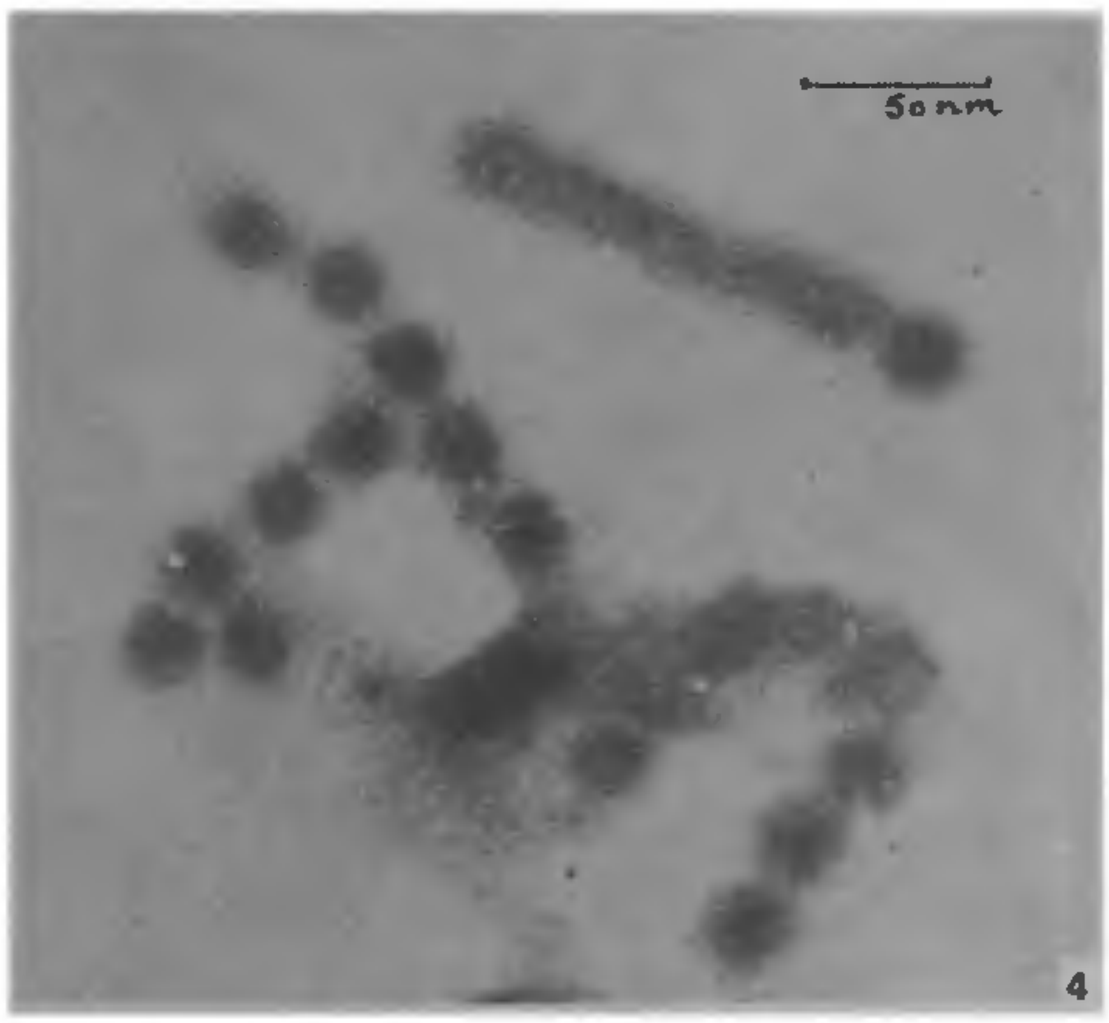

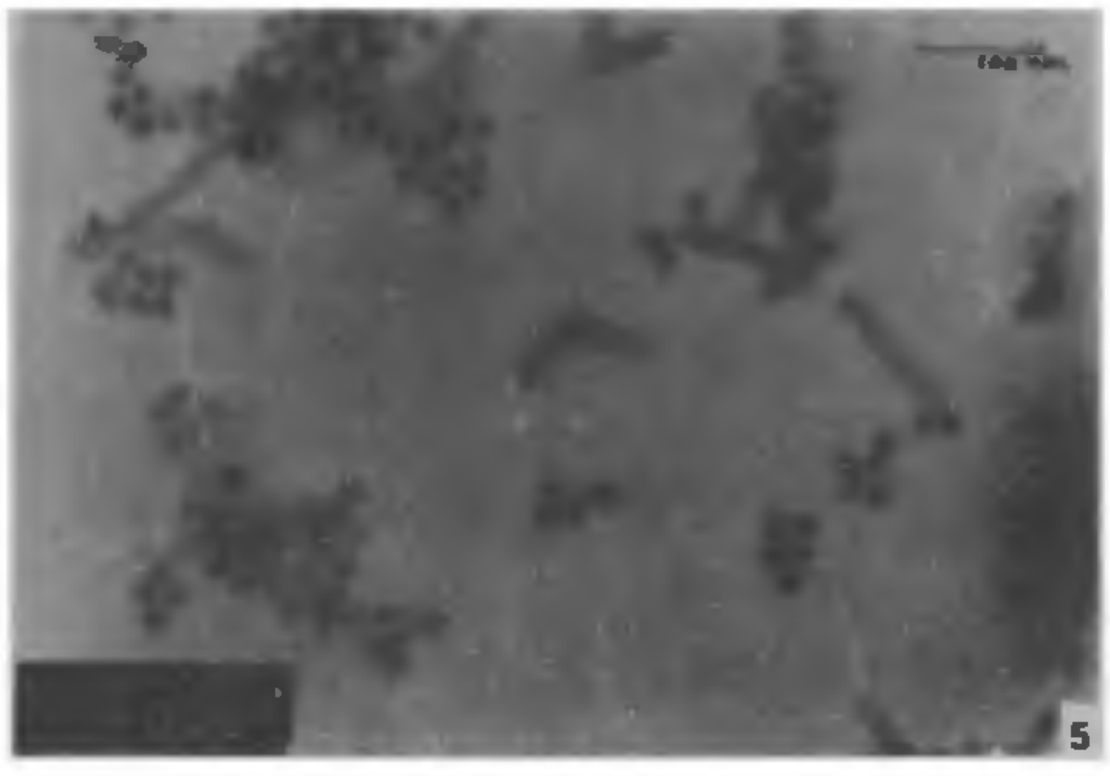

Figures 4 and 5. RTSV particles associated at the ends or along the sides of RTBV particles.

to further confirm the relationship between the two particles.

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VESICULAR-ARBUSCULAR MYCORRHIZAL ASSOCIATIONS OF CASTOR AND SAFFLOWER

