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Occasional Invaders

Brown Dog Tick In the Home



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PESTPRO

magazine is a publication of
Pest Management Education, Inc.,
and is the official magazine of the
Florida Pest Management Association



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PESTPRO (ISSN 1553-4693) is published Jan.–Feb.,
March–April, May–June, July–Aug., Sept.–Oct., and
Nov.–Dec. by:

Pest Management Education, Inc.
5814 Nob Hill Blvd.
Port Orange, Florida 32127
Phone (352) 392-2326

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Inc., a nonprofit corporation working to help UF
Urban Entomology. Technical information provided
by the University of Florida and other sources.

POSTMASTER: Send address changes to:

Pest Management Education, Inc.
5814 Nob Hill Blvd.
Port Orange, FL 32127

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ON THE COVER

Rhipicephalus sanguineus is a significant vector of dog diseases as these ticks move from dog to dog. Enlist homeowners and veterinarians and you can help prevent brown dog tick infestations. Catch them early and the ticks won't have a chance.

Tick photo by Saionara DaCosta

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FPMA is Here for You

Message from the President of FPMA

Suzanne Graham

SINCE MY previous column, life as we knew it has changed.

First, I would like to update you on what Florida Pest Management Association has been doing to help you navigate through the changes and, secondly, to give you some insight into what the leadership of the Association is doing to position it to thrive in the challenging times ahead.

FPMA UPDATES

As the state went into lockdown, FPMA quickly swung into action and offered seven online CEU classes: two CORE classes of two CEUs, two GHP classes of two CEUs, two WDO classes of two CEUs, and one L&O class of two CEUs.

As the days unfolded, orders were issued to extend the deadlines for Certificate and License renewal, and members received emails alerting them to the changes.

In addition to giving our members the ability to tap into fellow-member webinars, FPMA did three business webinars covering disinfecting, changes in operations, and the Paycheck Protection Program, or PPP. We also did two marketing webinars.

FPMA also showed its commitment to our approved charity, P.E.S.T. Relief International, by donating \$500 to that organization to help fund the making of masks to be distributed to those in need.

Unfortunately, we did have to cancel our FPMA in Paradise Summer Conference. I, like many of you, look forward to this conference every year, and it is sad to think that in our 75th year, this conference could not take place. I am however, pleased to say that we have rescheduled the conference at the Tradewinds for June 14–16, 2021. Since considerable work has already been done in terms of concept and the schedule, we can now focus on content that will address the new priorities caused by the necessity to adapt to a “new normal.”

LASTLY, I AM PROUD TO SAY that Commissioner Nikki Fried sent us a video in which she thanked the pest management industry and specifically thanked “the members of the Florida Pest Management Association for their hard work.”

FPMA PLANS AS FLORIDA REOPENS

On Wednesday, June 3, Gov. Ron DeSantis announced Phase 2 of his “Safe. Smart. Step-by-Step” plan to reopen Florida.

According to DeSantis’ reopening plan, Phase 3 will begin after the successful conclusion of Phase 2, which includes a downward trajectory of the syndromic and epidemiology criteria while maintaining adequate health care capacity. This will occur when there is no evidence of a rebound or resurgence of COVID-19 cases and satisfies the benchmarks outlined in the plan.

As such, we are carefully approaching our regularly scheduled Regional meetings. See the website for those meetings that are currently scheduled.

Looking ahead, we are in the planning phase for our Strategic Planning meeting, which will be held on July 22–23. This has been several years in the making, and we see it as a fantastic opportunity to make some profound changes on the way the Association operates, how it engages its members, and how it advocates for the industry.

To fortify our advocacy clout, the FPMA Board of Directors approved the commissioning of an economic impact study. We are in the negotiation phase of this project, and we hope to finalize that negotiation in the next 30–60 days.

Part of that study will involve a survey. We encourage all pest control companies, both members and nonmembers, to participate because it is a study of the industry, not just members of FPMA. The more participants, the better the results, and the louder and more convincing our industry’s voice will be in Tallahassee.

As always, FPMA is here advocating for you. We are listening. Stay well. **PP**

Suzanne Graham
President, FPMA

Visit flpma.org for currently scheduled meetings and more.

Urban Entomology

At the University of Florida

LATELY, times have been crazy. The United States and the world are hurting because of COVID-19. Every pest control business has been affected one way or another. Your customers have been affected.

Even the University of Florida has been affected. In mid-March the University sent all of their more than 50,000 students home to spend the shutdown with their families. That included all the students who work in our laboratory. Research was shut down. That meant that all research projects were put on hold until research was allowed to be conducted again.

The shutdown also required that all classes be held online. So students continued learning at home — taking tests, writing, and submitting reports on their computers.

We were allowed to continue maintenance of our household pest colonies. Roberto and his wife, Liz, came in every day to feed and water the ants, cockroaches, flies, crickets, bed bugs, and other pests that we grow in our labs. Maintenance of colonies was considered an essential research activity, so it was allowed. We have not lost any of our precious pest colonies to the virus or lack of care!

AS YOU MAY HAVE HEARD, I will have retired on June 30 from the University of Florida. I hope it will be a “nonretirement,” so I can continue to work and help the urban pest management industry.

I have been at the University for a great 45 years. I started in 1975 and was given the Extension responsibilities for livestock and poultry in Florida. They also added on urban pest management, which is what I really wanted to do.

In 1982, I had the opportunity to become a visiting professor at the USDA in Gainesville with Dr. Richard Patterson. Together, we built the Household Pest Control Research Program to be one of the best in the world, and we were awarded several of the highest honors for research in the Federal government.



Dr. Roberto Pereira and Dr. Phil Koehler

In 1995, Dr. Patterson retired from the USDA, and I moved into the Urban Entomology Laboratory Building at the University of Florida. Industry paid to have the building constructed, and that is where I have worked for the past 25 years.

In 1999, I had the honor of being named the Margie and Dempsey Sapp Endowed Professor of Structural Pest Control and also the FPMA Endowed Professor of Urban Entomology.

I used the funds from those endowments to fund students and researchers in our laboratory. Our laboratory has produced a lot of highly talented students who have gone on to be leaders in academia, government and the pest control industry. We have graduated around 100 graduate students who earned their masters and Ph.D. degrees in our program. Most of those graduates were supported by either the Sapp or FPMA endowments. Without the foresight of Margie and Dempsey Sapp and FPMA, these leaders would most probably have chosen some other field for their careers.

BECAUSE of all the COVID-19 disruption of normal activities, the University of Florida and every other university in the country is in serious financial difficulty. As a result, filling my vacant position with another professor has been “paused” until the university’s financial crisis passes.

That means my position will not be filled for approximately two years at best. To keep the urban pest management program going, Dr. Roberto Pereira will be funded from the two endowments and additional funding from UF/IFAS. That is a temporary fix to provide him a position in the interim.

During my “nonretirement,” I hope to continue working as a professor emeritus and courtesy professor at the University of Florida. The impact of my retirement will be minimized by staying on and assisting the industry with both classes for University of Florida students and education for the urban pest management industry.

TIMES HAVE CHANGED AT THE University of Florida. Tuition for graduate students used to be paid by IFAS. Now it is up to the professor to raise funds or use an endowment to pay the students. It used to be that the Florida legislature would fund projects in urban pest management. Now we see huge budgetary deficits, with no funding for applied urban pest management research.

The insecticide manufacturers used to have new active ingredients and formulations that needed testing for the control of urban pests, but those are not available as often now. Those funds were used to support student research and keep the laboratory operating. Now that those funds have shrunk, it is very difficult to keep the Urban Entomology Laboratory operating.

Regardless of these challenges, we are going to keep producing *PestPro* magazine with FPMA and the support of our advertisers. We are planning on graduating more students who plan to develop their careers in urban pest management. We are planning on keeping things going with Roberto in charge of the laboratory. We are hoping to continue conducting research that will assist every pest control operator in Florida and the United States. We will continue to do that, knowing that the industry needs and appreciates our efforts.

Let us know your needs and thoughts, and how we can best serve the pest management industry. **PP**

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

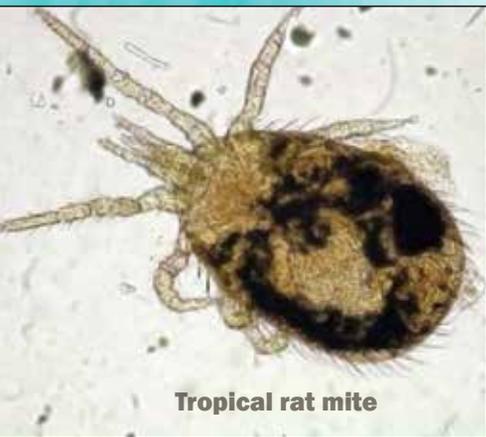
Occasional Invaders at HOME: Identification and Treatment

Philip Koehler and Roberto Pereira



Straw itch mite

Eric Erbe, USDA-ARS



Tropical rat mite

P.J. Bhayn and A.J. Nath



House mouse mite

Mahmoud Rabhlar

OCCASIONAL INVADERS are pests that do not usually live and breed inside buildings but can wander or migrate seasonally into structures.

Some of these pests are associated with trees, shrubs, mulch or other habitats conducive to pest development. Others are attracted to lights at night. Some are dislodged from preferred habitats by management procedures that make the environment unsatisfactory. Environmental extremes such as excessive rainfall, drought, temperature changes, or poor drainage around a building may stimulate these occasional invaders to move indoors.

Many of these pests can be managed by eliminating conditions near the structure that allow them to build up to large numbers. Generally, sanitation or basic landscaping help eliminate pest-infested sites near structures. Also, pest exclusion using caulking, weatherstripping, screening of vents, and lighting location can solve many problems with occasional invaders.

Mites

Mites are small arthropods with two body regions, sucking mouthparts, no antennae, and four pairs of legs as adults. Their cycle has four stages: egg, larva, nymph and adult and requires one to four weeks depending on species and conditions. Mites are occasionally found in or near homes and attack humans in the absence of their normal hosts — birds, rodents or insects. Bites from these mites may be painful and cause severe skin irritation.

Mites that can be problems in buildings include the bird mites, insect mites, and house dust mites.

The adult female **bird mite**, above, lays eggs on the host bird. When the nonfeeding, six-legged larval stage emerges from eggs they molt to the nymphal stage in about eight hours.

If the birds have vacated the nests in eaves, rafters or gutters, the nymphs and adult mites may seek blood meals elsewhere. Bird mites may enter homes as they migrate into human residences. These mites prefer to feed on fledglings in the nest, but when these hosts are not available the mites may migrate in search of a blood meal.

The almost invisible **straw itch mite** is parasitic on the larvae of insects such as the Angoumois grain moth, wheat jointworm, and furniture beetles. The female mite retains up to 300 eggs in her body, where the immature stages develop to adults. Upon emerging, they search for hosts to parasitize.

Humans become infested when they come in contact with straw, grain or wood. Houses may become infested when the insect hosts of the mites are present. The bites of the straw itch mite are located almost entirely on the clothed portions of the body. Dermatitis develops from bite reactions within 24 hours.

