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Cycad Scale Update

Industry Impact: FPMA Economic Study Results



BACK in the Game



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SOUTHEAST PEST MANAGEMENT CONFERENCE

MAY 3 — MAY 5, 2022, UNIVERSITY OF FLORIDA, GAINESVILLE, FLORIDA

GHP TUESDAY, May 3, 2022

7:30 AM — 12:05 PM **GHP** General Household Pests Classes

12:05 AM — 1:00 PM LUNCH: Pizza Party Lunch

1:00 PM — 3:15 PM **GHP** General Household Pests Classes

3:15 PM — 4:55 PM **CORE** CORE

5:00 PM — 8:00 PM Tailgate Steak Dinner

WDO WEDNESDAY, May 4, 2022

7:30 AM — 12:05 PM **WDO** Wood-Destroying Organisms Classes

12:05 AM — 1:00 PM LUNCH: Gator Low Country Boil

1:00 PM — 3:15 PM **WDO** Wood-Destroying Organisms Classes

3:15 PM — 4:55 PM **CORE** CORE

L&O THURSDAY, May 5, 2022

7:30 AM — 12:05 PM **L&O** Lawn & Ornamental Pests Classes

12:05 AM — 1:00 PM LUNCH: Sponsored by McCall Services

1:00 PM — 3:15 PM **L&O** Lawn & Ornamental Pests Classes

3:15 PM — 4:55 PM **CORE** CORE

REGISTRATION Regular Attendees: \$70 — \$160
Exhibitors: \$180 — \$300
(6-foot table available)

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PESTPRO

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ON THE COVER

It's spring, and cycad aulacaspis scales are in the air. For beleaguered cycads, it is time to monitor for scale crawlers and treat before populations build up. Check cycads for initial symptoms: white specks in the crown and at leaf bases. Learn more in this issue of *PestPro*.

Photo by Scot Nelson

Heather Walden, UF/IFAS



FPMA EXPO: Another Success

Message from the President of FPMA, Suzanne Graham

WE have just concluded the 2022 FPMA Business & Operations EXPO. From the feedback we received, we are pleased to report that, despite some challenges, it was a success! The COVID situation continues to affect attendance, but for those who did attend, there were plenty of opportunities to connect and learn.

TECH Day a Whopping Success

Tuesday is normally the day we reserve for internal association meetings, but this year we started out with a bang with our first-ever TECH Day. The day was comprised of two 50-minute classes geared toward providing technicians with guidance on how to conduct themselves in the field, and six teaching stations rotating in the kitchen, bar, bedroom, dumpster area, hotel perimeter, and the landscaped areas of the hotel. At the end we asked for written feedback. We can proudly report that an overwhelming majority of respondents said that it was a high-quality, well executed event, that they would recommend it to a colleague, and that they would do it again!

Sessions Informative and Insightful

The CEU sessions on Wednesday were packed. Thursday's Keynote speaker David Averin pumped everybody up for the day, and Tony Massey's *100 Pennies* presentation ran overtime with so many questions being asked!

Annual Business Meeting

Proposed changes to the By-laws were presented which called for the elimination of the President Elect Position on the Executive Committee (EC). That change was unanimously approved. The slate of the 2022 EC officers was presented and elected. Suzanne Graham (Massey Services) will return as President, Chris Cavanagh (Petri

Pest Control Services) will serve as Vice President, Jeremy Maneol (Rentokil) will serve as Treasurer, and Elliot Zace (Slug a Bug) will now join the EC as Secretary. The new Board members and Allied Member Representative were also installed.

Economic Impact Study

The much-awaited results of the Economic Impact Study were presented by the lead researcher, Hayk Khachatryan, and indicated that the industry has an overall economic impact of \$2.7 billion and employs over 26,000 people. The final report will be forthcoming.

Much-Deserved Awards Bestowed

After a two-year hiatus, I was able to present the following awards in person during the event:

President's Award —

Sean Brantley (Emory Brantley & Sons)

Harry J. Balcom Legend Award —

Matt Remmen (Bayer)

Doug Vander Poest Extra Mile Award —

Eric Hoffer (Hoffer Pest Solutions)

Fellowship Award —

Kyle Varona (Fabey Pest & Lawn Solutions)

Regional Director of the Year —

Chrissy Crenshaw (Crenshaw Termite and Pest Control)

Committee Chair of the Year —

Andrew de la Chapelle (PCO Bookkeepers)

Committee Member of the Year —

Derek Pumphrey (Brock Lawn & Pest Control, Inc.)

Thank You, Sponsors!

Finally, I would be remiss if we did not thank our sponsors, listed below. Without them, FPMA would not be able to put on the quality event that it does. Special thanks go to Syngenta for stepping up again as the title sponsor and having Todd Himelberger serve on the FPMA's Event Planning Committee.

It is with great pride that I serve another year as your President. I'm still here, and I'm still listening. **PP**

*Suzanne Graham
President, FPMA*



JOIN FPMA! Visit flpma.org for more information.

Economic Impact of the Florida Pest Management Industry

FOR years, we have known that the pest management industry, that controls residential and commercial pests, is an important economic engine for the state of Florida. But that is not widely known by most of the public, regulators, or important politicians. It is a diverse service industry that protects people, structures, food, lawns, ornamental plants, and our environment from damaging pests. Overall, it is an important industry that protects public health, employs thousands, and delivers service through the entire state.

As an industry that provides much service using pesticides, it is regulated by the Florida Department of Agriculture and Consumer Services (FDACS). As such, it is an agriculturally regulated industry inspected by agricultural inspectors to make sure that services are provided by companies with pest control licenses that employ a certified pest control operator as part of their staff.

Unlike many other agriculturally regulated industries, our industry does not produce an agricultural product. Other agricultural industries, like citrus and tomatoes, are surveyed by FDACS and USDA to determine the value of their produce. The pest management industry has never had a formal evaluation done to determine its economic impact and value to Florida. Consequently, pest management companies are at a disadvantage compared to these other industries. No one has understood whether the pest management industry is a large entity or is relatively insignificant.

For the first time, the Florida Pest Management Association (FPMA) commissioned a Florida economic impact study for the nonagricultural pest management industry. *PestPro* magazine wants to let the industry know how important the industry is to the people of Florida and Florida's economy. We were excited to learn about the preliminary results of this study at FPMA's Expo in January. The preliminary report was presented by UF/IFAS agricultural economists to FPMA membership. See the executive summary in this *PestPro* issue. The study was conducted by

Total Production Value of Florida Agricultural Products: 2019

Product	Percent of U.S. Value	Value in Dollars
Oranges	51%	\$867 million
Tomatoes (fresh market)	60%	\$426 million
Strawberries	12%	\$307 million
Bell peppers (fresh market)	45%	\$235 million
Watermelons	29%	\$162 million
Sweet corn (fresh market)	29%	\$141 million
Peanuts	11%	\$119 million
Grapefruit	40%	\$65 million
Cabbage (fresh market)	11%	\$58.4 million
Squash	16%	\$35.4 million

Source: USDA National Agricultural Statistics Services

Dr. Hayk Khachatryan, Associate Professor of Agricultural Economics at the University of Florida.

The number in his report that stood out to me was \$1.324 billion, which is the total pest management revenue in Florida. This number includes lawn and ornamental pest services that occur in Florida by pest control operators. National surveys of the pest management industry have not included lawn and ornamental pest services. Florida's total industry revenue for FUME, L&O, GHP and WDO services in 2020 was \$1.324 billion.

WHILE it is not customary to compare the value of a service industry to the value of agricultural products, the Entomology and Nematology Department is in the Institute of Food and Agricultural Sciences, so it could be interesting to make some broad comparisons with the revenues for agricultural products as a proxy for the relative importance of the industry in the state.

Florida is always known as the orange or citrus state. The table above presents the total value of the most important agricultural products grown in Florida. A total industry revenue of \$1.324 billion for pest management dwarfs the revenue value of

products like tomatoes, oranges, bell peppers, grapefruit, and every other agricultural product listed. Even more impressive is that the total economic impact of the pest management industry in Florida is \$2.7 billion, which includes all direct, indirect and induced regional multiplier effects.

So why is all this important?

At the University of Florida, we have to justify why researchers are working to solve problems for stakeholders. Most people take pest management for granted. They do not consider it important, and they don't even want to think about it. That is why Floridians hire PCOs, after all. If an industry is not considered important, then there is no justification to conduct research to improve the industry.

Because agricultural products like oranges and grapefruit are seen as important, there are many researchers solving problems for their producers.

Nonagricultural pest management is not perceived as important. Therefore, unlike other industries, tax dollars paid by pest management firms are not readily allocated to improve their management programs and service.

This economic impact study of the Florida pest management industry is a significant step forward in being able to communicate the importance of pests and pest management in Florida. We thank Dr. Khachatryan doing a diligent job in conducting and analyzing this survey, and FPMA for their wisdom in commissioning this important research.

Another important reason for knowing the value of the industry is to communicate to students and potential employees that pest control is not a meaningless occupation with no future. The industry is large and perceived by customers as an essential service. Who would not like to be a part of this vibrant industry?

FPMA needs to be congratulated for seeing the need for this study and paying to commission the work to be done. Many thanks to the officers and membership for their support and encouragement to improve all of the pest management industry in Florida. **PP**

— Dr. Philip Koehler,
Managing Director, *PestPro*

FPMA Economic Impact Study Results

Hayk Khachatryan



In August 2020, FPMA contracted the UF/IFAS Food and Resource Economics Department to conduct an economic impact study for the Florida pest management industry. The lead author on the project was Hayk Khachatryan, Ph.D.

The study's executive summary begins at right. A copy of the full report can be seen on the FPMA website at www.flpma.org under Resources/Industry Resources. ▼



Florida has 14 percent of U.S. pest control companies



A Vibrant Industry

THE Florida pest management industry is one of the nation's leading pest control and extermination service industries, accounting for more than 14 percent of industry establishments in 2021. The main services provided by the Florida pest management industry include and are not limited to insect extermination and control, bedbug extermination, mosquito control, termite extermination and control, and rodent control and extermination.

During the past decade, the market share concentration of the Florida pest management industry has increased due to consolidation within the industry. However, the general concentration within the industry stayed relatively low. The majority of the operators are midsize or small and strategically located near densely populated areas.

