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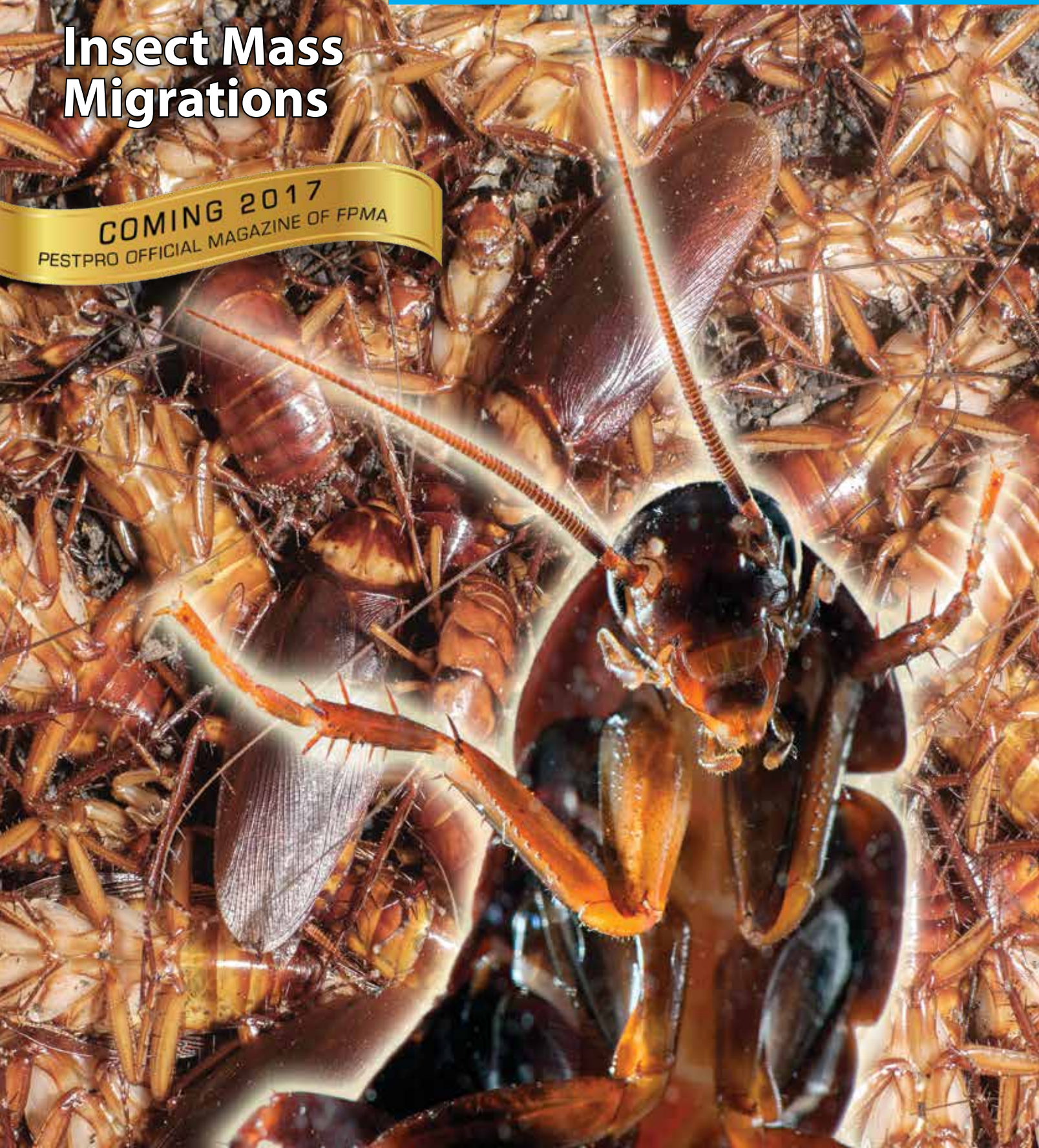
PESTPRO

From University of Florida Entomology to Landscape and Pest Managers

Termiticides in the Environment

Insect Mass Migrations

COMING 2017
PESTPRO OFFICIAL MAGAZINE OF FPMA



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ON THE COVER

Cockroaches are just one example of crawling, hopping and/or flying critters known to gang up and roam the land in shockingly large numbers. Insect experts Phil Koehler and Roberto Pereira explain these baffling insect mass migrations.

Photo illustration by Jane Medley


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Pest Control *is* Constant Change

THE PEST management industry is constantly changing. Sometimes you probably wonder why you are required to get CEU training every year. Well, just follow pests and pesticides in the news, and you will see why.

If you do not stay up to date, you will be left behind. It seems like every day a new pest is introduced into Florida. It seems like every day a new disease transmitted by insects is introduced into Florida. It seems like every day there is a new concern issued about pesticide and fertilizer use. If you do not stay up to date with your knowledge, you cannot be successful in pest control. *PestPro* is trying to help the industry by keeping you up to date on your knowledge of pests, pest-transmitted diseases, pesticides, and fertilizers.

AN OLD PEST REARS ITS HEAD

Let me address the pest issue. The newest pest is the **primary screwworm fly** in the Florida Keys. Agricultural officials have found it in the Key deer population and have had to put down several deer to prevent the spread of this serious pest.

The primary screwworm fly, *Cochliomyia hominivorax*, used to be a major livestock, wild animal, and human pest in Florida. The fly larvae develop in living flesh. They actually consume the living skin and muscle tissue, causing a condition called myiasis.

While the primary screwworm fly requires *living* tissue for its larvae, other flies — the secondary screwworm fly, bottle fly, and flesh fly — develop in *dead* tissue. The primary screwworm fly lays its eggs around wounds on animals, especially on newborns and mothers. The larvae hatch, burrow into the flesh, and feed. Until around 1960, human infections were common in Florida when people who worked outside got cut and did not bandage the wound.

The Florida Department of Agriculture is in the process of trying to eradicate the primary screwworm fly before it spreads throughout the state. Before its eradication from Florida in 1959, the fly was not able to survive winters farther north. So every year, winters would knock back screwworm fly populations to southern states like Florida and Texas. The screwworm fly eradication effort was and has been one of the best examples of using the best technologies in entomology to control a difficult pest. Nobody ever expected that the primary screwworm fly could ever be eradicated from Florida and North America. Actually, scientists in the USDA lab now located in Gainesville were instrumental in the eradication.

The USDA scientists discovered that female screwworm flies mate only once in their life. They guessed that if the mating was with a sterile male, the female fly could not lay viable eggs for the remainder of her life. That was the birth of the sterile-male technique. Millions of screwworm flies were produced in a facility in Sebring, Florida. The males were separated from the females and irradiated with gamma rays to make them sterile. These flies were then released over the state of Florida in 1958 and 1959. The winter was severe that year, so the program was helped by the weather. Consequently, since 1959 there have been no human or animal screwworm fly infections in Florida.

As the flies were eradicated from the southern United States, sterile-male production facilities were built in Texas to eradicate the flies from the Southwest. Facilities were built in Mexico and Panama to eliminate screwworm flies from Mexico and, finally, Central America. The narrow area of Panama has been used to prevent the reestablishment and spread of the flies back into North America. Actually, one of the folks in our lab went to Panama to head up the production of sterile males for the control program. However, I don't think the screwworm fly was ever eradicated from Cuba and South America, and that may be the source of the current infestation in the Keys.

What is happening in the Florida Keys is the release of sterile males to control the screwworm fly before it can spread to mainland Florida. Many residents of Florida have been concerned that the fly could be spread by hurricane winds to the mainland.

ALERT PEST PROS CAN HELP

For the pest control industry it is important that technicians are able to differentiate the **primary screwworm fly,** which had been eradicated, from the **secondary screwworm fly**, which is found throughout Florida in decaying meat and garbage.

We need the pest control industry's help to make sure that if the fly spreads to the Florida mainland, that the infestations are found and eradicated quickly.

The sterile-male technique has been tried for many insects. For instance, Dr. Richard Patterson, who worked in our lab for many years, was able to eradicate mosquitoes from islands in the Caribbean using the sterile-male technique. Consequently, there is a big movement to eradicate the main vector of Zika, *Aedes aegypti* mosquitoes, using the sterile-male technique. The technique does not use aerial application insecticides like Dibrom, which has been very controversial in Miami. It also does not use genetically modified organisms, or GMO, which has also been very controversial.

Be aware that pest management changes almost on a daily basis. You need to stay up to date so you can provide the best protection for your customers. *PestPro* can help you stay abreast of the latest developments. PP

— Dr. Philip Koehler, Managing Director

Insect Mass Migrations

Philip G. Koehler and
Roberto M. Pereira

In 2014, Madagascar was the scene of a red locust swarm.

AFP / Getty Images

One species, two stages

Grasshopper: Solitary stage

Locust: Migratory stage

Adapted from NASA

In 1950, American cockroaches swarmed the walls as they migrated from a trickling filter at a UF sewage treatment plant.

INSECT MASS MIGRATIONS can be a real headache for the pest management industry. These migrations often occur in the fall, when the typical conditions outside change. Maybe wet places dry out. Maybe warm places cool off. And there may be overpopulation of insects compared to their food sources.

So mass migrations of insects may result in hundreds, thousands, or even millions of insects moving through the environment. Often these insect masses move into houses, causing grief for the homeowners and headaches for pest management companies. Let's examine some different types of insects that sometimes migrate *en masse*.

