

PESTPRO

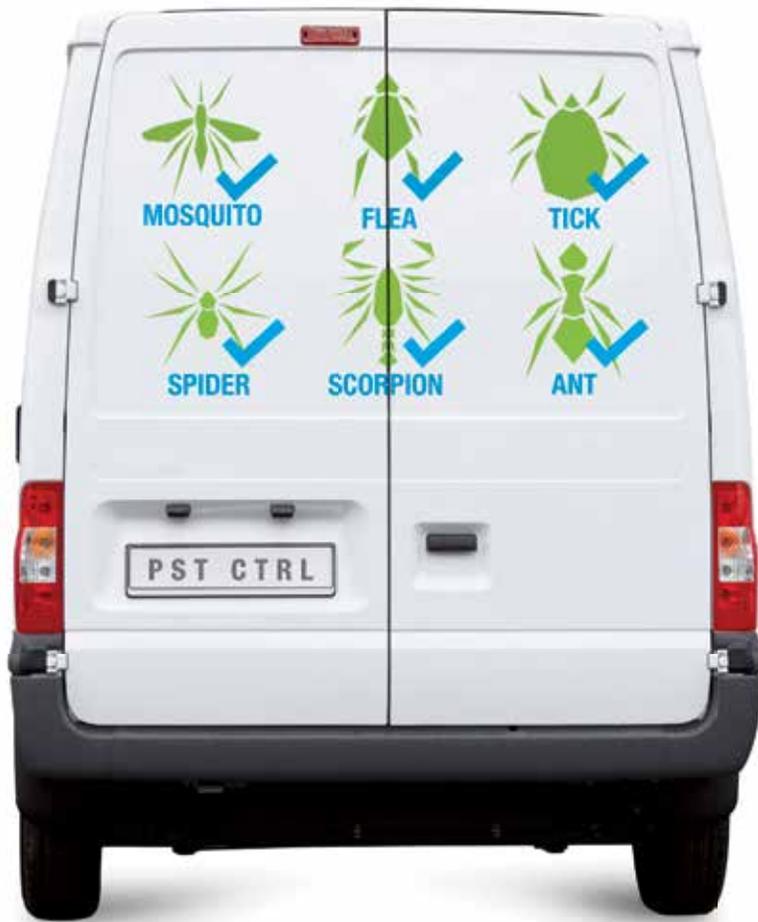
From Pest Management Education, Inc. to Landscape and Pest Managers

**Common
Indoor Spiders**

**Reevaluating
Liquid Termiticides
and Baits**

**Scorpionism
In Mexico**





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ON THE COVER

Newborn scorpions crawl onto their mother's back, where they remain during the first instar without feeding. Mexico hosts more than 100 scorpion species. Seven of those are dangerous to humans, including *Centruroides vittatus*, pictured on the cover.

Photo by Alejandro Santillano



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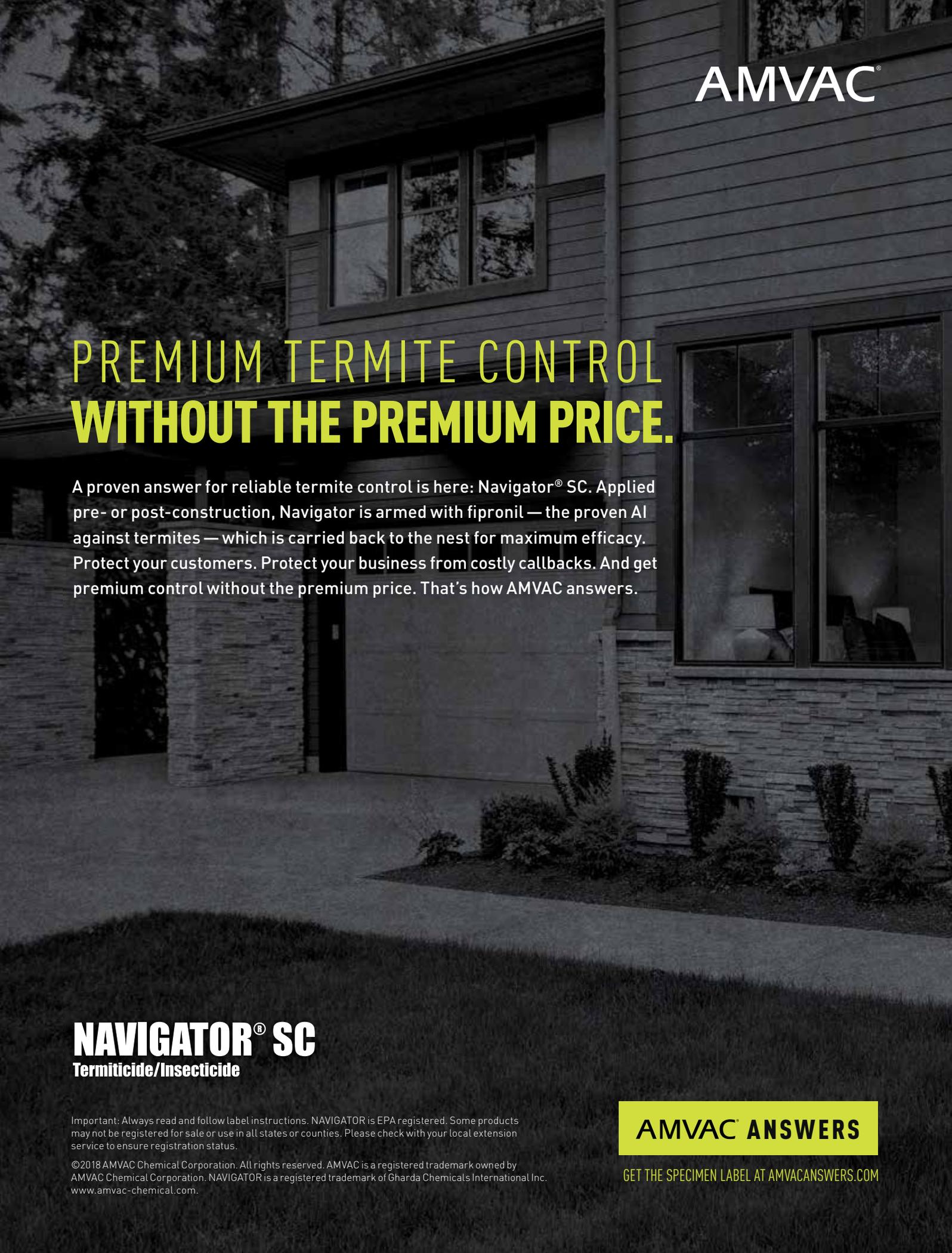
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What Lies Within Us

Message from the President of FPMA

Steve Lum

2018 IS PAST and will fast become a fading memory. It leaves us as fast as it came upon us. What we have accomplished, no matter how great or how small, is but a small piece of the puzzle that makes up the now and the future.

What's important is that we strive to overcome the next challenge toward building our association, toward building our businesses and toward building our lives. What's important is that we continue to grow *together as a community*.

FPMA as an association has a lot going for it. The beauty of FPMA is that the association only does well when its members do well. We each have our own businesses. We each have our own personal, professional and even company agendas. The amazing thing is that FPMA can, will and does work within the framework of those agendas as long as those agendas are legal, moral and ethical.

FPMA's mission is to connect industry leaders and to further the cause of professionalizing the pest industry — to be a voice for the industry in the state of Florida and to create environments where we each gain knowledge and connect with those who help us grow as people, which helps us grow our businesses.

So how will we do this in 2019? I'm happy to say that your incoming FPMA president will be Eric Hoffer of Hoffer Pest Solutions. Eric is more than capable for the position and is an

accomplished leader and entrepreneur in his own right. I have included Eric in nearly every meeting and in nearly every significant action of my administration, so Eric comes to the position already familiar with the job in almost every way. Eric will support and continue the initiatives we've put forth in recent years. I will support those that he and his Executive Committee and the FPMA Board agree to install.

I will take on two roles next year. In addition to serving on the Executive Committee as immediate past president, I will work directly with the new incoming FPMA Board of Directors to assist region operations in 2019 and to act as liaison when appropriate. I'm also happy to say that your FPMA Executive Vice President Leslie Herren will be on the forefront of operations and will be at President Hoffer's side as he leads the charge.

This is by no means a single-handed gig. Pest control operators are, for the most part, salt-of-the-earth, blue-collar converts who've learned to wear suits when we have to. We will give you the shirts off our backs when you're in need. We are diverse, fiercely independent, and unconventional. We see ourselves as captains of our own destiny. We are also not in any way the easiest bunch to corral. That said your EVP Leslie Herren has found a way to fit in with this bunch and manage us —sort of.

