

VEGETABLE CROPS

CORNELL COOPERATIVE EXTENSION

Carrot Leaf Blight

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Two fungal pathogens commonly cause leaf blight symptoms on carrots grown in New York State: *Cercospora carotae* and *Alternaria dauci*. In 1972, the bacterial pathogen *Xanthomonas carotae* also was found to cause leaf blight symptoms on carrots in upstate New York. All three pathogens can produce severe blighting on carrot leaves and petioles if wet weather is prolonged during the growing season. Entire leaves and petioles may die on severely infected plants.

Research in Canada has shown that significant harvesting losses can occur when ten to twenty percent of the leaf area of the crop is blighted. When petioles are lost for gripping by a mechanical harvester, many carrot roots are left unharvested. Further, leaves weakened by blight organisms are susceptible to breakage when gripped by a mechanical harvester. Yield losses also occur when blighted leaves retard root growth.

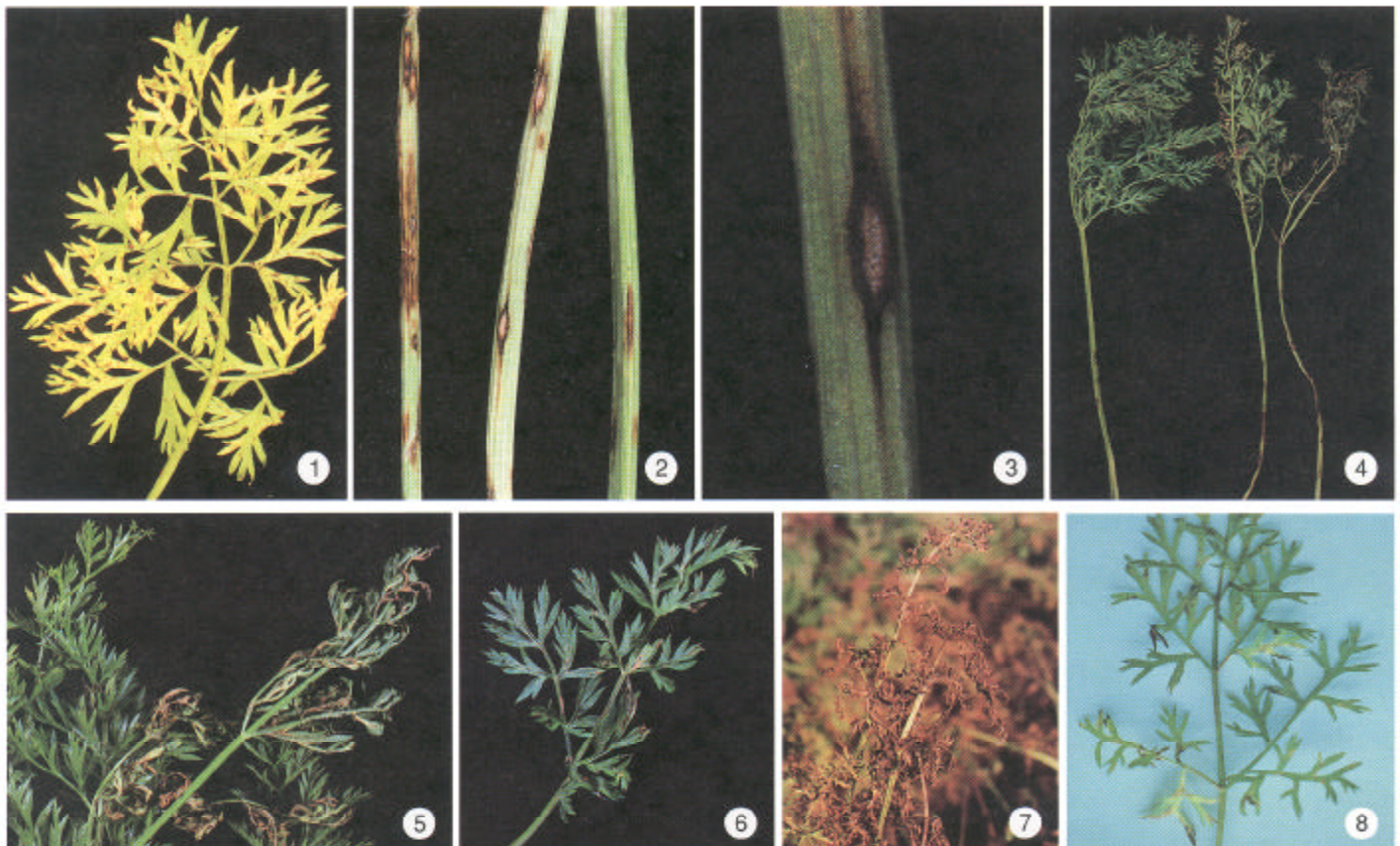
Symptoms and Signs

Cercospora Leaf Blight

Leaf spots caused by *Cercospora carotae* first appear along the margins of the leaves, often causing the leaves to curl. Spots inside the leaf edges are small, roughly circular, and tan or gray to brown with a dead center (fig. 1). As the lesions increase in number and size, the entire leaflet withers and dies. The fungus attacks younger leaves and plants in preference to older ones. In heavily infested fields, however, both older and younger leaves are subject to attack. The pathogen also produces lesions on the petioles and stems (fig. 2), characterized by dark brown borders and tan to gray centers (fig. 3). The lesions may merge and girdle the stems, causing the leaves to die. Because *Cercospora* leaf blight develops rapidly in hot or humid weather, it is likely to occur in July and early August in New York State.

Alternaria Leaf Blight

Alternaria leaf spots first appear at the margin of the leaflets and are dark brown to black and irregular in shape (figs. 4, 5, 6). Lesions produced on the petioles and stems are dark brown and often coalesce and girdle the stems (fig. 4). As the disease progresses, entire leaflets may shrivel and die, appearing scorched (fig. 7). *Alternaria* leaf lesions are generally more prevalent on older foliage and plants than on young foliage. The



disease spreads rapidly on the older leaves of a maturing crop after the rows have closed. This is due in part to poor air circulation among the older lower leaves in the canopy and to the moisture-holding capacity of the dense foliage. Infected older leaves produce many spores which eventually infect younger leaves and may also wash to the ground and attack the roots (especially after mechanical injury). Root lesions are irregular, dark brown to black, and appear as a shallow, firm area of decay. Because cool weather is favorable for its development, *Alternaria* leaf blight is most severe in late August and September in New York State.

Bacterial Leaf Blight

Early symptoms of leaf blight caused by the bacterium *Xanthomonas carotae* appear on the leaflets as small yellow areas. The centers of young lesions become brown and dry and are often surrounded by a yellow halo (fig. 8). Well-developed symptoms appear on the leaves as irregular brown spots and on the petioles and stems as brown streaks. Mature foliar symptoms of bacterial leaf blight are indistinguishable from leaf blights caused by *Alternaria dauci* and *Cercospora carotae*. Positive identification of the pathogen requires microscopic examination and isolation by extension personnel or diagnostic laboratory technicians.

