Phytophthora erythroseptica

MANAGING PINK ROT IN POTATOES

Pink rot is a soil-borne disease caused by the pathogen *Phytopthora erythroseptica*. This fact sheet provides information on the pathogen, its lifecycle and management options.

MANAGEMENT OPTIONS

Use the following options to help manage pink rot:

- Use Metalaxyl and Metalaxyl-M (mefenoxam)* according to label instructions
- Keep soil moist (between field capacity and above wilting point) but without excess moisture.
- Use the PreDicta Pt service to identify areas that are infected with the pink rot pathogen
- Avoid planting into soils that are compacted (> 2000 kPa with a penetrometer) and/ or waterlogged. Consider using controlled traffic and/or minimum tillage practices to improve soil condition.
- Remove all volunteers and weeds that can act as potential hosts.
- Avoid mixing tubers from contaminated areas with other tubers during storage or better still avoid harvest of contaminated tubers.
- Rotate potatoes with other crops (for at least 4 years)
- Use clean, certified seed.

POTENTIAL MANAGEMENT OPTIONS

Research has shown that:

- Biofumigants such as mustards can be effective. Biofumigants should be used according to best practice advice.
- Low soil pH (<5) in the rootzone and low levels of free calcium in the soil solution may increase pink rot severity.[1] Liming and soil application of soluble calcium fertilisers may alleviate this risk (by increasing the pH and the soluble calcium). Further research is required to better understand this relationship.

Photo: Jordan Eggers, Oregon State University

THE PATHOGEN AND DISEASE

Pink rot of potato is an important soil-borne storage disease of potatoes worldwide. It is caused by the fungus *Phytophthora erythroseptica* and sometimes by *Phytophthora cryptogea*. Pink rot infection is often associated with secondary infection by anaerobic soft rot bacteria. Key features of pink rot are that:

- Infections vary in virulence
- Some cultivars are less susceptible than others but can still get the disease to some extent
- It can survive for long periods in the soil (up to 7 years)
- It can be spread by tubers, water and soil
- It develops rapidly at soil temperatures from 10 to 30°C with 25°C optimal for infection
- It resembles blackleg in early infection stages
- There are many plants that act as hosts including many weed species
- High humidity along with poor ventilation can cause heavy losses of stored potatoes.

*Metalaxyl is effective in Australia but resistance has been identified in the US where the active ingredient has been over-used in the crop rotation. Metalaxyl is a chemical which has been shown in certain soils to develop enhanced biodegradation (i.e. the soil microorganisms use it as a food source and thus it is rapidly degraded before it can be effective). This is more likely to occur with repeated usage on many crops.

SYMPTOMS

Diseased plants are first observed in poorly drained (waterlogged) parts of the field and late in the season, near harvest. Disease symptoms are mostly characterized by stunting and wilting of plants. Wilting starts from the base of the stem and progresses upward, causing leaf yellowing, drying and defoliation. Vascular discoloration and blackening of the underground stems may also be observed. Similarly, roots may turn brown to black, and occasionally aerial tubers may develop.

Symptoms on tubers are more obvious and characteristic of the disease. Tuber decay begins at or near the stem or stolon end of the tuber. Infected tissue becomes rubbery but not discoloured in the early stages of infection, and when infected tubers are cut open the rotted portion is bordered by a dark line visible through the tuber skin (Figure 1). The tuber skin (periderm) over the rotted portion is light brown in white-skinned cultivars.

Pink rot is not a slimy soft rot, and rotten tissues remain intact but spongy. When rotten tubers are cut open, the internal tissues are cream-colored and usually odourless. The tough, leathery, rubberlike texture of infected tubers distinguishes pink rot from bacterial rot disease where the diseased tissue becomes soft and pulpy and contains numerous cavities. However, infected tissues are easily invaded by secondary pathogens, such as soft rot bacteria (*Pectobacterium* spp.), which produce the slimey symptoms often found in potatoes with pink rot (Figure 2).

As tubers are exposed to the air, the colour of the infected tissue progressively changes from cream to salmon pink within 15 to 30 minutes (Figure 3). After about one hour, the tissue gradually turns brown and then black. If the cut tuber is squeezed, a clear liquid may ooze out of the cut surface.