It has truly been my pleasure to work with Leslie Herren. She has an indomitable spirit.

She is optimism in the face of tragedy. She refuses to fail. She works as hard as the best I've ever seen. She has vision, a healthy degree of both moxie and humility, and she has respect for people regardless of their position. She is passionate about serving, passionate about this association, and she truly cares for the people within it. I look forward to working with Leslie, the incoming Board of Directors, and the Executive Committee in 2019.

In closing I will leave you with a quote from Henry Stanley Haskins:

"What lies behind us and what lies before us are small matters compared to what lies within us. And when we bring what is within us out into the world, miracles happen."

There are great opportunities ahead of us as an association and ahead of each of us personally and professionally. Opportunities seem most often to come in the form of problems and challenges. If we make the decision now to see as problems and challenges as the opportunities they really are and if we also decide to "bring what is within us out to the world" then we will truly see miracles happen.

With that, I bid you adieu. It has been a pleasure and has been quite the experience to serve as your president. I will continue to serve the association like so many presidents before me. I will see you in 2019. **PP**

Steve Lum
President, FPMA

BUSINESS AND OPERATIONS

EXPO

FLORIDA PEST MANAGEMENT ASSOCIATION

JANUARY 22-24, 2019

The Florida Hotel, Orlando, Florida

Florida is Best

FLORIDA is the best place in the world for urban pest management. Insect pests are cold blooded and need heat to stay alive. Florida has an abundance of warm weather. The average temperature for the state is about 68 degrees F. In fact, the average temperature in July is 82 degrees F, and for December temperature averages 61 degrees.

PEOPLE vs. PESTS

Those temperatures are great for most pests, and they are also great for people. Unfortunately, the two do not mix. Pests and people do not get along very well.

Florida also has an abundance of water, which is also needed by pests. The pests are blessed with an average rainfall of about 60 inches of precipitation a year. Some pests develop in water, like mosquitoes. But cockroaches are also regulated by the availability of water.

For instance, German cockroaches usually thrive in kitchens and bathrooms because of the availability of water in those locations. People also need water, so pests and people occur in the same places due to the availability of water.

As far as water, Florida has 30,000 lakes and 1,800 miles of coastline and boasts of 1,200 miles of sandy beaches. Those lakes and coastlines provide us with a healthy harvest of saltmarsh mosquitoes, sand flies, and blind mosquitoes, or aquatic midges.

TAMING the FLORIDA FRONTIER

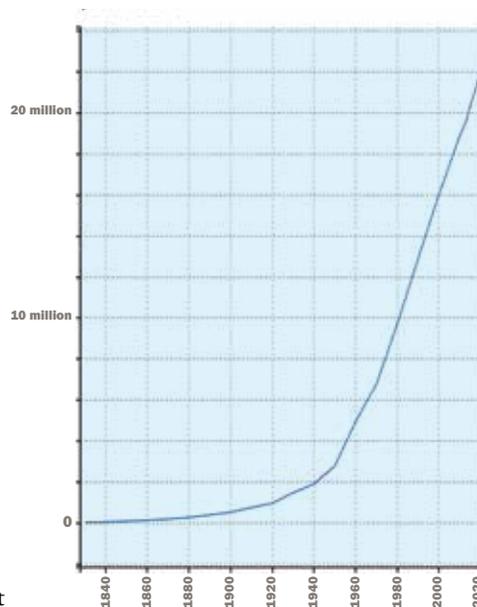
In fact, the climate in Florida is loved by people and pests. The numbers of people and the numbers of pests are growing every year. We now have about 21 million people living in our state. But you can add on all the snowbirds and tourists, who add on more than 100 million people coming to Florida annually. All those people need a place to live, either temporarily or permanently. As a result, there are about 9.5 million housing units in the state, accommodating 7.5 million households that are earning a median income of \$50,000.

We also have 40,000 restaurants in the state, 370,000 hotel rooms, and 1,250 golf courses. Pests live in all those places,



whether it is housing, restaurants, hotel rooms, beaches, or golf courses. Of course, pests enjoy those same locations. People are told that when they come to Florida, they should expect pests.

Florida used to be virtually uninhabitable because of pests. It is well documented that Florida's population was 2.7 million people in 1950, but now we have 10 times as many people living here. What changed? It was the use of modern management methods for mosquitoes and other pests that has allowed Florida to prosper. Without the pest management industry, Florida would be an impossible place to live.



Florida population chart. Florida residents number 21 million and rising, with no end in sight.

PEOPLE and PESTS 'ARRIVE ALIVE'

People and pests enter the state in many ways. Florida has 19 commercial airports and 14 deep-water ports. People fly or sail here from all parts of the world.

They also drive here. There are 7.8 million cars here as well as millions more trucks. All these modes of transportation are either infested with pests or have the potential to move pests from one place to another. Cars and trucks are also important methods of killing hordes of insects like lovebugs, which get splattered on windshields two times a year.

The number of species of pests imported into the state grows every year. We have imported fire ants, Asian tiger mosquitoes, Asian cockroaches, and Formosan termites. And the list goes on.

It seems as if every month we have a new pest appearing in Florida. That emphasizes the fact that pest management professionals need to stay up to date on the new pests and products available to control those pests. We are glad that *PestPro* magazine is an important tool for alerting the industry about new pests and pest situations.

FLORIDA needs YOU

All these numbers add up to mean that pest management is extremely important in Florida. It is readily apparent that about one-third of pest management occurs in the state of Florida. Florida pest management firms are prominent in the top-100 list of businesses in terms of revenue.

Years ago, I said that pest management generates as much income as citrus in the state. Now with citrus acreage declining, I expect that pest management has greater value than citrus.

You can be proud that you are serving the needs of Floridians and visitors to our state. Florida would not be habitable without this vital pest management industry. And at *PestPro* magazine we are proud to provide quality articles to support your efforts in urban pest management. **PP**

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

SCORPIONISM



Infants are among those most likely to be stung by a scorpion.



SCORPIONISM—
The accidental
envenomation of
humans by toxic
scorpions.

SCORPIONISM is a very important health problem in Mexico, the country with the highest number of people stung by scorpions.

Mexico had 277,240 reported scorpion sting cases in 2017 and 259,423 cases as of week 48 in 2018. This number of cases may be underestimated because many people that are stung by scorpions do not seek medical attention.

Clinical manifestations vary from local symptoms to severe disease and even death. The major concern is the possibility of anaphylactic shock — a severe allergic reaction. Scorpion envenomation is most common in children from birth to two years old and people above 60 years old.

The number of cases of death has decreased significantly since the availability of antivenoms used in fabotherapy, known as Alacramyn in Mexico and Anascorp in the United States.

In the 1980s there were about 800 deaths a year. However, in recent years the fatalities are fewer than 100 annually. Most of these fatal cases occur because some people who are stung do not seek medical attention during the first two hours after the encounter with the scorpion.

Mortality is higher in the smallest Mexican settlements, but it is greatly reduced in mid-sized and large settlements where scorpions are considered pests. This is a function of both the proximity to medical care in larger settlements and of the higher numbers of scorpions to people in smaller settlements or less urbanized settings.

Despite many superstitions and misconceptions about scorpions, their reputation as venomous arthropods is overstated. Most scorpions are not aggressive and inflict only minor pain and discomfort when they do sting. But even without death, in some cases the pain may last for one week, depending of the sensibility of the person.

Typical scorpion sting symptoms are:

- immediate pain or burning
- very little swelling
- sensitivity to touch, and
- a numb/tingling sensation.

More serious types of venom symptoms include:

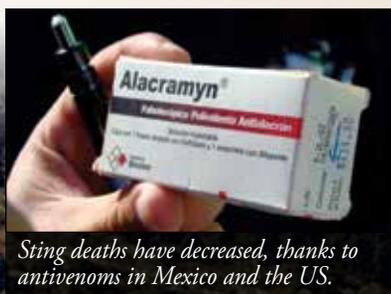
- rapid breathing
- high blood pressure
- increased heart rate
- involuntary muscle twitching
- weakness.



Redness and pain or burning may follow a scorpion sting.



Swift medical attention can prevent a sting fatality.



Sting deaths have decreased, thanks to antivenoms in Mexico and the US.



A wild scorpion glows at night under UV light

Jerry Kirkhart

Dangerous Encounters

Scorpions are active at night and rest and hide during the day. Due to their nocturnal behavior, you are likely to encounter them at night.

