NOTES

A NOTE ON *IN VITRO* SCREENING OF FUNGICIDES ON *FUSARIUM SOLANI* AND *F. OXYSPORUM* ISOLATED FROM *PTEROCARPUS INDICUS* (ANGSANA)

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Angsana (*Pterocarpus indicus*) is one of the most popular wayside and shade trees in Malaysia because it can be easily propagated by cuttings and stumps (Yap & Adnan 1991). In addition, it has been regarded as relatively free of pests and diseases (Wong 1982).

However, lately angsana trees in Kuantan, in the state of Pahang, Malaysia, have been attacked by a fungus causing wilt (personal observation). The typical symptoms of this attack are yellowing of leaves and dieback on one side of the tree. At advanced stages of infection the stems are invaded by pin hole borers. The pathogen *Fusarium oxysporium* described by Booth (1971) has been isolated from the roots of these trees. In Singapore, *F. oxysporum* and *F. solani* are known to infect and kill angsanas (Fong, personal communication). The disease may pose a serious threat to the angsana trees that are widely planted in the country.

Four commercial fungicides with different concentrations were therefore screened against *F. solani* and *F. oxysporum*. The concentrations were chosen based on the recommended rates by the manufacturer. A plug of the pathogen from a 5-day-old culture (4 mm in diameter) was placed in the middle of a Petri dish containing potato dextrose agar (PDA) and a piece of filter paper disc (5 mm in diameter) soaked in the tested fungicide was immediately placed at a distance of 30 mm from the inoculum. Each treatment was replicated seven times and incubated at 24 ± 2° C. The fungicides tested were thiabendazole, benomyl (benlate), metalazyl and mancozeb at different concentrations. The radial growth of the fungus was measured four days after the incubation and the percentage growth inhibition was assessed as follows (Fokkema 1973):

$$I = \frac{r_1 - r_2 \times 100}{r_1}$$

where

I = percentage growth inhibition
r_1 = radius of the pathogen away from the fungicide (mm)
r_2 = radius of the pathogen towards the fungicide (mm)

These data were transformed into arc sine values for the analysis of variance using complete radom design at 1% level of significance.

Table 1 shows that both thiabendazole and benomyl at the concentration tested inhibited the growth of both pathogens (Figures 1 & 2). Both mycelial growth and production of macro and microconidia were inhibited. Thiabendazole inhibited the radial growth of *F. solani* by 50 - 55% while benomyl by 33 - 41%. This suggests that thiabendazole is more effective in surpressing the pathogen. However, these fungicides