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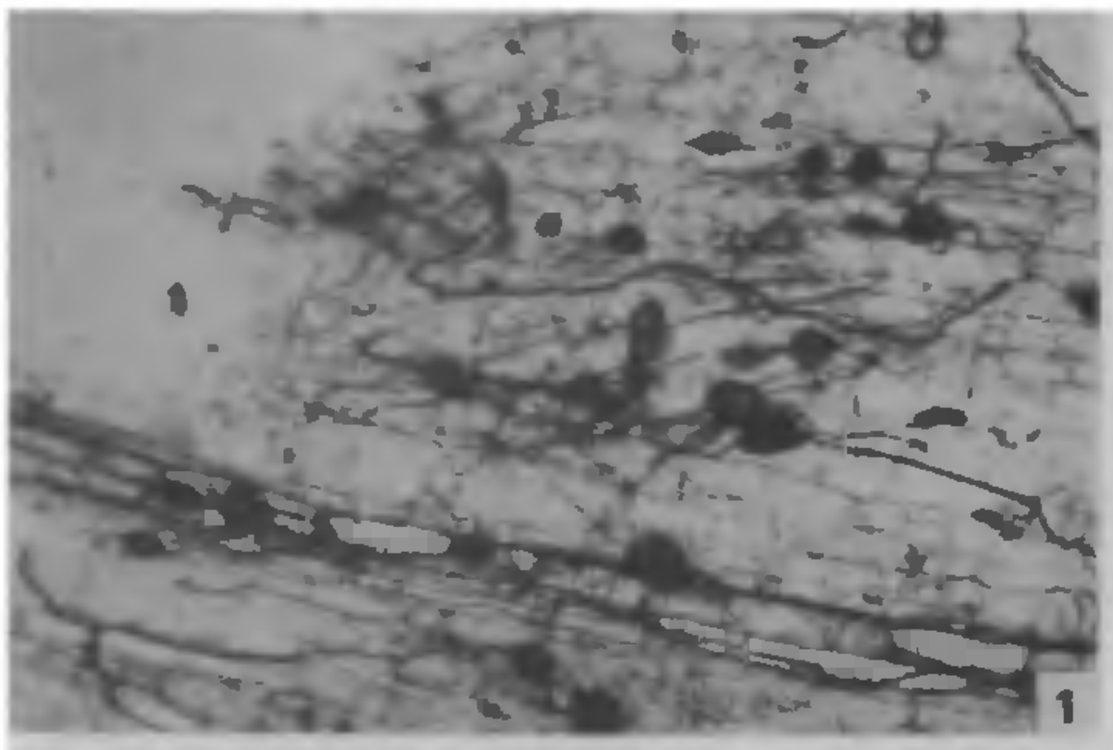
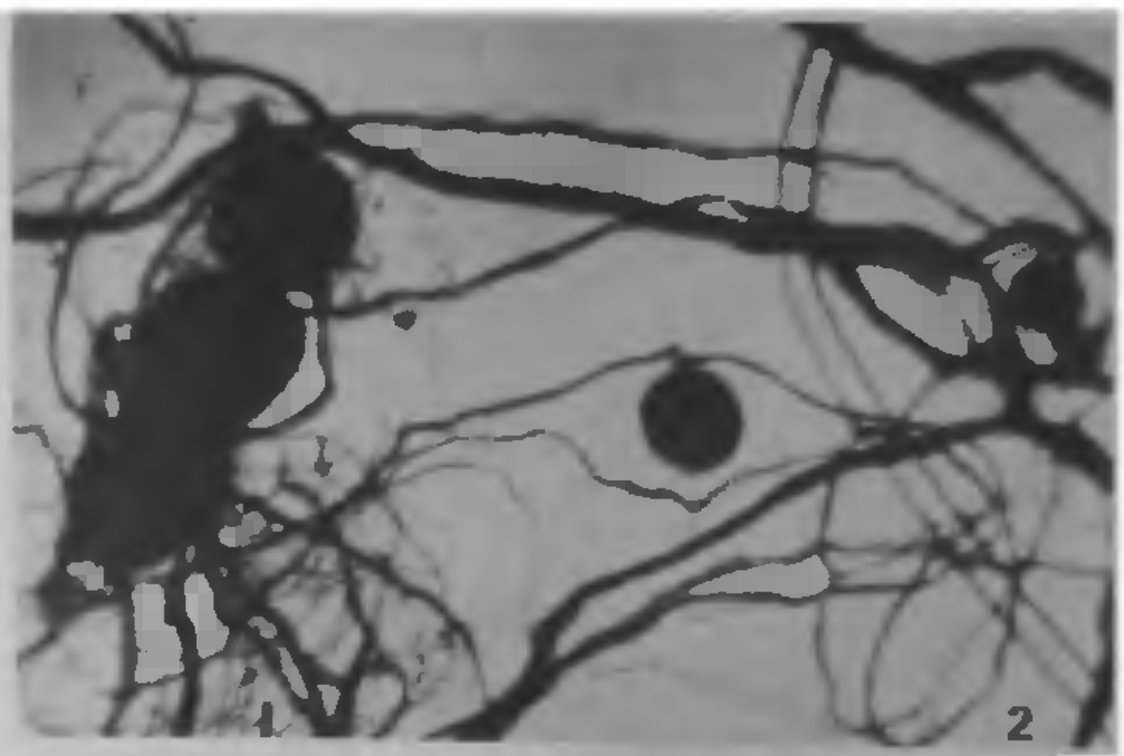
OCCURRENCE of vesicular-arbuscular mycorrhizas (VAM) is ubiquitous and they are known to increase the phosphorus and the moisture uptake in all agricultural crops[1-3]. Plants infected with mycorrhizal fungi exhibit significant increase in the yield as compared with non-mycorrhizal plants[4,5]. There are a few reports of VAM on groundnut[3], soybean[6], sunflower[7] and sesame[8]. As there were no studies of VAM in castor (*Ricinus communis* L.) and safflower (*Carthamus tinctorius* L.), the identity of the VAM, their development in the root-system and spore count in the corresponding rhizospheres are investigated.

