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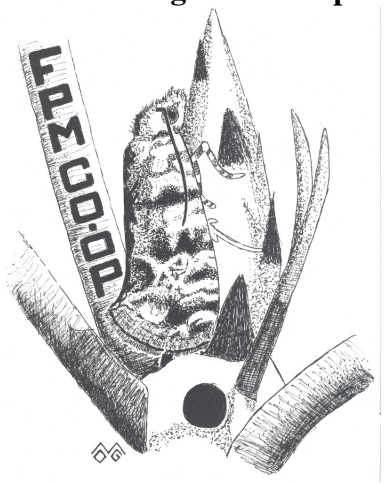
Quarterly Newsletter on Forest Pest Management Issues

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:

The Forest Pest Management Cooperative has a new website! In the past, FPMC had a small informational web page associated with the Texas Forest Service website. To make general information about the FPM Cooperative more accessible to the public and new potential members, a new website (www.FPMCoop.com) was established with HostGator (a web hosting site). In addition, the site will provide FPMC members with password-protected access to proprietary information, including accomplishment reports, proposals, newsletters, and research data. Please take a minute to visit the site. Let us know what you thing – good or bad. We hope you find it useful.

Beetle Epidemic Escalates: Applying pheromones and injecting insecticides may help prevent bark beetles from decimating trees

(Source: By Rachel Petkewich, Chemical & Engineering News, Volume 86, Number 51 pp. 36-37, December 22, 2008)

William J. Murrey says he has a difficult time convincing people standing next to a giant pine tree with beautiful green needles that the tree is actually dead. That's because although tiny mountain pine beetles can essentially kill the tree in only six weeks, it takes a year for the tree's needles to turn sickly rust red, says Murray, the scientific director for the Colorado-based nonprofit For the Forest. (http://www.fortheforest.org/)

Colorado is among the hardest hit areas in what entomologists are calling one of the largest insect infestations in North America's recorded history. Stretching from British Columbia to as far south as New Mexico, millions of acres worth of pine trees have been killed by mountain pine beetles (*Dendroctonus ponderosae*) over the past few years. The trees' deaths pose ecological, social, and economic challenges. The threat of fire ranks among the biggest concerns, particularly as the rice-grain-sized beetles migrate from trees in sparsely populated higher altitudes to forests surrounding residential neighborhoods.

This species of bark beetle is native to western North America and infests trees as part of a natural cycle. Entomologists and chemical ecologists say several factors have contributed to the insect's recent population boom, including a 10-year drought that weakened the pines' natural defenses and winters warm enough that more of the beetle larvae can now survive. In areas where mountain pine beetle numbers equate to an epidemic, many trees are already dead. Simply removing the beetle-riddled arboreal carcasses is one of the only remaining options for controlling the epidemic, scientists say. Meanwhile, researchers are studying how the

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Beetle(continued from Page 1)

combination of other forestry management techniques and chemical tools may help save remaining trees from massacre by beetles.

Dead, rust-colored lodgepole pines near Steamboat, CO., that fell victim to mountain pine beetles (Photo by William Murray/For The Forest)

Bark beetles inhabit various tree species throughout the continent, but the most devastating infestations have been by the mountain pine beetle. Its primary host is the lodgepole pine tree.

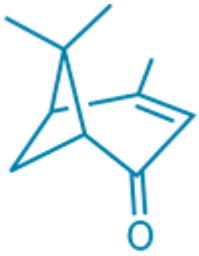
The beetles bore into the tree to mate, and they deposit eggs in the phloem, the thin layer of vascular tissue in the bark that separates it from the wood. When mountain pine beetle populations are low, healthy trees can often stop their attacks, says Kimberly F. Wallin, an entomologist at the University of Vermont. The tree's first line of defense is to "pitch out" the insect by drowning it in sap. If that tactic proves unsuccessful, the tree may then produce high levels of monoterpenes that may kill maturing beetle larvae.

