July 2007

Forest Health Note

"STEWARDSHIP IN FORESTRY"

White Pine Weevil

"Sitka spruce weevil"
(Pissodes strobi)

Hosts:

Although called the white pine weevil, this insect infests only spruce trees in the western United States. The native hosts in Oregon are Sitka and Engelmann spruce, but ornamental spruce, particularly Colorado blue and Norway, are also very susceptible to attack.

Importance:

This pest is also referred to as the Sitka spruce weevil since it commonly kills the current and one-year-old terminal growth of this tree. Foresters have avoided planting Sitka spruce in western Oregon because repeated weevil infestations slow tree growth and produce severe stem deformations. In ornamental situations, weevil attacks result in bushy, stunted trees with low aesthetic value.

Look For:

Damage is first noticed in the summer when the spruce terminal suddenly yellows and eventually loses its needles and turns brown (Figure 1). Normally, tree dieback does not extend beyond the previous year's terminal growth.

Photo: Scott Tunnock, USDA FS, Bugwood

Figure 1: A dead spruce terminal in late summer is a strong indication of weevil infestation.

"...repeated weevil infestations slow tree growth and produce severe stem deformations."

April - June

During this period, adult weevils are present on the one-year-old terminal shoot feeding and laying eggs (Figure 2). Weevil presence is often indicated by glistening drops of resin near the tip of the tree's terminal.

July

Weevil larvae are feeding in the terminal's inner bark which interferes with the ability of the sapwood to conduct water. The new terminal growth starts to wilt and yellow (Figure 3).

August - September

Terminal shoots turn red and new adult weevils bore out of the terminal leaving emergence holes in the bark. At this stage, the bark can be easily peeled off to reveal chip cocoons, a unique characteristic of white pine weevil infestations (Figure 4).

Biology:

There is only one generation of the white pine weevil a year, but some adult

Photo: Dave Powell, USDA FS, Bugwood

Figure 2: Adult weevils are reddish-brown with patches of white and have a long, curved snout.

weevils survive for up to four years. Adults fly to new hosts in both the spring and fall of the year. The female weevil lays eggs in the one-year-old spruce terminal in May and June, and larvae feed on the tissues beneath the bark into August. During August and September a new generation of weevils emerge from the dead terminal. The adults overwinter in the duff beneath trees or on the lateral branches.

Impact On Sitka Spruce Regeneration:

White pine weevil infestations can start at stand age 3 and increase until 30-50% of the trees are attacked annually. Infestation levels decrease around stand age 20, but low levels of weevil attack (<10%) can persist beyond stand age 40. Weevils preferentially attack the fastest growing spruce and kill both current and last year's terminal growth. Trees recover when a lateral in the upper whorl turns up to become the new terminal. Repeated attacks result in bushy trees with crooks or multiple terminals (Figure 5). Weevil infestations have been estimated to reduce stand volumes by 15-40%. The amount of volume loss depends on the severity and duration of the infestation, and the length of time until harvest.

Photo: Whitney Cranshaw, CSU, Bugwood

Figure 3: Drooping new terminal and lateral shoots during June-July are an indication of weevil attack.

Control On Forest Land:

Natural

Weevil larvae and pupae are subjected to predation by insects, birds, and mammals, but natural enemies are insufficient to control damage in spruce plantations.

Site

In Oregon, weevil attacks are visible on spruce growing on headlands and close to the ocean. Dense commercial plantings of Sitka spruce within five miles of the coast appear to have good form after 20 years. Spruce grows vigorously at many fog belt locations, and this may contribute to a rapid recovery from weevil attacks.

Photo: Steve Munson, USDA FS, Bugwood

Figure 4: Bark is easily removed from dead shoots to reveal "chip cocoons."

Silvicultural

Pure spruce stands should be planted no wider than 9' x 9' spacing and not precommercially thinned until age 25. This stand prescription does not prevent weevil infestations, but does mitigate the effects of damage. Close tree spacing stimulates height growth, benefits tree form, and creates a less favorable environment for the weevil. Planting mixtures of Sitka spruce and western hemlock at high densities on sites where both species have comparative growth rates may also reduce the severity and impact of weevil infestation. Best results with high-density spruce plantings will occur at sites close to the coast or in the fog belt.

Photo: USDA FS Archives, Bugwood

Figure 5: Repeated attacks lead to bushy trees with multiple terminals.

Growing Sitka spruce under an alder overstory can reduce white pine weevil attacks, but also reduces spruce growth. This management technique is still under development and it may provide an attractive method of regenerating spruce at more inland sites.

Weevil Resistant Planting Stock

Sitka spruce seed from trees resistant to weevil damage is available from commercial sources. Tests of weevil resistant planting stock are being conducted at several locations in western Oregon. The use of weevil resistant planting stock shows promise and may be widely used in the future.

Insecticide

No insecticides are currently registered for use against white pine weevil on forestlands.

Control For Ornamental Trees:

Tree Selection

In western Oregon, ornamental varieties of white and black spruce are rarely attacked in a landscape setting.

Sanitation

Infested terminals can be cut and burned before August to prevent weevil emergence. Since some weevils survive for several years, this procedure may have to be repeated. To avoid the formation of multiple tops after a weevil attack, trim off all but one of the lateral branches in the whorl just

below the dead terminal. The one remaining lateral will turn up and become a new terminal shoot.

Insecticides

Applications of insecticide to prevent damage to ornamental trees should be made in late April or early May to the upper portion of the tree. Cyfluthrin is the only product registered for ground application to prevent weevil damage to spruce terminals.

Remember, when using pesticides, always read and follow the label.

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