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## Joro Spider Marches On



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# PESTPRO

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# CONTENTS



## FEATURES

- 6** A New Way to Fight an Old Problem:  
Managing Mosquitoes in Atlantic Beach
- 11** Identifying and Monitoring for Pests:  
Two Requirements of IPM
- 15** Insects: Drivers of  
Human History
- 16** Joro Spider  
Marches On



Bob Peterson

## DEPARTMENTS

- 4 FPMA President's Message**
- 5 Editorial:** The Pest Control Industry is Maturing
- 19 Executive Suite:** Are All Your Eggs in One Basket?
- 21 Pest Detective:** Black Corsair
- 27 Ask IFAS:** Can UF/IFAS Diagnose Palm Disease?
- 29 PCO Pointer:** Consumer Notice 13692 and  
Consumer Consent 13671



## ON THE COVER

Joro spiders might raise a ruckus among us as they colonize more and more of the Eastern United States. Luckily, however, Joros are harmless spiders and might even be considered helpful as they catch and consume mosquitoes and other pest insect species.

*Photo by Hans Christiansson*



# On Your Mark ... Get Set ... Sign Up!

*Message from the President of FPMA, Suzanne Graham*

**F**LORIDA Pest Management Association's Education Committee, Event Planning Committee, and HQ have been busy all summer, planning activities for 2022 and on into 2023.

## **Business & Operations EXPO**

Registration is now open for our premier event: The Business & Operations EXPO. Last year, we experimented with a new program called TECH Days, which piggy-backed on EXPO and was designed to give technicians hands-on training using the hotel as a training facility. It was so well received that TECH Day has now evolved into TECH Days — a two-day event with six rotating training stations qualifying for two GHP CEUs, six stations qualifying for two L&O CEUs, and, on the second day, six stations in safety training that will qualify for CORE. And we've thrown in a two-hour CEU in WDO just for good measure.

In keeping with the idea that EXPO is truly the event that *everyone in the pest management industry should attend* for any number of reasons, we have one day of EXPO devoted to just CEUs and another day devoted to just business sessions.

And this year will truly be a year of the best of the best. The University of Florida has the No. 1 urban entomology department in the world, and between retired (yes, you know who I'm talking about) and current professors (guess who?) and our UF/IFAS professors (yep, them too!), we will have an all-star lineup of PhD entomologists. It doesn't get more professional than that.

For the Business Sessions, we have noted that PCOs/PMPs — by whatever acronym you want to call them — are incredibly generous in sharing their knowledge and that our attendees get some of the most useful information directly from each other. If one PMP sharing their experience is good then a panel of your peers is even better!

This year, the idea is to have three panels of your peers covering topics related to selling, servicing and retaining your customers and your employees. Stay tuned as we start pulling the best in the business together to impart some of the wisdom that made them so successful.

Even if all you do is visit the Exhibit Hall on Thursday, January 19, if you are a member, you owe it to yourself to attend the Annual Business Meeting at 4 PM. This is when any changes to the By-laws come up for vote and when nominations for officers are presented and voted upon.

If you are an FPMA member, you have a vote and a say about what paths the Association is taking. There have been many changes in the industry in the last two years and the profile of FPMA's membership is evolving. This is *your* Association, and we need your input and participation if we are to meet the challenges ahead.

**Embassy Suites in Kissimmee, Fla., will host the FPMA Business and Operations EXPO in January 2023.**



## **Behind the Scenes**

In the meantime, we are also planning to reinstate our “Behind the Scenes” program after a two-year hiatus. This program invites our members to visit the establishments of a host member and ask questions about “how they do it.”

It's a wonderful opportunity to learn both from your host and your peers, who are participating with you. We are finalizing dates in October and will keep our members posted on what member-companies are hosting and the details on how to participate. Not a member? This is just one of the reasons to join. To learn more, visit us at [www.flpma.org](http://www.flpma.org) under Join.

## **2022 Clay Shoot**

But enough serious business. Our 19th Annual Clay Shoot is taking place again on December 6. This is a strictly for-fun event, and we get a nice turnout of around 100 shooters every year. Registration is open for that, too, on the website [www.flpma.org](http://www.flpma.org) under EVENTS at the top.

As always, we are here and we are listening. **PP**

*Suzanne Graham  
President, FPMA*

Visit [flpma.org](http://flpma.org) for currently scheduled meetings and more.

# The Pest Control Industry is Maturing

**T**HE PEST control industry in Florida is a mature industry. What are the life stages of a mature industry? A mature industry has passed the introduction stage, growth stage, and shakeout stage, but has not yet reached the declining stage.

The pest control industry is not even close to the declining stage. In fact, pest control is still growing despite all the many obstacles to growth in the current economy.

I was reminded of maturity and obstacles to growth this year when the owners of my lawn service company decided to retire. They did not sell the company. They did not turn their clients over to another company. They just very nicely informed their customers that they were going to close their business.

The owners were mature and wanted to simplify their lives. But I soon learned why the company did not turn their clients over to another company. I started making calls to other L&O companies in the area. Most of the companies were not taking new customers. They had all the business they could handle. Wow. I was shocked! I asked why they could not handle new customers. Here is what I learned.

## Good Workers Are Hard to Find

First, although a company would like to add new routes and expand their business, that often cannot be done without hiring new employees. It is really hard to hire a new service technician. In fact, with the U.S. labor market, it is almost impossible to hire new employees. I have talked with plumbing companies, well drillers, and now pest control companies.

One plumber told me that he had contacted a local community college and put out brochures to advertise and hire a helper. He said none of those brochures were taken. Many employers have the same problem. Job advertisements do not get any, let alone quality, employees applying for positions.

In pest control, employees must have a clean record: no drug or alcohol dependencies. There cannot be a criminal record — customers do not want former criminals to have access to their homes. Job applicants with clean records are really hard to find. Also, it takes time to check all the records before obligating to hire someone.

## Vehicles Are Scarce

Second, it is really hard to get new service vehicles. There is a huge backlog of orders for new vehicles. I have heard that if a company wanted to expand its routes and needed a new service vehicle for those new routes, it might take six months to more than a year for a new truck to arrive. Even used trucks are going at a premium price these days, if you can find one. The system of supply is broken, and demand is greater than the supply of new and used vehicles.

## Inflation, Instability

Third, costs for supplies, money and gas are volatile. The pest control industry is based on running routes using vehicles to get from one customer to the next. That means gas prices are critical. The volatility of the cost of gas has caught everyone by surprise and scrambling to adjust price of service. A lot of the cost increases are due to the Russian attack in the Ukraine and the fallout from that war.

The war is a sad situation for Ukraine and has affected almost all types of businesses. But did you know the war in Ukraine has tremendously affected insects of public health importance? I was contacted by a biologist in Ukraine who was seeking assistance for a fly problem. Fly populations explode when there are wars and natural disasters. The war in Ukraine is no different. They have no infrastructure left in many parts of the country — no sanitary sewers, lots of rotting food, no garbage service. And, tragically, a lot of dead bodies breeding flies.

Ukraine needed a portable solution because they had no vehicles to use for pest control. So, I lined up 9,700 Florida Fly Baiters, which we invented at the University of Florida. They were supplied by the Insecto company to Ukraine at cost.

## Employee Training and Recruitment

Fourth, employees do not arrive with a knowledge of pest control and how to run a route. They need training. It takes time and resources to train employees well. Several years ago, one of our faculty had his house inspected for termites. The technician removed the shower head and looked inside the pipe for termites because he was told that termites follow pipes. That employee was not trained properly.

At the University of Florida, we can help you train. *PestPro* magazine is a great resource. Pest Management University does hands-on training with building construction elements.

