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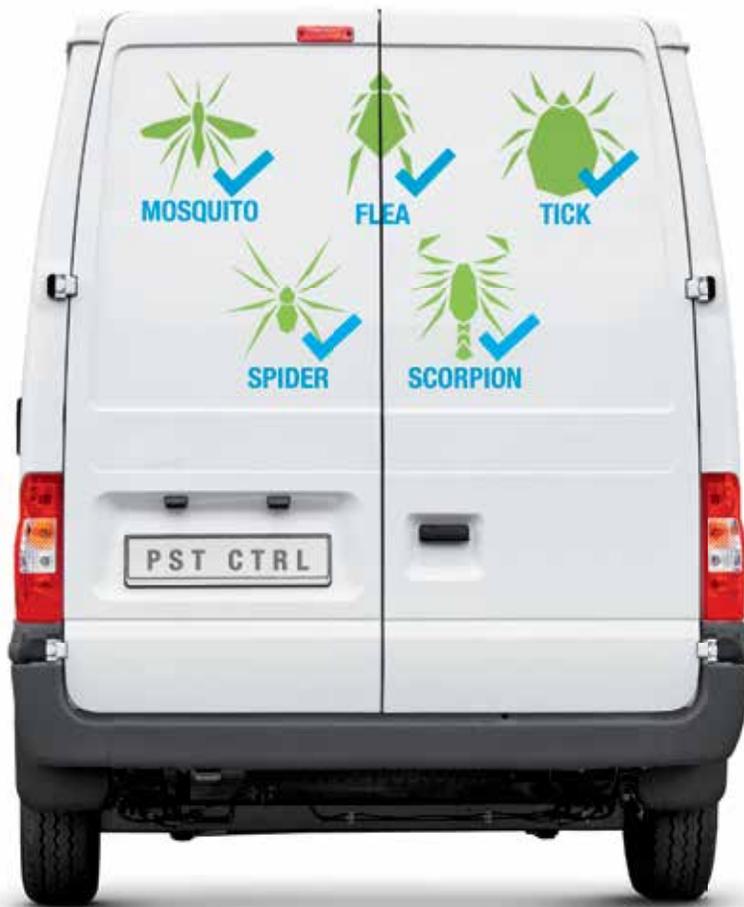
From Pest Management Education, Inc. to Landscape and Pest Managers

**Hard to be Humble:
Bigheaded Ants**

**Managing Insecticide
and Miticide Resistance**

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or Nutria,
In Florida**





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April Nobile

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ON THE COVER

“What small, dull teeth you have,” said no one to a coypu, ever. *PestPro* helps you get your coypu game on with detailed biological and management info about this destructive creature of Florida's fragile wetlands, page 16.

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Together we RISE

Message from the President of FPMA

Steve Lum

TWO thousand seventeen has come and gone, and 2018 is upon us. With the new year comes the chance for new beginnings, new hope, and new direction.

In order to make the most of the new, it's important to remember the triumphs and the lessons learned thus far. Immediate past president Anne-Marie Tulp and executive director Leslie Herren, along with a loyal and dedicated team of FPMA volunteers, led the charge in 2017 that established structure and stability to our organization and that introduced new and valuable opportunities for member engagement.

We celebrated success in 2017

Two thousand seventeen was one of FPMA's most successful years. We had outstanding attendance at both the FPMA in Paradise Summer Conference and the 2018 Business and Operations Expo. The UF Entomology Lab Site Visit as well as the "Behind the Scenes" Company Visits were also a major hit.

What's more, FPMA remained well in the black for all events throughout Anne-Marie's presidency. Thank you Anne-Marie,

Leslie and team for an amazing year that will go down in the record books as one of, if not the most, productive and innovative years in FPMA history. Thank you to Anne-Marie for setting the bar high. In doing so you have set the stage from which to maintain and build on the successes of 2017, which will allow us to set our sights on other challenges we need to overcome in order to move our association forward to the next level.

Onward and upward in 2018

And so with a short overview of the year that was, that brings us to the year that is to be. This coming year our focus will be three-fold.

The first focus is to continue to define, enhance and agree on the mission and purposes of FPMA so that we are scripting from the same page and acting in one accord.

Next, we must build our leadership base by investing in and providing vision and direction for our current and upcoming leaders. We are an all-volunteer, not-for-profit organization. We depend on passionate, talented and dedicated volunteer leaders to further the purposes of our organization, which is to support the pest/turf industry and to educate people about the public benefits we provide.

Third, we must continue to add significant value to our membership offerings so that we appeal to the current and upcoming generation of pest management professionals. A good example of adding significant value is immediate past president Anne-Marie Tulp's health insurance initiative. Put simply, we must build membership value so high that it becomes foolish not to join the Association. This kind of value proposition will significantly increase membership.

That said, this is no easy task. It will take enlisting help from new leadership. It will take hard work, dedication and innovation, and it will require a small army of volunteers to bring arms to bear. I truly believe that if a majority of us does a little then no one gets burned out, and we will accomplish a lot.

We must build our association to the point where we represent the majority of licensees and pest control operators in the state of Florida. It is our duty to represent our industry and protect it from over-reaching regulation while at the same time protecting public health and safety and our environment. This won't all be accomplished in one administration. It is an ongoing commitment.

My goal is to establish a decidedly upward direction, and in doing so we will "light a path for future generations." **PP**

Steve Lum
President, FPMA

The BEST Pest Management

WE ARE very proud that *PestPro* magazine is highly respected by the pest management professionals we encounter. We work hard to produce a high-quality magazine that provides information the pest management industry can use every day. We are also very proud of the recent recognition by the Center for World University Rankings as the No. 1 entomology program in the world, right here at the University of Florida, due to the quality of our research and instruction, student placement, and faculty. As members of this prestigious entomology program, we try to bring the best possible information to the industry on the pages of *PestPro* magazine.

'World's Best Pest Management' At SE Pest Conference in May

To go along with the No. 1 ranking of the entomology department, the theme for the SE Pest Management Conference 2018 is "World's Best Pest Management." Learn about the World's Best Pest Management May 7–9, 2018, at the Physics Building on the University of Florida campus. Monday, May 7, is GHP day, with lunch and a steak tailgate dinner included with registration. Tuesday, May 8, is WDO and FUME day, with a low-country boil at noon. Wednesday, May 9, is L&O day, with the Cooksey Family Cookout at noon. CORE CEUs will be offered every day.

Join Us In Reaching for the Stars

Have you ever thought about who is the best? Your goal should always be that you provide the best service and best quality pest management. Our goal at the University of Florida is to be the best at education and research. Last year's recognition of our entomology department as No. 1 in the world was a tremendous honor for us. Not only were we ranked No. 1, but 100 percent of the votes were for us to be No. 1. This unanimity in the ranking gives confidence in our standing, but also the incentive to continue providing high quality education.

Academic departments are ranked only every five years, so we can be certain to



hold the No. 1 ranking for the next five years. In the meantime, we will be working hard to deserve this honor again next time. Not only is the entomology department highly ranked, the University of Florida is the preeminent university in Florida and No. 9 in top public universities in the United States. Here are other programs at UF with high rankings: No. 6 in biology/agriculture, No. 8 in real estate, No. 11 in accounting, and No. 12 in marketing.

What does the No. 1 rank mean for the entomology department? The Center for World University Rankings put us at the top because of the overall quality of the faculty and research, the quality of the students, and the quality of the instruction provided. Our entomology department was ranked ahead of Ivy League universities like Cornell and Harvard, which have a long tradition of doing great entomological research and education, and other public powerhouses like the University of California, Riverside.

Of course, we are most proud of the high-quality students that have passed through our program. All you have to do is look at where our students have gone. Take a look at some of the students we had in urban entomology in 2017. Two are staying in pest control companies in Florida. Lettie Cronin plans to return to her family's company in Ft. Lauderdale. Dallin Ashby is in the technical department at Florida Pest Control and Chemical Co. Megan Bernier is going on to medical school. Heather Erskine has moved to Houston to be a product manager for Control Solutions. Tony Hughes is an active duty lieutenant commander in the US Navy. He will work at CDC in Atlanta after graduation.

Finally, Johnalyn Gordon has graduated with her BS degree and is now a graduate student in termites at the Ft. Lauderdale Research and Education Center. These are only some of our most recent students, pictured here at PestWorld 2017. We have a long list of other students who have graduated and are now part of the industry.

When you look at what the University of Florida has done for the urban pest management industry, you will probably agree with the No. 1 ranking. Here is a list of some of our department's

contributions to urban pest management in Florida:

1. Discovered the first infestations of Formosan subterranean termites in Florida at Hallandale.
2. Discovered the first infestations of Asian cockroaches in the United States, at Plant City.
3. Developed the first effective subterranean termite bait, Sentricon.
4. Discovered the first Asian subterranean termites in Florida at Miami.
5. Documented repellent or nonrepellent residual soil termiticide treatments.
6. Prepared the emergency responders and the pest management, tourist, and agricultural industries for Africanized bees.
7. Discovered that Formosan and Asian subterranean termites can hybridize in Florida.
8. Developed new fly control techniques using vision and baits.
9. Developed Zika vector control tools for adult and larval mosquito control.
10. Developed UV LED devices for fly and mosquito control.

