

ABSTRACT

Studies on vesicular-arbuscular mycorrhizas in Barbados

John Michael Phillips

Three of the four genera of the Endogonaceae that form vesicular-arbuscular mycorrhizas (VAM) are represented in Barbadian soils. Glomus spp. and Sclerocystis spp. were common in sand dunes, forest soils and cultivated soil under onions. Three unidentified sporocarp forming Glomus species were found in sand dunes and forest soils. Gigaspora spp. were found only in the natural (undisturbed) ecosystems, particularly in sand dunes, where G. Margarita was very common. Acaulospora spp. were not found.

Infection levels in field onions (island wide) ranged from 40% to 89% and plants were infected with fine hyphae, coarse hyphae or both. Available phosphorus (Olsen P) varied greatly even between neighbouring fields and increased levels of P decreased VAM infection levels. The best conditions for growth of onions (adjudged by yields) corresponded with the best conditions for the development of the VAM fungi. In many fields, plants showed symptoms of 'onion blast' disease. Of those plants affected by onion blast, those that had the worst symptoms also had the highest VAM infection.

Pigeonpea (Cajanus cajan) showed a dramatic response to VAM in an experiment using natural 'infective' soil and soil treated by a new 'freeze-thaw' technique. In this treatment, soil is deep frozen and

held at -20°C and then warmed to $+28^{\circ}\text{C}$; the cycle is repeated. The soil is rendered free from viable VAM fungi and more complex organisms, while bacteria such as Rhizobium are unaffected.

Paylis (1975) hypothesised that sedges (Cyperaceae) have become non-mycotrophic through having evolved a highly efficient graminoid root system. But sedges in Barbados were found to be regularly mycotrophic when the soil was not oxygen deficient due to water-logging. The Graminoid characteristics of roots were not altered by infection nor water-logging. The Paylis' Hypothesis as it applies to sedges is therefore rejected.