CFS CANADIAN FOREST SERVICE
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PEST Notes

No: 3

Balsam Woolly Adelgid

What Is It?

The balsam woolly adelgid (once known as the balsam woolly aphid), *Adelges piceae* (Ratzeburg) (Homoptera: Adelgidae), is a tiny, sucking insect pest of true firs (*Abies* spp.). It was accidentally introduced to Canada from Europe in the early part of the 20th century. It is a major cause of balsam fir (*Abies balsamea*) mortality in North America.

Its population size is usually limited by cold temperatures (mortality increases at –20°C and is 100% at –37°C), but the mild winters of the 1990s and early 2000s have allowed the pest to increase to damaging levels in parts of Atlantic Canada. Christmas trees, nursery seedlings, ornamental trees, and stands that have undergone expensive silvicultural treatments are especially prone to damage or mortality.

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What Does It Look Like?

Female adults (there are no males) are about the size of a pinhead (about 1 mm), wingless, and covered with a white, waxy, wool-like material that they secrete. They begin to lay their eggs (usually 30–60) in early May. The eggs are pale yellow or red-brown, and are deposited around the adult's body beneath the "wool." They hatch near the end of May (in 1–2 weeks). The microscopic, brownish-orange nymphs, the only mobile stage, crawl about the tree in search of suitable places (such as crevices on the main stem, at the bases of buds and twigs, or under bud scales) to settle. They feed by inserting their mouthparts, called stylets, into the bark, and sucking nutrients from the tree. Feeding continues throughout the summer. Development from egg through three or four nymphal stages to adults takes about 14 weeks. By late summer, this generation of adelgids is laying eggs that will eventually become overwintering nymphs—the second generation. Nymphs resume feeding in May and molt three times before becoming adults. The adelgid usually has two generations per year, but three generations may be completed, depending on summer temperatures. Insects are dispersed by wind, birds, and mammals, and by the movement of young crawlers on the branches in the forest canopy. Adelgid life stages can also be spread on nursery stock and wood that still has the bark attached.

What Damage Does It Cause?

Damage can occur on either the stem or the twigs. Both types are marked by increased cell growth, a response of the host tree to chemicals injected by the insect when feeding. An attack on the stem or main branches, where the bark is covered with white, woolly threads, causes swelling in the affected areas. Needles soon start dropping, the crown turns brick red, and proper movement of water and nutrients within the tree is limited by the insect's feeding activity. The result is the formation of dense compression wood that reduces the quality of the wood fiber used in pulp and paper manufacture. A heavy infestation may kill the tree in 3 or 4 years.

A crown attack (damage to the twigs) causes shoots to swell and become distorted at the nodes; this is commonly referred to as "gout." If attacks persist, bud growth ceases, height growth slows, and the trees slowly die from the top down.

Woolly masses on the lower bole, and possibly on large branches, are the earliest sign of the insect's presence. They occur in the spring and summer. Crown gout and top kill are other signs of infestation. Landowners may observe scattered cases of light stem attack, but most damage results from gout.

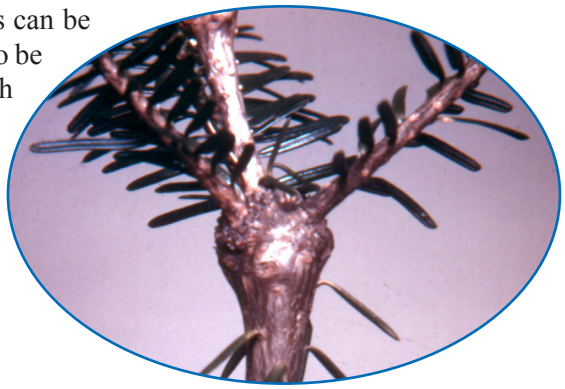
Where Is It Found?

Although current populations are low, the insect is still a threat throughout Atlantic Canada, particularly in southern New Brunswick, Nova Scotia, and Newfoundland and Labrador, which have all suffered damage in the past.

What Can We Do About It?

The adelgid can be controlled by both silvicultural and chemical methods. A combination of chemical control and salvage—cutting all balsam fir trees of merchantable size in visibly infested stands—is the most practical option. There are no known natural parasitoids of the adelgid, although some predator studies have met with limited success.

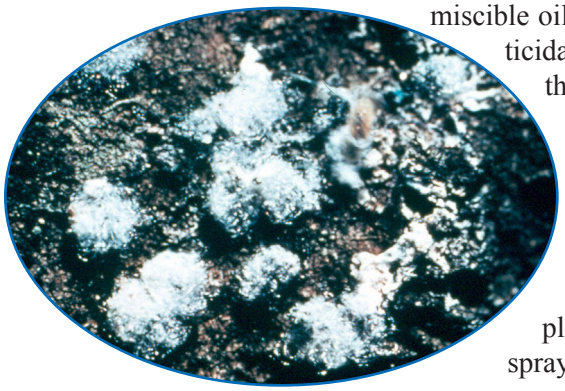
Silvicultural control



Larger trees in a stand are generally the first to be infested, and thus outbreaks can be prevented in the early stages by culling these trees. The best time to mark trees to be cut is late August or September, and it should be done by someone familiar with all stages of infestation. Cutting should be done in the winter, when the nymphs are anchored to the tree by their stylets. Overwintering nymphs can survive on winter-cut logs, but not on the tree tops, which dry out rapidly. Infested logs should be removed and used before spring. Felled slash should be burned on site to prevent future contamination. Logs should be stripped of bark before they are transported to non-infested regions. The best way to minimize losses is to salvage cut Christmas trees and natural trees near infested stands.

Chemical control

Chemical control is not easy because the wool produced by the adelgid shelters it from insecticide sprays. Early tests show that systemic insecticides can work well, but there is, as yet, no economical way of employing chemical control in natural stands or over large forested areas.



Valuable shade trees and ornamentals, however, can be protected by thoroughly spraying them with miscible oils (hydrocarbon oil containing emulsifiers) or a registered insecticide. Insecticidal soaps and chemical insecticides containing permethrin are highly toxic to the balsam woolly adelgid, and can control stem infestations and outbreaks in nursery seedlings, Christmas trees, and ornamentals. A high volume of spray mix is required for effective control. Spraying should target the nymphs in the early spring (early to late May) over a 3-week period up to bud break. If minimum winter temperatures are -32°C to -34°C or lower, infestations can be eradicated by spraying trees at their bases, where the trunk has been protected by snow. Apply dilute sprays, using hydraulic sprayers, and completely wet the foliage to obtain adequate coverage. Do not use concentrated sprays on the foliage.

The above control recommendations are based on current science (2006) and may change over time; they are provided as information only, and are not meant as an official CFS endorsement. Pesticides must be handled with care because they are poisonous to all forms of animal life, including humans. Read all labels carefully, and follow the directions for use diligently. Contact your local municipal or regional authorities to determine which products are registered for use in your area.

For additional information on this pest, please consult our website: www.atl.cfs.nrcan.gc.ca

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