Cockroaches

One of the first mass migrations of cockroaches was reported in 1895 in Washington, DC. There was an old restaurant on Pennsylvania Avenue that had a "vast army" of German cockroaches leaving the restaurant and marching across a muddy street through pools of water, ashes and other barriers.

The building they were moving to was a machine shop. The foreman of the machine shop and several of the workers there took brooms and tried to sweep back the hordes of cockroaches trying to enter the shop. They actually swept for hours until their arms were tired.

Eventually they gave up, and the foreman made a circle of hot ashes around the building in an attempt to keep the German cockroaches out. The first cockroaches burned their antennae and front legs. At that point, the army of cockroaches split in two and scurried into the buildings on either side of the machine shop. This mass migration of German cockroaches continued for two to three hours, with thousands of cockroaches leaving the infested restaurant.

The reason for the migration was unknown. No insecticides had been applied. Also, the restaurant was still filthy. The guess was that the population of cockroaches had grown to such a great degree that they had overpopulated the harborages. The migrating cockroaches were mostly females with oothecae. They were likely moving to deposit their egg capsules at a place where their young would have a better chance of survival. Cockroaches are cannibalistic, and they are known to eat their young. Therefore, a less crowded place would mean a better chance of survival for the young nymphs.

A more recent case of cockroach mass migration was from a sewage treatment plant at the University of Florida around 1950. Several of the employees that witnessed the migration and knew its cause were still around in the late 1970s. The pictured trickling filter at the plant became heavily infested with American cockroaches, which were eating the sewage and bacteria on the rocks. In an attempt to solve the problem, the employees flooded the trickling filter, causing the cockroaches to leave by the millions. The adult American cockroaches crawled out of the plant into a wooded area close by and took wing. The workers claimed that the sky darkened as the cockroaches flew south and blocked the sun. It must have been a remarkable sight.

Years later, in the 1990s, American cockroaches were still inhabiting the trickling filter by the millions. Experts from the UF Entomology Department were called in to help. When we approached the plant at sunset the odor of Periplanone B, the sex attractant of American cockroaches, was so strong that it overpowered the odor of sewage. We actually caught eight pounds of cockroaches in one night at the plant. When the cockroaches were sprayed, they left in masses during broad daylight. It was interesting to see the lawn shimmering shiny brown as the cockroaches crawled through the grass by the thousands.

Locusts and Grasshoppers

Of course, locusts are well known to swarm in masses. Hordes of locusts are actually a different stage of grasshoppers. When a grasshopper population becomes too large, the repeated bumping of the individuals into each other causes color and behavioral changes into the migratory stages known as locusts.

These groups of migratory locusts can grow very large. In the desert locust plague in Africa, the Middle East, and Asia that lasted from 1966 to 1969, the number of locusts increased from 2 billion to 30 billion, and the area covered with locusts grew from 1,900 to 39,000 square miles.

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

Millipede mass

Millipedes

Fortunately in urban pest management, mass migrations of insects are usually a lot smaller than locust swarms. For instance, millipedes are known to migrate in large numbers. Not technically insects, these arthropods usually live outdoors, where they feed on damp and decaying wood, compost and vegetable material. They are slow crawling and have two pairs of legs on each segment. They protect themselves from predators with glands that produce a foul, unpleasant odor.

During the fall, millipedes living in the woods and swamps can migrate in large numbers. In 1949 in Pittsburgh, a fall migration of millipedes occurred. They were seeking a harborage where they could overwinter. Other populations can leave the woods in mass migrations due to drought or excessive water and flooding. In Pittsburgh, millipedes were seen crawling over the threshold into a house and underneath the garage door into the garage. This migration occurred again in 1950.

Some locations have these mass migrations yearly. In Florida, mass migrations of millipedes occur from wet areas into homes by the thousands. No treatments seem to work. The solution is to wait for these mass migrations to cease.

Other parts of the world also experience mass migrations of millipedes. In Hungary, trains could not move on their tracks because the squashed millipedes made the track so slick. In West Virginia, one mass migration of millipedes was so large that a swinging kitchen door left a pile of dead millipedes 1 foot high.

Many times these mass migrations are unsuccessfully treated with residual sprays. At one location, the homeowner dug a trench around his home and poured motor oil in it. This motor oil trench prevented the movement of millipedes into his house, but this is probably not a procedure that can be recommended in most locations, if any at all.

Multicolored lady beetles mass

Multicolored Lady Beetles

More recently, some of the occasional invaders have caused problems during mass migrations for the pest control industry. The multicolored lady beetle was introduced into the United States in 1978–1981 from Asia to control aphids, scales and other crop pests. The lady beetle has been very successful in establishing throughout much of the country and is prevalent in north Florida. However, it has become an important urban pest.

The beetle migrates in mass from forests and vegetation during the fall and winter. It is trying to find a protected place to overwinter and crawls into houses and commercial buildings through cracks and crevices. The Asian lady beetle exudes a defensive secretion when handled, leaving behind a foul-smelling, yellow secretion that seeps from its leg joints. The secretion can stain walls, floors and fabrics. Hundreds to thousands of these beetles have been found inside and on structures during the fall and winter. The dead bodies of these beetles in walls and attics may be a reason for the increase in Dermestid (carpet) beetles found in houses. The carpet beetle larvae can develop by feeding on the dead bodies of insects.

Kudzu bugs

Kudzu Bugs and Brown Marmorated Stink Bugs

Other pests that have mass migrations are the kudzu bug and the brown marmorated stink bug. The kudzu bug was first reported in Georgia. It is in the Plataspidae family and is a really odd-looking bug. Kudzu bugs were first detected in northeastern Georgia during October 2009. They are now spread throughout many parts of Florida, Georgia, South Carolina, and other southern states.

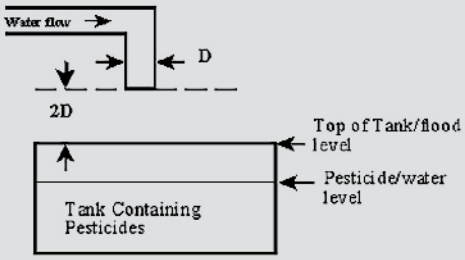
Kudzu bugs feed on kudzu vines and on many other plants such as wisteria, soybeans and almost any bean plant. In the fall large numbers of kudzu bugs will move from plants to sheltered areas to overwinter. They seem to be attracted to white houses, maybe due to the reflectance of ultraviolet light from the paint. Their body secretions produce a foul odor and can stain fabrics and wall coverings. Handling kudzu bugs can cause staining of the skin and even blistering and moderate discomfort in some individuals.

Brown marmorated stink bug masses also try to enter structures through cracks and crevices during the fall. Numerous bugs have entered the living areas of

Continued on Page 18

Termiticides can damage the environment when they are not properly applied.

Armed with the right tactics, we can effectively fight termites AND protect people, pets, wildlife, waters, plants, and our food supply.



Termiticides in the ENVIRONMENT

Philip G. Koehler and Roberto M. Pereira

IN MOST CASES, termiticides are intended for application underneath and around structures. These areas are usually dry, not susceptible to leaching, soil does not usually move from the treatment zone, and children, pets, and wildlife would normally not contact the treatment. However, there are some particular situations that could result in environmental damage from improper termiticide application. This damage could be by contamination of water, food plants and animals, exposure of people, pets and wildlife (bees, birds, fish and vertebrate animals), and structural surface contamination. There is also concern about the mobility of termiticides in the soil and their ability to contaminate areas away from the treatment site.

Preventing Water Contamination With Termiticides

In most cases, buildings needing termite control are built well above the water table, but in some of Florida's soils, the water table or tidal zone may be close to the underside of the foundation of the structure. Care needs to be taken with termiticide applications so water is not contaminated. All plumbing pipes, sewer lines, and floor drains need to be located and identified before any treatments are applied. None of these elements should be punctured or contaminated as a result of drilling or treating.

Termiticides should not be applied to intertidal areas below the mean high water mark. In some locations in Florida, buildings are barely above the mean high water mark. The foundations of these buildings are sometimes below the tidal level. Residual soil treatments should not be made to any intertidal areas regardless of the need to treat the building. Other forms of treatment (i.e., mechanical barrier systems, above-ground structural element treatment/protection, termiticide baiting systems and structure fumigation) should be considered.

Water movement and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Care must be taken to avoid runoff. Cleaning equipment or disposal of wastes is a common way to contaminate water. Make sure all equipment rinsate and wash water is collected and saved for later use. DO NOT contaminate water when disposing of equipment wash waters or rinsate.

Anti-backflow or air gap equipment (at left) should be installed and used on power sprayers. During tank filling, termiticide from the tank could flow back into water sources if this protective equipment is not used or installed.

Rainfall can be difficult to predict. Residual soil applications should be timed so treatments are not made during or immediately following periods of significant rainfall or flooding. In fact, the ground to be treated should be dry so the termiticide binds to the soil particles and does not run off from the treatment site during a rain event.

Treatment of structures with wells or cisterns: Some structures have wells or cisterns near the building where termite treatments need to be applied. It is important that the water in the well that is part of the aquifer not be contaminated

Continued

with termiticide. Also, cisterns are used to collect potable water for drinking and washing in the building. It is important that this potable water not be contaminated with insecticide. Therefore, there are specific directions for doing termiticide treatments near wells and cisterns. No termiticide should be applied within 5 feet of any well or cistern. Soil between 5 and 10 feet from a well or cistern must only be treated by the backfill method. Prior to treatment, expose water pipes coming from the well to the structure if the pipes enter the structure within 3 feet of soil surface. Treatment of soil adjacent to the water pipe(s) should be done according to the backfill method described below.