To minimize the chances of being stung, a person should keep a small flashlight handy and wear footwear, taking the time to shake footwear first before putting them on. Stepping on a scorpion is a common way to get stung. Scorpions reflect the light, making them easy to see because they glow.

These arachnids generally run from danger and use their venom only when they feel trapped or cornered. When people find a scorpion under rocks or other places, the scorpion will often try its best to get away as quickly as possible. This means that they will only use their venom if a person tries to touch them. Thus, accidental human stinging occurs when scorpions are touched while in their hiding places, with most of the stings occurring on the hands and feet.

Biology and Behavior

Scorpions have a three-part body comprised of the head; their main body, or trunk, which has seven segments; and the tail, which has six segments.

The last segment of the scorpion's tail has a stinger. Scorpions can move their tail in any direction and, though most think of their classic "C" position with the stinger over their head, scorpions will sting any way possible when in danger.

Scorpions have eight legs along with a set of pinchers that are quite strong and agile. They use the pinchers for hunting prey, self defense, grooming, and caring for the offspring.

When scorpions mate, the male initiates the courtship by grasping the female's pedipalps with his own and guiding her through a complex courtship behavior in the form of a mating dance, or promenade. During the promenade they may engage in cheliceral massages or "kissing," in which the male grasps the female's chelicerae with his chelicerae (mouth parts) and gently kneads them.

Continued on page 16



Scorpions dance a promenade

THERE ARE over 100 species of scorpions in Mexico, but only seven are dangerous — all belonging to the Buthidae family. These are found along the Pacific Coast:

Centruroides sculpturatus
Sonora and Arizona

Centruroides suffusus
Durango, Nayarit and Sinaloa

Centruroides noxius
Nayarit

Centruroides infamatus
Colima, Durango, Jalisco, Michoacán, Nayarit and Aguascalientes

Centruroides tecomanus
Nayarit, Colima, Jalisco, Michoacán and Guerrero

Centruroides elegans
Colima, Jalisco and Michoacán

Centruroides limpidus
Morelos, Guerrero, Michoacán and Méx

Scorpion Risk Areas In Mexico



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IF YOU cannot find the time or the right opportunity to get your pest management CEUs, we have you covered. You can now take several CEU courses online, directly from the experts at the University of Florida Entomology and Nematology Department. For a small fee, you can take these courses at your own pace from home, from the office, or anywhere else you get an Internet connection.

These courses were prepared specially for you by the experts at the No. 1 entomology program in the world, and they have been approved as continuing education units by the Florida Department of Agriculture and Consumer Services.

For folks from other states, the Florida CEU form that you get upon completion of the course and exam may be accepted in your state too. Talk with your state officer in charge of pest management CEUs.

To see the courses available, go to <https://ifas-urbanpestmgt.catalog.instructure.com>. On the landing page you will see the courses, their cost, and number of CEUs per course. **PP**

THE LIST of online pest management CEU courses includes:

Bloodsucking Arthropod Recognition: 2 CEUs GHP/Public Health

Learn to recognize insects and other arthropods that bite and suck blood.

Ant and Stored Food Pest Recognition: 2 CEUs GHP

Learn to recognize ants that are important household pests. Also, learn to recognize the important pests of stored food.

Cockroach Recognition: 2 CEUs GHP

Learn to recognize the cockroaches that are major urban pests.

Fly, Wasp and Bee Recognition: 2 CEUs GHP

Learn to recognize filth-breeding flies. Also, learn to recognize insects that sting, such as wasps and bees.

Recognition of Mulch, Moisture, and Occasional Invaders: 2 CEUs GHP

Learn to recognize insects and other arthropods that develop around the perimeter of structures and annoy residents.

Beneficial Insect Recognition: 2 CEUs Core

Learn to recognize insects that may be confused with pests but are actually biological control agents.

IPM and Pesticide Application: 2 CEUs Core

Learn about how to implement IPM and how to go beyond spraying as well as applying the correct amount of product.

PPE and Personal Care: 2 CEUs Core

This course contains two modules: personal protective equipment (PPE) and daily personal care. Both modules explain how to protect you and your family from pesticide residues.

Labels and SDS: 2 CEUs Core

Learn about the components of a pesticide label and the information on the Safety Data Sheet (SDS). Also, be prepared for pesticide emergencies and first aid.

Spill Control and Vehicle Inspection: 2 CEUs Core

This course contains two modules. The first is on pesticide spills, and the second is on pesticide vehicle inspection.

Triple Rinse and Emergencies: 2 CEUs Core

This course contains two modules: one on triple rinse procedures for empty pesticide containers, and the second on emergency procedures for pesticide exposure.

Ornamental Pest Recognition: 2 CEUs L&O

Learn to recognize insects and other arthropods pests of ornamental plants in the landscape.

Pest Caterpillar Recognition: 2 CEUs L&O

Course covers recognition of caterpillars affecting ornamental plants and also stinging caterpillars. Learn to recognize the important caterpillar species encountered on landscape plants.

Turfgrass Insect Recognition: 2 CEUs L&O

Learn to recognize insects that affect the health and appearance of turfgrass.

Wood-Destroying Insect Recognition: 2 CEUs WDO

Learn to recognize the most important insects that can destroy wood.

FOR THOSE of you interested in mosquito control in the urban setting, with special attention to the container-breeding mosquitoes such as *Aedes aegypti*, the vector of Zika, Dengue and Chikungunya, there is a four-credit course with 11 modules on mosquito biology and control at <https://ifas-mosquitoceus.catalog.instructure.com>.

For other online courses you can check this UF Entomology and Nematology Department website at <https://entnemdept.ifas.ufl.edu/extension/training-ceus/>.



Reevaluating Liquid Termiticides and Baits Against Invasive Subterranean Termites

Thomas Chouvinc



Formosan subterranean termites
Coptotermes formosanus

AS THE Formosan subterranean termite inevitably expands its range throughout Florida and creates significant problems in many urban areas, the Asian subterranean termite is becoming a major issue for the southeastern metropolitan area of Florida.

These two formidable foes are increasingly problematic for homeowners and for the termite control industry. For the folks who have been dealing only with native subterranean termites, the emergence of one of the two invasive termites in their neighborhoods changes the game.

Over the past few years I have received an increasing number of testimonials from the industry sharing challenges when dealing with Formosan or Asian subterranean termites.

Often, they have shared with me their disbelief in various cases where they had to go back and retreat multiple times because termites were still present in a treated house. In all instances it was treated with liquid termiticides.

Such observations matched the argument that Dr Nan-Yao Su of UF/IFAS made back in 2005. Su stated that liquid termiticides may only kill termites near the treatment, and the rest of the colonies may survive. In the case of *Coptotermes* species, their underground foraging area can be the size of a football field, and it is unlikely that a liquid termiticide treatment can affect termites more than 10 feet away from the application.

What was most troubling with the industry testimonials is that it appears that in some cases the termite colonies were able to find their way around the treatment and still cause damage to the treated structure.

Continued

A three-year-old *Coptotermes gestroi* colony under observation in the Chouenc lab at UF/IFAS.



USDA

Asian subterranean termite
Coptotermes gestroi

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ONE OBSERVATION with these two invasive subterranean termite species is their impressive ability to forage underground. It is not unprecedented to observe these termites entering a building by improbable access routes. Such occurrences often result in additional invasive drilling and treatment within the structure, which lead to a disgruntled homeowner — not to mention the possibilities for a lawsuit down the line.

Within this context, I reexamined field data and laboratory data on the use of liquid termiticides from the past 20 years. The evidence was unambiguous. Termites more than 10 feet away from the treatment are not affected, and the colony still has the potential for damage.

Therefore, my question was: If termites can find their way around the treatment, what would be the consequence to the structure? In addition, how do liquid termiticides compare with baits where a termite colony has multiple accesses to a structure and, therefore, only a small fraction of the colony is directly exposed to the liquid termiticide or bait?

Launching the Study

To answer these questions I had to use whole termite colonies with several hundreds of thousands of termites and realistic foraging distances of over 40 feet. Conveniently, I have been rearing *Coptotermes* colonies in our facility for the past four years, and I had enough large *Coptotermes* colonies to perform the experiment.

The protocol took almost two months to set up. I needed 54 planar arenas, almost 200 meters of tubing, and 12 colonies with equivalent populations. In total, we processed more than three-quarters of a million termites: 780,000 termites in this study.

