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IMPACT©

The University of Florida Institute of Food and Agricultural Sciences

Central Florida Focus

putting FLORIDA FIRST

UNIVERSITY OF FLORIDA

Institute of Food and Agricultural Sciences

Perspective

By Michael V. Martin

Mike Martin
Vice President for Agriculture
and Natural Resources

Florida FIRST *Report to the People : Year One*

During the initial phase of the Florida FIRST (Focusing IFAS Resources on Solutions for Tomorrow) strategic planning effort, the UF's Institute of Food and Agricultural Sciences (UF/IFAS) has launched a special initiative, followed through on several organizational commitments, and expanded activity in research and education program "imperatives."

Under the mandates of the Florida FIRST program, 47 positions have been approved and will be filled this year by departments. Diversity in the workplace is being pursued, including five targeted "excellence through diversity" positions.

The positions, along with $387,000 in program mini-grants, represent the first installment of the resource allocation process under the Florida FIRST program. Thirty-six mini-grants are targeted for accomplishing specific tasks under the goal of "Putting Florida FIRST." The mini-grant allocations, ranging from $5,000 to $20,000, cover a wide spectrum of subjects.

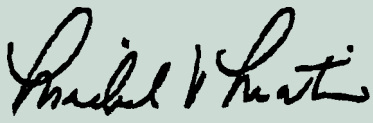
An additional $40,000 has been awarded to five projects that are part of a Florida FIRST commitment to launch an institutional marketing program to improve the linkage and visibility of UF/IFAS research and education programs in different areas of the state.

UF/IFAS also has initiated a detailed analysis of the economic impact of Florida's natural resource sectors (agriculture, forestry, fisheries, etc.) on the state's economy.

During the first year, our faculty and staff also began making a number of internal adjustments to maximize the potential for accomplishing goals and objectives. Generally, those adjustments include new and strengthened partnerships with federal and other state agencies, other State University System (SUS) institutions, private universities and nongovernmental organizations; streamlined administrative functions with funds and savings redirected to faculty salaries and program support; improved program efficiencies and reduced costs through space and facilities consolidation; out-sourcing services as appropriate and redirecting savings to program support; and improved internal cost controls with resulting savings in utilities, service contract costs and software licenses redirected to programs.

As we move forward with this strategic planning initiative, it will continue to have a positive impact on the lives of all Floridians -- putting Florida FIRST.

This issue of IMPACT, the second in a series on different regions of the state, focuses on UF/IFAS research and education programs in Central Florida. A previous issue focused on South Florida; future issues will focus on North Florida and Northwest Florida.



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UF/IFAS is putting Florida FIRST in developing knowledge in agricultural, human and natural resources and the life sciences and making that knowledge accessible to sustain and enhance the quality of human life. Visit the Florida FIRST (Focusing IFAS Resources on Solutions for Tomorrow) Web page at: **floridafirst.ufl.edu**

On the cover: Clayton McCoy, professor of entomology at the UF's Citrus Research and Education Center in Lake Alfred, examines citrus foliage for feeding injury caused by the Diaprepes weevil. In June, McCoy received a U.S. Department of Agriculture Honor Award for his work.

Photograph by Thomas Wright.

UNIVERSITY OF FLORIDA
Institute of Food and Agricultural Sciences

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Volume 16, No. 1 Fall 2000

Center of CHANGE

By Chuck Woods

Changes at the UF/IFAS Mid-Florida Research and Education Center in Apopka open the door to expanded research and new teaching programs in the growing Interstate 4 urban corridor.

Donn Shilling, who became director of the Mid-Florida Research and Education Center on July 1, stands in front of the new $9.5 million classroom, laboratory and administrative complex at Apopka.

Never in its 23-year history have more changes occurred more rapidly than during the past year. First, to avoid any lingering confusion with the University of Central Florida in Orlando, the Central Florida Research and Education Center name was changed to the Mid-Florida Research and Education Center (MREC).

Then, to consolidate programs and build "interdisciplinary synergy" at one location, faculty from research and education centers in Leesburg and Sanford were moved to the Apopka center. The Leesburg and Sanford centers are being closed.

Finally, to accommodate expanded research and new teaching programs, new $9.5 million laboratory, classroom and administrative facilities were dedicated in May of this year.

"It all adds up to major growth and change for our faculty, staff and programs," said Donn Shilling, who also represents a change at the center, one of 16 operated by UF's Institute of Food and Agricultural Sciences (UF/IFAS). In July he became the new director, moving to Apopka from the directorship of the West Florida Research and Education Center in Jay and Milton.

Thomas Wright

Robert Stamps, who served as acting director prior to Shilling's arrival, will serve as assistant director of the Apopka center.

"The consolidation of our programs, including 16 faculty and 60 staff members, at a single site in Apopka will better serve growers, students and consumers in the mid-Florida area," Shilling said. "The MREC program will continue to emphasize biotechnology, horticultural sciences, plant pathology, environmental horticulture, crop breeding, entomology, and food and resource economics."

Shilling, a professor of agronomy, said research will focus on developing new plant varieties with improved growth and resistance characteristics; more efficient, profitable and environmentally sensitive plant production systems; improved pest, disease and nutrient management practices, and advanced economic analysis and planning.

"Extension programs at the center will be increased to better serve various clientele groups," he said. "New education and training programs in horticulture, pest management and other areas will be provided to the mid-Florida community."

Shilling said consolidation will allow the UF's College of Agricultural and Life Sciences to expand teaching programs for place- and time-bound students in mid-Florida. New teaching programs, scheduled to begin in January 2001, will be linked to existing state universities and community colleges in the area, similar to UF/IFAS teaching programs in Fort Lauderdale, Fort Pierce and Milton.

The new teaching program, which can accommodate 200 students per semester, initially will offer bachelor of science degrees in nursery management and landscape horticulture.

Thomas Wright

Left, Richard Henny checks flower quality on Anthurium 'Red Hot,' which he developed in 1995. The cultivar is one of the most popular in Florida.

Below, Henny checks Diffenbachia breeding stock for pollen production.

Thomas Wright

Award-Winning Research and Education

Fern anthracnose — a devastating disease that spread rapidly through Florida's cut foliage and landscape plant nurseries in the early 1990s — was brought under control in an award-winning project by research and extension faculty. During the crisis, losses from the disease were as high as 50 percent.

Stamps, who coordinated the project with the Florida Fern Growers Association and other industry officials, said Florida accounts for about 80 percent of the nation's cut foliage production. With an annual wholesale value of about $70 million, leatherleaf fern is the state's most valuable ornamental crop. Florida growers account for 97 percent of U.S. production and export it to Europe and Asia as well as throughout North America.

"Today, largely because of the UF research and extension team, growers in Florida, Texas, Central America and elsewhere are able to protect against, detect and control this pathogen," said Stamps, professor of environmental horticulture. New cultural practices, scouting techniques, fungicides and application methods developed at the center made control possible. Information was presented to growers at extension field days, and results were published in a 68-page fern anthracnose disease management guide.

"Without this successful effort, hundreds of growers might have gone out of business and Florida's cut foliage industry might have perished or at least lost significant market share," said Stamps.

Others working on the fern anthracnose project include James Strandberg, professor of plant pathology; David Norman, assistant professor of plant pathology, and Linda Landrum, Volusia County extension agent.

In other research, Stamps and Richard Beeson, associate professor of environmental horticulture, are solving irrigation problems in the ornamental industry.

Stamps, who is developing best management practices (BMPs) for leatherleaf fern producers to reduce nitrogen fertilizer leaching into groundwater, said the research also has helped convince growers to reduce water consumption. BMPs are helping them save $180 per acre in fertilizer costs, or more than $1 million industry wide.

To increase irrigation efficiency, Beeson is developing precision irrigation systems for the nursery industry. Cyclic irrigation applies small volumes of water throughout the day instead of just one large application.

"This results in less fertilizer leaching below the root zone and more water being utilized by the plants in landscape nurseries and tree farms," Beeson said. "Depending on species, tree growth rates have been increased by 30 to 100 percent through cyclic micro-irrigation compared to applying the same volume of water once daily."

Thomas Wright

Robert Stamps, left, and research assistant Loretta Satterthwaite check leatherleaf fern for signs of insect damage.

Breeding and Biotech

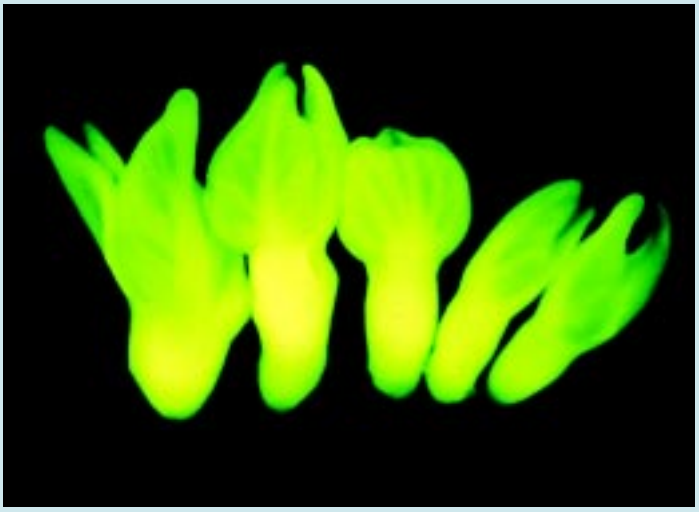
The MREC's ornamental foliage breeding program is adding color and variety to tropical plants. Over the past two decades, Richard "Jake" Henny, professor of environmental horticulture, developed and released 15 new cultivars of Dieffenbachias, Aglaonemas, Spathiphyllums and Anthuriums. Twelve more cultivars are currently in trial production.

"In addition to adding bright leaf variegation patterns and compact growth habits to a class of plants that was predominantly plain green, the breeding program is aimed at developing plants with disease resistance," Henny said. "Spathiphyllum resistance to Cylindocladium root rot, Anthurium resistance to systemic Xanthomonas bacteria and Syngonium resistance to Myrothecium fungal leaf spot are current goals."

Henny also is developing attractive Aglaonema hybrids that withstand chilling temperature changes.

Spin-off technology from the development of new hybrids has been adapted by the Florida foliage industry, he said. For example, Spathiphyllum was once sold as a green crop but now enjoys status as a flowering potted plant due to the routine application of Gibberellic Acid to induce flowers.

