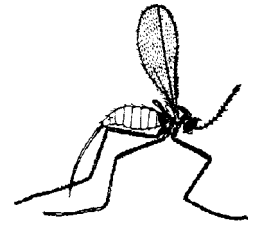


Biology and Control of Douglas-fir Needle Midge in Christmas Trees

J.D. DeAngelis



The Douglas-fir needle midge can be a very destructive pest of Douglas-fir. Infestation of new needles can be as high as 100 percent. Severe infestations can cause intolerable needle loss, and trees may take several years to recover. Needle loss is an especially serious problem in Christmas trees because of the aesthetic value of these trees.

Life cycle

Needle midge adults emerge in the spring and live only a couple of days, just long enough to mate and lay eggs. The eggs are deposited in groups on newly expanding buds. Midge eggs hatch in a couple of days, and the larvae immediately bore into young needles.

Larvae feed in the needles throughout the summer. A single needle may harbor many larvae.

When they are full grown in the fall, the larvae drop from the needles and spend the winter in the soil beneath infested trees.

Larvae pupate during March and April. Adults begin to emerge sometime between early April and early May, depending on location and weather. In cool years, emergence is delayed; in warm years, it may be as early as March. Males emerge slightly earlier than females, and emergence generally is complete 7 to 10 days after it begins in a particular locality.

Adults immediately mate and lay eggs on opening buds and new needles. Eggs hatch, and the cycle begins again; there is only one generation per year (Figure 1).

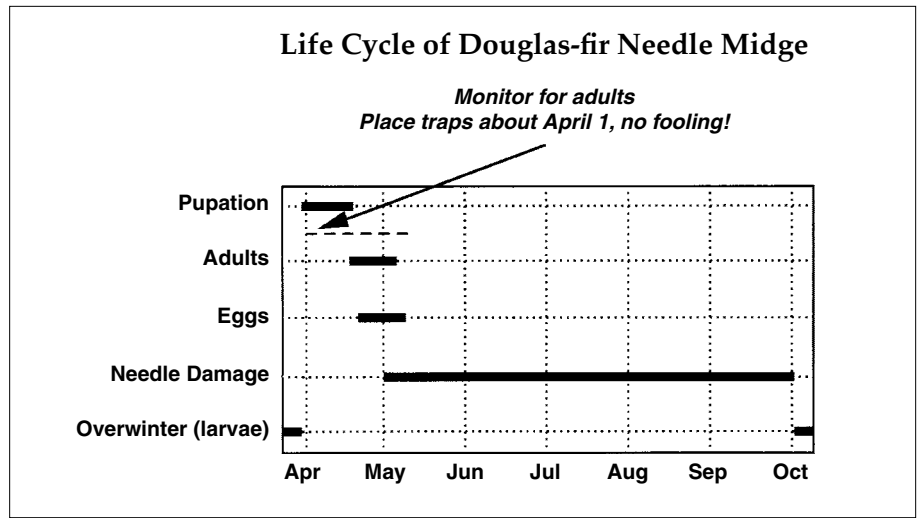


Figure 1.—Life cycle in western Oregon. Exact dates will vary year to year.

We don't know yet what causes midge outbreaks. Outbreaks occur in cycles that may "sweep" south to north. Some natural biological control does occur, as tiny parasitic wasps help regulate midge populations. These chalcid wasps attack midge larvae. The wasps emerge shortly after the adult midges and may show up in emergence traps.

Identification

Adults are small, fragile flies about 1/8 inch long. Female flies have a long ovipositor (Figure 2), which they use to insert eggs into expanding buds. The males are slightly smaller and lack an ovipositor.

Look for clouds of mating and egg laying adult midges during warm April days (60°F or warmer), when emergence and egg-laying



Figure 2.—Adult female midge.

Jack D. DeAngelis, Extension entomologist, Oregon State University.

activity peak. If you observe adults, use a hand lens to look for groups of orange eggs on young needles or between bud scales in swollen buds.

