



## Cooley Spruce Gall Adelgid

The Cooley spruce gall adelgid, *Adelges cooleyi* (Gillette), is often called an aphid but it is actually a closely related group of insects. Adelgids have short antennae and no cornicles (pipe-like organs on the tip of the abdomen of aphids). This pest is found wherever its hosts are grown. It can be found across North America and it is now found worldwide where its hosts have been imported.

### Plants Attacked

Colorado spruce and Douglas-fir are the two major hosts but this adelgid occasionally causes galls on Englemann and Sitka spruces.

### Damage

On spruces, this pest forms pine cone shaped galls from the newly expanding buds. These galls eventually die, resulting in slowed growth of the spruce tree and sparsely filled in branches. Many people think that the galls are seed cones and a few galls may not warrant control. Heavily infested trees produce unsuitable growth and need periodic protection.

### Description and Life Cycle

The Cooley spruce gall adelgid has four distinct forms which can be found on Colorado spruce. In nature, this pest also flies to Douglas fir, its alternate host, where it lives on the needles. On Colorado spruce, the most important form of this insect is the one responsible for forming the spiny galls from the expanding buds.

On spruce, the adelgid overwinters as an immature female (the fundatrix) attached to branches at the base of new buds. In March and April, before the buds break, these fundatrices suck out the newly flowing sap and mature. As they mature, they secrete long waxy filaments over the body in which are laid 150 to 200 eggs. By this time the spruce buds have swollen and the bud sheaths have begun to loosen. Within seven to 10 days, the eggs hatch into yellow nymphs, called gallicolae migrans, which crawl to the bases of the needles of the new bud. These needle bases have already begun to swell from the fundatrices' feeding. Usually these affected bud bases are distinctly pink or yellow in color. The gallicolae begin to suck sap from the needle bases and produce a substance which causes the needle bases to continue to expand. Eventually the needle bases swell into interlocking chambers which protect the developing nymphs. The gallicolae shed their skin three times within the gall. By late July to early August, the galls turn brown and the walls of the chambers dry, leaving openings for the adelgids to escape. The mature nymphs crawl to nearby spruce needles and molt into dark brown, winged adults which can fly to Douglas-fir. There is good evidence that some of these winged forms can also produce another generation on the spruce without traveling to the Douglas-fir. In the fall, usually September, winged forms of the adelgid (sexuparae) return to the spruce from the Douglas-fir to lay eggs for the sexual generation (sexuales). The sexuales are wingless males and females which feed at the needle bases and then move to the center of the tree to mate, lay eggs and die. By October and early November, these eggs hatch into the overwintering fundatrices which move to the bases of next year's buds.



## Control Hints

In the past, people were encouraged to avoid growing Colorado spruce next to Douglas-fir because of the adelgids' life cycle. We now know that the adelgid can complete its life cycle on either host and winged forms can migrate several miles in search of their alternate host. A well timed spray schedule is the best control technique or attempt to find trees which demonstrate resistance.

**Strategy 1: Cultural Control- Use Resistant Plants** - Some Colorado spruce varieties and provenances are apparently less prone to attack by this adelgid. More work is needed to identify good resistant stock. Trees in plantations which have not been regularly sprayed and do not have galls are probably resistant. These should be selected for landscape use.

**Strategy 2: Cultural/Mechanical Control - Pruning Galls** - Galls which are still green, usually before mid-July, can be picked off the trees and destroyed. This kills the adelgids still trapped within the gall. This technique is only useful where the trees have a few galls. This technique will not prohibit the formation of galls in the next season.

**Strategy 3: Chemical Control - Dormant Oil Sprays** - Dormant oil sprays have been used to control this pest. Fall sprays are applied in late October and early November while spring sprays are applied before bud swell. Great care must be taken so as not to spray actively growing trees as this will result possible burn of the new growth.

**Strategy 4: Chemical Control - Fall Insecticide Sprays** - Insecticides can be applied with good success. Apply sprays so as to thoroughly cover branches and buds.

**Strategy 5: Chemical Control - Spring Insecticide Sprays** - Insecticides should be applied in early spring, mid-April, before the fundatrices lay eggs. In order to time these sprays, look at the bases of spruce buds and as soon as the waxy filaments begin to appear, sprays should be applied. If eggs have been laid, an application of a long residual insecticide may catch the migrating nymphs.

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