Bruce Carle, assistant professor of horticulture, is a plant breeder who is improving cucurbits such as watermelon,



Courtesy of D. Gray

To monitor progress of genetic enginering methods on grapes, Gray and co-workers developed a system that causes cells and tissues to flouresce green when transformation has been successful.

squash, cucumber and melon—crops with an annual wholesale value of $120 million in Florida.

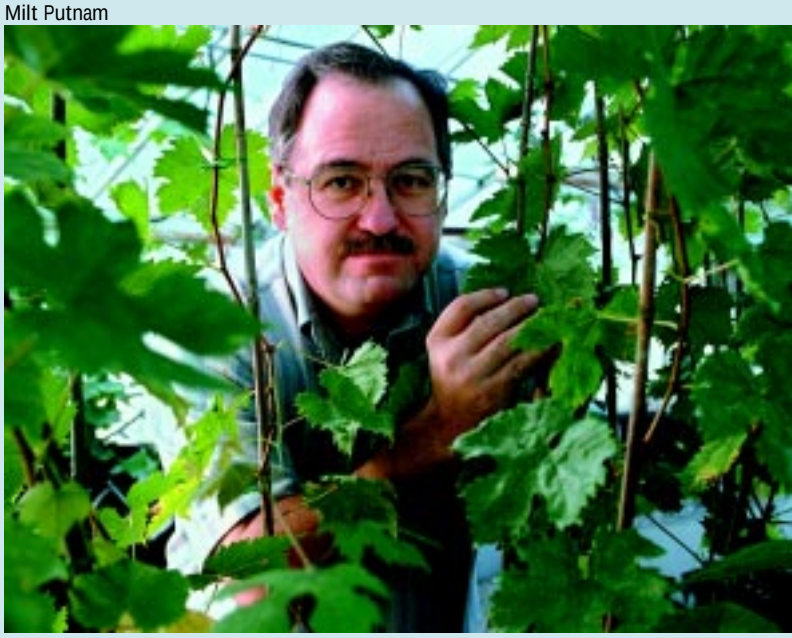
"Although the state's climate is amenable to cucurbit production, heat and humidity foster many pests and diseases," he said. "As a result, we need to incorporate multiple pest and disease resistance into horticulturally superior varieties. Currently, we are breeding for Fusarium wilt and viral resistance in watermelon and transferring mildew, viral and whitefly silverleaf resistances into summer squash."

Carle said research is aimed developing seedless watermelon varieties adapted to Florida with elevated sugars, improved flesh color and distinctive rind patterns. The new seedless hybrids may be released in 2001 or 2002. Carle also is working on a tropical pumpkin or calabasa in cooperation with Don Maynard, professor of horticulture at the UF's Gulf Coast Research and Education Center in Bradenton. Two hybrids, expected to be popular in Florida's booming Hispanic market, may be released this year.

In other biotech research, Dennis Gray, professor of horticulture, is developing disease-resistant, transgenic grape varieties that will allow Florida to produce a greater percentage of the products consumed in the local market.

"Florida is the third largest consumer of grape products in the nation after California and New York, but does not have a competitive grape industry because the humid climate causes severe disease problems in varieties used for fresh fruit and wine," Gray said. "Fungal diseases as well as a bacterial malady called 'Pierce's disease' prohibit the cultivation of traditional varieties in Florida."

Milt Putnam



Tara Piasio

Above, Dennis Gray is using genetic engineering and other methods to develop grapes that resist Pierce's disease, which is caused by bacterial infection. Similar approaches are being used to develop resistance to fungal diseases.

Left, Bruce Carle looks at virus symptoms on squash plants.

Gray is using genetic engineering and other methods to produce Pierce's disease-resistant and fungal-resistant versions of traditional grape varieties.

"The first step toward these goals was to develop a genetic engineering system for grapes," he said. "We accomplished that by using a unique marker gene that causes successfully genetically engineered — or transformed — cells and tissues to fluoresce green. Use of this gene allows results of experiments to be analyzed very quickly."

He is currently using the system to insert a gene with antimicrobial properties. Transformed plants then will be tested for Pierce's disease resistance. Gray is using similar strategies to achieve fungal resistance in grapes.

Integrated Pest Management

Sustainable production of quality ornamental plants requires efficient management of pests, says Lance Osborne, professor of entomology, who is developing integrated pest management (IPM) programs for mites and mealybugs. IPM reduces pesticide use and encourages natural predators or biological controls to manage pests.

"Mites are the No. 1 ornamental pest, requiring application of more miticides annually than all other insecticides," he said. "While we have found effective natural predators to control mites, growers often must use pesticides when mealybugs and aphids become a problem. But pesticides can interrupt the work of natural predators. As a result, there's an urgent need to develop effective IPM programs for mealybugs and other difficult-to-control pests."

Worse yet, he said, ornamentals are being attacked by different types of mealybugs, and new species are expected to invade the state. Of particular concern is the Pink Hibiscus mealybug that has devastated agriculture in the Caribbean.

To manage the mealybug pest complex, Osborne is testing new pesticides and biocontrols, including a new predator and parasitoid. By combining chemical and biocontrols in an effective IPM program for mealybugs, biocontrol programs for mites also can be used more widely in the industry.

Gary Leibee, associate professor of entomology, is working on the problem of insect resistance to pesticides used on landscape ornamentals, cut foliage and vegetables. Areas of specialization include crops such as cabbage and collards, trees and shrubs and cut foliage, especially leather-leaf fern and tree fern.

Leibee helped develop a successful strategy for managing the leafminer, which threatened the existence of Florida's celery industry. His research on insecticide resistance also helped improve management of the diamondback moth, a troublesome cabbage pest.

"Dependency on pesticides has resulted in many problems, particularly the development of resistance in target pests and the destruction of beneficial insects," he said. "We need to integrate pesticides with alternative forms of insect control in IPM programs. Development of spray-decision tools, such as action thresholds, can reduce overall pesticide usage. We also need to increase the use of biorational or 'soft' pesticides to promote natural control provided by beneficial species."

Economic Effect

Due to the scarcity of economic information on the environmental horticulture industry, John Haydu, professor of food and resource economics, is analyzing the industry from the standpoint of structure and technology, market research and business management programs to improve financial performance of nursery and turf-related businesses.

"A recent economic impact study of the Florida nursery industry placed the wholesale value of ornamental plants at $1.46 billion, second after vegetables with $1.56 billion and greater than citrus with $1.38 billion," Haydu said. "The industry employs about 185,000 people, more than all the state's recreation and theme parks combined, and generates $5.42 billion in value-added wealth."

Donn Shilling, dgs@gnv.ifas.ufl.edu
Robert Stamps, rhstamps@mail.ifas.ufl.edu

James Standberg examines a petri dish containing different strains of the pathogen (Colletotrichum acutatum) that causes fern anthracnose. The malady was brought under control by disease management methods developed by scientists at the Mid-Florida Research and Education Center.

Thomas Wright

Diaprepes!

With a name like that, it spells trouble for Florida agriculture. But scientists at the UF/IFAS Citrus Research and Education Center have developed new environmentally compatible controls for the highly destructive Diaprepes citrus root weevil and other pests.

By Chuck Woods

Since its accidental introduction into Florida from the Caribbean 35 years ago, the Diaprepes weevil has been impossible to eradicate and difficult to control.

The exotic weevil has spread through Florida citrus and ornamental plant industries causing devastation of trees in every producing county of the state. More than 100,000 acres of citrus alone is estimated to be infested by the weevil.

Despite the damage, there is some good news. For the first time, the Diaprepes root weevil is being controlled with new genetically selected microbial agents developed by scientists at the UF's Citrus Research and Education Center (CREC) in Lake Alfred and private industry.

"These new bio-pesticides represent a major step forward in the development of environmentally compatible components for current citrus integrated pest management (IPM) systems," said Clayton McCoy, professor of entomology at the center who coordinates the Diaprepes research project. "These biorational agents use microbes such as fungi and nematodes – instead of chemical pesticides – to kill damaging pests."

McCoy said the larval or "grub" stage of the weevil feeds on the roots of citrus trees, opening wounds that are frequently invaded by Phytophthora, a soil-borne pathogen also capable of killing the tree outright. Combined, the two can be devastating.

A large infestation of citrus root weevils can begin from only one female. The adult female lays eggs, typically numbering in the thousands, between citrus leaves. The larvae hatch, drop to the ground and then move to tree roots to feed. The larvae can develop into adults in 80 days, so the emergence of adults can occur sporadically throughout the year.

"Growers may be able to suppress adult infestations with pesticides during peak adult emergence, but these measures are costly, unreliable and can upset current citrus IPM strategies," McCoy said. "In severely infested areas, citrus growers have been forced out of business."

When traditional chemical pesticides used for grub control were canceled about 10 years ago for environmental reasons, McCoy began an aggressive search for effective new microbial agents such as fungi and nematodes that would kill most root weevil grubs before they injured the plant. These microbial agents, formulated as bio-pesticides, are less disruptive to other organisms and appear to be safer for the environment than chemical pesticides.

In his search for soil pathogens that kill the citrus root weevil grub, McCoy tested approximately 100 different strains of fungi from soils in Florida and other parts of the world. He found three fungi that are highly virulent to weevils and stable in Florida soils.

He successfully gained industry support to produce one strain of the fungus, *Beauveria bassiana*, for commercial use in Florida. He developed different methods of applying the

Thomas Wright

Thomas Wright

Above, Ian Jackson, biological scientist, and McCoy harvest eggs of Diaprepes abbreviatus from an adult colony confined to a cage in the greenhouse at Lake Alfred.

Left, McCoy performs a microscopic examination of a sixth instar larva of Diaprepes for infection by parasitic nematodes.

Thomas Wright

McCoy inspects a citrus root for larval injury. Deep grooves in the bark tissue can serve as an entry site for soilborne diseases.

Thomas Wright

fungus to the soil using conventional spray equipment and micro-irrigation. He also found that sub-lethal dosages of neurotoxic chemicals in combination with a lesser amount of bio-pesticide alter weevil grub behavior and, in turn, increase fungal mortality.

"This discovery of the synergism of fungal activity has important and broad implications for insect pathology and other microbial pest control throughout the world," said McCoy, who received the U.S. Department of Agriculture Honor Award in June for his research.

