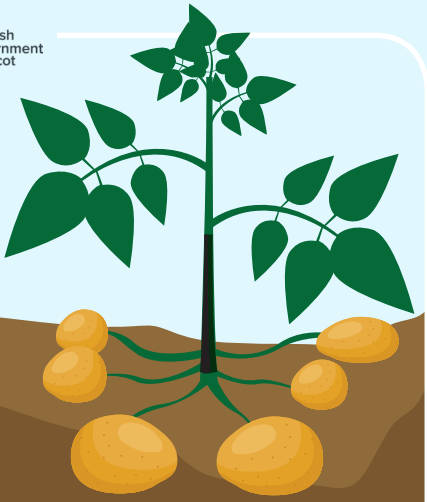
Blackleg Essential Facts



Blackleg Pathogens and Sources of Infection

1. Several species of the bacterial pathogens *Pectobacterium* and *Dickeya* cause blackleg and tuber soft rot.
2. *P. atrosepticum* (Pba) is the main cause of blackleg in the UK.
3. Other species, including *P. brasiliense*, *P. parmentieri* (formally *P. wasabiae*), *D.dianthicola* and *D. solani*, have also been found to cause blackleg in the UK but to a limited extent.
4. Blackleg symptoms vary according to the prevailing weather conditions irrespective of the species of bacterium.
5. For reasons yet to be determined, hotspots of blackleg in seed potato crops occur at different locations each year.
6. *P. atrosepticum* can cause blackleg at lower soil temperatures (<15°C) than other *Pectobacterium* or *Dickeya* spp.
7. All *Pectobacterium* and *Dickeya* spp. can survive on harvested tubers during storage.
8. Sources of initial infection of high-grade seed in the first field generation may include:
   a. wind- and rain-dispersed aerosols from neighbouring infected potato crops or waste dumps
   b. contaminated machinery
   c. soil and ground water
   d. surface water
   e. crop and weed rhizospheres
   f. insects and possibly nematodes
9. Contaminated seed tubers are important sources of inoculum in later field generations.

Bacterial Entry Points

10. Blackleg bacteria can infect growing plants from the mother tuber, during emergence of root hairs or via wounds (e.g. wind and insect feeding damage above ground, and potentially nematode feeding damage below ground).
11. Infection through wounds above soil level can lead to aerial blackleg, especially during wet weather or overhead irrigation.
12. Preliminary data suggests that free-living nematodes can increase bacterial populations in potato plants by up to 10 times, increasing the chances of blackleg development.
13. Blackleg bacteria can be present on the tuber surface, and the bacteria may enter through wounds, lenticels or systemically from the mother plant via the stolon to cause infection.

Bacterial Multiplication and Disease Progression

14. All varieties of potato are susceptible to blackleg and soft rot but some more so than others.

15. Under disease conducive conditions, bacterial loading on the surface or within lenticels of tubers, and blackleg incidence, generally increases in seed tuber stocks after each field generation.

16. Disease initiates when the bacteria multiply to a critical threshold population under conducive environmental conditions such as condensation during storage and when temperatures are >4°C. A bacterial regulatory system known as quorum sensing ensures that plant cell wall degrading enzymes are induced only when the threshold population is reached.

17. Plant defences against soft rot bacteria are oxygen dependent, and water around tubers reduces oxygen availability thereby reducing plant defence capacity.

18. Disease incidence and severity increases with duration of tuber wetness.

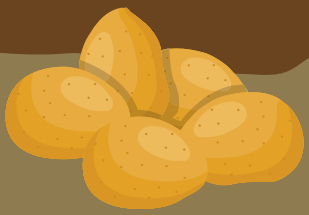
Control

19. Excessive irrigation/rainfall can increase tuber contamination and blackleg disease, the latter either from infected tubers or directly from the environment. Improved irrigation management and good field drainage can therefore restrict blackleg development.

20. Condensation during storage can initiate bacterial multiplication and soft rot initiation, especially where temperatures are >4oC. Strict temperature control and ventilation with dry air is therefore essential to prevent bacterial multiplication during storage and transit.

21. Rapid haulm destruction is important to reduce bacterial contamination of tubers as the bacteria can multiply on dead plant material prior to full desiccation, especially under wet conditions.

22. While current management practices offer some solutions to blackleg and soft rot incidence (see SASA control document) new methods, including the use of bacteriophages, are currently under investigation.



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