We are proud to add the publishing of *PestPro* magazine to this list. We do not know of any other entomology department in the world that has a fast-track magazine for getting information to the pest management industry. If you keep reading and staying up to date, we will continue to publish. Let us know how we are doing and where we can improve. **PP**

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

23RD ANNUAL SOUTHEAST PEST MANAGEMENT CONFERENCE
MAY 7 – MAY 9, 2018, UNIVERSITY OF FLORIDA, GAINESVILLE, FLORIDA



**PEST
MANAGEMENT**

May 7, 2018: General Household Pests (GHP)

- 7:00 AM – 8:30 AM Registration
- 8:30 AM – 9:20 AM  Mosquito Biology and Control, Educational Movies
– Genilton Vieira, Inst. Oswaldo Cruz, and Fábio C. Branco, PhD, World Health Org., Brazil
- 9:20 AM – 9:40 AM Break
- 9:40 AM – 10:30 AM  Insect Growth Regulators for Bed Bug Control – Brittany Campbell, PhD, NPMA
- 10:30 AM – 10:50 AM Break
- 10:50 AM – 11:40 AM  World's Best Pests / Pest Control – Rebecca Baldwin, PhD, UF/IFAS
- 11:40 AM – 12:00 PM SEPMC, Urban Entomology Lab, and FPMA: Partners in PCO Education
- 12:00 PM – 1:15 PM Lunch, on your own
- 1:15 PM – 2:10 PM  Mosquito Vision and Control – Randy Buckley, UF/IFAS
Fly Vision and Control – Don Foster, UF/IFAS
- 2:10 PM – 3:00 PM  The Arrival of the Little Yellow Ant in Florida – Thomas Chouvenc, PhD, UF/IFAS
- 3:00 PM – 3:20 PM Break
- 3:20 PM – 4:10 PM  The Dirty Dozen: Causes of Workplace Accidents – Janice Reed, PhD, Control Solutions International
- 4:10 PM – 5:00 PM  Insecticide Resistance – Blair Siegfried, PhD, UF/IFAS
- 5:00 PM – 7:00 PM Sapp - Walkup Tailgator Steak Dinner, Parking Garage on Gale Lemerand Drive

May 8, 2018: Wood-Destroying Organisms (WDO)

- 7:00 AM – 8:30 AM Registration
- 8:30 AM – 9:20 AM  WDO ID and Damage – Daniel D. Dye, ACE, Gainesville, Fla.
- 9:20 AM – 9:40 AM Break
- 9:40 AM – 10:30 AM  Impact of Formosan and Asian Subterranean Termites in Urban Tree Canopy
– Thomas Chouvenc, UF/IFAS
- 10:30 AM – 10:50 AM Break
- 10:50 AM – 11:40 AM  Termite Treatments in Trees: Concerns and Consequences – Ben Hottel, Florida A&M Univ.
SEPMC, Urban Entomology Lab, and FPMA: Partners in PCO Education
- 11:40 PM – 12:00 PM Lunch Sponsored by B&G: Gator Low-Country Boil, Parking Garage on Gale Lemerand Drive
- 12:00 PM – 1:15 PM Lunch Sponsored by B&G: Gator Low-Country Boil, Parking Garage on Gale Lemerand Drive
- 1:15 PM – 2:05 PM  Equipment for Termite Treatments – John Paige, PhD, Bayer, and Claude Thomas, PhD, B&G
- 2:05 PM – 2:55 PM  Movement of Soil Particles by Termites – Roberto Pereira, UF/IFAS
- 2:55 PM – 3:15 PM Break
- 3:15 PM – 4:05 PM  Pollinators and Pest Control – Rachel Mallinger, PhD, UF/IFAS
- 4:05 PM – 4:55 PM  Insecticide Mode of Action – Rebecca Baldwin, PhD, UF/IFAS

May 9, 2018: Lawn & Ornamentals (L&O)

- 7:00 AM – 8:30 AM Registration
- 8:30 AM – 9:20 AM  Management Challenges for Heavily Used Sites – Tom Wichman, Grounds Manager, UF
- 9:20 AM – 9:40 AM Break
- 9:40 AM – 10:30 AM  Creating Winning Product Rotation Plans – Erin Harlow, MS, and Adam Dale, PhD, UF/IFAS
- 10:30 AM – 10:50 AM Break
- 10:50 AM – 11:45 AM  Cultural Management of Turf Caterpillars – Ethan Doherty, UF/IFAS
Golf Course IPM – Rebecca Perry, UF/IFAS
Effects of Residential Development on Landscape Insects – Matthew Borden, UF/IFAS
Cultural Management of Southern Chinch Bug – Brianna Whitman, UF/IFAS
- 11:45 AM – 12:45 PM Lunch Sponsored by McCall Service, Parking Garage on Gale Lemerand Drive
- 12:45 PM – 1:35 PM  Improving Turf Quality Through an Understanding of Turf Nutrition – Travis Shaddox, PhD, UF/IFAS
- 1:35 PM – 2:25 PM  Can Compost Create a No. 1 Lawn and Landscape? – Eban Bean, PhD, UF/IFAS
- 2:25 PM – 2:45 PM Break
- 2:45 PM – 3:35 PM  Insights into Disease Management to Evade Turf Death – Phil Harmon, PhD, UF/IFAS
- 3:35 PM – 4:25 PM  Innovative Tools for Evidence-Based Turfgrass Management – Bryan Unruh, PhD, UF/IFAS

http://entnemdept.ifas.ufl.edu/sePMC/Main_Page.html

<http://tinyurl.com/2018-SEPMC>

HARD *to be* humble

The bigheaded ant
Pheidole megacephala



Alex Wild

TROPHALLAXIS:

These bigheaded ants may appear to be kissing, but they are actually sharing liquid food. Minor workers build up the major workers to defend the colony.



Tony Hughes, Philip Koehler and Roberto Pereira

None preaches better than the ant, and she says nothing.

~ Benjamin Franklin ~

THE bigheaded ant, *Pheidole megacephala*, has been “preaching” for quite some time. Experts agree that this bigheaded preacher originated from Africa. However, no one knows for sure the exact origin and exit of the bigheaded ant from the continent.

Judging from historical records, it is safe to say that this impressive ant was readily preaching in the New World Americas as far back as the mid-1850s and likely earlier. It was in 1933 that M.R.

Smith, writing for *The Florida Entomologist*, first listed the bigheaded ant as a species of Florida. Over 80 years have gone by since that publication.

Nowadays, the bigheaded ant spends its time among loftier lists. The Global Invasive Species Database (GISD), found at www.iucngisd.org, ranks and lists the top 100 worst invasive alien species in the world. Accordingly, it is noted in the list’s introduction that species are ranked in the context of two overarching criteria.

The first criterion is that the species must “seriously impact biological diversity and/or human activities.” The second is that each invasive species on the

list illustrates an important issue that relates to biological invasion.

The bigheaded ant currently occupies No. 68 on the list. You may be thinking that No. 68 isn’t that impressive, but think again. According to the website, this list is compiled after taking into consideration the invasive characteristics of all global taxonomic groups, ranging from microorganisms to plants and animals. How and why has the bigheaded ant gained such global notoriety? Does the pest control industry in the United States, or closer to home in Florida, have reasons to further worry about this pest ant? Let’s take a quick journey into understanding this little yet big-headed ant.

Continued

Biology and ecology of bigheaded ants

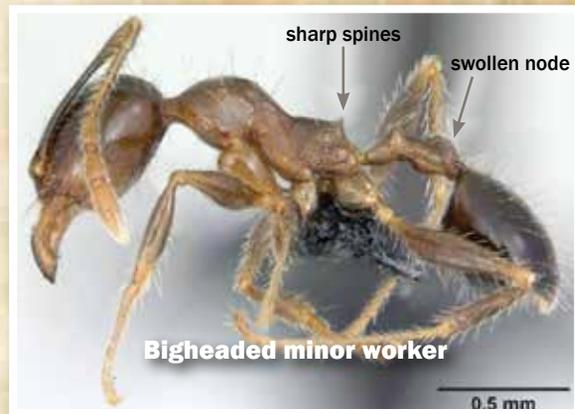
TO RESIST the temptation to think about your boss, we are talking about bigheaded *ants* here. These ants belong to the genus *Pheidole*. E.O. Wilson writes in *Pheidole in the New World* that this genus is among the largest of all genera of plants and animals in the world.

Pheidole, as of 2003, contained close to 900 species. Wilson reckoned then that the number might be closer to 1,500 species.

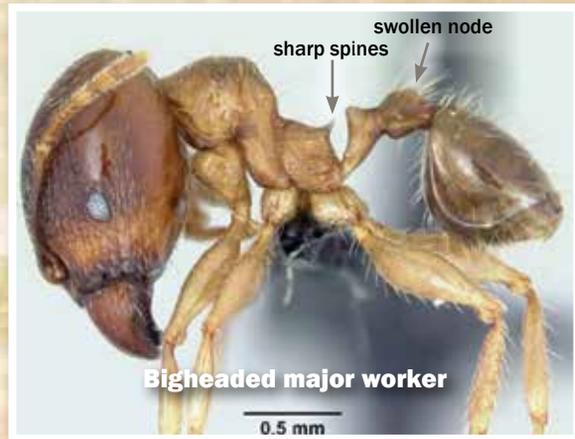
Why bother to mention perhaps the most famous ant man in the world and such lofty numbers at all? Simply put, the bigheaded ant belongs to a very big genus, with a big number of species, and with a big-time presence throughout the warmer regions of the world.

Most species of *Pheidole* are called bigheaded ants. This is due to the fact that almost all species of *Pheidole* display two very distinct workers, or castes — “dimorphic” species means “two forms.” There is the smaller or minor worker, and the bigger or major worker, which some call a soldier. It is this clear distinction in caste with bigheaded majors that inspires the bigheaded name.

Now let’s be clear, to make this simple. The bigheaded ant as a common name refers to a specific ant species: *Pheidole megacephala*. For the remainder of this article, we will be discussing this specific ant, and as commonly used throughout other publications, it is simply abbreviated as BHA.



April Nobile



April Nobile

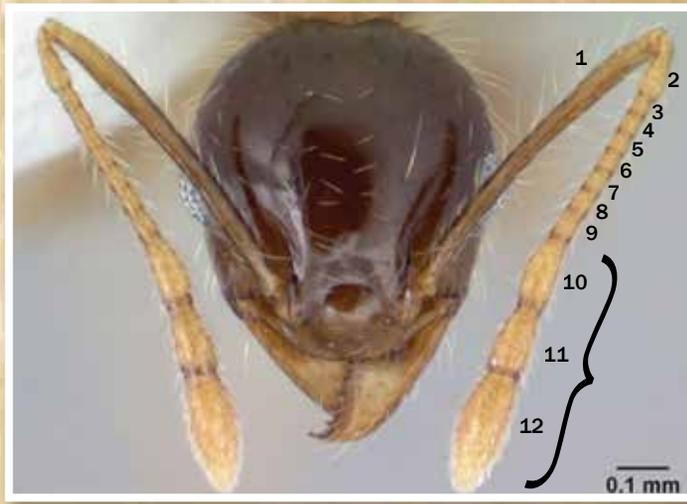


Bigheaded ant major and minor workers feeding on a crumb.