The following is the treated backfill method of termiticide application:

1. Trench and remove soil to be treated onto heavy plastic sheeting or similar material or into a wheelbarrow. Spread the soil, breaking up large clumps, so it is evenly distributed for treatment.
2. Treat soil at the vertical treatment rate of 4 gallons of termiticide per 10 linear feet per foot of depth of the trench, or 1 gallon of termiticide per 1.0 cubic foot of soil. Mix thoroughly into the soil taking care to contain the liquid and prevent runoff or spillage.
3. After the treated soil has absorbed the termiticide finished dilution, return the soil into the trench.

Treatment of Structures with Subsurface Foundation or French Drains

Subsurface or foundation drains, sometimes called French drains (below), are used to prevent or correct moisture problems under and around homes. They are common in hollow block foundation structures to drain water seeping from the exterior perimeter or underneath the foundation.

Some homes have foundation drains installed during construction. Others have them installed as a corrective measure, due to water drainage issues. When present, the soil above and beneath the foundation drain must be treated in a way that avoids contaminating the drainage system.

Foundation drains may go unnoticed during a termite inspection. If a pest control company is planning to treat a structure for termites, The property owner should be interviewed and questioned regarding the presence of hidden obstacles to a conventional soil treatment. All drainage systems should be located. This will help prevent accidental runoff of the termiticide into the yard, storm sewer, pond or roadside ditch, wherever the drain line empties.

Problems can arise when drains are installed on an existing home or when a remedial termite treatment needs to be applied. The soil next to a foundation can be treated with termiticide, but the soil must be dry. Soil should not be treated if it is saturated. It is especially important to not make treatments to French drains while precipitation is occurring.

The following are some tips on treating structures with subsurface drains:

- Prior to treatment, the applicator must take precautions to limit the risk of applying the termiticide into subsurface drains that could empty into any bodies of water. This includes an evaluation of whether an application to the top of the foundation footer might contaminate the subsurface drain.
- When appropriate (e.g., on the side of the structure near a body of water), the treated backfill method described previously can be used to minimize off-site movement of termiticide.
- Treatments by drilling and rodding through the slab should not be any closer than 24 inches to a French drain. This prevents finished dilution seepage and/or damage to the drain or the tiles.

Treatment of Areas with Sump Pumps

Termiticide/insecticide should not be applied within 5 feet of a sump pit and pump (at left). Hollow block foundations that border the French drain should not be drilled and injected with termiticide in order to prevent drainage/seepage from the concrete block foundation into the drain.

Once French drains have been identified and located, termiticide should be applied as follows:

1. Unplug the sump pump. Inspect sump pit for water. If no water is present, the treatment can be made provided the sump pump remains unplugged.
2. If water is in the sump pit, unplug the sump pump and remove four cups of water from the pit. The water level should be marked. After 10 minutes the water level should be checked again. If the water level has risen in the pit, there is too much seepage to perform the treatment at this time. If the water level does not rise, the treatment can be made provided the sump pump remains unplugged.

During application, the sump pump pit should be checked every few minutes for the presence of termiticide dilution. If dilution is detected (i.e., due to the presence of chemical odor or discoloration), the treatment should be stopped immediately. Any pesticide in the pit should be removed from the pump pit. This can

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Plenum configuration


Dirt floor crawl space

be accomplished with the use of a portable electric pump or hand pump and a section of hose emptying into a pail or other suitable container. All dilution must be removed from the sump pit before plugging in the sump pump again. Dispose of dilution from the sump pump as directed by the label or use the product to treat an approved area of the structure.

Preventing Contamination of Food, Plants, and Animals

Soil termiticide treatments should not be applied to areas where edible plants are grown or where livestock graze. Unfortunately, some homeowners place their garden next to the foundation. The general rule is that soil termiticides should not be applied within one foot from the drip line of edible plants. However, treatments can be made to lawns and ornamental plants in the landscape.

Formosan and Asian termites often are found in trees. As long as these trees are not producing edible fruits or nuts, these plants can be treated for termites. Termites usually attack the dead heartwood of the tree with limited exposure of their galleries on the surface. Therefore, termite carton nests in trees may be injected with termiticide dilution using a pointed injection tool. Multiple injection points to varying depths may be necessary.

Preventing Contamination of Air in Structures

For certain types of construction it is common to drill the slab and inject termiticide under the slab. These holes later could allow volatiles from the treatment to contaminate occupied spaces in the structure. For that reason, all holes should be plugged with noncellulose material and concrete sealant or mortar patch mix when they occur in commonly occupied portions of the treated structure.

Soil treatment termiticides are not very volatile and do not evaporate from the soil in most situations. However, in the past, termiticides were found to contaminate the air inside certain kinds of buildings when they are improperly applied. Some structures have heating and air conditioning ducts embedded in the concrete slabs and floors of buildings. When the slab is vertically drilled to treat the soil underneath, termiticides can be accidentally injected into the air-handling system.

Termiticides should never be applied until all heating/air conditioning ducts and air vents are known and identified using construction plans, insertion of mechanic's mirror into floor vents and inspection with flashlight, or scanning with a metal detector or thermal-imaging camera. Care should be taken to not puncture or contaminate any of these air-handling systems.

Plenum construction: Plenum construction is a particular problem for air contamination with soil treatment termiticides. In this construction (upper left), the crawl space or basement is a part

of the living space air that is circulated under the structure for energy conservation. With this system there is a moisture sealing fabric that is laid on the soil surface in the crawl space.

Treatment of plenum construction begins by turning off any air-circulation system that moves air from the space to be treated to an untreated interior space of the structure. The water sealing fabric can be pulled back and termiticide can be applied to the soil as an interior perimeter band no more than 18 inches wide, adjacent to the foundation and as suggested for accessible crawl spaces. Once the termiticide has been absorbed by the soil the sealant fabric can be replaced.

Interior treatment of plenum structures that use a sealed underfloor space to circulate heat and/or cooled air throughout the structure need to be treated as directed below:

Structural Surface Contamination

When treating with residual soil termiticides adjacent to an existing structure, areas to be treated should be checked for visible cracks and holes to prevent any leaks or significant exposures to persons occupying the structure. After application, the building should be checked thoroughly for leaks. All leaks resulting in the deposition of termiticide in locations other than those prescribed on the product label must be cleaned up using label-prescribed methods prior to leaving the application site.

People or pets should not be allowed to contact contaminated areas or to reoccupy contaminated areas of the structure until the cleanup is completed. Prior to drilling and treating through concrete structures such as patios, porches, sidewalks and foundation slabs, applicators should first determine that there are no habitable areas below that could be unintentionally contaminated by the treatment.

People, Pets, and Wildlife

People present or residing in a structure during application should be advised to leave the building during treatment. For safety, only applicators wearing personal protective equipment as required by the product label should be in the area during application. Unfortunately, some residents will refuse to leave their building during treatment. If that is the case, they should be told to take their children and pets and leave the building immediately if they see any signs of leakage.

Most termiticides are toxic to fish, aquatic, and marine invertebrates. Termiticides should never be applied directly to water. They should also not be applied during rain or to areas where surface water will be present before the treatment dries. Care should be taken anytime termiticides are applied in areas adjacent to any body of water (Figure 6). They should never be applied

Continued on Page 30

Christmas trees bundled for sale can harbor an unwanted gift: Cinara aphids

Wingless Cinara aphid on Fraser fir

Winged Cinara aphid on Fraser fir

Winged Cinara aphid on pine tree

Insect photos by Lyle J. Buss

Cinara Aphids

Lyle J. Buss

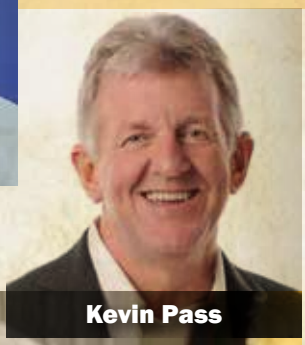
DECEMBER is one of the slower months in the Insect Identification Lab. Cooler weather means fewer insects are active, and frankly, people are more concerned about getting their Christmas shopping done than they are about bugs. But one type of call that comes in at this time of year is aphids in the house. These aphids are usually dark brown and ⅛ to ¼ inch long — larger than the aphids that I typically see on plants. When folks take a closer look, they may realize that the aphids are actually coming from their Christmas tree!

These aphids belong to a genus called Cinara. Cinara contains a lot of different species that feed on conifers including all pines, spruces, Douglas fir and true firs. When the trees are cut in the field and bundled, the aphids get trapped. Infestations may also arise from overwintering eggs that hatch when the tree they inhabit is housed in a warm building. The aphids can live pretty well on cut Christmas trees as long as the tree stays fresh, but as the tree dries out, the aphids will start to wander away from the tree. Because they are large and plump, people often mistake them for engorged ticks.

