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Cracking the Insect Egg Problem



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CONTENTS

FEATURES

8 Cracking the
Insect Egg Problem

11 Little Landscape
Home Invaders

16 The Cuban Treefrog
In Florida

19 Subterranean Termite
Prevention and Control

20 Tales From
Future Pest Pros

DEPARTMENTS

6 FPMA President's Message

7 Editorial: Pest Diversity

13 Past President's Corner: Brendan Cavanagh

15 Pest Detective: Late-Season Tree Defoliators

23 Market Hardware: Seasonal Marketing

25 PCO Pointer: Independent Contractors

27 Featured Creatures: The Good, the Bad, the Pretty

29 Capitol Corner: Government Action Committee

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Jeff Wright



ON THE COVER

Native subterranean termite nymphs surround a clutch of eggs. Insect eggs of all types are the trickiest life stage to control. Find expert egg management tips on page 8.

Cover photo by Lyle J. Buss



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Member Dues are Falling

Message from the President of FPMA



Anne-Marie Tulp

It was a busy summer, for sure!

WE KICKED it off in June with a very successful FPMA in Paradise Summer Conference at Hawks Cay Resort in Duck Key. This was our first return to this beautiful property since 2013. Based on attendance, the sold-out exhibit hall, and the well attended business and CEU tracks, it was apparent that you were all very happy to return! Of course, none of this could happen without the continued support from our sponsors. A big thank you goes out to Syngenta, who once again was our Title Sponsor. Thanks also to our sponsors Amvac, BASF, Bayer, Bell Labs, BioGreen, Central Life Sciences, Douglas Products, Dow, Florida Sprayers, Forshaw, GT Leasing, Market Hardware, MGK, Oldham, Real Green Systems, Target, Turf Signs, Univar, and Workwave.

While there, it was my honor to recognize some well deserving FPMA members. The first award was the Fellowship Award. This award is given in recognition of the many years of dedication to the spirit of community, continued activity and common interests. It is a special award only given when it is earned by a very unique member of FPMA. And boy, was it earned! Sean Brantley was the recipient, and I can't think of anyone more deserving of this award. Sean has dedicated countless hours for the betterment of this association. He is not only the co-chair of the Government Affairs Committee and the Leadership Committee, but he is also a Region Director, was a member of the 2017 Expo Committee, and continues to support me throughout my tenure.

The Harry J. Balcom Legend Award is given to the Allied member who exemplifies the highest level of professionalism and service to FPMA. This year's recipient was Dow's shining star, Marcie Downing. Marcie is my Allied Board member for 2017, was also a member of the 2017 Expo Committee and continues to co-chair the Leadership Committee. Marcie is truly one of the most genuine, giving, dedicated people I have ever had the pleasure to work with. She gives 110 percent, 110 percent of the time. Thank you, Marcie!

The final award presented at the closing ceremonies was the Pioneer Award. The Pioneer Award is the association's highest award. The award recognizes outstanding service to the pest management profession, to the association and the member companies and the communities and families it represents. When you read this definition, only one person comes to my mind: George Braker. As many of you know, George is a past president, has either served or chaired every committee, and has a true love of this association. Congratulations, George!

Your FPMA membership covers ALL your employees

As we move into fall, we continue to work on our membership data base to ensure that we have every member's correct information. Remember, when you are a member of FPMA, ALL of your employees are automatic members

at NO ADDITIONAL COST and are eligible to take advantage of all member benefits (including the first FPMA "Behind the Scenes" Company Site Visit, see page 35 on the inside back cover for more information).

Exciting news for member dues

AND for the first time we are lowering dues — yes, you read that right! — for all new and renewing members who are at the levels A and B of our dues structure. The current annual membership at level A is \$229, and this will now be reduced to \$149. That's an \$89 per year savings! Also, if you sign up as a new member at this level now, you will get the remainder of 2017 for free! Check out the new member application form on page 30. If you are not currently a member, what are you waiting for? Don't miss out!

Lastly, check out some "words of wisdom" from another valued past president. Turn to page 13 to read the Past President's Corner, featuring Brendan Cavanaugh.

As I close this letter, I leave you with a quote from Dr Phil Koehler that I jotted down at a recent FPMA region meeting presentation: "Change is difficult, not changing is fatal." Embrace change, sign up for the Company Site Visit, and find out how to break through to the next level in your business. **PP**

— Anne-Marie Tulp,
President, FPMA



Pest Diversity

THE BEST part of pest management is the diversity of problems that are encountered and constantly changing. You will be left in the dust if you don't constantly improve your knowledge, skills, materials and equipment. The world is constantly changing, and pest management must also change. *PestPro* is a great way to stay up-to-date on the current state of the pest management industry. We work very closely with FPMA to assure that the most important information is provided through *PestPro* magazine, educational meetings, and partnerships with the industry, University of Florida, and FPMA affiliate members. It is a great working relationship that has provided the industry as a whole with good, current information.

FLORIDA DP CASES on the RISE

Talk about change: Recently, our county Extension faculty for the University of Florida brought to our attention that there seems to be a tremendous increase in the number of suspected **delusory parasitosis** cases this year. Pest management professionals are always in a dilemma when a person complains of invisible, biting insects. The same is true at county Extension offices. The amount of time spent handling these complaints has skyrocketed this year. Nobody knows why. That means pest management companies are dealing with these issues as well. Have you trained your technicians to deal with delusory parasitosis cases?

The typical delusory parasitosis case is a woman over age 50 who has recently gone through a traumatic event. However, just about anyone can come down with delusory parasitosis. That traumatic event could be the death of a family member or a dramatic, life-changing event like divorce or children having problems. Maybe illegal or prescription drugs are causing an epidemic of drug addiction and subsequent skin disorders.

However, with the increase in delusory parasitosis cases this year, it may be that people are just getting more stress in their lives. They don't know how they will deal



Photo: Contents of a "match-box" sample, highly magnified, submitted by a delusory parasitosis sufferer. The match-box sign is when a person gathers bits of lint, dirt, hair, skin and similar detritus, places it in a container such as a matchbox, and presents it to a doctor or other expert.

with increasing healthcare costs or all the disasters around the world. The news media blasts out every evening with tales of tornadoes, earthquakes, mass shootings, terrorists, and so forth. There is no shortage of stress these days, and maybe that is the cause in the drastic increase in these problems.

Technicians need to know how to deal with rather strange behaviors from people experiencing invisible biting insects or mites. Our county Extension faculty report that people will insist that they look at all the bites on their bodies. They may also insist that you find the insect in the pounds of house dust that they vacuum up. They may ask you to go through all their laundry and underwear to find the culprit. They may also ask you to inspect their sheets and pillowcases for the insects. The worst is bringing you their scabs and body exudates for inspection.

All these scenarios require you to have several rules for everyone in your company to follow. These can be stated as: "We want to help solve biting pest and skin irritation problems, but please:

1. Do not remove clothing or show us bare skin, even on arms or legs. A health professional should be consulted to examine skin and hair.
2. Consult a health professional to examine skin, scabs, body exudates, hair and other tissues. We cannot safely handle bodily tissues and fluids.
3. Separate the suspected pest from debris, clothing and other items, and put the pest in a vial of alcohol so we can identify it. We cannot sort through piles of debris to find the pest."

TERMITES and ZIKA

Other things are changing. Did you know that the Formosan termite battle is going on in Jacksonville? The termite is threatening historic neighborhoods. To help, the Formosan termite task force is working to educate residents and protect the look of Jacksonville's oldest areas.

Everyone has been saying that Zika has been quiet this year. However on August 1, Florida health officials reported the state's first sexually transmitted Zika case in 2017. The Florida Department of Health confirmed the case in Pinellas County and said there was no evidence that transmission through mosquitoes took place anywhere in Florida. In the last week of July, Texas health officials reported a Zika infection likely contracted through a mosquito bite this year.

PESTPRO is THERE for YOU

When you look at the diversity of pests you and your company manage, the amount of new information you must master is impressive. We hope that *PestPro*, the University of Florida, and FPMA can be a part of helping you stay current on facts, figures and pest information. **PP**

— Dr. Philip Koehler,
Managing Director, *Pest Pro*

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FRIDAY, September 29, 2017

- 7:00 AM – 8:30 AM Registration
- 8:30 AM – 9:25 AM **L&O** A SW FL Cornucopia of Woody Ornamental Insects — Identities and Management
Doug Caldwell ¹
- 9:20 AM – 9:40 AM Break
- 9:40 AM – 10:35 AM **L&O** Ornamental Plant Diseases
Stephen Brown ²
- 10:35 AM – 10:50 AM Break
- 10:50 AM – 11:45 AM **WDO** Termites in Trees
Ben Hottel ³
- 12:00 PM – 1:15 PM Lunch (on your own)
- 1:15 PM – 2:10 PM **WDO** Spread of the Asian Subterranean Termite in SE Florida
Thomas Chouvenec ⁴
- 2:10 PM – 2:25 PM Break
- 2:25 PM – 3:20 PM **GHP** Ant Ecology and Sampling
Tony Hughes ⁵
- 3:20 PM – 3:25 PM Break
- 3:25 PM – 4:30 PM **GHP** Bed Bugs and How to Control Them
Brittany Campbell ⁵

Field Day for Technicians (Concurrent)

- 8:30 AM – 9:25 AM **CORE** Rodenticide Safety
Rod Smith ⁶
- 9:20 AM – 9:40 AM Break
- 9:40 AM – 10:35 AM **CORE** IPM and Quality Control
Rebecca Baldwin ⁵
- 10:35 AM – 10:50 AM Break
- 10:50 AM – 11:45 AM **CORE** Pesticide Safety Self-Inspection
Paul Mitola ⁷

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BEASTLY BUGS

AND HOW TO CONTROL THEM



¹UF/IFAS Collier County Extension, ²UF/IFAS Lee County Extension, ³FL A&M University—Center for Biological Control, ⁴UF Ft Lauderdale Research and Education Center, ⁵UF Entomology & Nematology Dept, ⁶Bell Laboratories, ⁷FDACS

Cracking the INSECT EGG Problem

Brittany Campbell, Philip Koehler
and Roberto Pereira

It's hard to imagine, but an insect's most invincible life stage typically remains undetected by the human eye.



Gillis San Martin

This butterfly eggshell reveals the head of the developing embryo inside.