The **tropical rat mite** and the **house mouse mite** are the most abundant rodent mites in buildings. Although primarily external parasites of rats and house mice, rodent mites will feed on humans, causing severe irritation and dermatitis. Areas bitten by mites may remain swollen for several days and leave red spots, depending on the person. Scratching the bites often can result in secondary infection.

Management of household mites is best accomplished by eliminating nests and roosting areas for birds and controlling rodents or insect hosts. Insecticide total release or mechanical aerosols and foggers are effective in killing mites but do not prevent reinfestation. Application may need to be repeated in two to three weeks if the source is not eliminated.

Photos are highly magnified, especially the mites. The actual mites are smaller than the period at the end of this sentence.



House dust mite

Gabriel Trujillo Escobedo



Booklice, or psocid

USDA



Silverfish and damage

Lyle Brass

House dust mites produce allergic reactions when humans inhale pieces of the mites in house dust. Because of their small size, approximately 1/64 inch or 0.5 mm, these mites are often overlooked in a house. House dust mites feed on shed human skin. Just 1 gram of skin will feed thousands of mites for months. Because a normal person sheds five grams of skin per week, there is plenty of food around if residences do not get cleaned regularly.

House dust mites, their fragments, and excretory or secretory products are the most important allergens in house dust as they cause asthma symptoms, especially when people go to bed where there is greater exposure to house dust mites.

There is no chemical control of house dust mites, but frequent changes of bedding, use of nonfibrous bedding or mattress encasements, frequent vacuum cleaning, and correction of excess humidity can reduce house dust mite populations.

Booklice

Booklice, or psocids, are small, soft-bodied insects, most of which are shorter than 1/8 inch (3 to 3.5 mm). They may be either winged or wingless, and they have chewing mouthparts.

The majority of psocids are outdoor species with well developed wings. They are most commonly found on bark or foliage of trees and shrubs and are frequently called "barklice." Most of the species found in buildings are wingless. Because they are often among books or papers, they are called booklice.

The term "lice" in the names is somewhat misleading, because none of these insects are parasites, and few of them have a louselike appearance. Psocid eggs are laid singly or in clusters and are often covered with silken webs or debris. Most species pass through six nymphal stages. The entire lifespan from egg to adult is between 30 and 60 days.

Reduction of moisture to prevent mold growth is a very effective method for controlling booklice. Infested furniture, bedding, or other movable furnishings should

be thoroughly cleaned and aired. Spilled food products should be cleaned immediately and all stored products should be kept in tightly sealed containers to prevent infestations.

Insecticide applications are not usually needed to control booklice, but spot or crack-and-crevice treatments may be used in severe infestations.

Silverfish and Firebrats

Silverfish and firebrats are among the most primitive insects. There are about 18 species of silverfish and firebrats in the United States.

These wingless pests do not undergo complete metamorphosis, so the nymphs look like adults but are smaller. All life stages have similar feeding habits. Immature forms may molt as many as 50 times before becoming adults and will continue to molt even after becoming adults and reproductive. Silverfish and firebrats are long-lived, taking up to two years to reach maturity. However, the immature stage may last two to three months under optimum conditions and continue living for several years as adults.

Adult length ranges from 1/4 to 3/4 inch (6 to 19 mm), depending on the species. Silverfish are tapered in the back, giving rise to their fishlike appearance, and most are silver. Firebrats are gray with darker markings. Both silverfish and firebrats have long antennae and three long bristles known as cerci arising from the tip of the abdomen. Therefore, sometimes they are called bristletails.

Silverfish and firebrats gain entry through openings in foundations or around pipes or wires passing through walls. They can also be carried into buildings in boxes, books, papers or other items brought from infested areas.

These insects survive in warm, moist environments with suitable food. They can be found mostly in attics, basements and wall voids. Firebrats require warmer areas than silverfish and can tolerate drier conditions.

Both silverfish and firebrats are nocturnal and are not attracted to light. Thus, they are rarely seen in well lighted locations.

Silverfish and firebrats feed on fabrics such as linen, rayon and cotton. They are attracted

to starched fabrics and also feed on paper, paper sizing, glue, book bindings, and dead animals. They feed on any type of human food but appear to be especially attracted to flour, starches and breakfast cereals. They do not feed on wool, hair, or other animal fibers, but may damage some synthetic materials. Silverfish and firebrats are voracious feeders but can go long periods without food. Silverfish and firebrats can leave yellow stains and dark feces on items they touch.

Surveys of silverfish or firebrats should be done at night using a flashlight or with sticky traps. These insects may go unnoticed until populations get large or damage becomes severe. Control may be difficult because it is hard to locate the infestation sources.

Preventing silverfish and firebrats from entering buildings by caulking or otherwise closing outside openings is key for control and elimination of hiding places. Repairing leaking pipes and drains, and insulating water pipes and air conditioning ducts can prevent water condensation that attracts these insects. Finally, proper storage of potential food such as flour, cereals and similar items can prevent populations from growing.

Chemical control methods used for other crawling pests work against firebrats and silverfish. Insecticides and desiccant dusts applied to attics, crawl spaces, and voids in walls and beneath cabinets form barriers that keep out silverfish and firebrats.

Continued on next page



Firebrat

David R. Maddison



House cricket

Rinaldo R.



Springtail

Jean N. Fred



Striped earwig

Public domain

Crickets

Crickets are nuisances in buildings and may damage fabrics or other materials, especially silks and woolens, when they are attracted to perspiration and stains on clothing and fabrics.

Cricket infestations are usually seasonal. Most often, problems occur during the fall as evenings become cooler and the insects seek buildings for warmth and shelter. Occasionally, crickets invade a structure in large numbers, especially when they are attracted to lights around a building. Besides damage, their chirping may be annoying to building inhabitants.

The most common crickets to invade buildings include the house cricket, *Acheta domesticus*, and the field cricket, *Gryllus* spp., which are very similar in appearance. House cricket adults range in length between ½ and ¾ inch (13 and 19 mm). They may be light yellowish brown with three dark bands on the head, or solid shiny black. This species has long, slender antennae. The field cricket is slightly longer, at up to 1 inch (25 mm), and usually brown or black. Females of both species have a long, thin ovipositor projecting from the tip of the abdomen.

The key to managing crickets inside is exclusion. Cracks and other openings must be sealed with caulk or other materials.

Weeds and debris around the outside of the building should be removed to eliminate attractive habitats, and sodium vapor lights or yellow lights that are less attractive to crickets and other insects should be used in outside lighting. Garbage and other refuse that serves as food should be stored in containers with tight lids and elevated off the ground on platforms or bricks.

Liquid insecticide sprays registered for indoor use can be used as spot or crack-and-crevice treatments. Sorptive powders may also be blown into inaccessible areas. Liquid sprays, insecticide-impregnated baits, or granular formulations can be applied around the perimeter of the building or in other outdoor areas if crickets cannot be controlled through sanitation.

Springtails

Springtails, or Collembola, are tiny insects that may invade homes and other structures in enormous numbers and can also be indoors in potted plants and decaying bulbs. Outdoor, they are soil insects that fulfill an important role in soil development and enrichment.

These insects are white or gray, with a forked appendage to the rear and bottom of the abdomen. This appendage, used as a lever, allows these insects to jump or spring into the air, which is how these insects got their name.

They infest buildings that have constant high humidity. This is usually in the basement or crawl space but may be in other areas with water leaks. As a result, the best method of control is to stop the water source or decrease the humidity. Fans may be used to dry out wet areas quickly.

Household Casebearer Moth, Or Plaster Bagworm

Household casebearers are similar to clothes moths, with the larvae encased in a cocoon made of silken fiber and other debris. Casebearers are easily seen on light-colored walls. Close examination of the house may reveal cases attached to the underside of chairs, bookcases and other furniture.

They are often found along rug edges, near baseboards, or on the lower edges of walls. Household casebearers are quite common in garages and underneath buildings. The larvae mainly feed on spider webs and dead insects. However, they also eat fabrics made of wool and other natural fibers. Control requires good housekeeping and removal of spider webs. Read more on Page 23.



Household casebearer moth

Juan Villanueva-Jimenez

Earwigs

Earwigs are in the Order Dermaptera and are beetle-like, short-winged, fast-moving insects. Length is about ½ to 1 inch (12 to 25 mm). They are usually dark brown and have a pair of pincer-like appendages at the tip of the abdomen. They have chewing mouthparts and a gradual type of development.

Earwigs are active at night and usually hide in cracks, crevices, under bark, or in similar places during the day. They are usually scavengers in their feeding habits, but occasionally feed on plants.

The name earwig is derived from an old superstition that these insects enter peoples' ears. This idea is entirely unfounded since earwigs are harmless to humans. Some species have scent glands from which they can squirt a foul-smelling liquid. This is probably used for protection from predators.

Striped earwig adults are dark brown with light tan markings. The males are large and robust with stout pincers. The females are somewhat smaller and lighter in color than the males. This earwig lives in subterranean burrows or under debris in areas with sandy or clay soils. They are usually outside unless populations are large or other conditions are adverse. They enter structures in search of food, a more suitable environment, or accidentally.

Because they are nocturnal, striped earwigs remain in the soil or under debris during the day. Heavily thatched lawns or mulched flower beds are among their preferred daytime habitats. At night, they collect in large numbers around street lights, neon lights, lighted windows, or similar locations where they search for food. Favorite foods include armyworms, aphids, mites and scales. They also forage on food scraps or dead insects.

The female lays about 50 tiny eggs in a subterranean burrow. The eggs hatch into nymphs in about seven days, and the nymphs feed on their egg case. The female continues to care for the young, grooming and manipulating them in the burrow throughout the first nymphal stage.

Continued on Page 26



How to Prevent and Control Brown Dog Tick in the Home

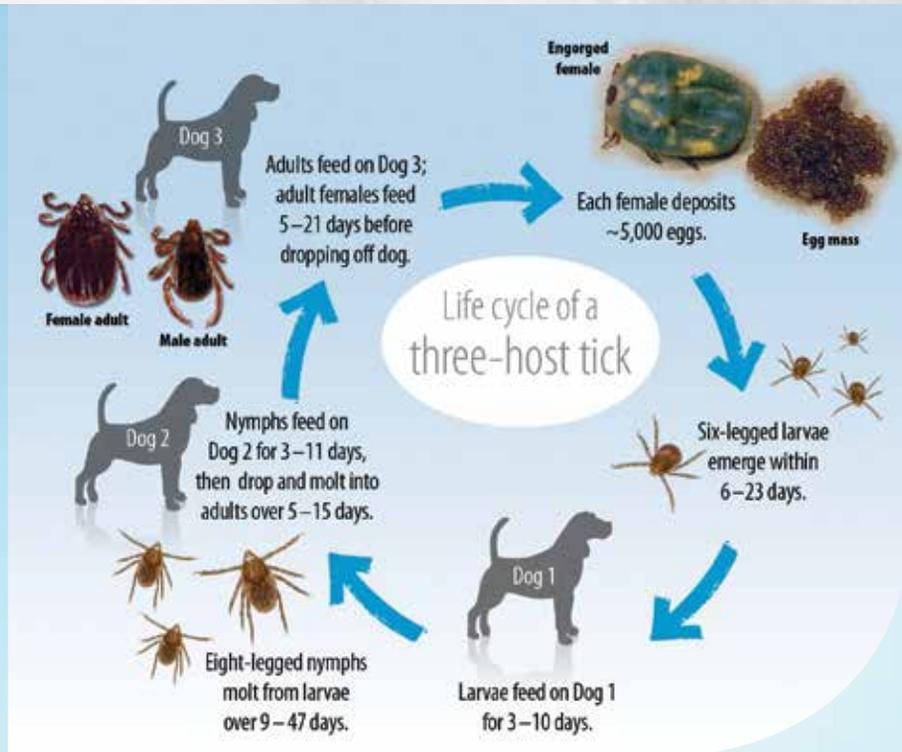
Faith Oi and Phillip Kaufman

MORE THAN just a pet peeve, the brown dog tick, or BDT, can be a serious pest in homes with pets. There are several things that homeowners can do to prevent and control ticks at home. Homeowner cooperation greatly improves the effects of professional chemical control treatments that may be used in the fight against ticks.

