

ABSTRACT

A Survey of Selected Fungi and Nematodes Associated with Banana Rhizosphere and their Pathogenic Effects on Bananas in the Windward Islands

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A survey of banana farms in three of the Windward Islands, Dominica, St Lucia and St Vincent, was conducted to determine the presence and population levels of selected fungal and phytonematode species in rhizosphere soil and roots. The main factors considered were the effects of altitude and soil types on the frequency of isolation of fungi and phytonematode population densities.

The roots and corms of banana plants were assessed for necrosis and were assigned root and corm necrosis indices (RNI and CNI) ranging from 0 to 6. Fungal species were isolated from banana roots and phytonematodes were extracted from soil and roots. The fungi associated with banana roots were *Fusarium oxysporum* f. sp. *cubense*, *Fusarium moniliforme*, *Fusarium solani*, *Cylindrocladium* / *Cylindrocladiella* sp., *Trichoderma* spp. and *Rhizoctonia* sp.; the associated phytonematode species were *Radopholus similis*, *Helicotylenchus* spp., *Pratylenchus coffeae*, *Rotylenchulus reniformis*, *Meloidogyne* sp. and

Hoplolaimus sp.

The significance of (i) relationships between altitude and soil types and (a) frequency of isolation of fungal species and (b) population densities of phytonematodes and (ii) correlations between root and corm necrosis indices and (a) percentage fungal isolation and (b) root nematode population densities was determined.

In Dominica, the frequency of isolation of *Fusarium* spp. was higher than that of *Trichoderma* spp., *Rhizoctonia* sp. and *Cylindrocladium* / *Cylindrocladiella* sp. at both high and low altitudes. For the combined data for all three islands, the frequency of isolation of *Fusarium* spp. was higher at high than at low altitude and that for *Trichoderma* spp. was higher at low than at high altitude. *Trichoderma* spp. and *Cylindrocladium* / *Cylindrocladiella* sp. were isolated more frequently from bananas grown in the entisol soil and the ultisol/alfisol/inceptisol soil, respectively. In Dominica, the frequency of isolation of *Fusarium* spp. from banana roots at high altitude was higher than at low altitude in the ultisol/inceptisol soil and that of *Cylindrocladium* / *Cylindrocladiella* sp. was higher at low altitude than at high altitude in the inceptisol soil.

The combined data for Dominica and St Lucia indicated that soil population densities of *P. coffeae* and *Meloidogyne* sp. were higher at high than at low altitude. *Meloidogyne* sp. population densities were higher in the alfisol/inceptisol, ultisol/alfisol and mollisol/inceptisol/vertisol soils than in the other soils.

Combined data from Dominica, St Lucia and St Vincent showed that the root phytonematode population density of *Helicotylenchus* spp. was significantly higher at low than at high altitude. There were no significant differences between the various soil types in root phytonematode population densities.

Combined data for Dominica and St Lucia showed that the RNI of the mother plant was higher at high than at low altitude. There were no significant differences between RNIs or CNIs and (i) soil types (ii) soil types and locations and (iii) altitudes and soil types. There were significant positive correlations between the root phytonematode population densities and the RNIs and CNIs from suckers at high altitude in St Lucia. There was also a positive correlation between the percentage isolation of *Fusarium* spp. and CNIs from suckers in St Vincent.

The separate and interactive effects of *F. oxysporum* f. sp. *cubense*, *Cylindrocladium* / *Cylindrocladiella* sp. and *R. similis* were investigated on seven- to 16-week-old tissue-cultured banana plants for a duration of 10 weeks. There were no significant effects of these microorganisms on the plants for this growth period.