NOVEMBER/DECEMBER 2020

Winter Protection For Fla. Plants | Panther Depredation

PESTPRO

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

German Cockroach: The Making of an Indoor Pest

Indoor Christmas Tree Pests

OFFICIAL MAGAZINE OF FLORIDA PEST MANAGEMENT ASSOCIATION

Pest Management Education, Inc.
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National Christmas Tree Association statistics show that throughout the years, Americans have preferred to put their presents under a real Christmas tree. However, natural trees may harbor uninvited pests. Get the lowdown on common Christmas critters.

Photo by Tante Tati

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Defining Vision and Values

Message from the President of FPMA

Suzanne Graham

OVER the last several months, the FPMA Strategic Planning Committee has been hard at work coming up with ideas, discussing them, articulating them, and prioritizing the steps the Association will take to move confidently into the future. One of those steps was to define our vision and values.

Our vision is: To be known as the pest management industry's premier source for Advocacy, Networking, and Technical & business education, or A.N.T. for short.

Our values are: Relationships, Professionalism, Advanced Education, Best Practices, Industry Representation, Leadership Development, and Innovation.

After this unprecedented year, here are just a few of the ways we plan to realize that vision in 2021:

Advocacy

- FPMA has commissioned an economic impact study that will be available in September 2021. This study will arm the Association with solid information on the importance of the industry within the state, and will be used to leverage our positions with legislators in Tallahassee.
- FPMA will continue to support and collaborate with EREF and other affinity partner associations regarding fertilizer ordinances.

OUR VISION

To be known as the pest management industry's premier source for Advocacy, Networking, and Technical & business education, or A.N.T. for short.

OUR VALUES

Relationships, Professionalism, Advanced Education, Best Practices, Industry Representation, Leadership Development, And Innovation.

- FPMA will continue to liaise with the University of Florida and IFAS to support Urban Entomology programs, research and Extension.

Networking

- Regional Meetings will recommence as health and safety-related issues allow. Stay tuned for some exciting changes!
- The Region 5 Annual Clay Shoot is scheduled to be held on December 7, 2020. Check your emails and the website for details.
- The FPMA Business & Operations EXPO is scheduled for January 19–21, 2021, at the Embassy Suites in Kissimmee. All protocols and precautions will be in place for you to enjoy some REAL HUMAN interaction. Watch your emails and refer to the website for details.

Technical & Business Education

- EXPO 2021 will be the kick-off for the launching of an overarching business education program we are calling the Compass Program. The Program is divided into two tracks: The Helmsman Program is designed to give technicians the kind of business training they can use every day, and the Navigator Program caters to owners and managers and is designed to enhance the leadership and decision-making skills required to navigate in this complex business environment.

Benefits

- FPMA has partnered with LIG Solutions, a provider of member health benefit programs that offers members the advantages of affordable healthcare pricing, streamlined enrollment process, all under a turnkey solution that delivers true ROI that covers individuals, families, and all level of employees.

Members, watch your emails for details for upcoming events and benefits. For those of you who are not members, there's never been a better time to join. Just go to the FPMA website (www.flpma.org) and click Join! PP

Suzanne Graham
President, FPMA

Visit **flpma.org** for currently scheduled meetings and more.

What Kind of Job Is Pest Control?

PERCEPTIONS are that jobs in the pest control industry are not very glamorous. In fact, among the publications that rank the best and worst jobs, pest control is considered one of the world's worst jobs. For instance, *24/7 Wall St.* lists pest control as the fifth-worst job in the world, *Glamour* ranks pest control as the sixth-worst job, *Money Inc.* ranks it as the 12th-worst job, and *CareerAddict* ranks it as 21st-worst.

They look at the job as dealing with dangerous animals like alligators and snakes. They say the work spaces are often confined or otherwise unpleasant. As if that is not bad enough, technicians work with poisonous materials, like pesticides. Also, financial rewards for the job are low, with low salaries that average at $32,000 per year.

PEST CONTROL CAREER: PROS

I take exception to these unflattering allegations about pest control.

Pest control is a very rewarding and satisfying career. It takes knowledge, education, experience, and attention to detail. There are very few jobs as diverse as pest control. Technicians not only have to deal with pests, but they have to deal with customers also. Which is more challenging: an insecticide-resistant cockroach infestation or a customer who is paranoid about pests? Technicians have to deal with both extremes. Often, the biggest reward for a technician is both successfully controlling a cockroach infestation and making the customer happy with the service.

It takes a very special person to enjoy pest control. Technicians have to be self-motivated. What other job requires that the boss gives you the keys to a service vehicle, the route for the customers, and then expects you to do the job with virtually no supervision? Most other jobs have a boss standing over your head, yelling at you throughout the day to be more productive. Many bosses are impossible to be around and want to make sure you understand your lowly place in the organization and the world.

Pest control technicians have a lot of independence. Not everyone is self-motivated enough to do the best job possible on their own with no prompting. Those who do not step up and excel are let go.

Ron Navon

A pest pro on the job with a yellowjacket nest

They go to work in maybe the food service or retail sales industry. Many of the best technicians come from food service or retail sales. They hated their previous jobs because of the lack of challenge, overbearing bosses, and boredom of doing the same thing day after day. Pest control is a wonderfully diverse career that continues to change from customer to customer and from day to day.

Not only does the job change, but the pests change also. There are new and invasive pests all the time in Florida. We get a new species introduced into Florida about every week on average. These are accidental introductions associated with trade and travel to other parts of the world. For instance, Asian and Formosan termites are introduced pests. Asian cockroaches are introduced.

Even if a pest doesn't occur here, it may be feared by customers who want an explanation of whether they should be concerned. The "murder hornet" from Japan is the latest example of that. A technician never knows when a customer will want an explanation about a new or even old pest.

PEST CONTROL CAREER: CONS

Some people would not be good fits for the pest control industry. Someone who likes to put the same cog in a machine for eight hours a day would not fit into this industry very well. A person who does not like interacting with people would not enjoy most aspects of pest control. A homebody who does not like leaving the house would not enjoy driving a route all day long.

A sloppy person would not enjoy the care needed to protect himself and others from insecticides. This person is a really poor fit for this industry. These people would not be happy as pest control technicians.

Let me address the issue of low salary. The salaries listed on the web for technicians are starting salaries of a person with no experience. A seasoned and experienced technician is usually paid much more that the $32,000 per year that appears on the web. So, the salary is low only during the initial period used to evaluate the new employee and see whether that person has the aptitude to succeed in pest control.

FOCUS ON JOB SATISFACTION

In the United States, are people really happy with their jobs? According to a recent survey, 85 percent of people are happy with their jobs, but 30 percent are thinking of quitting and doing something else with their lives.

Do you know what keeps people in their jobs? Providing workers with opportunities to advance their careers is often the best way to keep them from leaving. Just 13 percent of workers who say their companies provide "excellent" opportunities for advancement were thinking of quitting their jobs.

So, pest control companies should provide ongoing training, recognition, and incentives for employees to advance their knowledge and even possibly their salaries. Technicians should feel part of a team, and recognition of team members' success is a great way to make them feel special about their accomplishments.

A company could have a special recognition for technicians who read *PestPro* magazine. Maybe there is an opportunity for some employees to get a certificate from the University of Florida through online learning or training from Pest Management University. There could be an incentive for employees who acquire ACE (Associate Certified Entomologist).

Technicians do not always need a raise to stay at a place. If they are given a good salary, what makes them want to stay in a company is opportunities to better themselves so they can perform their jobs to the best of their abilities. *PestPro* and the University of Florida provide great opportunities for ambitious pest control personnel to advance and flourish. Think about giving those employees an opportunity to become truly successful. PP

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

German Cockroach:

The Making of an INDOOR PEST

Roberto Pereira and Philip Koehler

Fewer than 40 cockroach species live in urban areas, but the ones that do certainly cause great problems. Pest cockroaches can cause allergies and other medical problems. They are considered of great importance as pests, even when they are not causing much of a problem, living outdoors and taking care of their own business.