The total economic contributions in 2020 were estimated at \$2.718 billion in industry output, 26,637 full-time and part-time jobs, \$958.7 million in labor income, and \$1.437 billion in value added, including all direct, indirect and induced regional multiplier effects.

Focus on Florida

To estimate the economic contributions of the Florida pest management industry, survey questionnaires were sent to over 3,500 pest control firms. A total of 764 firms responded to the survey, resulting in a 22 percent response rate. The majority of the firms (80.6%) reported primary involvement in pest control services and 543 (72%) indicated that they were involved in pest control services exclusively.

The average age of surveyed firms was approximately 24 years, with the majority of firms established during the 1970s and later. Roughly 73 percent of the pest management services were provided to residential homes, and 23 percent were to commercial establishments.

The number of permanent employees over the past five years has increased notably, where 280 firms (47.8%) reported an increase, 258 (44%) reported no change, and only 48 firms (8.2%) reported a decrease in the number of employees.

In contrast to permanent hires, the majority of the respondent firms (85.5%) indicated no changes in temporary or seasonal employees. Overall, the number of permanent employees increased by 18.5 percent

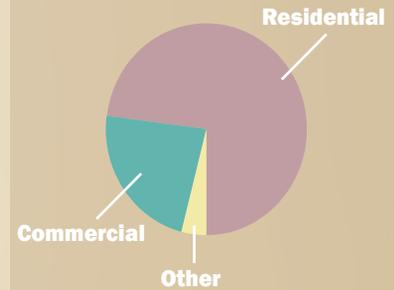
and a slight increase (2.2%) was observed for temporary employees across all survey respondents. Total employment in the industry was estimated at 17,665 persons, including full-time, part-time, or temporary employees.

Over 500 respondent firms reported revenue information, with an average gross revenue of \$13.4 million per firm and median revenue of \$375,000, reflecting the variation in reporting by a small number of large industry firms that are involved in both pest management and allied services. For firms involved in pest control services only (423 responding firms), the average gross revenue per firm was lower, at \$10.6 million, with the same median revenue of \$375,000.

Considering revenues by company size category, the average gross per-firm revenue was about \$119 million for large firms, \$3.43 million for medium-sized firms, and \$250,202 for small firms. The average annual gross revenue of the firms involved in pest control service only were close to that of the general sample size for small and medium-sized firms, but were lower for large firms (\$104 million). The total industry revenue for 2020 was estimated at \$1.3 billion.

Continued next page

Surveyed services provided



Change in number of permanent employees, past 5 years



Average gross revenue per pest control firm, by size

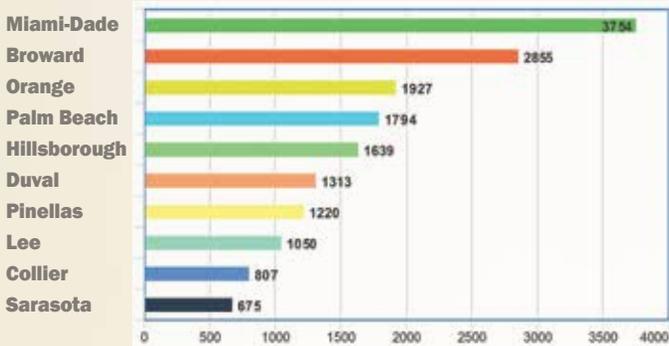
LARGE	\$119 MILLION
MEDIUM	\$3.43 MILLION
SMALL	\$250,202

Total Industry Revenue in Florida, 2020:

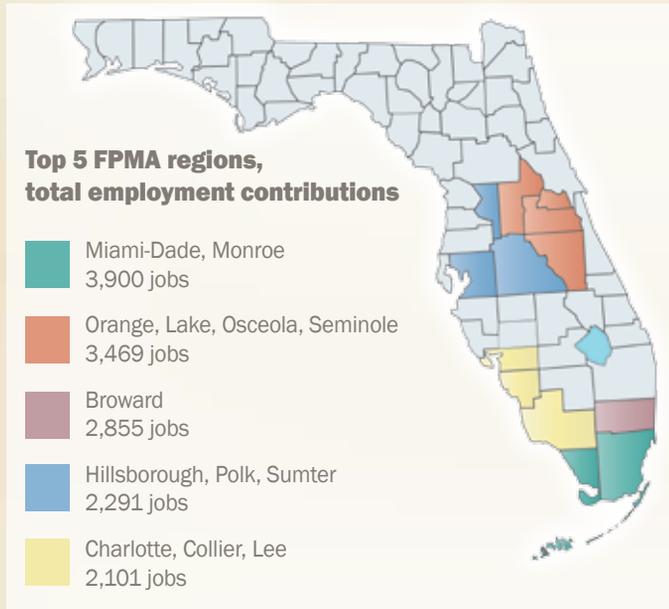
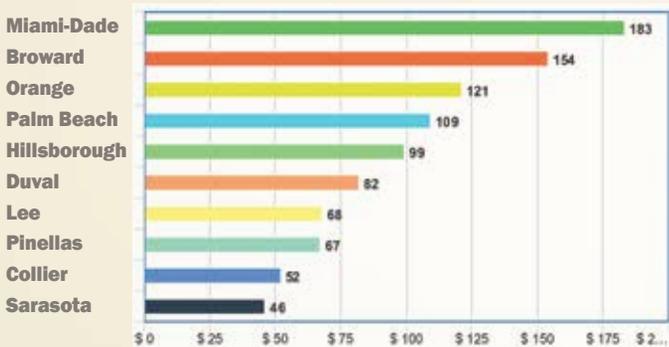
\$1.3 Billion



Top 10 counties, total employment contributions (jobs)



Top 10 counties, value-added contributions (in \$ millions)



Economic Contributions

AN ECONOMIC contribution analysis for the Florida pest management industry was conducted using the IMPLAN® regional economic modeling system and associated databases¹. Economic multipliers estimate the economic activity that occurs in other sectors of the economy through the industry supply chain (indirect effects) and responding by employee households and governments (induced effects).

The estimated total economic contributions were 26,637 full-time and part-time jobs, \$958.7 million in labor income (wages, salaries, benefits, proprietor income), \$1.437 billion in value added or gross domestic product (GDP), and \$2.718 billion in industry output or revenues, including all direct, indirect and induced regional multiplier effects.

Economic contribution estimates were developed for each of Florida's 67 counties, nine economic regions, and 16 Florida Pest Management Association (FPMA) regions. The top 10 counties in terms of total employment contributions were Miami-Dade (3,754 jobs), Broward (2,855 jobs), Orange (1,927 jobs), Palm Beach

(1,794 jobs), Hillsborough (1,639 jobs), Duval (1,313 jobs), Pinellas (1,220 jobs), Lee (1,050 jobs), Collier (807 jobs), and Sarasota (675 jobs).

The top 10 counties in terms of total value-added contributions were Miami-Dade (\$183 million), Broward (\$154 million), Orange (\$121 million), Palm Beach (\$109 million), Hillsborough (\$99 million), Duval (\$82 million), Lee (\$68 million), Pinellas (\$67 million), Collier (\$52 million), and Sarasota (\$46 million).

When grouping the results based on the FPMA regions, the top five regions in terms of total employment contributions were Region 1 (3,900 jobs: Miami-Dade and Monroe counties), Region 16 (3,469 jobs: Orange, Lake, Osceola and Seminole counties), Region 7 (2,855 jobs: Broward County), Region 3 (2,291 jobs: Hillsborough, Polk and Sumter counties), and Region 10 (2,101 jobs: Charlotte, Collier and Lee counties). **PP**

Hayk Khachatryan is Associate Professor in the UF/IFAS Food and Resource Economics Department at Mid-Florida Research and Education Center

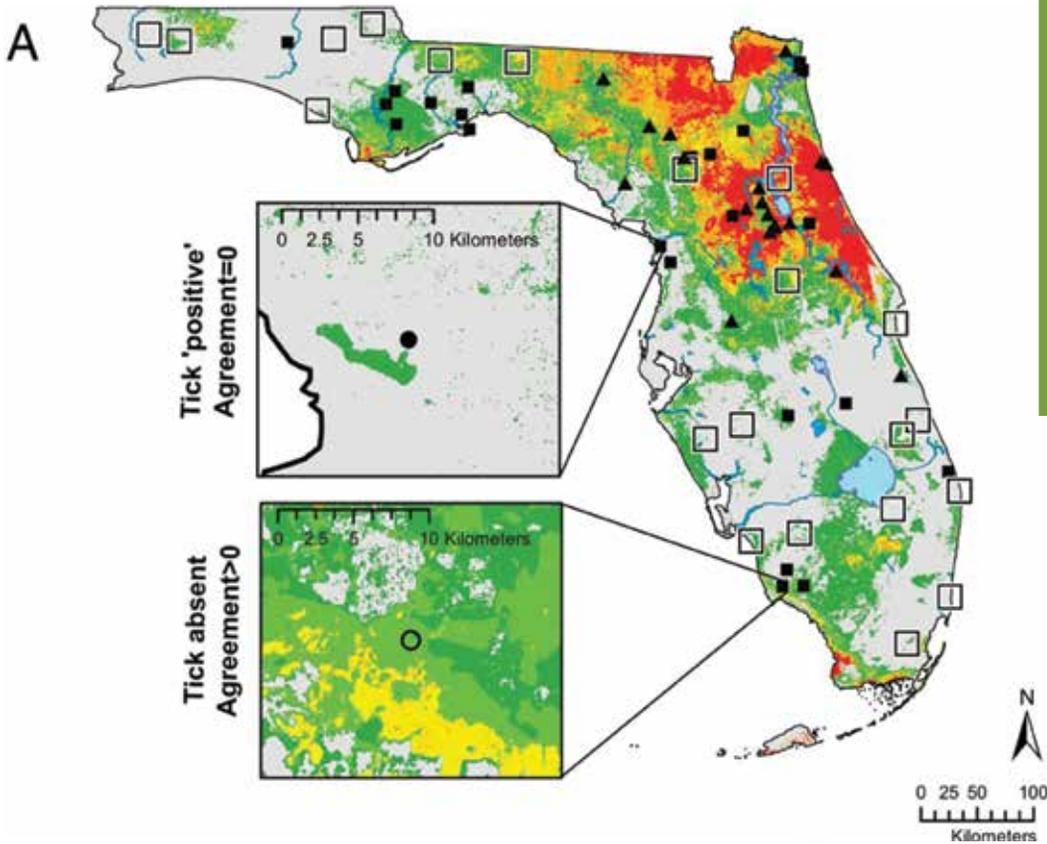
¹ Implan Group LLC, 2020

Summary of economic contributions of pest management industry in Florida, 2020

IMPLAN® Industry Sector	Multiplier Effect	Employment (Jobs)	Labor Income (Millions)	Value Added (Millions)	Industry Output (Millions)
Services to Buildings	Direct effect	17,665	\$509.87	\$675.18	\$1,324.87
	Indirect effect	4,230	\$255.13	\$343.25	\$654.76
	Induced effect	4,743	\$223.69	\$418.48	\$738.66
	Total effect	26,637	\$958.69	\$1,436.91	\$2,718.30

Values in 2020 dollars. Employment values include number of full-time and part-time jobs. Labor income includes employee wages, salaries and benefits, and proprietor income.