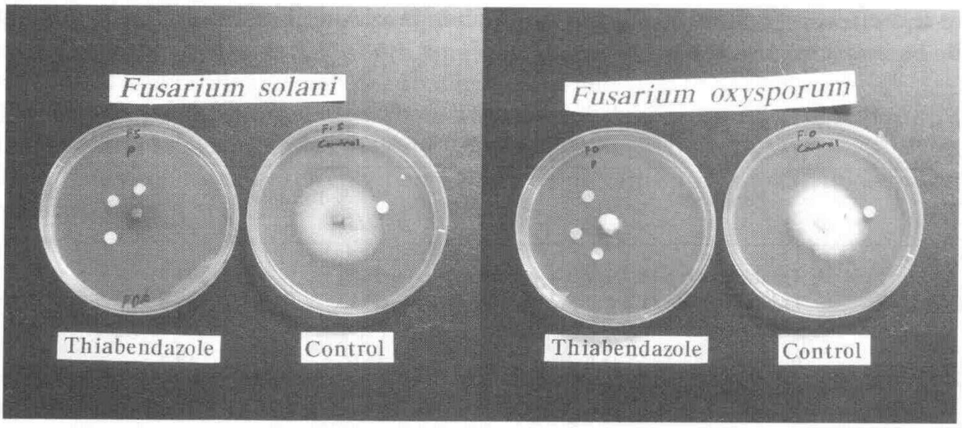

Figure 1. Inhibition by thiabendazole

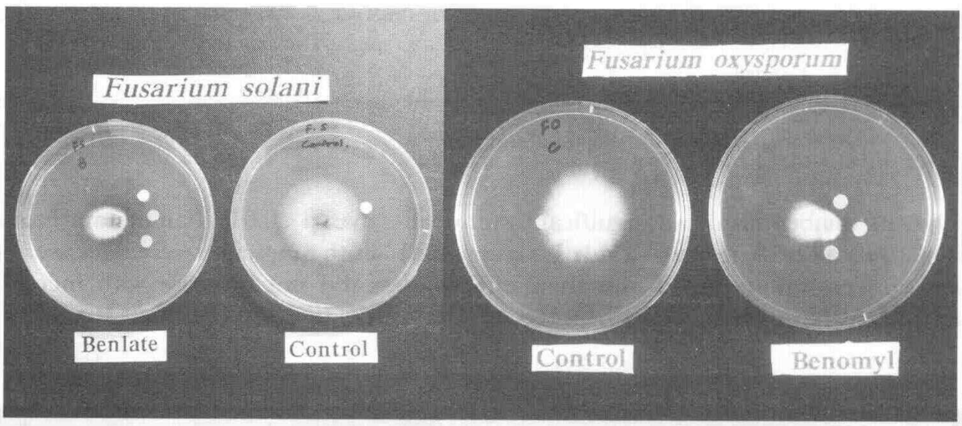

Figure 2. Inhibition by benomyl (benlate)

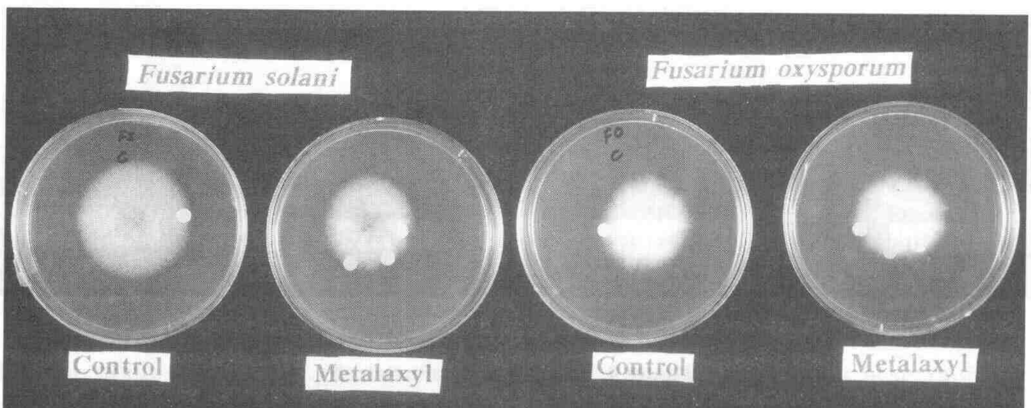

Figure 3. Inhibition by metalaxyl

were less effective against *F. oxlysporum.* Thiabendazole inhibited the growth by 32 - 40% while benomyl by 15 - 26%.

Table 1. Percentage radial growth inhibition caused by the test fungicides after four days incubation

Fungicide	% Inhibition *F. solani*	*F. oxysporum*
Thiabendazole (1.2 g l^{-1})	64.7	43.4
Thiabendazole (2.8 g l^{-1})	68.1	43.5
Thiabendazole (4.0 g l^{-1})	70.8	43.1
Benomyl (benlate) (4.0 g l^{-1})	51.9	13.5
Benomyl (benlate) (5.0 g l^{-1})	54.1	12.8
Benomyl (benlate) (5.6 g l^{-1})	55.6	15.9
Metalaxyl (8.0 g l^{-1})	0	0
Metalaxyl (10.0 g l^{-1})	0	0
Metalaxyl (12.0 g l^{-1})	0	0
Mancozeb (1.6 g l^{-1})	0	0
Mancozeb (2.4 g l^{-1})	0	0
Mancozeb (2.8 g l^{-1})	0	0
Control	0	0

* ANOVA was based on arc sine transformation.