Mountain pine beetles (photo by William Murray/For The Forest)

Wallin says the tree succumbs when the number of beetles attacking it overwhelms its defenses. If enough mountain pine beetles burrow into the phloem, together they can starve or dehydrate the pine tree. The beetles destroy vascular tubes that move water and nutrients through the tree. And along with their eggs, they deposit an ascomycete fungus. The fungus blocks the remaining tubes, killing the tree and leaving a telltale blue stain in the wood.

When the beetle population explodes, scientists can do little as whole forests succumb, says Steven J. Seybold, a chemical ecologist with the U.S. Department of Agriculture Forest Service's Pacific Southwest Research Station, in Davis, Calif. "The trick," he says, "is to prevent the beetles from starting in the first place." He says that prevention usually entails forward-looking forestry methods such as diversifying tree species, monitoring beetle populations, and thinning forests in advance of an outbreak. Chemical protection and control methods using pheromones and insecticides can be expensive, but may be successful at saving a few trees when beetle populations are low, he adds.

The beetles generate pheromones to communicate with each other. For example, they produce a repellent pheromone called verbenone, which is a monoterpenoid. This compound signals to other beetles that the tree is full. "Go find another tree" is the message. (This pine-wintergreen-scented chemical is also found in rosemary oil and is used by the flavor and fragrance industry.)



Verbenone

Foresters exploit the signaling chemical by scamming the insects into thinking trees already are taken. The usual method is to hang small bags of synthetic verbenone on the trees, says David Wakarchuk, president of British Columbia's Synergy Semiochemicals, which markets verbenone-based insect management products.

Verbenone is synthesized by oxidizing α-pinene, and it is registered for use as an insecticide in the U.S. and Canada, although it only repels the insects rather than kill them. A 5-inch pouch containing 7.5 g of the volatile pheromone lasts about three months, and a few pouches might be needed to protect a single tree, depending on the tree's size, Wakarchuk says. Each pouch costs about $10, so this method could, for example, prevent infestation in small acreages of high-value trees located near a home, campground, or resort, but the method is not cost-effective for the lumber industry, he says. He acknowledges that

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Beetle (continued from Page 2)

verbenone treatments become ineffective once beetle populations reach epidemic proportions in an area.

Blends of chemical messengers called semiochemicals show promise for deterring other bark beetle species from taking up residence in their preferred host trees. In Alaska, Seybold is working with colleagues to field test semiochemical cocktails that include verbenone. These mixtures not only convince northern spruce engraver beetles that a spruce tree is full, but they also mask the tree's true identity. They, in effect, make a spruce tree smell to spruce beetles like another kind of tree, one that the insects have no interest in attacking.

Like pheromones, insecticide treatments are a prophylactic measure for protecting high-value trees from invasive beetles. However, spraying insecticides can be expensive and labor intensive, can wreak environmental havoc, and may be effective for only one growing season. Active ingredients such as carbaryl, bifenthrin, or permethrin must be applied to the entire exterior of a 100-foot tree. And entomologists point out that the powerful insecticides also kill beneficial insects, put animals that eat bugs at risk, and can be a danger to people in the forest.

Entomologists are a little more optimistic about using injectable, systemic insecticides than using sprays. Insecticides applied to the surface of trees can kill adult beetles flying to and landing on the tree, but they don't affect the beetle larvae under the bark. Injecting an insecticide into the tree could reach the insecticide larvae and eliminate many of the environmental exposure problems inherent to spraying, says Donald M. Grosman, an entomologist with the Texas Forest Service.

Tree IV system applying emamectin benzoate to lodgepole pine (photo by Don Grosman)

Grosman and his colleagues have tested injection methods with formulations containing commercially available active ingredients, including abamectin, emamectin benzoate, fipronil, imidacloprid, and nemadectin. Preliminary results from a recent field test in Colorado indicate that emamectin benzoate may protect lodgepole pines from mountain pine beetles, provided the insecticide is injected into the trees several months before the beetles attack in the late summer so that the insecticide has enough time to circulate through the tree.

