



Kentucky Christmas Tree Production Workbook



GROWN IN

KENTUCKY

Pest Control: Insects

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Because several insects like to feed on Christmas trees, it is necessary to manage these insects to produce marketable and attractive Christmas trees. There are several ways to minimize insect problems in a Christmas tree plantation and completely avoid the need for insect pest control:

1. **Site selection** is essential to growing healthy trees. A level or slightly rolling site is easier to manage, and more accessible if spraying for pests is necessary, than a steep slope site. It is also advisable to locate near a source of water, for spraying, for irrigation, and for protection in case of fire. Avoid planting new conifer seedlings near old conifers which show symptoms of disease or insect attack.
2. **Leave wide access areas** between rows of trees about every 50-60 feet apart. Such roadways allow easy access for pest management and harvesting, as well as serving as firebreaks.
3. **Learn to recognize the typical tree symptoms** and physical characteristics of the most common insect pests in the area. Early detection of a problem means that it may be solved easily. Growers should always carry hand pruners with them while walking through or working in the plantation.
4. **Select equipment for applying insecticides** that is appropriate both for the chemical to be used and the trees to be treated. Options include a small hand duster, backpack sprayer, compressed air sprayer, mist blower, fogger, or high-pressure, high-volume hydraulic sprayer.

Some of the more common insects found causing damage to Christmas trees are discussed below. This discussion is by no means exhaustive, so, if needed, seek additional help from resource people such as your local county Extension agent for agriculture or from the USDA publication

Christmas Tree Pest Manual. This publication illustrates a wide variety of pest problems with colored photographs and gives prescriptions for management and control of each pest.

Pest management is always based on the following three steps:

1. **IDENTIFICATION** - It is always essential to know exactly what pest is causing damage to the trees. When you have the exact identification of the pest, you can read about its biology and behavior and use this information to develop a management program to minimize damage by that pest.
2. **PRESCRIPTION** - During this phase of pest management, management strategy is developed. The problem may be solved by regular shearing of the tree, changing varieties of Christmas trees used in the next production cycle, using insecticides, or some combination of all three.
3. **CONTROL** - This is the action phase of pest management. This is the step where one can apply an insecticide in some cases, take other protective action, or ignore the situation if it is minor.

Develop a Pest Management Program

Pest management requires periodic "scouting" or visual checks of the plantation to see what is going on. This can be as simple as an enjoyable evening stroll through the plantation to see whether or not problems are developing. If a certain type of pest has made an appearance, then check 30 to 50 trees at random and keep a record of the number that are infested. If a significant percentage of the

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trees are infested (and that percentage will vary with different pests), a general application of a pesticide may be needed to solve the problem. If there are only a small number of trees with the problem, it may be possible to use mechanical control or spot application of a pesticide to solve the problem.

Your pest management program depends on:

- n which pest is the problem
- n the size of the infestation (how many trees? what percentage of trees?)
- n which tools and equipment are available to use for solving this problem.

Cultural Practices

If the insect pest problems are minor, and pruning away damaged branches is enough to solve the problem, make certain that all pruned material is removed from the plantation and, preferably, burned. Also, the equipment used to prune off damaged material should be thoroughly cleaned after the work is completed. This will avoid spreading eggs of insect pests as well as spores of various disease fungi that often accompany insect pests and the damage they cause.

Common Christmas Tree Arthropod Pests

I. Sap-feeding Insects and Mites

WHAT TO LOOK FOR: The foliage may be hollowed out and off color, or it may have sticky, cottony, or powdery materials on it; foliage may be thin because of needle loss.

There are several insects and mites that feed on the sap of the tree. The following are some of the more common ones found on Christmas trees.