Continued on page 14

Hometown: Willow Grove, Pennsylvania

Where you live now: Jensen Beach, Florida

About your company: Taylor Pest Management was founded by my grandfather, my father and my uncle, and has been in business since 1946. I started working there at 13 years of age in the early 1950s, sweeping out termite holes. Through the years I assumed increasing responsibility and took over the business in 1962. I continued to work until 2014, when I retired. Today my boys run the business. We have 12 employees doing general pest control.

First paying job and what you learned from it: Initially my father didn't want me to work for the company, so I went into the service. I was discharged on a Friday, and on the following Monday at 5 AM my father woke me up and told me we were going to work on a termite job. I've been with the company ever since. Through the years I've learned that every job is different.

First break in the pest business: My break in the business was that I had a father that owned a business I later inherited. My father wanted to keep things as they were. I wanted the business to grow. Eventually I got my way!

Best business book: *The Mallis Handbook of Pest Control*, by Arnold Mallis. I consider it to be the "bible" of pest control.

Best piece of business advice you received: I listened to my father and never stopped learning. I was taught to treat your customers fairly and be honest in all your dealings with them. I learned to be fussy about who I hire. For that reason I have excellent employees who have stayed with the company for many years. Our policy at Taylor Pest Management is the Golden Rule: Do unto others as you would have them do unto you. That's how I was raised.

What is the most important trait you look for when hiring: I never hire on the spot. I talk to the applicant first and

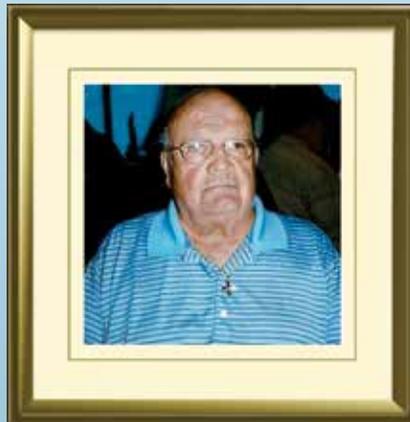


then arrange another interview. I watch them leave the first interview and observe how they are dressed, how they carry themselves, and what their car looks like. This will be how they present themselves to our clients and how clean they will keep the company vehicles. If they are currently

working, I ask them why they are looking. I ask them when they would be available to start. If it's right away, I don't hire them. I draw them out and listen to them talk. If their home life is chaos, their troubles will follow them into the workplace. Also, I prefer to hire and train.

What you would tell someone new to the pest business? There is no magic secret to success. Get the best training you can. Things are ever changing, so stay current. Products change, treatments change. Don't be afraid to ask for help or to help others. Use your suppliers, ask them questions — they have a wealth of information.

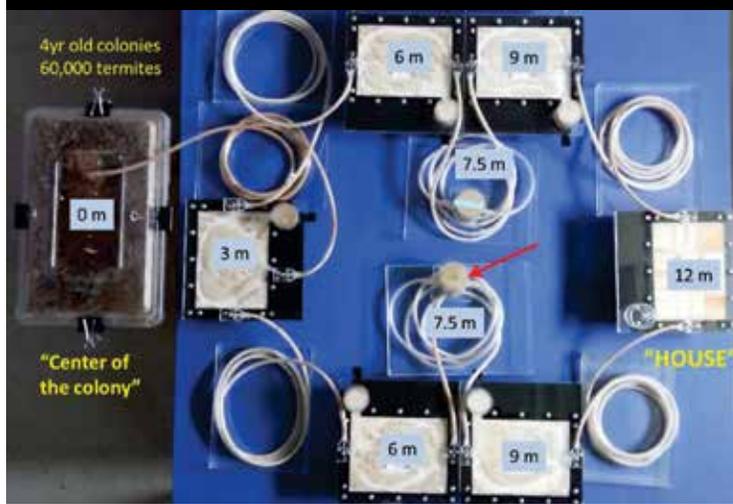
Where can we find you when you are not at the office? In the casino or spending time at home with my dog. **PP**



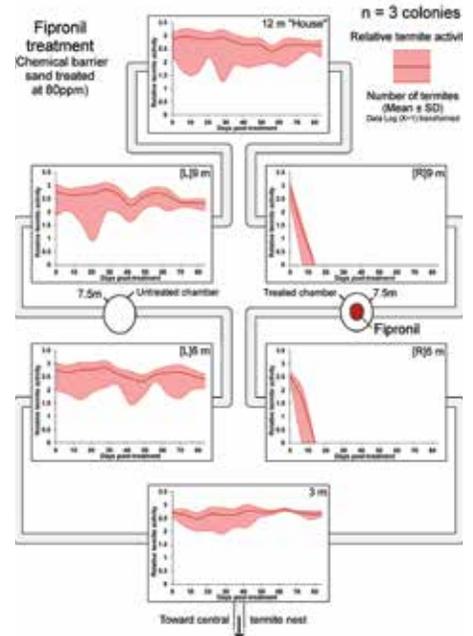
James B. Taylor

• FPMA •
IN PARADISE
JUNE 17–20, 2019 BOCA RATON RESORT & CLUB

The protocol simulated remedial treatment of a termite-infested structure.



Termiticide Study, continued from page 12



The protocol simulated the implementation of remedial treatment of an infested structure where the colony has multiple access routes and where only a portion of the population is directly exposed to the treatment.

Observations

Within two weeks after the implementation of the liquid termiticide, all termites within 5 to 6 feet of the treatment died. The accumulation of termite cadavers near the treated area resulted in secondary repellency, and the colonies avoided the treated area for the remaining 10 weeks of the experiment, using alternative foraging galleries.

At the end of the 12 weeks, colonies exposed to the liquid termiticide did not have any difference in population size compared to untreated colonies. Comparatively, colonies exposed to baits had no change in foraging activity for the first 40 days, but then termites progressively ceased their activity throughout their foraging territory. By 12 weeks, all bait-exposed colonies were eliminated.

The study showed that subterranean termite colonies with access to baits were inevitably eliminated, regardless of the position of the bait and despite minimal feeding on the bait. In comparison, colonies exposed to liquid termiticides were only locally excluded from the area near the treatment, but maintained their foraging activity in untreated areas and retained their potential risk for structural damage in the long term, as alternative foraging galleries were able to reach the house.



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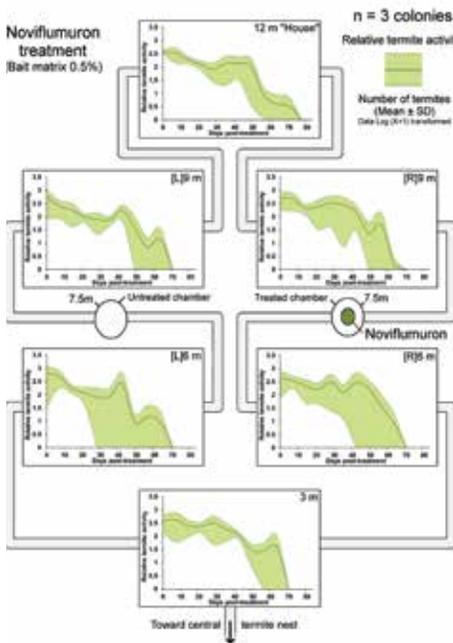
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Photos by Lyle J. Buss.

Outcomes

There are many implications coming out of this study. First, the two termite control methods have distinct approaches. Baits' goal is colony elimination, while liquid termiticides' goal is localized termite exclusion. This means that baits essentially eliminate the termite pressure around the treated structure, while liquid termiticides do not.

Second, with liquid termiticides colonies can rebound, swarm as mature colonies, and create new colonies nearby. In comparison, colonies affected by baits lost their reproductive ability because of colony elimination.

Final Thoughts

To conclude, in areas with high termite pressure from Formosan and/or Asian subterranean termites, the use of liquid termiticides is not sustainable to reduce termite populations and to reduce potential damage to structures in the long term. There is mounting evidence that in the case of high *Coptotermes* infestations in neighborhoods, area-wide termite management using baits is the most sustainable approach to prevent damage to structure in the long term. **PP**

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

Varied Carpet Beetle

Lyle J. Buss

BEETLES in the family Dermestidae are especially adapted to feeding on materials of animal origin and can be serious pests of items that contain animal hides, hair, wool and feathers. One of the most common and widespread species is the varied carpet beetle, *Anthrenus verbasci*.

Adults are 2 – 3 mm long and covered with yellow, white and brown scales that cross the back in zigzag bands. The larvae get up to 5 mm long, and are covered with long hairs. The hairs are especially dense in tufts near the tail end.

