

Using Douglas-fir Cone Gall Midge Pheromone Traps To Time Insecticide Applications

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Introduction

Douglas-fir cone gall midge (*Contarinia oregonensis* Foote) is considered the most significant pest of Douglas-fir seed orchards (Schowalter et al., 1985). Seed damage caused by Douglas-fir cone gall midge (DFCGM) may be substantially reduced by a properly timed application of a synthetic pyrethroid insecticide (Sandquist et al., 1993). The timing of sprays is critical so the residual life of the insecticide overlaps with the short period when DFCGM are active.

Insecticide treatments should be timed to just precede or coincide with peak emergence of adult midges in the spring. This also corresponds to the brief period when female flowers are upright and receptive to pollen (Hedlin, 1961). Ground trap data indicate that the emergence pattern for male and female midges is highly synchronous (Figs. 1 and 2). Peak emergence usually occurs five to ten days following detection of the first DFCGM individual (male or female).

The recent identification of a sex pheromone for the DFCGM means that detecting emerging male midges can be done quickly and simply using pheromone baited traps (Gries et al., 2002).

Equipment Needs

- Ten traps per orchard block are sufficient for detecting gall midge emergence. Wing traps are recommended because the two-piece design (separate top and bottom) means the top can be removed for easy viewing of the sticky surface where midges collect (Fig 3).
- One pheromone lure is required for each trap. Lures and traps are available by mail order from pest pheromone product suppliers. One common lure is a rubber septum that is placed on the sticky surface with the cup facing up. Other types of lures may require a different attachment to the trap. It is important to refrigerate lures until traps are deployed so the volatile pheromone is not lost prematurely.
- Flagging to mark trap locations is helpful.
- A hand lens, 10x or higher, is necessary to identify male midges.

Fig. 1. Cone phenology and midge emergence, Schroeder seed orchard, 1994.

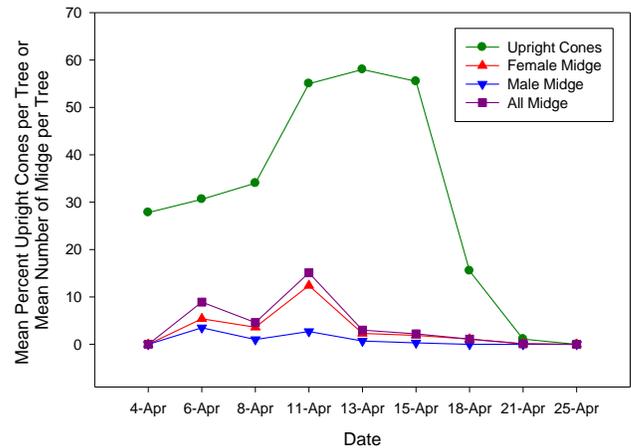


Fig. 2. Cone phenology and midge emergence, Schroeder seed orchard, 1995.

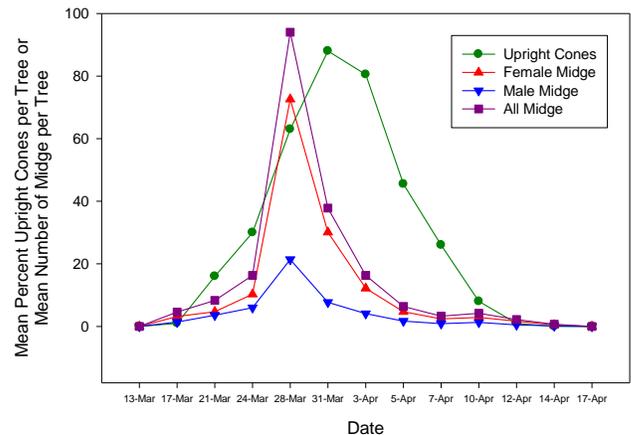


Fig. 3. Wing trap with midge bait.



Installing the Traps

Place ten traps in each treatment block one week before reproductive bud break. Timing varies by location and by year, but reproductive bud break in Douglas-fir usually occurs in late March on the floor of the Willamette Valley.

Traps may be assembled in the office or field. Just before hanging, insert lures into the traps. Traps can be placed on any branch that is easy to reach.

Traps should be deployed along a transect through the center of the treatment block. The transect should start at least one tree row in from the edge.

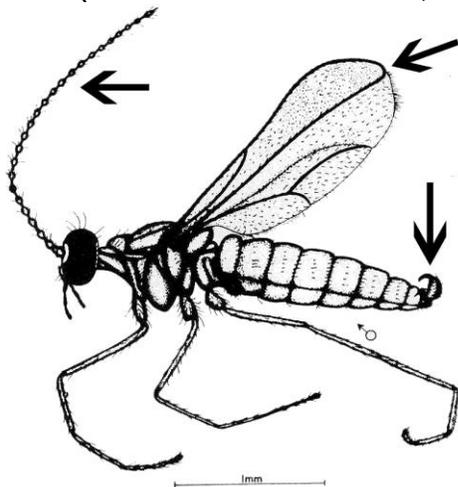
Monitoring the Traps

Inspect traps daily for capture of the first DFCEM. Other midges may be captured in the traps, so special care must be taken to correctly distinguish DFCEM from any others present. Monitoring within a treatment block may stop when the first DFCEM is detected in a trap.

Identification of Male Douglas-fir Cone Gall Midge (Fig. 4 & 5)

- Bright orange abdomen (fresh specimens).
- Long antennae (approximately as long as the body), each consisting of 24 round "beads." Each bead separated by a narrow constriction. approximately the same length as bead. Short bristles encircle each bead.
- Wings with only 3 dark veins apparent.
- Uprturned male genitalia.
- Legs much longer than body.
- Body length 2.3 to 2.8 mm.

Fig. 4. Drawing of male midge with arrows indicating diagnostic characteristics; antennae, wing veins, and male genitalia (from Johnson and Heikkinen, 1958).



Treatment Timing

Insecticide application on a treatment block should occur three to five days after detection of the first DFCEM within that block.

References Cited

Gries, R., G. Khaskin, G. Gries, R. Bennett, S. King, P. Morewood, K. Slessor, and W. Morewood. 2002. (Z,Z)-4,7-Tridecadien-(S)-2-YL Acetate: Sex pheromone of Douglas-fir cone gall midge, *Contarinia oregonensis*. J. Chem. Ecol. 28: 2283-2297.

Hedlin, A.F. 1961. The life history and habits of a midge, *Contarinia oregonensis* Foote (Diptera: Cecidomyiidae), in Douglas-fir cones. Can. Entomol. 93: 952-967.

Johnson, N.E., and H.J. Heikkinen. 1958. Damage to the seed of Douglas-fir by the Douglas-fir cone midge. Forest Science 4:274-282.

Sandquist, R., D. Overhulser, and J. Stein. 1993. Aerial applications of esfenvalerate to suppress *Contarinia oregonensis* (Diptera: Cecidomyiidae) and *Megastigmus spermotrophus* (Hymenoptera: Torymidae) in Douglas-fir seed orchards. J. Econ. Entomol. 86(2): 470-474.

Schowalter, T.D., M.I. Haverty, and T.W. Koerber. 1985. Cone and seed insects in Douglas-fir, *Pseudotsuga menziesii* (Mirb) Franco, seed orchards in the western United States: distribution and relative impact. Can. Entomol. 117:1223-1230.

Fig. 5. Male DFCEM trapped on the sticky surface of a trap. Note orange-brown color of the abdomen and characteristics illustrated in Fig. 4.



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