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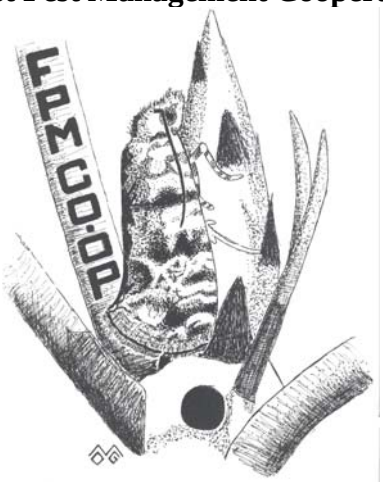
Quarterly Newsletter on Forest Pest Management Issues

Forest Pest Management Cooperative



Nantucket Pine Tip Moth, *Rhyacionia frustrana* (Comstock)

Texas Forest Service, Forest Pest Management,
P.O. Box 310, Lufkin, Texas 75902-0310

PEST is a quarterly newsletter that provides up-to-date information on existing forest pest problems, exotic pests, new pest management technology, and current pesticide registrations related to seed orchards and plantations. The newsletter focuses on, but is not limited to, issues occurring in the South (Texas to Florida to Virginia,).

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Announcements:

Three New FPMC Members – We would like to take this opportunity to welcome North Carolina Division of Forest Resources, CellFor Inc. and International Forestry Company into the FPMC.

The North Carolina Division of Forest Resources (NCDFR) is a state agency based in Raleigh, NC. NCDFR currently manages 35,000 acres and grows 18 million seedlings for the citizens of NC. Mr. James West (james.west@ncdrenr.gov), Nursery and Tree Improvement Program Head out of Goldsboro, NC, and/or Rob Trickel (rob.trickel@ncdenr.gov), Pest Control Program Head out of Raleigh, will serve as their Executive Representative(s) and primary contacts.

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TREE-äge® registration has been approved by EPA!!!!!

After 12 long years, it's official - EPA has approved the use of emamectin benzoate (TREE-äge®, Syngenta) for "control of mature and immature arthropod pests of deciduous, coniferous and palm trees, including, but not limited to, those growing in residential and commercial landscapes, parks, plantations, seed orchards, and forested sites (in private, municipal, state, tribal and national areas)."

Since 1997, the Forest Pest Management Cooperative (FPMC) has been working with Dr. David Cox, Syngenta Crop Protection, and Joe Doccola, Arborjet, to test tree injections of emamectin benzoate for control of cone and seed insects, bark beetles, wood borers, and other forest pests. In nearly all trials, this chemical has provided excellent extended protection to conifers and hardwoods.

EPA did approve use of emamectin benzoate on ash for protection against emerald ash borer in 2009, but postponed a decision on other uses. This new decision extends the use of TREE-age for several species of defoliators (gypsy moth, spruce budworm, tent caterpillars, winter moth, bagworm, fall and mimosa webworm, tussock moth, leafminers and sawfly), bark beetles (*Ips* engravers, southern pine beetle, and others), borers (clearwing, flat-headed and roundheaded), pine needle scale, red palm mite, and pinewood nematode.

Be aware that EPA is requiring some changes to be made to the master label. Once these changes are made, each state has to approve this use as well, so it will take some time to finalize everything. No one knows exactly when the product will be available in the South. Additional information about TREE-äge will be provided in future issues of the PEST newsletter. Also, Plans are being made to provide tree injection training. Stay tuned.

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Thought You Might Be Interested to Know . . .

EPA to Require Permits for Aerial Pesticide Applications

(***Source "The Forestry Source", November 2010, Vol. 15, No. 11***)

The US Environmental Protection Agency (EPA) is planning to broaden its regulation of the use of pesticides in or near waters of the United States by requiring pesticide operators to obtain Pesticide General Permits (PGPs) for such applications. The new rules, which are scheduled to become effective on April 9, 2011, apply to four types of pesticide application, including "Forest Canopy Pest Control -- aerial application of a pesticide over a forest canopy to control the population of a pest species (e.g., insect or pathogen) where to target the pests effectively a portion of the pesticide unavoidably will be applied over and deposited into water."

Pesticide operators who aerially apply chemical or biological pesticides to 640 or more acres of forest canopy annually are subject to the new rule. Although the permits will not be required for ground-based pesticide applications, the EPA is considering the expansion of its Clean Water Act authority to regulate such practices.

The new permit requirement also applies to mosquito and other flying insect pest control, aquatic weed and algae control, and aquatic nuisance animal control. In all, the EPA estimates that about 35,000 pesticide applicators in the United States that perform roughly half a million pesticide applications annually will be subject to the new rule.

"EPA believes this draft permit strikes a balance between using pesticides to control pests and protecting human health and water quality," said Peter S. Silva, assistant administrator for the EPA's Office of Water, in a press statement.

