Blackleg extension
Meeting the needs of the modern agronomist

Current resources

Blackleg management guide

- Blackleg ratings as bare seed (GRDC funded).
- Blackleg rating with seed treatments (GRDC / seed company payment).
- Major gene resistance complement (R Groups).
- R group rotation matrix.

TABLE 3 2020 Spring Blackleg ratings and resistance groups. See page 3 (Step 4) for information on how to use this table.

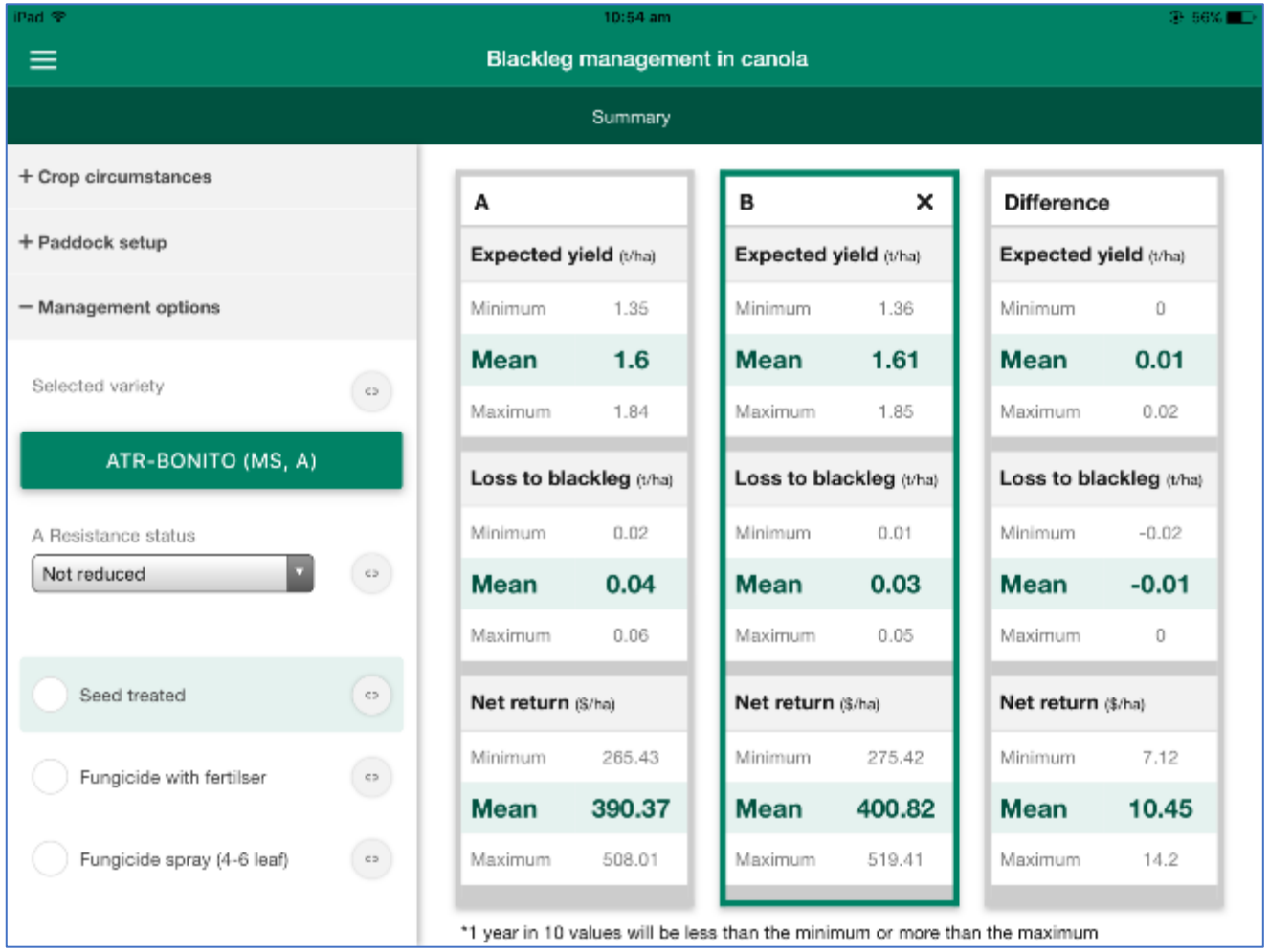
Variety	2020 Blackleg Rating Bare	2020 Blackleg Rating Jockey	2020 Blackleg Rating ILeVo	2020 Blackleg Rating Saltro	Type	*Section A* – Resistance group of cultivar	*Section B* – Resistance group of previous year's cultivar (stubble)														
							A	B	C	AB	AC	AD	ABC	ABD	ABF	ABS	ABDF	ABDS	BF	BC	H
CONVENTIONAL VARIETIES																					
Nuseed Quartz	R				Hybrid	ABD															
Nuseed Diamond	MR	R	R	R	Hybrid	ABF															
AV-Garnet[b]	MS				Open pollinated	A															
TRIAZINE-TOLERANT VARIETIES																					
Hyola® 350TT	R	R	R	R	Hybrid	ABDF															
HyTTec Trifecta	R				Hybrid	ABD															
HyTTec Trident	R				Hybrid	AD															
Hyola® Blazer TT	R				Hybrid	To be determined															
Monola® 420TT	R				High stability oil, Open pollinated	AD															
HyTTec Trophy	R				Hybrid	AD															
Monola® H421TT	R				High stability oil, Hybrid	BC															
SF Spark TT	R	R	R	R	Hybrid	ABDS															
Hyola® 559TT	R			R	Hybrid	ABD															
Pioneer® 44T02 TT	R		R		Hybrid	ABD															
Pioneer® 45T03 TT	R		R		Hybrid	ABD															
Monola®416 TT	R-MR				High stability oil, Open pollinated	B															
DG 670TT	MR		R	R	Hybrid	BF															
ATR-Mako[b]	MR	R-MR	R	R	Open pollinated	A															
ATR-Stingray[b]	MR	R	R	R	Open pollinated	C															
InVigor® T 4510	MR	R	R	R	Hybrid	BF															
SF Ignite TT	MR	R	R	R	Hybrid	BF															
SF Turbine TT	MR-MS	R	R	R	Hybrid	BF															
SF Dynatron TT	MR-MS				Hybrid	BC															
InVigor® T 3510	MR-MS	MR	R		Hybrid	BF															
InVigor® T 6010	MS				Hybrid	BC															
ATR-Wahoo[b]	MS				Open pollinated	A															
ATR-Bonito[b]	MS	R-MR	R	R	Open pollinated	A															
CLEARFIELD® SYSTEM VARIETIES																					
Hyola® 970CL	R	R	R	R	Winter, Hybrid	H															
Phoenix CL	R				Winter, Hybrid	B															
Pioneer® 45Y93 CL	R		R	R	Hybrid	BC															

