ICAR-NBAIR Newsletter

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ICAR-National Bureau of Agricultural Insect Resources

Welcome!

Dr. M. Nagesh, Principal Scientist & Head, Division of Genomic Resources, has taken over the charge as the Director (Acting) of ICAR-NBAIR on 1 August 2021.

NBAIR attempts to keep alien invasives at Bay

Increasing global trade and quick transportation facilities have enhanced the threat posed by invasive alien insects to crops, veterinary animals and forest trees. In addition to causing direct damage, their entry has an impact on the ecosystem and human health due to the increased dependence on chemical insecticides to contain the damage and spread of invasive alien insects. In the recent past, the notable invasives include Fall armyworm, *Spodoptera frugiperda*, cassava mealybug, *Phenococcus manihotti* and *Thrips parvispinus*. The first line of defence against the invasives insects is to sensitize the stakeholders viz. farmers, researchers, developmental agencies and policymakers on the potential damage that it would cause on entry. To address this, ICAR NBAIR through its network gathers information and collects samples for scrutiny and provides details through a PEST ALERT window on the institute's website that provides a detailed description of the identification based on morphological and molecular characterization, biology and spread of the invasives on a spatiotemporal scale across the country. This initiative is widely appreciated by stakeholders for the vital information that it provides during times of need.

Entry of invasive pests into a new geographical location causes a knee jerk reaction by increasing pesticide use to scale down the damage caused by them. In the absence of natural enemies, the population buildup of the invasive pests makes the situation even worse. ICAR NBAIR with its competence and expertise delivers Bio-intensive Pest Management measures to manage alien invasive pests. The technologies so developed are popularized to benefit the farmers through demonstrations and training. One such BIPM package that involves the natural enemies and pheromones was developed to manage the FAW and was demonstrated in the farmer's field increased the adoption rate.

The entry of a new invasive cassava mealybug, *Phenacoccus manihoti*, was first noticed in Kerala during February/March 2020. The problems faced by the farmers could be best addressed by devising an effective biocontrol strategy. Taking a cue from the success of employing *Anagyrus lopezi*, a parasitoid for effective management of *P. manihoti* in countries like Thailand, ICAR NBAIR initiated measures to get necessary approvals from the regulatory bodies to import the parasitoid from the Republic of Benin. The proactive measures by ICAR NBAIR to combat the invasive despite the COVID-19 pandemic needs to be lauded. On satisfying the quarantine requirements the parasitoids would be released to scale down the incidence of *P. manihoti*. Recent flareup of invasive chilli thrips, *Thrips parvispinus* causing serious damage on *Capsicum annuum* was recorded in Andhra Pradesh, Chhattisgarh, Karnataka, Maharashtra, Tamil Nadu and Telangana. In this case, too, ICAR NBAIR has devised strategies involving the bioagents to manage the pest.

Researchers at ICAR NBAIR have contributed immensely during the entry of invasive insects by harnessing the expertise available in the field of taxonomy, molecular biology, biological control and insect ecology. NBAIR actively collaborates with institutes in India and abroad to handle the crisis like situation on entry of invasives and the success of such achievements aids to make an impact of Indian entomology at global level.

Dr M. Nagesh
Director (Acting)

Research Highlights

Review of the Oriental species of the genus *Brachycerocoris* with description of two new species

The Oriental species belonging to the genus *Brachycerocoris* (Hemiptera: Pentatomoidea: Pentatomidae: Podopinae s.l.) were revised with description of two new species, *B. petrii* (Fig. 1) and *B. davidii* (Fig. 2) from India and Philippines, respectively. *Brachycerocoris camelus* was diagnosed and illustrated for female genitalia and *B. dromedaries* for both male and female genitalia. Additionally, host record, bionomics of *B. petrii* and a key to the Oriental species of the genus was prepared and published. Adults of *B. petrii* were collected on *Vitex trifolia* of Lamiaceae (Fig. 3) and were found feeding on the fruits borne on clusters.