THREE GLOBAL COCKROACHES

COCKROACHES moved into human dwellings in ancient times. The German cockroach, specifically, has been a problem ever since. This species is so adapted to life close to humans that it has never been found in natural habitats. If we were to eliminate it from human structures, we might actually cause it to go extinct. We would not want to do that, would we? [Probably so!]

A six-legged enigma

Although we call this species "German cockroach," its origin is not completely understood. Perhaps it is time to try to understand where it comes from.

The earliest written record of German roaches was Aristotle's *History of Animals* in the late 4th century BC. Cockroaches were first scientifically classified as Order: Blattodea, meaning insects that shun light, in a group that included many different household pests. Later, Blattodea was reserved for cockroaches only. In 2018, however, roaches were grouped with the termites in Order: Blattodea.

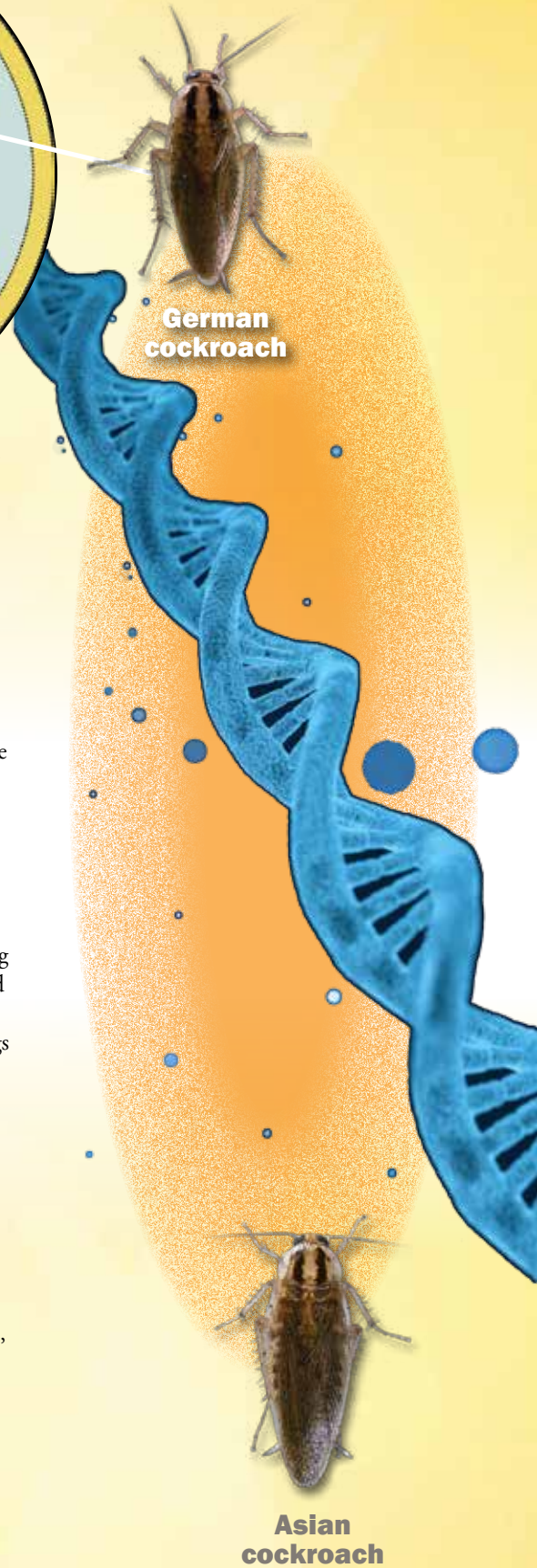
In China during the Ming dynasty, from 1368 to 1644, cockroaches were described as urban pests found in kitchens. The cockroach species at these locations are not known, but it is reasonable to expect that the ancient pests remain pests today.

Of the 40 or so species of modern cockroaches found in and around cities, only about 20 are commonly found in numerous populations. Of these, three species are global: the American, Oriental and German cockroaches.

By the way, what we call the different cockroaches has nothing to do with where they are really from: The Australian cockroach is likely native to western Africa, the brown cockroach is also likely from Africa, and the brownbanded cockroach is from the west coast of Africa. The smokybrown cockroach is from Asia.

Of the global species, the American cockroach is from tropical south and west Africa, where it spread from slave ships. The Oriental cockroach, probably the earliest pest cockroach species, is likely from southwest Asia, and wild populations occur in the Crimea and Greece.

The German cockroach has the most widespread distribution. It is found from Alaska to Antarctica and has adapted to human dwellings, whether residential, commercial or industrial, and whether permanent or mobile, such as ships, trains, trucks and cars. *Continued next page*



BUT WHERE, exactly, is the German cockroach from? The genus *Blattella*, in which the German cockroach is included, is cosmopolitan, meaning those cockroaches exist in many areas of the globe and are ancient, having been around for more than 45 million years. (Yes, they were around before Phil Koehler started working at the University of Florida!)

Europe has no other *Blattella* species, so it is certain that the German cockroach is not from Germany or Europe at all. The majority of *Blattella* species are endemic to Asia, like their close relative the Asian cockroach, which is also a pest here in Florida and other places. The German cockroach is very similar to the Asian cockroach, and these two species can actually interbreed in the laboratory, although the offspring are sterile. So it is now well accepted that the German cockroach is from Asia, although no wild population seems to exist.

Mysterious path from East to West

There is no clear understanding of how the German cockroach ended up in Europe.

In 1763, the German cockroach was first recorded in Europe as *Blatta transfuga*. It was renamed *Blatta germanica* in 1767. But it is likely that this cockroach had been in Europe for a while. The first U.S. record occurred in New York City in 1842 during the construction of an aqueduct that was blamed for bringing the German cockroach to the city. By the late 19th century, German cockroaches were present all over the globe, especially in ports that had a great deal of trade with Europe.

With the global expansion of European colonialism during the 19th and 20th centuries, the German cockroach found easy transportation to new locations. Similar buildings and city layouts allowed for easy exploitation of these new digs.

In many cases, German cockroaches were first reported from hotels and hospitals. Of course, first records usually are based on some entomologist identifying the insect, so the insect presence may predate that identification by many years. Also, German cockroaches may have been introduced at the same location many different times before it was recognized as a pest and as a German cockroach.

Modern tools help us find answers

Today, with genetic studies it is a little easier to determine origins and relationships among different German cockroach populations and other factors that may affect these insects.

German cockroaches in different buildings are genetically distinct, indicating that the cockroach populations from different buildings usually do not interbreed. The urban environment, being highly fragmented, makes the German cockroach populations in different locations a bit different from other populations in the same city. That is why we may end up with German cockroaches in a certain location that are highly resistant to a certain pesticide, while in other locations — even within the same city — the cockroaches can still be controlled by that same pesticide.

Another conclusion that comes out of these genetic studies is that although new introductions of German cockroaches are rare, the chances of the successful establishment of a new German cockroach strain is very high. Because the new strain

Continued on Page 12

Florida lawns are subject to many environmental stresses. These can include nutrient deficiency, salinity, temperature extremes, over- or under-watering, soil problems, and prolonged exposure to shade or traffic.

Paul Brennan

Environmental Stresses and Your Florida Lawn

Laurie Trenholm

ENVIRONMENTAL stresses are not the same as problems caused by insects or disease, although they may occur in conjunction with insects or disease. You may see an insect or disease and assume that treating for the biological pest will take care of the problem. However, if there is an underlying environmental stress or if management practices are not done correctly, it is necessary to correct or manage for those problems to make the site less conducive to the pest.

For example, certain weeds such as dollarweed and sedges are often found in overwatered lawns. Controlling the weeds is one step in remediating the problem, but without adjusting irrigation practices, the problem will likely recur. Similarly, lawns that are overfertilized will often be more likely to have disease issues. Applying a fungicide may arrest the development of the disease, but if excess fertilization continues, the problem will persist.

