



**United States Department of Agriculture
Animal and Plant Health Inspection Service**

Best Management Practices for Prevention and Control of Blackleg Disease in Potatoes

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Purpose

This document is intended to provide general guidance on practices that will reduce the likelihood of blackleg disease in potatoes. Consult with local and university extension services for the best approach to preventing occurrence and spread of blackleg in potato crops.

Causes of Potato Blackleg

The bacteria causing blackleg, which affect the growing plant and results in tuber soft rot of potato, are part of a disease complex that includes *Pectobacterium* spp. and *Dickeya* spp. The *Pectobacterium* species causing blackleg are *P. atrosepticum*, and *P. carotovorum* subsp. *carotovorum* (Pérombelon, 1992; Van der Wolf and De Boer, 2007). Recently, two new subspecies, *P. carotovorum* subsp. *brasiliensis* and *P. c.* subsp. *wasabiae* have been reported to cause blackleg symptoms in South Africa and New Zealand, respectively. *Dickeya* spp. have been associated with blackleg symptoms in tropical and subtropical regions (Van der Merwe et al., 2010; Pitman et al., 2010), but until 2004, only *D. dianthicola* was reported from symptomatic plants in Western Europe. Since 2004, *D. solani* has been detected across Europe on seed tubers. Other highly virulent strains of *Dickeya* have been isolated from seed potatoes in France, Germany, Poland, and the Netherlands. Apparently, these strains have lower temperature growth tolerance than other *Dickeya* strains (Janse & Ruissen, 1988; Czajkowski et al., 2011).

Symptoms

The symptoms associated with *Dickeya* species infection are often indistinguishable from those caused by *Pectobacterium* spp. (Toth et al., 2011). Under wet conditions, typical blackleg symptoms are slimy (creamy), black rot lesions spreading from the rotting tuber up the stem; when conditions are dry, the symptoms are typically stunting, yellowing, wilting and stem desiccation (Pérombelon & Kelman, 1980; Czajkowski et al., 2011). Tuber soft rot symptoms include macerated tissue with creamy exudate which turns black; with secondary bacterial infection, tubers often have a foul smell.

Epidemiology

Most of our knowledge of blackleg epidemiology is derived from research conducted on *Pectobacterium* spp. *Dickeya* spp. are different from *Pectobacterium* spp. in that they can initiate infection in potatoes with lower inoculum levels, spread more readily through the plant's vascular tissue, are more aggressive, and have higher optimal temperatures for disease development. However, both genera share the following characteristics: The major source of inoculum for blackleg is infected seed (Pérombelon & Hyman, 1988; Czajkowski et al., 2010). When an infected tuber is planted, the bacteria are released into soil, transmitted by water, can colonize neighboring potato roots, and subsequently move through the vascular system into progeny tubers (Czajkowski et al., 2010). Other modes of transmission include mechanical transmission via contaminated potato equipment, water, and insects (Czajkowski et al., 2011; Harrison et al., 1987; Pérombelon, 1992; Van der Merwe et al., 2010).

Prevention and Exclusionary Practices

Wash and disinfect equipment used for seed cutting, planting, spraying, harvesting and grading in fields and during storage and grading to reduce the risk of introduction and spread of soft rot bacteria.

Before Purchasing and Planting Seed

- Purchase certified seed potatoes from reputable sources
- Request seed potato health certification information - many seed certification agencies require testing and inspections for a number of diseases including blackleg.
- Examine tubers for any soft rot symptoms before planting.

- If possible, use whole seed. If cut seed is used, make sure that cutters are properly disinfested.
- Plant tubers in well-drained soil after soil temperature is greater than 10°C/50° F.

During the Growing Season and Harvest

- Eliminate cull piles as they can be a source of inoculum and don't dispose of cull potatoes on fields that will be used for potato production.
- Scout potato fields for blackleg-diseased plants. Contact your local extension advisor at the first sign of symptomatic plants.
- If uncertain about the cause of disease in your field, sample the symptomatic plant or tuber, place in a clean plastic bag, and take to the university diagnostic laboratory or an extension advisor in your area.
- If the crop is irrigated, manage the system to prevent standing water in fields.
- Harvest potatoes after the vines are completely dead to ensure skin maturity - this will limit wounding and reduce the risk of exposure to the bacteria.
- When possible harvest potatoes under dry conditions.
- Minimize wounding and bruising by properly adjusting machinery during harvesting and grading.
- When possible delay harvest until tuber pulp temperatures are between 45°F and 65°F.
- Use approved chemicals to disinfest spraying, harvesting, and grading equipment to reduce risks of spreading the bacteria. Follow a two-step process:
 - Power wash or steam clean to remove soil and debris before leaving the field site or take it to a non-farm site for cleaning AND;
 - All surfaces must be treated with an approved disinfectant at labeled rates*. Keep surfaces wet for a minimum of 10 minutes. Some commonly used disinfectant chemistries include:
 - Sodium, calcium, or ammonium hypochlorite
 - Chlorine dioxide
 - Copper quinolinolate
 - Quaternary ammonium
 - Hydrogen peroxide and/or peroxyacetic acid mixtures

- * Read and follow all label directions.
- Plan crop rotation by growing non-solanaceous crops in the following year.
- Control volunteer potatoes in rotation crops to eliminate volunteers as a source of inoculum for the succeeding potato crop.

During Storage

- Clean and disinfest storage facilities and equipment before harvest.
- Consult with local extension advisors for proper storage recommendations for your area.
- If lots are suspected of being infested with *Dickeya* spp., store such lots in an area where they can be accessed easily so they can be removed quickly if disease symptoms are expressed.
- After an initial 1-2 week period at 50-60°F, lower the temperature to 38-42°F for long-term storage.

Summary

These recommendations provide general guidance for reducing the likelihood of blackleg in potatoes. Consult with local and university extension advisors for the most appropriate approach to preventing occurrence and/or spread of blackleg in your area.

References

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