

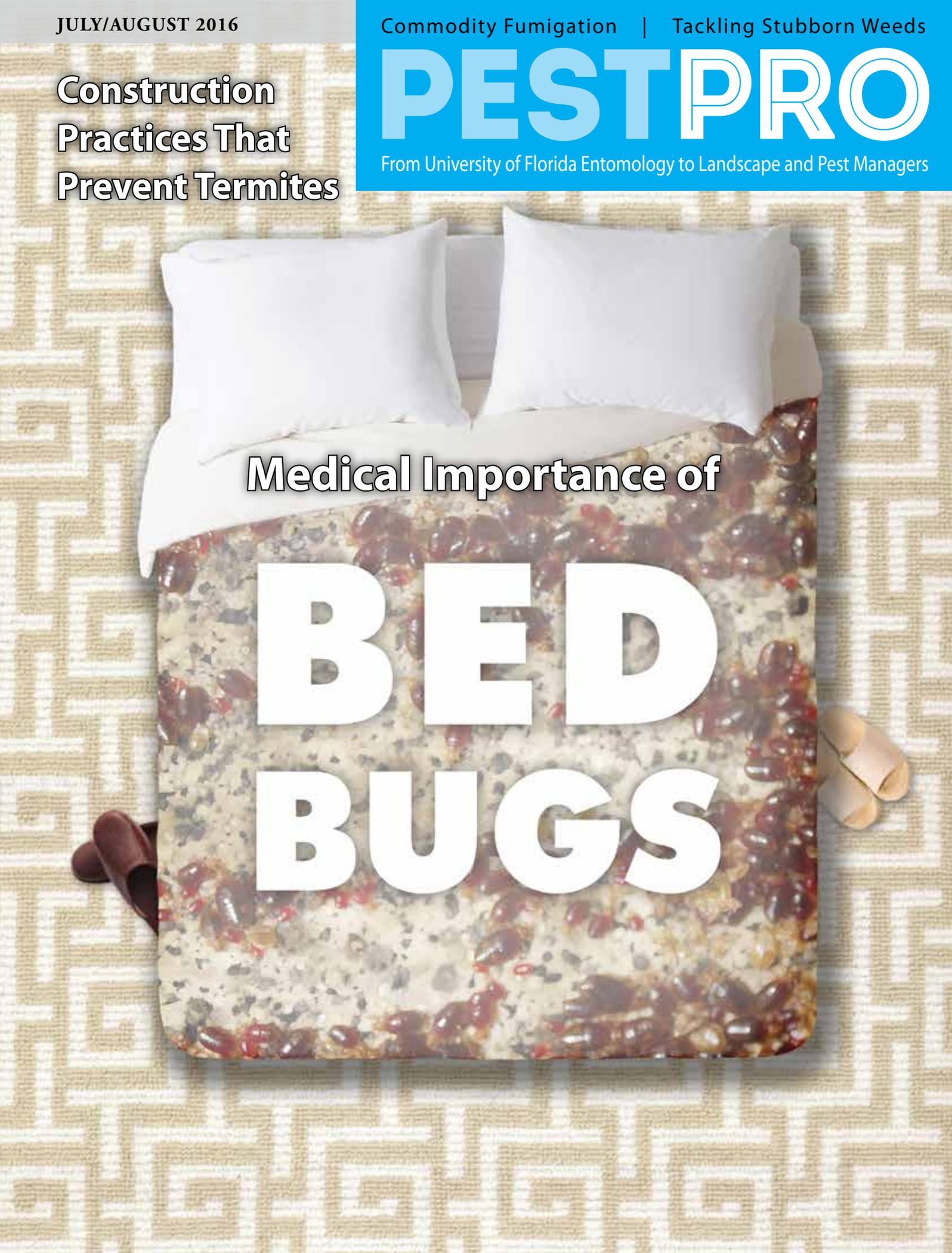
**Construction  
Practices That  
Prevent Termites**

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From University of Florida Entomology to Landscape and Pest Managers

**Medical Importance of**

# BED BUGS





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## ON THE COVER

Your customers may already know: Bed bugs can cause red bite reactions on the skin and spread anxiety and other psychological problems. But did you know bed bugs might spread Chagas and other diseases? Learn the latest from this report about bed bugs and their medical importance.





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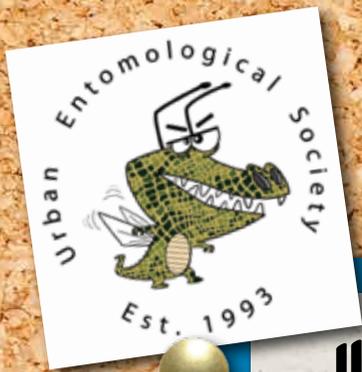
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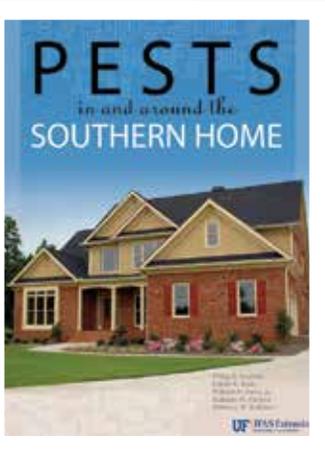
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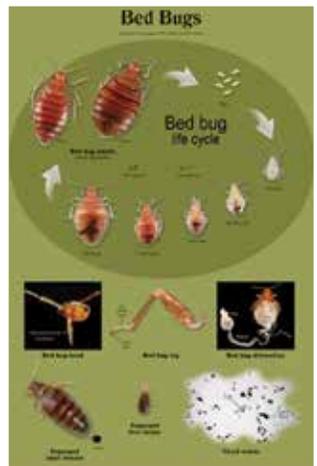


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# Summer Has Arrived

## And Pest Problems are Blossoming

**P**EST PROBLEMS are everywhere in Florida during this time of year. Of course, the problems never completely go away, but summer is a time when everyone has pests and needs help. This year is a great year for pest control. The Formosan termites had a great year for swarming. Sowbugs, pillbugs, millipedes, and earwigs are thriving in the wet mulch and leaf litter around houses. Cockroaches are running wild. Flies are breeding in all the waste that people are generating. Termite swarms this year have been really heavy in most parts of the state. In fact, the Formosan termite swarms are now so large that people report trouble breathing.

### FORMOSANS HIT RIVERSIDE

The Formosan termite hit the big time this year in Jacksonville. A museum took over the historic women's club building in the Riverside area. According to the press, the termites have destroyed the building, costing the museum about \$7 million dollars in losses. The building may need to be demolished. Formosan termites are finally being taken seriously in Jacksonville, and the pest control companies are helping people understand the issue. Because of all the press coverage, the mayor's office is working with the County Extension Office to coordinate appropriate termite treatment strategies for the community. In other words, a task force was formed, and several strategies are being developed.

The issue of Formosan termites is community wide in Jacksonville and in almost every other large municipality in Florida. Years ago Jerry Williams, past FPMA president, took on the job of tracking the termite in the Jacksonville area after its discovery in 2005. He was able to find the Formosan termite on the west side, the south side, and the east side. He was most concerned that it was prevalent in the Riverside area, which is the historic heart of Jacksonville. That area has lots of large shade trees, and many of the buildings have been there a long time. Jerry told me that many of the trees were infested with termites.



Photos by Scott Threlkeld, The Times-Picayune

*Top: Formosan termites swarm around streetlights in the French Quarter, New Orleans. Bottom: A closeup view of Formosan swarms.*

After the first task force meeting, the group took a tour of Riverside and found more than 20 trees along the city right of way that had evidence of Formosan termite attack. One tree had fallen on a stand-alone garage and smashed it. The Formosan termite nest in one tree was several feet in diameter. So the termites are really thriving there. Of course, the termites follow the tree roots from the city streets to the houses.

### LESSONS FROM NEW ORLEANS

There is no organized program to treat the trees, and they will be in danger of falling as the termites hollow out the dead wood in the center. It is only a matter of time until trees and branches start falling on cars and possibly people. That has happened in New Orleans over the years. New Orleans has a similar issue with shade trees along roadways being attacked and causing damage when they fall.

At the Jacksonville task force meeting, it was brought up that the termite protection code part of the stat building code needs to be updated. Also, there needs to be a decision on who will treat trees next to roadways that the city has responsibility for and how those

trees should be protected. The public is now asking for more information on termites from companies and the Extension office. They are scared. The homeowners groups in the historic areas want to have an areawide treatment effort similar to Operation Full Stop, which was implemented by the USDA in New Orleans. There, termite control was coordinated for the historic French Quarter in order to eliminate the termite. The bad news for the property owners in New Orleans is that the program did not completely eliminate the termite. The good news for the pest control industry is that the termite business is still thriving.