Overall, thiabendazole was significantly more effective ($p < 0.01$) than benomyl against both *F. solani* and *F. oxysporum* (Table 1, Figures 3, 4). Both fungicides were effective at the lowest concentrations tested and their effectiveness did not increase with increasing fungicide concentration.

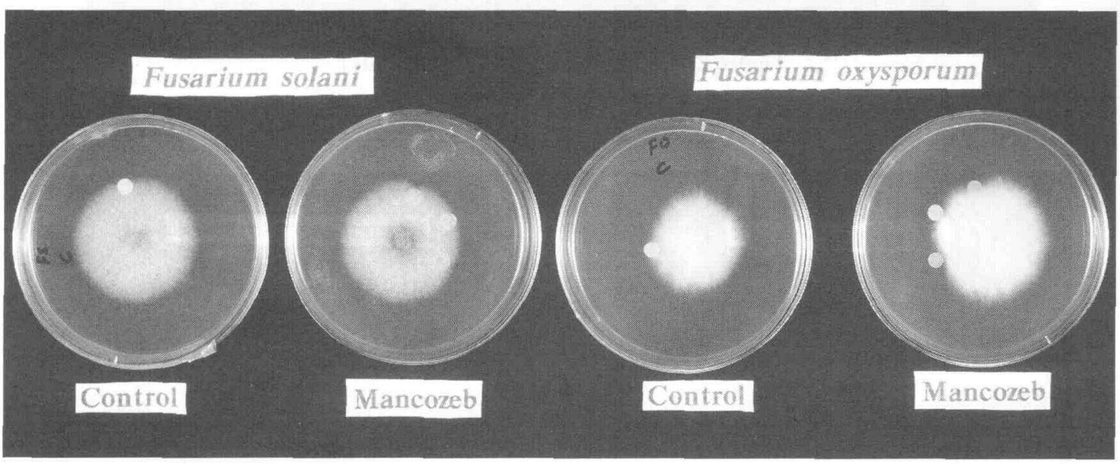

Figure 4. Inhibition by mancozeb

Metalaxyl and mancozeb, however, did not inhibit the growth of either *F. solani* or *F. oxysporum* (Table 1, Figures 3, 4). Both fungi challenged with these fungicides grew as well as the control and produced macro- and micro- conidia.

The experiment shows that low concentrations of thiabendazole and benomyl can inhibit growth of *F. solani* and *F. oxysporum in vitro.*

Field experiments are presently being carried out, with application of thiabendazole and benomyl as soil drenches.

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A NOTE ON THE NATURAL DURABILITY OF SOME MALAYSIAN TIMBERS

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The first series of tests on the natural durability of Malaysian timbers were started in 1918 at a site known then as the Weld Forest Reserve, Kuala Lumpur (Foxworth & Wooley 1930). The tests were continued but on a new site in the Forest Research Institute Malaysia (FRIM), and the results were published by Jackson (1957) and Mohd Dahlan and Tam (1985). There were a number of ongoing trials which had not been completed at the time of the last publication and this note presents the results of those ongoing trials up to December 1991.

The description of the existing test sites, known respectively as the upper and lower graveyards was given by Jackson (1957). Procedures in selecting and preparing test stakes, methods of stakes installation and assessment and the durability classification employed were also given in the same report. Basically, the tests involve planting of stakes (600 mm long and 50 mm square) of the various timber species in trenches about 450 mm deep with 150 mm of the stakes above ground. Assessment of the stakes is carried out at six monthly intervals. After each assessment, the average service life of a particular species is estimated, i.e. when all the test stakes have been destroyed, and placed under respective durability classes which are defined as follows: