mohammed Zargar, a Ph.D. student from Tarbiat Modares University, was carried out at NBAIR during 25 July 2018 – 27 March 2019 under the guidance of Dr Ankita Gupta.



Fig. 1: *Iconella mongashtensis*



Fig. 2: *Iconella similis*

Entomopathogenic nematodes for fall armyworm control

Application of *Heterorhabditis indica* (NBAII Hi101) at the rate of 10^4 IJs per sq.m within three weeks of emergence of maize seedlings after sowing effectively controlled the fall armyworm in on-farm trials. A granular formulation of this bioagent has been developed with a shelf-life of 4–6 months.

Fall Armyworm Preparedness and Management Workshop

Drs Chandish R. Ballal (Director) and A.N. Shylesha (Principal Scientist) participated in the “Fall Armyworm Preparedness and Management Workshop” organised by CIMMYT, USAID and Government of Nepal at Hotel Himalaya in Lalitpur, Nepal, during 29–31 July 2019. They presented the country report for India, which included the biocontrol-based management options identified, evaluated and adopted by ICAR for tackling the pest. Dr Ballal was one of the panelists in the technical session on “Implementing IPM-Based Strategy for FAW Control in Asia” and was convenor for the breakout group discussions on “South–South Collaborations”. Both experts visited the FAW-infested maize fields in Nepal and provided inputs on the need to conserve beneficial organisms in the field.



Molecular characterisation of insects

Molecular characterisation of insects, viz. *Chauliops fallax*, *Carpomya* sp. and *Yponomeuta* sp. from Kashmir; *Crociosema* sp. and *Spodoptera frugiperda* from Maharashtra; and *S. frugiperda* from Khumaltar, Nepal, was done through amplification of CO-1 gene.

Pruned petioles of papaya as nesting sites for the leafcutting bee *Megachile laticeps*

Leafcutting bee *Megachile laticeps* constructed its nests inside mature and nearly dry petioles of papaya (Fig. 3). The nest occupancy and adult emergence rates were 64.7% and 89.1%, respectively, with an average of 12.7 ± 2.11 cells per nest. Scopal pollen loads from foraging adult female bees were removed and identified to the lowest taxonomic level possible. Pigeonpea, sunnhemp and field bean pollen made up on an average of 54% of total pollen grains carried in the scopae of adult female bees. Nest pollen analysis indicated that Fabaceae pollen was the most prevalent in the brood provision. Dried pruned petioles of standing papaya plants could serve as nesting homes for the solitary leafcutting bees.



Fig 3. Nest built by *Megachile laticeps* in a papaya petiole

On-field demonstration on biocontrol of fall armyworm

An “On-Farm demonstration-cum-Farmers–Scientists Interactive Meet on the Management of Fall Armyworm, *Spodoptera frugiperda*, in Maize” was organised for the benefit of maize farmers on NBAIR's research farm at Yelahanka on 3 August 2019. Around 50 farmers from Hosahalli, Tekalahalli and Mallasandra villages of Doddaballapura taluk, Bengaluru Rural district, Karnataka, participated in the programme. On-farm trials on NBAIR's ecofriendly technologies, including formulations of entomopathogenic nematodes and *Pseudomonas fluorescens* were showcased. Biocontrol agents such as trichogrammatid egg parasitoids, *Bacillus thuringiensis* strains and entomopathogenic fungi, as well as pheromone traps and nanogel formulations were exhibited for the benefit of the farmers.



Farmers' awareness meeting on fall armyworm management in Davanagere

A “Farmers' Awareness Meeting on Fall Armyworm Management” was organised by NBAIR at the Krishi Vigyan Kendra in Davanagere, Karnataka, on 22 August 2019. Around 190 farmers and officials from the Department of Agriculture participated in the programme. Dr M.J. Chandre Gowda, Director, ICAR–ATARI, Bengaluru, inaugurated the programme and briefed about the notoriety of the invasive fall armyworm. NBAIR scientists Drs A.N. Shylesha and G. Sivakumar delivered lectures on the biology of the pest and on its microbial control, respectively. In the interactive session, the queries raised by the farmers were clarified by NBAIR experts.



Awareness programme on fall armyworm management

An “Awareness-cum-Method Demonstration Programme for Fall Armyworm Management” was organised by NBAIR along with CABI and University of Agricultural Sciences (UAS, Bengaluru) at the Krishi Vigyan Kendra in Hassan, Karnataka, on 12 September 2019. The programme was inaugurated by Dr Chandish R. Ballal (Director, NBAIR) and Dr M.S. Nataraj (Director of Extension, UAS-B). There were 110 participants, including farmers from H.N. Pura and Alur villages, and 40 input-dealers from Hassan district. NBAIR experts Drs N. Bakthavatsalam, M. Nagesh, A.N. Shylesha and K. Subaharan participated in the meeting. Information related to identification, biology and management of the pest was explained to the participants. Use of pheromone traps and bioagents was demonstrated. An event on “Swachh Bharat Mission” to create awareness on cleanliness was also conducted during the demonstration programme.



