

Common Insect Pests of Tennessee Forests

Hemlock Woolly Adelgid

The hemlock woolly adelgid is an imported pest that threatens to destroy eastern and Carolina hemlock. It is spreading into East Tennessee at a rate of 15 to 20 miles per year.



The adelgid itself is too small to see with the naked eye, but its presence can be seen by the white woolly fluff it secretes at the base of needles. Infested trees (seedlings to mature hemlocks are susceptible) develop discolored yellow or gray-green needles, which fall off the tree; foliage becomes more and more sparse and branches dry out and die until the tree dies. Death follows infestation by two to ten years, depending on tree size and vigor and climatic conditions.

Loss of the hemlock from eastern forest ecosystems will have serious effects. Eastern hemlocks shade mountain streams and provide critical habitat for certain birds and animals.

At this point there is no effective control or prevention in forested situations. Yard trees can be sprayed at high pressure with insecticidal soap or horticultural oil. Thorough spray coverage can be attained only on trees 30 feet or less in height with a conventional hose-type applicator. The insecticide Merit can be applied as a foliar spray, as a soil drench, or injected into the tree. Merit is available for homeowners under the trade name Bayer Advanced Garden Tree and Shrub Insect Control Concentrate. The best times to spray are in spring and early summer, or in fall. Treating with either insecticidal soap, horticultural oil, or Merit involves important details too lengthy to cover here; please consult the University of Tennessee Agricultural Extension Service's bulletin SP503-G for those details.

Additional tips for maintaining hemlocks and avoiding or decreasing infestations:

- Do not disturb shallow roots;
- Keep hemlocks well watered during dry spells;
- Do not place a bird feeder in hemlocks – birds can spread the adelgid
- Remove large heavily infested trees that can act as reservoirs for uninfested trees;
- Clip and burn heavily infested branches;
- Do not change the slope of the land near hemlocks, and do not change water flow to or away from them;
- Fertilize uninfested trees lightly with a balanced fertilizer, such as 5-10-5; do not fertilize infested trees as this tends to make the infestation worse;
- When applying lime or weed killer to lawns, stay at least ten feet away from the outermost branches.

Ips Beetles (*Ips* spp.)

Ips beetles are represented by three different species that can live between the outer bark and the wood of all pine tree species found in Tennessee. *Ips* beetles often attack pines stressed by drought, lightning strikes, wind, hail, ice, and forest fire. They are almost always found in dying or recently cut pine material with the bark intact such as in weather-stressed trees and the stems and branches of treetops in logging debris.



The smallest species of *Ips* (*Ips avulsus*) can attack one limb at a time in larger pines. The two other *Ips* species (*Ips caligraphus* and *Ips grandicollis*) attack the main stem of pine.

How Do They Spread?

Ips beetles are strong fliers and can travel up to two miles to find a weakened pine. Once a stressed pine is located, the beetle releases a sex attractant that calls other beetles to the tree to mate, lay eggs of the next generation, and leave the infested tree. An entire life cycle requires three to four weeks during the growing season and longer during the dormant season.

- Pines that are planted too thickly with declining growth rates are susceptible.
- Pines that have declining growth rates because of old age (mature/overmature) can easily be infested.
- Pines with mechanically damaged trunks or root systems due to construction are susceptible as well.

Prevention and Control

- A good soaking rainfall usually reduces *Ips* infestations started by draught but, short of nature's cooperation, keep a watchful eye for yellow or red-topped pines in the area and remove them as soon as possible.
- Keep pines in an 8' x 8' spacing or greater depending on the site productivity.
- Remove treetops or stems from the site or chip on-site within three weeks of cutting or after any tree disturbance.
- Do not disturb stands in the summer when beetle populations are at their highest (unless the stands are already infested). Wait until the winter to do cutting or clearing.
- On sites where annosus root rot is known to be a problem, treat cut stumps immediately with borax.
- Use wood rail or plastic fencing barricades to keep bulldozers and other equipment away from trees in yard areas during construction.

Southern Pine Beetle (*Dendroctonus frontalis*)

The southern pine beetle, *Dendroctonus frontalis*, Zimm., is the most destructive insect killer of pines in the southeastern United States. For poorly understood reasons, this native insect periodically increases to epidemic proportions causing severe timber losses.