GRDC

BlacklegCM

The grower puts in their parameters:

Potential yield: 2 t/ha
Seeding rate: 3kg/ha
Grain price: $500/t
Production cost: $400/ha
Canola in the district: 20%
Spore maturity risk: High
Distance to 1 year old stubble: 10 metres
Distance to 2 year old stubble: 200 meters
2 year old stubble: standing
Cultivar: ATR Bonito
Seed treatment: No
Fungicide with fertiliser: No
Fungicide spray: No

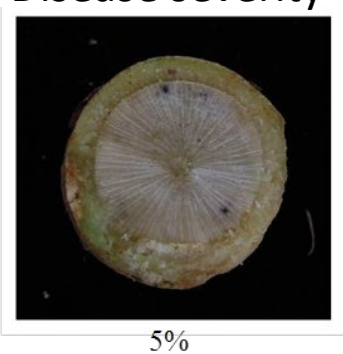


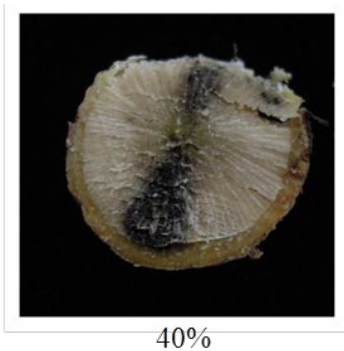
The predicted yield loss from blackleg is 20%.

Field blackleg monitoring

- **Utilise the NVT network.**
- **Monitoring sites have 9 cultivars to represent all resistance groups.**
- **Collect new blackleg populations.**

Disease severity





Summary of all Australian blackleg monitoring sites for 2020

The 2020 blackleg monitoring site results are presented within this document. An explanation of the colour key is found on the following page and suggested management strategies are provided. The below information applies t all regions and cultivars.

General information:

Background:

- Blackleg disease can be minimised by a number of factors including: sowing cultivars with high black resistance; avoiding sowing canola in close proximity to last year's stubble; and applying fungicides; BlacklegCM App to estimate your risk; see the current Blackleg Management Guide for detail www.grdc.com.au.
- An additional method for minimising disease is rotating cultivars with different resistance genes.
- All canola cultivars are classified into different resistance groups based on their resistance genes. Refer to current Blackleg Management guide (www.grdc.com.au) for resistance groups for individual cultivars.
- Cultivars representing each of the resistance groups are sown at 30 trials across Australia and monitored

2020 Site recommendations

Site	Resistance Group						
NSW	**A**	**B**	**C**	**BF**	**AD**	**ABDF**	**H**
Beckom							
Condobolin							
Cootamundra							
Cudal							
Gerogery							
Grenfell							
Lockhart							
Parkes							
Wagga Wagga							
Wellington							
SA	**A**	**B**	**C**	**BF**	**AD**	**ABDF**	**H**
Arthurton							
Cummins							
Keith							
Riverton							
Roseworthy							
Spalding							
Wangary							
Yeelanna							
Vic	**A**	**B**	**C**	**BF**	**AD**	**ABDF**	**H**
Charlton							

Modern agronomists – make decisions in the field

Agronomist queries for crown canker

- How much blackleg will Cultivar X get in my region in 2021?
- Does Cultivar X have reduced resistance rating in my region?
  - -Erosion of resistance; eg was an R, now a MR?
  - -Does Cultivar X have effective or overcome major resistance genes in my region?
  - -Is Cultivar X going to do a “sylvestris”?
- Agronomist seeing more leaf lesions in Cultivar X.
  - -should I change cultivar?
  - -should I change R groups?
  - -should I apply more fungicide?

- Quote: “Should I keep growing dirty old Bonito, or switch to the best Hybrid”?

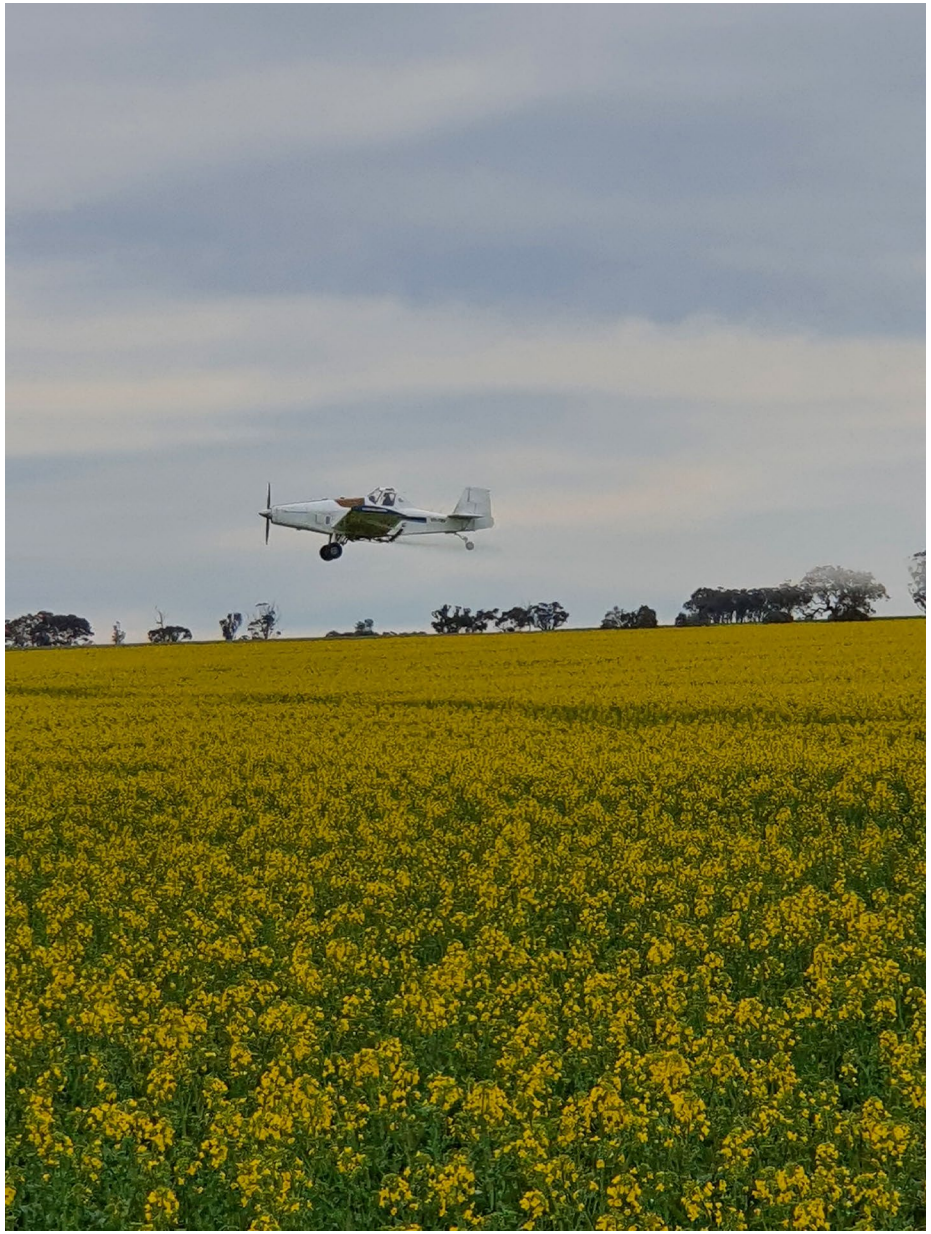
-This question relates to spending money on seed or on fungicide?