Biocontrol training programme for officers of the NEH region

NBAIR organised a training programme on “Biological Control and Compatible Pest Management Modules for Management of Major Pests in NEH Region with Emphasis on Fall Armyworm” in two batches, viz. 19–23 August and 16–20 September 2019. Twenty-one participants employed as Subject Matter Specialists (Plant Protection), Assistant Professors, Block and Assistant Technology Managers, Entomologists, Pathologists and Nematologists from Assam, Manipur, Arunachal Pradesh and Tripura participated in the training. The participants were trained on mass production of various biocontrol agents that have relevance to their region. Special attention was given to expose them to strategies for management of the invasive fall armyworm (FAW), *Spodoptera frugiperda*. The trainees were also taken to FAW-infested fields in Chikkaballapura to see the nature of damage by this pest. Drs M. Sampath Kumar, K. Selvaraj, Richa Varshney, Veeresh Kumar, G. Mahendiran, S. Salini, U. Amala and B. Ramanujam coordinated the training programme.



On-farm demonstration on utilisation of *Trichogrammatoidea bactrae* for the management of pink bollworm on *Bt*-cotton in Maharashtra

Partnering with ICAR–National Centre for Integrated Pest Management, New Delhi, and Krishi Vigyan Kendra, Jalna, NBAIR organised an “On-Farm Demonstration on Utilisation of Egg Parasitoid *Trichogrammatoidea bactrae* for the Management of Pink Bollworm” on 21 August 2019 at Wakhari in Maharashtra in an area of 75 acres of *Bt* cotton. An interactive meeting was also held with *Bt*-cotton growers. The method of field use of Tricho-cards (*T. bactrae*) under the IPM module was explained to the farmers. Tricho-cards were supplied for large-scale demonstrations to the farmers. Drs Richa Varshney and Omprakash Navik took questions from the audience and cleared the doubts. Around 71 farmers, including women, participated in the programme.



Independence Day at NBAIR

NBAIR celebrated the 73rd “Independence Day” on 15 August 2019 with the hoisting of national flag and singing of national anthem by the staff at Hebbal. Addressing the staff members, Director Dr Chandish R. Ballal reminded them that India stands united because of the strength of its Constitution. She also honoured the meritorious children of employees. Dr T.M. Shivalingaswamy, farm in-charge, unfurled the national tricolour on the other campus of NBAIR at Yelahanka.



NBAIR advocates biocontrol to suppress broad mite on mulberry in Ramanagara district of Karnataka

NBAIR scientists participated in the one-day awareness programme entitled “Demonstration on Integrated Pest Management in Mulberry” organised by the Department of Sericulture, Government of Karnataka, at Mothersabaradoddi in Ramanagara district on 29 August 2019. The key pest discussed was the broad mite, *Polyphagotarsonemus latus*, which has been on the rise in the district. Through their speeches and interactions with the mulberry farmers and sericulturists, Drs P. Sreerama Kumar, Richa Varshney and Y. Lalitha advocated the use of biological control methods to suppress the mite as well as other pests of mulberry. In the field, farmers were shown the mite through the Foldscope. Over 150 farmers, including women and those belonging to SC/ST communities, participated in the programme. Mr S.V. Kumar (Joint Director of Sericulture, Bengaluru Division), Mr G.M. Mahendrakumar (Deputy Director of Sericulture, Ramanagara) and Mr K.S.K. Subramanya (Assistant Director of Sericulture, Ramanagara) were present.



Foldscope introduced to mulberry farmers and sericulturists of Magadi taluk, Karnataka

A workshop entitled “Utility of the Foldscope in Crop Protection: Training Workshop for Mulberry Farmers” was conducted by NBAIR for mulberry farmers and sericulturists at Uduvegere village, Magadi taluk, Ramanagara district, Karnataka, on 19 September 2019. This field-oriented programme was received well by the mulberry farmers as they could observe minute arthropods, including the broad mite, *Polyphagotarsonemus latus*, through the Foldscope. Dr P. Sreerama Kumar demonstrated how the Foldscope can be used in the field to observe minute pests. More than 50 farmers, including women and those belonging to SC/ST communities, participated in the programme. Mr C.L. Sateesha, Assistant Director of Sericulture, Magadi, and other officials from the Department of Sericulture, Government of Karnataka, were present during the demonstration.



