1. INTRODUCTION

Species within the genus *Fusarium* are recognized as important plant pathogens responsible for wilts, blights, root rots and cankers in a very wide range of important crop plants including trees (Moss and Smith, 1982). The Fusarium wilt of banana caused by *F. oxysporum* f. sp. *cubense* is one of most destructive diseases of banana in the tropics. The disease almost destroyed the banana export trade of Gros Michel in the 1940s and 1950s in Latin America because of the prevalence of race 1 and the extreme susceptibility of this cultivar (Pegg and Langdon, 1987). Development of the resistant Cavendish group of cultivars had provided effective and economical control, but the emergence of race 4 and its dissemination poses an immediate threat and challenge. Other attempted control measures like injection of chemicals, soil treatments including fumigation and incorporating soil amendments may reduce the severity of the disease but none were commercially applicable (Hwang and Ko, 1987). Pegg *et al.*, (1996) reported that fungicides, fumigants, flood fallowing, crop rotation, and organic amendments have rarely provided long-term control in any production area and it is generally accepted that the only method for controlling Fusarium wilt is the selection of resistant varieties through conventional plant breeding and induction of somaclonal variants or mutants.

Field evaluation, though a reliable method for disease resistance screening, is demanding in terms of cost, manpower and space requirements (Pegg *et al.*, 1996). There is also the need to maintain strict quarantine control to avoid pathogen spread. In banana Fusarium wilt, field infection is time consuming as plants tend to show

symptoms only after 4 to 5 months (Morpurgo *et al.*, 1994). The uneven distribution of pathogen in the field can lead to "disease escape" while many variables that may affect infection and symptom expression are difficult to control.

A double-cup sand-culture containment method was developed earlier for laboratory testing of pathogen virulence (Liew, 1996). The objective of the current project was to adapt the technique into an effective and reliable early screening method that :-

a) is sensitive to differential host response when challenged by different pathogenic races;

b) is amenable to modifications to allow investigations into the effects of variable inoculum concentrations and environment variables on infection and disease expression;

c) has the capacity for pathogen containment so as to eliminate cross-contamination;

d) is suitable for large-scale testing.

The technique adopted for testing comprised a 'double compartment' apparatus made up of two plastic trays, one fitting inside the other. In confirmation of the reliability of the method, factors considered during the inoculation experiments include the determination of: -

a) Suitable age/height of tissue-cultured plantlets for inoculation;
b) Suitable inoculum concentration for disease expression;
c) Duration of root immersion in the microconidial suspension during inoculation;
d) Ability of test plants to show clear differential responses similar to field evaluations.

The ultimate goal is to apply the technique in the mass screening programs necessary for selection of resistant clones.