Source: IMPLAN software, IMPLAN Pro, 2019 model data for State of Florida (Implan Group LLC)

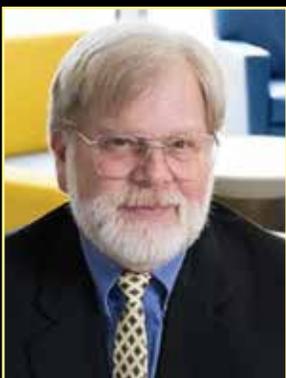


▲ Lone star tick, *Amblyomma americanum*
Photo by Judy Gallagher

◀ Ensemble map for *Amblyomma americanum*

RED: High agreement for tick presence

GREEN: Low agreement for tick presence



Dr. Gregory Glass

New maps detailing the distribution of key tick species will help the Florida Department of Health with investigations into reports of tick-borne illnesses.

UF Maps Predict Where Medically Important Ticks are Found in Florida

DeLene Beeland

THE Florida Department of Health has a new tool to investigate cases of tickborne illness: maps created by University of Florida medical geographers that predict where three medically important tick species are likeliest to occur in the Sunshine State.

The good news is that these ticks aren't everywhere, says Greg Glass, a geography professor in UF's College of Liberal Arts and Sciences who led the mapping effort. Ticks that have the potential to carry Lyme disease, for example, are found in a smaller region of the state than expected — though they are found very reliably in some areas.

The maps were recently published in the *Journal of Medical Entomology*. The study looked at three tick species: the lone star tick, *Amblyomma americanum*, deer tick, *Ixodes scapularis*, and the American dog tick, *Dermacentor variabilis*. These species are vectors for tularemia, human ehrlichiosis, heartland virus disease, Bourbon virus disease, Southern tick-associated rash illness, Rocky Mountain spotted fever, babesiosis, anaplasmosis, Powassan virus disease, and Lyme disease.

“Based on some citizen science work and anecdotal reports, there was an impression

that some of these species may have been more widespread than we found them to be,” Glass says. “If you live in northeast Florida, these ticks are very prevalent. But west of Tallahassee and south and east of Tampa, their presence declines dramatically.”

The maps' spatial detail is highly refined compared to national-level maps that tend to treat whole counties as either having ticks, or not. “Ours are down to the 100-meter resolution, which is football-field sized,” Glass says. “Which, when you are talking about practical investigations is far more useful and efficient.”

Continued on Page 11

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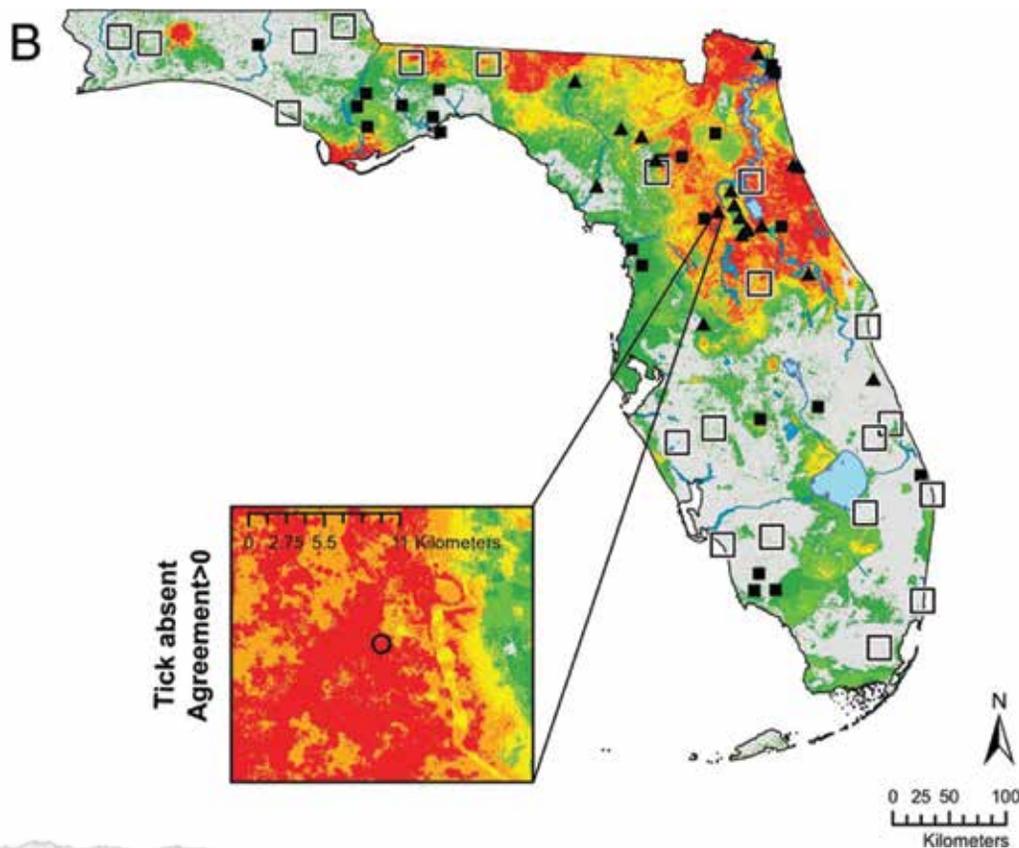
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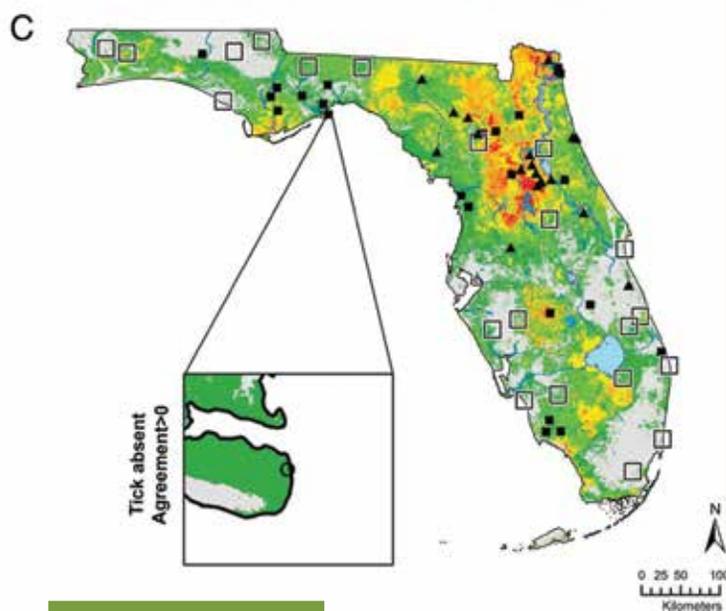


▲ Female blacklegged tick, or deer tick, *Ixodes scapularis*
Photo by Robert Webster

◀ Ensemble map for *Ixodes scapularis*, the vector for Lyme disease.

RED: High agreement for tick presence

GREEN: Low agreement for tick presence



▲ Ensemble map for *Dermacentor variabilis*.

◀ American dog tick, or wood tick, *Dermacentor variabilis*.
Photo by Judy Gallagher

Predictive power

The project grew from past tick-mapping efforts by the Southeastern Center for Excellence for Vector Borne Diseases that surveyed Florida to document tick distribution. The center is one of five across the nation that were established in 2017 by the U.S. Centers for Disease Control and Prevention to address issues concerning infectious diseases transmitted by insects and arthropods. Glass leads the tick program in the southeastern center and is the first author to the most recent mapping paper.

“We had a lingering question as to whether our original maps merely described our survey data, or if they had any real power for predicting where these ticks may be,” says Glass, who is also a member of UF’s Emerging Pathogens Institute.

Glass and his colleagues previously used CDC-recommended protocols to

survey the state of Florida for ticks, as part of an effort to create standardized data sets spanning the nation. But in their most recent effort, they used ensemble modeling to see where five different models held the most agreement to predict where these medically important ticks would be. They then tested these predictions by both resampling old survey areas and sampling new survey areas that they’d not previously visited — but where their maps and the ensemble modeling indicated the ticks would be.

“Turns out, our maps do very well at predicting where these ticks are,” Glass says.

The team surveyed 250 transects at 43 sites (25 new and 18 old) every other month in 2019, performing a total of 1,450 surveys.

Green areas of the maps represent areas where the ensemble modeling held low agreement for the presence of

The most common diseases that come from ticks in Florida are ehrlichiosis, Lyme disease, Rocky Mountain spotted fever and other spotted fever illnesses.

— Florida Department of Health

Photo at right shows a bulls'-eye rash that indicates Lyme disease. Not all Lyme disease cases have a rash.

CDC



ticks, and red areas show where they held high agreement. Survey sampling from the transects validated the models. The researchers note that the ensemble models performed better at predicting where ticks would be absent than they did in predicting exactly where they are.

Lyme disease and citizen science

The deer tick, also called the black-legged tick, from the *Ixodes* genus is known to transmit the spirochete-shaped bacteria, *Borrelia burgdorferi*, which causes Lyme disease.

“Northeast up around Jacksonville, and across North Central Florida, are great areas for *Ixodes*. If I were investigating Lyme disease, that’s where I’d look,” Glass says.

