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Cole crops disorder: Blackleg

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Once a very destructive disease, blackleg of cole crops has become less important with the introduction of effective control measures.

The fungus that causes blackleg, *Phoma lingam*, affects most cole crops. All types of cabbage, Brussels sprouts, kohlrabi, radish, rutabaga, and white mustard are severely affected. Black mustard, broccoli, cauliflower, kale, turnip, and wild radish are moderately susceptible. Mildly susceptible plants include Chinese mustard, cress, rutabaga, and many turnips.

Symptoms and effects

All plant parts are susceptible at all stages of development. The earliest symptoms occur in the plant bed 2–3 weeks before transplanting time. The leaf spots are inconspicuous and indefinite at first. The spots gradually become more defined and circular with ashen-gray centers speckled

with tiny black dots. These dots are the fruiting bodies of the fungus. Leaf spots continue to appear, particularly during wet weather. Infected seedlings and young plants die quickly. On older plants, spots on outer leaves sometimes turn a reddish color, particularly near the margins. Blemished cabbage heads are unmarketable.

Elongated, sunken, tan lesions appear on the stems near the soil line. The spots are often surrounded by a purplish border. As the disease progresses, the stem may be girdled, resulting in the wilting and death of the plant.

Roots may also become infected and entire root systems may be



Blackleg spots become more pronounced with age. The tiny specks are fungal spores.



Blackleg lesions have made this cabbage head unmarketable.

destroyed. Often, the first above-ground sign of infection occurs when plants suddenly wilt. The leaves of wilted plants remain on the plant. (This is unlike wilt caused by *Fusarium* and black rot, where leaves of infected plants die and break off.) Infected plants may topple over as they mature because of poor root anchorage. In crops that are harvested for their roots, such as radish and rutabaga, such damage makes them unmarketable.

Disease cycle

The fungus overwinters on crop debris, soil, or infected seed. Spores are disseminated to susceptible plants by splashing rain, irrigation, or wind. The fungus can survive in the soil for at least 3 years and may also be present on seed. It usually kills plants rapidly and produces large numbers of spores on the dead tissue. Further spread requires moist periods and splattering rains or irrigation. The severity of the disease is in direct proportion to the amount of rainfall in early summer.

Control

No cole crop varieties are currently resistant to blackleg. However, the following set of cultural controls are highly effective in preventing outbreaks of the disease.

- Plant certified disease-free seed grown in the Western United States.
- Grow seedlings in soil that is free of the blackleg fungus or sterilize the soil before planting.
- Carefully inspect plants at transplanting for symptoms of blackleg. Avoid transplanting any plants from a seedbed that shows even the slightest infection.
- Do not dip transplants in water prior to transplanting.
- Since the fungus remains alive in the soil for 3 years, practice at least a 4-year rotation with non-cruciferous crops.
- Do not plant seedbeds and fields in shaded areas where dew evaporates slowly. Dews that persist through the morning favor disease development.
- Eradicate susceptible crucifer weeds (wild mustard, shepherd's purse, pepperweed) growing in and around seedbeds and fields.
- Do not compost infected plants and do not use manure from animals fed diseased plants.