...some pests just have a big head



Minor worker and major worker, about 2x normal size.



Erin Prado

Using a microscope, you can see that the entire length of the BHA antenna has 12 segments. The wider club at the end of the antenna has three segments.

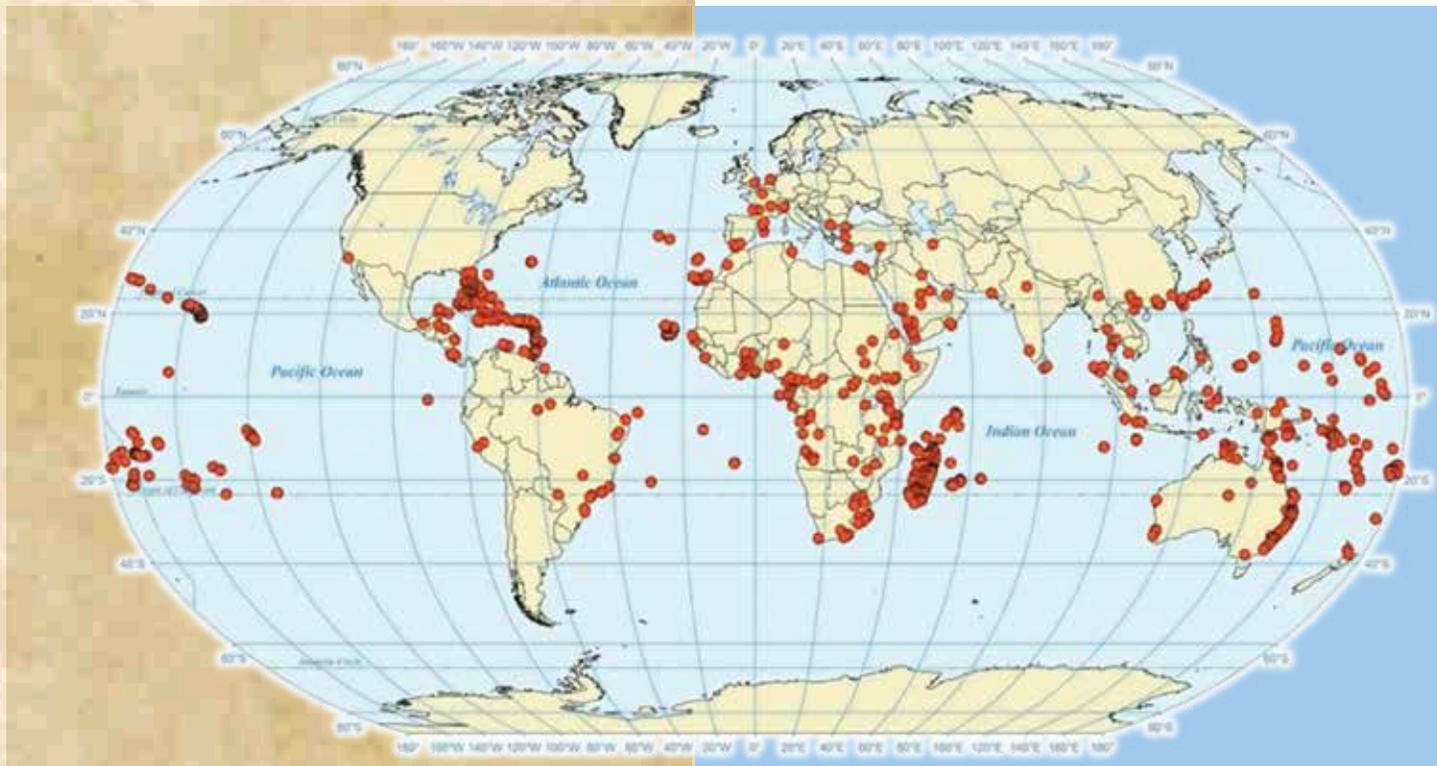
Contrary to the buildup in this article, the BHA is not really a large ant, comparably speaking. The minor worker is up to 2 mm in length, while the bigheaded major ranges from 3 to 4 mm. To put that into perspective, the side of a nickel is about 2 mm thick. Bigheaded ants possess a two-segmented waist with a noticeably swollen node after the waist (post-petiole). The antenna is composed of 12 segments, which includes a three-segmented club. You will also notice a hairy, reddish-brown body, and a pair of sharp spines before the waist.

not all, of the warm regions of the world. In a 2012 article in *Myrmecological News*, James K. Wetterer compiled information from over 1,600 sites where BHA had been collected. It is clear from the distribution map that BHAs have successfully spread across the warmer latitudes of the world.

The bigheaded ant is affectionately known as a “tramp ant.” This term implies that BHAs are able to take full advantage of human activity. Judging from historical records, one can easily correlate that BHAs were disseminated across the world via human behavior and logistical movements, which we now lump in with globalization.

Compared to its humbly diverse origin of Africa, the BHA is now found in most, if

Continued



Worldwide distribution records of the bigheaded ant, *Pheidole megacephala*, as noted in J.K. Wetterer (2012).



BHAs tending aphids for honeydew

Alex Wild



Bigheaded ant nest

R.H. Scheffrahn



Foraging tubes on palm

R.H. Scheffrahn



Budding nest

R.H. Scheffrahn



Bigheaded ant queen

Alex Wild

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Ants, continued from Page 10

In many of the areas of the world where BHAs are prevalent, they are the dominant ant in their chosen habitats. On par with other successful global ant invaders, BHAs possess at least five characteristics that lend to their success:

- **Omnivorous** — will consume sweets, fats, and protein. BHAs eat invertebrates and young vertebrates. They also harvest seeds and readily tend bugs (hemipterans) for honeydew, which contributes greatly to the populations of plant pests, as BHAs tend and defend the pests.
- **Flexible nesters** that take advantage of disturbed habitats. Will nest indoors and outdoors. BHAs will nest in walls, voids and under stones and debris. BHAs are also able to take advantage of termite nest sites and will construct foraging tubes themselves made out of soil particles, as seen in the photo above of a palm tree.
- Expand colonies by **budding nests** (polydomous). Fertile queens are able to move out of established colonies and start new colonies not far from their original colony. In other words, a queen does not have to take a nuptial flight, although it appears that in some areas, BHAs do swarm.
- Have **multiple queens** (polygyny), and may reproduce all year round.
- Generally **tolerate other BHAs** in their habitats.

All of these characteristics contribute toward the spread and success of the BHA.

Continued on Page 14

Name: Dempsey (D.R.) R. Sapp, Jr.
Hometown: Born in Gainesville, Florida, "The Swamp." Go Gators!
Where you live now: I live in Bradford County, in a little township known as New River. I live on our family farm that has been in our family since the late 1800s.

About your company: Florida Pest Control was established and started by my father in 1949. This September 5, we will be celebrating 69 years serving customers in the north, central and panhandle areas of Florida. We employ over 500 people and I consider all of them as family.

First paying job and what you learned from it: My first job was working on our farm one summer killing trees. That's the process for clearing land and making more pastures. My pay,

or reward, was my first shotgun. I learned that it was very important to do every job right the first time, and if you work hard, give 100 percent or more, there will be rewards in the outcome.
First break in the pest business: As a youngster I did a lot of playing the part of a single man. Then I got married, had my first son, and I guess my dad thought I was showing signs of maturing and getting serious about life. I spent many years under houses, on top of houses, doing L&O work, running a GHP route, and learning subterranean termite applications the old-fashioned way. That has become a lost art.

Best business book: I have read about six books in the last year. My favorite book was by Patrick Smith, *A Land Remembered*. My favorite by John C. Maxwell is *Be a People Person*.

Best piece of business advice you received: I've always been a sponge for leaning from my peers. My father and my father's VP and general manager, Doyle Webb, were both excellent mentors. I've learned a great deal from many of our employees, FPMA workshops, conventions, and CEUs. While serving on the FPMA Government Affairs



Committee, I learned if I feel legislation is good for most of the members and nonmembers, it's probably good enough for me too. I feel so blessed to have learned all that I have and from so many willing to give their knowledge.

What you would tell someone new to the pest business: Join the

FPMA, and be active and do all the networking with fellow members you can. Always follow the laws and rules established for the pest control industry. Be honest with your employees and your customers. Treat every customer as if they were your only customer. If you tell someone you are going to do this or that, do it!

Where can we find you when you are not at the office: My homes in Suwannee and at Santa Fe Lake east of Gainesville. I love to fish and ride around the farm looking at the cows, deer, turkeys — all sorts of wildlife. During hunting season you can find me in a tree stand with my Hoyt bow.

What is the most important trait you look for when hiring: How many jobs they have had and the length of time they stayed with previous employers. I look for three very important traits: honesty, morals and integrity. **PP**



D.R. and DIANE SAPP

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Young petrel



Petrel chick

Ants, continued from Page 12

Big-Headed Damage

Unlike the red imported fire ant, BHAs do not sting people. They are able to provide a biting pinch, but their primary "pain" to humans is their ease at foraging and nesting indoors. In addition, BHAs are known to be attracted to electricity and cause damage to wires or associated electrical components. Such behavior affects people's pocketbooks.

As bad as any of that nuisance may be, the more significant damage inflicted by BHAs is ecological. In many areas of the world where BHAs are introduced and established, their success leads to the demise of other ant species. Bigheaded ants out-compete many other ants for food, and are able to effectively defend and out-produce other ants.

Furthermore, due to BHAs' flexible diet and successful foraging and recruitment abilities, many nearby invertebrate species experience declining populations. Young vertebrates are vulnerable too, especially hatchling birds. In areas where birds require large numbers of insects to eat, BHAs have eaten much of those insects and even attacked or killed young birds in the nest. Examine these pictures of poor petrel chicks in Hawaii, overrun by BHAs.

Simply put, large numbers of BHAs lower biodiversity and change the local ecology. This is especially true in areas BHAs have newly inhabited or in areas that lack effective ant competition, such as island habitats.

Lastly, as BHAs tend sucking plant pests such as aphids and scales that feed on plants, their presence contributes to the ability of these agricultural pests to increase in population. BHAs actively defend the pests and in turn feed on the sweet excretions from these pests. BHAs also harvest seeds, and this can be an issue when there are very large numbers of BHAs in an area. Anything or anyone that negatively affects food supply earns a bad reputation!