USUALLY WELL HIDDEN by its mother, giving her offspring a chance to grow and propagate her species, the insect egg is a formidable foe for any insect management program. Albeit tiny — many smaller than a grain of rice to the largest barely exceeding ½ inch in length — the insect egg has many tricks to combat what we humans throw at it.

People often don't consider the entire life cycle of an insect when choosing treatment methods. The egg stage can wreak havoc for pest management professionals attempting to control a pest problem. Oftentimes, the management strategy is to essentially ignore the eggs, wait for them to hatch, then treat the nymphs that hatch because they are easier to kill. During many treatments, the eggs are left unaccounted for. However, the eggs left behind that were not killed by the treatment will soon hatch and eventually cause a reinfestation. It may take a while before the infestation grows to become a problem again, at which time reevaluation or a new treatment may be necessary.

One of the main reasons insect eggs are extremely difficult to control is the eggshell. The eggshell isn't just a thin layer protecting the first instar during development, it is comprised of multiple layers made of

intertwined proteins and waxes that prevent water loss and allow the insect to breathe. The very layers that help an egg hold water inside are also extremely resistant to allowing anything inside. Consequently, it is incredibly difficult to get insecticides into the eggshell.

The eggshell is the first line of defense for the embryo against the environment. Not surprisingly, the eggshell is an excellent barrier to insecticides as well as some fumigants.

There are only a few areas on an insect egg that would allow insecticides to enter: tiny holes that penetrate the eggshell and allow the immature insect to breathe, and a hole to allow sperm to enter the egg at the time of fertilization. Those holes are called **micropyles** and **aeropyles**.

Not only does the eggshell provide protection, but the pregnant female provides another barrier that is secreted from her accessory glands when laying an egg, called cement. These gluelike substances have to be able to withstand environmental stress for the duration of embryonic development before the larva is ready to emerge from the eggshell.



Continued



A healthy louse nit, attached to hair shaft



Inset: termite queen and eggs.



ANYONE who has experienced head lice is well aware of the glue sheath that surrounds a head louse egg, called a nit. The glue sheath is laid down by the mother from her collateral glands and adheres the nit to the hair shaft. This makes nits incredibly difficult to remove from hair.

If an insecticide does make it through the cement outer layer and the many eggshell layers, it still has to penetrate the insect inside the egg to have an effect. Researchers have shown that even a tiny embryo can resist insecticides if their parents had some resistance. The combination of reduced insecticide penetration through the eggshell and pesticide resistance makes eggs an extremely difficult life stage to kill.

What Works?

A pesticide that specifically targets the egg stage or has activity against insect eggs is called an ovicide. The eggshell is comprised of a waxy component that allows the passage of oil-based products rather than water-based formulations. More often than not, the carrier of the active ingredient in a formulation is the most important factor for egg control.

Oil and petroleum-based insecticides have been shown to penetrate insect eggshells more readily than water-based insecticides. Many aerosol insecticides have also been shown to be more effective in killing eggs — again, not necessarily from the active ingredient but from the propellant in the aerosolized product. Some insecticide labels will also have specific instructions for eggs of pests, so be sure to also check the label of the product you are using for further instructions.

FUMIGANTS

Fumigants work extremely well against all life stages of insects, including eggs. As with all products, however, the egg is the life stage most tolerant of fumigant exposure. Fumigants enter insects through their respiratory system. Eggs are much smaller than other life stages, so they also breathe less. Thus, eggs require an increased dose of fumigant or longer exposure time to a fumigant to be killed, compared to their elder counterparts.

HEAT TREATMENTS

Heat treatments will also kill all life stages of insects, including eggs. Eggs are the most difficult life stage to kill using heat, so temperatures have to be increased or exposure prolonged to ensure that eggs are

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Continued on Page 12

Little Landscape Home Invaders

Erin Harlow



Amphipod closeup

Pest management professionals often get phone calls about insects invading homes during wet times of the year, when the rains have the littlest landscape pests on the move.

There are two lawn shrimp species in Florida, *Talitroides topitotum* and *Talitroides allaudi*, and they range in size from $\frac{3}{16}$ to $\frac{3}{4}$ inches. These interesting creatures have two sets of antennae. They have leglike appendages on their six or seven thoracic segments, and usually have well developed eyes.

Lawn shrimp regulate their body moisture from their environment. Too much water can be lethal, and they need to migrate to higher ground such as garages. Too little water is also deadly. They normally reside in the top half inch of mulch and leaf litter and really like the decaying material under groundcovers. They will jump like a springtail or flea, but don't confuse them — more on springtails later. Lawn shrimp are a variety of colors ranging from greenish to pale brown or darker. When they die they normally turn pinkish.

There are no products labeled for lawn shrimp control, and most lawn shrimp are discovered after they are dead anyway. If large numbers are seen then efforts can be taken to try and dry out the mulch areas surrounding the structure. Sometimes lawn shrimp can be found in large numbers in pools, which can clog the drain.

Continued on Page 14

MOST of these insects are harmless, but because they may be the lesser known and more unique creatures of the leaf litter, they can have your clients in a tizzy.

Lawn Shrimp, or Terrestrial Amphipods

Lawn shrimp are not insects, but are in the subphylum crustacea and look very similar to shrimp. These guys don't swim in open water and actually are terrestrial. However, they do need a moist environment to survive, which is why we tend to see them during heavy periods of rain.

Amphipod bodies litter the pavement of a Florida home.

Amphipod closeup by Lyle J. Buss

Insect Eggs, continued from Page 10

killed. Bed bugs are considered one of the hardest indoor pests to control, especially the eggs, so heat is a viable alternative method to insecticides and structural fumigation. However, like fumigation, heat treatments do not provide any residual effects. Therefore, proper care should be given to not reintroduce bed bugs or other pests. In addition, application of residual insecticides following treatment may be necessary for precaution against new pests.



Bed bug adult



Bed bug eggs closeup

Proper heat treatments kill all stages of bed bugs, including bed bug eggs



Bed bug eggs photo by Brittany Campbell. Bed bug adult by Lyle J. Buss

INSECT GROWTH REGULATORS, OR IGRS

Lastly, controlling reproduction and preventing eggs from being laid in the first place can be implemented using insect growth regulators. Insect growth regulators have been shown to be transported from mother to offspring, causing a considerable reduction in the number of eggs laid and successful egg hatching. Insect growth regulators affect the development and occasionally the reproduction of insects. There are two main types of insect growth regulators: juvenile hormone analogs and chitin synthesis inhibitors, or CSIs. Juvenile hormone analogs, or JHAs, mimic the natural juvenile hormone present in insects and can cause multiple physiological and morphological problems. Chitin synthesis inhibitors, as the name suggests, inhibit the proper formation of chitin between insect molts. CSIs can cause insects to have malformed, thinner cuticles and ruptured intestines. Many of the symptoms will lead to eventual death of the insect if they do not die at the time of molt.

Bottom Line

Insect eggs are a very important life stage to consider when contemplating potential management strategies. Insect eggs could be the culprit of an unsuccessful treatment and the cause of customer callbacks or treatment failure. When the egg stage is ignored during the implementation of treatments, those eggs are left to hatch and possibly cause a reinfestation. Insect eggs should not be ignored in pest management programs just because they are small and do not bite or feed. Rather, control efforts targeting insect eggs are advantageous because the pests would be eliminated before they have a chance to cause any damage. **PP**

Brittany Campbell is a Research Assistant, Philip Koehler is Endowed Professor, and Roberto Pereira is Research Scientist at UF/IFAS Entomology and Nematology Department.

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Name: Brendan E. Cavanagh
Hometown: Coytesville, New Jersey
Where you live now: Boynton Beach, Florida
First paying job: My first job was delivering newspapers for four dollars a week. Three dollars went toward my college savings, 50 cents toward shoes, and 50 cents I kept for myself. In high school, I had a number of jobs from pumping gas, parking cars, and caddying at a private golf club.

I went to Roanoke College, where I was president of the senior class and captain of the track team. I was recruited by the US Marine Corps, where I expected to continue my track running. That all changed with the Vietnam War. I was sent to Danang on March 8, 1965, as an infantry platoon commander. In the Marines I learned responsibility, discipline and pride, but most importantly the skills to build a good business.

About your company: My father-in-law Hank Petri started Petri's Positive Pest Control in Miami in 1956. In the mid-1960s he bought a small pest control company in Pompano Beach. When my first wife, Deborah, and I moved to Florida in July 1972, Hank asked me if I would be interested in the pest control business. He offered me a position and asked me to just try it for six months.

The office had four people in the beginning, myself included. I learned the business from the bottom up. The building business was booming, and I knocked on doors, sold accounts and often did the work myself. I built the company by giving exceptional service. Weekends, evenings, any



business — we did it, and did it well. By 1978 I became a partner. Three years ago I bought Hank Petri's shares in the company when he passed.

My son Chris has been working with me for the past 20 years, and my youngest son, Trevor, has now been with us for two. So here it is 45 years later, and our little Pompano office has grown from a \$60,000-a-year business to a \$6-million business.

We are now 53 people strong and listed as one of the Top 100 pest control companies in North America by *Pest Control Technology* (PCT). We were recognized by our local newspaper, the *Sun Sentinel*, as the second-best small company to work for, and for the last eight years we have received the Angie's List Super Service Award.

First break: When my father-in-law asked me to "just try the pest control business for six months."
Best advice: The best business advice was from Hank Petri, who told me to "always take care of the customer, and they will care of you."

What would you tell someone new in the business?

I would tell them to first learn the basics from the bottom up, and to give great service. Word will eventually spread that you have a reputable, trustworthy company.

Where can we find you when you aren't at the office?

I am fortunate that two of my sons have joined me in the business and are continuing to make our company grow as a quality company. They enable me to come in late and leave early, allowing time to enjoy my home and time with my wife, Joanna, as well as time on the golf range or in the gym.

Best business book: Alvin Toffler's *Future Shock*.

Hiring trait: The most important trait I look for when hiring someone is a good attitude. **PP**



BRENDAN CAVANAGH

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Don Laurie



Ringlegged earwig



Actual size

Earwigs

Earwigs are in the order Dermaptera. Their most distinct feature is a pair of tweezerlike cerci that they use to defend themselves. If they are picked up they can pinch you. Also, some species of earwigs have scent glands that allow them to spray foul-smelling liquid like a skunk. They do not enter peoples' ears and eat their brain — that is simply a superstition. There are a few species in Florida, the most common being the ringlegged earwig, *Euborellia annulipes* (Lucas). Adults range in size from ¼ to 1 inch long. They have flattened bodies and are brown, ranging from dark to pale.

