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Australian Blackleg Management Guide

January, 2005



**Canola Association
Of Australia**

Blackleg caused by the fungus *Leptosphaeria maculans* is the most serious disease of canola in Australia. Blackleg disease severity has increased in recent years due to the increased canola area and intensity of production. However, it can be successfully managed by:

- **growing resistant varieties**
- **avoiding the previous year's canola stubble**
- **using fungicides in high risk situations.**

The Blackleg Life-Cycle

Blackleg survives on canola stubble producing fruiting bodies that contain enormous quantities of airborne spores (capable of travelling several kilometres). These fruiting bodies can easily be seen with the naked eye (Figure 1).

Date of spore maturity depends on summer/autumn rainfall and temperature. Higher rainfall results in early spore maturity and may lead to increased disease severity.

In the autumn and winter, rainfall triggers spore release from the fruiting bodies on the stubble. Within two weeks of spores landing on canola cotyledons and young leaves, clearly visible lesions develop. Within the lesion, more fruiting bodies that release rain-splashed spores are produced (Figure 2).

Once the lesion has formed, the fungus grows within the plant's vascular system to the crown where it causes a canker. Severe canker will sever the roots from the stem (Figure 3), whereas a less severe infection will result in internal infection of the crown restricting water and nutrient flows within the plant.



Figure 1. Blackleg fruiting bodies on stubble that produce wind-borne spores.



Figure 2. Blackleg lesion on leaf, the small black dots are fruiting bodies that produce spores spread by rain-splash.



Figure 3. Canola plant falling over due to stem canker.

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Determining the disease severity within your crop

In order to determine if different blackleg management techniques are working or warranted it is important to measure disease severity within your crop each year.

1. Check for lesions on cotyledons (seedling leaves)

Visually determine if cotyledons are prematurely dying. Cotyledon death caused by blackleg lesions is the first indication that disease pressure is very high (Figure 4). Lesions on other plant parts are not a good indicator of disease pressure and potential yield loss. Canola plants infected after the seedling growth stage may not develop stem cankers. Lesions can occur on all plant parts including cotyledons, leaves, stems, branches and pods.

2. Check for seedling death

Visually determine if seedlings are being killed by blackleg. A pinched hypocotyl is symptomatic of seedling death caused by blackleg (Figure 4). If the roots are diseased the cause is probably a damping off fungi such as *Rhizoctonia*. Cankered seedlings may become detached from their roots.

3. Check for internal infection of the crown

Internal infection can be determined immediately after windrowing (swathing) by randomly pulling stalks out of the ground, cutting the roots off with a pair of secateurs and inspecting the stem cross section (Figure 5). If the stem is dark coloured the plant has symptoms of blackleg infection. Yield loss (grain and oil) occurs when more than half of the cross-section of the stem is discoloured (Figure 6).

4. Check for stem cankers

Stem cankers are clearly visible at the crown of the plant. Severe cankers may cause the plant to die or fall over as they become separated from their roots (Figure 7).



Figure 4. Seedling with cotyledon lesions and stem canker, note healthy roots but constricted hypocotyl.



Figure 5. Cutting a canola plant at the crown to assess internal infection.



Figure 6. Canola crown cross sections showing various levels of internal infection. Sections 1 & 2 have minor infection and will not cause yield loss. Sections 3 & 4 have enough infection to cause yield loss.



Figure 7. Dead canola plants, resulting from stem canker.

Blackleg management

1. Choose a variety with adequate blackleg resistance

The blackleg resistance ratings of all Australian canola varieties are published by the Canola Association of Australia in February each year (Figure 8) [www.canolaaustralia.com].

Blackleg rating data are collected each year from a number of sites in NSW, Vic, SA and WA. It is important to only consult the current blackleg rating guide as blackleg resistance ratings can change from one year to the next due to changes in the frequency of different blackleg strains.

A rating of 4 is considered adequate for lower rainfall regions, while a minimum of 6 is required for medium to high rainfall areas.

2. Isolate this year's crop from last year's canola stubble

Varietal resistance alone is not enough to protect your crop from yield loss caused by blackleg. It is also crucial to avoid high levels of disease.