There are popular opinions that lots of different ticks can transmit the spirochete that causes Lyme disease. He thinks multiple vectors are unlikely.

“Next, we’re going to compare the maps produced by citizen science and see how well they align or not with ours, now that we’ve validated ours,” Glass says. “How different are they? Are they biased? If so, how?”

Projects that collect data from citizens tend to be less costly than time- and resource-intensive sampling, which can be attractive for research efforts with tight funding. If citizen science is found to be a reliable method for surveying ticks, it could benefit cash-strapped states. However, it’s not clear whether attempts to generalize tick distribution from citizen science may potentially suffer from biases that lead to incorrect conclusions.

Despite all the time spent surveying for ticks, their absence made just as much of an impression on Glass in some regions of Florida as did their presence.

“After covering 40,000 miles in four years, I can tell you that you can find places in the right season where you can find lots of ticks, but most of the time, you’re just walking and not picking up anything.” **PP**

DeLene Beeland is Science Writer at the University of Florida Emerging Pathogens Institute. This article originally appeared on www.epi.ufl.edu

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Closeup of cycad aulacaspis scale, *Aulacaspis yasumatsui*.

An Update on Cycad Scale

Aulacaspis yasumatsui

Hamutahl Cohen



Scott Nelson

Sago palms in Florida, Georgia and other states often fall prey to the tiny terrors known as cycad aulacaspis scale. Scout them out early and treat consistently for success among the sagoes.

THE cycad aulacaspis scale, *Aulacaspis yasumatsui*, is native to Thailand and was introduced into South Florida in 1995. It has since spread rapidly to most of Florida as a pest of popular landscape and native cycads. Predictive models suggest that the distribution of the cycad scale will only increase with climate change.

Cycad aulacaspis scale, also known as CAS, is a serious pest. Cycads are an ancient group of gymnosperes, and nearly all cycad species are threatened or endangered in the wild. In Taiwan and Guam, *Cycas micronesia* and *Cycas taitungensis* are threatened to extinction specifically because of this scale.

The scale is incredibly successful at international movement because it is small with a complex surface morphology that makes initial infestations difficult to detect

visually. It also has a short pre-oviposition period and considerable fecundity of about 18 eggs a day, resulting in rapid population expansion on host plants. Finally, CAS has few enemies within its invasive range, allowing its growth to remain unchecked.

Infestation and Treatment

CAS feeds on both the aerial and root parts of the host cycads, with initial infestation appearing as chlorotic spots on the underside of leaves. This progresses as an infestation of the upper leaf surfaces, petioles, and stems. Finally, infested plants become completely covered by layers of dead and live scales and appear enveloped by a white crust. The scales deplete plant nonstructural carbohydrates, resulting in plant death.

While it is challenging to control CAS, researchers at UF/IFAS have to evaluate insecticide treatments. For example, in 2004 Dr. Catherine Mannion's team compared the efficacy of fish oil, imidacloprid, Distance™ (pyriproxyfen), Organocide™ horticultural oil, and dimethoate on king sago plants infected with scale. They found that foliar applications of Organocide™, foliar application of Distance™, and foliar plus drench application of dimethoate provide excellent control of female scales and resulted in egg mortality. Imidacloprid was not effective in this study or in others, and all treatments required repeat applications. Since then, systemic pesticides such dinotefuran have shown to be promising for effective control when applied as a root drench.

Continued on next page

Exploring Treatment Options

There are pros and cons with every pesticide choice. Dimethoate, while effective in studies, is a broad-spectrum organophosphate that can be toxic or dangerous if used inappropriately and is currently not registered for ornamentals. Distance™, on the other hand, is an insect growth regulator that mimics insect hormones and is less likely to harm biological control agents and the applicator. However, while Distance™ is quite effective for CAS when cycads are lightly infested, it loses efficacy for densely infected plants, and resistance is a concern with repeated applications.

Dinotefuran requires few applications but impacts to beneficial pollinators is a serious concern. Finally, horticultural

oils are also effective, but need to be applied weekly for long periods of time to maintain infestation control, and are most effective on newly hatched scales that exhibit crawling and lack a hard exoskeleton.

When applying pesticides, the complicated leaf architecture of cycads can make it challenging to spray all parts of the plant. Attention must be made to saturate the entire plant surface and to wash the plant of dead scales to expose living scales to pesticides.

Biological Control

Another avenue of cycad control is predation by natural enemies. In Collier County, for example, a nonnative predaceous beetle consumes the scale and helps remove scale layers on the plant surface. However, it is thought



Scot Nelson

Cycad aulacaspis scale, *Aulacaspis yasumatsui*, harming a sago palm.

that most natural enemies will not consume the scale due to the absorption of defensive chemicals from the cycad host that make the scale undesirable.

Currently, there are no natural enemies in Florida that provide complete control of the scale.

More research is needed on biological control of CAS. **PP**

Hamutabl Cohen is a Commercial Horticulture Extension Agent and Landscape Entomologist with the UF/IFAS Collier County Extension Office



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Aedes aegypti emerging adult

- ▶ Oxitec, leading developer of biological pest control solutions, announced that it is pursuing approval by federal and state regulators to implement two pilot projects in the United States.
- ▶ In Florida, Oxitec has been invited by its partner, the Florida Keys Mosquito Control District, to continue its landmark pilot project in the Florida Keys.
- ▶ Oxitec's biological insect control technology is proven to safely control the invasive, disease-transmitting *Aedes aegypti* mosquito species that has been detected in Florida, California and other states.

Oxitec Anticipates Mosquito Project Expansion in 2022

Oxford, UK — Oxitec, leading developer of biological pest control solutions, announced expansion plans for its *Aedes aegypti* program in the United States.

In Florida, where the U.S. Environmental Protection Agency approved a landmark pilot project in 2021, the Florida Keys Mosquito Control District (FKMCD) and Oxitec announced the continuation of their collaboration into 2022, pending further approvals from the EPA and the Florida Department of Agriculture and Consumer Services.

Andrea Leal, Executive Director of the FKMCD, commented, "After a successful start to our project in 2021, we look forward to continuing our partnership with Oxitec.

We made significant progress during the pilot project last year, we look forward to continuing this important work during this year's mosquito season."

In California, Oxitec is preparing a request for a research authorization to launch a project, anticipated to be in northern Tulare County in the city of Visalia. Pending EPA approval, Oxitec will submit a formal application, which will be reviewed by California's Department of Pesticide Regulation. The DPR's review will include a scientific evaluation of Oxitec's *Aedes aegypti* technology and will include opportunities for the public to engage and review the results of the state's evaluations. *Continued on Page 20*

**View of the Florida Keys
from the satellite
Copernicus Sentinel-2, ESA**



**Phil Koehler with new sculpture
in 1998**

Cockroach Sculpture
Presented to
**Professor
Dr. Philip G. Koehler**
Artist: Bill Secunda
Commissioned by
students and friends of the
Urban Entomological Society
Installation 1998

Colonel Dick Godwin Matt Remmen Laura Collins Remmen Brian Eisenberg Erin Monteagudo Jerry Gahlhoff Tom Powell Clay Scherer	Jennifer Brumfield Dina Richmond Deanna Branscome Cindy Tucker Russ Horton Joe Jonovich Mike Baric Marie Knox
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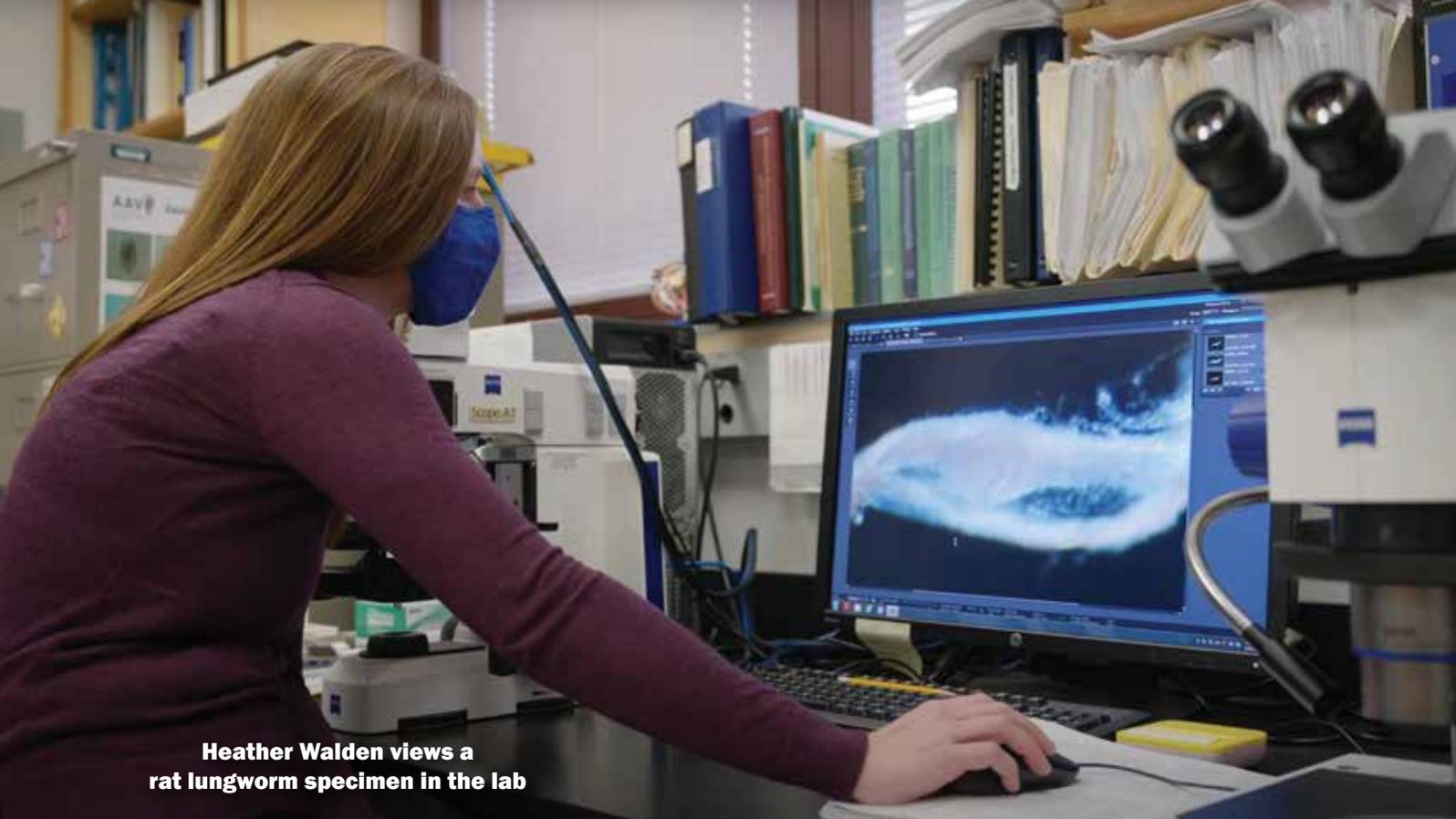
UF Urban Lab Legacy Lives On in Art and Science

THE GIANT cockroach sculpture pictured at left was presented to Dr. Phil Koehler in 1998 by his then-students and friends of the Urban Entomological Society. They commissioned famed sculptor Bill Secunda to create the custom metal sculpture. Recently, the sculpture was relocated from the Urban Entomology Laboratory at the University of Florida to the main entrance of the UF entomology building, Steinmetz Hall. A plaque was created to go with the sculpture to recognize the presenters and the artist.

