

# FUNGICIDE RESISTANCE IN CANOLA

# FACT SHEET

## Fungicide resistance in canola: causes, management and mitigation strategies

### KEY POINTS

- Isolates with reduced sensitivity to the DMI (Group 3) fungicides have been identified across all canola growing regions of Australia. The DMI fungicides will be less effective towards these isolates but will still provide some control.
- Only use fungicides if there is a high probability of yield return, i.e. grow a cultivar with a high blackleg rating and scout for disease before making a decision to apply a foliar fungicide.
- Do not use two applications of the same mode of action (MOA) for crown canker control, i.e. in-furrow, seed treatment, four-to-eight leaf foliar.
- The same MOA may be used once for crown canker control (seedling) and then again for Upper Canopy Infection (UCI). Avoid using the same MOA more than twice in a season.
- If you use Group 7 SDHI or Group 11 Strobilurin/quinone for multiple applications for crown canker control you may not have the technology for very long.

Photo: AgCommunicators.



**Populations of the fungal pathogen causing blackleg on canola have exhibited reduced sensitivity to several common Group 3 (DMI) fungicides across most growing regions of Australia. The field implications of this finding are currently unknown, but it does increase the risk of full resistance to DMI fungicides evolving if these fungicides are misused.**

Targeted surveys have identified reduced sensitivity to Group 3 (DMI) fungicides in blackleg pathogen populations across all Australian canola growing regions. More cases are expected to arise as survey and detection methods improve, and if current fungicide use patterns continue.

Fungicide resistance occurs when a previously effective fungicide fails to control a disease such as blackleg.

It is a preventable issue, caused by repeatedly exposing a pathogen to a

single fungicide active or to the chemical actives of a single Mode of Action (MoA) group.

It can become a major constraint to good disease control, especially where no alternative fungicide or host-plant resistance is available.

Fungicide resistance can be a regional problem. Spores released by fungicide resistant fungi can spread over large areas in a short time. Misuse of fungicides and poor disease management practices on a single farm can affect everybody in the district.

## Fungicide resistance in canola

Reduced sensitivity to many Group 3 (DMI) fungicides has been identified in blackleg pathogen populations and growers need to take all possible agronomic and fungicide management precautions to avoid placing further pressure on these fungicides.

The fungicide resistance screens indicate that mutants with reduced sensitivity to the DMI fungicides are present in the blackleg pathogen population. However, we do not know at what frequency these isolates occur in the field and there is currently no data to determine if these isolates are present at a frequency that will result in fungicide field failure. In fact, no DMI fungicide field failures have been verified in Australia and therefore these fungicides can still be used.

Reduced sensitivity or resistance to specific chemicals in specific regions should be treated as an indication of risk for other chemicals in the same MoA group

within that region, as well as in other regions that share similar environments and/or employ similar agronomic practices.

It is therefore essential to rotate fungicide actives and MoA groups to avoid consecutive applications of the same chemistry, including between seasons if only one application is needed within a season.

Remember that seed treatments and in-furrow fungicides also count as a fungicide application, so a seedling foliar application from the same fungicide group that was applied as a seed treatment in the same season should be avoided.

**As canola growers often manage blackleg and Sclerotinia concurrently, it is important to consider fungicide rotations for both pathogens together. Otherwise, applications targeting Sclerotinia may apply selection pressure that favours the fungicide resistant blackleg pathogen population (and vice versa).**

## Known detections of fungicide resistance – canola

*The following information is correct at the time of publication and is subject to change. For the latest data on fungicide resistance in canola, please consult an agronomist or refer to the [AFREN website](#).*

### Blackleg

**(Pathogen: *Leptosphaeria maculans*)**

Blackleg is widespread across all growing regions and is typically favoured by high intensity canola plantings, high annual rainfall (>500 mm), high total rainfall in the three months prior to sowing (>100 mm, Mar-May), susceptible cultivars and extended periods of leaf wetness (>48 hours).

Blackleg is stubble-borne and spores are released from the previous season's stubble.

Yield losses can be as high as 30 per cent in conducive years.

### FUNGICIDE RESISTANCE PROFILE

- **Reduced sensitivity** to Group 3 (DMI) fungicides fluquinconazole (e.g. Jockey®, etc), flutriafol (e.g Impact® in-Furrow, Flutifol®, etc), prothioconazole and tebuconazole (e.g. in Prostaro®, etc) has been confirmed for the fungal isolates from New South Wales, Victoria, South Australia and Western Australia populations through *in vitro* and *in planta* assays. Field implications remain unclear.
- **Lab detection** of reduced sensitivity to the Group 2 fungicide iprodione (e.g. Rovral®, etc), which is not registered for blackleg, have been detected in Western Australia.

Since 2014, surveys across canola growing regions have identified blackleg pathogen isolates with reduced sensitivity to the fungicides fluquinconazole, flutriafol, prothioconazole and tebuconazole.

These results, and the pathogen's demonstrated ability to overcome genetic resistance in canola varieties, indicate a high risk of blackleg developing resistance to Group 3 fungicides.



Photo: GRDC.

Blackleg.

## Sclerotinia

(Pathogen: *Sclerotinia sclerotiorum*)

Fungicide resistance status currently unknown – no screening occurring at present.

There is a low to moderate risk of fungicide resistance development. Resistance to Group 1 and reduced sensitivity to Group 2 and 7 fungicides has been detected in France, and reduced sensitivity has been detected throughout Europe.