Understanding brown dog ticks

Ticks are not insects — they are more closely related to spiders and mites. Pet dogs are the usual tick host. The brown dog tick is an “obligate three-host tick.” This means that larva, nymph and adult ticks must acquire a blood meal from the dog before proceeding to the next developmental stage. One female tick carrying eggs into a home can result in 5,000 more ticks if left unchecked.

The brown dog tick is the only tick that can successfully complete its life cycle inside a home, particularly in the southeastern United States. This makes BDT a concern not only for dogs, but for people as well.



Ticks wait in the grass until a host passes

Max Rade

Homeowner checklist

We recommend the following integrated pest management approach for BDT, ideally to be done on the same day. Homeowners may expect to repeat this process several times to achieve maximum tick control and prevention:

PETS

1. Inspect pets as they enter the home.
2. Do additional on-pet interventions as needed and recommended by your veterinarian.
3. Do a daily “tick check” and removal.

INSPECT AND CLEAN PET RESTING AREA

1. Indoor tick management can be achieved by steam cleaning upholstery, cracks, and crevices where ticks may hide. Be careful about the surfaces that you choose to steam clean, as the steam can damage some surfaces.
2. Consider using a detergent to clean pet resting areas on surfaces that can be washed in this manner.

Continued on Page 13



DeltaGard® G

The granule insecticide that works hard so you don't have to.

DeltaGard G helps make your job easier with a proven effectiveness against ticks. Less dust and no more heavy equipment – in fact, this product can be effectively applied with a hand-held spreader. With a quick application and no extended re-entry period, DeltaGard G is effective at application rates that are 50 times lower compared to old-fashioned granular insecticides.

ALWAYS READ AND FOLLOW LABEL INSTRUCTIONS.

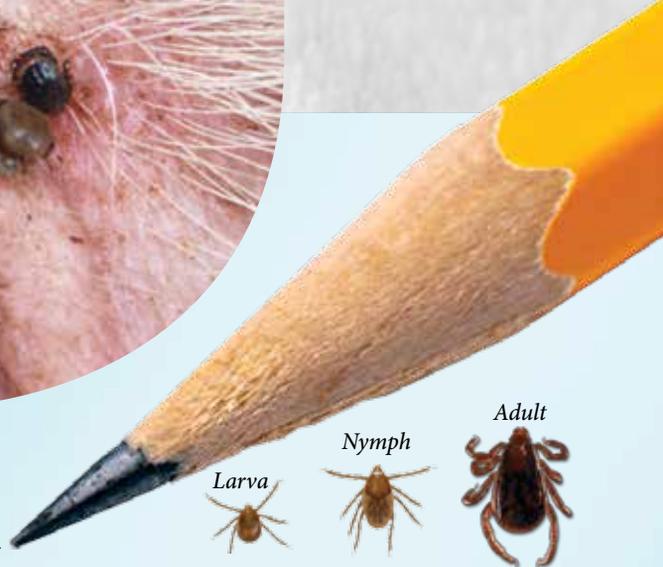
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Jerry F. Butler

In a dog's ear: severe infestation of brown dog tick. Larvae, nymphs and adults are present, and ticks are engorged with the dog's blood.



Larva Nymph Adult

Pencil shown for size comparison

Brown Dog Tick, continued from Page 11

IT IS IMPORTANT to keep in mind that only a small percentage of ticks are estimated to be on dogs, while the vast majority of ticks are in the environment. We recommend that homeowners:

REMOVE POTENTIAL TICK HARBORAGES

1. Cut back shrubs as far as possible.
2. Keep grass cut as low as possible.

SEEK PROFESSIONAL INSECTICIDAL TREATMENTS

1. Call a professional.
2. A pro will use products according to the label.
 - a. Understand that outdoor broadcast treatments will not last long in our southern sun and summer rains.
3. A pro will rotate classes of insecticide to delay the onset of insecticide resistance.

A factor complicating BDT management is the ability of this tick to survive without a host for several months during each of its three life stages, thereby negating the “wait-it-out” strategy of

starvation by absence of hosts. An unfortunate side effect occurs when the dog is considered the culprit of the infestation and is removed from the home: The tick can complete its life cycle on rodents. Furthermore, when dogs are not present, ticks use humans as hosts.

Brown Dog Tick Q&A

How does an infestation start in a home?

A dog brings in one or more adult ticks from outdoors. Following a blood meal, a female tick drops off and oviposits up to 5,000 eggs in a single mass. The larvae that emerge immediately seek shelter in cracks or crevices such as baseboards or furniture, but also commonly move en masse up walls and congregate in the corners of ceilings. These larvae eventually find the dog and receive their first blood meal. The larvae go largely unnoticed because they are about the size of a pencil tip.

The larvae then drop off into the surrounding area, molt to the nymphal stage, and again seek the dog for a second blood meal.

At this point owners occasionally notice the ticks, but they usually go unnoticed.

After they molt to the adult stage, the ticks find the dog for a third and final blood meal. Ticks are noticed at this stage for two reasons: 1) Adult females engorge to the size of a raisin and are often located on or near the dog's head, or 2) adults are seen crawling on floors actively looking for the dog. This “predatory” behavior is somewhat unique to ticks.

Typically, residents do not notice these ticks until they have completed a full generation. Often, overlapping generations of ticks occur in homes, so tick numbers can quickly multiply into the thousands.

How can I prevent an infestation?

Regular inspection of your dog and its resting areas are key to tick prevention. Mechanically remove ticks from your dog: Use tweezers to grasp as closely as possible to the dog's skin and around the mouthparts of the tick, and pull the tick straight out. This can be difficult.

The earlier you can catch an introduction of ticks into your home, the easier it will be to implement a control program. Here's why: By movement of the dog or the ticks themselves, BDT can be distributed throughout the home and yard. Ticks may end up anywhere the dog has access, including beds, cars, couches and kitchens, just to name a few.

How can I control an infestation?

On-pet interventions. Resistance to permethrin has been found, which means that products will no longer kill ticks effectively. Owners should consult with veterinarians for alternative on-animal treatments. **PP**

Faith Oi is Associate Extension Scientist at University of Florida Entomology Department and Phillip Kaufman is Head of the Department of Entomology at Texas A&M University.

Adapted from a UF/IFAS Extension brochure, “How to Prevent and Control Brown Dog Ticks in Your Home.”

Your Safety is Worth it!

Training With a UF/IFAS Poster Series

Anthony Ruiz



Above, Anthony Ruiz demonstrates the correct use of PPE as shown on “Protecting Yourself.” The UF/IFAS poster series is available in printable form online at https://edis.ifas.ufl.edu/topic_series_pesticide_safety_miniposters

Story is lightly edited for clarity and flow.

As the owner and operator of a small pest control business, it falls on Anthony Ruiz to make sure that proper safety measures are taken, best practices implemented, equipment well maintained, and accidents or mistakes quickly mitigated.

In early 2020, Anthony and his technician Leo had the opportunity to take a University of Florida course, Urban Pesticide Application. A UF/IFAS poster series on pesticide safety forms much of the coursework. Below, Anthony reviews his experiences with the poster series.

THE FIRST TWO posters we reviewed were related to safety. One of the hesitations before getting into this business was my concern for toxicity of the chemicals I would be in contact with daily, as well as my fear of dealing with bugs and rodents in general. Taking these entomology courses at UF has helped me a great deal in overcoming most of those fears. I guess the old adage that “we fear what we don’t know” is true, because now that I’ve learned a little about how amazing insects are, I’ve grown to respect and admire them.

The chemicals and their toxicity, however, are still a major concern for me. I was quite surprised to learn how little my tech, Leo, knew or cared about the chemicals he was handling every day and how little he knew about the risks of chronic poisoning if he didn’t take the proper safety measures. As we went through the first poster, “Protecting Yourself,” we reviewed personal protective equipment. I made sure Leo understood why wearing each article of clothing and proper safety devices would help him stay safe and healthy.

The biggest hurdle for him is wearing a mask, which Leo claims affects his breathing. This in turn affects his heart rate. He is afraid that his difficulty breathing while wearing a mask could increase his heart rate and lead to a heart attack.

Leo also told me he wasn’t wearing gloves when rinsing out cans because he didn’t think it was necessary. Once we looked at the second poster, “Label and SDS,” which reinforces the need to read the label and follow the directions regarding PPE, he started coming around.

We then went over how chronic poisoning works slowly over time and is not always noticeable until possibly many years later. Leo admitted that wearing the right gloves so chemicals are not absorbed through your skin and a mask so you’re not inhaling anything noxious is a good idea. I also reminded him that he is legally required to follow the label instructions on PPE use.



Reading the label



Handling Pesticides; IPM

The next few posters were “Pesticide Formulations,” “Apply the Correct Amount,” and “IPM: Beyond Spraying.” Leo was familiar with the different formulations because we use all of these on our daily routes. Aerosols for quick knockdowns and flushing bugs out of their hideouts. Liquid emulsifiers in spray cans, power sprayers and dusts in areas where people can’t access them in places like wall voids and attics. Baits for ant and roach control, and granules on lawns.

What Leo was less familiar with was applying the correct amounts, as this is usually calculated for him. We looked at the labels of a few of the most popular products we use often — bifenthrin, chlorfenapyr, imidacloprid — and focused on the quantities specified to target different pests in various settings using different application methods. This was very helpful to him, as I don’t think he had ever really taken the time to read the labels in much detail. The person who had previously trained Leo would simply tell him which chemicals to use and how much, without going over the label or explaining the details of how the insecticide gets into or on the insect, or even how it affects the insect — let alone

the LD50 or the toxicity of the product to nontarget organisms and the environment.

The poster on IPM was something Leo was also somewhat familiar with, as we go over IPM with customers all the time. He mentioned “sanitation, exclusion and chemicals,” which is partly correct. Leo’s pest identification skills are something we will definitely have to work on, and I too am getting better at with more experience. One thing neither of us is doing very well is monitoring and record-keeping, which I know would help us in our fight against pests and to better inform our customers.