The EPA issued draft permit rules and held three public meetings, a public hearing, and a webcast in June, and accepted public comment for 45 days. The agency plans to finalize the permit in December 2010. The permits will be required after April 9, 2011, in six states, US territories, tribal lands, and federal facilities where the EPA is the permitting authority. Environmental protection agencies in the remaining 44 states will issue the permits under the auspices of the EPA.

Scott Jones, chief executive officer of the Forest Land Owners Association, said the new permit requirement is a significant worry to many of the organization's members, who collectively own and manage more than 40 million acres in 48 states.

"Forest landowners in the Northeast have to spray for gypsy moth and tent caterpillar, and in areas of the Southeast landowners often aerial spray over cypress swamps," said Jones. "It's a big concern."

Several million acres of forestland have been aerially sprayed with pesticides over the last three decades in an attempt to suppress outbreaks of the gypsy moth, according to the US Forest Service.

"There is also the concern that terrestrial applications will be regulated when it is determined that these may impact a wetland," said Jones. "And then we bring the age-old question of 'what is a wetland?' back into play."

Jones said the EPA appears to be positioning itself to increase its regulation of pesticide applications on private lands. In its *Federal Register* notice about the draft permit rules, the EPA stated that it is "still exploring whether other use patterns should be included. Specifically, the EPA has not included most use patterns that target land-based pests and flying pests that are not near or over water. The EPA is seeking comment on whether certain pesticide application activities targeting such pests may involve unavoidable point-source discharges to waters of the United States. The EPA also is requesting comment on whether this general permit should provide coverage for any such activities, and if so, which activities should be covered."

Who's an Operator?

Carson Bowler, an attorney for Schwabe, Williamson, & Wyatt, a Pacific Northwest-based law firm that serves the forest products and other industries, said the EPA will need to clarify who, specifically, is required to obtain the permits. The EPA defines operators as individuals or entities that have control over the financing for or the decision to perform pesticide applications, or have day-to-day control of applications. In many cases, this test might be met by landowners, foresters, and pesticide contractors involved in one project, leaving the question of who

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Permits (continued from Page 2)

must hold a permit open to interpretation.

"This is an important question to landowners, contractors, and forestland management companies. Who will have to put their name on that permit?." Bowler said. "The 'or' in the definition is key, because in many cases, there may be multiple operators. For example, a management company might hire a third-party vendor for its pest control. In that case, both the management company and the applicator would be considered 'operators' who are required to obtain a permit. The EPA did note in its draft notice, however, that it would consider additional comments about whether this definition of operator was 'logical,' but right now it's not clearly spelled out in the draft permit rules. It'll be interesting to see how that plays out."

In addition to obtaining a permit, the EPA will require all operators to reduce pesticide discharges by using the lowest effective amount of pesticide , preventing leaks and spills, calibrating equipment, monitoring for and reporting adverse incidents, and employing integrated pest management practices, which are "an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices," including "comprehensive information on the life cycles of pests and their interaction with the environment."

The bottom line for most landowners is retaining the ability to make pesticide applications as the need arises.

"The possibility of delays in acquiring permits is a huge issue," Bowler said.

In 2006, The EPA issued a rule that exempted from Clean Water Act regulation pesticide applications compliant with the Federal Insecticide, Fungicide, and Rodenticide Act, which covers the production, labeling, use, and safety of pesticides. The rule was appealed, and in a case known as *National Cotton Council of America v. EPA*, the US Sixth Circuit Court of Appeals ruled that excess or residual chemical pesticides that impact waters of the United States are subject to Clean Water Act jurisdiction and thus require EPA permits. On April 9, 2009, the court granted the EPA two years to develop a pesticide permit program.

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Announcements – Continued from Page 1

CellFor Inc., a leading independent supplier of high technology seedlings to the global forest industry, is based in Vancouver, British Columbia. CellFor currently produces >11 million pine seedlings for the southern U.S. market. Mr. Nick Muir (nmuir@cellfor.com), Varietal Testing Program Manager, out of Lufkin, TX, will serve as their Executive Representative.

International Forestry Company (IFCo) is the largest producer of container tree seedlings in the U.S. with an annual production of over 40 million container seedlings. They are based in Moultrie, GA. Mr. Wayne Bell (wbell@interforestry.com), Chief Operations Officer, and/or Chris Rosier (crosier@interforestry.com), Marketing and Product Development Manager, will serve as their Executive Representative(s).

Recent Forest Service Publications

Ciesla, W. M., R. F. Billings, J. T. Compton, W. R. Frament, R. G. Mech, and M. A. Roberts. 2008. **Aerial signatures of forest damage in the eastern United States.** USDA Forest Service. FHTET-08-09. 113 p. Note: To request copies, contact Frank Sapio (fsapio@fs.fed.us or Christine Mattingly (cmattingly@fs.fed.us).

