

## BLACK ROT OF BRACCICAS

Black rot, caused by *Xanthomonas campestris* pv. *campestris* (Xcc), is considered the most important disease of vegetable brassicas worldwide. The pathogen also infects crucifer weeds. The disease is more common in warm, humid climates. Full crop losses can be caused by this disease. Xcc is a serious seedborne pathogen and can also be spread by rain splash, insects, and equipment. Major crops affected by Xcc are broccoli, Brussels sprouts, cabbage, cauliflower, collard, kale, kohlrabi, mustard green, radish, rutabaga, and turnip.

### Symptoms

The first symptom of black rot is usually seen as 1- to 3-cm ( $\frac{1}{2}$  to 1 inch) irregular, dull yellow areas along the margins of leaf. The spots expand from the leaf margin toward the midrib, exhibiting a characteristic “V” shape with yellow margin and dry, brown center (Figure 1). Veins within the spots are dark brown to black. When infection is heavy, lesions coalesce to give the margin of the leaf a scorched appearance. Invasion of fleshy petioles and head leaves of vegetable brassicas by Xcc



**Figure 1.** Cabbage plants infected with black rot bacterium (V-shaped spots on leaves).

rapidly followed by soft-rotting bacteria. In oilseed brassicas, injury may be most evident on the leaves. Early invasion of the vascular system can result in severe stunting and plant death. Under ideal conditions of 25°C (77°F), black rot symptoms appear 10-14 days after entry of the pathogen into tissues.

### Disease cycle

Xcc is a seedborne pathogen. Seedborne bacterium results in infected seedlings, which serve as

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primary inoculum for spread. Bacteria enter guttation water from the hydathodes and are spread by splashing rain, irrigation sprinklers, and insects or by cultivation equipment. Plants infected in the seedbed or greenhouse are unlikely to be detected because of low temperatures. Infected transplants often do not show symptoms for several weeks following transplanting. Bacteria from infected transplants can rapidly spread to noninfected plants.

Heavy rain or overhead sprinkler irrigation can spread the bacteria many meters (yards) through the crops. The bacteria also spread through surface runoff, with most severe infection often occurring in low-lying areas of the field.

Xcc infects a wide range of brassica crops and weeds and overwinters or oversummers in these plants. The pathogen can also survive on plant residue in the field. Xcc can persist on seeds for several years.

## Disease management

- Plant Xcc-free seeds. Xcc on seed can be eradicated by seed treatment in hot-water [50°C (122°F)] for 15-30 minutes (depending on the crop).

- Plant resistant cultivars.
- Plant Xcc-free transplants.
- Prepare transplants in Xcc-free beds. Sterilize soil using steam.
- Avoid planting brassicas in an area that gets run-off water from brassica planting.
- Practice 3-year crop rotation with non-crucifer crops.
- Increase spacing between plants to minimize moisture building up.
- Do not work in field with wet plants.
- Incorporate crop residues after harvest.



**Figure 2.** Black rot, caused by *Xanthomonas campestris* pv. *campestris*. Comparison of susceptible (left) and resistant (right) cultivars of cabbage (Courtesy APS, P. H. Williams).

- Actigard (acibenzolar-s-methyl) may be used to induce resistance in plants.
- Actigard may be used to induce resistance against black rot. Application of copper compounds (copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper diammonium diacetate complex, cuprous oxide) may slow the spread of Xcc. For the up-to-date information on using chemicals for managing black rot of brassicas, refer to the Midwest Vegetable Production Guide for Commercial Growers (<https://mwvegguide.org/uploads/pdfs/2022-Midwest-Veg-Guide-8.5-x-11-with-covers-no-bleeds-bookmarked-compressed.pdf>).