UF | IFAS Extension
UNIVERSITY of FLORIDA

REPORT

of

In-Service Training (IST#: 31605), FDACS Program (#26139) and CCA Programs (FL 53350)

New Technology for Commercial Crop Production (VII)

Join from PC, Mac, Linux, iOS or Android: https://ufl.zoom.us/j/355626855

Tuesday, February 26, 2019

Zoom from 1306 Fifield Hall to 12 registered host sites statewide


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G. David Liu, Fred Fishel, and Kelly Morgan

Horticultural Sciences, Agronomy, and Soil and Water Science Departments

Monday, March 11, 2019

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New concepts and/or new techniques have been developed to help growers make right decisions for crop production. These new techniques improve the profitability and sustainability of Florida's crop production and help enhance use efficiency of natural resources such as water and fertilizers. To provide an opportunity for our extension agents, CCAs, and graduate students to learn these new techniques, One out-state and five UF/IFAS extension specialists were invited to share their expertise at the New Technology for Commercial Crop Production (VII) IST training on February 26, 2019.

The objective of this IST training was to introduce new concepts and techniques to our extension agents, crop certified advisors, and graduate students for saving labor and enhancing the economic and environmental sustainability for commercial crop production in Florida.

This program had six specialists to present. The presentations covered improving and prolongong tropical fruit production, improving efficency of foliar sprays, nutrient stewardship, nematode management, and breeding for crop production with better management of challenegs in crop production in Florida.

This IST training and FDACS/CCA CEU roundups were conducted face-to-face training in Gainesville and video-conferenced training in 12 registered host-sites statewide. There were 76 participants for this IST training event. For some reasons, there was no participants in three of the off-campus sites. The presentations are accessible at the hyperlinks at
https://hos.ifas.ufl.edu/people/on-campus-faculty/guodong-david-liu/in-service-training/

This IST ended up with 76 participants. Fifty attendees received FDACS or CCA CEUs. A total of 300 CEUs were provided. A survey was completed for overall evaluation, knowledge gain, and economic and environmental impacts at the end of the IST training. The evaluations are summarized below.

Overall Evaluation of the IST Training

The education program was rated on a 1 (low) to 5 (high) point scale and summarized below:

1. You've learned something new today: 4.5
2. The techniques you learned are useful: 4.2
3. Please rate your knowledge gain from today's program: 4.0
4. The knowledge you gained will help you or your growers save labor: 3.5
5. The knowledge you gained will help you or your growers save fertilizer: 3.8
6. You intend to change the behavior with the knowledge you gained today: 4.0

Knowledge Gain

Pre-and post-tests were matched by names and graded. Tests from either pre- or post-tests that had no match were not graded and discarded. The pre- and post-test grades were used to obtain means, median, and mode, standard errors, and percentage points of knowledge gain. On average, the trainees got a rise of 22 percentage points from this IST training. A table is generated with the data (Table 1).

Table 1. Statistics summary for the In-service Training event

Count of paired tests	**34**		**Knowledge gain (percentage points)**
Number of Questions	**13**		
Evaluation	**Correct answers (%)**		
	Pre-test	**Post-test**	
Mean	50	71	22
Median	46	77	31
Mode	46	61	15
Standard error	3.0	3.0	-

Estimate of economical sustainability

The trainees estimated that the new techniques they learned from this IST training were able to help commercial crop producers reduce production cost of $73/acre and increase production as much as $246/acre on average. Thus, the increase in total income is $319/acre. The trainee serves 28.4 farms in size of 224.5 acres on average. There were 20 trainees answered the questions on economic impacts. Based on the survey, each trainee serves 28.4 farms and 224.5 acres/farm on average. The income increase including production savings was $319/acre (Table 2). Potentially, the total income increase would be $2,035,947.