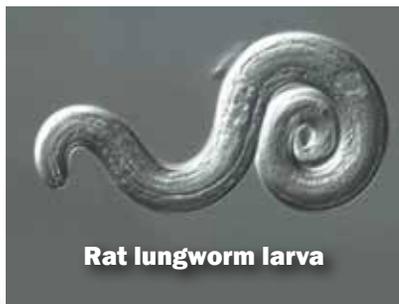
Bill Secunda is an award-winning artist who creates massive metal sculptures. Each piece he makes is designed and handmade using a variety of materials such as thick steel plate, stainless steel, copper, bronze, and a very special common item — carpenter’s nails. Bill devised a technique to create amazingly realistic animal sculptures made entirely out of thousands of nails welded together.

Bill’s pieces are so unique they can be found in several *Ripley’s Believe It Or Not* museums around the world. The Aspen Bear, St. Louis Zoo, and the latest public installation of three bison sculptures at the entrance to Oklahoma Baptist University are just three of the public sites that have welcomed Bill’s wonderful sculptures.

Continued on Page 18



Heather Walden views a rat lungworm specimen in the lab



Rat lungworm larva

Heather Walden

UF STUDY:

Rat Lungworm Has Spread to Cuban Treefrogs in Florida

University of Florida researchers report that the rat lungworm parasite, which can cause deadly disease in humans and in animals, has been found in a new host in Florida with its discovery in Cuban treefrogs, an invasive species.

THE FINDING represents the first time an anuran — a frog or toad amphibian — has been identified as a host for the parasitic nematode in the state, although it has previously been identified in a variety of other hosts in Florida.

The frogs were found in Volusia County, where the rat lungworm had not previously been detected, the researchers said in a study published online Jan. 31 in the *Journal of Wildlife Diseases*.

“These frogs are going through the state, disrupting our native populations,” said Heather Walden, Ph.D., an assistant professor of parasitology at the University of Florida College of Veterinary Medicine and the study’s lead author. “They are eating native species, such as green treefrogs, and consuming not just the frogs and other food sources, but the parasites they carry with them.”

Continued on Page 24



Cuban treefrogs have distinct bulging eyes and large, round toepads



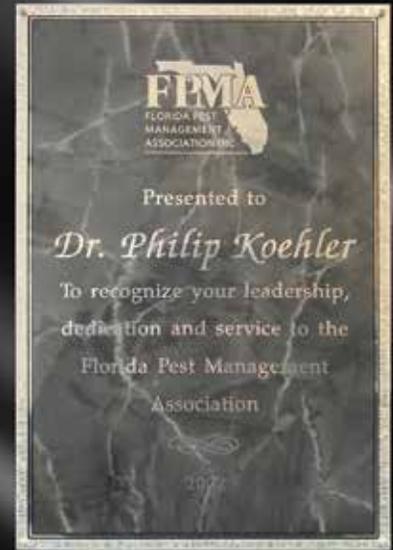
Dr. Michael Scharf



Dr. Roberto Pereira



Dr. Faith Oi



Urban Lab Legacy, continued

In January, the FPMA awarded Dr. Phil Koehler, Emeritus Distinguished Professor of Entomology, a plaque recognizing his 45 years of leadership, dedication and service to the pest control industry as a professor at the University of Florida.

Phil has given hundreds of presentations to the Florida and U.S. pest management industries. Over the years, Phil and his students have, among other achievements,

- 1) discovered the first Florida infestations of Formosan termites,
- 2) discovered the first infestations of Asian cockroaches in the United States,
- 3) researched the first methods of mass-producing cat fleas, which allowed the development of on-animal cat flea treatments,
- 4) evaluated the first gel baits for cockroach control,
- 5) Determined repellent or nonrepellent residual soil termiticide activity,
- 6) helped release biological controls (decapitating flies and protozoa) for control of fire ants, and
- 7) developed new methods of fly and mosquito control: Inzecto blue sticky traps for flies, Inzecto mosquito traps, and Inzecto mosquito larvicide chips.

Phil's faculty replacements are Dr. Mike Scharf as Endowed Professor of Urban Entomology, Dr. Roberto Pereira as FPMA Endowed Professor, and Dr. Faith Oi as Extension Associate Professor of Entomology. **PP**

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Risky Business

Allen Fugler

OSHA Fine a Reminder of Best Summer-Safety Measures

ALTHOUGH it is spring in Florida, with comfortable temperatures and balmy breezes, we need to consider the approaching summer conditions and take measures to stay healthy in the heat.

The Occupational Health and Safety Administration (OSHA) recently levied a \$24,576 fine against a Florida environmental company for failing to prevent and promptly respond to an employee who succumbed to heat-related stress illness. Read the U.S. Department of Labor press release online¹.

Even in adverse conditions, our bodies can regulate temperature through sweating until this regulatory mechanism is overwhelmed. Heat exhaustion and heat stroke can then escalate rapidly, which can lead to delirium, internal organ damage, and ultimately to death. As recently as 2019, 884 people died in the United States from exposure to excessive heat, according to labor statistics sources.

Although almost everyone can be susceptible, those at risk include infants and young children, people over 65 years old, those with chronic health conditions or on certain medications, and those with a higher body mass index (BMI).

Lawn & Ornamental ID cardholders and certified operators often work outside in hot weather, and GHP and Termite/WDO technicians can encounter hot attic environments almost year round in Florida. Regardless of the time of year and interior/exterior nature of heat exposures, everyone should take precautions to minimize the risk of heat-related illnesses. An OSHA poster outlines heat safety guidelines²:

- ✓ Stay aware of the length of heat exposures, especially as the seasons change from cooler to hotter weather.
- ✓ Stay hydrated and drink plenty of fluids before you get thirsty.

- ✓ Monitor coworkers for signs of heat exhaustion or heat stroke.
- ✓ Take breaks during the day to rest, rehydrate and cool down.

Knowing the symptoms and proper responses to heat exhaustion and heat stroke as outlined by Centers for Disease Control³ can save lives on and off the job!

Heat exhaustion can occur when you lose an excessive amount of water and salt due to sweating. Signs and symptoms include:

- ✓ Pale or moist skin
- ✓ Muscle cramps
- ✓ Fatigue, weakness and/or exhaustion
- ✓ Headache, dizziness and/or fainting
- ✓ Nausea or vomiting
- ✓ Rapid heart rate

Left unaddressed, heat exhaustion can develop into heat stroke, so render aid by moving the person into cooler areas (preferably air conditioned indoors). Provide water and other cool beverages, and apply wet towels to the face, neck or head.

A delay in responding to signs of heat exhaustion can lead to heat stroke. Those signs include:

- ✓ Body temperatures of 103° F or more
- ✓ Flushed, dry skin that is hot to the touch, since sweating has usually stopped as the condition worsens
- ✓ Forced and rapid breathing
- ✓ Headache, dizziness, confusion and/or irrational behavior
- ✓ Convulsions or lack of response

You should take immediate action by calling 911, moving the person to an air conditioned, indoor environment and using cold compresses, removing excess clothing, and cooling the person by immersing them in cold water or placing them in a cold shower if possible. Maintain the first aid and CPR (if needed by monitoring breathing) until help arrives and the body temperature drops to under 101° F. You can

actually harm someone by forcing them to drink liquids, using rubbing alcohol on the skin, and providing pain relievers or salt tablets, so avoid these well intentioned but potentially dangerous measures.

Avoid heat-related illness by managing time exposures during hot days by:

- ✓ Drinking fluids even if you don't feel thirsty! Salt lost by sweating can be replaced by fruit juice and/or sports drinks. You must get ahead of dehydration, because it's really difficult to catch up while exposed to high temperatures.
- ✓ Wearing loose, lightweight and breathable clothing that covers your arms and legs. Hats, sunglasses and sunscreen are musts as well — long-term exposure can increase the risk of skin cancer and eye damage.
- ✓ Staying aware of exposures during the hottest part of the day, from 11 AM through 3 PM. Take breaks during these hours, and cool off.

You can take these mild spring months to prepare your team for the long, hot and harsh Florida summer:

- ✓ Schedule routes to allow for daytime cool-down breaks and weather disruptions.
- ✓ Equip your crews with coolers, cups, bottles, water and sports drinks.
- ✓ Select the right outdoor shirts and hats to protect your team from heat and sun, while projecting a professional image with company logos and colors.

Managing heat exposures can be tough, especially in summer in the Sunshine State, but keeping our employees safe and healthy is our most important charge and responsibility. For additional resources, please contact Allen Fugler, Xterminator Pro Director of Risk Management, at afugler@xterminatorpro.com or (407) 241-3037. **PP**

¹ <https://www.dol.gov/newsroom/releases/osha/osha20220119>

² <https://tinyurl.com/heat-safety-poster>

³ <https://www.cdc.gov/disasters/extremeheat/warning.html>

Allen Fugler is Director of Risk Management for Xterminator Pro, a Division of Aegis General Insurance



A billboard touts the 2021 Oxitec mosquito project in the Florida Keys.

