Science Setu Webinars by NIPGR

CHEMICAL ECOLOGY OF PLANTS INSECT INTERACRION

Press- Note

Date: 11-06-2021, Friday

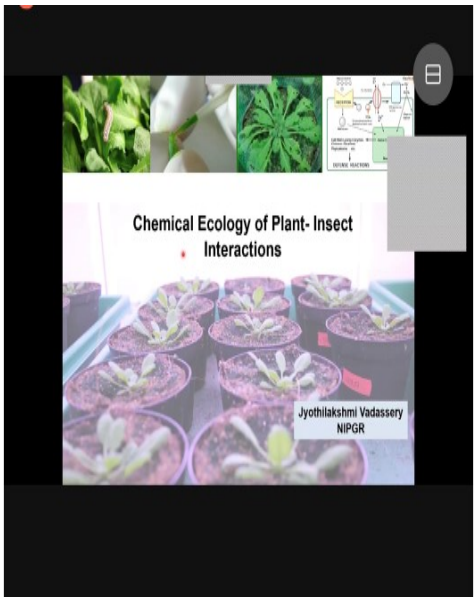
Resource person: Dr. Jyothilakshmi Vadassary, Scientist IV, NIPGR

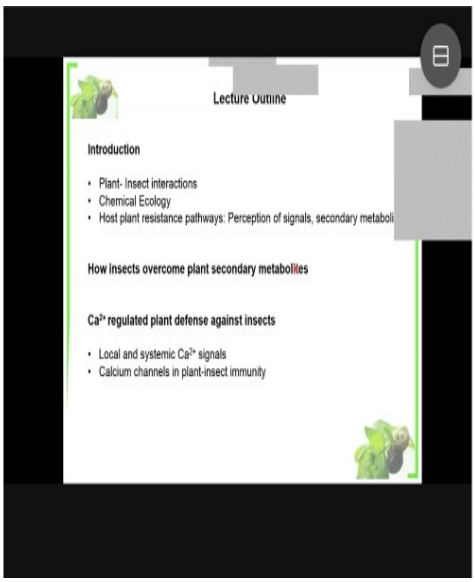
The Department of Biotechnology, Government of India, has planned "Science Setu" as a virtual platform to connect research Institutes with undergraduate students. Under this, our college has been assigned to National Institute of Plant Genome Research (NIPGR), New Delhi. NIPGR is an autonomous institution aided by the Department of Biotechnology. Research at NIPGR focuses on functional, structural, evolutionary and applied genomics of plants, including crop plants. Through the Science Setu program, our students and faculty virtually connect with NIPGR, New Delhi and got to know about the multifarious kinds of plant based research. It is a unique opportunity for science students at undergraduate and postgraduate level to get an exposure to high-level research.

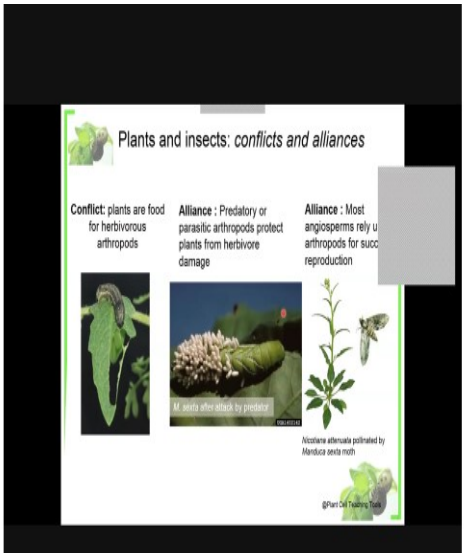
Dr. Jyothilakshmi explained various mode of chemical signaling induced in plants in response to damage in plants by pathogens or physical means. The main focal areas were the various defence mechanisms in plants like trichomes, secondary metabolite secretion, release of inhibitory enzymes along with elevation in calcium level during herbivory. The secondary metabolites like glucosinolates upon breakdown release isothiocynate which are toxic for insects.

Dr. Jyothilakshmi also used various experimental data to explain the above plant response, the rise of calcium levels in response to herbivore explained by various graphical data along with florescent pictures of plants.

Several research question were also explained like how herbivore signaling activate or block calcium elevation, how calcium rise induce Jasmonic acid signaling . A data shows that about 25%of crop loss worldwide due to insect attack so the topic of webinar discussion seems to be an important one to create awareness and to generate a research mindset how to fight against this big issue.

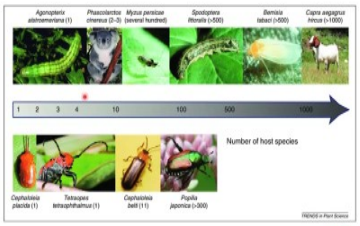

Chemical Ecology of Plant- Insect Interactions
Jyothilakshmi Vadassery
NIPGR


Lecture Outline
Introduction
• Plant- Insect interactions
• Chemical Ecology
• Host plant resistance pathways: Perception of signals, secondary metaboli
How insects overcome plant secondary metabolites
Ca2+ regulated plant defense against insects
• Local and systemic Ca2+ signals
• Calcium channels in plant-insect immunity


Plants and insects: conflicts and alliances
Conflict: plants are food for herbivorous arthropods
Alliance : Predatory or parasitic arthropods protect plants from herbivore damage
Alliance : Most angiosperms rely u arthropods for succ reproduction
M. sexta after attack by predator
Nicotiana attenuata pollinated by Manduca sexta moth
@Plant Cell Training Tools


Insect attacks cause 25% crop loss worldwide
Leaf-chewing larvae
Phloem-sucking Aphids
Root feeding
Fruit borers

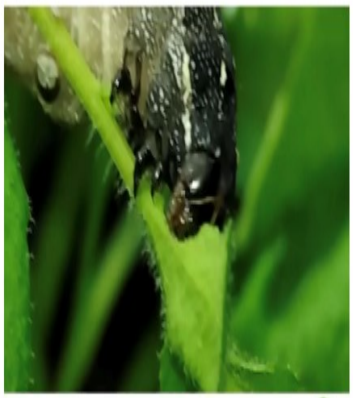
Generalist and Specialist Insect Herbivores



Chemical Ecology...

- ... examines the role of chemical signals that mediate the interactions between plants, insects and their environment, and evolutionary and behavioral consequences of these interactions
- Chemists, ecologists, entomologists, molecular biologists work in collaboration to unravel the complexity of chemical communication that occurs in nature
- The primary research focus is on the co-evolution of plants and insect herbivores. Key to understanding the interactions that have produced the variety of species that exist today

Rapid leaf defoliation by insects



Spodoptera litura : Polyphagous , many food types

Insect saliva derived signals: HAMPs and Effectors

HAMPs – trigger plant defense	Effectors- downregulate plant defense
➢ Insect oral secretions (OS): saliva, regurgitant	➢ Found in oral secretions
➢ There are no known HAMPs from lepidopteran insects that are active in *Arabidopsis*	➢ Effector targets defense pathways – early signaling, phytohormone pathway, secondary metabolites
➢ Fatty acid amino acid conjugate (FAC) are known elicitors in other plants	

HAMP: Herbivore Associated Molecular Patterns