How Do You Control Big-Heads?

This is an appropriately human question, as it seems over the ages that big-headed humans are resistant to many, if not most, control measures.

Fortunately, there are several methods of control available for BHA suppression in urban environments. Some simple means of preventing large infestations are to reduce debris near structures, keep lawns and turf healthy, and preserve a more natural environment that isn't disturbed.

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Once an infestation is detected, the effective use of a broadcast bait such as Amdro or bait stations in an area can achieve control over a period of weeks. Baits may be preferable to residual types of treatments for BHAs, as baits are carried back into the nests and shared with other members and eventually will kill queens and the entire colony.

Bait use is a slower process than directly treating a nest with liquid insecticide. If a liquid is used, any residual spray would need to penetrate deep enough into the soil to really get at the heart of a colony. The addition of insect growth regulators would make sense as well.

Lastly, as mentioned before, colonies of BHAs can extend over a large area. Neighborhoods that have large infestations provide a challenge, as treating on one property certainly does not control populations on other properties, and reinfestations are more than likely.

A Little Parting Big-Head Trivia

Now having convinced you, dear reader, that BHAs are a force to be reckoned with, your blood might be boiling if you are inclined to defend those who are taken advantage of by the BHA. Therefore, let us turn to some neat tidbits of information that might inspire you to appreciate the BHA.

Many ants respond to cues gathered from competition and their environment to direct the future of their colonies. It has been proposed that BHA workers vary in size depending upon the presence of other competitive ants and feedback from the environment. Ants are often ants' worst enemies.

Bigheaded ants regulate the number of minors and majors in a colony. For the most part, BHAs do not produce a large number of major workers. To produce a major worker, more nutritional input is required, so it is more costly than producing smaller minors.

As BHAs depend on division of labor, it is advantageous to produce bigger majors if more defense of the colony is required. A larger threat to the colony produces a bigger major, which can do damage to intruders or other threats. If you are still not impressed, BHAs have been known to push around Argentine and fire ants. That is a pretty nifty adaptation, is it not? **PP**

Tony Hughes is Graduate Research Assistant, Philip Koehler is Endowed Professor, and Roberto Pereira is Research Scientist at UF/IFAS Entomology and Nematology Department.



Orgyia detrita cocoons on flower pot



Orgyia detrita light form



Orgyia detrita dark form



Cocoons on oak tree

Photos by Lyle J. Buss.

Tussock Moth

Lyle J. Buss

IT'S SPRING, so the bugs are coming back! This is the time of year when you may get complaints about "hairy caterpillars" and "fuzzy cocoons." These complaints are usually due to tussock moth caterpillars. The most abundant species in Florida is the live oak tussock moth, *Orgyia detrita*. Sometimes it is called the fir tussock moth, but I avoid that name since it doesn't even eat fir.

The caterpillars are about 1 to 1.5 inches long. Two long, black "hair pencils" project forward past their red head, and another projects backward from the tail end. Four dense tufts of shorter hairs are on the back of the caterpillar. Two color forms occur in Florida: a darker gray form and a lighter yellow form.

During the month of March, the caterpillars feed on the leaves of oaks. Occasionally they may be abundant enough to totally defoliate some trees. In early April the caterpillars finish feeding and construct cocoons in somewhat sheltered locations. Many spin their cocoons in bark crevices and under large branches, but many others leave the trees. A big nuisance issue arises with the caterpillars because they like to crawl up buildings and make their cocoons under the eaves.

You should avoid touching the caterpillars. Some people develop an itchy dermatitis or even welts when their skin comes into contact with hairs on the caterpillars. Contact with the cocoons can also cause these symptoms.

Control of the caterpillars usually isn't practical. By the time that people notice them, they have already finished feeding. Remove cocoons with a stick or a broom with stout bristles. If they are problems at schools and daycare centers, kids should be encouraged not to touch the caterpillars or cocoons.

If you'd like to read more about tussock moth larvae, check out our Featured Creatures article at http://entnemdept.ufl.edu/creatures/URBAN/MEDICAL/tussock_moths.htm. **PP**

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



The coypu is a large, aquatic rodent with white muzzle, long whiskers, and prominent orange or yellow incisors.

Isaag Valden



The Coypu

Also known as nutria, it has a round, scaly tail.

William H. Kern, Jr.

Whether you call it coypu, nutria, coypu rat, nutria rat, or swamp beaver, this mammal's scientific name is *Myocastor coypus*.

THE COYPU, or nutria, is a large, aquatic rodent native to South America. It used to be placed in its own family Myocastoridae. However, recent studies have placed it in the family Echimyidae — the neotropical spiny rats.

While they look like small beavers or large muskrats, coypus are actually more closely related to porcupines. Adults are typically 11–20 pounds in weight and 22 inches in body length, with a 12–18-inch tail. They have a coarse, darkish-brown outer fur with a soft underfur.

Coypus swim with the top of head and upper back exposed and their shoulders underwater. They do not typically use their tail to aid in swimming.

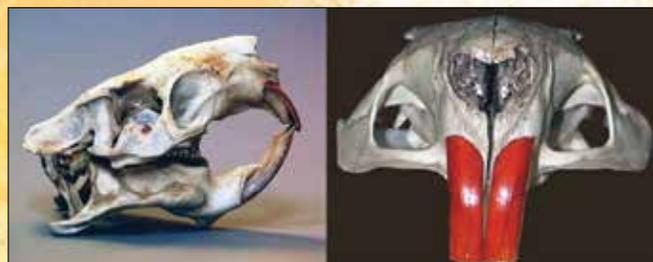
The name *Myo-castor* means mouse-beaver or rat-beaver. The species name *coypus* is based on the indigenous name for this animal. The most

commonly used name in the United States is nutria, Spanish for otter.

When coypus were first introduced into the United States for fur farming in 1899, they were likely called nutria rats or otter rats. The contraction to nutria is unfortunate because of the confusion it causes in Spanish-speaking countries. For that reason coypu is a better common name.

Distribution

Coypus were first introduced into the United States in about 1899 for fur farming. Fur farms were set up in marshlands in Maryland, Louisiana, the Pacific Northwest, and several locations in Europe. Coypus were introduced into Florida in the 1950s for fur farming. They escaped captivity during flood and storm events or were released and are now feral in several locations in Florida. ▶



Side and front views showing the coypu's porcupinelike skull.

UTEP



Coypu tracks, left, and hind foot showing size.

USFWS



Coypu droppings, showing size.

USFWS

in Florida

Damage Caused By Coypu

Coypus are herbivorous, feeding on aquatic plants, terrestrial weeds, landscape plants, and many truck crops. Generally it is their burrowing behavior that causes the most economic damage. Their burrows cause damage to berms, dams and dikes and erosion to the shorelines of streams, ponds, lakes and canals. Their bank dens can cause injury to livestock if their hoof pushes through the tunnel, and the animal's leg could be broken.

In Louisiana, coypu degradation to freshwater and brackish marshes is of major ecological concern.

Control Options

Coypus are usually controlled and removed by trapping and shooting at night. Legal traps for use in Florida include cage live traps and snares on private property. Live traps can be baited with sweet potato or carrots and set on trails, slides and burrow entrances.

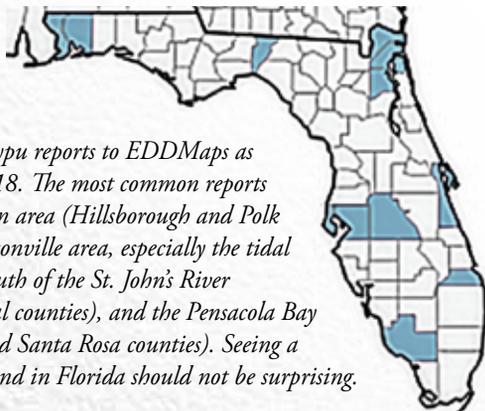
Self-locking, wire-cable snares can be effective if set properly. The most common

mistake is to make the loop too large. For coypu, the capture noose should be only about 5 inches in diameter and suspended where you expect the animal's head to pass through.

The use of steel traps (body-gripping and leg-hold traps) requires a steel-trap permit from the Florida Fish and Wildlife Conservation Commission before these traps can be used in Florida. The *FWC Steel Trap Permit Policy and Guidelines* document is available online¹.

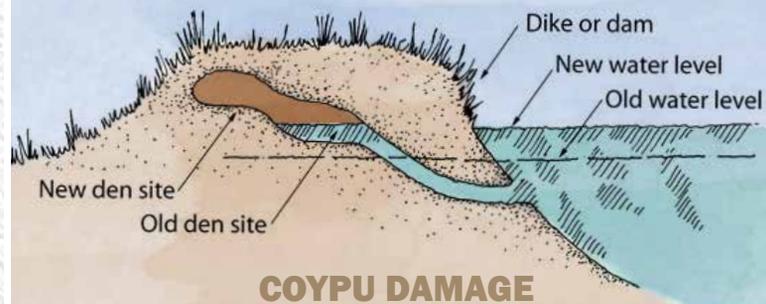
The 7" x 7" or 8" x 8" body-gripping trap (Conibear 220, 280) and the No. 1.5 leg-hold trap (coil spring, long spring, or jump trap) on a drowning wire are both very effective for coypu when set in the water, especially in the burrow run. These traps require a steel-trap permit, whereas live traps and snares do not. There is no registered coypu/nutria rodenticide authorized for use in Florida. **PP**

William H. Kern, Jr. is Associate Professor of Entomology at UF/IFAS Ft. Lauderdale Research and Education Center.



FLORIDA MAP:

The locations of coypu reports to EDDMaps as of January 30, 2018. The most common reports are from the Ruskin area (Hillsborough and Polk counties), the Jacksonville area, especially the tidal marshes by the mouth of the St. John's River (Nassau and Duval counties), and the Pensacola Bay area (Escambia and Santa Rosa counties). Seeing a coypu in any wetland in Florida should not be surprising.