Earwigs have chewing mouthparts and a varied diet that includes plant material and other pest insects — even other earwigs. The amount of plant material they consume is miniscule compared to their preference to make a meal out of other insects. Explain to your customers that while they look dangerous, they really are just after other insects and are considered beneficial. They typically wander into homes during the night, when they are most active and are attracted to lights.

Earwigs are easily managed with residual insecticide treatments.

Springtails

Springtails are extremely small and range in length from 0.25 to 6 mm, requiring a microscope to correctly identify them. They are insects in the order Collembola and get their name from a forked appendage on their abdomen, called a furcula. This appendage allows them to spring into the air when disturbed, and they can jump as high as 4 inches in the air. They range in color from white, yellow or gray to blue-gray.

Typically, springtails are found outside in the turf thatch and mulch areas. Indoors, you may only notice springtails when you have large numbers in areas with high humidity, mold, or organic materials. Springtails are found in these areas because they feed on decayed or damp vegetation, fungi and fungal spores. Sometimes springtails have been found to feed on young seedlings or cause damage to the stems and roots.

There are insecticides labeled for springtails that can be applied as crack-and-crevice or spot treatments. Indoor plants should be checked for activity, and plants that are to be brought inside should be checked beforehand for any activity.



Visit our booth at PestWorld 2017 Oct. 24–27 in Baltimore, MD

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Centipede



Centipedes

It seems like the more legs a creature has, the less likely your clients are going to like them — and the centipede has a lot of legs. Centipedes are in a class of arthropods called Chilopoda. They have a flat body with multiple segments. Each segment of its body has a pair of legs.

Centipedes can range in size from 1 to 6 inches. They are nocturnal and have undeveloped eyes. They feed on insect and spiders. Centipedes can have a painful bite, and they use venom to kill their prey, but the venom is not lethal. The smaller local centipedes are not able to penetrate a person's skin, so biting is normally not a concern.

When centipedes find their way indoors, they don't cause damage to food, clothing or anything else in the home. Centipedes can be found in places that are dark and have high humidity. Outdoors this would include underneath logs, stones, leaf litter, and mulch. Indoors they can be found in closets or bathrooms. Centipedes can live for a long time relative to other arthropods, with a lifespan of up to six years.

There are two options for control of centipedes: barriers and broadcast treatments. A barrier treatment can be made to the walls, soil and damp areas that could harbor centipedes, like mulched areas or areas near landscape plants. Another option is a broadcast treatment to harborage areas in the landscape. It is recommended that these chemical treatments should be done after the removal of breeding and harborage sites.

If large numbers of what look like centipedes are invading the interior of a home, they are probably millipedes. These arthropods have two sets of legs per body segment and can climb exterior walls, looking for any small opening. Vacuuming or sweeping the millipedes from inside the home is the safest indoor option. Then a perimeter treatment and removal of harborage sites around the structure should reduce populations. **PP**

Erin Harlow is Commercial Horticulture Agent for UF/IFAS Extension in Duval County.



Millipede



Fall webworm tents



Fall webworm caterpillar



Pinkstriped oakworm



Variable oakleaf caterpillar

Fall webworm tents photo by James L. Castner. Caterpillar photos by Lyle J. Buss

Late-Season Tree Defoliators

Lyle J. Buss

OUTDOOR TEMPERATURES are starting to get more tolerable, but it still might not be a good time to have a picnic under your oak trees. Various caterpillars are out there feeding right now, and you don't want extra sprinkles in your potato salad! Some of the caterpillars that feed in the fall have two to four generations each year, and when conditions are right, this can lead to large populations in the final few months of the year.

Two common species on oaks are the variable oakleaf caterpillar and the pinkstriped oakworm. True to its name, the variable oakleaf caterpillar comes in several color forms. Most are green, often with a brick-red back. They feed high up in the tree canopies and may cause significant defoliation. Pinkstriped oakworms are large, nearly 2½ inches long. They have pink stripes running the length of the body and a pair of long, black "tentacles" behind the head. They can be common, but usually don't defoliate entire trees.

If you see branches enclosed by silk, you are likely seeing fall webworms. They are active most of the growing season in Florida, and since they may have four generations in a year, their numbers can grow quite large as the season progresses. The caterpillars feed together in colonies, enclosing branches with leaves in their silk tents. This helps distinguish them from eastern tent caterpillars, which make smaller, dense silk tents in branch forks of cherry trees in early spring.

Although outbreaks of late-season defoliators can be an annoyance to homeowners, they usually aren't very detrimental to the trees. As long as the trees are otherwise healthy, they can withstand the defoliation and will put out a new flush of leaves in the spring. **PP**

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



The Cuban treefrog is considered an invasive species in Florida.

The Cuban treefrog is an introduced species in Florida. The earliest confirmed records date to the 1920s in the Florida Keys. The first Cuban treefrogs in Florida likely arrived as stowaways in shipping crates originating from the Caribbean. By the mid-1970s, they had dispersed throughout most of South Florida.



Cuban treefrogs are the largest species of treefrog in Florida, and adult females may exceed 6 inches in length. Most Cuban treefrogs, however, range from 1–4 inches long. They have very large eyes, giving them a somewhat “bug-eyed” appearance. They usually have rough or warty skin, sometimes have a pattern of large wavy markings or blotches on their back, and frequently have stripes or bands on the dorsal surface of their legs. The colors of Cuban treefrogs vary a lot. Most often they are creamy white to light brown, although they can be green, gray, beige, yellow, dark brown, or a combination of these colors.

AS OF 2017, there are established breeding populations as far north as Cedar Key on Florida’s Gulf Coast, Jacksonville on the Atlantic Coast, and Gainesville in north-central Florida. This species certainly has the potential to expand its range in Florida and the Southeast, and isolated individuals have been documented in coastal South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Texas. The number of reports of Cuban treefrogs from the Florida Panhandle continue to increase, and this invasive frog may already have small populations established there.

Several of Florida’s native treefrogs superficially resemble Cuban treefrogs. These frogs, like Cuban treefrogs, also show considerable variation in colors and markings, but generally are smaller and have smaller eyes. Therefore, it can be difficult to distinguish native treefrogs from invasive Cuban treefrogs. However, there are ways to confidently identify all of Florida’s treefrogs, and with a little bit of practice anyone can tell them apart¹.

Identifying Cuban Treefrogs

The Cuban treefrog is a member of the frog family Hylidae. All of Florida’s treefrogs, including Cuban treefrogs, have expanded pads on the ends of their toes that allow them to climb trees, shrubs, windows, and buildings. Their toe pads help distinguish treefrogs from other frogs such as toads and aquatic frogs like bullfrogs. Cuban treefrogs have exceptionally large toepads as compared to Florida’s native treefrogs: see below.

Cuban Treefrog Ecology and Natural History

Cuban treefrogs are found in a variety of natural and human-modified habitats in Florida. Natural habitats invaded by Cuban treefrogs include pine forests, hardwood hammocks, and swamps. In urban and suburban settings they are most commonly found on and around homes and buildings, and in gardens and landscape plants. They also occur in agricultural settings, orange groves, and plant nurseries. They occur throughout Florida’s peninsula, and are continuing to expand their range to the north. The expansion of their range is augmented by the activities of people. Cuban treefrogs are transported to new areas as stowaways on cars, trucks, and boat trailers as well as in ornamental plants and trees that are shipped north from southern Florida.



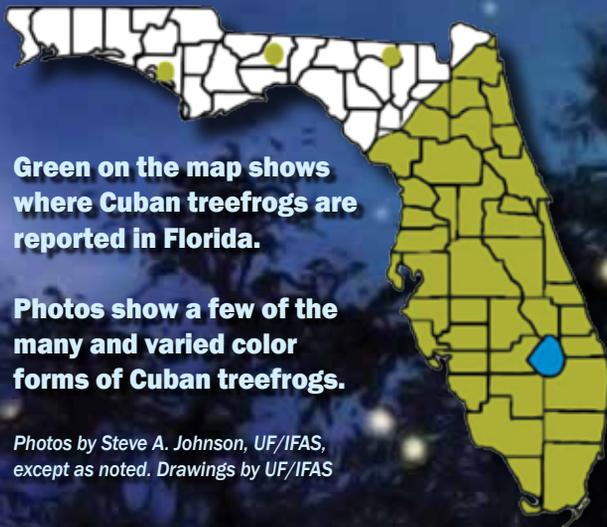
The Cuban Treefrog in Florida

Steve A. Johnson

Green on the map shows where Cuban treefrogs are reported in Florida.

Photos show a few of the many and varied color forms of Cuban treefrogs.

Photos by Steve A. Johnson, UF/IFAS, except as noted. Drawings by UF/IFAS



¹ <http://ufwildlife.ifas.ufl.edu/index.shtml>



Thomas Brown



Esther Layman



Invasive Cuban treefrogs eat a wide variety of food items, including snails, millipedes, spiders, and a vast array of insects. They are predators of several of Florida's native frogs and are cannibalistic. They are also known to eat lizards and even small snakes. Fortunately, several species of native snakes will eat Cuban treefrogs, including rat snakes, black racers, pygmy rattlesnakes, and garter snakes. Owls, crows, and wading birds have also been seen feeding on Cuban treefrogs.

Cuban treefrogs breed predominately in the spring and summer, but in southern Florida they can breed year-round. Reproduction is largely stimulated by rainfall, especially warm summer rains such as those associated with tropical weather systems and intense thunderstorms. The number of eggs deposited by a female is related to her size—larger females lay more eggs. A very large female may lay in excess of 15,000 eggs in one season.

Cuban treefrogs are not picky about their breeding sites, as long as the sites lack predatory fish, such as bass and bream. Acceptable breeding sites include isolated wetlands, ditches, decorative ponds, and even swimming pools that are neglected. Cuban treefrogs can breed in surprisingly small amounts of water. An old ice chest or child's wading pool half full of water are suitable nurseries for Cuban treefrog tadpoles to develop into frogs.

Male Cuban treefrogs have a fairly distinct call that sounds like a squeaking door and has also been described as a "snoring rasp." In addition to their breeding calls, individual males will also call from daytime retreat sites to advertise their presence. This "rain call," as it is sometimes called, can be triggered by light rainfall during the day.