Many people in Florida now are afraid that their houses are infested with Formosan termites. They may find a single Formosan swarmer in their houses. In many of these cases, the Formosan termite swarmed outside, was attracted to lights at night, and squeezed into the house through cracks and crevices around windows and doors. First, industry pros need to properly identify the situation as either a Formosan or a drywood termite. Then if the swarmer is Formosan, a large number of termites present *in* the structure may indicate an infestation. Small numbers of swarms mean that the infestation may be *outside* the home and the termite individuals are just attracted to light inside.

### WHO'S NEXT?

Besides Jacksonville, Formosan termites are just about everywhere in Florida. In the past few years, they have caused tremendous damage to structures in West Florida. The situation with Jacksonville and New Orleans will repeat in most cities where there are large shade trees and historic buildings. So be ready for Tampa, Sarasota, Tallahassee, Orlando, and everywhere else. Be aware that the Formosan termites are coming to a community near you.

This summer of 2016 is a great time for pest control. Pests are thriving, and the termites are on the front page — along with mosquitoes, flies, moisture pests, cockroaches and ants. **PP**

— Dr. Philip Koehler,  
Managing Director

# The Medical Importance of Bed Bugs

Ben Hottel, Roberto M. Pereira,  
and Philip G. Koehler

**Blood-feeding insects can cause discomfort and disease in the hosts they parasitize, and bed bugs are no exception. Bed bugs inflict numerous negative impacts upon human hosts.**



**BED BUG BITES ON AN INFANT**



**BED BUG BITES ON ARM — EXTREME REACTION**



**CLOSEUP OF INFECTED BED BUG BITE**



**H**OST BLOOD lost from bed bug feeding can become harmful if the bed bug populations reach high enough levels. Blood loss can lead to iron deficiencies and is particularly concerning in situations involving infants, young children, and the elderly. There have been reported cases of elderly people who ended up in a hospital with cardiac problems that were brought about by severe anemia due to excessive bites from bed bugs. The process of feeding can also lead to other ailments in the human hosts.

Blood-sucking insects use various strategies to combat hosts' physiological response to blood feeding. Bed bugs, *Cimex lectularius*, use various compounds in their saliva to thwart these host responses including: a) nitrophenol, which prevents vasodilation; b) apyrase, which decreases platelet aggregation; and c) a compound that prevents clotting in the blood. Bed bugs are also "clever" enough to include an anesthetic that prevents us from feeling the bite, although the jury is still out on the presence of this anti-pain compound. The problem is that these saliva compounds can cause immune response in the host, and that is what makes us itch after a bed bug bite. The itching is followed by scratching, and this can lead to scars and secondary bacterial infections on the skin.

#### WHEN BED BUGS BITE

Individuals respond differently to bed bug bites. A study that examined how quickly a skin reaction would occur after being bitten by a bed bug showed that a little less than half of the people reacted to the bites after being fed upon by bed bugs for the first time. In the individuals who reacted, it took six to 10 days post-feeding for those reactions to occur. However, if people are bitten by bed bugs after the first exposure, the reaction times occur much faster for those people that reacted to the first bed bug bite. And those who did not react the first time will start reacting to the bed bug bites. Of course, there are those individuals that remain insensitive to bed bug bites. These people are probably the best candidates for bed bug control technicians.

Of course, bite reactions are not entirely bad. They let us know there is an insect problem that requires attention, and that perhaps it is time to contact a pest management professional.

The delay in the reaction to bed bug bites is one of the reasons why it is hard for individuals first exposed to bed bugs to pinpoint when and where they were bitten. For example, cutaneous reactions

that appear while someone is staying at a hotel may actually be caused from bites that occurred days earlier at another location. Also, individuals insensitive to bed bug bites may never realize they have an infestation until populations reach large numbers.

#### DISEASES AND BED BUGS

There has been an extensive investigation of the bed bug's ability to vector diseases. Many different diseases-causing organisms have been found in bed bugs, but few have been shown to develop in the insect and be transmissible. For example, one disease caused by nematodes found in bed bugs is filariasis. However, research found that most of these nematodes died or did not develop in bed bugs.

Bed bugs are also unlikely vectors of some important viruses. Human immune deficiency virus (HIV) lasts only four to eight hours in these insects. The virus does not replicate in bed bugs, is not excreted in the feces, and was not shown to be able to be transmitted by infected bed bugs during feeding. There have been some studies that

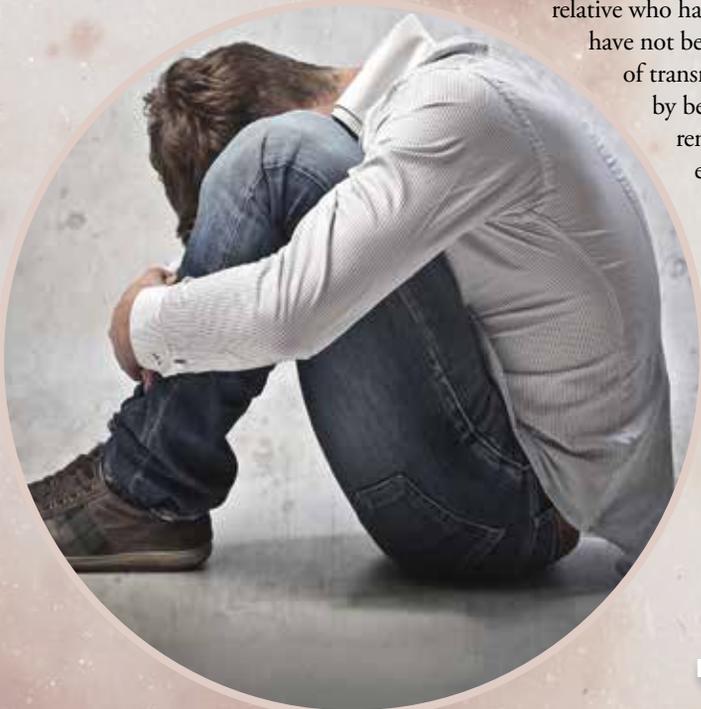
*Ben Hottel is Assistant Professor in Urban Entomology at Florida A&M University. Roberto M. Pereira is Research Scientist and Philip G. Koehler is Endowed Professor at UF/IFAS Entomology Department.*



**KISSING BUGS ARE BED BUG RELATIVES THAT CARRY CHAGAS**



**CHAGAS TRANSMISSION MAY BE POSSIBLE BY BED BUGS**



**BED BUGS CAN CAUSE WORRY, ANXIETY, DEPRESSION AND PTSD**

point to the possibility of bed bugs serving as vectors for hepatitis B virus (HBV) through bed bug feces. However, more recent studies have concluded that bed bugs are unlikely HBV vectors in nature.

Nevertheless, Chagas disease has not received enough attention in relation to transmission by bed bugs. The *Trypanosoma cruzi* protozoa that cause Chagas disease remain the most likely candidates for a disease that can be vectored by bed bugs. These protozoa are capable of developing in bed bugs. However, transmission of these disease organisms was unsuccessful in dogs, hamsters, and guinea pigs, but was successful in the bats. *Trypanosoma cruzi* is vectored by over 100 species of kissing bugs, relatives of bed bugs. The transmission of the disease is through the insect feces. Host immune response to the blood feeding of the kissing bugs causes the host to itch near the bite wound. The feces containing *T. cruzi* are then scratched into the wound. With bed bugs, the transmission route could be the same.

The vector competence of bed bugs in relation to the Chagas disease protozoa was primarily examined in the early 20th century, and there has not been much other work done since. There have only been two reported transmissions of *T. cruzi* by bed bugs that did not involve injection. Both studies involved rodents, not humans.

There is a single case where a boy contracted Chagas disease after sleeping in the same bed bug-infested bed with a relative who had the disease. While there have not been any human case studies of transmission of Chagas disease by bed bugs, this transmission remains a possibility. This is especially important given the rising cases of *T. cruzi* in the United States, and the rapid spreading of bed bug infestations in various regions of the country.

## PSYCHOLOGICAL EFFECTS

It is easily assumed that a blood-sucking parasite such as the bed bug could inflict physical bodily harm on the host upon which it feeds. However, negative psychological effects caused by real or perceived infestations of *C. lectularius* can also be damaging to the host's health and wellbeing. Some of the negative psychological effects experienced by individuals with infestations or individuals who fear becoming infested by bed bugs have been described in the past. Responses to infestations include major depressive episodes and anxiety spectrum disorders. Anxiety spectrum disorders can be in the form of acute stress disorder, adjustment disorder, and phobias.

These disorders can appear due to the infestation or they can be preexisting disorders that get worse because of the bed bug infestation. Social isolation can also occur because of the negative stigma associated with bed bug infestations or can be from self-imposed withdrawal. Infested individuals may also experience depression and suicidal thoughts, decrease in occupational or education productivity, and other psychological problems. Some experiences from having an infestation can even manifest similarly to post-traumatic stress disorder (PTSD).

