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# Scientific Tracks & Sessions

## May 05, 2021

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### *Plant Science 2021*



### 3<sup>rd</sup> International Conference on Plant Science and Agriculture

May 05-06, 2021 | Webinar

## Sustainable Agriculture



Chair

**Atul Kumar**

GB Pant University of Agriculture and Technology | India

### Session Introduction

Title: Ecological engineering for pest management: A review

**Sunidhi Pilania** | CCS Haryana Agricultural University | India

Title: Scenario of pest management in organic farming

**Sova Yadav** | CCS Haryana Agricultural University | India

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## **Ecological Engineering for Pest Management: A Review**

**Sunidhi Pilia, Abaker M Malik, Sova Yadav, Amit Kumar, Krishna Rolania and Surender Singh Yadav**  
CCS Haryana Agricultural University, Hisar

**E**cological engineering for pest management has recently emerged as a paradigm for considering pest management approaches that rely on the use of cultural techniques to manipulate farm habitat and to enhance biological control. In contrast to the past, intensive use of ecosystems these days to enhance productivity can affect agro-ecosystems through soil and water depletion, biodiversity loss, challenging pest problems and disruption in flow of ecosystem services. Ecological engineering for pest management mainly focuses on increasing the abundance, diversity and function of natural enemies in agricultural habitats by providing refuges and alternate or supplementary food resources and also attracts different kinds of pollinators like honey bees. The aim of ecological engineering in agricultural ecosystem is to integrate soil and pest management strategies with regular practices of farmers for the benefit of environment and farming community. It involves knowledge of agriculture, ecology and farm economics, for restoration and construction of healthy and sustainable agriculture ecosystems. In this article we review that by redesigning the agro ecosystem (above and below ground) farmers can enhance biodiversity on their farms through adopting polyculture, cover crops, corridors, crop rotations and various habitats and this is a key strategy in sustainable agriculture to enhance

biodiversity at the landscape and field level. For example, the planting of buckwheat, *Fagopyrum esculentum* as a cover crop in vineyards and alyssum, *Lobularia maritima* between rows of vegetables provide resources for predators and parasitoids resulting in reduced herbivore damage. The main approach in ecologically-based pest management is to increase agro ecosystem diversity and complexity as a foundation for establishing beneficial interactions that keep pest populations in check.

**Keywords:** Ecological engineering, pest management, sustainable agriculture, habitat manipulation.

### **Biography**

Sunidhi Pilia is currently a PhD candidate at Department of Entomology, CCS Haryana Agricultural University, Hisar, India. In this pesticide-intensive agriculture, her research interests centre on the implementation of biological approaches, including biological control, bio-pesticides, bio-stimulants, botanicals and pheromones to control the insect pests which are generally safe for the environment and non-target species. In this regard, she dealt with the biometrics, avoidable losses and bio-ecological management of cucumber moth i.e. *Diaphania indica* on bitter gourd in her Master degree. Moreover, she is looking for new opportunities like ecological engineering to restore the biological harmony, to diminish the dependability to pesticides and to mitigate the residue problems.

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### Scenario of Pest Management in Organic Farming

**Sova Yadav, Lomash Kumar, Abaker M Malik, Sunidhi Pilania, Shweta Yadav and Jyoti Indora**

Department of Entomology, CCS Haryana Agricultural University, Hisar

Organic farming is gaining popularity worldwide among the farmers, entrepreneurs, policy makers, scientists and other stakeholders as it minimizes dependence on chemical inputs, thus safeguarding quality of natural resources and environment. In organic farming, insect pest poses a major challenge since genetically modified crops and synthetic pesticides are not permitted for use in organic production systems. Organic farming (OF) has significantly increased in importance in recent decades. Broad management of ecosystem through little modification in the cultural practices such as crop rotation, soil quality management through the addition of organic amendments constitute the preliminary defense against the attack of insect-pests and diseases followed by use of the curative methods like use of predators, parasitoids, plant products and ecologically safer chemicals forms the next line of defense against the insect pests. However, major pests could still be managed through manipulation of the agro ecosystem processes in advantage of the crops and disadvantage of pests. The limited number of active plant protection substances authorized for use in organic farming can provide support to natural and biological control agents in suppression of pests. Modern farming affects our world, by the way of land exhaustion, nitrate run off, and soil erosion, soil compaction, loss of cultivated biodiversity, habitat destruction, contaminated food and destruction of traditional knowledge systems and traditions. Thus, to overcome the ill effects of modern

