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SHORT COMMUNICATION

Effect of Fungicides on Growth and N_2 Fixation by *Beijerinckia* Isolated from Coconut Rhizosphere

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The effect of three fungicides such as dithane-45, bavistin and aureofungin at different concentrations on two strains of *Beijerinckia* isolated from the rhizosphere of coconut has been studied. Only dithane caused inhibition of growth and nitrogen fixation.

Fungicides are normally used for the control of plant pathogenic fungi but their application sometimes results in the destruction of non-target beneficial micro-organisms (1). A major portion of fungicide applied is deposited in the soil and can exert considerable influence on the beneficial microbial processes in the rhizosphere of various crops. The effect of pesticides on population dynamics and N_2 fixing potential of diazotrophs such as *Rhizobium*, *Azospirillum* and *Azotobacter* has been reported (2–5). *Beijerinckia* is the dominant non-symbiotic N_2 fixing bacterium in the rhizosphere of coconut under acidic soil conditions (6). The present investigation reports the *in vitro* effects of three commonly used fungicides in the coconut based cropping systems on growth and N_2 fixation by *Beijerinckia* isolated from coconut rhizosphere.

The fungicides used in this study were dithane M-45 (Mancozeb), bavistin (Carbendazim) and aureofungin-sol at 0, 100, 250 and 500 ppm concentrations. Two strains of *Beijerinckia*, (CMF—7 and WCT—12) isolated from the rhizosphere of coconut were used as the test organisms and these had a high level of acetylene reduction activity of 105.5 and 122.9 nm C_2H_4 $tube^{-1}h^{-1}$ when tested by acetylene reduction assay method (7).

Inoculum for the study was prepared by growing the cultures in N_2 free Becking's broth (8) under shake culture conditions for 7 days. Different concentrations of the fungicides were incorporated in Becking's broth and 8 ml portion of broth was dispensed in 25 ml tubes and autoclaved. To each tube 0.2 ml of inoculum was added and incubated at 30 ± 1°C for 14 days (7) in a BOD incubator. Growth was measured as optical density at 540 nm using a spectronic-20 (Bausch and Lomb) and nitrogen fixed in the broth estimated by microKjeldahl method (9).

The data on growth and N_2 fixation by the two *Beiierinckia* cultures at different concentrations of the fungicides are presented in Figs 1 and 2. Of the three fungicides, only dithane M45 caused inhibition of growth and N_2 fixation at 100 ppm concentration. There was complete inhibition of growth and N_2 fixation at 250 and 500 ppm concentrations. On the other hand, addition of bavistin at 100 ppm concentration resulted in an increased growth and N_2 fixation but it was inhibitory at 500 ppm. Aureofungin-sol at 100 ppm level did not cause any change in growth and N_2 fixation by the two cultures but at 250 and 500 ppm the adverse affect of aureofungin-sol was observed. All the three fungicides had similar effect on both the cultures of *Beijerinckia* tested.

The present study indicated that the effect of fungicides on the *Beijerinckia* cultures from coconut soils depended on the nature and the concentration of fungicide used. The variation

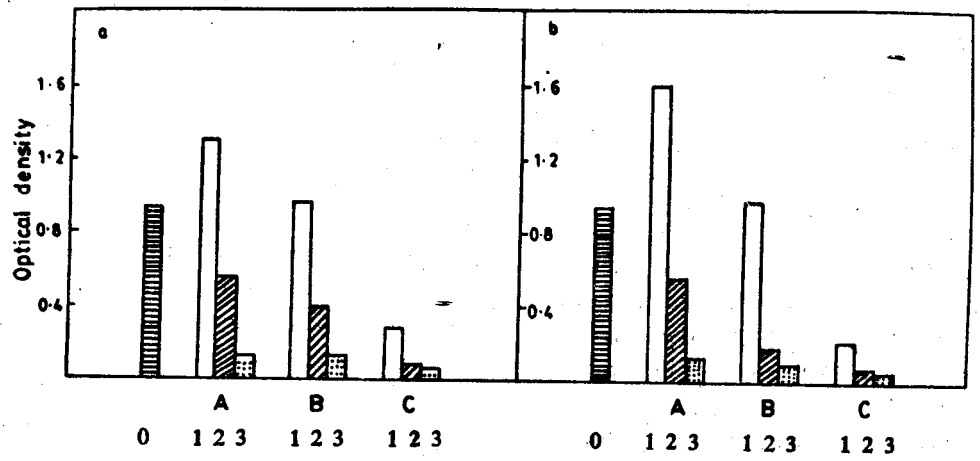

Fig. 1. *In vitro* effect of fungicides on growth of *Beijerinkia* strains (a) CMF-7 (b) WCT-12.
A—Bavistin, B—Aureofungin-sol, C—Dithane M-45
0 — 0 ppm 1 — 100 ppm 2 — 250 ppm 3 — 500 ppm.

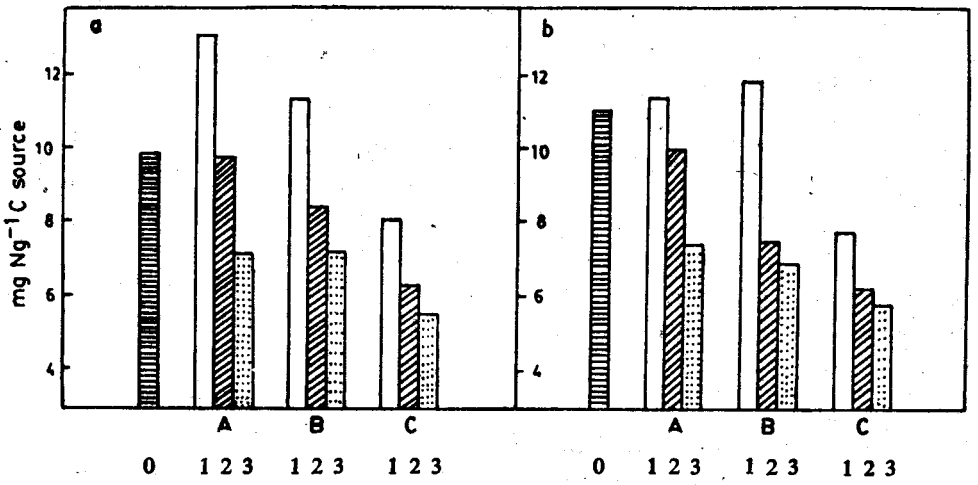

Fig. 2. *In vitro* effect of fungicides on nitrogen fixation by *Beijerinckia* strains (a) CMF-7 (b) WCT-12. A—Bavistin, B—Aureofungin-sol, C—Dithane M-45
0 — 0 ppm 1 — 100 ppm 2 — 250 ppm 3 — 500 ppm.

variation in the effect of different fungicides on non-target micro-organisms and beneficial microbial processes has been reported (2, 4, 10). In the present study, bavistin upto 250 ppm level and aureofungin-sol at 100 ppm was not inhibitory to N_2 fixation by *Beijerinckia* from the coconut rhizosphere and hence can be applied safely in crop protection measures. This information on pesticide effects on beneficial micro-organisms is useful to develop suitable pesticide application programmes for various crops in coconut based farming systems.

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