Invasive Cuban Treefrogs and Their Impacts in Florida

An invasive species is generally defined as a plant, animal, or microbe that is found outside of its native range, where it negatively impacts the ecology, economy, or quality of human life. Cuban treefrogs fit this definition of an invasive species because they were introduced to Florida by the activities of people and they are causing harm to Florida's natural ecosystems and the quality of life of Floridians. They are also causing economic impacts in some places.

Ecological Harm

Cuban treefrogs are having negative impacts on Florida's native species and ecosystems. Although they predominately occur around human development, such as urban neighborhoods, Cuban treefrogs are also able to invade natural areas. In both natural and urbanized settings, Cuban treefrogs are known predators of Florida's native treefrogs and appear to be responsible for declines of some native treefrog species. They also are known to eat several additional species of native frogs, lizards, and many types of invertebrates. Many homeowners in Florida report that Cuban treefrogs appear to have replaced native treefrogs as the dominant frog found around their homes. These same people say that they no longer see native species, such as squirrel treefrogs or green treefrogs, but only Cuban treefrogs. As scientists continue to conduct research on

the ecological impacts of Cuban treefrogs, we will develop a better understanding of the effects that this invasive frog is having on Florida's environment.

Human Quality-of-Life Impacts

Cuban treefrogs thrive in human-modified landscapes, such as urban and suburban communities. As a result, they are having impacts on the quality of life of Floridians. Cuban treefrogs seek shelter during the day in tight, enclosed spaces. Homes and buildings provide many of these shelters and abundant sources of food. Because of the combination of abundant places to hide, consistent food sources, and adequate breeding sites provided by human-dominated landscapes, Cuban treefrog populations can become quite dense and the frogs a real nuisance.

Cuban treefrogs are "sit-and-wait" predators. On warm nights in Florida, it is common to encounter Cuban treefrogs hanging on walls and windows near lighted areas as they sit and wait for insects and native treefrogs to be attracted to the lights. As they feed, they defecate on the windows and walls and their fecal deposits can become unsightly over time, especially if there are a lot of frogs in the area.

Furthermore, when a person enters or exits his or her home at night, Cuban treefrogs waiting for an insect meal may be startled and occasionally jump onto people or into their homes through open doors. This can be a scary experience for a person

who is afraid of frogs. Florida's native treefrogs rarely enter homes and buildings and do not cause problems attributed to Cuban treefrogs.

When they get into homes, Cuban treefrogs can be especially annoying. They may jump through open doors or windows, be brought into a house inadvertently on an ornamental plant, or get into a home's plumbing system through vent pipes on the roof. When Cuban treefrogs gain access through vent pipes of a home plumbing system they usually end up in a bathroom. There are numerous instances where unsuspecting people have opened the lid to their toilet only to find a bug-eyed Cuban treefrog staring up at them. Cuban treefrogs have also been responsible for clogging sink drains.

Because a single adult female may lay thousands of eggs, and many females will be present in any given pond, you may find numerous gelatinous masses of eggs floating on the surface of a decorative pond or swimming pool after a rainy night in the spring or summer. Left to develop into tadpoles, these egg masses may result in an onslaught of Cuban treefrogs, which, depending on the temperature of the water, can develop and metamorphose into small frogs in as little as three to four weeks, further increasing the population of this invasive frog around people's homes.

Continued



Thomas Brown



Thomas Brown



Ryan C. Means





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Cuban treefrogs may also be a nuisance to wildlife enthusiasts that set up nesting boxes to attract and benefit birds. Because Cuban treefrogs prefer enclosed hiding spaces, they readily enter nest boxes erected for birds. Birds may be dissuaded from using nest boxes when they are invaded by Cuban treefrogs, but research is needed to study how the presence of the invasive frogs affects bird use of nest boxes.

Although they are not nearly as toxic as cane toads (also known as the invasive Bufo toad), Cuban treefrogs have a sticky skin secretion that is extremely irritating to the mucous membranes of people, such as the eyes and nose. The secretions cause a burning and itching sensation that can last for more than an hour. This can be especially problematic for people who suffer from asthma or allergies, in which case full recovery from the ill effects of the frog's skin secretions may take several hours. Therefore, it is always a good idea to wash your hands thoroughly after handling a Cuban treefrog. Better yet, wear rubber gloves when handling or attempting to capture Cuban treefrogs.

There do not appear to be any documented deaths or serious injuries of pets from ingesting or attempting to eat a Cuban treefrog. However, there are reports of excessive salivation and even seizures by pets that have tangled with these noxious frogs, so dogs and cats should be kept away from them.

Economic Impacts

Unlike many invasive insect pests and invasive plants, Cuban treefrogs do not appear to be having any large-scale negative effects on Florida's economy. Nonetheless, they are known to get into transformer boxes and electrical switches and occasionally cause short-circuits. This increases maintenance costs for electrical utility companies, and power to some customers in central Florida has been interrupted as a result of short-circuits in disconnect switches caused by Cuban treefrogs. They

Continued on Page 24

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Preventive measures early in the construction process help keep termites in the soil at bay.



No treatment: Termites invade the building through their mud tubes.

Subterranean Termite Prevention and Control

Wai-Han Chan, Philip Koehler and Cynthia Tucker

THE BEST way to control termites is to prevent the infestation before it happens. Treating a building and the area around it before construction provides the best protection against termites. Prevention should include:

- Remove stumps, roots wood and similar materials from the building site before beginning construction, in addition to removing all foam boards and grade stakes used in construction. This helps remove preexisting termite colonies that can potentially infest the structure.
- To prevent termites from finding a food source, there should be no contact of building woodwork with the soil or fill. Exterior woodwork should be a minimum of 6 inches above ground, and beams in crawl spaces at least 18 inches above ground, to provide ample space for future inspections.
- Ventilation openings in foundations should be designed to prevent dead air pockets. These openings should be of sufficient size to assure frequent changes of air to keep the ground dry and unfavorable for termites—at least 2 square feet per 25 linear feet of outside foundation wall.
- Landscape plants and irrigation should not be placed within 2 feet of the foundation.
- Annual inspections should consist of searching for mud tubes, winged adults, shed wings, or wood damage to discover evidence of an active termite infestation.

- Any wood that contacts the soil, such as fence posts, poles and general foundation structures, should be commercially pressure treated, and should not be attached to the house.

Preconstruction Soil Treatment of Structures

Control subterranean termites by preventing the termite colony in the soil from entering the structure. It is practically impossible to build structures so termites cannot cause damage. Therefore, a thorough preconstruction treatment should be applied to protect the structure for at least five years.

There are two general categories of soil treatment termiticides, shown in the table, that are differentiated by how termite tunneling is affected when they encounter an effective soil treatment. The first category is referred to as a “repellent termiticide.” All of the synthetic chemicals classified as repellent termiticides are pyrethroids. The term repellent termiticide is ambiguous; the chemical properties of the soil treatment only repel termites from the structure. Although repellent termiticides could kill termites, when these products are applied to soil, the termites are able to detect the presence of the soil treatment. If gaps exist in the treatment, termites are able to find them. Since the termites are able to detect the treated soil, they do not tunnel into the treated soil barrier.

BAITS ACTIVE INGREDIENT	WOOD TREATMENT ACTIVE INGREDIENT
Diflubenzuron	Disodium Octaborate Tetrahydrate
Hexaflumuron	
Noviflumuron	
Novaluron	

SOIL TREATMENTS	
Repellents ACTIVE INGREDIENT	Nonrepellents (kill) ACTIVE INGREDIENT
Bifenthrin	Acetamiprid
Cypermethrin	Chlorantraniliprole
Permethrin	Fipronil
Lambda-Cyhalothrin	Chlorfenapyr
	Imidicloprid

The other category is referred to as a “nonrepellent termiticide.” Termite tunneling is not affected by a nonrepellent termiticide soil treatment because the termites are unable to detect the treated soil. Since they continue to tunnel freely through the treated soil they are exposed to the nonrepellent termiticide by contact or ingestion and are killed. Both repellent and nonrepellent termiticides have proven satisfactory for making effective barriers when applied properly.

The integrity of the soil treatment is a key factor in providing protection to the structure. A repellent termiticide properly applied to the soil will provide protection to the structure unless the barrier is disturbed. A termiticide barrier composed of a nonrepellent termiticide allows more flexibility and will provide protection even if the integrity of the barrier is disturbed.

Continued on Page 22

Tales from Future Pest Pros

OUR USUAL graduate student profile will return next issue. This time, we welcome three UF urban entomology students to share with *PestPro* readers their experiences as interns in the field, edited for space and flow.

The students reported on a wide range of pest management situations, indoors and out, all over Florida. Pest professionals statewide hosted student interns Lettie Cronin, Kayla Luzier, and Joshua Ore.

Their summer experiences prepared the students for a future in urban pest management. Joshua said, "After this summer, I feel much better equipped to enter the field of urban pest management and I am very excited to begin my career."

"Overall, I learned an incredible amount that I plan on using in my own pest control business," Kayla said. "I can't wait to apply all this knowledge to my own business and to continue learning through experience." **PP**



UF Urban Entomology thanks all who participated in hosting a summer intern, including Knight Pest Control, Bud's Pest Control, McCall Service, Great Southern Environmental Services, Ft. Lauderdale REC, Duval County Extension Office, and City of St. Augustine.

Kayla Luzier, UF summer intern

My internship with Knight Pest Control far exceeded my expectations. During my internship, I had the opportunity to ride along with several technicians on a lawn and ornamental route.

I had the opportunity to spray several yards by myself under the supervision of the technician. My first thought was how heavy the hose is when carrying it across front yards and into backyards. I quickly learned to pull enough hose out near the truck to prevent constantly fighting the hose reel. I also quickly learned the correct walking pace to apply the product with a spray gun that casted 3.5 gallons a minute.

I also had the chance to shadow Billy Knight. I went on problem calls with him, which were when customers had a complaint they needed addressed. He taught me the difference between Bermuda, Zoysia, St. Augustine and Bahia grass. He told me about the importance of proper irrigation and how to differentiate between stressed and diseased or insect damaged grasses. I also had the chance to go with him on a couple termite inspections where we examined the whole house for any signs of mud tubes or termite damage.

