

Webinar on Entomology 2020: Beyond COVID-19

Entomology-Hyderabad, a group of professionals, along with the Professor Jayashankar Telangana State Agricultural University, Entomological Society of India, the Plant Protection Association of India and Agri Biotech Foundation organized two day webinar on “Entomology2020: Beyond COVID-19” during 11-12 December 2020. This is in sequel to Entomology 2018, organised by the same group.

Inaugurating the event with the keynote address, Dr. N. Krishnakumar, former DDG, ICAR, New Delhi, highlighted the importance of biodiversity as the foundation for the sustainable development to meet the millennium goals. Role of Entomologists in this direction is more defined since COVID-19 pandemics and beyond, he added. Arthropod diversity, insect diversity in particular, is the key factor in enriching soil health and providing ecosystem services that are vital for sustainable agriculture. Flagging key researchable issues, Dr. Krishnakumar noted that role of symbiotic microflora in adaptation and evolution of whitefly biotypes need to be studied thoroughly and the role of honeydew excreted by homopteran sucking pests in attracting ants, fungal growth and natural enemies need to be investigated. COVID-19 pandemic and subsequent lockdowns have paradoxically brought back clean air and biodiversity for a common man to feel and appreciate, he concluded.

Dr. Anathnarayanan Raman, Senior Scientist, CSIRO, and Adjunct Professor, Charles Stuart University, Australia, delivering his lead talk in the session on Ecological Entomology focused on gall forming insects and noted that the primary stimulus of gall induction is still not clearly understood. The primary stimuli for gall induction in plants by the gall forming insects are less likely to be hormones like IAA or kinins, as it was considered so far, but some of the high molecular weight proteins from either the salivary glands or accessory glands of the insects are more likely candidates. More studies are needed to understand this critical step.

Dr. M. Bheemanna, Dean Agriculture, University of Agricultural Sciences, Raichur, dealt with pesticide residues as the determinants of food quality, in his lead talk in the Toxicology session. Though India is among those countries that use very low amounts of pesticides *per se*, but our agricultural produce is highly contaminated with residues of these toxic chemicals that pose threat to the health of humans and livestock animals, besides being a major trade barrier. Random sampling and analysis have revealed about 2-3% of food items being contaminated with pesticides above permissible minimal residue limits. Educating farmers for right use of pesticides, intensified monitoring with residue analysis and informing consumers about simple ways of reducing the risk are the ways forward, he emphasized.

Dr. Sudeshna Majumdar-Leighton, Professor of Botany, University of Delhi, spoke on evolution of polyphagy in insects. Several of the insects have evolved to be polyphagous and are able to feed and survive on a wide range of plants belonging to different families. This ability stems from their counter evolution against a range of plant defense related chemicals. It is expressed as differential expression and expansion of several gene families like cytochrome P450 monooxygenases, glutathione S transferases, hydrolases, serine type

endopeptidases and alike. Ability of insects to switch over to alternative lineages of serine proteases in response to plant protease inhibitors has rendered trypsin inhibitor genes as untenable choice for developing transgenic crop plants. Monophagous insects are niche feeders and are able to overcome host-plant defense within their diet breadth and derive evolutionary benefits at low fitness cost. Polyphagous insect, on the other hand, have very well developed physiological machinery to detoxify, degrade or sequester plant defense compounds. However, adaptive response of insects to diets are plastic and influenced by the environment, she emphasized.

Dr. Jyothilakshmi V, staff scientist, National Institute on Plant Genome Research, New Delhi dealt with how plants perceive the threat of insect attack and respond. Insect herbivores are voracious feeders and damage plants more rapidly than any other biotic stress. So, plants not only have to recognize herbivore attack rapidly, but also respond back quickly. Plants sense elicitors in oral secretion of insects, that activates jasmonate mediated plant defense and plant secondary metabolite production. Early perception of insect herbivory, however, involves a rapid cytoplasmic Ca^{2+} elevation that activates downstream signalling pathways within minutes of insect attack. Recent studies on Arabidopsis-Spodoptera system suggested positive defense regulation role of one of the Cyclic Nucleotide Gated Channel (CNGC) family of genes -CNGC-19.