His accomplishments also include development of nematodes as bio-pesticides against citrus root weevil grubs. Working with Larry Duncan, professor of nematology, and others at CREC, McCoy field tested two nematodes that appear to be effective against all stages of root weevil grubs. These nematodes are commercially produced by Thermo-Trilogy Corporation, Columbia, Md., and Integrated Biological Controls Systems in Aurora, Ind.

McCoy said field tests show grub populations can be reduced by 80 to 90 percent in four weeks in sandy soils.

Thanks to McCoy's pioneering research, registered microbial products are successful and available to commercial citrus growers. Today, an estimated 60,000 acres of commercial citrus receive at least two applications of nematodes annually to control root weevil grubs.

He said nematode and fungal bio-pesticides are compatible with each other biologically. Continued use of bio-pesticides for the control of Diaprepes in the future is expected to increase the role of other naturally occurring beneficial organisms for the control of adult and larval Diaprepes. Although bio-pesticides will cost growers from $30 to $50 per acre, this expense is about one half that of chemical pesticides.

Research on Diaprepes involves a number of scientists at the center. Jude Grosser and Bill Castle, professors of horticulture, are testing new rootstocks resistant to soil-borne diseases that in combination with grub feeding on the roots cause major tree decline. Jim Graham, professor of soil microbiology, is examining the Phytophthora/Diaprepes interaction in different soils. Herb Nigg, professor of entomology, is studying various aspects of weevil biology. Robin Stuart, research associate, is determining the role of ants as predators of weevil eggs and larvae.

Collaborative research is ongoing with other scientists in UF's Institute of Food and Agricultural Sciences and the U.S. Department of Agriculture. Much of this research is being done through funding from citrus growers and USDA.

Clayton McCoy, cwmy@icon.lal.ufl.edu

MOSQUITOES meet their match

at the UF/IFAS Florida Medical Entomology Laboratory

By Cindy Spence

Anyone who has ever been chased indoors on a sunny day or balmy evening by mosquitoes or other biting insects will be glad that Walter Tabachnick and his colleagues are on the job.

Tabachnick is director of the Florida Medical Entomology Laboratory in Vero Beach, and he and a team of scientists are dedicated to solving a host of insect problems.

The center has been in place since 1956 and a part of UF's Institute of Food and Agricultural Sciences since 1979. Its mission: taking the bite out of biting insects.

Tabachnick says there are many ways to do battle with biting insects but the laboratory's goal is to find the best ways. Pesticides, for instance, work well, but have side-effects that sometimes limit their use. So the laboratory focuses on control methods without side-effects, and that sometimes calls for high science.

Take researcher Jonathan Day's recent work on an encephalitis risk map.

Thomas Wright

Biological scientist Lee LeFevre gives a nutritional supplement to mosquitoes as part of a study on the life span of mosquitoes.

Jonathan Day, right, and laboratory technician Dave Ryden count mosquitoes that were caught in a trap the previous evening. Using the traps, they can tell when the mosquitoes are active and in which direction they have been traveling.

Thomas Wright

Day is combining satellite surveillance data from NASA, weather information from the National Oceanic and Atmospheric Administration and a map of North America to develop a tool that could be made available nationwide via a Web site.

The map would change as various indicators for encephalitis show up or disappear across the country. The goal is a risk map that will provide valuable time for officials to educate residents about the risk of encephalitis and prevent an outbreak.

Mosquitoes get the encephalitis virus from infected birds and pass it on to humans. Encephalitis starts as a flu-like illness but can progress to a fatal inflammation of the brain.

Through his work on the map this year, Day said the risk of a widespread St. Louis encephalitis epidemic in Florida was almost nonexistent. He also predicted New York City would be spared a repeat of last summer's epidemic of West Nile virus, a close relative of St. Louis encephalitis.

Weather conditions were expected to keep both mosquito-borne diseases in check along the East Coast.

"In Florida, 200 cases of encephalitis is an epidemic," Tabachnick says. "There are places in Africa that would gladly trade for 200 cases a year of encephalitis."

A Diet Pill for Mosquitoes

One new weapon in fighting mosquito-borne diseases is a "diet pill" developed by Dov Borovsky after 10 years of research. The diet pill starves mosquitoes to death with a substance that alters mosquito digestion, making it impossible for them to feed, lay eggs or survive.

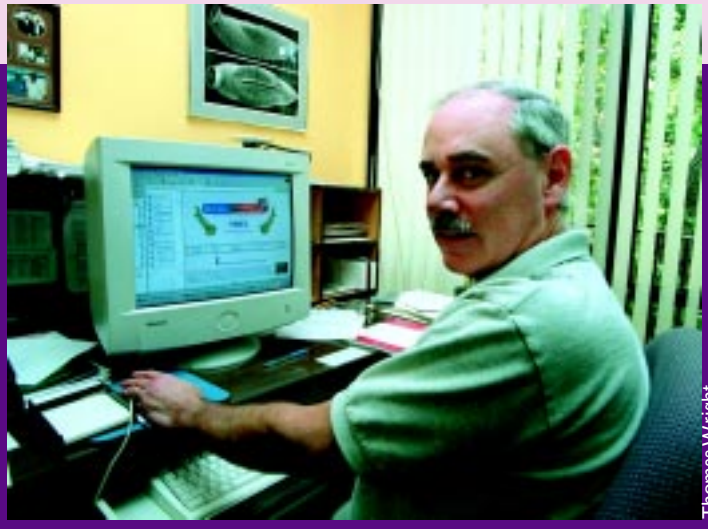
"We hope this will be a new tool to stop the advance of malaria and other mosquito-borne diseases," said Borovsky, an insect biochemical and molecular biologist. "It is likely to work on all mosquitoes, all over the world."

There are more than 3,000 species of mosquitoes. Worldwide, mosquito-borne diseases infect about 700 million people each year and kill 3 million, according to the Centers for Disease Control and Prevention in Atlanta.

But the diet pill is promising, not only because it is wickedly efficient but because it has great potential to be environmentally safe.

To come up with the "pill," Borovsky combined mosquitoes' digestive control hormone with two substances, yeast cells and chlorella, a common alga. The pill can be placed into any water body where mosquitoes are known to breed. The larvae feast on the chlorella or the yeast, then die of starvation as their digestive process is interrupted.

The mosquitoes that feed on the pill cannot produce eggs, so Borovsky first thought he had developed a birth control pill.

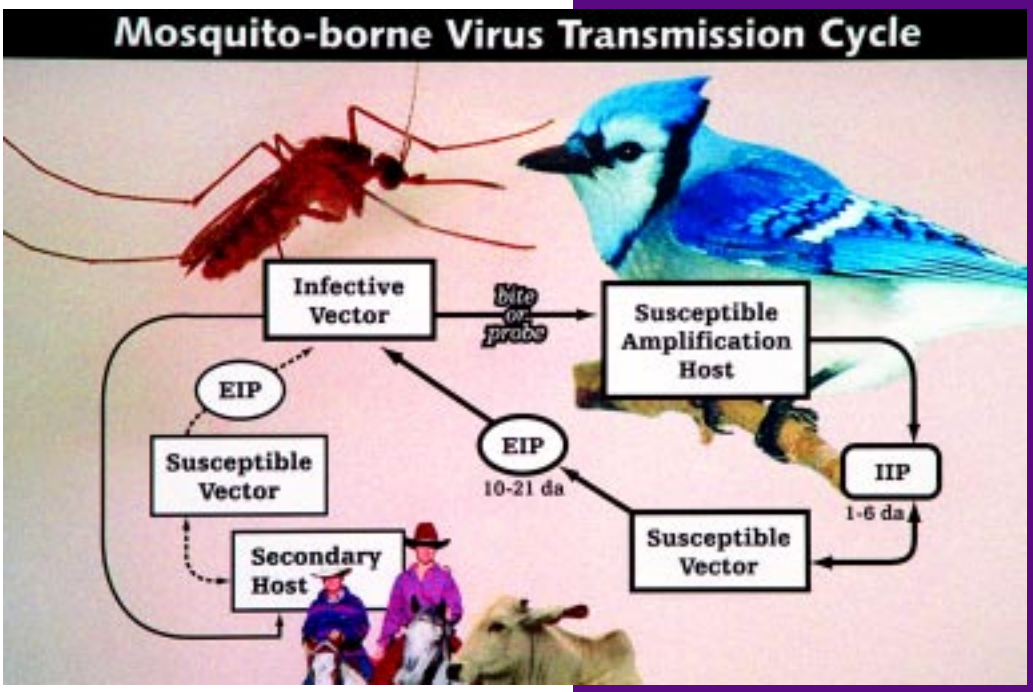


Thomas Wright

Florida Medical Entomology Laboratory Director Walter Tabachnick said controlling insects without harming people is the goal of research at the laboratory.

Thomas Wright

Dov Borovsky analyzes DNA data in developing the mosquito diet pill.



This chart shows how mosquitoes transmit viruses.

"But then we found that the reason they were not producing eggs was because they were not digesting, so then we knew we had a diet pill, not a birth control pill," Borovsky said.

The synthesized hormone is inexpensive, as are yeast cells and chlorella. Chlorella can be freeze-dried and stored for long periods and then brought back to life as the deadly diet pill, while yeast cells can be dried and used as a powder to feed mosquito larvae.

Unlike DDT and some other pesticides, the pill does not alter the environment, and mosquitoes that feed on the hormone-laced chlorella or yeast starve to death within 72 hours.

"This is a natural bullet that we can use in the environment because the hormone doesn't stay in the environment," Borovsky said.

Fencing Out Pests

Other pest controls developed at the laboratory combine science with common sense, such as Day's carbon dioxide fence to keep biting sand flies away from public gathering places, like playgrounds.

Day field-tested his fence at St. Mark Catholic School in Boca Raton, where the playground is next to a mangrove marsh. Biting sand flies and other blood-sucking insects use exhaled carbon dioxide to locate a host, so recess for the children was like mealtime for the sand flies, also known as no-see-ums and winged teeth.

The children were like beacons, "flashing 'blood meal, blood meal, blood meal,'" Day said.

But Day used the sand flies' thirst for blood against them. Between the marsh and the playground he built a fence out of a lattice of PVC pipe. The lattice is hung with mesh panels coated with mineral oil. The pipes carry carbon dioxide, which draws the flies to the fence, where they get trapped in the mineral oil on the panels and die.

