

BLACKLEG: PREVENTING A PROBLEM

Ms Nellie Malseed and Dr Nigel Crump report



For many years, blackleg in potatoes has been successfully managed through the Australian seed certification schemes. However, detection of new species of bacteria that can cause blackleg, combined with their ability to cause significant crop loss, has demanded a renewed awareness in relation to the management of blackleg. It also highlights the importance of using certified seed.

Traditionally, Australia has only had one type of bacteria causing disease. However, there have now been reports of other bacteria that can also cause blackleg.

WHAT ARE THE PATHOGENS IN AUSTRALIA THAT CAN CAUSE BLACKLEG?

"New blackleg"

- *Dickeya dianthicola*
- *Pectobacterium carotovorum* subsp. *brasiliense*
- *Pectobacterium parmentieri*

"Old Blackleg"

- *Pectobacterium atrosepticum*
- *Pectobacterium carotovorum* subsp. *carotovorum* (common soft rot)

The new bacteria detected in Australia are more suitable to local climatic conditions. Their effects can be devastating, with crop losses of up

to 90% reported overseas. *Dickeya*, *P. carotovorum brasiliense*, and *P. parmentieri* are most damaging in warm environments (>25°C), and can be asymptomatic at cooler temperatures.

This means that seed produced in a cool growing area may be infected but have no symptoms of disease. When this seed is planted in a warm growing area, the disease can be expressed, causing non-emergence, stand losses and subsequent crop loss.

Distinguishing the symptoms in the field caused by the various bacterial species is difficult. Diagnosing the specific bacteria involved often requires a laboratory test.

D. dianthicola was detected in potatoes in Western Australia a few years ago. It is now confirmed as present in other states, including Tasmania and Victoria. In addition, two new bacteria *P. parmentieri*, and *P. carotovorum* subsp. *brasiliense* have been found in some regions of Australia.

Widespread crop losses can occur unless the levels of blackleg pathogen in seed stocks is minimised. Blackleg pathogens can progressively accumulate in the multiplication of seed lots, meaning that undetectable levels of the disease in early generations can contribute to significant disease development in later generations and associated commercial crops.

A RENEWED FOCUS FOR SEED POTATO CERTIFICATION

Blackleg continues to be a major focus of the seed certification system.

The best way to reduce the risk of blackleg is by minimising the chance of the disease pathogens entering your farm. The use of clean, certified seed supported with robust laboratory diagnostics and an on-farm hygiene program are all key in the ongoing management of this disease.

The detection of new bacterial species and the occurrence of crop loss emphasise the importance of using certified seed potatoes that have a known disease status.

Adoption of good biosecurity practices on farm is also essential. Blackleg can be spread rapidly through handling potatoes with contaminated seed cutters or equipment. Equipment for handling potatoes should be thoroughly sanitised between seed lots, such as by using a quaternary ammonium (quat) disinfectant or strong chlorine solution.

Avoid using fields that have been used to grow alternative hosts for the bacterial pathogens that cause blackleg, such as flower bulbs.

WHAT VARIETIES ARE RESISTANT TO BLACKLEG?

Blackleg can infect any potato variety. There are no known resistant varieties.

ARE THERE BACTERIA THAT CAUSE BLACKLEG THAT AUSTRALIA DOES NOT HAVE?

Dickeya solani is a major cause of the disease in Europe. Fortunately it is not known to occur in Australia. *D. solani* has been shown to be one of the aggressive species of the blackleg pathogens, as even a low level of the bacteria can cause severe disease and crop loss.

AuSPICA has developed a diagnostic preparedness strategy for this pathogen. In the 2021 season, seed potato crops with symptoms of blackleg were tested in the laboratory for the presence of *D. solani*. All samples in the survey were negative. While you can't prove absence, this supports the conclusion that *D. solani* does not occur in Australia.

Ongoing biosecurity conditions for the entry of potatoes into Australia

provides a robust protection to the Australia potato industry.

DISEASE SYMPTOMS

Above ground symptoms of blackleg include uneven emergence and wilting. Affected plants wilt very quickly and easily.

A symptom of the "new blackleg" is black stem lesions that typically rise from the base. Often, the disease progresses within the crop along the row. The "new blackleg" does not typically have a potent smell and is not slimy or wet to the touch.

For more information on disease symptoms and the history of blackleg, see [fact sheet by Steven B Johnson](https://www.auspica.org.au/wp-content/uploads/2019/02/Blackleg-on-Potatoes-in-Australia.pdf). (<https://www.auspica.org.au/wp-content/uploads/2019/02/Blackleg-on-Potatoes-in-Australia.pdf>)

In the field, *Pectobacterium carotovorum brasiliense*, *P. parmentieri*

and *D. dianthicola* all express similar disease symptoms and can only be differentiated using laboratory diagnostics. It is also common for more than one bacterial species to be isolated from infected plant material.

IT'S ALL A LOAD OF ROT!

Blackleg is NOT widespread across the current seed potato production regions in Australia. However, being aware of the pathogens involved means that we, as an industry, can take action to prevent the spread of blackleg, and in doing so, mitigate the crop loss that can be caused by this disease.

There are no pesticides available to combat blackleg in potatoes, meaning that prevention is the main defence. Knowing the disease status of the seed lot that is used to produce a potato crop will help make sure you don't plant a problem.



Figure 1. *Dickeya dianthicola* in Australia (left - Nellie Malseed) and in Maine, USA (right - Steven Johnson)



Figure 2. *Pectobacterium parmentarie* and *Pectobacterium carotovorum* subspecies *brasiliense*

- Nellie Malseed