

LETTUCE AND ONION INSECT PESTS

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Aster leafhopper (Fig. 1) (also known as the six-spotted leafhopper) is the major carrier of aster yellows disease. Aster yellows is a common disease of many vegetable crops, including carrots, celery and especially lettuce (Fig. 2). Onions are also occasionally affected. The disease, caused by a mycoplasma-like organism, can only be controlled by controlling the leafhopper and weed hosts for the leafhopper and the disease organism.

The adult leafhopper is light gray-green and 1/8 inch long. It is an active flier. Immature aster leafhoppers are rarely present in vegetable crops. Aster leafhoppers overwinter in Michigan as eggs on grasses and small grains. They also overwinter in southern Missouri and northern Arkansas, and adults may migrate into Michigan on storm fronts.

Numerous weeds are hosts for the aster leafhopper and sources for aster yellows disease, including Queen Anne's lace (wild carrot), pineappleweed, and horseweed or mare's tail. To transmit the disease, a leafhopper must pick up the aster yellows organism from an infected plant. The organism then must incubate inside the leafhopper for approximately 3 weeks before it can be transmitted to another plant. Because of this long incubation time, the disease is rarely spread from plant to plant within a commercial field. The most common method of infection is undoubtedly by leafhoppers that have fed on infected weeds and migrate into the crop after the 3-week incubation period.

Green peach aphids (Fig. 3) are also serious pests of lettuce. Populations may build to very high numbers, damaging the plant as well as contaminating the product.

The green peach aphid overwinters as an egg on peach, plum and possibly wild cherry and other stone fruits. Eggs hatch in the early spring and all develop into females. Each female may give birth to 80 to 100 live young, also all females. No mating occurs, so each of the young is a genetic copy of the mother. Two or three generations occur in this manner on the overwintering host. As the aphids get crowded or the food quality of the host declines, winged adults are produced and begin migrating to more than 250 kinds of host plants, including lettuce, celery, carrots, potatoes, tomatoes, and many other crops and weeds. These females alight and begin feeding and producing more female offspring. There may be 12 to 15 or more generations per year. A generation including winged males is produced in the fall, in response to shorter day-length. The winged males and

females migrate back to the overwintering hosts, mate, and the females lay the overwintering eggs.

Aphids have many natural enemies, including predators (lady beetles, lacewing larvae, etc.), parasitoids (tiny wasps) and diseases specific to these insects. These help tremendously in controlling aphids under most conditions, in spite of the aphids' very high reproductive rates.

Onion thrips (Fig. 4) are very small insects, less than 1/16 inch long. They are cream to brownish-black, with the larvae somewhat lighter. Adults possess wings, are quite active and often fly away when disturbed. The larvae tend to be sluggish.

Onion thrips overwinter as adults, primarily in weeds, forage crops and winter grains. Early in the season, thrips are rarely found on onions, but as the weather gets warmer and winter hosts die back, they migrate to onions and other hosts and may multiply very quickly. During a dry, hot period in July or August, thrips numbers may double in a week.

There are 3 to 6 generations of thrips per year in onions in Michigan. The life cycle consists of an egg stage (laid inside the plant tissue), two larval stages, pre-pupal and pupal stages (in the soil), and the adult. During the summer, they go through a complete life cycle in approximately 2 weeks. Onion thrips feed on the leaves and damage the plants by rasping small holes in the leaf surface and sucking up the resulting sap. This rasping process removes chlorophyll and sap, leaving white blotches that can be quite large. They often have black spots inside them because of secondary invasion by fungi. Dry growing conditions intensify thrips damage because the plants are under stress and do not recover readily. Severe damage, especially early in the season, results in reduced bulb size at harvest.

Thrips are attacked by a number of predators—including lady beetles and lacewing larvae—parasitoids and fungal diseases, but the major mortality factor in Michigan appears to be heavy rain. After a heavy rain, growers should check the population before spraying.

Onion maggot adults (Fig. 5) are flies, approximately ¼ inch long and brownish-gray. In general, females are larger than males. There are many other species of flies, including houseflies, that look much like the onion maggot in all stages, but are not harmful. Some are even beneficial in that they attack and kill onion maggot adults.

Onion maggots overwinter in the soil as pupae. In late April to mid-May, adult flies emerge and, within 10 to 14 days, begin laying eggs at the base of seedling onion plants (Fig. 6) or volunteer onions. The eggs hatch in a few days and the young larvae move down through the soil and attack the plant roots. The maggots (Fig. 7) are spindle-shaped and creamy-white to white, and they lack both a definite head and legs. The pupal stage (Fig. 8) is chestnut brown and possesses a relatively hard cuticle (outer skin). Onion maggot damage (Fig. 9) is characterized by wilting of the plants. The leaves often have yellow or brown tips. With prolonged feeding, the bulb is completely consumed by the onion maggots and soft rot bacteria, leaving only the dried leaf tissue and outer bulb sheath. The maggots leave the damaged plants to pupate in the soil or migrate to other onions to complete their development.

Summer adults emerge from late June to mid-July. The life cycle is similar to that of the first generation, but second generation larvae cause little damage to the crop, generally attacking previously damaged onions. Survival of eggs and larvae is also very low at this time, because of the hot, dry soil conditions. Temperatures as low as 100°F may be lethal to the eggs.

Fall adults emerge in late August to early September, and the females lay their eggs on mature bulbs or culls. These larvae pupate and overwinter in the soil. Sprouting or damaged bulbs are especially attractive for egg laying. If maggots are present in onions at harvest, they may continue to feed and develop in the damaged onions but will not migrate to other bulbs or cause extensive rotting in storage (no more than any type of mechanical damage).

Dead flies will often be seen attached to the tops of weeds or onion plants. These flies have been attacked by a disease, *Entomophthora* (Fig. 10), that causes the flies to attach themselves to vertical objects just before they die. Fungal spores are then released to infect other flies. *Entomophthora* is a major mortality factor, but a number of predators and parasitoids also attack eggs, larvae, pupae and adults.

For chemical control recommendations, homeowners should consult Extension Bulletin E-760(b), "Home Vegetable Garden Disease, Insect and Weed Control," available from your county Cooperative Extension Office. Commercial growers should consult Extension Bulletin E-312, "Control of Insects, Diseases and Nematodes on Commercial Vegetables."

Lettuce and Onion Insect Pests



1. Aster leafhopper adult (left: front view; right: top view)

2. Aster yellows disease in lettuce (note distorted growth and yellow color)



3. Green peach aphids (left); nymphs and wasp parasitoid (right)

4. Onion thrips (left: closeup; right: on onion)



5. Onion maggot adult

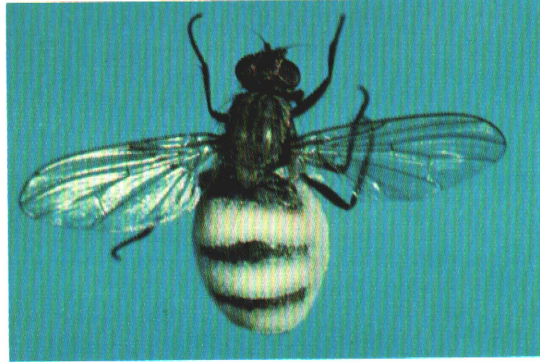
6. Onion maggot eggs

7. Onion maggot

8. Onion maggot pupa



9. Onion maggot damage in field



10. Diseased onion maggot adult