But killing the adult beetles and their larvae may not even be enough to keep the tree alive, Grosman says. Before the beetles die, they can introduce blue-stain fungus into the tree's phloem. A tree that had been infested with many beetles, therefore, can still succumb to the fungus even after the beetles are dead. No fungicide treatments are registered to battle the fungus, but Grosman says the injection treatment could be modified to include a fungicide component.

"The method of application is probably as critical as the choice of an active ingredient itself," says David L. Cox, an entomologist at Syngenta, which makes emamectin benzoate. He has worked with Grosman and other collaborators to develop a safe and effective product for tree injection, emphasizing that chemical solutions are just one tool in the forest management toolbox. "We cannot use one individual tool alone and be successful" in fighting bark beetles, he says.

Although new preventative chemical methods can't do anything for the large swaths of green-needled lodgepole pines now turning red in the West, research may yield more tools in time to help entomologists and foresters control the worrisome emerald ash borer, an invasive species of beetle that has started to devour its way through ash trees in the eastern U.S. and Canada.

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Duh! Don't Do It!!!

In Sargent, GA, a single-story home was set afire when the homeowner used a blow-torch to remove cobwebs from the eaves around the exterior of the house. The fire investigator responding to the fire advised against using a blow torch to rid a home of cobwebs. (Source: Newnan, GA *Times-Herald*, 11/5/08 via Potpourri in Chemically Speaking, Nov-Dec. 2008).

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Thought You Might Be Interested to Know . . .

Adjuvants

(Source: National Pesticide Applicator Certification Core Manual by P. Nixon. via Illinois Pesticide Review, Nov./Dec. 2008)

Adjuvants are chemicals that do not possess pesticidal activity. Adjuvants are either premixed in the pesticide formulation or added to the spray tank to improve mixing or application or to enhance pesticidal performance. They are used extensively in products designed for foliar applications. Adjuvants can be used to customize the formulation to specific needs and compensate for local conditions.

The right adjuvant may reduce or even eliminate spray-application problems, thereby improving overall pesticide efficacy. Because adjuvants themselves have no pesticidal properties, they are not registered by the EPA. As a result, there is no set of standards for composition and quality, although some states have modified registration requirements for these chemicals and may require labels, technical data sheets, and efficacy information.

Before using any adjuvant, consult the pesticide label. Many registered pesticide products have very specific recommendations on their labels for use with one or more adjuvants. Failure to follow these instructions is as much a violation of the product label as inappropriate use of the pesticide.

If you have questions about the specific properties of an adjuvant, contact the manufacturer before attempting to use it. Companies that produce adjuvants can provide labels, technical data sheets, MSDSs, supplemental labeling, and promotional literature about their products.

Adjuvants are designed to perform specific functions, including wetting, spreading, sticking, reducing evaporation, reducing volatilization, buffering, emulsifying, dispersing, reducing spray drift, and reducing foaming. No single adjuvant can perform all these functions, but compatible adjuvants often can be combined to perform multiple functions simultaneously.

Much of the confusion surrounding adjuvants can be attributed to the lack of understanding of associated terminology. For example, many people use the terms "adjuvant" and "surfactant" interchangeably. These terms can refer to the same product because all surfactants are adjuvants; however, not all adjuvants are surfactants.

Surfactants, also called wetting agents and spreaders, physically alter the surface tension of a spray droplet. For a pesticide to perform its function properly, a spray droplet must be able to wet the foliage and spread out evenly over a leaf. Surfactants enlarge the area of pesticide coverage, thereby increasing the pest's exposure to the chemical. Surfactants are particularly important when applying a pesticide to waxy or hairy leaves. Without proper wetting and spreading, spray droplets often run off or fail to cover leaf surfaces adequately. Too much surfactant, however, can cause excessive runoff and reduce pesticide efficacy.

