

2019 AUTUMN VARIETY RATINGS FACT SHEET

BLACKLEG MANAGEMENT GUIDE

Quantify the risk, paddock by paddock

Blackleg can cause severe yield loss, but can be successfully managed. This Guide and the recently released BlacklegCM app (see Useful Resources section) will help growers and advisers effectively manage canola crops against blackleg infection and determine if there is a high-risk situation and what practices need to change to reduce or prevent yield loss. Follow the four steps, in sequence below.

KEY POINTS

- **Never sow your canola crop into last year's canola stubble.**
- **Choose a cultivar with adequate blackleg resistance for your region.**
- **Relying only on fungicides to control blackleg poses a high risk of fungicide resistance.**
- **If your monitoring has identified yield loss and you have grown the same cultivar for three years or more, choose a cultivar from a different resistance group.**
- **Monitor your crops in spring to determine yield losses in the current crop.**

Leptosphaeria maculans, the causal agent of blackleg disease, is a sexually reproducing pathogen that may overcome cultivar resistance genes. Fungal spores are released from canola stubble and spread extensively via wind and rain splash. The disease is more severe in areas of intensive canola production.

STEP 1: Use Table 1 to determine your farm's blackleg risk.

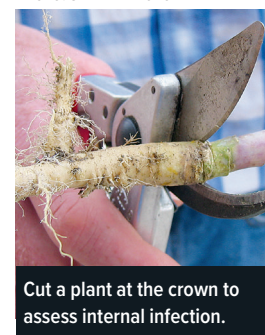
TABLE 1 Regional blackleg factors.									
Environmental factors that determine risk of severe blackleg infection	Blackleg severity risk factor								
	High risk			Medium risk			Low risk		
Regional canola intensity (% area sown to canola)	above 20	16–20	15	11–14	11–14	10	6–9	5	below 5
Annual rainfall (mm)	above 600	551–600	501–550	451–500	401–450	351–400	301–350	251–300	below 250
Total rainfall received March–May prior to sowing (mm)	above 100	above 100	above 100	above 100	91–100	81–90	71–80	61–70	below 60

Combined high canola intensity and adequate rainfall increase the probability of severe blackleg infection.







STEP 2: Determine each crop's blackleg severity in spring.

- Assess the level of disease in your current crop. Sample the crop anytime from the end of flowering to windrowing (swathing). Pull 60 randomly chosen stems out of the ground, cut off the roots with a pair of secateurs and, using the reference photos in Table 2 below, estimate the amount of disease in the stem cross-section. Yield loss commonly occurs when more than 50% of the cross-section of the cut stem is discoloured.
- A dark-coloured stem is a symptom of blackleg (Table 2). Stem cankers are clearly visible at the crown of the plant. Severe cankers may cause the plant to fall over as the roots become separated from the stem.
- If you have identified that you are in a high-risk situation (Step 1), use Steps 3 and 4 to reduce your risk of blackleg for future seasons.
- If you are in a low-risk situation and you have not identified yield loss due to blackleg infection when assessing your crop, continue with your current management practices.

PHOTO: STEVE MARCROFT



Cut a plant at the crown to assess internal infection.

TABLE 2 Crop blackleg severity.											
High risk		Medium risk			Low risk						
	100%		80%		60%		40%		20%		0%
Yield loss occurs when more than half of the cross-section is discoloured.											

STEP 3: Management practices can reduce the risk of blackleg infection.

If your crop monitoring (see Step 2) showed yield loss (cut stems were >50% discoloured) in the previous year, the following practices can be used to reduce blackleg severity. Complete the following process for each canola paddock to be sown.

- For each of the eight management factors listed below, circle where each canola paddock fits to determine the risk of blackleg. For example, **blackleg rating**: if your cultivar is DG 560TT, circle 'MR', indicating a low risk of blackleg; or **distance from last year's canola stubble**: if your proposed canola crop is 200 metres away, high risk is indicated.
- Complete all eight management factors to determine which practices are causing increased risk and how they can be reduced. For example, for distance from last year's canola stubble, choose a different paddock, at least 500m away from last year's stubble, reducing the risk from high to low.

WARNING: 'CANOLA ON CANOLA' WILL CAUSE A SIGNIFICANT YIELD LOSS AND WILL REDUCE THE EFFECTIVE LIFE OF CANOLA CULTIVARS AND FUNGICIDES.

Blackleg management practices that determine risk of blackleg infection, from highest to lowest effectiveness are:

A. BLACKLEG RATINGS

The cultivar blackleg rating is the most important blackleg management tool. If your previous crop had a high level of disease, choose a cultivar with a higher blackleg rating. The 2019 blackleg ratings are listed in Table 3 on page 4.