Clarke, S. R. and J. T. Nowak. 2009. **Southern pine beetle.** U.S.D.A. Forest Service. Forest Insect & Disease Leaflet 49. 8 p.

Mallams, K. M., and R. L. Mathiasen. 2009. **Mistletoes on hardwoods in the United States.** U.S.D.A. Forest Service. Forest Insect & Disease Leaflet 147. 12 p.

Mallams, K. M., K. L. Chadwick, and P. A. Angwin. 2010. **Decays of white, grand, and red firs.** U.S.D.A. Forest Service. Forest Insect & Disease Leaflet 52. 12 p.

Owen, D. R., S. L. Smith, and S. J. Seybold. 2010. **Red turpentine beetle.** U.S.D.A. Forest Service. Forest Insect & Disease Leaflet 55. 8 p.

Staeben, J. C., S. Clarke, and K. J. K. Gandhi. 2010. **Black turpentine beetle.** U.S.D.A. Forest Service. Forest Insect & Disease Leaflet 12. 8 p.

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Pest Spotlight: Imported Fire Ants

(Source: http://ipmworld.umn.edu/chapters/lockley.htm)

History

Four species of fire ants are currently found within the contiguous southeastern United States. The tropical fire ant, *Solenopsis geminata* Fab, and the southern fire ant, *S. xyloni* McCook, are considered species "native" to the area. The two imported species of fire ants were introduced into the United States from South America at the port of Mobile, Alabama. The black imported fire ant, *Solenopsis richteri* Forel, arrived sometime around 1918 and the red imported fire ant (RIFR), *Solenopsis invicta* Buren, in the late 1930s. The presence of imported fire ants in the United States was first reported in 1929. Both species probably came to the port in soil used as ballast in cargo ships. In the years preceding the arrival of the RIFA, the black imported fire ant slowly spread into adjacent counties in Alabama and Florida. Since its introduction, the RIFA, a much more aggressive species than the black imported fire ant, has spread quickly. Today, the RIFA has spread throughout the southeastern United States and Puerto Rico replacing the two native species and displacing the black imported fire ant. Currently, *S. richteri* is found only in extreme northeast Mississippi, northwest Alabama and a few southern counties in Tennessee.

Imported fire ants disperse naturally through mating flights, colony movement or by rafting to new sites during periodic floods. It is through the actions of man, however, that the dramatic spread of imported fire ants has occurred. Beginning soon after the Second World War, and in conjunction with the housing boom of the period, the imported fire ant began its march across the South. The spread of these ants was largely due to the movement of grass sod and woody ornamental plants used in landscaping. This inadvertent movement of *S. invicta* and *S. richteri* was noted by the U.S. Department of Agriculture in 1953 when a direct link was established between commercial plant nurseries and the spread of imported fire ants. In response to mounting public pressure, the U.S. Congress appropriated $2.4 million in 1957 for control and eradication efforts. As part of an overall plan a quarantine was imposed to retard or prevent the artificial dissemination of these now notorious pests. On May 6th 1958, regulations governing the movement of nursery stock, grass sod and some other items were instituted through the Federal Quarantine 301.81. By that time, however, imported fire ants had moved into eight southern states. This spread, although slowed considerably by federal regulations and climatic conditions, continues even today. In recent years, isolated infestations of imported fire ants have been found as far west as California and as far north as Kansas and Maryland.

Biology

Ants belonging to the genus *Solenopsis* can readily be distinguished from all other ant species in North America by their 10-segmented antennae with a 2-segmented club. These characteristics, combined with the presence of a sting, a two-segmented pedicel and an unarmed propodeum make identification of the genus relatively easy. Identification of individuals to the species level is somewhat more difficult; made more so by the hybridization between the two "native" species as well as between the two imported species.

Colonies of fire ants consist of eggs, brood, polymorphic workers, winged males, winged females and one or more reproductive queens. Among the sterile workers, labor is divided by age (and to a much lesser degree by size). Younger workers are assigned the job of caring for the developing brood; middle-aged workers are tasked with colony maintenance and protection while the eldest workers forage for food.

Alates, or winged forms, are most abundant in the late spring and early summer but can be found at any time of the year. The winged forms are reproductives. Males (left), easily distinguished from female alates, are decidedly smaller, glossy black and have a small head. Although both alate males and females can be found in the same colony; as a general rule one form will be dominant. Nuptial flights most often occur in the middle of the morning one or two days following a rainfall; if the temperature is above 22°C and the wind is light. The males fly first and await the females in the air. The female alates emerge and take flight climbing up into the cloud of waiting males where they mate in the air. After mating, the male dies and the newly mated female lands, sheds her now useless wings and begins searching for a suitable nesting site. The new queen excavates a brood cell approximately 25-50 mm below the surface of the soil. Often more than one new queen will occupy the same cell but only one will survive to establish a colony.