An employee can see virtually all the types of Florida construction in a few days. Typically, it might take a year to gain that experience.

We also produce pest management conferences in several parts of the state and online training for the industry. There are certificates in pest control technology, urban pest management, medical entomology, and landscape pest management. Florida Pest Management and Certified Pest Control Operators associations provide training at their meetings. These are great ways to provide top-quality instruction to employees both new and old.

There are several sources of new, trainable employees. The UF entomology department has students graduating every year. Contact Dr. Rebecca Baldwin to learn about good students interested in entering the industry. Another good source of employees is the armed forces. As a former Navy officer, I can attest to the quality of people who have been in the military and are either retiring or returning to civilian life. These former military folks usually have a squeaky-clean record, are used to abiding by rules, and are very responsible people.

I was recently at meetings at Navy bases in Georgia and Florida. I ran into quite a few retiring military people who were leaving the service and going back to civilian life. I would like to see many of the armed forces preventive medicine technicians enter the field of pest control. They would be very good employees for companies who have had difficulty filling positions. "Recruit Military" is a service for matching employers with former military members. They are even having a job fair in Jacksonville in October. Also, the U.S. Department of Labor has a Veterans' Employment and Training Service. Contact them about hiring military veterans.<sup>1</sup>

A MATURE INDUSTRY like the Florida pest control industry will face times of difficulty. These days they are actually times of growth. Revenues for pest control have never been higher. In fact, the economic impact analysis funded by FPMA shows that the Florida pest control industry has an economic impact of 2.7 billion dollars. That is bound to grow, even though it is hard for companies to grow in this economy. The sky is the limit for the pest control industry. **PP**

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

<sup>1</sup> <https://www.dol.gov/agencies/vets>

# A NEW WAY To Fight an OLD PROBLEM: *Managing Mosquitoes in Atlantic Beach*

Philip Koehler



Dean Calma

**Yellow fever mosquito**  
*Aedes aegypti*



*Photo above: Inzecto mosquito trap demonstration at Atlantic Beach City Hall complex. Approximate trap locations marked with yellow dots.*

*Photo at left: Each Inzecto mosquito trap location consisted of a trap held in place by a zip tie to a stake. A card informed residents that the trap was placed to control mosquitoes and should not be disturbed — none of the traps were disturbed.*



*Phil Koehler and Atlantic Beach Mayor Ellen Glasser.*

**I**NZECTO mosquito traps were deployed this year in a three-month demonstration of mosquito control. The traps were installed in shady, outdoor areas in the city of Atlantic Beach, Fla., in April 2022.

At the conclusion of the three-month demonstration project, Atlantic Beach Mayor Ellen Glasser was pleased with the traps' efficacy, their positive effect, and potential of this innovative mosquito control for the Atlantic Beach community.

The mayor spoke recently on the WJXT News4Jax morning show. "We have been very pleased," said Glasser. "Each of the traps, on inspection, has seen thousands of dead female mosquitoes and larvae."

"The outcome of this demonstration gives us confidence that these traps do their jobs to control mosquitoes trying to breed around our government complex and may well be a very viable alternative to spraying pesticides while controlling the mosquito population," Glasser said.

### **Setting the Traps**

The Atlantic Beach government complex houses City Hall in one building and the police and fire headquarters in another. Between the two structures sits an elongated area of ponds and streams containing stagnant water from runoff. Jack Russell Park is adjacent on the other side of the City Hall parking lot. The

heavily utilized park consists of lighted sports fields and tennis courts, rest rooms, a playground, a covered picnic table area, and a skateboard park.

A ban on spraying insecticides to control mosquitoes in the Atlantic Beach municipality has been discussed. The demonstration originated from city residents' strong desire to use highly effective and acceptable green alternative solutions to spraying.

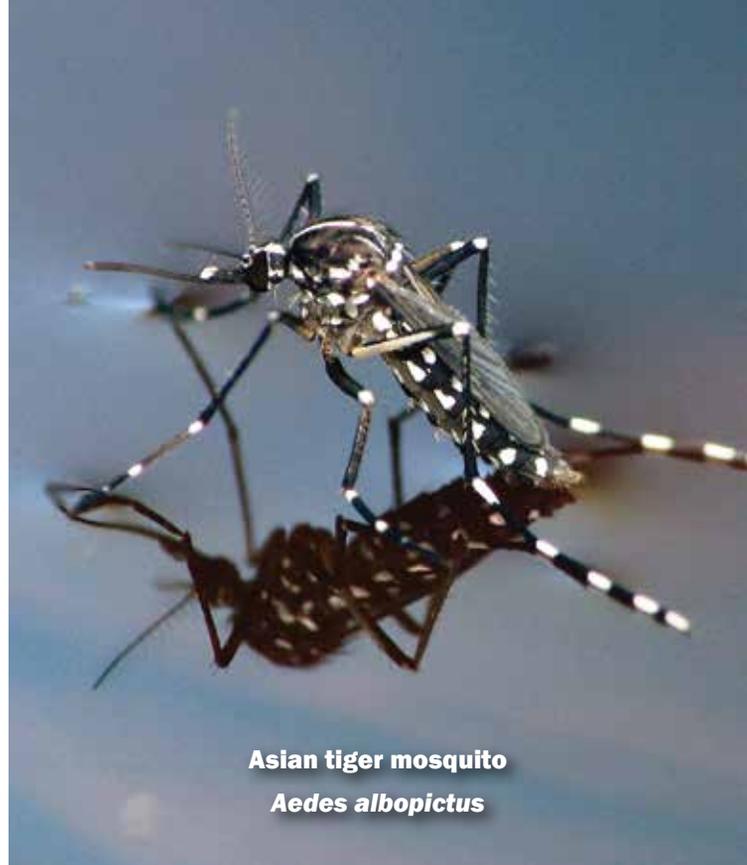
The demo had two goals: to observe the efficacy of the traps in a public area with high foot traffic, and to evaluate where the traps could be deployed in other parts of the city.

The parameters of the demo were a three-month deployment, maintenance, and observation of 64 mosquito traps supplied, managed and fully funded by Inzecto, the traps' manufacturer.

Each trap was filled with water, fastened by a zip tie to a wooden stake, and placed near a Sentricon termite bait station. The traps and the bait stations followed both buildings' roof lines. In most cases, the traps were placed in the shade of shrubs near the building.

Affixed to the upper portion of each stake was a small, laminated Inzecto identification card to inform employees and visitors to the government complex that the traps were placed to provide mosquito control.