A test of a similar fence on the laboratory grounds caught 200,000 sand flies per night.

Day said insect repellents provide limited relief from sand flies because the insects are so persistent. With populations in the millions near swampy areas, it is inevitable that some sand flies will find little patches of skin not treated with repellent and even crawl up under hair.

"Their bite is very painful," Day said. "They really can make life unbearable, sometimes."

Day says future applications of the carbon dioxide fence range from small-scale use by homeowners to large-scale settings such as sports fields and resorts.

The carbon dioxide fence grew out of a 14-year research project to develop environmentally friendly techniques of trapping sand flies.

"Historically, we'd treat a marsh like the one near the school with DDT, and that worked great. Later, we'd treat it with chlordane, and that worked great. The problem is DDT and chlordane stay in the muck forever, and now they're banned," Day said. "What we have essentially done is remove insecticide from the marsh. We bring the sand flies to the trap and catch them. So we're not killing butterflies, fireflies, parasitic wasps or beetles or anything other than sand flies."

Protecting People, and the Economy

The common thread in the laboratory's work, Tabachnick says, is finding a control method that is appropriate, and that means something that kills biting insects without harming people and other animals, including beneficial insects.

"Certainly there have been control strategies in the past that today would not be proper," Tabachnick said. "We are getting away from the use of pesticides that affect the environment, and to do that we need to understand the biology of these insects better."

The center is an important resource for mosquito-control professionals, county health departments, extension agents and graduate students, Tabachnick said. The center also is mindful of its role in protecting Florida's economy.

"Mosquitoes can have an economic impact," Tabachnick said. "With a severe encephalitis outbreak, for instance, you'd see a shutdown in recreational facilities and some tourist attractions. The impact can be very severe, so we try to get out in front on these things. We want to protect Florida's ability to enjoy its resources."

Florida has the premier mosquito-control system in the country, Tabachnick said, and owes much of its development to past research on controlling the pests.

"The approach is no longer just to spray and spray to control mosquitoes. We're trying to assess the risk mosquitoes pose and mitigate that risk," Tabachnick said. "With all the years of research in this area, this laboratory is where the rubber hits the road."

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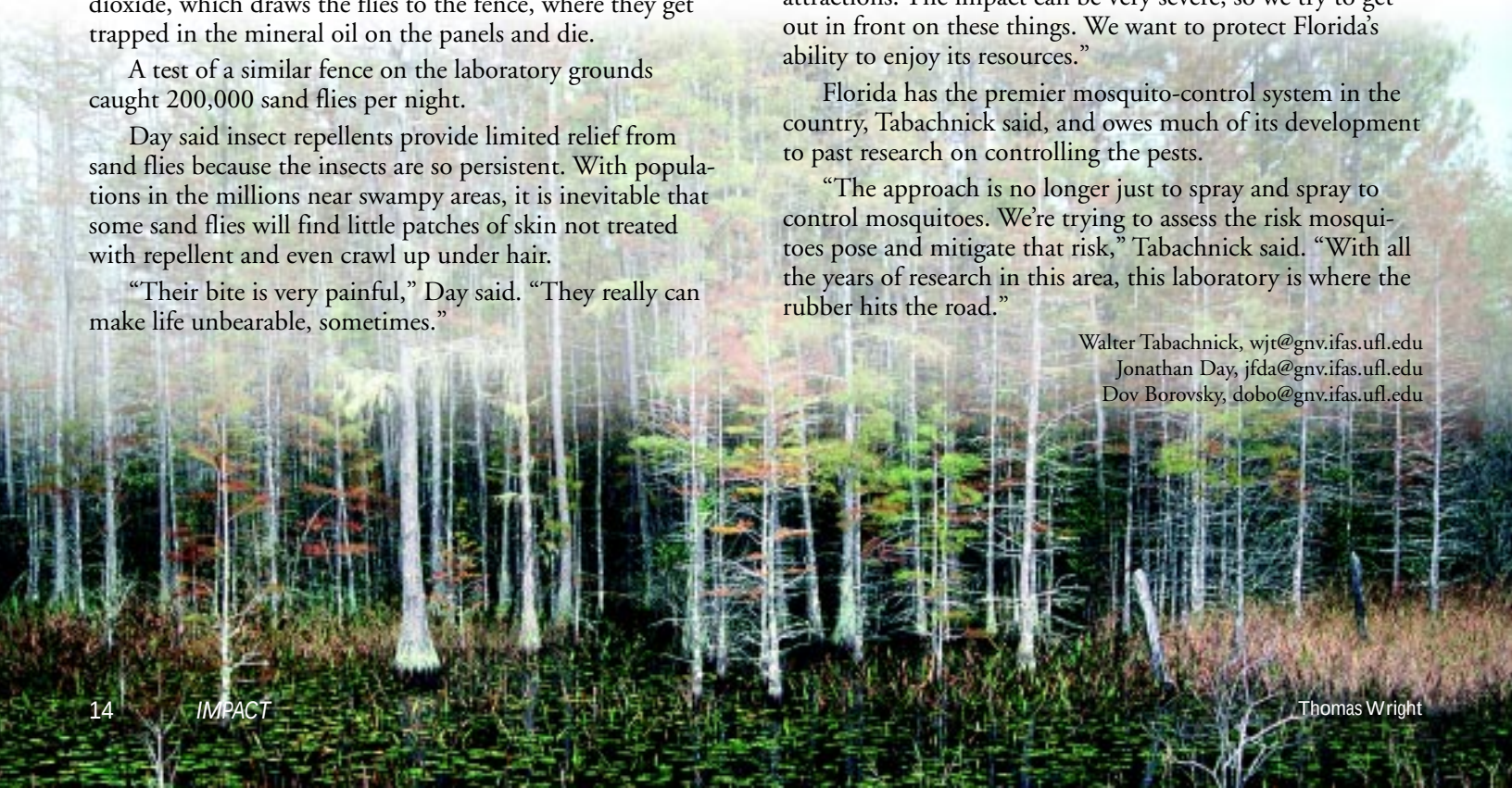
Jonathan Day, jfda@gnv.ifas.ufl.edu
Dov Borovsky, dobo@gnv.ifas.ufl.edu



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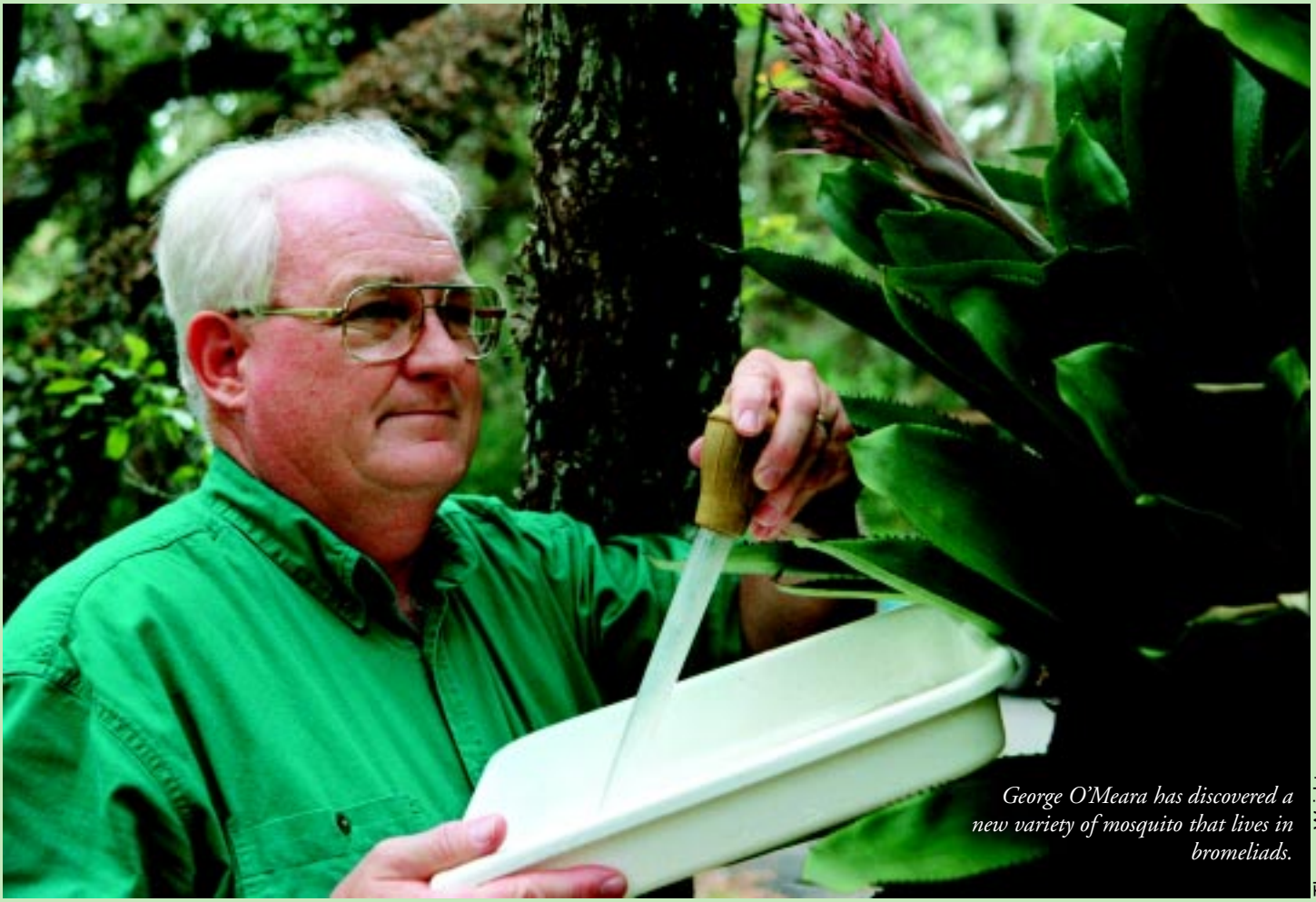


George O'Meara has discovered a new variety of mosquito that lives in bromeliads.

Thomas Wright

Mosquito family gets new member

A new mosquito is on the scene in Florida and may push its more vicious kin out of one common home

By Cindy Spence

University of Florida entomologist George O'Meara has discovered a new variety of mosquito.