Fig. 1: *Brachycerocoris petrii*

Fig. 2: *Brachycerocoris davidii*

Fig. 3: *Brachycerocoris* eggs on *Vitex trifolia*

A bizarre pentatomid, *Phricodus hystrix* on *Ocimum* spp.

Phricodus hystrix, a bizarre looking pentatomid, was found feeding on seeds of various species of Tulsi plants such as *Ocimum tenuiflorum* and *O. gratissimum*. The species was redescribed based on male and female genitalia, which were illustrated for the first time. Besides, the bionomics of the species was also recorded for the first time. DNA barcode of *P. hystrix* was also generated.

Fig. 4: *Phricodus hystrix*

Fig. 5: Tulsi floret with eggs of *Phricodus hystrix*

Asobara jenningsi, a parasitoid of fruit fly

A new braconid species, *Asobara jenningsi* (Fig. 6), parasitic on a fruit fly of economic importance, *Zeugodacus cucurbitae* infesting tomato in India was described and illustrated from Karnataka. This new species was compared with all the possible closely allied species from the Oriental region.

Fig. 6: *Asobara jenningsi*

New host record

Biltothrips minutus (Fig. 7) originally described from Kolkata, belonging to the subfamily Thripinae (Thysanoptera: Thripidae), was recorded for the first time from the *Manihot esculenta*.

Fig. 7: *Biltothrips minutus*

Studies on the new invasive pest, *Phenacoccus manihoti*

In the comprehensive yet complicated food web associated with the niche of the recently invaded cassava mealybug (CMB), *Phenacoccus manihoti* (Homoptera: Pseudococcidae), there was a multitrophic interaction structured vertically as well as horizontally (Figs 8-10). Altogether 45 species were recorded for the first time to be associated directly or indirectly with CMB) thirty-four species of insects from six orders (Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, and Neuroptera) and eleven species of spiders (Arachnida) were grouped under four trophic levels into 11 guilds.The analysis of trophic guild structure and interaction indicated that many indigenous parasitoid species, which are qualified to be placed under the fourth trophic level, actively parasitised the potential native predators of CMB and thereby negatively impacted the natural biological control of CMB.

The different associations found in the food webs of CMB were; the hymenopteran parasitoids—*Aprostocetus* sp. (Eulophidae), *Homalotylus turkmenicus* (Encyrtidae), *Metastenus concinnus* (Pteromalidae) and *Chartocerus* sp. (Signiphoridae) parasitising immature stages of *Hyperaspis maindroni* (Coleoptera: Coccinellidae) while *Tetrastichus* sp. (Eulophidae) and *Brachycyrtus* sp. (Ichneumonidae) parasitic on *Mallada desjardinsi* (Neuroptera: Chrysopidae) which was actively predating on CMB.

Antrocephalus japonicus (Chalcididae) was parasitic on pupae of *Autoba silicula* (Erebidae) while *Apanteles* sp. (Braconidae), *Brachymeria* sp. (Chalcididae), *Bucekia differens* (Chalcididae), *Elasmus anticles* (Elasmidae), *Eurytoma* sp. (Eurytomidae), *Hockeria nikolskayae* (Chalcididae), *Hockeria* sp., *Phanerotoma* sp. (Braconidae) and indetermined Bethylidae were parasitic on immature stages of lepidopteran species complex in the CMB colonies.

The following species were observed in the Lepidoptera species complex: *Autoba silicula* (Erebidae), *Anatrachyntis* sp. (Cosmopterigidae), *Conogethes* sp. (Crambidae), *Lobesia* sp. (Tortricidae), *Nola* sp. (Nolidae), *Psuedohypatopa* sp. (Blastobasidae), *Spalgis epius* (Lycaenidae), *Stathmopoda* sp. (Oecophoridae) and indetermined Pyralidae. Among all the moth species, *S. epius* was found most actively predating on CMB.