Regardless of what environmental stress is causing problems, there are some basic management strategies that will help sustain a lawn. The use of proper cultural practices will help keep your lawn healthy, sometimes even despite environmental stress. These practices should always be followed to maintain a healthy, more stress-tolerant lawn.

1. Choose the most appropriate grass for your site conditions: Plant the right plant in the right place.

It may not always be practical or affordable to replace a lawn if you have a grass that is not well suited for your site, but there are times when that option may provide the best solution. For example, if you have heavy shade in part of your lawn, the grass may thin out and not do well over time. In this case, it is best to look for an alternative ground cover that will do well in shade, or think about mulch or hardscape for this area.

2. Fertilize appropriately.

Fertilizer labels list N-P-K ratio numbers of the proportion of three plant nutrients: nitrogen (N), phosphorus (P), and potassium (K). The nutrients in fertilizer are needed for healthy lawn maintenance, but it is very important for the health of your lawn and for the environment that fertilizers be applied at the appropriate time and rate. When nitrogen is applied in excess of recommended amounts, the resulting growth surge consumes much of the grass's stored energy reserves. This can leave the grass in a weakened condition to cope with stress, so the turf has a harder time recovering and staying healthy in the long term.

If excess nitrogen fertilizer is applied late in the growing season, especially in any part of Florida where the grass is dormant over the winter, spring growth can be delayed or reduced. This sometimes occurs in North Florida — north of Ocala — and less often in Central Florida — south of Ocala to Vero Beach on the east coast and Tampa on the west coast. Turf density will also decrease in such cases, giving weeds a greater chance to invade.

Potassium, the third number on the fertilizer label, can impart stress tolerance and can help grass maintain a healthy condition. You might consider looking for a fertilizer with equal amounts of nitrogen and potassium, particularly for the last fertilizer application of the year.

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German Cockroaches, continued from Page 10

may very well be resistant to certain pesticides, in your first encounter with a German cockroach population in a certain location, you may already be dealing with a resistant population.

In fact, most new occurrences of German cockroaches are the result of populations that exist near that location. Fast population growth facilitates spread of a German cockroach population already adapted to the local conditions, which may include adaptation to the use of certain pesticides.

The spread of the German cockroach is due in part to the combined effects of a short life span, small size compared to other cockroach species, a preference for warm temperatures, a social lifestyle, preference for the food and shelter found in urban environments, and help from humans in providing transport, food and even pest control measures, including insecticides, that may allow the German cockroaches to outcompete other species.

An urban opportunist

The German cockroach is a tropical species with optimal temperature range around 25 to 32°C, or 77 to 90°F. This may not be the temperature range we typically maintain in our buildings, but around active engines, compressors, elevators, escalators, generators and similar equipment, survival for this tropical species is very comfortable — even in areas with much cooler weather. As long as they can limit water loss, cockroaches do not suffer reduction in development or reproduction. Elimination of water sources is also a way to limit German cockroach populations.

Interestingly, the German cockroach does not seem to have a significant advantage in urban environmental conditions when compared to other pest cockroach species. However, their short lifespan and physiological requirements, which may have been problematic initially, became advantages after fast transportation and the improvement of the indoor environment, especially heating, became common practice among human populations.

Pest cockroaches are gregarious: They live in large groups, which allows large numbers of roaches to survive in small harborages. German cockroach aggregations have a superior organization compared to other pest cockroach species, allowing greater population density and greater individual fitness. Aggregations grant the ability for the cockroaches to increase the temperature and humidity in the microenvironments where they live.

Outside of large groups, German cockroaches suffer delays in development and sexual maturation as well as behavior disorders, which are not known in other pest cockroaches. Aggregation and social behaviors are more necessary for the German cockroach than for other pest cockroach species.

Resistance to insecticides, common in German cockroaches, is not as common in other pest cockroaches. Resistance includes behavioral and physiological resistance and metabolic detoxification.

Several reasons make the German cockroach better adapted to urban environments than other pest cockroach species. In some situations, the German cockroach has replaced other cockroach species in human households, but an overall decline in cockroach populations has not occurred. Unlike other *Blattella* species, which are found mostly outdoors, the German cockroach is found exclusively inside human dwellings.

Reflections through the mists of time

A potential scenario for how the German cockroach became an urban pest is that its ancestors were brought in from the fields in ancient times, as the Asian cockroach from southern Asia was transported indoors with agricultural produce. These ancestors of the German cockroach may have gone from Asia to Arabia and Turkey, then into Italy and the rest of Europe.

The cold, European winters may have killed these tropical insects outdoors, leaving isolated indoor populations that adapted to those habitats. Once dependent on humans and their buildings, the German cockroach could spread to other urban areas and then to the European colonies all over the world.

Or perhaps the Asian cockroach ancestors of the German cockroach were brought to more than one urban area in Arabia and Africa, before Europe. It then evolved and spread worldwide.

Whatever the scenario that led the German cockroach to its current distribution and importance, it looks like it is here to stay. Be ready! PP

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

This article is a text adaptation from a scientific article, "Global spread of the German cockroach, *Blattella germanica*," by Qian Tang, Thomas Bourguignon, Luc Willenmse, Eliane De Coninck, and Theodore Evans. Published 2019 in the scientific journal *Biological Invasions,* Vol. 21, pages 693 – 707.

Indoor Christmas Tree Pests

Roberto Pereira
and Philip Koehler

According to the National Christmas Tree Association, about 25 to 30 million real Christmas trees are sold every year. Your customers might find that some of those trees bear "gifts" of the six- or eight-legged variety.

WE ARE going to talk about bugs that may be brought into a house on natural Christmas trees during the holiday season. These bugs may be true pests on the living tree, or they may be just hitchhikers that were on the tree when you brought it into your house.

They will probably not do any damage to a tree that has been cut and transported. However, these pests may be annoying to have in the house as you are trying to enjoy the holidays.

Plant-Sucking Insects

Aphids are plant-sucking insects that will not cause any harm to people. They are soft-bodied and can easily be crushed. They may stain clothing and other material if they do get crushed. Some common aphids could transfer to other house plants, but that is not very likely to happen in the house. Dark aphids can stain fabric if they are crushed, so be careful if these insects are present.

Other sap-sucking insects, such as **adelgids** and **scale insects**, may also come into the house attached to the Christmas tree branches. These insects are tiny, and some may be covered with a waxy or wooly coating. Continuous feeding of these insects on the tree may cause the needles to drop prematurely. Like aphids, when crushed these may cause stains.

Psocids are known as barklice or booklice, but are not "lice" at all. Psocids may also be moved in on Christmas trees. These insects feed on fungi or mold, so they usually find something to eat on the bark of trees. They usually occur in groups that may stay very close together.

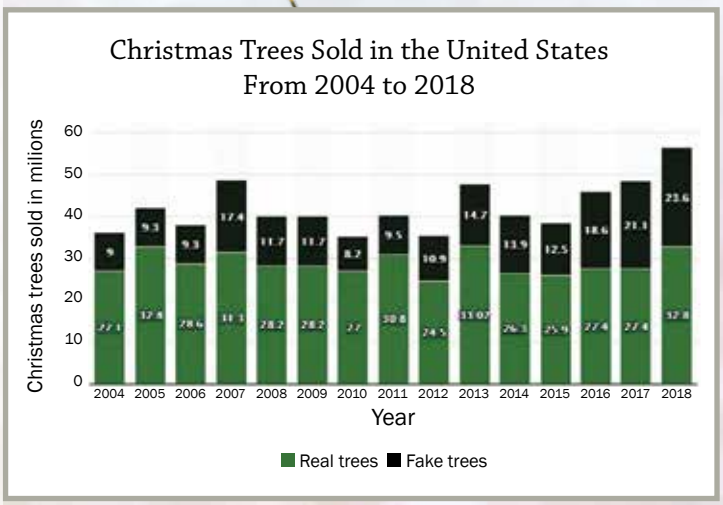
Spiders

Spiders, both small and large, may also come in on trees — especially if insects or other organisms are present — because spiders are predators that feed on insects and arthropod pests. Most spiders are completely harmless to humans, so one does not necessarily have to fear them. But because they tend to wander off, they may not stay on the tree.

