

# 'ADELGIDS': The Aphid Controversy

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PINE BARK aphid, eastern spruce gall aphid, balsam woolly aphid — these and other insects in the subfamily Adelginae have been given names which include the word 'aphid.' They are not very much like true aphids but are more closely related to the grape phylloxera which devastated the French vineyards in the latter part of the nineteenth century.

Generally names, as such, are unimportant but in this case they have led to misunderstanding and resultant economic loss. Perhaps a change is in order. I propose to call them 'adelgids.'

The problem is that the physiology of the adelgids differs from that of aphids and, as a result, insecticides which are very effective in controlling aphids are often useless against adelgids. However, since they are stuck with the name and most people do not know their idiosyncrasies, many who try to combat them with aphicides are disappointed with the results. In general, organophosphate insecticides, such as malathion, are used for aphid control but are not effective against adelgids, while carbamates, such as carbaryl, are excellent for adelgid control and not very effective against most aphids. Endosulfan, a chlorinated insecticide, is an example which is effective in control of both aphids and adelgids.

The adelgids are an extremely in-

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**'ADELGIDS'** (from page 32)

interesting group of insects because of their bizarre life histories and host relationships. All of them feed exclusively on conifer bark or needles. Most of them have very complicated life cycles during which two to eight distinctly different morphological forms can occur.

Many adelgids are capable of causing gall formation and spend one phase of their cycle inside these induced plant structures. Galls are formed only on spruce and their form varies according to the species of adelgid which stimulates their production. On other hosts adelgids are free-living and are typically protected by white woolly wax which they produce.

Nearly all species of adelgids infest different host genera during certain parts of the complete life cycle. Some forms reproduce sexually and others are entirely female and produce offspring from unfertilized eggs. Each species of adelgids has specific hosts and the various forms are produced only on the appropriate host. One form serves the function of dispersal to the alternate host.

The galls formed on spruces can be aesthetically objectionable and, if

numerous, can result in disruption of the symmetry which is frequently desirable in landscape plants. The free-living forms which feed on needles cause discoloration, distortion and premature needle drop. Adelgids which feed on the tender bark of new shoots frequently cause stunting and distorted growth. Some species, such as balsam woolly aphid, severely injure trees and, if numerous, can cause tree mortality. Individual trees vary in their susceptibility to adelgid attack, some suffer repeated severe attacks and others are essentially resistant.

The two most common adelgids in ornamental plantings are Cooley spruce gall aphid (CSGA) and eastern spruce gall aphid (ESGA). Both can be found in any part of the world where their hosts occur. Discussion of their life histories will illustrate the diversity to be found in this group of insects.

CSGA induces galls on spruces, mainly Colorado blue, Sitka, and Englemann. It also feeds on the needles of Douglas-fir. The galls are terminal on new growth, green through the summer when the adelgids are active inside and then brown after the adelgids leave in late summer. There are six forms of individuals in the complete cycle of CSGA — two found only on the bark of spruce twigs, one which develops within the galls and then moves to other twigs of the same tree or flies to another spruce or to Douglas-fir, two found only on the needles of Douglas-fir and one which develops on Douglas-fir needles and then flies to spruce. One of the two forms of spruce twigs is the sexual state, the other five are all parthenogenetic. These six forms are all different in structure and habit.

ESGA is known only from Nor-

way spruce and white spruce and has only two morphological forms; one is free-living on bark twigs and the other develops withing galls which are basal on new growth and open to release the inhabitants in late summer or early autumn. These move to other branches or to other trees. Both forms of ESGA are parthenogenetic.

About 20 additional species of adelgids are known to occur in the United States. Various ones cause galls on all species of spruce and the free-living forms are found on larch, hemlock, fir and pine.

Control studies in Ohio, Maryland, Pennsylvania and Washington have shown that prevention of galls on spruce can be accomplished by a thorough application of insecticide in the autumn, sometime between the time the old galls open and the first frost. This generally gives at least six weeks leeway and can be easily scheduled.

Endosulfan at 0.5 lb. active ingredient per 100 gallons of spray or carbaryl (the only carbamate registered for CSGA and ESGA) at one lb. active ingredient per 100 gallons are most effective. The free-living forms can be controlled by the same insecticides whenever they are present. Of course, if new foliage is to be protected, insecticide application must be made before damage occurs, and should be applied shortly after bud break. Repeated applications in the same season are almost never necessary.

While these two materials have Environmental Protection Agency approval for control of adelgids, an applicator should always check local regulations, insecticide labels, and State recommendations before applying them. □



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Table 1.

Type	Material	Lb. AI/100	% reduction from untreated check
carbamate	carbaryl	1	99
phosphate	parathion	0.5	44
phosphate	malathion	1	0
systemic carbamate	aldicarb	*	100
systemic carbamate	carbofuran	1	96
systemic phosphate	monocrotophos	1	0
chlorinated	endosulfan	0.5	97

\*6 g. AI/in. d.b.h. applied to the soil.

Table 1 illustrates selected results from several experiments.