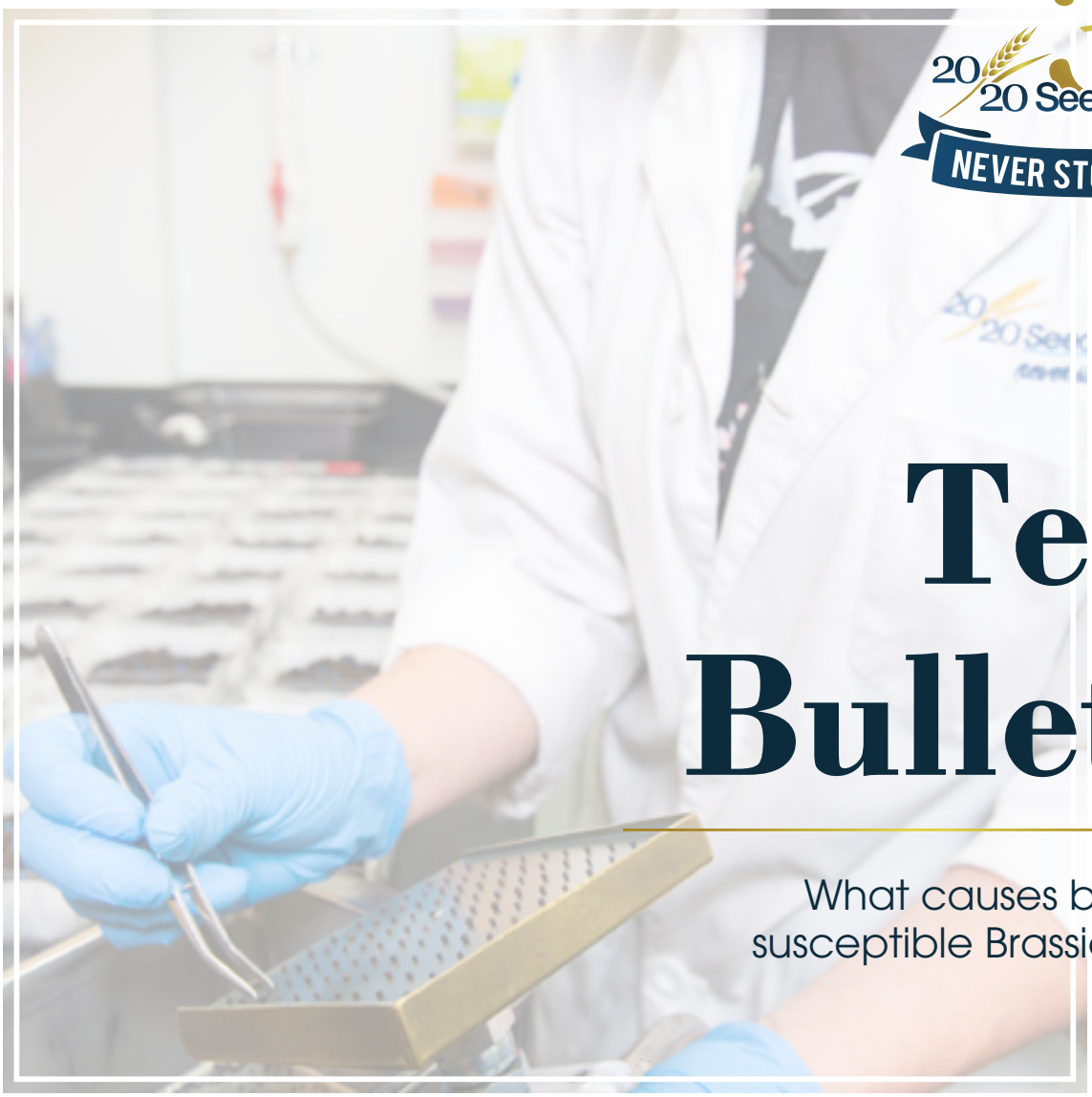

Tech Bulletin

What causes blackleg in susceptible Brassica crops?

Blackleg (stem canker) is primarily caused by the highly virulent fungal pathogen Leptosphaeria maculans. Blackleg infestations cause significant yield losses in susceptible crops.