But the mosquito researcher says that's good news.

The new mosquito sets up housekeeping in bromeliads, which means it uses up one of the habitats in which the dreaded Asian Tiger Mosquito breeds. While the Asian Tiger can spread disease, the new kid on the block does not even feed on humans.

The new mosquito was named *Culex biscaynensis* because it was found near Biscayne Bay while O'Meara was on a mosquito safari of sorts, sampling for the little pests in southeastern Miami-Dade County.

"Right away, this one looked a little different," said O'Meara, who is based at the Florida Medical Entomology Laboratory in Vero Beach, a part of UF's Institute of Food and Agricultural Sciences. "But what was it?"

O'Meara wasn't all that surprised to find a new mosquito in southeastern Miami-Dade. After all, that area of Miami-Dade was severely damaged by Hurricane Andrew in 1992, so many new bromeliads were imported and some may have had mosquito passengers.

And to hear O'Meara tell it, what the world needs is more mosquitoes like this little nectar-feeder.

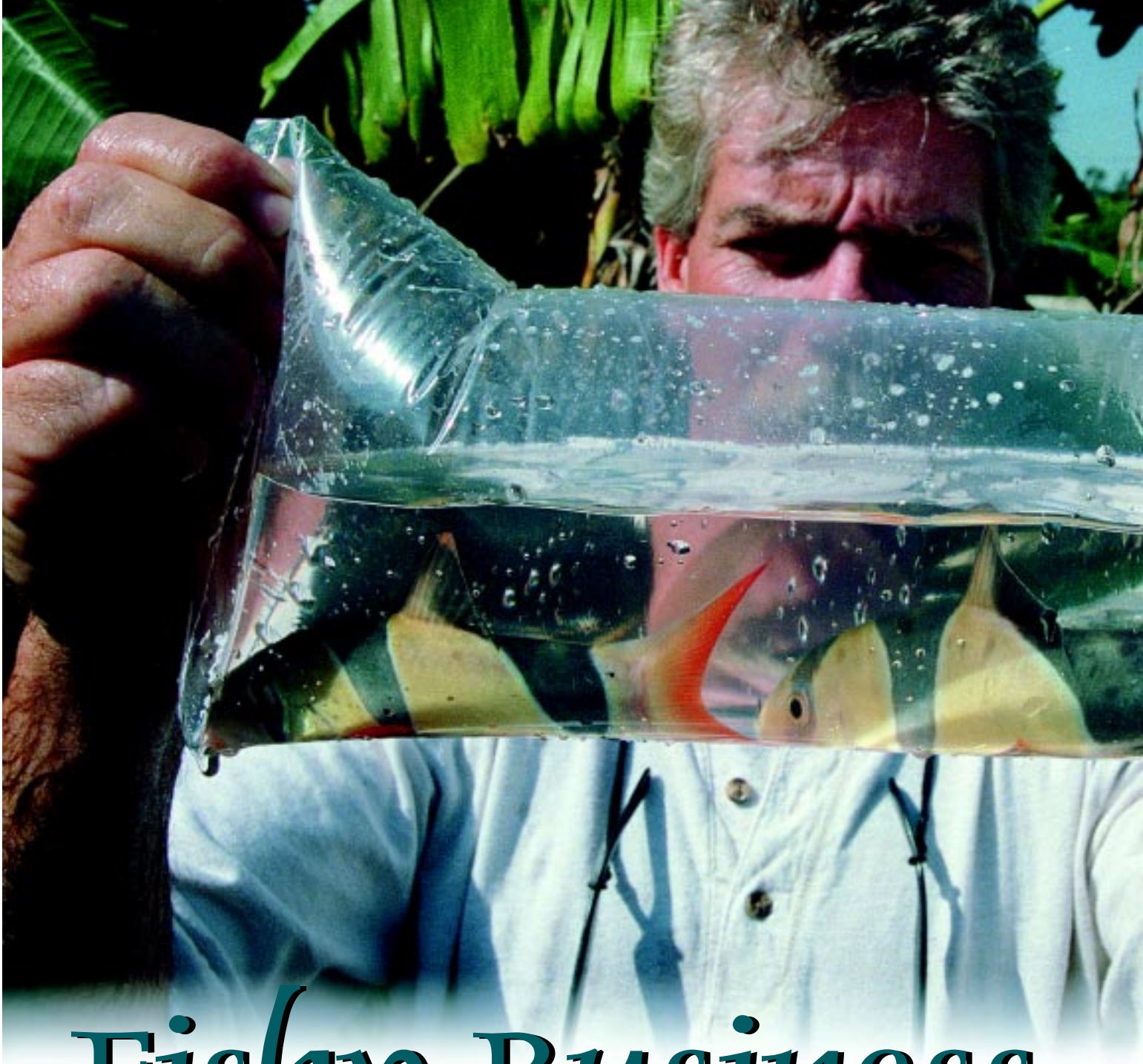
"The fact that it is in bromeliads is a plus," O'Meara said, "because it takes up habitat that Asian Tiger mosquitoes would colonize, and nobody likes Asian Tiger mosquitoes."

The Asian Tiger mosquito arrived in Jacksonville in 1986. By 1994, it had infested every county in Florida. It's a vicious biter and the bane of picnics, barbecues and other outdoor activities throughout Florida.

People think of old, water-filled tires and pails and pots as mosquito habitats but don't usually realize that mosquitoes can find other homes in the environment, O'Meara said.

"It's not just artificial containers that are a problem," O'Meara said. "Bromeliads and tree holes are natural containers for mosquito production."

George O'Meara, gfo@gnv.ifas.ufl.edu



Fishy Business

Tropical Aquaculture Laboratory in Ruskin serves Florida's $57-million-a-year industry

By Ed Hunter

The University of Florida's Tropical Aquaculture Laboratory in Ruskin was founded in 1996 with strong support from the state's tropical fish industry.

"The Florida Tropical Fish Farms Association supported our operations by funding a veterinarian for two years," said laboratory Director Craig Watson. "They gave us money to set up the diagnostic lab and they've funded individual research projects.

Thomas Wright

Craig Watson shows off a pair of clown loaches. All clown loaches sold in this country are imported, but Watson hopes to change that by developing methods to help the fish reproduce in fish farms.

Thomas Wright

Thomas Wright

Farm manager Scott Graves, left, and Craig Watson use a net (above) to coral off-color and diseased fish in a pond at the Tropical Aquaculture Laboratory. After a pump lowers the water level in the pond (below), Watson, left, Graves, right, and research biologist Dan Bury remove fish.

"After two years, the state assumed funding responsibility for the veterinary position as an assistant professor in the UF Department of Fisheries and Aquatic Sciences," he said.

Now, just three years later, the facility in a former National Weather Service building is on the verge of an expansion that will nearly double its size and capability to serve the industry.

The laboratory is currently housed in a 4,000-square-foot building next to a 6-acre fish farm purchased with a

Thomas Wright

Biological scientist Eric Curtis performs a necropsy on a tropical fish in the diagnostic lab.

$500,000 grant from the Florida Department of Agriculture and Consumer Services. Future plans call for construction of a new building with an indoor hatchery, a water quality laboratory, space for controlled experiments and 1,200 square feet of outdoor research space.

The new building will provide the space to perform research that will be beneficial to the industry, Watson said.

"It's hard for scientists to report just pond results," Watson said. "On the other hand, producers find it difficult to take something that just happened in the laboratory and try it in their ponds. You have to prove it in the real world.

"This will give us a controlled environment where we can do research and then see what it does in replicated ponds in a real-life situation," Watson said.

New Species

Florida farms provide 95 percent of tropical fish raised in the United States. Because of imports, Watson said American producers only control about 30 to 40 percent of the U.S. market.

Watson said for Florida farmers to gain a larger market share, they will need new species of fish to breed. One good addition to area farms would be the clown loach, a brightly colored orange and black tropical fish found only in the rivers of Sumatra and Borneo. The problem, he said, is that clown loaches brought to Florida are not reproducing with any regularity.

"If we can figure out how to produce the clown loach repetitively and in mass numbers, Florida fish farms could potentially start providing clown loaches to pet shops worldwide," Watson said.

According to Watson, the challenge is to find out why clown loaches won't or can't have babies away from their native rivers. It seems to researchers that the female loaches are producing viable eggs, and the males are capable of fertilizing the eggs, but something is preventing the process from going forward.

Watson said researchers think artificial fertilization techniques used with other animals could be used with the loaches if they could only tell when a clown loach is ready to lay eggs. To come up with a method of "spawn detection," researchers are looking at vitellogenin, a compound that is found only when fish are getting ready to produce eggs.

"Based on the level of vitellogenin in the blood, we can say when a fish is ready to spawn," Watson said. "Hopefully she will do it on her own, but if not we can inject her with releasing hormones which cause her to ovulate. Then we can artificially inseminate the eggs."

Another research project has the goal of breeding the large male swordtails prized by hobbyists. Prior UF research has shown there is a genetic component for size, and that large male swordtails tend to have large, male offspring, said Watson.

"Wild populations have more large males present, and the sword is longer in relation to the body," Watson said. "So we're going to Belize, Guatemala and Mexico to collect the largest males we can find."

The researchers plan to breed the large males with domestic swordtails to increase the average size of the swordtails sold in pet shops.

Caring for Fish

Researchers in Ruskin are doing more than just looking for new species or ways to improve existing species. They also want to help farmers and hobbyists care for their fish.

One study will determine the amounts of the antibiotic florfenicol to use on tropical fish. Staff veterinarian Roy Yanong said florfenicol could be very useful in treating tropical fish diseases because it is effective against a wide variety of bacteria.

Yanong said the project is still in its early stages and is focused on getting basic information on how antibiotics in general interact with the metabolism of tropical fish.

"The dosages for a lot of the antibiotics used in the past have been based on those used for food fish," Yanong said. "There have not been many studies involving ornamental fish.

"Typically when temperatures are higher, as in warm water fish, the metabolism of the animal can be a lot quicker, and the medicine will be flushed out before it can do any good," he said.

Other studies will determine the levels of the drug necessary to kill bacteria associated with common fish diseases, he said.

