

---

## Cone and Seed Insect Pest Leaflet No. 10

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



---

# GREEN SPRUCE APHID (*Elatobium abietinum*)

---



*Elatobium abietinum* winged adult

(D. Manastyrski)

## TAXONOMY:

Order: Hemiptera (true bugs)

Family: Aphididae (aphids)

**HOSTS:** Spruce species, especially Sitka and Engelmann (*Picea sitchensis*, *P. engelmannii*), and rarely on Douglas-fir (*Pseudotsuga menziesii*) and pines (*Pinus* spp.). Ornamental spruces are very susceptible to this insect.

**DISTRIBUTION:** Native to Western Europe, but well established in western North America throughout the range of Sitka spruce from Alaska to California. On Engelmann spruce, occurs as far inland as southeastern Arizona, in areas where winter lows do not exceed about -15 C. In BC, it occurs only in coastal areas.

**DAMAGE:** On spruce, green spruce aphid feeding occurs in late winter and early spring, prior to budburst. Aphids are concentrated on the underside of one year old or older needles, primarily in the lower third of the crown. In outbreak situations, aphids may become more evenly distributed, affecting both the leader and upper crown of the tree and causing severe defoliation. Heavy infestations may result in branch or tree mortality. Mild winters can lead to rapid growth of aphid populations.



*Elatobium abietinum* feeding damage on Sitka spruce (D. Manastyrski)

Due to the small size of individual aphids (1.0 mm to 1.5 mm), feeding is difficult to observe directly and damage is often the first indication of aphid activity. Aphid feeding damage appears as yellow patches on the needles. Needles eventually turn completely yellow and drop from the tree during spring and summer. Trees can lose a large proportion of their needles, becoming thin or bare on the inside of the canopy. Current year needles are usually undamaged. The effects of green spruce aphid on cone production have not been quantified.



*Elatobium abietinum* nymphs and wingless adult on spruce needle  
(D. Manastyrski)

Mortality of Engelmann spruce due to green spruce aphid in southeast Arizona has been as high as 10% due to the aphid alone, and up to 70% when combined with dwarf mistletoe. Western spruce dwarf mistletoe, *Arceuthobium microcarpum*, found only in Arizona and New Mexico, increases susceptibility of trees to infestation by green spruce aphid.

**IMPORTANCE:** As of 2009 in BC, *Elatobium abietinum* is a coastal problem only: all coastal spruce seed orchards are at annual risk to defoliation, growth loss, and/or mortality caused by green spruce aphid.

On the coast, plantations and ornamental, young, or stressed spruce trees are also all at risk to damage caused by green spruce aphid. **This is the only serious winter-active insect pest of spruce in coastal British Columbia.**



Sitka spruce defoliation caused by *Elatobium abietinum* (D. Manastyrski)

---

## Description

**LIFE HISTORY:** Aphids generally have complex life cycles involving sexual and asexual (parthenogenetic) reproduction and alternation of generations. North American populations of green spruce aphid are usually female-only (some males have been found in Arizona populations) and no sexual reproduction occurs. Females can be wingless (apterous) or winged (alate); the wingless morphotype predominates throughout the year.

**EGG:** No eggs are laid by North American populations of the green spruce aphid. Alate and apterous adult females bear live young.

**NYMPH:** Nymphs resemble small wingless adults. They are 0.5-1.4 mm long. Some nymphs develop wing buds – these ones will become winged adults.



Various sizes of *Elatobium abietinum* nymphs including two with wing buds (arrows). (D. Manastyrski)



Close-up of *Elatobium abietinum* nymph. Note cornicles at terminal end of the abdomen (arrow indicates cornicle) (D. Manastyrski)

**ADULT:** Small, green, oval, 1.0-1.5 mm, dull red eyes, and predominantly wingless. They have long cornicles located on the terminal end of the abdomen. In British Columbia, winged individuals appear only during the dispersal phase in early to late spring.

---

## Detection and Monitoring

Early detection of active aphid populations in mid- to late-winter is critical for management of this insect in British Columbia; warm early and mid-winter weather often leads to population outbreaks. Green spruce aphid shows distinct preferences for individual trees. Any tree suffering defoliation one year is likely to be attacked in future years.