Photo: P.S. Wharton

Figure 1. *In the early stages of pink rot infection, the rotted portion of the tuber is delimited by a dark line.*

Photo: P.S. Wharton

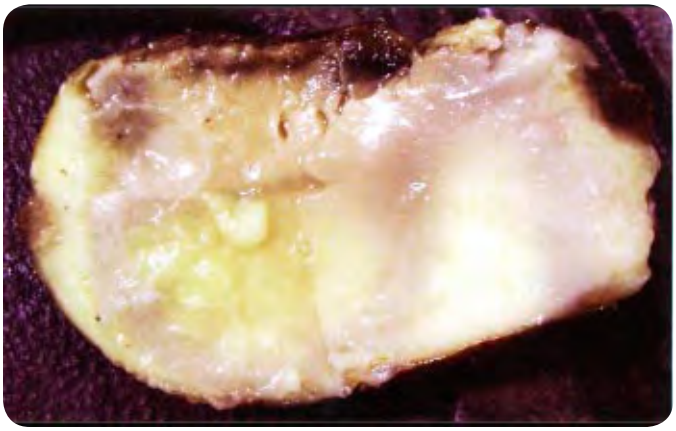

Figure 2. *Pink rot infection is usually followed by secondary infection by anaerobic soft rot bacteria. These turn the tuber tissue soft, creamy and mushy.*

Photo: P.S. Wharton

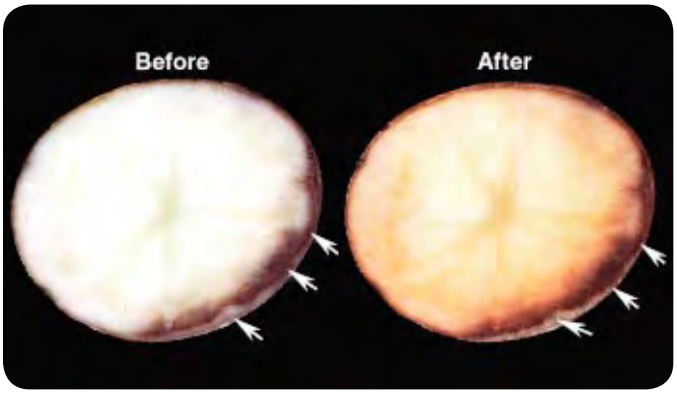

Figure 3. *Tubers infected with pink rot turn pink after exposure to air for 15 to 30 minutes. Arrows indicate diseased tissue.*

DISEASE CYCLE

The disease cycle of pink rot is shown in Figure 4. The pathogen can be transferred by:

Soil - to new fields via farm machinery and bins, and within an infested field during cultivation.

Tuber - the surface of healthy tubers may be contaminated with oospores from infected tubers that were missed during harvest (volunteer potatoes) or in cull piles that will end up in the soil after deterioration of the tubers.

Water - irrigation water is also an important source of movement of the oospores from one location to another within a field and among nearby fields.