One of their favorite foods is dead insects, so in buildings they may breed in areas where dead insects accumulate, such as in light fixtures and on window sills. This fondness for dead insects also makes varied carpet beetles a major pest of insect collections, in which they can reduce specimens to dust. They may damage other animal products like skins, fur, wool, taxidermy mounts, leather book bindings, feathers, silk, and bee and wasp nests.

Even pet hair that accumulates in a home can be food for these beetles. They can also feed on plant products such as red pepper, spices, peanuts, cereals and seeds. Once I was cleaning under my sofa, and I found a single sunflower seed that had eight varied carpet beetle larvae feeding on it.

Adults are often attracted to light, so finding them at windows may mean that they were trying to get outside. Newly emerged adults like to go outdoors, where they can visit flowers to feed on nectar and pollen. After mating, they may go indoors to lay eggs. **PP**

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



Cannibalism is common among scorpions



Wood piles may harbor scorpions



Pesticide treatment of scorpions in Mexico

Scorpionism, continued from page 9

Upon finding an acceptable site, the male deposits his spermatophore and attaches it to the substrate in an upright position. He then guides the female over the spermatophore so that she can contact the spermatophore with her genital valves. As the spermatophore bends under pressure, the sperm is released directly into her genital tract. Once the insemination is completed, the male abruptly disengages from the female and leaves in a hurried escape, to avoid being attacked and eaten by the no longer receptive mate.

Females are viviparous, giving birth to young following a developmental period that

varies from two to 18 months. The average brood size is about 26, and the sex ratio at birth is equal, even though this ratio later shifts toward females after reaching maturity. After their birth, the newborns crawl onto their mother's back, where they remain during the first instar without feeding (photo, top left).

Dispersal of the young occurs shortly after they molt to the second instar, usually within three to 14 days after birth. The average scorpion will molt several times during the first few years of life and reach maturity after three to four years. They will then live another five to 10 years.

Scorpions are well adapted for surviving in a wide range of habitats and live very near the ground, where they typically are found under objects, in forest litter, or excavated burrows. Scorpions in the Family Buthidae like to live in clay soils during the dry season, but during the rainy season they are able to climb to any object available. They are excellent climbers and may be found under the bark of trees and logs, on the top parts of plants, among crevices in rocky cliffs, and inside houses.

Scorpions feed on a variety of prey: soft-bodied insects and arachnids, and even other scorpions. Owing to poor vision, scorpions depend on their sensory hairs and their ability to sense ground vibrations as a means of detecting, locating and recognizing suitable prey.

Managing Scorpions

When looking for pesticides to control scorpions, look for those that specifically list scorpions on the labels. The most widely pesticides used in Mexico for control of scorpions are lambda-cyhalothrin, bifenthrin and propoxur in wetttable powders or microencapsulated formulations. PP

Hussein Sánchez-Arroyo is Professor at Colegio de Postgraduados in Montecillo, Mexico.

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Why Customers are Skeptical Of Pest Management Companies With 'Perfect' Five-Star Ratings

Alain Parcan



IT'S HAPPENING more than you think: potential customers look up pest control services online and begin their research process. They find local businesses that offer the service they need and begin to compare. They aren't doing price comparisons, as you may have expected, but are actually looking at the online reviews and rankings.

Pest Control Company A and B have perfect five-star ratings, while C has a 4.5. While we used to believe that Pest Control Company C would have been eliminated for their score, the opposite rings true today.

Here's why: "Perfect" five-star ratings are a new red flag for consumers. When they see them, rather than assume the company does a great job, potential clients see perfect ratings as a sign of dishonesty.

In a world where businesses can pay for five-star ratings or offer deals or gifts in exchange for positive clout, people value authentic reactions from real people. Potential customers are more influenced when they hear about actual experiences rather than when they read canned responses or see wordless five-star reviews.

In a study featured in *TechCrunch*, product purchases were measured across 40 different categories. The researchers found that buyers were most influenced by reviews with an average star rating between 4.2 and 4.5. Unexpectedly, it was found



that negative reviews – in moderation, of course – were actually helpful in making products or services look reputable.

So why is it that five-star reviews cause customers to become so uneasy? It's because some things are too good to be true. Today's online customer understands the Internet to be full of exaggerations, so they know to take things with a grain of salt. Customers prefer authenticity to perfection. They understand that negative reviews are bound to happen and are often reassured by seeing a few negative (or even just non-five-star) reviews.

Reviews are a powerful tool for your company, so it's important to make it a priority for your team. Whether you

prefer to have your technicians ask customers directly to leave a review or have your office send clients a post-service email with a link to your Google Reviews, it's essential that you make this a company-wide process. Increasing the amount of reviews your company receives is a surefire way to make your reviews page work for you.

WITH ALL this knowledge, what should a business owner's attitude be toward negative reviews? One- to two-star reviews present an opportunity for growth, if handled properly. Negative reviews give you a chance to impress potential customers with a genuine, authentic response. While it is admittedly not the greatest feeling to hear about a customer's bad time with your company, there are a few things you can do to make the most out of the experience.

First off — and this is one of the most important steps — relax and take a moment. As a business owner or manager, it's understandable that you may take the review personally.

Emotional responses don't bode well for your brand,

however, so take a minute to collect yourself. Then you can address the feedback. It's important to always acknowledge their pain and offer up a resolution. Even if your response says something as general as "We will be in touch to help resolve your experience," this willingness to address and respond to criticism will reflect positively on your customer service.

When dealing with online reviews, striving for perfection is a lost cause. Instead, work to build a network of strong reviews from your customers over time and respond appropriately to any negative ones that pass through.

Chances are you already have plenty of experience with customer service, and managing your online reviews is just an added layer of that customer experience. Keeping all of the above in mind, you shouldn't worry about getting a perfect rating; it turns out customers don't even want you to have five stars! **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.



A giant crab spider. Fully grown it is the size of a man's palm!

Mark Yokoyama

What creatures have eight legs and visit your customers' worst nightmares?

Common Indoor SPIDERS

William H. Kern, Jr.

stripping, but we will cover them in future articles. Spiders need food — usually insects — so the fewer insects indoors, then the fewer spiders there will be.

Giant Crab Spider

The pantropical huntsman spider or the giant crab spider, *Heteropoda venatoria*, Family Sparassidae, is a large spider. The body, with legs, is the size of a man's palm.

These spiders do not make a web, but the females use silk to construct her egg sac. They seem to prefer vertical surfaces such as walls and furniture adjacent to walls.

They are not native to Florida, but originated in tropical America. They have since hitchhiked on ships to all warm regions of the globe.

Huntsman spiders seem to prefer cockroaches and can be abundant inside buildings with large cockroach infestations. Their size allows them to easily handle both German cockroaches and the large, peridomestic *Periplaneta* species.

THE air-conditioned indoor environment is not a great habitat for spiders because it is too dry. Although they are more abundant outside, a few spider species can survive indoors. This article will help you identify some of the spiders most often seen indoors.

Active hunting spiders like wolf spiders, fishing spiders, jumping spiders, and sac spiders often enter a structure under doors with poor weather-



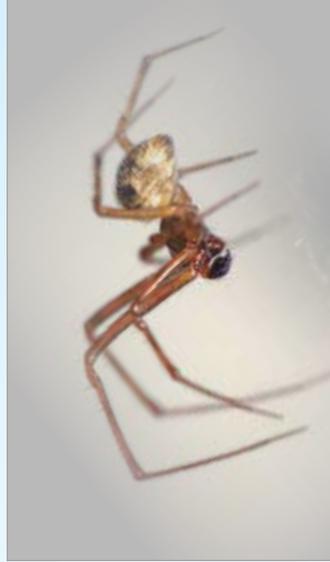
Above: Heteropoda venatoria male. Notice the distinct, light 'V' mark on the dark cephalothorax. The legs are longer in the males than the females.

Right: Heteropoda venatoria female. The body is generally brown with stout, black setae on the legs. A white line above the chelicera is seen in both males and females.





Smeringopus pallidus is a cosmopolitan, elongate cellar spider species.



A female crevice crab spider, likely *Selenops insularis*.



A male crevice crab spider, *Selenops insularis*. The enlarged mittlike pedipalps distinguish this as a male.

The Family Selenopidae

Crevice Crab Spiders, Crevice Spiders, or Flatties

This family of spiders is widespread and abundant in tropical and subtropical regions worldwide. There are two or three species in Florida in the genus *Selenops*. The most common species are *Selenops insularis* and *Selenops submaculosus*, which are hard to tell apart.

