New Director, New Doctorates

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A Newsletter for IRREC Advisory Committee Members, Faculty, Staff and Students

New Interim Center Director, Plant Pathologist and two new Doctors of Horticulture

Dr. Cave during a trip to China to seek insects for biological control among native cycads

Welcome to the Director's Office

An entomologist recognized internationally as a specialist in biological control of insect pests and an expert in the study of beetles, Dr. Ronald D. Cave, has been named interim director for IRREC.

Dr. Cave said he was humbled by the appointment, although the move from his office in the UF Norman C. Hayslip Biological Control Research and Containment Laboratory is a 5-minute walk to the director's office. The facility in which Dr. Cave has served for 13 years is situated on the IRREC campus, connected by a mulched path through a mature stand of pine trees.

The laboratory is named after Hayslip, who in 1961 began his position as IRREC's first director. Dr. Cave will serve as sixth director.

From IRREC's 1947 start as the Indian River Field Laboratory, the center has served both agricultural and natural resources interests with research, extension, and education programs. The center is one of 12 situated in the state's most important agricultural production regions, all of which are part of IFAS.

Dr. Cave was appointed to his new position by Jack Payne, UF Senior Vice President of Agriculture and Natural Resources, who leads IFAS and its statewide programs.

"In this challenging time for the citrus industry and for other agricultural commodities, we cannot afford a leadership gap even for a few months," Payne said.

"Ron Cave is the right leader for this transition because of his accomplishments as a scientist, his dedication as a mentor and his familiarity with the center. It's this combination of excellence and stability that makes him an ideal choice for this important role."

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IRREC News

ENTOMOLOGY RESEARCH

In his work as professor of entomology, Dr. Cave is one of two researchers on the forefront of invasive species control at the UF laboratory. Dr. Cave's research has involved control of invasive insects that include the Mexican bromeliad weevil, the cycad aulacaspis scale, and ambrosia beetles.

The weevil is depopulating 12 of 16 of Florida's natural bromeliads. The invasive scale insect is destroying king sagos, one of central and south Florida's commercially valuable landscape specimens. Ambrosia beetles vector a fungal pathogen that causes laurel wilt in avocado trees.

GRADUATE STUDENTS

Dr. Cave has supervised six UF doctoral students and eight master's students. His first doctoral student, Trevor Smith, is currently the Director of the Division of Plant Industry of the Florida Department of Agriculture and Consumer Services.

Anita Neal, UF/IFAS District Extension Director, South Florida, is pursuing a Ph.D. under Dr. Cave's supervision

Dr. Cave currently oversees three graduate students who are pursuing doctorates. Angie Niño Beltran, a Colombian national and a Fulbright Scholarship recipient, completed a master's degree and is now pursuing a Ph.D. at IRREC, both under Dr. Cave's supervision. Her work involves control of the yellowmargined leaf beetle, an insect that attacks vegetables in the mustard family.

"One aspect of my work is watching and helping students as they work towards successful research projects and promising careers."

A second student, Anita Neal, UF/IFAS district extension director, South Florida, conducts research on biological control of the Sri Lankan weevil by using entomopathogenic fungi.

"One aspect of my work is watching and helping students as they work towards successful research projects and promising careers," said Dr. Cave.

"Mentoring graduate students is one of the most fulfilling aspects of being a university professor," he said.

ZAMORANO, HONDURAS

Prior to his 2002 appointment with UF, Dr. Cave was for 15 years a professor in the Department of Plant Protection at the Escuela Agricola Panamericana, Zamorano, Honduras. In Central America, Dr. Cave remains a prominent adjunct educator.

Dr. Cave has mentored 31 students at Zamorano and two at the Escuela de Agricultura y Ganaderia de Esteli in Nicaragua. He continues to host Zamorano students as interns in his laboratory, he said.

COLEOPTERIST

An entomologist--and more specifically--a coleopterist, Dr. Cave is recognized as an expert in the taxonomy and biology of beetles.

Along with international fellow coleopterists, Dr. Cave co-authored three monographs on the dynastine scarab beetles in Mesoamerica and the West Indies. He currently serves as Managing Editor of The Coleopterists Bulletin, an international journal devoted to the study of beetles.

PUBLICATIONS

Other publications authored by Dr. Cave range from 106 articles in scientific journals to 14 non-refereed works, 19 book chapters, and four book reviews. He has also produced six videos on pest management, which are used in the courses he teaches.

Dr. Cave's work with jewel scarabs in Honduras was featured on the cover and in a 10-page spread in National Geographic magazine.

VISION

In accepting the position as interim director at IRREC, Cave said he envisions the restoration of the Indian River District as a thriving production region for the world's highest quality grapefruit and oranges.

"We are hiring new faculty members whose missions will be to resolve the current problems the local citrus industry is facing. My job will be to facilitate all IRREC faculty to be successful in their research and extension programs and lead the region to its full production potential."