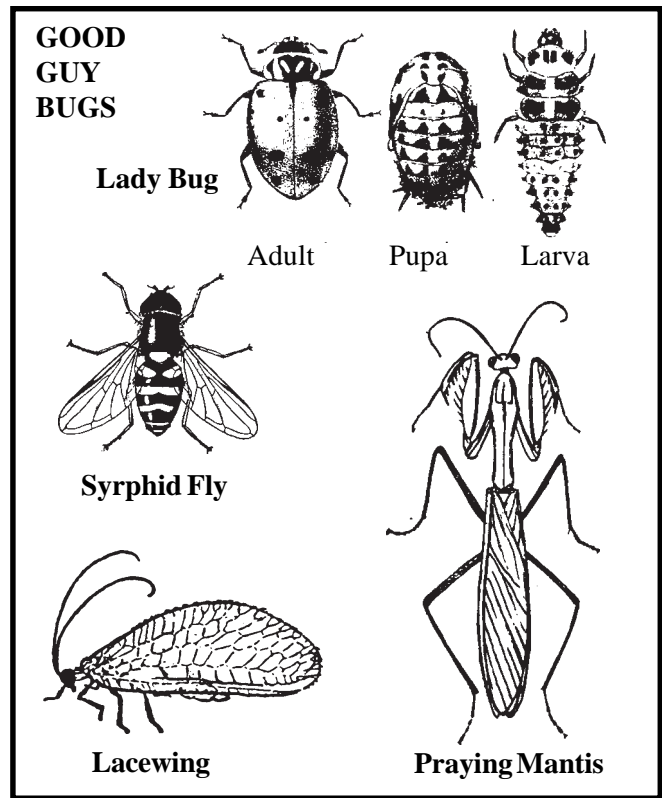
A. Aphids

WHAT TO LOOK FOR: Foliage may be sticky with “honeydew”; black sooty mold may also be on the smaller branches and needles.

DESCRIPTION: There are three common aphids found on Christmas trees:

- **White Pine Aphids** - black-and-white-checked aphids usually found on the leader of the tree.
- **Spotted Pine Aphids** - green aphids with dark spots, usually found on the needles.
- **Wooly Pine Aphids** - look for tufts of wool-like material at the **base** of the pine needles.

SCOUTING: Check 30 to 50 trees in each separate plantation and apply control measures **if more than 30% of the trees are showing discolored (yellow) needles and if aphids are present.** Be sure to check for the presence of



beneficial insects such as lady beetles and their larvae, syrphid flies, lacewings, and praying mantids when scouting (see illustrations above). If these insects are present in moderate numbers and appear to be feeding on the aphids, use of insecticides may be unnecessary. Use insecticides sparingly, if at all, when predators and parasites are present.



White Pine Aphids



Spittlebug Spittle

INSECTICIDES: Aphids can be controlled using Orthene, Guthion, Trithion, Dursban, Systox, Diazinon, Di-Syston, Thiodan, and Meta-Systox-R.

Dormant oils applied in the early spring (March) are also helpful in controlling populations of aphids that have hatched from overwintering eggs.

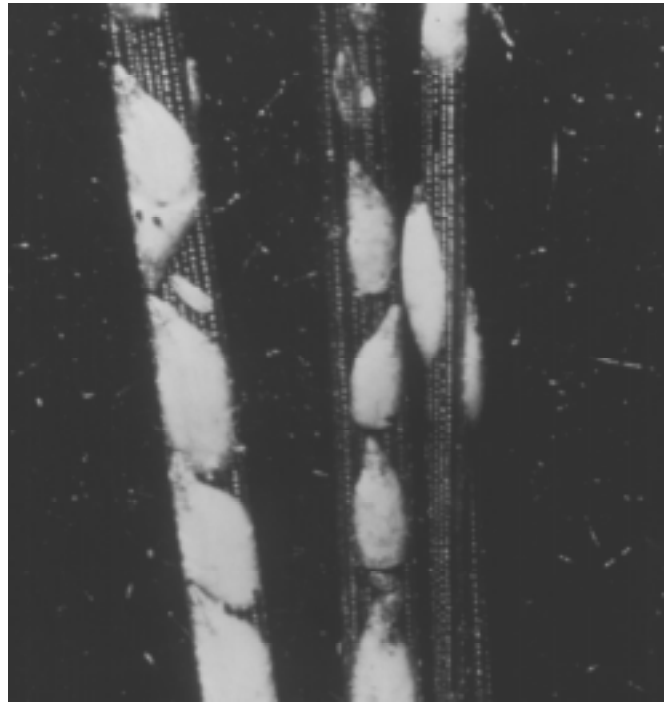
B. Pine Spittlebug

WHAT TO LOOK FOR: Something that appears to be gobs of spittle on the needles of the trees in the spring and early summer.

DESCRIPTION: Inside these foamy masses may be 4 or 5 wingless insects which are nymphs of the spittlebugs. During the summer and early fall look for oval, gray, adult spittlebugs which feed on the stems of the plant. *Diplodia* (a fungus) often infects the feeding wounds, resulting in browning and flagging of the branch tips.

