

Spots and Rots on Brassicas: Managing Common Diseases

Chris Smart, Holly Lange, Rachel Kreis, Juan Luis Gonzalez Giron

Plant Pathology and Plant-Microbe Biology Section, Cornell University, Geneva

Managing diseases of brassicas can be a challenge. Cool and wet weather will certainly increase disease pressure on these crops (as well as on everything else you are growing), while hot dry weather can stress the plants. Two of the most common diseases we see in New York every year are black rot and *Alternaria* leaf spot. The best way to manage disease is to 1) grow resistant varieties when available 2) start with disease-free seed or transplants 3) rotation is critical – minimum three-year rotation before growing another brassica crop 4) foliar pathogens generally need water on the plant leaves to cause disease so reducing leaf wetness can go a long way in disease management as long as we don't get too much rain!

Black rot is a disease that my lab has studied for quite some time. Caused by the bacterial pathogen *Xanthomonas campestris* pv. *campestris* (Xcc), black rot thrives in wet and warm weather. Symptoms of black rot generally begin with yellowing at the leaf margin, which expands into the characteristic V-shaped lesion. This pathogen is systemic, meaning that it can enter the veins of the plant and spread throughout the plant and even into the cabbage/cauliflower/broccoli head. Blackening of the vascular tissue is typical in severe infections. As with most pathogens, control can be very difficult when the weather is conducive for disease. Once a plant is infected, there is no rescue treatment since the pathogen is systemic however copper-based products are effective in controlling spread to healthy plants. Work done in our lab has shown that new strains of Xcc enter New York each year, and that the pathogen generally does not overwinter on-farm if proper crop rotation and sanitation methods are used. Sanitation is critical for disease management. If growing transplants, sanitizing the greenhouse, flats, and anything used in transplant production prior to the start of the season is key. We have also done studies to determine if commonly used brassica cover crops could serve as a host for the black rot pathogen. All cover crops tested (3 radish, 4 turnip, 6 mustard and three rapeseed/canola cultivars) could serve as a host for Xcc, with the radishes having the highest incidence of disease symptoms.

Copper is currently the most widely used strategy for controlling black rot in brassica crops. During the summer of 2020, my lab started a new project to determine if copper resistance was widespread among Xcc isolates collected in NY. A collection of 250 isolates from diseased brassica crops (2004-2020) were tested for copper resistance. Of the 250 isolates, 220 were susceptible, while 30 were tolerant (able to grow) at 200 parts per million copper. We are now working to understand the mechanism of copper resistance in these 30 isolates.

Alternaria leaf spot is a fungal disease caused by several species of the fungus *Alternaria* but the most common culprit in NY has been *Alternaria brassicicola*. The disease begins as small black or brown dots on the leaf surface, which grow in size and become dark target-shaped lesions. The older lesions produce many black spores that can spread to other plants by wind, water, or animals. In cauliflower, cabbage and broccoli, the spores can splash onto the head and cause head rot. The *Alternaria* pathogen needs either free water or very high humidity for spore

production, germination and infection, so wet seasons certainly increase the chances of this disease. The fungal spores can survive on seed, susceptible weeds, or on crop debris in the field. Cultural controls include removal of diseased seedlings from a greenhouse or seed bed, a three-year rotation away from crucifer crops, destroy crop debris after harvest, and increase row spacing to improve air movement and decrease leaf wetness.

The Smart lab is part of a new project, together with Georgia, Virginia, and Nebraska, to study *Alternaria* leaf spot and head rot on broccoli. Growers have seen an increase in both incidence and severity of *Alternaria* on brassica crops over the past several years. We are now studying isolates from recent outbreaks to determine if they are *A. brassicicola* or a new species attacking brassica crops. Starting in the summer of 2021, we will be performing cultivar trials, fungicide efficacy trials, as well as nutrition and irrigation studies to determine factors that increase the likelihood of disease. We will also be collecting isolates to assay for fungicide sensitivity and to determine the genetic diversity of the pathogen population. Knowing sensitivity of NY isolates to commonly used fungicides will enable the use of the most effective control products.