COYPU DAMAGE

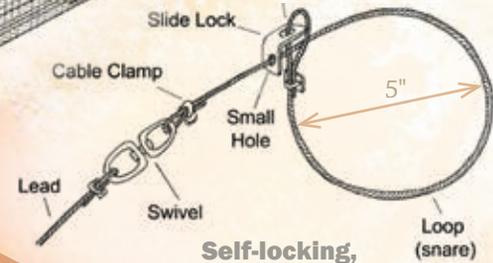
Coypus usually dig bank dens in berms, dikes, dams, and the banks of streams, ponds, and canals, similar to beaver and muskrats.

COYPU CONTROL OPTIONS



Cage live trap

NO STEEL-TRAP PERMIT REQUIRED



Self-locking, wire-cable snare



No. 1.5 coil spring trap

STEEL-TRAP PERMIT REQUIRED¹



Conibear model 220 body-gripping trap, in set position. The round device on top right is a safety tool that prevents harm to the trapper while setting the trap; it is removed to activate the trap. The ruler shows a 6 7/8 inch jaw opening between the flat portions of the jaws.

¹ <http://myfwc.com/media/1586134/nuisance-SteelTrapPolicy.pdf>



Don Foster



Photos, from left:

Don prepares for pasta plant fumigation.

Don with his green Gregory car, at the UF Entomology main building in Gainesville.

Don and wife Natalie celebrate their wedding day.

Don works with ultraviolet light-emitting diodes (UV LEDs), comparing the advantages and disadvantages with insect light traps currently available in the industry.

Setting up one of several fans for ProFume introduction.

Outside the Urban Entomology Lab in Gainesville.

DON FOSTER was born in Muscatine, Iowa, and moved to South Carolina in 1985 at the age of 10. His father, who is deceased, was from Muscatine, and his mother was from McColl, South Carolina. Now retired, she resides to this day in South Carolina.

Both Don's parents grew up in poverty, so their options in life were not great. Don's father served in the United States Army during the Vietnam War and was honorably discharged due to his two brothers being killed in action.

Don's Early Career

Don graduated from Spring Valley High School in Columbia, South Carolina, in 1992 and soon entered the workforce. Through a series of events, Don ended up working for the state of South Carolina as a juvenile correctional officer. At the time he had an interest in pursuing a career in law enforcement and this was a step in the general direction. "I worked for about six months assigned to the 16- and 17-year-old delinquents housed in the reception and evaluation center," Don says.

But soon Don realized that working third shift was not for him.

"One day, I was looking through the classified ads in the newspaper and saw a job opening for a termite technician."

The potential salary was twice the amount Don was making at the time. He applied for the job and was scheduled for a ride-along at All-America Termite and Pest Control, which did business as a Sears-authorized termite and pest control company.

"The day of my ride-along was enhanced with bad thunderstorms. We pulled up to the first stop and met with the customer," Don says.

The house did not have gutters. The technician slid through the crawl door and told Don to follow him. "I laid belly down, water rushing off the house onto my back, thinking to myself, 'Absolutely not!'"

Don was soaked when he came out from under the house, and he admits that the next statement he made was probably not the brightest: "So, the termites are *under* the house?"

The two had a good laugh about it, and Don followed his instructor under the rest of the houses that day.

About a week later, Don was called and offered the job. "Fast

forward more than two decades later, and I'm still in the pest control industry," Don says.

Q&A with Don

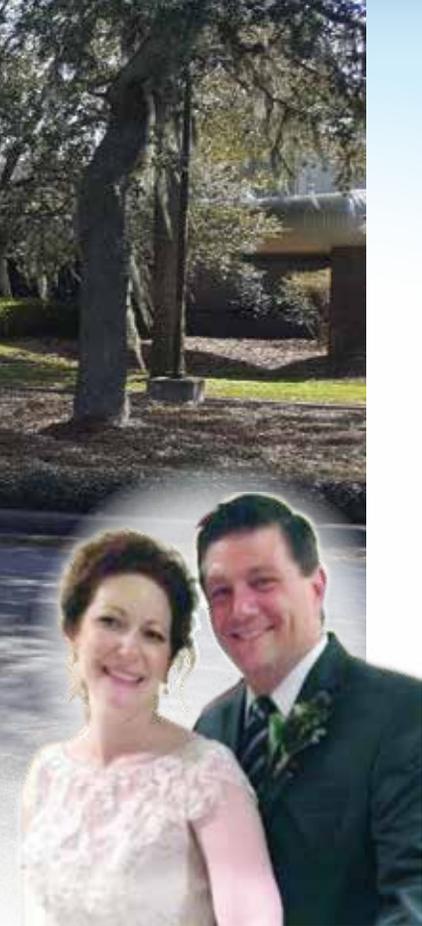
Who is your current employer?

I work for Gregory Pest Solutions, headquartered in Greenville, South Carolina. I have served in different supervisory roles, including service manager, district manager, and, currently, quality assurance manager in technical services for Gregory.

What experiences and training have you had at Gregory?

I started at Gregory as a commercial technician in 1998. I obtained several certifications and licenses over the years, including the prestigious Associate Certified Entomologist (ACE) from the Entomological Society of America, which I have maintained since 2012. And I was a finalist for the 2009 "Commercial Technician of the Year" award in *PCT Magazine*.

My certifications include both structural and commodity fumigation, turf and ornamentals, aquatics, public health, and wood-destroying organisms covering seven states. As a quality assurance manager, I have audited and provided training for third-party



auditing programs that fall under Good Manufacturing Practices and Global Food Safety Initiative as it pertains to Hazard Analysis and Critical Control Points programs in the food-processing industry.

What has been your main focus in the pest management industry?

I attended the New York City Department of Public Health and Mental Hygiene Rodent Academy taught by Dr. Bobby Corrigan. At Gregory, I am considered the resident rodent expert due to my passion for solving major rodent infestations, in addition to handling major bat extractions. I have a passion for urban pest management and I have been seeking to further my expertise in this industry.

What brought you to the UF Urban Entomology lab?

It's been a long journey that has landed me in the Urban Pest Management Lab under the direction of Dr. Phil Koehler. I first

met Dr. Koehler at our company-sponsored annual training several years ago. I remember thinking that I would love to study insects under this professor.

In 2014, my lovely fiancée (now wife), Natalie, did some research to find an online program for entomology. She found the microbiology and cell science program at the University of Florida, which allowed a minor in entomology.

I was reluctant to review the paperwork for admission in the program, but after two weeks Natalie demanded that I look at the program and insisted that I call the coordinator. After several phone conversations and submission of an application, I was accepted for the fall semester. Thank you for your love and support, Natalie!

Has it been difficult to commute to UF from South Carolina?

While pursuing my undergraduate degree in Florida, I worked full time

for Gregory in South Carolina and spent weeks on the road traveling across the Southeast. I moved to Gainesville, Florida, in the fall of 2015 and got my bachelor's degree in urban pest management in April 2017. I drove 102,000 miles during a two-year period while obtaining my degree with honors.

There were several obstacles along the way. But I was very determined to graduate and took on the financial responsibility that also included out-of-state tuition.

Now you are in graduate school at UF. How did that come about?

During the fall of 2016, I approached several professors to help me define the next step in my education, and finally had an opportunity to sit down with Dr. Koehler to discuss my future. The meeting was short and ended with him offering to supervise my graduate studies.



Continued

GOES **Back to School**



Don Foster, continued

As a 43-year-old completing my bachelor's degree, I reminded myself to proceed with caution. I told myself, "You might have no idea what you are signing up for! Paying for graduate school presents some obstacles, along with getting accepted to the No. 1 entomology department in the world."

That sounds expensive — did you have any financial assistance?

Gregory Pest Solutions was hosting the annual training meeting, in which Dr. Koehler was invited to speak. Dr. Koehler and I arranged a meeting with Ben Walker and Phil Gregory to discuss my accomplishments in school and to see if they would consider supporting me for graduate school.

I had my answer in less than 24 hours. Early the next morning, Phil and Sara Gregory

met with Dr. Koehler and expressed their willingness to support me in furthering my education. Gregory Pest Solutions would fully support me in pursuing a master's with thesis.

Phil Gregory approached me shortly after. "On behalf of Sara and I, we want to thank you for your years of dedication to our company," he said. "We have expressed to Dr. Koehler our commitment to support you in graduate school. Merry Christmas."

What an amazing show of support from your employer! Are there any other examples of outstanding leadership?

I'm very grateful for the opportunity that Gregory Pest Solutions has provided me in addition to my employment over the years. Thank you for the continued support, Phil

and Sara Gregory. I have been with the company for 20 years, experiencing both the growing pains and culture changes of a great company.

My direct supervisor, Brad Baker, has supported my growth and development in my current position working as a team. Thank you for the guidance, Brad.

Phil and Sara continue to treat the employees as their own children and express their gratitude for the continued support of the company.

Gregory Pest Solutions has experienced solid growth under the unprecedented leadership of Ben Walker. In recognition of this, they have invested in Ben by providing him ownership to take the company to the next level. Thank you for your leadership and support, Ben.

The Gregorys support the Make-A-Wish Foundation, which inspires hope and changes children's lives. They have supported animal rescue programs by auctioning off decommissioned vehicles. They continue to invest in their employees by their commitment to make Gregory Pest Solutions the premier provider in the Southeast. I would like to challenge other owners to invest in their employees the same as Gregory Pest Solutions.

What direction is your master's research heading at the UF Urban Entomology Lab?

My research focuses on filth flies and their attraction to light. I have spent over 300 hours studying fly behavior and their attraction to light in my first semester of graduate school. I am working with ultraviolet light-emitting diodes (UV LEDs), comparing the advantages and disadvantages with insect light traps currently available in the industry.

During one of my experiments, I noted what forensic entomologists knew very well: the fact that fly excrement would fluoresce under UV light. This has provided information on tracking flies in and out of environments.

I have noted changes in fly behavior through running back-to-back experiments lasting several hours into the night describing intermittent periods of activity that affect fly capture. The handling of the flies as they emerge from pupae has garnered insight into the reasons why fly control programs fail.

I plan to present my research to the industry to enhance fly control efforts due to vector pathogenicity. After fulfilling my contractual arrangement with Gregory, I plan to use my talents addressing urban pests in a metropolitan city.

Any final thoughts?