The beetle attacks southern yellow pines, i.e., loblolly, shortleaf, Virginia, pitch, and Table Mountain pines. Eastern white pine is occasionally attacked during an especially large build-up of the insect population.

Southern Pine Beetle Infestation in Tennessee: During 1999, 2000 and 2001, Tennessee experienced its worst recorded epidemic of southern pine beetle. Pine timber valued at \$358 million was killed on approximately 390,000 acres.

Identification: Areas of dead or dying pines with yellow or red needles are obvious indicators of a southern pine beetle infestation. Other signs to look for are pitch tubes and exit holes. Pitch tubes are masses of resin which accumulate where the adult beetle bores into a pine. Exit holes are neatly cut holes the size of a pencil lead puncture left in a tree's bark when an adult beetle emerges.

Prevention: Good forest management is the key to resisting southern pine beetle attack. Preventive actions include thinning overcrowded stands, removing slow-growing, overmature trees, removing diseased and damaged trees, and minimizing soil compaction and injuries to trees.

Control: When a southern pine beetle (SPB) spot is located, one of two methods can be used to directly control the infestation. One is cut-and-leave. The other is salvage removal.

Cut-and-leave is the simplest and least expensive control method for spots with less than 50 infested trees and where salvage will be possible in the future. The primary advantage of cut-and-leave is that SPB control can be accomplished soon after a spot is discovered.

Salvage removal is the preferred method of controlling SPB since it usually makes more money than it costs. Salvage, however, is not practical for situations in which logging costs would be greater than the value of the wood. Salvage also allows a SPB spot to grow when sale and removal take too long to arrange.

If you choose chemical control, be sure to apply insecticide to all sides of the tree up to 2/3 of the height of tree to the point of runoff as a preventative. For infested trees, fell trees and cut into 5-foot lengths, turning over logs to spray all sides to the point of runoff. *Please*

Note: Both lindane and Dursban are highly toxic to bees exposed to direct spray and to the residue on blooming crops and weeds. They are also highly toxic to fish and aquatic organisms at the recommended rates. These insecticides should not be applied where runoff from the treated area into adjacent waters is likely to occur. There is no evidence to show that lindane and Dursban will accumulate and increase in concentration through the food chain.

Dursban (44.6% active ingredient of liquid concentrate): Prepare spray by mixing 2 2/3 fluid ounces of concentrate with water to make one gallon. This mixture is equivalent to 2.0 gallons in 100 gallons of water. One application is good for two to three months. Dursban is registered for both urban and forest trees. If you do not have a local source, Cyren 4E manufactured by Cheminova is available through Forshaw Chemical at Columbus, GA (706-561-7490); Cincinnati, OH (Erick Ham, 513-489-6616); Charlotte, NC (John Sage, 704-372-6790).

Lindane (20% active ingredient of liquid concentrate): Prepare spray by mixing 3.2 ounces of concentrate to make one gallon. This mixture is equivalent to 2.5 gallons in 100 gallons of water. Lindane has an urban tree label only and may be available locally. There is no major distributor for it.

Petroy 2E is no longer labeled for SPB. There is no injection chemical proven effective for SPB.

Gypsy Moth (*Lymantria dispar*)

History: The gypsy moth defoliates hardwood forests and has weakened many acres throughout the northeastern states. It is native to Europe, Asia and northern Africa but was brought to Massachusetts from Europe in 1869. Since then, it has spread southward through the northeastern states into southwestern Virginia and is now approaching Tennessee.

Current Situation: A spreading front of gypsy moth infestation is approaching Tennessee at about seven miles per year through Virginia and could reach northeastern Tennessee by 2010. Spreading fronts are also approaching through Indiana and Ohio. Gypsy moth is detected in various parts of the state every year, and occasionally an infestation is found. The Department of Agriculture sets out traps with an attractant chemical in them across the state in order to detect moths' presence, and takes action to eradicate any infestations that are found.

Identification: There are four stages in the gypsy moth's life cycle – egg, larva, pupa, and adult.