The neuropteran predators associated with CMB were: *Mallada desjardinsi*, *Pseudomallada astur* and *Apertochrysa* sp. and among them, *M. desjardinsi* was observed as the most predominant predator of CMB. The other miscellaneous species associated were *Cheilomenes sexmaculata* (Coccinellidae), *Carpophilus mutilatus* (Nitidulidae) and two indeterminate species of Diptera and Hemiptera (Geocoridae), respectively.

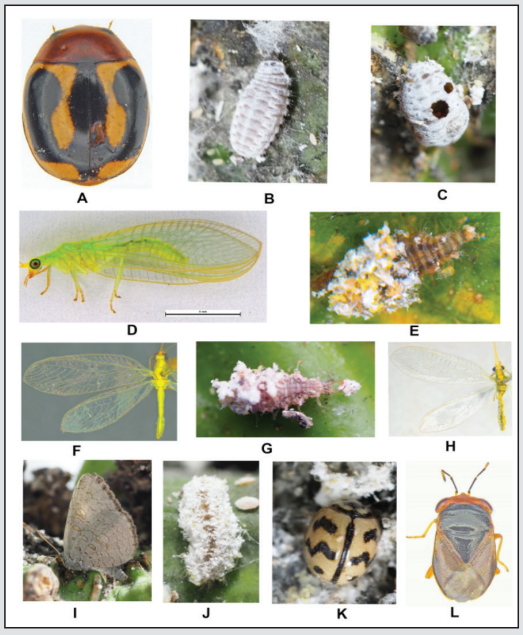


Fig. 8: Third trophic level active predators of cassava mealybug colonies. A, *Hyperaspis maindroni* adult; B, *H. maindroni* grub; C, *H.maindroni* grub with parasitoid emergence holes; D, *Mallada desjardinsi* adult; E, *M. desjardinsi* grub; F, *Pseudomallada astur* adult; G, *Pseudomallada* sp. grub; H, *Apertochrysa* sp. adult; I, *Spalgis epius* adult; J, *S. epius* grub; K, *Cheilomenes sexmaculata* adult; L, indeterminate Geocoridae

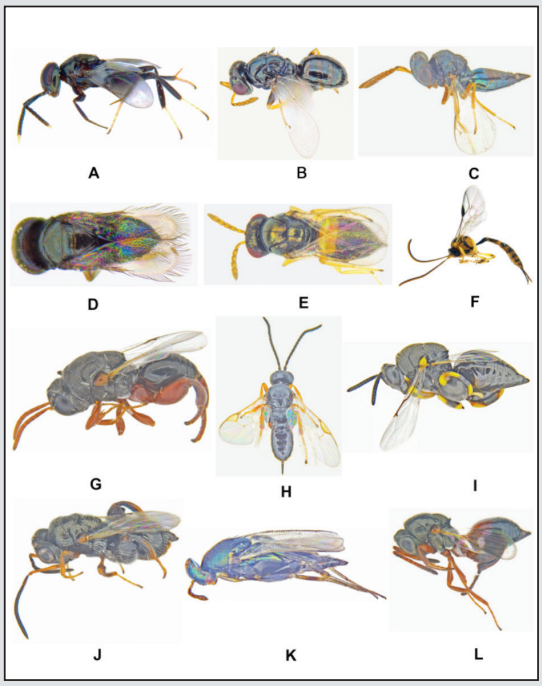


Fig. 9: Fourth trophic level hyperparasitoids (secondary parasitoids) in the CMB colonies. A, *Homalotylus turkmenicus*; B, *Tetrastichus* sp.; C, *Metastenus concinnus*; D, *Chartocerus* sp.; E, *Aprostocetus* sp. ; F, *Brachycyrtus* sp.; G, *Antrocephalus japonicus*; H, *Apanteles* sp.; I, *Brachymeria sp.*; J, *Bucekia differens*; K, *Elasmus anticles*; L, *Hockeria nikolskayae*