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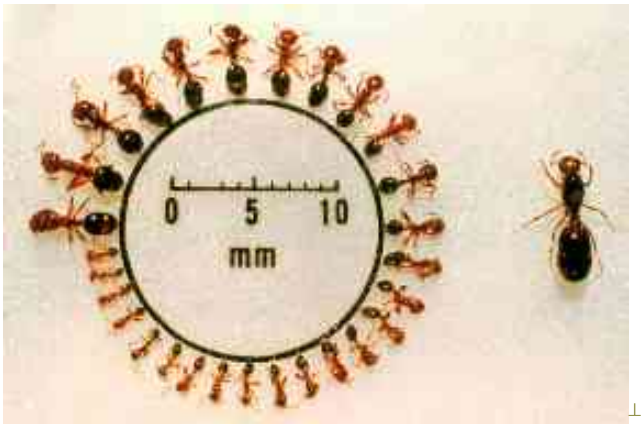
Fire Ants (continued from Page 4)

Queens do not forage for food but rely on fat reserves and the energy acquired from absorbing her wing muscles to survive until her first workers are ready to take on the task of colony maintenance. Initially, the new queen will oviposit 10-15 eggs. These hatch in 7-10 days and are fed by the queen through trophallaxis (exchange of alimentary fluids) or from sterile, trophic eggs she has laid for that purpose. In 6-10 days, the larvae pupate and emerge 10-15 days later. These workers, called minims, are very small due to the limited amount of energy the queen could devote to their development. These small workers open the brood cell to the outside world and begin foraging for food to feed the queen and the developing brood. Within 30 days, larger workers have emerged and the colony begins to grow. Workers start to emerge daily and within six months several thousand workers can occupy the colony and a "mound" is readily visible. As the colony matures, the polymorphic nature of the worker becomes more apparent. The largest workers in the colony (majors) can be as much as 10 times the size of the smallest workers (media). The queen lives up to seven years and produces an average of 1600 eggs per day throughout her life. At maturity, a monogynous fire ant colony can consist of over 250,000 ants.



Size variation in RIFA worker ants and queen on the right. Photo: S. Porter.

One of the identifying characteristics of a fire ant colony is the earthen nest or mound. The mound is a conically-shaped dome of excavated soil that has a hard, rain-resistant crust. The mound averages 0.40 m in diameter and 0.25 m in height. In heavier soils, a mound can exceed 1.0 m in height and 1.5 m in diameter. There are usually no external openings in the mound; tunnels approximately 25-50 mm below the surface radiate from the mound allowing foraging workers ready egress and ingress. The purpose of the mound is three-fold: 1) to be a flight platform for nuptial flights; 2) to raise the colony above the water

RIFA mounds have a fresh tilled appearance. Photo: Bart Drees.

table in saturated ground and; 3) to act as a passive solar collector to supply warmth to the colony during the cold winter months. Although mound size and shape differs to some extent based on soil type, during the dry hot days of late summer and early fall, new mounds are not formed and older mounds are not maintained. While mounds are important to a colony, they are not essential for colony survival. Given a dark, protected site with sufficient moisture and an adequate supply of food, fire ants will nest in a wide variety of sites (e.g. rotten logs, walls of buildings, under sidewalks and roads, in automobiles, in dried cow manure).

Fire ants are omnivorous, feeding on almost any plant or animal material; although insects seem to be their preferred food. In rural habitats, fire ants have a major impact on ground nesting animals from insects to reptiles to birds to mammals. The arrival of imported fire ants into an ecosystem wreaks havoc on the local ecological community. Studies have shown that a minimum two-fold reduction occurs among populations of field mice, oviparous snakes, birds, turtles and other vertebrates when imported fire ants

Tricolor heron chick being attacked by fire ant workers. Photo: Bart Drees.

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Fire Ants (continued from Page 5)

are allowed to establish colonies within a given area. In some instances, the depredation by fire ants has completely eliminated some species from an ecosystem. The reduction or elimination of a species or group of species from a system has repercussions throughout the local food web. Not only do imported fire ants reduce animal populations, they also feed on plants. Fire ants attack young saplings and seedlings. They destroy buds and developing fruits and have been shown to feed on the seeds of 139 species of native wildflowers and grasses. Secondarily, fire ants "nurse" numerous homopteran pests of plants such as aphids and scale insects. Although not conclusively shown, observations indicate that their activity on the plant itself may reduce the ability of pollinators to successfully pollinate flowers.

In agriculture, fire ants have been identified as damaging fifty-seven species of cultivated plants. Fire ants feed on the germinating seeds of some crops (e.g. corn, sorghum, soybeans) and the buds and developing fruits of others (e.g. citrus, okra). Tunneling fire ants have galleried Russet potato tubers and have significantly damaged the subterranean pods of peanuts. Young citrus and pecan trees have been destroyed when imported fire ants girdled stems and trunks. Damage to plants is exacerbated during periods of drought as fire ants seek alternate water sources. In fields where drip irrigation is used, fire ants will build their mounds over the emitters reducing or blocking the flow of water to crops. Finally, the mere presence of fire ants on plants and within the field will deter hand-harvesting of fruits and vegetables.