Dr. Mustapha Debboun, General Manager of the Delta Mosquito and Vector Control District, said, “With mosquito and vector-borne diseases a growing concern in California, we see Oxitec’s technology as an important additional option to control the invasive *Aedes aegypti* mosquito. We look forward to working in partnership with Oxitec and have been impressed with results from their previous projects in Brazil and the Florida Keys. They have proven the effectiveness that their biological solution can deliver in suppressing this nonnative invasive and disease-spreading mosquito.”

In anticipation of this research approval, the Delta Mosquito and Vector Control District (Delta MVCD) seven-member elected Board of Trustees issued a unanimous vote of approval in October 2021 to partner with Oxitec to carry out focused projects in areas that are part of the Delta MVCD’s jurisdiction.

Oxitec is also developing a research and development facility in Visalia, which will provide support to Oxitec programs in the United States and globally.

In its published approval of Oxitec’s 2021 Florida pilot for this technology, the EPA cited the technology as safe for humans and the environment¹.

As it does around the world, Oxitec will work hand-in-hand with its government partners in Florida and California as well as with residents, communities, civic groups, nonprofits, businesses, and many other stakeholders who will guide, shape or contribute to the projects. Oxitec also carries out extensive public engagement efforts, ensuring that each project benefits from broad participation, local leadership, inclusive outreach and education, and opportunities for learning and sharing feedback. These two additional pilot projects will help contribute to Oxitec’s application to the EPA for commercial approval of this technology.

Grey Frandsen, CEO of Oxitec, said, “Our growth in the U.S. is based on our strong partnerships with two outstanding local government agencies and with a large and diverse coalition of stakeholders

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1. Edward F. Marshall. Cholecalciferol: A Unique Toxicant for Rodent Control. DigitalCommons@University of Nebraska-Lincoln, Proceedings of the Eleventh Vertebrate Pest Conference. 1984.

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¹ <https://www.epa.gov/pesticides/epa-approves-experimental-use-permit-test-innovative-biopesticide-tool-better-protect>

— from residents who participate in our pilot projects to conservation organizations, small businesses, scientists and teachers, community leaders, and more — who have supported our efforts to bring our safe and effective technology to the United States. We're thankful to our partners and to the communities that have enthusiastically embraced us and look forward to getting to work this year."

A mosquito species invasive to both Florida and California, *Aedes aegypti* can transmit mosquito-borne diseases such as yellow fever, dengue, Zika, chikungunya, and animal heartworm, and continues to spread through the state of California and across the United States. *Aedes aegypti* was first detected in California in 2013 and has spread rapidly to 22 counties since then.

About Oxitec's

***Aedes aegypti* technology**

Oxitec's nonbiting male mosquito was designed to control invasive, disease-spreading *Aedes aegypti*. It has successfully provided significant suppression of *Aedes aegypti* in other geographies and does not persist in the environment or cause harm to beneficial insects such as bees and butterflies.

This technology also removes all requirements for adult mosquito-rearing and releases and eliminates the potential for female releases. Combined with other innovations, this technology is anticipated to reduce up to 90 percent of costs associated with traditional insect-release programs.

Similar projects in the Brazilian city of Indaiatuba found that Oxitec's male mosquito suppressed disease-carrying *Aedes aegypti* by up to 95 percent in urban, dengue-prone environments following just 13 weeks of treatment, as compared to untreated control sites in the same city. **PP**

Learn More

- 1 (888) 308-1859, weekdays 9 AM to 5 PM, or contact FKMCD at (305) 292-7190

Report by Oxitec, Oxford, UK



"Mystery bug" photos by Douglas Butterman, all other photos by Lyle J. Buss

Southern Yellowjacket Queen

Lyle J. Buss

IN FALL and winter I'm often asked to identify a large wasp. Over the past couple years people often suspect it is an Asian giant hornet, dubbed the "murder hornet" by the media. But this is actually a queen of the southern yellowjacket, *Vespula squamosa*. When it comes to yellowjackets, people are generally more familiar with the workers, which are smaller and aggressively defend the nest from threats.

To better explain why these yellowjacket queens are out at this time of year, it helps to talk about their life cycle a bit. During the summer, a yellowjacket nest in the southeastern United States is comprised of a single egg-laying queen along with workers taking care of her young. In the fall when a colony is mature, it produces males and queens. They leave the nest, mate, and then these new queens find a sheltered location like a rotten log in which to spend the winter. These are the queens that are often seen in November and December in Florida.

In spring, these mated queens emerge and start new colonies. Their nests are usually subterranean, built in existing cavities such as old animal burrows or holes from decayed tree roots. In Florida, these queens are often seen in April and May. Now, here's where it gets strange. The southern yellowjacket queen may start her nest from scratch as I just mentioned, but more often she takes a different approach.

The southern yellowjacket queen is a "facultative social parasite," meaning she can start her nest from scratch like most yellowjacket species, but she actually prefers to take over an existing nest. In the southeastern United States, the victim is usually a young nest of a different species called the eastern yellowjacket, *Vespula maculifrons*. The southern yellowjacket queen enters the nest, finds and kills the queen, and takes over the colony, including the existing workforce of eastern yellowjacket workers. She starts laying her own eggs, and the eastern yellowjacket workers raise her young. Over time, the eastern yellowjacket workers die off until the nest is eventually comprised of only southern yellowjackets. **PP**

Lyle J. Buss, Scientific Photographer, manages the Insect Identification Lab at the UF/IFAS Entomology and Nematology Department.

Ask IFAS: Who Works to Tackle Our Invasive Mosquitoes?

INVASIVE mosquito species are finding their way into the United States with greater frequency than ever before. The southern United States are more susceptible to invasions due to their tropical and subtropical climate and abundance of mosquito breeding habitat.

New additions to the local mosquito fauna burden current surveillance and control approaches. For instance, mosquito control and public health workers require additional training to identify new mosquito threats and optimized sampling strategies to accurately survey populations.

Objectives

UF researchers at the FMEL have teamed up with mosquito control to tackle this problem.

The Mosquito BEACONS Working Group (Biodiversity Enhancement and Control of Non-Native Species) was established in March 2021 and brings together leadership in the mosquito control communities. We are using an IPM approach to:

- identify priority areas for research and Extension
- build strong collaborations
- promote sustainable IPM infrastructure.

Membership

Our group has members from universities, private pest control, public health, state departments of agriculture, and most importantly, mosquito control. Collectively, we cover Texas, Louisiana, Mississippi,



<https://fmel.ifas.ufl.edu/invasivemosquito/>

Alabama, Georgia, Florida, North Carolina, South Carolina, and Puerto Rico.

Upcoming Activities

We are working with mosquito control programs through virtual and in-person meetings, surveys, and a workshop. Stay tuned for more information or visit our website to read more about our objectives.

Funding

We are supported by the Southern IPM Center (Project S21-002) as part of the USDA National Institute of Food and Agriculture Crop Protection and Pest Management Regional Coordination Program (Agreement No. 2018-70006-28884). **PP**

Report by Bryan Giordano, UF/IFAS Mosquito BEACONS Working Group

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Robbie Ringler, Arrow Services Technical Training Director

Rodenticide Considerations

In the last issue we highlighted rodenticide uses being banned or severely restricted in California. Over the years, our industry has seen proposed regulations that start out west make their way east pretty quickly. It looks like we have that same thing occurring now.

The rodenticide manufacturers have been in informal discussions with the EPA and we can expect a Proposed Interim Decision on the regulation of rodenticides in middle to late March. As you might expect, none of these proposals are designed to increase efficiency or time management. The proposals being discussed include making all bulk rodenticides (over a 4-lb. container) a Restricted Use Product, which would require all applications of product to be applied by a certified applicator or under his/her direct supervision. We would be required to conduct inspections four days after applications to check for and remove dead rodents, and then every two days after that as long as there's bait on the site.

Think about your rodent control programs and your pricing structure: Can your company make money being required to add that amount of increased service visits to a property? Consider your customers — hotels, restaurants, bars, grocery

stores, food production — the list is endless, and we're still dealing with staffing and labor issues from a pandemic. A big price increase is not exactly what they will want!

NPMA, FPMA and the pest management industry will have time to respond to the EPA with a consistent message, so please be ready to comment when the period starts. We must speak in a unified voice and attempt to inject some common sense into this discussion. We have been successful in the past with the EPA when we get our stakeholders together and present reasonable solutions — think back to the synthetic pyrethroid label changes and rodenticide use patterns we were able to amend a few years ago.

Certification and Training

Staying with the EPA theme, the Certification and Training Rule deadline of federal, state, territory and tribal certification plans has been extended to Nov. 4, 2022. This allows the EPA additional time to review certification plan modifications and gives everyone time for public comment to address these issues.

This extension is mostly positive because it will give the EPA more time to ensure that the programs submitted meet the standards. In the Southeast, most states have robust training

and certification programs already in place, so we're hoping that we won't see too many changes but we have to constantly monitor the process all the way to the end.

U.S. Senate Bill 3283

From a Federal legislative perspective, the Farm Bill is on the docket for 2023. NPMA is currently working with and aligning stakeholders to speak as a collective voice in making sure the changes put in place are ones that agriculture, structural pest management, and the many associated industries can support or live with.

Of particular concern for our industry is Senate Bill 3283, the Protect America's Children from Toxic Pesticides Act. It should sound familiar because it's been introduced before. Senator Booker from New Jersey authored the bill, and it is cosponsored by senators Gillibrand, N.Y., Sanders, Vt., Warren, Mass., and Padilla, Cal. — all well known friends of the pest management industry.

This bill seeks to amend FIFRA, whereby cities, counties, municipalities and other local jurisdictions could regulate the sale, use and availability of pesticides. Can you imagine applying materials one way in Tampa, another way in St. Pete, and something totally different in Clearwater? And who might these cities have on staff to regulate

pesticides or their use? Where would the funding come from?

