

Disaster knocking at the door – the ongoing battle against plant disease in Australia.

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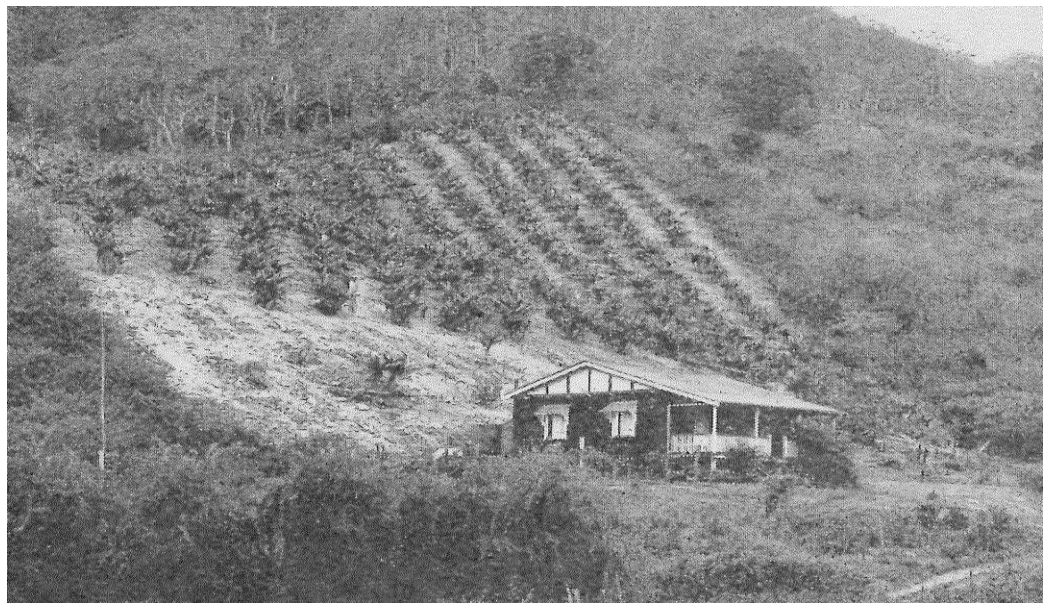
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European colonization began with the arrival of the First Fleet from England in 1788. Numerous seeds and plants were on the Fleet’s cargo manifest, including wheat and bananas. It is uncertain if those crops survived their initial introduction.

Many of Australia’s food crops continued to arrive as settlement expanded into new farming areas, along with most of their severe pathogens. Few native diseases have caused serious economic impact; however, many introduced pathogens are proving difficult to manage. With intense farming comes high disease pressure.

Ongoing plant pathology research into crops and their major pathogens has supported sustainable food production in Australia over the last century.

A production limiting pathogen unique to each crop – banana and wheat - is examined, as well as research progress over the last 100 years.



Left – typical early farm.
Right – harvesting bananas



Left – Steam driven winnowing.
Right – Baling hay with Massey Harris tractor



Banana bunchy top virus (BBTV) *One of the most serious diseases of banana worldwide*

1913: First reported in suckers imported from Fiji. Initially thought to be a nutritional problem.

1920’s: 90% of south east Queensland crop destroyed.

1924: Bunchy top investigation committee was established.

1927: Charles Magee demonstrated that the causal agent was a virus which was aphid transmitted. This work resulted in Government legislation which regulated field management and restricted plant movement.

1926 and 1954: Incursions into North Queensland. These were eradicated following swift intervention.



BBTV symptoms on young plants

Past 120 years: Although still present in south east Queensland, BBTB is actively managed.