These aphids feed only on conifers, so they will not spread to houseplants. They are not a danger to people or pets either. Smashing them may leave a small stain, so picking them up with a vacuum is better. To deal with these pests preemptively, shake the Christmas tree vigorously before bringing it into the home. PP

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

Bobby Pass



Kevin Pass

Sam Pass at age six

Passing the

Sam Pass 'Takes the Torch' for

UNLIKE MANY of his peers, Sam Pass discovered entomology very, very early in life. Both Sam's father and grandfather studied entomology, making him a third-generation entomologist. Bobby Pass, Sam's grandfather, was chair of the University of Kentucky Entomology Department for thirty-three years and served as president of the Entomological Society of America in 1987. Kevin Pass, Sam's father, holds a bachelor's degree in entomology from the University of Kentucky, is the former owner of Action Pest Control in Indiana, and a past president of the National Pest Management Association.

Despite this, Sam insists that he did not decide to study entomology in college until late in his senior year of high school. A picture of him dressed as a "bug man" at age six says differently.

"There is no doubt I was well acquainted with entomology at a young age. I can remember collecting and pinning insects and tagging monarchs with my dad as a kid. He used to bring monarch caterpillars and milkweed in containers he made from Baskin-Robbins ice cream cartons in to my class every year in elementary school to teach us about butterfly life cycles. I think that's probably when people began coming to me with all their bug questions," Sam says.

Years later, when Sam was finishing junior high, his father encouraged him to get a summer job. "It was definitely not my intention for that job to be at my dad's company, but at age 13, it's pretty difficult to find a job," Sam says.

That first summer, Sam worked part time doing what was basically janitorial work at Action Pest Control. He swept the shop floor, picked up trash, cleaned restrooms, and prepared company vehicles for sale or new drivers. Over the next five summers, he continued to work at Action doing a variety of different jobs and working more hours every year.

His second summer, Sam moved up from janitor to lawn care technician. "That was the one job I really hated. I ran a weed eater all day. By the end of the day I was never sure what was more numb, my hands or my brain," he jokes.

"The next summer I did almost nothing but heat treatments for bed bugs. It was much more interesting and rewarding than lawn care. Things kept getting better after that. The following summer, I did mosquito control and fumigation. Then finally, my last summer working for my dad, I ran a pest control route," Sam says.

Life is not a brief candle. It is a splendid torch that must be made to burn as brightly as possible before it is handed on to the next generation.

George Bernard Shaw

Torch

the Next Generation

IFAS Communication Services

Sam Pass and Phil Koehler in the Urban Lab at UF

Despite that, or perhaps because of it, Sam planned on eventually studying medicine until he landed an internship shadowing doctors at the local hospital during his senior year of high school. After that, he says he quickly soured on a career in medicine. He says, "It just did not seem like something I would find fulfilling in the long term."

From then on, his focus was on business and entomology as he weighed his college options. For the most part, Sam made his list of colleges on his own — selecting colleges with good business schools — but his father made a list of schools with good urban entomology programs for him to visit. Ultimately, it was the University of Florida that won out.

"I waited until the deadline to make my decision, which by that time was between studying business the University of Indiana, where I had gotten a partial scholarship and direct admission to the Kelley School of Business, and studying entomology at UF. It was tough to decide to move so far from home in Indiana, but Dr. Koehler and Dr. Baldwin really won me over during my visit to the department in Gainesville," Sam says.

Now, three and a half years later, Sam is finishing up his bachelor's degree a semester early, having majored in entomology and nematology and minored in business administration. During his first three years at UF, Sam spent a year as president of the entomology club and volunteered sporadically in the Urban Entomology Lab. Over the past six months, however, Sam has been much more involved in the lab.

Q&A with Sam

What made you get more involved in the Urban Entomology Lab?

Last spring, I came into the lab to talk to Dr. Koehler about my plans for my summer and my final semester, and he sold me on doing a summer research project with him. For the first time, I enjoyed doing research, and I have just continued with my summer project this fall.

What research are you doing with Dr. Koehler?

Well, I started off focused on the consumption of different baits by different strains of German cockroaches. We took a few different approaches to look at that, and that took me to what I am doing now. Which is looking at the attractiveness to German cockroaches of different cockroach baits.

What do you do outside of entomology?

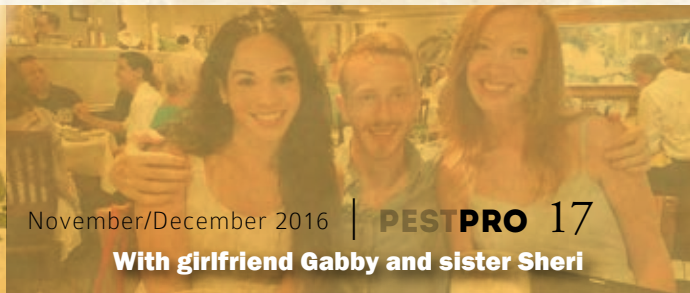
Well, I am from Indiana, so I love basketball. I played some in high school, and I still enjoy playing pick up from time to time. I also like to watch the Gators, the Cats, and the Indiana Pacers. Outside of basketball, I also love to read everything from Arthur C. Clarke and Ray Bradbury to Malcolm Gladwell. I also like to spend time with my friends in the department, hang out with my girlfriend, Gabby, and visit my dad in Longboat Key.

What are your plans following graduation in December 2016?

I have not committed to anything yet. In a lot of ways, I feel like I'm back to where I was before my freshman year of college — torn between entomology and business. I have been exploring options to continue my education in both business and entomology, but I have also been considering starting my career in the pest management industry.

I have a lot of experience in the industry for my age. With that and my education with Dr. Koehler, I can bring a lot to the table regardless of what I decide to do. Right now, I am focused on maintaining my academic success through graduation and finding the right opportunity for my future. PP

With dad Kevin



With girlfriend Gabby and sister Sheri


Brown marmorated stink bug


Tawny crazy ants

Insect Mass Migrations, continued

homes. Typically, stink bugs emerge from cracks under or behind baseboards, around window and door trim, and around exhaust fans or lights in ceilings. Live and dead stink bugs can be removed from interior areas with the aid of a vacuum cleaner. However, the vacuum will blow the smell of stink bugs throughout the house.

Tawny Crazy Ants

Mass migrations of ants have been reported, especially the tawny crazy ant. When the tawny crazy ant moves into an area, billions of ants are seen crawling around and on houses. They can short out electrical equipment like well pumps and air conditioners. They can be so numerous that, if sprayed, dead bodies of these ants can accumulate to a depth of 6 inches. Many companies will take a leaf blower to remove the piles of dead bodies from the sprayed areas to expose the residual treatment in order to kill more ants. These ants do not really forage indoors, but they can invade houses in certain instances.

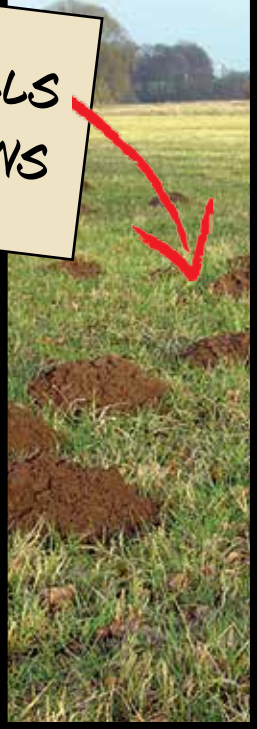
How to Cope With a Mass Migration

Mass migrations of insects can be challenging for the pest control industry. When pest managers fail to deal with a manageable population, some of these infestations can become overwhelmingly large. In most cases, the solution is usually sealing cracks and crevices to keep the hordes outside and the interior clean and livable. Weep holes in masonry can be plugged with wire mesh. Attic vents should be screened.

Exclusion should be done before the insects get inside. If insects are confined inside the attic and walls of the structure, they will enter living spaces in large numbers. Also, even though they are killed in the walls or attic, their dead bodies will be a food source for other pests. Of course, spot or general treatments can be applied during the fall to prevent many of these overwintering pests from entering buildings. PP

Eastern mole

Kenneth Catania, Vanderbilt Univ.



Is it a molehill or a mountain range in your customers' yards?

Dig down and understand mole problems once and for all.

MOLES

William H. Kern, Jr.

THE EASTERN MOLE, *Scalopus aquaticus*, occurs throughout Florida. Moles are not rodents but belong to the mammalian Order Insectivora. Insectivora means insect eater, and this group includes moles, shrews and hedgehogs. The most notable aspect of the mole is its large, powerful front feet, designed for pushing soil out of its way. The eastern mole has an average total length of 5½ to 6 inches and a short, sparsely haired tail that is 1 to 1½ inches long.

The fur is very soft and differs from that of most mammals because it does not project toward the tail. With their fur pointing up, moles can move forward or backward within their tunnels without rubbing their fur the wrong way and trapping soil in their coats. The coat is so fine and dense that it keeps out water and dirt. The fur is slate gray with a velvety sheen. Moles living in red clay soils sometimes appear rusty in color. Their bellies may be slightly lighter in color, and some individuals may have tan or orange blotches on their bellies.

The starnosed mole, *Condylura cristata*, has been collected in the Okefenokee Swamp in Georgia and has been reported in Florida. It is identified by numerous fleshy, fingerlike projections around the tip of its nose. This mole is normally found in wet soils, in marshes, and along streams, so it rarely causes problems in yards and turf. Because of its rarity in Florida, the starnosed mole will not be discussed further.

Front paw

Eastern mole

Habitat and Food

The eastern mole prefers loose, well drained soils. It has been found in dune sand and rich forest humus. The characteristic mole ridges that lie just below the surface are foraging tunnels (below). These tunnels are created as the mole searches among the plant roots for the earthworms and insects on which it feeds.

