

## TROPICAL CROPS

Unlike most of the state, the southernmost tip of peninsular Florida features soils, weather patterns and other crop production conditions that closely resemble those found in Caribbean island nations. Consequently, the region offers one of the few opportunities for U.S. agricultural producers to grow tropical crops under field conditions.

Tropical crop industries in Florida are supported by the UF/IFAS Tropical Research and Education Center (TREC) in Homestead. Opened in 1929, this facility addresses the unique needs of local growers, conducting research on various management issues and evaluating new crops and plant varieties originating in other countries.

The combined harvest of Florida's tropical fruit, vegetable and ornamental crops has an annual farm gate value of \$800 million and total economic impact in excess of \$1 billion. To help this dynamic and multifaceted industry segment keep pace with changes in market demand and the production environment, researchers at TREC are constantly communicating with growers, monitoring developments in other nations' crop production industries, conducting applied research and re-evaluating their own efforts to ensure the greatest likelihood of successful outcomes.

NATURAL  
RESOURCES



HUMAN  
SYSTEMS



AGRICULTURE



## Ongoing Research



### HELPING CROPS SURVIVE FLOODING

South Florida's low elevation, high water table and frequent storms can lead to flooding that damages or kills fruit crops. Bruce Schaffer, a UF/IFAS professor with TREC in Homestead, is part of a research team investigating the effects of flooding on plant physiology and growth of fruit crops. The team's work revealed that flooding makes avocado trees more susceptible to phytophthora root rot, a disease that is present in South Florida but rarely causes damage under non-flooded conditions. Current avocado research investigates whether pruning can mitigate flood damage; additional studies involve flooding effects on mango, papaya and other tropical fruit crops. The team hopes to identify flood-tolerant crop varieties and management practices that enable plants to survive exposure to standing water.



### SMART FERTILIZERS

Crops use only about 30 to 50 percent of the nitrogen fertilizer they receive if the fertilizer is applied in traditional water-soluble forms such as urea; the remainder is lost to the environment through leaching and other processes. Scientists have developed fertilizers coated with porous materials that release nutrients to crops slowly, but the coatings for these products are often prohibitively expensive. To address the problem, Yuncong Li, a UF/IFAS professor with TREC in Homestead, is working with colleagues to evaluate "smart fertilizers" coated with low-cost substances such as recycled polystyrene foam. Initial results show that these fertilizer pellets are effective and affordable, particularly when manufactured in larger sizes that have a smaller ratio of surface area to volume.



### IMPATIENS DOWNY MILDEW

For years, the flowering shrub *Impatiens walleriana* was Florida's best-selling annual bedding plant, and for good reason — it's beautiful, inexpensive, shade-tolerant and hardy. But in 2011, an outbreak of downy mildew disease devastated outdoor plantings of impatiens throughout the state. Scientists aren't sure what caused the outbreak, but Aaron Palmateer, a UF/IFAS associate professor with TREC in Homestead, is focused on helping homeowners and landscaping professionals cope with the disease by developing integrated management strategies and identifying resistant impatiens varieties. Palmateer is evaluating biological control products to determine if any are effective, inexpensive and environmentally friendly; he says the biggest challenge is protecting impatiens in the landscape at low cost.

## Research with Impact



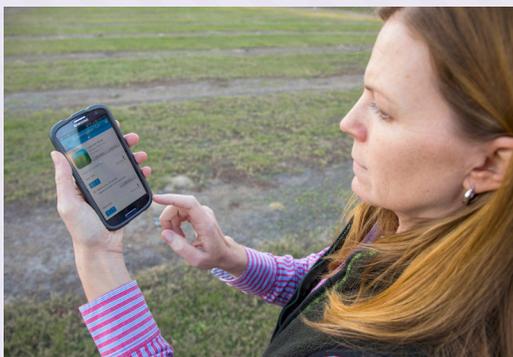
### LAUREL WILT

In 2012, the invasive fungal disease laurel wilt was detected in Miami-Dade County avocado groves. At the time, researchers believed the pathogen responsible for the disease, *Raffaelea lauricola*, was only transmitted by its well-known vector, the invasive redbay ambrosia beetle. However, a UF/IFAS research team including entomologist Daniel Carrillo, an assistant professor with TREC in Homestead, seldom found redbay ambrosia beetles in the affected groves. The scientists discovered that some native ambrosia beetles also harbored the pathogen, having apparently acquired it when they bred in infected redbay or swampbay trees. Experiments showed that some of the native species can also vector laurel wilt to avocado trees. These findings led growers to fund monitoring and increase management efforts aimed at native ambrosia beetles.



### ORCHID CRYOPRESERVATION

Cryopreservation is a process involving storage of biological materials at extremely low temperatures. Wagner Vendrame, a professor with TREC in Homestead, has optimized the use of this technology with orchids, to protect seeds and other tissues. His recent research focuses on chemicals called cryoprotectants, which are added to plant tissues before freezing to improve the odds that preserved material will be usable after thawing. Vendrame reports that an organic compound called phloroglucinol has performed well as a cryoprotectant, and he's communicated his findings to industry personnel who routinely freeze large amounts of orchid biological material. Other researchers who previously worked at TREC also are using these techniques to preserve endangered Brazilian orchids.



### SMART IRRIGATION APPS

With Florida expected to suffer freshwater shortages more frequently in the future, conservation will be a key component of water management strategies. To help agricultural producers and homeowners in Florida and Georgia use water wisely, a team of UF/IFAS and University of Georgia faculty members have developed a suite of irrigation applications for smart phones and other mobile devices. Apps for citrus, strawberry, cotton and turfgrass are available; results show the turf app can cut water use by 30 to 40 percent, said Kati Migliaccio, a UF/IFAS associate professor with TREC in Homestead. New apps for avocado, tomato, squash and other crops are in development, and the team plans to expand coverage to other Southeastern states.

### UNIT LEADERS

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### RESEARCHER CONTACTS

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