As an urban pest, imported fire ants cause many of the same problems experienced in rural areas as well as some problems unique to the urban environment. As in agriculture, imported fire ants cause significant damage to numerous plants and, as in rural habitats, fire ants can reduce the number of birds and mammals in an urban landscape. Fire ants nest within urban structures such as the walls of homes and offices. They establish colonies under sidewalks and roadways. When the site is abandoned, subsidence will cause cracks to appear and will occasionally result in the complete collapse of sections of these structures. The presence of fire ants can deter outdoor activities in yards, parks and school grounds. Home invasions can threaten small children and the elderly. House invasions are especially prevalent during periods of heavy precipitation and flooding.

Imported fire ants are attracted by electrical currents and have caused considerable damage to heat pumps, air conditioners, telephone junction boxes, transformers, traffic lights, gasoline pumps, etc.

Fire ants are most notorious for their stinging behavior. They respond rapidly and aggressively to any disturbance of the colony or to a food source. A single fire ant can sting repeatedly and will continue to do so even after their venom sac has been depleted. Initially, the sting(s) result in a localized intense burning sensation (hence the name "fire" ant). This is followed within 24 - 48 hours by the formation of a white pustule at the sting site. This pustule is formed only in response to the stinging of the two imported species. No pustule forms from the stings of native species. These pustules can become sites of secondary infection if not kept clean and can leave permanent scarring.

A minority of those stung by fire ants are hypersensitive to the venom and can react quite strongly; suffering chest pains, nausea, dizziness, shock or, in rare cases, lapsing into coma. Some deaths have been documented as having been caused by fire ant stings but these cases are extremely rare.

Control

While any attempts to control imported fire ants over large areas are currently impractical, there are two basic methods that can successfully control fire ants within a limited area: treatment of individual mounds and broadcast treatments.

Individual Mound Treatments. There are several proven methods that can be employed to control individual colonies of fire ants. Insecticidal mound drenches with common insecticides are generally effective against fire ant colonies. The mound is flooded with a large volume of a liquid containing a contact insecticides such as carbaryl, pyrethroids, etc. Numerous insecticides are currently labeled for this use. A major problem with this method is that the queen is sometimes too deep within the colony to be contacted by the toxicant. Care must be taken not to disturb the mound prior to application of the drench. A disturbance will alert the colony and the queen may be taken deeper into the mound. Application of insecticidal surface dusts or granules have a limited effect on a colony if they are not watered in. The dissolved granules must come into direct contact with the ants to have any effect. As in mound drenches, care must be taken not to disturb the colony prior to application. The queen can be taken to a point within

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Fire Ants (continued from Page 6)

the mound where she may not come in contact with the poison. Some insecticides are marketed as injectants. The FPMC has tested PTM™ Insecticide (fipronil) and has found this soil injection treatment to be highly effective against RIFA (see summary of research project in PEST 15.1 p. 4-5). Note: BASF has submitted a request to EPA to add RIFA to the PTM label. We anticipate that approval will be given by spring 2011.

Fumigants are also commercially available. They are expensive and dangerous if not handled properly. A number of fire ant baits are available. These can be used for treating individual mounds or for broadcast treatment of larger areas. The bait should be uniformly applied around the mound 0.3 to 1.0 meters away and not on the mound itself. Baits are much slower than the control methods listed above but are generally safer, cheaper and more effective in the long run.

Broadcast Treatments. A number of fire ant baits are commercially available for broadcast treatments. Baits are composed of an inert defatted corn grit carrier and soybean oil. A toxicant (either a slow-acting insecticide or an insect growth regulator) is incorporated into the oil. Foragers find the bait and carry it back to the colony. Once there, the ants will ingest the soybean oil/toxicant and begin feeding other members of the colony. Eventually, the toxicant is spread throughout the mound and all members of the colony are affected. Broadcasting baits has a number of advantages. Unlike individual mound treatments, colonies need not be "located" in order for them to be treated. Foraging workers quickly retrieve the broadcast granules and carry them back to their nestmates. Broadcasting baits is a great deal less labor intensive than individual treatments and per acre costs are dramatically lower than with any of the other methods. Some of the disadvantages to broadcasting baits include: lack of specificity to fire ants; baits dissolve when they come in contact with water rendering them irretrievable by fire ants; retrieval of the baits is temperature dependent; and baits are slow-acting.