These are active hunters that hide in crevices or under objects during the day and hunt at night. As the name “flatties” implies, these spiders are very flattened to squeeze into tight places. They are neither aggressive nor venomous.



Crossopriza lyoni, Asian long-legged spider, was introduced to North America and is spreading. The bottom photo shows a female carrying her egg sac.



The American or common house spider, *Parasteatoda tepidariorum*, has an abdomen about the size of a small garden pea. They are most easily confused with brown widows.



The red house spider, *Nesticodes rufipes*.



Steatoda triangulosa, the triangulate cobweb spider.

Cellar Spiders

The cellar spiders are daddy-long-legs spiders, Family Pholcidae, pronounced *fol-si-day*. These long-legged spiders are quite common in structures.

Do not confuse cellar spiders with the harvestmen called daddy-longlegs. Harvestmen have a single body region and do not produce silk.

Neither harvestmen nor cellar spiders are dangerous to people. Both cellar spiders and harvestmen have an odd, bobbing behavior when disturbed. This rhythmic shaking is a defensive behavior to confuse predators.

Cellar spiders make an irregular lattice web from which they hang. They prefer corners where walls meet ceilings or where two walls meet.

Cellar spiders can have a spherical or an elongate abdomen. There are about six genera in Florida.

Common House Spider

The American or common house spider, *Parasteatoda tepidariorum*, is one of the most common commensal spiders. They superficially resemble a widow spider in shape and general size. They do not have a red or orange mark on the underside of the abdomen. Their egg sacs are distinctly teardrop shaped.

I have been bitten several times by this spider, and the bite is not painful but results in a large, local reaction: a raised, red welt that is hot to the touch for several days. This was an allergic reaction on my part and may not represent a normal reaction.

Common house spiders are not considered dangerous to people.

Red House Spider

The red house spider, *Nesticodes rufipes*, is our most abundant indoor cobweb weaver in South Florida. They also occur in Texas.

These are small spiders with an abdomen the size of a BB. The legs and cephalothorax are brick red, and the abdomen is variable from brick red to black. They are commonly found in pantry cabinets, behind furniture, and in wall corners inside and outside.

The egg sac is spherical and about the size of the female's abdomen, 0.2 inches.

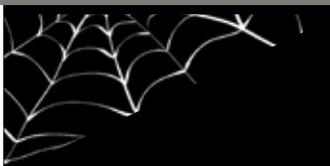
Genus Steatoda

The genus *Steatoda* is another common structural spider. They are slightly larger than *Nesticodes*, but much smaller than any of the widows. Many in this genus have a black abdomen. They replace the red house spider in north Florida and most of the rest of North America.

Continued



When you need a spider identified, try to get a good picture of its eyes. Each family has a distinctive eye pattern that can be used for identification. In the flattie above, six eyes are in a row, and two more eyes are up and behind the row.



LEFT: A wolf spider, closeup of eyes. This type might wander into your house — or your nightmares!



The brown widow, *Latrodectus geometricus*, is highly variable in color. The legs are always banded at the joint and the abdomen can range from a light, ashy gray to satin black.

Very dark individuals of brown widows are often misidentified as black widows. Dark brown widows always have evidence of the black joint banding of the legs. The abdomen can be black but with a satin texture, not glossy.

All brown widows have an orange hourglass on the underside of the abdomen, while our native widows have a red hourglass.

The egg sacs of the brown widow are distinctly spikey in appearance. No other Florida spider has an egg sac like it. This is the evidence I look for to confirm a brown widow infestation.

Common Spiders, continued from page 19

Widow Spiders and Other Cobweb Weavers

The cobweb weavers of Family Theridiidae include the widow spiders (*Latrodectus*) and numerous small harmless species.

The widows of Florida include our native northern black widow, southern black widow, red widow, and the invasive brown widow. While our four widow species are found on the outside of structures, I have only ever found brown widows, *Latrodectus geometricus*, living inside air-conditioned buildings.



The doily spider or wall spider, *Oecobius annulipes*. The shiny spot to the right of the spider is a grain of sand for scale. The webs can be very abundant and often are evenly spaced over surfaces.

Doily Spider, or Wall Spider

The wall spiders, or doily spiders, Family Oecobiidae, are tiny spiders the size of sesame seeds that make flat webs on concrete, plaster, brick and stone surfaces. This is the source of the name doily spiders.

There is one genus, *Oecobius*, pronounced *ek-O-bee-us*, and one or two species in Florida. In South Florida, *Oecobius annulipes* is the common species.

Usually the flat surface web is cluttered with ant remains. If these spiders are disturbed, they quickly run from the web to protected crevices.

This has been an abbreviated discussion of the most common indoor species and is not a comprehensive list of all spiders that can be found in customer's homes. **PP**

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

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Hurricane-Damaged Palms: *Care After the Storm*

Monica L. Elliott and Timothy Broschat



Royal palm

WHILE MANY palm species are adapted to windstorms, a hurricane can damage even the most tolerant palms. Learn what to do after a windstorm once it is safe to venture outside to care for the landscape.

IT IS IMPORTANT to understand how a palm grows. The growing point of a palm is the apical meristem, often referred to as the palm bud or palm heart. It is located at the top of the trunk, surrounded by the leaf bases. All new leaves come from this bud. If the bud is severely damaged, new leaves fail to develop, and the palm eventually dies.

Unless the palm trunk is broken or it is otherwise obvious that the bud has been damaged, there is no way to predict which palms will survive wind damage and which ones will not, as the bud is not visible or accessible for inspection. However, it is apparent after several years of hurricanes in Florida that certain palm species are more tolerant of high winds than others.

The native sabal palm, *Sabal palmetto*, and royal palm, *Roystonea regia*, both tend to survive high winds but in very different ways. While sabal palms lose very few leaves, royal palms, which have a crownshaft, shed most of their leaves.

Taking Care of Palms

The following are some suggestions on caring for palms after a hurricane. The main point to note and inform clientele is that it will be at least six months — and probably longer — before it is apparent that a palm will

recover. Recovery consists of new leaves emerging from the bud.

In some cases, the new leaves will not look normal. They may be abnormally shaped and/or shorter than normal, or the leaflets or leaf segments may have dead edges. However, over time, each successive new leaf should appear a little more normal until eventually normal leaves appear. Again, this takes time, so patience is required. It is recommended to monitor damaged palms carefully during the next one to two years.

It is also important to understand that because of the storm, people are examining their landscape more closely than they probably did before the storm. Thus, they may not realize that the palms had problems such as nutrient deficiencies¹ prior to the storm. The challenge is to determine which problems existed before the storm and address them accordingly as opposed to those that developed because of the storm.

Broken Palms

If the trunk of a single-stemmed palm is broken, it should be cut at the base and removed. It will not recover. However, a clustering palm has a lateral meristem at the soil line. Thus, new stems will emerge, and the palm should recover in most cases.

Cut the broken stems as close to the soil line as possible. If

possible, the stumps of single-stem palms should be removed or ground up.

If the stumps are left in place, they should be monitored for development of *Ganoderma zonatum* conk, a shelflike mushroom. As soon as a conk starts to form, it should be removed, placed in a bag and the bag placed in garbage that will be incinerated or buried. The fungus is not harmful to people or pets, but it may kill the other palms in the landscape if it spreads. See *Ganoderma Butt Rot of Palms*².

Uprooted Palms

Palms should be stood upright as soon as possible and replanted at the same depth at which they were planted previously. Bracing is necessary and should be kept in place for at least six months.

These “replanted” palms should be treated as if they were being installed for the first time. Thus, water management is the most important component of a management program in the first six months. The root zone should be irrigated as necessary during the reestablishment period. Refer to *Transplanting Palms in the Landscape*³ for more information about caring for transplanted palms.

Continued

¹ <http://edis.ifas.ufl.edu/ep273>

² <http://edis.ifas.ufl.edu/pp100>

³ <http://edis.ifas.ufl.edu/ep001>



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Palm Damage, continued from page 21

Leaf Removal

If the broken leaves are still green, it is recommended to leave them attached, as they will provide photosynthetic capability for the palm as it recovers. However, if only a few leaves are broken, then removing these leaves, and only these leaves, may be acceptable. See *Pruning Palms*⁴ for more information about how to remove palm leaves.

Fertilization

For palms that are not uprooted, maintain the same fertilization program that was in place prior to the storm. For replanted palms, no extra fertilizer should be applied to the root zone until the palm exhibits new growth, i.e., new leaves. This will take a month or longer in many cases.