SCOUTING: Look for spittle masses in the spring (April through June). **Control is warranted when the trees appear to be “flocked” with the spittle. Monitor the spittle masses on 30 to 50 trees and apply an insecticide when 95% of the masses are EMPTY.** Timing the insecticide application in this way ensures that most of the adults have emerged and provides control before adult feeding has caused severe damage.

INSECTICIDES: Pine spittlebugs can be controlled with Sevin, Malathion, or Dursban.



Pine Needle Scale

C. Pine Needle Scale

WHAT TO LOOK FOR: Foliage is pale, but not sticky. Needles may also be stunted and will be lined with 1/10 inch long, flat, white oyster-shaped scales.

DESCRIPTION: Eggs overwinter under female scales and hatch into “crawlers” in late April or early May. The crawlers wander and eventually settle down and form the hard outer coating of a scale. They mature by mid-summer and produce a second generation.

SCOUTING: Check at least 30 to 50 trees looking for the white scales attached to the needles. **Treat individual trees that have 5 to 10 scales per shoot.** Check for predatory insects (good guy bugs) described in the aphid section. Dormant oils applied in early spring (March or April) suffocate eggs and crawlers. Insecticides can also be applied during the time that lilacs are in bloom.

INSECTICIDES: Pine needle scale can be controlled with Dormant Oil, Orthene, Dursban, Diazinon, Meta-Systox-R, and Ethion.

D. Spider Mites

WHAT TO LOOK FOR: Foliage off-color (yellowish on pines, grayish on spruce). Severe infestations may have fine silk webbing on the needles.

DESCRIPTION: Spider mites are very small eight-legged creatures whose feeding causes a “bronzing” of the foliage. Heavy feeding will cause the whole tree to have a bronzed appearance. The mites spin a silken webbing from needle to needle which often has mites visible on it.

SCOUTING: Check 30 to 50 trees per plantation looking for webbing, mites, and bronzed foliage. Early morning scouting when dew is on the webbing makes it easier to see. Mites can be shaken off dry foliage onto a sheet of white paper by sharply striking a branch being held over the paper. Be especially aware of mites during dry weather.

Control can be accomplished using dormant oil sprays in March and miticide sprays in late spring and summer. There are several generations per growing season.

MITICIDES: Spider mites can be controlled with Dormant Oil, Orthene, Dursban, Systox, Di-Systox, Meta-Systox-R, Guthion, and Malathion.

II. Foliage Feeding Pests

WHAT TO LOOK FOR: Needle tips or entire needles may be chewed or only notched at the sides. There may be webbing or web nests in the foliage.

Pests that feed on the needles of the trees are especially damaging since conifers are very sensitive to defoliation. Normally, conifers carry more than one year's growth of needles; if they are completely defoliated, they will die. In addition, trees with partial needle loss are ragged-looking and unsuitable for sale.

A. Bagworms

WHAT TO LOOK FOR: Spindle-shaped sacs covered with bits of needles or other leaf, twig, or fruit material that hang down from the tips or on the outer parts of branches. The materials used are normally from the host plant and can therefore act as camouflage, making them sometimes difficult to see. These "bags" vary from 1/8 to 1 1/2 inches in length and contain a single larva.

DESCRIPTION: These small- to medium-sized caterpillars spin silken bags in which the larvae reside while feeding. The adult males emerge from the bag and are often seen mating with the females that remain in the bag in late



Sawflies

summer. Eggs are laid in the bag of the female and spend the winter there. The young larvae in their tiny bags become apparent in early June.

SCOUTING: Check 30 to 50 trees per plantation checking carefully for small bagworms in early June through July.

If 10% of the trees have five or more bags per tree, you need to treat. Lighter infestations can be controlled by picking off the "bags" by hand. Once you have removed the bags from the tree, destroy the bags by placing them in alcohol, putting them in an airtight container, smashing them, or burning them. Make sure they are also removed from the plantation.

INSECTICIDES: Bagworms can be controlled with Dipel, Thuricide, Sok BT (these products contain *Bacillus thuringiensis*, a bacterial insecticide specific to caterpillars), Orthene, Sevin, Dursban, Diazinon, and Cygon.

