



MITIGATING THE IMPACT OF BLACKLEG IN CANOLA



Without current control measures, blackleg has the potential to cause yield losses of more than 90 per cent in canola.

The challenge

Blackleg is the most serious disease affecting Australian canola crops. Yield loss caused by blackleg is common, and in some circumstances has resulted in complete crop failure. Blackleg is most common in areas with high canola density and is most prevalent in the southern and western cropping regions.

Blackleg survives on canola stubble and produces fruiting bodies that contain large quantities of airborne spores capable of travelling several kilometres. Spores are spread extensively via wind and rain splash. Most spores originate from the previous year's stubble.

Blackleg is also a sexually reproducing pathogen resulting in diverse populations, and this diversity results in selection of aggressive blackleg strains which will overcome cultivar resistance genes. In areas of intensive canola

production resistance genes are routinely overcome in three years.

A critical part of blackleg control is the breeding of canola varieties with resistance to the disease. Without developing improved resistance, canola will not be able to be grown in the future. Gaining an understanding of the levels of resistance of all canola cultivars is a priority for industry.

The response

Since 2000, the GRDC has invested in an extensive research, development and extension program into the blackleg pathogen, genetic solutions and the agronomic management of its impact.

One of the key projects is the National Canola Pathology Program (UM00051) which is helping support the canola industry and facilitate expansion of the crop into new regions, particularly northern NSW.

Worth approximately \$7 million, the six-year program involves monitoring all canola diseases and equipping growers with information regarding disease management and yield loss risk.

The program is multi-faceted and involves researchers from the University of Melbourne, Marcroft Grains Pathology, the South Australian Research and Development Institute, the Western Australian Department of Primary Industries and Regional Development, the New South Wales Department of Primary Industries and CSIRO.

Key components include:

- Determining the risk of blackleg resistance breakdown by monitoring blackleg disease levels across all canola-growing regions. This is undertaken through the GRDC's National Variety Trial (NVT) sites which are



located throughout the GRDC's northern, southern and western production regions.

- Providing growers with regionally specific warnings and knowledge for cultivars that may be at risk of reduced disease resistance.
- Classifying all current NVT cultivars and lines into resistance groups based on the potential major gene resistance they may possess. The rotation of these cultivars with different resistance genes can be used as a tool to help growers minimise the incidence of blackleg disease.
- Facilitating the identification of genetic materials responsible for causing the disease and the development of molecular markers to monitor virulence changes in the population.
- The National Blackleg Rating System which assigns each canola cultivar with a blackleg resistance rating, ranging from susceptible to resistant. The screening combines both independent and seed company data to produce a single blackleg rating for each cultivar, and these ratings are updated twice a year.
- Determining when fungicide applications are likely to provide economic returns.
- Monitoring blackleg populations for fungicide resistance.
- Determining regional severity of upper canopy blackleg

infections (including pod infection), potential yield losses and control strategies. Research from this investment has shown that control can be achieved by delaying flower timing, genetic resistance and fungicide applications.

- Updating cultural practices. Helps determine how modern farming systems that conserve stubble and use early sowing change blackleg severity and risk.

Data generated through the National Canola Pathology Program is used to update the GRDC Blackleg Management Guide which helps growers determine disease risk, likely severity in spring, and management practices required to reduce or prevent yield loss.

Recognising the increased demand for tailored crop management information, the GRDC recently released an extension of the Blackleg Management Guide – a blackleg management app, BlacklegCM. The app was developed as part of a concurrent GRDC investment, the national pathogen management modelling and delivery of decision support project, and provides growers and advisers with an interactive interface to explore and compare the economic outcomes of different blackleg management strategies.

The impact

GRDC investment of more than \$8 million since 2008 in blackleg-specific research projects has produced a number of benefits for Australian canola growers. These include the development of blackleg risk ratings and resistance groups and more targeted management practice recommendations resulting in improved yield outcomes.

GRDC research investments have shown that while blackleg can cause severe yield loss, it can be successfully managed by adhering to the following recommendations:

- Never sow your canola crop into last year's canola stubble. Maintain a 500m separation from the previous year's stubble.
- Choose a cultivar with adequate blackleg resistance for your region.
- Monitor crops for reduced resistance and change your cultivar to a different resistance group if required.
- Use fungicides when warranted, depending on expected disease severity, blackleg rating and seasonal conditions. Consult BlacklegCM app for spray decision advice.
- Relying only on fungicides to control blackleg poses a high risk of fungicide resistance.
- Delay the commencement of flowering as late as possible without compromising potential



yield to avoid severe upper canopy infection. Use a 30 per cent bloom fungicide application if warranted for upper canopy infection control.