Although Dr. Cave's academic interests are specifically focused on insects and their impacts on agriculture and natural plants, entomology is an essential part of integrated pest management and crop production throughout the world. He also stresses the future of scientific research is in the hands of graduate students.

"Student research is critical to the success of scientists and to solve global agricultural problems. One of my goals as interim director is to assist faculty in attracting graduate students who have a desire to support the industry that IRREC serves with innovation and passion for an integrative approach to crop production and protection."

Dr. Cave's work has been funded with more than $1 million in grants provided by the National Science Foundation, the U.S. Department of Agriculture, the Florida Department of Agriculture and and Consumer Services, and Florida Nursery Growers and Landscape Association.

Dr. Cave examines a Florida natural bromeliad for damage by the Mexican bromeliad weevil

Dr. Liliana Cano, a Plant Pathologist, Joined IRREC to Help Solve Citrus Industry Issues

Dr. Liliana Cano in her new plant pathology laboratory at IRREC

A plant pathologist with 12 years of experience in plant-microbe interactions has joined the faculty of the University of Florida Institute of Food and Agricultural Sciences' Indian River Research and Education Center to help citrus growers.

Following an international search for a scientist to join a team of UF researchers in their efforts to restore Florida's citrus production region, Dr. Liliana Cano has been named assistant professor of plant pathology at IRREC.

"Dr. Cano offers the state's citrus industry innovation, knowledge and the application of cutting-edge research methods." said former IRREC Director Dr. Peter Stoffella.

The IRREC is one of 12 research stations around Florida that serve the state's important agricultural production regions. Research faculty at the Fort Pierce location work with citrus horticulture, soil and water science, entomology, aquaculture and post-harvest technology.

GENOME ANALYSES

Dr. Cano's appointment, which started on Feb. 26, will involve genome analyses of the most important pathogens affecting citrus in Florida toward the identification of key molecules secreted by these microbes and the elucidation of the mechanisms used by these pathogens to cause disease in citrus.

UF/IFAS LEADERSHIP IN CITRUS RESEARCH

"I welcome inquiries by local growers and industry representatives as to how my research may best serve their interests," said Dr. Cano.

According to Dr. Stoffella, the UF/IFAS goal is to develop management strategies for citrus production, an economically important specialty crop. Grapefruit produced in the Indian River region is celebrated as the world's premier fresh fruit product. But in recent years the state's citrus industry has declined as a result of a disease called huanglongbing (HLB), also known as citrus greening.

GRADUATE COURSES, PLANT PATHOLOGY

In addition to her research interests, Dr. Cano will develop and instruct a graduate-level plant pathology course.

PUBLICATIONS

Dr. Cano has co-authored 33 articles published in national and international scholarly journals such as eLIFE, Science, Nature, PNAS, Plant Cell, Bio Med Central Genomics, Genome Biology, Molecular Plant Pathology, Molecular Plant-Microbe Interactions, New Phytologist and the Public Library of Science-PLOS Pathogens.

AWARDS AND RECOGNITIONS

An accomplished scientist, Dr. Cano's work has been recognized with a number of honors including the 2011 Excellence in Science Communication Student Prize from the John Innes Center Foundation for having co-authored 12 publications during collaborations while completing her doctorate at The Sainsbury Lab in the United Kingdom; The Daiwa Adrian Prize in 2010, awarded by both Japanese and United Kingdom trade organizations for training and collaboration work with Japanese scientists in the use of genomics to understand plant-pathogen interactions.

EDUCATIONAL CREDENTIALS

Dr. Cano was awarded a doctorate in Plant-Microbe Interactions from The Sainsbury Laboratory at the University of East Anglia, Norwich, England, within the United Kingdom. She earned a Diploma in Molecular Biology and Genetics at the University of Pamplona, in Pamplona, Colombia. Cano completed a Bachelor of Science in Biotechnology Engineering from Francisco de Paula Santander University, located in Cucuta, Colombia.

Dr. Cristina Pisani, new IRREC Doctoral Graduate, and research findings for avocado crop production

Dr. Cristina Pisani explains how laurel wilt disease in an avocado tree develops so rapidly the leaves die without falling from the tree

Findings from new University of Florida research may lead growers to produce avocados in the Indian River region of Florida, an area where the citrus industry has fallen on hard times.

The research comes from a dissertation by Cristina Pisani, who recently completed her doctorate in horticultural sciences here at IRREC.

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AVOCADO CULTIVARS

For her research, Cristina studied a grove of about 150 avocado seedlings collected in California by Rey Schnell, a researcher at the U.S. Department of Agriculture Subtropical Horticulture Research Station in Miami.

Schnell identified the true hybrids of avocado Hass and Bacon cultivars. Then the seedlings were planted at the USDA Horticultural Research Laboratory, adjacent to the IRREC.