Biological Control. A large number of arthropod species have been identified from nests of imported fire ants., Many of these are known to be endoparasitic, socially parasitic or predaceous fungal, protozoan and viral pathogens have also been identified in association with fire ants. Three potential biological control agents have been identified in South America for intensive study. These studies, if successful, may lead to their introduction into the United States. The organisms under consideration are: *Pseudacteon* sp. flies (Diptera: Phoridae) ca. 17 spp.; *Thelohania solenopsae* a protozoan disease and; *Solenopsis dagerrei* (Hymenoptera: Formicidae), a workerless social parasite.

Phorid flies are known to be parasitic on a number of ant species. Some are thought to be host specific to imported fire ants. The adult flies oviposit on foraging fire ant workers outside the mound; the maggots migrate into the ant's head capsule where they feed. This eventually leads to decapitation of the ant. As interesting as this phenomenon is, the major effect of these flies is to cause the ants to cease foraging. In the presence of the fly, worker ants will retreat into the colony to prevent oviposition by the phorid. This disruptive response to the fly restricts the ability of the colony to feed itself and may "even the playing field" so that other ant species can become more competitive with fire ants.

The microsporidian disease *Thelohania solenopsae* is an obligate intracellular pathogen of fire ants. Preliminary field studies on populations of the black imported fire ant, *S. richteri*, carried out in Argentina indicated that decreasing densities of fire ants were associated with increasing presence of this pathogen. These data suggest that this pathogen may be an important factor in reducing fire ant numbers by weakening the colonies. Although the vertical transmission of this disease is understood, the horizontal transmission is not.

Solenopsis (Labauchena) *dagerrei* is a parasitic ant that attaches to the fire ant queen and redirects fire ant workers to tend the brood of the parasite to the detriment of the colony's own larvae. *S. dagerrei* is intriguing because it lacks a worker caste; only queens and males are produced. The presence of this parasitic ant has a debilitating effect on colony growth and the proportion of sexual reproductives produced in the colony. Queens of *S. dagerrei* enter fire ant colonies and attach themselves to the mother queen. Previous studies have demonstrated that this parasite inhibits the fire ant queen and her egg production; thus causing the fire ant colony to collapse and eventually die out.

To date, none of these natural enemies has been sufficiently evaluated to determine if, in and of themselves, they might produce any true suppression of fire ant populations. In all likelihood, parasites, predators and pathogens will be used in combinations

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Fire Ants (continued from Page 7)

to reduce colony fitness. Reduction in colony vitality could cause greater mortality under stress conditions and allow for better competition from native ant species.

Links to Other Imported Fire Ant Pages

http://en.wikipedia.org/wiki/Red_imported_fire_ant

http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7487.html

http://fireant.tamu.edu/controlmethods/index.php

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Exceptional Damage to Young Pine Trees Found in Several Western Gulf Pine Plantations.

Early this summer, foresters in Arkansas, Louisiana, and Texas began noticing extensive shoot mortality on young (2-5 year-old) loblolly pine trees in several plantations (Fig. 1). Most were thinking that pitch canker was the cause of the dieback. However, a closer look revealed numerous pitch blisters along young shoots (Fig. 2). These shoots were found to be hollow and often contained small, orange larvae or pupae. The true culprit: Nantucket pine tip moth. Presumably, the severe drought periods over the past few years has stressed young pine plantations and have allowed tip moth populations to explode. In many cases, the numerous tip moth attacks resulted in 6" to 12" inches of shoot mortality for each of the last generations (Fig. 3).

Fig. 1. Extensive tip moth damage to 4 year-old loblolly pine in AR.

Fig. 2. Multiple tip moth attacks on loblolly pine shoot in LA.

Fig. 3. Shoot mortality (12") on 3 year-old loblolly pine in TX.

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Winter Weather, People, and Trees in the Urban Landscape

By *Ann B. Gould, Ph.D., Extension Specialist in Plant Pathology and Mark C. Vodak, Ph.D., Extension Specialist in Forestry* in Rutgers Cooperative Extension, Plant and Pest Advisory, Landscape, Nursery & Turf Edition, April 22, 2010

Each year we receive many inquiries about troubles with trees in urban settings. Everyone expects a certain amount of damage due to insects, diseases, and environmental factors such as drought or moisture stress; many of these are often unpredictable or unavoidable. These topics are saved for another newsletter. Some tree problems in the landscape, however, are caused by winter temperatures or storms. Others are caused by human activities. To keep trees healthy, it is important to be aware of these injuries and how to prevent them. Some of the more common tree injuries are discussed below.

✔ Winter Injury

Winter injury is a result of environmental factors such as late spring frosts, a cool summer followed by a warm fall and a sudden drop in temperature, excessive or late season fertilization, excessive fluctuations in temperature, drying winds, lack of snow cover, and abnormally cold temperatures during winter. In addition, trees and shrubs may be damaged by winter storms, snow, and ice.

