



LEAF BLIGHTS OR SPOTS OF CARROT

Alternaria and *Cercospora* leaf spot or blight diseases are caused by the fungi *Alternaria dauci* and *Cercospora carotae*. Both diseases occur worldwide and commonly are found together in the same field or garden. *Cercospora* blight generally occurs earlier in the season than *Alternaria* blight. *Cercospora* blight is generally more severe on young leaves and increases as the plant grows. *Alternaria* blight is more damaging on older leaves and does not normally become prevalent until plants approach maturity. In warm, moist weather, entire carrot fields may appear bronzed or scorched by these blights.

CERCOSPORA LEAF BLIGHT OR SPOT

Symptoms

Round to elongated spots (lesions) with light tan to whitish centers develop on the leaflets. Primary lesions usually form along the margins of the leaflets causing them to curl (Figure 1). The lesions may merge into large blotches that shrivel, blacken, and kill entire leaflets, closely resembling symptoms of *Alternaria* blight. In humid weather the lower surface of the lesion is usually light gray or silver due to the production of spores (conidia). Elliptical to elongated or linear lesions, usually having pale centers and dark margins, form on the petioles and stems. The petioles may be girdled, causing the leaves to die. Floral parts of carrots grown for seed shrivel and die if infected early. When infection occurs later, the *Cercospora* fungus commonly invades the seed. This serves as an important source of inoculum if the seed is later planted. The edible fleshy root is not affected.



Figure 1. *Cercospora* leaf blight or spot of carrot (courtesy Dr. A.F. Sherf).

Disease Cycle

The *Cercospora* fungus overseasons on and in seed; in wild carrot or Queen Anne's-lace (*Daucus carota*) and other minor wild hosts including *D. gingidium*, *D. hispanicus*, *D. maritimus*, *D. pulcherrimus*, and *D. pusillus*; in soilborne debris from diseased plants; and in foliage carried into storage and later discarded.

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The spores (conidia) of *Cercospora* are borne on the surface of the leaflets and petioles and are disseminated by air currents, splashing rains, and flowing water, on farm equipment and tools, and the clothing of workers. Hyphae from germinated spores penetrate through stomata and infect the carrot foliage. Infection occurs over a temperature range of 60° to 92°F (16° to 33°C) with an optimum of about 73° to 82°F (23° to 28°C). Symptoms can appear three to five days after infection has occurred and a new crop of microscopic conidia is formed on the new lesions. The conidiophores bear the elongated, cylindrical conidia successively at their tips (Figure 2).

ALTERNARIA LEAF BLIGHT

Symptoms

The symptoms of this disease closely resemble those caused by *Cercospora*. However, the lesions are more irregular, dark brown to black with yellow borders, and develop near the margins of the leaflets (Figure 3). In prolonged, warm, moist weather the enlarging lesions cause entire tops to turn a yellow-brown, shrivel, and die. These symptoms are often confused with frost damage. Elongated, girdling lesions may develop on the petioles killing the leaves. Petiole infection can occur without spots developing on the individual leaflets. *Alternaria dauci* can also cause damping-off of seedlings and a blighting of seed stalks. A closely related fungus, *A. radicina*, causes a black decay of the fleshy roots.

Disease Cycle

The *Alternaria* fungus overseasons on or in seed and in soilborne debris from diseased tissue. Besides carrot, the fungus infects parsley, rooted parsley, celery, celeriac, and a number of related weed hosts. The fungus can grow, produce conidia, and cause infection between 57° and 95°F (14 ° to 34°C) with an optimum of 82°F (28°C). Moisture from dew or rain is needed for spore germination. Infected seedlings are commonly a primary source of inoculum. Germination, penetration, and the development of symptoms take 8 to 16 days; less time when wounds are present. Within two to three weeks a large number of conidia (Figure 4) can be produced on the lesions, and secondary disease cycles can be repeated as long as the weather remains favorable. The fungus

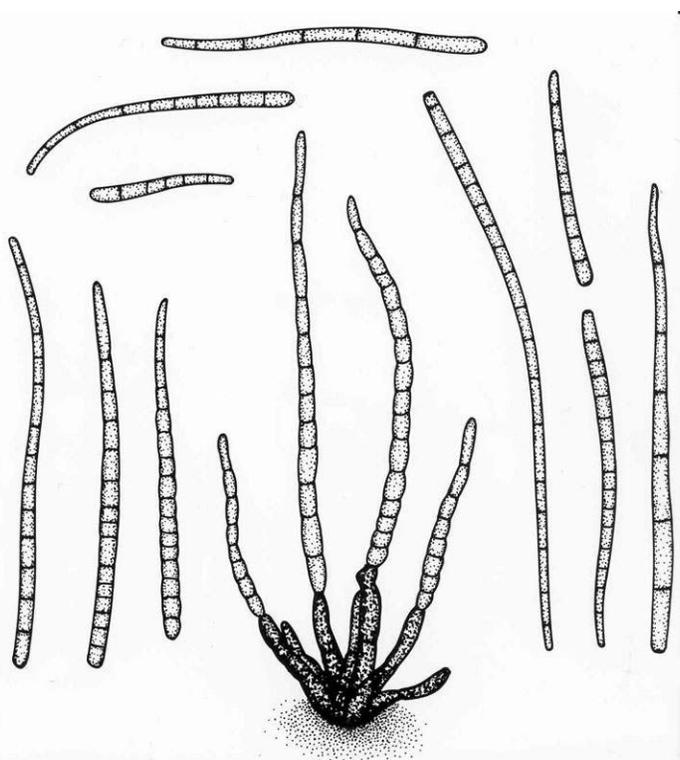


Figure 2. *Cercospora carotae*, the fungus that causes *Cercospora* leaf blight or spot of carrot, as it would appear under high power of a light microscope (drawing by Katharine A. Golasyn-Wright)



Figure 3. *Alternaria* leaf blight of carrot (courtesy Dr. A.O. Paulus).

is probably present in most fields but does not become obvious until the leaves are killed more rapidly than new ones are produced.

