

# Lesser bulb flies on potatoes in the Pacific Northwest

by J.D. Barbour, M. Seyedbagheri, M. Thornton, J.B. Johnson, F. Merickel and J. Alvarez



**Figure 1.** Adult onion bulb fly: Note parallel white markings just behind the head on the thorax. Look also for three pairs of white markings on the abdomen. Photo by Frank Merickel



**Figure 2.** Onion bulb fly late instar larva is a gray to yellowish maggot ranging in size from 0.75 mm (1/32 inch) to 12 mm (1/2 inch) depending on its age. A red to brown breathing tube with a fleshy tubercle on either side can be seen at the end of the abdomen of larger larvae. Photo courtesy of Ken Gray Collection, Oregon State University

## Background

The onion bulb fly has been found damaging potato tubers in Pacific Northwest fields. In Idaho, most of the damage has been seen in Elmore and Owyhee Counties with some fields reporting damage in more than 10 percent of the tubers.

The onion bulb fly is one of three “lesser bulb flies” known to occur in Idaho: the lesser narcissus bulb fly, *Eumerus narcissi* Smith, the lesser bulb fly, *Eumerus tuberculatus* Rondani, and the onion bulb fly, *Eumerus strigatus* (Fallen).

The lesser bulb flies were introduced into the United States from Europe, probably on infested bulb plants. All three lesser bulb flies belong to the family of flies called the Syrphidae. They are very similar in appearance and cannot be easily distinguished in the field. Their biology and management are also similar.

Adult syrphid flies often resemble bees and wasps and are frequently seen hovering above flowers, hence the common name of hover flies or flower flies for this family. In agricultural situations, syrphid flies are usually harmless, or even beneficial: adults feed on nectar and pollen and the larvae (maggots) can be voracious feeders on aphids. The bulb flies are pests of bulb and field crops and are therefore, exceptions to that rule.

This publication provides information on the identification and biology of the lesser bulb flies along with suggestions for their cultural management in potatoes.

## Description

Adult lesser bulb flies (Fig. 1) are about the size of a housefly, 5 to 9 mm (1/5 to 3/8 inch) long. These dark blue insects have a metallic bronze sheen and appear black from a distance. Three pairs of grayish white crescents decorate the abdomen and a pair of pale stripes line the thorax (Fig. 1). The hind legs have one large segment (the femur) that makes it look as though the flies are adapted for jumping.

**Eggs:** Lesser bulb fly eggs are tiny, elongate (0.72 mm (~1/32 inch), slender, and somewhat pointed on one end. They are usually laid in clusters of 10 to 40 near the base of the host plant.

**Larva:** Larvae (Fig. 2) are gray to yellowish maggots ranging in size from 0.75 mm (1/32 inch) to 12 mm (1/2 inch) depending on their age. Larvae are wrinkled and covered with minute spines. A red to brown breathing tube with a fleshy tubercle on either side can be seen at the end of the abdomen of larger larvae. No other maggot pests of bulbs or tubers have these tubercles.

**Pupa:** Pupae (Fig. 3) develop within the last larval skin, which becomes a tough protective covering (the puparium). The puparium is about 6 to 8 mm (1/3 inch) long, light gray to reddish brown, but is typically covered with particles of soil.

## Biology

**Host plants:** Lesser bulb flies usually are pests of narcissus and related bulb plants (amaryllis, daffodil, hyacinth, iris, lilies, tulips, etc.), but will sometimes attack onion, shallots, garlic, parsnips, and potato. Lesser bulb flies are secondary pests, attacking bulbs and tubers previously injured by some other agent.