Other lead talks were by Dr. Gururaj Katti, Principal Scientist (Retd.) ICAR-IIRR, Hyderabad on recent advances in plant protection technologies for food crops. Research, regulations, and responsibilities are three wings of IPM that need to be strengthened to develop and provide effective and safe pest control products; regulate their quality at point of sale and protect human health and environment with safe application methods like those involving the drones, he opined. Further, multiple sources of information available to the farmers now on IPM practice are, at times, contradicting and confusing which needs to be avoided.

Dr. S.J. Rahman, Professor of Entomology, PJTSAU, Hyderabad spoke on issues relating to the biological control of crop pests. One of the major constraints in effective implementation of biological control of crop pests is non-availability of effective parasitoids for inundative releases for which the speaker suggested a solution to shift emphasis from mass production to production by masses – encouraging cottage industry of production of these agents. For the effective predators, awareness and conservation is the key. In case of effective microbial bioagents, need of genuine manufacturers with assured quality is the main issue.

Professor (Emeritus) TVK Singh, PJTSAU, Hyderabad spoke on different methods of measurement of impact of pesticides on the environment. Among a dozen or so methods available to quantify impact of pesticides on environment, Environment Impact Quotient (EIQ) proposed by Kovach et al. is the most accurate and widely adopted. It has three principal components covering farm worker, consumer and environment with equal weightage. Based on this quotient, EIQ Field Use Rating can be computed for different situations.

Dr. Chitra Shanker, Principal Scientist, ICAR-IIRR, Hyderabad talked on novel strategies of biological pest management based on the recent advancements in understanding

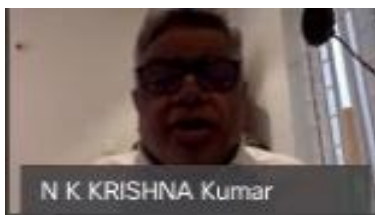
communications between the plants and insects. Herbivory induced plant volatiles (HIPV) are part of the plant defense system that act indirectly by attracting the natural enemies of the herbivore. Recent studies have shown that HIPV can be used to develop novel biocontrol strategies of pest management she suggested.

In a special talk, Dr. Mohan K.S. Biotech Consultant, Bangalore, gave an account of the recently introduced 'Refuge In Bag' regulation for growers of Bt Cotton and its possible impact on sustainability of cotton Bt technology in India.

There was a special panel discussion on day 2 on 'Role of Public Private Partnership in crop protection during Post-COVID era'. Panellists Drs. Pradeep Kulkarni (Adama India) , G. Pampapati (Corteva Agriscience), John Peter (Varsha Bioscience) and M. Lakshminarayana (AG Biosystems) highlighted the role of private sector in facing the recent threat of locust swarms and expressed their concern about the pending Pesticide Management Bill and summary banning of several generic pesticides in one go.

The webinar organized into eight technical sessions had eight oral presentations and 26 posters that were also presented orally. Besides, a photo competition was also held on the occasion. During the concluding sessions, awards were conferred for best presentations in different categories and best photographs. Life-Time Achievement Award was conferred on Dr. B. Vasanthraj David, former Chairman, International Institute of Biotechnology and Toxicology (IIBAT), Chennai. Dr. David, participated in the event online and addressed the gathering.

Views of the webinar



Keynote address



Invited Talks

Crop Protection technologies for food crops – An Overview

Gururaj Katti
Retd. Principal Scientist (Entomology)
ICAR, Indian Institute of Rice Research, Hyderabad

BIOLOGICAL CONTROL IN PLANT PROTECTION: AN INSIGHT INTO IMPEDIMENTS AND AVENUES FOR UPTAKE

Dr. S. J. Rahman
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PJTSAU, Rajendranagar, Hyderabad

The image shows two presentation slides. The left slide is titled "Crop Protection technologies for food crops – An Overview" and features a collage of agricultural images and a central diagram labeled "IPM" (Integrated Pest Management) with "Crop + Livestock" below it. The right slide is titled "BIOLOGICAL CONTROL IN PLANT PROTECTION: AN INSIGHT INTO IMPEDIMENTS AND AVENUES FOR UPTAKE" and features a collage of images showing various insects and biological control methods. Both slides include the names and titles of the speakers, Gururaj Katti and Dr. S. J. Rahman, along with their affiliations.

