

MAY/JUNE 2018

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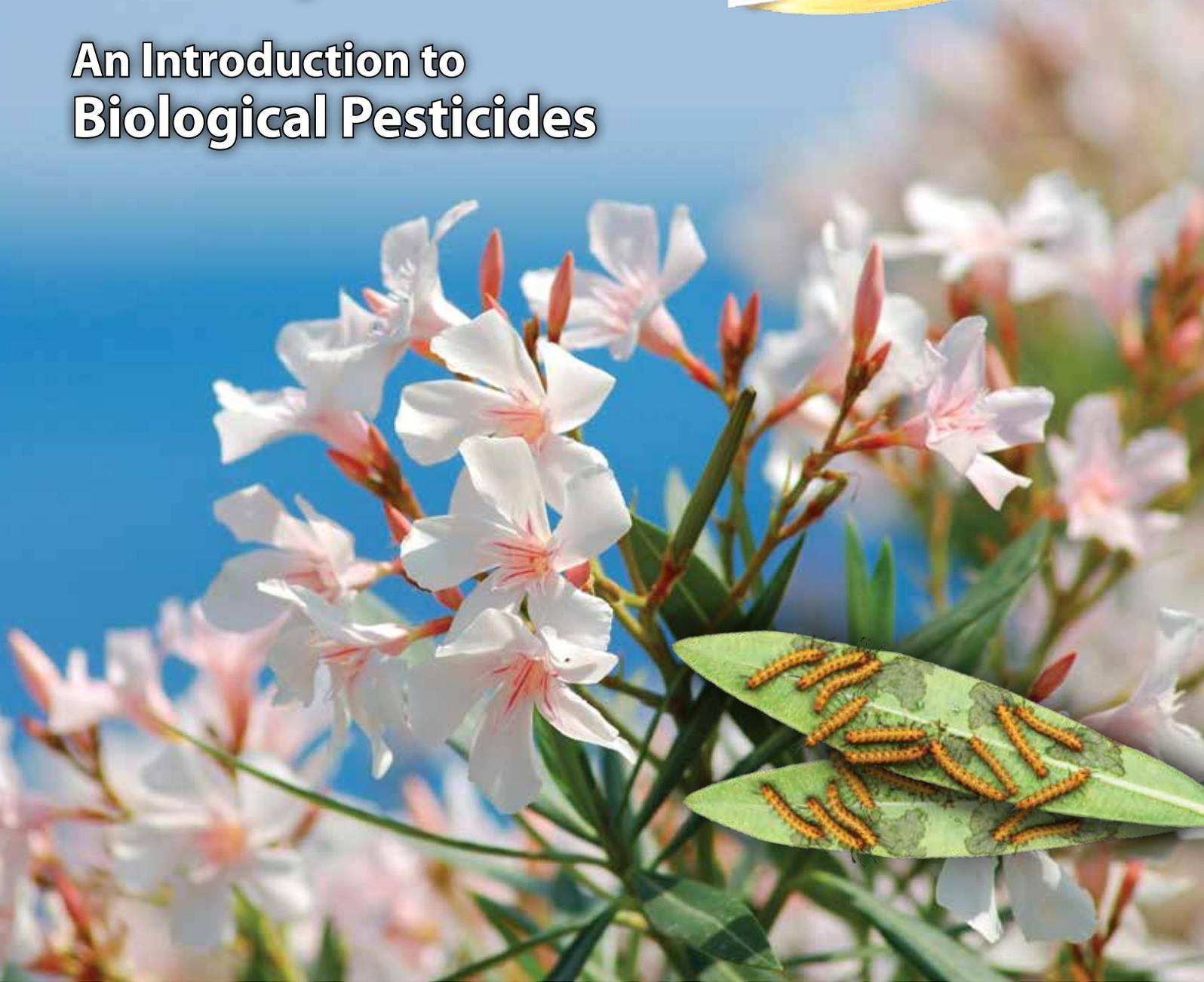
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From Pest Management Education, Inc. to Landscape and Pest Managers

Fly Trap Facts

Burmese Pythons

An Introduction to Biological Pesticides





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Michael Palmer



ON THE COVER

Nerium oleander is host plant of the highly damaging oleander caterpillar. Luckily, the biological pesticide *Bacillus thuringiensis* can help manage this pest and many others that show up on ornamentals in the South.

Cover photo by Giovanna Tondelli

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Networking Works

Message from the President of FPMA

Steve Lum

MAY is upon us, and business is in full swing for those of us in the pest and lawn industry. School will be letting out soon, as the year nears the halfway mark. For many of us this is the busiest time of year. Pests are running rampant, leads are flying in, we're all trying to get the work done, and there's no time to slow down.

We're incredibly fortunate in Florida to have pest pressure virtually year-round. It's a wonderful thing. The downside, however, can be what I call "forest-for-the-trees syndrome." Forest-for-the-trees syndrome refers to working with blinders on without regard for the big picture. We all have to make a living, and we're told to strike while the iron is hot. There are times, however, when you want to stop working like a dog in your business and in your jobs and instead start working on your business, on yourself, and on your career.

Invest in yourself

Are you taking time to get educated? Are you perfecting your craft to become an expert in your field? Do you know about new advances in product chemistry? When was the last time you went to the UF Southeast Pest Conference?

This year the conference was on May 7-9, and like every other SE Pest Conference it's an outstanding value. If you missed it this year I highly recommend you not miss it next year. It's also an excellent place to send your up-and-coming technicians.

It was at a Southeast Pest Conference perhaps over 20 years ago where I first solidified my love for this industry. We were a small company back then with, I think, six pest control routes. Doug Vander Poest owned the company at the time. He invested a few dollars and sent fellow PC tech Dale Velie and me to the conference.

From that investment, two long-term careers were sparked and were realized, and that investment still pays benefits to the company to this day. Dale stayed with the company for 20 years and was promoted to pest department manager. I went on to become general manager and president.

Prior to his passing, Doug continued the investment in me for many years. Doug suggested I put my name in the hat to run for Region 4 director. I was the only name in the hat, so I won. Doug sent me to Pest Expos and other conferences. I got experience running a region. I met owners of large companies. I met professors and entomologists, and I met and associated and worked with FPMA presidents and managers and leaders from dozen of companies. I got to know nearly all the Allied members.

I discovered that each person I associated with, each person I helped and worked with and for would help me get better and would help me find solutions.

Everyone I meet in the Association, everyone I meet from UF, everyone I've ever met from the Dept (DACs) knows stuff I don't know and, amazingly enough, nearly all of them have shared their knowledge, their wisdom and their time with me. I've invested heavily in FPMA, but I've received so much more than I've given. So what about you?

Isn't it time you registered for Southeast Pest Conference to continue learning? Maybe you should spend a few days at the Naples Grand for FPMA Summer Conference. Sure, there'll be food, CEUs, education, sunshine, and an amazing place to stay, but the real payoff will be that brainstorm you get that transforms your business. Or maybe you'll have a 10-minute conversation with Greg Rice and Tim Hulett as they share an idea with you. Maybe you'll run into Dan Gordon from PCO Bookkeepers and he'll teach you how to keep more of your money. Fifteen minutes can save you 15 percent at Geico, but 15 minutes with Mickey Nolen and Paul Sugrue might net you 50K this year. Fifteen minutes with Mark Ruff might keep you from a million-dollar lawsuit. Maybe it's time to invest some time and a few dollars in FPMA. I guarantee you'll see a great return. **PP**

Steve Lum
President, FPMA



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The Changing Face of Education For the Pest Management Industry

I HAVE BEEN associated with educational programs for the pest management industry for about 45 years now and have seen many changes. Of course, *PestPro* magazine is a great resource for the industry. We pride ourselves in providing information directly from the researchers to the Florida industry.

DAWN of PEST CONTROL TRAINING

When I was hired as an assistant professor at the University of Florida, I had the responsibilities for educating not only the pest management industry, but also the livestock and poultry producers in the state. It was explained to me that the pest management industry was a lower priority than those other clientele. So for my first few years I concentrated on educating the beef, dairy and poultry producers.

At the same time, I had a passion for training the pest management industry. FPMA in those days was an important association, with its foundation at the University of Florida. The educational activities were a mimeographed, one-page newsletter that was sent out in the mail to members, the 11 or so yearly educational regional meetings that were held for certified operators and technicians, the winter business conference held at the University of Florida, and the summer conference held at various locations in the state.

My main educational activities then were to travel to the 11 locations on Friday, provide a six-hour program on Saturday, and travel back on Sunday. The need for training was, at that point, to comply with the new EPA standards for pesticide certification.

I remember providing programs to hundreds of pest control employees in Miami, West Palm Beach, Jacksonville, Tampa, and Ft. Myers. One of the first programs was in Jacksonville, where 220 folks arrived for the training program. I found out that there were few alternatives for people to get quality training and education. So attendance was at its highest point ever. The industry was growing and needed to comply with the new EPA standards.

After about five years with the University, I shifted my focus in training from the livestock and poultry industries to mainly pest control education and research. I linked up with the USDA and Dr. Richard Patterson to not only provide research, but also educate the industry.

PEST CONTROL TRAINING EVOLVES

In those days, we started exhibiting at FPMA and NPMA so the industry would be aware of what we were doing. There is no reason to generate research information if it stays in a book on a shelf and is not utilized by the industry.

When we exhibited our cockroach arenas and research results on controlling populations of cockroaches with baits, I remember folks coming up and asking us why we were exhibiting. We were not selling anything, just interacting and educating.

That was a huge change that occurred. Education became personal and interactive. Eventually, I discovered that if I brought students to the exhibits, they could see the industry and the job opportunities available to them. Exhibits then changed from just educating the industry to educating students as well. That whole process blossomed into a whole generation of students who entered the industry and brought a fresh approach to pest management.

In the early 1990s, EPA had a big push on School IPM. IPM was a word not recognized or appreciated in urban pest management. I got with the Department of Education, and we organized a series of regional School IPM meetings.

Some members of industry told me that there would be very poor attendance because nobody wanted to hear about how to reduce spraying for pests in schools. It turned out that several hundred pest controllers were trained in IPM. At the same time, we started holding the SE Pest Management Conference, which will have had its 23rd annual meeting on May 7–9. Since those early beginnings, IPM has been adopted as a goal for almost every pest management company.

The University of Florida's Pest Management University has been ongoing for the past 20 years and is a unique program to give hands-on training to the urban pest management industry. The training facility in Apopka gives employees the chance to see all forms of construction and pest damage without spending a year trying to find all the construction styles in their area.

CHALLENGES in the 21ST CENTURY

Education has changed drastically. Many companies now approach education in-house, and attendance at pest control education

meetings has dropped off. Large companies have built in-house training facilities so employees are taught the procedures used by their company.

Also, there is a wide variety of educational materials provided by distributors, manufacturers, and online. So the combination of training being provided by people who sell to the industry and online distribution of education has further changed the ways new research on pest management is provided.

We took on the task of publishing *PestPro* magazine to preserve the direct movement of information from the researchers to every urban pest management company in Florida. We send the magazine free of charge to everyone in Florida who wants to receive it. We have about 12,000 on our mailing list, and others view the magazine online at pestpromagazine.com.