Surfactants are classified by the way they ionize or split apart into electrically charged atoms or molecules called ions. A surfactant with a negative charge is anionic. One with a positive charge is cationic, and one with no electrical charge is nonionic. Pesticidal activity in the presence of a non-ionic surfactant can be quite different from activity in the presence of a cationic or anionic surfactant. Selecting the wrong surfactant can reduce the efficacy of a pesticide product and injure the target plant. Anionic surfactants are most effective when used with contact pesticides (that is, pesticides that control the pest by direct contact rather than being absorbed systemically). Cationic surfactants should never be used as stand-alone surfactants because they usually are phytotoxic.

Nonionic surfactants, often used with systemic pesticides, help pesticide sprays penetrate plant cuticles. Nonionic surfactants are compatible with most pesticides, and most EPA-registered pesticides that require a surfactant recommend a nonionic type.

A **sticker** is an adjuvant that increases the adhesion of solid particles to target surfaces. These adjuvants can decrease the amount of pesticide that washes off during irrigation or rain. Stickers also can reduce evaporation of the pesticide, and some slow down the degradation of pesticides by sunlight. Many adjuvants are formulated as spreader–stickers to make a general-purpose product.

Extenders function like stickers by retaining pesticides longer on the target area, slowing evaporation, and inhibiting degradation by sunlight.

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Adjuvants (continued from Page 6)

Plant penetrants have a molecular configuration that enhances penetration of some pesticides into plants. An adjuvant of this type may increase penetration of a pesticide on one species of plant but not another. Enhanced penetration increases the activity of some pesticides.

Compatibility agents are used when pesticides are combined with liquid fertilizers or other pesticides. Certain combinations can be physically or chemically incompatible, which causes clumps and uneven distribution in the tank. Occasionally, the incompatible mixture plugs the pump and distribution lines, resulting in expensive cleanup and repairs. A compatibility agent may eliminate these problems.

Read product label directions carefully before adding a compatibility agent to a spray mix. You may wish to do a compatibility test in a quart jar to determine the stability of the mixture. After adding the desired pesticides and the compatibility adjuvant to the jar, shake the mixture and then check for clumping, separation, thickening, and heat release. Any one of these signs indicates an incompatibility problem.

Buffers or pH modifiers increase stability of mixed pesticides. Most pesticide solutions or suspensions are stable between pH 5.5 and pH 7.0 (slightly acidic to neutral). Above pH 7.0 (alkaline or basic), the pesticide may be subject to degradation. Once a pesticide solution becomes alkaline, the risk exists for the pesticide to degrade quickly. Buffers and acidifiers are adjuvants that acidify and stabilize the water in the spray tank. Buffers must be added to the tank-mix water first. The water must be neutralized or slightly acidified prior to adding pesticides and adjuvants.

Drift-control additives, also known as deposition aids, improve on-target placement of the pesticide spray by increasing the average droplet size. Drift reduction can be very important near sensitive sites and may well be worth the small reduction in efficacy that may result from the change in droplet size.

Defoaming agents reduce or eliminate the foam or frothy "head" that some pesticide formulations create in spray tanks. This is often the result of both the type of surfactant used in the formulation and the type of spray-tank agitation system. The foam usually can he reduced or eliminated by adding a small amount of a defoaming agent.

Thickeners increase the viscosity (thickness) of spray mixtures. These adjuvants are used to control drift or slow evaporation after the spray has been deposited on the target area. Slowing evaporation is important when using systemic pesticides because they can penetrate the plant cuticle only as long as they remain in solution.

Many factors must be considered when choosing an adjuvant for use in a pest-management program. Use only adjuvants manufactured and marketed for agricultural or horticultural uses. Do not use industrial products or household detergents with pesticides because they may interfere with pesticide performance.

Remember, there are no miracle adjuvants. It is generally wise to be skeptical of such claims as "keeps spray equipment clean" or "causes better root penetration" unless the manufacturer has supporting evidence to back up such claims. Make sure the adjuvant has been thoroughly tested and proven effective for your intended use. Test questionable products on a limited area before proceeding with full-scale use.

