From the Director’s Desk

IFAS must satisfy three goals to meet its mission: teaching, research, and extension. Teaching is not just about developing courses and delivering them live or online once a year. Teaching encompasses mentoring graduate students during their MSc and PhD programs.

Mentoring means advising the graduate student on how to select a research project, how to design the research and experiments, how to collect and analyze the data, and how to coherently present the results in written and oral forms. It also implies suggesting coursework. This is a critical role that all IRREC faculty play in developing knowledgeable and ethical professionals who will contribute substantially to their respective discipline.

In 2016, IRREC faculty saw to fruition, i.e., graduation, the successful graduate programs of two MSc and three PhD students who conducted their research at our Center. Six graduate students are continuing their research projects into 2017, and new students will be coming throughout the year. Collectively, they address issues and questions in horticultural sciences, soil and water sciences, aquaculture, entomology, and plant pathology. Our students come from the USA, Ecuador, Argentina, Colombia, and China.

We will miss those IRREC graduate students who have moved on to successful careers here in Florida, or in other states, or in other countries. But we also look forward to new faces who will challenge us with new ideas and add life to our laboratories.

Graduate students add a vivacious dimension to IRREC. We relish their fresh perspectives, their yearning to learn and grow professionally, and of course their youthful energy. This is why we welcome them to IRREC with open arms and celebrate their success and accomplishments in this newsletter.

Ronald D. Cave
An IRREC graduate and Fulbright Scholarship recipient, Angie Niño recently completed a Ph.D. in Entomology.

Her doctorate research contributed to pest management techniques needed to control an invasive insect that has taken a bite out of Florida crucifer crop growers’ profits.

Working under the direction of Dr. Ronald Cave, IRREC’s acting director, Angie studied the yellowmargined leaf beetle, a pest that attacks crucifer vegetables such as broccoli, cauliflower, bok choy, cabbage, collards, mustard, radish, turnip and watercress.

Her findings were that: an entomopathogenic fungus, Metarhizium anisopliae, shortened the lifespans of female beetles; and that plant extracts neem, hyssop, and thyme will limit leaf damage caused by the insect.

Neem showed the most significant results. Using a trap cropping experiment, she applied the oil to turnip crop leaves, and found that the neem protected the crops from the beetle, said Angie.

“But further testing on whole plants in laboratory conditions and in field conditions are necessary to determine the effectivity of neem for use in the management of the yellowmargined leaf beetle,” Angie said.
In addition to the specific beetle Angie examined, she identified two pests that pose more threats to the same vegetables. The pests are diamondback moth and aphids.

**DISSEMINATION**

In her PhD dissertation, Angie recommended the use of multiple IPM methods to protect the crucifer crops. The crops are exceedingly valuable to the state’s agricultural industry and to the nation’s fresh vegetable supplies throughout the winter season.

Angie returned recently to Colombia where she will assist the agricultural industry there with its fight against insect pests.

“I want to be a part of improving the food we produce for our citizens in Colombia,” said Angie.

“Colombia’s government representatives want people who have doctorate degrees related to science which can be applied back in Colombia,” she said.
During soil science classes in my third year at EARTH University, I saw the value of soil management and fertility in modern agriculture and I decided to apply for the internship opportunities at the University of Florida,” said Jean-Yves.

In addition to the soil and water sciences internship, Jean-Yves participated in a community service facet to detect the presence of microplastics in the Indian River Lagoon.

Dr. Alan Wright supervised Jean-Yves’s internship for which he learned how to enhance soil fertility and how to apply fertilizers to achieve optimum tree growth and fruit yield. His internship focus was with grapefruit nutrition studies to improve production practices, Wright said.

INSPIRATION

“The internship at IRREC inspired me to work on soil fertility and the knowledge I took from Dr. Wright will help me in the future to work with farmers in my country,” said Jean-Yves.

While growing up in Haiti, Jean-Yves realized how important agriculture was to his country and that food production provided great value to its residents. As a youth, he realized the need for good agricultural practices and how progressive practices would improve the quality of life in his country, he said.

SOIL AND WATER SCIENCES

In addition to the soils research project, Jean-Yves participated in a community service project along with Florida Sea Grant Extension Agent LeRoy Creswell. His work along with Creswell involved the identification of microplastics found in the Indian River Lagoon. Microplastics are plastic product debris and small beads found in household and hygiene items such as toothpaste and cosmetics. The small beads eventually find their way into major bodies of water and contribute to pollution, making a negative impact on marine life. Jean-Yves took boat trips to gather water samples for this effort. He also served as a spokesperson before the public, in an effort to raise awareness at local school and special events.