Agronomist queries UCI

- Will Cultivar X get UCI this year?
- What is the UCI blackleg rating for Cultivar X?
- Should Cultivar X be sprayed with a 30% bloom spray in my region?
- Last year Cultivar X got a big fungicide yield return so I'm spraying this year.
- Last year Cultivar X didn’t get a fungicide yield return so I'm not spraying this year.

- Last year Cultivar Y got a fungicide return so I'm spraying Cultivar X this year.

- 2019 Scenario: August 15, leaf lesions break out on upper leaves. Should Cultivar X be sprayed with fungicides?
- Cultivar X sown in April do I spray? Cultivar X sown in May do I spray?



Agronomist are making in-season blackleg management decisions.

1. Manage blackleg
2. Add value to their client

- This is a large change in the way blackleg is being managed.

There is a urgent need to deliver cultivar and region specific knowledge to agronomists.

3:36 79%

Marcroft Grains Patholo...
184 Tweets

Tweets | Tweets & replies | Media | Likes

Marcroft Grains Pathol... · 22 Aug 19
This short video explains the symptoms of upper canopy infection of blackleg and how you can spot it in your field.

4,542 views

2 39 95

Marcroft Grains Pathol... · 15 Aug 19
Crop at 30% bloom. 20 open flowers and pods on the main stem. Ideal for Sclerotinia and upper canopy bla (aerial blackleg) fungicide applic timing if warranted.

3:36 79%

Marcroft Grains Patholo...
184 Tweets

Tweets | Tweets & replies | Media | Likes

Marcroft Grains Pathol... · 22 Aug 19
If you are seeing symptoms of upper canopy infection, here is a short clip about making spray decisions for controlling it.

1,971 views

5 23 46

Marcroft Grains Pathol... · 22 Aug 19
This short video explains the symptoms of upper canopy infection of blac and how you can spot it in your

