EFFICACY OF THREE SYSTEMIC FUNGICIDES IN CONTROLLING PHYTOPHTHORA INFECTIONS OF BLACK PEPPER

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Efficacy of three systemic fungicides in controlling Phytophthora infections of black pepper*

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Following the introduction of systemic fungicides having specific action against Pythiaceous fungi[1,2] reports have appeared on the use of Ridomil and Aliette in controlling Peronosporales affecting various crops. In our earlier studies[3], these chemicals were found to be effective in checking the growth and sporulation of '*Phytophthora palmivora*'—MF_4, which causes the foot rot or quick wilt disease of black pepper (*Piper nigrum*). The efficacy of three systemic fungicides viz., Ridomil, Terrazole and Aliette in controlling this infection is reported in this communication.

One year old plants of pepper hybrid Panniyur-I, raised in 10" dia earthen pots, each containing seven kg of nursery mixture (Sieved field soil, river sand and cowdung in the ratio 4 : 2: 1 by volume) were used. The fungicides (i. e., Ridomil at the rate of 500 μg/ml; Terrazole at the rate of 700 μg/ml and Aliette at the rate of 2000 μg/ml) were applied as soil drench and foliar sprays at the rate of 1000 ml per plant. Ten single plant replications were maintained for each treatment besides ten untreated but inoculated plants serving as control.

The fungus '*Phytophthora palmivora*'—MF_4 was cultured on carrot agar medium and incubated at 25°C. Discs of one cm diameter were taken from the margins of four day old cultures and kept in Petri's mineral solution[4] for four days to induce sporangiogenesis. The culture discs were subjected to cold shock[5] before inoculation. Inoculation was done ten days after the fungicide treatment by loosening the soil in the pots and keeping six discs of the fungus around the collar of each plant. The discs were covered with soil and the pots were watered copiously.

The plants were asssessed for infection 30 days after inoculation. Root necrosis was evaluated based on a scale having one and four as minimum and maximum grade points, respectively. For the purpose of calculation, maximum grades were given to the plants that succumbed to infection.

To compare the persistence of the fungicides in the plant tissue, a minimum of ten leaves were clipped at random from each of the treatments and control, 40 days after treatment. The leaves were inoculated on the lower side on either side of the midrib. The inoculum was a 2mm. mycelial disc taken from the advancing margin of the colony and placed on a point with a pin prick injury. The leaves were incubated in humid petriplates for 72 hrs at 25 $\pm$ 2°C. The diameters of the lesions were recorded, The inhibition of lesion development compared to control was calculated.

In this pot culture study, Ridomil treated plants showed the least root necrosis and death of the plants was not noticed (Table I). Plants treated with Terrazole and Aliette had 10 per cent and 20 per cent deaths compared to 60 per cent in control. Root necrosis was comparatively higher in plants treated with these two chemicals. On statistical analysis, the means of the scores for root necrosis were

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TABLE 1 : Effect of fungicides on *Phytophthora* infection in black pepper.

Treatments	No. of plants infected*	Root necrosis** (grade average)
Ridomil	0	0.3
Terrazole	1	2.0
Aliette	2	1.9
Control	6	3.2

*Number of plants inoculated = 10; **Scale for root necrosis : Root necrosis 1-25 per cent = 1; 26-50 = 2; 51-75% = 3; 76% and above = 4. CD at 5 per cent = 0.89.

found to be highly significant among the treatments. As an adjunct to the potculture study pepper vines in the field were treated with Ridomil 5G at the rate of one g a.i./plant applied to the soil during July (South-west monsoon period). Eleven fungicide treated and eight control plants were artificially inoculated with 20 sporulating discs of '*P. palmivora*' ten days after treatment. Three treated (27 per cent) and five control (62 per cent) plants were infected. The persistant activity of Ridomil was present in the leaves even 40 days after treatment, Ridomil completely inhibited the lesion development, whereas Terrazole and Aliette inhibited the lession formation to the extent of 55.7 per cent and 23.9 per cent respectively. It is reported that Ridomil at a concentration of more than one μg/g of air dried soil is required to prevent the activity of *Phytophthora syringae*.[6] The persistence of this concentration was obtained in the field for two, three and over four months by applying 0.5, 1.5 and 4 kg a. i./ha respectively. In the present study the concentration of the fungicide applied to the soil works out to 71.4 μg/g of soil. Phytotoxicity of Ridomil is reported in potted citrus plants at 200 μg/ml.[7] However no phytotoxicity was noticed in the present investigation. The poor protective effect of Aliette might be due to the low concentration used. Higher concentrations are to be tried inorder to test its efficicacy. In general all the three systemic fungicides are effective in checking the '*P. palmivora*' infection when compared to control.

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