



canolacouncil
OF CANADA

Managing Blackleg and Verticillium Stripe in Canola

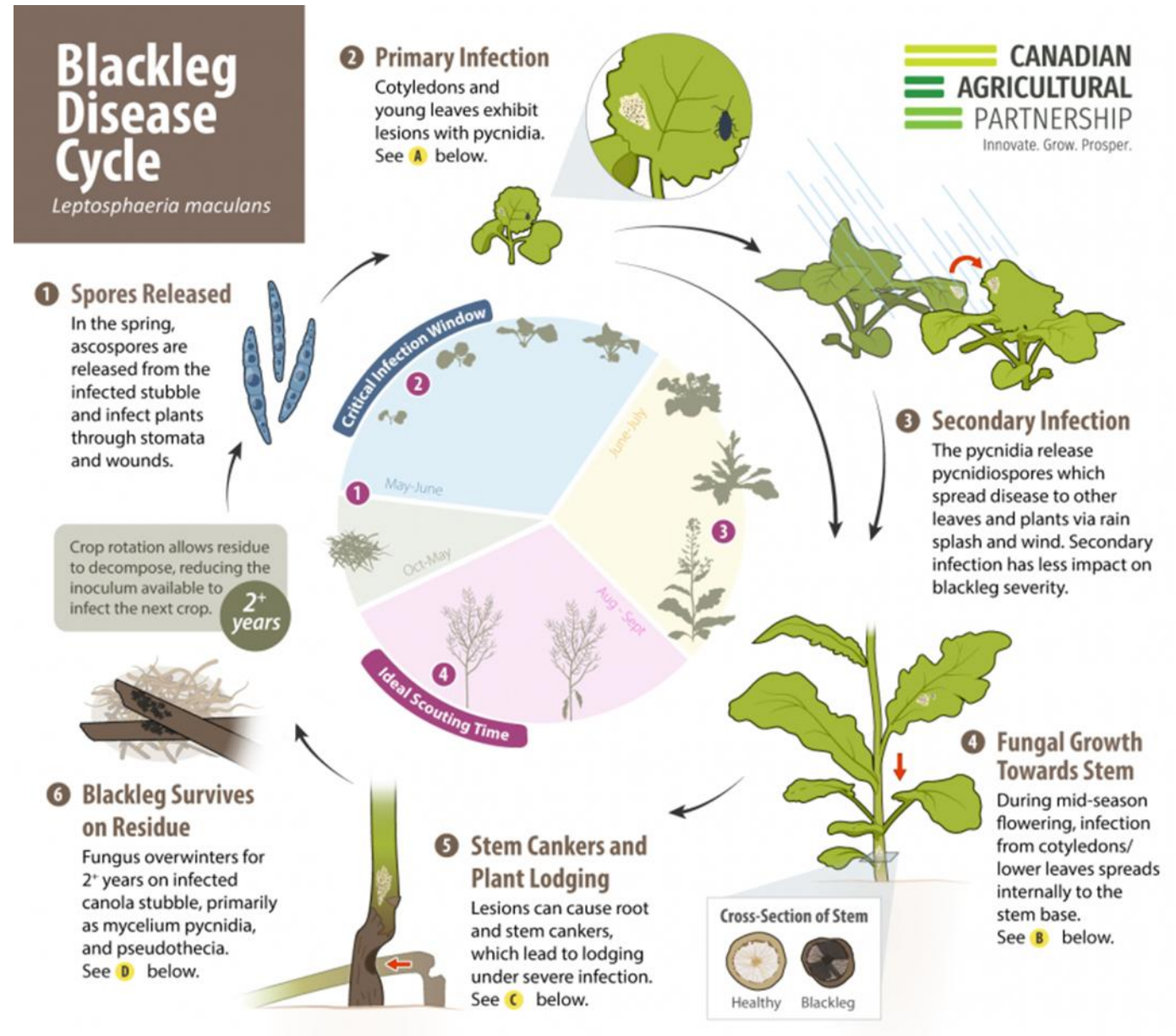
IHARF Soil and Crop Management Seminar - Feb 5, 2025

Warren Ward



Disease Cycle

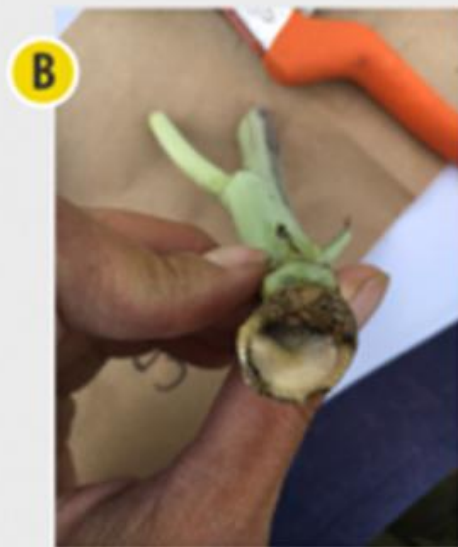
1. Spores released from infected stubble
2. Cotyledons and young leaves show lesions with pycnidia
3. Pycnidia release spores that travel to other leaves via rain splash and wind
4. Fungal growth down towards stem
5. Lesions cause stem cankers and lodging
6. Blackleg survived on residue and overwinters 2 years



Symptoms of blackleg disease in canola plants:



Early stages present as lesions with pycnidia (black specks) on the leaves.