High risk				Medium risk			Low risk	
VS	S-VS	S	MS-S	MS	MR-MS	MR	R-MR	R

VS = very susceptible; S = susceptible; MS = moderately susceptible; MR = moderately resistant; R = resistant

B. DISTANCE FROM LAST YEAR'S CANOLA STUBBLE

The distance of your current crop to last year's canola stubble will determine disease severity.

NEVER sow your canola crop into last year's canola stubble. Distances from last year's stubble up to 500m will reduce blackleg severity.

High risk				Medium risk			Low risk
0m	100m	200m	300m	400m	500m	>500m	

C. FUNGICIDE USE

Fungicides will provide an economic return only if your crop is at high risk of yield loss. Fungicides complement other management practices, never rely solely on fungicides.

RELiance ON FUNGICIDES TO CONTROL DISEASE POSES A HIGH RISK OF FUNGICIDE RESISTANCE.

High risk		Medium risk				Low risk
No fungicide	Foliar-applied fungicide	Seed dressing fungicide	Fertiliser-applied fungicide	Seed dressing + fertiliser-applied fungicide	Seed dressing or fertiliser-applied + foliar fungicide	

D. YEARS OF SAME CULTIVAR GROWN

The pathogen will overcome cultivar resistance genes if the same genes are used each year. By sowing a cultivar based on different resistance genes, the ability of the pathogen to overcome resistance will be reduced. All cultivars have been placed into different blackleg resistance groups based on their resistance complement (see Table 3, page 4).

If you have:

- high or increasing levels of blackleg in your crop (from monitoring disease levels each year);
- used the management practices outlined here in Step 3; and
- sown cultivars from the same resistance group in close proximity (within two kilometres) for three or more years, then sow a cultivar from a different resistance group (see page 4 – Blackleg Resistance Groups).

High risk		Medium risk			Low risk	
Sown the same cultivar/resistance group for more than 3 years		Sown the same cultivar/resistance group for 3 years		Sown the same cultivar/resistance group for 2 years	Sown the same cultivar-resistance group the previous year	Sown cultivar from a different resistance group

E. DISTANCE FROM TWO-YEAR-OLD CANOLA STUBBLE

Stubble older than two years produces fewer blackleg spores and will normally have minimal effects on blackleg severity, even where canola is sown into two-year-old stubble. However, two-year-old stubble may cause disease if inter-row sowing canola (see Point F, Canola stubble conservation) or if the cultivar resistance has been overcome.

High risk			Medium risk			Low risk
			0m	100m	250m	500m >500m

STEP 3 CONTINUED PAGE 3

STEP 3 FROM PAGE 2

F. CANOLA STUBBLE CONSERVATION

Stubble destruction is not effective in reducing blackleg infection. Inter-row sowing canola into two-year-old canola stubble where germinating seedlings are immediately next to standing stubble may result in higher levels of blackleg infection.

High risk	Medium risk	Low risk
	Inter-row sowing	Disc tillage Knife-point tillage Burning/burying tillage

G. MONTH SOWN

Canola is most vulnerable to blackleg as a seedling. If crops are sown early in warmer conditions and get through the seedling growth stage quickly, they may escape high blackleg severity.

High risk	Medium risk	Low risk
	June to August	May 15 to 31 May 1 to 14 April 15 to 30

H. DUAL-PURPOSE GRAZING CANOLA

Grazing canola can increase the severity of blackleg in the crop. To minimise any associated reduction in grain yield select a cultivar with a high level of blackleg resistance (\geq R-MR), and if using a cultivar with a lower level of resistance, consider use of a fungicide (keeping in mind chemical withholding periods).

High risk	Medium risk	Low risk
	Grazing canola	



CLICK ON THE FOLLOWING LINK TO ACCESS A WORKSHEET THAT ALLOWS YOU TO VISUALISE THE BLACKLEG RISK OF YOUR INDIVIDUAL PADDOCKS AND HOW YOU CAN REDUCE THIS RISK.

<http://www.grdc.com.au/GRDC-FS-BlacklegManagementGuide>

STEP 4: Blackleg resistance groups.

Canola cultivars have different combinations of blackleg resistance genes. Over time, growing cultivars with the same blackleg resistance genes has led to changes in the pathogen's virulence, which have enabled it to overcome cultivar blackleg resistance. By rotating between cultivars with different resistance genes, you can reduce the probability of resistance breakdown and reduce disease severity.