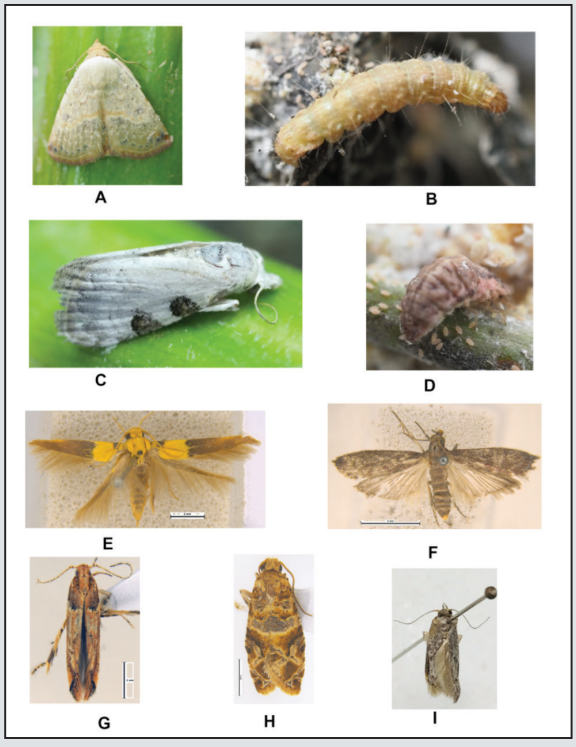


Fig. 10: Lepidoptera species complex in the CMB colonies: A, *Autoba silicula* adult; B, *A. silicula* larva; C, *Nola* sp. adult; D, *Nola* sp. larva; E, *Stathmopoda* sp.; F, indeterminate Pyralidae; G, *Anatrachyntis* sp.; H, *Lobesia* sp.; I, *Psuedohypatopa* sp.

Humbling arrival of the exotic parasitic wasp, *Anagyrus lopezi* to tackle invasive cassava mealybug, *Phenacoccus manihoti* menace in India

Increased globalization and trade have made India a target for entry of many new alien insect pests. One such unintentional recent introduction is the cassava mealybug (CMB), *Phenacoccus manihoti* (Hemiptera:Pseudococcidae) on cassava during 2020. *Phenacoccus manihoti* is one of the most destructive pests of cassava in the world. It is native to South America, but had become acclimatized throughout sub-Saharan Africa since its unintentional introduction into the continent in the early 1970s causing up to 84% loss of yield and endangering the subsistence of about 200 million people. Among the Asian countries, it has first invaded Thailand in 2008 and then spread to other neighbouring countries. In India, the occurrence of this pest was first observed on cassava in Thrissur, Kerala during 2020. Thereafter its severity was noticed in Tamil Nadu with the severe reduction of tuber yield.

In the absence of any effective native natural enemies and other methods of control, CMB poses a major crisis to the cassava industry in India. The prospects of its suppression by classical biological control are quite vibrant. After a year long struggle, ICAR-NBAIR, Bengaluru imported the parasitoid wasp, *Anagyrus lopezi* from the International Institute of Tropical Agriculture (IITA) sub centre located in Republic of Benin, West Africa. (Govt. of India import permit No. 1712020-21 dated 29 October 2020). As per the Material Transfer Agreement (MTA) signed between IITA and NBAIR, the first shipment of the parasitoid wasp arrived India on 1 July 2021. Due to long hours in transit, no parasitoids were alive upon arrival. Fortunately, the parasitoid cocoons from second consignment which was received on 13 August 2021, could survive and the emerged parasitoids are being maintained at NBAIR QC-2 quarantine facility.