agriculture, can be delineated by adopting organic farming. This review highlights the principles and strategies of crop protection in organic farming, the cultural practices adopted, the active substances allowed for use to suppress pests, and the impacts on faunal and floral biodiversity. Keywords: Organic farming, Bio pesticides, Pest management, Argo ecosystems, Plant diversity.

#### Biography

Sova yadav has been awarded an undergraduate B.Sc. (Hons) Agriculture scholarship by the Indian Embassy. This journey was full of knowledgeable and joyful in every aspect, those four years were the most important part of her life as she gained both theoretical and practical knowledge. I always have keen interest in organic farming which helped her to perform very well in many aspects. Not only she had focused in course theme, she also expanded her boundaries and worked as a social worker in a Non-governmental Organization (Krishna foundation) in Nepal, which helped her gain lots of experience regarding outside world scenario. Upon completion of her undergraduate studies, She was further enrolled by Indian embassy and was provided an academic scholarship to pursue Masters in Entomology at one of Asia's and India's most decorated university, CCSHAU, Hisar, where currently, She have completed her course work and conducted research on Seasonal abundance and management of sucking insect pests on chilli (*Capsicum annum L.*) & with all the faith and hard work she has been planning to pursue her Ph.D. as soon as her masters programs are completed. She consider herself a very hard working, enthusiastic, honest and creative person, who has a vision to impact positive change and have enough confidence to achieve her goals in life.

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## Plant Nutrition | Traditional Medicine | Plant Biochemistry | Ethnobotany | Biotechnology | Sustainable Agriculture



Chair

**Suphla Gupta**

CSIR- Indian Institute of Intergrative Medicine | India

### Session Introduction

Title: Volatomics profiling of papaya fruits to identify non-invasive marker for tracking different ripening stages

**Komal Kushwaha** | Indian Institute of Technology Roorkee | India

Title: Building Resilience and community resilience against COVID 19 and climate change

**Aneesha Holaday** | Certified Ayurvedic Practitioner | USA

Title: Functional state of mandarin plants under the influence of exogenous plant growth regulators

**Oksana Belous** | Russian Research Institute of Floriculture and Subtropical Crops | Russia

Title: Phoretic Mites ( Acari Mesostigmata) Associated with Scarab Beetles in haryana

**Abaker M. Malik** | CCS Haryana Agricultural University | India

Title: Role of Quantitative Ethnobotany in Conservation and Sustainable Use of Plant Wealth

**Preeti Rani** | Kurukshetra University | India

Title: Biotechnology for Hydroxy Fatty Acid Production

**Grace Chen** | Agricultural Research Service | USA

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### **Volatomics Profiling of Papaya Fruits to Identify Non-Invasive Marker for tracking different Ripening Stages**

**Komal Kushwaha and Debabrata Sircar**

Indian Institute of Technology Roorkee, India

**P**apaya (*Carica papaya* L.) is one of the most important fruit crops grown in the tropical and sub-tropical regions of the world. Being a climacteric fruit, papaya has a short postharvest life, which limits the nutritional value and economic return. Shipping in refrigerated containers cannot yet offer sufficient storage life without the use of fungicides. This work is focused on identifying signature volatile organic compound (VOCs) as non-invasive marker for tracking the ripening stages and nutritional profile under pre- and post-harvest conditions. VOCs were profiled using SPME GC-MS techniques. Total thirty-seven VOCs were detected from the papaya fruits, out of which five were identified as signature VOCs. Signature VOCs showed significant variation during ripening and post-harvest storage along with exhibiting a pattern correlation with nutritional profile. Sugars, amino acids, carotenoids,

fatty acids and phenolics were profiled during pre and post-harvest storage. VOCs were discriminated using the Principal Compound Analysis. Correlation of VOCs with nutritional profile was established using pattern algorithm. These signature VOCs could serve as excellent candidates for sensing ripening stages and nutritional value of papaya by using non-invasive sensors. Farmers in this mobile phone generation could easily accept this technology.