Routine Care and Prep

The next area we focused on was how to keep oneself, the vehicle, and the equipment clean and ready for the next day’s work. The poster “Daily Personal Care” went into some detail on the importance of cleaning, starting with the truck and including the surfaces one comes in contact with most such as the steering wheel, door handles, and pesticide storage compartment handles. We used to wash the truck only once a month, but have changed to twice a month. Unfortunately, it’s not realistic or feasible to wash the truck every day, but

we are washing our PPE every day, which is something we weren’t doing prior to this course.

Another thing we learned was to separate our dirty work clothes from the other clothes at home. This makes sense not just because of the chemical residues but also because of the stray insects we may inadvertently bring home. The poster “Triple Rinse Steps” is something the previous owner of the business did strictly adhere to and made sure both Leo and I did daily. We did learn to always look at the label under disposal instructions for containers like aerosol cans or pesticides left unused. I found out that every county has a way one can arrange to have unused chemicals picked up and disposed of properly.

Vehicle Security; General Safety

The final three posters dealt with making sure everything was up to par on the pest control truck, how to properly deal with spills, and what to do in case of other exposure emergencies. Our pest control trucks are a vital component of this business and require constant attention. Besides regular maintenance and inspection of the equipment, ensuring that the adequate



Safe disposal



Continued on Page 32

'WhoDini': A Story of Respect, Pain and Recovery



Dini Miller, Professor of Urban Entomology at Virginia Tech and graduate of UF Entomology, shown just before her copperhead encounter went bad.

DR. DINI MILLER is a lover of wildlife. You often see photos of her rescuing turtles, snakes and other wildlife trying to cross the road.

On Sunday, June 7, Dini stepped away from her lab and bed bug research to enjoy a short hike down the picturesque Huckleberry Trail in Blacksburg, Virginia. A finely colored snake lay right on the paved trail.

The snake might be harmed if it remained on the trail. Being a lover of wildlife and appreciator of snakes, Dini wanted to take a closer look and move it off the trail. The snake ended up taking a closer look at *her*. Not only a look, but a flick of its tongue and bite on her left arm as well.

Being an educator, Dini shared the timeline of her close encounter of the copperhead kind. To read Dini's snakebite diary on Facebook, visit <https://tinyurl.com/SnakebiteDiary>. **PP**

— Rebecca Baldwin, Associate Professor UF Entomology and Nematology

"IT'S ALL FUN and games when you're trying to save snakes crossing the Huckleberry Trail. Copperheads may look very friendly and sweet. But after you pick them up and try and put them back down, you get to spend the night in the emergency room experiencing some of the worst pain you've ever dreamed of." — Dini Miller, on Facebook



June 8: Pain



June 10: Worse, not better



June 17: Recovery



Dini's new lab mascot

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Name: John Cooksey

Hometown: Jacksonville, Florida

Where you live now: Jacksonville

About your company: McCall Service has been around since 1928. It started as an ice and coal delivery company in Jacksonville. The company began selling heating oil and got into the heating and air conditioning business. They hired my father in 1960 to start a lawn care division and then a pest and termite division. My father was eventually able to buy the company. We are now primarily a lawn, pest and termite company, although we have expanded into some other services. We have eight offices throughout Florida and Georgia.

First paying job and what you learned: When I was 14 I started working at a mom-and-pop grocery store called the Mandarin Supermarket. It taught me the value of time and money. It also taught me the lesson of having to show up for work on time and get a job done.

First break in the pest business: When I graduated from college I worked as an analytical chemist in Tallahassee and Pompano Beach. I was stuck in a lab all day running tests for heavy metal contamination in soil and water

samples. My father offered me the opportunity to come try out the pest control business. I never thought I would work in this industry when I was growing up. I ended up going back to school at UF to get a master's degree in entomology with Phil Koehler.

Best business book: My favorite business book is not really a business book, but it is about a family business and generational transition: *The Good Earth*, by Pearl S. Buck.

The best piece of business advice you received: My father was always very cautious when it came to taking on debt. He would always warn us of what can happen when



John Cooksey

you become overextended and have a bank making decisions for you. Always be cautious of the amount of debt you take on. You never know when the next recession, depression,

and these days, pandemic will happen.

What you would tell someone new to the pest business? This is a great industry. It is much more scientific than it gets credit for. You can spend a lifetime learning about the different aspects of it. Always continue to educate yourself on the bugs and the business.

Where can we find you when you are not at the office? My wife and I have two kids in college and a daughter at home with us that has autism. Her favorite place to be is on the water, which is just fine with me. The three of us spend a lot of time on the Suwannee and St. Johns rivers.

What is the most important trait you look for when hiring? Honesty and integrity. The rest can be taught. **PP**





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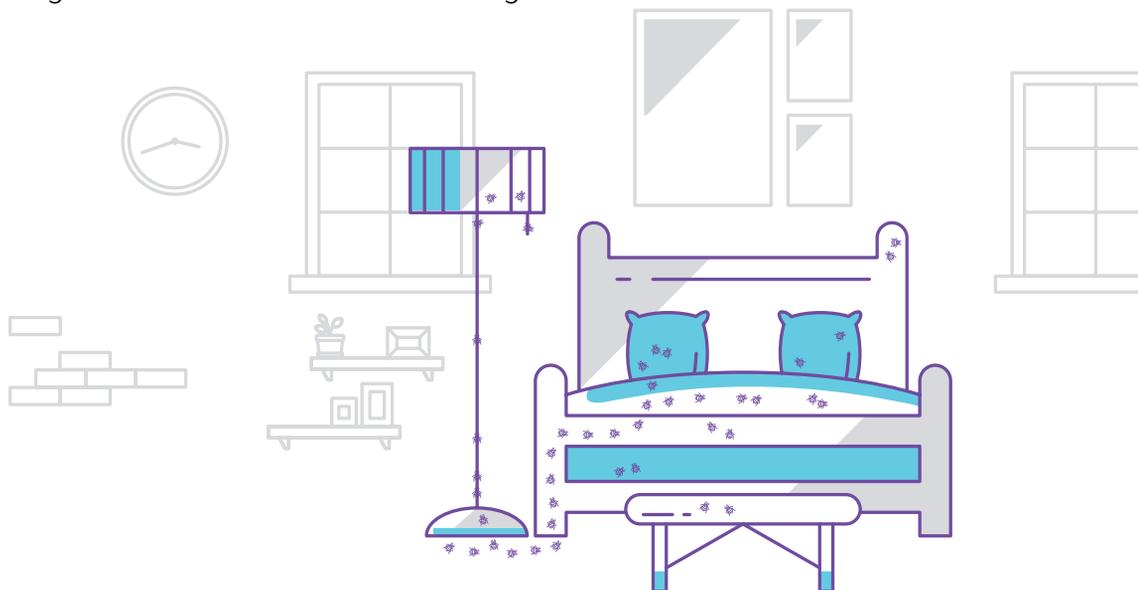
*Claim based on years/mileage (whichever occurs first) covered under the New Vehicle Limited Warranty basic coverage, Ward's In-market Large Pickup Segmentation and Small Pickup Segmentation v. 2019 TITAN and TITAN XD and Ward's Light Vehicle Segmentation 2019 Nissan NV Cargo, NV Passenger v. In-market Large Van Class, 2019 Nissan NV200 v. In-market Small Van Class. Commercial Vans compared only. Nissan's New Vehicle Limited Warranty basic coverage excludes tires, corrosion coverage and federal and California emission performance and defect coverage. Other terms and conditions apply. See dealer for complete warranty details. NV200** Tax is covered under a separate limited warranty with a different level of coverage.

**Ward's Small and Large Pickup Segments compared, 2019 Frontier vs. latest in-market competitors. Based on lowest MSRP models. Price is Manufacturer's Suggested Retail Price (MSRP). MSRP excludes tax, title, license, destination/handling fees and optional equipment. Dealer sets actual price. Comparison based on manufacturer websites.

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WEED CONTROL

Glyphosate Alternatives in Landscape Planting Beds

Chris Marble

You are probably well aware of the growing controversy surrounding the herbicide glyphosate, which has led to bans on public property or customers not wanting it to be applied to their property in some cases. Safety information on glyphosate is beyond the scope of this article, but the bottom line is that companies that have relied on glyphosate for spot-spraying weeds will need to look to alternatives to continue offering their services in these situations.

GLYPHOSATE is by far the most commonly applied herbicide in planting beds in Florida. Because glyphosate is translocated, it is effective on most annual and perennial weeds. With one herbicide, and in many cases with one application, an applicator could control almost all weeds in Florida landscapes.

Glyphosate is also an ideal choice because it is not soil-active. It is tightly bound to soil particles and not absorbed by the roots of trees or shrubs that are not exposed. Another important factor is that glyphosate is affordable and controls most weeds at very low use rates.

There is no perfect herbicide, and glyphosate is no exception. Glyphosate can kill weeds at very low usage rates, but this

means that it can also kill many ornamentals at these same low rates. Even a small amount of drift or overspray can kill or disfigure most common ornamentals.

Glyphosate is also not effective on a few of the most troublesome landscape weeds such as artilleryweed, *Pilea microphylla*.

For companies that are looking for postemergence herbicide alternatives to either satisfy customers, follow local ordinances, or to provide better overall control and implement a more integrated strategy, there are many options to choose from, including both selective and nonselective herbicides.

Nonselective alternatives

A list of some of the more commonly available nonselective alternatives are

included in Table 1 below. All of these nonselective alternatives are contact herbicides, meaning that they will not translocate throughout the plant. An exception would be glufosinate, which is minimally translocated but still considered a contact herbicide, although it can be more effective on larger annual weeds and some perennials compared with other products listed in Table 1.

All of the products listed in Table 1 usually result in rapid symptom development such as burning of foliage and wilting. This occurs sometimes within only a few hours, depending upon weather. Contact herbicides require most, if not all, of the leaf surfaces to be covered, especially if weeds are over 6 inches in height or mature.

Continued on Page 22

Active Ingredient	Example Trade Name(s) ¹	Label Signal Word ²	OMRI Certified? ³
acetic acid (vinegar)	WeedPharm®, many others	Danger	Yes
ammoniated soap of fatty acids	FinalSan®	Warning	Yes
ammonium nonanoate (i.e. pelargonic acid)	Axxe®, Mirimichi® Green Pro Weed Control	Warning	Yes
caprylic + Capric acids	FireWorxx®, Homeplate®, Suppress®	Caution to Warning	Yes
citric acid + clove oil	Bonide Burnout®	Danger	No
clove oil + cinnamon oil	Weed Zap®	Caution	Yes
diquat	Reward®	Caution	No
d-limonene (citrus oil)	Avenger® Ag	Caution	Yes
eugenol	Weed Slayer®	Caution	Yes
glufosinate	Finale®	Warning	No
pelargonic acid	Scythe®	Warning	No

Table 1. Nonselective postemergence herbicide alternatives to glyphosate for use in landscape planting beds.