Now back in Costa Rica, Jean-Yves is using the knowledge he gained and the techniques he learned about soil sampling and analysis for his continuing studies at EARTH University. Currently in his senior year, Jean-Yves is looking forward to a return to Haiti, where he plans to improve food production as a consultant, or as an agricultural research scientist.
An IRREC graduate determined that certain enhanced nutritional spray combinations may increase the production and size of grapefruit, even in groves where citrus greening is present.

Diego Ramirez recently completed a MSc degree in horticultural sciences. His graduate thesis titled, “Mitigation of Huanglongbing effects on grapefruit trees using enhanced nutritional programs,” is part of the university’s effort to support citrus nutrition research in groves affected by Huanglongbing (HLB).

Mitigation of HLB

“We need to help growers continue production of valuable fruit even for HLB-infected trees,” said Diego. “HLB is the most important disease in the citrus industry and we are seeking ways to manage production so growers can continue to produce nutritious fruit.”

Diego’s thesis research was supervised by José X. Chaparro, professor of horticultural sciences, Brian Boman, professor emeritus of agricultural and biological engineering; and, Alan Wright, associate professor of soil and water sciences.

“There appeared to be some nutritional treatments that increased the percentage of medium and large grapefruit, which have a greater value for the grower,” said Chaparro. “With the treatments, the growers are able to get higher returns.”

Experiments

For the experiments, Diego used five commercial water-soluble components. The components were: dipotassium polyphosphate (DKP), potassium nitrate accompanied by low biuret urea, potassium phosphite, calcium nitrate, and a commercial mix of microelements including Mn, Zn, B and Fe. He used five combinations of the components in one grove; nine in a second. The product sprays were made three and four times annually during 2014 until 2016.

Though Diego urges further studies are needed, he recommends growers use a specific combination of nutritional sprays for citrus trees.

Results

“Despite no significant differences being observed in the field, the treatments DKP plus potassium phosphite, and microelements, and the treatment with potassium nitrate and potassium phosphite showed the most outstanding results, with average increases in the gross pack value (an estimation of the economic gross return based on the prices for fresh market) of 60 percent compared to the control,” said Diego.

“The results of costs and returns analysis suggest positive returns for the use of these two enhanced nutritional programs.”

The results provide growers with a formula to improve fresh fruit quality, but more complimentary strategies will evaluate the economics of nutritional sprays and fertilizer needs. Selective pruning to increase tree canopy volume and density will also be beneficial, said Diego.

“The magnitude of the benefit is still not clear,” said Diego. “Additional research will be required to determine the full economic cost and the benefit of these enhanced nutritional program.”
 Introduced to IRREC by our former co-worker Dr. Rodrigo Diaz, Ph.D. student Patricia Prade helped with studies to identify a possible natural enemy arthropod against the Brazilian peppertree. This tree is one of the state’s most serious invasive species.

It was during Patricia’s final year of studies at the Universidade de Blumenau in Brazil when Rodrigo was seeking help to search for an insect that fed on Brazilian peppertrees in their native habitat.

BRAZILIAN PEPPERTREE ENEMY

University officials introduced Rodrigo to Patricia and to Dr. Marcelo Vitorino. Together, the three colleagues scanned local forests for native species: the Brazilian peppertree, and the insect that kept the tree at its normal size. The tree is diminutive when compared to the massive, out-of-control tree stands growing in central and south Florida.

Patricia Prade participates in outreach programs to share entomology with the public

UF COLLABORATION

Dr. Overholt, Rodrigo and Dr. Manrique had also located psyllids from the same genus attacking Brazilian peppertree in Bahia and Espirito Santo.

Patricia was at that time about to complete a Master of Science degree in Forestry and Conservation at the Brazilian university. IRREC Professor Emeritus Dr. Bill Overholt, who was a member of her graduate committee, had supervised her master’s degree. She earned a bachelor’s degree in Forestry, also at Universidade de Blumenau.

A native of Santa Catarina, just south of Rio de Janeiro, Patricia had been contemplating a Ph.D. at the time when she met the IRREC scientists. Rodrigo asked Patricia to consider earning her doctorate in Entomology at IRREC and encouraged her to apply with UF.

UPCOMING PSYLLID RELEASE

Today, Patricia is working under the direction of Dr. James Cuda in Gainesville and IRREC’s new assistant professor of Entomology, Dr. Carey Minteer. Dr. Minteer and Patricia are collaborating with Dr. Cuda, to prepare for an anticipated release of the psyllid Patricia, Rodrigo and Veronica collected in Brazil. Expected to fight the invasive nature of Florida’s unique version of the Brazilian peppertree, the psyllid controls the trees’ growth in Brazil. The research conducted by Patricia during her master’s research at IRREC found that the psyllid would have similar effect in Florida on the Brazilian peppertree, and could contribute to successful control of the species.

