

Plant Pathology Fact Sheet

Black Rot of Crucifers

by Kenny Seebold, Paul Bachi and Julie Beale

Black rot, caused by the bacterial pathogen *Xanthomonas campestris* pv. *campestris* (*Xcc*), can be a very destructive disease of cabbage, cauliflower, and broccoli. Other susceptible crucifers include: collards, kale, Brussels sprouts, Chinese cabbage, kohlrabi, turnip, mustard, radish, and rutabaga.

Symptoms

Symptoms first appear as yellow V-shaped areas with the open part of the “V” along the edge of the leaf (FIGURES 1 and 2). The diseased areas then become brown and brittle, and the affected leaf veins turn dark-brown to black. The V-shaped areas enlarge and the entire leaf eventually turns yellow or wilts and falls from the plant. When a young seedling is affected, the infection usually spreads throughout the plant causing it to remain stunted and unproductive.

A cut made through the stem of infected plants usually reveals a ring of black discolored tissue within the stem. Soft-rotting bacteria often colonize tissues affected by black rot, resulting in a slimy, foul-smelling decay of stalks and/or heads.



FIGURE 1. BLACK ROT SYMPTOMS ON CABBAGE.

Disease Development and Spread

The black rot bacterium is seedborne and can survive the winter on plant parts left in the field. Cruciferous weeds, such as wild mustards, are hosts of *Xcc* and can serve as reservoirs of inoculum. The bacterium can be carried to the field on infected transplants and it can be spread within the field by splashing rain, insects and windblown plant debris. Warm, rainy weather favors the spread of the black rot bacterium.

Disease Management

- **DISEASE-FREE PLANTING MATERIAL.** Use certified disease-free seed and transplants. If the seedlot is known or believed to be contaminated, hot-water treatment is recommended. Crucifer seeds should be treated at 122° F. Soak seeds of cabbage, broccoli, and Brussels sprouts for 25 minutes, and those of cauliflower, kohlrabi, kale, turnip, and rutabaga for only 15 minutes. Refer to *Seed Treatments for Commercial Vegetables in Kentucky* (PPFS-VG-09) for more information on the disinfection of vegetable seed with hot-water treatments.

- **SANITATION.** Employ good sanitary practices to minimize the risk of pathogen introduction and carry-over. In transplant production, use new or bleach-sanitized trays. Avoid clipping transplants in order to prevent plant-to-plant spread of the black rot pathogen, and don't purchase transplants that have been clipped. Do not handle plants when they are wet – this will reduce the risk of pathogen spread. Destroy crop residue by disking or deep-turning at season's end, particularly if black rot has occurred in a field.

- **PEST MANAGEMENT.** Manage insects and weeds (especially weeds in the crucifer family). The following cruciferous weeds are susceptible to black rot: birdsrape mustard (*Brassica rapa*), Indian mustard (*B. juncea*), black mustard (*B. nigra*), shortpod mustard (*Hirshfeldia incana*), Virginia pepperweed and other pepper grasses (*Lepidium* spp.), shepherdspurge (*Capsella bursa-pastoris*), radish (*Raphanus sativus*), wild radish (*R. raphanistrum*), hedge mustard (*Sisymbrium officinale*), swinecress (*Coronopus didymus*), and hairy whitetop (*Cardaria pubescens*).

- **CROP ROTATION.** Rotate crucifers with crops that are not susceptible to black rot. Do not plant cruciferous crops in the same field in consecutive years.



FIGURE 2. A TYPICAL V-SHAPED LESION AT THE MARGIN OF A CABBAGE LEAF INFECTED WITH THE BLACK ROT BACTERIUM. (PHOTO COURTESY OF DB LANGSTON, UNIVERSITY OF GEORGIA)

- **RESISTANT VARIETIES.** Plant varieties of cabbage and broccoli with partial resistance (tolerance) to black rot. Cabbage varieties reported to be tolerant include 'Atlantis', 'Blue Dynasty', 'Bronco', 'Cecile', and 'Ramada'. The broccoli varieties 'Arcadia', 'Eureka', and 'Greenbelt' have shown tolerance to black rot in tests conducted at Cornell University. Consult *Commercial Vegetable Guide for Commercial Growers* (ID-36) for additional information on variety selection.

- **CHEMICAL CONTROL.** The effectiveness of chemical control for black rot has been inconsistent in university trials over the years. The spread of black rot in fields may be slowed in some instances through applications of fixed coppers. These materials are inexpensive and are available to both home gardeners and commercial producers. Actigard, a chemical that induces resistance to certain diseases in some plants, is labeled for suppression of black rot on commercially grown crucifers; however, results have been disappointing with this material in general. Refer to the University of Kentucky production guides listed below for products and rates, but keep cultural practices and sanitation at the forefront of any disease management program for crucifers.

Additional Resources

Disease management advice can be found in the following University of Kentucky publications. They are available at County Extension offices, as well as on the Web.

- Home Vegetable Gardening in Kentucky, ID-128

<http://www.ca.uky.edu/agc/pubs/id/id128/id128.htm>

- Seed Treatments for Commercial Vegetables in Kentucky, PPFS-VG-09

http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-VG-9.pdf

- Vegetable Production Guide for Commercial Growers, ID-36
<http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm>

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