*Continued*

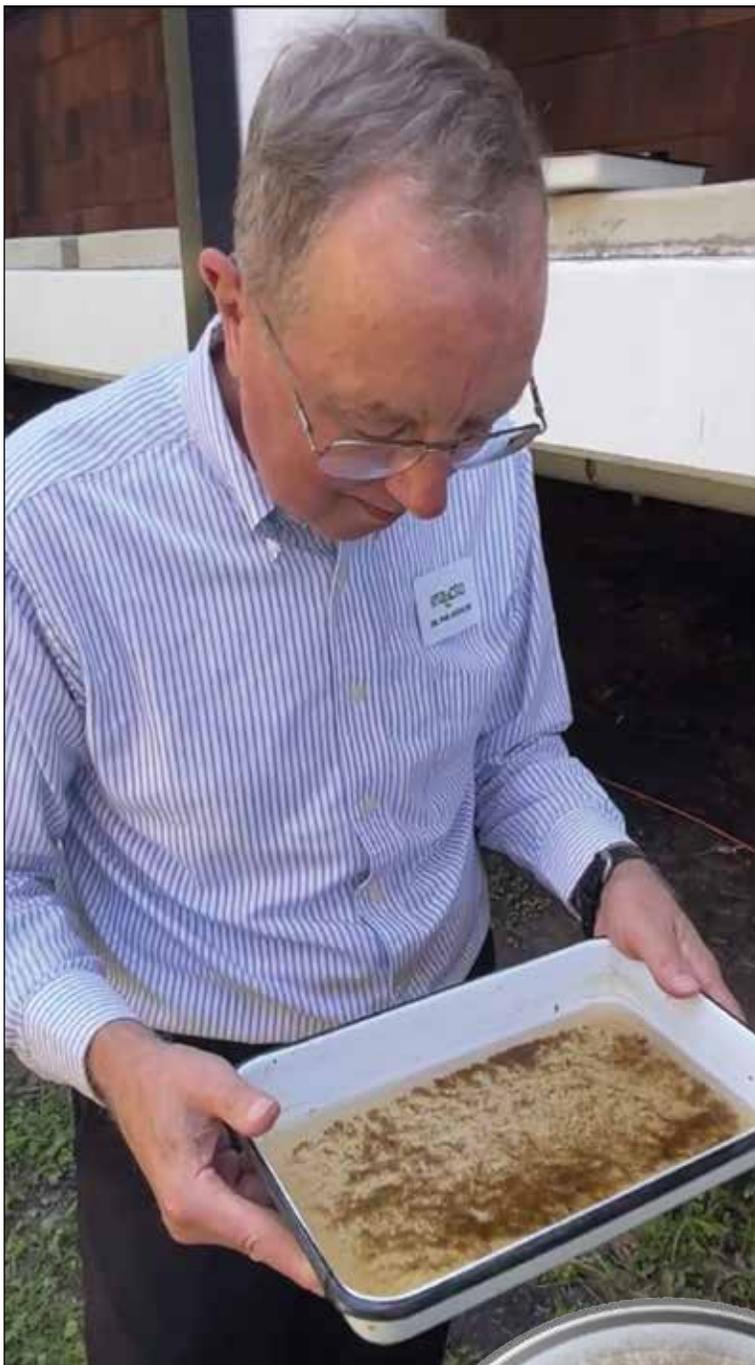


**Asian tiger mosquito  
*Aedes albopictus***

*Sean McCann*



**Phil Koehler demonstrates mosquito trap placement**



*Photo above: Dr. Phil Koehler inspects the contents of a mosquito trap at the Atlantic Beach City Hall complex. The water in each trap contained many dead mosquitoes and their larvae/pupae at two months after placement.*

*Photo at right: Closeup view of mosquito trap contents. Newly killed pupae, circled, were seen along with decayed remains of mosquitoes.*



*They would have been out here trying to bite us.”*

— Phil Koehler



**T**HE TRAPS' minimal maintenance ensured the devices remained upright, secured to the stake, and contained water. This task was performed periodically over the course of the three months. At no point were any of the traps missing or disturbed by adults, children or animals. Very few traps needed to be manually refilled with water, because they refilled with rainwater.

**Impressive Results**

Coinventor of the Inzecto mosquito trap Dr. Phil Koehler, distinguished emeritus professor at the University of Florida, at the 60-day mark examined the contents of randomly selected traps. Each trap had dead adult female mosquitoes and mosquito pupae. The traps also contained live larvae, because the larvicide works to kill mosquitoes when they pupate to the adult stage and before they can emerge as biting adults.

Koehler recently examined the contents of an Inzecto trap placed just south of the police station entrance. “This is amazing,” Koehler said. “I am impressed with this because this is a large number of mosquito



*Integrated mosquito management using Insecto traps, along with other approved methods of mosquito control.*

larvae that have died. They would have actually emerged as adults by now and been out here trying to bite us.”

A long-time Atlantic Beach public works employee said that in years past there would have been a noticeable mosquito population around the government complex. But with the traps present this summer, he did not see any mosquitoes.

A nearby resident said that where he lives there are many mosquitoes, but he noticed this was not the case down the street around City Hall.

### **Trap Development, Distribution and Placement**

The Urban Entomology Laboratory in the University of Florida Entomology & Nematology Department researched, developed and tested the trap, with initial funding and additional guidance provided by the U.S. Department of Defense’s Deployed Warfighter Protection Program. The DoD needed an effective, safe device that would be easy to use by American troops deployed in the Middle East and other locations overseas to protect them from disease-carrying mosquitoes.

The University of Florida patented the trap and licensed the rights to manufacture, commercialize, sell and distribute the trap to Insecto, a Gainesville, Florida-based company. Insecto manufactures effective, affordable, innovative and environmentally sensitive pest control products and systems backed by science, with stringent testing standards.

The traps protect humans from dangerous, annoying insects while respecting other animals and the environment.

The Insecto mosquito trap’s use is EPA-registered for sale in 48 states and more than 20 countries. The trap is distributed through companies such as BWI, Target, Paragon and Vesperis to national, regional and local pest control companies across the United States. The traps are sold to pest control companies for use in their mosquito-service programs.

The trap is most effectively used and placed by pest management professionals. To work effectively, it should be placed in shady areas with minimal air movement. For residential locations, two to four traps per yard can be placed.

### **Trap Design and Use**

The trap is made of plastic — more than 50 percent recycled — with ribbed sides. Its red and black colors are highly preferred by the resting and egg-laying female mosquitoes that bite. The trap requires minimal maintenance and is activated simply by adding water.

Female mosquitoes enter the trap to lay their eggs, attracted by a water-soluble sachet of organic material that creates stagnant-water odor. The trap has an adulticide, permethrin, and a larvicide, pyriproxyfen. This combination kills 100 percent of mosquito larvae by a time-released microdose of the two insecticides, which are embedded into a polymer coating inside the trap. Activated by water, it is a UF patent-protected, proprietary process.

Because the two insecticides are completely contained inside the trap, the product can be used for mosquito control at many locations that may be difficult to spray. The trap can be placed near or under flowering plants because it does not affect pollinators. It can also be used within 25–50 feet of

water where residual mosquito adulticide products cannot be applied. Other sensitive locations where the trap can be placed are in vegetable gardens or under fruit trees to prevent residues of pesticides in food. After three months, the traps can be collected and disposed of by recycling.

The Insecto mosquito trap can be used as part of a total integrated mosquito management program which could include adulticide fogging, residual adulticide applications, and larvicide treatments to water-holding areas in the landscape.

Mayor Glasser and her team are now in discussions with Insecto to begin a second 90-day phase. This would replace the existing traps with new ones at the government complex and expand the use of the traps in other parks and locations in Atlantic Beach. **PP**

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*Philip Koehler is Professor Emeritus in Urban Entomology at the UF/IFAS Entomology and Nematology Department.*

# Bugs, Drones and Peppertrees! Oh, My!

INTRODUCED in the 1840s as an ornamental, the Brazilian peppertree, *Schinus terebinthifolia*, is one of Florida's most widespread invaders. It is abundant throughout south, central and parts of northern Florida, spanning canals, coastal dunes, pastures and urban landscapes.

Mechanical and chemical methods are typically used to control the spread of Brazilian peppertree. *Florida's Noxious Weed List* states that "it is unlawful to introduce, multiply, possess, move or release any noxious weed" without a permit (FDACS 2019). Furthermore, the Brazilian peppertree was adopted into the Hernando County Noxious Plant Control Ordinance of 2015.

Unfortunately, birds and mammals often feed on the fruit of the Brazilian peppertree and disperse the seeds, allowing for widespread colonization.

Biological control is another method explored to combat Brazilian peppertrees. Scientists have studied Brazilian peppertree thrips, *Pseudophilothrips ichini* for over 20 years as a possible biological control agent. These insects are host-specific and feast on Brazilian peppertrees, stunting plant growth and limiting fruit production.