Psychological issues can also develop in individuals who do not currently have an infestation but are worried about getting one. Most of these psychological issues focus on maladaptive behaviors such as insomnia, paranoia, itchiness, and taking unreasonable precautions to risky behavior that could lead to an infestation, such as not staying at hotels, avoiding public transportation, and avoiding public places such as movie theaters. These disorders are usually worse in individuals who have previously had bed bug infestations. These disorders, along with delusional parasitosis, can also be driven by media coverage of bed bug infestations.

You do not have to scare your clients with horror stories about bed bug infestations, but have an informed discussion with them about the real medical importance of bed bugs. **PP**

# CONSTRUCTION PRACTICES THAT HELP PREVENT TERMITES



Use smart practices and treatments from the start to prevent termites from entering a new home.

Wai-Han Chan, Philip G. Koehler, and Cynthia L. Tucker

**T**HE BEST WAY to control subterranean 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.

---

*Philip G. Koehler is Endowed Professor and Wai-Han Chan and Cynthia L. Tucker are former Graduate Research Assistants at UF/IFAS Entomology Department.*

# CATEGORIES OF TERMITICIDES

## Repellents

Active Ingredient	Brand Name
Befenthrin	Befenthrin Pro TalstarOne
Cypermethrin	Permethrin Pro Prevail FT
Permethrin	Dragnet FT Prelude Tengard SFR
Fenvalerate	Tribute

## Nonrepellents

Active Ingredient	Brand Name
Fipronil	Termidor
Chlorfenapyr	Phantom
Imidicloprid	Premise Prothor

## 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.

As listed in the table at left, there are two general categories of termiticides 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.

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.

## 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. However, labels generally specify to apply 4 gallons of the termiticide per 10 linear feet per foot of depth. Sloping the trench



**Before construction, remove all stumps, roots, wood and other materials that termites consume.**

Photo by Gerald Wegner

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 of 4 gallons per 10 linear feet of trench. 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.

The soil underneath and around the concrete slab should be treated with insecticide before the concrete slab is poured. The chemical should be applied after all the subslab fill and reinforcement rods are in place. Apply diluted spray to the fill at the rate of 1 gallon per 10 square feet. Along both sides of foundation walls and interior foundation walls and plumbing (critical areas), apply

diluted insecticide at the rate of 4 gallons per 10 linear feet. Treat all hollow masonry units of foundations with 4 gallons of diluted spray per 10 linear feet. Apply the insecticide to reach the footing.

### Postconstruction Treatment of Structures

#### Crawl Space Treatment

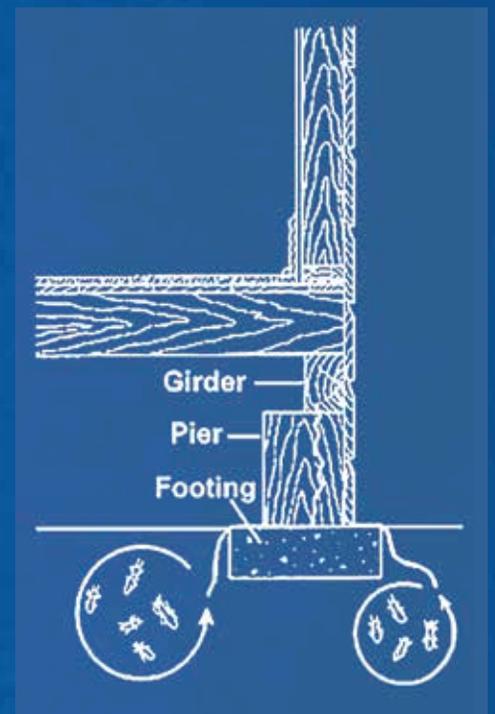
Dig narrow trenches along both the inside and outside of foundation walls and around piers and chimney bases, and apply diluted spray as described above. Also, be sure to trench and treat around sewer pipes, conduits, and all other structural members in contact with the soil.

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 of 4 gallons per 10 linear feet of trench. Mix the insecticide with the soil as it is being replaced.

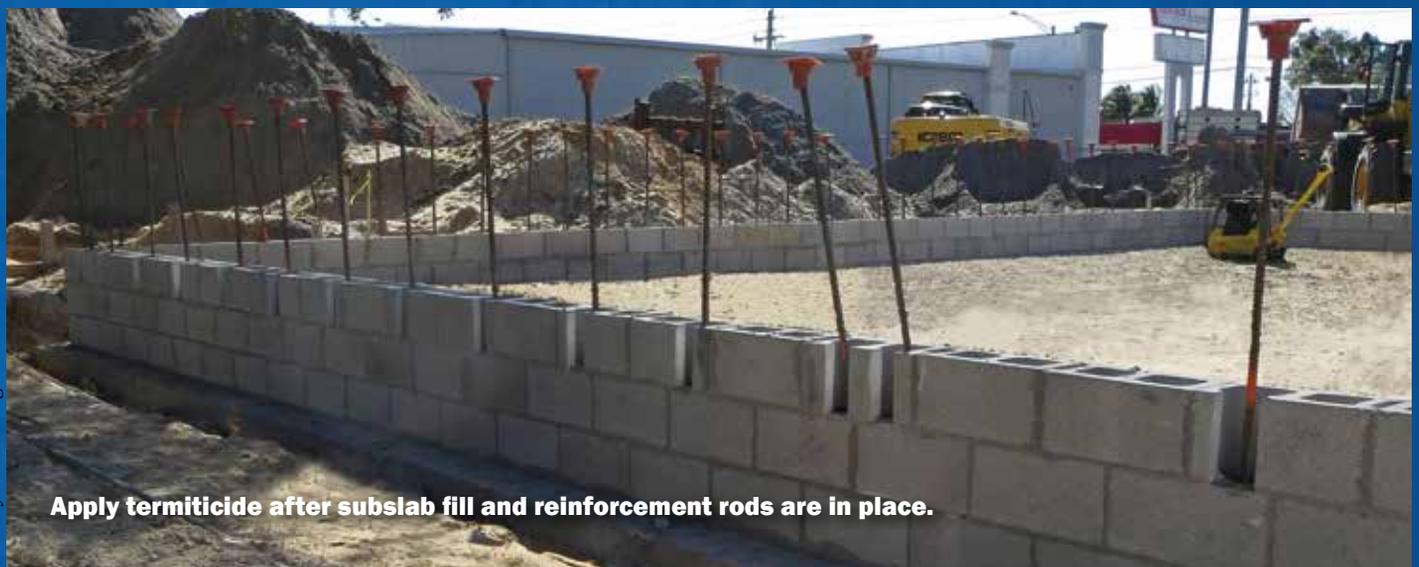
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**Preconstruction treatment**

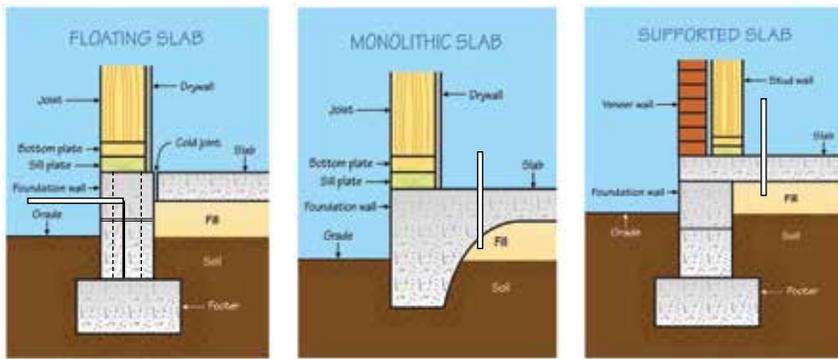


**Termite infestation of crawl space**



**Apply termiticide after subslab fill and reinforcement rods are in place.**

*Photo by Gerald Wegner*



**From left: Treatment of floating, monolithic and supported concrete slabs.**

## Concrete Slab Construction

It is possible to trench and treat around the outside of a slab after it has been poured, as described on the preceding page. Most homeowners do not have the right equipment or know how to treat under slabs after the slab foundation is completed, as shown at left. 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 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.

- 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.
- The second method skips the monitoring process and places baits before checking for an active colony.
- 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.

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## 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 below-ground bait stations around the foundation exterior as well as beneath the structure.