A wide range of plants are affected by winter injury. Commonly affected species include broadleaved evergreens (rhododendron and mountain laurel), needled evergreens (hemlock, yew, pine, and juniper), and deciduous trees and shrubs (flowering cherry and almond, maple and dogwood). Leaves on rhododendron and mountain laurel will scorch along the margins and roll longitudinally along the mid-vein (we've seen a lot of this symptoms this spring). On needled evergreens, look for browning of needle tips, needle drop, and twig dieback.

Excessive drying (or winter desiccation) is quite common in dormant evergreens when water evaporates from leaves or needles on windy or warm sunny days during the winter or early spring. Drying occurs because this water is not replaced since the roots cannot take up enough water from cold or frozen soil.

Freezing injury is common in plants that are not acclimated to cold winter temperatures. When acclimation is delayed in the fall, typical winter cold injures these susceptible tissues.

Frost damage occurs in the spring when tissues deacclimate normally but are subject to cold. Newly developing buds and twigs may be killed outright by these unseasonable temperatures.

Sunscald occurs when the winter sun raises the temperature of plant cells in tree trunks facing south or southwest. These cells deacclimate and are killed at sunset or when the temperature drops. Affected bark appears discolored and sunken, later falling away to reveal dead tissue underneath. Trees most commonly affected by this type of injury include thin-barked trees such as ash, honey locust, linden, maple, oaks, and willow.

Frost cracks form on trunks as tissues beneath the bark expand and contract with fluctuations in winter temperatures. Cells in the outer bark cool at a faster rate than do the inner cells; this fluctuation causes a long, v-shaped crack to form along the trunk. Although frost cracks may callous over during the summer, they are susceptible to re-cracking the following winter. Thin-barked trees are most commonly affected.

Heavy winter snows and ice can cause limbs and tree tops to break. Japanese maples were particularly hard hit this past winter. Inherently weak limbs (those that branch at a narrowly acute angle from the trunk) are more susceptible to breakage. In saturated soils, the weight of snow and ice may heave the root system out of the ground.

Strategies to minimize winter injury include:

- Select ornamental plants that exhibit medium to high tolerance to low temperatures.
- Install physical barriers such as canvas, burlap, or wood slats on the exposed sides to reduce winter desiccation.
- Apply sufficient moisture in the root zone before the soil freezes in the fall, and mulch the ground to retain moisture in the winter.
- Avoid late summer and early fall fertilization.
- Use antidessicants in late fall to protect conifers and broadleaf evergreens from winter drying.
- Wrap thin-barked (e.g., ash, crabapple, maple, tulip tree) or newly planted trees to prevent winter sunscald.
- Prune dead twigs and branches that serve as sites for secondary pests. Consider removing inherently weak limbs since these are more prone to breakage during winter storms and wind. Broken branches should be properly pruned back to a secondary branch or the

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trunk, making sure the branch collar remains intact. More about proper pruning is discussed at the end of this article. Winter injury predisposes plants to secondary pests. Unfortunately, symptoms of winter injury are not often evident until sometime (spring or summer) after the injury has occurred.

✔ Improper Planting

Many times trees are injured when improperly handled during planting or if planted at the wrong depth.
Symptoms due to improper planting may occur soon after planting or not until several years afterward. Correct handling and planting techniques help to ensure survival of newly planted trees.

• Depending on tree species, plant in the early spring or fall.
• Prepare the planting hole so that roots are not cramped, and prevent roots from drying out before planting.
• Whenever possible, remove plastic and burlap wrapping on balled trees during planting.
• Plant the tree at the same depth that it grew in the nursery.
• Water immediately after planting (and periodically) for two seasons to maintain a moist, but not waterlogged, soil. Ideally, trees need about 1 inch of water every 7 to 10 days.
• Stake newly planted trees only when necessary by supporting the tree with rubber-protected guy wires attached to two sturdy stakes or poles. Support wires must be removed once trees roots have become established (usually within 2 years). Guy wires that are left on trees will eventually strangle the trunk.
• Mulch soil at the base of the tree to maintain soil moisture, control weeds, and minimize mower damage. Maintain mulching to a maximum depth of 2 to 3 inches. DO NOT pile mulch "beehive style" around the base of the tree – excessive mulch restricts aeration to the roots and keeps the trunk abnormally moist.
• Do not fertilize when planting; wait until about one year after planting.

✔ Soil Compaction

Soil compaction around trees is caused by people, animals or pets, bicycles, and cars. Since compaction cuts off water and oxygen to tree roots, trees growing in such soils may decline and die. Design pedestrian and other traffic patterns to prevent soil compaction. Soils high in clay are more prone to compaction than are sandier soils.

✔ Construction

Trees, like people, are easily disturbed by changes in their surroundings. It may be several years, however, before obvious symptoms appear. Construction of buildings and roads is a major cause of tree injury and loss.