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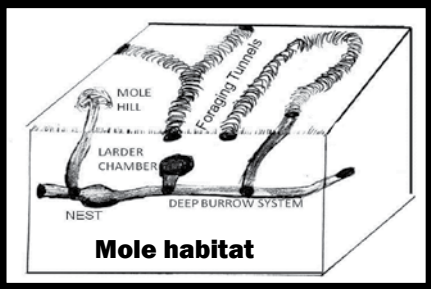
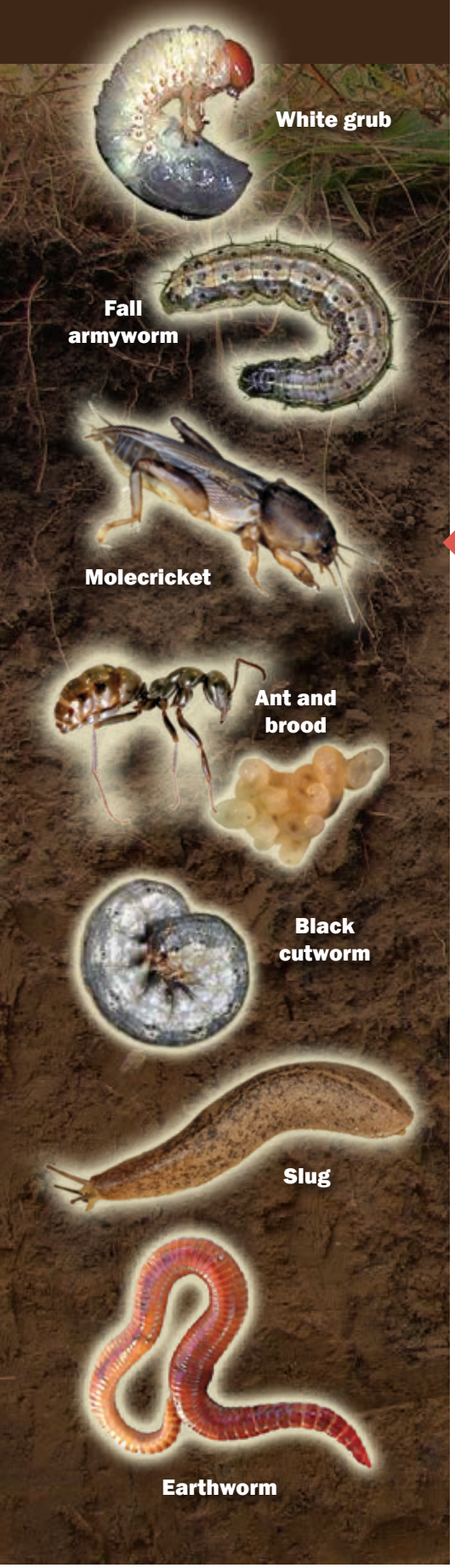


Mole habitat

Starnosed mole

Gordon Ramsay

MOLE BUFFET



MOLES are beneficial because they eat mole crickets, beetle larvae such as white grubs and wire worms, ants and ant brood, moth larvae and pupae (cutworms and armyworms), and slugs. They are known to paralyze earthworms by biting the worms' brain/ganglion. The earthworms don't die but can't move, and the moles store them in deep chambers called larders. These food resources can be used when foraging conditions are unfavorable.

Moles also help to loosen and aerate the soil. In loose soil, moles can tunnel up to 18 feet an hour. Their living space is in tunnels and chambers 6 to 12 inches below the soil surface. Soil from these deep burrows is pushed to the surface in small mounds.

Reproduction

The mole's nest chamber is 4 to 6 inches in diameter and lined with fine grass and leaves. Moles have one litter of two to five young per year. The young are born in March after a 45-day gestation period. They are large at birth relative to the size of their mother and are able to fend for themselves in about four weeks.

Damage and Control

The damage caused by moles is almost entirely cosmetic. Although moles are often falsely accused of eating the roots of grass and other plants, they actually feed on the insects causing the damage. The tunneling of moles may cause some physical damage to the root systems of ornamental or garden plants and may kill grass by drying out the roots, but this damage is usually minor.

When mole tunnels become an intolerable nuisance, moles may be captured and removed without a permit by homeowners, renters, or employees of the property owner. If a lawn service or pest control technician is hired to trap nuisance animals, that person must have a certified pest control operator's license in lawn and ornamental pest control or the Florida Department of Agriculture and Consumer Services (DACS) wildlife certification for commercial mole control.

No poison (bait or fumigant) may be used on native wildlife in Florida other than those pesticides that are registered by the Florida Department of Agriculture and Consumer Services and then only used in a manner consistent with the product labeling. This means that registered mole and pocket gopher products available in stores in Florida are legal to use according to the label directions on these two native mammals.

Some products purchased from outside of Florida, on the internet, may not be legal to use if they do not have a Florida registration. Misuse of these products, like placing them on the surface, is both a violation of the Federal Insecticide, fungicide, and rodenticide Act (FIFRA) and Florida State Wildlife Laws Title 68A -9.010 (2) of the Florida Administrative Code.

Proven Control Methods

Moles can be live trapped using a simple pitfall, shown at right. Find an active surface tunnel. Collapse a tunnel with your foot, then come back in an hour or two to see whether the tunnel has been reopened. If the tunnel has been pushed back up, it is an active tunnel. Dig a hole through the tunnel large enough to insert a large coffee can, wide-mouth quart jar, or similar container. Sink the can into the ground so the top of the container lies just below the bottom edge of the tunnel. Cover the area with a piece of cardboard or a board and the soil from the hole to keep light and air currents from alerting

the mole to the trap. When the mole falls into the trap, the whole container can be pulled out of the ground and the mole carried to a forested area and released. Check your live trap several times a day. If this is not done, trapped moles may die from starvation or thirst.

Commercial mole traps are available in several types: the choker-loop, pinch or scissor, easy-set scissor style and the harpoon, seen at left. The harpoon trap impales the mole with steel spikes when the animal pushes up on the trigger. To improve soil penetration, the spikes should be worked into the soil prior to setting the trap. Step on the tunnel to partially collapse it and set the trap so the trigger is over the collapsed section of tunnel. A plastic bucket can be placed upside down over the trap to keep children and pets from disturbing the trap.

The choker-loop trap kills the mole by squeezing it between the loop and the trap body. To set a choker loop trap, lay the trap next to the mole tunnel. Make two slits across the tunnel with a spade. Step on the tunnel between the slits to partially collapse it. The choker loops are inserted into the slits, and the trigger is positioned over the collapsed tunnel. Read and follow the instructions that come with the trap you purchase. Set traps in active tunnels. If the trap is not sprung within three days, move it to a new, more active location.

Small, sensitive areas can be fenced to keep out moles, gophers, and pine voles (bottom). The barrier should be made with small-mesh galvanized hardware cloth, brick, or concrete. The barrier should extend at least 6 inches above the ground and 2 feet below the ground, with an outward projection extending 3 to 6 inches.

Moles can be discouraged from digging foraging tunnels in turf by controlling the populations of insects on which they feed. Elimination of white grubs, mole crickets, and other soil insects will make an area less attractive to moles. Identify the insect pests so the appropriate control method can be used.

Ask your local county horticultural extension agent to recommend insecticides for your particular insect problem. Always follow label directions when using any pesticide. Nematodes or bacteria that parasitize insects can be used instead of chemical pesticides to control turf insects.

If your soil is rich in organic material and supports a large earthworm population, insecticide treatments will not necessarily discourage moles. Also, be aware that insecticide treatment of an area may cause moles to tunnel more to seek out a diminishing food supply.

Several mole repellents are available that use emulsified castor oil to repel moles from treated areas. The duration of effectiveness of these products is related to soil type and the amount of rainfall. They remain effective longer in clay and loam soils than in sandy soils. During rainy periods, these products may need to be applied more often. Always read and follow label instructions.

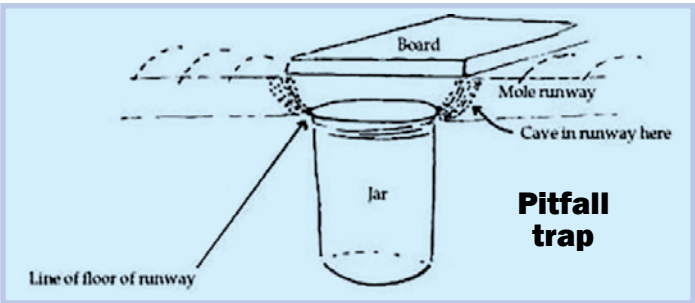
Some Methods May Yield Less Success

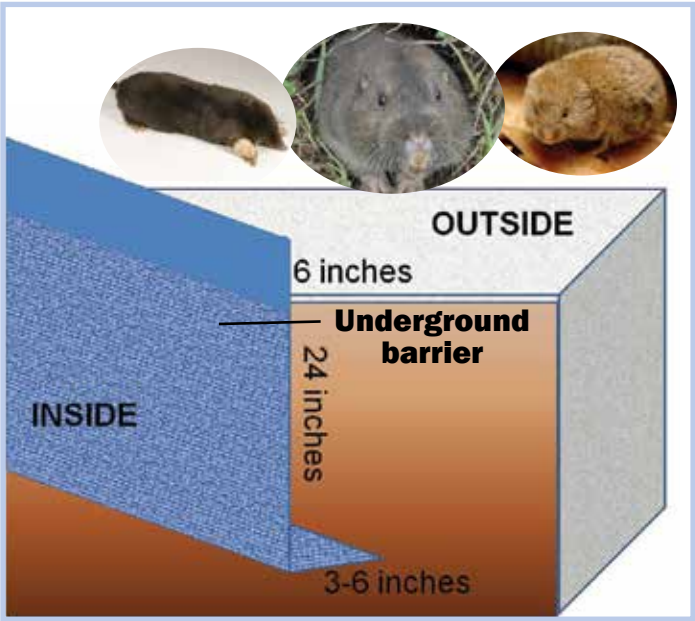
Flooding the tunnels with water may force moles to the surface, but this method rarely works in deep, sandy soils like those common in Florida.