Some issues I encountered during the internship were fungus, scale and sod webworms. Fungus issues were common because of the amount of rain that we had. Where water sat in the yard the grass appeared matted and brown. These areas were treated with a fungicide using the backpack sprayer.

I sprayed a whole soccer field by myself under Billy Knight's supervision. The purpose of spraying it was to eliminate the crabgrass and nutsedge from taking over the field. It took me a couple hours but the rewarding part was receiving an email on the success rate from the happy customer.



Joshua Ore, UF summer intern

For my internship, I worked with my family's pest control business, Bud's Pest Control. During my internship, I learned about how to provide general household pest control, preventive and curative termite treatments, and to apply chemical to lawns for pest and weed control. Before I applied any pesticides, however, I was trained on how to read and understand pesticide labels and on safety procedures when handling, mixing, or applying chemicals. [Ed. note: Joshua gained extensive experience in general pest control, termite treatment, lawn care, and miscellaneous services. A few examples follow.]

A gas station was having issues with flies inside and outside the convenience store. I was able to find the source of the flies on the interior (a leaky pipe under a sink) and using the maggots and adult flies I found there, I was able to identify the pests as drain flies. To remedy this, I cleaned the cabinet and pipes where the maggots were, sealed the leak in the pipe, removed the remaining eggs and maggots, and left a fly trap to capture the remaining adult flies. Outside, I treated around the dumpsters and air conditioning units with Maxforce Granular Fly Bait.

A house I treated clearly had termites. The owner had already taken the drywall down from the infested wall, and all the wood in the wall had lost most of its structure to termites. Also, there were termite alates piled up on the floor and window sills inside the home. I treated the perimeter with Termidor HE, applying extra on the exterior of the affected wall. On the interior, I treated the wood with Termidor foam, but I recommended to the owner that he remove and replace all the infested wood.

I learned to look out for and to be able to identify a few common lawn pests including sod webworms, chinch bugs, and various fungal and weed pests. The most typical turf pest I saw and treated for this summer were chinch bugs. I usually identified these by their trademark brown patches that start near surfaces like driveways and sidewalks spreading outward. Once I spotted this sign, I would pick through the living grass in the area around the dead spot. If I saw any chinch bugs or their predator the big-eyed bug, I would treat around the spot with Aloft granular to contain the infestation.

In a house that was infested with carpenter ants, the ants had come from an exterior nest (a rotted tree that was blown over in Hurricane Matthew) and had made a new nest in a rotted exterior door frame. I treated the frame with Delta dust and Termidor foam and sprayed the baseboards of the room with Crosscheck. I recommended to the homeowner that she replace the rotted wood as soon as possible and to direct her sprinklers so they did not hit the exterior wall, which may be what caused the rot to begin with.



Lettie Cronin UF summer intern

Monday, May 15, 2017: Ride along with Wade (McCall's).

- Animal trapping: Opossums, Armadillos.
- Treatments: Flea spray using Alpine in a sweeping motion throughout the home. Close all doors as we exit a room. Start in the back and work our way to the desired exit.

Monday, May 29, 2017: Ride along with Sean Cronin.

- GHP service for treatment for German Roaches with Avert, Advance Gel Bait, and Delta Dust.
- Helped set up BG Sentinel traps for mosquito surveying at two condominium complexes. Set Traps and collected Popsicle sticks for egg counts.
- Set new Popsicle sticks and water along with repairing the cups and holders.
- Re-inspection of current customer's home for yearly Drywood Termite Renewal.

Monday, June 5, 2017: Ride along with Wade.

- Bedbug heat treatment
 - o Walked through home to make sure there was nothing that could be a hazard to job.
 - o Family left and we started to pull out the massive heaters.
 - o Home needs to be around 120 degrees. Huge heaters are placed throughout the house with fans.
 - o The huge heaters have sensors on them that report back to a laptop.
 - o Check every hour.
 - o Once it hit near 120 degrees, we went in to move mattresses and dump clothes out of drawers and move furniture.

Friday, June 30, 2017: Jacksonville: Duval County Demonstration

- Watched a tree injection.
- There were special made tips for injection of the infected tree. Drill (or find) two holes and inject in one, watch it exit the other hole.
- To drill you take the circumference to find the diameter and then the radius to know how far to drill into the infected tree.

Saturday, July 1, 2017: St. Augustine: Meeting with Jerry

- Met with Jerry and talked about the tent of Lightner Museum.
 - o Took a year to plan because they had to collaborate with the city to look at past plans, square footage
 - o Went up on a Wednesday and came down on Saturday.
 - o Took roughly 8 hours to air out.





Gerald Wegner

Preconstruction treatment zones along exterior and interior foundation perimeter.

Subterranean Termites, continued from Page 19

Preconstruction Treatment of Foundation Wall and Piers

After the footings are poured and the foundation walls and/or piers have been constructed, apply the insecticide to a trench in the soil. The soil along the side of the foundation should be treated to prevent termites from building tubes up the foundation wall. The amount of termiticide required to apply depends on the depth of the foundation footing. Sloping the trench toward the foundation allows the termiticide to seep down close to the wall, creating maximum protection. The insecticide must be applied to both the inside and outside of the foundation and also around piers, chimney bases, pipes, conduits, and any other structures in contact with the soil. The trench should be as deep as the top of the footing. The insecticide should be mixed with water as recommended on the pesticide label and applied at the rate stated on the label. The insecticide should be mixed with the soil as it is being replaced.

Preconstruction Treatment of Concrete Slabs

The most common type of construction in Florida is concrete slab resting on the soil. Often the slabs crack or shrink away from the foundation wall, allowing termites to infest the wood above.

An overall treatment of termiticide should be applied to the entire surface to be covered beneath the concrete slab (see photo below). This includes the slab under the actual living area, plus carports, porches, basement floors, and any extended entrances. This treatment should be applied at the horizontal treatment rate using a coarse spray nozzle and low-pressure spray (less than 25 psi), spraying the dilution evenly and uniformly over the entire area treated. As with any pesticide application, always follow label directions.

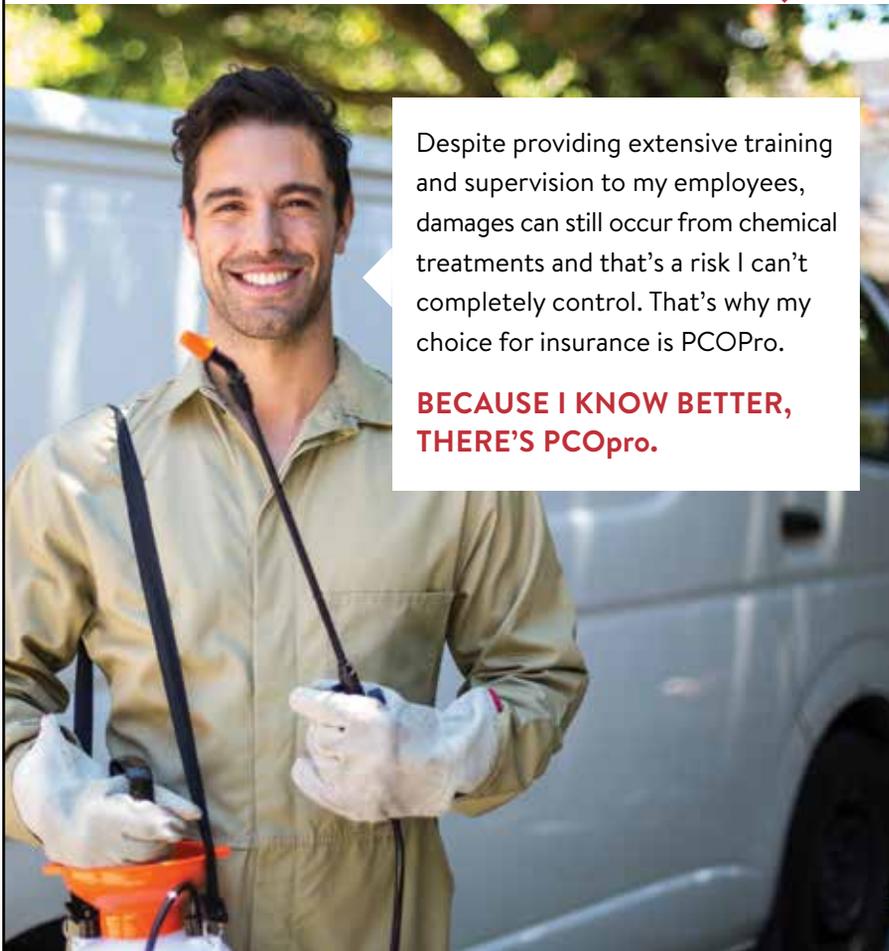
Continued on Page 31



Home Learn Pest Defense

Treatment of graded soil to be covered by concrete slab.

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Three Strategies for Using Your Website to Promote Seasonal Offerings

Alain Parcan



SEASONS CHANGE. And so should your marketing messages. But, when it comes to highlighting new services or seasonal offerings to your online audience, your message should inform, educate, and deliver your news in a detailed and impactful way. But the biggest challenge, and the one many businesses often struggle with, is getting the message out to their audience in a timely and effective manner.

So to solve for that challenge, here are three simple strategies to help you communicate new services and offerings to your audience — particularly useful when you want to market your most profitable services.

Announce Seasonal Topics On Your Website

First and foremost, your website is the central hub of all your online marketing efforts, which means this should be the first place you announce new services or seasonal offerings. If your business decides to add a new service or advertise a seasonal promotion, add a small paragraph on your home page mentioning the offer. Just be sure to remove or update it once it's no longer relevant, so your website won't seem outdated.

Call to Action

You can also take it a step further by adding a call to action. To promote mosquito prevention, Bug Out Service of West Florida, an FPMA member, added a callout box on their home page referencing mosquito control and linking to their residential pest control page. It may require a designer to add a tool like that to your website, but it pays off if you're eager to promote a certain service.

Send Out An Email Newsletter

Email newsletters can be sent out to huge lists at once, with a small investment. Email is a perfect opportunity to tell your customers about new service offerings and remind them about your specialties. And while we recommend keeping your

email newsletter 90% educational, that last 10% is a great opportunity to include a promotion that recipients can claim during their next service call or appointment. A small, goodwill offer is a great way to show your customers you value their business, and sending it out through your email newsletter will ensure that all of your clients and prospects will be able to take advantage of it. As long as you keep the bulk of your email newsletter educational, customers will appreciate receiving a small offer from time to time. Of course, be sure to reuse your newsletter content on your social media pages to get more bang for your buck.