Blackleg-infected crop and weed residues release fungal spores that are carried by wind or rain-splash to susceptible plants. Disease symptoms manifest as lesions on the cotyledons, leaves, stems, and pods. The infection spreads down through the petiole and into the stem causing dry rot and stem cankers. These cankers can be white to grey in colour with a dark border and contain small dark spots (pycnidia) where spores are produced. Stem cankers restrict the flow of water and nutrients thereby stunting the plants' growth and increasing the risk of lodging.

The Canola Council of Canada warns that even moderate infection can result in a significant drop in yield: https://www.canolawatch.org/2017/09/13/seed-how-much-blackleg-before-i-need-to-think-about-rotating-resistance/

Important agronomic management practices include crop rotation, field location, growing resistant varieties, fungicide application, and field scouting. Seed is not considered a major source of infection because certified seed is tested for blackleg and seed treatments are often used to prevent seed-borne infection. Keep in mind that seed treatments do not protect seedlings and older plants from later infection.

Longer crop rotations are the first step to preventing a disease epidemic. Canola stubble can take 3-5 years to fully decompose.

Rapeseed.

Records of field location and history need to be considered. A minimum 3-year rotation between blackleg-susceptible crops is recommended as infected plant residue can release spores for 3-5 years post-harvest. Be aware that spores can travel short distances by wind.

Scouting crops to monitor for blackleg symptoms allows growers to assess whether fungicide application is warranted. Plants exhibiting symptoms can be submitted to 20/20 Seed Labs for testing to verify if the symptoms are caused by the blackleg pathogen.

The Canola Council of Canada has excellent scouting tips and blackleg information: https://www.canolacouncil.org/canola-encyclopedia/diseases/blackleg/

Resistant varieties provide a vital tool in preventing blackleg infections from impacting yield. Since 2003, disease presence has been increasingly noted in resistant varieties, suggesting a genetic shift in virulent blackleg populations. Use of alternative resistant varieties and good agronomic practices will help to minimize yield loss and maintain the effectiveness of genetic resistance.

Blackleg on canola leaf with pycnidia.

In 2018, the Canola Council of Canada introduced a voluntary labelling system for breeders to identify the major blackleg resistance genes bred into individual canola varieties. The objective of this program is to enable growers to specifically select varieties that would be most able to resist virulent blackleg populations present in specific fields.

Blackleg pseudothecia on a canola stem.

How do you test the results?

20/20 has two Blackleg tests available:

1. Standard Blackleg test:

a. The grower submits 20 stems with apparent blackleg disease symptoms.

b. Our Disease diagnosticians dissect the stems to determine if blackleg pycnidia are present.

c. Specimens are then tested for the presence of the blackleg fungus.

2. Kompetitive Allele Specific PCR (KASP) - Blackleg:

20/20 Seed Labs Inc. cultures and genetically fingerprints the blackleg fungus from diseased plant stems to identify which fungal Avirulence (Avr) genes are present, in order that specifically resistant plants can be identified and used to block infection.

a. The grower submits 20 stems with apparent blackleg disease symptoms.

b. Stems are cultured for 2-3 weeks to isolate the blackleg fungus. Our disease diagnosticians examine the cultures to identify virulent blackleg strains.

c. DNA is extracted from individual cultures of virulent blackleg and subjected to KASP genetic fingerprinting. The process takes approximately 3 days. A report is issued that indicates Avr genes present in the isolated strains. A predicted phenotype will also be given to indicate activity of the Avr genes found.

d. Growers match plant Resistance (Rlm) genes to the pathogen Avr phenotype to select appropriate canola varieties to plant in the field. More Avr genes present in a fungal strain gives the grower more resistance options, but only one Avr gene per pathogen needs to be matched by the plant to generate resistance. If a common Avr gene occurs across all pathogen phenotypes within a field, a single corresponding plant Rlm gene will be sufficient to protect yields.

Blackleg infected canola roots and basal stems, also showing root maggot damage.
Photo by Vikram Bish and Province of Manitoba

Pycnidia found on four-leaf canola,.
Photo credit Canola Council of Canada

Testing can reduce the introduction of new blackleg populations into fields, and allows growers to select canola varieties that are best able to resist blackleg populations present in specific fields. Additional information on selecting plant varieties to resist virulent blackleg is available through the **Canola Council of Canada**: https://www.canolacouncil.org/media/597865/18CCC9862_Understanding-Blackleg-Resistance-WEB1.pdf . www.blackleg.ca

Please contact us for more information.

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