¹ Many active ingredients are marketed and sold under different trade names. Trade names listed here are for informational purposes and do not imply endorsement or the use of suitable alternatives.

² Label signal words listed here are examples for trade names listed and are for informational purposes only. Always read the label and follow directions.

³ OMRI = Organic Materials Review Institute and shows which products are allowed for use under the US National Organic Program Standards for organic agricultural production.



Lyle checks a specimen under the microscope



Caribbean fruit fly photo by Lyle Buss



Imperial moth larva photo by Lyle Buss

Lyle Buss, Pest Detective

AS *PESTPRO'S* own "Pest Detective," Lyle Buss has informed our readers over the years about the world of unique Florida insects, from gas can borer to telephone pole beetle.

Meanwhile, at his main job Lyle stays busy as a bee. His University of Florida career has been split between Florida insect identification and photography of the small subjects for nearly 20 years.

Lyle was born and raised in Minnesota. He attended the University of Minnesota, then Michigan State, where he met Eileen Eliason. The two hit it off, bonding over their love of insect collecting.

"We met when we were both master's students, had the same adviser, started at the same time, worked in the lab together, and collected bugs together," Lyle said.

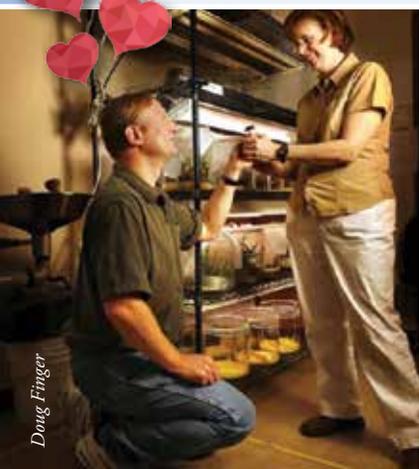
Lyle and Eileen Buss married in 2001, and both found insect-focused jobs at the UF Entomology and Nematology Department in Gainesville. Their family grew to add two daughters, Heather and Holly, now in their teens.

Insects remain the career focus for the couple, with Eileen curating and organizing specimens at the Florida State Collection of Arthropods as well as being a UF Emeritus Associate Professor.

Lyle's main job is senior biological scientist and Insect ID Lab manager at University of Florida. He receives hundreds of insect ID requests a year from Florida county agents, homeowners, pest professionals, plant nurseries, physicians and veterinarians.

On the photography side, you may often recognize Lyle's insect photos in *PestPro*. These represent only a small portion of the vast image collection he has produced over the years. Through it all, Lyle's insect enthusiasm never wanes.

"I can't really imagine doing anything else than working with bugs," Lyle said. "I get to do my hobby at work!"



Doug Finger

Lyle and wife, Eileen Buss, were once profiled for a Valentine's Day article in the local paper. The subject was "love bugs."

Scorpion with babies photo by Lyle Buss



Q&A with Pest Detective Lyle Buss

How did you end up in Florida from Minnesota?

My early entomology training was in forest entomology. I did my master's research on gypsy moth in Michigan, and then worked as a lab technician in the Forest Entomology Lab at the University of Kentucky Entomology Department.

I then worked for the North Carolina Forest Service for about one-and-a-half years before moving to Florida to join my [then] wife-to-be.

Did your training prepare you for your insect ID work?

I had to broaden my scope beyond forest insects, since pretty much any bug is fair game.

Are there any insects that stump you?

Even though I've been studying Florida insects for 19 years, I know there are a LOT of species I haven't seen yet. I still frequently get samples of insects that are new to me, and I can even go into my own backyard to find new and interesting bugs. The insect diversity in Florida keeps the job interesting.

What is special about your work at the UF Insect ID Lab?

I have been running the Insect ID Lab since 2001 and really believe that it is an important diagnostic lab within the University of Florida — and not just because I get a paycheck to be here!

With ever-increasing scrutiny on pesticide use, you need to know exactly what kind of pests you are dealing with. I hope that the identifications from my lab help people figure out the best way to manage their pests, and help them avoid applying pesticides unnecessarily.

Do you get many ID requests from pest pros working in Florida?

I have always enjoyed interacting with pest management professionals. I know they are under pressure to identify pests in homes and get rid of them as quickly as possible. I have the luxury of working in a lab with a nice microscope, and I know it is difficult to identify insects out in the field with a hand lens.

I appreciate it when PMPs take the time to send in some specimens to make sure which termite or ant species they are dealing with, or to figure out which unusual beetle is showing up in a home.



Geena Hill

What's the best part of being a professional "pest detective"?

A big part of my job as an entomologist under the umbrella of Extension is to respond to public inquiries about insects. It's fun sharing the fascination of folks that ask me, "What is this strange bug that I've never seen before, even though I've lived in Florida my whole life?" **PP**



Top: Lyle displays an insect collection at a UF Entomology event. Above: Lyle received a UF Superior Accomplishment Award in 2018 from President Kent Fuchs. Below: All kinds of beetles are represented in the UF insect collection.



Active Ingredient	Example Trade Name(s) ¹	Label Signal Word ²	OMRI Certified? ³
Bentazon	Basagran® T/O	Caution	6
Clethodim	Envoy®	Caution	1
Clopyralid	Lontrel®	Caution	4
Fenoxaprop-ethyl	Acclaim® Extra	Caution	1
Fluazifop-p	Fusilade® II	Caution	1
Halosulfuron	Prosedge®, SedgeHammer®	Caution	2
Imazaquin	Sceptor® T/O	Caution	2
Sethoxydim	Segment® II	Caution	1
Sulfentrazone	Dismiss®	Caution	14
Sulfosulfuron	Certainty®	Caution	2

Table 2. Selective postemergence herbicide alternatives to glyphosate for use in landscape planting beds.

IT'S TIME TO TALK ABOUT THE BIRDS AND THE BEES AND IGRs.

COMPARISON CHART	HYDROPRENE (GENTROL®)	PYRIPROXYFEN	NOVALURON
• Broad spectrum control includes cockroaches, drain and fruit flies, and bed bugs	✓		
• Translocates to reach pest harborages	✓		
• Increases gel bait consumption in adult female cockroaches and nymphs	✓		
• Low odor and non-repellent	✓	✓	✓
• Long-lasting residual activity	✓	✓	✓
• Use in food and non-food areas	✓	✓	✓

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Weed Control, continued from Page 19

Many of the products in Table 1 on Page 19 must be applied at application volumes ranging from 1 to 9 gallons per 1,000 square feet, which requires significantly more time and water (refilling) to make applications compared with glyphosate products.

It will be especially difficult to control large, established perennial species, which can quickly regrow following treatment. Multiple applications will be required to control established perennial weeds, but control can be achieved over time, especially when combining with nonchemical methods such as hand-weeding and incorporating the use of systemic herbicides as part of an overall integrated weed management strategy.

Selective Alternatives

A list of selective alternatives to glyphosate labeled for use in landscapes is included in Table 2. For sedge control, products such as halosulfuron, sulfentrazone, bentazon and imazaquin, could be used. Many companies are already using these herbicides on the turf they manage. While these products have activity on sedges they may also control certain broadleaf species. However, not all, or even most, broadleaf weeds will be controlled.

¹ Many active ingredients are marketed and sold under different trade names. Trade names listed here are for informational purposes and do not imply endorsement or the use of suitable alternatives.

² Label signal words listed here are examples for trade names listed and are for informational purposes only. Always read the label and follow directions.

³ Weed Science Society of America herbicide groups are based on herbicides' primary mode of action and can be used to select herbicides that have differing modes of action to minimize the potential for development of herbicide-resistant weeds (WSSA, 2018).

For grassy weed control, there are several graminicides — herbicides that control grasses only — labeled for use in and around hundreds of ornamental plants including clethodim, fenoxaprop-ethyl, fluzafop-p, and sethoxydim. These herbicides can be used as spot applications around the base of plants. When needed, they can be applied over the top of ornamentals listed on product labels.

Broadleaf weed control is more challenging, as few selective options exist. Clopyralid is labeled for use around certain landscape ornamentals and provides a high level of control of certain broadleaf weeds, but is not broad-spectrum. Luckily, the nonselective options are typically more effective on broadleaf species compared to grasses and sedges.

How to Choose

There is no single herbicide that will work in all situations. Herbicides should be chosen based on the site, the weed species present, cost, the number of times the site will be visited during routes, and many other factors.

Application volume should also be considered. There is a big difference between a herbicide that is applied at 0.5 gallons per 1,000 square feet and one that is applied at 5 gallons per 1,000 square feet in terms of labor time.

With the nonselective alternatives, the biggest advantage is that they will have activity on almost all types of weeds. Many can be mixed up at concentrations and spot-sprayed similar to glyphosate. However, they will not offer total control of large annual or perennial weed species and will require frequent reapplication in many cases.

Some products require high use rates and high application volumes, which can quickly increase costs. The selective alternatives can often give better control of perennials and can be applied over the top of some ornamentals, but the spectrum of control is lacking. To control broadleaf, grass and sedge weeds, two or three different herbicides might be needed.

Continued on Page 34



Photos by Lyle J. Buss

Household Casebearer

Lyle J. Buss

CATERPILLARS use various tactics to protect themselves from natural enemies and harsh environmental conditions. One such tactic is living inside a protective case. Some clothes moths do this, such as the tropical casebearing clothes moth that was the topic of the March/April 2020 Pest Detective article. The clothes moth isn't very common, but it can be an important pest in certain situations. In this article I want to compare it to a related species called the household casebearer. The household casebearer, also called plaster bagworm, is very common in Florida but is only a nuisance pest. Both species belong to the family Tineidae, but since their habits and pest status are different, it is important to be able to tell them apart.

In both species, the caterpillars make a case that they live in. They come halfway out when they need to feed or crawl somewhere, but the caterpillar never fully leaves its case. Once they turn into adult moths, they finally leave the case — but the moths are rather secretive and aren't seen very often.

Cases made by household casebearers are about ½ inch long. They are shaped like a watermelon seed, rather flat and widest at the middle. Each narrowed end has a hole, so you may see the caterpillar retract into one end and then emerge from the other end. Cases are light to dark grey and made of sand grains and other bits of debris held together by silk. The case of the tropical casebearing clothes moth is smaller and narrower in the middle. It is made of fibers and fecal pellets and has a hole at only one end.

The location of the cases is helpful for identification. Household casebearer cases are most often found on the outside walls of buildings, in garages, and inside homes. Cases of clothes moths are found indoors, usually relatively close to their food items, such as woolen fabrics.

Household casebearer caterpillars are scavengers and feed on spider webs, dead insects, and other bits of debris they encounter. There are old reports of them feeding on wool or fur, but this seems to be uncommon. Because they are often seen on walls, people thought that they fed on plaster, and called them plaster bagworms. But since they don't actually eat plaster, and to avoid confusion with another family of moths that are called bagworms, the name household casebearer is preferred. Removing cases with a broom or vacuum is the best way to deal with unwanted household casebearers. **PP**

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

The Curious Case of the Incredibly Constipated, Curly-Tailed Lizard

Halle Marchese

Feasting at a Cocoa Beach pizza parlor grease bin gave one northern curly-tailed lizard a record-breaking case of constipation.



A healthy northern curly-tailed lizard suns itself in Delray Beach, Florida

MOUTHFULS of insects, an anole, and greasy sand congealed into an unpassable glob of poop nearly 80 percent of the lizard's total body mass — the largest known feces-to-body-mass ratio recorded in a living animal.

“When we caught it, we just assumed the animal was ready to lay eggs,” said Natalie Claunch, a Ph.D. candidate in the University of Florida School of Natural Resources and Environment. “But when we went to feel for eggs, it just felt like it was full of Silly Putty.”

When Claunch and Edward Stanley, director of the Florida Museum's Digital Discovery and Dissemination Laboratory, CT scanned the lizard, they found the massive fecal bolus lodged in its enlarged stomach. The bolus-to-body-mass ratio was more than six times greater than the previous record held by a Burmese python.

“I was blown away by how little room there was left for all the other organs — if you look at the 3D model, it has only a tiny space left over in its ribcage for

the heart, lungs and liver,” Stanley said. “It must have been a very uncomfortable situation for the poor lizard.”

Claunch said the female curly tail was likely hunting insects and smaller lizards lured to the parking lot bin by pizza grease — and inadvertently getting a dose of sand with each meal. The pear-shaped lizard was starving from being unable to digest the nutrient-depleted bolus, she said, and was humanely euthanized.

Native to the Bahamas, the Cayman Islands and Cuba, northern curly-tailed lizards were originally introduced to Florida in the early 1940s to combat sugar cane pests. Claunch said the species' diet, which includes anything from bits of fish to cheese and crackers, likely put it at higher risk for fecal impaction.

“They're like sparrows or gulls at a fry stand, without the chirping or swooping,” said Claunch, who studies the northern curly tail's immune system, heat tolerance and adaptability in the lab of Christina Romagosa, assistant

research professor in the department of wildlife ecology and conservation.

The northern curly-tailed lizard offers a key case study of how invasive populations can successfully establish themselves in Florida, Claunch said. By tracking the lizard's populations from Key West to Orlando, researchers can better understand how to monitor and prevent reptile invasions across the United States. In addition to potentially spreading parasites and disease, northern curly tails threaten native lizards' food sources and prey on their hatchlings, contributing to the state's decline in reptile diversity.

“New populations are still being reported and discovered — these lizards can hitchhike in cars, plant delivery trucks or boats, so they end up in a lot of disconnected places,” Claunch said. “We have so many invasive lizards in Florida that funding and person-power is typically directed toward ‘high priority’ species that are a direct threat to native threatened or endangered





species, or to infrastructure, but the curly-tailed lizards' successful spread makes it an interesting case."

Claunch said an example of fecal impaction this extreme is a rare find in wild lizards, likely because they typically eat only small, passable amounts of sand or soil when capturing prey, and sluggish animals become easy targets for predators.

"We might not have noticed the fecal boluses we've found in some curly-tailed lizards if we hadn't been capturing and examining hundreds for a physiology project," Claunch said. "It just shows you never know what you'll find when you least expect it."

The researchers published their findings as a note in *Herpetological Review*.

Funding for the research was provided by the U.S. Geological Survey Fort Collins Science Center Invasive Species Branch and the Florida Museum. **PP**

Halle Marchese is Science Writer Intern, Florida Museum of Natural History.

Above left: Nearly all of this northern curly tail's digestion was halted by an impassable fecal bolus. Claunch said the lizard was "effectively starving because it could not ingest food or absorb nutrients from the bolus and had to metabolize its own organs for energy."

Courtesy of Natalie Claunch

Above right: Florida Museum herpetologist and CT expert Edward Stanley said he carefully handled the lizard during scanning for fear its already thinly stretched stomach lining would burst. *Florida Museum image By Edward Stanley*



Northern curly tails often successfully pass large amounts of feces, Claunch said, as seen in this healthy lizard. *Courtesy of Natalie Claunch*



Lawn shrimp, highly magnified

Scott Bauer, USDA



Sowbug with babies

Lyle Baas



Pillbugs

Franco Folini



Florida blue centipede

Meghan Cassidy

Occasional Invaders, continued from Page 10

Earwigs are difficult to control with chemicals, but for severe indoor infestations, insecticide sprays should be used for spot treatment. Proper scheduling of outdoor applications may increase the efficiency of control. Application of residual insecticides should be made in a band treatment about ten feet wide around the entire perimeter of a structure, following label instructions. It may also be necessary to treat the base of mulched shrubbery or flower beds. Glass jars or tin cans baited with fish or cat food, buried level with the ground, can be used to trap earwigs.

Lawn Shrimp

Lawn shrimp are in the group Crustacea, which also includes crabs, lobsters and shrimp. Lawn shrimp have a shrimplike form but are terrestrial, although they still require moist habitats. The two species common to Florida are a larger one, *Talitroides topitotum* (3/32 inch or 7 mm long), and a smaller one, *Talitroides allaudi* (1/8 inch or 3.5 mm long).

Lawn shrimp are elongate and compressed laterally. The abdominal segments are usually fused, so the thoracic segments make up most of the body. They have two pairs of antennae, with one pair usually very small. Lawn shrimp have chewing mouthparts.

Eggs are deposited within a brood pouch on the underside of the adult female's body. The eggs hatch in one to three weeks. The young lawn shrimp, which resemble the adults, leave the pouch until the mother has her first molt during mating. Lawn shrimp complete their life cycle, egg to adult, in one year or less.

Lawn shrimp live in the top half inch, or 13 mm, of mulch and moist ground and are active at night. After rains, large numbers of lawn shrimp may migrate onto sidewalks, driveways, garages, or under the doors into houses to avoid being drowned because they do not have a waxy layer on their exoskeleton

as do insects, and they lose or gain moisture from their environment. After dying and being heated by the sun, these animals turn the typical orange to red of cooked shrimp.

If lawn shrimp are a continual problem on sidewalks, pavement, or within open structures after heavy rains, then steps should be taken to dry out the mulch or ground cover near these areas by reducing irrigation. This technique also decreases fungus gnats and other moisture-loving soil organisms. Weatherstripping of doors can prevent lawn shrimp from entering structures.

Sowbugs and Pillbugs

Sowbugs and pillbugs are common Crustacea belonging to a group of animals called isopods and are found throughout Florida. They are wingless, oval or slightly elongated arthropods about 1/2 inch or 13 mm long and slate-gray, with their body segments appearing as armored plates.

Both pillbugs and sowbugs feed primarily on decaying organic matter, although occasionally they damage the roots of green plants. Their normal habitat is outside but they occasionally wander indoors, where they do no damage.

Sowbugs are often called woodlice and possess two taillike appendages, seven pairs of legs, and well developed eyes. They are incapable of rolling into a tight ball. Pillbugs, or "roly-polies," lack the taillike appendages and can roll into a tight ball.

The habits, biology and control of sowbugs and pillbugs are similar. Both animals are slow-moving, crawling arthropods. They require high moisture and are most active at night. When resting during the day, they may be found under trash, rocks, boards and decaying vegetation, or just beneath the soil surface. A heavy infestation indoors usually indicates a large population outdoors.

Isopod breeding occurs throughout the year in Florida. The female carries the eggs in a brood pouch on the underside of her body, where the eggs hatch and the young remain for six to seven weeks. Once the young leave the pouch, they never return. Some species produce only one brood per year, but others may produce two or more. Individuals may live up to three years.

Sowbugs and pillbugs cause no damage inside the home. Simple mechanical control such as a broom and dustpan or a fly swatter may be adequate. If they become a serious nuisance, elimination of hiding places, food and moisture sources will reduce the infestation. Source reduction outdoors helps considerably. Piles of leaves, grass clippings, and fallen fruit should be removed. Boxes or boards and other debris should be stored off the ground to eliminate a moist shelter.

Indoor treatment with residual insecticides may kill pillbugs and sowbugs that wander inside. Complete control is difficult to achieve, and treatments may not last more than one month.

Usually, outdoor treatments are necessary to control sowbugs. Treatments should be to and near foundation walls, around steps or damp areas surrounding the structure. Cracks between sidewalks and the foundation require thorough treatment. Granules or dusts are also useful for treating around foundations and crawl spaces.

Centipedes and Millipedes

Neither centipedes nor millipedes damage furnishings, homes or food. Their only importance is that they annoy or frighten individuals.

Centipedes are many-legged, usually brownish, flattened animals with many body segments. Most of the body segments have one pair of legs. Centipedes are fast runners and may vary in length from 1 to 6 inches (25 to 150 mm). They have one pair of

Continued on Page 28

Six-Step Website Checklist For a Post-COVID World

Alain Parcan



“HOW CAN I bounce back from the coronavirus era and make the most out of the second half of my year?” That’s a big — and increasingly important — question.

Chances are, you already have several marketing programs in place to drive traffic to your website. And as regulations start to loosen up, many consumers will be looking for your services online. But with so many potential customers evaluating your business based on your website, do you feel confident enough that it’s making the right impression on visitors?

Whether you built your website yourself or had someone do it for you, here are our top tips to give your website a refresh prior to the loosening of coronavirus regulations.

1. Can website visitors find your most important information easily? This is and always has been one of our most important website tips — and is consistently one of the most commonly ignored. Remember that the average person has a short attention span. If potential customers

land on your website and are looking to hire you, don’t make them spend any extra time searching for your phone number or storefront address. Make sure your contact info stands out on your home page.

Pro tip: We suggest placing your phone number in the top right of your website across every page.

2. Highlight key seasonal services on your site according to the time of year. As we head into summer seasons, you’ll want to make sure your website reflects that seasonality. Whether you have summer hours, seasonal services, or new specials based on the closest holiday, it’s up to you to make sure your company is keeping up with the times. The same goes for any banner images on your home page that might still be showing a wintertime photo.

Pro tip: Do you have coupons on your website? Check their expiration dates.

3. Display any professional association’s logo on your home page. Skeptical online searchers are always focused on finding a service provider

that looks official, professional and trustworthy. Featuring an association logo like FPMA on your website quickly sends the message that you take your place in the industry seriously. It’s important to keep up-to-date with those logos, too, as an outdated badge may send the wrong message to a visitor.

4. Be personal with your visitors. People enjoy working with people, not faceless companies. Help your customers make a connection with you by including team photos, bios and pictures of your team at work. When visitors are able to see who you are and what you do, they’ll be enticed to make a deal with you.

On the other hand, having stock photos of your industry isn’t going to impress anyone. You want to stand out from the competition, not blend in.

5. Check your site for yesterday’s web design standards. When was your website built? If it was a while ago, has it been updated regularly through the years? Businesses go through a lot of change, and your website needs to keep up. Make sure your site is reflecting modern design and current information, or people may write your company off as a business of the past.

Pro tip: What’s the copyright year on your website? Is your most recent award from 10+ years ago? Be sure to update these!

6. Own your business’s web address. Your web address, or URL, domain name, is essentially your business’s address on the internet. Many online companies register a domain with your name but keep ownership of it. This puts them in a powerful position over you. Ask your web designer or web marketing provider if you aren’t sure who registered your website.