I have a message for one of my mentors:

By the way, Dr. Corrigan, I tried to convince Dr. Koehler to let me perform my research on roof rats, but that would require too much red tape. I know you understand how much I love dealing with major rodent infestations, especially roof rats, but flies will have to take center stage for now.

How 'bout them rowdy reptiles?

My new favorite animal has changed: Go Gators! **PP**



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Managing Insecticide And Miticide Resistance In Florida Landscapes

Nicole Benda and Adam Dale

INSECTICIDE RESISTANCE has become a familiar concern for landscape managers. Southern chinch bugs, *Blissus insularis*, have been found resistant to chlorinated hydrocarbons, organophosphates, carbamates, pyrethroids, and neonicotinoid insecticides. The American serpentine leafminer, *Liriomyza trifolii*, developed resistance to several chemical classes after heavy insecticide use in annual bedding plants in the 1970s and early 1980s.

However, we can maintain long-term, effective chemical control through diligent insecticide resistance management. With the limited development of new cost-effective pesticide chemistries, landscape managers need to be good stewards of existing products. Resistance management boils down to reduced pesticide use. Fortunately, there are many ways to do that and still manage the pests that affect our landscapes and lawns.

How does insecticide resistance occur?

When a population of insects (Fig. 1a) is exposed to an insecticide, most of the insects die (Fig. 1b). But a few survive, and these resistant survivors will reproduce (Fig. 1c). Some of their offspring will inherit resistance to this insecticide. With additional applications of the same insecticide, the majority of the population can become resistant in a few generations (Fig. 1 d-e).

Resistance can develop faster in insects or mites that reproduce quickly, have many offspring, and remain in the same area, like mites, aphids, whiteflies, and thrips. These characteristics often translate to repeated exposure to consecutive pesticide applications to

Important definitions

Resistance — Inherited (genetic) adaptations that allow some individuals to survive and reproduce in the presence of a toxin, which leads to pest control failures.

Cross-resistance — When resistance to one insecticide confers resistance to another insecticide.

Mode of action — The specific physiological effect of a toxin on an insect.

the same pest population, hastening the rate of resistance development.

At the biological level, pests can become resistant to pesticides by changing their physiology or behavior. Some insects may develop ways to detoxify or break down the toxin. Behavioral changes like flying away or hiding during applications may help them by simply reducing their exposure to certain insecticides.

The key to avoiding resistance is to avoid repeatedly exposing a pest population to the same insecticide class, and recognizing high-risk populations. This can be done by following an integrated pest management, or IPM, program and rotating chemical classes, or sometimes using mixtures of different modes of action.

Using IPM to reduce pesticide resistance development

The best way to reduce pest population exposure to the same insecticide is to spray less often! Integrate cultural, mechanical, biological, and chemical controls to control pests more sustainably by promoting plant and ecosystem health.

Guidelines for using landscape IPM

- Sanitation reduces insect pests and diseases. Remove excessive plant debris from flower beds before, and periodically after, installing new plants.
- Inspect plants to be sure they are pest-free before purchase.
- Look for pest-resistant plant species and varieties.
- Rotate species in annual flower beds.
- Follow fertilizer and irrigation recommendations.
- Identify pest species and life stage to help choose the most appropriate pesticide.
- Spot-treat when using pesticides so that natural enemies can recover in untreated areas.
- Use reduced-risk, pest-selective, or biorational pesticides that are softer on beneficial insects.
- Avoid calendar-based spray programs when possible. Spray when pest density reaches economic or aesthetic thresholds.

Insecticide classifications

Insecticides are classified by the way they affect insects at the molecular level, called the mode of action, or MoA. The Insecticide Resistance Action Committee (IRAC) was formed in 1984 and provides insecticide and miticide number and letter designations on all insecticide labels. These numbers are a guide for applicators to incorporate chemical class rotations into their pest management programs.

Some products with more physical modes of action, such as insecticidal soaps and horticultural oils, have no IRAC codes. Their use is unlikely to result in pest resistance, so their rotation is not necessary. However, they are great to incorporate into a rotation program to reduce the likelihood of resistance to synthetic pesticides.

Insecticide class rotation

The objective of insecticide class rotations is to alternate pesticides with different modes of

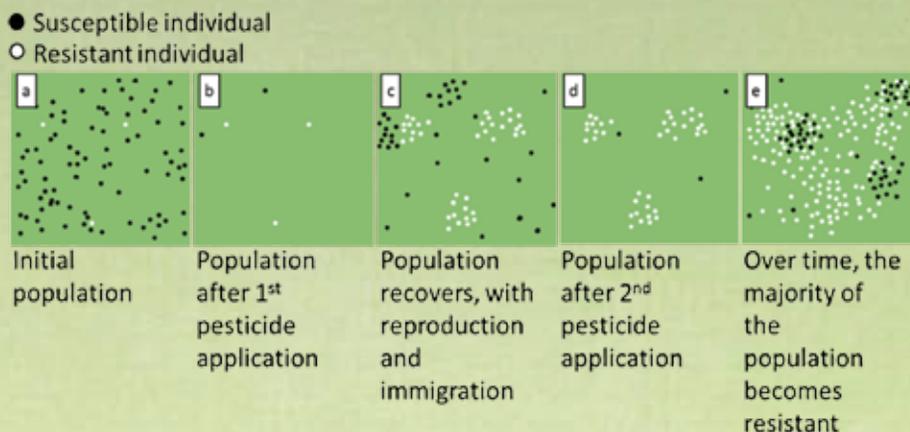


Figure 1. Timeline of insecticide resistance development.

action, so that a single generation of a pest is exposed to only one insecticide class, but the population experiences more than one class over time. This strategy assumes that a pest with resistance to one mode of action (e.g., a pyrethroid) will not be resistant to another mode of action (e.g., an organophosphate).

Rotate the order in which you use insecticides by class if multiple applications are

required. Use the IRAC numbers on the label to select a different mode of action each time before returning to a previously-used one. An example of a rotation could be: Talstar [pyrethroid], Purespray Green [horticultural oil] and then Merit [neonicotinoid]. Using products with different active ingredients or trade names will NOT work to avoid resistance development if the active ingredients are

from the same chemical class (eg. Talstar = Bifenthrin [pyrethroid], Sniper = Bifenthrin [pyrethroid], Tempo = B-cyfluthrin [pyrethroid], Astro = Permethrin [pyrethroid]).

Keep in mind that rotations should be based only on the IRAC number, not the letter in the classification. Altus [flupyradifurone, Group 4D] is in the same pesticide class as neonicotinoids like Merit [imidacloprid, Group 4A] and Arena [clothianidin, Group 4A]. Therefore, a pest population resistant to IRAC Group 4D is likely to also be resistant to IRAC Group 4A.

Mixtures

Pesticide applicators often appreciate applying mixed pesticides because they can reduce the number of applications and/or broaden the spectrum of pest control. There are several commercial products sold as mixtures for use on turf and ornamental plants, including Allectus (bifenthrin and imidacloprid) and Triple Crown (zeta-cypermethrin, bifenthrin, and imidacloprid).

Simultaneously applying a mixture of active ingredients and insecticide classes exposes pests to more than one toxicant. This strategy may mitigate or delay resistance development, if there is no cross-resistance between the products, if the products have similar residual periods, and if some of the population remains untreated.

However, mixtures should be part of a rotation with other chemical classes. Although these mixtures include multiple modes of action, repeatedly applying them is not considered a rotation and may encourage resistance to multiple classes over time.

Pesticide applicators can make their own mixtures unless the product labeling prohibits it. This practice comes with several important considerations. Do not mix products with the same IRAC number. Also, keep in mind that mixing compounds runs the risk of reducing their effectiveness (antagonism) or causing plant damage (phytotoxicity). Check the label to make sure the products are compatible. If you aren't sure, test a small quantity before preparing a tank. Consider using synergists, which are nonpesticide materials that can boost the efficacy of pesticides. A common synergist is piperonyl butoxide, or PBO, which is often added to pyrethroids or pyrethrins.

Is it resistance?

Finally, it is important to realize that resistance isn't always the problem. If you have had failed control efforts, there are a

few things to do before ratcheting up the pesticide rate or applying another dose of the same insecticide.

- Monitor the insect population. Damage can linger a while after the insects are gone.
- Make sure you're applying products correctly. Try applying the highest label rate. Check your walking speed, equipment calibration, and wind speed to make sure the correct amount of product is contacting the infested parts of the plant.
- Consider nonionic wetting agents — a type of adjuvant — to increase penetration and coverage onto plant material. Check your water pH and add a buffer to your spray mixture if needed.
- Follow label instructions regarding irrigation, either watering the product in or allowing it to dry.

Know the chemicals you are using, and use all the tools in your toolkit

Be familiar with the insecticides and miticides you're using. Read the product labels and make note of the IRAC classification number. Utilize your UF Extension resources. Be sure that other IPM techniques such as using pest-resistant varieties, appropriate cultural practices, and natural enemy conservation are being implemented to help sustainably control pests in our Florida landscapes.

Resources to help choose insecticides for rotation

- IRAC MoA smart phone app
- IRAC's Insecticide Mode Of Action Classification: <http://edis.ifas.ufl.edu/pi121>

More information on IPM in landscapes, as well as insect identification, can be found at ufl.edu/EDIS:

- *Managing Insecticide and Miticide Resistance in Florida Landscapes*
- *Landscape Pest Management in Florida*
- *Landscape Integrated Pest Management*
- *Natural Products for Managing Landscape and Garden Pests in Florida*
- *Guidelines for Purchasing and Using Commercial Natural Enemies and Biopesticides in North America*
- *Insect Pest Management on Turfgrass*
PP

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Three 'Can't-Miss' SEO Trends To Implement in 2018

Alain Parcan



WHEN today's customers are looking up products and services, it's no secret Google is the No. 1 option. Therefore, it is easy to see why business owners are desperately seeking the right answers when trying to solve the mystery of page-one ranking on Google.

In 2018, more and more pest control professionals will reap the benefits of their search engine optimization efforts by staying up-to-date on current trends. Reaching your target audience relies on your ability to produce relevant content and optimize your website based on current best practices. Here are three trends to keep in mind when setting up your SEO strategy.

