

Identification and Life History

The MFF has at least four generations per season in commercial meadowfoam fields. Fly activity in February is used to determine potential for damage as well as timing for a possible insecticide spray.

Adults

Flies are about 3 mm long. Body color ranges from drab brown to gray. Eyes are red, as are those of many related species in the Drosophilidae family.



A few flies can be found in meadowfoam fields when seedlings emerge in the fall. Beginning in late January, populations increase rapidly. Three or four population peaks occur from late January through mid-June, each one indicating a new generation of flies and/or a few days of mild weather.

Flies are most active on warm, calm days. They fly at canopy level and contrast nicely with the white petals when they rest on a flower.

Water availability seems to govern adult MFF activity and population size, as flies frequently are found in parts of fields where moisture is most abundant. Few adults are seen from late June through August as fields mature and dry out.

Eggs

Eggs are laid singly anytime adults are active; the peak egg-laying period usually occurs from mid-January through April. Eggs are very small, white, and somewhat elliptical. When flower buds are

present, flies insert eggs almost exclusively into these buds. During the vegetative growth stage, however, they will lay eggs in plant leaves, stems, and crowns. Eggs hatch in 7 to 10 days.

Larvae

Larvae are light colored and about 3 mm long at maturity. Under a microscope, distinct posterior spiracles (breathing pores) are visible. These pores are light colored, raised, and tapered. Mouth hooks are distinct and dark.

The first larvae usually are detected in January in small, yellowish, distorted plants. The number of larvae increases sharply after mid-February and peaks in April. Few larvae are found in plants after bloom.

Larvae mature in 2 to 3 weeks. During the vegetative phase of meadowfoam growth, they mine leaves and stems and tunnel shallowly into plant crowns. Later, they are found almost exclusively inside developing flower buds.



Pupae

Pupae are light to dark brown. They are formed on the soil surface or on plants, usually on the undersides of leaves close to the soil. The pupal stage can be as short as 10 days or might last for months during the summer and fall.

Meadowfoam Fly

(*Scaptomyza apicalis*)

Life History, Detection, Monitoring, and Control

This pest of meadowfoam is a small fly in the family Drosophilidae. It has been identified tentatively as *Scaptomyza apicalis* Hardy. It is commonly referred to as the meadowfoam fly (MFF). It occurs throughout the Willamette Valley in most commercial plantings of meadowfoam (*Limnanthes alba*). Thus far, meadowfoam is the only known host plant for MFF.

Larval infestations cause extensive damage to plant crowns and flower buds. Stand losses and reduced seed yields have been observed in heavily infested fields.

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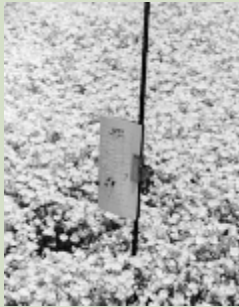


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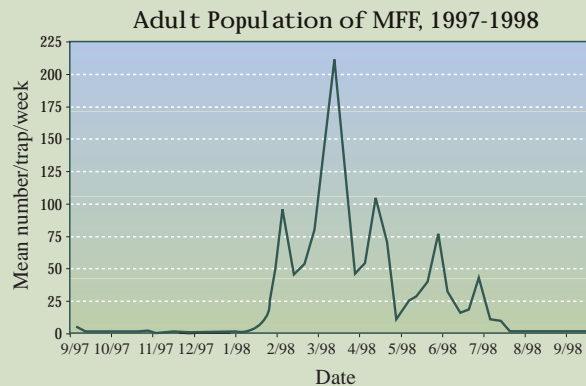
Adult flies



MFF adults are monitored with unbaited yellow sticky cards (the same kind as those used for cherry fruit flies). In mid-January, place traps within fields and near field borders. Use approximately one trap for every 3 acres. Attach each trap to a wooden stake driven into the soil. The bottom of the trap should be at canopy height (or about 12 inches above the soil surface in seedling stands) to minimize mud splash on traps.