The stem displays varying degrees of black, as seen in cross-section.



Late stages present with root and stem cankering (shrunken, pinched areas).



Pseudothecia and pycnidia can be seen on old canola stubble.



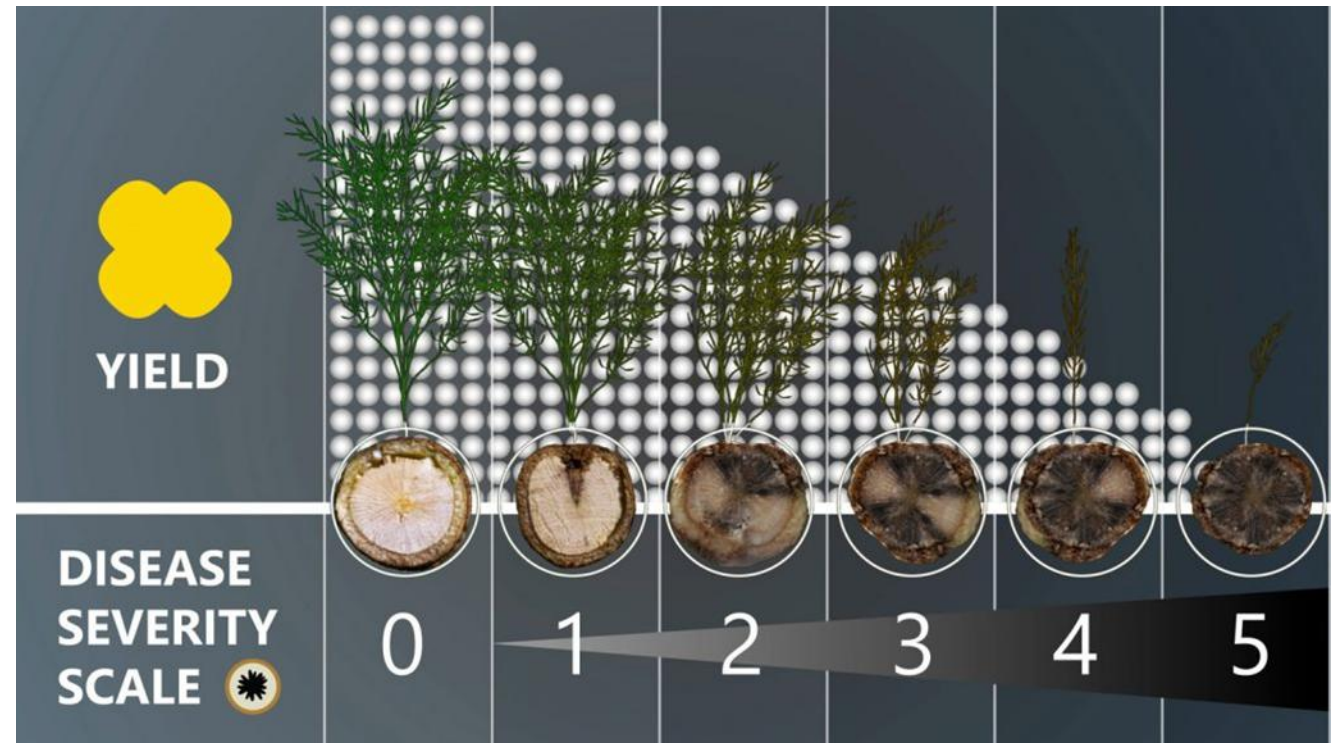
Favorable Conditions

Blackleg

- Warm, humid conditions
- Wet conditions favor rapid spread and development of the disease