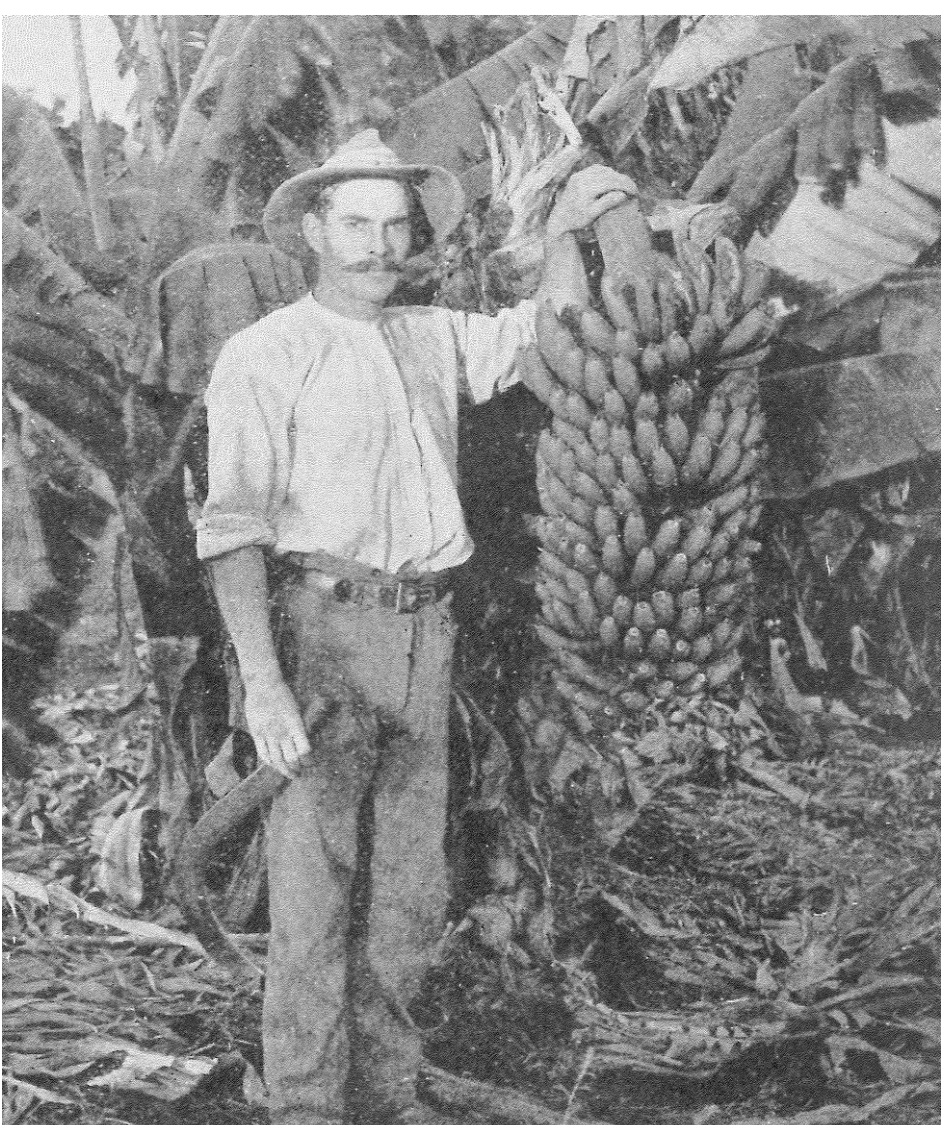
Disease has been kept out of the major production areas in northern Australia, where 95% of the crop is grown.

Current work involves:

- Improving destruction methods for infected plants in the field.
- Computational modelling into epidemiology and management strategies.
- Collaboration with Asian researchers to search for a source of BBTB resistance in wild banana germplasm.
- Development of new antibody reagents for detection assays.