Set Up A Targeted Ad Campaign (The Right Way)

In the past, traditional pay-per-click ads on Google were a great source of new customers. Today, this method is increasingly competitive, to a point where it is typically too expensive for many businesses.

On the other hand, setting up a display ad campaign is much more affordable, and can also target people searching for your services, or even just web users that have previously visited your website. If you'd like to get the word out about new services and offers, consider setting up a display ad campaign. On average, web display ads only cost about 1 cent every time your ad is seen,

so they can result in great long-term exposure at a reasonable cost — with effective results, too!

As an FPMA member, you are familiar with the constant ebbs and flows businesses deal with. This includes new services, expanded product offerings, and more. It's important to evolve as a business, but it's even more important that your audience is in the loop about that evolution. Incorporate these strategies to ensure your message is delivered in a timely and appropriate manner. **PP**

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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PEST MANAGEMENT | FUMIGATION | VECTOR

Independent Contractors

ONE OF THE ISSUES that the Department deals with on a regular basis is pest control employees/identification cardholders operating as independent contractors. Florida Statute (F.S.) Chapter 482 defines employee, independent contractor and identification cardholder as follows:

Chapter 482.021 (8) "Employee" means a person who is employed by a licensee that provides that person with necessary training, supervision, pesticides, equipment, and insurance and who receives compensation from and is under the personal supervision and direct control of the licensee's certified operator in charge and from whose compensation the licensee regularly deducts and matches federal insurance contributions and federal income and Social Security taxes.

Subsection (13) "Independent contractor" means an entity separate from the licensee that; (a) receives moneys from a customer which are deposited in a bank account other than that of the licensee; (b) Owns or supplies its own vehicle, equipment, and pesticides; (c) Maintains a business operation, office, or support staff independent of the licensee's direct control; (d) Pays its own operating expenses such as fuel, equipment, pesticides, and materials; (e) Pays its own workers compensation as an independent contractor.

Chapter 482.091 (2)(a) An identification cardholder must be an employee of the licensee and work under the direction and supervision of the licensee's certified operator in charge and shall not be an independent contractor. An identification cardholder shall operate only out of, and for customers assigned from, the licensee's licensed business location. An identification cardholder shall not perform any pest control independently of and without the knowledge of the licensee and the licensee's certified operator in charge and shall perform pest control only for the licensee's customers.

In some case investigations, individuals are issued pest control identification cards from a licensed pest control company (licensee), but are allowed to operate independently by paying a fee to the licensee. These licensees are allowing these individuals to operate this way for their own profit. These licensees are not claiming them as employees for workers' compensation insurance; Licensees are not providing them with vehicles or other equipment used in the conduct of pest control but are directing them to use their own vehicles and equipment; Licensees are not providing training or supervision to these identification card holders. These independent contractors in most cases do not have any insurance to protect consumers from any claims.

This is one of the issues that can make it difficult for the pest control industry to compete in the market place. If a business/individual does not have to pay for licensure, insurance, worker

compensation, vehicles, and other pest control business costs, it gives that business/individual an unfair advantage. These individuals may not have the proper training to apply pesticides safely and per the labels, which can be unsafe to the public and or the environment. These individuals should be reported to the department so they can be stopped or become in compliance with the law. The department inspectors cannot be everywhere

all the time so we need the help of the industry and or consumers. The department has a website where anyone can report an illegal operator. Pictures can also be uploaded to the report. Learn more online: <http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Environmental-Services> . **PP**

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

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may also invade electric water pump housings and A/C compressor units around residential homes, potentially causing damage. As Cuban treefrog populations continue to expand, this may eventually become a large-scale issue.

What You Can Do

There are several things Floridians can do to help manage invasive Cuban treefrogs and to help scientists at the University of Florida track their spread in the state and elsewhere. You can help advance our knowledge about the geographic distribution of this invasive species by reporting your sightings of Cuban treefrogs. As Cuban treefrogs continue to expand their range, precise tracking of their status and distribution is imperative for decision-making and resource management. In addition to helping track the expansion of their range, you can also help manage this invasive species in and around your yard. Because Cuban treefrogs eat our native frogs and other wildlife, it is important that we take action to manage them and reduce their negative impacts on our native ecology. Managing Cuban treefrogs will also help reduce their negative impacts on the quality of life of Floridians. Benefits will be greatest in the immediate area around where the frogs are managed, i.e., in yards.

Report the Presence of Cuban Treefrogs

It is important to document the locations of Cuban treefrogs in Florida, especially in the Panhandle. If you see a Cuban treefrog or suspect you have seen one outside of peninsular Florida, please email Dr. Steve A. Johnson at tadpole@ufl.edu. Include your name, date you saw the frog, where you saw it (state, county, city, street address), and attach a digital image so Dr. Johnson can positively identify the frog. It is also important to report Cuban treefrog sightings from peninsular Florida

and elsewhere at EDDMapS, the online mapping system for invasive species in United States². Click the "Report Sightings" tab. Thank you for being a citizen scientist!

Manage Cuban Treefrogs Around Homes

Because of the destructive effects of invasive Cuban treefrogs on Florida's native species, as well as the problems they cause for people, we recommend that Cuban treefrogs be captured and humanely euthanized. However, before you euthanize a Cuban treefrog, be sure that you are positive about its identification. At this site³ you will find lots of helpful information about catching, identifying, and reporting Cuban treefrogs.

To humanely euthanize a Cuban treefrog, you must first capture it; there are several effective methods for doing this. The first is to simply grab the frog from a window, wall, or other perch site. Be sure to wear rubber gloves or use a plastic grocery bag as a glove. Approach quickly and decisively, and with a continuous, swift movement firmly grab the frog.

Another way to capture Cuban treefrogs in order to eliminate them from your property is to attract the frogs to hiding places where they can be easily captured and removed. To do this, simply place short sections of PVC pipe in the ground around your home and garden. Cut 10-foot sections of 1.5-inch-diameter PVC pipe available at home improvement stores into approximately 3-foot-long sections and push them into the ground about 3–4 inches.

Cuban treefrogs may show up in the pipes in a few days, depending on the weather, time of year, and the density of frogs in your immediate area. In some situations it may take several weeks for frogs to find the pipes, so be patient. To remove a frog from a pipe, place a clear sandwich bag over the top end, pull the pipe from the ground, and insert a broom handle or other "plunger" device in the

other end to scare the frog into the sandwich bag.

Gently herd the frog and avoid touching it with the plunger. Once it is in the bag, examine the frog to be sure that it is an invasive Cuban treefrog and not a native species. Euthanize Cuban treefrogs as described below and release native frogs back into the pipe. PVC pipes provide great artificial habitats for native treefrogs and can help enhance the wildlife value of your garden. For more details on using PVC pipes to attract treefrogs, see the UF/IFAS fact sheet on making treefrog houses⁴.

The easiest way to humanely euthanize a Cuban treefrog is to place the bagged frog into a refrigerator for three to four hours, then transfer it to a freezer for an additional 24 hours. The initial cool-down period in the fridge acts as an anesthetic to numb the frog so it does not feel any pain when it freezes.

Alternatively, you can firmly hold a recently captured Cuban treefrog and apply a benzocaine-containing ointment to the frog's back to chemically anesthetize it before placing it into a freezer to ensure death. To do this, apply a 1-inch stripe of topical benzocaine ointment (Orajel is one popular brand) to the frog's back, rub the ointment around so it covers the back, then after the frog has ceased to move put it in a sealed bag and place in a freezer for 24-hours. After freezing, simply remove the bagged frog from the freezer and dispose of in the trash.

Do not use bug spray, suntan lotion, insecticide, bleach spray, or other household chemicals to euthanize Cuban treefrogs, and never place a live, bagged frog into the trash! Remember to wash your hands thoroughly after handling a Cuban treefrog to avoid any adverse reaction to the noxious skin secretions of these frogs.

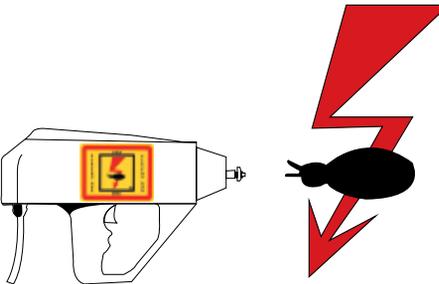
You can also reduce the negative impacts of Cuban treefrogs by eliminating eggs and potential breeding sites. Monitor ornamental ponds for Cuban treefrog egg masses during the spring and summer, especially after heavy rains. Be sure to check for eggs the morning following rain so the eggs do not have time to hatch. Use a small-mesh aquarium net to scoop out masses of Cuban treefrog eggs floating on the surface of the pond and simply discard them on the ground to dry out. You should also remove Cuban treefrog tadpoles from pools and ornamental fish ponds and euthanize them by cooling then placing in a freezer as described. Properly maintain swimming pools so they are not attractive to Cuban treefrogs, and dump out stagnant water that accumulates in various containers around your yard, such as ice coolers and buckets. This will also help eliminate breeding sites for mosquitoes. **PP**

*Steve A. Johnson is Associate Professor in the University of Florida Department of Wildlife Ecology and Conservation. Article is adapted from EDIS WEC218, The Cuban Treefrog (*Osteopilus septentrionalis*) in Florida.*

² <https://www.eddmaps.org/>

³ http://ufwildlife.ifas.ufl.edu/cuban_treefrog_inFL.shtml

⁴ <http://edis.ifas.ufl.edu/uw308>



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Featured Creatures Update

The Good, the Bad, and the Pretty

Jennifer Gillett-Kaufman

AS YOU MOVE through your career, you will reach a point where you start to appreciate the diversity of insects that are around us. You start to realize that even as you watch a beetle eating a plant you cannot say all beetles are bad. Of the six new lawn and ornamental creatures you will learn about today, three might be hard to characterize as good or bad until you get to know them a little better. You will also learn about two butterflies you can help protect by discouraging your account holders — and friends and family — from planting a common plant that is a larval “death trap!”

We are proud to present you these newest creatures from the University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) Featured Creatures website. These articles were developed by UF scientists, students and collaborators, and the excerpts below are from the actual articles.