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Scott Graves compares sizes of two male swordtail fish. Researchers from the Tropical Aquaculture Laboratory will travel to Belize, Guatemala and Mexico to capture wild swordtails. The goal is to increase the size of swordtails raised in the U.S. by breeding them with the larger, imported fish.

Thomas Wright

Good, Better, Best!

Best Management Practices, detailed in a new UF/IFAS manual, are helping citrus growers improve water quality in the Indian River area

By Serya Yesilcay

A coalition of citrus growers, state regulators, environmental groups and University of Florida scientists has been working together toward a common goal: promoting the use of Best Management Practices (BMPs) to improve water quality in the St. Lucie Estuary and Indian River Lagoon.

One result of the work that began in December 1998 is the *Indian River Citrus BMP Manual*, a 164-page document prepared by researchers and extension faculty at UF's Indian River Research and Education Center and the St. Lucie County extension service. Located in Fort Pierce, both programs are part of UF's Institute of Food and Agricultural Sciences (UF/IFAS).

The manual evolved from workshops among groups with diverse backgrounds who had a chance to express their concerns and discuss the most efficient ways to promote better grove management, said Jack Hebb, a UF multi-county citrus extension agent in St. Lucie County. Hebb helped develop the publication along with researchers Brian Boman and Chris Wilson at the center.

"The most important component of this manual was grower input – getting them involved to present their concerns openly," Hebb said. "There was a lot of exchange between industry groups such as the Indian River Citrus League and state agencies such as the Florida Department of Environmental Protection (DEP)."

Brian Boman, left, and Chris Wilson organized the BMP manual to include references that citrus growers can use to improve both land and crop quality.

Thomas Wright

A series of workshops helped regulators and growers understand the difficult issues facing both groups, which helped them come together to find solutions to some old problems, said Boman, an associate professor of agricultural and biological engineering at the research center.

"It was very educational for all of us and also very satisfying to see growers take regulators out to visit their groves – showing them, for example, how a speed sprayer works," he said. "Some people who develop environmental regulations had never been in an orange grove before.

"Regulators got to understand they were dealing with real people, that growers were basically there to make a living," Boman said.

The flip side of the coin was having growers understand the concerns of regulators and how they could work together toward some common goals.

When they first started the BMP workshops, a lot of growers were skeptical, said Wilson, assistant scientist for agro-ecology at the research center. "But then they started to see this was an opportunity for them to be part of the solution instead of the problem. If they didn't do something, regulators would."

That was when they started to get a lot of positive feedback, Boman said. "Growers are typically not always sharing, even among themselves – they can be very independent-minded on issues, because what is good for one grower might not be good for another. They face different issues depending on the location of their land, the size of the their grove and their management style."

"It was all a little overwhelming when we started talking," said Stan Carter, citrus division manager of McArthur Farms and one of the 1,200 members of the Indian River Citrus League headquartered in Vero Beach. "We soon realized this was a great opportunity for the league to start becoming proactive and really look at the pros and cons of our practices so we could do something to change for the better," he said. "And we are off to a running start."

Thomas Wright

The citrus BMP manual targets growers in the Indian River area, from Brevard to Palm Beach counties.

BMPs Make A Difference

BMPs refer to those on-farm practices that have been tested scientifically and through actual industry practice. "These are steps growers can take to help protect the environment while improving the way they manage their groves," Boman said.

The result should be a win-win, because better management practices can be more profitable and environmentally friendly in the long run. Under a BMP program, growers can perform environmental assessments of their crop management operations, which could improve water quality, crop quality and yield, worker safety, and result in more efficient resource allocation and reduced environmental impacts.

Through BMPs, growers also can find opportunities for cost-sharing incentives and reduced regulatory requirements, as well as chances for self-regulation within the citrus industry.

The UF's citrus BMP manual addresses five areas that growers, state regulators, researchers and environmental groups agreed to target during workshops: BMPs for water volume or excess water, sediment, pesticides, nutrients and aquatic weeds.

Nutrient enrichment, for example, was identified as one of the biggest problems resulting from fertilizer runoff both from citrus land and urban areas. "Now growers can refer to the manual to see how they can decrease runoff," Wilson said.

The publication also refers to UF/IFAS circulars and bulletins on different topics that growers can use.

"All the steps covered in the manual are interrelated," Wilson said. "Some are changes in housekeeping, most are changes in practices, such as using the right materials correctly when dealing with pesticides or fertilizers."

Some of those practices might require expensive new investments, he said, such as building reservoirs, which would mean taking land out of use.

Although any change is difficult and requires effort, the stimulus is significant, Boman said. "Instead of getting

hammered with regulations, the citrus industry has the chance now to do something to prevent that from happening."

Getting the Word Out

Workshops in the past year have been helpful in teaching growers and workers more about BMPs, said Hebb, who has given on-site training to more than 700 workers.

"He's been working with operators, tractor drivers – that is where the change is going to happen, in everyday practices," Boman said.

Through basic educational programs, he gives workers tips on how to deal with issues such as alleviating spills and stopping chemicals from draining into canals, Hebb said. "We also encourage them to read and understand labels and know how to take necessary precautions, such as making sure tanks do not overflow, that there are no chemical spills along canals, that they take care of leaks, or that they calibrate properly when mixing chemicals."

The citrus BMP manual addresses issues that both regulators and growers need to work on, but it is still up to the people to implement those techniques, said Gary Roderick, administrator with the Florida DEP, who also participated in BMP workshops and meetings.

He pointed out that the citrus industry is only one of many entities responsible for the quality of Florida's lands and waters. Urban areas, golf courses and other farm operations all contribute to some of Florida's major environmental problems, and all need to be more environmentally conscious to make sure conservation is successful in the long term, he said.

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The BMP manual was published in June. Florida Citrus Mutual, Florida Department of Environmental Protection, Florida Farm Bureau, South Florida Water Management District and the St. Lucie River Initiative (representing different environmental action groups) were among the organizations that provided input during the manual's development. The UF's Indian River Research and Education Center will introduce the manual in the fall and make it available to as many growers in the area as possible. Workshops are planned for October and November dealing with pesticide BMPs and controlling sediment runoff. To find out more about the Indian River Citrus BMP programs, contact the research center at 561-468-3922, or visit the Web site at *www.irrec.ifas.ufl.edu*

On the Waterfront

By Serya Yesilcay

The humble oyster is helping scientists at UF's Indian River Research and Education Center find new ways to monitor Florida's environmental health.

Liberta Scotto, research program coordinator for estuarine science, has been working on water quality and excess water – runoffs from the land that affect the salinity and cleanliness of water bodies such as the Indian River Lagoon and the St. Lucie Estuary.

The American oyster, *Crassostrea virginica*, was chosen by the South Florida Water Management District as a Valued Ecosystem Component to be protected and restored in the St. Lucie Estuary. Scotto says oysters are a good measure of the general health of the estuary. "When salinity is right, oysters will be viable, and they will also provide a good habitat for other animals such as crabs, mussels and fish."

Estuaries are a mix of fresh and salt water and receive stormwater runoff from all land uses, including agriculture, she said. "The quality, amount and timing of freshwater entering the estuary is critical to the survival of oysters, as well as other estuarine organisms.

"What comes off the land flows into the waterways, they all tie together. People need to remember that whatever happens on the uplands eventually affects a downstream water body – so we all contribute to the welfare of Florida's environment."

Thomas Wright

The health of oysters can be a good measure of the overall ecological balance of the St. Lucie Estuary and Indian River Lagoon.

Scotto has been doing weekly water quality samplings since April, measuring salinity and temperature, to determine when and where spat – baby oysters – settle. She also examines adult oysters for disease, condition and reproductive potential.

"Spat settlement depends on many factors, including amount of food, dissolved oxygen, salinity, temperature, total suspended solids and pH," Scotto said.

"If we know when they spawn, how many are out there, and when they go through their reproductive cycle, we can see where the best spots for survival are," she said. "Then we can help rebuild oyster populations by bringing in oyster shells, building bars in appropriate places and providing the right salinity in the estuary through reservoirs that can hold runoff water back."

Scotto's research ties in to the Central and South Florida Restudy being conducted by the U.S. Army Corps of Engineers. The study involves "replumbing" an area from the Kissimmee River to the Everglades.

"When waterways were straightened and extensive canal systems were built to drain the land, it allowed water to run off the land too fast into Florida's estuaries and other wetland systems," she said. "Now we have to go back, replumb, and recapture all that water that flows off the land too fast.

"But people also need to understand that Florida never would have developed unless these things were done, so we need to stop pointing fingers and start working together to improve things," Scotto said. "Anyone who lives in Florida now has to take responsibility for what has happened, otherwise they couldn't have settled here and called it home."

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Thomas Wright

Liberta Scotto, the only marine biologist at the Indian River center, is studying oysters to determine how populations may be replenished.

from PEPPERS to POINSETTIAS

Food and ornamental crops get a boost from scientists at the UF/IFAS Gulf Coast Research and Education Center

By Christine Penko

Gulf Coast Research and Education Center (GCREC) scientists study a variety of fruits and vegetables vast enough to stock a produce market and an array of ornamentals sufficient to sustain a nursery.

Entomologists, plant pathologists, horticulturalists and other experts collaborate to help Florida growers yield high-quality products – from juicy tomatoes, sweet strawberries and crisp peppers, to flourishing caladiums.

"The No. 1 reason we're here is to serve producers and growers," said Jack Rechcigl, associate director of the center, part of UF's Institute of Food and Agricultural Sciences. "We work to develop and share knowledge that will place Florida agriculture among the most efficient and economically competitive in the world."

The Gulf Coast center comprises two locations: Bradenton in Manatee County and Dover in Hillsborough County. Tomato, pepper, watermelon, cucumber, squash and other food crops, along with ornamentals such as amaryllis, poinsettia and chrysanthemum, are studied at Bradenton. Efforts at Dover are concentrated solely on strawberry production.

Interdisciplinary researchers focus on plant breeding and genetics, as well as integrated biological, chemical and cultural pest management, according to Rechcigl. Other research areas include characterizing bacteria, fungi and viruses that infect vegetables, ornamentals and strawberries; developing cultural practices for sustaining commercial production; and improving soil and water management and natural resource protection.

Dave Schuster, right, watches as laboratory assistant Sandy Thompson conducts whitefly repellent trials.

