FGC Forest Genetics Council of British Columbia

Cone and Seed Insect Pest Leaflet No. 9

British Columbia Ministry of Forests and Range,
Tree Improvement Branch, Saanichton, BC

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LARCH CONE ADELGID
(*Adelges lariciatus*)

Adelges lariciatus winged adult on a spruce needle (W. Strong)

TAXONOMY:

Order: Hemiptera (true bugs)

Family: Adelgidae ("adelgids", pine and spruce aphids, gall aphids)

HOSTS: Spruces (*Picea* spp., primary hosts) and larches (*Larix* spp., secondary hosts).

DISTRIBUTION: Alberta, Saskatchewan, and adjacent areas in USA; relatively recent introduction into BC.

DAMAGE: On spruce, *A. lariciatus* causes short, pineapple shaped galls to form from vegetative and reproductive buds, damaging or destroying current and future cone sites.

Adelges lariciatus galls on spruce (W. Strong)

On larch, adelgid populations are found in association with buds and developing cones and may cause copious pitch and honeydew accumulations on cones in early summer. Although often abundant

in larch seed orchards, this adelgid does not usually have a significant impact upon larch seed production.

Western larch cones infested with *Adelges lariciatus* (R. Bennett)

Western larch cone infested with *Adelges lariciatus* (D. Manastyrski)

Healthy western larch cone (D. Manastyrski)

IMPORTANCE: *Adelges lariciatus* alternates hosts between larch and spruce, but it does not generally affect the health of its hosts. This adelgid is not usually abundant in spruce seed orchards, except where larch is grown in close proximity. Galling tends to be most prevalent on lower to mid crown branches and therefore may not be a serious problem for seed production on larger spruce trees. Heavy infestations on larch cones may result in difficulties in seed extraction due to deposits of pitch and honeydew on the cones.

LIFE HISTORY: Adelgid species usually exhibit a complex life cycle involving six generations, asexual and sexual reproduction, and host alternation between spruce and larch over two years. Sexual reproduction only occurs in one generation on spruce; all other generations are asexual.

On larch: Winged females arrive from spruce in mid summer, settle, and begin producing nymphs. Nymphs overwinter on and around dormant larch buds. In early spring, nymphs enlarge dramatically, mature into wingless females, begin egg production and become covered in waxy "wool". Eggs hatch as reproductive buds flush (May or June). Nymphs swarm onto female reproductive buds and attach to developing conelet scales. Nymphs mature and a second generation are usually produced on cones. Mature winged females exit larch cones and fly to spruce in mid-summer.

On spruce: Winged females arriving from larch cones give rise to a generation of males and females which mate and lay eggs. These develop into female nymphs, which overwinter on spruce twigs some distance away from dormant buds. In early spring, nymphs mature; their progeny migrate to expanding buds. Infested buds turn into distinctive galls with chambers containing maturing nymphs. When nymphs mature, gall cavities open to allow winged females to emerge and fly to larches.

1st photo: Gall formed by *Adelges lariciatus* cut open so that chambers are visible. 2nd photo: Nymphs visible in the chambers. (D. Manastyrski)

Description

EGG: Oval, pale yellowish-green to reddish-brown, 0.5 mm in length. Eggs occur in large numbers on and around individual females under "wool".

A female adelgid with protective woolly covering pulled back to expose the adelgid and her eggs. (D. Manastyrski)

NYMPH: There are four nymphal instars. Nymphs are oval, range in size from 0.3-0.7 mm, and are yellow to reddish-brown when young, aging to brownish-black (with cotton-like woolly wax on spruce when sessile).

Adelges lariciatus nymphs exposed (D. Manastyrski)

Adelges lariciatus nymphs prior to budburst on larch (W. Strong)

GALL: On spruce only. *Adelges lariciatus* galls are short, stubby, and pineapple-shaped, green to purple, with chambers forming at the bases of needles and containing adelgid nymphs. Galls dry, harden, and turn brown after emergence of mature adelgids from the gall chambers.

Gall from which mature adelgids have emerged (D. Manastyrski)

ADULT: Wingless forms: oval, light brown to purplish-black, covered with a white, woolly waxy covering at maturity, approximately 1 mm long. Winged forms are often larger (up to 3 mm), active, lacking wool, with wings folded roof-like over their backs.

Detection and Monitoring

Population sizes on spruce can be accurately estimated in late winter using the survey methodology developed by Ward Strong and others. Unfortunately, population size appears to have no

bearing on the number of resultant galled buds later in the spring and no economic thresholds have been established.

Control

Although heavy populations may cause seed extraction issues during cone processing, this adelgid normally has little impact on larch seed production. Population explosions of any adelgid species in seed orchards or other managed forest ecosystems may be the result of past pest management practices (adelgid populations rebound much faster than do populations of their natural enemies) or of excessive nitrogen fertilization (adelgid reproduction is markedly increased in response to addition of nitrogen). Problems with adelgids can often be avoided through careful consideration of unintended consequences of "routine" pest management and fertilization practices.

One solution to larch cone adelgid issues is to grow larch seed production trees in isolation from spruces, if possible.

To be successful, regular monitoring of adelgids on larch buds should begin in late winter (e.g. no later than March in larch seed orchards in British Columbia) before the females mature and begin egg production. If control is believed warranted, measures are best taken when a majority of eggs have hatched and the nymphs are actively migrating to new sites (buds on spruce, foliage on larch). When the foliage is dry (i.e. no dew or rain) and nymphs are active, spraying trees thoroughly to runoff with 2% insecticidal soap should provide effective control. Alternatively, apply a dormant oil spray prior to bud break (mid-late March) and hatching of eggs.

Key References

Hedlin, A.F. 1974. Cone and seed insects of British Columbia. Canadian Forestry Service, Pacific Forestry Research Centre, Victoria, BC. BC-X-90. 63 pp.

Strong, W.B. and R.G. Bennett. 2010. Sample plan for *Adelges cooleyi* (Hemiptera: Adelgidae) in spruce seed orchards. *The Canadian Entomologist* 142: 14-23.