The fungus can form conidia on carrot petioles stored dry for 90 days, but dies under alternating wet and dry conditions. *Alternaria* spores, like those of *Cercospora*, are spread by air currents, splashing or flowing water, machinery and tools, and by workers.

Control

1. Plant disease-free seed grown in areas such as semiarid regions of the Pacific Northwest, where *Cercospora* and *Alternaria* are absent.
2. Treat all carrot seed with a seed protectant fungicide. Refer to Report on Plant Diseases No. 915, "Vegetable Seed Treatment," for suggested fungicides and procedures.
3. Whenever possible, plant in raised, well-drained beds. Avoid overcrowding of both plants and rows.
4. Eradicate all weeds, preferably before planting and during the season, particularly those in the carrot family (Umbelliferae). For current herbicide recommendations, refer to Midwest Vegetable Production Guide for Commercial Growers, revised annually. Keep down all weeds as far around the field or garden as is practical.
5. Apply a suggested fungicide at 7- to 10-day intervals starting about June 15 or when the leaf spots are first evident. Spraying is more effective than dusting. If the weather is unusually wet, shorten the interval to 2 to 4 days for dusts and 5 to 7 days for sprays. Thoroughly cover all aboveground plant surfaces with each spray or dust. Try to apply the fungicide just before rainy periods when infections occur. For current fungicide recommendations refer to Midwest Vegetable Production Guide for Commercial Growers. Apply dusts and sprays in the early morning or evening when the wind is usually at a minimum (less than 5 miles per hour for dusting and 10 mph for spraying) and leaf surfaces are damp with dew.

Dusts should contain at least 5 to 10 percent fungicide. Be sure to follow all directions and precautions for mixing and applying as printed on the container label.
6. When practical, plow or spade down cleanly, burn, or compost all tops after harvest.
7. Rotate carrots two or three years with other crops, excluding parsley, celery, and celeriac.

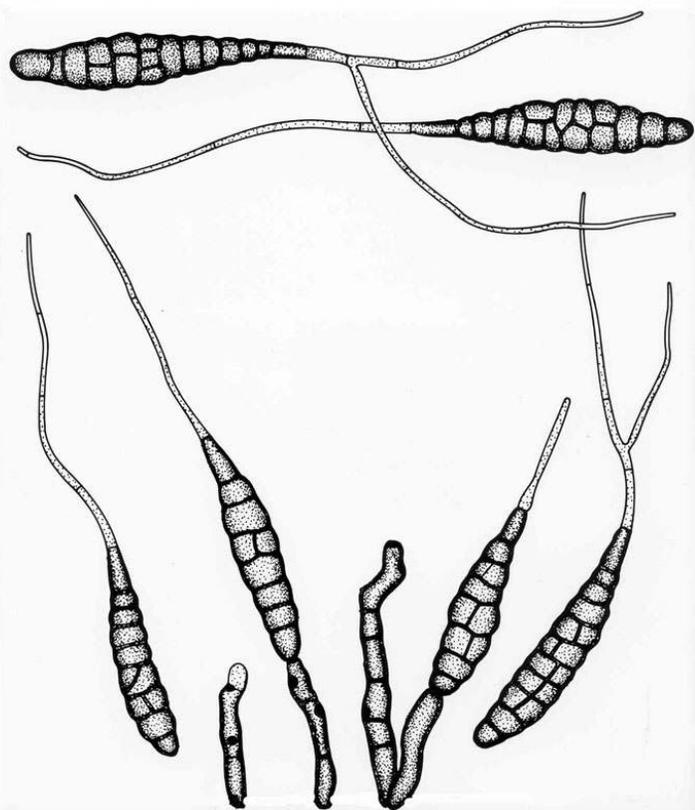


Figure 4. *Alternaria dauci*, the fungus that causes Alternaria leaf blight of carrot, as it would appear under high power of a light microscope (drawing by Katharine A. Golasyn-Wright).

8. Some commercial carrot cultivars are less susceptible than others to *Cercospora* and *Alternaria*. For example, the following Spartan cultivars are partially resistant to *Cercospora*: 'Spartan Bonus', 'S. Classic', 'S. Delite', 'S. Delux', 'S. Fancy', 'S. Premium', and 'S. Winner'. Tolerant cultivars to *Alternaria* include 'Hi-Color 9', 'Orlando Gold', and 'Waltham Hi-Color'. For the latest information on recommended varieties for growing in Illinois refer to Midwest Vegetable Production Guide for Commercial Growers. Also consult current seed catalogs and trade publications. A list of seed companies and distributors is also included in the above mentioned publication.

Publications mentioned above are available at your nearest Extension office or ITCS, University of Illinois P345, 1917 S. Wright St., Champaign, IL 61820.