UF/IFAS partnered with Hernando County to release approved Brazilian peppertree thrips to reduce the need for other costly control techniques. The thrips were reared by Dr.

Carey Minter at the UF/IFAS Indian River Research and Education Center and released at a test site in Hernando Beach.

Agents Brittany Scharf of UF/IFAS Hernando County and Dr. Stacy Strickland of UF/IFAS Osceola County are integrating drone imagery to monitor the project's progress. UF masters student Emily Le Falchier will assess the project's environmental and biological components to help further entomological innovations. The release site is part of Hernando County's Environmentally Sensitive Lands program, under Carla Burmann. **PP**

*By Brittany Hall-Scharf  
Hernando County Extension*



**Brittany Scharf places thrips on a Brazilian peppertree.**



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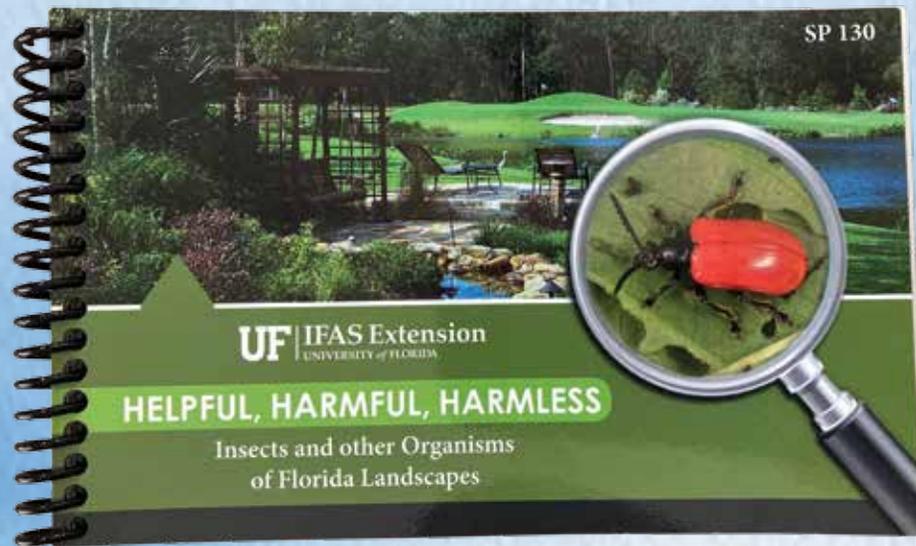
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2020 Ward's Light-Vehicle Fleet U.S. Market Segmentation.

The *Helpful, Harmful, Harmless* identification guide is available at [ifasbooks.ifas.ufl.edu](http://ifasbooks.ifas.ufl.edu)



# How to Identify and Monitor for Pests

Adam G. Dale, PhD

*IPM programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made.*



*Eastern leaf-footed bug.  
Credit: Judy Gallagher*

IT SEEMS obvious, but is always worth stating: Effective pest management requires accurate pest identification and diagnosis of the problem. If you get that wrong, you're well positioned to spend time and money only to still have the problem.

That's why identification is the first step of integrated pest management. Every subsequent step is determined by knowing what pest(s) you're managing.

## Identifying Pests

Where, when and how do you look for the pest? What cultural practices affect that pest's success? What pesticides and application methods are most effective against that pest? You cannot be certain about the answer to any of those questions unless you know what the pest is. Fortunately, there are tons of resources readily available to help you get that step correct.

The University of Florida Institute of Food and Agricultural Sciences and other state land-grant institutions are supported by taxpayer dollars to help you do things like properly diagnose problems.

My colleagues and I spend a lot of time and energy developing resources and providing education to make your job easier. When it comes to pest identification, there are all sorts of resources available on the web or as hard copies from Extension bookstores.

For example, a couple of years ago I published the *Helpful, Harmful, Harmless* guide for insects and other organisms in the landscape. This field guide gives you the tools to identify and learn about over 80 different organisms that are commonly encountered in the landscape. And it will fit in your back pocket.

There are countless publications about managing different pests and plants in landscapes on the web. At UF, *Ask IFAS* is an online database of thousands of publications written by Extension specialists like myself to help agricultural professionals and homeowners solve problems. Got a question? Type, "your problem. IFAS," into Google and I bet you'll find an answer, or a person who has one.

If you aren't confident in your own diagnosis, there are people

and labs specifically available to help you with that. Become familiar with your local county Extension office and the nearest diagnostic labs that can diagnose your problem for you. And, use them!

## I Know My Pest. Now What?

Once you have properly identified an organism, you have decisions to make. Maybe that organism was actually not a pest at all — great news. Let it on its way to continue making the world a better place.

In contrast, you may have found a plant-feeding insect and potential pest. Although typically present, plant-feeding insects are not always being pests (causing a problem). The only way to know when they are being a pest is with active monitoring. In other words, eyeball the plants regularly.

True landscape IPM programs use scouting or monitoring to inform their decisions to apply pesticides. This means walking a property and looking for signs and symptoms of pests like yellowing leaf tissue, chewing damage to leaves, or actual high-density pest infestations. *Continued*



**Tropical sod webworm  
closeup**

**Next-Level Management**

Once a problem is detected, the next step can be to apply an appropriate insecticide. If there isn't a problem or a pending problem, there is no reason to apply a pesticide. Applying insecticides based solely on the time of year is not IPM.

Time of year is very helpful, though. It can tell you when to anticipate specific pest presence. For example, in Florida, we know to start monitoring for sod webworm activity in early summer so we can catch an infestation before it is damaging.

Even great IPM practitioners can fall short of effective pest management when they incorrectly identify a pest or are not thorough in their monitoring efforts. One turfgrass insect pest that gets a lot of people is the Tuttle mealybug, *Brevinnia rehi*. Several professionals notice damage from this pest and misdiagnose it as disease or nematodes. Based on this, they apply fungicides and/or nematicides, sometimes multiple times, without success.



**Tuttle mealybug,  
highly magnified**

*Photo by Lyle Buss*

**O**THER professionals will treat with an appropriate insecticide, but follow up a couple of weeks later with another insecticide application because the turfgrass hasn't recovered. Neither professional correctly monitored for the pest.

Monitoring includes initially detecting the pest, but also tracking that pest population over time. If you see plant damage, dig deeper to identify the culprit. Confirm that diagnosis with multiple reliable resources, like I described earlier.

If you treat that pest population with an insecticide, follow up a week or two later to see if it was effective. Are those pests still alive and kicking?

Remember, insecticides control insect pests. They do not directly improve plant health. Therefore, tracking plant damage is not the most reliable way to determine if your insecticide was effective. In many cases, like with Tuttle mealybug, you may effectively kill the bug with an insecticide, but then the plant needs to be directly managed to help it recover: An integrated approach.



*Left: Damage to a zoysiagrass lawn caused by Tuttle mealybug. Inset: Closeup of a zoysiagrass leaf infested with Tuttle mealybug.*

*Photos by Adam Dale except as noted*



### Mix In Some Cultural Practices

As I have written in the past, improper cultural practices like poor plant management or selection are typically the foundation of pest problems or unhappy plants. Cultural practices are also the most valuable tool for reducing pest problems, and they come in many forms. Integrated pest management is more than identification and monitoring. It is also combining multiple management strategies to control pests. Most importantly, each component of IPM is dependent on you practicing the other components of IPM.

CitraBlue® St. Augustinegrass is a new, commercially available turfgrass developed at the University of Florida. This grass has several advantages

that can reduce maintenance inputs compared to other common St. Augustinegrasses. For example, it has excellent fungal disease resistance and tolerance to the southern chinch bug. Therefore, a CitraBlue® lawn should need fewer fungicide and insecticide applications than standard St. Augustinegrass varieties because it is less susceptible to those pests.