#### **Biography**

Komal Kushwaha, completed her graduation and post-graduation in botany from Banaras Hindu University, India. Currently, she is a senior research fellow in department of biotechnology, IIT Roorkee, India. She qualified GATE with 94.91 percentile in 2017.

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### **Building Personal and Community Resilience against Covid-19 and Climate change**

**Aneesha Holaday**

Certified Ayurvedic Practitioner, USA


**R**esilience means “having the ability to rebound after difficulties, barriers or obstacles.” the Covid-19 and effects of Climate Change have certainly created unseen difficulties, barriers and obstacles around the world. It is clear that humanity cannot continue to abuse take the earth for granted as it has done over the past two hundred years and has to change its behavior. Ayurveda says that the only person who we can change is you, so we must build resilience against these forces by looking to nature itself, working in harmony with it and abiding by its laws. We must strengthen immunity and manage the inevitable stresses that these crises present. The ethics and principles of Permaculture show us what we must do to correct our behavior so that human activity will benefit the earth rather than contributing to its decline. In these global crises we must unite globally and act locally to make significant, incremental changes, securing basic human

needs while restoring the earth’s natural tendency to sustain life on earth.

#### **Biography**

Ann (Aneesha) Holaday CAP was born, brought up and educated in Britain and has lived in Washington with her family since 1981. Her lifetime career has been in Radiation Oncology where she was an educator, manager, and practitioner. She has lived in Puerto Rico, New Zealand, India, Britain, and Germany. She studied Ayurveda under Dr. David Frawley, Dr. Vasant Lad, Dr. Partap Chauhan of JIVA, and at the Ayurveda College in Kerala, India. She is a professional member of NAMA and AAPNA. She has presented at the AAPNA Conference in Lucknow, Global Ayurveda Festival in Cochin, 6th Annual Holistic Health Conference in Kottayam, World Ayurveda Congress in Delhi, ICHM conferences at MG University Kerala. William Research Centre Kerala European Ayurveda Association. She published her research in Holistic Healthcare Volume 1 and 2. She hosted an internet radio program on Voice America. She is a certified permaculture designer.

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## Functional State of Mandarin Plants under the Influence of Exogenous Plant Growth Regulators

**Oksana Belous and Platonova N**

Federal State Budgetary Scientific Institution Russian Research Institute of Floriculture and Subtropical Crops, Russia

The objects of research are mandarin plants (*Citrus reticulata* var. unshiu Tan.) dwarf varieties "Miyagawa Vase". The research was carried out in the field and laboratory conditions: mandarin plantations in the experimental and technological Department of the fruit crops sector of the Institute and the laboratory of plant physiology and biochemistry, using classical and modern methods of plant physiology and biochemistry, as well as STATGRAPHICS Centurion XV programs. The goal is to study the effectiveness of using new-generation exogenous growth regulators on mandarin plants to increase productivity, product quality, and crop resistance to environmental factors. The expediency of using exogenous phytohormones to increase the productivity of plants and the quality of fruits of dwarf mandarin in specific weather conditions of the summer period: under the influence of high temperatures and drought. The features of the influence of exogenous growth regulators of regulatory action on the growth and development of mandarin plants are revealed. The prospects of various physiologically active substances (abscisic acid, gibberellins, cytokinins) for increasing the resistance of mandarin plants to adverse factors of the spring and summer period, increasing their

productivity and fruit quality have been proved. Treatment of plants with growth regulators did not affect the content of green pigments in the leaves. An active growth of shoots was established and an increase in the number of remaining fruits on the tree was noted when treated with growth regulators. Under the influence of exogenous phytohormones, there was a significant increase in the amount of ascorbic acid in the fruit.