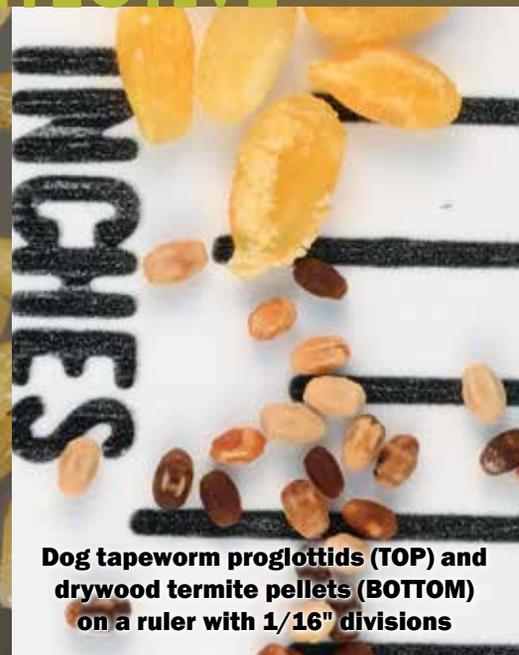
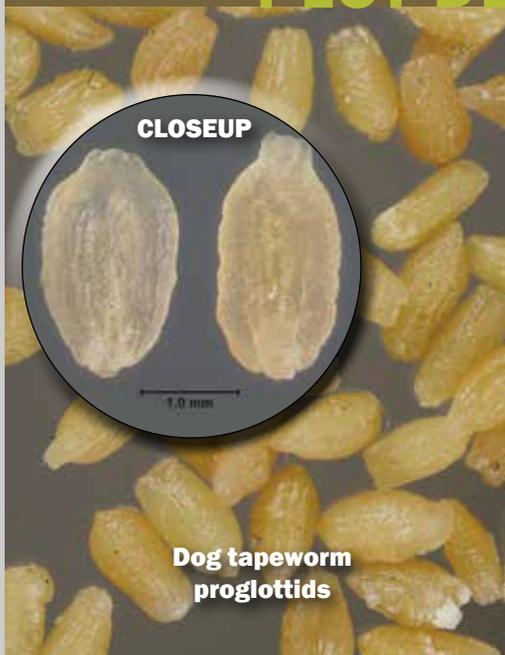
**Homeowners who do not want floors drilled and furniture, stored items, or carpeting moved** are good candidates for baits. Baiting requires fewer disruptions than does conventional barrier treatment. Installation and subsequent monitoring of bait stations generally does not even require the technician 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. **PP**



Photos by Lyle J. Buss

**Dog tapeworm proglottids**

**Dog tapeworm proglottids (TOP) and drywood termite pellets (BOTTOM) on a ruler with 1/16" divisions**

# Dog Tapeworms

Lyle J. Buss

**Y**EARS AGO I received a sample of some small, yellow pellets from a homeowner. I had never seen these things before, so I gave her a call. She was somewhat distressed because she kept finding small piles of these pellets, especially on her bed. She would clean them up but they would reappear the next day. Many of you pet owners probably recognize what took me a couple days to figure out: These are tapeworms! The homeowner had a cat, and it turned out that these objects were appearing in places where the cat slept. I'm sure this comes as no surprise to Dr. Koehler — the cats are the culprit for all kinds of problems!

This particular species is the dog tapeworm (scientific name *Dipylidium caninum*). It affects both dogs and cats, and has an interesting life cycle. The tapeworm lives in the small intestine of the pet and can be up to 8 inches long. Its body is comprised of many segments that mature starting from the terminal end of the worm. These mature segments, called proglottids, break off and are passed with the feces, or can crawl out of the pet's anus on their own. When proglottids end up in the bed of the pet, they can be fed upon by flea larvae. Tapeworm eggs eaten by the flea larvae hatch, and the tapeworms develop inside the flea larva as it grows into an adult flea. To complete the life cycle, the infected adult flea must be eaten by a vertebrate host, usually dogs, cats, or foxes.

It doesn't happen often, but it is possible for humans to get infected as well. Most of these cases involve children that hug their pets a lot and accidentally ingest a flea. The intermediate host (the flea) is a necessary step in the life cycle. Dogs, cats and people cannot get tapeworms directly from infected pets; ingesting an infected flea is necessary for transmission of the tapeworm to a vertebrate host.

By the time that tapeworm proglottids are found in homes, they are often dry and shrunken. Their color is white to yellow, and they are cylindrical to sesame seed shaped. They are around 1–3 mm long (a little more than 1/16 inch), so they are several times larger than drywood termite pellets.

Tapeworms aren't usually a serious health problem for dogs and cats, and treatment is simple and effective with drugs from a veterinarian. Flea control is also needed to prevent a reinfection after the tapeworm drugs have worn off. **PP**

*Lyle J. Buss, scientific photographer, manages the Insect Identification Lab at the UF/IFAS Department of Entomology and Nematology.*



# Kristen Stevens

## COMPOSES A

### *Buzzing Symphony*

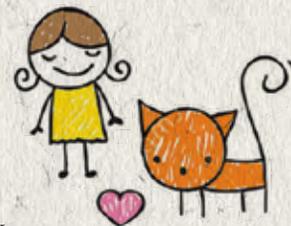
Before she discovered her interest in insects, and before she married a pest pro, this Florida girl found her refuge in music.

**K**RISTEN Donovan Stevens has played the violin for 14 years and has a passion not only for classical violin but also for singing. Kristen says music continues to be one of her favorite pastimes. “Playing the violin is my calm in the storm. When research, schoolwork or life has me down, besides coming home to my family, music always seems to brighten my day.”

#### *Prelude*

Along with music, young Kristen Donovan cultivated a love of animals. If you asked Kristen today what her favorite insect is, she would tell you the mosquito, but this fondness of insects was not always so. “Insects were my least favorite animal out there, especially roaches,” she said. “I can remember many a time that a roach crawled on me, and my mom thought I was dying because of all the screams!”

Growing up in Fort Lauderdale, Kristen spent her early years focused on school, music, sports — and animals. She was determined to attend a college that had a veterinary school. In fact, Kristen arrived at the University of Florida in 2011 thinking that she wanted to pursue a career in veterinary medicine. “For as long as I can remember, I wanted to be ‘Dr. Donovan’ and work with all the little puppies and kitties. I still have artwork from the first grade that I drew of myself as a vet,” said Kristen. However, that dream soon changed when she discovered that the prerequisite coursework at UF was not her cup of tea.



Contemplating a new direction, Kristen encountered an intriguing professor who spoke of the entomology major during freshman convocation at UF.

Without the assistance and direction of Dr. Rebecca Baldwin, Kristen might not have considered studying insects, never mind making a career of it. After taking an entomology course, Kristen soon found what her new “composition” of life was going to be.

In the words of the famous composer Dmitri Shostakovich, “A creative artist works on his next composition because he is not satisfied with his previous one.” That is exactly what Kristen set out to do. For the next three and a half years she pursued her undergraduate degree in entomology.

During her junior year, she began research in Dr. Susan Webb’s vegetable entomology lab. She found research to be exciting and learned a lot about rearing insects and the research process. Kristen seemed to have found her niche. She became active in the Entomology Club, serving as the events coordinator for two years. In this role she planned the entomology department’s open house in 2014 and 2015 and was actively involved in community outreach.

“**MUSIC** is a pastime, a relaxation from more



**Kristen conducts research with mosquitocidal chips that are treated with IGRs (closeup above).**



Kristen also served two semesters as a teaching assistant for Insect Classification and one semester as a teaching assistant for Bugs and People. “I cannot remember a dull moment during my undergraduate career,” Kristen said. “I loved being so involved with the department. It was a joy getting to share my knowledge of entomology with other people. Teaching was one of my favorite things I did as an undergrad.”

Kristen also served as a College of Agricultural and Life Sciences Ambassador, which provided many opportunities to share her buggy knowledge with the public. During this time, Kristen thought that she would eventually pursue work in the biosecurity field to help protect the United States from invasive insects. And yet, her composition was not finished.

### *Container-Breeding Crescendo*

In the summer before Kristen’s senior year, she applied for a University of Florida Institute of Food and Agricultural Science internship and found herself working in Dr. Phil Koehler’s urban entomology lab. It was here that she began her work with *Aedes aegypti* mosquitoes and mosquitocidal chips.

“If you had asked me coming into college if I would ever study insects I would have said no, and then if you asked me if I would ever study pest management I would have said ABSOLUTELY not,” Kristen said. “But you could say that the Urban Lab is where my love of mosquitoes and urban entomology all began.”

One of Kristen’s first tasks as an undergraduate researcher in Dr. Koehler’s lab was learning how to rear mosquitoes. “I did not fully understand the life cycle of the mosquito until I began rearing them,” she said.

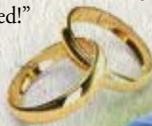
She soon found that an entomology rumor that there were chickens at the lab was true. Kristen had to feed her mosquitoes using these chickens. This was the most shocking thing about the mosquito rearing process. Kristen said, “I knew that mosquitoes had to be blood fed, but I never imagined using chickens to do it!”

Kristen dove right into her project with mosquitoes and mosquitocidal chips. This project sparked her interest in mosquitoes and their control. These chips were specifically designed to target *Aedes* mosquitoes, which carry infectious diseases and breed in any container — even as small as a bottle cap — that holds water. The concept behind the chips is that they can be placed in any container habitats to treat the containers over time.

The tiles are treated with an insect growth regulator that hinders regular metamorphosis, thus causing mosquitoes to die before reaching adulthood. “Most treatments where you treat the water, when the water is gone so is your treatment. The great thing about these chips is that they continue to be there. When the water is gone, if and when it comes back, the treatment remains,” said Kristen.