Certain pesticides and application procedures require certain types of adjuvants. Determine the correct type and use only an adjuvant of that type. For example, do not substitute an anionic surfactant when a nonionic surfactant is recommended. A particular pesticide label may require one or more adjuvants for a certain use yet prohibit any adjuvant for another use. Read the pesticide label carefully. Using an adjuvant is not always necessary. It is just as important to know when not to use an adjuvant as it is to know when to use one.

Spray adjuvants can contribute substantially to safe and effective pest control. Many spray adjuvants are available, each formulated to solve problems associated with a particular type of application. Check pesticide and adjuvant labels to make sure adjuvants are suitable for the site you plan to spray, the target pest, your equipment, and, of course, the pesticide you plan to use.

Remember, many pesticide products already contain an adjuvant. If a pesticide is already formulated properly for your crop, using an additional wetting agent, for example, may not give better spreading or coverage; instead, it could increase runoff, reduce deposit, and even severely damage the target plants.

Oust Changes

(Source: EPA RED Document via OK Coop Ext Serv. Pesticide Reports, Dec. 2008)

EPA has completed its registration review for sulfometuron-methyl (Oust).

EPA will require chemical resistant gloves when mixing/loading and using hand held nozzles or equipment. Chemical resistant apron must be worn when mixing and loading Oust to support aerial application. Use will be prohibited in counties where the average annual rainfall is 10 inches or less. Aerial applications are required to have a 500 foot, no-spray vegetative buffer zone around surface water bodies such as rivers, lakes, streams, ponds, irrigation sources, and crops. Ground applications are prohibited within 100 feet of surface water bodies such as rivers, lakes, streams, ponds, irrigation sources, and crops.

Routes of Exposure

(Source: Information adapted from Signs and Symptoms of Pesticide Poisoning *by L. Schulze, C. Ogg, and E. Vitzthum; via Illinois Pesticide Review, Nov./Dec. 2008)*

Pesticides can enter the human body three ways: (1) by absorption through the skin or eyes **(dermally),** (2) through the mouth **(orally),** and (3) by breathing into the lungs **(inhalation).**

Dermal exposure results in absorption immediately after a pesticide contacts skin or eyes. Absorption will continue as long as the pesticide remains in contact with the skin. The *rate* at which dermal absorption occurs is different for each part of the body. The relative absorption rates are determined by comparing each respective absorption rate with the forearm absorption rate.

Relative absorption rates, compared to the forearm with an absorption rate of 1.0. It is easy to transfer pesticide residues from one part of the body to another. When this occurs, the applicator increases the potential for pesticide poisoning. For example, residues can be inadvertently moved from a hand to a sweaty forehead (4.2) or to the genital area (11.8). At this very high rate, the absorption of a pesticide is more dangerous than if it were swallowed! The speed of which it enters the body can be likened to that of direct injection by hypodermic needle into a vein.

Oral exposure may result in serious illness, severe injury, or even death if a pesticide is swallowed. Pesticides can be ingested by accident, through carelessness, or intentionally.

The most common accidental oral exposures occur when pesticides have been removed from their original containers and placed into an unlabeled bottle, jar, or food container. Children under age 10 are victims of at least half of the accidental pesticide deaths in the United States. If pesticides were managed properly, children would never touch them.

Follow these guidelines:

• Always store pesticides in their original, labeled containers.

• Never use the mouth to clear a spray hose or nozzle, or to begin siphoning a pesticide.

• Never eat, drink, or use tobacco until after leaving the work area and washing thoroughly.

Respiratory exposure is particularly hazardous because pesticide particles can be rapidly absorbed by the lungs into the bloodstream. Pesticides can cause serious damage to nose, throat, and lung tissue if inhaled in sufficient amounts. Vapors and very small particles pose the most serious risks.