It is a challenge to educate the industry. The print model for education goes back a long way. But we have new programs that are being developed for online training:

1. 10 mosquito training modules were developed for the urban pest management industry. With the advent of Zika in Florida, UF and FDACS were interested in making sure mosquito control services were appropriate and effective.
2. TechPro will be an online training program of 10 modules for new technicians.
3. SE Pest Management Conference lectures will be delivered online for people to view.
4. Label tutorials are being updated and will be available soon.
5. iPest is being updated for both android and iPhones.

We expect the five new programs to be available later this year.

We are taking on the challenge of education for the urban pest management industry even though the methods of delivering quality instruction are changing. We are proud of *PestPro* magazine and the dedication of all the contributors. Together we hope to see the industry prosper and deliver quality service for customers. **PP**

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

Fly trap facts

Learn the correct use of insect light traps

Don Foster



When an industrial food processing plant shuts down due to flies, it can lose an astronomical \$32K a minute. This real-life scenario shows the importance of controlling fly populations within facilities. Having a grip on fly pressure in your account can mean the difference between a happy customer or a loss on your bottom line.



**Food processing plant
local environment**

I KNOW everyone is thinking, “Our clients spend most of their time correcting conducive conditions that support fly populations in and around their facilities. In fact, fly control is a passive, add-on service that does not require any significant effort. You simply install an insect light trap and the client will reap the rewards of your efforts.”

If fly control has been a passive, add-on service in your bag of tricks, maybe it's time to consider the following facts about establishing fly control using insect light traps, or ILTs.

The environment

Fly control is impacted by the environment near the facility as well as areas up to a few miles away. You must first understand the target species and the environment supporting the fly population.

A great starting point may include an aerial shot of the local environment from Google Earth™ at <https://earth.google.com/web/>.

This will give you a general idea of potential fly populations impacting your facility due to agricultural lands, water sources, landfills, wastewater treatment plants, neighboring businesses, and more.

The clients' facility may also contribute to large fly populations. Fly programs designed to control filth flies — large flies — are a product of macrohabitats. The opposite is true as well. If your fly program is designed to control small flies, then these are a product of microhabitats.

Once your target species have been identified, you can identify fly ingress points throughout the structure. Corrective action plans may require additional measures if the client has these as part of their standard operating procedures, or SOPs. Always verify that the program is in line with your clients' SOPs. Some areas can easily be overlooked when addressing fly infestations.



Identify all target species



Insect light traps come in many shapes, sizes, finishes, makes and models

An ILT for everyone

Insect light traps come in many different flavors. You have the cute, dainty tabletop models that clients want to conceal under counters, behind furniture, or in wait stations, which severely undermines fly control programs and has no real impact on fly populations in commercial establishments. However, these models may satisfy homeowners that contend with the occasional flying insect in their home. Rest assured, there is an ILT for everyone.

We also have the real breadwinners that perform well in dining rooms, cafeterias, vestibules and lobbies, which help announce population changes in sensitive environments. These come in a variety of models known as wall sconces. They can be designer models fabricated from metal that blend with existing lighting or appliances with finishes in black, white, antique and/or polished brass.

Other models may be made of PVC and/or polypropylene components with neutral colors. They generally conceal a glue board that if properly positioned will prevent prying eyes.

On the other hand, some units effectively display their treasures for all to see. Manufacturers have designed covers that shield these treasures from the public for those that wish not to expose a high capture rate.

Then we have the glorious industrial-type units that are fabricated out of aluminized or stainless-steel components. These are most often found in trash rooms, dock areas, transition

rooms, corridors, and warehouses. In some instances, these units have been installed outdoors under protective canopies.

Every ILT in its place

The environment can significantly impact the design of any effective fly management program. Insect light traps are not one-size-fits-all. Strategic placement prior to the deployment of your insect-light-trap arsenal is key.

There are several models to choose from, but understanding the placement of these devices and how they function can play a significant role in your fly-control program.

Placement can affect several aspects of your fly-control program. So what is the ideal placement of an ILT? Does placement affect target capture? Does it still capture insects when obstructed? Who installs the ILT: a PCO or a contractor?

Ultimately, any placement requires educating your customer on placement options along with knowing the dimensions of the device. It helps to have demonstration models when practical. Unless you plan to supervise the installation of the ILT, the PCO installs it whenever possible.

What about a power source? Keep in mind that some models may require an electrician. All units do not come equipped with that super-popular device that makes an electrical connection, a plug. Ideal placement depends on your target species. Enter: the fly zone.

What is the fly zone?

The fly zone, or FZ, is the area 2 to 5 feet above the floor. Does this mean zero catch at 8 feet above the floor? No, it simply means that flies have a resting height and flight pattern consistent within this region above the floor.

What other surfaces are consistent within this region above the floor? Food-contact surfaces. Flies do not go far from their food sources unless they want to change the menu.

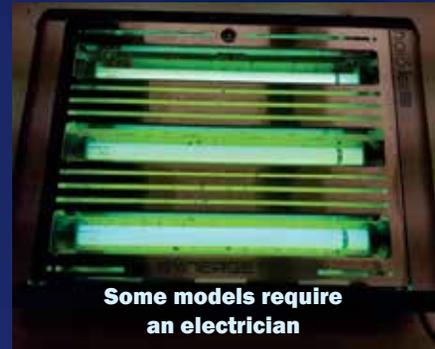
How many places can you install an ILT within the FZ? Not many. Why? Mainly because the customer has other uses for the space. Either placement is incorporated into the design or you will have to improvise with what you are given to work with. This means manipulation.

An ILT is a tool. You make it work. How do you work around food-contact surfaces? You don't. You work under them whenever necessary.

Regulations along with inspector preferences can vary by state and by location. Most regulations indicate that ILT placements in food preparation areas are to be no closer than 5 feet and cannot be installed above food-contact surfaces, to prevent food adulteration. Any ILTs installed in food-preparation areas should contain glue boards.

One ILT design has a low-voltage grid that stuns the fly but does not disrupt the insect cuticle or appendages, leaving the insect intact. Electric grid units should be placed in areas less visible to the public eye and should never be installed in food-handling areas.

Continued



Fly zone is 2-5 feet above the floor (shaded in green)

Why is wall space so precious?

ILTs were not in the original plans. Since wall space is precious, areas may exist at lower levels below the food-contact surface or workspace. Hotspots in food-service areas must be evaluated constantly to identify times of peak fly activity.

ILTs can be relocated if placement is less than effective. A common mistake is believing that once an ILT has been installed, it cannot be relocated. This is nonsense. Be the professional that you are and relocate the ILT if it is warranted.

Make sure you discuss this with the client. Technicians that take over existing routes have the responsibility to enhance the effectiveness of the fly program. Just because an ILT was installed does not mean it was properly placed.

Be prepared to repair blemishes and holes after relocating the unit. Please make sure that the device is relocated during nonpeak hours to prevent unexpected pest sightings. Who knows what you might find harboring behind the unit?

What about the tubes?

Yes, there is a difference among the bulb types that can be used in different locations. ILTs placed in food preparation areas should have protected tubes.

ILTs should also be placed in an area that reduces the potential for damage. Remember wall space is precious to the client. Special coatings are applied to the surface of the bulb to prevent glass shards from displacement outside the unit. Some units may come with a protective sleeve that is substituted for the coating due to the shape of the bulb.

Most food-handling facilities have a glass, plastics, and brittles SOP. Keep this in mind when installing ILTs. The components should be in line with this policy to prevent a HACCP failure.

Ultraviolet fluorescent tubes have been used for many decades in the fight against flying insects. These tubes produce polychromatic

light in broadband wavelengths that include peaks in UVA at 365nm, violet 409nm and 440nm, green 550nm, and yellow at 580nm. Tubes producing wavelengths shorter than 365nm can be damaging after prolonged exposure, in the same fashion as tanning beds.

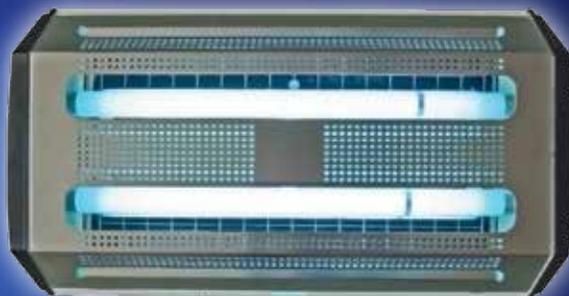
UVB tubes should never be installed, as these can burn the eyes in a relatively short amount of time — e.g., changing a glue board. Only UVA spectrum and greater tubes should be utilized in these units.

UVC tubes are medical grade and are simply not an option. Other tubes available have peak wavelengths at UVA 368nm and green 540nm.

We can't forget about the ultraviolet LED, or light-emitting diode. Ultraviolet LEDs produce narrowband wavelengths, which simply means the bandwidth is smaller — producing a peak wavelength such as 365nm. This is referred to as monochromatic light.

Please note that ultraviolet LEDs are not all the same. Finetuning of the wavelength causes fluctuations in the price of the light bar. Special equipment is needed to test the accuracy of these new light sources that can vary as much as 30 percent.

Arrangement of the LEDs along with the energy driving the output can make an extreme difference in capture rate. Various manipulations in positioning can either increase or decrease the effectiveness. Patents can also affect availability.



Some ILT tubes have a protective sleeve

What about competing light sources?

Is this a myth or a legitimate concern in ILT placement? ILTs should be positioned to be effective!

Units should not be placed where it is visible from the outside. Why? At dusk, units visible from the outside may become more visible. Not to us! To the flying insects! Flying insects will draw more crawling insects.

Operating hours can affect the placement of ILTs as well. Is the business open 24 hours a day? Placement of the ILT in a lobby with regular business hours can draw insects consistently during nonbusiness hours and weekends, creating additional concerns. So if the lights are out during nonbusiness hours, supplemental treatments may be needed on the exterior. Consider window tinting if this may be a concern.

What happens if the only light source is the ILT? Are flies active when the lights are off? This goes back to evaluating your target area. Flies are diurnal. This must mean they are only active during the day. Not so fast! Periodicity is a physiological event that can be reset while antagonizing the circadian rhythms of flies.

Flies may also have a need for photoregeneration. This means that when light stimulates the compound eyes, another stimulus of light may be needed to allow the eyes to reset for it to respond to the next light stimulus. This may be important when considering the use of LEDs in your fly program.

Fluorescent lighting above your ILT may or may not interfere with your capture rate. ILTs are designed to operate within peak sensitivities of flying insect compound eyes.



What about temperature?

Can the temperature affect capture count? You bet! Flies respond to temperature differences just like us with one exception: they do not have a wardrobe! So, they will seek out environments that maintain homeostasis.

Cold temperatures kill the party for these lovely creatures. Placement of ILTs in cool environments reduces capture rates. Simply check out the dairy section at the local grocery store. Flies are attracted to food sources in these environments and enter a state of quiescence — forced sleep. Warm a few of these specimens up, and it's time to party, fly-wise!

The opposite is true as well. If the environment is too hot, they will move to cooler areas. The laws of physics play a role here. Standard ceiling heights in food preparation areas are generally too hot around ovens and steam kettles. Even though food particles may rise and stick to the ceiling, flies will avoid these areas due to excessive heat. Hot surfaces around 135 degrees F will generally deter flies as well.