- Monitor crops in spring to estimate yield losses in the current crop and determine if current management techniques are adequate or more rigorous management is required.

The most effective approach to reduce the impact of blackleg is to use an integrated strategy that utilises cultivar resistance, cultural control and the strategic use of fungicides.

Investments focusing on cultivars with improved resistance has led to 13% of growers on average adopting varieties with adequate resistance that minimises a potential 20% yield loss for their region.

This practice change benefits these growers by an estimated \$68.75 per hectare annually.

Validation

Marcroft Grains Pathology principal Dr Steve Marcroft from has been involved with canola disease research and extension for more than 20 years and has seen firsthand the value of long term investment in blackleg management.

“Since 2012 the area sown to canola in Australia has increased by 30 per cent and this increase in



Marcroft Grains Pathology’s Steve Marcroft speaking at the 2020 GRDC Grains Research Update in Wagga Wagga, New South Wales.

canola intensity has dramatically increased blackleg inoculum loads and consequently disease severity,” he said.

“Furthermore, as blackleg is able to overcome resistance genes in cultivars and create tolerance to fungicides, without investment we would have observed increasing yield losses each year.

“Since 2012 blackleg has not become more severe which is testament to the new genetic resources, fungicide knowledge, and cultural practices as a result of this GRDC investment.

“Disease management has changed considerably over this time, enabling the canola industry to continue to flourish without being overly impeded by the blackleg pathogen.

“As a result of research and extension efforts, growers now have

a wider choice of resistant cultivars, knowledge on how to deploy and maintain resistance groups, greater understanding on when to best deploy fungicides, increasing understanding on how changing farming systems impact on disease and how to mitigate these risks.

“Since 2012 there have no catastrophic blackleg events that occurred in the past; sound blackleg advice has given the Australian canola industry the confidence to invest and grow.”

For Landmark Elmore manager and agronomist Greg Toomey, having access to the latest blackleg groupings, ratings and pathogen testing services is critical to making informed agronomic decisions within canola cropping systems.

“We rely on blackleg ratings and groupings for our varietal selection.



Groupings are particularly important when a varietal change is imminent and we regularly monitor alterations in ratings over time to determine when a change needs to be made,” he said.

“The value of regular blackleg testing was highlighted recently when we received some interesting results on a stubble sample taken from a paddock near Elmore. The sample contained blackleg that has begun developing tolerance to our fungicide applications. Given that it was taken from ATR Bonito which is a variety widely grown in this area, we will have to carefully monitor and manage this situation in the coming seasons.

“It was also a clear demonstration of the importance of using a multi-faceted disease management strategy rather than simply relying on fungicides.

“Given the importance of the canola industry in the southern cropping zone, blackleg is a constant part of our crop and rotation management. On-going monitoring of the blackleg ratings and groupings is critical if we are to keep abreast of interactions between varieties and the disease and assess how new varieties might fit into our rotations.

“The importance of the research, monitoring and extension work undertaken by Steve Marcroft and his team can’t be underestimated. Without it, there wouldn’t be a viable canola industry in southern Australia.”

The outlook

With the Australian Oilseeds Federation projecting national canola production to reach more than 6mmt per year by 2025, the pressure from diseases will only increase.

To prepare for this scenario, the GRDC is preparing to invest in a new five-year phase of the National Canola Pathology program, to further develop key elements from the most recent initiative such as disease monitoring and cultivar resistance research. This will provide growers with management decision tools based on new knowledge about cultivar resistance, epidemiology, frequency, distribution and virulence of the pathogen populations causing blackleg, helping reduce input costs and potential yield losses.

References and resources

BlacklegCM app

<https://grdc.com.au/news-and-media/news-and-media-releases/national/2018/02/technology-gives-canola-growers-a-leg-up-against-blackleg>

Blackleg Management Guide

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

Australian National Blackleg Resistance Rating System

<https://grdc.com.au/research/reports/report?id=3889>

Managing canola diseases blackleg and sclerotinia

<https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2017/03/managing-canola-diseases-blackleg-and-sclerotinia>

GRDC’s Diseases of canola and their management: The Back Pocket Guide

<https://grdc.com.au/GRDC-BPG-CanolaDiseases>

National Variety Trials

<https://nvt.grdc.com.au/>

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