NBAIR conducts Women's Cell meeting

NBAIR organised "Women's Cell Meeting" to discuss women's welfare and other related issues on 5 September 2019. Chief guest Ms S.G. Susheelamma, a prominent social worker and founder of Sumangali Seva Ashrama, Bengaluru, addressed the women on their welfare concerns and emphasised the importance of self-defence for women. All the women staff interacted and expressed their opinions and thoughts. Director Dr Chandish R. Ballal shared her thoughts as well. Dr Kolla Sreedevi, In-Charge, NBAIR's Women's Cell, coordinated the programme.



Schoolchildren visit insectarium

Around 180 students from Presidency School, Yelahanka, visited NBAIR's insectarium at Hebbal on 6 September 2019. They were exposed to the live and preserved specimens of both harmful and beneficial insects and were explained about the insect world in simple terminology. Later the children visited the insect photo gallery to get an insight on the variety of insects present around. The students interacted actively and showed keen interest in looking at the various species of insects displayed in the insectarium.



NBAIR's efforts to promote Hindi

Mr A.K. Jagadeesan, Assistant Director (Official Language), ICAR-IIHR, Bengaluru, delivered a lecture on "Use of IT tools in Hindi" at NBAIR on 3 September 2019. "Hindi Vishesh Divas" was organised on 16 September 2019. Chief guest Mr Ishwar Chandra Mishra, Joint Director, Central Translation Bureau, Bengaluru, delivered a lecture on "Use of Hindi language in central governments offices". Various competitions like elocution, essay writing and noting were held. The valedictory programme was held on 20 September 2019. Chief guest Dr V. Thilagam, Senior Hindi Officer, Indian Institute of Science, Bengaluru, participated in the programme and gave away prizes to winners of various competitions.



Awards and Recognitions

Dr T. Venkatesan

Received *Dr Sithanandam Award for Excellence in Biological Control Research with Special Emphasis on Horticulture* from Association for Advancement in Pest Management Science during the “International Conference on Plant Protection in Horticulture: Advances and Challenges (ICPPH 2019)” held at ICAR–IIHR, Bengaluru, 24–27 July 2019.



International Travel Support

Dr R. Gandhi Gracy presented a paper entitled “Insect gut microflora interactions and variations in the insecticidal resistant and susceptible populations of *Helicoverpa armigera* using metagenome analysis” at the “Eighth International Symposium on Molecular Insect Science” held in Sitges, Spain, 7–10 July 2019. She received International Travel Support from the Department of Biotechnology, Government of India.

Dr P. Sreerama Kumar presented a paper entitled “Simplifying insect pathology by means of the Foldscope” at the “2019 International Congress on Invertebrate Pathology and Microbial Control & 52nd Annual Meeting of the Society for Invertebrate Pathology & 17th Meeting of the IOBC-WPRS Working Group on Microbial and Nematode Control of Invertebrate Pests” held in Valencia, Spain, 28 July – 1 August 2019. He received travel support from the Society for Invertebrate Pathology, USA, and the Department of Biotechnology, Government of India.

Awards at ICPPH 2019, Bengaluru, 24–27 July 2019

Best Oral Presentations

Dr M. Nagesh	Dr Ankita Gupta
Dr Kesavan Subaharan	Dr Jagadeesh Patil
Dr Kolla Sreedevi	Dr U. Amala

Best Poster Presentation

Dr B. Ramanujam

Awards from Society for Biotic and Environmental Research, Tripura, at Biotic Science Congress 2019, Salem, 26–27 July 2019

Dr T. Venkatesan: *Research Excellence Award*

Dr G. Sivakumar: *Outstanding Scientist Award*

Dr Kolla Sreedevi: *Women Scientist Award and Best Oral Presentation Award*



Selected Publications

- Gupta, A., Ramesh Babu, S. & Sampath Kumar, M. 2019. *Cotesia ruficornis* (Haliday, 1834) (Hymenoptera: Braconidae) emerging as a common natural parasitoid of *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae) in Indian maize fields. *Journal of Biological Control*, 33(3): 193–196.
- Sreedevi, K., Ranasinghe, S., Fabrizi, S. & Ahrens, D. 2019. New species and records of Sericini from the Indian subcontinent (Coleoptera: Scarabaeidae) II. *European Journal of Taxonomy*, 567: 1–26.
- Veeresh Kumar, Belavadi, V.V., Revanasidda, Tharini, K.B. & Srinivasa, Y.B. 2019. Stamen elongation in sunn hemp appears to allow delayed self-pollination in the absence of pollinators – A case of bet-hedging? *South African Journal of Botany*, 127: 110–116.
- Zargar, M., Gupta, A., Talebi, A.A. & Farahani, S. 2019. A review of the Iranian species of genus *Iconella* Mason (Hymenoptera: Braconidae: Microgastrinae) with description of two new species. *Zootaxa*, 4586(3): 491–504.

ANNOUNCEMENT The Sixth National Conference on Biological Control will be held during 14–16 May 2020 in Bengaluru.

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