Kristen continued her research throughout her senior year, and that is when her composition took on a new sound. Dr. Koehler approached Kristen and asked her to stay on as a master’s student in his lab that summer, and continue her research on the chips.

“I was so excited to begin my work in Dr. Koehler’s lab as a graduate student,” Kristen said. But first, she had other plans. “I do not think that Dr. Koehler will ever let me live down that instead of starting my graduate work immediately in the summer, I decided to get married!”

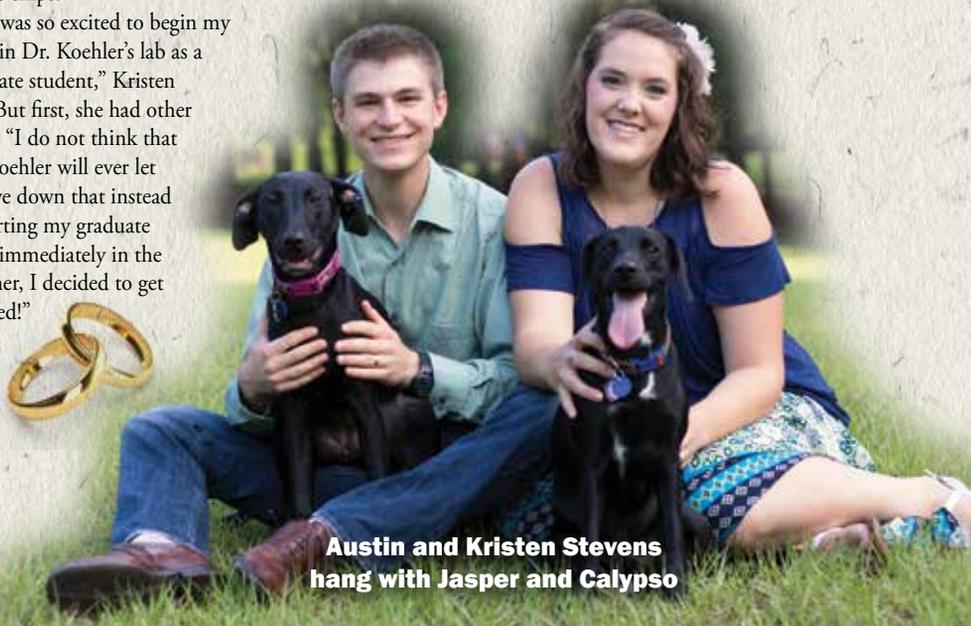


So not in summer, but in fall 2015 — *after* she became Mrs. Austin Stevens — Kristen began her master’s research in Dr. Koehler’s lab.

### *Master’s Movement*

Newly wed and prepared to start the next movement of her composition, Kristen was eager to continue her education. “I felt like I just walked right into my master’s — the transition was seamless,” she said. “I remained actively involved in our student organization and my days still revolved around mosquitoes, larval chips, and classes.”

As president of the Urban Entomology Society, she organized lab events and trips and oversaw the stocking and sales of club merchandise at various conferences. Being a master’s student has allowed her to teach in a classroom setting and deliver presentations on her mosquito studies. *Continued*



**Austin and Kristen Stevens hang with Jasper and Calypso**

*serious occupations” — Alexander Borodin, Russian composer, doctor and chemist*



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Above all, Kristen enjoys sharing her passion and love of insects with students who may not appreciate them at all — something that she has loved to do since she was an undergraduate.

She has also presented her research at local, state and national meetings. “Having the opportunity to teach or give a talk, whether it pertains to my research or insects in general, is something I do not take for granted. I love public speaking and entomology, so I will never turn down the opportunity to share my knowledge and experience with others,” she said.

One of Kristen’s favorite things about being a master’s student is the sharp focus of her coursework: “Taking classes that only entail things I enjoy learning about makes my graduate degree so much more enjoyable.”

One of her favorite memories from her program thus far is the time she spent at the UF/IFAS Florida Medical Entomology Lab, where she took an advanced mosquito identification course with Dr. Roxanne Connelly. Spending a week housed in a cabin with her best friend, cousin and a bunch of new students who quickly became friends was an experience Kristen

will always treasure. “I not only learned how to identify mosquitoes, but also made lasting relationships with the people who spent eight hours a day just looking at tiny mosquitoes with me. I think the friendships were the reason I didn’t go crazy looking at mosquito setae and scales for 40 hours a week!”

The more Kristen has been exposed to the pest control industry and all that it has to offer, the more excited she gets at the opportunity to work in the industry. “When people learn that I’m earning a degree in entomology, I often get inquisitive looks,” she said. “However, entomology always seems to be the talk of the table. My husband and I laugh because between my work as an entomologist and his work as a pest control technician we always end up in conversation about insects.”

*Grand Finale*

Kristen will graduate with her master’s in May 2017. People often ask what she plans to do with a degree in entomology, to which Kristen says, “A lot!”

With her desire to teach and to learn, she wants to be somewhere where she can do a little bit of both. “I love the pest control

industry. One thing I have learned from meeting professionals in this field is that it is full of opportunities. I am not one to turn down good opportunities, so when I get asked the question what exactly it is that I want to do, I say that I am open to see what offers present themselves. In the words of the famous composer Karlheinz Stockhausen, ‘I am an adventurer, I like invention, I like discovery.’ That fits my description of an ideal career, but currently I am just waiting for the next open door!”

Although graduation will be approaching quickly, for now Kristen is enjoying the remaining time as a Gator graduate student by going to football games, hanging with her pups Jasper and Calypso and most of all being involved in the Gator Orchestra and her church music team.

Kristen says the one thing she will miss the most is the energy and the good times that happen in the lab. “Whenever I graduate, that’s what I will miss the most: being around my urban lab family. It’s never a dull day in our lab, and the friendships are priceless. But I know that in this industry we will all see each other again. My life’s masterpiece doesn’t end here — it is just beginning!” **PP**



**Commodities in shipping containers are easily fumigated on site.**

# Commodity Fumigation

John Cooksey

**S**TRUCTURAL FUMIGATION is a division of the pest management business that is avoided by most pest control operators. From having to deal with tarps to the liability of injuring both customers and employees, maintaining specialized equipment, and the aspect of government reporting — all can be influences that keep most PMPs out of the structural fumigation business. Like many things in life, if you don't specialize in it and perform jobs on a regular basis, it can be difficult to keep a level of proficiency that keeps you competitive in the market. Many PMPs who want to offer structural fumigation services for drywood termites, beetles or bedbugs choose to subcontract to a structural fumigation specialist.

There is more to the fumigation business than structural fumigation, though. Commodity fumigation is a type of fumigation that involves the fumigation of post-harvest, raw agricultural products and most of the time does not involve structures. The two biggest economic influences to the Florida economy are agriculture and tourism. In 2014, the total value of agricultural commodities produced in Florida was \$8.45 billion. In that same year, Florida ranked eighth of all the states in agricultural exports at \$4.1 billion, exporting commodities to 159 different countries ([www.freshfromflorida.com](http://www.freshfromflorida.com)).

We must also not forget that Florida imports a great deal of commodities, not only for the use of Floridians, but for the use in all areas of the United States. Our ports are one of the greatest assets this state has, and we have a bunch of them. Florida has large-scale ports like Jacksonville, Canaveral, Ft. Lauderdale, Miami, Tampa, and other smaller ones like Fernandina and Manatee. Most of them specialize in imports from and exports to certain countries, and deal in specific commodities.

As Floridians in the business of pest management, we are all familiar with the impact of imported and invasive pest species. For this reason, most countries are concerned about getting unwelcome guests with the commodities they import. The bottom line is we don't want to import or export pests in our agricultural products. Just counting the exported commodities, there is \$4.1 billion in stuff that could need fumigation. This makes commodity fumigation a viable and needed business.

In Florida, commodity fumigation can be performed with a structural fumigation license that falls under Chapter 482 of the Florida statutes. It can also be performed under a commodity fumigation license, which is also regulated by FDACS, but under chapter 487 of the Florida statutes (see box below).

## **(f) Category 1E – Raw Agricultural Commodity Fumigation.**

**This category is applicable to individuals using or supervising the use of any restricted use fumigant pesticide injected or otherwise applied to any post-harvest raw agricultural commodity within any storage facility, during processing or manufacturing procedures, or applied to or within a storage facility prior to the facility receiving a raw agricultural commodity for storage or after a raw agricultural commodity has been removed from such a facility. Storage facilities include but are not limited to corn cribs, grain elevators, tobacco barns, produce trailers, farm vehicles used to store agricultural commodities, processing plant bins or storage rooms for raw commodities, and any other enclosed structure used to contain a harvested raw agricultural commodity. This category is valid for licensure of public and commercial applicators.**



**Pine logs are commonly fumigated under tarps.**

## **FUMIGATION FUNDAMENTALS**

There are simple commodity fumigations and there are ones that can be just as complicated as, if not more complicated than a structural fumigation. These commodity fumigation jobs can be broken down in two ways: a) how they are contained, and b) what product can be used on them.

