

Gall Aphids and Woolly Aphids on Spruce and Hemlock, by Edward H. Holsten, Entomologist, U.S. Forest Service, Alaska Region, State and Private Forestry, and Wayne Vandre, Horticulture Specialist, Alaska Cooperative Extension, University of Alaska Fairbanks, March 1984.

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USDA Forest Service
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Juneau, Alaska 99801
Phone: (907) 586-8811

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Newly formed galls on white spruce.



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Gall Aphids and Woolly Aphids on Spruce and Hemlock

by Edward H. Holsten and Wayne Vandre

Gall aphids and woolly aphids are commonly encountered by the homeowner on ornamental spruce and hemlock. These aphids seldom become abundant enough to cause serious damage to forest stands in Alaska. Adverse climatic conditions, such as cool temperatures, as well as parasites and predators usually check aphid reproduction and population growth. Several species can, however, become quite damaging to ornamentals and young forest trees. This brochure is intended to provide the homeowner with descriptions of aphid damage and aphid life history and guidelines to help reduce damage by aphids.

Description

Gall aphids are common on white spruce in southcentral and interior Alaska. These aphids cause the tree to form conspicuous, cone-shaped galls on the twigs of spruce (cover photo). The aphids live within the protective galls for part of their life cycle. The galls are seldom abundant enough to cause serious damage to the tree. Repeated attacks by the insect, however, can result in dead twigs and a generally ragged appearance of foliage, which usually is of great concern to the homeowner. The galls are somewhat conelike in appearance and range in length from one-half to two inches. They are light green to dark purple while developing in the first year, but become reddish brown the second year after the aphids have vacated the galls.

Woolly aphids are more commonly encountered than gall aphids. During the spring and summer, woolly tufts appear on the needles and twigs of both white spruce and western hemlock. At times the aphids are so abundant that the infested branch or tree appears to be

covered with snow (Figure 1). Similar to the gall aphids, woolly aphids are of little consequence in the forest, but large populations can seriously weaken and sometimes kill ornamental trees. Aphid feeding causes a loss in plant vigor as a result of the removal of plant juices, and infested foliage becomes yellowish brown. After several infestations, the foliage may turn brown and fall from the branches.



Figure 1. Woolly aphids on white spruce.

Life History

The life history of these insects is unusual and complex. The identifications and biologies of Alaskan woolly aphids and gall aphids are not fully understood.

Woolly aphids (*Adelges tsugae* (Annand.)) on western hemlock are common throughout southcentral Alaska, but their biology in Alaska is unknown. In Canada and the Pacific Northwest however, a one-year life cycle is common for this species, which feeds only on hemlock. The young aphids are oval, $1/32$ to $1/16$ of an inch long, and yellow-brown in color. In mature stages they are dark brown to black and are covered with a white, waxy wool. This woolly material is secreted by the aphids and serves

as a protective covering. Populations of woolly aphids probably consist only of females which are able to reproduce asexually (without mating). Aphids are “coldblooded” and are quite responsive to changes in temperature. When temperatures increase in the spring and summer, large aphid populations appear in a relatively short time. As temperatures are usually higher in residential areas than in forest settings, aphid populations are usually larger in residential areas.

The life cycle and identification of woolly aphids on spruce are not fully understood in Alaska, but the insects are believed to be either the ragged spruce gall aphid (*Pineus similis* (Gill.)); eastern spruce gall aphid (*Adelges abietis* (L.)); and/or an asexual population of the Cooley spruce gall aphid (*Adelges cooleyi* (Gill.)). The life history of the ragged spruce gall aphid and the eastern spruce gall aphid is described in the following paragraph. Certain stages of these aphids produce waxy, white filaments. The Cooley spruce gall aphid normally feeds on both spruce and Douglas-fir; it produces galls on spruce and woolly tufts on Douglas-fir. The aphid must complete part of its life cycle on Douglas-fir to produce galls on spruce; however, populations of the aphid that do not cause galls live on spruce year-around and produce woolly tufts. The latter appears to be the case in Alaska where Douglas-fir is not found except as a rare ornamental.