B. Sawflies

WHAT TO LOOK FOR: Caterpillar-like larvae, up to 2 inches in length, often in groups, can be seen near the ends of branches and/or on the terminal leader and uppermost whorl of the tree. When disturbed, they arch their bodies with their heads pointed into the air.



Bagworms



Very Small Bagworms



*Sawfly
Damage*

DESCRIPTION: The two most common sawflies found on Kentucky Christmas trees are compared in the table below:

A Comparison of European and Red-headed Sawflies

<u>CHARACTER</u>	<u>EUROPEAN</u>	<u>RED-HEADED</u>
HEAD COLOR	black	red
BODY COLOR	green with black stripes	yellow with black dots
OVERWINTERING		
STAGE	eggs in needles	pupae at base of tree
GENERATIONS/YR	one	two or three
FEEDING/DAMAGE	last year's needles	new and old growth
TIME TO SCOUT	late March - April	May - July

SCOUTING: Look for sawfly larvae feeding on shoots. If infestation is heavy and impractical to control mechanically, use a viral suspension, insecticidal soap, or an insecticide such as Orthene, Trithion, Dymet, or Malathion.

NOTE: Viral suspensions can be made by collecting dead (freshly killed) diseased sawfly larvae that are hanging head down from foliage. Place 100 to 150 of these larvae into a pint of distilled or rain water and allow to disintegrate for several months (until the following winter or spring). Strain out the big pieces of debris through fine cotton cloth or a stocking and mix 2 to 3 tsp per 6 gallons of water plus either some commercial sticker-spreader or 5 level tsp of powdered milk. Use this mixture for spraying trees shortly after larvae emerge from eggs.

III. Shoot and Branch Damaging Insects

WHAT TO LOOK FOR: Damage is confined to ends of branches, terminal shoots, or buds. Since the terminal shoot or leader of a Christmas tree is its focal point, damage of this type causes problems in producing properly shaped trees and reduces the value of affected trees.

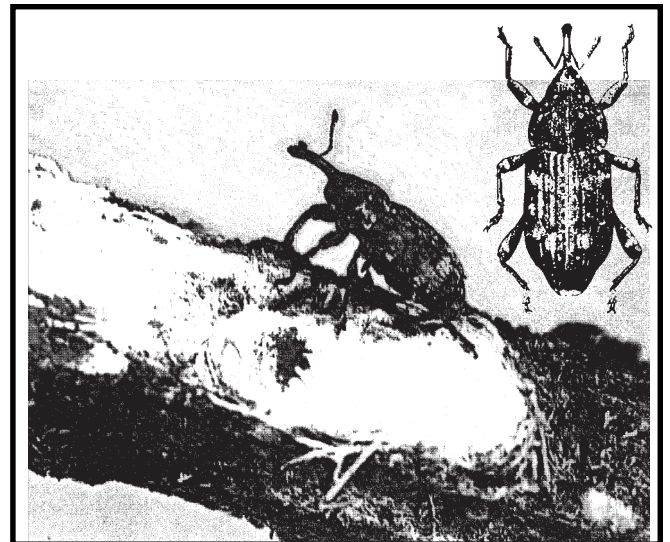
A. Nantucket Pine Tip Moth

WHAT TO LOOK FOR: The buds and shoot tips next to buds on pines are browned and hollowed out by brown to orange caterpillars up to 3/8 inch long.

DESCRIPTION: When young larvae begin feeding, they build a tiny silken, tent-like web on the expanding shoots. After feeding, the larvae burrow into the buds or terminal shoots to complete their development. This burrowing activity kills the buds or shoots; the dead and/or dying shoots can be found on any part of the tree.



Nantucket Pine Tip Moth



White Pine Weevil

SCOUTING: Pheromone traps strategically placed in the plantation can be useful in detecting the flight activity of the adult moths. Begin checking expanding shoots for the young feeding caterpillars in late April through May. Look for silken webs on the shoots. Prune damaged tips if infestation is light. If shearing and pruning are impractical, insecticides can be applied, but they will be effective only if they are applied when the larvae are exposed. Once inside the shoots, they are protected from the insecticide. **INSECTICIDES:** Nantucket pine tip moth can be controlled with sprays containing Cygon, Guthion, Trithion, Dylox, or Proxol.

B. White Pine Weevil

WHAT TO LOOK FOR: Dead or dying terminal leaders may have the shape of a “shepherd’s crook.” Weevils can affect lateral or side branches also. Yellowish-white, legless, grub-like larvae, approximately 1/3 inch long, can be found under the bark during early to mid-summer.