Lungs can be exposed to pesticides by inhalation of powders, airborne droplets, or vapors. Handling concentrated wettable powders can pose a hazard if they are inhaled during mixing. The hazard from inhaling pesticide spray droplets is fairly low when dilute sprays are applied with low-pressure application equipment. This is because most droplets are too large to remain airborne long enough to be inhaled.

However, when high-pressure, ultra-low-volume (ULV), or fogging equipment is used, the potential for respiratory exposure is increased. The droplets produced during these operations are in the mist- or fog-size range and can be carried on air currents for a considerable distance.

Another Gypsy Moth Found at Port of Brownsville

(*Source: By Ildephonso Ortiz, Brownsville Herald, November 7, 2008*)

Brownsville, TX - U.S. Customs and Border Protection (CBP) agriculture specialists have intercepted various adult specimens and eggs of a dangerous foreign pest aboard a ship at the Port of Brownsville.

According to CBP, the discovery was made Wednesday afternoon, during an inspection of a foreign vessel that had arrived from Asia. The specimens were collected and transported to the USDA Plant Inspection Station at Los Indios for identification. The specimens were also sent to other labs for molecular testing and the results came back positive.

According to CBP spokesman Eduardo Perez, the moth is dangerous because it's foreign and it doesn't have any natural predators.

"The danger is that if they are allowed to spread they will spread and spread," Perez said.

He said that agriculture specialists working at U.S. ports of entry ensure that incoming vessels and cargo are not contaminated with pests and diseases that could harm American agricultural products.

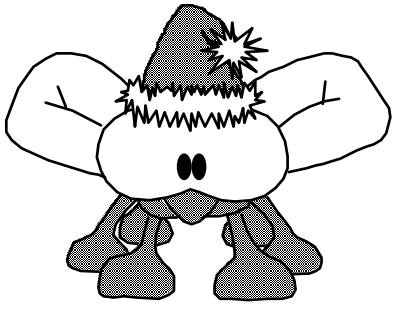
Perez said that the agricultural specialists take special precautions by treating the entire area with pesticides after removing the specimens.

This incident is the third time that the Asian gypsy moth has been found in Texas in the past year. The first interception was at the Port of Houston on Aug. 18, and the second was in Brownsville on Sept. 8.

The Asian gypsy moth is even more damaging than the more commonly found European gypsy moth because it has more diverse appetites, consuming more than 500 plant species. Also, it can fly up to 20 miles, unlike its European relative, according to *Brownsville Herald* archives.

"Protecting trees and plants is CBP agriculture specialists' primary job as the front line in the fight against the introduction of insects, pests and plant diseases into the United States," said Michael T. Freeman, port director at the CBP Port of Brownsville.

(Note: According to Joe Pase, TFS, "This has happened at other ports in other states in past years. Apparently pupae are on crates or containers that are loaded on the ships. The pupae get there because the containers have been in a location where caterpillars have been feeding on trees. When the caterpillars mature, they will seek a location to pupate and spin a cocoon. While the pupae are in the cocoon, the container will be loaded on a ship. At some point, either out in the middle of the ocean or at a port, the adult moths will emerge. Then the adults will mate and the females will lay eggs. If the eggs hatch and there is no host material around for the caterpillars to feed on (middle of the ocean, eggs not on trees, etc.), then the caterpillars all die and that is the end of the story. Fortunately, that is usually the case. However, if adults emerge after a ship arrives at a port, then the moths will mate and the females will fly off and lay eggs on a host plant. Also, adults could emerge in the hold of the ship and be trapped there until cargo is off loaded and then fly off to lay eggs. The female Asian adults are attracted to lights, so they may leave a port area and fly to a light source if conditions are right. That is when the trouble begins. The biggest difference between the Asian and the European gypsy moths (GM) is that the females of the Asian strain can fly while the European females cannot. Males of both strains can fly. I think you can see how the situation could get out of hand. From what I know, the Asian GM has not become established in the Brownsville area or Houston or anywhere else in TX.")



Santa Bug says

"Wishing Ya'll Pest-Free Wishes for a Great Holiday Season and a Happy New Year!!!!"