InVigor® | BASF We create chemistry

INVIGOR HYBRID CANOLA
Blackleg Resistance

At BASF, the longevity and continued success of the American canola industry is as important to us as it is to you. With this in mind, our team knows that our blackleg management tactics need to provide tangible and clear value to growers, the industry and our trade partners.

Don’t give blackleg a leg to stand on.

Blackleg can be most effectively managed with a coordinated and comprehensive integrated pest management (IPM) plan that includes:

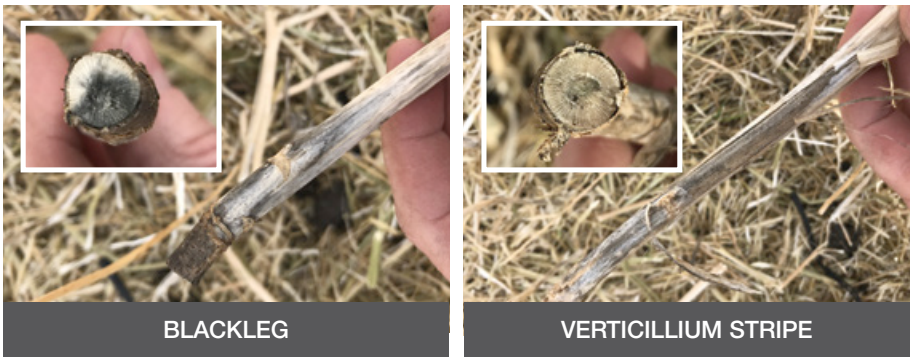
- Utilizing newest ‘R’ rated hybrids
- Scouting fields, properly identifying and monitoring the infection
- Managing susceptible weeds and volunteer canola to reduce inoculum sources
- Using a registered fungicide at the proper timing (see our frequently asked questions section on the back for more information)
- Utilizing a seed treatment such as Vercoras® seed treatment to protect cotyledons through critical infection period and reduce potential for stem infection

BASF understands that farming is a balance of agronomy and business. That being said, BASF recommends following a minimum of a 1-in-3-year canola rotation.

Identifying blackleg.

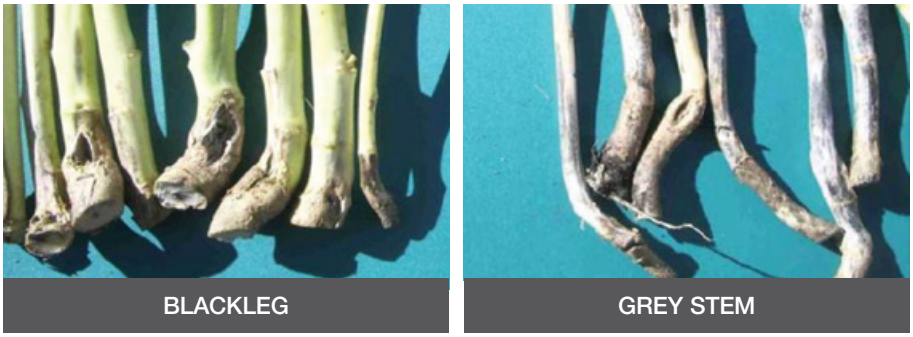
Many canola diseases can be misdiagnosed as blackleg due to visual similarities. To be certain of a correct diagnosis, a sample should be submitted for analytical testing (plate/PCR). These tests can include a disease or pathogen panel, or a blackleg race ID screen, if needed.

Blackleg vs. verticillium stripe



Source: BASF internal trials

Blackleg vs. grey stem



Source: Canola Council of Canada

Resisting blackleg on multiple levels.

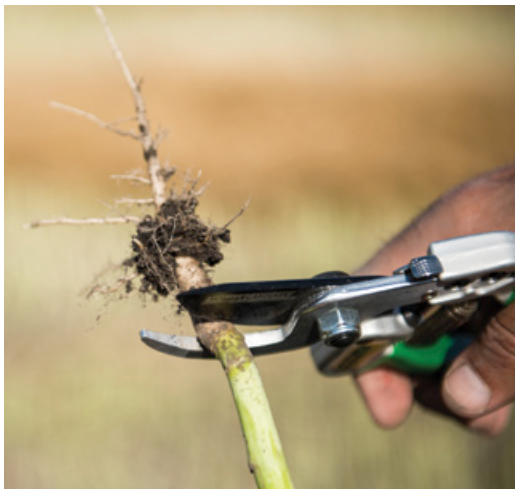
InVigor® hybrid canola utilizes a combination of both minor and major gene disease resistance to effectively manage blackleg infections across a wide range of blackleg races.