IT MAY BE A LONG TIME before things are completely back to normal. In the meantime, some things haven’t changed: Any good web marketing strategy will revolve around a quality, professional website. We hope that these tips help identify some areas for improvement in your website.

If you’d like us to take a look at your website for you, feel free to reach out and schedule a free one-on-one website evaluation where we can give you our input. **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.



Florida Ivory millipede

Andrew Cannizzaro

antennae, which are easily seen. Centipedes have poorly developed eyes and are most active at night.

Centipedes are active predators and feed mainly on insects and spiders. All centipedes have venom glands to immobilize their prey. The jaws of the smaller, local species cannot penetrate human skin. However, the larger species may inflict painful bites.

Centipedes are usually associated with damp, dark places such as under stones, leaf litter, logs, bark, or soil crevices. Indoors, they may be found in closets and bathrooms where there is high humidity.

Centipedes usually lay 15 to 55 eggs clustered together in the soil, although the eggs of some species are laid singly. The eggs hatch soon after they are deposited. The female will usually guard the eggs and newly hatched young. Young centipedes closely resemble the adults and require three years to mature. Centipedes are rather long-lived, and individuals may live up to six years.

Millipedes are commonly known as “thousand-leggers.” Millipedes are wormlike, cylindrical animals with many body segments. Most of their body segments bear two pairs of legs. Millipedes tend to coil up tightly when disturbed, and some species can secrete a foul-smelling fluid.

MILLIPEDES feed on decaying vegetable matter and are often found under stones, flower pots, boards or similar debris where there is abundant moisture. Occasionally after rains or during cold weather, large numbers of millipedes may migrate into buildings. They can climb foundation walls and enter homes through any small opening. These pests are generally more troublesome in wooded or newly developed areas, where decaying vegetation provides excellent food and breeding conditions.

Female millipedes can lay 20 to 300 eggs singularly or in clusters in the soil. The eggs hatch in a few weeks, and the young go through seven to eight stages before maturing to adults.

Indoor chemical treatment eliminates only the centipedes or millipedes already inside. Spot treatments of residual insecticides to infested areas aids in control. Removal of individuals with a broom or dustpan is sometimes sufficient. A large indoor population usually indicates large numbers of millipedes or centipedes surrounding the structure. Removal of breeding sites and harborages will aid in control. Compost piles and decaying vegetation should be removed from areas close to the home. Outside treatments of residual sprays should help control outdoor populations. Dusts and granules may be applied to crawl spaces and around foundation walls.

Conclusion

Many of these pests can be managed by eliminating conditions near the structure that allow them to build up to large numbers. Generally, sanitation or basic landscaping will help eliminate pest-infested sites near structures. Also, pest exclusion, using caulking, weather-stripping, screening of vents, and lighting location can solve many problems with occasional invaders. **PP**

Philip Koehler is Endowed Professor and Roberto Pereira is Research Scientist at UF/IFAS Entomology and Nematology Department.

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Employee Goodwill

RAND HOLLON



THE LARGEST asset a pest business has to sell is intangible — meaning it's an asset that is not physical in nature. You can't touch it. The **intangible goodwill value** of a company's customers to continue to accept and pay for future services is larger than the **tangible asset value** of a company's fleet, equipment and chemical inventory combined.

It's no secret that one of the best ways to capture the goodwill value of a Seller's business is through the retention of the selling company's employees. Employees are the face of the company. The Seller's employees "carry holy water," in the form of employee goodwill. When sprinkled throughout an acquired customer base, employee goodwill delivers purchased customer goodwill value to the Buyer.

EMPLOYEE GOODWILL. Sounds simple enough. However, sometimes employee goodwill isn't always delivered by the Seller or captured by the Buyer. When employee goodwill isn't delivered and captured, transaction value suffers which is something no one wants. So, what's the best way to retain employee goodwill post-Close?

First, the Seller should look at employee goodwill as somewhat of a deliverable. The employee component of a Seller's business should be presented well, and at the right time. Work with your advisor to provide employee data that's complete in every way. In addition to historic pay data, a complete narrative for each employee which not only includes an accurate job description, but also includes your thoughts regarding employee strengths. Remember the little things. Does the employee commute with a company vehicle? Regardless of size, are there any stipends for items such as personal fuel or cell phones? Are there any "special benefits?"

Identify key employees. In the pest industry, everything doesn't always follow the organizational chart. There's always going to be "that" person other employees informally look to for direction. It's often best that a Seller identify key employees with which a Buyer should create supporting alliances post-Close.

Secondly, the Buyer should have an active interest in capturing employee goodwill. Make

effort to have a good understanding of how the Seller's employees worked prior to the acquisition. A Buyer should have a focus on how, when the time comes, he can best get the Seller's employees to stay on board as part of the Buyer's team. Successful Buyers make this happen by actively learning about the employees, gathering information, and talking with the Seller and Seller's advisor.

It is important to identify ahead of time organizational differences that exist between the Buyer and Seller when it comes to things like payroll, pay dates, and benefits. There will be differences. After all, the measure of a successful transaction isn't always about how compatible two companies are, but how the companies deal with incompatibilities.

Third, prior to Close, continue to keep things confidential between the parties of the transaction and their advisors. Without confidentiality and professionally managed release of company information, overall transaction value for both Buyer and Seller can be put at great risk. And when risk increases, transaction value decreases!

When rumors of a sale spread prior to Close, there's often a shift in employee thinking. Happy, content employees may start worrying about job security and protecting their future. These concerns may include weighing options other than simply staying with the Seller's business. Employees that are not so content but held by a regular paycheck may start dusting off their resumes. More often than not, employees assume a paycheck is no longer guaranteed when they think a future sale is in the offing.

Keeping things confidential provides an informed and prepared Buyer the ability to plead his own case to the Seller's employees — at the right time.

Lastly, announce the sale to the employees at the right time. The vast majority of acquired pest businesses are closely held S corporations — family businesses. It can be emotional. For the Seller's employees, the sale of a business can easily feel like a death in the family. An employee announcement made at the wrong time can provide an unwelcome distraction from the performance of the many tasks needed to complete an effective transaction.

BECAUSE THERE ARE SO MANY moving parts to any transaction, with few exceptions, I've found it best to advise my clients to make an employee announcement post-Close with the Buyer present, or at least nearby. Upon making announcement of the sale to the employees, it's critical to immediately provide answers to the following questions:

- 1) Do I still have my job?
- 2) Has my pay changed?
- 3) Who is my new boss?

Employees of an acquired business should go home with news of the sale, to include:

- 1) I still have my job,
- 2) My pay hasn't changed (or maybe it got a little better) and,
- 3) I met my new boss, and I like him!

Providing answers to those three questions quickly and at the right time will help keep the delivery of an acquired business' goodwill value on track.

Successful acquirers view employee tenure as a **key performance indicator**. With a focus on acquired employee retention, great staff additions can deepen an organization's well of talent. When employee goodwill is properly delivered and captured additional value is created for both Buyer and Seller. **PP**

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

Asian Giant Hornet

Vespa mandarinia

THIS INSECT has been called “murder hornet” in recent news, though that name is not used by scientists or beekeepers. The team at the UF/IFAS Honey Bee Research and Extension Lab provides the following overview about this novel pest and its risk to honey bees.

- It is native to Japan. Also found in many other Asian countries.
- First known appearance in the United States was fall 2019. Has not been found outside its limited distribution in Washington State.
- Length is 1.5 to 2 inches. Large orange/yellow head with prominent eyes. Brown/yellow striped abdomen. Nests in the ground.
- Poses a potential threat to honey bee colonies by feeding on adult and immature honey bees.
- Regular monitoring and trapping efforts are under way to minimize spread.
- Insects that might be misidentified as Asian giant hornet include:
 - ✓ European hornet — <https://tinyurl.com/vespac>
 - ✓ Cicada killer — <https://tinyurl.com/sphecus>
 - ✓ Yellow jacket and baldfaced hornet — <https://tinyurl.com/vespula>
- Human interaction with any stinging insect can result in a medical consequence. This is not unique to Asian giant hornet.



PHOTO ILLUSTRATION:
Honey bees are frequent prey
for *Vespa mandarinia*

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Featured Creatures Update

Asian Giant Hornet: A Big Wasp With a Bad Reputation

Caitlin Gill, Cameron Jack, and Andrea Lucky

ASIAN GIANT HORNETS are large, robust wasps with several features that distinguish them from other similar species. Adults have a matte orange-yellow head. Banding on the abdomen is yellow and brown, with the last segment uniformly yellow.

All Asian giant hornet colonies are established in the spring by mated queens. The queens feed on tree sap for energy and first scout for a proper space to start a colony.

Predatory Strategies

Asian giant hornet workers have a more extensive foraging range than other hornet species. They tend to attack prey within about a mile of the nest, but have been noted to travel as far as four miles or so in search of food. These hornets are very assertive when competing for resources during spring. For example, Asian giant hornet nestmates congregate around the sap supply on a tree and prevent other hornet species from feeding.

Insect prey is a vital source of protein for the growing larvae in the nest, and Asian giant hornet most often preys on large beetle species. If accessible, this hornet also preys on honey bees and other wasps, among other insects.

Asian giant hornet, or *Vespa mandarinia*, uses a pair of attack strategies to hunt other social insects. For example, the lone hunting mode involves a single hornet worker capturing one honey bee at a time outside the beehive entrance. The hornet kills the bee by detaching the head from the rest of the body at the thorax, then chews it into a gummy paste for transportation back to the nest, where it is fed to larvae.

Hornets take bees from multiple colonies rather than concentrating on one specific colony. This mode of hunting can inflict minor or major damage to the colonies, depending upon the honey bee species. Often referred to as a slaughter, the most famous mode of predation by this hornet is extremely damaging to the prey colony.

The slaughter strategy involves groups of 10 to 20 or more Asian giant hornet nestmates staging a coordinated attack on a single colony by ripping apart multiple guard bees with their mandibles, typically at the head, until no individuals remain to defend the nest entrance.

An entire honey bee colony of about 30,000 individuals can be destroyed in several hours, with the remains of those workers left in and around the hive. If there are still survivors come nightfall, the hornets will retire to their nest and reappear the next morning to continue their attack until occupation is complete.

Once the majority of the bee workers are destroyed and unable to defend the nest, the hornets retrieve the bee larvae and pupae to feed the hornet nest larvae. These types of invasions typically occur in the late summer, when the hornet colonies have produced many workers. A depiction of this process can be viewed in the National Geographic *Hornets from Hell* video (Handwerk 2002).

European honey bees, *Apis mellifera*, are practically defenseless against this predator as they have not evolved strategies to defend their colonies. Honey bee stings are ineffective at deterring the hornet, as Asian giant hornet's robust cuticle is not susceptible to these stings.

Asian honey bees, *Apis cerana*, have evolved a stronger group tactical technique because of their historical coexistence with Asian giant hornet. The bees communicate to each other to begin surrounding, or "balling," the hornet in order to raise their group temperature to about 115°F, which is high enough to kill the hornet but not kill themselves.