The larger spiders may be a little easier to spot and eliminate before bringing the tree indoors, so it is more likely that small species or young **spiderlings** are the ones that make it indoors. Sometimes there is a **spider egg sac** attached to the tree, and

Continued on page 20

Spider, at left, and spiderlings (highly magnified)



If you are a Christmas tree farmer, or if you are growing a tree on your property that will eventually be used as a Christmas tree, see the USDA Forestry Service's *Christmas Tree Pest Manual* online at https://tinyurl.com/USDA-christmas-tree-manual

Winter Protection for Florida Plants

Sydney Park Brown and Thomas H. Yeager

WINTER temperatures in Florida are frequently low enough to cause cold injury to tropical, subtropical and, occasionally, temperate plants not adapted to Florida climatic conditions. Freezing weather normally occurs in north and central Florida, while below-freezing temperatures are rare for South Florida. Tropical plants and summer annuals do not adapt or harden to withstand temperatures below freezing, and many suffer "chilling injury" at temperatures below 50°F.

Subtropical plants can harden, or become accustomed to withstand freezing temperatures, and properly conditioned temperate plants can withstand temperatures substantially below freezing. Recently planted, unestablished plants may be more susceptible to cold injury.

What to Do Before a Freeze

Florida homeowners often desire a tropical appearance to their landscapes and may plant species past their northern limit. Tropical and subtropical plants can be used effectively in the landscape, but they must be protected or replaced when necessary. Intermingle cold tender plants with hardy plants so that the whole landscape is not totally devastated by extremely cold weather.

Homeowners can take steps to acclimate plants and protect them from temperature extremes by taking advantage of microclimates and using good cultural practices.

Temperatures can fluctuate within a landscape due to microclimates created by tree canopy, proximity to structures, and other factors. Identify these microclimates in your landscape when choosing the planting site for cold-sensitive plants. For example, tender plants should not be planted in low areas where cold air settles. Poorly drained areas result in weak, shallow roots that are susceptible to cold injury.

SHADE

Tree canopy creates a microclimate that typically reduces cold injury during radiational freezes. Plants in shaded locations usually go dormant earlier in the fall and remain dormant later in the spring. Tree canopies trap heat radiating from the ground to the atmosphere and thereby elevate air temperature beneath them. Shade from early morning sun may decrease bark splitting of some woody plants after a freeze.

Plants that thrive in light shade usually display less winter desiccation than plants in full sun. However, plants that are not shade tolerant will become unhealthy, sparsely foliated, and less tolerant of cold temperatures.

WINDBREAKS

Windbreaks are helpful in reducing the effects of short-lived advective freezes and their accompanying winds. Fences, buildings, adjacent plantings and temporary coverings can all serve this purpose although their height density, and location will affect the degree of wind speed reduction.

Injury due to radiational freezes is influenced little by windbreaks.

PROPER PLANT NUTRITION

Plants in good nutritional health will tolerate cold temperatures better and recover from injury faster than plants grown with suboptimal or imbalanced nutrition. However, late fall fertilization can result in growth flushes that are more vulnerable to cold injury.

Additionally, fertilizers should be applied at the correct rates and times and only when needed. Because they have the potential to pollute water, some municipalities have adopted ordinances that regulate the formulations, sale, and application of lawn and/or landscape fertilizers. Check with your county's UF/IFAS Extension office for recommendations and rules (see http://solutionsforyourlife.ufl.edu/map/).

WATER RELATIONS

Watering landscape plants before a freeze can help protect plants. Well watered soil will absorb more solar radiation than dry soil, reradiate heat during the night, and slightly elevate minimum night temperatures in plant canopies. However, prolonged saturated soil conditions damage the root systems of most plants.

Continued next page

When will Jack Frost come to town?

Here are some expected first-frost dates:

Tallahassee	November 9
Gainesville	November 25
Pensacola	December 1
Ocala	December 1
Panama City	December 8
Jacksonville	December 10
Daytona	December 20
Tampa	December 27
Melbourne	December 28
Orlando	January 1
Fort Myers	January 1
West Palm Beach	January 2
Miami	Infrequent

For more information about Florida frost dates, visit https://www.almanac.com/gardening/frostdates/FL

PRUNING and PEST MANAGEMENT

Avoid late summer or early fall pruning. This can result in growth flushes more prone to cold injury.

Healthy plants are more resistant to cold than plants weakened by disease, insect damage, or nematode damage. Routinely inspect for pests. Contact your county's Extension Office for information on pest identification and recommended management (see http://solutionsforyourlife.ufl.edu/map/).

Methods of Protection

Plants in containers can be moved into protective structures where heat can be provided if necessary. Containers that must be left outdoors should be protected with mulches and pushed together before a freeze to reduce heat loss from container sidewalls. Plants may be damaged if crowded together for extended periods.

Heat radiating from soil surfaces warms the air above the soil or is carried away by air currents. Radiant heat from the soil protects low-growing plants on calm, cold nights, while tall, open plants receive little benefit. Radiant heat loss is reduced by mulches placed around plants to protect the roots. For perennials, the root system is all that needs to be protected, because some perennials die back naturally in winter while others survive freezes and quickly regenerate new foliage from the roots.

Grafted or budded plants, like some gardenias and many fruit trees, can be protected by insulating the trunks with commercial tree wraps or 1- to 2-foot mounds of soil. This protects the trunk so that even if the branches freeze, the tree will be able to resprout from above the graft. Remove the wrap or mounded soil each spring.

COVERS are better at protecting plants from frost than from extreme cold. Covers must extend to the ground to trap radiant heat and may need to be anchored with rocks, bricks or soil if is windy. Ideally, the covering should not rest on the foliage, which may be injured by the contact. Some examples of coverings are "frost cloth," bedsheets, quilts, or black plastic.

Gallon milk or water jugs can be used to protect small plants. Simply cut the flat bottom off and place them over the plants. Valuable plant specimens can be protected with temporary greenhouses constructed of wood framing and plastic sheets. The addition of a light bulb or a string of Christmas lights under a cover is a simple method of providing heat to plants in the landscape. Remove or ventilate plastic covers during a sunny day.

Continued on Page 26

Sally Lanigan, UF/IFAS

Name: Billy Riley

Hometown: Highland Springs, Virginia

Where you live now: Niceville, Florida

About your company: Bryan Pest Control was founded in 1977 by Bryan Grimes in Fort Walton Beach. Starting out as a one-man operator, Bryan has grown his family business into three branch offices providing GHP, L&O, and termite protection along the Emerald Coast. The company employees 65 team members, including Bryans's son Rick and grandson Hunter.

First paying job and what you learned: My first paying job at age13 was at a grocery store in a small community, where I worked until my senior year in high school. This job instilled in me the value of a dollar, that hard work pays off, and the importance of customer service. I believe that starting work at a young age helped me learn that nothing in life is free and you have to work hard to prove yourself to succeed in life.

Billy Riley

First break in the pest business: I started with Bryan Pest Control at the age of 19 treating lawns and homes for termites. After a few years of learning other aspects of the business, I decided to pursue getting my state certifications. I am proud to say that after 30 years I am still here working for a great company, managing our Niceville branch.

Best business book: The latest ones I read were *Courage to Execute* by James Murphy and Linda Robinson's *Masters of Chaos,* which isn't really a book on business but a good read that you can build character and teamwork off of.

Best piece of business advice you received: Be honest and upfront with your customers and employees, set goals, and exceed your customers' expectations.

Past President's Corner

FPMA

What you would tell someone new to the pest business? Have a plan in place, execute that plan, and continue to gain knowledge about the industry. Always portray a professional image. How the public views your company will go a long way in your success.

Where can we find you when you are not at the office? I have a passion for the outdoors. You can find me spending time with my family, hunting or fishing and just enjoying life.

What is the most important trait you look for when hiring? I look for someone that wants to be part of a team, not just another job. A person with a good personality and seems eager to learn will typically make a great employee. PP

Eva Buckner

University of Florida scientist Eva Buckner is collaborating with Miami-Dade Mosquito Control to evaluate and determine the most effective insecticides to control the mosquito that spreads the West Nile virus.