The use of vibrating devices to drive away moles has not been proven effective in scientific trials. In fact, the presence of mole tunnels next to highways would seem to be evidence against the effectiveness of these devices. The same is true for the use of mothballs to repel moles. The mole just blocks off the treated tunnels and moves to a different part of the yard.

Many people claim that putting sticks of Wrigley's Juicy Fruit gum into moles' tunnels will eliminate the moles. This is another method not proven in scientific tests. **PP**

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





Are You Ready To **Take a 'SWOT' at Your Business?**

HARVEY F. GOLDGLANTZ

THIS IS the time of year when you begin looking back and evaluating performance indicators during the past year in preparation for the upcoming year. One very effective way of proceeding is by conducting a comprehensive SWOT analysis of your business.

What Is a SWOT Analysis?

A SWOT analysis is a structured method of planning used to evaluate the strengths, weaknesses, opportunities and threats that exist within your business environment.

The role of a SWOT analysis is to take the information from the analysis and separate it into internal issues (strengths and weaknesses) and external issues (opportunities and threats). Once this is completed, the data compiled from the analysis determines if the information indicates something that will assist you in accomplishing its objectives (a strength or opportunity), or if it indicates an obstacle that must be overcome or minimized to achieve the desired results (weakness or threat).

The information gathered from the SWOT analysis should be used as a basis for the development of your 2017 business and marketing plan.

I recommend that you include your managers and supervisors in this valuable exercise, so that you can get broad-based input that will allow for a valuable consensus moving forward.

Breaking Down the Analysis Into Four Parts

I have incorporated a typical SWOT analysis into this column, so that you may use this format as soon as you are ready to begin planning for 2017. Feel free to add any of your own questions under each section, as you see fit.

STRENGTHS

When writing down strengths, it is imperative that they be considered from both your view and the view of your customers. These strengths should be realistic. A well developed listing of strengths should be able to answer a couple primary questions. What are the firm's advantages? What does the firm do well? To help identify these strengths, consider asking the following questions:

- What is the company's average annual rate of growth?
- What is the average annual rate of profit?
- What are the major sources of the company's revenue and profit?
- Does the company have a strong brand?
- Is the marketing/advertising effective?
- What is the major focus of the company?
- Does the company have skilled employees?
- Is the morale of the employees high?
- Are there rewards in place to create an atmosphere conducive to excellence?
- Does the company have adequate financial resources to facilitate growth?
- Does the company harness information technology effectively?
- Does the company manage its inventories efficiently?
- Has the company demonstrated the ability to adapt and change?
- Is the company able to innovate?
- How has the company withstood competition?

WEAKNESSES

Every company also has some weakness. It is important to note that companies that are extremely competent in what they do, also have weaknesses. How badly these weaknesses will affect the company is a matter of analysis. Delaying the discovery of weaknesses will only hurt the firm. A well developed listing of weaknesses should be able to answer a few major questions. What can be improved? What is done poorly? What should be avoided?

To help identify these weaknesses, consider asking the following questions:

- What are the least profitable areas within the company?
- In what areas is the company not able to recover costs?
- Is the marketing/advertising effective?
- Is the company not focused?
- Is the company not able to attract competent employees?
- What are the biggest expenditures of the company?
- Is the company able to raise money when it needs to?
- Will the company be able to stand price pressure from competitors?
- Has the company been able to bring new ideas and services to its customers?
- Do employees feel facilitated to perform their best?
- Do employees have faith in management?
- Are the company standards high enough?
- Is the company losing out to competitors on the service front?

OPPORTUNITIES

All organizations have some opportunities that they can gain from. These could range from diversification of services and branch expansion,

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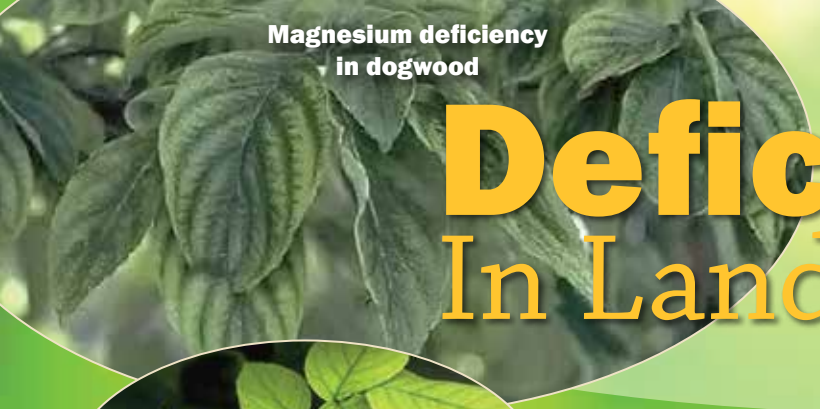
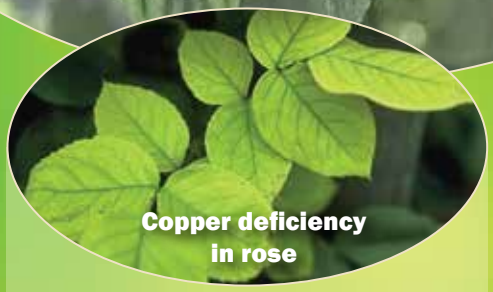


Magnesium deficiency in dogwood

Deficiencies In Landscape Plants

Erin Harlow



Copper deficiency in rose

Want to grow healthy plants and improve your skill set? Learn to diagnose plant nutrient deficiencies!

TRYING TO determine why your landscape plants are not thriving can be a frustrating task, and many factors have to be considered. The soil pH, temperature extremes, lighting, watering, soil conditions, and nutrition program all have to be taken into account. Landscape managers should examine all of these factors when dealing with problem plants, as they may contribute to nutrient deficiencies. This article will help landscape professionals become more familiar with common visual symptoms of nutrient deficiencies and how to diagnose them in the field.

For proper diagnosis of nutrient deficiencies, it is important to understand a little bit about the nutrients plants need to thrive and how they move throughout the plant. The nutrients they need are broken into two groups: macronutrients and micronutrients. **Macronutrients** are needed in a greater amount for plant processes and include nitrogen, phosphorous, potassium, calcium, sulfur and magnesium. **Micronutrients** are needed in only small quantities.

Some nutrients are mobile in the plant. This means that the plant can move the nutrient to the area where it is needed the most. As a result, macronutrient deficiencies tend to show up on the bottom of the plant first, because the nutrients have been moved to the newest leaves. The newest leaves will be greener and healthier because it has the nutrients, where the leaves on the bottom of the plant may be yellowing, necrotic, or dead as a result of the nutrients being pulled away from that area. Table 1 below displays the micro and macronutrients, their chemical symbol, available form, and if they are mobile in the plant (redrawn from Denny & Crouse).

Continued

	Essential Nutrient	Chemical Symbol	Plant Available Form	Mobile or Immobile
MACRONUTRIENTS	Nitrogen	N	Nitrate (NO_3^-) & Ammonium (NH^{4+})	Mobile
	Phosphorous	P	Phosphate (HPO_4^{2-} & $H_2PO_4^-$)	Mobile
	Potassium	K	Ionic Potassium (K^+)	Mobile
	Calcium	Ca	Ionic Calcium (Ca^{2+})	Immobile
	Sulfur	S	Sulfate (SO_4^{2-})	Partially Immobile
	Magnesium	Mg	Ionic Magnesium (Mg^{2+})	Mobile
MICRONUTRIENTS	Iron	Fe	Fe^{2+} form	Partially Immobile
	Zinc	Zn	Zn^{2+} form	Partially Immobile
	Manganese	Mn	Mn^{2+} form	Partially Immobile
	Copper	Cu	Cu^{2+} form	Partially Immobile
	Molybdenum	Mo	Molybdate (MoO_4^{2-})	Partially Immobile
	Boron	B	Borate ($H_2BO_3^-$)	Immobile
	Chlorine	Cl	Ionic Chlorine (Cl^-)	Mobile

Table 1. Essential plant nutrients, their available forms, and mobility.