Fiery Searcher

Ann Marie Carias, Cell and Molecular Biology Department, Northwestern University Medical School, and Andrea Lucky, Entomology and Nematology Department, University of Florida
http://entnemdept.ufl.edu/creatures/beneficial/beetles/calosoma_scrutator.htm

OF THE MANY BEETLES inhabiting North America, many collectors favor and seek out those found in the genus *Calosoma*, particularly the fiery searcher beetle, *Calosoma scrutator*. This species is especially attractive in appearance with its striking bright, metallic colors, and is one of the continent's largest ground beetles (family Carabidae). This ground beetle is predatory in both the larval and adult stages, as is typical of the tribe Carabini, thus earning it the common name caterpillar hunter. Ground beetles are the largest family of beetles within the suborder Adephaga, with about 200 genera and approximately 2,000 species recorded in North America to date.



Whitefly Predatory Lady Beetle
Janine Raze and Oscar E. Liburd, Department of Entomology and Nematology, University of Florida
http://entnemdept.ufl.edu/creatures/beneficial/delphastus_catalinae.htm

DELPHASTUS CATALINAE (Horn) is considered an effective biological control agent for whiteflies because of its high prey consumption rates, long adult survival, and high reproduction rates. *D. catalinae* has received research attention in Florida and other states for its value as a predator of the whitefly *Bemisia tabaci* (Gennadius), which is an economically important pest of ornamental and agricultural crops. There is a growing interest to increase knowledge and focus efforts on incorporating integrated pest management (IPM) strategies that are compatible with sustainable and organic production systems. Biological control has the potential to manage key pests in an IPM program for whiteflies and other pests.



Fire Ant Decapitating Fly
Ariane McCorquodale and James P. Cuda, Entomology and Nematology Department, University of Florida, and Sanford D. Porter, USDA-ARS-CMAVE Imported Fire Ant and Household Insect Research Unit
http://entnemdept.ufl.edu/creatures/beneficial/flies/ant_decapitating_phorids.htm

PSEUDACTEON FLIES are parasitoids of ants in many genera worldwide. About two dozen species parasitize native fire ants in South

America. In the United States, the range of introduced species varies according to their rates of expansion and dates of introduction. *Pseudacteon triscuspis* and *P. curvatus* are distributed across most of the southeastern United States. *P. litoralis* populations are occasionally abundant in Alabama, as are *P. nocens* in Texas. Both species have limited but expanding ranges. *P. obstusus* is abundant in a large portion of both Texas and Florida, with smaller established populations in Mississippi and Georgia. *P. cultellatus* is the most recently released species and is established at two sites in Florida.



Redbanded Stink Bug
Morgan Pinkerton and Amanda Hodges, Department of Entomology and Nematology, University of Florida
http://entnemdept.ufl.edu/creatures/veg/bean/redbanded_stink_bug.htm

The redbanded stink bug, *Piezodorus guildinii*, is a neotropical stink bug that has recently become established in the southeastern United States. The redbanded stink bug feeds on many leguminous plants including several economically important crops such as beans, peas, alfalfa and lentils. In South America, the redbanded stink bug has become one of the most significant pests of soybean, *Glycine max*.

The first description of the redbanded stink bug originated from the Caribbean island of St. Vincent. This pest is present in both Central and South America and has caused major economic damage throughout South America. In Brazil, Uruguay and Argentina, the redbanded stink bug is one of the most prevalent pests of soybean. The redbanded stink bug was first reported in the United States in the early 1970s, but the time of its arrival in North America is still unclear. It was not until 2002 that the redbanded stink bug was considered a major economic pest in the United States. As of 2016 the redbanded stink bug was recorded in several states including Alabama, Florida, Georgia, Louisiana, Mississippi, New Mexico, South Carolina, and Texas.

Continued on page 33

Jennifer Gillett-Kaufman is Featured Creatures Editor and Project Coordinator, University of Florida/IFAS Entomology and Nematology Department. Visit the Featured Creatures website to read the complete articles at <http://entnemdept.ufl.edu/creatures/>



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Sean Brantley and Suzanne Graham

IT IS STILL 2017, but the 2018 Florida legislative session is ready to rush the calendar forward. The 2018 legislative session will start in January rather than March, so that puts everything that leads up to the 60 days of fury closer to today than tomorrow, with some things already done.

The governor's office has already asked for agency LBRs (legislative budget requests). These lists from agencies are basically wish lists with explanations. Along with those lists come explanations as to what programs can be reduced and how, in the event of funding crisis or budget shortfalls. This year's exercise asks agencies to pretend they are getting a 10 percent cut and see how they can do their jobs. This has all been forecasted from past year's actions and predictions that these shortfalls would be coming sooner than later. So, the exercise may be more than just an exercise this time around. The timing is going to be right on the money, per se, because the legislature will be working with these results and vying to appropriate funds at a fevered pace and favored location. And this is just the start of the busy season ahead.

Legislative Committee Weeks will be ramping up starting in August. All claim bills will have to be filed by August 1, and interim committees will begin meeting mid-September. September 15 the long-range financial outlook is due along with the aforementioned LBRs. September 29 the agency long range plans are due. We will be watching all of these closely, of course.

Beginning October 9, interim committee meetings will hold five series of meetings ending December 8. On December 11, Governor Rick Scott will release his budget recommendations at the mandatory 30-day pre-session deadline. Then we roll full speed into the January 9 regular session start and power through the March 9 last day of regular session. Any bets on whether we have special session or extended session with all the budget drama and big issue items we know are on the table? Stay tuned, it will be fast and furious. There will be a lot of things that we will be tracking and working on that affect our businesses and families. The good news is that as of this article's writing there is no intent on opening Chapter 482. Fingers crossed and eyes wide open, folks.

I think I will leave the low hanging fruit of the governor's race and the commissioner's race alone until next time. Keep your eyes and ears open for your candidate choice. They are making the rounds, picking up money, and making waves to and from the voters. FPMA has a very good relationship with many of the candidates, and we are keeping ourselves in the conversations as these races mature.

Fumigators have seen the last of the big changes hit their radar screens. The new fumigation notification website is up and running. Fumigators must now keep track of clearance devices in their ownership by serial number, date of calibration verification, and party performing the service. This provides the Department with a record that shows proper

and legal equipment is out there and in use.

In addition, new training requirements must now be met to hold a new endorsement, the fumigation endorsement, on pest control identification cards. Registrants, distributors and vendors are now part of a global alert system that immediately notifies them of stop sales or other major actions. This notification is meant to alert suppliers that a company is now ineligible for fumigant sales until a release by the state has been sent. This is an entirely new rule and process and part of the long-developed tools meant to support DACS in its effort to more closely regulate this ultra-hazardous category of pest control.

The Pest Control Enforcement Advisory Council has commissioned a research project on label-approved clearance devices that began this summer. We are hoping to have reports of progress or possibly final reports at the next PCEAC meeting November 8 in Apopka.

The forecast for rulemaking certainly looks like a real prospect. Items on the radar include changes to the 487 side of things that would place bee removal activity back in our industry entirely, where it can be properly regulated as pest control activity when dealing with structures, mosquito control changes in public health licensing versus 482 licenses, and a few items of clarification including the posting of residential pest control applications (yard signs). In addition, while the ID cards are nearly immediate right now, we are still discussing the ID card

itself. There are discussions about illegal operators and even LCLM, and all of these are potential rulemaking opportunities. Once again, stay tuned.

ON THE NATIONAL LEVEL, NPMA and FPMA have been working with EPA on the fumigation issues. These issues are ongoing, and DACS has joined us in discussions about certain EPA thoughts about Fumigation Management Plans (FMP) for structural fumigation. These FMPs are something the EPA thinks would provide a written plan for a fumigation that would make it safer. Nonsense. The elements of the FMP are already part of Florida law, label requirements, and ordinary restricted-use pesticide recordkeeping.

We have been challenging the Fed and will continue to do so. Neonicotinoids are going through their registration process, and NPMA along with members like you are trying to educate EPA on the importance of these products. It is amazing the view that federal employees have of these products in light of all the importance they play in the world around us. When you see an email from us asking you to take a few minutes to spread the word, please do it! It is your chance to make a difference and we make it really easy to do. All you have to do is click the link and enter your information, the rest is done for you.

The FPMA is always here to support our members and our industry. We thank you for your support! **FP**

Sean Brantley and Suzanne Graham are Co-Chairs, FPMA Government Affairs Committee

Florida Pest Management Association
PMP Membership Application/Renewal
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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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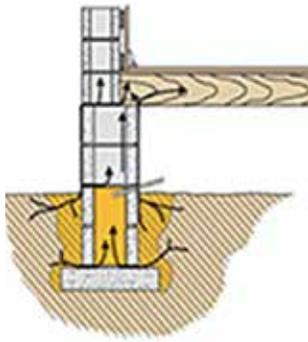
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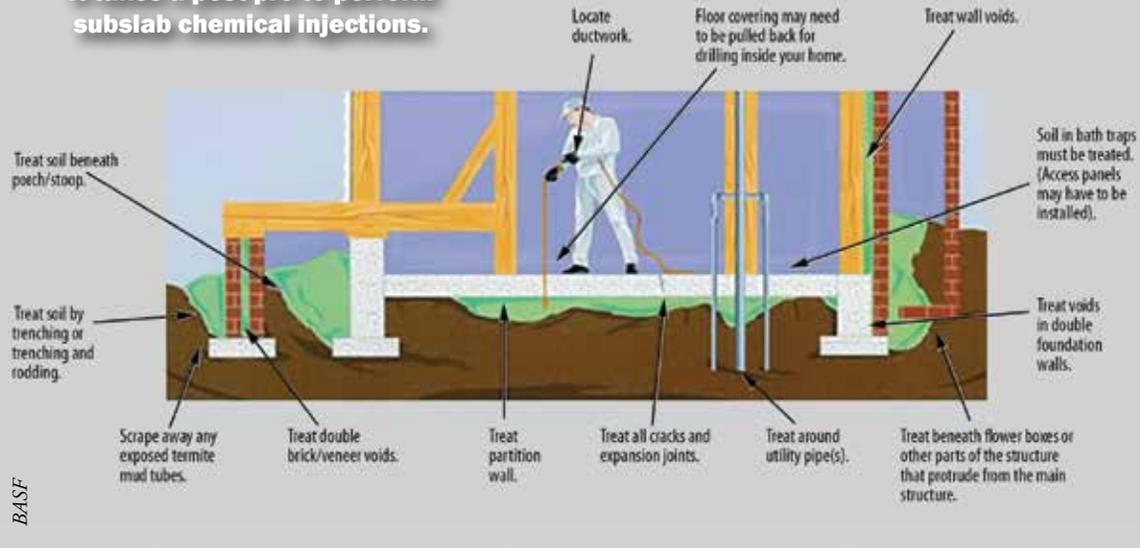
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Crawl space foundation. Termiticide (shown in yellow) needs to be applied where termites enter and contact foundation elements.