3:37 78%

Tweet

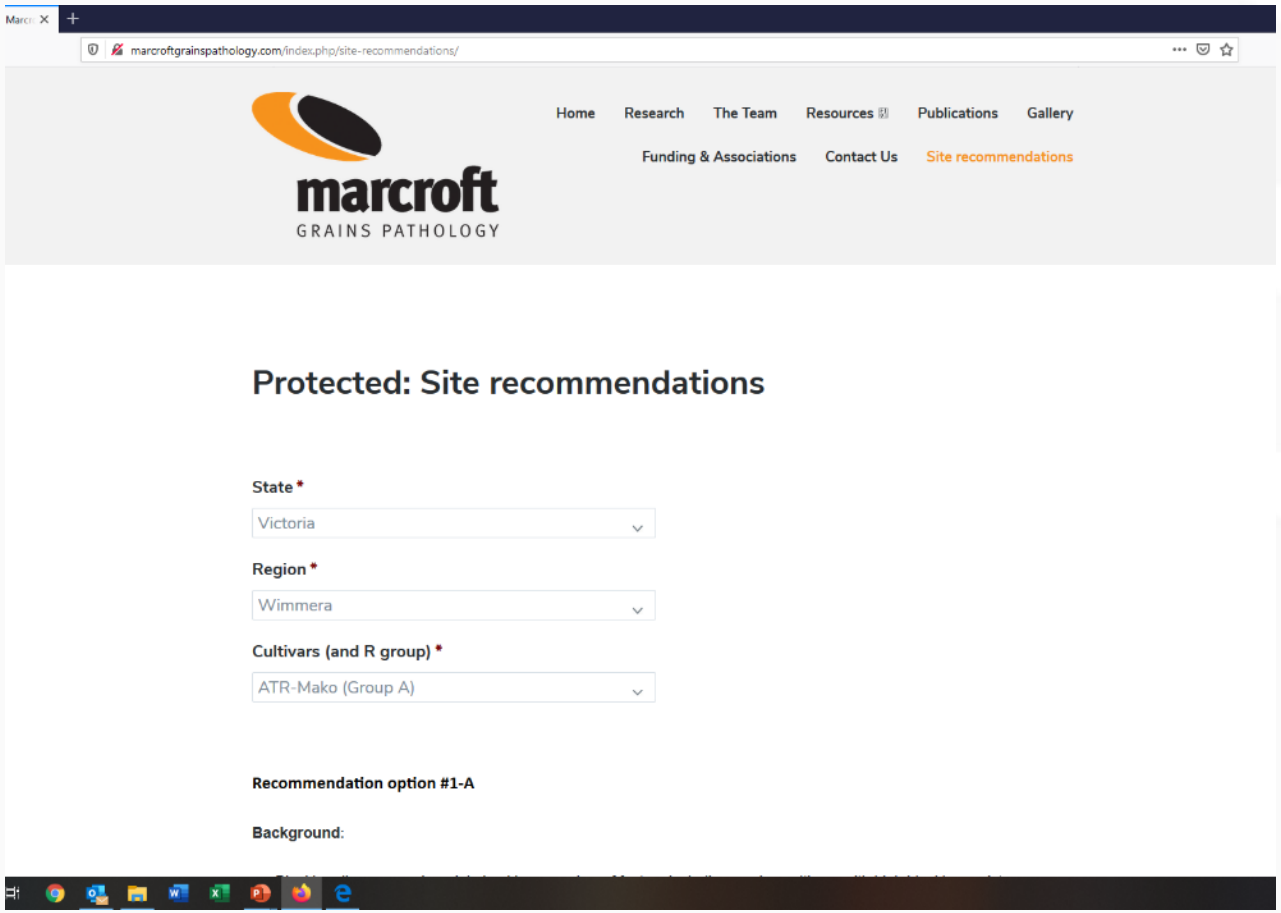
Marcroft Grains Pathology
@Steve_Marcroft

A quick update on the progression of blackleg upper canopy infection. The symptoms we are seeing at Lake Bolac suggest our recommendations were on point and the season is progressing as expected.

New plan

- Plan to provide information on each resistance combination, regionally specific.
  1. General blackleg management
  2. How MGR and QR work within the same cultivar.
  3. How to monitor Crown canker and UCI
  4. Site & resistance specific –e.g. *Western district Victoria - Blackleg rating MR resistance Group A (MR Group-A)*
  5. Management & fungicide options for specific region and cultivar resistance.

Online regional recommendations coming soon



- Regional blackleg severity for each resistance group is compared to the national average
- Regional recommendations provided to industry

Blackleg Rating MR Group-A

General information (on all results):

Background:

- Blackleg disease can be minimised by a number of factors including:
    1. Sowing cultivars with high blackleg resistance.
    2. Avoiding sowing canola in close proximity to last year's stubble.
    3. Applying fungicides.

Use BlacklegCM App to estimate your risk; see the current Blackleg Management Guide for details - www.grdc.com.au.

- An additional method for minimising disease is rotating cultivars with different resistance genes.
    1. All canola cultivars are classified into different resistance groups based on their resistance genes. Refer to the current Autumn 2020 Blackleg Management guide (www.grdc.com.au) for individual cultivar groups.
    2. Cultivars representing each of the resistance groups are sown at 30+ trials across Australia and monitored for levels of blackleg disease. These data indicate which resistance groups have higher levels of disease compared to the other resistance groups at the same location.