Based on Steps 1 to 3, have you observed increasing blackleg severity and been growing the same cultivar in close proximity for three years or more?

- **No** – your current management practices should be sufficient to adequately manage blackleg resistance.
- **Yes** – you may be at risk of the blackleg fungus overcoming the blackleg resistance of your cultivar and it is recommended you grow a cultivar with a different combination of blackleg resistance genes.
- To facilitate this process, all cultivars have been placed into groups (A to H) based on their resistance genes in **Table 3**, page 4.
- **You do not need to change resistance groups (cultivars) every year.**

How to use Table 3

1. Identify the resistance group of your previously grown cultivar using the column labelled **Section A – 'Resistance group of cultivar'** (shaded in light purple). Note: some cultivars belong to multiple groups. Some cultivars have not yet been classified and rotation recommendations cannot be made for these cultivars.

Examples: AV-Garnet[®] belongs to resistance group A

Hyola[®] 575CL belongs to resistance groups B and F

If your previously grown cultivar is not included in Table 3 (page 4), as it is no longer commercially available, refer to Table 4 (page 5).

2. Using **Section B** look down the column with the resistance group of the variety grown previously (e.g. column A if AV-Garnet[®] was grown previously, or column BF if Hyola[®] 575CL was grown previously) to identify cultivars with reduced risk.

■ Green = best possible rotation (no resistance genes in common)

■ Blue = OK rotation (at least one resistance gene not in common)

■ Orange = not advised (all resistance genes in common)

Examples: AV-Garnet[®] (resistance group A) for 2019 planting – sown after cultivars shaded

■ Orange (e.g. ATR-Mako[®], Group A) is not recommended and anything shaded

■ Green (e.g. ATR-Stingray[®], Group C) is best.

Hyola[®] 575CL (resistance groups B and F) for 2019 planting – sown after cultivars shaded

■ Orange (e.g. Nuseed Diamond, Group ABF) is not recommended, following cultivars shaded

■ Blue (e.g. Pioneer[®] 45Y91 CL, Group B) is okay and anything shaded ■ Green (e.g. ATR-Mako[®], Group A) is best.

TABLE 3 2019 autumn blackleg ratings and resistance groups. See page 3 (Step 4) for information on how to use this table.

Variety	2019 blackleg rating bare	2019 blackleg rating Jockey®	Type	Section A – resistance group of cultivar	Section B - resistance group of previous year's cultivar (stubble)											
					A	B	C	AB	AC	ABD	ABF	ABS	ABDF	BF	BC	H
CONVENTIONAL VARIETIES																
Nuseed Quartz	R	R	Hybrid	ABD												
VICTORY® V3002	R-MR	R	High stability oil, hybrid	ABF												
Nuseed Diamond	MR	R	Hybrid	ABF												
AV-Garnet [®]	MS	MR	Open pollinated	A												
TRIAZINE-TOLERANT VARIETIES																
HyTTec Trident	R	R	Hybrid	ABDF												
Hyola® 350TT	R		Hybrid	ABDF												
Hyola® 650TT	R		Hybrid	ABD												
HyTTec Trophy	R-MR	R	Hybrid	ABD												
Pioneer® 45T03 TT	R-MR		Hybrid	ABD												
SF Spark TT	R-MR	R	Hybrid	ABDF												
Hyola® 550TT	R-MR		Hybrid	ABDF												
Pioneer® 44T02 TT	R-MR		Hybrid	ABD												
Hyola® 559TT	MR	R	Hybrid	ABD												
Monola®416 TT	MR	R	High stability oil, open pollinated	B												
Monola®515 TT	MR	R	High stability oil, open pollinated	Different blackleg resistance pattern, further testing required. Effective rotation with existing groups currently unknown.												
DG 670TT	MR	R	Hybrid	BF												
SF Ignite TT	MR	R-MR	Hybrid	BF												
DG 560TT	MR	R-MR	Hybrid	BF												
ATR-Mako [®]	MR-MS	R-MR	Open pollinated	A												
InVigor® T 4510	MR-MS	R-MR	Hybrid	BF												
ATR-Stingray [®]	MR-MS	R-MR	Open pollinated	C												
SF Turbine TT	MR-MS	R-MR	Hybrid	BF												
ATR-Wahoo [®]	MS	R-MR	Open pollinated	A												
InVigor® T 3510	MS	MR	Hybrid	BF												
ATR-Bonito [®]	MS	MR	Open pollinated	A												
CLEARFIELD® SYSTEM VARIETIES																
Hyola® 970CL	R		Winter, Hybrid	H												
Hyola® 575CL	R		Hybrid	BF												
Phoenix CL	R		Winter, Hybrid	B												
Pioneer® 43Y92 CL	R-MR		Hybrid	B												
VICTORY® V7002CL	R-MR	R	High stability oil, hybrid	ABF												
Pioneer® 45Y93 CL	R-MR*		Hybrid	BC												
SF Edimax CL	R-MR		Winter, Hybrid	C												
Pioneer® 44Y90 CL	R-MR		Hybrid	B												
VICTORY® V7001CL	MR	R	High stability oil, hybrid	ABF												
Pioneer® 45Y91 CL	MR		Hybrid	B												
Saintly CL	MR	R	Hybrid	B												
Banker CL	MR	R	Hybrid	A												
CLEARFIELD® AND TRIAZINE-TOLERANT VARIETIES																
Hyola® 580CT	R	R	Hybrid	BC												
ROUNDUP READY® VARIETIES																
Nuseed GT53	R	R	Hybrid	ABDF												
Nuseed GT42	R	R	Hybrid	ABDF												
Hyola® 506RR	R		Hybrid	ABD												
Pioneer® 44Y27 RR	R-MR		Hybrid	B												
Nuseed GT41	R-MR	R	Hybrid	ABF												
VICTORY®V5003RR	R-MR	R	High stability oil, hybrid	A												