Commodities can be contained in several different ways. Generally speaking, imported and exported commodities come into and go out of Florida in shipping containers. These containers are normally 20 feet long or 40 feet long. Once the product arrives at the port, it is off-loaded and gets fumigated on site or at a location selected by the shipper or owner. This is the easiest way to fumigate commodities because the product is already contained in an easily sealable space that can easily contain the fumigant.

Some commodities are shipped in bulk and are fumigated under tarps, similar to a structural fumigation. Pine logs are one of the most common commodities fumigated this way. When China's economy was booming, they had such a need for pine logs that they used up most of what they had available in their own country. They were going into Russia to cut their timber, and it got to the point where it was cheaper for them to ship whole pine logs from Florida and Georgia than it was to haul them from Russia. China was very concerned about a nematode that we have in our timber, so much so that they required methyl bromide fumigation before they would take our logs. Some of these logs were cut to fit in containers, but sometimes, entire stacks of logs would be fumigated by tarping them.

The other critical factor in commodity fumigation is the product that is used as the fumigant. There are three commonly used products: phosphine, methyl bromide and sulfury fluoride. Phosphine gas is commonly

*Continued on Page 26*



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## Congratulations, **Ben Hottel!**



DR. BEN HOTTEL, a 2015 graduate of Dr. Phil Koehler's lab at the University of Florida, recently joined the Center of Biological Control at Florida A&M University as an assistant professor in urban entomology.

Ben will be involved in enhancing the urban entomology program at Florida A&M and organizing

the annual FAMU Field Day and Workshops for pest control professionals. This year, the conference will be held November 2 – 4 at the Civic Center in Tallahassee. The conference will include lectures and hands-on workshops on topics such as bed bugs, public health issues, mosquitoes, and new identification methods for termites. **PP**



**Tim Hulett of  
Hulett Environmental  
Services**

### **GATOR GRAD TIM HULETT IN THE NEWS**

## Former Koehler Student Expands His Business

NAPLES, FLORIDA — Hulett Environmental Services announced in June its acquisition of Collier Pest Control located in Naples, Florida. Headquartered in West Palm Beach, Hulett has been a leader in providing family-, pet- and planet-friendly pest control services for over 45 years. Its customized Healthy Home Services set a standard of excellence for the industry.

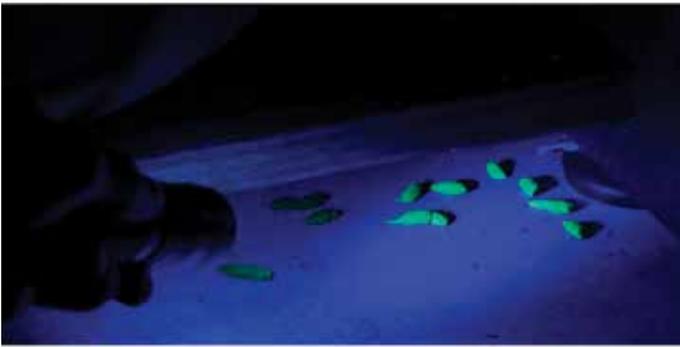
The acquisition of Collier Pest Control will help to serve Hulett's longtime dedication to providing top pest control services in South Florida. Collier Pest Control was owned and operated with a sense of excellence and professionalism by Phil Hadley since its opening in 1990. The successful 20-employee pest control company is also family-owned and operated.

"I'm happy to see my family-founded business carried on by another family company," said Hadley. "We have always relied on our excellent customer service to build our business, and the Hulett Environmental Services family and team share our values and dedication to customers. I was also pleased with their close involvement in the process and their true understanding of the real value of our business and being more than fair when we all sat down from the beginning."

"We are pleased to bring Collier Pest Control into the Hulett family," said President and CEO Tim Hulett. "We are fortunate to have another family-built company aboard as we continue to grow." **PP**

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## Fostering Accountability: The Path to Growth, Part II

HARVEY F. GOLDGLANTZ

**P**ART I of this column on fostering accountability appeared in the March/April *Executive Suite*. Nurturing an atmosphere of accountability requires managers or owners to take specific actions. Employees need to clearly understand their role in the company and what they are responsible for accomplishing. Managers need to define and reinforce expectations and ensure their employees are empowered to do what is expected. In the March/April issue of *PestPro*, we looked at how to implement accountability in your company, the importance of providing direction and feedback, and creating a culture of accountability.

### Rewarding Accountability

Rewarding accountability is relatively simple, yet many times ignored by management. First acknowledge, and thank employees for their accomplishments. Next, show your appreciation in a concrete manner through bonuses, raises or other means of tangible recognition. Finally, celebrate with your employee(s) by organizing company functions.

### Avoiding the Blame Game — The Poison Pill of Accountability

Managers that focus on blame destroy initiative, teach employees to avoid, turn function into dysfunction, and disengage staff for the purpose of self-preservation. Blame reveals a broken leadership culture that has degraded into self-preservation instead of ascending to inspiration and productivity. It wastes opportunities for employee engagement and accountability as everyone stays trapped in a constant sense of vague fear.

### Hire the Right People

Accountability begins with hiring the right employees. In order to accomplish this, it requires implementation of a comprehensive hiring process. Most small

companies, in their rush to fill a position, skip one or more of the following steps in this process. First, write a classified ad detailing the job requirements and expectations. Second, thoroughly examine the candidates' employment applications and résumés, looking for inconsistencies or gaps. Third, once the interview is scheduled, present the candidate with a comprehensive job description, outlining responsibilities and expectations. Fourth, conduct an in-depth interview with questions that are prepared prior to the interview. Fifth, have the prospective employee complete a personality profile (there are many companies that specialize in providing this service at a nominal fee). Sixth, request and verify as many references as possible. Seventh, run the following reports: a criminal background check and driving record report. Finally, request a drug screening test if the position warrants the test.

### Conclusion

Accountability rests at the heart of success of any project — or any company for that

matter. It means letting actions rise above excuses. Performance is the result of commitment. If your company is to grow and prosper, accountability must be the cornerstone upon which it is built.

One final thought for owners and managers: If your employees are to be accountable, it is up to you to set the bar. Your vision must be clear, your systems must be in place, your goals and objectives must be set, and you must communicate clearly.

If you have any questions regarding this column, or would like more information about setting up business or marketing systems that will help you grow profitably into the future, please give me a call at (215) 906-9988. **PP**

*Harvey F. Goldglantz is President of Pest Control Marketing Company, Inc., a consulting firm to the pest management industry located in Elkins Park, Pennsylvania. His clients range in size from start-up companies to those with revenues in excess of \$30 million. Goldglantz has been in the pest control industry for more than 40 years. He served three terms on the National Pest Management Association Board of Directors.*

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**Doveweed**



**Chamberbitter**



**Florida pusley**

DEALING with weeds in the landscape, whether in turf or in beds, can really be a drain on time and labor. It doesn't matter if you are a landscape maintenance company or a lawn pest control business — you have to deal with these unwanted plants. This article will help you identify some of those stubborn summer weeds you might deal with and provide some possible control options.

**D**OVEWEED, *Murdannia nudiflora* This difficult-to-control summer annual weed typically prefers wet areas and can be found in soils that may not drain well or turf that receives overirrigation. You may not notice this little flowering plant until it is too late, because it looks similar to turfgrass and can be hard to notice in St. Augustine or centipede lawns. The leaf blade is shiny and the plant is very herbaceous (not woody). It has creeping stolons and roots at the nodes, which allow it to easily spread.

It germinates when soil temperatures reach 65° to 70°, which is typically a little later than crabgrass or goosegrass. Applications of pre-emergence herbicides that were applied in February or March are starting to wear off when doveweed is just getting started. If you have a site where doveweed is a problem, you should consider a second application of pre-emergence herbicide in the spring.

# Tackling Stubborn Weeds

Erin Harlow

Doveweed seeds can stay viable in the soil for several years, so it is important to plan your doveweed control for multiple years. Early treatments when the seeds are just germinating or in an early stage is the best time to treat. Rotating products each year will also help reduce possible resistance. Cultural practices such as mowing are also important to controlling this plant. Check the mowing height and frequency if you just can't seem to get this plant under control. If the turf is mowed too short the doveweed will take advantage of the extra sunlight, and the horizontal growth of the plant will begin to out-compete your turfgrass.

**Chamberbitter, *Phyllanthus urinaria***

You will find this summer annual growing in both the turf and landscape beds. Its leaves include lots of little leaves called leaflets that are arranged alternately on the main stem of the leaf. Chamberbitter has tiny, round seeds that grow on the underside of the leaves. They are attached directly to the leaf's rachis (the part that looks like a stem where the leaflets are attached). A close cousin, long-stalked phyllanthus, looks similar but has seeds that are attached by short stalks to the rachis. Chamberbitter germinates around the same time as doveweed and has a long taproot.