Scouting Blackleg

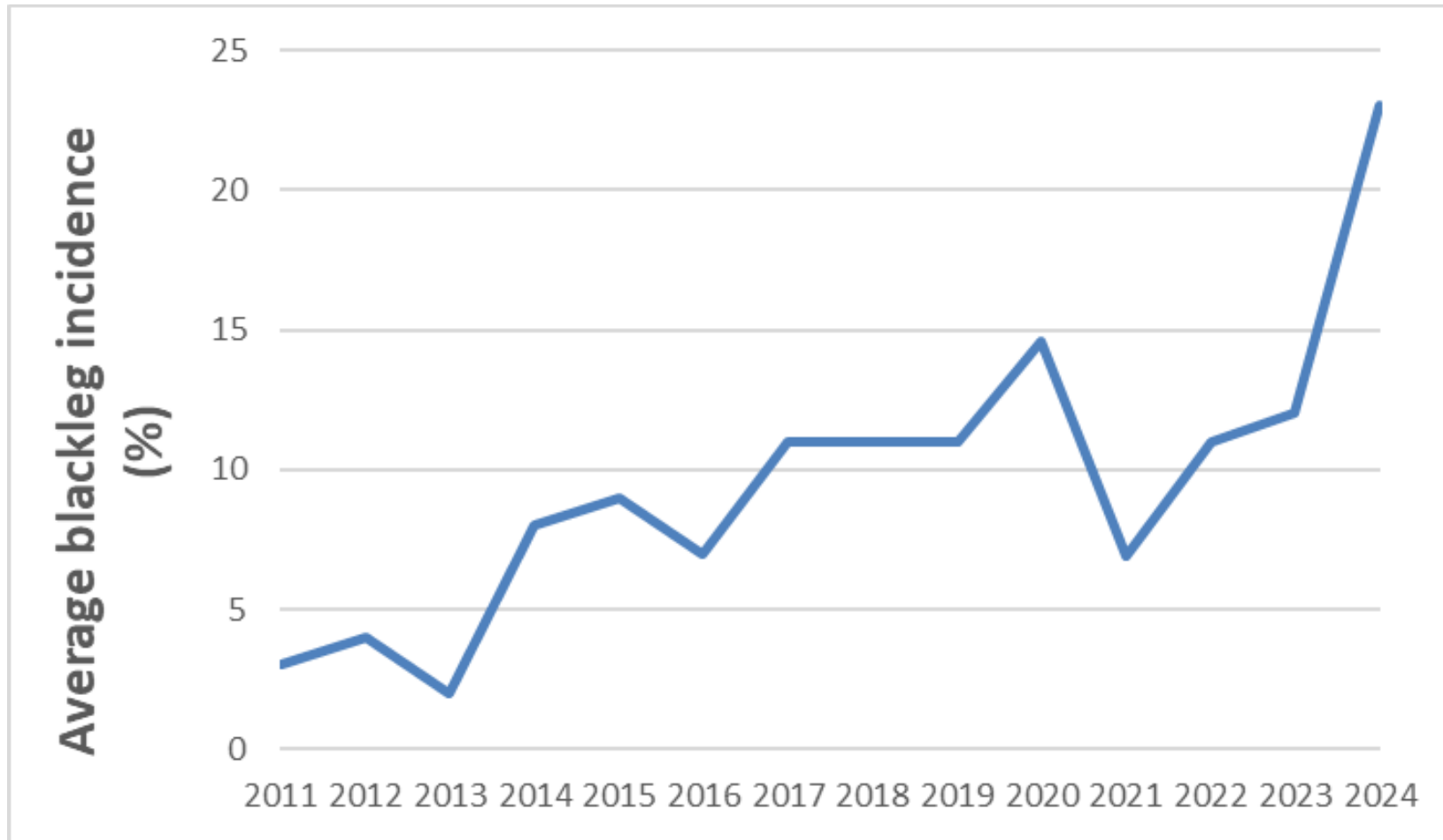
1. Prior to planting (old stubble pycnidia)
2. Vegetative Stage
 - a. Cotyledon to two-leaf
 - b. Three to six-leaf
3. Swathing