Minor gene resistance	Major gene resistance	Minor + major gene resistance
• Effective across multiple blackleg races • Helps to protect the longevity and durability of major genes • Having multiple minor genes strengthens the durability of the resistance within an individual hybrid • Protects the plant at later stages during the formation of cankers to slow down the disease • Minor genes have an additive effect to resistance across blackleg races • Also known as quantitative or adult plant resistance	• Targets a specific blackleg race, providing 1:1 resistance to that specific race • Will have no effect on other blackleg races that may be present in the field, and can induce a high level of selection pressure against individual hybrids • Protects seedlings at the site of initial infection on the cotyledons or leaves to limit the spread of the disease • Works by recognizing specific genes in the fungal pathogen to initiate the defense response • Also known as qualitative or seedling plant resistance	• This strategy has proven to be effective in providing high yielding, durable blackleg-resistant hybrids • Combines the benefits and protection of both major and minor gene resistance • InVigor hybrids developed with minor and major gene resistance often show better levels of resistance than hybrids with multiple major gene resistance • Simplifies the hybrid selection process for the grower • The combination provides both quantitative and qualitative resistance for adult plant and seedling plant resistance mechanisms

BASF blackleg solutions.

All InVigor hybrids are rated 'R' for resistant to blackleg. This resistance rating is given to a hybrid by comparing their blackleg sensitivity to a susceptible variety. Relative ratings are based on the information provided in this table—with Westar being the susceptible check variety.

FIELD RESISTANCE RATING	% DISEASE SEVERITY OF WESTAR
R (Resistant)	0-29
MR (Moderately Resistant)	30-49
MS (Moderately Susceptible)	50-69
S (Susceptible)	70-100



When selecting a blackleg-resistant hybrid, the year of registration for the resistance profile will help to identify or define which "newest" hybrid you should be selecting. Though all InVigor hybrids fall under the resistant category, InVigor L357P contains exceptional blackleg resistance, even for an R-rated hybrid.

Vercoras™

Seed Treatment

Introducing our new seed treatment for canola.

A new seed treatment offered on all InVigor hybrids. Vercoras® seed treatment is a frontline insecticide along with four unique fungicide active ingredients delivering broad-spectrum protection against both flea beetles and key diseases, including blackleg.*

*Vercoras is an on-seed application of Vercoras F3 seed treatment, Vercoras insecticide seed treatment and Vercoras XC seed treatment.

Additional protection in your IPM program.

Priaxor® fungicide delivers advanced health benefits and a high level of blackleg management for more consistent performance.

Priaxor®

Xemium® Fungicide

Frequently asked questions – blackleg in canola.

At BASF, our goal is to keep growers informed about the latest agronomic research information. That's why we're providing this question and answer section to address several key findings on managing blackleg in canola.

Q. How many blackleg races can I expect to find in my field?

A. As with all other aspects of field variability, each individual field will contain many different races of blackleg and predominant races can vary throughout.

Q. Can I send a soil sample in to test for blackleg races?

A. Yes, you can. However, it is important to remember that there can be many different blackleg races spread across your field, which are not evenly distributed. Because of the random nature of soil sampling, you may not detect all of the races present in your field. For this reason, we suggest growing hybrids that utilize both minor and major gene resistance, which is effective across many different races.

Q. What is the difference between qualitative and quantitative resistance, and how do they relate to minor and major gene resistance?

A. **Qualitative resistance = major gene resistance = seedling resistance.**

This kind of resistance protects the canola plant at early stages (cotyledon through first true leaves) by isolating and pre-maturely killing cells around an infection point to stop the spread or advancement of the disease.

Quantitative resistance = minor gene resistance = adult plant resistance.

This kind of resistance aids the plant from early growth stages through to harvest by slowing down any potential threat or spread of blackleg that may have entered the plant.

Q. What additional benefits does Vercoras seed treatment provide when all InVigor hybrids are resistant to blackleg?

A. Resistance does not equal disease immunity and blackleg populations can evolve over time. Vercoras adds another layer of defense to protect the seedling from potential disease infections and helps protect the longevity of resistance genetics.

Q. When should I plan to make a foliar fungicide application to manage blackleg?

A. You should plan to apply a foliar fungicide, such as Priaxor, around 2 to 6 leaf in your canola when you have less than a 1-in-3-year canola rotation, a history of blackleg, high inoculum levels in a field or following an event such as hail causing tissue damage or open wounds where blackleg can enter the plant.

To learn more about products from BASF, visit **www.agproducts.basf.us** or contact your local BASF representative.

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Results may vary on your farm due to environmental factors and preferred management practices.

Always read and follow label directions.

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