Stay tuned for more fly trap facts in an upcoming issue of *Pest Pro*. **PP**

Don Foster is Graduate Research Assistant at UF/IFAS Entomology and Nematology Department.

An Introduction to Biological Pesticides

Bacillus who?

Entomopathogenic what?

PestPro sorts it all out.

Matt Borden
and Adam Dale

During conversations with pest control professionals, county Extension agents, and homeowners throughout Florida and the Southeast, a topic that frequently arises is natural or biological pesticides, also called biopesticides.

PEOPLE are curious about what natural products they can use to effectively and safely reduce pests without some of the constraints or unintended effects of conventional synthetic insecticides. There is a general lack of knowledge about what biopesticides are, options that are commercially available, and how to most effectively use them. However, the number of options is rapidly increasing, and we have found that many of them effectively control key plant pests.

One of the more common and effective forms of biopesticides are microbial

insecticides. Microbial insecticides are a category of biopesticides that contain microorganisms like viruses, bacteria, fungi, protozoa or nematodes, or the natural toxins these organisms produce.

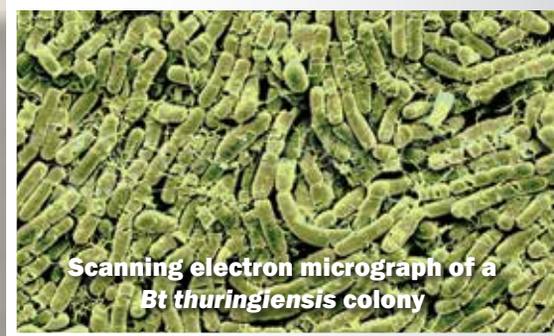
Microbials are valued for specifically targeting the pest of concern, with reduced risk to nontarget insects and extremely low risk to humans and the environment. They can be successfully incorporated into programs with conventional insecticides, and may be particularly useful for their short pre-harvest interval (PHI) when managing edible plants.

Some products contain live organisms and may have special requirements — e.g., kept cool, gentle agitation, modified nozzles — while others can be formulated as standard sprays, dusts, liquid drenches, liquid concentrates, wettable powders, or granules.

The more common products, such as *Bacillus thuringiensis*, spinosad, and insect-parasitic (entomopathogenic) nematodes, are readily available, while others can be difficult to find or cost prohibitive. When using microbial insecticides, it is particularly important to understand their specific limitations and strengths.

Bt, or *Bacillus thuringiensis*

Bacillus thuringiensis is a naturally occurring bacterium found in soil, fresh water, and on plant surfaces. *Bt* products are the most commonly used microbial insecticides, with different subspecies available that target specific pest groups without harming other organisms. When an insect feeds on material treated with *Bt*, it becomes activated (toxic) and the bacteria colonizes the insect, causing it to stop feeding and die within a few days. The downside to *Bt* is that it is rapidly broken down by sunlight, which means frequent and properly timed applications may be necessary for some pests. *Continued*



Scanning electron micrograph of a
Bt thuringiensis colony



Lesser cornstalk borer larvae severely damage unprotected peanut leaves (left) while those feeding on Bt-protected leaves quickly cease feeding, crawl off and die. Photo by Herb Pilcher, USDA-ARS

BEFORE selecting a *Bt* product, it is important to identify the target pest and know which life stage the *Bt* will control. For example, *Bacillus thuringiensis* variety *kurstaki*, or *Btk*, is toxic to caterpillars, but not adult moths. Common caterpillars that *Bt* var. *kurstaki* effectively kills include fall webworm, cabbage looper, bagworm, tomato/tobacco hornworm, and Io and oleander caterpillars.

In recent years, *Bt* varieties have been developed that target other pest groups: fly larvae such as mosquitoes, blackflies, and fungus gnats (*Bacillus thuringiensis* var. *israelensis* [Bti]); wax moth larvae in honeybee hives (*B. thuringiensis* var. *aizawai*); and beetles (*B. thuringiensis* var. *san diego*, *B. thuringiensis* var. *tenebrionis*, and *B. thuringiensis* var. *galleriae*). We recently found that *Bt* var. *galleriae* effectively reduces Sri Lanka weevil damage on hibiscus shrubs. Among homeowners, *Bt* products are especially popular thanks to their efficacy, price and minimal risk to beneficial insects.

Spinosad

One of the most familiar and commonly used microbial products is spinosad, which is also derived from a species of soil bacteria, *Saccharopolyspora spinosa*. Spinosad is relatively broad-spectrum and controls a wider range of pests than other microbials, including caterpillars, leafminers, flies, thrips, beetles and spider mites.

Spinosad attacks the nervous systems of insects that come in contact with or ingest it, stopping feeding within minutes and causing death within two days. When used correctly, it has low-to-moderate toxicity to beneficial organisms, and very low toxicity to mammals and wildlife.

We recently demonstrated that spinosad provides rapid control of chilli thrips on Indian hawthorn shrubs with minimal impacts to its key predators. However, it does not have much residual toxicity and is highly toxic to bees when the spray is wet. Therefore, applications should be made in early morning, late evening, or at night when pollinators are not actively foraging.

Other bacterial insecticides

Chromobacterium subsugae produces fermentation chemicals that control a broad range of insects and mites, acting as a stomach poison, feeding repellent, and by reducing reproduction. Recent pest control

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Continued on Page 14

Name: Vernon C. Pickhardt, II
Hometown: Sarasota, Florida.
Where you live now: Palmetto, Florida.
About your company: When the division I was working in with ConAgra was sold, I started my business by literally knocking on doors. It is a small company. We do interior pest control and lawn care.



Vernon C. Pickhardt, II

First paying job and what you learned from it:

I cleaned pools. I learned that I loved working outdoors and not behind a desk. I would receive commission for selling new accounts. It taught me to not fear knocking on doors and not to take the word no personally.

First break in the pest business:

I acquired the [spring training] home of the Pittsburgh Pirates — Pirate City — my second year in business. It gave me the cash flow to build my business.

Best business book: *Selling Techniques*, by Tom Hopkins.

Best piece of business advice you received: Always conduct yourself as a citizen of Heaven.



What you would tell someone new to the pest business:

It has become a very mature business, which makes internal growth difficult. If you do not have sufficient capital to get you through the lean times, you may fail. Find a mentor that has been there. We don't know what we don't know.

Where can we find you when you are not at the office?:

You can find me in my workshop. I love building furniture and detail wood crafting.

What is the most important trait you look for when hiring?:

Team player that wants the team to succeed. **PP**

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Tawny mole cricket infected with *Beauveria bassiana* fungus. Photo by Lyle Buss, UF/IFAS



Infective nematodes emerge from a dead moth pupa. This nematode species, *Heterorhabditis bacteriophora*, can attack immature stages of many beetle and moth pests. Photo by Peggy Greb, USDA-ARS

trials have found that this bacterial product also works well against foliar feeding beetles.

It is soft on beneficial insects and is approved for organic use by the Organic Materials Review Institute, or OMRI, but should still be used carefully to minimize toxic effects to bees, aquatic invertebrates, and soil-dwelling organisms.

Fungi

There are also several insecticides developed from fungi that can provide safe and effective pest control tools. Insect-parasitic fungi thrive in moisture — humidity and rainfall — which favors the germination of fungal spores that penetrate insect bodies and produce toxins that kill the insect. Thus, unlike bacterial and viral pathogens, fungi do not need to be consumed by the insect.

Beauveria bassiana is one of the few fungal products readily available for purchase. This pathogen naturally occurs in soils, and many soil-dwelling insects may be naturally tolerant to it. Commercially available products are therefore labeled for use against foliar-feeding pests such as aphids, thrips, whiteflies, beetles, and spider mites.

On the downside, the fungi must contact the pest for infection to occur, and death may take several days. However, there is an advantage — the mold growing from dead insects provides millions of new spores for further infection.

Insect-parasitic (entomopathogenic) nematodes

Although not truly microbial, these nematodes (roundworms) are used much like microbials and are often referred to as “biopesticides.”

Steinernema and *Heterorhabditis* species are common commercially available beneficial nematodes. They infect the soil-dwelling insect host by swimming through the soil and into a host’s body where they release bacteria into the insect’s blood. The bacteria cause the insect to die within a couple of days.

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 ** Excluding carpenter, fire, harvester and pharaoh ants

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After reproducing, young nematodes exit the dead insect and search or wait for a new host. Products containing parasitic nematodes have been developed to control white grubs in turfgrasses, as well as root weevil larvae and similar soil-dwelling pests that attack lawn and garden plantings.

They work best in sheltered or undisturbed environments with high moisture levels. Before purchasing insect-parasitic nematodes, it is important to identify both the target pest and the species of nematode because many are host specific.

Explore your options

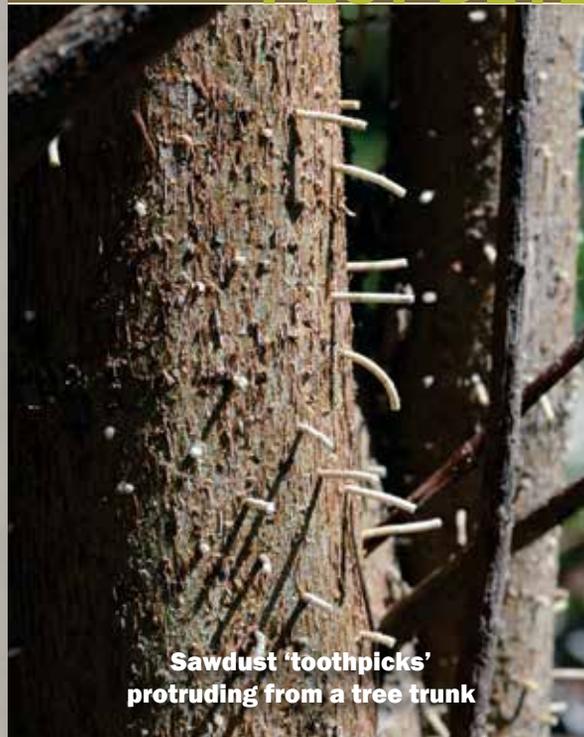
As various insect plant pests continue to create challenges, it is important to explore the various microbial pest control tools available. This is particularly important as we begin to better understand undesirable effects of our most commonly used conventional insecticides.

Although there are several effective microbial products, they remain underutilized in many plant management areas and resistance management product rotation programs. Despite challenges associated with their use, there are efforts to expand microbial insecticide options and make them more compatible with current practices.

Our recent research has found that multiple products — *Chromobacterium subsugae*, *Bt* var. *galleriae*, and spinosad — work as well or better than commonly used synthetic products against damaging pests.

As always, the first step is to read the label to learn how and when to apply these products, since local environmental conditions — heat, sunlight, and dry conditions — affect how well they work. Then, explore the options and begin to master their safe and effective use. **PP**

Matt Borden is Graduate Student and Adam Dale is Assistant Professor and Extension Specialist at UF/IFAS Entomology and Nematology Department, Gainesville, Florida.



Sawdust 'toothpicks' protruding from a tree trunk



Tunnels in a mango trunk. The ambrosia fungus is black



Granulate ambrosia beetle

Photos by Lyle J. Buss.

