Food and Agriculture Organization of the United Nations

ISHS International Society for Horticultural Science

Innovative Technologies for Small-Scale Farmers

21 June 2022 | 14:00 –15:30 CEST

©FAO/Bruno Telemans

Fruit and Vegetable Small-Scale Farming Webinar Series

Programme

Time	Item and presenter
14:00 –14:05	Opening remarks by **Yüksel Tüzel**, President of the International Society for Horticultural Sciences (ISHS)
14:05 –14:20	Keynote speech by **Murat Kacira**, Director of the University of Arizona's Controlled Environment Agriculture Center (UA-CEAC)
14:20 –15:05	Panel discussion: **Dr. Sindhuja Sankaran**, Associate Professor, Washington State University, Department of Biological Systems Engineering **Dr. Manuela Zude-Sasse**, Group leader for Precision Horticulture at the Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB) **Melvin Medina Navarro**, Agricultural Officer, FAO, and Lead Technical Officer of the FAO Smart Farming Project
15:05 –15:25	Q&A session
15:25 –15:30	Concluding remarks by **Fenton Beed**, Team Leader - Rural and Urban Crop and Mechanization Systems, Plant Production and Protection Division, FAO

The webinar will be moderated by **Makiko Taguchi**, Agricultural Officer, FAO

Concept note

Background

Sustainable optimization of agricultural production is a priority to address today's social, economic and environmental challenges. Innovation based on new technologies that are adapted for use by small-scale farmers can facilitate improved livelihoods based on sound ecological interactions.

As part of the Fruit and Vegetable Small-Scale Farming Webinar Series, the Food and Agriculture Organization of the United Nations (FAO) and the International Society for Horticultural Science (ISHS) are inviting you to this webinar on **Innovative Technologies for Small-Scale Farmers**.

Objectives of the webinar

The webinar will share context-specific and practical solutions based on appropriate technologies for farmers in low- and middle-income countries. The challenges, opportunities and progress made in sustainable fruit and vegetable-based production systems will be actively discussed and include:

- Adapted technologies
- Protected cultivation systems resilient to shocks and stresses
- Remote sensing of crops, nutrients, water, pests and diseases
- Use of tractors, drones and satellites

Speakers' biographies

Murat Kacira

Murat Kacira is the director of the Controlled Environment Agriculture Center and a professor in the Biosystems Engineering Department at the University of Arizona. He holds a B.Sc. degree in Agricultural Engineering from Cukurova University and M.Sc. and Ph.D. degrees in Food, Agricultural and Biological Engineering from The Ohio State University. Murat's research involves automation, environmental control, alternative energy applications, and resource use optimization in controlled environment agriculture systems including greenhouses and vertical farming-based plant factories with artificial lighting. He serves as ISHS chair of the Division Precision Horticulture Engineering.

Title: Precision horticulture and technologies to support smallholder farmers

According to the FAO, the world's population is expected to grow to almost 10 billion by 2050. This means that food demand will increase by approximately 70%. During the next decade, horticultural science should be focused on generating fundamental and applied scientific knowledge to contribute to producing more food (increasing productivity) and ornamental plants in a sustainable way, with not only better quality, using fewer natural resources, but also with zero or reduced emissions of greenhouse gases and much less water use. A brief overview of integrating precision engineering and technologies into horticultural practices to support smallholder farming practices will be given.

Dr. Sindhuja Sankaran

As a researcher in agricultural automation engineering, Sindhuja Sankaran's work focuses on advanced sensor technologies in crops, supporting plant breeding, crop plant research, and precision agriculture. She utilizes opto-electronic, biological, and chemical sensors for non-invasive, rapid and continuous monitoring of plant responses to environmental stress, helping create a faster and better understanding of how food crops react to a changing environment. Over the past six years, Sindhuja has developed new tools to evaluate traits including crop vigour, stress tolerance, and seed size and quality across multiple crop breeding programs.

Title: Concepts related to sensing and associated technologies applicable to smallholder farmers

Over the past years, sensing technologies have greatly advanced both in terms of hardware (e.g. miniaturized sensors, internet of things/IoT, single board computers) and software (e.g. higher computational speed) capabilities, enabling the integration of these technologies to assist in crop production and improvement. Some of these recent advancements and applications in agriculture, which may potentially benefit small hold farmers, will be highlighted, drawing on examples such as applications of unmanned aerial system and IoT-based open-source/open-science sensing systems.

Speakers' biographies

Dr. Manuela Zude-Sasse

After finishing school, Manuela Zude-Sasse became a professional gardener, later studied chemistry and obtained a PhD at the Technical University Berlin. While working as a researcher at the University of Florida and INRA-Versailles, she also provided extension services for fruit growers. Manuela became associate professor at Humboldt University with habilitation in Applied Plant Physiology, and subsequently full professor at Berlin University of Applied Sciences and Technology. Presently, she serves as group leader for Precision Horticulture at the Leibniz Institute for Agricultural Engineering and Bioeconomy, meanwhile publishing a book on optical methods for crop sensing.

Title: Plant data recording with satellites, drones, and tractors - Is it valuable to apply digital tools in fruit production?

In recent decades, reflecting the plant status in digital format has been approached by means of newly available sensors. From the perspective of supply chain management, farming with sensors is easier, since real-time knowledge on the produce helps making precise management decisions. Tools of information and communication technology exist for all scales, supporting data acquisition through remote and proximal sensors. However, translating sensor data into information on the crop as well as knowledge of this process is still challenging. Several examples on feasible applications in practice will be presented, pointing out both benefits and challenges.

Melvin Medina Navarro

Melvin Medina Navarro, obtained his Agronomy and Engineering degrees from the Agricultural University Zamorano and holds a Master degree in Plant Nutrition of Intensive Cropping Systems from the Polytechnic University of Cartagena in Spain. After managing private sector farms as well as his own farm, growing crops in greenhouses in El Salvador, he has been providing technical assistance and capacity building for adapted protected cultivation systems in Central America, The Caribbean, East Africa, Central Asia and South-East Asia with FAO, promoting adaptation of technologies suitable for small-scale farmers.

Title: Adapted technologies to develop resilient protected cultivation systems

Sustainable horticultural systems cultivating short cycle vegetables are important to generate high and stable incomes from relatively small units of land, water and nutrients, to promote decent jobs, improve nutrition and create appropriate business opportunities for seeds, seedling systems, pest and disease diagnostic and management systems, accurate water and nutrient delivery systems, post-harvest practices and market linkages. FAO and partners have successfully adapted technical solutions to increase production efficiency including: low cost structures for protected cultivation systems using efficiently covering materials for greenhouses and net-houses, adapted varieties, seedling production systems, soil management, soilless systems, efficient irrigation systems and integrated pest and diseases management.