In most situations over 95% of all blackleg spores originate from canola stubble from the previous year's crop. Older stubble does not produce many blackleg spores. For instance at Lake Bolac, Victoria a hectare of one year old canola stubble released 507 million spores, two year old stubble released 1.5 million spores and three year old stubble released only 12,000 spores.

Therefore, place crops away from last year's canola stubble. Disease pressure falls markedly in the first 200 metres away from last year's stubble and then continues to decline up to 500 metres. There appears to be little advantage in increasing the isolation distance past 500 metres (Figure 9).

Stubble destruction such as raking and burning or burial reduces disease pressure. However, it is not known how much stubble must be destroyed for an economic benefit. Average number of spores released from conserved stubble was 493 million per hectare compared to 263 million from burnt stubble paddocks.

Extended rotation length does not reduce disease severity. Paddocks that have been sown into two year old stubble do not have more disease than crops sown in paddocks with a three year break from canola (Table 1). Some growers have found that block planting canola to ensure isolation between the crop and last year's stubble has had positive impacts on their yields.

Table 1. Blackleg disease severity is not affected by rotation length.

Rotation length	Average Internal Infection %
Long (no canola in previous 3 years)	32
Short (canola / wheat / canola)	26

3. Consider fungicide use

Fungicides applied as a seed dressing or on the fertiliser reduce blackleg disease severity. However, they do not always give an economic return. Generally, if varieties with low blackleg resistance ratings are sown in higher rainfall areas or if varieties with good resistance are sown into situations of high disease pressure then fungicides will give an economic benefit (Figure 10). The economic viability of using fungicides in other situations should be determined by monitoring the level of disease in the current season's crop. If yield loss from blackleg has occurred, the use of a fungicide may be warranted in future years (see fact sheet "Fungicide Use for Blackleg control in Canola").

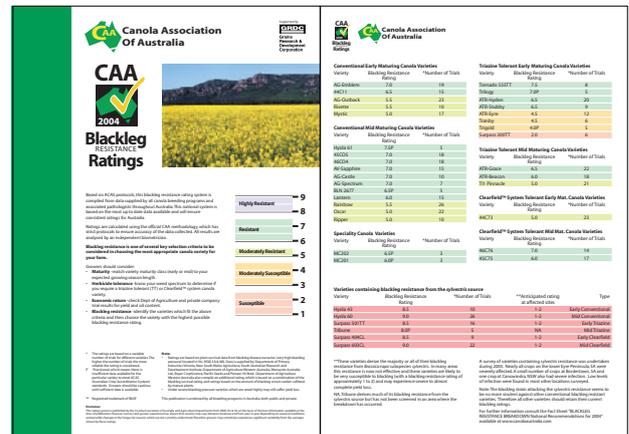


Figure 8. The Canola Association of Australia Blackleg Ratings should be consulted before choosing a variety.