The mandatory quarantine studies on the biology, safety and host specificity of *A. lopezi* will be undertaken to understand its non-target impacts. Field release and subsequent evaluation will be undertaken to reveal the value and short comings of the existing natural enemies, to provide insights into the biotic and abiotic factors regulating its population size and to demonstrate the effectiveness of the introduced *A. lopezi* on the colonies of cassava mealybug.

The parasitoid wasps will be field released once the limited area release permit is granted by Directorate of Plant Protection Quarantine and Storage (DPPQ&S), Ministry of Agriculture and Farmers Welfare, Government of India.

Invasive pest, *Thrips parvispinus* threatening chilli cultivation in India

Thrips parvispinus (Fig. 11) is a cosmopolitan species of quarantine importance and was reported from Thailand to Australia. The last two decades witnessed a drastic extension in the geographic distribution of *T. parvispinus* and it is now known to occur in France, Greece, Hawaii, Mauritius, Reunion, Spain, Tanzania and Netherlands, besides India. It is a polyphagous pest, infesting beans, eggplant, papaya, pepper, potato, shallot and strawberry and causes appreciable damage to different crops. In addition, it inflicts injury to ornamentals viz. Anthurium, Chrysanthemum, Dahlia, Dipladenia, Gardenia and Ficus. In India, this species was first reported in 2015 on *Carica papaya* (Caricaceae) in Bengaluru and later on *Brugmansia* sp. (Solanaceae) and *Dahlia rosea* (Asteraceae).

Since its first report from our country, systematic surveys had been conducted to monitor the species and a total of 4865 specimens were examined from seven states viz. Andhra Pradesh, Chhattisgarh, Gujarat, Karnataka, Maharashtra, Tamil Nadu and Telangana. Since then, the species had been collected from nine different hosts belonging to seven families. Out of the nine recorded host plants, four were fruit crops, three were ornamentals, one each of vegetable and field crop, reflecting the adaptability of this thrips species and capability to breed in diverse agro-ecosystems. Thrips population congregate on underside of leaves (Fig. 12) as well as on flowers (Fig. 13). The both larvae and adults suck the plant's sap. Heavy infestation eventually leads to large scale shedding of flowers, malformation of fruits and fruit drop in chilli, leading to severe yield loss (Fig. 14). About 90 to 95 per cent flowers were badly damaged by the thrips, and on an average of 18-20 thrips were recorded per flower.

Serious damage was recorded in Andhra Pradesh, Chhattisgarh, Karnataka, Maharashtra, Tamil Nadu and Telangana on *Capsicum annuum* (Fig. 15). About 90 to 95 per cent chilli flowers were badly damaged by the thrips, and on an average, 18.20 thrips were recorded per flower. Multiple samples received from the above states for identification cited the prime reason that farmers were unable to control this species after repeated application of insecticides. In case of the *C. annuum*, farmers were forced to abandon the crop since the species was found to congregate in large numbers on flowers causing severe flower drop leading to huge crop loss.

Even though trade of different commodities is essential to boost the economic growth of the country, careful vigilance would prevent the entry and dispersal of alien species into our terrain. Further, it is also imperative that the domestic quarantine mechanisms should be stringent enough to check the spread of this notorious pest to the rest of India.