Left - Transporting fruit to rail depot.
Right – Farmer with mature bunch



Acknowledgements - for technical advice and photos Pat Abbott, Kathy Crew (banana) and Stephen Neate (wheat)

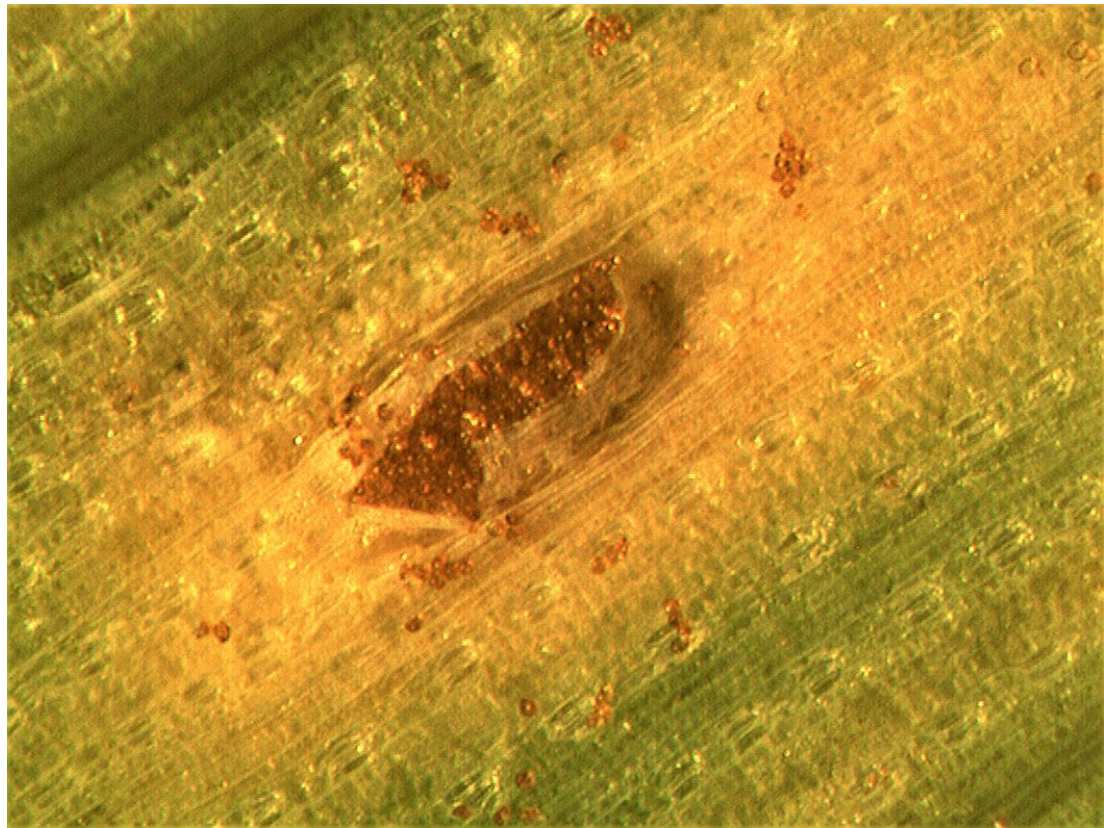
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Wheat rust - *Puccinia graminis f. sp. tritici* (Pgt) *Re-emerging around the world as a serious threat*

Early epidemics – Numerous outbreaks in the 1800s, with a very severe one in 1889.

Daniel McAlpine (1849 – 1932) is considered to be the father of plant pathology in Australia for his applied and scholarly research. He felt the best approach to tackle wheat rust was to record all rusts so far known in Australia. He understood the complexities of the disease and was conscious that much work needed to be done by future researchers. He supported and worked closely with wheat breeder, William Farrer.

William Farrer (1845 - 1906)
Applied science to developing wheat hybrids, initially applying cross-pollination techniques to create rust immune strains of wheat. New wheat strains led to major improvement in yield – with the cultivar ‘Federation’ released in 1903, yield over next 20 years.



Wheat rust symptoms

Current work involves:

- Resistant varieties – ongoing work on pathogen variability, host resistance and resistance breeding. National Variety Trials disease testing assures that industry is aware, at the time of cultivar release, of the resistance status to known pathotypes.
- Annual pathotype surveys undertaken by the University of Sydney for the last 100 years continue. These surveys have detected exotic introductions and subsequent mutations of the pathogen.
- High yielding resistant wheat varieties continue to be available for all cropping regions of Australia.
- Ongoing International collaboration to tackle worldwide rust strains.



Far left – stubble burning.
Left – wheat harvesting.