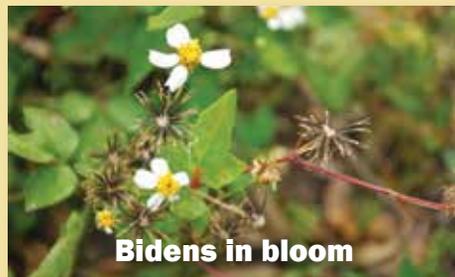
**Florida Pusley, *Richardia scabra***

This plant is normally considered a summer annual, but in some parts of the state it may be found year-round or found with its perennial relatives, largeflower pusley or Brazil pusley. Florida pusley is a spreading annual with hairy stems and leaves. It is normally found in poor soils and if found in large numbers may indicate nematode activity. It has a six-petal, white flower that grows at the tip. It reproduces by seed and has a fairly large taproot. It does well in drought-stress areas. It has to be controlled with pre-emergence herbicide or when the plant is very young and not under drought stress.

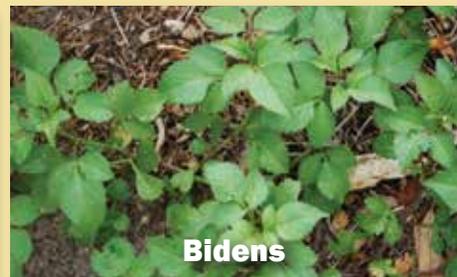
**Bidens, *Bidens alba***

You may know this plant as Spanish needle, common beggars-tick, or bidens, but even though you may call it something different, everyone can agree that it can be a prolific weed in landscape beds. This plant can be identified by its opposite leaves that have toothed margins and white-and-yellow daisylike flowers. The seeds can stick to people and animals passing by because they have two projections covered in hairs that face backward. Bidens can be annual or perennial in different parts of the state.

*Continued next page*



**Bidens in bloom**



**Bidens**

## Pre-emergence control

### Atrazine/simazine

(doveweed, chamberbitter)

- Apply during late spring right before germination.
- Will damage bermudagrass and bahiagrass.
- Maximum rate of 1 lb of ai/ac
- No more than 2 lbs ai/ac per year
- Can move into groundwater.
- Simazine provides a fairly quick kill.

### Dimethenamid-P

(doveweed, chamberbitter)

- Two applications at 0.98 lb ai/ac at a five- to six-week interval for control
- I.e., Tower

### S-metholachlor

(doveweed, chamberbitter)

- Not labeled for St. Augustinegrass, except sod farms.
- No more than two applications of 2.5 lb ai/ac per year
- I.e., Pennant, Magnum

### Isoxaben

(chamberbitter, Florida pusley)

- Can be used in turf and beds.
- I.e., Gallery75 Dry Flowable
- Available in two-way products or can be mixed to target grassy weeds: isoxaben + trifluralin (Snapshot TG — for beds), prodiamine (Barricade) + isoxaben (Gallery).
- Also may control spurges and pigweed.

## Post-emergence control

### 2,4-D and dicamba

(doveweed, chamberbitter, Florida pusley)

- Fair control with other herbicides
- St. Augustinegrass is susceptible to damage.
- No more than 0.5 lb ai/ac of 2,4-D or 0.11 ai/ac of dicamba per application
- Can be found in three- and four-way products with (mecoprop-p and carfentrazone) (i.e., Quicksilver) or mecoprop-p and sulfentrazone (i.e., Surge) for enhanced control. Surge is not labeled for St. Augustinegrass and has a supplemental label for control of doveweed.
- Also may control pigweed.

### Thiencarbazon and iodosulfuron (doveweed, chamberbitter)

- No more than 0.43 oz ai/ac of thiencarbazon and 0.01 oz ai/ac of iodosulfuron per application
- Slow kill, and may take two to three weeks for injury to appear
- Can be used in a program with 2,4-D and dicamba for better control.
- I.e., Celsius, Tribute Total

### Metsulfuron-Methyl (doveweed, chamberbitter)

- Combine with dicamba for control on bermudagrass and zoysiagrass.
- MSM can stunt St. Augustinegrass and centipedegrass for a couple of weeks.
- Use caution around trees, especially oaks, to minimize potential damage.
- I.e., Manor

### Glyphosate (doveweed, chamberbitter, Florida pusley, bidens)

- Can be used if there is a small area.
- Nonselective herbicide, so it will kill the grass as well; spot spray.
- 2% solution for bidens
- I.e., Roundup
- Mix with flumioxazin (SureGuard) for some PRE control in treated areas, also on hardscapes without staining

### Glufosinate (bidens)

- 3 to 4 oz per gallon + nonionic surfactant
- Spot spray
- I.e., Finale

## Stubborn Weeds, continued

While it is too late this year to do a pre-emergence herbicide application for these summer annual weeds, you should start planning your herbicide program for next year. Consider which weeds are the worst, then choose your products based on these. Remember that even with pre-emergence herbicides, some work better on grassy weeds and some on broadleaf weeds.

Many companies choose not to use pre-emergence herbicides due to the cost, but you have to consider how much is it costing you in labor to have crews hand-pull or constantly use post-emergence herbicides in beds. In turf, if you don't use pre-emergence herbicides then you are setting yourself up for callbacks and complaints. These weeds are difficult to control. Some can be controlled with post-emergence herbicides, but at the expense of adding stress to the turf. Some grassy weeds have no post-emergence control, especially in St. Augustinegrass.

If you are doing applications in beds, consider the form of irrigation as well. If you have low-volume drip irrigation, then the granular herbicide may not become activated until it receives adequate rainfall. These are just a few important considerations to remember when creating your herbicide program.

The mention of brand-name products in this article does not mean that we recommend one product over another with the same active ingredient. They are simply being used as examples. Please check with your distributors and sales representatives for products with these active ingredients that will fit into your program. Make sure to always read and follow label directions. **PP**

*Erin Harlow is a Commercial Horticulture Agent, UF/IFAS Extension – Duval County.*

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# South Florida Update Not Another Whitefly?

Catharine Mannion and Muhammed Z. Ahmed



It has been reported in Mexico and the United States (California, Florida, Hawaii, Louisiana and Texas). It is also found in some countries in Africa (Mozambique, Nigeria and Reunion) and Oceania (Fiji, French Polynesia, Guam and Micronesia). In Asia, it was reported in India in 2014. North America, Africa and Asia might be where it has invaded. In Florida, it has been reported in more than 15 counties from south to north Florida, with approximately half the reports coming from Miami-Dade County.

Adults of *Aleurotrachelus trachoides* are small, white insects typical of most whiteflies (Figure 1). It is similar to some of the spiraling whiteflies like *Aleurodicus dispersus*, *A. rugioeperculatus* (rugose spiraling whitefly), *A.*

*destructor* (coconut whitefly), and *A. dugesii* (giant whitefly), because all these whiteflies excrete large amounts of honeydew and white, waxy flocculent.

This group of spiraling whiteflies also lays their eggs in a spiral or circular pattern, which *A. trachoides* does not (Figure 2). Also, the bodies of the immature stages of *A. trachoides* found on the underside of leaves are dark, unlike many other whiteflies (Figure 3). These whiteflies can cause damage by feeding on plants but can also become a tremendous nuisance due to the excessive honeydew they excrete, which promotes the growth of sooty mold (Figure 4).

IT SEEMS that Florida has been particularly plagued with new whiteflies over the past several years. First there was the ficus whitefly, *Singhiella simplex*, which continues to defoliate many of our ficus hedges and trees. Next there was the rugose spiraling whitefly, *Aleurodicus rugioeperculatus*, which created an enormous mess with the excretion of honeydew and waxy material. Fortunately, this whitefly is much less of a problem due to a small wasp parasitoid that attacks and kills it. Then there was Bondar's nesting whitefly, *Paraleyrodes bondari*, which is a periodic pest.

Most recently, there have been several reports of the insecticide-resistant sweet potato whitefly, *Bemisia tabaci*, in the landscape.

There are two major cryptic species previously known as biotypes of *Bemisia tabaci*. They are morphologically identical, except one has been in Florida for more than 30 years — MEAM1 species, also known as B Biotype. The other one is a newer problem because it is more resistant to conventional pesticide controls — MED species, also known as Q Biotype.

## Sadly, Yes — Another Whitefly

In addition to these whitefly issues, another whitefly appears to be on the rise. It is *Aleurotrachelus trachoides*, commonly called solanum or pepper whitefly. This whitefly was considered an intermittent pest of pepper and other horticultural crops and has been in the United States for more than 50 years. It has a wide distribution in Central and South America that might be assumed its home range.