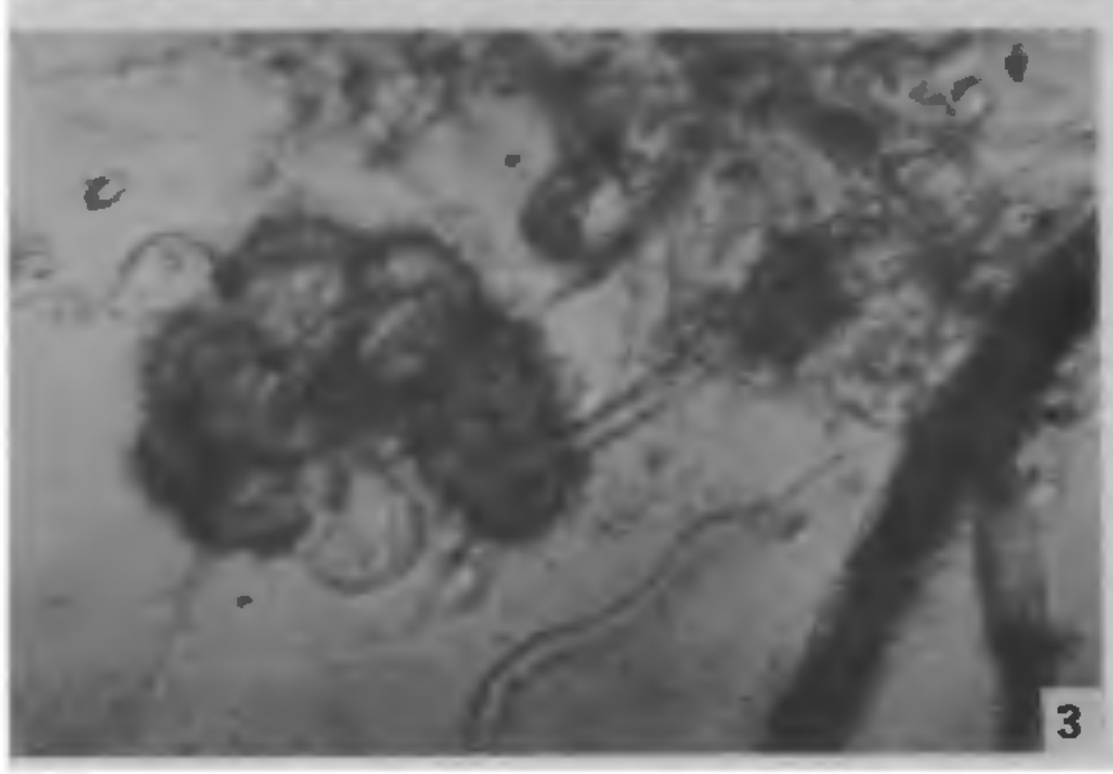
Field sites of castor and safflower located in Rajendranagar (pH 7.3, MHC 20%) were selected for the study of VAM fungi. The rhizosphere soil samples, root pieces of castor and safflower were collected on days 30, 60 and 90 from seed sowing. The VAM spores in 100 g of rhizosphere soil were extracted by the wet-sieving and decanting methods[9], counted and identified[10]. The root bits were cleared, stained and examined for VAM fungi[11] and the percentage of mycorrhizal infection was calculated[12].