“In Florida, the trees grow so close to each other and it is hard to control just with chemicals,” said Patricia. “I am excited because we have an opportunity to solve this problem with the right biological control agent and that’s important to me and to Florida’s resource managers.”
Liguang Li is conducting research toward a Ph.D. in Soil and Water Sciences. Her research thesis involves the presence of nitrogen and phosphorus in water running off St. Lucie County’s agricultural lands that will eventually disperse into the Indian River Lagoon. Dr. Zhenli he is supervising her graduate work.

“This information has important implications in the development of best management practices to minimize agricultural practice impact to the nitrogen and phosphorus loading in the Indian River Lagoon,” said Liguang.

AGROECOLOGY RESEARCH

Nitrogen and phosphorus, she said, are essential elements that trigger algal blooms in the lagoon. For her graduate research, she collected runoff and surface water samples in agricultural fields and from waterways that hold water that had drained from agricultural production lands.

Liguang has been interested in natural resources conservation for a long time. She completed a Master of Science in ecology at Nanjing Forestry University and a Bachelor of Science in ecology at the University of Science and Technology Beijing.

ECOLOGY OF CHINA’S WUYI MOUNTAINS

Her master’s thesis involved variations of organic carbon in soil aggregates along an altitudinal gradient in China’s Wuyi Mountains. Situated in the northern Fujian province, west and inland from Taiwan, the Wuyi mountain range is an important agricultural region where production of both oolong and black teas takes place.

Before her studies here at IRREC, Liguang worked as a research assistant for Key Laboratory of Forestry and Ecological Engineering of Jiangsu Province, where she has been employed since 2009. Her duties for the laboratory include measurement of soil organic carbon dynamics in both natural and artificial forests, and in croplands along coastal China. In addition, she measured dissolved organic carbon concentration in the Wuyi Mountain forests and cultivated microorganisms with which she measured enzymes and microbial biomass carbon in soils.

Liguang has published seven peer-reviewed journal articles in publications such as Ecological Engineering, Chemosphere, PLOS ONE, Environmental Science Pollution Research, and the Chinese Journal of Ecology.

Throughout Liguang’s academic career, she had devoted time to volunteer projects, most recently as a judge for the St. Lucie County Regional Science Fair. In China, she volunteered at the Global Village-Beijing, organizing a charity sale, arranging lectures and teaching environmental science courses to youth.

CAREER GOALS

In anticipation of her upcoming graduation, Liguang’s career goals are to become an independent research scientist and a leader at a university or research institution. Her strongest interests are in the protection of natural resources with field experiments and with modeling predictions. Her goal in pursuing a doctorate with UF was to build networking among worldwide scientists and to participate in global large-scale research projects, which, she has accomplished.
Valentina Candian, IRREC Intern from Italy’s University of Torino

WORK WITH DR. CANO

“It is wonderful to work with Dr. Cano, who is an expert in identifying effector genes which can be used as molecular tools to help monitor diseases that are damaging citrus,” said Candian. “We are currently studying the genetic diversity of a collection of isolates of the citrus fungal pathogen, Colletotrichum acutatum, and are also looking into biological control for the psyllid, using a fungus.”

Valentina said she learned about biological control and crop protection while working for five years at an Italian botanical garden, Mountain Botanical Garden of Oropa, on a mountainside near where she grew up. “It’s a small but fantastic place with lots of plants from all over the world,” she said. “There are no invasive species in this garden because the workers are very careful to protect the plants there.”

Valentina’s interest in plants, both ornamental and food crops, prompted her to earn both a Master and Bachelor of Agricultural Science degrees at the University of Torino, in northern Europe.

INVASIVE PEST BIOLOGICAL CONTROL IN ITALY

Her graduate work in her native country involves an insect, Halyomorpha halys, commonly known as the brown marmorated stink bug. This insect is exotic and invasive in Italy where it attacks fruit crops such as apples and peaches. Feeding on fruit trees, the insect causes deformations and can lead to depreciation of the product, or a total loss of marketability. The insect compromises fruit quality to the point of which the fruit cannot be stored and sold in commercial quantities. At this time, the Italian producers do not have effective tools to protect fruit from the pest in their production orchards, but they are studying exclusion nets, Valentina said.

“The opportunity to study the application of biological control and effector gene expression to resolve an orchard crop problem is valuable to my work,” said Valentina.

Upon graduation with her doctorate, Valentina intends to seek employment with a university or private research firm. She noted that American research laboratories Bayer Crop Science and Syngenta Crop Protection have facilities in northern Europe.