Sitka spruce plantation trees showing healthy current year foliage and extensive defoliation from previous years caused by *Elatobium abietinum*. (D. Manastyrski)

Monitor aphids in trees each week by visually examining needles or by beating branches over white sheets (paper on a clipboard works well) beginning in late January or early February. BC seed pest management personnel estimate aphid population size by sampling 3 or more branches from the lower or mid-crown of selected survey trees using a “standard” insect beating sheet (collapsible rectangular frame supporting a white sheet approximately 24” x 32” (61 cm x 81 cm). The sheet is held horizontally underneath sample branches and branches are each lightly tapped several times with a long wooden dowel or a suitable stick. Dislodged aphids are easily seen against the white background – aphids are counted and the number divided by the number of branches beaten. An average of 25 or more aphids per branch indicates a high population and excellent potential for severe defoliation. Ten or fewer aphids per branch indicate a low population without much likelihood of defoliation. Weekly sampling will provide ample warning of sudden increases in aphid numbers and consequent shift to a higher potential for significant defoliation.

---

## Insect Stages and Monitoring Calendar

Winter-early spring winter	Summer	Autumn
Aphids are actively feeding on older needles.	Nymphs stop feeding; populations decline.	Aphids begin feeding again as nutritional status of host improves.

---

### Monitoring for *Elatobium abietinum*

---

Essential to be actively searching for the insects in mid-winter (late January-early February).

If control is warranted, insecticide must be applied prior to any needle damage being visible.

---

## Control

Weather appears to be a major regulating factor for green spruce aphid populations in British Columbia. Mild winter weather often triggers population outbreaks while cool, overcast periods will maintain populations at low levels. Spring frosts and/or sudden drops in temperature can reduce aphid numbers in late winter or early spring and reduce the amount of defoliation damage to trees.

Defoliation can be minimized through application of one of a variety of registered insecticides when population levels start to climb or before needle damage is visible. Regular monitoring in late winter and early spring is critical for success. If control is warranted, contact the British Columbia Ministry of Forests and Range cone and seed specialists or the British Columbia Ministry of Agriculture and Lands for current recommendations on chemical control of this aphid.

## Key References

- Bergvinson, D. 1988. The green spruce aphid, *Elatobium abietinum* (Homoptera: Aphididae): A review of its biology, control and status in British Columbia. B.Sc. Undergraduate thesis, Simon Fraser University, Burnaby, BC. 35 pp.
- Day, K.R., G. Halldórsson, S. Harding, and N.A. Straw, eds. 1998. The green spruce aphid in Western Europe: Ecology, status, impacts and prospects for management. Forestry Commission Technical Paper 24. Forestry Commission, Edinburgh. 105 pp.
- Harding S, H. Roulund, and H. Wellendorf. 2003. Consistency of resistance to attack by the green spruce aphid (*Elatobium abietinum* Walker) in different ontogenetic stages of Sitka spruce. *Agricultural and Forest Entomology* 5: 107-112.
- Hedlin, A.F. 1974. Cone and seed insects of British Columbia. Canadian Forest Service, Pacific Forestry Research Centre, Victoria BC. BC-X-90. 63 pp.
- Koot, H.P. 1991. Spruce Aphid. Forestry Canada. Forest Insect and Disease Survey, Forest Pest Leaflet No. 16. 4 pp.
- Lynch, A.M. 2009. Spruce aphid, *Elatobium abietinum* (Walker), life history and damage to Engelmann spruce in the Pinaleño Mountains, Arizona. In: Sanderson, H. Reed and John L. Koprowski (eds.). Last refuge of the Mt. Graham red squirrel: ecology of endangerment. Tucson: University of Arizona Press. p. 318-338.
- Ruth, D.S., G.E. Miller, and J.R. Sutherland. 1982. A guide to common insect pests and diseases in spruce seed orchards in British Columbia. Canadian Forest Service, Pacific Forest Research Centre, Victoria BC. BC-X-231. 28 pp.
- Straw NA, N.J. Fielding, G. Green, and J. Price. 2005. Defoliation and growth loss in young Sitka spruce following repeated attack by the green spruce aphid, *Elatobium abietinum* (Walker). *Forest Ecology and Management* 213: 349-368.