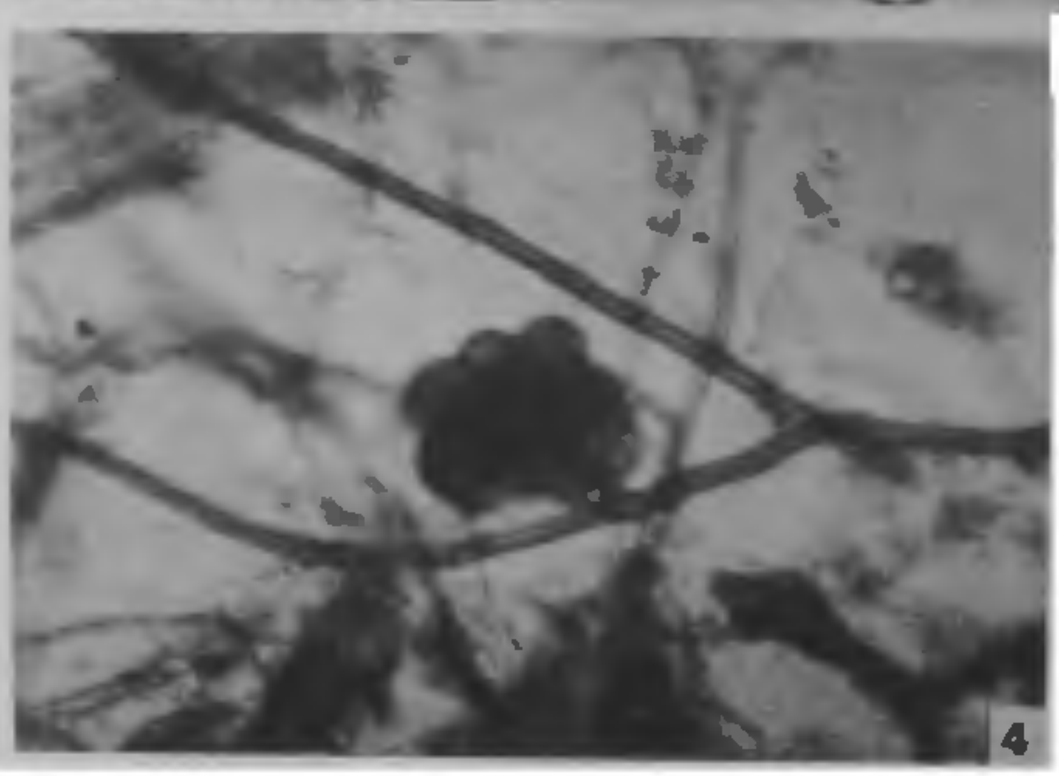
The study confirms the formation of VA mycorrhizas in castor and safflower grown in semi-arid tropical soils. The roots were found to be mycorrhizal (figure 1) from early to mature stages with a progressive increase in the number of spores in the rhizosphere having a direct correlation with the age of the host plant (table 1). Similar trend was observed earlier in peanut[13,14], sesamum[15] and sunflower[16]. The rapid development of VAM fungi in castor and safflower is related to the increased vegetative growth of the host plant and it may be due to the availability of adequate moisture, suitable pH, available nutrients and root exudates.

Qualitatively the castor supported eight VAM fungi while safflower has been found to be associated with four. Of the eight species reported on castor, *Glomus fasciculatum* (figure 2), *G. constrictum*, *Gigaspora* sp. (figures 3 and 4) with echinulated and smooth extra matrical vesicles were predominant









Figures 1–4. **1.** VAM root colonization of castor in natural field condition (×100); **2.** Spores of *Glomus fasciculatum* (×200); **3** and **4.** *Gigaspora* sp. extramatrical vesicle from rhizosphere soil of castor echinulated (**3**) and smooth (**4**) (×200).

Table 1 *Vesicular-arbuscular mycorrhizal infection in castor and safflower*

Sampling time (days from sowing)	% root infection	No. of spores in 100 g rhizosphere soil							
		G. fasciculatum	*G. constrictum*	*G. mosseae*	*G. epigaeum*	*G. aggregatum*	*Gigaspora* sp. echinulated extramatrical vesicles	*Gigaspora* sp. smooth wall extramatrical vesicles	*Acaulospora* sp.
Castor									
30	40	30	25	10	5	5	20	15	15
60	60	55	40	25	10	8	30	25	20
90	75	80	65	30	15	10	40	35	25
Safflower									
30	15	40	50	25	—	—	—	—	10
60	25	45	60	30	—	—	—	—	15
90	40	60	75	40	—	—	—	—	25

followed by *Glomus mosseae*. In the case of safflower, *G. constrictum* (figure 5) was more in number than *G. fasciculatum*. From the point of host specificity rhizosphere soils and roots of castor supported maximum VAM association as compared with safflower.