PESTPRO readers might have heard that South Florida is experiencing a West Nile virus outbreak. As of September 21, the Florida Department of Health confirmed 55 cases in Miami-Dade County. By the end of September, Palm Beach, Broward, Bay, Collier and Lee counties also had reported human cases of the virus. Researchers are working to find the most effective integrated mosquito management practices.

Eva Buckner, an assistant professor and medical entomology state Extension specialist at UF/IFAS Florida Medical Entomology Lab, has been monitoring the outbreak while working closely with the Centers for Disease Control and Prevention, Miami-Dade Mosquito Control, and FDOH. Through an FDOH grant in the amount of $178,161, Eva Buckner and Barry Alto, a UF/IFAS associate professor of entomology, have been working with the agencies on "Improving our understanding of domestic mosquito control of *Aedes aegypti, Ae. albopictus,* and *Culex quinquefasciatus* through assessments of insecticide susceptibility." The grant closes in December 2020.

West Nile virus is the leading mosquito-borne disease in the continental United States. It is spread to people by the bite of an infected mosquito. Cases of West Nile occur during mosquito season, which starts in the summer and continues through fall. While symptoms vary greatly there are no vaccines to prevent or medications to treat the virus in humans, according to the CDC. That is where science-based research designed to help choose the right insecticide to kill the mosquito spreading West Nile virus enters the picture.

Miami-Dade County Mosquito Control has been sending samples of mosquitoes to the CDC for testing, and the CDC has found numerous testing positive for West Nile virus containing just one species: the southern house mosquito, *Culex quinquefasciatus*, Eva said.

"This suggests that the southern house mosquito is most likely the mosquito species responsible for transmitting West Nile virus to humans in the current Miami-Dade outbreak," Eva added. "Southern house adult mosquitoes are frequently found to be resistant to insecticides, and resistance in Miami-Dade populations could be affecting the ability of Miami-Dade Mosquito Control to curtail the current virus outbreak."

Eva is working with FDOH to determine the insecticide resistance of southern house, Asian tiger, and yellow fever mosquito populations across Florida to better control them. Mosquito control programs throughout the state have been sending Eva Buckner's lab mosquito eggs that she and her lab technicians rear to adulthood, test for resistance, and determine which

insecticides used by mosquito control programs result in the highest mortality rates. She then provides the resistance data for the insecticides tested and resistance management recommendations based on that data to the mosquito control program managers.

"Miami-Dade County Mosquito Control is one of the programs that we have been working closely with and have provided resistance data and management recommendations for multiple yellow fever mosquito populations in areas where the Zika virus outbreak occurred in 2016," Eva said.

During the weeks of July 27 and August 3, Eva Buckner's lab received egg samples of the southern house mosquito causing the West Nile virus from multiple locations in Miami-Dade County collected by Miami-Dade Mosquito Control. While more will be needed to complete the work, Eva is in the process of getting Miami-Dade County Mosquito Control information on which insecticides kill the highest percentage of their southern house mosquitoes.

"This information could potentially help reduce the number of virus human infections in Miami-Dade County, before neighboring counties are impacted further." Eva said.

Eva Buckner joined the faculty of the Entomology and Nematology Department at the University of Florida in September 2018. She grew up in rural southwestern Georgia.

West Nile virus, highly magnified

Q&A with Eva Buckner:

Where did you pursue your undergrad degree?

I got my bachelor of science degree in biology from Armstrong Atlantic State University in Savannah, Georgia, which is now Georgia Southern University's Armstrong campus.

How did you end up in medical entomology?

I attended the University of Georgia for my master of science in ecology. For my thesis, I researched the community composition, blood-feeding patterns, and arboviruses of adult mosquitoes within an ecological preserve in southwestern Georgia. I have been hooked on medical entomology and mosquitoes in particular ever since.

Continued on Page 30

Eva and her husband on their 10-year wedding anniversary in June 2020.

Eva sorts dengue virus–infected mosquitoes inside a glove box in BS-L3 lab for her PhD research. Photo by UF/IFAS

Eva and other Golladay Lab members at Joseph W. Jones Ecological Research Center take a break from catching mosquitoes to pose for a photo during her master's research. Photo by UF/IFAS

A southern house mosquito emerges from the pupal exuviae, or cast skin, onto water. Photo by James Newman, UF/IFAS

Pests, continued from Page 13

hundreds of new spiderlings may emerge when moved to the warmer temperatures in the house. As these young spiders move away from the tree their presence is not harmful, but people in general are not very fond of spiders.

Besides spiders, **mites** may also be present on Christmas trees. These look like small spiders and may be confused with spiderlings. Some of the mites may get on people and cause some discomfort or itchiness.

Bark Beetles

Beetles, especially **bark beetles** and others that normally attack trees in the field, are a common occurrence on Christmas trees. Most of them are quite small and may go unnoticed, but larger ones may be more readily seen. Continuous feeding by some beetles may leave some accumulation of sawdust on the tree trunk or branches, or on the floor just below the point where the beetles are attacking the tree.

"Hitchhikers"

Some insects are just hitchhikers. They will come into homes on a Christmas tree not because they have any affinity for that specific tree, but simply because they are general predators or general feeders. They just happened to be on the tree when it was brought indoors. Some insects may look harmful but are perfectly harmless.

That is the case with **praying mantises**. These are predators on other insects and can be found on many trees and shrubs. The green adults can sit perfectly still for a long time and go unnoticed against the green foliage of a tree. Nymphs can be brown and may also go unnoticed against a tree trunk.

Other potential hitchhikers are **ticks**. Ticks hide at the base of trees and shrubs to spend the winter and sometimes lay egg

masses there. A tick egg mass can contain several thousand seed ticks. If an egg mass is brought inside, it can hatch due to the warmer temperatures. These seed ticks climb walls and can be a real problem. It is important to inspect the base of the tree for these egg masses to prevent this problem.

Managing Christmas Tree Pests

So, what should one do to avoid some of these pests in the house? A good inspection and a good shaking is usually all that is needed to prevent surprises later. After bringing the tree home, you may want to leave it in a warm place that is not inside the house — a garage, perhaps. This may be all that is needed to encourage most insects to move away from the tree in search of a better place to live.

Before bringing the tree indoors, a thorough inspection may spot any potential problem creatures, which can be sucked up using a vacuum cleaner or handpicked off the tree. The vacuum cleaner may be all one needs, either before the tree is brought into the house or after, in the case of creatures that do make it into the house on a Christmas tree.

For more serious infestations, some general household insecticides may be used sparingly. However, taking the tree outdoors may be the best course of action before making any insecticide applications.

A better solution is the use of harmless products such as diatomaceous earth to dust over your tree. This may actually repel insects so they may get more active, so make sure you and the people around the household are aware of the issue. PP

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


Frass


Damage to a pine two-by-four


Stephanopachys rugosus dorsal and side views

A Bostrichid Powderpost Beetle

Lyle J. Buss

SEVERAL times in the past few years I have received samples of an interesting powderpost beetle. The beetles were found in homes, usually coming from two-by-fours that still had remnants of bark on them. Its scientific name is *Stephanopachys rugosus.* Unfortunately, it does not have a common name.

Beetles in the genus *Stephanopachys* are associated with conifers, and this particular species attacks pines. It is found across the eastern United States. It is a small beetle, only 3 or 4 mm long, or ⅛ inch. Like many species in the family Bostrichidae, the head is not visible from above, and it has a somewhat cylindrical body that is flattened below. It is covered with conical tubercles, each with a protruding hair.

