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Poster paper

Effect of *Phytocercomonas venanatans*, the causal agent of chlorotic streak, on yield of commercial sugarcane cultivars

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Chlorotic streak is a global disease of commercial sugarcane and is one of the major diseases in the Australian sugar industry. The disease occurs in high rainfall areas, poorly drained fields and is particularly prevalent during wetter than average seasons. The cause of the disease was unknown for almost 90 years but has recently been identified through a combination of modern molecular techniques and traditional pathology (Ngo *et al.* 2018; Braithwaite *et al.* 2018). The ability to culture *Phytocercomonas venanatans* allows the development of methods to screen sugarcane clones to assess their resistance to the disease.

We assessed two inoculation methods (Figure 1) and determined their effects on symptom development, pathogen abundance and yield traits in field-grown plants. The first method imitates a natural infection through roots and involved soaking damaged roots in cultured *P. venanatans* cells. The second method imitates the planting of diseased material and was achieved by forcing cultured cells into the ends of two-eye setts.

Figure 1. Inoculation of the pathogen was done through roots (top) and setts (bottom).

Generally, symptoms increased as plants matured, but they were lowest in winter and highest in mature plants (Figure 2). Symptoms can also be high in young plants, almost disappear in winter and then become high again in summer. The difference between the winter and summer period can be a change of up to 70% diseased stools.

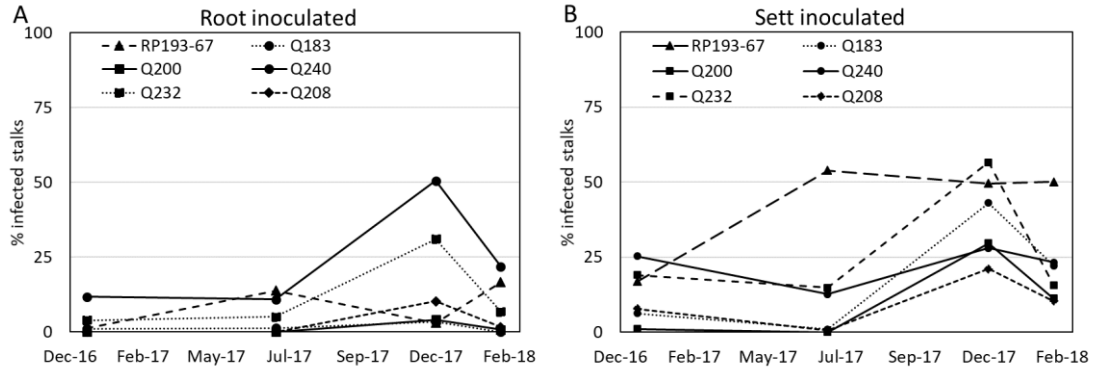

Figure 2. Chlorotic streak symptom development in the plant crop following (A) root inoculation, and (B) sett inoculation. Harvest occurred in December 2017 and the February data point is from the ratoon crop.

We also found plants that contained high pathogen levels and did not show signs of the disease (Figure 3). In addition, not all inoculated plants tested positive for the disease even if they showed symptoms.

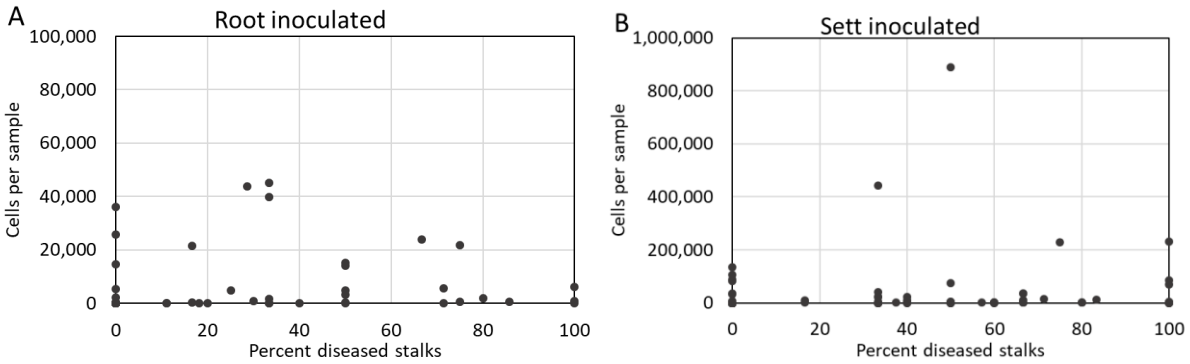

Figure 3. Comparison of symptoms to pathogen abundance following (A) root inoculation, and (B) sett inoculation. Note there is a 10-fold difference in the cells per sample scale between the two graphs.

Both findings mean that disease surveys or clonal-screening trials should not be rated in winter and that even symptomless plants may be infected. Symptoms are also correlated to pathogen population in the root-inoculation method but could not be confirmed in the sett-inoculation method. This suggests that more work is required to understand how sampling for diagnostics should be performed.

Key words Chlorotic streak, *Phytocercomonas venanatans*, symptoms, pathogen abundance, yield traits

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