Canola traits 2024

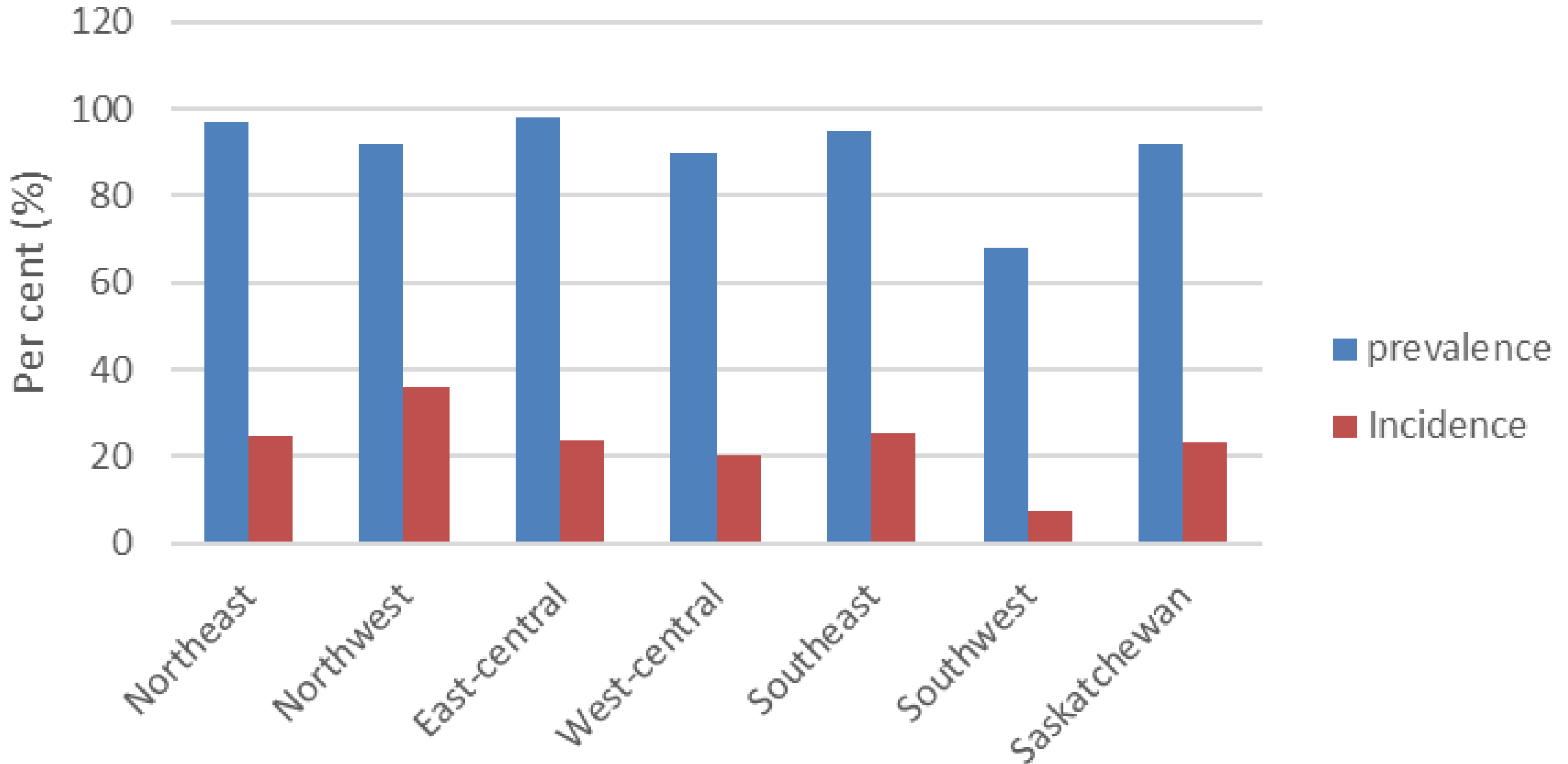
Distributor (Brand)	Name	Herbicide tolerance	Blackleg resistance (field label)	Blackleg resistance (group)	Clubroot resistance	Shatter rating
BASF (InVigor)	L233P	LL	R			
BASF (InVigor)	L234PC	LL	R		R*	
BASF (InVigor)	L340PC	LL	R		R	
BASF (InVigor)	L343PC	LL	R		R*	
BASF (InVigor)	L345PC	LL	R		R	
BASF (InVigor)	L350PC	LL	R		R	
BASF (InVigor)	L356PC	LL	R		R	
BASF (InVigor)	L358HPC	LL	R		R	
BASF (InVigor)	L359HPC	LL	R		R	
BASF (InVigor)	LR354PC	TF + LL	R		R	
Bayer (DEKALB)	DK400TL	TF + LL	R	E2	R	7.2
Bayer (DEKALB)	DK800LL	LL	R	A, E2	R	7.3
Bayer (DEKALB)	DK801LL	LL	R	A, G	R	7.3
Bayer (DEKALB)	DK900TF	TF	R	A, E2	R	7

Blackleg Incidence in Saskatchewan (2011-2024)



Source: SK Ministry of Agriculture

Blackleg prevalence and incidence in 2024

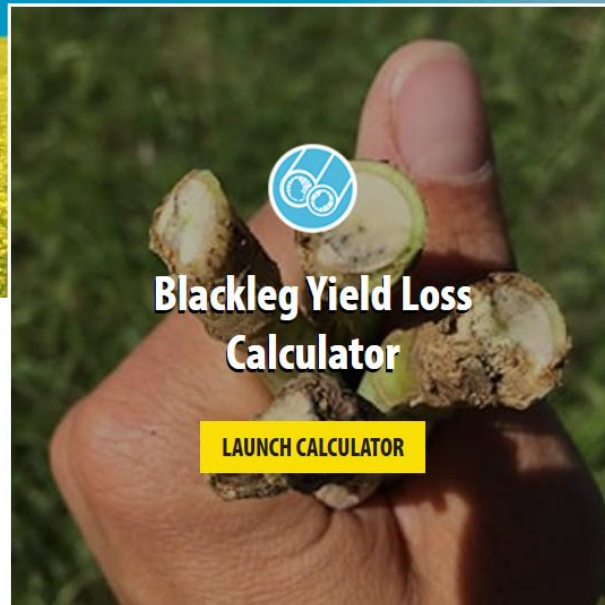


Source: SK Ministry of Agriculture

What does this mean for yield loss?

