

PALM TREE HEALTH

Florida is home to 11 native palm species – more than any other state in the continental U.S. – and imports numerous other species for landscaping. These striking evergreen trees are intertwined with Florida's history and image. Palms adorn tourism advertisements, city logos, and even the state seal, which includes a sabal palm. They provide aesthetic value to a landscape, enhance the value of a property, and contributed nearly \$600 million to the state's palm and tropical foliage plants industry in 2015.

But Florida's palms face multiple challenges. In the 1970s, a disease known as lethal yellowing devastated South Florida's coconut palm population, and today, other palm species face a growing number of disease threats.

To assist the industry and homeowners, multidisciplinary research teams with the University of Florida Institute of Food and Agricultural Sciences' (UF/IFAS) Fort Lauderdale Research and Education Center (FLREC) focus on palm health issues and continue to refine management recommendations for nurseries, landscapers, and even the Department of Transportation. All palms research at FLREC emphasizes sustainable fertilization, irrigation, integrated pest management, and pruning methods.

NATURAL
RESOURCES



AGRICULTURE



HUMAN
SYSTEMS



Ongoing Research



PLANTHOPPER IDENTIFICATION

Since 2006, thousands of Central Florida date and cabbage palms have died from a disease known as 'Texas Phoenix palm decline'. This disease is caused by phytoplasma bacteria and likely transmitted by small, plant-feeding insects known as planthoppers. Scientists have been unable to predict outbreaks or develop management practices to curtail infections because they are uncertain of which planthopper species transmits the pathogen. Entomologist Brian Bahder, an assistant professor with UF/IFAS, leads an effort to identify the culprit using DNA analysis. Researchers collect planthoppers in affected ecosystems using insect nets and aspiration devices, and then analyze bodily fluids to find gene sequences unique to the phytoplasma. The team is developing a detection procedure for the low concentrations of the phytoplasma that are typically found in infected palms.



IDENTIFICATION OF FUNGAL DISEASE

Among the fungal pathogens affecting palms in Florida, approximately 10 cause identical symptoms – dark streaks and discolored or dying leaflets on one side of affected stalks. Two of these pathogens are strains of *Fusarium oxysporum* and can kill palms; the others cause similar-looking symptoms but are non-fatal diseases known as blights. Accurate pathogen identification is fundamental to disease management, so Monica Elliott, a plant pathologist and professor with UF/IFAS, leads a team working to improve diagnostic procedures. The team is sequencing the genomes of both *F. oxysporum* strains to enhance DNA-based identification procedures. Researchers are also evaluating blight pathogens to determine which palm species they affect, and which blight diseases are most prevalent in Florida. These efforts will lead to faster disease diagnosis and better-targeted control strategies for fungal pathogens.



GENOME ANALYSIS

Lethal yellowing and Texas Phoenix palm decline are potentially fatal palm diseases caused by tiny bacteria that lack cell walls (phytoplasma); different strains of the same pathogen might be causing both diseases. By pinpointing genetic differences between these microorganisms, scientists hope to find ways of developing new management methods for their associated diseases, a possibility under investigation by plant pathologist Nigel Harrison, an emeritus associate professor at UF/IFAS. Collaborating with USDA colleagues, Harrison is searching for gene sequences unique to each pathogen to map each disease's current distribution. The team also plans to identify pathogen genes that promote infection by activating biochemical processes in palms, a finding that could facilitate development of gene-silencing strategies that protect palms by altering their response to infection.

Research with Impact



PALM NUTRITION

Ornamental palms require supplemental nutrition to thrive in Florida’s sandy, chalky soils. Over the past three decades, UF/IFAS professor and horticulturist Timothy Broschat has determined the exact nutrient requirements for virtually every palm species grown in Florida through a series of field fertilization experiments conducted over 35 years. Broschat recently found that the areca palm, *Dypsis lutescens*, seldom requires supplemental phosphorus, but does require supplemental potassium, magnesium, and micronutrients when grown in landscapes receiving ordinary lawn fertilizer. Broschat’s improved management recommendations have advised industry personnel and homeowners on how to reduce nitrogen and phosphorus inputs into the environment, improve water quality, and optimize palm health while minimizing fertilizer applications and expenses.



NEW WILT PATHOGEN

When large numbers of queen and Mexican fan palms died unexpectedly throughout Central and South Florida in the mid-2000s, UF/IFAS researchers suspected that a strain of *Fusarium oxysporum* fungus was responsible. A team led by plant pathologist and UF/IFAS professor Monica Elliott, analyzed tissues from infected trees and confirmed that the pathogen was a new strain of *F. oxysporum*. The associated disease was dubbed “palm wilt.” Working with arborists at Walt Disney World™, the team determined that fungal spores were spread by wind and rain. As a result, plans were developed to replace infected palms if an outbreak of the incurable disease struck the properties. Subsequently, team members have advised every major Florida landscaping company on palm wilt diagnosis and management, thereby minimizing and preventing localized outbreaks.



NEMATODE INVASIONS

The red ring nematode, *Bursaphelenchus cocophilus*, is a microscopic roundworm that kills oil and coconut palms in Mexico and Central America. Although the nematode has not yet been found in the U.S., one of its primary carrier hosts was recently detected in California – the invasive South American palm weevil. Robin Giblin-Davis, a professor and nematologist in UF/IFAS, realized that if the nematode was detected in California, it could enter Florida in shipments of infected trees and then spread by a native weevil that feeds on palms. To prevent the nematode’s introduction to Florida, Giblin-Davis helped California officials develop monitoring and management plans for the industry. He also worked with colleagues at USDA to educate regulatory personnel in Caribbean nations about palm weevil identification and reporting protocols.

Unit Leaders

Blair Siegfried
Chair and Professor
Entomology and Nematology
352-273-3970 • bsiegfried1@ufl.edu

Robin Giblin-Davis
Acting Director and Professor
Fort Lauderdale Research and
Education Center
954-577-6333 • giblin@ufl.edu

Rosemary Loria
Chair and Professor
Plant Pathology
352-273-4634
rloria@ufl.edu

Rosemary Loria
Interim Chair and Professor
Environmental Horticulture
352-273-4634
rloria@ufl.edu

Researcher Contacts

PLANTHOPPER IDENTIFICATION

Brian Bahder,
Assistant Professor
Entomology and
Nematology Department
Fort Lauderdale Research
and Education Center
954-577-6305
bbahder@ufl.edu

IDENTIFICATION OF FUNGAL DISEASE

Monica Elliott, Professor
Plant Pathology
Department
Fort Lauderdale Research
and Education Center
954-577-6315
melliott@ufl.edu

GENOME ANALYSIS

Nigel Harrison, Emeritus
Associate Professor
Plant Pathology
Department
Fort Lauderdale Research
and Education Center
954-577-6321
naha@ufl.edu

PALM NUTRITION

Timothy
Broschat, Professor
Environmental
Horticulture Department
Fort Lauderdale Research
and Education Center
954-577-6317
tkbr@ufl.edu

NEW WILT PATHOGEN

Monica Elliott, Professor
Plant Pathology
Department
Fort Lauderdale Research
and Education Center
954-577-6315
melliott@ufl.edu

NEMATODE INVASIONS

Robin Giblin-Davis,
Professor and Acting
Center Director
Entomology and
Nematology Department
Fort Lauderdale Research
and Education Center
954-577-6333
giblin@ufl.edu