"The results show that we did select hybrids that were comparable to commercial Hass," said Pisani. "We chose the best avocadoes from the field plot and tested them for the postharvest attributes, screened them and they were judged by trained panelists who participated in sensory panels."

"Cristina's contributions to avocado research are suggesting that some Hass-like avocado selections may be grown under Florida conditions and provide attractive options for growers," said Dr. Mark Ritenour, associate professor of horticulture, who specializes in postharvest technology and served as Pisani's graduate adviser.

Another important focus for the research was to screen avocado hybrids for resistance to a disease called laurel wilt, spread by the redbay ambrosia beetle and its fungal symbiont Raffaelea lauricola, which kills avocado trees and threatens the crop nationwide.

"We used fruit from a half-sibling population of families that originated from the National Clonal Germplasm repository in Miami," said Cristina.

"Cristina's contributions to avocado research are suggesting that some Hass-like avocado selections may be grown under Florida conditions and provide attractive options for growers."

SCREENING FOR DISEASE RESISTANCE

"Those plants are being screened for both tolerance and for resistance to laurel wilt."

Although Cristina's doctoral research is complete, she said the avocado research will continue as the Hass-Bacon avocado hybrids show considerable promise for production in the Indian River region.

"There is still more research needed to decide if growers in the area could make a good profit from avocados and sustain the crops from disease," Cristina said.

"My research screened the seedling plants for good horticultural and fruit quality traits," said Cristina. "The crops were evaluated for traits such as flowering, oil content and postharvest rots."

Postharvest qualities in avocados are important because the fruit are shipped to markets nationwide, with customers looking for excellent quality, said Cristina. The project focused on selections comparable to the commercial Hass variety, a high-value crop produced primarily in California.

The nation's top avocado-producing states are California and Florida, according to 2014 statistics from the National Agricultural Statistics Service. In southern California, the crop is produced on about 55,000 acres. In Florida, 7,000 acres are devoted to avocado production, primarily in Miami-Dade and Monroe counties.

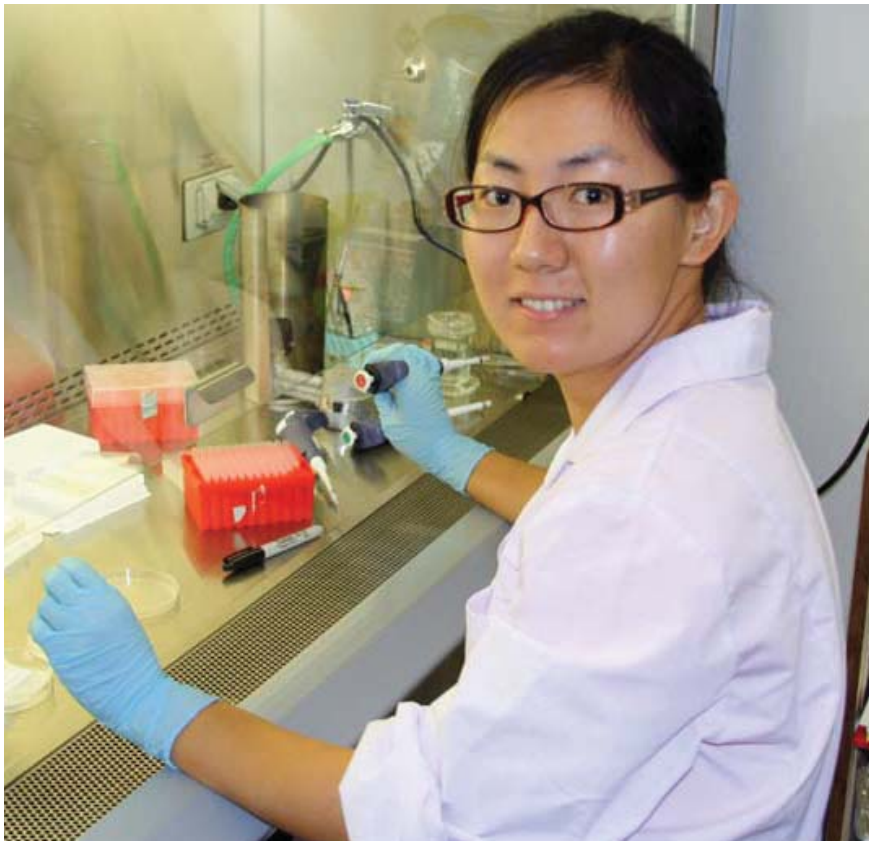
Dr. Pisani, Dr. Ritenour, and their USDA colleagues, think there is potential for increased avocado production in Florida, especially in the Indian River area.