Table 2. Estimate of economical and environmental sustainability after the techniques from this IST training are employed for commercial crop production

# of Farms	Farm Size	Estimate of Sustainability						
		Cost Reduction	Income Increase	Pollutant Reduction in Groundwater		Saving of NPK (lbs/acre)		
	(acre/farm)	($/acre)	($/acre)	N (ppb)	P (ppb)	N	P	K
28.42	224.46	73	246	12	11	24	20	25

Estimate of environmental sustainability

The trainees estimated the techniques from this ISTtraining program can help growers reduce nitrogen and phosphorus in groundwater by 12 and 11, respectively. Additionally, the Floridian growers can respectively save fertilizers of nitrogen, phosphrus, and potassium by 24, 20, and 25 lbs/acre.

Presentation Description

Title: Technology to improve and prolong production of selected tropical fruits
Specialist: Dr. Jonathan H. Crane (University of Florida, IFAS, TREC)
Presentation description: There are several basic cultural methods to prolong production of tropical fruit crops. These include shoot and limb pruning and bending for guava and carambola, mechanical or chemical defoliation for guava and carambola, soil applied chemicals to stress trees such as longan, and crop sacrifice for carambola and papaya. In addition, properly pruning single-stemmed papaya plants (called ratooning) stimulates branching and prolongs the time of efficiently harvested fruit production. Timing of these methods based on tree phenology and weather conditions is important for success.

Title: Overcoming the leaf cuticle as a barrier to foliar sprays
Specialist: Dr. Ed Etxeberria (University of Florida, IFAS, CREC)
Presentation Description: In horticulture, foliar sprays are the preferred means to deliver agrichemicals given the large leaf surface area and the fact that these are vastly more accessible than the root system. However, penetration of externally applied substances into leaves is severely hindered by the presence of the protective cuticle (composed of hydrophobic wax/cutin) found on leaves and young stems. Only a small percent of agrochemicals enters the plant, the remaining being washed into the ground with undesirable environmental impact. To bypass the cuticular barrier and increase infiltration, we have tested laser-based alternatives. Laser energy perforates or removes the cuticle depending on the laser used and facilitate the penetration of applied substances.

Title: 4R nutrient stewardship for crop production
Specialist: Dr. Sally Flis, the Director of Agronomy at The Fertilizer Institute (TFI) in Washington D.C.
Presentation Description: 4R Nutrient Stewardship provides a framework to achieve cropping system goals, such as increased production, increased farmer profitability, enhanced environmental protection and improved sustainability. The framework achieves these goals through adaptive management considering the right source of fertilizer, at the right rate, at the right time, and in the right place. As cropping goals change 4R Nutrient Stewardship practices will change with them. In Florida, The Fertilizer institute has worked with potato, tomato, and citrus growers to learn about what practices are working in the field for them and what are the costs for making practice changes. This session will talk about 4R Nutrient Stewardship through the results of the 4R Research Fund and experiences with 4R Advocates.

Title: Overview of nematodes, why they are important and difficult to manage
Specialist: Dr. Donald Dickson (University of Florida, IFAS, Entomology and Nematology Department)

Presentation Description: The most important plant-pathogenic nematodes that harm Florida agriculture will be discussed. Emphasis will be placed on newly emerged species that are being shown to have a high degree of plant virulence, and why these species are a threat to agriculture. Methods of nematode management will be shown including crop management, host-plant resistance, regulations, biological control, soil suppressiveness, and fumigant, nonfumigant, and experimental nematicides.

Title: How breeding can help lettuce growers manage challenges?
Specialist: Dr. Germán Sandoya (University of Florida, IFAS, EREC)
Presentation Description: Florida grows 3% of the national production of lettuce in the US with a value of $70 million dollars to growers grouped at the Everglades Agricultural Area (EAA). There is a significant amount of small operations that grow lettuce in other nontraditional settings that do not account for the 15,000 acres of lettuce in Florida. The crop faces many challenges with diseases being the top priority in any type of operations. Lettuce improvement is mostly focused on diseases, but other areas such as postharvest, water and nutrient use efficiency will be a top priority in the future. Lettuce breeding will be done for protected environments as these types of operations are increasing worldwide.