There is no known benefit to applying a micronutrient spray to the canopy, and it may be harmful if applied incorrectly. See *Fertilization of Field-Grown and Landscape Palms in Florida*⁵ for more information about proper fertilization of landscape palms.

Fungicides

There is no research to document the benefits of using fungicides after a hurricane. The theory behind this common recommendation is that if the apical meristem, or bud, has been damaged, then it is possible that fungal pathogens — primarily *Phytophthora* or *Thielaviopsis* — or secondary bacterial pathogens may become established in the bud and cause a bud rot. See *Bud Rot of Palm*⁶.

The only chemical pesticides that may have an effect on both fungi and bacteria are copper-based fungicides, not copper nutrient sprays. These fungicides should be applied as a drench to the bud, not

to the soil, as these fungicides do not translocate from the soil to the bud area where they are needed.

All fungicides must be used in accordance with the label. Do NOT mix fungicides together or with a nutrient spray unless the label indicates it is safe to do so.

There is no research to indicate copper-based fungicides will help wind-damaged palms, but they probably will not hurt the palm if used according to the label. The normal recommendation is not to use copper-based fungicides more than twice, because they are not prone to degradation in the environment.

Based on observations from previous hurricane seasons, it is obvious that many palms, especially native palm species, survive windstorms without any fungicide applications. Thus, it may be best to reserve fungicide use for those palms that are highly valuable or severely damaged. *Continued on page 28*

⁴ <http://edis.ifas.ufl.edu/ep443>

⁵ <http://edis.ifas.ufl.edu/ep261>

⁶ <http://edis.ifas.ufl.edu/pp144>



Satellite view of “Termite City” in the state of Bahia, Brazil. Large termite mounds have altered the landscape in an area measuring 90,000 square miles.



Giant termite mounds in Brazil are visible from space!

WHEN you think you have heard everything, something else comes up that truly amazes you! The world of insects is certainly full of surprises and facts that go well beyond what we can even imagine.

THE Strange World of Insects: **BRAZIL'S TERMITE CITY**

Roberto Pereira

A RECENT PAPER published in *Current Biology* certainly caught my attention, and it was not because this happened in Brazil, where I was born a few years ago! I say “a few” in relation to my age in comparison to the age of this termite city I am about to describe to you.

Actually, if you go to Google Maps or something else that allows you to see satellite pictures of the Earth, you may want to look at point at 12° 23' south and 41° 00' west — close to the center of the state of Bahia in northeastern Brazil. You will see a strange landscape that seems to have a bunch of dots, shown in the photo at the top of the page.

This may actually look like some type of crop or construction done by humans, but what you are looking at is indeed the artwork, or perhaps just work, of termite colonies over a short period of about 4,000 years. No! Not a typo, *four thousand* years.

Those little dots on the satellite picture are actually mounds that were built by termites. The mounds are between 6 and 13 feet tall and have an approximate diameter of 30 feet across.

The dirt mounds are just that — mounds of dirt. They are not termite nests, because the termites live underground. The mounds seem to be just an accumulation of soil the termites

excavated over the course of 4,000 years as they dug galleries in that area.

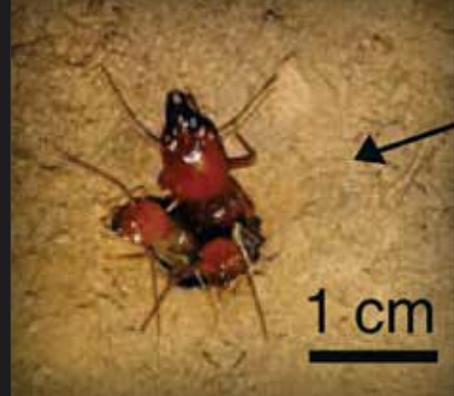
The area where these mounds are found extends over almost 90,000 square miles. That is a bigger area than the whole state of Florida, which extends over only 65,755 square miles.

The researchers estimated that there are about 200 million of these termite mounds in that area of Brazil, which corresponds to an about 2.4 cubic miles of excavated soil, or 2.6 trillion gallons of soil.

One can see the mounds only if the vegetation has been cleared. Otherwise, the trees and other vegetation block the view. But an unblocked view looks like



Aerial photograph of portion of the "Termite City" in State of Bahia, Brazil, showing mounds that seem to be almost perfectly spaced in the landscape. Credit: Jaime Sampaio



Syntermes dirus termites coming out of a nest entrance. A soldier is on the top, and two workers are on the bottom of the nest entrance.

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the landscape in the photo at above left. It almost looks like the termites planned exactly where the piles of dirt should go.

Termites did not exactly "plan" the arrangement of the mounds, but the researchers described the well spaced mounds as a consequence of the termites optimizing the disposal of the soil waste resulting from the excavation of a complex network of underground tunnels. The termites used these tunnels to access the leaf fall from the vegetation in the area. These termites feed on the leaves, and they forage at night on the surface of the soil.

How can we know that these mounds are 4,000 years old? The researchers collected soil from the center of the mounds and determined, using some sophisticated method, when that soil was last exposed to sunlight. The researchers assumed the soil at the center of the mound was last exposed to sunlight when it was deposited in the sun-lit exposed surface of the mound. Since that time, that soil has been covered by other layers of soil.

Exactly what type of termites build these huge mounds? These are fairly large termites. The species constructing these mounds is *Syntermes dirus*. The workers of this species weigh about 43 milligrams, compared to about 3 mg for workers of the Formosan termites, *Coptotermes formosanus*, and about 3.5 mg for the eastern subterranean termite, *Reticulitermes flavipes*. These termite workers are about as heavy as a large worker of the Florida carpenter ant and about 15 times the size of the termites we are most familiar with here in Florida. The *Syntermes dirus* soldiers weigh about three times the workers, at 118 mg.

If you want some other information on this termite city, there is plenty that has been written about it, so you can search the internet and find plenty of information. There are even some videos that are very interesting. **PP**

Roberto M. Pereira is Research Scientist at UF/IFAS Entomology and Nematology Department.

Buyers *Like* Vanilla

RAND HOLLON



FROM MY childhood, I remember hand churning — which seemed like forever — homemade ice cream at my grandmother's home in south Georgia and asking the question, "Why vanilla?"

She replied, "It's because you can do so much with it. You can add whatever you like. Peaches, chocolate syrup, nuts — just about anything in any combination that suits you. Or, you can just leave it alone and enjoy it the way it is."

She was right.

When it comes to ice cream, vanilla reigns supreme. Of course, there will always be flavors du jour like mint chocolate chip or "Pereira Peppermint Patty," which over time fall both in and out of flavor — I mean favor.

At the end of day, vanilla enjoys its timeless appeal because of what you can choose to do with it, or not! Options with vanilla are endless, and they're yours! No surprise vanilla continues to capture a large, diverse segment of ice cream buyers.

What's all that got to do with the value, sale, and purchase of pest control businesses?

In my view, plenty. And here's why: Like vanilla ice cream, buyers buy businesses for what they're doing and what they may do with them.

Being mindful of your business's "vanilla-ness" is an important challenge. It's a challenge because while building a business asset, there's inherent difficulty in differentiating your business to prospective customers in a competitive environment while at the same time working to keep things "vanilla" enough to create the greatest appeal to the broadest number of future prospective buyers.

In today's marketplace, buyers of pest control businesses are various and sundry. If you're reading this, you're probably familiar with some acquirers. There are many, however, you may not know.

To get the best deal as a seller, it's necessary to appeal to the largest number of buyer types. Types of buyers include companies, investor groups, and individuals operating inside your current geography. There are also buyers in the form of investor

groups, companies, and individuals operating outside your current geography looking to enter.

There are still others looking to enter the pest industry for the very first time. Having a certain amount of "vanilla-ness" will help increase your business's appeal to them all, which in turn will help identify the best buyer in the marketplace for you.

STICKING with the ice cream analogy, here are three quick examples that work to make a business appear a little more vanilla and a little less rocky road!

Large accounts

Customers representing over 10 percent of a company's annual revenue are typically seen as risky to an acquirer. I'm not saying large accounts are a bad thing, but when they represent a large chunk of business, they're risky to both you and an acquirer. If a business is purchased and the big account cancels the next week, that's a big hit.

To reduce "big account risk," buyers sometimes design a different set of rules when it comes to the future stickiness of a large, game-changer account. Big accounts are great to have, but recognize the risk and work to minimize it for yourself and others.

In short, landing a large account should incentivize you to grow your business even more to reduce the percentage risk of having a large account.