       These data reflect the **virulence profile** of the blackleg fungal population at the **blackleg monitoring site(s) assessed from this region ONLY** and may be different to the blackleg population on your individual farm. The level of blackleg in your crop is influenced by the cultivars that you and your neighbours have sown over the past 3 years. However, the provided data can be used as a guide as to which resistance genes are effective and which are not in your region.

Cultivar resistance explanation

All cultivars have two modes of genetic resistance.

1. Quantitative Resistance - QR

   Quantitative resistance is created by minor genes with additive effect, e.g. a cultivar with 10 QR genes has more resistance than a cultivar with 5 genes, this is reflected in the blackleg rating e.g. MR rating cultivar may have 10 QR genes, whereas a MS rating cultivar may have 5 QR genes. QR is only effective against crown canker. QR does not provide complete control of blackleg, i.e. plants will still get lesions on leaves, stems pods etc, but the QR will slow/reduce the crown canker. QR expression will vary under varying disease pressure. For instance, MR blackleg rating will completely stop the fungus causing yield loss under low/moderate disease pressure but a MR blackleg rating cultivar may still have yield loss under high disease pressure.

   QR can be eroded over time by the blackleg fungus. Therefore check the current blackleg management guide to ensure that your cultivar does not have a reduced blackleg rating compared to previous seasons; see the current Blackleg Management Guide for details - www.grdc.com.au).

   QR is not known to be effective against Upper Canopy Infection blackleg.

   Photos

2. Major Gene Resistance - MGR

   Major Gene Resistance is individual genes with the ability to completely control the blackleg fungus providing an immune response (no crown canker, no lesions on leaves/stems/pods). The GRDC blackleg resistance groups designated as letters indicate the MGR contained in each cultivar; see the current Blackleg Management Guide for details - www.grdc.com.au). Unfortunately, MGR is readily overcome by the blackleg fungus, meaning that most cultivars rely on their QR once the MGR has been overcome.
   When effective, MGR is also effective against upper canopy blackleg. See this youtube clip for more detailed explanation.

   photos

Recommendation option #1-A

Western district Victoria - Blackleg rating MR resistance Group A (MR Group-A)

Blackleg Rating MR Group-A

MR blackleg rating means that the QR is effective providing good but not total protection against crown canker development. However, MR-Group A will not protect the plant against Upper Canopy Infection in this region.

Crown canker management

MR Group-A blackleg rating is sufficient to protect your crop if sown under moderate levels of disease pressure. That is, sown in medium or lower rainfall regions, 500m separation from the previous year's canola crop and 1 in 3 year or longer rotation. Use the blackleg Management guide and/or BlacklegCM App to determine disease pressure for your situation.

Factors that will influence blackleg severity.

1. Periods of prolonged wetness, which result in extensive spore release and provide conducive conditions for lesion development.
2. Rotation length, canola wheat-canola-rotations (canola stubble in the paddock) are greater risk compared to longer rotations.
3. Distance to previous canola crop's stubble, crops sown adjacent to last season's canola stubble enables spores to move readily from surrounding paddocks. Isolation of 500m or greater reduces risk.
4. Later sown crops, canola plants are most susceptible to crown canker when infected from the cotyledon to 5th leaf stage. Later infections are unlikely to cause crown cankers. Therefore, early sown crops develop quicker under warmer Autumn weather and are established prior to the main winter infection period. Later sown crops remain as small susceptible seedlings throughout the winter infection period. Later sown crops are therefore more likely to benefit from fungicide seed treatments and /or fertiliser applied fungicides.

Warning; wetter seasons can result in high disease severity regardless of management practices.

Fungicide application for crown canker control on MR Group-A

If the crop is established early prior to the winter infection period, economic return from fungicides for crown canker control is less likely.

Monitor disease severity in crop by assessing your crop for leaf lesion severity. If leaf lesions are severe up to the 8 leaf stage you can protect your crop with a fungicide; see BlacklegCM App for likely economic returns. If blackleg becomes severe post 8 leaf stage blackleg is unlikely to cause a yield loss. See youtube clip for more detailed advice.
Photos

Monitor crown canker severity at windrowing to determine if yield loss is likely to have occurred. If yield loss has occurred consider changing management for future crops. Use BlacklegCM App and/or the Blackleg Management Guide to investigate options to reduced disease severity in future years. See youtube clip for methodology.
Photos

Major Gene Resistance (MGR) MR Group-A

In the blackleg monitoring site(s) from this region there was HIGH blackleg severity in Group A compared to other Resistance Groups. The data suggests Group A major gene resistance is ineffective in this region. An easy way to determine MGR effectiveness on your farm is to monitor for leaf lesions, no leaf lesions indicate that the MGR is probably effective.