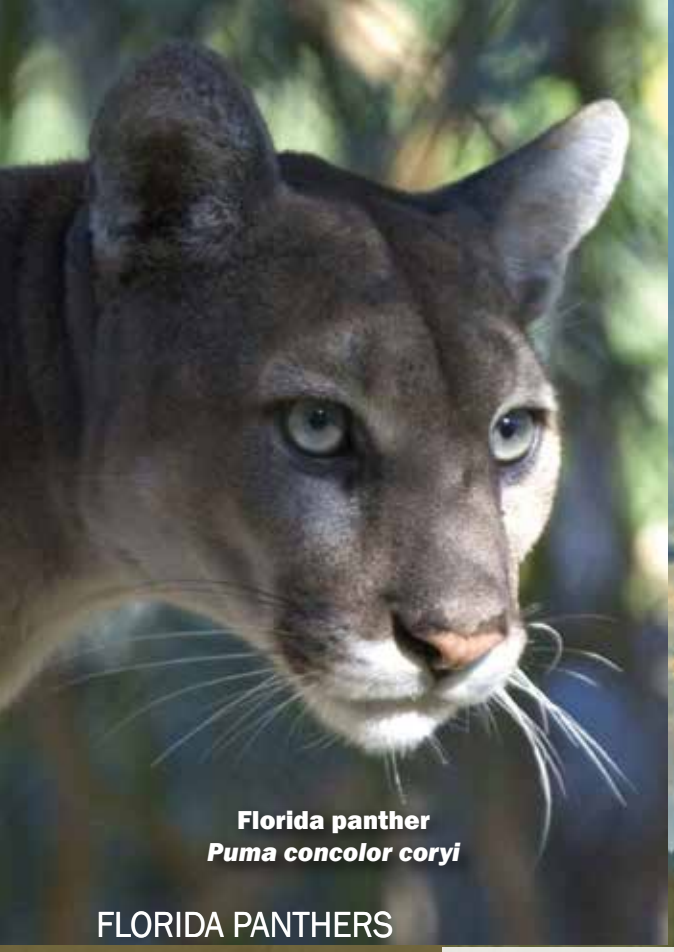
It is a borer, but it seems to prefer bark rather than wood. In most of the samples I have received, they have come from two-by-fours in the rafters or walls of houses and, more specifically, from boards that still had pieces of bark on them. The frass and sawdust from infestations have been very dark — the same color as the bark — which also indicates that they are tunneling in the bark, not the wood. The frass photo above shows the dark frass produced from bark.

This species doesn't seem to be a serious structural pest, as I haven't been able to find any research papers on its pest potential. Most of the information I have seen is collection data from specimens in insect museums.

Although much of the data indicates an association with bark, there also are reports of this beetle causing considerable damage to flooring and other timbers in buildings. I suspect that in buildings, this species feeds mainly in bark that is left on pine lumber and probably prefers to do so in relatively newly constructed buildings. Therefore, I think there is a good chance that infestations in homes will disappear on their own without causing significant damage to wood.

Finding *Stephanopachys rugosus* in a home isn't as big of a deal as finding lyctid powderpost beetles or old house borers. However, infestations should be examined closely to see if wood damage is occurring. PP

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

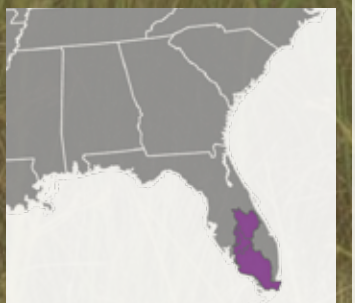


Florida panther
Puma concolor coryi

Florida Panther **Depredation:** *Protecting Pets and Livestock*

Florida Fish and Wildlife Conservation Commission

FLORIDA PANTHERS are the larger of Florida's two native cat species: panthers and bobcats. Although most panthers are found south of Lake Okeechobee, they have been documented throughout the peninsula and even into Georgia. Female panthers have been documented only in South Florida, so that is where all known breeding occurs.



Florida panther breeding distribution

Florida panther mating season runs November through March

PANTHERS are carnivores that primarily prey on white-tailed deer, hogs, and raccoons, but they are opportunistic hunters and their diet varies. Any unsecured domestic animal may be at risk of depredation.

Homeowners and Hobby Farmers

The best way to protect your household pets and backyard hobby animals is to keep them indoors or in a predator-resistant enclosure, especially at night. In order for an enclosure to provide adequate protection against panthers, it must be totally enclosed.

The roof can be solid or made of heavy-gauge fencing such as chain link. The sides should be secured and flush with the ground so there are no gaps or weak spots that a panther may push through or go under. Make sure the door is securely fastened so it cannot come open if it is rammed by an animal on the inside — a chain or cable fixed around gate posts will keep the gate closed. You can build an enclosure of your own design or follow the plans in the online guide to building enclosures.[1] Finally, the most important thing is to consistently use the enclosure!

Other Tips

Remove or reduce low-growing vegetation that can provide cover. Panthers are ambush predators and must get as close as possible before initiating an attack.

Install motion-activated lighting. The surprise of a light suddenly coming on may alter a panther's intentions.

Electric fencing around an enclosure also may deter an inquisitive panther from attempting to get your animals. But it is ineffective when placed on perimeter fencing surrounding one's property, because panthers can easily jump over a fence and may never come into contact with the hot wire.

Commercial Cattle Ranchers

Many large ranches provide quality habitat for native wildlife. Because cattle typically roam across expansive landscapes, panther depredations are difficult to prevent or even detect. Due to their size, adult cattle are not typically preyed on, but calves up to 300 pounds have been killed by panthers.

A study conducted by the University of Florida's Department of Wildlife Ecology and Conservation found that calf losses due to panther depredation ranged from 1 to 5 percent annually on two ranches in southwest Florida.

The U.S. Department of Agriculture's Farm Services Administration has a livestock indemnity program that offers partial payment for livestock losses caused by animals protected

[1] https://tinyurl.com/NPS-enclosures

A panther depredation is when a panther kills or injures domestic animals such as goats, sheep, calves, dogs or house cats.

Larry W. Richardson, USFWS

PANTHERS are listed as an Endangered Species under the Endangered Species Act, and it is illegal to harm or harass them in any way. There are approximately 120 to 230 adult panthers in the population.

Predator-resistant enclosures protect pets from panther depredation

by Federal law, such as the Florida panther. While livestock-guard animals, particularly certain breeds of dogs, have been used in other parts of the world for other predators, they have not been studied or evaluated in Florida in regard to panthers.

Assistance Programs

Various agencies and organizations offer assistance programs depending on the particular set of circumstances. The Conservancy of Southwest Florida and Defenders of Wildlife offer cost-share programs to help individuals acquire a predator-resistant enclosure to secure their pets and hobby livestock.

Additionally, The Conservancy has a compensation program intended for small-scale cattle farmers with herds up to 300 head who have lost calves due to panther predation. Large-scale commercial cattle ranchers can apply for compensation for livestock losses caused by federally protected animals such as the Florida panther through the U.S. Department of Agriculture's Farm Services Administration Livestock Indemnity Program. For more information and to apply for the program appropriate for your needs:

- The Conservancy of Southwest Florida Pen Building Assistance and Free-Ranging Cattle Compensation Programs
- U.S. Department of Agriculture, Farm Services Administration Livestock Indemnity Program

WHO TO CALL

If you experience a panther depredation please call the Florida Fish and Wildlife Conservation Commission's Wildlife Alert Hotline at 888-404-FWCC (3922) or #FWC or *FWC on a cell phone. The FWC investigates reports of panther depredations and provides technical assistance to prevent future conflicts. PP

Adapted from *Depradations: Protecting Pets and Livestock,* by Florida Fish and Wildlife Conservation Commission at https://myfwc.com/wildlifehabitats/wildlife/panther/depredations/

Recommended mowing heights for lawn grass species

Grass Species	Mowing height (inches)
Bahiagrass	3 – 4
Centipedegrass	1.5 – 2.5
St. Augustinegrass — standard*	3.5 – 4
St. Augustinegrass — dwarf**	2 – 2.5
Zoysiagrass	2 – 2.5

*Standards include Floratam, BitterBlue, Classic, DeltaShade and others

**Dwarfs include Captiva, Delmar, Seville and others

Stresses, continued from Page 11

3. Mow at the recommended height for your grass species.

All landscape grasses should be maintained at the highest mowing heights for that species and cultivar. Higher mowing heights produce deeper root systems. Deep roots increase the ability of the grass to survive stresses, including drought stress. Mowing below the recommended height reduces the grass's ability to photosynthesize and forces the grass to put energy reserves into regrowth. Refer to the table at left for recommended mowing heights for your grass species.