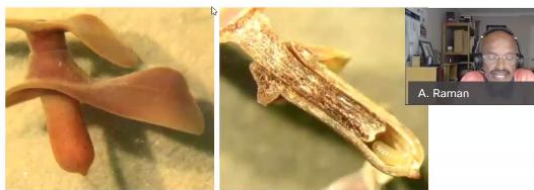
Will Refuge-in-bag improve the sustainability of Bt cotton in India?

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Webinar
ENTOMOLOGY 2020 : BEYOND COVID-19
11- 12 Dec. 2020

Insect—plant interactions: gall initiation

Anantanarayanan Raman
CSIRO (Health & Biosecurity Division), Floreat Park, WA 6014, Australia



Cylinder-piston galls on the leaves of *Senecioia ferruginea* (*Acacia ferruginea*) (Fabaceae) – *Cantantia mali* (Diptera: Cecidomyiidae)
Source: Harris, K. M., 2003, *2010*, 2423, 03-08

Talking Plants and Insect Recruits

novel strategies for biological pest management

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Entomology 2020 : BEYOND COVID-19
11-12 December 2020

Entomology 2020 : Ecological Knowledge, 11-12 Dec 2020

Impact of Pesticides on Environment

PROF. T. V. S. SIVAK
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DEAN OF AGRIC. PROGRAM & P. 25/04/14 8022

11-12 December 2020
Hyderabad, India

UNIVERSITY OF AGRICULTURAL SCIENCES,
RAICHUR
DEPARTMENT OF AGRICULTURAL ENTOMOLOGY

PESTICIDE RESIDUE AS DETERMINANTS OF FOOD QUALITY

NABL
ACCREDITED LABORATORY
FOR AGRI-COMMODITY

PESTICIDE RESIDUE AND FOOD QUALITY ANALYSIS LABORATORY

Dr. BHEEMANNA, M.
PROFESSOR AND HEAD (PRFQA)
Dear (Agri.), AC, Raichur, UAS, Raichur

clideo

Structures of *A. thaliana* glucosinolates and scheme for myrosinase-catalyzed hydrolysis of glucosinolates to isothiocyanates and nitriles.

Core glucosinolate structure

Evolution of polyphagy in insects

4-methylsulfinylbutylglucosinolate (4MSOB)

8-methylsulfinyloctylglucosinolate (8MSOO)

Indol-3-ylmethylglucosinolate (13M)

Nonuniform distribution of glucosinolates in *Arabidopsis thaliana* leaves has important consequences for plant defense

Stroff R et al. PNAS 2008;105:6196-6201

PNAS

How plants respond to insect attack rapidly using calcium channels?

Jyothilakshmi Vadassery
National Institute of Plant Genome Research (NIPGR)

Oral Presentations



Biological Control of Invasive Rugose Spiralling Whitefly *Aleurodicus rugioperculatus* Martin in India: A success story

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LEPIDOPTERAN PESTS SCENARIO IN MANGO ECOSYSTEM OF ANDHRA PRADESH



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Dr. R.Rajya Lakshmi, Sr.Scientist-Horticulture



ENHANCING DIVERSITY AND DENSITY OF NATURAL ENEMIES IN COTTON TO MITIGATE PESTS USING SOYBEAN AS AN INTERCROP

K R MAHENDRA¹, G ANITHA¹, C SHANKER² and BHARATI BHAT³
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²Indian Institute of Rice Research, Rajendranagar, Hyderabad -500030
³Dept. of Plant Pathology, College of Agriculture, Rajendranagar, Hyderabad -500030

Effect of Imidacloprid 600 FS (48 % w/w) seed treatment in rice crop

S. Malathi¹, R. Shrehan Kumar and P. Jagan Mohan Rao
Regional Agricultural Research Station, PJTSAU, Warangal, Telangana, India



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11-12 DECEMBER-2020

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Title of the paper
Development of insecticide resistance in Black legume aphid, *Aphis craccivora* Koch. to thiamethoxam



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Entomology – 2020

SPATIAL AND TEMPORAL DYNAMICS OF ENDOSYMBIONTS vis a vis HOST SHIFT BY WHITEFLY, *Bemisia tabaci*

Shubham [redacted] ramanian, S



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Molecular basis of differential resistance in rice line RP2068-18-3-5 against BPH and WBPB

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