Granulate Ambrosia Beetle

Lyle J. Buss

HAVE YOU SEEN any trees that look like they have toothpicks sticking out from their trunks? It may look like a strange prank, but it's actually a sign that ambrosia beetles are attacking!

The "toothpicks" are made of sawdust. When the female beetle attacks a tree, she chews a hole through the bark and tunnels into the wood. She pushes the sawdust out of the hole behind her. Sometimes the sawdust sticks together and may project an inch or more from the bark. These "toothpicks" are fragile and easily broken by wind or rain.

Ambrosia beetles don't feed on the tree itself. The beetle inoculates the sides of the tunnels with an ambrosia fungus. She and her young actually feed on this fungus, not on the wood. The picture above at upper right shows a mango trunk that has been cut open, and you can see the dark fungus growing in all the tunnels.

Many species of ambrosia beetles can cause these sawdust "toothpicks," but the one most commonly responsible is the granulate ambrosia beetle, *Xylosandrus crassiusculus*. It is a very small beetle, only 1/8-inch long. It attacks a very wide range of hardwood trees, shrubs and vines.

Most ambrosia beetles are secondary pests, meaning they are attracted to trees that are stressed, dying or even recently dead. Flooding, drought and construction damage are a few factors that can stress trees, leading to ambrosia beetle attacks. Ambrosia beetles are difficult to control since they bore deep into the wood, where insecticides can't reach. The best management is preventive, keeping trees as healthy as possible so that they aren't attractive to ambrosia beetles. **PP**

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



A Burmese python coiled in the grass in the Florida Everglades.

Brian Falk, USGS

Burmese Pythons in South Florida



FEMALE Burmese pythons lay eggs in May and June, further expanding their Everglades population boom. Researchers and government agencies persevere to attack the python problem on many fronts.

A Rapidly Growing Problem

BURMESE PYTHONS, *Python molurus bivittatus*, are popular pets in the United States because of their attractive color pattern, reputed docility, and the allure for some of owning a giant snake.

An inexperienced snake keeper who takes home a 20-inch hatchling is, within a year, responsible for a brawny eight-foot predator. Unable to handle their giant snakes, and unable to find new homes for them, some owners illegally release them into the wild. Released and escaped Burmese pythons are now breeding in the wild, and their growing numbers may result in dire consequences for native wildlife and ecosystems in South Florida.

As predators and competitors, Burmese pythons pose a threat to endangered wildlife in South Florida. A growing wild population of pythons has the potential to create a major ecological problem in Everglades National Park and threaten successful restoration of the greater Everglades.

Pythons' rapid and widespread invasion is facilitated by aspects of their natural history such as diverse habitat use, broad dietary preferences, lifespan of 15–25 years, high reproductive output, and ability to move long distances. Burmese

python hatchlings are larger than hatchlings of native species and are less susceptible to predators. These multiple advantages may allow pythons to compete with native snakes and other predators for food, habitat and space.

Of particular concern is the spread of pythons to biologically vulnerable areas such as the Florida Keys. Because Burmese pythons are excellent swimmers and can travel long distances in water, the many creeks and canals separating the Keys should not inhibit python movement. In fact, pythons have already been found on Key Largo, where dietary analysis established that the endangered Key Largo woodrat, *Neotoma floridana smalli*, is among their prey.

Human safety is also a concern. There is no evidence that wild Burmese pythons hunt humans. However, on several occasions large captive Burmese pythons have killed their owners. Perhaps more importantly, large snakes may stretch across roads, posing a hazard to motorists.

Reproduction

On May 17, 2006, the first python nest was discovered in South Florida in Everglades National Park, confirming that pythons are breeding in the wild. Pythons of both sexes are believed to reach sexual maturity at a length of around 8.5 feet.



Female Burmese python with egg clutch.

Tigerpython

Rebecca G. Harvey, Matthew L. Brien, Michael S. Cherkiss, Michael Dorcas, Mike Rochford, Ray W. Snow, and Frank J. Mazzotti

Adapted from EDIS publication WEC242, Burmese Pythons in South Florida: Scientific Support for Invasive Species Management. Rebecca G. Harvey, environmental education coordinator; Matthew L. Brien, wildlife research assistant; Michael S. Cherkiss, wildlife biologist; Mike Rochford, wildlife research assistant; and Frank J. Mazzotti, associate professor; Fort Lauderdale Research and Education Center, UF/IFAS Extension. Michael Dorcas, associate professor, Department of Biology, Davidson College; Ray W. Snow, wildlife biologist, South Florida Natural Resources Center, Everglades National Park.

Mating in ENP occurs between December and April. Males locate females by detecting pheromones — chemicals secreted by one animal to send a message to others of the same species. Breeding aggregations of one female and several males are commonly formed.

Females lay eggs in May and June and remain coiled around the clutch until hatching occurs in July and August. In a sample of eight clutches discovered in South Florida (one nest and seven pregnant females), the average clutch size was 36 eggs, but pythons have been known to lay as many as 107 eggs. A recently captured adult female in ENP was found to be carrying 85 developing eggs.

Size and Appearance

The Burmese python is one of the largest snakes in the world: it reaches lengths of up to 23 feet and weights of almost 200 pounds. The largest python found thus far in the Everglades 16 feet long and weighed 152 pounds. Hatchlings range in length from 19–31 inches and can more than double in size within the first year.

Burmese pythons are light colored with dark brown blotches bordered in black, and a pale belly. They grow much longer and heavier than any of Florida's native snakes.

Management Priorities

Priorities for invasive snake management include prevention, eradication, containment and reduction. To prevent the release of pets, we must promote responsible pet ownership through education, limiting ownership, and providing disposal sites for unwanted animals.



Jemema Carrigan

A captured Burmese python.

Unfortunately, it is too late to prevent the invasion of Burmese pythons and possibly other species of large constrictor snakes. Dealing with established species requires that we understand their extent, behavior, potential ecological impacts, and how to remove them. Research by the Python Science Support Team is providing answers to these critical questions.

Eradication of invasive snakes is most feasible when intervention is early and when the area is small, isolated and accessible. Priority areas for eradication include the Florida Keys, because of their ecological vulnerability, and Deering Estate, to eliminate another potentially destructive nonnative species, *Boa constrictor*. When eradication is not possible, containment and reduction are realistic management goals.

To effectively remove invasive snakes, the Python Science Support Team will continue to research and develop traps and deployment methods. Radiotelemetry and thermal research will be continued in concert with trapping efforts to enable managers to identify areas and times of snake activity. “Judas snakes” play an important role by leading researchers to additional pythons to capture and remove. Continuous synthesis and integration of data into the containment and control program will help to prevent the further spread of invasive exotic snakes throughout South Florida.

Exotic Reptiles and the Law

Releasing any exotic wildlife in Florida is a first-degree misdemeanor with a penalty of up to one year in prison and a \$1,000 fine. Further regulatory measures went into effect in 2008 to limit and control the sale of “reptiles of concern,” or ROCs, which include Burmese pythons, African rock pythons, amethystine pythons, reticulated pythons, green anacondas, and Nile monitors:

- ✓ Owners of ROCs must purchase a \$100 annual permit.
- ✓ ROCs greater than two inches in diameter must be identified by an implanted microchip.

What You Can Do to Help Prevent the Spread of Invasive Snakes

- ✓ Discourage friends from keeping giant snakes as pets. If you or someone you know wants an exotic pet, do your research first and avoid impulse buys.
- ✓ If you or someone you know can no longer care for an exotic pet, find someone who can. Don't let it loose!
- ✓ Learn to identify Florida's native snakes and tell them apart from exotics.
- ✓ Report sightings of free-ranging pythons by calling the USNPS Python Line: 305-815-2080, or the Keys Python Line: 1-888-I've Got 1 (1-888-483-4681).
- ✓ To request removal of a nuisance python or an unwanted pet reptile in Miami-Dade County, call the Fire Rescue Department: 786-331-4454.

Continued on Page 22

Population Reduction

The Program for Elimination of Pythons from SFWMD Lands is designed to incentivize members of the public to locate and remove invasive Burmese and Northern African pythons on District properties and rights-of-way in Miami-Dade, Broward and Collier counties. The South Florida Water Management District recently announced the elimination of the 900th snake in its Python Elimination Program.

The Florida Wildlife Commission continues to encourage the public to remove and kill pythons found on private lands.

Conservancy of Southwest Florida officials are promoting radio-telemetry tracking of pythons to target and remove breeding females and disrupt the egg-laying cycle. As of March 1, 2018, Conservancy biologists and research collaborators had removed upward of 10,000 pounds of python and more than 3,000 developing eggs from the local ecosystem.

Alex Wild



American cockroach



Red imported fire ant

Invasive Species: How and Why We Should Keep Them Out

Roberto Pereira and Philip Koehler

THOUSANDS OF INVASIVE SPECIES CAUSE ECONOMIC DAMAGE IN THE UNITED STATES, AND MORE SPECIES CONTINUE TO ARRIVE.

Invasive.org



Asian termite

Formosan termite



Scott Bauer, USDA

HAVE YOU ever thought about how many of the pests you manage on a daily basis actually are “imported” into the United States from other places? A lot of them actually come from other lands, including the good old American cockroach, which is not American at all — it was introduced from Africa.

You can say the same thing about so many other pests, from the red imported fire ant, which wasn't really imported but just caught a ride on a ship, to many other pests in the urban environment, in agriculture, and just about everywhere else.

Although in urban pest management we worry mostly about insects and weeds, many other types of organisms may come in and get established. For instance, you probably take a flu vaccine every year to protect yourself from a new flu virus that ends up here in the United States.

An Imperfect First Line of Defense

Our national borders, with their border security, agricultural inspections at ports and other points of entry, fences, and walls, may keep out larger animals and people, but there are always opportunities for invasive species to end up here. Many of the insects we consider pests were

brought into the United States by somebody either knowingly or by accident.

With greater commerce and international travel, geographic borders are becoming very leaky. Along with people and goods, other organisms also enter. Fortunately, many of the potential pests that may come in do not get established and never become a problem. But a few make it through the hard adaptation phase, get established, and become pests.

Insidious Invaders

So why do some invasive species thrive and cause so much trouble? The simple answer is the lack of natural controls. In their original habitat, natural enemies keep the species from growing out of control. In a new habitat, these natural controls are not present, so the invasive species population can grow with no major obstacle.

Some of these species also take advantage of transportation by humans in order to spread beyond the point of introduction. When termite-infested wood is moved from the infestation site to a waste or recycling facility, or plant pots infested with fire ants are moved, the invasive pests get an opportunity to spread that goes well beyond their natural ability to move into a new place.

Economic Significance

The impact of invasive species can be minimal to devastating, including serious damage to agricultural crops, livestock and other animals, native wildlife, and structures.

Two devastating species of termites are relative newcomers to the United States: the Formosan termite, *Coptotermes formosanus*, and the Asian termite, *Coptotermes gestroi*. Folks in southern Florida and other areas in the country can attest to the devastating effects of these species not only to structures but also to vegetation. Most of the damage from these two introductions is still to come, so the pest management industry will have a lot of work to try to minimize the future detrimental effects of these invasive termites.