DESCRIPTION: The small brown weevils are seen feeding and laying eggs on the leader in early spring (March and April). Pitch flow on the leader results from this activity. In late summer these larvae pupate in wood chip cocoons that are also under the bark. In early fall the adult weevils can be seen feeding on the living terminals.

SCOUTING: Check 30 to 50 trees per plantation, examining the growing terminals in March and April. Look for adult weevils and pitch flow indicating feeding and egg-laying. **Apply control insecticides to the top of the tree when more than 10% of the trees show pitch flow; this is usually in late March or early April.** If less than this number, prune infested leaders before mid-June and burn the material you have removed to control the weevil larvae.

INSECTICIDES: Insecticides labeled for white pine weevil control include Turcam and Meta-Systox-R.

C. European Pine Shoot Moth

WHAT TO LOOK FOR: A few dead needles near the buds in late summer. There usually is a mixture of webbing, pitch, and sawdust-like frass (insect droppings) at the entrance to the burrows of the larvae. Trees become bushy and deformed.

DESCRIPTION: Brownish-black-headed caterpillars up to 5/8 inch long feed on the surface of or bore into new shoots. Infested shoots are stubby and die before the needles expand. Hardened globs of pitch are also evident where the larvae have bored into the shoots. Growth is often distorted and the tips have a multi-leadered appearance. Damage can be found all over the tree.

SCOUTING: Check trees in early April and May. Check new shoots carefully for caterpillars feeding. **Apply a**

control measure if more than 10% of the trees are infested. Light infestations can be controlled by pruning out the infested shoots. *If trees are to be harvested the same year, treat trees at any level of infestation.* Late shearing may remove most eggs and larvae on shoot tips. **INSECTICIDES:** European pine shoot moth can be controlled with insecticides such as Cygon, Guthion, Sevin, Trithion, Diazinon, or Malathion.

D. Zimmerman Pine Moth

WHAT TO LOOK FOR: An accumulation of coarse sawdust in loose webbing at bases of the top whorl of shoots in pines and Douglas-fir. Pink-green, dark-spotted caterpillars up to 3/4 inch bore inside these shoots; the shoots later turn brown and break off.

DESCRIPTION: Damage is most often recognized when the leader is discolored or broken with a pitch mass at the junction of the leader and lateral shoots. Pitch is often pink to white.

SCOUTING: Larvae overwinter in bark crevices and emerge in early spring. Inspect plantation regularly throughout the growing season. Look for pitch masses and prune out occasional injured shoots. For heavily infested plantations, apply insecticides from late March to early May to control emerging caterpillars.

INSECTICIDES: Zimmerman pine moth can be controlled with Cygon, Thiodan, Dylox, or Proxol.

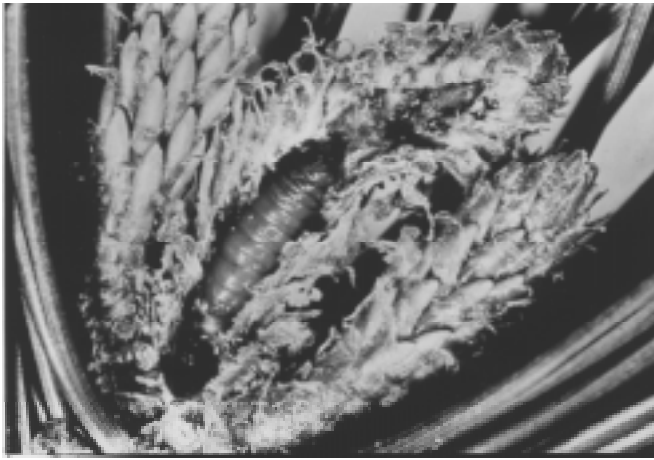
Using Insecticides

Insecticides are poisons and must be used carefully. It is important to use them only if it is necessary and to apply them in a fashion that protects the person using them. Use protective clothing, including respirators, gloves, spray suits, and hats when applying insecticides.

Read and follow label directions carefully. If something is unclear, get assistance from your county Extension Agent or from insecticide vendors.

If you wish to use insecticides that are classified as RESTRICTED-USE, contact your county agricultural Extension agent for appropriate training.





European Pine Shoot Moth



Damage of Pine Shoot Moth

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