Canola Calculator

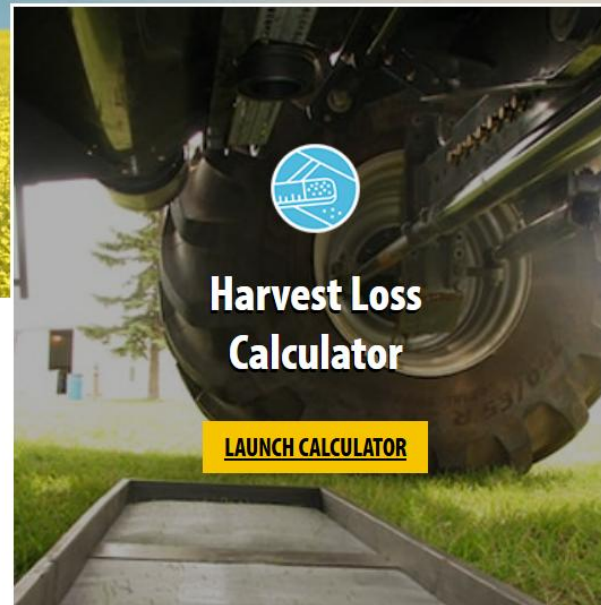
Minimize your **risk** and maximize your **profit**
with this suite of **canola tools**



Blackleg Yield Loss Calculator

LAUNCH CALCULATOR

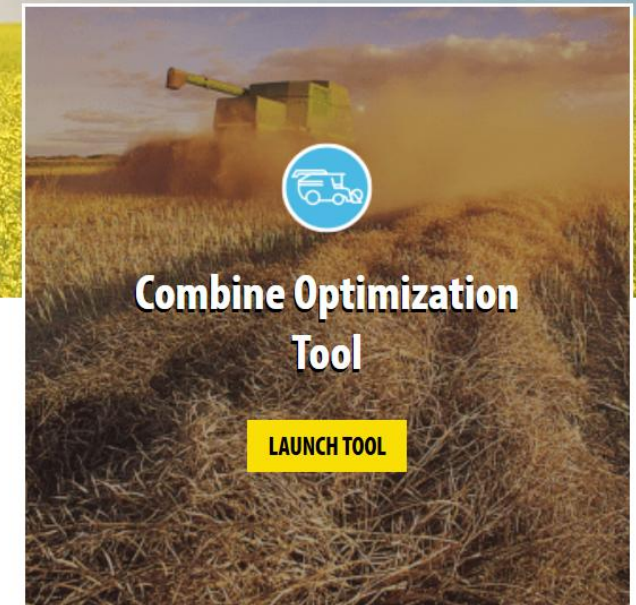
Calculate your potential blackleg yield loss based on severity, incidence and projected yield of your canola.



Harvest Loss Calculator

LAUNCH CALCULATOR

Calculate combine seed losses in weight, volume, or seed count, so you can adjust your settings appropriately to increase profitability.



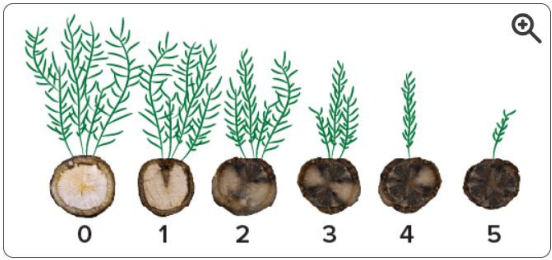
Combine Optimization Tool

LAUNCH TOOL

Identify and address grain loss, grain sample quality and combine productivity challenges to improve your canola harvest.

Blackleg Yield Loss Calculator Example

Blackleg Severity Rating 0-5



Use the images and 0 to 5 scale above to match blackleg severity of each plant you survey. Provide the average rating for all the infected plants surveyed.

1.6
Diseased tissue occupies 26 – 50 per cent of the cross-section.

Blackleg Incidence Percentage 55 %

55
Percentage of infected plants in that field.

Projected Canola Yield 50 bu/ac

50
Input the projected canola bushel yield per acre.

Price of Canola 12 \$/bu

12
Input the price of canola per bushel.

Percentage of estimated yield loss per infected plant:
3.73 %
Volume of potential yield loss:
1.02 bu/ac
Value of potential yield loss:
\$12.29/ac

Management Solutions

Blackleg

- Scouting
- Rotation
- Testing + genetic selection
- Seed Treatments/Fungicides (*Saltro, Nexicor, etc.*)
- Controlling weeds and volunteers

History in Canada

Verticillium Stripe

- Found in Manitoba 2014
- Later discovered across all prairie provinces
- Name change from Verticillium Wilt to Verticillium Stripe
- Relatively new disease to us, top research priority

