

Development of detached root and leaf assays to evaluate the antagonistic properties of biocontrol agents against *Fusarium* wilt of banana

ABSTRACT

The failure of bio-control agents (BCAs) in suppressing *Fusarium oxysporum* f. sp. *cubense* tropical race 4 (Foc-TR4) was reported in vivo although antagonism was obtained from in vitro dual culture assay. This study aims to develop rapid assays to validate the antagonism of BCAs using detached banana leaves and roots. Both *Trichoderma harzianum* and *Pseudomonas aeruginosa* reduced root lesion length (2.7–3.1 cm) compared to 4.9 cm in TR4 treatment. BCA-treated leaves reduced wilting severity from 93.75 to 33.75%. Trypan blue staining showed lower cell death area in BCA-treated roots and leaves. Reduced leaf wilting was indicated by lower red ink content and higher chlorophyll content in BCA-treated leaves. Both defense-related genes, PR-1 and PR-3 were expressed in BCA-treated roots and leaves which could be associated with reduced root necrosis and leaf wilting. In conclusion, both assays could be served as rapid methods to select potential BCAs before attempting large-scale trials.

Keyword: Banana; Biocontrol; Defense-related genes; *Fusarium* wilt; In vitro assays