General Facts About Conifer Root Aphids and Management Considerations

Prepared by
Bruce L. Parker, Margaret Skinner, Donald Tobi and Stephen Wanderlich
University of Vermont Entomology Research Laboratory
661 Spear Street, Burlington, VT 05405-0105
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Scientific Name: *Prociphilus americanus* (Walker). There are around 50 species in the genus *Prociphilus*, all with different primary host plants, but the same secondary host, i.e., conifers.

Fig. 2. Conifer root aphid on roots of a Fraser fir tree.

Biology. The primary host of conifer root aphid is thought to be ash trees (*Fraxinus* sp.). They are believed to reproduce sexually on this host. Root aphids at this stage form dark brown or black colonies that gather on terminal shoots causing them to become deformed and curled. They can also form on tender suckers that grow around the base of the tree. It is believed that in late April - June they fly to the secondary host—conifers. This stage moves to the roots where they feed underground, reproducing asexually over the summer until late August – October when they are believed to move back to ash trees. Though *P. americanus* is said to move to ash trees for part of its life cycle, we have yet to observe this migratory behavior in our Vermont test sites. Winged aphids were seen in the fall coming out of the soil but were not found when ash trees adjacent to the infested plantation were inspected. The literature reports that some colonies may reproduce continually on conifer roots. Therefore, removing ash from around Christmas tree plantations will not eliminate the aphid problem.

Fig. 2. Ant transporting aphid (top). Ant tunnels, infested with aphids (bottom).

Conifer root aphids feeding on the roots produce a waxy substance around them, secreting a sugary substance called honeydew. Ants feed on the honeydew, and aggressively defend the aphids from predators. The ants are likely responsible for spreading an aphid population around the plantation. They make tunnels throughout the tree root systems and can be seen carrying aphids to new locations (Fig. 3).

Tree Susceptibility. It is believed that tree species vary in their susceptibility to conifer root aphids. Nordmann fir is the least susceptible, followed by Douglas fir, Noble fir and the most susceptible being Fraser fir.

Fig. 3. Infested seedling planted adjacent to stump of old tree (bottom).

Symptoms of Infestation. The general symptoms of a conifer root aphid infestation are stunted new growth, yellowish needles, and decline and death of the leader and tips of branches. These symptoms are similar to those of nutrient deficiencies and environmental problems (flooding, drought, etc.). Therefore it is difficult to confirm that a tree is infested with conifer root aphid without digging it up and inspecting the roots, or looking for evidence of ants around the base of the tree.

Management. The best approach is to try to keep the aphids out. Therefore, the roots of seedlings should be inspected before they are planted to ensure they are free of root aphids. Infested seedlings should be discarded and if the infestation is widespread, it may be necessary to contact the supplier to ask for a new shipment.

Several commercial formulations of insect-killing fungi are registered for soil-dwelling pests or for aphids. These fungi occur naturally throughout the environment. They specifically infect insects and mites, not plants or mammals. These commercial strains are selected for their particular pathogenicity to the pest. While most are general pathogens, they do not usually negatively impact the natural enemies that contribute to reducing pest populations. Therefore insect-killing fungi are considered environmentally-friendly.

Several chemical insecticides are registered for conifer root aphids. A systemic pesticide, imidacloprid, is often used. This is a neurotoxin which acts on the central nervous system of insects. It is the most widely used insecticide in the world, and can be applied as a drench, spray, injection or granular. To minimize impact on bees, it is commonly applied as a drench to the soil. It should be noted that sometimes growers observe a secondary outbreak of spider mites following treatment. This may be caused by the negative effect of the pesticide on other non-target beneficial predators. Always read the pesticide label before making an application to ensure the dosage is correct. In addition, because of its widespread use, insect pests readily become resistant to it, so that it loses its effectiveness. If it is used, it should be included in rotation with other insecticide classes to minimize the potential for resistance to develop.

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To learn more, contact:
Bruce L. Parker or Donald Tobi, UVM Entomology Research Laboratory, 661 Spear St., Burlington, VT 05405-0105
Tel: 802-656-5440 Email: bparker@uvm.edu Website: http://www.uvm.edu/~entlab/

VERMONT USDA Northeast Region SARE Sustainable Agriculture Research & Education Program Applied Bio-nomics Ltd. The University of Vermont