Title: Opportunities and challenges of current breeding through biotechnology
Specialist: Alfred Huo (University of Florida, IFAS, MFREC, Apopka, FL 32703
Presentation Description: To cope with the increase in world population and the need to protect the environment, developing crops that are better adapted to abiotic and biotic stresses is important for sustainable food production in many parts of the world today. Convectional breeding including hybridization and mutagenesis have been dominant methods for years in genetic improvement of plant characteristics. However, innovation in plant breeding is necessary to meet the challenges of global changes such as population growth and climate change. New techniques have to be adopted to integrate into current breeding approaches to improve the breeding efficiency for accelerating breeding process and maximizing breeding output. Although breeding techniques such as genomic selection and genome editing have been recently developed, their potential roles in the growth and sustainability of global food supplies and how to influence our farmers have not been recognized. In this training, the milestones of plant breeding techniques including domestication, mutation breeding, cross breeding, genetic engineering, marker-assisted selection, targeted/precision breeding will be reviewed; some of the main achievements from each area and their common characteristics and individual limitations will be discussed and highlighted. The new cutting-edge breeding technique, CRISPR/Cas9-mediated genome editing will be emphasized. The following questions will be discussed: what are the advantages and disadvantages of CRISPR in plant breeding? What is the difference between the gene-edited crop and traditional GM crops? How are gene-edited crop regulated? Is gene-edited suitable for organic farming? Can you detect a gene-edited crop variety from the one developed with conventional breeding techniques? What is the status of research and development of big ag-companies with CRISPR technology?

Speaker's Bio-sketch

Dr. Jonathan H. Crane, professor of horticultural science in the Horticultural Science Department at UF/IFAS and located at the Tropical Research and Education Center in Homestead has over 30 years' experience with the horticulture of tropical fruit crops. During this time, he has collaborated with colleagues on cultural practices to enhance and induce off-season fruit production on guava, carambola, longan, and papaya. Dr. Crane's programs are split among extension (~60%), research (~20%), teaching (~10%) and administration (~10%). He has authored or co-authored over 71 extension publications and 62 refereed journal publications.

Dr. Ed Etxeberria, Professor of plant physiology at the Department of Horticultural Sciences, CREC, Lake Alfred. All degrees (B.S., M.S., and Ph.D.) in Botany from University of Massachusetts Amherst and University of Florida. soil biogeochemistry and soil fertility management at Cornell University, received his graduate degrees in Soil Science at the University of Bayreuth, Germany. During the past 12 years, I have focused on the mobility mechanisms of the citrus greening causing agent *C*Las within the tree. Also, on ways to improve penetration of substances to ameliorate the effects of citrus greening.

Dr. Sally Flis, the Director of Agronomy at The Fertilizer Institute (TFI) in Washington D.C. In her role at TFI, Sally works with the 4R Nutrient Stewardship programs to help increase the science base and understanding of on-farm practice implementation. Sally is also involved in providing science support for state and national nutrient policy issues. Before joining TFI, Sally worked with famers in the Northeastern U.S. to implement and develop nutrient management plans. Dr. Flis received her Ph.D. in Plant and Soil Science from the University of Vermont, her M.S. Dairy Science and B.S. in Dairy Science and Agronomy from the University of Wisconsin-Madison.

