Influence of VA - mycorrhizal inoculation on the growth and phosphorus uptake of cashew seedlings

B. M. Bepaish, S. K. Ghai*
and
George V. Thomas*

Central Plantation Crops Research Institute
Regional Station, Vittal 574 243, Karnataka

SUMMARY

A screening experiment using nine cultures of VA - mycorrhizal fungi was carried out on cashew var. VTH - 12. *Glomus macrocarpum, G. versiforme* and a local isolate C - II (Coconut black) inoculated plants recorded higher shoot and root weight as compared to those inoculated with other VA - mycorrhizal cultures. All the VA - mycorrhizal inoculation treatments resulted in greater plant growth as compared to uninoculated control. The phosphorus content was also more in VA - mycorrhizal inoculated plants.

Cashew is generally grown in poor soils which are not suitable for the cultivation of other crops. The plant requires considerable amounts of nutrients for the growth and production. Considerable work have been reported on the association VA - mycorrhizal (VAM) which increases the uptake of P, Zn and Cu and plant growth in annual crops, but not much information is available for the perennial crops except in citrus (Kleinshnidt and Gerdemann, 1972; Krishna *et al.*, 1983; Thapar and Khan, 1985). In the present study, nine VAM cultures were screened for their influence on cashew seedlings.

MATERIALS AND METHODS

Fumigated laterite soil (2% formaldehyde) was used for the pot culture experiment. VAM inoculum was prepared by multiplying spores in pots using sorghum as the host plant. The inoculum of VAM fungi was applied at the rate of 300 spores/bag containing 3 kg fumigated soil and sown the cashew seeds of variety VTH - 12. Five replications were maintained for each VAM culture and a control without VAM. After 5 months, the seedlings were removed to record the growth parameters (plant height, fresh and dry weight of shoots and fresh weight of roots). The P content of the leaves were also determined (Piper, 1966). The VAM colonisation in roots was recorded after clearing and staining the roots with 0.05% trypan blue (Phillips and Hayman, 1970).

RESULTS AND DISCUSSION

The data on the growth, 'P' content and VAM colonisation in cashew seed-

* CPCRI, Kasaragod 670 124, Kerala

Contribution No. 672 CPCRI, Kasaragod 670 124, Kerala, India.

TABLE 1

THE INFLUENCE OF VA - MYCORRHIZAL INOCULATION ON CASHEW SEEDLINGS

Sl. No.	VAM culture	Plant height (cm)	Shoot wt. (g)		Root wt. (g) fresh	Phosphorus content (%)	VAM colonization	
			Fresh	Dry			Percent	Infection grading %
1.	Control without VAM	50.6	21.5	6.3	7.6	0.19	17.6	7.4
2.	*Glomus fasciculatum*	54.6	25.0	7.7	8.7	0.22	36.8	15.0
3.	*Gigaspora margarita*	47.4	21.9	8.2	5.6	0.19	28.6	12.2
4.	*Acaulospora* sp.	58.8	28.7	10.0	5.8	0.22	59.2	25.0
5.	*Gigaspora calospora*	53.0	23.8	7.9	8.7	0.21	39.2	15.2
6.	*Glomus macrocarpum*	69.0	40.1	13.9	10.2	0.24	89.6	51.4
7.	*Glomus versiforme*	64.0	35.8	11.8	8.2	0.23	79.2	37.2
8.	Local isolate — C - II (Coconut black)	56.5	31.2	10.2	7.1	0.22	81.6	45.8
9.	Local isolate — C - III (Coconut brown)	50.6	23.1	8.2	7.7	0.21	72.0	20.8
10.	Local isolate — C - I (Coconut — I)	57.2	26.5	9.7	7.6	0.20	48.8	36.2
	C. D. at 5% level		13.8	5.1	3.3			

*Average of 5 replications

lings revealed that *Glomus macrocarpum, G. versiforme* and a local isolate C - II (Coconut black) had increased shoot and root weight as compared to other VAM cultures tested (Table 1). However, all the VAM inoculated treatments gave better growth as compared to the un-inoculated control but the increases were not significant. Similarly the 'P' content was also higher in the VAM inoculated plants. The observation on the VAM colonisation have indicated the higher percentage of colonisation and intensity of infection in *Glomus macrocarpum G. versiforme*, local isolate C - II (Coconut black), C - III (Coconut brown) and *Acaulospora* sp. whereas the per cent colonisation as well as infection grading was less in *Glomus fasciculatum, Gigaspora margarita, G. calospora* and local isolate C - I (Coconut I) inoculation treatments. Krishna *et al.*, (1985) reported higher shoot growth and P content in *Glomus fasciculatum* inoculated cashew as compared to *Gigaspora calospora* in red sandy soils. But in the present investigation both *Glomus fasciculatum* and *Gigaspora calospora* recorded poor plant growth and P content as compared to *Glomus macrocarpum, G. versiforme* and C - II (Coconut black).

Thus the VAM inoculation studies have clearly shown the beneficial effect in cashew seedlings. Therefore, the use of VAM in nursery can be thought off to get vigorous and healthy seedlings which may help in better establishment and growth when planted in field.

ACKNOWLEDGEMENT

The authors are grateful to the Division of plant breeding, CPCRI, Regional Station, Vittal for supplying VTH - 12 cashew seeds.

REFERENCES

Kleinschmidt, G. D. and Gerdemann, J. M., 1972. Stunting of citrus seedling in fumigated nursery soils related to the absence of endomycorrhize. Phytopathology *62*: 1447 - 1443.

Krishna, K. R., Balakrishna, A. N. and Bagyaraja, D. J. 1983. Mycorrhizal symbiosis in cashew Curr. Res. *12*: 17 - 18.

Phillips, J. M. and Hayman, D. S. 1970. Improved procedure for clearing roots and staining parasitic and vesicular Abuscular mycorrhizal fungi for rapid assessment of infection. Trans. Br. Mycol. Soc. *55*: 159 - 162-

Piper, C. S. 1966, Soil and plant analysis, Hons, Publishers, Bombay.

Thaper, H. S. and Khan, S. N. 1985. Effect of VA - mycorrhizae on the growth of hoop pine (*Anancaria cunninghaini* sweet) J. tree. Sci. *4*: 39-43.