Thomas Wright

Superb Strawberries

Strawberries grow on just 6,000 acres in Florida, but with annual gross sales of $150 million, the work at Dover is critical. It is the only publicly funded research center in the United States dedicated to strawberry production, according to Dan Legard, a plant pathologist at Dover.

Legard works to combat two diseases that plague strawberries: Botrytis fruit rot and Colletotrichum. He examines causes of diseases and how epidemics develop, then generates improved control practices that will lead to higher yields and decreased pesticide use.

The fungus that causes Botrytis fruit rot, also known as gray mold, can infect petals, flower stalks, fruit caps and fruit. It results in problems before and after harvest and during storage, where it frequently appears as white or gray fuzzy material on the berries.

Colletotrichum diseases, which lead to fruit and crown rot and leaf spots, pose a major preharvest problem, limiting yield for the Florida strawberry industry.

"The first thing growers are interested in is the cultivar," Legard said. "Disease is the next most important concern and also the hardest thing to manage. Florida's yearly loss due to disease averages $10 million to $15 million."

Among the most perishable fruits, the strawberry is highly susceptible to the elements and disease. Without fungicide sprays, Legard says strawberries could not be grown in Florida.

The Food Quality Protection Act of 1996 established national standards for safe pesticide residue levels, with special protections for infants and children. Legard says growers are beginning to lose some pesticides and fungicides as a result and must invest in alternative disease prevention.

Legard is evaluating new fungicides for effectiveness and determining whether growers can reduce usage rates while still controlling disease. He combines that with research on different strawberry varieties and cultural practices, such as varying spacing between plants and removing old foliage.

In addition, he has found that growing strawberries in tunnels seems to control Botrytis and eliminates the need for fungicides. Growing the Sweet Charlie cultivar in tunnels, for example, may reduce loss to 2 percent – a cost savings of approximately $6 million.

"Despite the potential benefits of tunnels," Legard said, "growers are able to make a living growing in the open.

Thomas Wright

Bob McGovern, right, checks the roots of ornamental plants with plant breeder Brent Harbaugh.

They're reluctant to switch, in part because of the cost of tunnels, which is about $10,000 to $20,000 per acre."

Legard predicts tunnels will become popular only if there are regulatory reasons, such as water restrictions or Environmental Protection Agency bans on certain fungicides, or for niche marketing purposes, including organic crops.

Stopping the Silverleaf Whitefly

A newly hatched silverleaf whitefly attaches itself to a leaf's underside and begins feeding. The pest sucks nutrients from the plant, resulting in poor growth, defoliation and sometimes death.

David Schuster, an entomologist at the GCREC, is seeking ways to curb silverleaf whiteflies and their damage to Florida's tomato crops.

"In the case of the tomato, silverleaf whitefly nymphs' feeding interferes with normal ripening," Schuster said. "We are looking at ways to apply pesticides that are insect growth regulators, which interfere with the whitefly's normal development."

The heat-loving species, about 1/16 inch long, rapidly reaches high populations. Females lay 80 to 100 eggs in a lifetime; as many as 14 generations can be expected in one year.

Schuster is determining when to treat plants with insect growth regulators to minimize whitefly nymph population density, which should then reduce irregular ripening.

Schuster also has tried plastic soil mulches that reflect ultraviolet light, repelling the whitefly. Fewer land on tomato plants and fewer pesticide applications are needed. He cautions that these mulches are effective only as long as tomato plants do not cover them, which is approximately eight weeks.

Fighting Fusarium

Plant pathologist Bob McGovern approaches plant disease management holistically. He incorporates strategies that include chemical and biological control, host resistance and soil solarization to find the most environmentally sound method.

McGovern and other GCREC scientists recently studied the origins and spread of Fusarium root, crown and stem rot of lisianthus, an ornamental crop worth $100,000 to $200,000 per acre in Florida.

In 1995, Fusarium avenaceum, a soil-borne fungus, became widespread in Florida and California lisianthus production areas. Florida growers experienced losses up to 30 percent in 1995-96. In 1997, many growers' losses reached 70 percent.

McGovern and his colleagues discovered that Fusarium rot did not survive well in Florida soils and did not appear to be seed-borne, but it persisted for many months on plastic and Styrofoam transplant trays. They found a strong link between outbreaks in Florida and infected plants coming into the state from transplant sources. The team worked with producers to manage crown and stem rot in lisianthus transplants. Since the 1998-99 Fusarium outbreaks, crown and stem rot have been minor and sporadic in Florida.

In addition to his work with Fusarium, McGovern is evaluating soil solarization for bedding plants such as begonias and impatiens – a unique use for the process, which growers typically employ for vegetable crops.

"Solarization has shown significant benefits in terms of reducing disease of landscape plants," McGovern said. "It may not be the magic bullet, but could be part of the picture when combined with other things."

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Life in the Big City

Indoors and out, UF/IFAS extension reaches out to urban residents

By Jean Feingold

Tara Piasio

Florida's urban residents need information to enhance their lives as much as their rural counterparts do. And they can get it from the same place – the Florida Cooperative Extension Service.

The extension service, a part of the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS), maintains offices in each of Florida's 67 counties. In metropolitan counties, the offices tailor their programs to meet the special needs of urban residents.

In Pinellas, Florida's most densely populated county with about 4,000 residents per acre, the extension service helps residents get back to nature.

The Pinellas County Extension Service maintains the Florida Botanical Gardens on about 180 acres near county government offices. County extension director Judy Yates explained, "That garden will be our urban environmental classroom."

When completed in 2002, there will be 18 specialty gardens, 11 of which will open to the public this fall. Paid for largely by the Pinellas County government through a 10-year, 1-cent local option sales tax, the total cost is estimated at $25 million.

Sixty acres purchased with the help of state funding are devoted to native Florida plants, including several endangered and threatened plant and wildlife species. A creek going through the area, which had been dredged by the Army Corps of Engineers in the 1950s, has been returned to its natural state, allowing it to meander and flow over into swamp lands.

A 35-acre former landfill will be restored to botanical garden status, Yates said. Research and trial gardens on this site will help determine how best to restore former landfills. She said methane could be piped from the site to heat greenhouses and water elsewhere in the gardens. An anonymous donor has provided $1 million for the first endowed extension professorship, and plans are under way to hire a renowned professor to study urban environmental sustainability.

The new Gulf Coast Art Center, an art museum with sculpture gardens and a history museum, which includes 20 historic structures from houses to churches, also are located on the site. Vegetable gardens and historic gardens have been planted near them.

Technology will help visitors learn more about what they see. Yates said when people walk up to a garden site and see a vista, there will be a kiosk with that same vista on a computerized touch screen. When visitors touch an object on the screen, they will be connected to a database with complete information about it. They also can print out a fact sheet on each plant, available for pickup at the welcome center as they leave, or get a locator map of businesses that can supply the plant. The information also will be visible in every science classroom in the county through the Internet, as well as through interactive on-line classes with extension faculty, Yates said. But she hopes people who visit on-line will be inspired to come in person. "It's nice to see a picture, but there's nothing that substitutes for touching a flower," she said.

Even though only a few gardens are open now, the project seems to be a hit. "It definitely has changed our attendance," Yates said. "We're seeing a lot more young people, families with children. It's doubled our number of volunteers."

Landscape architect Jack Siebenthaler, who was the first president of the Friends of the Florida Botanical Gardens support group, is enthusiastic about the project. "It's a major attempt to bring to an urban area a composite of what extension and its programs are all about," he said. "The public will have a place to go to learn, to relax, to see things that are new, to take people as their guests at no charge, and really to brag about." Since the gardens are located about two miles from the beach, Yates said local hotels are already planning excursions there as part of their tourist packages.

"This whole site will show people water, wildlife, plant life and an ecosystem in an urban setting that is thriving,

Judy Yates can look at an aerial map and envision the future for the Florida Botanical Gardens.

Tara Piasio

and, ultimately, how they can do that in their own yard," Yates said. "It's extension teaching at its best."

Home Sweet Home

The Orange County Extension Service has several programs helping low-income people with housing issues. Since April 1998, extension agent Kathy Bryant has presented "A Healthy Home: A Guide to Successful Household Management" as part of the qualification process for people applying for Section 8 rental housing. The monthly, two-hour seminar covers money management issues and household care and maintenance. About 600 people have attended so far.

Other housing programs focus on low-income homeowners whose houses have been rehabilitated with federal Department of Housing and Urban Development (HUD) funding. In Orange County, homeowners are visited individually once rehabilitation is completed. Those living within the Orlando city limits must attend seminars before the repair work begins.

Judy Yates, left, holds compost donated by Pinellas County. Below, Pinellas County construction inspectors Mike Williams, left, and Don Kersting, center, talk with Yates about progress on the180-acre Florida Botanical Gardens.

Tara Piasio

Participants are taught how appliances, plumbing, and electrical systems work and how to maintain them. Bryant encourages homeowners to inspect their homes regularly inside and out to identify any problems early so they can be fixed inexpensively. Household care and cleaning information also is included.

Bryant explained that some previous recipients of HUD rehab assistance failed to maintain their homes properly and needed additional repairs at federal expense later. These courses are important because HUD no longer does repeat rehabilitations.

Post-purchase training for new home buyers also is offered. This provides similar information on financial management and home care, as well as yard maintenance and being a good neighbor. These housing classes emphasize "the whole concept of needs versus wants and differentiating what the two of those are," Bryant said. "If the participants can manage their money just a little bit better, they can have some of those luxuries in their lives and still pay their bills."

At two Orange County elementary schools, extension agent Glinder Stephens leads a program for fifth graders from low income families to develop leadership and citizenship skills. Called "Twelve Keys to Unlock Your Leadership Potential," students learn leadership and communication, decision making and team building in 12 weekly sessions held during school hours.

Lessons include what leadership means, developing listening and expressive skills, establishing goals based on one's own values, setting priorities, using the decision making process to analyze and evaluate alternatives, accepting cultural differences, "using conflict resolution strategies as opposed to violence," getting along with others, and how to make people feel comfortable and included in the group. At the end of each session, each student is given a key, Stephens explained. The students are awarded medallions at a graduation ceremony and party when the program is completed. Their pictures are taken with a county official and these photos are posted at the school to recruit future participants.

Stephens said initially, only academically motivated students were eligible to attend, but it has been expanded to include everyone. "It's been one of those things where it's kind of prestigious" to participate, she said. About 120 students have graduated so far.