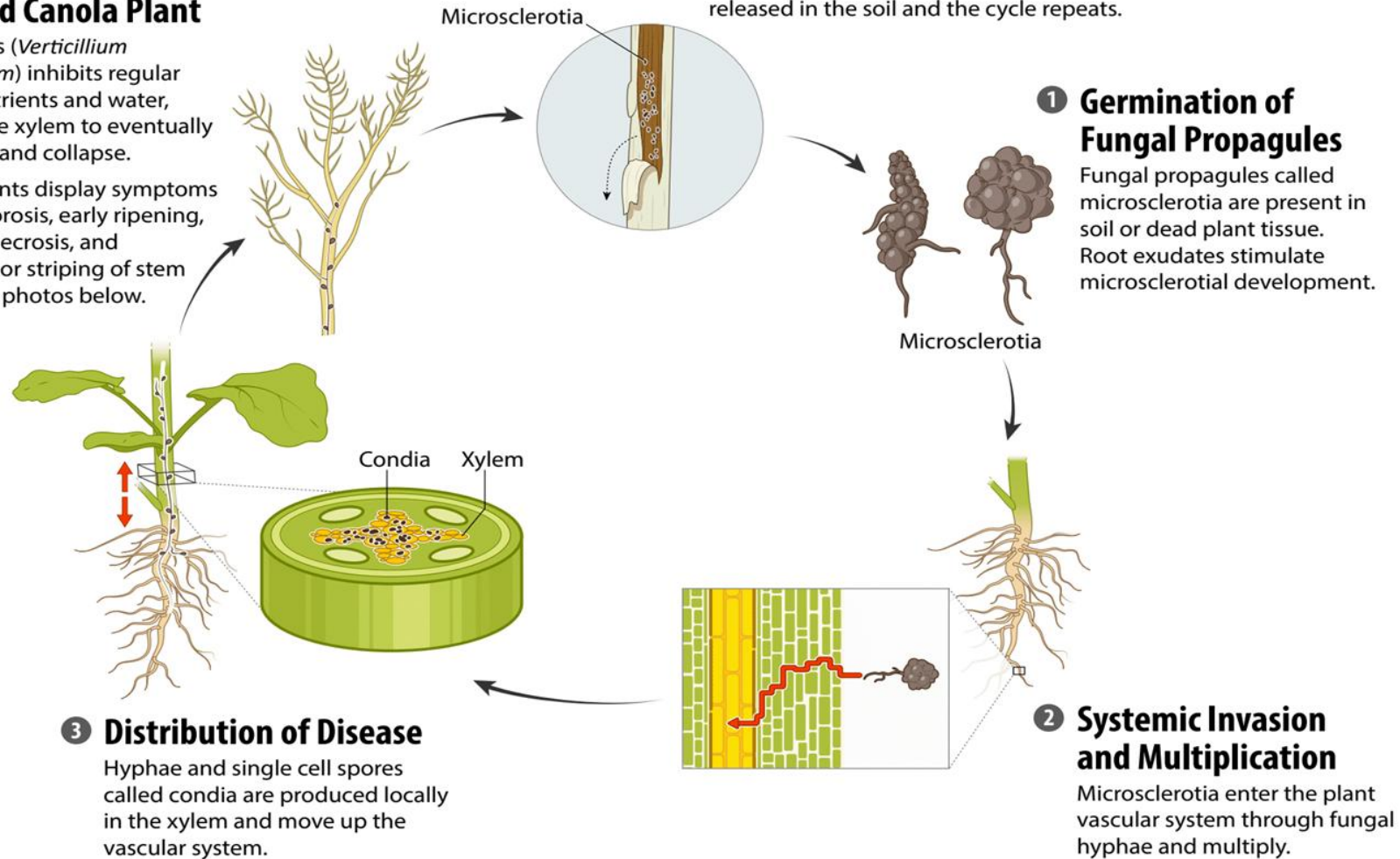
Verticillium Stripe Disease Cycle

(Caused by the fungus *Verticillium longisporum*)

4 Diseased Canola Plant

The fungus (*Verticillium longisporum*) inhibits regular flow of nutrients and water, causing the xylem to eventually turn black and collapse.

Canola plants display symptoms of leaf chlorosis, early ripening, stunting, necrosis, and shredding or striping of stem tissue. See photos below.



Symptoms + Diagnosis

Verticillium Stripe

Early Symptoms include
vertical striping up the main
stem.