Check trees for signs of infestation in August. Infested needles usually are bent and distorted (Figure 3). They also become discolored—first yellow, and then purple to brown during the fall.

When the larvae are full grown in the fall, they are about $\frac{1}{8}$ inch long; they may be white or orange.

Cultural control

Needle midge damage is most severe on trees whose bud-break coincides with midge emergence. These are early-breaking trees in most years. Later-breaking varieties may therefore reduce midge damage, but their benefits must be balanced against other concerns; for example, late-breaking trees produce less growth during drought periods.

Chemical control

Note: The timing of applications is critical. Adult midges must encounter treated foliage before they lay eggs. You *must* use emergence traps to ensure appropriate timing. Late application of chemicals results in little or no control and can worsen midge problems by killing later-emerging parasites.

To monitor the presence of adult midges, begin placing traps by April 1. Midges begin emerging during early April in western Oregon, but emergence can vary by as many as 10 days depending on weather and exposure. *Heavy rain and cool weather will reduce or stop trap catches.* The farther north or higher in elevation you go, the later emergence occurs.

You can easily construct a trap from a cardboard box and jar (Figure 4). Use a box that is about 12 to 15 inches wide and high.

Wax-coated produce boxes are ideal; however, you can use any weather-resistant material, including sheet metal or plywood.

Turn the box upside down. Cut a hole slightly smaller than the lid of a canning jar in one of the sides near the bottom surface, which is facing up. Place a small piece of crumpled paper towel in the jar to absorb moisture. Screw the jar into the hole and secure it. Midges that emerge beneath the box fly to the light in the jar and collect there.

Place traps under the north side of an infested tree by April 1. Place at least three traps per field. Check the traps every other day until midges appear in the collecting jar.

Within a week of your first trap catch, depending on the weather, apply a control treatment if needed.

There is no threshold trap catch. Make your decision on the basis of damage during the previous year. If the weather is cold and rainy, as it often is in mid-April, delay applications until better weather arrives.

A single application at the start of emergence usually will control the midge during the current year. You might consider a second application, 2 weeks after the first, if the infestation has been severe on trees *that you plan to harvest or if the first application is closely followed by heavy rain.*

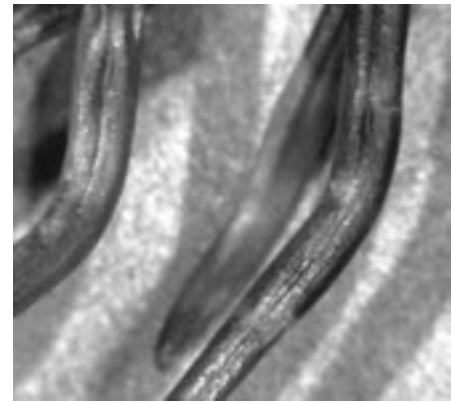


Figure 3.—Needle damage.

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
 - **Read** the pesticide label—even if you've used the pesticide before. **Follow closely** the instructions on the label (and any other directions you have).
 - **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.
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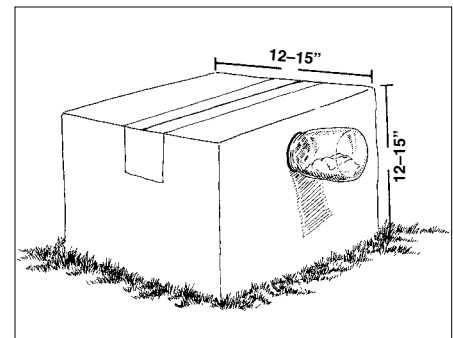


Figure 4.—Homemade midge trap. Box is 12–15 inches on a side.

Since pesticide registrations change frequently, resulting in more or fewer available pesticides and changes in permissible pesticide practices, this publication doesn't make specific pesticide recommendations. For current recommendations, refer to the *Pacific Northwest Insect Management Handbook*, published and revised annually by the Extension Services of Oregon State University, Washington State University, and the University of Idaho. In addition, detailed instructions for pesticide use are provided on pesticide container labels and in other literature provided by pesticide manufacturers.

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