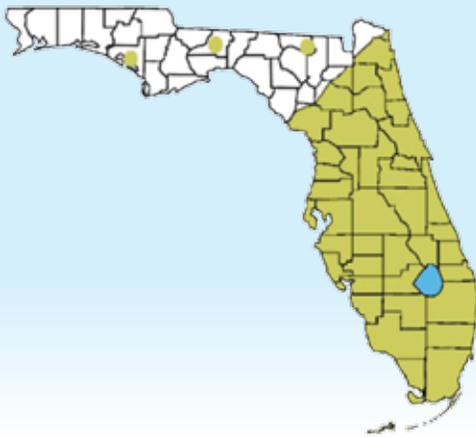
This bill would take regulatory authority from FDACS and potentially create thousands of new pesticide "experts" all over Florida — imagine that! Probably a good idea to watch D.C. and Tallahassee with a high level of scrutiny.

Florida Legislature

Speaking of Florida, the 2022 Legislative Session began with the new year. Along with the redistribution of seats in the U.S. House of Representatives, it should be busy and exciting.

Several bills are being tracked, with one of interest being SB 732 (Sen. Rodriguez, Miami) // HB 887 (Rep. Chambliss, Miami), Heat Illness Prevention. In part, this will require an employer to implement an outdoor environment heat-exposure program designed to prevent and identify heat-related illness. Outdoor work environments could also pertain to sheds, tents, greenhouses or other structures where the temperature is not aided by controlling devices such as air conditioning.

Requirements of SB 732 // HB 887 would include definitions of terms used, applicability, providing responsibilities for certain employers and employees, annual training for employees and management, and that FDACS, along with the



Cuban treefrog main range, shown in green

Note: The dots shown on the map represent isolated locations where these frogs have been reported and could be breeding. Report any sightings outside the main range to tadpole@ufl.edu.

Rat Lungworm, continued

Walden's laboratory examined 16 Cuban treefrogs from Volusia County for parasite species and confirmed the results by PCR. Her team recovered larvae of the rat lungworm, also known as *Angiostrongylus cantonensis*, from the frogs' hind leg muscles.

Other studies Walden's team has been involved in have documented the rat lungworm's presence in Florida in gastropods — snails and slugs — as intermediate hosts and in rats as definitive hosts, as well as in nonhuman primates. The parasite has previously been found in Miami-Dade, Orange, Hillsborough, Alachua, St. Johns and Leon counties.

"The Cuban treefrog is extremely abundant in residential areas in peninsular Florida, often seeking shelter around homes that put them in close contact with humans," Walden said. "If infected with parasites, this species' association with humans indicates they have great potential to serve as agents of zoonotic transmission and may also threaten pets that consume them."

Dogs, especially puppies, are by nature curious about their surroundings and explore the world through their mouths, Walden said.

"Although rare and not yet reported in Florida, dogs have become infected with rat lungworm by swallowing a snail or slug that carries infected larvae," she said. "It's very possible that a dog could eat a Cuban treefrog, or any other potential anuran host, and become infected as a result."

In humans, infection with rat lungworm can cause meningitis, brain damage and blindness. In dogs, symptoms can include rear limb weakness and hind leg paralysis.

The Cuban treefrogs' position in the food webs of Florida makes them well suited for the life cycle of a variety of parasites. They are known to eat a variety of snails, insects and even lizards and frogs. In addition, the close association of these anurans with humans can result in human-aided dispersal events capable of spreading their parasites to new geographic locations, the researchers said.



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*A SERIOUS HEADACHE: If ingested, larvae of *Angiostrongylus cantonensis* can migrate to the brain, spinal cord, and eye.*

“The parasite itself is definitely a concern to humans and animals,” Walden said. “You have to ask: What would eat the Cuban treefrog, and how would the parasite affect that particular host? And if it does spread to other frogs, it’s the same question. What would eat those frogs?”

Native frogs might be more readily ingested, whether by humans or other animals, she added. The skin of the Cuban treefrog can be irritating to mucus membranes and not appetizing for many.

“Humans do eat frog legs,” Walden said. “While humans are not likely eating Cuban treefrogs, what other Florida frog species are infected with rat lungworm, and how are they affected? What we’ve found is just touching the surface.”

She added that while the Cuban treefrog’s role in the rat lungworm’s life cycle remains unknown, the findings are cause for concern, primarily due to its rapidly expanding geographical range.

“This finding highlights the necessity for increased awareness of emerging parasites and the role invasive species play in their survival and distribution,” Walden said.

Collaborators in the study included Robert Ossiboff, D.V.M., Ph.D., a clinical assistant professor of pathology and virology at the UF College of Veterinary Medicine, Steve Johnson, Ph.D., an associate professor of wildlife ecology at UF/IFAS and Terence Farrell, Ph.D., a professor of biology at Stetson University, among others. Two UF veterinary students, Ellis Chase and Kelsey Lykins, also participated in the study. **PP**

Report by University of Florida College of Veterinary Medicine. This article originally appeared on www.vetmed.ufl.edu



Heather Walden displays a vial that contains preserved rat lungworm specimens.



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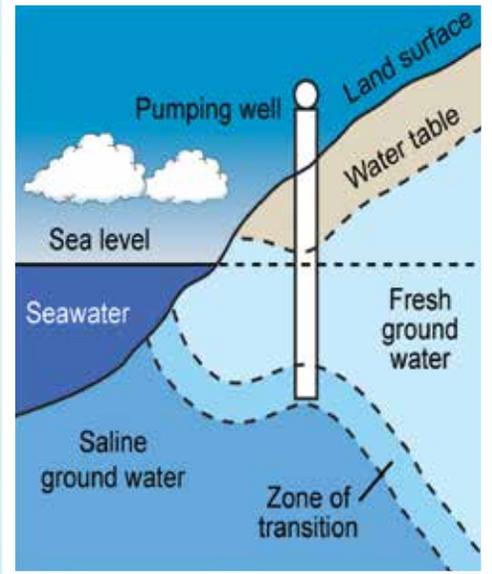
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EPA

Water resources along the coasts risk saltwater intrusion. Rising sea levels, drought, and changes in water demand and availability can increase the salinity of both groundwater and surface water sources of drinking water. — EPA



Potassium deficiency on mango



Magnesium deficiency on schefflera

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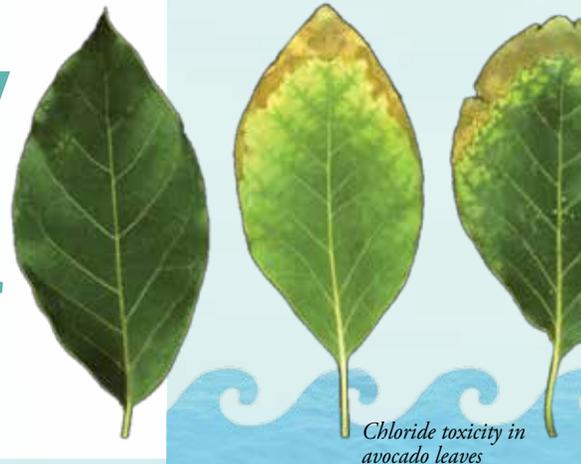
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Healthy Coastal Landscapes

Erin Harlow



Chloride toxicity in avocado leaves



Plumeria is a salt-tolerant flowering shrub or small tree.

FLORIDA flaunts 1,350 miles of coastline, according to the Florida Department of State. More than 19 million residents call Florida home, and 15 million of them live in coastal areas¹. That's 76 percent of Florida's population!

Because of the high population density and manicured nature of many of these coastal landscapes, technicians and applicators may find many unique challenges on these accounts. This article will discuss some of those challenges, how to recognize them, and best practices for improving the health of coastal landscapes to reduce inputs.

Just like with any account, it is important to survey the site periodically and record soil type, pH, environmental factors, and plant types. It is imperative to record this information because it can influence how and which products may be chosen for the program.

Salt in the Landscape

In coastal landscapes, damage from salt is a top concern. Salt may be introduced to plants through irrigation water, saltwater intrusion, salt spray, or natural disasters such as flooding.

Soils with excess salts can cause disruptions in nutrient uptake for plants. Both magnesium and potassium uptake can be disrupted when salt levels are high. Plants with potassium deficiency are generally characterized as having speckled yellowing on the leaves, or necrotic leaves. Magnesium-deficient plants can be recognized by yellow leaves with dark green midveins. Both magnesium and potassium deficiencies will be seen first on the bottom leaves on a plant.

Salt can also cause an increase in chloride or sodium levels in plants, water or soil. Plants with chloride or sodium toxicities may appear stunted, yellow, or have necrotic or dead areas.

Saltwater intrusion is becoming more common. As

freshwater is pumped through wells from the aquifer during dry periods, voids are left, and saltwater moves into these spaces.

Saltwater intrusion is of particular concern in Florida and can affect landscapes that are not directly next to coastal waterways. Salt water can enter wells horizontally or from the bottom and may affect wells that have worked for decades.

Saltwater intrusion is most likely noticed during periods of extended drought. Technicians and managers may notice plants that have necrotic leaves or sections. Sodium and chloride toxicity look very similar to chemical or fertilizer burn because salts are the base for many of these products. Plants directly in the path of irrigation sprinklers will show the most damage because the saltwater can damage the plant depending on the plant's sensitivity level.

Sending a tissue sample to a laboratory for analysis is the most accurate way to determine if a plant has sodium or chloride toxicity. Levels can then be compared to the plant's tolerance level for chloride and sodium.

If the well water is the suspected source, then that can be tested for its electric conductivity, or EC. The soil EC can also be tested, although this will not indicate where the salts originated from — for instance, flooding from a natural disaster, irrigation water, or fertilizers. It would only indicate if the soil had a high salt level.

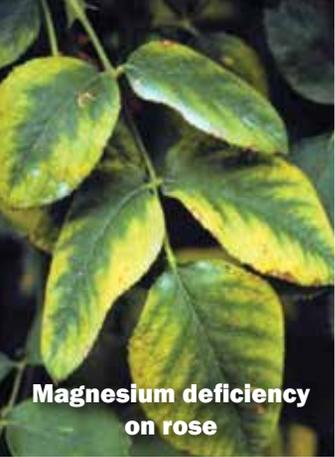
Plants have varying sensitivity to salts, and levels normally have to be researched based on individual plant species. If a site ends up with high salt levels from something like a buildup of salt spray or a natural disaster then, aside from removing the soil, flushing with freshwater or rainwater is the best way to remove the salts. If the well is contaminated, then the plants will continue to be damaged with the use of that as a water source. More salt-tolerant plants may need to be installed on the site.

