

Life History and Control of Pine Root Collar Weevil in Christmas Tree Fields

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Pine root collar weevil (*Hyllobius radicus* Buchanan) is found throughout the north central and northeastern regions of the United States and in southeastern Canada. It primarily attacks Scots, red, jack, Austrian and eastern white pine.

BIOLOGY

Weevils require two years to complete their entire life cycle. They lay eggs from early May to early September on the root collar of living trees or in the soil surrounding the root collar. Each female adult will lay 10 to 70 eggs in one season. Eggs hatch in 7 to 17 days, depending on temperature. Larvae are small (up to 1 cm long) whitish grubs. Larvae burrow into the inner bark (cambium) of the root collar and large roots, and feed until the weather turns cold in autumn. During the winter, larvae are inactive and are protected from cold temperatures in galleries under the bark or in tunnels in the soil. As the soil warms in the spring, larvae resume feeding. Pupation occurs in chip cocoons made of sawdustlike frass; they are found in the soil near the root collar or, occasionally, under the bark. Adult weevils emerge in 30 to 40 days.

Adult weevils feed on the bark of live pine tree shoots until autumn, then overwinter in the litter or in bark crevices at the base of trees. Adult weevils often live and continue to feed and reproduce for two more years. Up to three overlapping generations of pine root collar weevil may occur on the same host tree. Adult weevils are not strong fliers and frequently move only a short distance to attack a new host tree.

Weevils are sensitive to light and temperature. Most adults feed during evening hours when temperatures are cool. Weevil adults spend the day resting at the base of the tree, venturing up to the canopy only on cool, overcast days. However, when

pinus are grown in shade, beneath other trees, or in dense stands, conditions are often too cool for pine root collar weevil populations to build. Trees growing in open sunlight in Christmas tree fields or young plantations are most susceptible to pine root collar weevil.



Red tree in center of photo was killed by pine root collar weevil. Yellowish tree on right is heavily infested and dying.

DAMAGE

The principal injury to trees is caused by larvae feeding below ground in the root collar, root crown and large roots. Small trees (less than 4 inches in diameter) can be killed in a single year by as few as two to five larvae. Larger trees may harbor several larvae and may be repeatedly attacked each year. Soil and bark near the root collar of infested trees becomes black and soaked with pitch. Trees are weakened at ground level and may fall over or die within one to four years of the first attack. When trees are girdled, the entire canopy fades from green to yellow to red. Larger trees that have been partially girdled have



Feeding by larvae weakens the tree at the root collar, eventually girdling and killing the tree.

low growth rates and are more susceptible to wind-throw and secondary pests.

Feeding by adult weevils girdles small shoots and branches, causing them to die and "flag" or turn red. Weevil feeding can be distinguished from other pest damage by the gnawed wounded area, often covered with pitch, located at the base of the dead shoot.

CONTROL

Cultural: Growers can take advantage of the sensitivity of adult weevils to temperature and light when developing an integrated management program for pine root collar weevil. Basal prune young trees (remove the lowest one to two whorls of branches) to allow more light to reach the root collar. Where practical, rake away litter from the base of the tree. If trees are living but show early signs of larval feeding in the root collar, or if pine root collar weevil populations are in nearby pine stands, scrape away the surface soil as well as the litter. Usually, pruning, raking or soil scraping will only need to be done once in a rotation. Avoid mulching trees in areas where pine root collar weevil is a common problem.



Black pitch oozing from the root collar is sure evidence of pine root collar weevil infestation.

Avoid mixed plantings of different pine species. Risk of pine root collar weevil damage is greater if two or more species of pine are grown together.

Weevils typically do not move far to find new host trees. If a tree is killed by pine root collar weevil, scout adjacent rows or clusters of trees for signs of infestation. Try to locate new pine Christmas tree fields 1/2 to 1 mile away from other infested fields or forest stands.

Biological: Eggs, larvae and pupae are protected under the soil and bark, so they have few natural enemies. However, a wasp parasitoid (*Bracon radialis* Shenefelt) is known to attack larvae feeding near the soil surface. Ants may feed upon eggs or young larvae. Ground beetles, spiders and rodents prey on adult weevils.

Chemical: Use a persistent registered insecticide to drench the root collar of infested trees. Research indicates that this will control parent adults hiding at the base of the tree, and newly emerging adults. Apply cover sprays in mid-May (about 300 to 350 degree days [base 50]) and again in mid-August (1200 to 1400 degree days [base 50]) to control adult weevils feeding on shoots. Check with your county Extension office for current information on registered insecticides.

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