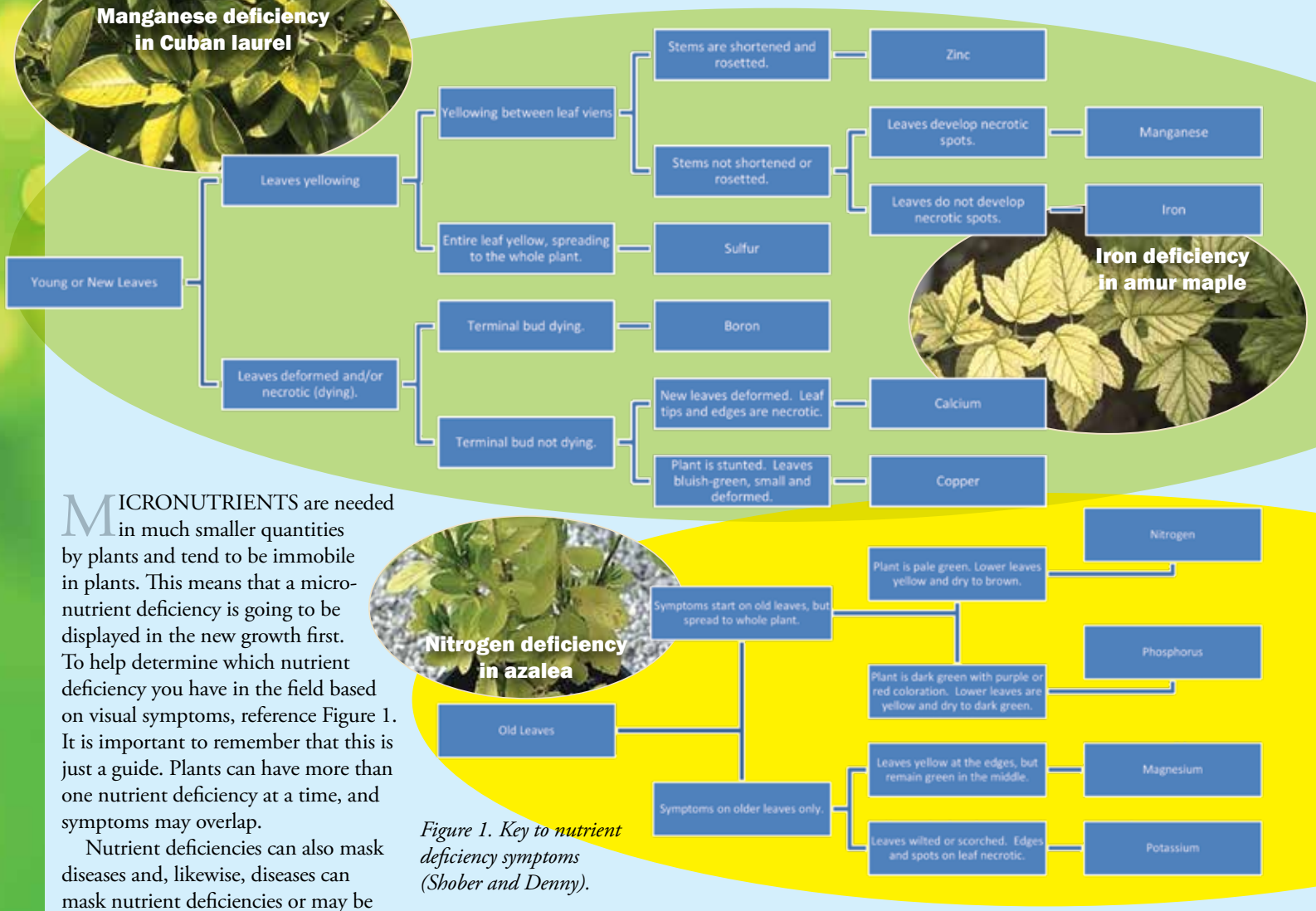


Figure 1. Key to nutrient deficiency symptoms (Shober and Denny).

MICRONUTRIENTS are needed in much smaller quantities by plants and tend to be immobile in plants. This means that a micronutrient deficiency is going to be displayed in the new growth first. To help determine which nutrient deficiency you have in the field based on visual symptoms, reference Figure 1. It is important to remember that this is just a guide. Plants can have more than one nutrient deficiency at a time, and symptoms may overlap.

Nutrient deficiencies can also mask diseases and, likewise, diseases can mask nutrient deficiencies or may be exacerbated if the plant is stressed. When trying to determine what might be wrong with a plant that is not thriving, identifying and correcting the nutrient deficiencies should be one of the first steps.

Soil pH can also influence the uptake and availability of nutrients by plants. Micronutrients in alkaline soils, which are soils with a pH greater than 7.0, tend to be less available to plants for uptake. As a result, the plant may show a micronutrient deficiency even if the granular fertilizer program contains those elements.

To correct micronutrient deficiencies on alkaline soils or soils that may have poor drainage, consider a liquid fertilizer application that would bypass the soil completely. Figure 2 shows the nutrient availability at various pH levels and can be helpful in deciding the fertilizer treatment method that may be best at your location. PP

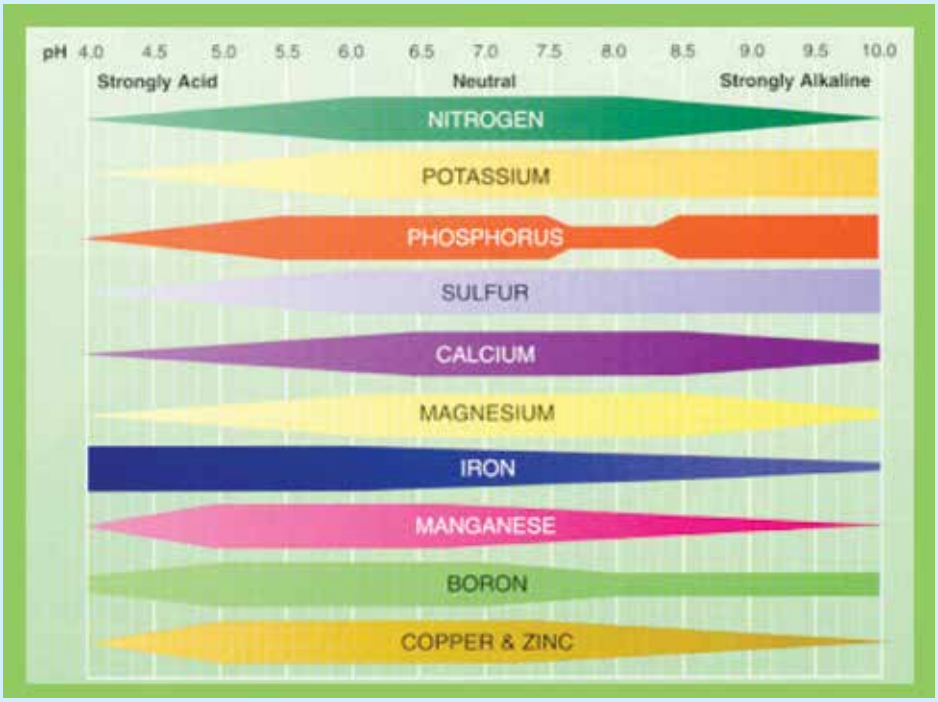


Figure 2. Nutrient availability at various soil pH levels (Rosen, et al).

For more diagnostic photos and information, visit http://hort.ifas.ufl.edu/database/nutdef/

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

to prudent acquisitions, to the potential sale of the company. Identifying hidden opportunities is the mark of a progressive and successful company. Below, you will find some questions that will assist you in identifying opportunities.

- What is the company's competitive position?
- Are there new technologies or services that the company can use to innovate or lower costs?
- Are there opportunities to expand into other related areas?
- Are there inexpensive acquisition opportunities?
- Can the company use the internet as a channel of marketing?
- Is there room for implementation of additional incentive plans to boost employee performance?
- Can the company spread its wings (into other geographic areas)?
- Can the quality of operations, services and inventory management be improved without incurring serious costs?
- Is there an opportunity to demand better prices from suppliers?
- Is there an opportunity to justify higher prices from customers?
- Can the employees be multiskilled to encourage the level of redundancy?
- Are there opportunities to cooperate with noncompetitive businesses for mutual benefit?
- Can deadwood in the workforce or service lines be reduced to boost profitability?
- Can the company get more predictable cash flow by establishing better relations with customers?

THREATS

No organization is immune to threats. These could be internal, such as falling productivity, or they could be external, such as lower priced competition. Below, you will find some questions that will help you uncover some potential threats.

- Does the company have adequate reserves to withstand sudden changes in the environment?
- What is the level of regulation (locally, statewide and nationally)?
- Is there trade-union activity that could have an adverse effect?
- Do the services the company offers have enough equity to withstand price competition?
- Are competitors eating away market share?
- Are employees adequately trained and motivated?
- Is the company considered a good employer?
- Is the company spread too thin?
- Are accounting practices adequate?
- Are accounts receivable within acceptable limits?
- Are the financials stable?
- If the economic environment becomes unstable, does the company have adequate resources to survive the downturn?
- Is the company keeping up with technological changes?
- Have profit margins been under pressure (within departments and overall)?
- Has the company been able to keep up with competitors in cyberspace?

It is not enough to simply identify the strengths, weaknesses, opportunities and threats of a company: You must act on them! In applying the SWOT analysis it is necessary to minimize or avoid both weaknesses and threats. Weaknesses should be looked at in order to convert them into strengths. Likewise, threats should be converted into opportunities. Lastly, strengths and opportunities should be matched to optimize the potential of a firm. Applying SWOT in this fashion can obtain leverage for a company. As can be seen, SWOT analysis can be extremely beneficial to those who objectively analyze their company. PP

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

What Ant is This!?

In September, Al W. sought help from Florida ant experts to learn the identity of ants he found in his home and yard. Here is an excerpt from Al's email, along with the reply from naturalist Mark Deyrup. Mystery solved!