### Biography

Oksana Belous is a professor, head of Plants Biochemistry and Physiology Laboratory of Russian Institute of Floriculture and Subtropical Crops (Sochi, Russia). She researches concern is studying of physiology of mineral nutrition, water status of plants, physiology-and-biochemistry adaptation mechanisms to abiotic and biotic factors, accumulation of biological activity substances into plants. She has over 200 publications, and has been serving as an editorial board member of reputed Journals from Russian and other countries. She is the head of sciences school of Institute: "Physiology of adaptability of subtropical, southern fruit and flower-and-decorative crops" and read courses of lectures for graduate students in the disciplines physiology of stress, physiology of mineral nutrition, water regime of plants, physiology of cells in vitro, physiology and biochemistry of plants.

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## **Phoretic Mites (Acari Mesostigmata) associated with Scarab Beetles in Haryana**

**Abaker M Malik, Sunidhi Pilania, Krishna Rolania, Surender Singh Yadav, Sova Yadav, Jyoti Indora and Amit Kumar**

CCS Haryana Agricultural University, India

**P**redatory and parasitic mites are likely to assume a great role in Integrated Pest management. As world attention is now focused on finding out self-perpetuating means for managing the agricultural pests, this survey was conducted in different climatic zones of Haryana, India during the monsoon season, 2019- 2020. Different Scarabaeid species were collected using light traps and mechanical handpicking. Among the collected species, phoretic mites (Acari) were found associated with *Onthophagus taurus* and *Catharsius sagax* from Panchkula and Rewari district of Haryana, respectively. Collected phoretic mites successfully parasitized the new host provided namely *Holotrichia serrata* and *Anomala bengalensis* which were dominant Scarabaeid beetles having highest economic importance in Haryana and India.

**Key words:** Scarabaeidae, phoresy, biological control, IPM.

### **Biography**

Abaker M Malik, a Ph.D. Entomology Scholar at CCS Haryana Agricultural University, Hisar, India. He obtained his M.Sc. Entomology in 2015 and B.Sc. Pesticides and Toxicology in 2006 from University of Gezira, Sudan. His doctoral research focused on Isolation and characterization of gut bacteria of white grub in Haryana, M.Sc. on Termites control in Sugarcane and B.Sc. on Effect of some aqueous extract on Rodent control. He has worked on several research projects with Faculty of Agriculture, University of Gezira, Sudan. Moreover, he had worked with IFAD on Training of trainers (TOT) scheme for three years and currently looking for Post-doctoral opportunity at an imperial institute. He also affiliated to the Plant Protection Directorate, Gezira, Sudan as a Pesticides Inspector from 2009 to 2015 and Pest Management Specialist from 2015 to date.

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## Role of Quantitative Ethnobotany in Conservation and Sustainable use of Plant Wealth

Preeti Rani, Rupinder Kumar and Neelu Sood

Kurukshetra University Kurukshetra, India

Census of India 2011, reports that 68.84% of country's total population lives in rural areas. Due to inadequate public health services and trained health workers, poor people in rural areas are not having sufficient modern healthcare facilities. Over the years, native population has been using local plants for medicinal purposes and has accumulated significant ethnomedicinal information and therefore found ways to deal with such health insufficiency. This manuscript contains statistical indices used in description of quantitative ethnobotany. The statistical indices require native data regarding usage of local plants in a particular area which is collected using proforma and interviews. Subsequently, the data is translated and statistically analyzed to arrive at some important result. For long, anthropogenic activities have been threatening plant wealth which led to extinction of many ethnomedicinally important plant species. Loss of such plant bodies stands for unsustainability. Through this study it is anticipated that ethnobotany plays a key role in conservation and sustainable use of plant wealth in rural pockets of Haryana, India.