The life history of gall aphids on spruce in Alaska is likewise not well-known. Both the ragged spruce gall aphid and the eastern spruce gall aphid attack all spruces, especially white spruce, and occur across the continent. They have no alternate hosts, and repeated attacks by the insects often result in dead twigs and a generally ragged appearance of foliage. There can be two generations of these aphids per year. At certain life stages, they produce

waxy, woolly tufts. Eggs are laid by the overwintering aphids in May. The eggs give rise to three types of aphids, two of which cause galls to form. The galls increase in size during the summer until they open, releasing the winged adults. In July these adults lay eggs which produce the new overwintering generation.

Guidelines for Reducing Aphid Damage

The suppression of woolly aphids and gall aphids is usually not warranted on forested lands. In landscape situations, where spruce and hemlock are grown as ornamentals, these aphids can be more damaging to the health of trees than in forest settings, and the homeowner may select one of the following alternatives for reducing damage by aphids.

Alternative 1: If aphid feeding is low to moderate and spruce and hemlock are vigorous and show little needle discoloration and galling, damage is minimal, and the use of pesticides is usually not warranted. These aphids are preyed upon by numerous enemies, including lady bugs, lacewings, syrphid flies, and mites. However, the following steps should be taken:

- Care should be taken to avoid damaging the trunk, injuring the roots, altering the drainage patterns, or severely compacting the soil. Make sure that trees receive adequate water throughout the growing season. Excess soil should not be placed on top of or removed from the area over the root zone. Such actions can cause water stress and/or suffocation of the trees.
- Spring fertilization helps promote tree vigor. The USDA Alaska Cooperative Extension recommends that approximately 1 pound of fertilizer per inch of tree diameter be applied by making a concentric series of holes 8 to 10 inches deep around the tree starting 2 feet from the trunk and extending a few feet

beyond the dripline (Figure 2). Any complete lawn or garden fertilizer high in phosphorus is adequate. Fertilization should begin in the spring and continue through the summer. Stop fertilization before the tree goes into fall dormancy. This feeding program may not be necessary every year. Fertilizer uptake, soil type, rainfall, weather, and grass cover all will determine the frequency of reapplication.

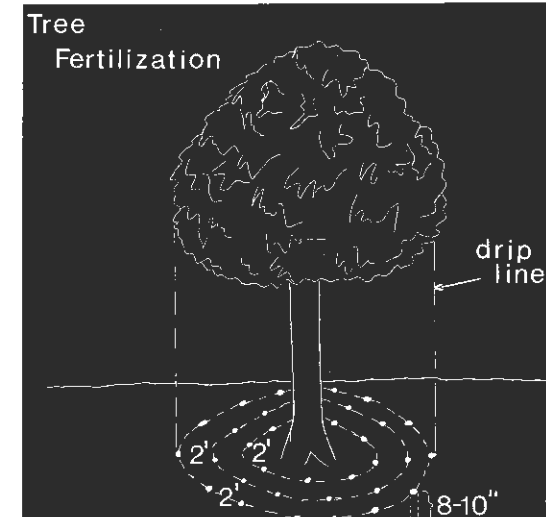


Figure 2. Location and depth of fertilization.

- If the tree is lightly infested with gall aphids, control can be effected by pruning and burning the green, closed galls in spring and early summer. Removal of brown galls is ineffective as a control because the aphids have left them. Appearance of the tree, however, is improved.

Alternative 2: If spruce and/or hemlock have large populations of woolly and/or gall aphids, chemical control may be necessary. However, these aphids can be difficult to control, and strict attention to timing of spray applications is essential. In general, chemical control is more

effective when directed at the immature stages, particularly in the spring. For control of Gall aphids, a systemic insecticide containing acephate or dimethoate can be applied as the buds begin to swell in the spring. The white Woolly aphids can be sprayed anytime. The systemic insecticides named above provide adequate control. Because of the small size of the aphids and their protective waxy, woolly cover, thorough spraying is necessary to saturate the foliage if contact insecticides, such as those containing malathion and diazinon are used. A spreader-sticker may increase the effectiveness of contact insecticides. When using insecticides, all label instructions should be followed. Contact the Alaska Cooperative Extension for recommended pesticides.