• Although trunk injury can kill trees, it is root injury during construction that is most likely to kill trees.
• Prevent damage to trees from earthmoving equipment near construction sites; consider using fencing.
• Do not place excessive fill or impervious material within the drip line of a tree. Since fill materials can cut off oxygen to plant roots, the extent of damage to roots is directly related to depth of material applied and the length of time it is allowed to remain.
• Lowering the grade during construction or removing soil can also destroy plant roots.
• Carefully design and construct trenching for cable and water lines to avoid or minimize root damage.

✔ Lawn and Garden Equipment and Chemicals

Use equipment carefully to prevent serious injury to tree trunks, branches, and roots. To prevent injuring trees accidentally with lawn mowers or weed-eaters, grass should be kept away from tree trunks. Mulches can be used as a "mower buffer."

Choose all pesticides wisely. Use all chemicals only in the precise manner described on the label. Remember that certain herbicides (weed killers) can kill trees, and many herbicides that are safe for grasses are not safe to use around trees. Check the pesticide label before applying any herbicide. Recently transplanted trees are especially susceptible to herbicide injury. Avoid excessive use of commercial fertilizer-herbicide mixtures near trees.

✔ Treating Wounds

Properly cleaned and shaped wounds help prevent tree decay. Treat wounds by removing dead and torn bark tissue, then scribe and round the edges of the wound with a sharp knife. Although wound dressings have no proven healing value, commercial asphalt-based preparations specifically for tree wounds or orange shellac can be applied to wounds as a cosmetic treatment.

✔ Improper Pruning

Pruning every 2 or 3 years helps to improve tree vigor and maintains an attractive, natural shape. Pruning is also used to removes dead or diseased branches and to remove branches near utility lines and buildings. Properly pruned trees can rapidly form callous tissue to compartmentalize injured tissues. Improper pruning,

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Winter Injury (continued from Page 10)

however, creates excessive wounding that reduces vigor and predisposes the tree to attack by diseases and insects.

• Pruning can be done any time of the year, but pruning some trees in the spring results in excessive sap flow or "bleeding" that is considered unattractive. Check with your local cooperative extension office or nursery for the best pruning time for the species in question.

• Prune living branches as close as possible to the trunk or connecting branch, without cutting the branch collar. Make a smooth cut.

• Remove broken tops and branches soon after storm damage or other injury.

• Prune diseased branches anytime during the year, but do so only during dry weather. To prevent disease spread, cut 6 to 8 inches below the affected tissue with surface sterilized pruning tools. To sterilize tools, dip them in denatured (70%) alcohol between cuts. Thoroughly wash and dry tools after use.

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More Announcements

Bayer Crop Science received the first registration worldwide for its new herbicidal active ingredient indaziflam in the United States. Indaziflam will initially be available in 2011 for professional users operating in turf segment marketed under the brand name Specticle®, to be followed by planned entries into the ornamental, industrial vegetation management segments and eventually in food crops. Bayer CropScience also plans to offer do-it-yourself gardeners a range of indaziflam based products under the Bayer Advanced brand. Indaziflam belongs to the chemical class of alkylazines. The new compound controls a broad spectrum of weeds and provides excellent long-lasting efficacy at low application rates. (Source: Farm Chemicals International, 9/7/10 via Chemically Speaking, Sept. 2010).

The EPA announced registrant requests to cancel all remaining uses of the insecticide fenoxycarb (Award® fire ant bait). The registrants cited cost associated data call-in as the reason for requesting cancellation. (Source: *Federal Register*, 8/25/10 via Chemically Speaking Sept. 2010).

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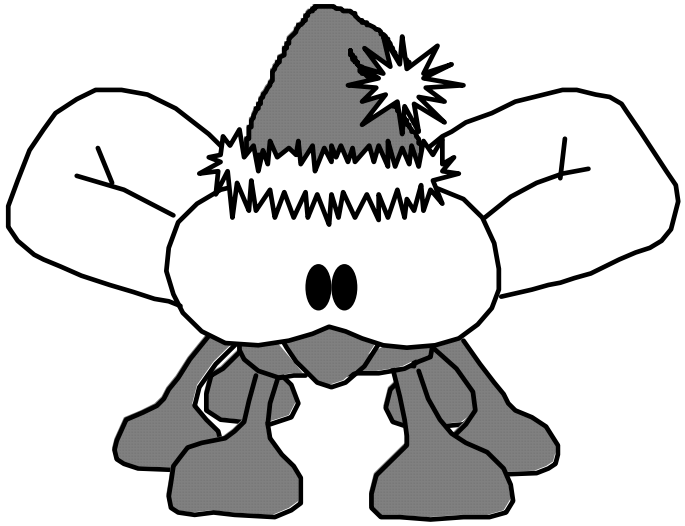

Santa Bug says
"Wishing Y'all Pest-Free Wishes for a Great Holiday Season and a Happy New Year!!!!"

Forest Pest Management Cooperative's

P.E.S.T. Newsletter

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