OVER THE PAST few years, there have been multiple reports of this whitefly attacking various ornamental plants, causing significant damage in private residences and nurseries. It appears to prefer plants from the Solanaceae and Convolvulaceae families. Feeding by this whitefly causes plant decline, stunted growth, and loss of leaves and can potentially kill the plant. The life cycle is approximately one month, so whitefly populations can build quickly. Under high infestations the white, waxy flocculent can be excessive (Figure 5).

Investigations are ongoing to determine why this whitefly, which was considered an intermittent pest, appears to be attacking more plants and causing more damage. Genetic analysis of various populations of this whitefly collected from different counties in Florida suggests that there may be two genetically different populations of this whitefly. Of these, one population has been established in north Florida for several years and appears to be a minor pest.

The more recent substantial damage, unlike what has been seen in north Florida, has been observed in south and central Florida and may be associated with a distinctly different population of whitefly. This population could be a more recent invader. Due to the difficulty in separating some of these species of whiteflies, this whitefly could be genetically distinct from the original invader or even a different species. We suspect that this newly emerging problem is linked to the Caribbean, where substantial infestations have been reported recently. **PP**



used in container fumigations. It is relatively easy to use because of the way it is delivered. Phosphine is sold as aluminum phosphide or magnesium phosphide. When these products are placed in the container with the commodity to be fumigated, they react with the water vapor in the air and go from a solid state directly to a gas state, giving off phosphine gas as a byproduct of the reaction. Over time, this gas concentration builds up and kills the targeted insects or other pests. Phosphine can be monitored by the use of Draeger tubes, which are also easy to use and relatively inexpensive.

One of the drawbacks to the use of phosphine is that it takes some time for it to work. It can take several days depending upon the temperature at the time of fumigation.

Methyl bromide is a fumigant that has been used on commodities for a very long time. Recently, it has been restricted to strictly import and export uses under critical exemptions because of its side effect of depleting ozone molecules in the atmosphere. It works phenomenally well and has very low holding times. Methyl bromide is released from a holding cylinder through a tube into the area to be fumigated. It is a liquid

in the cylinder and, when exposed to the atmosphere, becomes a gas. Most of the time a heating element is required to help the product transition from a liquid to a gas as quickly as possible. Methyl bromide requires special monitoring devices to measure gas levels and to clear fumigations. Since this product is highly regulated it has many special record keeping and regulatory requirements.

Sulfuryl fluoride has been used extensively for years in the treatment of wood-destroying organisms under the trade name Vikane and others. More recently, it been approved for the fumigation of certain commodities under the trade name Profume. Like methyl bromide, sulfuryl fluoride is released from a holding cylinder where it transitions from a liquid to a gas through a delivery tube. It is a very effective product and, depending on the concentration used, can have low holding times. It is being used more and more because of the restrictions on methyl bromide. Both methyl bromide and sulfuryl fluoride require special training from the manufacturer before you can purchase or use the product. As with most of the chemicals we use, each of these products has special label requirements for PPE, locations they can be applied, rates of use, and pests that they can be used for. Care must be taken to follow the label and stay safe.

It's important to keep in mind that many countries have specific regulations and rules about how imported items must be fumigated. These regulations apply to not only what product is used, but how much and how long the product is held during the fumigation process. Many of these countries require certificates of fumigation that are signed off on by the USDA. This means a USDA official must be on site to see that the fumigation is done properly. This can require a great deal of coordination and cooperation between the PMP and the USDA. This can be cumbersome, but once relationships are established it gets easier.

Commodity fumigation is a growing service in Florida. This article is meant to be an overview of commodity fumigation. Although it can be less complicated than structural fumigation, it is still fumigation! It requires special training and practice so the PMP can become proficient and safe. One of the best ways to get the proper training is to attend the Annual School of Structural Fumigation at the University of Florida Ft. Lauderdale Research Station. Although it is geared toward structural fumigation, it contains a section on commodity fumigation and is, hands down, the best training you can get.

Commodity fumigation can be a good addition to your business if you're willing to take the time to become properly trained. Happy fuming! **PP**

*John Cooksey is an Entomologist and Chief Operating Officer of McCall Service, Inc.*

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# Illegal Operators

ONE OF THE ISSUES that the Department deals with on a regular basis is illegal pest control. Chapter 482.165(1) states that it is unlawful for a person, partnership, firm, corporation, or other business entity not licensed by the Department to practice pest control.

This is one of the issues that can make it difficult for the pest control industry to compete in the marketplace. If a business does not have to pay for licensure, insurance, worker compensation, vehicles and other pest control business costs, that gives the illegal business an unfair advantage. These companies or individuals may not have the proper training to apply pesticides safely and according to the labels, which can be unsafe to the public and/or the environment. These companies need to 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.

Consumers are allowed and encouraged to check for proper licensing from persons performing pest control services on their property. Employees of licensed pest control companies are required by regulations to carry on their person an employee identification card issued by the Department while performing pest control services. Commercial landscape applicators will carry on their person a limited commercial landscape certificate, too. Suspected illegal pest control activity should be reported. The Department has a website where anyone can report an illegal operator. Pictures can also be uploaded to the report. See this web page for more information: <http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Environmental-Services/Business-Services/Pest-Control/Report-an-Illegal-Pest-Control-Operator>.

Upon completing the appropriate portions of the form FDACS-13687, you will be prompted to submit the form by mail. Other instructions guide you through the process so you can add further information to the body of the email and/or attach photographs or scanned images of service tickets/invoices to send directly to the Department. **PP**

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



Florida Department of Agriculture and Consumer Services  
Division of Agricultural Environmental Services

**ILLEGAL/UNLICENSED PEST CONTROL OPERATIONS REPORT FORM**

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COMMISSIONER

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**NOTE** - Florida has a very broad public records law. Most written communications to or from state officials regarding state business are public records available to the public and media upon request. This communication may therefore be subject to public disclosure. **DO NOT SUBMIT THIS FORM** if you wish your personal information, including email address, to remain confidential.

I would like to submit the following observations (which might include evidence such as photos, contracts, receipts, etc.) of what would appear to be unlicensed/illegal pest control operations to the Department.

**OBSERVATIONS:** \_\_\_\_\_ **DATE:** \_\_\_\_\_ **TIME:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**LOCATION WHERE ACTIVITY OBSERVED:** (if any) **COUNTY:** \_\_\_\_\_

\_\_\_\_\_

Street Address or P.O. Box

\_\_\_\_\_

City State Zip Code

**VEHICLE INVOLVED** (if any) **TAG:** \_\_\_\_\_ (If not FL, indicate STATE \_\_\_\_)

Indicate if vehicle displayed any markings/company name (if any):

\_\_\_\_\_

Indicate location where vehicle is parked/garaged (if known):

\_\_\_\_\_

Make: \_\_\_\_\_ Model: \_\_\_\_\_ Color: \_\_\_\_\_ Year: \_\_\_\_\_

**SUSPECTED CUSTOMERS** (if any)

\_\_\_\_\_

Name of individual(s) Contact telephone number

\_\_\_\_\_

Name of Company (if any)

\_\_\_\_\_

Street Address City State Zip Code

**YOUR CONTACT INFORMATION** (not required)

\_\_\_\_\_

Name Phone number

FDACS-13687 Rev. 07/14

**Form used for reporting illegal pest management services**



Hi Phil, Roberto, Liz,

Smokybrown cockroaches just arrived now! Their condition is pretty good! In this photo, my graduate student Sota is showing the case with big smile! Thank you very much!!

*Koichi*

Koichi Hasegawa, PhD  
Associate Professor  
Department of Environmental Biology  
College of Bioscience & Biotechnology  
Chubu University  
Aichi Japan

## SIX-LEGGED AMBASSADORS

# Smoky Brown Cockroaches

Research worldwide benefits from the University of Florida Urban Entomology Lab. A research lab in Japan was the happy recipient of a new batch of smoky brown cockroaches from UF. A scientist there stated the UF cockroaches were “very useful for our nematode/cockroach project because it has been cultured in your laboratory for a long time, and its genome and parasite structure are homogenized.”



**Smoky Brown Cockroach**  
*Periplaneta fuliginosa*

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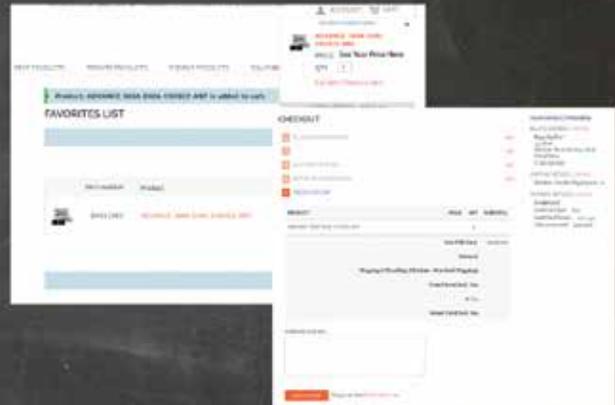
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