4. Irrigate appropriately for your lawn's needs.

Turfgrass water requirements vary based on a number of factors, including turf species, season, geographical location in the state, soil type, shade, root depth, etc. In general, apply irrigation at ½ to ¾" when 30–50 percent of the lawn is showing visible signs of wilt. If rain is forecast, postpone irrigation.

Incorrect irrigation practices account for a majority of lawn problems. For more information on irrigation, please refer to ENH114, *Frequently Asked Questions about Landscape Irrigation for Florida Friendly Landscaping Ordinances*[1] or ENH9, *Watering Your Florida Lawn*[2].

A Healthy Lawn is a Hardy Lawn

A healthy lawn is not only functional, it also requires fewer applications of herbicides, insecticides, and fungicides. That important difference will benefit your lawn and the environment.

To maintain a healthy lawn that can better withstand drought, traffic, and cold temperatures and better resist invasion by weeds, insects and diseases, follow the guidelines found on *Your Florida Lawn* website[3] and in *The Florida Lawn Handbook*[4].

For detailed information on caring for your lawn during drought, see EDIS publication ENH157, *Managing Your Florida Lawn under Drought Conditions*[5]. PP

Laurie E. Trenholm is Professor and Extension Turfgrass Specialist at UF/IFAS Environmental Horticulture Department.

1 http://edis.ifas.ufl.edu/wq142
2 http://edis.ifas.ufl.edu/lh025
3 http://hort.ifas.ufl.edu/yourfloridalawn/
4 http://edis.ifas.ufl.edu/features/handbooks/floridalawn.html
5 http://edis.ifas.ufl.edu/EP078

Live green tissue under the bark: The plant is alive

UF / IFAS

Winter Protection, continued from Page 16

What to Do After the Freeze

WATER NEEDS

Plant water needs should be checked after a freeze. Plants may have lost substantial moisture during a windy advective freeze. Plants will transpire (lose water vapor) on a sunny day after a freeze, but sometimes their roots are too cold to function normally.

Water in the soil of containerized plants can actually freeze and be unavailable to roots. Apply water to allow thawing, rehydration of plants, and dilution of fertilizer salts that might otherwise burn plant roots.

PRUNING

Cold-injured wood can be identified by lightly scraping the bark with your fingernail and examining the color of the cambium layer — food-conducting tissue — just underneath. Green tissue indicates the plant is still alive, and black or brown indicates dead or injured tissue. Prune these branches behind the point of discoloration.

Branch tips may be damaged while older wood is free of injury. If in doubt, delay pruning until new growth appears to ensure that live wood is not removed. Dead, unsightly leaves may be removed as soon as they turn brown after a freeze.

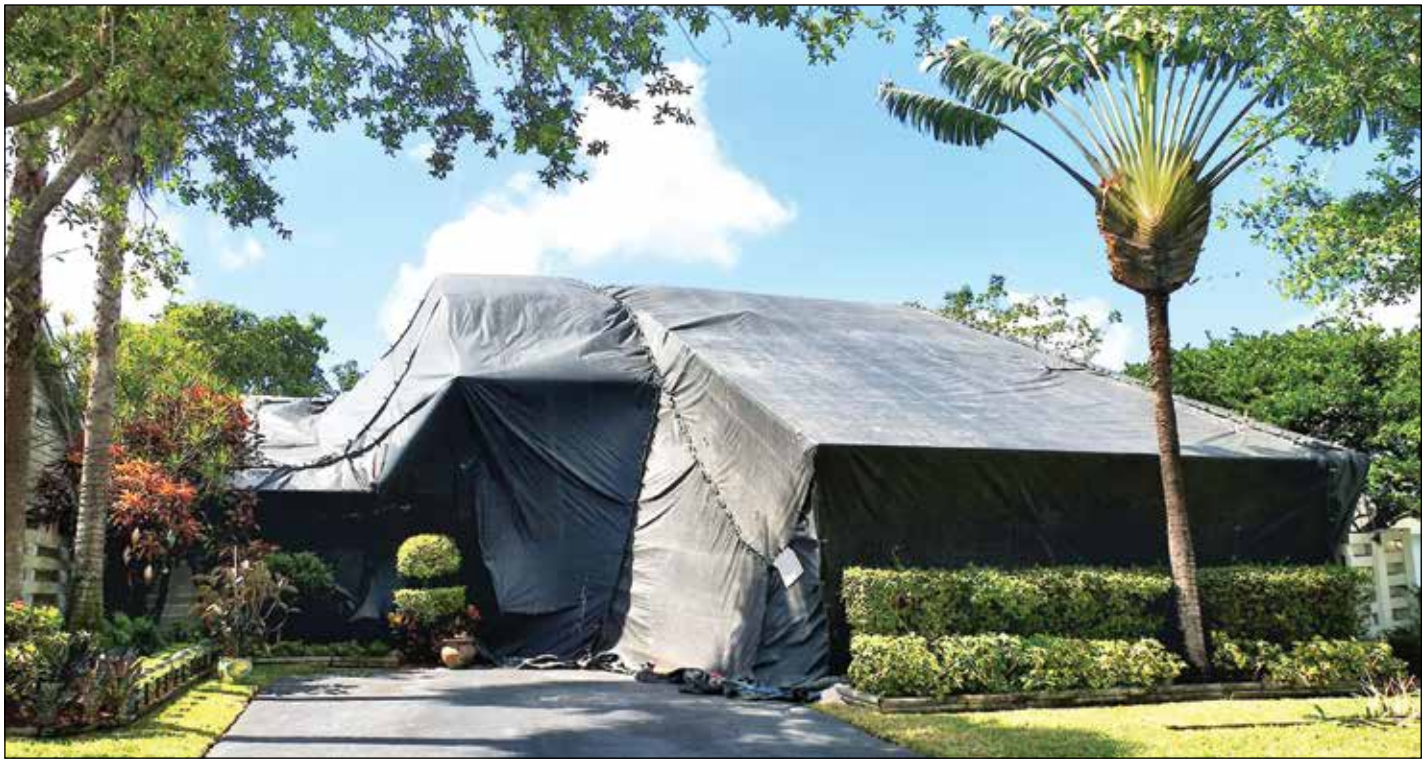
Cold injury may appear as a lack of spring bud break on a portion or all of the plant, or as an overall weak appearance. After a particularly harsh cold event, some plants may be very slow to recover, so some patience is required.

More Information

For additional information on cold protection and coping with cold injury to plants, visit the UF/IFAS EDIS website at http://edis.ifas.ufl.edu and use the search word "cold." PP

Sydney Park Brown, associate professor and Extension specialist-consumer horticulture; and Thomas H. Yeager, professor and Extension woody horticulturist, Environmental Horticulture Department; UF/IFAS Extension, Gainesville, FL 32611.

Adapted and excerpted from EDIS document ENH1, Cold Protection of Landscape Plants, one of a series of the Environmental Horticulture Department, UF/IFAS Extension. Original publication date June 1990. Revised June 2014 and July 2018.



Termite Tenting: Frequently Asked Questions

Brantley Termite and Pest Control Company

TENT FUMIGATION, or "tenting," is widely considered to be the most effective method for treating pest infestations such as termite, bedbug, or German cockroach infestations in an enclosed structure. It is a specialized service regulated by the state of Florida Department of Agriculture and Consumer Services.

What pest infestations can be treated with a tent fumigation?

Most general household pests can be managed with a regular pest control program, customized by a licensed pest control technician to meet the property's specific needs. The most common infestations that are treated with tent fumigations, however, are:

a) Drywood and Formosan termites
b) Bedbugs
c) German cockroaches
d) Wood-boring beetles
e) Powderpost beetles
f) Furniture and carpet beetles
g) Clothes moths
h) Rodents

What is the tent fumigation process, and how long does it take?