Fungicide resistance result	Impact on fungicide use
<b>Sensitive</b>	Still works
<b>Reduced sensitivity</b>	Might still work okay <ul style="list-style-type: none"> <li>• May need to use higher label rates</li> <li>• Higher risk of developing resistance</li> </ul>
<b>Resistant</b>	Doesn't work – avoid use
<b>Lab detection</b>	None – but indicates a potential risk to field effectiveness.

## Integrated disease management for blackleg of canola

Good integrated disease management (IDM) backed up with strategic use of fungicides only when they are necessary underpins good fungicide resistance management.

### Agronomic strategies

- Never sow your canola crop into last year's canola stubble.
- Plant less susceptible canola varieties to reduce reliance on fungicides for disease control.
- Rotate varieties from different resistance groups, especially if yield losses indicate resistance genes may be compromised. Review every three years to provide a dynamic host environment.
- Grow canola at least 500 metres from the previous season's stubble.
- Use the Blackleg Management Guide or BlacklegCM mobile app to determine individual paddock risks for blackleg. (See 'Useful resources' on page 4.)



## The Fungicide Resistance Five!

**1. Avoid susceptible crop varieties**

**2. Rotate crops – use time & distance to reduce disease carry-over**

**3. Use non-chemical control methods to reduce disease pressure**

**4. Spray only if necessary & apply strategically**

**5. Rotate & mix fungicides / MoA groups**

### Fungicide use and rotation

- Rotate fungicide actives and MoA groups, while minimising the use of fungicides known to have compromised efficacy due to resistance – specifically:
  - **Group 3 (DMI) fungicides**
    - Rotate Group 3 fungicides so the same chemical active is not applied twice in a row. That is, do not use a Group 3 fungicide as a foliar application at the 4-8 leaf growth stage if you have already used a Group 3 as a seed treatment or applied to the fertiliser.
    - Do not use any Group 3 fungicides in more than two consecutive applications.

- **Group 7 (SDHI) fungicides**

- Avoid making more than one application to protect seedlings from crown canker. That is, if a Group 7 seed treatment is used to protect against blackleg on the cotyledon/first true leaves stage of plant development (as per the label claims) do not use a product containing a Group 7 fungicide for the foliar four-to-eight leaf application.
- Do not make more than two applications of Group 7 fungicides in a growing season. This includes foliar sprays and in-furrow or seed treatments that affect foliar diseases. In-furrow and seed treatments count as one application each.

## FREQUENTLY ASKED QUESTIONS

### How does fungicide resistance develop?

Fungicide resistance occurs when fungicide resistant strains of a pathogen dominate the whole pathogen population. Fungicide resistant strains are 'selected for' by applications of the fungicide. That is, the non-resistant strains are controlled by the fungicide allowing the resistant strains to proliferate.

For more on the causes and effects of fungicide resistance, read the AFREN Fact Sheet [How Fungicide Resistance Develops](#).

### How do I know if I have a fungicide resistant disease in my crop?

If a fungicide application fails to provide adequate control of the disease, or if the lower range of application rates on the label for a fungicide must be steadily increased from application to application, there is cause for concern.

You should keep an accurate record of every fungicide application – including dates, times, weather conditions, application rates, crop growth stage and notes of any evidence of a disease being present.

### What should I look for?

It is important to inspect the crop after every fungicide application to confirm whether the expected level of control has been achieved.

If the disease is still present or increasing, review records of the application for reasons why it may have failed. If there is no obvious cause, consult an expert and consider having samples of the infected crop tested for fungicide resistance.

### Who do I contact?

Contact your agronomist or adviser and have them review the crop and your fungicide application records. If they suspect fungicide resistance, they will be able to arrange further investigation, sample collection and lab analysis.

Alternatively, you can visit the [AFREN website](#) About page for details of fungicide resistance experts in your region.

## USEFUL RESOURCES

### Australian Fungicide Resistance Extension Network (AFREN)

Dedicated site for the latest Fungicide Resistance information, reference materials, case studies, grower survey and news.

[afren.com.au](http://afren.com.au)

### AFREN Guide - Fungicide Resistance Management in Australian Grain Crops

Comprehensive guide to fungicide resistance issues, instances and management – including details of fungicide Mode of Action groups, chemical actives and diseases by crop. Prepared by AFREN and published by the GRDC.

[afren.com.au/resources/#FRManagementGuide](http://afren.com.au/resources/#FRManagementGuide)

### GRDC How Fungicide Resistance Develops Fact Sheet

[afren.com.au/resources/#factsheets](http://afren.com.au/resources/#factsheets)

### GRDC Blackleg Management Guide and BlacklegCM app

Valuable tools for assessing your blackleg risk, with useful information on blackleg infection and management.

[grdc.com.au/GRDC-FS-BlacklegManagementGuide](http://grdc.com.au/GRDC-FS-BlacklegManagementGuide)

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**DISCLAIMER** While every effort has been made to ensure the scientific accuracy and currency of all information and recommendations, our understanding of fungicide resistance is constantly developing and readers are advised to seek further information regarding fungicide resistance from the [AFREN](#), [CCDM Fungicide Resistance Group](#) and [CropLife Australia](#) websites.

Not all active constituents/products in each MoA group are registered for use on the target pathogens indicated in each region. It is the responsibility of growers and advisers to ensure that the fungicide is registered, or that permits are current, for the target pathogen, crop and region.

Current information on registered fungicides can be found on the [APVMA](#) website.

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## REFERENCES

The content in this Fact Sheet is based on the content and sources included in the AFREN Guide **Fungicide Resistance Management in Australian Grain Crops**. See 'Useful Resources' above.

## MORE INFORMATION

### Australian Fungicide Resistance Extension Network

[afren.com.au](http://afren.com.au)

## GRDC RESEARCH CODE

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