Fig. 11: *Thrips parvispinus*

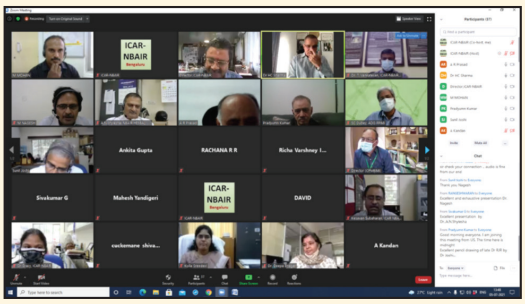
Fig. 12: Chilli leaf damage

Fig. 13: Chilli flower damage

Fig. 14: Fruit as well as leaf damage

Fig. 15: Infested chilli plant

Research Advisory Committee Meeting



The "XXV Research Advisory Committee Meeting" was held in virtual mode at ICAR-NBAIR on 5 July 2021. The committee consisting of Drs H.C. Sharma, S. Rajan, S. Mohankumar, Sudhir Singh, Pradyumn Kumar, and two progressive farmers, Mr N. Nanjundappa and Mr Shivakumar, reviewed the research achievements and progress. The meeting began with a welcome note by Dr N. Bakthavatsalam, Director of ICAR-NBAIR. He also presented an overview of the research progress of the Bureau. The divisional heads, Drs Sunil Joshi, M. Nagesh and A.N. Shylesha, presented the division-wise research achievements. The committee advised ICAR-NBAIR to focus on capacity building of young scientists and opined on the need to generate toxicological data for potential microbial strains through collaboration with other institutes and public private partnership. The importance of strengthening the insect collection and identification by forging links with different repositories and Institutes in India was also discussed.

XXX Workshop of AICRP on Biological Control of Crop Pests

The "XXX Workshop of AICRP on Biological Control of Crop Pests" was organised in virtual mode on 14 July 2021. Dr N. Bakthavatsalam, Director, ICAR-NBAIR, Bengaluru & Project Coordinator, AICRP on Biological control welcomed the dignitaries and presented the project co-ordinator's report. Dr Tilak Raj Sharma, Deputy Director General (Crop Sciences) inaugurated the workshop. In his inaugural address, he emphasised that the validated microbes should be registered at ICAR-NBAIM with the bio-efficacy and biosafety data. He highlighted the branding of the biocontrol products for further promotion, and also about generation of fingerprint data for all new microbial strains. Dr S.C. Dubey, Assistant Director General (Plant Protection & Bio-safety) emphasised that distribution maps should be prepared to assess the spread and establishment of various natural enemies of pests and plant pathogens. He stressed upon the importance of focussing on microbes with multiple traits for biological control of pests and diseases under protected cultivation. Six technical sessions were held on biological control of various crops. Dr H.C. Sharma, former Vice Chancellor, Dr YSPUHF, Solan; Dr H.B. Singh, Former Professor (Plant Pathology), BHU, Varanasi and Dr S.K. Jalali, former Head, Division of Genomic Resources, ICAR–NBAIR, Bengaluru participated in the workshop as external experts. More than 100 scientists, biocontrol experts and private entrepreneurs participated in the workshop.

Independence Day at ICAR-NBAIR

ICAR–NBAIR celebrated the "75th Independence Day" on 15 August 2021 with the hoisting of the national flag and singing of the national anthem by the staff at Hebbal. Addressing the staff members, Dr M. Nagesh, Director, ICAR-NBAIR, briefed the achievements of the bureau and urged the scientists to maintain integrity in the work place. Dr T.M. Shivalingaswamy, farm in-charge, unfurled the national tricolour at ICAR-NBAIR Yelahanka campus.

ICAR–NBAIR organises awareness programme on invasive cassava mealybug and fall armyworm management

ICAR–NBAIR organised an awareness programme on cassava mealybug and fall armyworm managaement to 25 farmers from Dharmapuri District, Tamil Nadu on 3 September 2021. Drs M. Sampath Kumar, M. Mohan and scientific staff of the institute explained about maize fall armyworm, its nature of damage, biology and biocontrol based management measures in regional language. The mode of dispersal, damage symptoms, life stages of the cassava mealybug and available management options were also explained. Dr M. Nagesh, Director of the Bureau distributed two technical folders and advisories on cassava mealybug and fall armyworm published by the Bureau in regional languages to the farmers. The various issues raised by the farmers on the management of cassava mealybug and fall armyworm were addressed by the scientists. HRD cell of the Bureau coordinated this awareness programme.

