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Effect of VAM inoculation on nitrogen and phosphorus uptake by custard apple seedlings

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ABSTRACT

In the pot culture experiment, all the three VA-Mycorrhizae (*Glomus epigaeum, Glomus mosseae* and *Gigaspora calospora*) either singly or in combinations significantly increased the nitrogen and phosphorus uptake by custard apple seedlings over non-mycorrhizal (control) plants. The combined inoculation of all the three mycorrhizae was superior over all the inoculation treatments in recording the maximum nitrogen and phosphorus uptake.

Key words : Custard apple seedlings, VAM fungi, N and P uptake

INTRODUCTION

The mycorrhizal fungus is a specialised member of rhizosphere microorganisms, occurring nearly in all important crop plants. Tree seedlings devoid of mycorrhizal associatioin suffer from nutrient stress in their early growth stages (Marx *et. al., 1978*). Studies on Vesicular - Arbuscular Mycorrhizae reported the beneficial effects of inoculation on plant growth (Mosse and Hayman, 1971). An experiment was conducted with the objective to study the effect of *Glomus epigaeum, Glomus mosseae* and *Gigaspora calospora* and their combinations on nitrogen and phosphorus uptake by custard apple seedlings.

MATERIAL AND METHODS

A pot culture experiment was conducted during July 2000 to Feb.2001 in the glass house of Post - Graduate Institute, M.P.K.V., Rahuri. Experiment was laid out in completely randomised design comprising of eight treatments, which were replicated three times. Disinfected earthen pots (30 cm. dia.) filled with sterilized P-deficient soil with known nutrient status and FYM mixture in 1:1 proportion, were inoculated with extramatrical chlamydospores (680 - 800 spores /50 ml.) of VAM fungus *viz; Glomus epigaeum, Glomus* mosseae and Gigaspora calospora and their combinations adjusting dose @ 150 g/pot. Six custard apple seeds were sown per pot, out of which two seedlings per pot were maintained after germination. The nitrogen and phosphorus content of shoot and root was determined at 90 days and 180 days after sowing by Micro-kjeldahls and Vandomolybdate yellow colour method (Jackson, 1971), respectively. The uptake of nitrogen and phosphorus was calculated with the help of these nutrient concentrations in different plant parts and dry weight at harvest. The nutrient uptake was obtained by multiplying the dry matter yield with respective nutrient concentration and then dividing with 100.

RESULTS AND DISCUSSION

The results of Nitrogen uptake as influenced by inoculation with different VA-Mycorrhizae were statistically significant both for shoot and root at 90 and 180 days. The combined inoculation of VAM mixture GE (*Glomus epigaeum*) + GM (*Glomus mosseae*) +GC (*Gigaspora calospora*) recorded the maximum N uptake by shoot (62.79 and 132.78 mg/plant) and root (44.89 and 98.43 mg/plant) at 90 and 180 days, respectively. This was followed by GE +GM, recording N uptake by shoot (57.80 and 117.29 mg/plant) and root

Table 1 : Effect of VA-mycorrhizal inoculation on nitrogen uptake by shoot and root of custard apple seedlings.

S.	Inoculant	Nitrogen uptake at 90 days (mg/plant)			Nitrogen uptake at 180 days (mg/plant)		
No		Shoot	Root	Total	Shoot	Root	Total
1	Glomus epigaeum (GE)	36.19 ^{bc}	21.64 ^{bc}	57.83 ^{bc}	63.11 ^{bc}	54.82 ^{bc}	117.93 ^{bc}
		(48.56)	(40.33)	(45.37)	(21.20)	(65.66)	(38.48)
2	Glomus mosseae (GM)	53.30 ^{de}	37.30 ^d	90.60 ^d	101.85 ^d	91.97 ^{de}	193.82 ^e
		(118.80)	(141.89)	(127.75)	(95.60)	(177.93)	(127.59)
3	Gigaspora calospora (GC)	28.36 ^{ab}	18.65 ^{ab}	47.01 ^{ab}	58.14 ^{ab}	45.65 ^b	103.79 ^{ab}
		(16.42)	(20.94)	(18.17)	(11.65)	(37.95)	(21.87)
4	GE +GM	57.80 ^e	41.33 ^{de}	99.13 ^{de}	117.29 ^e	93.89 ^{de}	211.18 ^e
		(137.27)	(168.02)	(149.19)	(125.25)	(183.74)	(147.98)
5	GE + GC	41.20 ^c	23.00 ^{bc}	64.20 ^c	67.11 ^{bc}	65.45 [°]	132.56°
		(69.12)	(49.15)	(61.38)	(28.88)	(97.79)	(55.65)
6	GM + GC	43.95 ^{cd}	25.36 [°]	69.31 [°]	72.67 ^c	83.42 ^d	156.09 ^d
		(80.41)	(64.46)	(74.23)	(39.56)	(152.10)	(83.29)
7	GE + GM + GC	62.79 ^e	44.89 ^e	107.68 ^e	132.78 ^f	98.43 ^e	231.21 ^f
		(157.75)	(191.11)	(170.68)	(155.00)	(197.46)	(171.50)
8	Non-mycorrhizal (NM)	24.36 ^ª	15.42 ^ª	39.78 ^ª	52.07 ^a	33.09 ^a	85.16 ^ª
	Mean	43.49	28.44	71.94	83.12	70.84	153.96
	S.E ±	3.933	2.043	5.676	3.257	4.136	6.224
	C.D at 5%	11.80	6.13	17.03	9.87	12.41	18.67

1. Figures with different letters differ significantly.

2. Figures in parenthesis indicate per cent increase over non-mycorrhizal i.e. uninoculated control.