This photo taken ~10% SCC



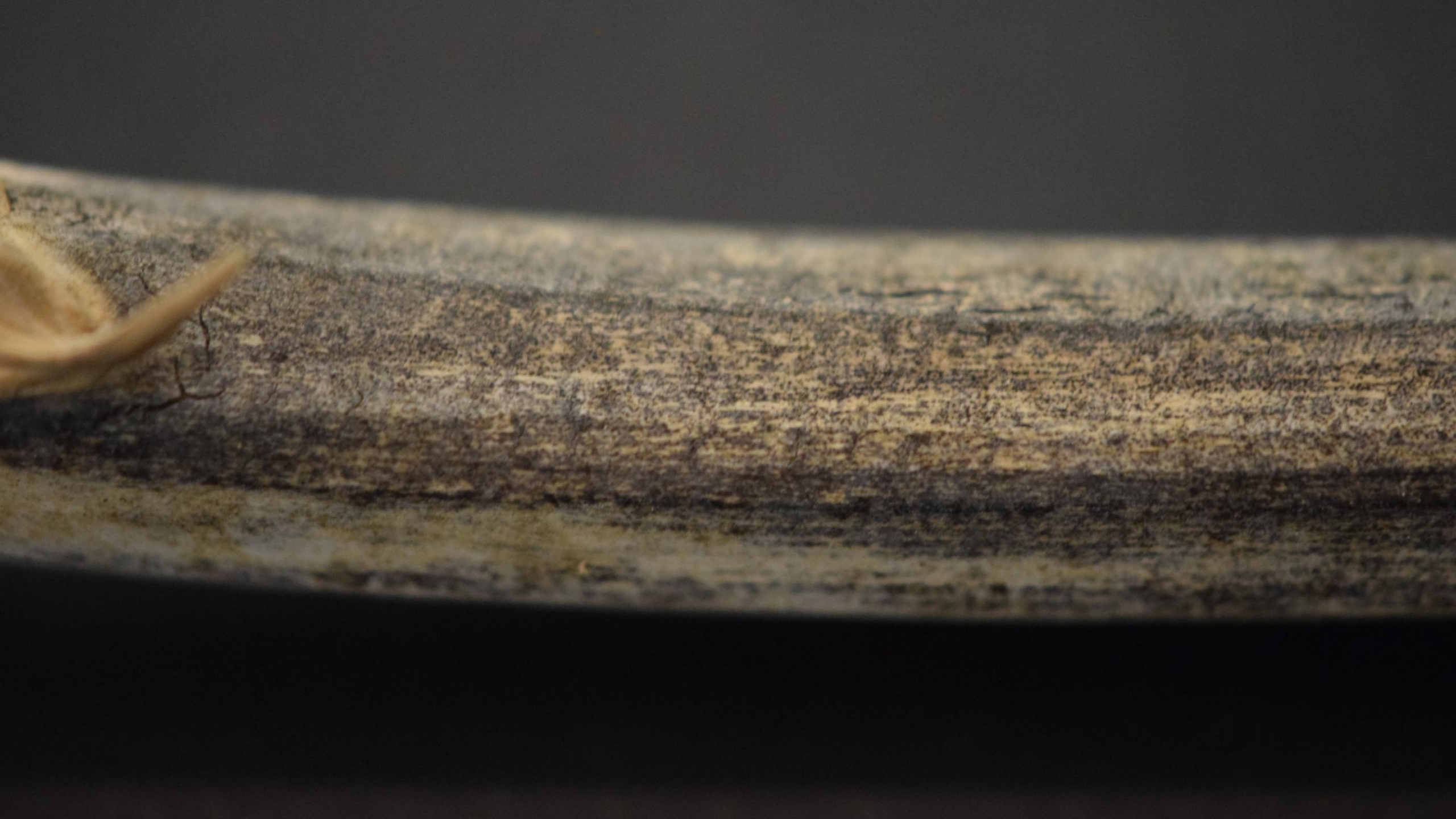


Verticillium

Blackleg

Clean













Favorable conditions

Verticillium Stripe

- Soil & air temperatures of 15-23°C (early season)
 - Moist spring is conducive to infection
- Thrives in hot, dry conditions (late season)
- Additional stressors increase risk
 - Blackleg
 - Sclerotinia? (observations from pathologists)
 - Poor/variable soils

Management

Verticillium Stripe

- Currently NO foliar or seed treatment fungicide
- Increase in rotation
- Minimize any extra stresses (Blackleg, other disease) – IPM approach
- Reduce the movement of soil
- Submit for testing to provincial labs



On-Going Research Projects

Where are we now?

- Verticillium identified as a top research priority
- Canola Agronomic Research Program (CARP) committed over \$2.7 Million in research proposals (4-year studies)



2022

Verticillium disease etiology and nursery –
Dilantha Fernando, Mario Tenuta, U of M

2023

Genetics and genomics of Brassica-Verticillium interaction
– *Hossein Borhan, AAFC Saskatoon*

2024

Verticillium Stripe – The Disease Management -
Sheau-Fang Hwang, Stephen (Steve) Strelkov

2027

Digging out the unknown: Finding the resistance against
verticillium stripe in canola – *Dilantha Fernando, U of M*

2028

Comparative analysis of *Verticillium longisporum* lineages in the Canadian Prairies: Safeguarding canola production – *Zhongwei Zou, Harmeet Chawla*

2028

Impact of synergistic interaction between *V. Longisporum* and *L. maculans* on canola yield – *Hossein Borhan, AAFC Saskatoon*

2028

Investigating the conditions favoring verticillium stripe development and yield losses in canola - *Sheau-Fang Hwang, Fouad Daayf ***

2028

A comprehensive survey of verticillium stripe and establishment of a disease nursery in Morden, Manitoba - *Ahmed Abdelmagid*

pH effect on Verticillium Stripe?