Over the past few years my program has developed a growing body of research evidence showing that creating blends of St. Augustinegrass cultivars can further increase the resilience of a lawn to insects, diseases and weeds compared to single-cultivar plantings. Therefore, if used in lawns, cultivar blends could reduce the frequency and quantity of insecticide, fungicide and herbicide applied

to those lawns. We have also shown that lawns adjacent to gardens with a diversity of flowering plants have fewer caterpillar pests than lawns adjacent to other lawns.

### Bring It All Together

I have listed a few new cultural strategies that effectively reduce pests, promote healthy plants, and reduce the need for pesticide inputs. This should translate to less money spent, fewer unnecessary pesticides going into the environment, and healthier ecosystems.

However, I was recently reminded of something important by one of my students: Unless a pest management professional is truly practicing IPM, these new cultural practices won't make a difference.

That is because IPM means integrating multiple pest

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*Above: CitraBlue® St. Augustinegrass lawn with at least ten different insect-attractive flowering plant species along its margins.*

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control strategies along with active identification and monitoring so that all lawns are not equal. If identification and monitoring do not determine pesticide applications, then lawns with fewer pests due to their superior cultural practices will receive the same amount of pesticide as lawns with lots of pests. **PP**

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*Adam Dale, Turf and Ornamental Entomologist, is Assistant Professor at UF/IFAS Entomology and Nematology Department.*

*Dr. Adam Dale can be reached via email at [agdale@ufl.edu](mailto:agdale@ufl.edu). More information about his research and Extension programs at the University of Florida can be found at <https://dalelab.org>.*

**19<sup>th</sup>**  
ANNUAL

# CLAY SHOOT TOURNAMENT

**SAVE**  
*the*  
**DATE**

**Tuesday, December 6**  
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Rat photo by William Kern, UF/IFAS | Plague doctor art by Matanikic | Y. pestis micrograph by NIAID | Flea photo by Olha Schedrina | Map by CABI, UK



Rat flea distribution shown in red

# INSECTS: Drivers of Human History

Roberto Pereira

**I**F YOU take a serious look back into world history, you will realize that insects have long driven human history.

To understand how insects influenced our history, one could probably research ancient times and see how insects, especially insect-borne diseases, influenced where human civilizations became established and flourished. In other areas, however, humans were probably fewer and did not have a fair chance to grow their populations and achieve the technological development that leads to a developed society.

## The BLACK DEATH

We do not have to go that far back to understand the importance of insects in human history and development. We can start sometime in the early 14th century, when a great portion of Europe was dealing with the Black Death, a plague pandemic.

The plague is a disease transmitted by fleas. It passes from wild hosts, such as rats and some other animals, to humans. We do not hear much about this disease nowadays, but it is still around. You could contract plague right here in the United States if you spent enough time around certain animal populations.

*Continued on Page 20*



Plague doctor of yore



Oriental rat flea, highly magnified

*They are among us.* Oriental rat flea, *Xenopsylla cheopsis*, is best known as a carrier of the plague bacterium, *Yersinia pestis*. The rat flea's estimated world distribution is shown in red on the map at top.

*Below:* UF/IFAS Entomologist William Kern counted 68 dead rats after fumigating an infested fig tree in Fort Lauderdale, Fla.

*Yersinia pestis* micrograph

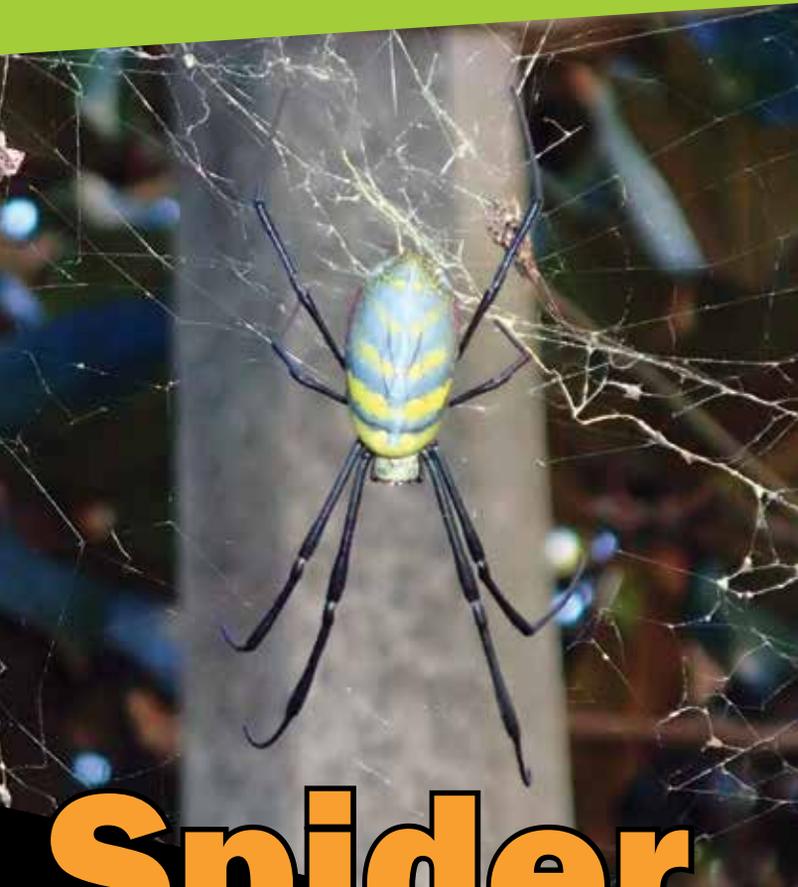
Dozens of dead roof rats



**Native banana spider female.**  
Back of the abdomen is  
yellow-tan with white speckles



**Joro spider female.**  
Back of the abdomen has  
bands of bluish gray and yellow

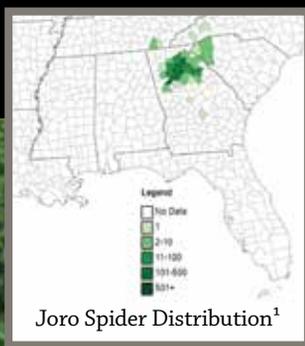


# Joro Spider

Nancy Hinkle



**The author wrangles an ungainly Joro spider**



**I**N LATE October 2014, Rick Vetter of the University of California, Riverside, Department of Entomology called me with news that a new spider species had been found in Georgia.

A woman from Jackson County, Georgia, had sent him a photo of a large spider she was finding in her back yard, and asked for identification. Rick, an arachnologist, identified it as a Joro spider. It was the week before Halloween.

This spider had never been reported in North America, so Rick wanted me to visit the site and get some photos to confirm that this was not a scam or mistaken identity. A cold front was bringing the first hard frost of the season our way, likely to turn all spiders into popsicles

in the next day or two, so I headed for the woman's home in Jackson County.

In her back yard I found some large webs made of a lovely, golden-tinted silk as well as half a dozen large, colorful spiders. I took photos and emailed them to Rick, who verified that they were indeed Joro spiders. I also provided physical specimens to Richard Hoebeke, associate curator of the Georgia Museum of Natural History, who confirmed their identity.

## **A Long Journey**

It is conjectured that Joro spiders were introduced to Georgia via their tiny eggs, glued to a shipping container originating in Asia, probably arriving at the port of Savannah.

<sup>1</sup>EDDMapS. 2022. Early Detection & Distribution Mapping System. The University of California, Riverside. Available online at <http://www.eddmaps.org/>; last accessed August 28, 2022.

**Joro spider female.**  
Underside has distinctive red markings. Silk is golden



**Joro spider male above a female.**  
Males are much smaller and less colorful. They live in a web that a female built.



# Marches On

A truck then might have carried them: Traveling along Interstate 85 through Atlanta, spiderlings were released, ballooning off along the highway.