When we hear about economic damage caused by invasive species, it usually is related to crops. That is because it is easy to calculate the damage and costs associated with crops. In urban environments, the cost of controlling invasive urban pests gets divided among many different people, businesses and properties. Therefore, it is a bit more difficult to come up with real costs and total control expenses.

With some species, such as the red imported fire ant or the brown marmorated stink bug, which is a



Brown marmorated stink bug adult

BlueRidgeKitties



Brown marmorated stink bug nymphs

David R. Lance

Estimated Potential Range of *Aedes aegypti* in the United States, 2017

Estimated Potential Range of *Aedes albopictus* in the United States, 2017

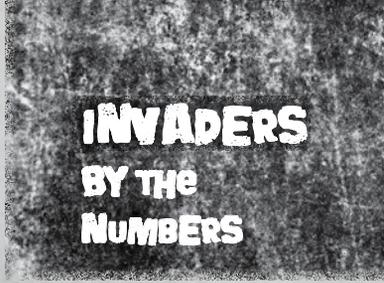
CDC



Yellow fever mosquito



Asian tiger mosquito



>\$2.5 billion:
Yearly cost of invasive insect control in the United States.

\$18 billion:
Yearly losses in crops, lawns, forests and pastures.

These cost estimates do not include the impacts to natural systems or human health.

both an urban and agricultural pest, it may be easier to estimate a true value for the economic damage. Costs from fire ants have been calculated in the billions of dollars per year.

Two invasive species — the Asian tiger mosquito, *Aedes albopictus*, and the yellow fever mosquito, *Aedes aegypti* — are spreading in the southern United States and are vectors for dengue, chikungunya and Zika. Along with other invasive mosquitoes, these mosquitoes have already cost our country millions of dollars in control efforts and are likely to continue to cause problems and cost money.

Pest Pros at the Forefront

The pest industry has an important role to play in preventing the spread of new pests. It all starts with recognizing that something is new about a pest infestation. When in doubt about any pest identification, folks at University of Florida Cooperative Extension offices and other agencies are available to help you prevent the spread of a new pest.

If we know about a new pest, education and outreach programs can inform the public and help stop the spread of an invasive species. New species may need to be studied so we can understand the conditions that allow certain

species to become invasive pests of economic importance, and to understand potential problems with new invaders and how to control them.

Of course, the most effective strategy is to prevent the arrival of invasive species, and that is mostly outside the scope of the pest management industry. However, the prevention of spread, minimization of damage, and vigilance for new pests are well within what the pest management operator can and should do.

Early detection of invasive pests usually requires an observant person out in the field, not sitting in a university office or lab.

Continued on page 34

Agriculture inspection specialists with the U.S. Customs and Border Protection, Office of Field Operations, National Agriculture Cargo Targeting Unit, inspect containers of imported goods for invasive insect and plant species that may have hitched a ride to the United States from overseas at the Port of Baltimore July 26, 2017. U.S. Customs and Border Protection photo by Glenn Fawcett



Asian Sub Termites Killing Pines, Oaks in South Florida

Thomas Chouenc



Asian sub termite damage at the surface of a slash pine



A Typical slash pine damage

Typical oak damage B

FT. LAUDERDALE, Fla. — In addition to being a structural pest, the Asian subterranean termite, *Coptotermes gestroi*, appears to be a serious pest of the native urban tree canopy of southeastern Florida. Asian subterranean termite colonies can cause feeding damage to a wide range of trees comprising the urban canopy, some potentially to a lethal level.

Slash pine, *Pinus elliottii*, appears to be particularly susceptible to *C. gestroi* feeding damage, as the termites feed primarily on the outer layers of the wood

immediately beneath the bark, wounding live tissues and ultimately girdling the tree to death. In comparison, hardwood trees such as live oak, *Quercus virginiana*, sustain damage to the heartwood at the center of the tree, resulting in a central cavity but leaving the live tissue intact.

Asian subterranean termite has the potential to kill slash pines within the urban canopy throughout the South Florida metropolitan area, which may irreversibly alter the urban forest composition. In addition, many large trees have been partially consumed by mature *C. gestroi* colonies, potentially compromising their structural integrity. Some large oak trees that were extensively hollowed out by *C. gestroi* collapsed in 2017 during Hurricane Irma. There is concern that future storm damage may increase as more of these trees are structurally compromised by Asian subterranean termite damage.

While the long-term impact of these termites on oak trees should be a source of concern for homeowners, the nature of the damage on slash pine trees is a more pressing issue: They are dying fast. Within the past decade, some neighborhoods of Ft. Lauderdale have lost up to 15 percent of their slash pines from Asian subterranean termite damage. Some of these trees, very old, are part of South Florida's identity and cannot be replaced.

Termite damage in these trees is restricted to the outer layers. It does not form the central cavity, usually observed in many other trees attacked by *Coptotermes* species. This means that using a foam formulation is not possible.

In order to prevent these slash pines from being lethally stressed by this termite, it is necessary to eliminate colonies before the damage is too extensive. One of the few options is to use above-ground baits applied directly to the trees where the termite activity is found. Because termites are restricted in the outer layers of pine trees, they can easily be detected, and baits can be applied directly where termite activity is found in the tree.

A current study is testing alternative treatment methods to protect these trees, as there is a strong incentive to prevent some of the very old, valuable trees of the South Florida urban canopy from being severely damaged by Asian subterranean termites. Area-wide management of subterranean termite populations remains a potential approach to protect both structures and surrounding landscape. **PP**



An oak tree collapsed during Hurricane Irma in 2017, with heavy damage of Asian subterranean termites at the center of the trunk. Arrow indicates a large termite carton nest.

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Thomas Chouenc is Assistant Professor in Entomology at the UF/IFAS Ft. Lauderdale Research and Education Center. His research focuses on invasive species of termites and ants in South Florida. Email tomchou@ufl.edu.

Pest Control's Biggest Risk: DAILY DRIVING

Allen Fugler



It's hard to appreciate the extent to which cell phones have become an integral and accepted business tool since their introduction in the late 1980s.

2017 MARKED only the 10th anniversary of the iPhone, and its effects of smartphone technology on our society have been far reaching and largely unforeseen.

While we have benefited from instant video connections, social media and the proliferation of apps that make our lives easier and more efficient, that technological advancement has come at a high price. Research now shows that use of cell phones while driving significantly impairs driving skills and costs thousands each year. This impairment, and the epidemic of drivers using cell phones, greatly increases the risk of crashes.

Tragic losses, by the numbers

It's reported that in 2015 alone, 3,477 people were killed and 391,000 were injured due to distracted drivers. The trends are not encouraging, either. Deaths from motor vehicles in 2016 — many caused by distracted driving — increased 6 percent over 2015, the most dramatic single year increase in over 50 years.

The monetary costs of distracted driving are staggering as well. A single insurer, State Farm, reported a single-year auto insurance loss of over \$6 billion. The estimated cost to society in lost work time, medical treatments, property damage, and other costs, was \$432 billion. As a leading insurer of pest control companies, HIIG-CRU loss experience is consistent with other personal and auto lines insurers.

According to insurance companies and law enforcement officials, the problem truly has reached epidemic proportions. To address the rising number of claims and costs from distracted driving, sample documents and training resources for company owners and drivers are now available from commercial auto insurance carriers.

Liability and legal considerations

With these resources, pest control companies must create a strong safety culture and take action to reduce risk and protect their employees and the communities in which they operate. Pest management professionals must be committed to best practices in safety and understand that safety is good investment that provides a great return.

Banning the use of cell phones while driving is an important risk reduction effort. Implementing a total ban policy, including company-issued and personal handheld and hands-free devices, is the best way to prevent distracted driving. This policy should be implemented with a signed acknowledgement and reinforced throughout the year with training.

Resistance to a total ban is understandable, as pest control is a route-based business and dispatch connectivity is critical. However, policies such as pulling off the road to return calls, using automated voicemail and text responses while driving, and the use of GPS technology makes a total cell phone ban a manageable policy.

Implementing and enforcing a total cell phone ban can help protect employees from crashes and injury, but it also helps protect employers from liability. A company may be held legally accountable for negligent employee actions if the employee was acting within the scope of his or her employment at the time of a crash. The key phrase, "acting within the scope of his or her employment," can and has been defined broadly in cases of crashes involving cell phones.

Following the law isn't enough. Most states, including Florida, have made texting while driving illegal, but it hasn't stemmed the increasing number of text-related crashes. Employers are responsible for ensuring their employees adhere to applicable federal, state and local municipal laws. However, these regulations and laws are a minimum requirement and may

not be enough to keep people safe.

Juries are motivated to award large verdicts when they believe that such verdicts make themselves and their children safer, not out of some sense of retaliation. Crashes involving cell phone use appeal to a juror's sense of self-preservation. Public opinion polls show that the majority of people believe it is very dangerous for other drivers to use cell phones while driving, and it is viewed similarly to drinking while driving. The claimant's attorney will seek large jury verdicts, including punitive damages where permitted, as a way to send the message to society that people shouldn't take actions that are perceived as threatening to life and limb.

Understand that jury compensatory damage awards are covered by insurance. However, punitive damage awards are not covered by insurance. They are granted by a judge and awarded by the jury as a means of punishing a company and sending a message to prevent similar behavior. Punitive damages appropriate when the act in question is committed with malice, moral turpitude, wantonness, willfulness, outrageous aggravation, or in reckless indifference to another person's rights. These acts are not covered by any type of insurance, so the payment of a punitive damage award is solely the responsibility of the defendant, that is, the company owner, who failed to act responsibly and implement and enforce proper safety measures such as a cell phone use policy.

Florida courts have provided a landmark case in employer vicarious liability: Caskey, Jr. vs. Astellas Pharma and Lawrence Daniels. This is one of the many circuit court of Florida trial-level courts which have permitted punitive damages against the driver who was texting at the time of the accident.

In August of 2008, Astellas Pharma pharmaceutical salesperson Lawrence Daniels struck and fatally wounded 80-year-old James Caskey, Jr. while he was riding his bicycle. Daniels was driving a company vehicle and using a company phone at the time of the fatal accident. Dawson defines the company vehicle in legal terms as a "dangerous instrumentality," an object that is known to have the potential to cause injury. This legal definition of a company auto elevated the responsibility of the company to ensure it was used in a safe manner.

Phone-use records, which are discoverable by plaintiff attorneys, were subpoenaed by the

plaintiff's attorney and showed Daniels made and received calls and texts just moments before the accident. Dawson stated that the phone usage in the records appeared to be a contributing factor in the accident. Plaintiff attorneys use these types of phone records to impress juries that companies have been negligent in protecting the public with enforced cell-phone use policies.

The Astellas Pharma cell-phone use policy expressly allowed use of cell phones ("use of a cellular phone in a company vehicle is permissible") but restricted it ("as much as possible while driving"), and did not state any penalties for violations. Also, there was no evidence of enforcement of this policy. The court found that Astella Pharma condoned and did not prohibit the use of cell phones by its sales staff in company vehicles.

At-fault drivers have a financial incentive to cooperate with the plaintiff in these types of cases. Punitive damages can alleviate an at-fault driver's personal financial responsibility by providing access to company assets, which normally exceed the driver's.