Exercise Care with Coastal Applications

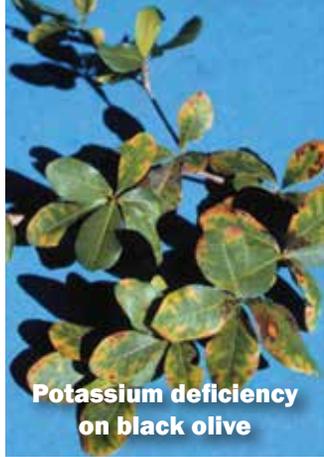
Beyond salty conditions, wind speed and soil type on coastal landscape applications should be monitored. Most soils in coastal areas are very sandy, with low organic matter. This means that products can quickly leach downward, entering the environment. Not only is it a poor practice, but it also wastes money when products are lost.

Improving organic matter on the site is one way to slow the off-site movement of fertilizers and chemical products by increasing exchange opportunities. Organic matter or soil amendments also improve overall soil health including increasing microbes which breakdown fertilizers and chemicals into usable forms for plants. *Continued next page*

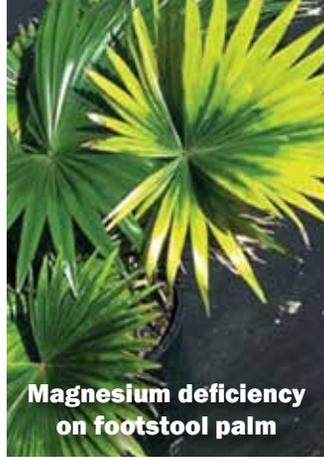
¹ NOAA, 2022



Magnesium deficiency on rose



Potassium deficiency on black olive



Magnesium deficiency on footstool palm

Coastal Landscapes, continued

IF AN account has poor soil with stunted, yellowing plants that do not respond to products, it might be time to consider adding soil amendments such as a high-quality compost. Also review the nutrient program and how the applications are made. If the soil pH is strongly alkaline, has low organic matter, sandy soils, and the plants tend to appear stunted or with a nutrient deficiency, then all-liquid applications should be considered. This allows the applicator to completely bypass the soil and make targeted applications in response to the needs of the plant. Utilizing tissue testing is a way to determine where gaps may be in the program and adjust accordingly.

Coastal Breezes

Wind speed is the final consideration on coastal sites. These accounts can be constantly windy, and technicians should have access to and be trained to use an anemometer. Understanding the product label and directions for use and wind speed restrictions is also important.

If accounts are constantly windy, technicians should be trained to mitigate for drift and use larger droplets, employ guards, monitor wind speed, and adjust their spray techniques as needed to be good stewards of their products.

TREATING AND MAINTAINING coastal landscapes is certainly not an easy task. Salt damage from spray, saltwater intrusion, and natural disasters will continue to cause problems in our landscapes. As the population increases and people continue to desire plants that are not native or suited to our harsh sandy, humid, and hot coastal environments and require constant maintenance the challenges will only increase.

Providing training and knowledge to technicians and maintenance professionals on how to recognize problems such as salt damage or nutrient deficiencies is one of the first steps to creating better coastal landscapes. The knowledge is then shared with clients, and more informed decisions on product selection, plant care, and overall account health can be realized. **PP**

Erin Harlow is Horticulture Agent III at Columbia County Extension Office

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Facts from FDACS: Training Requirements 2022

I RECEIVE a lot of questions about training requirements. Most training requirements break down into two categories: Those employees who carry an identification card, and those who don't.

Those employees who are required to carry an identification card are required to receive field and classroom training. There are also identification card endorsements for certain types of work conducted. These training requirements can be found in the following Florida Statutes:

Chapter 482.091 Employee identification cards (3) A licensee or certified operator may not assign or use an employee to perform any category of pest control without providing trained supervision unless the employee is trained and qualified in that category of pest control. An employee may not perform, solicit, inspect, or apply pest control without first having been provided at least 5 days of field training in the appropriate category of pest control under the direct supervision, direction, and control of a certified operator.

(9) For every employee who performs inspections for wood-destroying organisms pursuant to s. 482.226, the licensee or certified operator in charge must apply for an identification card that identifies that employee as having received the special training specified in this subsection in order to perform inspections pursuant to s. 482.226.

(10) In addition to the training required by subsection (3), each identification cardholder must receive 4 hours of classroom training in pesticide safety, integrated pest management, and applicable federal and state laws and rules within 6 months after issuance of the card or must have received such training within 2 years before issuance of the card. Each cardholder must receive at least 2 hours of continuing training in pesticide safety, integrated pest management, and applicable federal and state laws and rules by the renewal date of the card. Certified operators and special identification cardholders for fumigation who maintain their certificates in good standing are exempt from this subsection.

Chapter 5E-14.1421 Identification card training verification

(1) The licensee shall maintain written training records for both the initial five (5) day (40 hour) training required in Section

482.091(3), F.S., and the continuing training required in Section 482.091(10), F.S., on all identification cardholders within their employ and make those records available during routine inspection or upon request of the department. Licensees must maintain the training record for at least a two year period.

(a) Completion of the Verification Record of Initial Employee Training, FDACS-13665, Rev. 05/21, which is hereby adopted and incorporated by reference and available online at <https://www.flrules.org/Gateway/reference.asp?No=Ref-13521>, or

(b) A written record of 40 hours of attendance in a training course with a written course syllabus and copies of all training materials used in the course available for department inspection.

(3) Employees whose job duties include fumigation sales must have at least two of the 40 hours required by Section 482.091(3), F.S., cover the topics of contract regulations, fumigant fact sheet information, consumer preparation requirements, fumigant and warning agent properties including health risks, use of secondary locks, signage, re-entry notices, key/access provisions, subcontracting procedures, safety precautions, measuring the structure, and proper clearance testing.

(5) Licensees or certified operators applying for Wood-Destroying Organism Inspector Identification cards for employees in compliance with Section 482.091(9), F.S., may complete the application process online at <http://www.FDACS.gov>, or shall submit the Special Training to Perform Wood-Destroying Organisms Inspections and Control Training Verification Record, FDACS-13642

(6) Fumigation employees that participate in fumigations using a residential fumigant must complete Initial and Annual Stewardship Training as required by the label and Stewardship Policy for the residential fumigant(s) used as defined in rule Chapter 5E-2, F.A.C.

(7) The licensee or certified operator in charge of fumigation must apply for an identification card that identifies that employee as having received the training specified in paragraph 5E-14.108(3)(b), F.A.C., to assist as the second trained person during the use of a residential fumigant as described in subsection 5E-14.108 F.A.C.

(3) It shall be the duty of the certified operator in charge of fumigation to carry out the following:

(a) Train and/or verify training to each special fumigation identification cardholder in proper fumigation procedures as required by regulations and fumigant label directions, and to know the location, purpose, use and maintenance of personal protective equipment and fumigant detection and safety devices and when and how to use this equipment.

(b) Train each identification cardholder, assigned to fumigation work, in basic fumigation procedures, SCBA (self contained breathing apparatus) use and the proper use of fumigant safety equipment and to report immediately to the certified operator in charge or his special fumigation identification cardholder any irregularities or emergencies.

EMPLOYEES that do not participate in pest control activities as defined in **Chapter 482.021(22)** are not required to carry identification cards.

(22) "Pest control" includes:

(a) The use of any method or device or the application of any substance to prevent, destroy, repel, mitigate, curb, control, or eradicate any pest in, on, or under a structure, lawn, or ornamental;

(b) The identification of or inspection for infestations or infections in, on, or under a structure, lawn, or ornamental;

(c) The use of any pesticide, economic poison, or mechanical device for preventing, controlling, eradicating, identifying, inspecting for, mitigating, diminishing, or curtailing insects, vermin, rodents, pest birds, bats, or other pests in, on, or under a structure, lawn, or ornamental;

(d) All phases of fumigation, including:

1. The treatment of products by vault fumigation; and

2. The fumigation of boxcars, trucks, ships, airplanes, docks, warehouses, and common carriers; and

(e) The advertisement of, the solicitation of, or the acceptance of remuneration for any work described in this subsection. **PP**

Report by Paul Mitola, Environmental Consultant, Florida Department of Agriculture and Consumer Services

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Legislative Corner, Continued from Page 23

DOH, adopt specific rules. The program at a minimum would train and inform supervisors and employees about heat illness, how to protect themselves and coworkers, recognize environmental risk factors, along with signs and symptoms of heat illness and the appropriate first aid measures to be administered prior to medical attention (first responders) arriving should a serious heat-related event occur.

In addition to the above, for employees that work in an outdoor environment, additional measures would be but are not limited to the

acclimatization to a work environment gradually over a two-week period at a 20 percent increase in heat exposure per day, providing 1 quart of drinking water per hour for each hour in the employee's entire workday, and ensuring the employee takes a 10-minute recovery period every two hours in which the employee is exposed to high heat conditions. Implementing the program would occur when the outdoor heat index equals or exceeds 90 degrees F. And again, a training program would be required on an annual basis.

Other bills being watched are SB 1000 (Sen. Albritton, District 26), HB 1291 (Rep. McClure, District 58), this one dealing with Nutrient Application Rates which is geared more for the agriculture (farmers) side but worth noting as they all begin somewhere.

Toxic mold is back with SB 1394 (Sen. Jones) and HB 933 (Rep. Thompson) — Toxic Mold Protection. Both bills would also create the Toxic Mold Protection Advisory Council supplementary to the DOH

as well as require commercial and industrial real property landlords the obligation to provide certain written disclosures to tenants under certain circumstances. It would also require the department to develop and adopt standards for assessing the health threat from exposure to molds indoors as well as standards for the assessment of permissible exposure limits and disclosure requirements.

There are several other bills being watched: SB 1580//HB 1145 Regulation of Single Use Plastic Products, SB 1232 Florida Occupational Safety and Health and SB 1564//HB 1095 Telephone Solicitation.

All in all, 2022 promises to be an exciting year for each of us! **PP**

Robbie Ringler is Technical Training Director at Arrow Exterminators

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