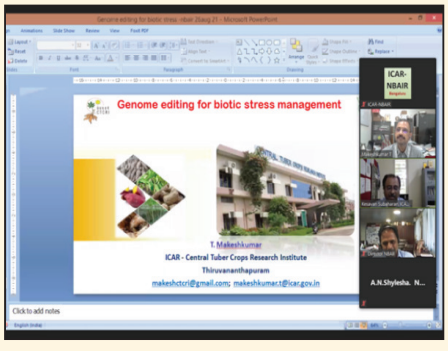
भा.कृ.अनु.प.- राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरु में 14 सितम्बर , 2021 को "हिंदी दिवस'' का आयोजन किया गया

भा.कृ.अनु.प.- राष्ट्रीय कृषि कीट संसाधन ब्यूरो, बेंगलूरु में ''हिंदी दिवस'' का आयोजन 14 सितम्बर, 2021 को ब्यूरो में आयोजित किया गया। ''हिंदी दिवस'' के उद्घाटन के अवसर पर ब्यूरो के डॉ. ए. एन. शैलेषा, विभागाध्यक्ष- जननद्रव्य संग्रहण और लक्षणीकरण, कार्यक्रम के मुख्य अतिथि श्री राजीव कुमार चतुर्वेदी, सेवानिवृत्त भारतीय वायु सेना अधिकारी, डॉ. सुनील जोशी, विभागाध्यक्ष- जननद्रव्य संरक्षण और उपयोगिता, डॉ. टी. वेंकटेशन, विभागाध्यक्ष- जीनोमिक संसाधन, श्री मलय बिष्ट, प्रशासनिक अधिकारी और श्रीमती कुसुमा एस., वित्त एवं लेखा अधिकारी ने दीप प्रज्वलित कर कार्यक्रम आरंभ हुआ। उद्घाटन के उपरांत ''हिंदी दिवस'' के अवसर पर माननीय गृह मंत्री, भारत सरकार, श्री अमित शाह का वीडियो संदेश सम्मेलन कक्ष में उपस्थित प्रतिभागियों ने देखा और सुना। ''हिंदी दिवस'' कार्यक्रम के मुख्य अतिथि सेवानिवृत्त भारतीय वायु सेना अधिकारी, श्री राजीव कुमार चतुर्वेदी, ने राजभाषा हिंदी की देश की आजादी में भूमिका और उसके महत्वपूर्ण योगदानों का विस्तृत रूप से व्याख्यान के माध्यम से प्रतिभागियों को रोचक जानकारी दी। इसके बाद हिंदी और अहिंदी वर्गों के लिए अलग-अलग रूप से आयोजित तात्कालिक संवाद/भाषण एवं वाक्य बनाने की प्रतियोगिता तथा हिंदी गीत गायन/काव्य पाठ प्रतियोगिता का आयोजन किया गया। इन कार्यक्रमों में राष्ट्रीय कृषि कीट संसाधन ब्यूरो के अधिकारियों/ कर्मचारियों ने उत्साह पूर्वक भाग लिया।

ICAR–NBAIR celebrates Poshan Vatika Maha Abhiyan & Tree plantation programme

ICAR–NBAIR celebrated Poshan Vatika Maha Abhiyan & Tree plantation at Lakshmidevipura village, Dodaballapura Taluk, Bengaluru Rural District, Karnataka on 17 September 2021 to commemorate the Curtain Raiser of International Year of Millets 2023. Dr M. Nagesh, Director Incharge, ICAR–NBAIR Bengaluru delivered a lecture on 'Role of nutri-cereal and their role in human health'. Ms Kadariamma, a woman farmer from the Lakshmidevipura village shared her life time experience and emphasized on the importance of millets in the healthy diet and life style. Millet based products were distributed to all the girl children and young women participants. This was followed by tree plantation in the school premises and nearby farmers' fields and distribution of around 125 tree saplings to all the farmers including 65 women farmers. The programme concluded with the chores singing of National Anthem by all the participants.