Major Gene Resistance groups status from the South West Vic monitoring site:

Ineffective: A, B, C etc.
Partially effective: AD, BF etc
Effective: ABDF, H etc

Monitoring MGR effectiveness

First check plants for the presence of leaf lesions, no leaf lesions probably indicates that the MGR is effective, but a lack of lesions could simply be due to the absence of disease (lack of rainfall/ no canola stubble nearby) or highly effective fungicide. If leaf lesions are present the number of leaf lesions will be determined by disease pressure (number of blackleg spores and conductive environment) and the effectiveness of the MGR. Completely effective MGP will result in no lesions, partially effective MGR is a result of individual virulent blackleg isolates present within the blackleg population but in low frequency. Partially effective MGR may result in a small number of lesf lesions being present. The only way to judge partially effective MGR is to view the GRDC blackleg monitoring sites where you can compare leaf lesion numbers in cultivars grown side by side ie lesion number on cultivar with effective MGR, no MGR and partially effective MGR.

At windrowing sever the plant crown with secateurs to inspect internal infection at the crown. If MGR is effective there should be no darkened discolouration. If the crown is partially discoloured from blackleg this is an indication that the MGR is either overcome or partially overcome. The amount of discolouration will be a result of disease pressure and the amount of QR in the cultivar.

photos

Rotation of Major Gene Resistance (MGR)

If you sow cultivars from the same Resistance Group each year, blackleg isolates that can attack the MGR in your cultivar will proliferate. Therefore, the MGR in your cultivar may be overcome resulting in your cultivar becoming reliant on its QR resistance.

Group-A in south west Victoria has been overcome.

Other blackleg isolates that can attack other MGR (not in your cultivar) may reduce in frequency over time. Therefore, if your MGR is overcome you can switch cultivars in future to a cultivar with different MGR. It is likely that the blackleg population on your farm will be less virulent towards the new cultivar (from a different resistance group).

If disease severity has increased over time against your Group A cultivar consider switching to a cultivar with different MGR. Ideal rotations (data from the western district blackleg monitoring site) are cultivars from Groups B, C, BF, BC or H. OK rotations are cultivars from Groups AB, ABC, AC, AD, ABD, ABF, ABDS or ABDF. Rotations to be avoided are cultivars from groups A.

Upper Canopy Infection blackleg management MR Group-A

Blackleg may also infect flowers, stems, branches and pods, termed as Upper Canopy Infection (UCI).

Upper canopy infection (UCI) is only controlled by effective major gene resistance and commencement to flowering date. Current blackleg ratings may not be a reliable indication for UCI protection.

In this region the MR Group-A major gene is overcome, so cultivars from this group are unlikely to have any protection against UCI regardless of their blackleg rating. For example, MR Group-A is likely to have the same susceptibility to UCI as MS Group- A.

If cultivars from this resistance group flower early and blackleg is present, they are likely to get UCI.

Key risk indicators for UCI

1. Presence of leaf lesions, severe lesion infestation may indicate an increased risk.
2. Commencement to flowering date (5% of plants with an open flower), early flowering is higher risk than later flowering.
3. New leaf lesions forming on leaves at first flower growth stage, indicating that conditions for disease development are conducive as plants elongate which is the plant's UCI susceptibility window.
4. Flower infection occurring by 30% bloom (15-20 open flowers on the main raceme).

If you have leaf lesions present and an early flowering crop, fungicide control may be warranted. See youtube clip for detailed explanation.

Fungicide application for UCI control

Applying a registered fungicide at 30% bloom to control UCI can result in significant yield returns if UCI is likely to cause yield loss. 30% timing will enable good penetration onto the main raceme, the main raceme provides the majority of yield of the plant. Later fungicide timings will provide less control on the main raceme but increased control on the branches. 30% bloom timing will likely control infections that have already occurred and provide a number of weeks protection into the future. By the time the fungicide has lost efficacy in the future, it is likely that plants will have passed through the UCI susceptibility window. Infections after this timing will still cause lesions but the pathogen will not have the time required to invade the vascular tissue and cause subsequent yield loss. That is, the crop will be harvested before the pathogen can damage the vascular tissue.