Fifth grade teacher Barbara Burrell said the program helps students gain self-confidence. "Children who were extremely shy are now openly prepared to be part of a group," she explained. The students were so impressed with what they learned about leadership, they held new student council elections and picked new officers, she said.

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EXPERIENCE COUNTS

New internship programs in UF's College of Agricultural and Life Sciences provide real-world experience

By Ed Hunter

Many students realize they need more on their resumes than just a degree when applying for their first job. Practical experience obtained through an internship program can be almost as important as an academic transcript.

Now, thanks to three new programs, students in the UF's College of Agricultural and Life Sciences have additional internship choices that are better suited to their academic majors, said Jimmy Cheek, dean of the college, part of UF's Institute of Food and Agricultural Sciences.

"In the last two years, we have launched internship programs that will be increasingly important as we prepare our graduates for their role in society," Cheek said. "Internships provide a vehicle for students to gain real-world, professional experience related to their academic programs."

One program allows students to serve as legislative interns in Washington, D.C. According to Cheek, the legislative internship program benefits both students and legislators.

"Students gain insight and experience in the development of public policy and laws through legislative internships," Cheek said. "These internships also allow legislators and their staff to gain a greater appreciation of the agricultural and natural resource issues facing our society as well as a better understanding of our college and its programs."

Devin Yontz, left, a graduate student from Orange Park and Greg Steube, an animal science major from Bradenton, were the first participants in the College of Agricultural and Life Sciences' legislative internship program in Washington, D.C. Photo by Capital Photography.

Greg Steube, 22, a senior animal science major from Bradenton, was one of two students who participated in the first year of the legislative internship program. Steube, who had prior experience working in the Florida legislature, interned in Rep. Karen Thurman's office.

"The most important benefit I received from the legislative internship program was the contacts I made for my future," Steube said. "I was able to see how the system works in Washington. Things work differently in the state legislature and the U.S. House."

Another college program gives students experience in extension work.

"Some students may not have a clear understanding of statewide extension education programs offered by UF in every county," said Christine Waddill, dean for extension.

Lynne Michaels, a senior food and resource economics major, was looking for just such an experience when she heard about the program from a friend who works at UF's Putnam County Extension Service in Palatka. Michaels said she was already considering an extension career, but her experience in the internship program helped.

"I had already pretty much decided to go into extension when the internship came up. I jumped on it, and that made me 100 percent sure," she said.

Michaels worked with the 4-H program in Putnam County attending meetings and writing and mailing newsletters. After her internship experience, she was hired as an extension agent for Putnam County.

The third internship program allows students to gain research experience on the main campus in Gainesville or statewide research and education centers, said Richard Jones, dean for research. Like legislative and extension internships, research internships give students a critical real-world perspective, he said.

"It is important that students appreciate how research contributes to our knowledge, but it is also important that they appreciate the uncertainties, caveats and conditions associated with research findings," Jones said. "The experience enhances their abilities to make decisions that involve interpretation of research. It also allows them to develop their problem solving, teamwork and observational skills.

"Internships offer the opportunity for students to evaluate their interest in research as a profession," he said. "This is particularly important for disadvantaged students since they might not otherwise have such an evaluative opportunity."

Butterflies and More!

Educational Resources from the IFAS—Extension Bookstore

The Butterfly Gardening ID Decks

UF/IFAS Communication Services with UF Department of Entomology and Nematology

SP 273, $10 Butterflies #1

SP 274, $10 Butterflies #2

Can you tell a Tiger swallowtail male from a dark-form female? Can you tell a Banded hairstreak from a Great purple hairstreak?

From the photographic collection of butterfly expert Jaret Daniels come the ultimate, pocket-sized butterfly references. More than 100 species of butterflies and caterpillars become larger-than-life in these splendid, full-color identification decks—perfect for use in the garden, in the field or in the classroom. Use them to inspire the minds of future entomologists, or enjoy in your backyard butterfly garden.

Your Florida Guide to Butterfly Gardening: A Guide for the Deep South

Co-published by UF/IFAS Communication Services and University Press of Florida

SP 272, $14.95

The book, third in the popular Your Florida Guide series, offers a thorough look at Florida's most important butterflies and the plants they prefer for food, shelter and egg laying.

Butterfly expert Jaret Daniels helps you select plants for a yard where butterflies can live and return year after year. It includes planting diagrams, easy one-day container projects and full garden layouts designed for each of Florida's three major growing zones, as well as designs suitable for the Deep South.

Full-color photographs, all taken by the author, show butterflies, the caterpillars from which they develop, nectar plants, host plants and garden designs. Of special interest is a section on conservation that describes how individuals can act locally to improve the quality and biodiversity of their environment.

Your Florida Guide to Butterfly Gardening Video

UF/IFAS Communication Services

SV 828, $24.95

This instructional video was designed as a complementary piece to the *Your Florida Guide to Butterfly Gardening* book.

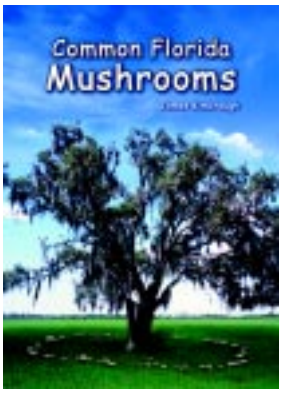
Butterfly expert Jaret Daniels shows you how to create your own butterfly paradise. You'll be treated to a sampling of exquisite butterfly gardens from all over Florida, learn about the butterfly life cycle and see the step-by-step process that will turn your landscape into a haven for butterflies.

This video is perfect for use in extension and classroom programming as well as by the individual butterfly enthusiast.

Common Florida Mushrooms

SP 256, $19.95

In *Common Florida Mushrooms*, James Kimbrough, University of Florida extension mycologist for the past 35 years, identifies and describes many species found in Florida's mild, subtropical climate, where mushroom hunting is enjoyed year-round.



From basic mushroom structure through the classification of orders, families and species, Kimbrough shares the science of mushroom hunting and identification, including information on those that are edible and those best left alone.

Vivid full-color photos assist identification in this color-tabbed reference, which also describes special features and habitats. A section on cooking with mushrooms, complete with recipes, makes this field guide a necessary addition to any mushroom-lover's library.

Educational Resource Information

Educational resources produced by IFAS, including those co-published with University Press of Florida, are available from the IFAS/ Extension Bookstore (formerly IFAS Publications) located in Building 440, Mowry Road, on the University of Florida campus.

To access the UF/IFAS catalog of educational resources and order form, visit the IFAS Communication Services Web site at **ems.ifas.ufl.edu/ForSaleResources**. Please call 1-800-226-1764 to place VISA and MasterCard orders; or fax orders to 352-392-2628.

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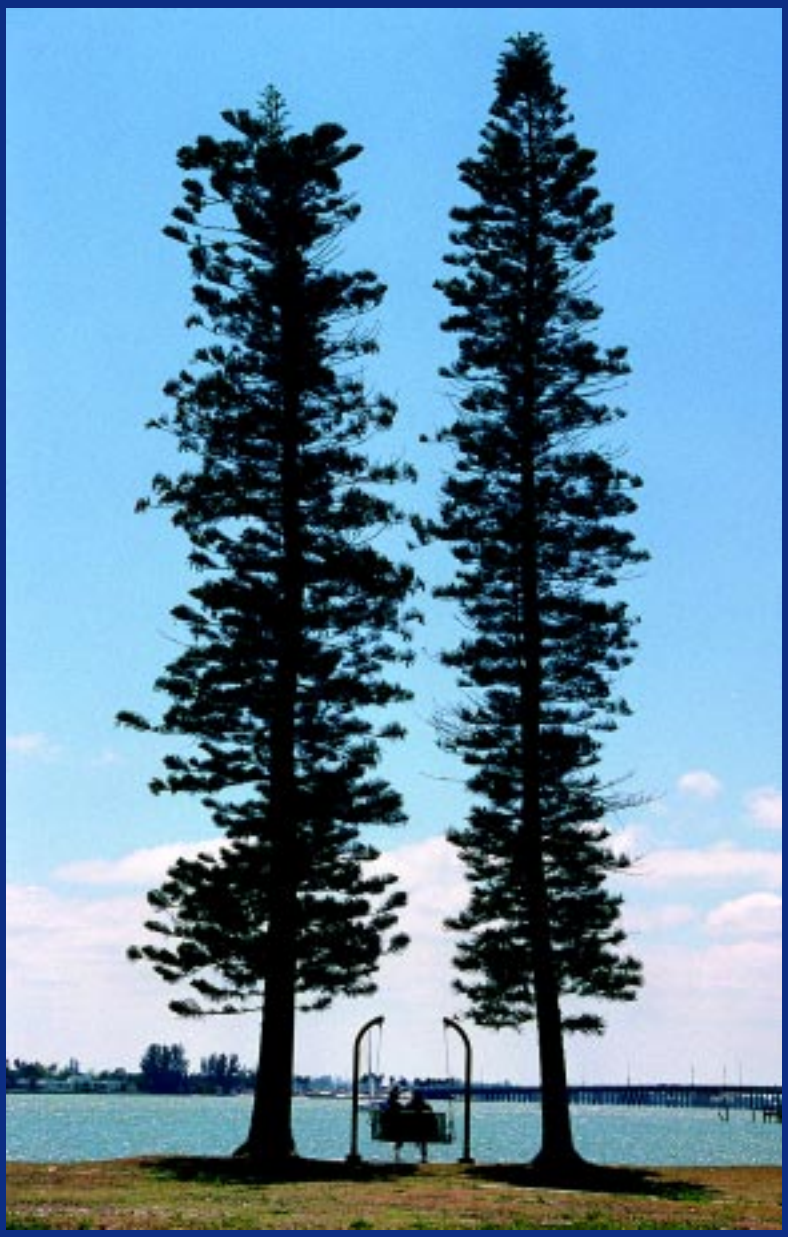

"Two Tall Trees with Swing" *is the name of this photo by* ***Danielle Tabar****, 12, from Sarasota County. Tabar's photo captured first place in the State 4-H Photography Contest 2000 Junior Division for a single photograph. She took the photo at City Park Island. For more winning photographs from this year's competition go to* ***4h.ifas.ufl.edu/*** *and click on news and info, then on to state 4-H photo and poster contests.*

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