Driven to succeed

Companies must develop and implement a comprehensive cell phone use policy and must demonstrate that a policy has been enforced. They must NOT develop a culture where employees feel that they need to use cell phones while driving. You can identify weaknesses in your policy by using the free National Safety Council Cell Phone Policy Assessment Tool. OSHA also provides sample distracted driving documents that can be used in your business.

Installing a GPS system to manage driver behavior and make corrections before they have accidents is a good way to demonstrate company dedication to safety. Operational costs for GPS systems have fallen so they are not financial obstacles any more. Affordable mobile device-based applications can now turn cell phones into GPS devices that report speeding and hard braking incidents. Most importantly, it deactivates keyboards and reroutes incoming calls and texts while devices are in motion, eliminating the temptation to talk, text and drive.

Regular driver training is essential in reinforcing cell-phone use policy and reminding drivers of the dangers of distracted driving. Training resources are available at no cost, and auto insurance carriers may provide pest control companies

this training at no cost. Ask your insurance agent about training and other loss control resources.

Other company initiatives that can reduce auto claims include:

- Driver recruitment process that includes pre-employment screening services (MVR, criminal and work history, drug screening).
- Written policy signed by drivers that prohibits the use of cell phones while driving.
- Written vehicle-use policy that addresses take-home use, cell-phone use, alcohol/drug use and non-employee passengers.
- Company employment policies that:
 1. Require drivers to pay for deductibles for at-fault accidents or other financial penalties such as time off with no pay;
 2. Suspend without pay or terminate drivers after two moving violations or accidents;
 3. Require pre-employment criminal background checks and drug screening;
 4. Require post-accident drug/alcohol screening.

In today's increasing litigious climate, companies have to "play defense" to protect themselves from accusations of negligence and the specter of punitive damages. As a route-based service business, a comprehensive auto loss control program is the best way to protect your company against the largest exposure to claims and lawsuits. **PP**

Allen Fugler is Director of Risk Management for Xterminator Pro, a Division of Houston International Insurance Group. He can be reached at afugler@hiig.com or 407-241-3037.

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Burmese Pythons, continued from Page 17

- ✓ Learn more about nonnative species and Pet Amnesty Days at <http://www.myfwc.com/wildlifehabitats/nonnatives/reptiles/burmese-python/> (September 2011).
- ✓ Learn more about invasive species and download educational materials such as the "Don't Let It Loose Guide," at <http://www.nps.gov/ever/naturescience/floridainvaders.htm>. **PP**

Six Rules for Paid Search Success

Alain Parcan



EXPERTS AGREE page one of Google is the best real estate online. Therefore, it should come as no surprise that getting your pest control business to show up is a real challenge. As with any marketing campaign, showing up on page one is likely going to cost money AND time. That said, a properly planned and executed pay-per-click (PPC) campaign can be an effective way to obtain that desired page-one placement.

Chances are you've gotten solicitations from telemarketers and marketing companies promising or even guaranteeing success. To help you respond to these solicitations, we want to share a few tips on what to look out for.

1. Know exactly what you are buying.

Fast-talking salesmen can take advantage of your lack of PPC knowledge by making tall promises that won't be kept. Make sure you understand precisely what you are buying before making any sort of commitment.

2. Don't sign a long-term contract.

While it is important to give a PPC campaign a few months to start showing results, we caution against signing a long-term contract. Commit to a six-to-12-month testing process to see if it works in your market. From there, you'll have enough data to decide whether you want to keep the program moving forward.

3. Be wary of anyone guaranteeing success.

Pay-per-click campaigns can fail for any number of reasons. Other than bidding unreasonably high amounts, it is impossible to guarantee page-one placement. Also, while many companies guarantee a certain number of clicks, they deliver them in a way that doesn't get the phone to ring. Remember, phone call leads matter — "clicks" do not!

4. Having a professional website is a must.

Don't invest a dime in PPC if you do not have a professional and up-to-date website. Spending hundreds of dollars a month won't bring any results if your website cannot convert those clicks into calls. Visitors are looking for a professional website with contact information easily visible. If someone cannot clearly find what you offer, where you operate, and how to contact you within 10–15 seconds of arriving at your site, they're likely to move on.

5. Don't expect to show up on every search.

Unless you spend huge amounts of money, you will not show up on page one for every search. Your marketing company should have a good understanding of your business, as well as the current competition online, and use that information to target specific searches.

6. Tie results to your spending.

One of the biggest advantages of PPC is the ability to track results and your return on investment. Any company you hire should be willing to share results with you on a regular basis. You should also be able to figure out with certainty that a phone call resulted from your PPC campaign. If a company can't deliver that information, it's time to look elsewhere.

It is important to remember a successful PPC campaign should increase revenue. Increased exposure and clicks don't mean much if they aren't being

converted into new customers. Any company can use technical jargon and promise unattainable results to sound legitimate.

However, if they can't explain in plain English how their work will benefit your bottom line, they aren't worth your business.

PP

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

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Managing Your Pesticide License and Exams in a Digital Age

Erin Harlow

Plus: Updates to Pesticide Exams

IT SEEMS EVERYONE has a cell phone or tablet now. They can be a great tool and resource on the job, whether you are taking photos or videos of insects, using a plant identification app, or checking weather patterns.

Did you know you can now use your devices to update your pesticide licenses online as well? There have been so many changes recently to not only online services, but also to study materials and exams that we wanted to make sure you had the most updated information.

To access the Florida Department of Agriculture and Consumer Service's website to manage your license, visit <https://aesecomm.freshfromflorida.com>.

Through this website, you can:

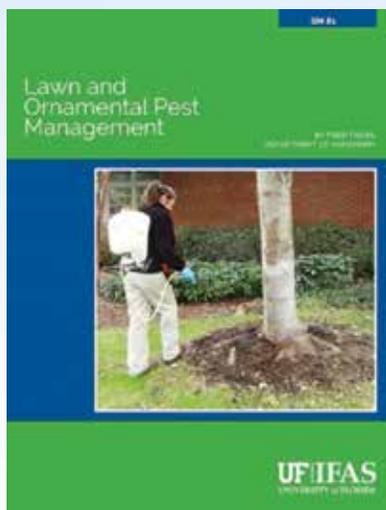
- ▶ Renew an individual or business license
- ▶ Apply to take an exam
- ▶ Add or remove ID cardholders
- ▶ Apply for a new business license, name, ownership, or location change
- ▶ Pay for licenses
- ▶ Request duplicate copies of licenses

Remember, you can now take the pest control operator (PCO) exam at Extension offices that provide computer exams. Before you contact your local Extension Office to schedule your pesticide exam, you need to apply online and receive a voucher number. This important step must be done prior to scheduling your exam, and you must bring your voucher number with you on your testing day.

Depending on the exam you are taking, payment may be required at application. If you are unsure which pesticide license you need, please contact your local Extension Office or the UF Pesticide Information Office at <https://pested.ifas.ufl.edu>.



SP499



SM81

To apply to take a pesticide exam, follow these steps:

Visit: <https://pesticideexam.ifas.ufl.edu>

1. Click on "Apply for Examination" — this will route you to the FDACS website. Follow the prompts for the license you need. Make sure you print or write down your voucher number since you will need this the day you test.
2. Click on "Schedule your Exam." You can use this feature to find the closest Extension office and offices with testing on computers. Some offer online scheduling, while others you have to call.

Continued

Did You Know?

- ✓ In 2017, the University of Florida/IFAS Extension offices provided 8,471 pesticide exams to landscape and pest control professionals in Florida. This included structural, restricted-use, and public health licenses.
- ✓ Some offices provide exams on both the computer and on paper. Computer exams will give you your score immediately.
- ✓ There are 32 pesticide licenses, certifications, and categories in the state of Florida.
- ✓ UF partners with the Florida Department of Agriculture and Consumer Services (FDACS) to provide pesticide exams locally to professionals and provide education related to pesticide licenses.
- ✓ Florida Department of Agriculture and Consumer Services is the regulatory agency that manages your license and related laws.
- ✓ Need CEUs? Check out FDACS' statewide CEU database online at <http://aesearch.freshfromflorida.com/AvailableClassSearch.asp>.

Updated Pesticide Exams and Study Material

To provide the industry with the most current and research-based information, the UF Pesticide Information Office strives to keep study materials and exams current and in-line with best practices. To do this, these materials occasionally need to be updated. In 2018, examinees will see changes to two pest control operator exams, the limited commercial landscape maintenance exam, and study material for all three. Here is a breakdown of the changes:

Pest Control Operator Wood Destroying Organisms (WDO) Exam

On July 1, 2018, a new WDO exam will begin at the County Extension offices. The new exam is already being administered in Apopka. The study material has been updated and is already available and being used for the exam. The recommended study materials for the WDO exam include Chapter 482, Chapter 5E-14, *Applying Pesticides Correctly, 7th Ed.* (SM1), *Construction and Building Terms Relevant to a Pest Inspection* (PDF), and *Wood-Destroying Organisms Applicator Training Manual* (SM80).

Pest Control Operator Lawn and Ornamental (L&O) Exam

The new PCO L&O exam went into effect on December 1, 2017. You need to make sure you study the new material from this point forward. The study material for the L&O exam now includes Chapter 482, Chapter 5E-14, *Applying Pesticides Correctly, 7th Ed.* (SM1), *Lawn and Ornamental Pest Management* (SM81), *Identification Guide to Common Florida Lawn and Ornamental Weeds* (SP-499), and *Florida Green Industries — Best Management Practices for the Protection of Water Resources, 2015* (PDF).

Limited Commercial Landscape Maintenance Exam

The updated Limited Commercial Landscape Maintenance exam will begin on July 1, 2018. The study material for this exam includes the new manual, *Limited Commercial Landscape Maintenance* (SM82), and *Applying Pesticides Correctly 7th Ed.* (SM1). If you plan on taking this exam prior to July 1, then the old material should be studied.

Finding the Study Material

The manuals for these exams can be found at the UF/IFAS Bookstore. The easiest way to order is online at www.ifasbooks.com. The regulatory material and PDFs can be downloaded from the Florida Department of Agriculture and Consumer Services' website at www.freshfromflorida.com.

The UF/IFAS Extension offices strive to provide the best possible pesticide exam testing experience for professionals. To help make this a positive experience for everyone, please double check that you have signed up for the correct license, remember to bring your voucher number with you on the day you test, and schedule your exam in advance. Don't forget to check out the UF Pesticide Information Office's website at <https://pested.ifas.ufl.edu> for online continuing education units (CEUs) and important information about pesticide safety and applications. **PP**

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

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Featured Creatures Update

Garden Pest Profiles: PCOs, Join the Gardening Game!

Jennifer Gillett-Kaufman

AS MORE homeowners, schools and small businesses begin incorporating gardens in their landscapes, you are all faced with a new dilemma: a “what pest is this” identification challenge. I have gathered up a top-ten list, in no particular order, of common garden pests — not all of them are insects — that plague our attempts to grow our own food. Aren't we all happy we have farmers keeping our grocery shelves stocked?

