Plant Pathology and Plant-Microbe Biology Section
School of Integrative Plant Science
Cornell Cooperative Extension
Cornell Agri-Tech

Alternaria Leaf Spot of Table beet

Pathogen

Alternaria leaf spot (ALS) is caused by fungi belonging to the *Alternaria* genus, mostly A. *alternata* (syn. A. *tenuis*) and A. *brassicae.*

Host

Both species have a broad range of hosts including various crops in Amaranthaceae (table beet, sugar beet, Swiss chard, lambsquarters), Brassicaceae (cabbage and cauliflower), Solanaceae and Alliaceae families. In addition, A. *brassicae* can also infect plants in the Fabaceae, Poaceae, and Cucurbitaceae families.

Significance

The disease can decrease the photosynthetic area of the crop leading to the poor growth and development of the roots. In severe cases, defoliation can occur and deleteriously impact mechanical harvesting of the table beet crop and may also reduce the customer appeal of fresh market beets rendering them unmarketable.

Symptoms and Signs

Symptoms usually begin in the lower and older leaves. Symptoms begin as tiny, pin head-like spots which can expand to form dark brown to black, circular or irregular patches (Fig. 1). Unlike Cercospora leaf spot, these lesions are not restricted by the leaf veins as the lesions expand. Signs of the pathogen are dense and fuzzy black to brown masses of fungal spores (conidia) produced on specialized hyphae that are visible in lesions with a hand lens (Fig. 2 A and B).

Figure 1: Alternaria leaf spot in sugarbeet leaves (Photo: courtesy of Dr. Linda Hanson, USDA-ARS, Michigan).

Prepared by Pratibha Sharma, Julie Kikkert and Sarah Pethybridge (October 2021)

