

# White Pine Weevil Management in Christmas Tree Plantations

Christmas trees and conifers in the landscape throughout the country are susceptible to attack from white pine weevils, *Pissodes strobi* (Peck) (WPW). Susceptible species include white pines, all species of spruce, Douglas-fir, and (rarely) true firs. The white pine weevil adult is a small and rust-colored weevil about 4-6 mm (1/4 inch) long. It has irregularly shaped patches of brown and white scales on the front wings.

RICHARD S. COWLES,  
CONNECTICUT AGRICULTURAL  
EXPERIMENT STATION,  
VALLEY LAB,  
WINDSOR, CT



Like most weevils, adults have a long snout-like beak from which small antennae arise. Adults spend the winter in the leaf litter under or near host trees, or in adjacent woods. On the first warm spring days they fly or crawl to the leaders of suitable hosts, usually from mid-March through April. Most feeding by adults is done within the top 10" of the terminal leader. Adults require at least two weeks of maturation feeding before being able to lay eggs. From mid-April through early May, females mate and start laying eggs, first by feeding, then turning around and depositing one to five eggs into the wound. Hundreds of eggs may be deposited in one terminal leader. The

eggs hatch in about seven days. The larvae live and feed on phloem beneath the bark, are white and legless, with a distinct brown head capsule. When mature, the larva is approximately 7 mm long and slightly C-shaped. When the terminal is heavily infested, larvae feed side by side in a ring encircling the stem. They feed downward, girdling and killing the shoot above where they have fed. Larvae reach maturity in mid- to late July and pupate in the infested terminal. The pupal chambers, called "chip cocoons," are filled with shredded wood and can be found under the bark at this time. Adults emerge in 10 to 15 days through small circular holes at the base of the dead terminal of the host

plant, usually in late July and August. Following adult emergence there is limited feeding, which is not considered important, before they enter the leaf litter to overwinter. The WPW has one generation per year.

The first symptom of attack by the adult WPW is glistening droplets of resin on terminal leaders in late March and April. This is the result of punctures made by adults in the process of feeding and cutting egg-laying sites. This injury is usually confined to the previous year's terminal leader. Infested trees are seldom killed, but girdling of the main trunk can extend below one or even two whorls of branches. The current year's growth wilts, droops, and eventually dies. The "shepherd's crook" appearance of the terminal leader(s) becomes obvious in July. Upon the death of the terminal leader, one or more side branches (laterals) may then bend upward to take over as the terminal leader, creating a crooked stem. One management techniques is to cut out

the infested portion at the top of the tree, making sure to remove all the larvae. The extent of feeding can be observed while making successive cuts from the top of the tree, until no more signs of frass (reddish insect excrement) are found under the bark. Then, reposition a side branch to become the new leader by tying it to a remaining section of trunk or a stake. Be sure to remove all infested plant material from the field before mid-July to discard properly, to prevent larvae from completing development and emerging as an adult.

This pest can be managed efficiently with an accurately timed spray. There are multiple methods of assessing and predicting insect activity, including growing degree-days (GDD), plant phenological indicators (PPI), trapping of adult weevils, and monitoring for signs of weevil activity. For WPW, adult activity begins at about 7 GDD, with a base of 50°F, making it one of the earliest insect pests to be active in the

spring. The first signs of yellow on forsythia flower buds are an effective plant phenological indicator (PPI) for WPW spray timing, as that coincides with the start of adult activity. This is also a convenient signal to trigger a spray to manage pales weevils adults, which lay eggs on fresh pine and spruce stumps. Growers can use the same insecticide and walk through the field once to spray leaders of trees susceptible to WPW and fresh stumps to manage pales weevils. Chemical control can readily be accomplished because the adult weevil activity is so focused on the leaders. To be effective, a lethal concentration of insecticide must be applied to these leaders to kill the weevils long before they have any opportunity to lay eggs. Using a backpack sprayer with a flat fan nozzle is ideal, as the insecticide can be applied precisely where the adults will contact the residues. A long-residual, contact pyrethroid insecticide, such as bifenthrin products (e.g., Onyx Pro)



Adult white pine weevil



White pine weevil larvae are white, legless, and have brown head capsules.



The leader needs to be cut back past all signs of internal feeding to repair the leader. The piece on the right clearly shows the reddish frass indicating that the stem has to be cut back further. The cut stem on the left appears clean of damage (and larvae). Larvae remaining in the stem can kill back the side shoot that is repositioned to take the place of the damaged leader.

should be applied at the beginning of adult activity, as that spray timing will allow the longest period of interaction of the insects with the spray residues, killing the adults before egg laying starts. Growers experience excellent control by walking only one side of each row and spraying one side of the leader. I have used this method to apply 14 liters (~3.5 gal.) per acre (with 1 ml Onyx Pro per liter) by spraying only the leader down to the first whorl: the cost for chemical is about \$1.60 per acre at this high rate. Only one properly timed spray each year was necessary for complete control. Once egg laying has started, contact insecticides cannot be fully effective because larvae then are feeding in protected sites under the bark; therefore, it is better to be earlier than to be late with this spray. Forsythia bud development indicates when to spray, but the need for spraying can be based upon actual presence of the pest. This may be indicated by having had damage the previous year, knowledge

that there is a source population from the surrounding landscape, evidence of adult feeding, or from trap catches. To aid growers in scouting for WPW, designs for making pyramidal traps using an attractant mixture of alcohol and turpentine are available from Gardosik and Lehman (2005). Many other insects, including the northern pine weevil (a sister species to WPW) and pales weevils are attracted to these traps and so positive identification of WPW can be difficult.

Bifenthrin is a broad-spectrum insecticide inimical to beneficial predators and parasitoids that help maintain other pests at low populations, such as aphids and spider mites. Targeting a bifenthrin spray to foliage and stems where the weevils are active is therefore preferable to using a mist blower sprayer and broadcasting insecticide over the entire tree (and surrounding vegetation), which could then induce secondary pest outbreaks.

Furthermore, bifenthrin is highly toxic to aquatic organisms, and so applying as little as possible of this insecticide is both most cost-effective and is an environmentally sound practice. An alternative that has worked for some Christmas tree growers is Dimilin 25W, which causes eggs laid by treated females to not hatch. I am concerned that weevils ready to lay eggs may not be affected by this growth regulator quickly enough to prevent deposition of some viable eggs, which would lead to subsequent damage.

Gardosik, S. and R. Lehman. 2005. White pine weevil detection traps fact sheet. Pennsylvania Christmas trees website, Penn State University, College of Agricultural Sciences. <http://ctrees.cas.psu.edu/pdfs/whitepinewvtraps.pdf>

*Information about pesticides does not constitute an endorsement or recommendation. Be sure to read the label and to follow its directions.* 🌲



*A side shoot can be repositioned to take the place of the leader killed by white pine weevil.*



*Resin bleeding from near the top of the leader can be an indication of feeding by white pine weevil, which starts well in advance of egg laying. A properly timed spray for WPW should take place at or slightly before any feeding occurs.*



*Wilting of leaders in early July should trigger a quick response to cut out damaged leaders to dispose of the larvae within, and to tie up side shoots to take the place of these damaged leaders.*