It takes a pest pro to perform subslab chemical injections.



Subterranean Termites, continued from Page 22

Postconstruction Treatment of Structures

Crawl Space Treatment

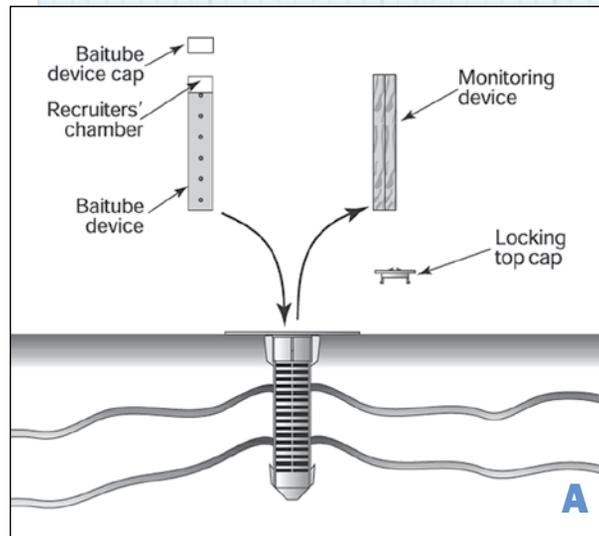
Dig narrow trenches along both the inside and outside of foundation walls and around piers and chimney bases, and apply diluted spray as described above. Also, be sure to trench and treat around sewer pipes, conduits, and all other structural members in contact with the soil. Apply the insecticide to the trenches. The insecticide must be applied to both the inside and outside of the foundation and also around piers, chimney bases, pipes, conduits, and any other structures in contact with the soil. The trench should be as deep as the top of the footing. Mix the insecticide with water as recommended on the pesticide label. Apply the diluted spray at the rate that is stated on the label. Mix the insecticide with the soil as it is being replaced.

Concrete Slab Construction

It is possible to trench and treat around the outside of a slab after it has been poured, as described above. Most homeowners do not have the right equipment or know how to treat under slabs after the slab foundation is completed. Usually a professional pest control operator is needed to do subslab chemical injections.

Termite Baits

Termite baits can be used to reduce the number of subterranean termites around the structure by killing the termites or diverting their foraging activity. Toxic termite baits use a small amount of insecticide to eliminate populations in and around the structure. They consist of paper, cardboard, or other termite food source, combined with a slow-acting insecticide. Because it is slow-acting, homeowners should be advised that this is an effective but lengthy



If a termite colony is confirmed, a monitoring station, shown at left, can be replaced with a baiting station, shown above.

baiting process. This type of control relies on the termite's foraging activity to locate the bait and distribute the toxicant to the rest of the colony.

The more below-ground baits that are installed, the better the chances of baits being located by termites. Planning, patience, and persistence are requisites for successfully using below-ground termite baits. There are three basic methods of baiting for subterranean termites.

1. The first involves a monitoring station, which is used to detect the presence of an active colony. Once the colony is confirmed, the monitoring station is replaced with a baiting station, as shown above in steps **A** and **B**.
2. The second method skips the monitoring process and places baits before checking for an active colony.
3. The third looks for an infestation such as wood damage or mud tubes and places bait stations where infestations are visible. Typically, the stations are installed directly in the path of active termite tunnels after the mud tubes have been broken.

Termite baits may also be installed above ground in known areas of termite activity. Effects tend to be more rapid with above-ground baiting because the procedure does not depend upon random termite encounters with the stations.

After bait stations are removed from the structure, it is possible that the same or a new colony can reinfest the structure. On the contrary, other termiticides, such as barrier treatments, provide a residual effect for some time after the day of application.

Deciding On Baits or Termiticide Barriers

Buildings with hard-to-treat construction or chronic retreatment histories are logical candidates for termite baits. Some structures have construction features that interfere with conventional soil treatment methods, such as wells, cisterns, plenums, drainage systems, and inaccessible crawl spaces. With baits, gaining access for treatment is seldom a problem since foraging termites are as likely to encounter

Continued on Page 34

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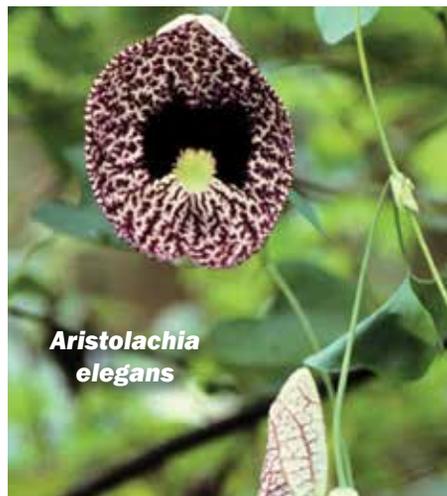


Pipevine Swallowtail

Donald W. Hall, Department of Entomology and Nematology, University of Florida

http://entnemdept.ufl.edu/creatures/bfly/pipevine_swallowtail.htm

The pipevine swallowtail, *Battus philenor* (L.), is one of our most beautiful swallowtails. It is also known as the blue swallowtail. The U.S. distribution of the pipevine swallowtail extends from southern Connecticut south to central Florida and west to Arizona with an isolated population in northern California. The pipevine swallowtail is also found northward to southeastern Ontario, Canada, and southward to southern Mexico. Various exotic *Aristolochia* species are planted as ornamentals because of their unusual and sometimes beautiful flowers. Some of these may be too toxic or too distasteful for pipevine swallowtail larvae and may be "death traps" for the larvae.



Aristolochia elegans

Elegant Dutchman's pipe, or calico flower, *Aristolochia elegans* Mast (synonym, *A. littoralis* Parodi), is attractive to female pipevine swallowtails for oviposition, but larvae usually do not survive on it. Kendall (1964) suggested that *A. elegans* is probably only distasteful and not toxic to *B. philenor* larvae and that the larvae probably die due to starvation because of their refusal to eat it. Therefore, planting of *A. elegans* and other exotic pipevines is not recommended where *B. philenor* (L.) occurs (central Florida and northward).



Polydamus Swallowtail

Donald W. Hall, Department of Entomology and Nematology, University of Florida

<http://entnemdept.ufl.edu/creatures/bfly/polydamas.htm>

The Polydamus swallowtail is one of only two U.S. swallowtails of the genus *Battus*. It is our only U.S. swallowtail without tails. *Battus polydamus lucayus* occurs as a regular resident in peninsular Florida and the Florida Keys. Often the larvae become pests by defoliating the vines and eating the flowers. Unfortunately, *Aristolochia elegans* and possibly some of the other exotic pipevines may be a death trap for our other native troilid swallowtail, *B. philenor* (L.). Female *B. philenor* readily oviposit on *A. elegans*, but most of the larvae cannot survive on it. Therefore, planting of *A. elegans* is not recommended where *B. philenor* occurs (central Florida and northward). **FP**

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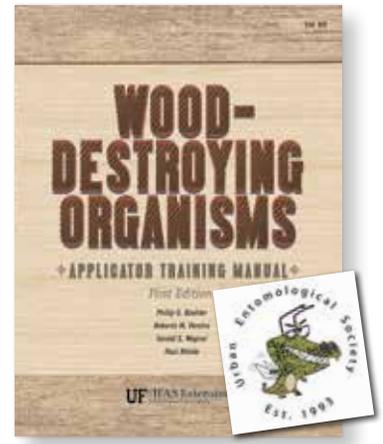
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Subterranean Termites, continued from Page 31

belowground bait stations around the foundation exterior as well as beneath the structure.

Homeowners who do not want floors drilled and furniture, stored items, or carpeting moved are good candidates for baits. Baiting requires fewer disruptions than does conventional barrier treatment. Installation and subsequent monitoring of bait stations generally does not even require the technician to come indoors. Noise, drill dust, and similar disruptions associated with conventional treatment are avoided.

Homeowners who are strongly opposed to the use of pesticides around their home are good candidates for baits. Although conventional liquid termiticides pose no significant hazard to humans, pets, or the environment when applied according to label directions, some individuals are still apprehensive. Chemically adverse homeowners may find the concept of baiting more attractive. With baits, the total amount of pesticide applied is small in comparison to the high gallonages needed to achieve a thorough and effective soil barrier treatment.

Property owners with a serious termite problem or those involved in a real estate transaction are good candidates for termiticide barriers. They may not be able to wait two to six months (sometimes longer) for baits to suppress or eliminate the infestation.

People living in attached housing (condos, attached residences) where the entire structure cannot be baited are good candidates for termiticide barriers.

In periods of economic instability, soil termiticide treatments may be preferred over baits. Baits typically require an annual maintenance fee for the regular inspections. If the fee is not paid, the bait system may be removed. With soil treatments, at least the termiticide remains in the soil, regardless of whether or not an annual inspection contract is retained. **FP**

Wai-Han Chan is former Graduate Research Assistant, Philip Koehler is Endowed Professor, and Cynthia Tucker is former Graduate Research Assistant at UF/IFAS Entomology and Nematology Department. Article is adapted from EDIS ENY210, Subterranean Termites.

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- 12:00 PM – 1:00 PM
Interactive Lunch
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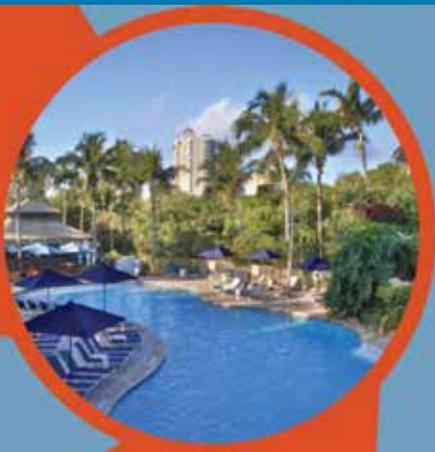
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