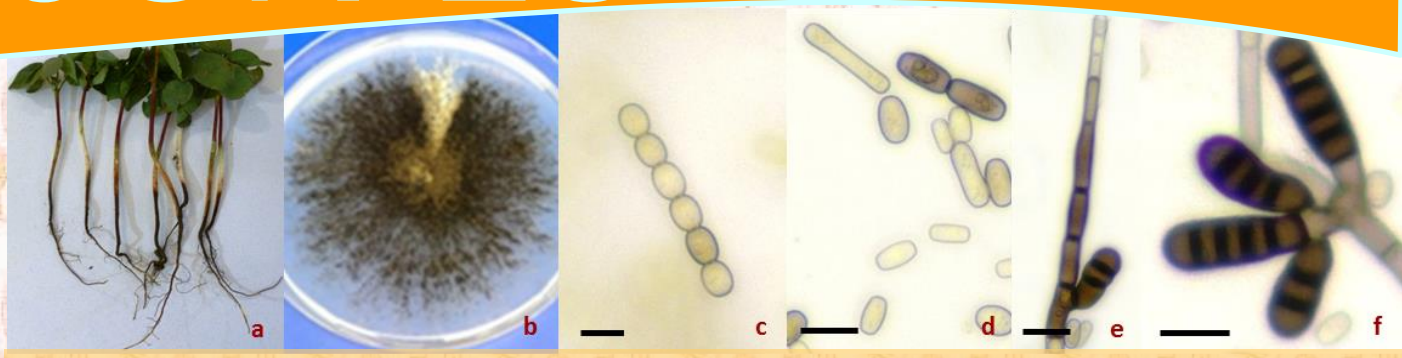
JUN 18 Pathogen of the month – June 2018

Thielaviopsis basicola (Berk. & Br.) Ferr.



Photos: Cotton seedlings with typical blackened cortical tissues of the tap roots (a), recovered pathogen growing on PDA showing an albino (white) sector (b), ovoid to cylindrical conidia produced abundantly singly or in chains in culture (c, d), segmented and dark-pigmented survival structures, chlamydospores produced singly (e) or clusters (f) (Bars = 10 µm).

Disease: Black root rot (BRR) of cotton

Name: Also known as *Chalara elegans*, most recently described as *Berkeleyomyces basicola* comb. nov. and *Berkeleyomyces rouxiae* sp. nov.

Classification: **K:** Fungi, **P:** Ascomycota, **C:** Soradiomycetes, **O:** Microascales, **F:** Ceratocystidaceae

Thielaviopsis basicola is distributed worldwide and causes a commonly known disease, black root rot (BRR). The fungus was first detected in Australia in 1930. On cotton seedlings, BRR was reported as early as in 1989 in north-western NSW. Since then the disease has been observed across cotton growing regions in NSW. Currently, BRR is of an economically important disease to the Australian cotton industry.

Host Range:

Over 230 plant species have been recorded as hosts of *T. basicola*. However, isolates of *T. basicola* from different host plants may exhibit a certain degree of host preference.

Biology and Ecology:

The fungus infects cortical tissue of cotton seedlings and subsequently induces BRR symptoms as early as 10 to 14 days after planting. BRR appears most severe on early planted cotton (late September early October in NSW) when soil temperatures are below 16 °C. The fungus has been reported to have synergistic interaction with root-knot nematode, *Meloidogyne incognita* resulting in more severe BRR on cotton elsewhere; yet this type of interaction has not been documented in Australia.

The fungus produces hyaline conidia within 24h and thick-walled, dark-pigmented chlamydospores within three days on cultures. Though chlamydospores are considered as the main resting structures, conidia can persist up to 15 months in clay loam soil.

Impact:

The pathogen does not kill the infected seedlings, but it causes significant reduction of seedling vigour, delay of maturity; and subsequently, yield losses.

Distribution:

T. basicola is found globally. In Australia, the fungus and BRR have been observed across all cotton growing valleys in NSW. BRR is occasionally observed in some cotton growing regions in QLD, where cotton is planted early in the season when cool temperature may occur.

Management options:

Currently, no resistant cotton cultivars are available and there is no single control option that could effectively manage BRR of cotton. A number of approaches have been recommended. Delay planting (where practical) until night soil temperature above 16 °C has shown a decrease in BRR incidence. For some regions, pre-irrigating to raise soil temperature at planting is also practiced. In Australia, acebenzolar-S-methyl (Bion®), a systemic plant inducer, was registered for seed treatment application against BRR on cotton. Soil incorporation with green biomass of either woolly pod vetch or some mustard lines or canola could diminish BRR pathogen inoculum. Summer flooding could effectively reduce the pathogen inoculum in soil; however, water availability and field topography have limited this application. Farm hygiene practices, including foot bath, machinery wash down and trash management are essential to minimize spread of the pathogen to new fields.

Further Reading: Nehl *et al.* (2004) *Aust. Plant Path.* **33:**87-95;
Nel *et al.* (2018) *Plant Pathol.* **67**: 871-882; Toksoz *et al.* (2009) *Plant Dis.* 93, 354-362

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