This would explain why the first populations of this spider were found within a mile or so of I-85 with the first reports in 2014 — although some people say the spiders also had been seen in 2013.

Since then, Joro spider populations have spread, covering most of north Georgia and extending to surrounding states. Joro spiders do attach egg sacs to vehicles, so don't be surprised if some of those snowbirds who come south in the fall bring a few Joro egg sacs with them. It won't be at all surprising if Joro spiders pop up throughout Florida.

## Friend or Foe?

Two Florida entomology grads took opposing positions on Joro spider invasion of Georgia. Will Hudson, UF Ph.D. 1985, attests that in 2021 he killed more than 300 Joro spiders in the acre surrounding his home, leaving at least as many survivors. Will took the stance that these spiders are a pest that homeowners should try to eliminate.

Yours truly, Nancy Hinkle, UF Ph.D. 1992, on the other hand, considers all spiders beneficial and encourages citizens to tolerate them and appreciate their utility in pest control. You can imagine how that has gone over. Reporters have enjoyed juxtaposing opinions of the two "experts," getting some mileage out of the controversy.

*Continued*



**Joro spider, *Trichonephila clavata*, was at first called *Nephila clavata*.**

**Can you spot the six Joro spider silhouettes in the background photo?**



**Joro spider female, magnified.**  
Despite claims of Joro spiders' large size,  
their body is only an inch long

Of course, it doesn't hurt that Joro spiders reach their peak in both size and number at Halloween, giving the media an attention-grabbing focus for the holiday.

### **Joro Appearance and Habits**

In spring, the newly hatched spiderlings are hardly noticeable and indistinguishable from any other orb weavers. Not until midsummer do they grow large enough to be noticed. Young spiders tend to construct their webs nearer the ground, up to head high. As they age, they move higher, with many making extensive webs between utility lines. Apparently they are very tolerant of conspecifics, often constructing webs within inches of each other.

While these adult spiders do not feed on mosquitoes and smaller prey, small pests certainly become entrapped in the webbing. My attitude is that any mosquito that gets caught in a Joro web is one less mosquito to bite me.

Joro spiders, *Trichonephila clavata*, are similar in size and appearance to common banana spiders, *Trichonephila clavipes*. The back of the banana spider's abdomen is typically orange-tan with white spots and speckles. The back of the Joro spider has bluish-gray bands alternating with yellow.

While we at the University of Georgia Department of Entomology concede that Joro spiders and their webs can be annoying, we want to prevent people from contaminating the environment with haphazard pesticide applications, so we encourage people to carry "spider sticks" to wrap up webbing and relocate spiders to areas with less human traffic.

### **Seeking Answers**

In their New World habitat, how will Joro spiders affect the native spider population? Will their diet make them an ecological asset, consuming major pests? How far will their population spread? There are many unanswered questions about these newcomers.

Dr. Jason Schmidt at UGA is leading the research effort on Joro spiders, investigating their dietary habits and behavior in their new environment. Simultaneously, he is developing a website to disseminate information about the ecology and distribution of these spiders in their North American habitat. He encourages anyone who encounters a Joro spider to help map its dispersal by going to the JoroWatch website at <https://jorowatch.org/>. **PP**

*Nancy C. Hinkle, PhD, is Professor and Extension Veterinary Entomologist at the Department of Entomology, University of Georgia.*

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# Are All Your Eggs In One Basket?

**RAND HOLLON**



**Recession-proof.** I can't remember a time when I haven't heard spoken of the pest industry being one of those "recession-proof" businesses.

Does being in the pest industry guarantee you a golden get-outta-jail-free card, allowing you to sail through economic downturns? Maybe not.

I'm comfortable calling the pest industry recession-resistant.

But not recession-proof.

I've been doing this thing I do for a long time. Over time, I've been fortunate enough to view past/current economic peaks and valleys through a lens created of pest industry financial and operational reporting from across the country.

I'll admit, it's somewhat of a narrow bandwidth, but for our purposes, it works.

Most pest businesses ride out economic downturns, moving in the right direction. Showing decent, albeit slower, growth and fair profitability, pest businesses are, as a whole, economically resilient.

Happily, others seem to flourish during downturns in the economy as if planets aligned and the business paid no attention to what's going on in the rest of world.

But that ain't always the case.

When the economy goes sour, I've seen some pest businesses take it in the shorts. Often self-inflicted. Growth, profit and overall business value take a hit. Only time, energy and effort can get them to the other side.

One large difference between businesses who ride out, or flourish, in the storm and businesses forced to play rock-paper-scissors for the last life preserver on the Andrea Gail has to do with **customer concentration**.

**Customer concentration** becomes high-risk when a single customer accounts for more than 10 percent of your revenue,

or when your top ten or fewer customers account for 25 percent or more of your revenue.

**Big customers.** And when you're growing a pest control business, who doesn't like big customers?

The cash windfall doesn't hurt. It can be rewarding, because working with large customers often allows a pest control operator to develop a long-term, partnerlike, relationship.

But ... the real wages of having high customer concentration aren't pretty. Once a pest business starts drinking big customer Kool-Aid, time and resources are often diverted from smaller customers to the big customer. It's only natural. The big dog gets more attention. A big-customer distraction may make it more difficult to keep the smaller pest accounts, which are the meat and potatoes of the pest industry. Before you know it, after losing enough of your small-customer business, your customer concentration can become larger. Your business may become even less diversified than when you initially sold the large account.

In the pest industry, for whatever reason, customer cancellations come with the territory. And just like the small, single-family residential pest account, a large account can be lost for reasons that are simply out of your control — economic fluctuations, competitive pressure on your customer — things that have nothing to do with you or your company's ability to provide the contracted service.

You get the picture. Losing a big customer can be a gut-punch to a business.

Additionally, customer concentration often has a negative impact on a company's overall asset value in the marketplace of pest control businesses. Buyers of pest

control businesses recognize high customer concentration as a high-risk condition. Many who value and buy businesses factor in the risk associated with a business's cash flow. If a business's customer concentration is high enough, you can bet a buyer's rate of return will need to be higher, which translates to a lower purchase price for the business.

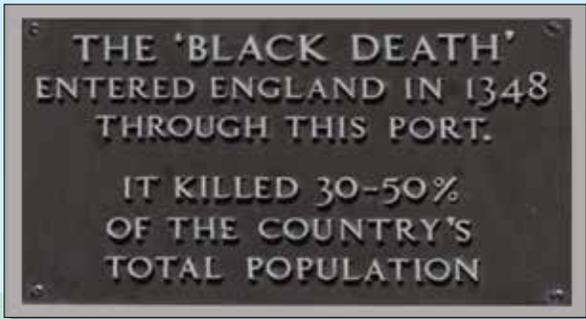
**Diversification.** Like an investment account, diversification works to lower overall risk.

Now this doesn't mean go fire your big customers! When the time comes, consider revisiting the agreements you have with big customers. Maybe make them longer-term (multi-year). Are there things you can do to increase the big customer's "stickiness?"

Dilute risk related to customer concentration by putting your resources to work to help expand your base of smaller customers. When it comes to your business, work diligently to make your big customers a little less "big." Doing this will help reduce the financial risk to your business, make your business more valuable to others, and help you better weather economic storms now and in the future. **PP**

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*Rand Hollon, a graduate of Florida Southern College, is a second-generation pest industry veteran. Preferred Business Brokers has exclusively served the pest industry for 30 years. Working exclusively in the pest industry, Hollon has led transaction processes and brokered pest industry deals throughout the United States and the Caribbean. Over the years, Hollon has also authored M&A-related articles for several pest industry publications and has served as an M&A participant/speaker for numerous local, state and national events.*



A sign at the port in Weymouth, England



Insects, continued from Page 15

But back then, the plague was a history-changing event in most of Europe, killing at least one-third of the existing population. As a more recent point of reference, World War II (1939–1945) killed about 1 percent to 18 percent of the human population in European countries involved in that conflict, with most countries losing far fewer than 5 percent of their population.

