

EFFECT OF CERTAIN PLANT PROTECTION CHEMICALS ON THE INCIDENCE OF VA MYCORRHIZA IN BLACK GRAM

Vesicular-arbuscular mycorrhizal association in crop plants is important because of its known benefits in enhancing the uptake of water and many plant nutrients especially phosphorus from the soil. However, in cultivated crops, this beneficial fungal association is often affected by the use of various pesticides (Persidskey and Wilde, 1960 and Spokes *et al.*, 1981). Although fungicides and insecticides are not generally recommended for the cultivation of black gram, in the present investigation, the effect of some of these chemicals on the natural incidence of VA mycorrhiza in black gram *Vignamungo* (L.) Hepper was studied because of the practice of growing this pulse crop in Kerala mainly in rice fallows. Many fungicides like Bavistin (benlate) and Vitavax (DMOC) are usually used for the control of sheath blight of rice and insecticides like HCH (hexachloro cyclohexane) and carbofuran (Furadan) for any pest incidence. Some of these pesticides may persist in the soil and affect the natural association of VA mycorrhiza in black gram raised subsequently in rice fallows. Therefore, a pot culture experiment was conducted in completely randomised design to study this effect by using the above fungicides and insecticides.

Bavistin (0.1, 0.2 and 0.3%) and HCH (15, 25 and 35 kg/ha) were applied to soil at the time of sowing while Vitavax (0.1, 0.2 and 0.3%) and carbofuran (3, 4 and 5 mg/g of seed material) were used for seed treatment. *Rhizobium* inoculation was done uniformly for all treatments. However,

in the case of seed treatment with different pesticides, they were applied only after *Rhizobium* inoculation. P_2O_5 and K_2O were given at the rate of 30 kg/ha. Three replications were maintained for each treatment. Observation on the effect of the above plant protection chemicals on the natural incidence of VA mycorrhiza in black gram was taken on 45th day of plant growth by the standard staining technique of Phillips and Hayman (1970). One hundred randomly selected root bits from each replication were examined for the presence of VA mycorrhiza. The extent of root colonisation was recorded by

Table 1. Effect of plant protection chemicals on the incidence of VA mycorrhiza in black gram

Treatment	Percentage mycorrhizal infection
Bavistin (0.1%)	38.61
Bavistin (0.2%)	29.04
Bavistin (0.3%)	12.72*
HCH (15 kg/ha)	38.23
HCH (25 kg/ha)	31.87
HCH (35 kg/ha)	19.32*
Vitavax (0.1%)	22.85*
Vitavax (0.2%)	13.42*
Vitavax (0.3%)	19.18*
Carbofuran 3 mg/g seed	45.80
Carbofuran 4 mg/g seed	24.77*
Carbofuran 5 mg/g seed	20.15*
Control	40.16
CD (0.05)	13.5

*Significant at 0.05 level

giving different grades from 0-4 depending on the intensity of mycorrhizal infection in different root segments. The final data are expressed as the mean percentage of mycorrhizal infection for each treatment.

The reduction in mycorrhizal infection was almost proportional to the concentration of different plant protection chemicals used irrespective of the method of its application. This was significant with the use of Bavistin (0.2%), HCH (35 kg/ha), Vitavax (0.1, 0.2, and 0.3%) and carbofuran (4 and 5 mg/g seed material). Thus, when the extent of mycorrhizal infection was as high as 40.16 per cent in the control treatment, it was only 12.72, 19.32, 22.85, 13.42, 19.18, 24.77 and 20.15 per cent respectively for the above treatments (Table 1). A marginal increase in

mycorrhizal infection was however observed with the seed application of carbofuran at the rate of 3.0 mg/g seed material. The deleterious effects of pesticide application on mycorrhizal infection is reported earlier from several crops such as wheat (Jalali and Domsch, 1975), citrus (Kleinschmidt and Gerdemann, 1972), barley, maize and potato (Nesheim and Linn, 1969 and Ocampo and Hayman, 1980). Among the fungicides tested, Vitavax was found to be more harmful than Bavistin in reducing the mycorrhizal infection. An almost similar effect was seen with carbofuran at higher concentrations. This indicates that the presence of even small quantities of these pesticides in soil particularly that of Vitavax can considerably affect the extent of root infection by VA mycorrhiza in black gram.

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