- Snippets published this fall from first year results of ongoing CARP project “*Investigating the conditions favoring verticillium stripe development and yield losses in canola - Sheau-Fang Hwang, Fouad Daayf*”
- Only 1 year in to 4 year study.
- Study suggest that *neutral to alkaline* environments promote pathogen growth, resulting in more severe disease symptoms. Fungus showed the fastest in vitro growth at pH **7.4 and 8.6**
- Conversely, *V. longisporum* displayed significantly smaller colony diameters when the pH was **<6.5**, suggesting poorer growth under acidic conditions
- ***However, the mechanism(s) by which pH influences the growth or pathogenicity of this fungus remain(s) unclear and requires further investigation***

VSSC

Steering Committee + Ongoing work

Composed of 24 members - that contribute feedback from their area of expertise and bring forth potential areas of concern for verticillium management

- Plant pathologists, VS key researchers, provincial extension staff, provincial canola producer groups, life science + industry members

Current Focus Areas:

1. Industry-wide rating scale
2. Lab ring-test
3. Develop harvest “best management” practices

VS Rating Scale

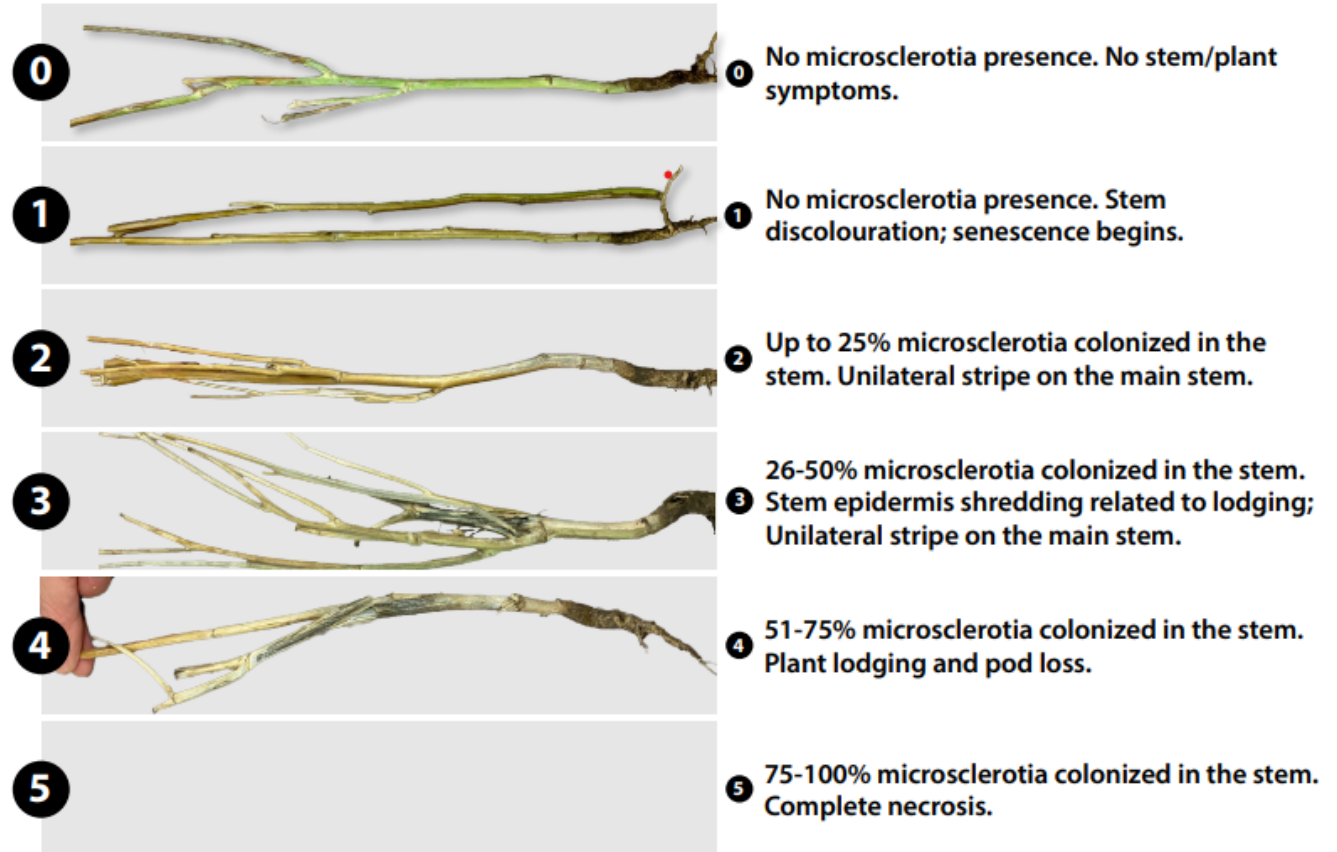
Winter 2025

- Adapted from Sheau-Fang's work, expanded to a 0-5 scale
- VSSC voted on new images to help create a clear visual for evaluating Verticillium disease severity
- New imaging working with graphic designer and should be available early 2025.

Verticillium stripe disease severity scale

Time of surveying: Close to harvest timing, 80-90% seed colour change (SCC)

Disease severity rating scale for verticillium stripe with photos* and microsclerotia and stem/plant symptom descriptions.



*Upper branches have been clipped on the plants, focus on stem discolouration. Photo source and scale adapted from research by: Sheau-Fang Hwang & Stephen Strelkov, University of Alberta.

Version: Aug-22-2024



THANK YOU

Questions?

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or

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