Inspect traps weekly from mid-January to April. Count and record the number of flies. A flight peak, or increase in the number of flies caught per trap, usually is seen sometime in February and is used to determine whether to spray an insecticide (see "Control," next column). Replace traps when trash accumulates or flies no longer adhere to the trap.

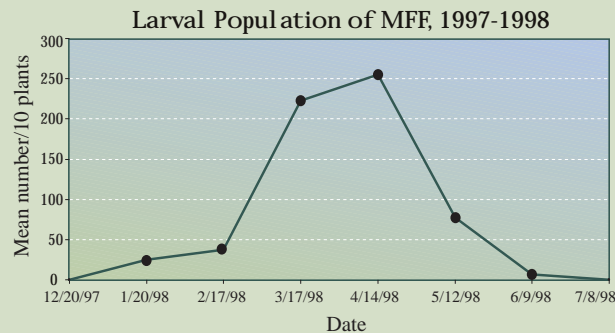
From November through March, few insects other than MFF are collected on these traps. However, you occasionally may find other small flies and flying insects. Correct identification is critical!



It's easy to collect flies from meadowfoam foliage by gently passing a lightweight aerial insect net just over the plant canopy. Best results occur on warm, still days when foliage is relatively dry. Rain, cold weather, and wind greatly reduce the number of flies caught because the flies remain inactive within the canopy in these conditions.

Larvae

Meadowfoam plants infested with MFF larvae are weak, stunted, and yellowish. Dead or dying stems may contain MFF larvae. Larvae also are found in shallow tunnels within crown tissue and in flower buds. A hand lens or microscope often is necessary to see the smaller larvae.



Berlese funnels are used to quantify larval infestations. They slowly dry plant material using a 25-watt light bulb. As the plants dry, the larvae move down the funnel and are collected in alcohol. More than 20 larvae have been collected from some meadowfoam plants in late winter using this method.

Control

Control of larval infestations in individual fields and test plots does not always increase seed yield. Replicated trials comparing seed yields from

insecticide-treated and untreated plots within commercial fields and at the Hyslop Research Farm seem to indicate benefit from a midwinter (late February) broadcast insecticide application on fields at risk of heavy infestations. This application reduces significant fly infestations and increases the potential for a boost in seed yield.

Factors affecting whether seed yield will increase following control of MFF are numerous and not well understood. They include:

- Ability of the meadowfoam plant to compensate for some larval injury
- Extent of larval infestation
- Timing of insecticide spray
- Weather during bloom
- Numbers of pollinating insects present
- Level of soil nitrogen fertility

MFF control benefits are most noticeable when conditions are good for seed set—i.e., soil nitrogen levels are not excessive, weather during bloom is conducive to honeybee activity, and sufficient bees are present to effectively pollinate all bloom.

Apply insecticide when average daily fly counts on sticky traps increase from fewer than one per trap per day to four or more per trap per day. Remember that cold, rainy, and windy weather reduces trap catches even when MFF is abundant. Don't underestimate fly populations.

To avoid making an additional pass with ground application equipment that might damage plants, apply insecticide as a tank mix with a necessary herbicide. Verify product compatibility.

Plant injury

MFF larvae destroy actively growing vegetative and reproductive plant tissues such as leaves, stems, crowns, and flower buds. Portions of fields may suffer poor seedling stands and even crop loss. Reduced seed yields can occur in heavily infested fields. However, yield also is affected by other factors such as soil nitrogen levels, weather during bloom, and pollinator numbers.



Geographical and host range

To date, MFF larvae have been collected or reared only on commercial varieties and wild populations of *Limnanthes* in Oregon and California.

MFF and/or larval injury has been found in nearly every commercial meadowfoam field in the Willamette Valley. Fields planted to meadowfoam two or three times in succession, or those next to such fields, tend to have the largest fly populations.

Although plants of the Brassicaceae family reportedly can be hosts for *S. apicalis* Hardy, none of the domesticated or weed brassicas collected in western Oregon has, to date, been infested. In laboratory studies, flies lay eggs only in or on meadowfoam even when other plants are present.