Mobile Load Speed

One of the newest announcements coming from Google deals with the impact of page load speed on your SEO rankings. As early as July 2018, Google will start tracking page speed as a ranking factor in mobile search results. In a world that revolves around the latest smart phones and tablets, more and more people are using mobile devices to search for what they need. Having a mobile-friendly website is more important than ever, given the impact it has on your SEO results.

To be clear, this update will only have an impact on pages that provide a slow experience on mobile devices. But, with as much as 75 percent of searches being

done on mobile devices, you can't afford to ignore this trend. As Google continues to stress the importance of mobile, it's essential that your site is optimized for the mobile experience.

SSL

As current technology continues to evolve, so does the need for more advanced forms of online security. A big factor in 2018 will be the implementation of SSL certificates on websites. These certificates — previously reserved for websites that transferred financial information and other sensitive data — help protect data shared by users, and Google wants to see them installed.

Google has indicated they are taking SSL into consideration when determining search rankings. If you're struggling to compete in search results in your area and don't have SSL enabled, it could be causing you to fall behind your competitors. We expect website security to play an increased role in search rankings as we move forward. Talk to your website provider about getting an SSL certificate set up on your website in 2018.

Optimizing for SEO

Search engine optimization is an ever-evolving strategy that you should attend to on a regular basis. Building a successful SEO campaign requires attention to detail when tracking results and constant optimization of your website.

There are some general techniques you can take advantage of that will show improved results for your SEO campaigns this year.

Focus on the content you are posting on your website. Is it optimized with relevant keywords to the services you provide? Use language that your audience will understand and is actually searching for. Google is looking for high-quality content that is informative and educational. When you create content that helps readers complete a task or solve a problem, this tends to rank higher in search results.

Take advantage of link building. Link building implies having external pages link to pages on your website. This is still one of the most important factors in the eyes of Google when determining search rankings. The more quality links you have pointing to your website, the better reputation your site holds in Google's eyes. Google also takes into account the source of your inbound links. Just as a link from a reputable site or organization can help your reputation, spammy links can quickly ruin your standing with Google. Have your links come from reputable sources and link to relevant content on your website. Be sure to monitor the links pointing to your website to make sure they are not broken.

Staying in tune with these SEO trends will help keep you ahead of the competition this year. SEO campaigns can have a great return on investment, but avoid a "set it and forget it" approach. SEO campaigns run best when the latest trends are followed and implemented on your website. If you're looking to improve your SEO strategy this year, give these tips a try. **PP**

Search engine optimization (SEO) is the practice of increasing the quantity and quality of traffic to your website through nonpaid, or organic, web search results.

Secure sockets layer (SSL) is a standard security protocol for establishing encrypted links between a web server and a browser in an online communication.

Alain Parcan, Director of Marketing for Market Hardware, Inc., contributed this article. Alain brings nearly 10 years of experience in educating businesses so they can market themselves more effectively. Market Hardware helps small businesses compete on the web and offers special discounts for professional association members. You can reach Alain's team at 888-381-6925.

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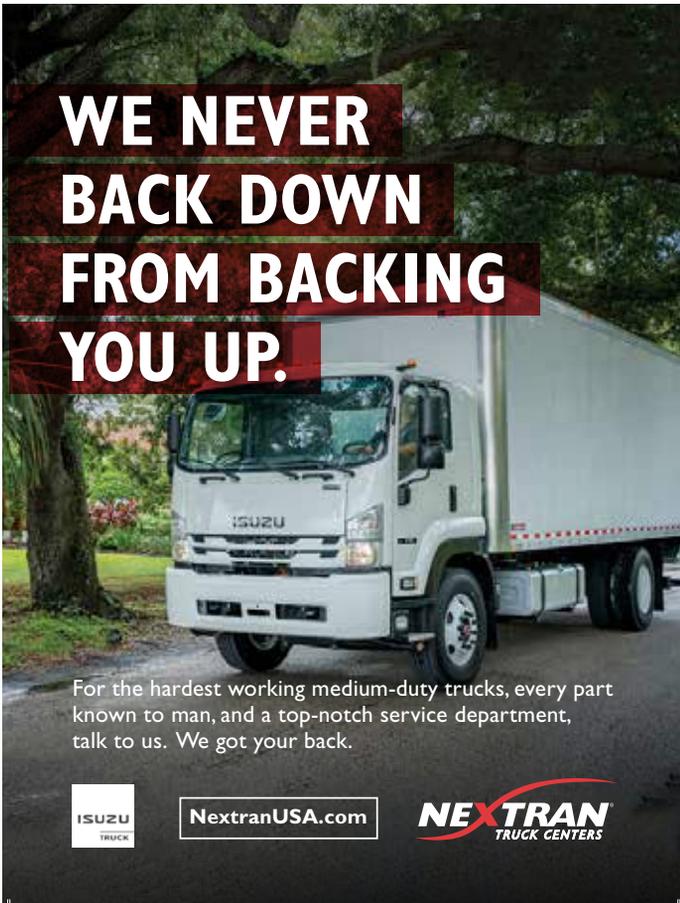
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The Hazards of 'BUG BOMBS'

Acute Illnesses and Injuries Related to Total Release Foggers



TOTAL RELEASE FOGGERS — sometimes called “bug bombs” — are pesticide products designed to fill an area with insecticide and often are used in homes and workplaces to kill cockroaches, fleas and flying insects.

Most total release foggers, or TRFs, contain pyrethroid, pyrethrin or both as active ingredients. TRFs also contain flammable aerosol propellants that can cause fires or explosions. Furthermore, misuse of TRFs can cause injury or illness in humans.

Acute TRF-related illnesses were studied and identified in 10 participating states in 2007–2015, by California Department of Pesticide Regulation in 2007–2014, and by poison control centers in Florida, Texas and Washington in 2007–2015.

A total of 3,222 unique cases were identified. Five percent of cases occurred in children aged birth to five years, and 14 percent in adults aged 60 years or more. The median age was 40 years.

Approximately 56 percent of the illnesses occurred in females. Ninety-two percent of exposures happened in private residences, and 91 percent were not work related.

Respiratory signs and symptoms — cough, upper respiratory pain or irritation, and dyspnea — and gastrointestinal signs and symptoms — vomiting, nausea, and abdominal pain or cramping — were the most commonly reported.

Severity was classified as low, moderate and high for 78 percent, 21 percent, and 0.7 percent of the illnesses, respectively. Four cases were fatal (0.1 percent).

Approximately 93 percent of cases involved exposure to the TRF active ingredients pyrethroid (78 percent) or pyrethrin (24 percent).

The most commonly reported causes of exposure were failure to vacate treated

premises during application, early reentry into treated premises, inability to vacate treated premises before TRF discharge, and inadequate ventilation of treated premises. Approximately 4 percent of cases were caused by TRF discharge by children aged less than 13 years. Incidence rates associated with failure to vacate premises during application increased during 2014–2015 compared with 2007–2012, whereas rates related to excessive fogger use — i.e., using more foggers than necessary — decreased.

Moderate or high-severity illnesses were more common among males, persons aged more than 60 years, those with preexisting asthma, and those who failed to vacate premises during application, or who were exposed to excessive TRFs.

A previous study identified 466 acute TRF-related illnesses in eight states during 2001–2006 for a crude average annual incidence rate of seven cases per 10 million population. This study identified 3,222 cases in 10 states during 2007–2015, with an average annual incidence rate of 27 per 10 million population. The increase might also partly result from increased TRF use and improved case ascertainment in recent years.

Many Forms of TRF Misuse

The Environmental Protection Agency required registrants of all TRFs manufactured after September 2012 to adopt improved labels that use pictures to illustrate some instructions and precautions and emphasize actions such as vacating treated premises for at least two hours, ventilating treated areas before

TRFs can reduce pest populations and often are used by consumers as a low-cost alternative to professional pest control services.

OLD SCHOOL

Because of their design to broadcast pesticides, TRFs have a substantial potential for unintended exposures, especially when the pesticide label is ignored or misunderstood.



NEW SCHOOL

Use of integrated pest management can reduce indoor insect populations and minimize the need for insecticides.

reentry for an additional two hours or until no odor is detected, and not using more foggers than necessary.

However, exposure narratives from case reports suggested that many users did not follow or read label instructions. Although many users left the treated area or room, they did not leave the treated premises as specified by the label. Early reentry usually involved entering treated premises shortly after application, often to turn off smoke alarms or retrieve pets or forgotten items.

Some users were exposed when they entered premises to initiate ventilation.

TRF labels do not provide guidance on how to minimize exposure when initiating ventilation. Some users ventilated treated premises for the recommended length of time or longer, but still became ill, suggesting that ventilation might be inadequate or the recommended period might be insufficient to fully eliminate TRF residuals before occupancy.

Some were sprayed in the face or at close range because of nozzle malfunction or inappropriate TRF activation (e.g., pointing the nozzle in

the wrong direction), suggesting a need for better nozzle designs and a label picture showing how to appropriately set off a TRF.

The reason that the overall illness incidence rate did not decline during 2014–2015 is unknown. Some TRFs used during 2014–2015 might have had old labels, or more time might be needed for the protective effects of the revised labels to be realized. Many users might not have read or followed label instructions. However, incidence rates associated with excessive fogger use did decline, suggesting that simplified label statements and pictures addressing this risk factor might have been effective.

Exposure Time and Preexisting Asthma Affect Severity

Early reentry likely led to brief exposure to TRF and more commonly caused low severity illnesses, whereas failure to vacate treated premises or excessive fogger use likely resulted in longer or higher concentration exposures and more commonly caused moderate or high-severity illnesses.

Preexisting asthma was associated with moderate or high-severity illnesses, indicating that a warning message for persons with asthma might be necessary on the labels. Although a previous Environmental Protection Agency assessment reported no association between pyrethrin or pyrethroid exposure and asthma, a recent study found that among persons with acute pesticide-related illness, those with pyrethrin or pyrethroid exposures were significantly more likely to have asthmatic symptoms than were those with other pesticide exposures.