Al's email

... I have queen palms and pine straw on the back side of my home. Queens and other palms on the front side, but use gravel and not pine straw. I'm starting to think that [the ants'] home of choice on my lot are the queen palms, as I have found them on the trunks and there are plenty of fibrous endings exposed from trimming.

My ants are 5–6 mm long. Some like to follow a yellow nylon "dog chain." They come into the lanai on it or on the floor. They find their way to our lanai furniture, go up a leg, and explore the nylon "wicker." If I take the chair leg away, they go up the table leg.

They just go anywhere they can, it seems. Doesn't seem to be a trail that's leading them anywhere in particular. They also tend to walk along the walk/grass edge. They don't seem to go onto the small slab, but rather along the edge of it, then onto the landscaper's cement slabs. These are the palms I found them on and sprayed Talstar as high up into them as I could. No change in their traffic pattern two days later.

I've tried Terro ant killer, a liquid that you drop for them to carry back to nest
I've tried Talstar professional insecticide, liquid and granule
Ortho Home Defense Insect Killer (this actually kills those in the path, while these ants seem to just walk through the Talstar)
Even tried Advion Cockroach gel bait insecticide, thinking that maybe it's stronger (just sat there and dried up, ants didn't even sniff it, let alone taste it)

Thanks so much for your interest,
Regards, Al W.

Mark's reply

GREETINGS, ANT WATCHERS!

THIS ANT IS THE NON-NATIVE SPECIES **PSEUDOMYRMEX GRACILIS**, THE LARGEST OF THE **SLENDER TWIG ANTS** IN THIS AREA. THEIR STING IS ANNOYING, BUT THEY ONLY STING WHEN TRAPPED AGAINST THE BODY OR CARELESSLY SWATTED. I TRY TO BRUSH THEM OFF WHEN THEY ARE ON THE BACK OF MY NECK, BUT SOMETIMES GET STUNG EVEN THEN. THEY ARE PREDATORS, OFTEN GOING AFTER CATERPILLARS, AND SOME PEOPLE THINK THAT THESE ANTS MAY HAVE REDUCED POPULATIONS OF SOME OF OUR NATIVE BUTTERFLIES.

THIS ANT IS VERY AGILE, WITH GOOD VISION, AND ENTERTAINING TO WATCH. THEY DO NOT TRAVEL IN ANY TRAILS (GOOD OBSERVATION) BUT EACH ANT FORAGES ON ITS OWN. WHILE THESE ANTS DO NOT REALLY RATE AS PESTS, SOME PEOPLE MIGHT NOT WANT THEM AROUND. THEIR NESTS ARE USUALLY IN HOLLOW TWIGS & DEAD BRANCHES.

FROM THE PHOTO IT LOOKS LIKE YOU LIVE IN A PLACE WITH VERY LITTLE VEGETATION, SO IT MIGHT BE EASY TO FIND THE NEST OF THESE ANTS. THEY DO NOT ATTACK EVEN WHEN THEIR NEST IS DESTROYED, SO YOU COULD TAKE THE NESTS AND DUMP THEM SOMEWHERE.

BEST WISHES,
MARK DEYRUP

Facts From DACS: Change is in the Air

CHANGE is everywhere: There have been a lot of changes in the pest control industry from the regulatory and enforcement agencies to the pesticide labels.

There have been changes in the Florida Department of Agriculture and Consumer Services (FDACS), which most of the industry is aware of. In 2014 the Department went through a reorganization that changed the names of the Bureaus from Bureau of Entomology and Pest Control and the Bureau of Compliance Monitoring to the Bureau of Licensing and Enforcement and the Bureau of Inspections and Incident Response. These are the bureaus that regulate the pest control industry. This change increased the number of inspectors from 18 to about 60. It also decreased their territories but increased their duties. One of their duties is to enforce pesticide uses by enforcing the pesticide labels. Remember, "The Label is the Law."

Pesticide labels have gone through and are continuing to go through changes. Some of the changes are very helpful to the end users, like the pesticide resistance codes on the front of some labels. These codes identify the "mode of action" (the way the pesticide effects the target organism) of the given pesticide. With any resistance management program it is important to know the modes of action for the pesticides used. It is not enough to rotate pesticides; you must rotate the mode of action.

There are three organizations that provide the modes of action and corresponding codes for most pesticides. The organizations are Insecticide Resistant Action Committee (IRAC), Fungicide Resistant Action Committee (FRAC), and Weed Science Society of America (WSSA). Their web addresses are **www.irac-online.org**, **www.frac.info**, and **www.wssa.net**.

Other changes to labels that greatly affect the way pesticides are used include pollinator protection language and the "Bee Box." Some of this language is very restrictive. Here is a sample of some of that language: "Do not apply this product while bees are foraging, do not apply to plants that are flowering. Only apply after all flower petals have fallen off." Other pesticide labels state, "This product is toxic to bees exposed to residues for more than 38 hours following treatment. Do not apply this product to blooming, pollen shedding or nectar producing parts of plants if bees may forage on the plants during this time period."

Pyrethroid labels have also had some label changes that include some very restrictive language. Pesticides that have an active ingredient that ends in "thrin" — like Bifenthrin, Cyfluthrin, and Lambda-Cyhalothrin, to name a few — are pyrethroids. Some of the application restrictions include: "To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters, do not treat when raining, do not apply within 10 feet of storm drains, do not apply within 25 feet of aquatic habitats, do not make on-grade applications when sustained wind speeds are above 10 mph at the nozzle height." These are just a few of the restrictions. You must read and follow the label directions. This is the first statement under the directions for use: "It is a violation of federal law to use this product in a manner inconsistent with its labeling." **PP**

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

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directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark.

Termiticides should not be applied when weather conditions favor drift from treated areas. Most termiticides are highly toxic to bees exposed to direct treatment or residues on crops or weeds. Termiticides should not be allowed to drift to crops or weeds on which bees are actively foraging. Of course, termiticide applications are not applied in a way that results in much drift.

Termiticide Mobility in Soil

The type of soil to which a termiticide is applied may affect the mobility of the active ingredient as it moves downward in the soil profile during treatment. Generally, termiticides are applied in unsaturated soils near the soil surface, where organic carbon levels are the highest. However, the amount of organic matter typically is very low at soil depths greater than 3 feet below the surface.

Organic matter is only a small fraction of soil that essentially coats soil particles. Most termiticide active ingredients bind to the organic matter in the soil, and this decreases their downward movement in the soil profile. The higher the amount of organic matter in the soil, the more likely the termiticide will be adsorbed and bound to the soil particle so it cannot be leeched by water movement.

Soil properties can also affect water flow through a soil and thus may alter the potential mobility of termiticide in soil. For example, a coarse, sandy soil has larger pores that are less able to hold water tightly, thereby increasing the speed of downward water flow. In addition, the larger particle size of sand decreases the amount of available surface area, and thus, less binding sites for the termiticide are available. Alternatively, the smaller particle size of silt and clay in soils results in smaller pores that hold water more tightly and can retard water movement. Finer-textured soils generally have more surface area available for sorption.

The amount of moisture that reaches a treated termiticide zone can be extremely variable from structure to structure. Some factors that may contribute to these variations can include geographic yearly rainfall trends, prevalent directional weather exposure to particular aspects of the home exterior and foundation, soil grade, presence or absence of rain gutters, lawn and landscape irrigation, leaky exterior faucets, missing or improperly maintained downspouts, or downspouts not extending far enough from the foundation. These factors may increase or decrease the amount of moisture entering the soil and potentially moving termiticide from its point of application. Termiticide movement could potentially threaten groundwater supplies or result in lower residual levels of chemical, providing less protection from termite attack.

Termiticide movement in soil is greatest immediately during and after application. After the termiticide dries, the formulation breaks, and the active ingredient binds to soil particles and organic matter. At that point, the binding to the soil and organic matter is greater than the active ingredient's solubility in water. Therefore, after the termiticide dries on the treated soil, there is extremely low movement of termiticide in the soil. PP

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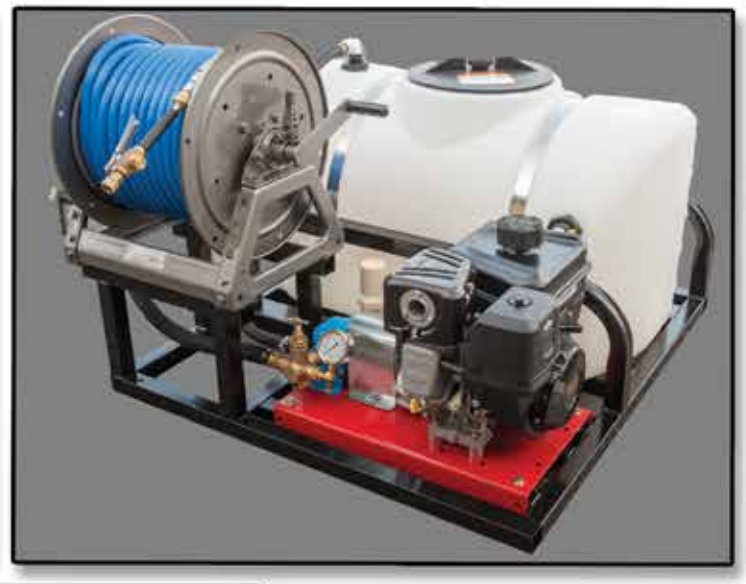

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