
Cone and Seed Insect Pest Leaflet No. 12

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



SPRUCE CONE AXIS MIDGE (*Kaltenbachiola rachiphaga*)



Preserved *Kaltenbachiola rachiphaga* adult female (W. Strong)

TAXONOMY:

Order: Diptera (true flies)

Family: Cecidomyiidae (gall and cone midges)

HOSTS: Principally Engelmann and Sitka spruce (*Picea engelmannii* and *P. sitchensis*) but also black, red, and white spruce (*P. mariana*, *P. rubens*, and *P. glauca*).

DISTRIBUTION: Widespread throughout host ranges in Alaska, Canada, and northeastern and northwestern United States.

DAMAGE: Larvae tunnel through scale tissue (usually no more than one larva per scale) and eventually into the cone axis, but do not attack seeds. Although spruce cone axis midges can be common and many larvae may occur in a single cone, impact to seed production is normally low. Some spruce orchards in the interior of British Columbia have suffered seed losses when infestation levels were high enough that affected cones dried and opened prematurely, releasing seeds before harvest. Seeds remaining in these cones are difficult to extract.



Extremely high *Kaltenbachiola rachiphaga* densities are unusual and result in scale death, premature cone opening, and loss of seeds. (W. Strong)

Generally there is no external evidence of damage, but heavy infestations result in ruffled-looking, prematurely opening cones with dried scales.

IMPORTANCE: Spruce cone axis midge is not a serious pest of conifer seed production, but has caused seed losses in some seed orchards in some years.

Description

LIFE HISTORY: One generation per year.

EGG: Whitish, oblong, 0.3 x 0.1 mm, laid at base of conelet scales at pollination time. Eggs are difficult to see without a microscope.



Kaltenbachiola rachiphaga eggs on spruce conelet (W. Strong)

LARVA: Larvae are readily visible in bases of scales or in the axes of dissected cones. Yellowish-orange, flattened, about 3 mm long, spatula lacking (only visible with a microscope), head capsule lightly sclerotized.

Young larvae enter scale tissue near an ovule, mine through the tissue, and enter the cone axis by mid-summer. Feeding ends in mid-summer and larvae spin white, papery cocoons in axis cavities where they overwinter. They are capable of extended diapause. Mature spruce cone axis midge larvae in cone axes may be misidentified as spruce seedworm caterpillars, *Cydia strobilella*. Seedworm caterpillars are also found in cone axes, but are pale yellow, up to 10 mm in length, and do not spin cocoons.



Mature *Kaltenbachiola rachiphaga* larva at the base of a cone scale (W. Strong)

PUPA: Larvae pupate in mid-spring in their paper cocoons in cone axes; adults emerge about ten days later. Young pupae are whitish, darkening as they mature. Pupae are about 2.5 mm long.



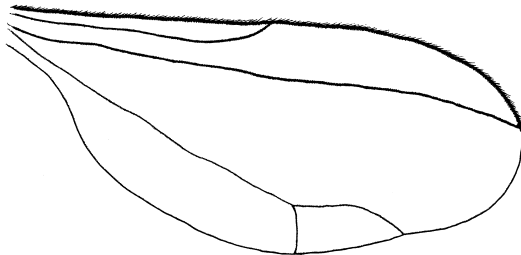
Kaltenbachiola rachiphaga overwintering larva in papery cocoon in spruce cone axis. (D. Manastyrski)

ADULT: Tiny, fragile mosquito-like fly about 4 mm long with a dark abdomen and clear wings with distinctive venation. It looks very similar to the Douglas-fir cone gall midge, *Contarinia oregonensis*, (Cone and Seed Insect Pest Leaflet No. 2), but has a dark body.

Adults emerge from pupal cocoons in old, overwintered spruce cones during the host pollination period in late spring, usually around May or June.



Preserved adult *Kaltenbachiola rachiphaga* (female left, male right)
(J. Corrigan)



A typical cecidomyiid midge wing. Note that venation is reduced to a couple of strong veins near the leading edge of the wing and a single weaker vein (split near the end) near the back edge.

Detection and Monitoring

If high populations of this insect are a consistent issue, then early spring conelet dissections should be conducted to search for eggs, similar to what is regularly done for the Douglas-fir cone gall midge, *Contarinia oregonensis*, in Douglas-fir. Population densities can also be tracked with half-cone cuts during mid-season or at harvest, to assess numbers of overwintering larvae. No action thresholds have been developed for this pest.

Insect stage calendar

Spring pollination period	Post pollination to August	September-Spring
Adults emerge from cones and mate; females oviposit at bases of conelet scales	Larvae feed on scale tissue, moving into cone axis by mid-summer where feeding ceases	Larvae overwinter in cone axis in papery cocoons; larvae pupate in late spring

Monitoring and Control of *Kaltenbachiola rachiphaga*

Survey conelets for eggs after pollination is complete	Track population densities with half-cone cuts during mid-season or at harvest, to assess numbers of overwintering larvae
If necessary, apply foliar spray of systemic insecticide at completion of pollination	Remove and destroy all non-crop cones from the seed production site to reduce numbers of overwintering larvae



Kaltenbachiola rachiphaga larvae in a spruce cone axis. (D. Manastyrski)

Management and Control

There is usually no reason to manage populations of spruce cone axis midge. Applications of dimethoate against *Cydia strobilella* or *Strobilomyia neanthracina* may reduce densities of *Kaltenbachiola rachiphaga*. If harvest time cone assessments suggest that populations are unusually high, efforts should be made to reduce the numbers of overwintering larvae. Remove and destroy all non-crop cones from the seed production site and, if crop cones are to be processed nearby, arrange to have spent cones destroyed after seed extraction. This will destroy overwintering larvae and may reduce populations to acceptable levels in the following year.

Key References

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