By the way, in a recent paper in a scientific journal, scientists described how they examined nine tombs in a 14th-century cemetery in Kyrgyzstan, dating from the years 1338 and 1339. They determined through DNA analysis that the people buried there had been killed by bubonic plague. This demonstrated that the source of the plague pandemic in central Eurasia originated somewhere near Lake Issyk-Kul in modern-day Kyrgyzstan, near Bishkek. It is truly amazing what can be learned with modern science techniques.

But this story is about how insects changed the world and the great changes insects brought about. By spreading the plague, fleas forced human society into new paths. Plague destroyed the feudal system, where landowners basically held slavelike workers toiling in fields. It opened new economic opportunities for a newly formed middle class that included salaried workers and other professionals.

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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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Above map: Potential starting location of the Black Death that changed Europe in the 14th century.

The Renaissance and associated intellectual and cultural development were brought about by rat fleas and the terrible disease they transmitted to humans. The Renaissance brought new developments in astronomy, philosophy, painting and sculpture, all thanks to a disease spread by fleas, which basically destroyed a feudal society and ushered in the birth of a new era in human civilization.

## MALARIA

Greater and more durable influence is exerted by mosquitoes that carry malaria.

Malaria has been a constant in human history and is considered one of the most important causes of human mortality. This mosquito-borne disease is still responsible for the loss of more than 300,000 human lives annually.

Malaria is the reason some areas of the world see little technological development and large human mortality. In other areas, where the disease was never established or has been controlled, economic development thrives. Much of the world, where economic opportunities are limited, is under the grip of *anopheles* mosquitoes and the malaria they transmit. *Continued on Page 24*



James Gathany

*Anopheles sp.*



Black corsair adult male



Black corsair wingless female



Male, showing proboscis

Photo at left by Judy Gallagher, photos at right by Okla. Panhandle State Univ.

## Black Corsair

Guest Detective Jim Revell

OUR *Bug of the Month* comes by way of the Virginia Tech Help Desk. A lady brought in a bug that bit her daughter. Somewhat fearful of the possible danger it presented, she felt it best to have the bug identified. Eric Day, entomologist at Virginia Tech, identified it as a black corsair, *Melanolestes picipes*: a member of the assassin bug family. Their species name, *picipes*, means “pitch-black feet.”

Adults are 12–20mm, with males fully winged and female wings varying in size but “stunted and nonfunctional.” You can note the difference in photos above: top right, the female with short wings and at left, the male with full-length wings. It appeared our sample was a male. The bug is black and has a pronounced proboscis, which can be used to inflict a painful sting — note the large proboscis in the lower-right photo, above.

Black corsairs range from Quebec, Canada, to Florida, Minnesota, South Dakota, Utah, and California — through most of the United States, except the Northwest — and south to Brazil. They hibernate in woods and fields beneath logs, and during spring and summer are found under stones, loose bark, and other natural cover such as piles of weeds. Females are often flightless and live under logs or stones. Males tend to be attracted to light during summer months.

Black corsairs feed on other insects such as caterpillars, earthworms, crickets and the May beetle. They attack them from behind using spongy pads on their legs to hold them, then sting them and suck them dry — not a pleasant way to go! The males also use these spongy pads in motivating the female during mating. Eggs are laid singly in the soil beneath rocks. Though the bite can be painful, they do not feed on blood and do not transmit diseases. **PP**

*Jim Revell is a Bedford (Virginia) Extension Master Gardener Volunteer. Adapted from “Bug of the Month,” July 2017.*



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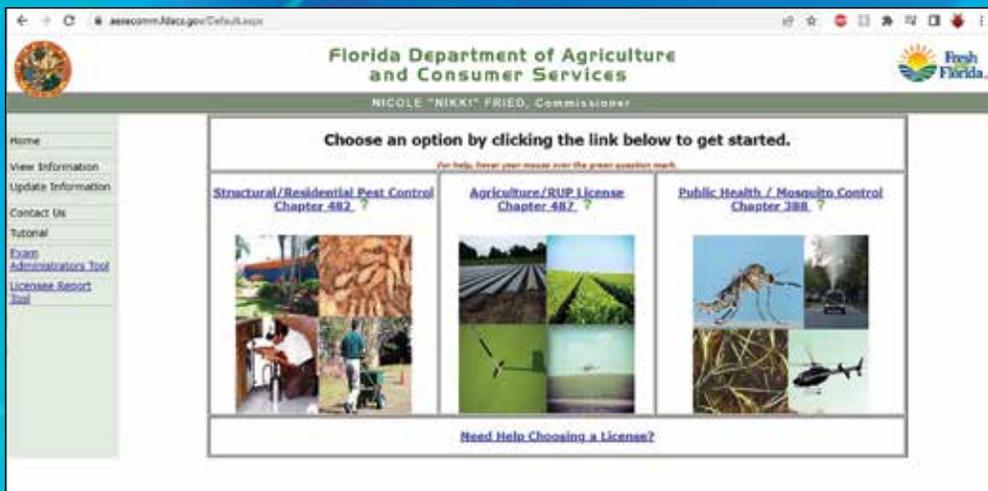
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UF/IFAS

A how-to video at <https://www.youtube.com/watch?v=8mcqcVVsF9E> explains the registration process. For more information, visit the UF/IFAS pesticide exam website at <https://pesticideexam.ifas.ufl.edu>.

**I**N FLORIDA, pesticide licensing exams help ensure the state's approximately 70,000 pesticide applicators are properly certified to follow state regulations and best practices for mitigating the impact of chemicals on the environment.

After the launch of several online pesticide exams earlier this year, all pesticide exams are now available on this platform, including those required for agricultural, structural pest control and mosquito control licenses. The online test is \$26.

Florida is one of only a few states that offers an online pesticide exam option, said Brett Bultemeier, an Extension assistant professor of agronomy with the UF/IFAS Pesticide Information Office, which partners with the Florida Department of Agriculture and Consumer Services (FDACS) to offer the exam.

*Continued on Page 26*



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*Insects, continued from Page 21*

Other mosquito species are also important. They maintain the human population under the threat of several additional mosquito-borne diseases that decrease human longevity, prevent economic development, and dictate which areas reach their economic potential and which areas are left in the dust of economic development.

### The SILKWORM

However, it is not only through diseases that insects have driven the development of human society. Another insect with great influence in human history in the silkworm. The domestication of the silkworm and the development of the silk trade brought many economic changes to different parts of the world. With that came a great exchange of cultures and ideas.

The silkworm is the larval stage of a moth that would fly around in search of a mulberry plant on which its eggs could be deposited. The resulting larvae could eat the host plant and complete the cycle into a new adult. However, with domestication of the silkworm, this insect became a dependent slave of humans.

Through domestication, silkworm adults — silk moths — lost their ability to fly. They are completely dependent on humans to find a mate. Once the silk moth eggs are laid, humans have to move the newborn larvae onto the right plants that serve as larval food. The larvae grow in controlled environments and produce the silken cocoons that are harvested for their valuable silk thread, in a process that kills the insect that produces the silken cocoon.

In order to guarantee a continuing silk production, some adults are allowed to live. They have to be paired, since they lost the ability to fly and look for their mates. Thus, a new generation of silkworms is guaranteed.