Photo: Michael Rettke, SARDI
Illustrations: Marlene Cameron

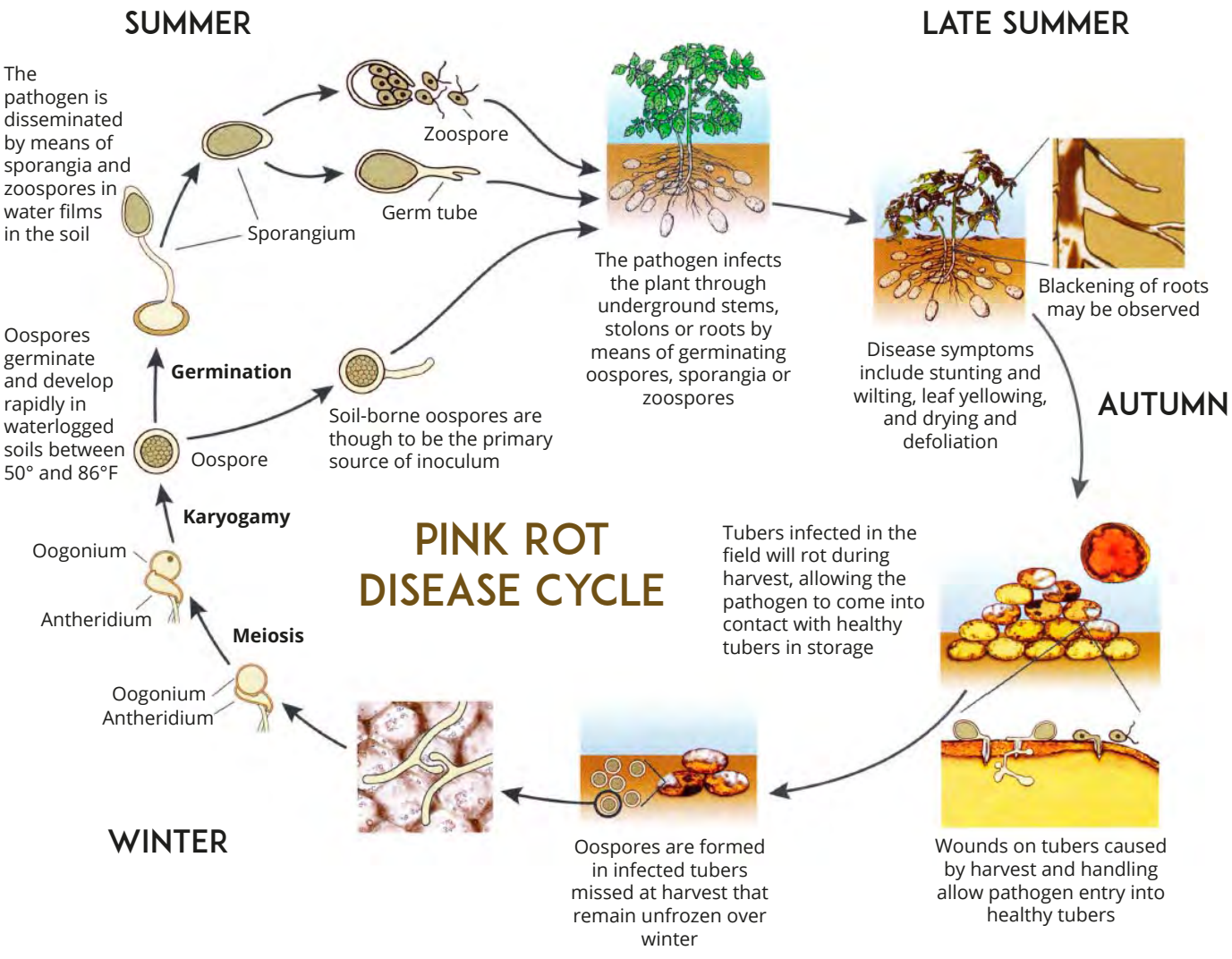

Figure 4. *The disease cycle of the pink rot pathogen, Phytophthora erythroseptica*

FURTHER READING

Management strategies including chemical control:

- https://www.syngenta.com.au/news/potatoes/reducing-risk-pink-rot-infection-season
- https://www.syngenta.com.au/news/potatoes/controlling-pink-rot-potatoes
- https://millerresearch.com/research-library/pink-rot/*
- https://www.croplife.org.au/resources/programs/resistance-management/fact-sheet-fungicide-resistance/

Hort Innovation reports
The following reports can be found on the InfoVeg webpage at https://ausveg.com.au/infoveg/infoveg-database/

- 2000 PT97026 Developing soil and water management systems for potato production on sandy soils in Australia https://ausveg.com.au/app/data/technical-insights/docs/PT97026.pdf
- 2001 PT97004 Potato pink rot control in field and storage https://ausveg.com.au/app/data/technical-insights/docs/PT97004.pdf
- 2002 PT01042 Potato pink rot control in the south east of South Australia https://ausveg.com.au/app/data/technical-insights/docs/PT01042.pdf

Fungicide activity groups:

- https://www.croplife.org.au/resources/programs/resistance-management/fungicide-activity-group-table-2/fungicide-activity-group-table-2-draft/

* Products mentioned in this factsheet may not be registered for use in Australia.

Photo: istock.com/oticki

References

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https://www.canr.msu.edu/uploads/resources/pdfs/michigan_potato_diseases_-_pink_rot_(e2993).pdf

A review of knowledge gaps and compilation of R&D outputs from the Australian Potato Research Programs PT13013 (2015) Dr Kevin Clayton-Greene Horticulture Australia Ltd

[1] Benson, Jared H., "Effect of Ca and pH on Disease Severity of Pink Rot Phytophthora erythroseptica in Russett Norkotah Potato Solanum tuberosum" (2008). All Theses and Dissertations. 1455.
https://scholarsarchive.byu.edu/etd/1455

Hort Innovation Strategic levy investment | POTATO – FRESH FUND
Hort Innovation Strategic levy investment | POTATO – PROCESSING FUND
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