ICAR–NBAIR organises Webinar on "Genome editing for biotic stress management"



ICAR–NBAIR organised a webinar 007 on "Genome editing for biotic stress management" as part of Azadi Ka Amrut Mahotsav on 26 September 2021. The programme was inaugurated by Dr M. Nagesh, Director, ICAR–NBAIR, Bengaluru. In his inaugural address, he emphasized the role of genome editing in the development of resistance against pests and pathogens through gene knockdown mechanism. The guest speaker, Dr T. Makeshkumar, Principal Scientist, ICAR–Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram delivered a talk on 'Genome editing for biotic stress management'. In his talk, he elaborated upon the various genome editing tools with an emphasis on CRISPR-Cas9 application. He also explained about the CRISPR mediated genome editing in crop plants to develop crop resistance to pathogens. The case studies on the success of employing genome editing in insect vector-like mosquitoes and wasp management were discussed. The possibilities of altering the volatile profile emitted from crop plants to affect a shift in the behaviour of insect pests and parasitoids were suggested by the speaker. Among the participants were, Dr T.P. Rajendran, Former ADG (Plant Protection & Biosafety); Dr Abraham Verghese, Former Director of the Bureau, and Dr Sheela, Director, ICAR–CTCRI, Thiruvananthapuram. Drs K. Subaharan, U. Amala and M. Pratheepa organised the webinar.

ICAR–NBAIR organises Farmers-Scientists interface meet on "Biological Management of Fall Armyworm (FAW) in maize"

ICAR–NBAIR organised Farmers-Scientists interface meet on "Biological Management of Fall Armyworm (FAW) in maize" at Yelahanka campus on 28 September 2021. 83 maize farmers participated in the programme. The main objective of the interface meet was to sensitise the farmers about ecofriendly management of fall armyworm. The damage symptoms and life cycle of fall armyworm were explained to the farmers in local language. The benefits of releasing egg parasitoids, especially Trichogrammatids was explained followed by an exhibition showcasing all the ICAR-NBAIR technologies to the farmers. Microbial control of fall armyworm using entomopathogenic fungi and bacteria, viz. *Metarhizium anisopliae*, *Beauveria bassiana*, *Pseudomonas fluorescens*, *Bacillus thuringiensis* and use of *Spodoptera frugiperda* NPV were explained to the farmers. Identification of diseased larvae under field conditions were explained to the farmers. Field use of entomopathogenic nematodes for the management of fall armyworm was deliberated. The use of pheromone trap and it's application for the management of fall armyworm was also discussed. The farmers expressed their satisfaction in learning the techniques to manage fall armyworm infesting their maize crop.

Superannuation

Dr N. Bakthavatsalam, Director (Acting) of the Bureau superannuated on 31 July 2021. To commemorate his retirement, colleagues at ICAR-NBAIR organised a farewell function and felicitated him.

Externally funded projects

Dr Ankita Gupta

Received funding from the Department of Science & Technology Science and Engineering Research Board funded Core Research Grant for the project entitled "Taxonomic studies on species complexes in selected parasitoids (Hymenopetera:Braconidae)".

Dr G. Mahendiran

Received funding from the Department of Science & Technology Science and Engineering Research Board funded Core Research Grant for the project entitled "Biodiversity and systematic studies on weevils (Coleoptera: Curculionidae:) with a special reference to Eastern Ghats of India".

Dr U. Amala

Received funding from the Department of Science & Technology Science and Engineering Research Board funded Core Research Grant for the project entitled "Enhancing the pollination in fennel (*Foeniculum vulgare* Mill.) by Syrphid fly, *Ischiodon scutellaris* Fabricius".

Dr Rachana, R.R.

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Selected Publications

Gupta, A. & David, K.J. 2021. A new species of the genus *Asobara* Foerster (Hymenoptera: Braconidae) parasitic *Zeugodacus cucurbitae* (Coquillett) (Diptera: Tephritidae) infesting tomato in India. *Zootaxa,* 5048 (3): 444–450.

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