**Distribution:** The lesser bulb flies occur in the Pacific Northwest wherever host plants occur.

**Life history:** Lesser bulb flies overwinter as maggots in infested bulbs and tubers. The maggots move from infested plant material and pupate near the soil surface in the spring. The first generation flies emerge in April and May and live for 2 to 4 weeks. After mating, female lesser bulb flies crawl into cracks in the soil to lay eggs in masses of 10 to more than 40 in soil or on exposed tubers or seed pieces. At this time of the season, seed pieces are the primary host tissue present and, therefore, very susceptible to attack. The eggs hatch in 5 to 10 days depending on temperature, and the newly hatched maggots begin feeding on the host. The maggots mature in about 30 days and pupate. Second generation flies emerge 1 to 4 weeks later in mid-summer, mate, and lay eggs on exposed tubers near the base of the plant. Second generation maggots overwinter in tubers or other infested plant material.

## Damage

Lesser bulb fly maggots graze on the surface, and may eventually begin tunneling into infested tubers. Feeding by maggots in association with secondary bacterial and fungal rot organisms eventually causes tubers to decompose into rotting semi-liquid masses (Fig. 4). In bulb crops, it is thought that although the maggots can successfully attack a healthy bulb, they cannot complete their development in the absence of certain decay organisms. Bulbs infested with stem nematodes, *Ditylenchus dipsaci* (Kühn) Filipjev, or infected with root rot fungi (e.g. *Phytophthora* spp.) are thought to be especially vulnerable.

## Monitoring and management

Adult flies resemble small bees or wasps, are fast fliers, and difficult to see. The flies can be captured on yellow sticky cards (Great Lakes IPM Inc., 10220 Church Road Vestaburg, MI 48891-9746; tel: 1-800-235-0285). With some practice, lesser bulb flies can be distinguished from other flies captured on the traps. Placement of these cards in problem fields appears to be useful for monitoring adult emergence (Fig. 5a).

## Chemical control

No pesticide recommendations are available for the lesser bulb flies infesting potatoes. Information from the floriculture industry indicates that several compounds currently labeled for use on other pests in potatoes may provide effective control. However, no research-based information on efficacy of these compounds for bulb flies in potatoes is currently available. While these applications may be legal, they are not recommended by University of Idaho.



**Figure 3.** Onion bulb fly pupae are about 6 to 8 mm (1/3 inch) long, light gray to reddish brown, but are typically covered with particles of soil. Photo courtesy of Ken Gray Collection, Oregon State University



**Figure 4.** Onion bulb fly damage to potato tubers is visible on both the exterior and interior. Photo courtesy of Mir Seyedbagheri, University of Idaho Extension



**Figure 5a.** Adult onion bulb flies here are shown captured on a sticky card. Photo by Frank Merickel, University of Idaho



**Figure 5b.** Other flies commonly found on sticky cards include the Tachinid fly. Photo by Frank Merickel, University of Idaho



**Figure 5c.** Yet a third type of fly commonly found on sticky cards is the bee fly. Photo by Frank Merickel, University of Idaho

### **Cultural control**

A number of cultural practices are known to minimize problems with lesser bulb flies.

**Sanitation:** Sanitation is extremely important. Infested bulbs and tubers left in fields, storage sheds, and cull piles are a source of infestation for the current year. All soft, decaying tubers should be buried under at least a foot of soil or be otherwise destroyed.

**Neighboring fields:** Adult flies are strong fliers and can move from emergence sites in infested fields to new fields. Planting potatoes in or near fields with a history of previous infestation increases the likelihood of damaging infestations.

**Healthy seed pieces:** Plant only healthy undamaged seed pieces and follow management practices that reduce the chances of bacterial and fungal rots in tubers, as the presence of these organisms can increase problems with lesser bulb flies.

**Deep planting:** Deep planting has been found to be beneficial in bulb crops. First-generation flies generally begin emerging before potatoes crack the soil. Eggs are laid in soil, and maggots must move to the seed pieces after hatching.

Planting seed pieces 20 to 25 cm (8- to 10-inches) deep and maintaining soil moisture to minimize soil cracking should prevent most larvae from reaching seed pieces. It should reduce damage to seed pieces by first-generation maggots and reduce numbers of second-generation flies.

### **Biological control**

No effective biological control options are available.

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