AVOCADOS ALTERNATIVE CROP FOR CITRUS PRODUCERS

Avocados are being studied as an alternative crop because a disease called Huanglongbing (HLB), commonly known as citrus greening, has reduced the once-thriving citrus industry. While citrus remains the most important crop along the Treasure Coast, many local citrus growers are eager to have alternative crops for cultivation.

For more information about Florida's avocado industry and the threat of laurel wilt, please access the website: http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Save-the-Guac.

Dr. Jiaqi Yan, new IRREC Doctoral Graduate, and research findings for citrus black spot disease



Dr. Jaiqi Yan is conducting an in vitro test with the black spot fungus at the UF/IFAS Citrus Research and Education Center in Lake Alfred, Fla. (photo credit: Katia Rodrigues)

Hot water and essential oil dips will deter the development of citrus black spot by up to 50 percent, according to new University of Florida research.

The new management techniques are the result of Jaiqi Yan's recently completed doctorate she earned at IRREC. Yan's dissertation focused on citrus black spot (CBS) and developed postharvest treatments using hot water, fungicides, and essential oils to significantly inhibit the development of CBS lesions.

CITRUS BLACK SPOT

Citrus black spot is caused by a pathogen called Guignardia citricarpa, a fungal disease first detected in 2010 in an Immokalee grove. Similar to canker, CBS forms dark lesions on fresh fruit skin and impacts the crop's marketability in an adverse way. The disease is believed to be confined to Hendry and Collier counties at this time.

As with costly citrus diseases like canker and greening, pathogens often spread throughout the entire state's production regions. Yan's research identified methods to deter CBS development after harvest and during storage.

"The research is aimed at inhibiting the development of CBS after harvest," said Yan. "Using hot water and fungicides will restrain the pathogen on the fruit. But, essential oils are more effective against the pathogen."

In carrying out Yan's research, a team of UF scientists in three separate production regions collaborated to resolve the black spot issue. Dr. Mark Ritenour, an associate professor of postharvest technology, supervised her dissertation at IRREC. Joining Yan and Ritenour

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were Dr. Pamela Roberts, professor of plant pathology at the UF/IFAS Southwest Florida Research and Education Center in Immokalee; and, Dr. Megan Dewdney, associate professor and plant pathologist extension specialist at the UF/IFAS Citrus Research and Education Center in Lake Alfred; and, Dr. Jeff Brecht at UF in Gainesville, professor of postharvest physiologist.

"Her work is important because it gives us alternatives for CBS control after harvest that may also be applicable to other important decay organisms," said Dr. Ritenour. "Her work also demonstrated that these can be incorporated into a commercial wax for easy application to the fruit."

ESSENTIAL OILS

Dr. Yan used essential oils from thyme plant organs for the experiments. Small portions of two essential oils, carvacrol and thymol, were mixed into food-grade wax that was then applied to fresh fruit on which CBS lesions were present. The wax is typically used in packinghouses to protect fresh fruit during shipping.

Two additional experiments were conducted to control black spot: One measured the effectiveness of dipping fruit into hot water; a second looked at six commercial fungicides.

FINDINGS

"We found the essential oils were more effective in inhibiting the pathogen by 50 percent," said Dr. Yan. "But the essential oils are expensive at this time so packers may decide to use commercial fungicides that we identified until the cost of essential oils are lower."

Dr. Yan said essential oils are a new way to control postharvest disease on fruit and on vegetables but more research is needed to identify the most efficient methods to apply the oils during postharvest. The oils she used are natural essential oils, carvacrol and thymol, at a cost of $1.50 per 100 oranges.

"Her work is important because it gives us alternatives for CBS control after harvest that may also be applicable to other important decay organisms. Her work also demonstrated that these can be incorporated into a commercial wax for easy application to the fruit."

"I used one synthetic carvacrol essential oil in the experiments and found it to be equally effective as the natural carvacrol," said Dr. Yan. "I found that the synthetic carvacrol cost was only 3 cents per 100 oranges."

GROWER RECOMMENDATIONS

For now, Dr. Yan recommends packinghouse leaders use a combination of hot water and fungicide dips to deter the lesions. More research is needed with the synthetic oils, she said.

"We found that dipping fruit into water at 56 degrees Celsius for 120 seconds significantly inhibited lesion development on fruit that had CBS symptoms," said Dr. Yan.

Of the six fungicides tested against the pathogen, thiabendazole, azoxystrobin, and imazalil were the most effective in reducing lesions, Dr. Yan said.

"Using hot water along with fungicides is the best treatment for CBS at this time because the fungicides are already commercially used," said Dr. Yan. "We are considering more tests with synthetic essential oils because they are affordable."

Dr. Yan is a Doctor of Philosophy in Horticultural Sciences with a minor in plant pathology. She is continuing her work as a postdoctoral associate looking at essential oils incorporated in commercial wax to control Diplodia stem-end rot in fresh fruit, said Dr. Ritenour.