**Egg masses ~ 25 mm. long, covered with tan hairs.
Color varies. Eggs laid in August.**



Young larvae are 3-5 mm. long



Mature larvae are 40-60mm. long



Pupae look like this



Adult female



Adult male

How They Spread: This moth spreads in three ways: (1) Crawling - females can't fly; (2) Ballooning – tiny gypsy moth caterpillars spin silk thread on which they ride to new homes, carried by wind; and (3) Hitchhiking – adult moths lay masses of eggs on trucks, cars and campers, which carry them hundreds of miles away. Moth populations can become established well ahead of the spreading front by hitchhiking.

Detection & Control: To detect these intruders, Tennessee places approximately 14,000 pheromone traps distributed on a grid pattern. If moths are caught, the area is trapped more intensively the next year. If necessary, other measures are taken such as spraying soybean oil on egg masses on individual trees and for large infestations, aerial spraying with Bt, Gypchek, and Disrupt II.

Bt is made from bacteria lethal to the gypsy moth and some other early-emerging caterpillars. Gypchek is made from viruses lethal only to gypsy moth larvae. Disrupt is a gypsy moth specific mating disrupter for the male moth. To this point, Tennessee has eliminated all new infestations and has even reduced the area sprayed annually by a substantial amount.

Everyone can help slow the spread by learning to recognize egg masses and reporting them to the TDA Division of Regulatory Services, Plant Certification Section.

Common Pests of Yellow Pine Seedlings

Pales Weevil and Pitch-Eating Weevil

Pales Weevil and the pitch-eating weevil are major threats to pine plantations. Pales weevil poses the greater problem of the two. It is about 3/8 inch long, is dark reddish brown with scattered yellow speckles, and has a distinctive curved snout and bent antennae. The larvae live in stumps and slash less than a year old. Adults, not larvae, do the damage. They emerge in early spring and chew down to the inner bark of seedlings, often below the soil line.



The weevil can be controlled by:

- Harvesting earlier than July 1. Stumps that weather over the summer are not suitable for weevil grubs. Any area cut prior to July 1 can be planted the next winter.
- Delaying planting of areas cut after July 1. Anything cut after July 1 should not be planted until the second winter. This option deprives the landowner of one year's growth, which is far more costly in the long run than control with insecticides.
- Applying insecticides. Insecticides can be applied mixed with water either as a seedling dip, sprayed at the base of seedlings, or sprayed mixed with kerosene, fuel oil, or (preferably) with basal oil on stumps.

Several insecticides are labeled for pales weevil, but Division foresters have found *Pounce* to be the most satisfactory. Seedlings treated with *Pounce*, while not advertised, may be available upon request from the Tennessee Division of Forestry for \$3.00 extra per thousand. Treated seedlings may also be available from some forest industries.

When choosing any other labeled insecticide, make sure it will not wash off easily or break down too soon. When selecting an insecticide, consult your Tennessee Division of Forestry Area Forester or Agricultural Extension Agent for advice.

Nantucket Pine Tip Moth

The Nantucket Pine Tip Moth commonly deforms trees and stunts growth by killing the tips of branches, mostly on trees less than 10 feet tall. The larvae live in the buds and middle of new twigs.

Chemical control in plantations is not practical, but cultural measures to reduce the severity of infestation include planting at a close spacing, mixing with other species, diversifying stand structure, and fertilization. Tip moths pose the greatest problem on poor sites.



Red Headed Pine Sawflies

Red Headed Pine sawflies cause partial to total defoliation. Needles may be partially consumed and turn brown, or they may be entirely consumed. The mature larvae are about an inch long, are yellow with two to four rows of black spots down each side, and have a red head. Defoliation, even complete defoliation, is seldom fatal.

Populations seldom stay at high levels for very long. Rodents and other predators, disease, parasites, and unfavorable weather serve to control the number of sawflies.

Damage is worse where trees are crowded, where there is serious hardwood competition, and on poor sites. Infestations are generally spotty, so broadcast spraying of chemicals is not necessary or practical. Physical removal and crushing of clustered caterpillars may be an option. Spot spraying can be done with acephate (Orthene), carbaryl (Sevin) or chlorpyrifos (Dursban). Insecticidal soaps are also effective if the larvae are covered with spray.