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Subsequently, the data is translated and statistically analyzed to arrive at some important result. For long, anthropogenic activities have been threatening plant wealth which led to extinction of many ethnomedicinally important plant species. Loss of such plant bodies stands for unsustainability. Through this study it is anticipated that ethnobotany plays a key role in conservation and sustainable use of plant wealth in rural pockets of Haryana, India.

**Keywords:** Quantitative ethno botany, Medicinal plants, Statistical Indices.

### Biography

Preeti Rani is a research scholar and studying for her PhD at Department of Botany, Kurukshetra University, Kurukshetra, India. Her area of research is ethno botany and application of statistical tools to empirically analyze ethno botanical information existing amongst aboriginals of the area She Presented a paper entitled; "**Bio-statistical tools for analysis of ethno botanical data**" in National seminar on "Biodiversity and Environmental Changes: Threats and Mitigation", held at Pandit Chiranjilal Sharma Government College, Karnal on 8th February 2020 and she also Presented a paper entitled: "**Rural pockets as ethno medicinal knowledge bank**" in UGC sponsored the 3rd national conference on "Innovation in Bioscience and Technology" at Multani Mal College, Patiala, Punjab, on 7th March 2020. Her publications include an extended abstract entitled: "**Role of quantitative ethno botany in conservation and sustainable use of plant wealth**" in the "Journal of agriculture". The research paper entitled: "**Qualitative and Quantitative Ethno botanical Analysis of Ricinus communis L. and Azadirachta indica A. Juss. In Sonapat District of Haryana, India**" in the "Journal of natural remedies". The research paper entitled: "**Ethno Medicinal Inquisition of Ricinus communis L. in Various Districts of Haryana, India**" in the "Journal of Ecology, environment and conservation".

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## Biotechnology for Hydroxy Fatty Acid Production

**Grace Chen**

US Department of Agriculture, Agricultural Research Service, USA

Castor (*Ricinus communis*) oil is the commercial source of hydroxy fatty acid (HFA) which contains 90% ricinoleic acid (18:1OH). HFA and its derivatives are used as raw materials for numerous industrial products, such as lubricants, plasticizers and surfactants. The production of castor oil, however, is hampered by the presence of the toxin ricin and hyperallergic 2S albumins. Lesquerella does not have such biologically toxic compounds and also contains a major HFA, lesquerolic acid (20:1OH), at 55-60% of seed oil. Therefore, lesquerella is being developed as a new industrial oilseed crop in the US. Biotechnology methods are effective for improving lesquerella through Agrobacteria-mediated genetic transformation. Lesquerella seed developmental studies show changes of morphology and physiology, as well as temporal details of fatty acid composition and gene expression patterns. Synthesis of 20:1OH is through elongation of 18:1OH, and the step is regulated largely by gene transcription of an elongase, PfkKCS3. By silencing PfkKCS3, transgenic lesquerella increased 18:1OH content from ~3% to ~27%. It is known that most of the HFAs in lesquerella are located only at sn-1 and sn-3 positions of

triacylglycerols (TAG). To improve HFA levels in lesquerella seeds, castor lysophosphatidic acid acyltransferase gene 2 (RcLPAT2) have been introduced into lesquerella. The resulted transgenic lesquerella seeds increase 18:1OH content at the sn-2 position of TAG from 2% to 17%, and consequently, oil accumulates more TAGs with all three sn positions occupied by HFA. Regiobiochemical analysis reveals the role of castor LPAT2 in the accumulation of hydroxy fatty acids in transgenic lesquerella seeds by exclusively acylating 18:1OH at the sn-2 position of tri-HFA-TAG in lesquerella seed oil. The results enhance our understanding of plant lipid metabolism and provide invaluable guidance for future research, not only for enhancing HFA content in lesquerella, but also for HFA production in other oilseeds.

### Biography

Grace Chen has completed her PhD in 1995 from University of Wisconsin at Madison, USA. She is a Senior Research Plant Physiologist at US Dept of Agriculture at Albany California. She has over 95 publications that have been cited over 4000 times. She has been serving as an editor of for two reputed Journals.

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