Effect of vesicular arbuscular mycorrhiza on rooting of black pepper (*Piper nigrum* L.)

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ABSTRACT

Incorporation of vesicular arbuscular mycorrhiza (VAM) fungus *Glomus fasciculatum* in the rooting medium of sand enhanced rooting of black pepper (*Piper nigrum*) cuttings. The rooting was reduced when the commercial rooting hormone (Ceradix B) was also added in addition to VAM. Rooting enhancement could be used as a cirterion to identify efficient strains of VAM for black pepper.

Key words: black pepper, *Glomus fasciculatum, Piper nigrum*, rooting enhancement, vesicular arbuscular mycorrhiza.

Black pepper (*Piper nigrum* L.) is mycotrophic (Manjunath & Bagyaraj 1982) and vesicular arbuscular mycorrhizae (VAM) enhances growth of black pepper cuttings (George & Ghai 1988; Bopaiah & Khader 1989; Shivashanker & Iyer 1988; Anandaraj, Ramana & Sarma 1991). Being a vegetatively propagated crop, addition of VAM to nursery mixture is a practicable proposition. Large scale propagation of black pepper is through rooting of runner shoots (stolons) which are produced on prostrate branches trailing on the ground. In the present study the effect of VAM on rooting was studied.

Single spore cultures of *Glomus fasciculatum* were cultured on Rhodes grass (*Chloris gayana*) in a mixture of soil + perlite at 1:1 ratio. After 6 weeks of growth, shoots were removed, roots were cut into bits and both soil and infected root bits were used as incoculum. This inoculum contained 1024 infective propagules per 100 cc as estimated by most probable number method (Alexander 1965). Runner shoots and lateral branches of black pepper *cv*. Karimunda were collected and cut into bits, each having a single node and leaf. These were used for the studies on rooting. The treatments were:

1. VAM inoculum - *Chloris gayana* roots in perlite + Soil
2. 1 + Sand in the ratio 1 : 1
3. 2 + Cuttings treated with Ceradix B
4. Sand + Cuttings treated with Ceradix B
5. Sand

The rooting medium was taken in poly-

bags of 30 cm x 40 cm size up to 5 cm height and moistened with water. Five single node cuttings were planted in each bag. Each treatment was replicated 10 times. The mouth of these bags were closed with rubber bands and were hung in a shed thatched with plaited coconut leaves. In treatments 3 and 4 the cuttings were dipped in Ceradix B for 2s, excess powder removed by a gentle tap on the cuttings and planted. After 45 days, the cuttings were taken out and observations on number of cuttings rooted and sprouted, total number of roots in each cutting and maximum length of roots were recorded. The experiment was repeated twice with runner shoots (Batches I and II) and once with plagiotrophic fruiting laterals (Batch III).

The rooting percentage was higher in VAM incorporated medium when compared to sand (Table 1). This was consistent when the experiment was repeated thrice. The number of roots and length of roots were also maximum in VAM treated cuttings (Table 2). When the cuttings from runner shoots were dipped in the commerical rooting hormone, Ceradix B, rooting did not increase when compared to untreated control whereas in laterals rooting was better than in control. When VAM and hormone were used together rooting was affected.

In case of runner shoots which are produced by the plant for vegetative propagation, the endogenous levels of hormones must be high so further addition of rooting hormone does not increase rooting. In case of laterals which are meant for production of fruits, the endogenous level of growth hormones must be low hence there is a good response to addition of growth hormone. So also when runner shoots are treated with VAM and Ceradix the rooting was adversely affected. As runner shoots already posses sufficient endogenous levels of hormones, addition

Table 1. Effect of VAM on rooting of black pepper cuttings

Treatment	Rooting %		
	Runner shoots		Laterals
	I Batch	II Batch	III Batch
VAM inoculum on Rhodes grass-in perlite + Soil	71.3 (89.8)	78.2 (95.8)	68.8 (87.0)
VAM + Sand (1:1)	61.8 (85.8)	75.5 (93.8)	63.3 (80.5)
VAM + Sand + Ceradix B	43.7 (47.8)	49.8 (58.4)	63.0 (79.4)
Sand + Ceradix B	32.4 (56.6)	42.6 (46.0)	61.5 (77.2)
Sand	48.8 (52.5)	50.9 (60.4)	36.5 (35.2)
CD at 5%	17.3	13.3	18.5

Figures in parentheses are transformed values

Table 2. Effect of VAM on production of roots in black pepper cuttings

Treatment	Runner shoots				Laterals	
	I Batch		II Batch		III Batch	
	No. of roots	Max. length (cm)	No. of roots	Max. length (cm)	No. of roots	Max. length (cm)
VAM inoculum on Rhodes grass-in perlite + Soil	4.71	4.07	4.29	2.30	2.60	7.69
VAM + Sand (1:1)	4.79	2.78	4.03	2.52	2.37	7.19
VAM + Sand + Ceradix B	3.49	2.64	2.44	3.24	2.44	3.89
Sand + Ceradix B	3.23	1.72	2.45	2.29	2.36	3.82
Sand	3.89	2.73	2.99	2.25	1.57	3.67
CD at 5%	0.85	1.35	1.16	NS	0.64	1.78

of VAM has a negative effect due to increase, concentration of hormones since VAM is reported to have hormonal effects in the inoculated plants. When IBA was used for rooting runner shoots of black pepper, the percentage of rooting was reported to be low (Sasikumar & George 1992); this also indicates that hormonal treatment is not necessary for rooting black pepper cuttings. VAM isolates collected from various areas need to be screened for their efficiency for inoculation in field conditions (Ewald 1991). This property of enhancement of rooting can be used as a criteria to identify efficient isolates for black pepper.

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