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



Vegetable Leafminer

John L. Capinera, University of Florida

http://entnemdept.ufl.edu/creatures/veg/leaf/vegetable_leafminer.htm

THE VEGETABLE LEAFMINER, *Liriomyza sativae* Blanchard, is a fly found commonly in the southern United States from Florida to California and Hawaii, and in most of Central and South America. Although originally limited to the Western Hemisphere, it is now also found in many areas of Asia and the Middle East. Occasionally it is reported in colder areas because it is transported with plant material. It cannot survive cold except in greenhouses. There are indications that this is actually a small complex of cryptic species. *L. sativae* is considered to be one of the three most damaging polyphagous leaf miners of horticultural crops. All originated in the New World but all have been spread widely. The two other important species are *Liriomyza trifolii* (American leafminer) and *Liriomyza huidobrensis*, pea leafminer. In most areas of the United States, vegetable leafminer has been reduced in relative importance by *L. trifolii*, which seems to display greater resistance to insecticides.



Spotted Cucumber Beetle

Harsimran Kaur Gill, Gaurav Goyal and Jennifer Gillett-Kaufman, Entomology and Nematology Department, University of Florida

http://entnemdept.ufl.edu/creatures/veg/bean/spotted_cucumber_beetle.htm

SPOTTED CUCUMBER BEETLE, *Diabrotica undecimpunctata howardi* Barber, is a major agricultural pest of North America. Another name for the spotted cucumber beetle is “southern corn rootworm.” Many *Diabrotica* species cause damage to field crops, especially corn, making these beetles a major agricultural concern. Because of the subterranean nature of their larvae, these insects are difficult and expensive to control.



Redbanded Stink Bug

Morgan Pinkerton and Amanda Hodges, Department of Entomology and Nematology, University of Florida

http://entnemdept.ufl.edu/creatures/veg/bean/redbanded_stink_bug.htm

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

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



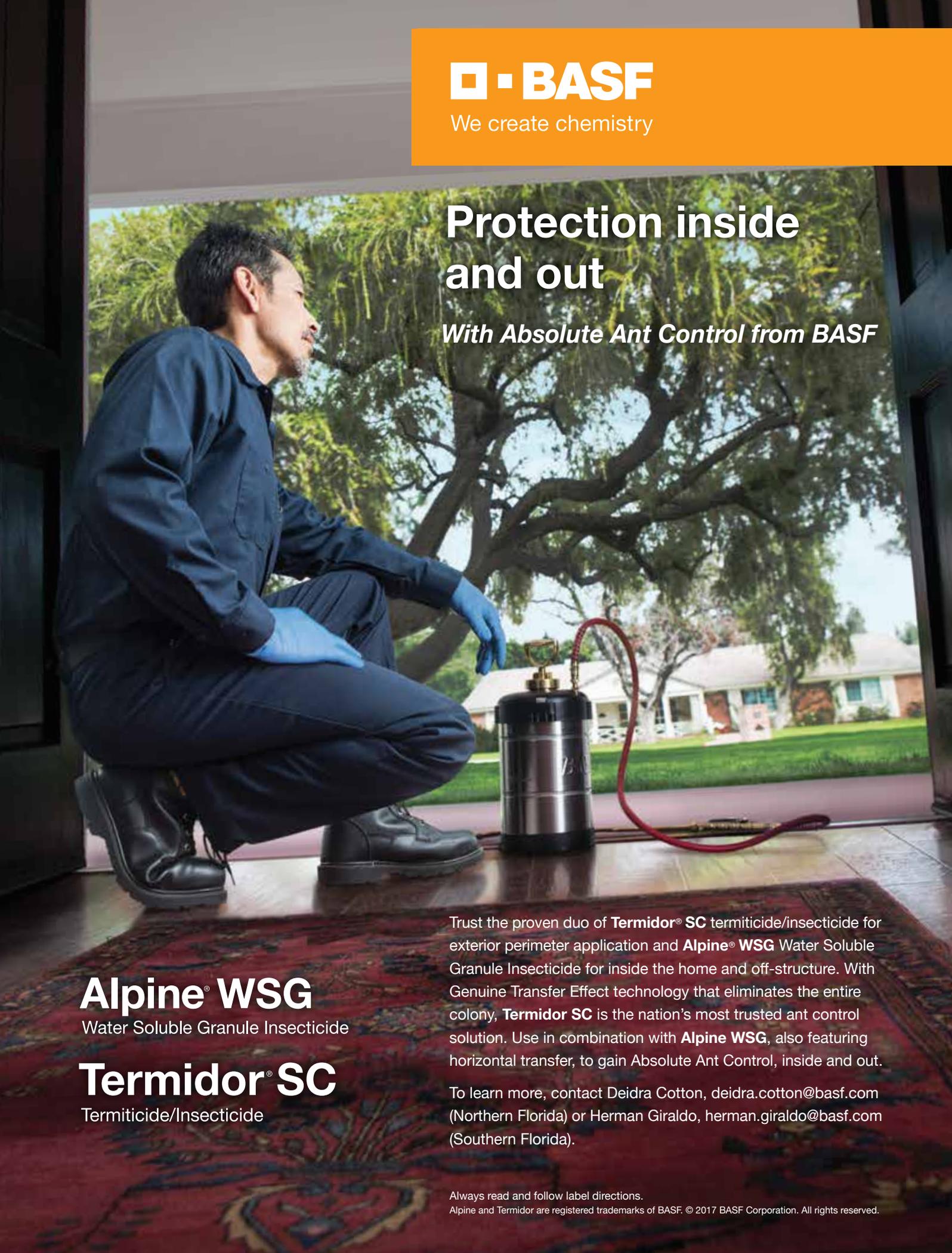
Tobacco Hornworm

Morgan A. Byron and Jennifer L. Gillett-Kaufman, University of Florida

http://entnemdept.ufl.edu/creatures/field/tobacco_hornworm.htm

THE TOBACCO HORNWORM, *Manduca sexta* (L.), is a common pest of plants in the family Solanaceae, which includes tobacco, tomato, pepper, eggplant, and various ornamentals and weeds. Caterpillars in the family Sphingidae are known as hornworms, due to their wormlike body shape and the presence of a small, pointed “horn” at their posterior, seen in the photo above. The adult stage of *Manduca sexta* is a heavy-bodied moth that resembles a hummingbird, and *Manduca* adults are commonly referred to as hawkmoths or hummingbird moths. The larval stage — hornworm — of this species is more often encountered, as it is resides on the host plant during the day and can cause significant defoliation of economically important crops.

Continued on page 31



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Pest Control Vehicle Inspections

FLORIDA Department of Agriculture and Consumer Services conducts random pest control vehicle inspections throughout the state, and I am very surprised at the number of pest control vehicles that are not in compliance with the statute and rule.

There are 11 questions on the FDACS pest control vehicle inspection report:

1. ID card valid with photo and signature? Chapter 482.091(2)(b) FS states the identification card shall be carried on the employee's person while performing or soliciting pest control and shall be presented on demand to the person for whom pest control is being performed or solicited, to any inspector of the Department, or to any such persons as are designated by the Rules of the Department. Section (c) states an employee may not perform pest control without carrying on her or his person a current identification card affixed with the employee's signature and current photograph.

2. Service vehicle or trailer properly identified? Chapter 5E-14.103(2) FAC states the licensee's name or trade name shall appear conspicuously on both sides of each motor vehicle and each trailer, and shall be in bold lettering at least one and one-half (1½) inches high, distinctly contrasting in color with the background, and shall be in plain view of the public.

3. Service vehicle equipped with lockable pesticide storage compartment? Contamination free? Chapter 5E-14.106(3) FAC states all pesticide concentrates used in the field shall be kept under lock when in unattended service vehicles. They shall be kept in leakproof containers legibly tagged or labeled for identification and providing information required by EPA regulations or recommendations. See memo 824.

4. Pesticide storage compartment secured (if unattended vehicle)? Chapter 5E-14.106(3) FAC states all pesticide concentrates used in the field shall be kept under lock when in unattended service vehicles. They shall be kept in leakproof containers legibly tagged or labeled for identification and providing information required by EPA regulations or recommendations.

5. Pesticide containers properly identified? Chapter 5E-14.106(4) FAC states pesticides kept in containers other than application equipment shall be accurately

identified by permanent, durable label or tag, showing the common or chemical name(s) of principal active ingredient(s) and providing information required by EPA regulations or recommendations. See memo 824.

6. Spray tank air gap or anti-siphoning device present? Chapter 5E-14.106(5) FAC states spray tanks in which pesticides are mixed or from which pesticides are dispensed in pest control operations and to which water is added shall not be filled through direct fill-pipe or hose connections protruding into the spray tank. Fill-pipes or hoses must terminate at least two inches above spray tank intake fill opening or be equipped with an effective anti-siphoning device to prevent back siphonage into water supply.

7. All pesticides stored in storage compartment? Chapter 5E-14.106(3) FAC states all pesticide concentrates used in the field shall be kept under lock when in unattended service vehicles. They shall be kept in leakproof containers legibly tagged or labeled for identification and providing information required by EPA regulations or recommendations.

8. Pesticides present out of category of licensee? Explain use, if marked yes.

9. Pesticide Product Review conducted? If yes, attach PPR form.

10. Are appropriate spill materials present?

11. Signage available for applications made to exterior foliage? Chapter 482.2265(2) FS states any person who is licensed or certified under this chapter, including any person who is a limited certificate holder, shall post a notice in a conspicuous location at the time of application of a pesticide to a lawn or to exterior foliage. The department shall provide for the wording and physical makeup of such notice by rule, but the notice must:

- (a) Be at least 4 inches by 5 inches in size;
- (b) Be constructed of rigid, durable, weatherproof material;
- (c) Have a background and lettering of contrasting colors; and
- (d) Clearly set forth the business name of the licensee or name of the limited certificate holder making the pesticide application.



Florida Department of Agriculture and Consumer Services
 CHARLES H. BRONSON, Commissioner
 The Capitol • Tallahassee, FL 32399-0800
 www.dacs.state.fl.us

Please Respond to:
 Bureau of Entomology and Pest Control
 1207 Governor's Square, Blvd., Suite 308
 Tallahassee, Florida 32301-2961
 (850) 924-4177 (850) 410-0724 FAX
 paco@flacs.usda.gov
 http://www.flentom.com/ehc.htm

February 7, 2008

MEMORANDUM NO. 824

TO: All Pest Control Licensees
 FROM: Michael J. Page, Chief
 Bureau of Entomology and Pest Control
 SUBJECT: Labeling of Service Containers for the Transportation or Temporary Storage of Pesticides

This memorandum should serve to clarify a number of questions the Bureau has been receiving regarding labeling service containers for transportation and temporary storage of pesticides in the field.

In 1976, the U. S. Environmental Protection Agency (EPA), Office of Enforcement issued a policy statement which acknowledged the value of utilizing service containers and outlined several requirements associated with their use. This policy was rescinded in 1979, and the aforementioned "requirements" then became "recommendations".

The Department, in an attempt to adopt the Agency's recommendations, promulgated a rule in Chapter 5E-14.106(4), Florida Administrative Code, which requires that "Pesticides kept in containers other than application equipment shall be accurately identified by permanent, durable label or tag, showing the common or chemical name(s) of principal active ingredient(s) and providing information required by EPA regulations or recommendations."