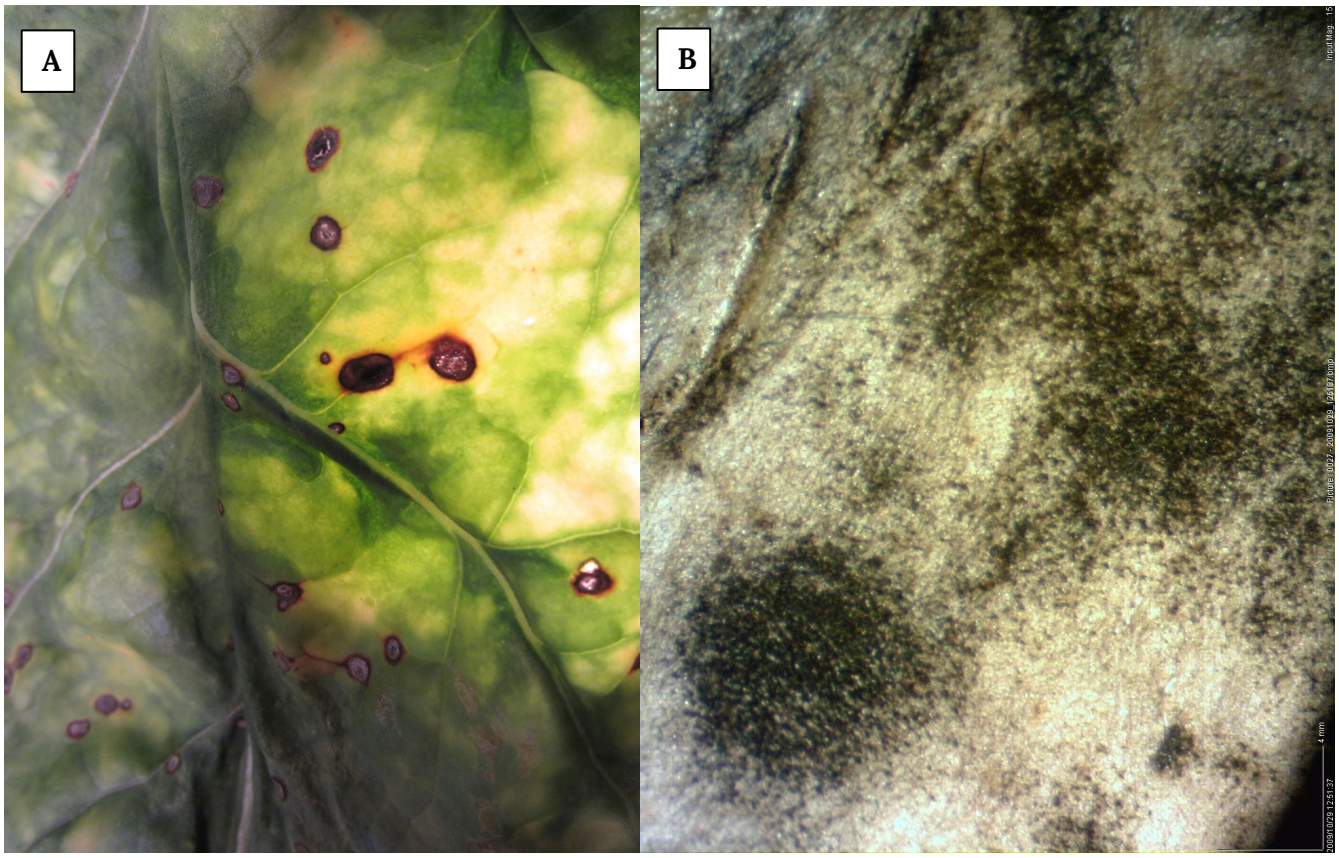

Figure 2: Alternaria leaf spots showing signs of the pathogen, *Alternaria* spp. which includes black, dense production of fungal spores in normal condition (A) and moist chamber (B) (Photo: courtesy of Dr. Linda Hanson, USDA-ARS, Michigan).

Disease Cycle

Alternaria leaf spot is favored by cool to moderately warm temperatures (15.6-25.6 °C or 60-78 °F) and high humidity. Therefore, this disease is mainly observed on mature plants in late summer or early fall when the temperature begins to fall. However, the disease can infect the crop at any stage if environmental conditions are optimal. The pathogen can survive in the absence of a host in the crop debris as saprophytes (organisms living on dead and decayed organic matter), in the form of special survival structures called: (1) chlamydospores (thick-walled vegetative spores produced by the enlargement and thickening of hyphal cells); and (2) microsclerotia (dark, hard, multicellular, and irregular to spherical-shaped structures produced from conidia) to withstand adverse conditions, such as freezing and desiccation, or in weeds and alternative hosts as a parasite (Fig. 3). Survival in seeds has also been reported in some hosts. The fungus usually enters the host through older leaves via wounds, diseased tissues, or stomata as a secondary pathogen, but direct infection of healthy leaves can also occur. Lesions are produced following infection and on the lesions are produced asexual spores called conidia that occur in chains. Conidia are dispersed via wind, water splash, farm equipment, and workers leading to several infection cycles within a season.