A typical tent fumigation usually takes three days and two nights from start to finish.

Day 1: A system of tarps is used to completely cover the structure. A pesticide gas is released into the structure that eventually envelops every part of it. The amount of gas introduced is carefully calculated based on various factors, such as the size and type of structure, the weather and temperature outside, expected exposure time, and the target pest. The structure is left this way, allowing exposure to the gas, for between 16 and 24 hours, again depending on various factors.

Day 2: The tarps are removed, and a period of active aeration takes place where doors and windows are opened for approximately one hour while personnel are on the property to supervise. Then the doors and windows are closed and the structure is allowed to passively aerate through the natural air circulation of the structure.

Day 3: During the final stage of the tent fumigation, a licensed and trained technician uses a calibrated, highly sensitive infrared gas detector to test the air quality throughout the structure, to be sure that it is safe for reentry.

What is the preparation process?

Each structure is unique, and certain specific preparation requirements may be necessary. Often, a trained technician will visit the structure and discuss preparing for a tent fumigation, in detail, prior to the scheduled treatment. In general, though, the following steps should be taken to ensure a quick and safe tent fumigation:

All opened (not factory sealed and not in porous containers) food, drink, and certain other consumable items throughout the entire structure, including in refrigerators and freezers, should be removed from the structure or double-bagged in special fume bags.

Key and access information should be provided to pest control personnel prior to the scheduled treatment.

If there is gas on the property, it should be shut OFF and pilot lights extinguished for the entire tent fumigation process.

Continued next page

Power and water utilities for the structure should be ON for the entire tent fumigation process.

All people, animals, reptiles, fish, and live plants should be out of the structure for the entire tent fumigation process.

All fences, screen cages, or attachments up against the structure should be removed prior to the scheduled treatment.

Mulch, rocks, plants, trees and bushes around the entire perimeter of the structure should be raked, cut back, or moved to at least 12 – 18 inches away from the structure prior to the scheduled treatment.

All rooms, closets, large safes, and other spaces of the structure should be made easily accessible by the licensed fumigator prior to the scheduled treatment.

If there is any security system installed, it should be set to "disregard" for the entire tent fumigation process.

A contract and prep sheet should be signed by the customer and a pest control representative.

A method of payment should be confirmed prior to the scheduled treatment.

What should be done about mattresses and waterbeds?

Most mattresses are made of cloth, which is extremely porous. To the tiny molecules of sulfuryl fluoride, the microscopic spaces between the fibers are gigantic and the gas can slip in and out without being trapped. Leaving mattresses in the structure during the tent fumigation is advised, so they can receive the full benefit of the treatment.

However, mattresses with removable plastic covers, especially crib mattresses, must be removed from the structure prior to the scheduled treatment.

Waterbeds, when filled, do not have usually have to be drained or removed. sulfuryl fluoride is not easily broken down by water and the water-tight bag helps keep the gas from becoming trapped inside.

What should be done with dishes, clothes and other items?

In laboratory tests neither trichloro(nitro) methane nor sulfuryl fluoride have been found to stain or leave any residue. The compounds dissipate completely during the aeration periods so there is generally no need to wash clothing, bedding, or dishes after the tent fumigation.

When is it safe to reenter the home?

During the final stage of the tent fumigation, a licensed and trained technician uses a calibrated, highly sensitive infrared gas detector to test the air quality throughout the structure, to be sure that it is safe for reentry. It is both dangerous and illegal to enter the structure before this time.

Does tent fumigation prevent future infestations?

The products used during a tent fumigation do not have preventative qualities due to the nonresidual properties of sulfuryl fluoride gas. However, as long as the tent fumigation is successful in eradicating the existing infestation, a reinfestation is unlikely. PP

Adapted from Brantley Termite and Pest Control Company, serving the needs of clients in Pinellas, Hillsborough, Pasco, Manatee, and Sarasota counties. Visit online at http://pinellastermite.com/

PCO Pointer

Facts from FDACS: Pesticide Labels, Signal Words, and Toxicity

WHEN asking, "How toxic is the pesticide I am using?," the first thing you should consider is the "signal word." This gives you a general understanding of a pesticide's toxicity. The signal words are DANGER, WARNING and CAUTION — and some pesticides don't have a signal word at all!

DANGER is a high level of toxicity, WARNING is a moderate level of toxicity, and CAUTION is a low level of toxicity. If there is no signal word printed on a label, the product has a slight level of toxicity — it does not mean that it has no toxicity. Someone told me that if it doesn't have a signal word, then that means it is nontoxic, which is not true. All pesticides have some level of toxicity. Even water can be toxic.

The signal word is based on the LD50 factor, which is the lethal dose to 50 percent of test animals in milligrams of product per kilogram of body weight. Therefore, the lower the LD50, the higher the toxicity.

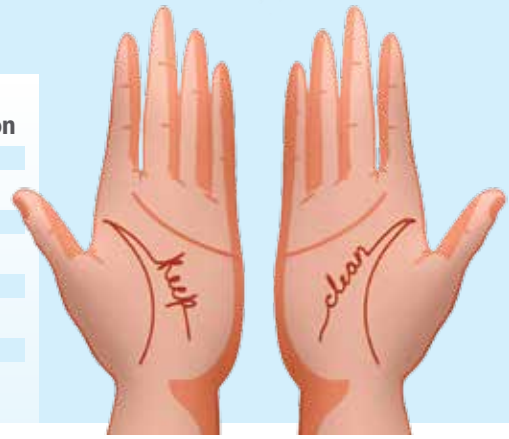
Also, there are four toxicity entry points: dermal, or on the skin; inhalation, or breathed in; ocular, in the eyes; and oral, swallowed. Dermal exposure accounts for about 97 percent of all pesticide exposures.

Below are the absorption rates through the skin for parathion emulsifiable concentrate:

Body region	Percent of relative absorption
Forearm	8.6
Palm of hand	11.8
Ball of foot	13.5
Abdomen	18.4
Scalp	32.1
Forehead	36.3
Ear canal	46.5
Genitalia	100

Besides washing your hands frequently for COVID-19, pesticide absorption is why I tell you to wash your hands before using the bathroom, and wash your hands after using the bathroom. PP

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



CLASSIFIED ADS

Eva Buckner, continued from Page 19

For my PhD, I studied entomology at the University of Florida. My dissertation research, which was conducted at FMEL, investigated the ability of Florida *Aedes aegypti* and *Aedes albopictus* female mosquitoes infected with dengue-1 virus (DENV-1) to vertically transmit DENV-1 to their eggs as well as the effects of larval environmental conditions on DENV-1 vertical transmission rates. During my postdoctoral position at Illinois Natural History Survey's Medical Entomology Laboratory at the University of Illinois, I researched superinfection interference between DENV serotypes within *Aedes aegypti* mosquitoes.

What did you do after your postdoc?

I obtained three years of operational mosquito control experience as the senior research biologist at Manatee County Mosquito Control District in Palmetto, Florida, before assuming my current position at UF.

Can you describe what you do in your position?

My time is spent primarily conducting Extension. I provide information and training on topics such as mosquitoes, mosquito-borne diseases, insecticide resistance, and integrated mosquito management to mosquito control programs, pest control operators, UF/IFAS Extension faculty, and the public. I also conduct research to help inform my Extension programs. My research focuses on mosquito control methods and their impacts. Currently, a big project taking place in my lab is investigating the susceptibility of Florida populations of *Aedes aegypti, Aedes albopictus, Culex nigripalpus,* and *Culex quinquefasciatus* — mosquito vectors of arboviruses affecting human health — to active ingredients in insecticides.

What do you like to do for fun?

I am lucky enough to be married to my best friend, so I enjoy doing pretty much anything with my husband. I love being outside gardening, hiking, birdwatching, or collecting shells. One of my favorite places to visit in Florida is Sanibel Island. PP

Lourdes Rodriguez, Public Relations Specialist at UF/IFAS Communications, contributed to this report.

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