The present study forms the first report of VAM association in castor and safflower from Asia,

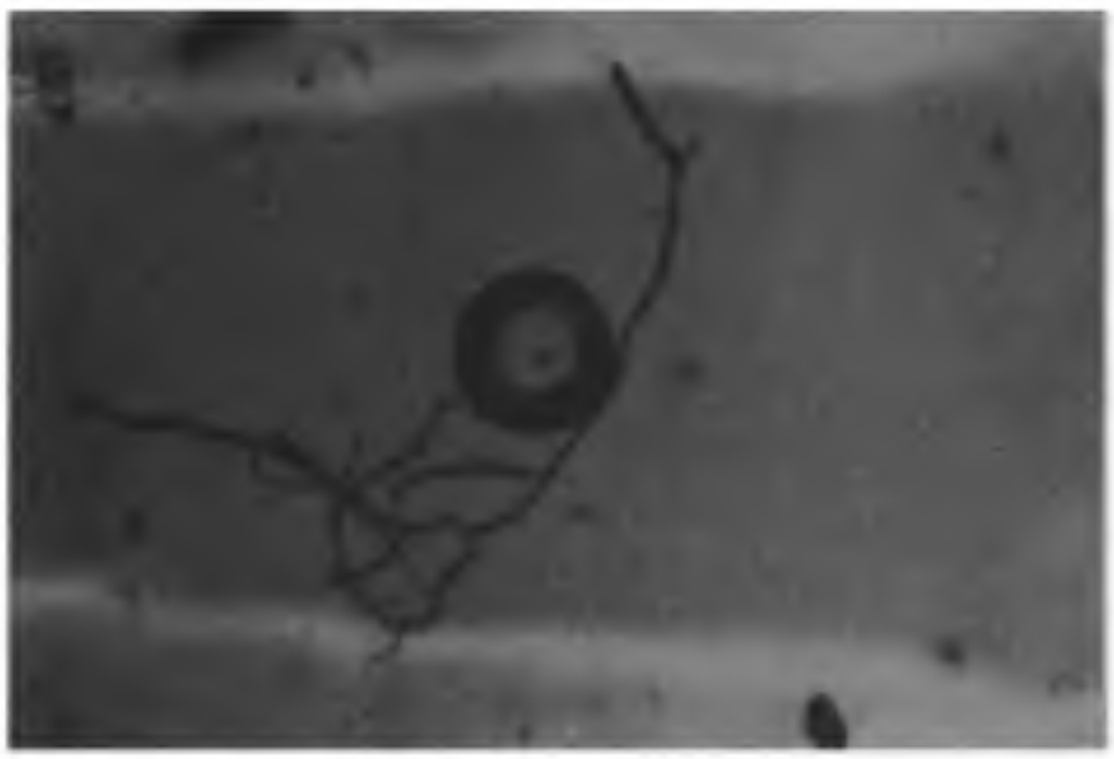


Figure 5. A spore of *Glomus constrictum* from rhizosphere soil of safflower (×100).

followed by the formation of VA mycorrhizas in oil-seed crops grown under semi-arid tropical alfisol soil conditions.

23 May 1988; Revised 30 July 1988

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VESICULAR-ARBUSCULAR MYCORRHIZAL ASSOCIATION IN MULBERRY

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IT is well known that mycorrhizal association in plant roots can lead to increased efficiency of nutrient uptake leading to the enhancement of plant growth[1,2]. Successful yield trials with various economic crops after inoculation with vesicular-arbuscular-mycorrhiza (VAM) have been reported[2–4]. However, little or no information is available on VA mycorrhizal association and its role in nutrient uptake and growth of important economic crop plant like mulberry (*Morus* spp) under natural conditions. Kandasamy *et al*[5] reported the response of four mulberry cultivars to VAM inoculation in pot culture.

The aim of this study was to survey the rhizosphere soil and roots of different mulberry cultivars for natural mycorrhizal association before selecting any VA mycorrhiza for field trials to increase the leaf yield. The present paper thus highlights the natural VAM association in various mulberry cultivars.

The fine roots of six mulberry varieties, viz. Kanva–2, Mysore Local, S_{30}, S_{36}, S_{41} and S_{54} grown at this institute were used in the present study. The roots of each mulberry variety in five replicates along with 0.5 kg rhizosphere soil collected in polythene bags were brought to the laboratory. The fine roots were washed in tap-water and cut into segments of approximately 1 cm in length (100 segments from each replicate plant). Root segments were processed and stained for detecting VAM association[6]. The percentage of root colonization by mycorrhizal fungi was calculated by