CONE AND SEED INSECT PEST LEAFLET NO. 2

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

DOUGLAS-FIR CONE GALL MIDGE (*Contarinia oregonensis*)

Contarinia oregonensis adult on Douglas-fir foliage

TAXONOMY:
Order (Family): Diptera (Cecidomyiidae)

HOST: Douglas-fir

DISTRIBUTION: Occurs throughout the range of Douglas-fir from central British Columbia south to north central Mexico. In BC, the cone gall midge is most common on the coast and is not usually abundant in the dry interior.

DAMAGE: Larvae develop in distinctive galls at the bases of cone scales adjacent to seeds. One cone may harbour hundreds of gall midge larvae. The exterior of the affected cone scale turns reddish brown toward the end of summer when infested with *C. oregonensis*.

Douglas-fir cone with distinctive *C. oregonensis* galls

IMPORTANCE: The Douglas-fir cone gall midge is the most destructive pest of Douglas-fir cones in coastal British Columbia. Seeds may adhere to galled scales (making seed extraction difficult) or be destroyed completely when midge populations are large. In some years, particularly when cone crops are small, almost all seeds may be destroyed.

DESCRIPTION

Life History: One generation per year. Adults emerge in early spring (April) during the Douglas-fir pollination period. After mating, the female midges lay eggs at the base of individual conelet scales.

Adult cone gall midge on Douglas-fir conelet

Egg: Whitish and translucent (about 0.3 mm x 0.1 mm), nestled in clusters in between the conelet scales. The eggs are hree to four times as big as Douglas-fir pollen grains (see photo).

Eggs are not visible to the naked eye.

Douglas-fir cone gall midge eggs and pollen grains

Larva: First instar larvae feed singly, are almost colourless and develop yellow patches and black eye spots (about 0.3 mm long). Second instars are about 1 mm long, while third instars (mature larvae) are orange (about 3 mm long) with a distinct spatula. They form swollen galls at the cone scale bases.

Mature *C. oregonensis* larvae in galled scales

Mature larvae leave the cones and drop to the ground with the onset of cold wet weather. They overwinter in the litter beneath the trees.

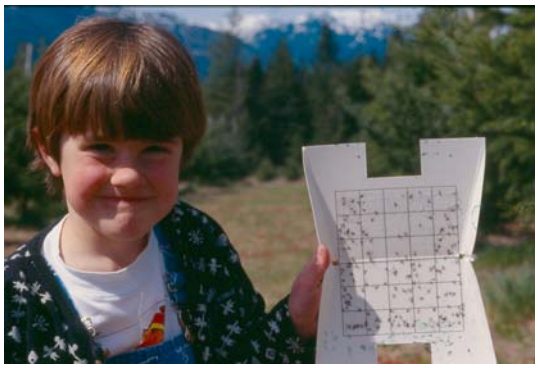
Pupa: The larvae pupate in the leaf litter often in old male pollen cones in February or early March.

Adult Douglas-fir cone gall midge stuck to a pheromone trap.

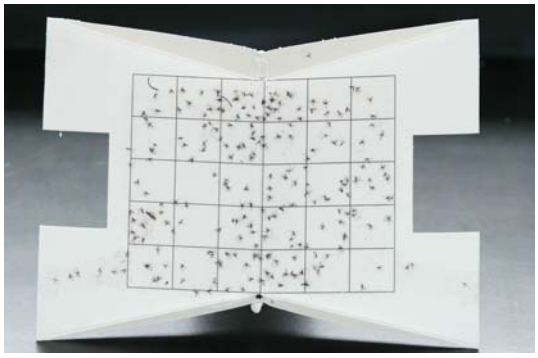
Adult: Very similar to other cone inhabiting midges. Tiny, fragile, mosquito-like fly about 3-4 mm long with clear wings and distinct venation. (**Are you going to draw the venation for this insect too?**)

DETECTION AND MONITORING

A sex pheromone based management system has been developed for the Douglas-fir cone gall midge. A female-produced male midge attractant pheromone has been isolated and synthesized. This pheromone is used as a monitoring tool to determine Douglas-fir cone gall midge population levels and whether control tactics should be employed. (**I am talking out of my hat here…..to be amended by you**)



Adult Douglas-fir cone male cone gall midges in pheromone traps



Accurate population size estimates and damage predictions can also be made by counting egg-infested scales in random samples of conelets collected during the pollination period.

Insect stage calendar to be added by me

CONTROL

When necessary, gall midge larvae can be controlled in cones through foliar or stem injection of systemic insecticides. (**Robb-more wise words need to be added here**)

Mature *C. oregonensis* larvae in galled cone scales

KEY REFERENCES

The pheromone paper

Any others?

Hedlin, A.F. 1974. Cone and seed insects of British Columbia. Canadian Forestry Service, Pac. For. Res. Cen., Victoria, BC. BC-X-90. 63 pp.

PHOTOGRAPHS: Dion Manastyrski unless otherwise noted.