TABLE 3 (continued) 2019 autumn blackleg ratings and resistance groups. See page 3, (Step 4) for information on how to use this table.

Variety	2019 blackleg rating bare	2019 blackleg rating Jockey®	Type	Section A – resistance group of cultivar	Section B – resistance group of previous year's cultivar (stubble)											
					A	B	C	AB	AC	ABD	ABF	ABS	ABDF	BF	BC	H
ROUNDUP READY® VARIETIES (continued)																
Hyola® 404RR	MR	R	Hybrid	ABD												
Pioneer® 43Y23 RR	MR		Hybrid	B												
Monola®G11	MR	R	High stability oil, hybrid	ABS												
Pioneer® 45Y25 RR	MR		Hybrid	BC												
Pioneer® 45Y28 RR	MR*		Hybrid	BC												
InVigor® R 3520	MR	R	Hybrid	Different blackleg resistance pattern, further testing required. Effective rotation with existing groups currently unknown.												
Pioneer® 43Y29 RR	MR*		Hybrid	BC												
InVigor® R 5520P	MR	R	Hybrid	AC												
IH51 RR	MR		Hybrid	A												
DG 408RR	MS	R-MR	Hybrid	AC												
ROUNDUP READY® AND TRIAZINE-TOLERANT VARIETIES																
BASF 3000 TR	MS-S	MR	Hybrid	B												

* Hybrid was screened in 2017, but not in 2018. It was therefore not exposed to the most recent pathogen populations.

TABLE 4 Resistance groups of cultivars that are no longer commercially available.

CULTIVAR	RESISTANCE GROUP	CULTIVAR	RESISTANCE GROUP
Archer	C	Pioneer®45T01 TT	AB
Carbine	A	SF Brazil	BC
IH30 RR	AB	DG 460RR	A
IH52 RR	AB	ATR-Gem [®]	A

BLACKLEG RESISTANCE GROUP MONITORING

Representative cultivars from all blackleg resistance groups are sown in trial sites in all canola-producing regions across Australia and monitored for blackleg severity. These data provide regional information on the effectiveness of each blackleg resistance group and are available on the National Variety Trials website (www.nvtonline.com.au).

USEFUL RESOURCES



BlacklegCM app, developed with GRDC investment, allows the user to input information such as paddock selection, variety choice, seed dressing, and banded or sprayed fungicide, and takes into account costs, yield benefits and grain prices to give the best/worse-case scenario and likely estimated economic return. Growers can change the parameters on the app to tailor the output to their own individual crop. It can be downloaded onto tablets (not smartphones) from both the App Store and Google play, <https://www.agric.wa.gov.au/apps/blacklegcm-blackleg-management-app>

Diseases of Canola and their Management: The Back Pocket Guide

www.grdc.com.au/GRDC-BPG-CanolaDiseases

Available from *GroundCover*™ Direct, 1800 110 044

Australian Oilseeds Federation – Agronomy Centre www.australianoilseeds.com

GroundCover™ Supplement (issue 116): 'Foliar fungal diseases of pulses and oilseeds'

<https://grdc.com.au/resources-and-publications/groundcover/ground-cover-supplements/ground-cover-issue-116-foliar-fungal-diseases-of-pulses-and-oilseeds>

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MGP0004, UM00051

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