

# The story behind soft rot

By Dirk Uys, Potatoes SA

Potatoes New Zealand chief executive, Chris Claridge, reminded viewers during a Newstalk ZB broadcast on 5 January this year that: “Potatoes aren’t particularly good swimmers and don’t like being submerged in water for long periods.” This is also true for South African potatoes. We have noted numerous incidences of soft rot and blackleg symptoms in areas that received higher than normal rain during the past season.

Blackleg and soft rot are not new to South African potato producers and have been widely covered in *CHIPS*. These bacterial diseases were first identified in South Africa in 1988. Initially, it was referred to as *Erwinia* soft rot but has since been associated with *Dickeya* spp. and *Pectobacterium* spp., which occur widely in South Africa, according to a study conducted by Dr Jacquie van der Waals.

## Optimal conditions

This pathogen is an anaerobic bacterium which survives in conditions where little oxygen is present, such as in very wet conditions. Infection occurs when the pectolytic enzyme breaks down the cell wall contents. It does not produce a resting structure, which means moisture must be available for survival.

Soft rot-causing bacteria are opportunistic and identify target plants under stress. The development of this disease is dependent on the temperature and moisture levels both on fields and in stores.

Fortunately, these bacteria are not able to survive in the soil for long periods, but it can survive in tubers, plant debris and various

host plants, which include beetroot, capsicums, carrots, cabbage-like crops, cucurbit, maize, onion, tobacco, tomatoes and of course *Solanaceae* volunteers and related weeds (Niederwieser, *CHIPS*, January/February 2012).

## Identifying infection

Tubers are initially symptomless but contain bacteria in the lenticels and wounds. Under suitable conditions, these bacteria start to multiply and invade the potato without triggering its defence mechanisms.

Once suitable conditions such as waterlogging occur, the plant is put under stress which acts as a trigger. Soft rot-causing bacteria are opportunistic and identify target plants under stress. The development of this disease is dependent on the temperature and moisture levels both on fields and in stores.

When a critical bacterial population is achieved, the ‘call to action’ is triggered and the plant is attacked. Enzymes are produced which break down the host cell walls, resulting in the content leaking and



Typical soft rot symptoms inside potatoes.

**Some characteristics of the Blackleg bacterium.**

- *Pectobacterium* produces enzymes that break down plant cell walls. This is aggravated once it reaches a 'call to action' critical mass.
- Water is required for survival and dissemination.
- The causal organism survives with and without oxygen.
- This organism is an opportunist waiting for the correct conditions, which include moisture and higher temperatures. Once conditions are conducive, it becomes aggressive.
- It enters through wounds and weak areas.
- It can survive in dead plant material as well as various host plants.

**Preparation tips to minimise risk (Elphinstone, n.d.):**

- Avoid cultivars that are known to be tolerant.
- Check seed quality if the seed was stored incorrectly.
- Check your rotation system.
- Remove volunteer weeds that are known hosts.
- Avoid soils with soil diseases or nematodes.
- Plant ready and certified tubers.
- Store in well-ventilated areas.
- Soil preparation and plant depth are critical to enabling optimal emergence.
- Remove suspect seed tubers before planting.
- Do not plant in very hot or cold soils.
- Do not leave tubers in the sun.
- Do not over-irrigate after planting.
- Fertilise correctly. Focus on optimal Ca levels and manage N levels.
- Ridge in time.
- Uniform irrigation is critical. Don't start too early.
- Remove sick plants.

the occurrence of typical soft rot symptoms, as seen in *Photograph 1*. Once the bacteria have penetrated the plant, it blocks the vascular tissue (Mololeke, 2013).

**Controlling the bacteria**

Typical of this bacteria, soft rot is difficult to control chemically. Soft rot increases after excessive rainfall and is aggravated when harvesting while the soil is wet. Careful planning is essential during periods of wet weather to minimise lifting wet crops.

Three main methods of transmission can occur. This includes:

- Tubers can be infected by already infected tubers early in the production season.
- Water is an important carrier.
- Mechanical transmission through insects, animals and equipment is also possible.

If desiccation is being done, it must be done fast. Optimise Ca fertilisation. This is essential for strengthening the cell wall. Minimal work has been done to characterise local varieties for tolerance, but it is valuable to reduce the risk by

planting different varieties from different sources.

**Post-harvest precautions**

- Harvest in time but ensure that the skins have set.
- Use clean equipment.
- During packing, check chlorine levels and dry tubers as fast as possible.
- Use well-ventilated storage conditions.
- Don't transport tubers when temperatures are extreme. 📍

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Soft rot symptoms observable on the outside of potatoes. (Photo: Prof J van der Waals)

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