Solving the Problem

Additional efforts are needed to prevent acute TRF-related illnesses, including promoting integrated pest management to prevent and mitigate pest infestations and identifying more effective strategies to educate users about reading and following label instructions. Redesigning TRFs to prevent sudden, unexpected activation might also be useful. **PP**

Article adapted from *Acute Illnesses and Injuries Related to Total Release Foggers — 10 States, 2007–2015*, Ruiling Liu, Ph.D, et al., *CDC MMWR Weekly*, February 2, 2018

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Phorid Flies:

Nature's Tiny Indicators of Filth and Decay

Ben Hottel

As outdoor temperatures start to warm up this spring in north Florida, phorid flies will become more and more active inside structures. One species, *Megaselia scalaris*, is particularly troublesome.

The larvae of these flies are unique from other insects in that they feed on a wide range of organic material. A flexible diet has inadvertently caused this fly to not only be a pest but to have medical and forensic importance.



A glue board taken from an ILT placed next to a sewer injection pit. You can see that there was a pretty severe drain fly and phorid fly issue.



Adult female phorid fly



Adult male phorid fly

Adult phorid flies are 0.02-0.22 inches long and humpbacked. The flies pictured are *Megaselia scalaris*, a pest species.

ADULT phorid flies are perceived as nuisance pests in the urban setting. They are usually associated with sanitation issues such as clogged drains, backed up sewer lines, or broken pipes. They can also be found around garbage indoors that hasn't been taken out recently. These are all perfect environments for the larvae, which feed on moist decaying organic matter.

The organic matter the larvae feed on is usually in a state of decay. The larvae can become very opportunistic to anything decaying, including human and animal tissues. Bodily discharges from open, infected wounds can attract female adult flies looking for a location to lay their eggs. After the female flies lay their eggs on the wound, it is only a matter of time before the eggs hatch and the larvae start feeding on the decaying tissues.

Adult phorid flies are small and humpbacked. Phorid flies display a sporadic "run-stop-run" behavior that can be used for initial identification. The flies will run on a surface, stop, and then continue running in this sequence repeatedly.¹ This behavior is why they are commonly referred to as scuttle flies.

The Phorid Fly 'Ick' Factor

While there are few cases of open wound infestations in the United States, it is likely that most occurrences go unreported. There

have been a few unique cases of internal infestations of phorid fly larvae in humans.

In one report, a woman in Texas became infested with phorid fly larvae in her vaginal area. This most likely occurred because the woman was sleeping naked near an open window during menstruation. The flies were likely attracted to menstrual discharge and laid their eggs on the sleeping woman.

There has even been a case in India where a man's urethra was infested with phorid fly larvae. The man was in the hospital for urination problems and had a catheter inserted into his urethra. Nearby phorid flies laid their eggs on the catheter and the larvae migrated into the man's urethra. It is likely the phorid flies were present in the hospital because of accumulated garbage on the premises. Phorid fly larvae have also been found in recently produced stool samples. This is a sign of an intestinal infestation by phorid fly larvae. Intestinal infestations are usually caused by the consumption of uncooked or undercooked food containing eggs or larvae.

Besides feeding on the living, phorid flies have been found on decomposing bodies. In the United States, phorid flies are usually present late in the decomposition process. Bodies are usually heavily infested with phorid flies — in place of the typical blow flies — when the bodies are in an enclosed

Continued on Page 34

¹ https://youtu.be/j8_C0N6g7YA

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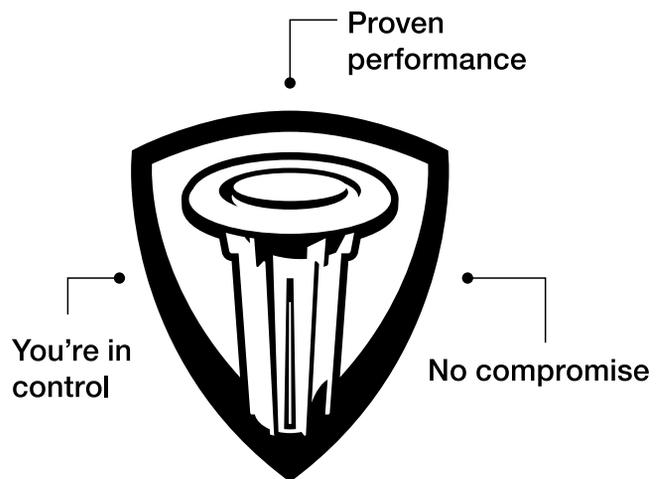
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*2012 University of Delaware study of active termites within one-half meter of both Sentricon® and Trelona ATBS stations

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At right is a table of all the online options available for pest management professionals through the Division of Agricultural Environmental Services licensing website.

If you are a new user you will be asked to sign up. Before you sign up, add the Florida Department of Agriculture email address to your contacts list to ensure your email provider does not block our emails. That email address is fl-ag-online@freshfromflorida.com.

Following your successful registration, you can log in and view all the available renewal, application and exam options. Make your choice and purchase online.

For step-by-step information on how to register, please visit <https://www.fl-ag-online.com/files/stepstosignup.pdf>. **PP**

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



482 ONLINE PROCESSES

New Application/Process Online

License/Certificate Code	License/Certificate Name
JF* (WDO, GHP, L&O, FUM)	Pest Control Operator (CPO)
JD* (SPIDS)	Special Fumigation ID
JB	Pest Control Business
LF*	Limited Fertilizer
LL*	Limited Lawn and Ornamental
LS*	Limited Structural
LC*	Limited Commercial Landscape Maintenance
LW*	Limited Urban Wildlife

* New certificate issuance does not require a separate fee or application if exam is taken online. Cards get sent upon passing exam.

Renew Online

License/Certificate Code	License/Certificate Name
JF	Pest Control Operator (CPO)
JD	Special Fumigation ID
JB	Pest Control Business
LF	Limited Fertilizer
LL	Limited Lawn and Ornamental
LS	Limited Structural
LC	Limited Commercial Landscape Maintenance
LW	Limited Urban Wildlife

Exams Online

License/Certificate Code	License/Certificate Name
JF (WDO, GHP, L&O, FUM)	Pest Control Operator (CPO)
SPID	Special Fumigation ID
LC	Limited Commercial Landscape Maintenance
LL	Limited Lawn and Ornamental
LS	Limited Structural
LW*	Limited Wildlife

Other Online Processes

- JB — Change of ownership / name / address
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D	\$300,001 - \$450,000	\$459
E	\$450,001 - \$700,000	\$598
F	\$700,001 - \$1,000,000	\$884
G	\$1,000,001 - \$2,500,000	\$1,638
H	\$2,500,001 - \$3,000,000	\$2,949
J	\$3,000,001 - \$4,500,000	\$4,699
K	\$4,500,001 - \$7,000,000	\$5,897
L	\$7,000,001 - \$10,000,000	\$6,989
M	\$10,000,001 - \$15,000,000	\$10,924
N	\$15,000,001 - \$20,000,000	\$12,139
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UF Study: Mosquitoes Can Lead Researchers To Elusive Burmese Python

GAINESVILLE, Fla. – Burmese pythons may be big and scary, but they are hard to find. Now, researchers can enlist the aid of mosquitoes to find the invasive snake in South Florida, according to a study by a University of Florida Institute of Food and Agricultural Sciences researcher.

Lawrence Reeves, a post-doctoral researcher at the UF/IFAS Florida Medical Entomology Lab in Vero Beach, conducted part of his doctoral research at UF on interactions between pythons and mosquitoes. He found that three species of mosquitoes are feeding on Burmese python.

“There is very little known about the ecological interactions between the python and animals that they don’t eat. Pythons have an obvious effect on mammals, because they’re eating them,” Reeves said. “But we don’t know how the python’s interaction with mosquitoes affects the ecosystem in general.”

Reeves and his team collected mosquitoes at a facility in Florida where pythons were housed in outdoor cages, and recovered Burmese python DNA from the blood meals

of three species of mosquitoes. “This is important because it tells us that mosquitoes feed from pythons, suggesting that we can use mosquitoes to detect the presence of pythons in South Florida,” Reeves said.

Researchers have long struggled to come up with ways to detect and capture pythons, which are one of the more worrisome invasive species in South Florida, Reeves said. “Pythons present a challenge because the probability of detecting one in the field is very low — they are cryptic, semi-aquatic, and their coloring helps them blend into the environment,” he said.

Most recently, UF/IFAS researchers have used local residents who volunteer to hunt python, dogs who are specially trained to detect the snake, and Irula tribesmen from India. Still, the pythons are no easy prey. “They are really good at hiding and they live in places that can be remote and difficult to access,” Reeves said.

Now, instead of manually hunting for pythons, researchers can outsource the job to mosquitoes. By testing local mosquitoes for

Burmese python DNA, we can learn which areas of Florida are home to the snakes, Reeves said. “We want to conduct biodiversity surveys through mosquitoes,” he said.

In the future, researchers plan to study if mosquitoes pick up diseases from Burmese python and pass them on to other animals or humans, Reeves said.

“In the U.S., other snake species are suspected of playing an important role in the transmission of West Nile virus and Eastern equine encephalitis virus,” Reeves said. “We know that snakes can become infected with pathogens and pass them along to mosquitoes. We just don’t know if that is happening with the Burmese python in the Everglades and the local mosquitoes.”

Researchers have recently learned that Burmese pythons can become infected with the chikungunya virus and spread it to mosquitoes. “We don’t know how important this is in its transmission, or if the virus is then passed on to other animals or humans,” Reeves said. “That will likely be a subject of future study.” **PP** — Beverly M. James, UF/IFAS

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Phorid Flies, continued from Page 27
or tightly sealed space. As with blow flies, the presence of these flies indoors could indicate the presence of hidden animal carcasses indoors.

Managing Phorid Fly Infestations

Given their association with filth and decay, phorid flies can be controlled in the urban setting primarily by cleaning up food sources that are available to the larvae. It may be

necessary to clean clogged drains and fix broken pipes that could be contributing to organic material and moisture accumulation. Drains can be monitored for phorid breeding sites by placing clear packing tape over drain openings. Recently emerged adults will fly out of the drains and get caught on the sticky adhesive of the packing tape. Adult phorid flies can also be monitored using insect light traps.

In an effort to relieve fly activity while

sanitation measures are being planned, fly spot bait can be used to treat for adult flies, and insect growth regulators, or IGRs, can be used in habitats such as sewer injection pits or septic tanks to help manage the larval stage of these flies. **PP**

Ben Hottel is Assistant Professor at the Center for Biological Control, Florida A&M University.

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