Unconventional service packages

Pest control is a competitive business. It's an ongoing challenge to set yourself apart from your competitors. Customer service packages are sometimes created with the intention of setting yourself apart and maintaining long-term customer relationships. Although they sometimes work wonders, they sometimes move a little too far off the beaten path.

Examples of unconventional service packages include things like bundling pest control services together with uncommon service offerings such as pressure washing, pool cleaning, or lawn mowing. We all want to show customers that "we're different and

better." And that's a good thing — until it isn't.

Service packages easily assumed by others can result in higher business value. Unique service packages can sometimes be value-depleting to the overall business value.

Production and financial information

Clear production and financial information work to create value and reduce risk.

Regardless of company size, this information answers critical questions like, "What specific work was performed to produce the money received?" and "What will the financial picture be like once the business belongs to the buyer?"

Buyers make value and risk assumptions based on the quality of information they receive about a business. Simply put, clear, accurate information works to reduce buyer risk assumptions, which increases business value. Like vanilla ice cream, I don't have to make many assumptions about what it contains. However, other ice cream flavors like "Koehler Cat Krunch" give one reason to paws — I mean, pause.

Those are but three examples that can be applied to all the moving parts that make up your business. Be mindful at some point there's a liquidity event in the future when you may look to sell. And when you do, you'll want the best deal the overall buying market has to offer. That means creating appeal to all prospective buyer types.

And when it comes to overall appeal, vanilla is a pretty good place to start. **PP**

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



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Application Equipment Calibration

CALIBRATION of application equipment is important but often overlooked. If you do not calibrate your application equipment, you could be in violation of the pesticide labels you are using.

Most labels give you the volume or rate of applications. If you don't use the correct amount, you may not get control of the target pest. If you use too much you can cost your company money.

Some technicians I've spoken to have told me that their supervisors calibrate their equipment. The issue is that the equipment should be calibrated to each technician. Every technician walks and sprays differently.

When FDACS does equipment calibrations for preconstruction treatments, we ask the technicians if they know what their equipment is calibrated to. Most technicians tell us what they think they are calibrated to. When we do the calibration,

we usually find that they are not correct. Sometimes they are off by a considerable amount, which would be a label violation. Some other technicians rely on flow meters. But if the flow meters are not calibrated, this could lead to a label violation.

If you have not properly calibrated your equipment, you could be inadvertently creating pesticide resistance by subjecting pest populations to sublethal doses.

You can use the time/volume calibration method, which will give you the gallons per minute. This is different with injector systems, but they also must be calibrated.

Handheld granular applicators typically are not calibrated. This can cost companies a lot of money. We do a handheld granular bait calibration activity at Pest Management University (PMU) and find that most of the technicians are applying two to four times the labeled rates.

Handheld granular applicators need to be calibrated to each technician because of

the speed they walk. It is not that difficult to calibrate equipment; some pesticide labels give you directions.

Here is an example of some sprayer calibration suggestions for hand sprayers:

1. Stake off a 400-square-foot area of turf for practice. This is an area 20 feet (seven steps) by 20 feet.
2. Add a measured quantity — 1.5 gallons, for example — of water to the sprayer and uniformly spray the 400-square-foot area. Measure water remaining to determine the amount applied per 400-square-foot area. *Note: a minimum of 3 pints per 400 square feet is recommended.*

For more information, visit the University of Florida's pesticide equipment calibration website at https://edis.ifas.ufl.edu/topic_calibration. **PP**

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

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Standing salt water may injure palms



New palm leaves may emerge yellow following a hurricane

Per Kratochvil

Palm Damage, continued from page 22

Yellow New Leaves Immediately After the Storm

Although this phenomenon has been observed on other palms, it is most commonly seen on royal palms. The youngest leaf of a palm is the spear leaf, which is actually an unopened leaf. It is normally upright, ramrod straight, in the center of the canopy. Under normal circumstances, it opens slowly from the tip to the leaf base. As each portion of the leaf expands, it becomes the normal color associated with mature leaves.

In a windstorm it is not uncommon for this spear leaf to be forced open prematurely. If this occurs, the leaf appears pale green or yellow because it was not fully developed. Typically, these leaves assume a normal green color after a few days.

As long as the bud — from which all subsequent new leaves will emerge — is not damaged, the palm will produce a new canopy to replace the one that was lost in the hurricane. It will take at least a year, and usually longer, for the entire canopy to be replaced.

Soluble Salts in the Soil

If the landscape has been flooded with salt water, the salts from evaporated or percolated salt water can cause serious injury to many species of palm. This is especially true if the salt water remains on the landscape for more than a few hours, or if there is no significant rainfall after the salt water recedes.

In the latter case, it may help to heavily leach the soil around palms with fresh water as soon as possible. Salt injury typically causes tip necrosis on leaves throughout the canopy. See *Physiological Disorders of Landscape Palms*⁷ for more information about soil-soluble salt injury. **PP**

Monica L. Elliot is Professor of Plant Pathology and Timothy Broschat is Professor of Environmental Horticulture at UF/IFAS Ft. Lauderdale Research and Education Center.

⁷ <http://edis.ifas.ufl.edu/ep263>

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Cockroaches Are Becoming Big Business In China

Cockroaches are being used to get rid of food scraps and to feed pigs

JINAN, China (Reuters) — In the near pitch-dark, you can hear them before you see them — millions of cockroaches scuttling and fluttering across stacks of wooden boards as they devour food scraps by the ton in a novel form of urban waste disposal.

The air is warm and humid — just as cockroaches like it — to ensure the colonies keep their health and voracious appetites.

Expanding Chinese cities are generating more food waste than they can accommodate in landfills, and cockroaches could be a way to get rid of hills of food scraps, providing nutritious food for livestock when the bugs eventually die and, some say, cures for stomach illness and beauty treatments.

On the outskirts of Jinan, capital of eastern Shandong province, a billion cockroaches are being fed with 50 tons of



A staff member shows cockroaches in shelves to the camera at a farm operated by pharmaceutical company Gooddoctor in Xichang, Sichuan province, China August 10, 2018. REUTERS/Thomas Suen

kitchen waste a day — the equivalent in weight to seven adult elephants.

The waste arrives before daybreak at the plant run by Shandong Qiaobin Agricultural Technology Co, where it is fed

through pipes to cockroaches in their cells.

Shandong Qiaobin plans to set up three more such plants next year, aiming to process a third of the kitchen waste produced by Jinan, home to about seven million people.

A nationwide ban on using food waste as pig feed due to African swine fever outbreaks is also spurring the growth of the cockroach industry.

“Cockroaches are a biotechnological pathway for the converting and processing of kitchen waste,” said Liu Yusheng, president of Shandong Insect Industry Association.

Cockroaches are also a good source of protein for pigs and other livestock.

“It’s like turning trash into resources,” said Shandong Qiaobin chairwoman Li Hongyi.

Continued

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A staff member walks among tanks that extract essence from cockroaches at a facility operated by pharmaceutical company Gooddoctor in Xichang, Sichuan province, China, 2018. Reuters / Thomas Suen

Cockroaches, continued from page 29

‘Essence Of Cockroach’

In a remote village in Sichuan, Li Bingcai, 47, has similar ideas. Li, formerly a mobile phone vendor, has invested a million yuan (\$146,300) in cockroaches, which he sells to pig farms and fisheries as feed and to drug companies as medicinal ingredients.

His farm now has 3.4 million cockroaches.

“People think it’s strange that I do this kind of business,” Li said. “It has great economic value, and my goal is to lead other villagers to prosperity if they follow my lead.”

His village has two farms. Li’s goal is to create 20.

Elsewhere in Sichuan, a company called Gooddoctor is rearing six billion cockroaches.

“The essence of cockroach is good for curing oral and peptic ulcers, skin wounds and even stomach cancer,” said Wen Jianguo, manager of Gooddoctor’s cockroach facility.

Researchers are also looking into using cockroach extract in beauty masks, diet pills and even hair-loss treatments.

At Gooddoctor, when cockroaches reach the end of their lifespan of about six months, they are blasted by steam, washed and dried, before being sent to a huge nutrient extraction tank.

Asked about the chance of the cockroaches escaping, Wen said that would be worthy of a disaster movie but that he has taken precautions.

“We have a moat filled with water and fish,” he said. “If the cockroaches escape, they will fall into the moat and the fish will eat them all.” **PP**

— Thomas Suen and Ryan Woo
 Reuters



Chen Qianjiang shows a spoonful of fine powder made of cockroaches to the camera at his home in Changning County, Sichuan Province, China, 2018. Reuters / Thomas Suen

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