Service containers must be in compliance with this rule. Service containers must therefore be labeled in accordance with the USEPA recommended information provided below:

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

**NOTICE OF INSPECTION
 PEST CONTROL SERVICE VEHICLE INSPECTION**

Section 570.07(2), F.S. and Rule 5E-14.1025, F.A.C.
 Telephone Number (850) 617-7896

Submit to:
 Bureau of Inspection and Incident Response
 3125 Coroner Blvd., Suite N,
 Tallahassee, FL 32309-1600

ADAM H. PUTNAM
 COMMISSIONER

(COMPANY)	(LICENSE NO.)	(DATE)
(BUSINESS ADDRESS)	(CITY)	(COUNTY)
(ZIP CODE)	(NAME OF INDIVIDUAL)	(YEAR/MAKE/MODEL OF VEHICLE)
(COLOR)	(TAG #)	YES NO N/A

- ID Card Valid with photo and signature? (482.091, FS) ID # _____
- Service vehicle or trailer properly identified? (5E-14.103, FAC) TRUCK TRAILER
- Service vehicle equipped with lockable Pesticide storage compartment? Contamination Free? (5E-14.106(3), FAC)
- Pesticide storage compartment secured? (if unattended vehicle) (5E-14.106(3), F.A.C.)
- Pesticide containers properly identified? (5E-14.106(4), F.A.C.)
- Spray tank air gap or anti-siphoning device present? (5E-14.106(5), F.A.C.)
- All pesticides stored in storage compartment? (Cont. Only) (5E-14.106(3), F.A.C.)
- Pesticides present out of category of licensee? Explain use, if marked yes.
- Pesticide Product Review conducted? If yes, attach PPR form.
- Are appropriate spill materials available?
- Signage available for applications made to exterior foliage? (482.2265(2), F.S., 5E-14.147, F.A.C.)

Violations Observed: _____

Documentation Obtained: _____

Comments: _____

(Signature of Company Representative) (Issuing Field Inspector)
 (Print Name)

FDACS-13655 Rev. 10/15

I CAN'T BEGIN to tell you how many pest control techs state they don't have their identification card with them or that it is expired. How about these? "It's in my other truck," or "I left it at home," or "I can't find it." Pesticide containers do lose their labels, and they need to be labeled. Why techs don't use the labeled personal protection equipment (PPE) is another whole issue! **PP**

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

Florida Pest Management Association
PMP Membership Application/Renewal
 Your dues payment provides for a joint membership in FPMA and NPMA.



THIS IS A: RENEWAL NEW MEMBER APPLICATION

Active Member (PMP)

A pest control company actively engaged in the pest control industry in Florida (licensed by appropriate State Agency under Chapter 482, Florida Statutes) is eligible to be an Active Member and is entitled to one voting representative for each registered office or branch.

Active Member Employees and Branch Offices

Any firm with an Active membership in the Association, having branches or separate offices has the option of registering any and all branches or separate offices as Active Branch Offices. Active Branch offices have voting privileges and can hold office. The member licensee shall inform the Executive Vice President in writing of the individual's name who will have the voting privileges for the Branch Office(s).

YOUR INFORMATION: (Please complete all fields.)

First Name: _____ Last Name: _____

Business Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

County: _____

Phone: _____ E-mail: _____

Website: _____

Certified in: GHP L&O Termite Fumigation

BRANCH INFORMATION:

of Branches/Offices in Florida: _____

There is no additional fee to list additional branches/offices for mailing privileges. Please attach a list of all branches/offices in Florida, including company name, contact person, address, telephone and email.

JOINT MEMBERSHIP DUES SCHEDULE		
Please circle appropriate category		
Category	Annual Sales Revenue	Dues Amount
A	\$0 - \$50,000	\$149
B	\$50,001 - \$150,000	\$229
C	\$150,001 - \$300,000	\$359
D	\$300,001 - \$450,000	\$459
E	\$450,001 - \$700,000	\$598
F	\$700,001 - \$1,000,000	\$884
G	\$1,000,001 - \$2,500,000	\$1,638
H	\$2,500,001 - \$3,000,000	\$2,949
J	\$3,000,001 - \$4,500,000	\$4,699
K	\$4,500,001 - \$7,000,000	\$5,897
L	\$7,000,001 - \$10,000,000	\$6,989
M	\$10,000,001 - \$15,000,000	\$10,924
N	\$15,000,001 - \$20,000,000	\$12,139
P	\$20,000,001 - \$25,000,000	\$14,574
Q	\$25,000,001 - \$30,000,000	\$16,998
R	\$30,000,001 - \$50,000,000	\$19,418
S	\$50,000,001+	\$21,209

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Cabbage Looper

John L. Capinera, University of Florida

http://entnemdept.ufl.edu/creatures/veg/leaf/cabbage_looper

THE CABBAGE LOOPER is found throughout much of the world where crucifers are cultivated, and during the summer months can be found throughout most of the United States. However, overwintering in the United States apparently occurs only in the southernmost states. It is somewhat erratic in occurrence, typically very abundant one year, and then scarce for two to three years. This is likely due to the residual effects of a nuclear polyhedrosis virus, which is quite lethal to this insect. The cabbage looper is highly dispersive, and adults have sometimes been found at high altitudes and far from shore. Flight ranges of approximately 200 km have been estimated.



Squash Vine Borer

Eutyclus Kariuki and Jennifer L. Gillett-Kaufman, University of Florida

http://entnemdept.ufl.edu/creatures/veg/leaf/squash_vine_borer.htm

SQUASH VINE BORER, *Melittia cucurbitae* (Harris), is a diurnal (active during the day) moth species. The larvae complete their growth and development on wild and domesticated species of the genus Cucurbita. This insect was once considered a nuisance to commercial growers and a problem to home growers of cucurbits. However, with the expansion of cucurbit production in the United States over the last decade, the squash vine borer has become a pest of economic importance.



Fall Armyworm

John L. Capinera, University of Florida

http://entnemdept.ufl.edu/creatures/field/fall_armyworm.htm

THE FALL ARMYWORM is native to the tropical regions of the Western Hemisphere from the United States to Argentina. It normally overwinters successfully in the United States only in southern Florida and southern Texas. The fall armyworm is a strong flier, and disperses long distances annually during the summer months. It is recorded from virtually all states east of the Rocky Mountains. However, as a regular and serious pest, its range tends to be mostly the southeastern states. In 2016 it was reported for the first time in West and Central Africa, so it now threatens Africa and Europe.



Terrestrial Slugs of Florida

John L. Capinera, University of Florida

http://entnemdept.ufl.edu/creatures/misc/gastro/slugs_of_florida.htm

FLORIDA HAS only a few terrestrial slug species that are native, but some nonnative species have successfully established here. Many interceptions of slugs are made by quarantine inspectors, including species not yet found in the United States or restricted to areas of North America other than Florida. In addition to the many potential invasive slugs originating in temperate climates such as Europe, the traditional source of invasive molluscs for the United States — Florida — is also quite susceptible to invasion by slugs from warmer climates. Indeed, most of the invaders that have established here are warm-weather or tropical species. Following is a discussion of the situation in Florida, including problems with slug identification and taxonomy as well as the behavior, ecology, and management of slugs.



Terrestrial Snails

Affecting Plants in Florida

John L. Capinera and Jodi White, University of Florida

http://entnemdept.ufl.edu/creatures/misc/gastro/terrestrial_snails.htm

AMONG THE most interesting of the molluscs are the snails. They occur in both aquatic (marine and freshwater) and terrestrial environments. Other snails are amphibious, moving freely between wet and dry habitats. A number of terrestrial snails occur in Florida, some indigenous (native) and others nonindigenous (not native). Most snails are either beneficial or harmless. For example, Florida is host to some attractive but harmless tree-dwelling snails that feed on algae, fungi and lichens, including at least one that is threatened. However, a few snails may feed on economically important plants and become pests.



Land Planarians

Paul M. Choate and R. A. Dunn, University of Florida

http://entnemdept.ufl.edu/creatures/misc/land_planarians.htm

ESSER (1981) discussed land planarians in Florida. He stated that in almost every month of the year, specimens of gray to brown, long flat worms, with several dark stripes running down the back, were submitted to the Nematology Bureau for identification and information concerning their biology. These worms were land planarians, included in the phylum Platyhelminthes. Almost all specimens submitted belonged to the genus Bipalium.

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Bashing iguana heads: Researchers smash reptiles to death to fight Florida invasion

RESEARCHERS seeking to curb the iguana invasion in South Florida settled on one method, primarily: Smashing in the reptiles' heads, quickly.

"Most of what we're doing is blunt force trauma," Jenny Ketterlin, a University of Florida wildlife biologist, told *The Sun Sentinel*. "Hitting their head very hard against a solid object."

The solid objects include the side of a truck used to track down the creatures. They've hit them hard against a boat, too. They also have a bolt gun, like the ones used to kill cattle. But mostly it's the head bashing.

The 15-person team from the university had killed about 250 of the lizards as of last week, *The Sun Sentinel's* Susannah Bryan reported, with researchers analyzing them at a lab before dumping them at a landfill.



Male iguana in Delray Beach, Fla.

Ianare Sevi

It's part of a \$63,000 project funded by the state's Fish and Wildlife Conservation Commission. Iguanas, an invasive species, gobble up native plants and add to erosion, a spokeswoman told the newspaper.

Eric Swalley, a resident of Davie, Fla., put it more bluntly: "It's a biological nightmare."

While the head-cracking tactics of the researchers sparked criticism — "appalling," a director of The Kimmela Center for Animal Advocacy told *Gizmodo* — experts claimed a quick head whack is relatively humane.

Head smashing abides by Florida's anti-cruelty laws, Ketterlin told *The Sun Sentinel*. Another wildlife biologist, Joe Wasilewski, approved of the method in an interview with *Gizmodo*, noting that the "in less than a second these lizards go from being cognizant to completely dead."

Scientists can't explain the state's booming iguana numbers, Wasilewski said, though he suggested climate change or shifts in vegetation may be to blame. **PP**

— Josh Hafner, *USA Today*, March 2018

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Invasive Species, continued from Page 19
 detection and rapid response are important. Because pest management industry professionals are out there looking at pest problems every day, they are likely to come across new pests before anyone else.

If we are able to detect a pest early, that pest can be contained and prevented from spreading, even if eliminating that initial infestation is not possible. The University of Florida has an early detector program that is mostly designed for training people on the detection of agricultural and some ornamental pests, but the concepts

and information may be of interest to people dealing with pests elsewhere. At this website¹ you will find educational materials that can guide you through the steps of pest detection and submitting samples for identification.

Teamwork Can Prevail

The world has never been more connected than it is today. People are providing unprecedented opportunities for invasive organisms to become established in new areas. Increased public awareness and vigilant action by folks involved in the pest management industry are important

elements in preventing establishment and consequent economic impact of invasive species. Coordinated efforts among universities, private industry, nongovernment organizations, and state and federal governments are needed to stem the tide and prevent or manage invasive species. **PP**

Based on "The Not-So-Hidden Dangers of Invasive Species: ESA Position Statement on Invasive Species," published in *Annals of the Entomological Society of America*, 111(2), 2018, 79–80.

¹ <http://ffirstdetector.org>

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