ALTERNATIVE SCREENING FOR SUGARCANE SMUT RESISTANCE USING HISTOPATHOLOGY

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SUGARCANE smut caused by *Ustilago scitaminea* is a serious fungal disease of sugarcane. It can significantly reduce the yield if susceptible varieties are planted. International experience indicates that sugarcane smut can be effectively managed by the propagation of resistant varieties. The current method of screening sugarcane varieties for smut resistance is a lengthy process that can take up to 12 months and is expensive. The aim of this study was to develop a simple, rapid and quantitative screening technique using tissue staining that can significantly:

(i) reduce the time and cost of screening; and

(ii) increase the number of clones that can be reasonably tested.

A trial was conducted using eight sugarcane varieties of a known smut rating: two resistant, two intermediate and four susceptible. Canes from the selected varieties were cut into one eye setts, dip inoculated and potted up as per standard smut screening methods. Meristematic tissue from growing buds was stained with trypan blue and observed under a light microscope at 1, 2, 4, 6, 8 and 10 weeks after inoculation. Assessment was conducted by quantifying the extent of colonisation of fungi within plant tissue with a grid scale. For comparison, the same eight varieties were inoculated and planted in the field in accordance with standard smut screening procedures. Plant and ratoon crops were visually rated for disease and severity in the field at 26 and 42 weeks respectively.

Results indicate that:

(i) smut can be detected inside the growing bud of sugarcane within a week of inoculation, particularly in highly susceptible varieties;

(ii) the fungus grows faster and the extent of colonisation is greater in susceptible varieties compared to resistant varieties.

Tissue colonisation was significantly ($P<0.001$) higher in susceptible varieties, compared to intermediate and resistant varieties, and colonisation was significantly ($P<0.001$) higher in intermediate varieties compared to resistant varieties. The average tissue colonisation for susceptible, intermediate and resistant varieties was 15%, 4% and < 1% respectively. These results suggest that there is potential to discard susceptible clones within a few weeks after inoculation. The histopathological screening technique could be adopted as an alternative to the existing field method, although the procedure would need to be stream-lined and automated to handle large scale screening trials.