

# Aster leafhopper

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The aster leafhopper (*Macrostelus fascifrons*) is a serious pest of many plants in the upper Midwest because of its ability to spread aster yellows disease. Aster yellows is untreatable; the only solution is to remove infected plants. Both the insect and the disease can attack a broad range of plants, including vegetables, field crops, flowers, and weeds. Infected flowers, particularly those in the aster family (Compositae), are severely disfigured by the disease, destroying both their visual appeal and their economic value.

Leafhoppers prefer lettuce, carrots, celery, and small grains for feeding and breeding, while other crops such as potatoes and onions provide a temporary source of food and refuge. Only adults use these temporary sites; immature leafhoppers fail to develop on these plants. All plants are susceptible to aster yellows infection.

## Symptoms and effects

Aster leafhoppers use their piercing-sucking mouthparts to suck plant juices from green parts of plants, often giving leaves a whitened, mottled appearance. While this damage is disfiguring, the real problem lies in the transmittal of the pathogen that causes aster yellows.

When mature plants are infected, their leaves and stems turn yellow (chlorotic) and become stunted and twisted. Seedlings and very susceptible cultivars show symptoms sooner. Flowers are discolored, mottled, distorted, and sterile. Occasionally plants produce a proliferation of leaves. Disease symptoms vary from plant to plant. On most plants, symptoms don't appear until 21 to 30 days after they've been infected with the pathogen. On lettuce and salad greens, symptoms can appear within 10 days.



**Adult aster leafhopper.**



**The foliage of susceptible carrots becomes bronzed and brittle when infected with aster yellows.**



**Aster yellows disease has caused the pink discoloration in this flower.**

On **carrots**, symptoms begin as a yellowing and twisting of new foliage. Later they produce a dense growth of chlorotic shoots. Older leaves become bronzed and break off easily. Carrot roots become covered with root hairs and develop a bitter taste, making them unmarketable. Infection also leaves the roots vulnerable to soft rots. When young plants are infected, they often die from secondary infections or pest outbreaks.

Aster yellows symptoms on **lettuce** first appear as a blanching (whitening) of the youngest leaves. As the disease progresses, plants become stunted and form a rosette. Characteristic deposits of milky sap may be found on the lower leaf surface along the midrib of affected leaves.

Purple top is the manifestation of the disease in **potatoes**. It is characterized by stunted plants, aerial tubers, and a yellowing or reddening of the older foliage. Newly sprouted potatoes are most susceptible.

On **celery**, chlorotic leaves and twisted stalks are the predominant symptom.

**Onions** show infection in the yellowing of new leaves. If bulbs have formed, these will sprout quickly in storage.

**Asters** and other flowering plants have distorted, sterile flowers following a yellowing of the youngest leaves.

## Life cycle

Adult aster leafhoppers are olive-green, wedge-shaped insects about 4 mm in length. They're also called six-spotted leafhoppers because of the three pairs of spots on the tops of their heads. Adults are extremely active and jump, fly, or crawl away when disturbed.

Aster leafhoppers are not born with the pathogen that causes aster yellows. They acquire the pathogen by feeding on infected plants. A period of 20–50 days must pass before the insect is capable of transmitting the pathogen to susceptible hosts. Several weeds, including Queen Anne's lace, ragweed, horseweed, dandelion and pineappleweed, act as natural reservoirs for the disease.

The first aster leafhoppers that appear in May and June do not overwinter in Wisconsin. They overwinter as eggs on grain plants in the Ozarks and migrate northward as adults each spring on warm, southerly winds. The first migrants to arrive are primarily female. The migrant leafhopper population is important because of the potential for the migrants to already be infected with the aster yellows pathogen when they arrive. The migrant females lay eggs in the plant tissues of grain crops and weeds. In June, the native population begins to emerge, increasing the potential for damage.

Young leafhoppers, or nymphs, hatch from the eggs in June and early July. They resemble the adults, but are cream-colored or dark and lack fully developed wings. Nymphs are less active but crawl rapidly when disturbed, often seeking to regain the lower leaf surface. Immature leafhoppers pass through five stages (instars) over a period of 20–30 days before reaching adulthood. There are normally two to three generations per year.

## Control

Due to the delay between infection and appearance of aster yellows, the duration of treatment depends on the crop. Lettuce and other salad greens should be treated until harvest. Treatment of other vegetables can be stopped 1 month before harvest. Flowers should be treated throughout the growing season since they're grown for their appearance. In home gardens, chemical control is not recommended.

Begin scouting for aster leafhoppers in early spring when plants are newly sprouted and continue scouting weekly through the end of July. Yellow sticky cards may be placed in the field to determine when the first migrants arrive. Place the cards just above the crop, a few rows in from the outer field edge. Once leafhoppers appear, you'll need to estimate the size of the population using an insect net to sweep the area. Take 25 sweeps per sample site and sample at least four areas. Refer to table 1 to determine when treatment is recommended.

Only a small percentage of leafhoppers carry the aster yellows pathogen, and that percentage can change throughout the season. For current percentages, contact your county Extension office. If you don't know how much of the population is infective, assume 2.5%.

**Cultural control**

Removing infective weed reservoirs and infected crop plants can reduce the spread of aster yellows to vegetable and flower crops. This method, while helpful, will not prevent spread of the disease because there will still be infective leafhoppers transmitting the pathogen.

Avoid planting susceptible crops near untreated crops or weeds that leafhoppers use for refuge. High stand density will further decrease the impact of aster yellows. When possible, plant resistant cultivars or species. Floating row covers may be used in small vegetable gardens to cover susceptible plants (lettuce, carrots, celery, potatoes, and onions).

Several carrot cultivars are resistant or tolerant of the aster yellows disease. For a listing of currently available resistant cultivars, see Extension publication *Commercial Vegetable Production in Wisconsin* (A3422) or contact your county Extension agent.

**Biological control**

No biological controls effectively reduce aster leafhopper populations.

**Chemical control**

Leafhoppers are difficult to control, especially on young plants with little surface area. Chemicals with low residual activity, such as synthetic pyrethroids, need to be applied 2–3 times weekly when leafhopper influxes and rains are frequent. To effectively control leafhoppers, insecticide applications should be timed to leafhopper influxes. Because disease symptoms take a month to develop, treatment may be discontinued 30 days before harvest. Carbaryl (Sevin), cyfluthrin (Baythroid), and esfenvalerate (Asana) are recommended for the control of aster leafhoppers. Aphid populations may be increased with repeated Sevin and Asana applications.

**Table 1. Treatment thresholds for various crops.** *Treat when leafhopper catches exceed those listed for a given percent infectivity. Contact your county Extension office for current percentages.*

Percent infectivity	Susceptible carrot	Resistant carrot, potato	Celery	Onion
	# leafhoppers/100 sweeps			
0.5%	100	200	70	50
1.0%	50	100	35	25
2.0%	25	50	17	12
2.5%	20	40	14	10
5.0%	10	25	9	6

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