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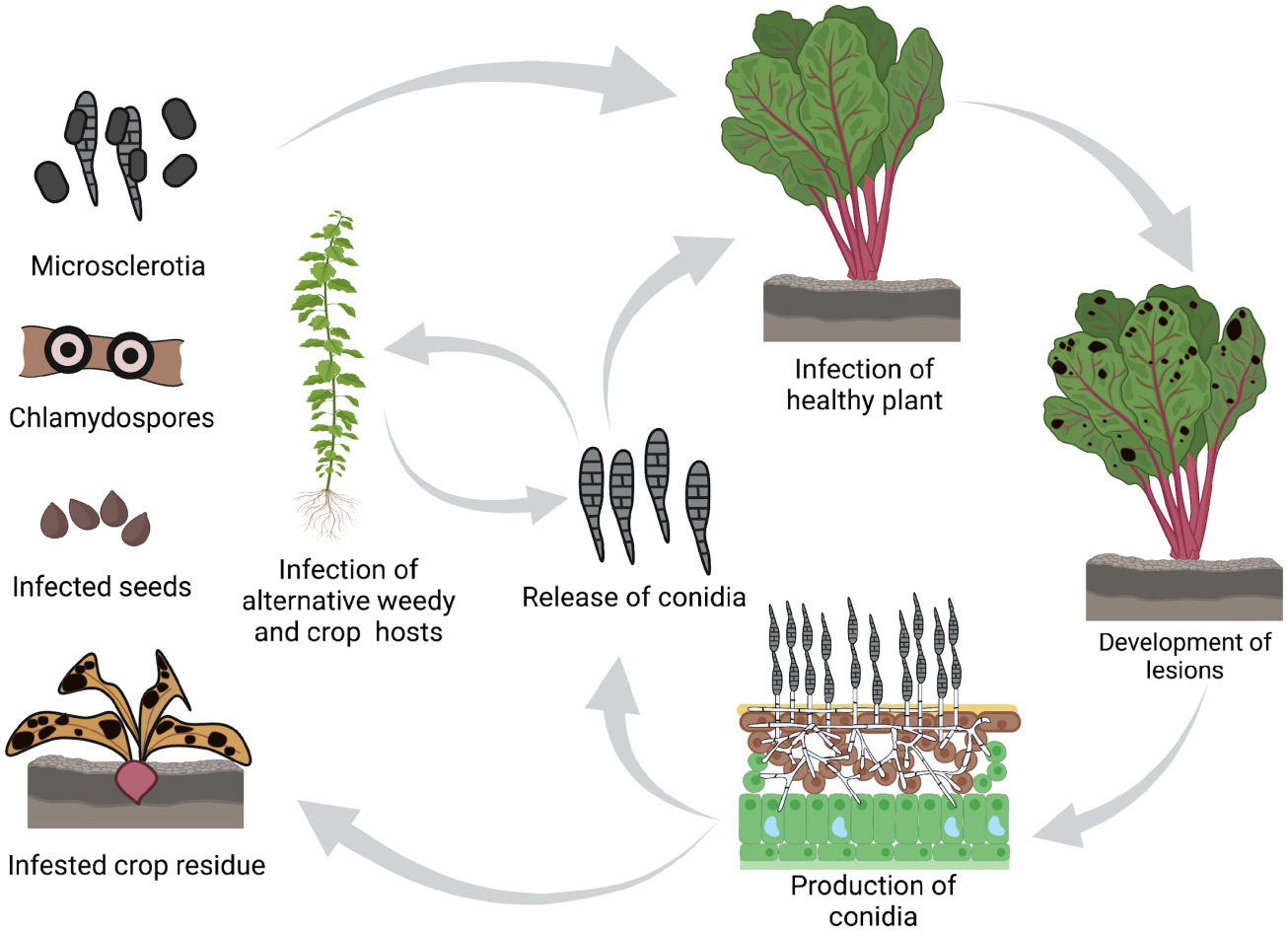

Figure 3. Disease cycle of Alternaria leaf spot of table beet (created with BioRender.com)

Management

The pathogen generally infects plants towards the end of the cropping season as temperatures fall and morning dews become more prevalent. The disease contributes to defoliation with others, such as Cercospora leaf spot. Foliar disease management strategies must therefore consider the complex of diseases affecting table beet, such as:

- Tillage to bury the crop debris and facilitate degradation and reduce the carry-over of inoculum between seasons.
- Use of certified and fungicide-treated seeds to avoid pathogen introduction.
- Arrangement of rows to promote air circulation to achieve rapid leaf drying and reductions in relative humidity.
- Use of drip and furrow irrigation instead of overhead sprinklers, to avoid splash dispersal of the fungal spores, where practical.
- Optimal soil fertilization and disease management to promote a healthy crop, as weak and diseased plants are more prone to the secondary infection by *Alternaria* species.
- No resistant or tolerant cultivars are available.

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- The efficacy of fungicides for ALS control is largely unknown. At this time, strobilurins (e.g., Quadris) and demethylation inhibitors (e.g., Tilt) already registered for foliar disease control in table beet in New York are likely to also control ALS.

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