Dr. Donald Dickson, Professor and a member of the Department of Entomology and Nematology, University of Florida. He received advanced degrees in plant pathology from Oklahoma State University and North Carolina State University. The focus of research has been on plant pathogenic nematode management mainly with biocontrol with *Pasteuria penetrans*, host plant resistance in vegetable, fruit, and agronomic crops, alternative fumigants for methyl bromide, and efficacy of fumigant, nonfumigants, and experimental nematicides. Service includes holding national and state professional offices, and editor of national and international Journal of Nematology

Dr. Germán Sandoya, Assistant Professor in breeding and genetics at the University of Florida, received his degree at the University of Vigo – CSIC in Spain in plant breeding and genetics. Germán previously worked as a project scientist at the University of California, Davis and the USDA-ARS, Salinas California in lettuce breeding for a soil-borne pathogen. His current mission is to improve lettuce cultivars for Florida production. He is developing romaine and iceberg lettuce cultivars. In addition, his program is increasing the breeding of boston, leaf and other niche types of lettuce. He is training master and Ph.D. students in plant breeding in the Horticultural Science

Department of UF. He has authored several scientific journal publications and is a member of societies such as ASHS, FSHS, APS, NAPB and internationally EUCARPIA.

Dr. Alfred Huo, Assistant Professor and Plant Breeder, Department of Environmental Horticulture at University of Florida, received his Ph.D. degree in Horticulture Science at University of Georgia. During the past 10 years, he has focused on genetic improvement of horticultural crops with biotechnology tools including tissue culture, mutagenesis and gene-editing. His current research is to utilize these advanced breeding tools to develop ornamental and vegetables that are tolerant to heat, drought and salinity stress.

In-service training (*IST# 31605*) with 12 CEUs

1.	Host Site	Phone Number	Building Name	Location	CEU provider	Email Address	Attendee
2.	Main Campus	352-273-4814	1306 Fifield Hall	2550 Hull Rd, Gainesville, FL 32611	Guodong (David) Liu	guodong@ufl.edu	23
3.	UF IFAS Extension - Osceola County	321-697-3000	Extension Services in Osceola Heritage Park	1921 Kissimmee Valley Lane, Kissimmee, FL 34744	Jessica Sullivan	sullivan@ufl.edu	2
4.	IFAS Extension Martin County	772-419-6962	2614 SE Dixie Highway	Stuart, FL 34996-4007	Yvette Goodiel	goodiel@ufl.edu	0
5.	PBC Extension	561-233-1718	Clayton Hutcheson Ag Complex	Exhibit Hall A	Christian Miller	cfmiller@ufl.edu	4
6.	Indian River Co Ext	772 226-4330	IRC Admin Complex, Bldg B	1800 27th St., Vero Beach	Christine Kelly-Begazo	ckellybe@ufl.edu	12
7.	North Florida Research and Education Center-Suwannee Valley	386-362-2771	Conference Room	8202 County Road 417 Live Oak, FL 32060	Jane Griffin	janeecant@ufl.edu	0
8.	Lake County Extension	352-343-4101	Lake County Extension	1951 Woodlea Rd. Tavares, FL 32778	Juanita Popenoe	jpopenoe@ufl.edu	4
9.	Miami-Dade Extension	305-248-3311	Miami-Dade Extension	18710 SW 288th ST, Homestead, FL 33030	Qingren Wang	qrwang@ufl.edu	11
10.	UF/IFAS Plant Science Research and Education Unit	352-843-3540	Citra Conference Building	2556 West Hwy 318 | Citra, FL 32113	Mark G. Kann	mkann@ufl.edu	12
11.	UF/IFAS Extension Charlotte Co.	941-764-4340	Charlotte County Environmental Campus	25550 Harbor View Road Pt. Charlotte, FL 33980	Holly Bates Ralph Mitchell	Holly.Bates@charlottecountyfl.gov Ralph.Mitchell@charlottecountyfl.gov	0
12.	Clay Co. Ext.	(904) 284-6355	2463 St. Rd 16 W	2463 St. Rd 16 W, Green Cove Springs, FL 32043-0278	Luke Harlow	harlow1231@ufl.edu	2
13.	SWFREC	239-658-3400	Main Building - Auditorium	2685 SR 29 North Immokalee, FL 34142	Camille McAvoy	cami13@ufl.edu	6