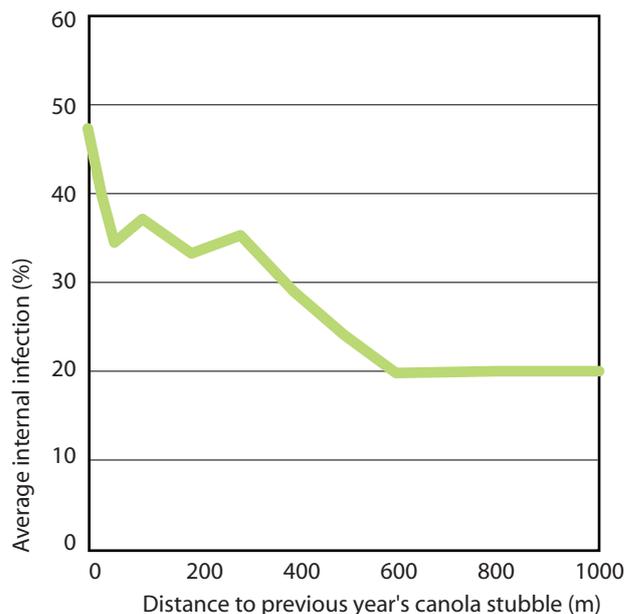
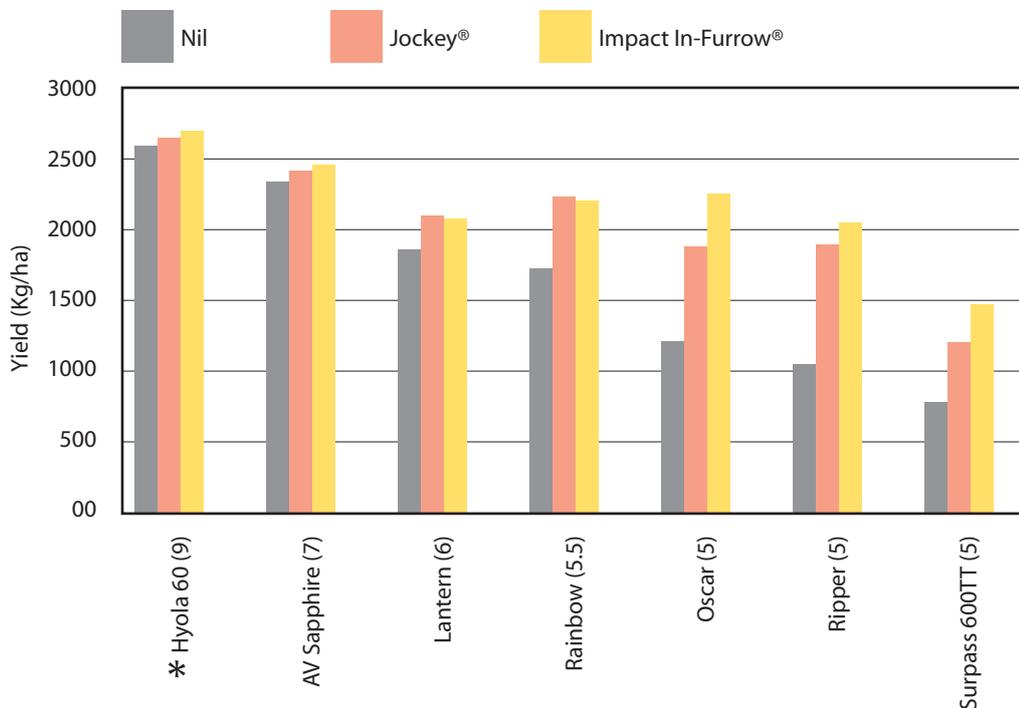


Figure 9. Blackleg disease severity is most severe when crops are sown close to the previous year's stubble.

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Left: Figure 10. Effect of Jockey® and Impact In-Furrow® on the yield of canola under very high disease pressure (canola on canola). Brackets contain 2004 CAA Blackleg Resistance Rating. Average 2 trials in SA (2003) data provided by Trent Potter, SARDI Field Crops.

Management Recommendations

- Monitor your crop for blackleg severity every year.
- Choose the most blackleg resistant variety that is suited to your rainfall and farming system.
- Leave 500m between this year's crop and last year's canola stubble.
- If blackleg has caused yield loss, consider using a fungicide and/or destroying last year's canola stubble.

Further Reading

- **Canola in Australia: The first 30 years**
- **CAA Blackleg Resistance ratings**
- **Blackleg Resistance Breakdown in canola varieties containing sylvestris resistance**
- **Fungicide use for Blackleg control in Canola**
 - www.canolaaustralia.com
- **CANOLA: The Ute Guide**
- **Blackleg Back Pocket Guide**
 - ground-cover-direct@canprint.com.au
 - Freecall 1800 110 044
- **Canola Concepts: Managing Sclerotinia**
 - www.agric.nsw.gov.au

* This variety derives the majority or all of its blackleg resistance from *Brassica rapa subsp. sylvestris*. In many areas this resistance is now not effective, and this variety is likely to be very susceptible to blackleg (with a blackleg resistance rating of approximately 1 to 2) and may experience severe to almost complete yield loss.

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