Black Leg Fungus in Cruciferous Vegetables

By Sheri Rylaarsdam
June 4, 2021

Protect our vital crops

Skagit County is home, not only to tulips that wow visitors from around the world, but to cole crops that help feed the world. Now these cole crops (also known as crucifer or brassica crops), including broccoli, Brussels sprouts, kale, mustards, turnips and radishes, are being threatened by black leg, a disease caused by two species of the fungus *Leptosphaeria*, *L. maculans* and *L. biglobosa*.

This fungus can infect seed of cole crops, infect living cole plants, and can survive on cole plant debris (dead plant material).

Seedlings that grow from infected seeds readily become infected as a result of seed transmission. Infected seedlings might damp-off (die) or, if they survive, become stunted. Infected plants can die if the stem becomes infected at the soil line.

When spores of the black leg fungus land on a cole plant leaf or stem, they germinate and penetrate the plant tissue, and produce pale, irregular to circular or oval spots. These turn ash-gray in the center with scattered tiny black dots. The black dots are pycnidia, the fruiting body of the asexual stage of the fungus, which produce more spores. These spores are splash-dispersed and can spread by splashing rain, irrigation water, or workers and equipment moving through infected fields. Infection of a plant at the soil line can lead to a canker that girdles the stem, leading to decay of the pith tissues inside the stem. A brown to gray to black rot develops in the infected stem, which is why the disease is called black leg.

The fungus can survive in cole plant debris after infected plants die. The fungus survives until the debris completely decomposes, which can be up to four years for thicker tissues like stems of plants, especially if the plant debris is not incorporated into the soil. In infected plant debris, the fungus produces the asexual fruiting bodies, pycnidia, and pseudothecia, which are the fruiting bodies of the sexual stage, *Leptosphaeria*. The pseudothecia release ascospores into the air when the air dries out following wet conditions, and when the temperature ranges from 46º - 59 º F, which is in the fall, winter and spring in the Pacific Northwest. They can be spread several miles by the wind.

What can gardeners do to protect their own cole vegetables and prevent the disease from spreading to local fields?

First, plant only seed that has been tested and certified to be pathogen-free. Planting non-tested seed purchased on the internet poses the most danger of the *Leptoshaeria* fungus being introduced to our area inadvertently.

Once your cabbage, broccoli or other cole crops are growing, look at the underneath surface of the lower leaves for the leaf spots described above and look for stem cankers. If infection is found, remove the symptomatic leaves. If the stems are infected, remove the infected plants. Foliar applied fungicides can be used but be sure to use an appropriate fungicide as recommended in the PNW Disease Management Handbook. Always follow the label directions, including safety requirements.

If you need help with identification, take clear, close-up pictures and send them to skagitmgplantclinic@gmail.com.

A black leg lesion on a cabbage leaf with typical symptoms of a dead (necrotic) tissue in the center of the lesion that becomes white/gray in color. It is surrounded by a yellow (chlorotic) margin, with small, black, asexual fruiting bodies (pycnidia) in the center of the lesion. Photo by Lindsey du Toit.

Another method to arrive at a diagnosis is to collect infected leaves, put them into a resealable bag with a moist paper towel, put the bag in the refrigerator for a few days. Then look at the black dots (pycnidia). If the pycnidia are exuding a pink to purplish ooze (of spores), that is a good sign this might be positive for black leg. Negative for your poor plant.

Get rid of volunteer crucifers and cole weeds that are also susceptible to black leg: various mustards, birdsrape, wild radish and turnips.

After harvest, remove plant debris, even of disease-free coles, as quickly as possible. You can also chop up the plant tissues and bury them deeply.

Skagit County farmers are genuinely concerned about the threat *Leptospheria* poses both to the cole crops raised for the fresh market and crops grown for seed. In 2019, Skagit farmers grew about 2,500 acres of Brussel sprouts, cauliflower and broccoli for fresh markets. The same year, the total value in cabbage seed production was $1,890,000.

Skagit County has been known as a black leg-free cole vegetable and seed production area for ~40 years, and this has given our farmers an advantage in the competitive world market. In the

past, in the rare instances when black leg infections have occurred, the seed industry has been able to eradicate the disease by strict measures, including crop destruction.

There are very few places in the U.S. where biennial brassica seed crops can be grown because of the unique climatic requirements needed for the plants to flower and set seed. One needs a winter that is cold enough to trigger bolting, conversion of a plant from vegetative to reproductive growth, but not cold enough to kill the plant. Western Washington and Western Oregon are the only places in the U.S. that cabbage seed crops can be grown.

As a community, we need to do everything possible to support and protect this vital, difficult to replicate, seed industry.

Here's a problem for your family mathematician to solve:

One acre of cabbage grown to produce hybrid seed yields ~2,000 pounds of seed, enough to plant ~10,000 acres of cabbage which, when planted, would produce 50 million pounds of cabbage. In 2019, Skagit farmers planted 189 acres of cabbage seed crops. How many pounds of cabbage could those seeds produce?

The answer is . . . . 9,450,000,000. Yes, BILLIONS. Way to help feed the world!

A black leg lesion with asexual fruiting bodies (pycnidia) on one of the cotyledons. Photo by Lindsey du Toit.

RESOURCES:

- Protect Oregon's Brassica Crops: ODA's black leg rules aim to control disease outbreak. Oregon State University OSU Extension Service. https://extension.oregonstate.edu/pests/weeds/diseases.
- Cabbage and Cauliflower (Brassica spp.) Black Leg (Phoma Stem Canker). Pacific Northwest Disease Management Handbook. https://pnwhandboks,org/plantdisease/host disease/brassicas.
- Dr. Lindsey du Toit, Professor and Extension Plant Pathologist, WSU Mount Vernon NWREC, April 15, 2021
- Don McMoran, Agriculture and Natural Resources Extension Faculty, Skagit County Director, WSU Skagit County. April 14.
- Skagit County Agricultural Statistics. WSU Skagit County Extension. extension.wsu.edu
- Skagitonians to Preserve Farmland. info@skagitonians.org