The economic and cultural exchange along the ancient, trade-heavy “Silk Road” is considered a precursor to the modern internet. The exchange of ideas changed cultures far from where the ideas were initially used and developed. The silkworm and its product were responsible for the first global exchange of ideas and products between very different cultures. Although silk production has lost part of its grip on the world due to cheaper synthetic products, the silkworm can be counted among the insects that changed the world.



Nikita



Bashiya

**From top:**  
Silkworm adult, larva and cocoon

### The FUTURE of INSECTS

Lately, there has been a great buzz about the future of insect populations in our warming world. Given the flexibility found in different insect populations all over the globe, some insects may be better prepared to survive warmer temperatures than many other types of living organisms.

Some species may disappear, but insects as a whole will survive. The composition of the insect populations will change in different areas of the globe. Relative numbers of insects will differ among species and other groups. But insects will certainly survive.

Count on insects to continue to change the history of the world, as they have been doing for so long. Diverse and abundant, insects are important as disease vectors, crop pollinators, and in other niches.

There will always be plenty of insects. They may not be the types of insects we want to have around, and we will have plenty of the pests we do not much care to have around our houses, but insects will thrive regardless of climate. They will continue to influence the history of humanity — assuming we survive our own destructive rampage on Nature. **PP**

*Roberto Pereira is Extension Professor in Urban Entomology at the UF/IFAS Entomology and Nematology Department.*

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**Brett Bultemeier**

“We hope this remote online option will save applicators both time and money,” Bultemeier said. “When you factor in travel time and testing time, a pesticide applicator may spend half a day or more to sit for an in-person exam. That’s time they could be spending working or growing their business. The remote online option will allow them to take the test on a rainy day or outside traditional working hours.”

“Taking the test online can also cut down on testing anxiety, as applicators can take the test from a quiet office or area in their home, rather than among several other people,” he added.

Bultemeier emphasized that the online exam does not replace in-person exams. Both will be offered. New applicators must pass the exam, while current licensed applicators must retake the exam every renewal cycle or accrue enough continuing education units during that licensing window for renewal.

Applicators can apply for an in-person or remote online test by first getting a voucher from FDACS. With a voucher in hand, examinees must register with UF/IFAS to test in person or online.

To maintain the integrity of the test results, the online exam uses software developed by the company Everblue to ensure test takers are not consulting the internet, books or study guides while taking the exam.

The UF/IFAS Pesticide Information Office also offers online courses that give applicators continuing education units, or CEUs, at <https://ifas-pest.catalog.instructure.com>.

Pesticide applicators who have already passed the exam once can either retake the test or accrue CEUs to maintain their license. For additional updates check out the PIO blog at <https://blogs.ifas.ufl.edu/pesticideinformation>. **PP**

*Courtesy of UF/IFAS Pesticide Information Office and Florida Department of Agriculture and Consumer Services.*

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*A new DNA-based diagnostic method confirms a wood-decaying fungus in palms — before it is too late to save the palm.*



*Sabal palm with wilted and desiccated leaves due to *Ganoderma zonatum* infection. Credit: M.L. Elliott, UF/IFAS*

GAINESVILLE, Fla. — More than 65 species of palm trees in the United States are vulnerable to a wood-decaying fungus that can damage or destroy palms. The fungus, *Ganoderma zonatum*, which causes the lethal disease known as Ganoderma butt rot of palms, shows few symptoms before you can detect something is wrong. Its mysterious nature has stunted research for decades, making early detection of the silent killer impossible — until now.

A University of Florida scientist in Fort Lauderdale has developed the first-of-its-kind, DNA-based diagnostic method that confirms the fungus in the palm months before the symptoms appear.

Published in the *Journal of Plant Disease*, the scientist utilized previously compiled sequence data from genetically validated North American

*Ganoderma* species to develop the tool. The result is a diagnostic protocol that can detect the genetic make-up of the lethal *Ganoderma zonatum* pathogen.

“We were able to find the unique genetic markers exclusive to *Ganoderma zonatum*,” said Braham Dhillon, a molecular plant pathologist at the UF/IFAS Fort Lauderdale Research and Education Center. “This has great implications for developing management methods for the disease from this point forward. It saves time and money and opens the doors for additional research on understanding how this pathogen survives and spreads in the landscape.”

If you suspect a palm has Ganoderma, a tree specialist can collect samples as wood shavings from the trunk and submit them to the palm mycology lab for diagnostic at the research

center. The procedure reduces the time needed for diagnosing Ganoderma butt rot to a week from when samples are received.

The detection method can be readily adopted into protocols of plant diagnostic facilities since the technology and equipment are routinely available without the need for additional instrumentation or chemicals.

“Early detection of the fungus, or any disease, is a crucial step towards building and implementing better disease management strategies and mitigating potential risks from palm deaths and destruction of property due to palm tree decay,” said Dhillon.

Palm trees of all varieties grace the lands of homeowners, public parks, business complexes and roadways. The fungus, common in homeowner and public spaces, a slow-growing pathogen, occupies the trunk and degrades



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*Ask IFAS, continued*

the vascular water-conducting tissue. This produces initial symptoms of wilting and dying palm fronds in the lower part of the canopy. These symptoms are also associated with other diseases like fusarium wilt and lethal bronzing, making it difficult to properly diagnose.

It is only in the later stages of the disease when a fruiting body known as a conk, or basiodiomata, appears at the lower surface of the trunk that confirms the presence of Ganoderma butt rot.

“The conk is the only distinguishing symptom of the disease and indicates a palm tree is not recoverable,” said Dhillon. “The conk produces millions of spores that can travel by wind, contributing to disease spread.”

As the fungus moves up the trunk, it compromises the structural integrity of the palm, said Dhillon. “In later stages of the disease, the decayed palm trunk is susceptible to breaking and becomes a hazard to properties, pedestrians and vehicular traffic. Depending on the girth of the trunk, the decay process can take up several months to a year.”

Until now, the appearance of the conk, or an invasive dissection of the infected trunk and culturing of the fungus were the only ways to confirm the diagnosis of the lethal disease, explained Dhillon.

For the study, scientists sequenced a variety of samples, including 24 cultures from 15 *Ganoderma* species collected from a previous study and archived at the Center for Forest Mycology Research Culture Collection and Herbarium, U.S. Department of Agriculture Forest Service.

Healthy and naturally infected sawdust palm samples from eight palm species were also collected. Infected palms used were categorized for one of two symptoms: wilted palm fronds or presence of a conk. Other samples included conks, infected tissues, soil and DNA from palm-infected lethal yellowing and lethal bronzing specimens. Researchers validated the method on DNA isolated from 60 samples. **PP**

*By Lourdes Mederos, UF/IFAS*

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## Facts from FDACS: Consumer Notice 13692 and Consumer Consent 13671 Forms

THERE STILL seems to be some confusion about the use of the FDACS Consumer Notice Form 13692 and Consumer Consent Form 13671.

The **Consumer Notice Form 13692** is used when entering a new written contract for the control of wood-destroying organisms.

*5E-14.105(1) Each licensee must enter into a written contract with the property owner or his authorized agent for each treatment for control or prevention of wood-destroying*

*organisms. No such contract shall be entered into after six (6) months following the effective date of this rule without first obtaining specific written consent signed by the property owner or authorized agent using the Consumer Notice Form, FDACS-13692.*

**Consumer Consent Form 13671** is used when placing a second contract on the same structure for the same wood-destroying organism.

*5E-14.105(7) A structure shall not be knowingly placed under a second contract for the*

*same wood-destroying organism control or preventive treatment in disregard of the first contract, without first obtaining specific written consent signed by the property owner or authorized agent using the Consumer Consent Form, FDACS-13671.*

I hope this clears up any remaining questions regarding these two forms. **PP**

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



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