Disease Cycle

The carrot leaf blight pathogens survive on or in the seed and on diseased crop debris in the soil. The fungal pathogens produce spores that become airborne and are spread predominantly by wind. The bacterial pathogen is spread primarily by wind-driven rain or by irrigation water. Moisture is essential for infection by all blight organisms because bacterial cells and fungal spores require surface moisture and warm temperatures to germinate. The higher the temperature, the shorter the wet period required for infection. When temperatures are warm or when moisture in the form of rain, dew, or irrigation water is persistent, the threat of infection and rapid spread of leaf blight organisms is high.

Control

Cultural

The leaf blight pathogens can survive from one year to the next in infected plant debris. Therefore, a two- to three-year rotation is recommended to allow for natural decline in the pathogen population. Fall plowing or disking is also recommended to hasten the decomposition of plant residues and to reduce the number of overwintering bacteria and fungal spores.

The use of disease-free seed is strongly recommended because all three pathogens can survive on or in the seed. Hot water treatment of seeds reduces bacterial leaf blight caused by *Xanthomonas carotae*.

Because *Alternaria* leaf blight destroys the mature foliage, it is important to encourage the continuous production of young vigorous leaves for gripping by a mechanical harvester. Research has shown that well-fertilized carrots are less likely to develop *Alternaria* leaf blight. A nitrogen application made in mid-August or early September may be beneficial in promoting foliage development. An alternative method of applying nitrogen is to add sprayable urea to each fungicide spray. Although only a small amount of the foliar-applied nitrogen is absorbed, the excess is washed to the ground and taken up by the roots.

Cultivars with tolerance to leaf blight are available from seed companies. Carrot producers with a history of leaf blight epidemics should consult their local extension agent to determine which tolerant cultivars are adapted to their growing conditions.

Chemical

Early applications of protectant fungicides, starting at the first sign of infection, effectively control leaf blights on carrots. Best control is achieved when fungicides are applied at high pressure and in sufficient water to reach the lower leaves in a dense canopy. When rainy weather prevents entry of farm machinery for fungicide applications, aerial sprays are not recommended because the spray material penetrates poorly to the lower leaves in the canopy. It is critical to obtain good coverage of the lower leaves in the canopy because, once infected, these leaves become sources of spores for infection of healthy younger leaves. Although three to five fungicide applications are commonly recommended, additional applications may be necessary when weather conditions are favorable for blight development.

Refer to the most recent issue of *Cornell Recommendations for Commercial Vegetable Production* for products registered for use on carrots. Always follow the label directions carefully.

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Quantity discount available.

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