Medical Significance

Any interaction with stinging insects can pose risks to those who are allergic to the venom. However, Asian giant hornet has been associated with severe responses in those who are not considered anaphylactic or allergic. This hornet's defensive nature intensifies the risk for serious medical complications in humans.

In Japan it is estimated that about 40 people die from the stings each year. These deaths have been attributed to kidney failure, anaphylactic shock, heart attacks, and multiple organ failure, often from multiple stings.

During a four-month period in 2013, Asian giant hornet caused 42 deaths and 1,675 injuries in China. In the cases of injuries that led to hospitalization, it often took about 30 days to recuperate. Further, these hornets can cause scars from stinging that can endure for some years.

Economic Importance

Management of Asian giant hornet is quite difficult because of the stinging risk and lack of accessibility to the nests. Japanese inhabitants have used physical elimination as well as chemicals to kill and reduce Asian giant hornet colonies, though they are difficult to find and kill below ground.

Insecticides such as ready-to-use aerosols and concentrates are used by the U.S. Department of Defense in efforts to control other species of oriental hornets. Some beekeepers have taken to using mechanical devices, including specially designed screening, to assist with defending and protecting the bees at the hive entrances. While there are homemade devices used by some beekeepers in Europe, there are also commercial products such as false bottom boards that trap hornets attempting to invade managed honey bee hives.

Sustained monitoring efforts should be employed for early detection of Asian giant hornet in a region and evaluation of its potential establishment. This species has the potential to negatively impact human health and honey bee colonies, particularly managed *Apis mellifera*. As honey bees play a significant role in the pollination of crops, establishment of Asian giant hornet in the United States could have a severe impact on agriculture and the economy as well as on human health. Continuous monitoring and subsequent elimination of any discovered colonies is paramount to prevent Asian giant hornet establishment. **PP**

Caitlin Gill is Apiary Inspector at Florida Department of Agriculture and Consumer Services. Cameron Jack is Apiculture Lecturer and Distance Education Coordinator, and Andrea Lucky is Assistant Professor at University of Florida Entomology and Nematology Department.

Adapted from the UF/IFAS Featured Creatures article about Asian giant hornet. See the entire article online at <https://tinyURL.com/Vmandarinia>



Safety Training, continued from Page 15

amounts of the necessary pesticides are properly locked in a storage area and that every pesticide has its labels and MSDS are just as important. The law also requires that all pest control technicians carry their state-issued ID cards.

One of the most important things to regularly inspect is the spill kit, which contains the necessary items one needs in case of a spill. Luckily, we haven't had any spills in the two years I've been in this

business, but that doesn't mean I don't worry about it. Not only are spills very dangerous for all living things nearby, they could also have other negative environmental effects. The poster labeled "Pesticide Spill Control" did an excellent job of breaking down step-by-step how to handle a spill. Leo and I practiced controlling a mock spill, and I think that after going through all the steps we both feel much more confident about what to do in one of these situations.

The last poster we worked on, "Pesticide Emergencies," went over the four ways one can be exposed to pesticides and what to do in case it happens. Of course, it's always necessary to read the label and MSDS for the specific insecticide one was exposed to and the exact course of action. I made sure both Leo and I had the telephone number for the poison control center stored in our phones so we wouldn't have to waste time trying to search for it in case of an emergency.

IN CONCLUSION, the most important thing Leo and I learned during these training sessions was how much we still need to learn and how important it is to regularly review some of these key safety and emergency procedures.

I was also left with a scary thought: How thoroughly and frequently are other pest control techs in this business trained? Although regulations and licensing procedures can be a bit daunting for small business owners like me, when it comes to pesticides with such potentially harmful effects, following the rules is critical.

In our experience, we've only been inspected by the department of agriculture once in the last three years, and the inspection process was not very in-depth. On the other hand, state-issued fines, fees and litigation keep most companies in line.

This is also something I'm constantly reminding Leo and myself: We have to "cross our T's and dot our I's" because even if the chemicals don't kill us, the potential fines or lawsuits may just put us out of business. **PP**

Anthony Ruiz is Owner/Operator at Great Florida Services, Inc.

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Facts from FDACS: Formosan Termites



FORMOSAN TERMITES are spreading. If you check the UF/IFAS termite distribution map¹, you will see what I mean: There are a lot of new areas where they are now reported.

I have visited four different locations this year that did not have Formosan activity last year, and they are spreading. Northwest Ocala is one of those areas where whole neighborhoods are infested. North Tallahassee near Interstate 10 is a new location.

Some companies do not cover Formosan termites on their subterranean

termite contracts, even though Formosan termites are a subterranean termite. There has been talk in the industry about not allowing Formosan termites to be excluded from subterranean termite contracts.

Why not cover all subterranean termites on subterranean termite contracts? Some pest control operators, or PCOs, tell me it is because Formosan termites are impossible to control, or that they build carton nests up in the walls and attics of structures, or that the liability is too great.

This is not totally correct — they are not impossible to control. However, they do build carton nests in walls and attics, and they do cause more damage on average than native subterranean termites, mainly due to the colony size, therefore increasing the liability.

Don Grant and I visited a house in the Leesburg area last year where five carton nests were removed from the walls: one over the front doorway, two from the master bathroom, and one each from the other

bedrooms. This was a 2 × 4 frame house with stucco below grade.

The PCO found out that if you miss any area the Formosan termites will exploit it. For example, the PCO treated the entire exterior perimeter walls by cutting off the stucco. However, there was one 3-foot section he couldn't get to because of the exterior air conditioner. The Formosan termites came in under the wall in that area and started to eat a box in that room. We could actually see where the termites came under the wall. He then treated under the stucco in that area, and it appears that the house is clear of Formosan termites.

So the take-home message is this: Formosan termites can be controlled like native subterranean termites. You just have to be very thorough and persistent with your treatments. **PP**

Report by Paul Mitola, Environmental Consultant

¹ www.flrec.ifas.ufl.edu/termites-in-florida/termite-distribution



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Jennings Cooksey IV
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Weed Control, continued from Page 23

Whether glyphosate can be used or not, successful weed control programs are based on an integrated approach using both chemical and nonchemical methods. One of the most effective nonchemical approaches to weed management in landscape planting beds is organic mulch such as pine straw, pine bark, or wood chips applied at around a 3-inch depth.

Preemergence herbicides should not be overlooked as part of an overall weed management program. In fact, they can eliminate many of the issues associated with postemergence herbicides. They are safe for use on most ornamentals, control many different types of weeds, and reduce the total number of applications that are needed, and in many cases, significantly reduce the overall maintenance cost of weed control in planting beds.

In most cases, the best results are achieved by combining nonselective and selective herbicides, preemergence herbicides, and nonchemical strategies. **PP**

Chris Marble is Assistant Professor at UF/IFAS Environmental Horticulture Department, Mid-Florida Research and Education Center.

Further information on glyphosate alternatives and choosing specific options for your company can be found online in the UF/IFAS EDIS publication *Glyphosate and Herbicide Alternatives for Weed Control in Florida Landscape Planting Beds* at <https://edis.ifas.ufl.edu/pdffiles/EDP/EP580000.pdf>.

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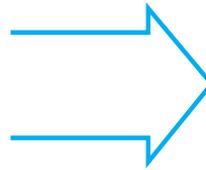


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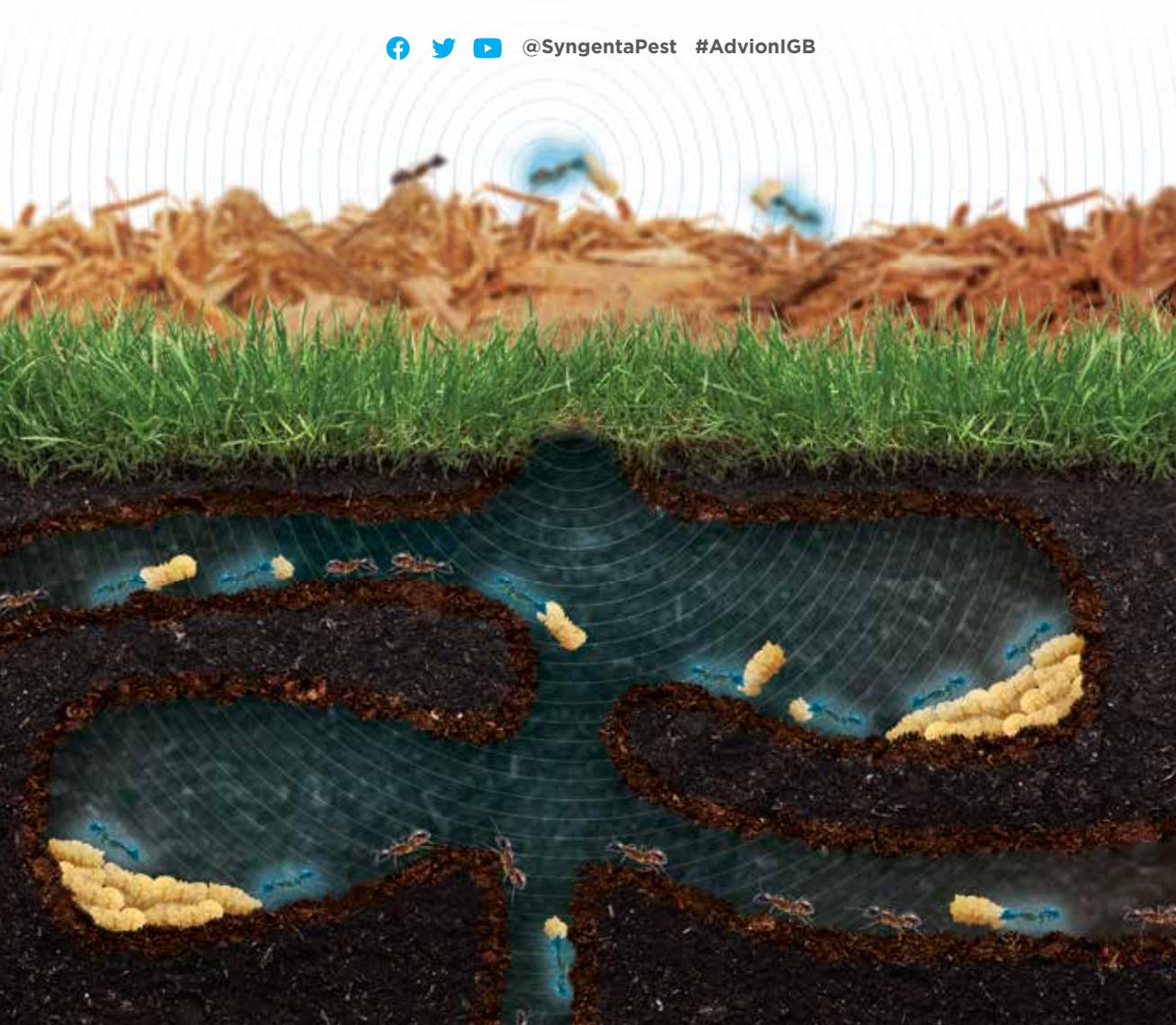
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