VAM INFECTION IN DIFFERENT LEGUMINOUS COVER CROPS OF RUBBER

K. JOSEPH, R. KOTHANDARAMAN & J. MATHEW

Rubber Research Institute of India, Rubber Board, Kottayam-686 009, India.

With a view to study the mycorrhizal formation in 4 common cover crops of rubber, *Puereria phaseoloides, Mucuna bracteata, Centrosema pubescens* and *Calopogonium mucunoides*, a field study was conduced. The cover crops differed significantly in mycorrhizal infection and count of spores in the soil. *M. bracteata* recorded highest percentage of infection followed by *C. mucunoides, P. phaseoloides* and *C. pubescens*. However the number of spores of mycorrhizal fungi in soils was highest in *C. pubescens* followed by *M. bracteata, C. mucunoides* and *P. phaseoloides*. There was no direct relation between the percentage of infection and number of spores in soil. Our study clearly shows the mycorrhizal formation in leguminous cover crops of rubber under Indian conditions and it differs in the cover crops.

World wide interest in VAM is increasing at a phenomenal rate due to its importance in nutrient uptake and plant growth. Almost all plants are infected by VAM (Gerdemann 1968). Of the various plant nutrients absorbed at the influence of VAM fungi, phosphate is most important (Hayman 1982) and many plants cannot develop normally, without VAM fungi, especially in phosphate deficient soils (Mosse 1973). In leguminous plants VAM formation is essential as it stimulates the activity of *Rhizobium*, which depends on phosphate. Leguminous creepers like *Puereria phaseoloides, Calapogonium mucunoides, Centrosema pubescens* and *Mucuna bracteata* are recommended as cover crops in rubber plantations. The occurrence of VAM association with *S. pubescens* (Crush 1974) and *P. phaseoloides* (Waidhyanatha *et al* 1979) has already been reported in other rubber growing countries. However, variation in infection as well as mycorrhizal population under different cover crops has not been studied. In this report, the difference in mycorrhizal infection in roots and spore counts in soils under different cover crops of rubber is presented.

Materials & Methods : The seeds of *P. phaseoloides, C. mucunoides, C. pubescens* and *M. bracteata* were sown in raised beds of one metre square (soil pH 4.8) containing average mycorrhizal spore count 156/100 ml (with a range of 143–169). Five replicates were maintained under each cover crop and randomised. After 8 months of growth, root and soil samples were collected from each bed and the percentage of VAM infection in roots and number of VAM spores in soils were estimated (Phillips & Hayman 1970 ; Gerdemann & Nicolson 1963).

Results : Infection with vesicles and arbuscules characteristic of VAM was observed in all the 4 leguminous cover crops of rubber (Fig. 1–6). The cover crops differed significantly in their susceptibility to mycorrhizal infection. *M. bracteata* recorded significantly higher percentage of infection followed by *C. mucunoides, P. phaseoloides* and *C. pubescens*. The mycorrhizal spore number in the soils underneath the 4 species of leguminous covers also differed significantly. Highest number of spores was recorded in *C. pubescens* plots followed by *M. bracteata, C. mucunoides* and *P. phaseoloides*. Spores with straight stalks resembling *Glomus* sp., were observed frequently in the soils. Occasionally a few spores with bulbs swelling at the base were seen (Fig. 7–8).

Discussion : Legumes generally have less root systems and many are poor foragers for soil phosphate (Hayman 1982). Hence VAM infection is of paramount importance for these plants to absorb phosphate, which plays a major role in biological nitrogen fixation. In the present study all the 4 leguminous plants showed VAM infection and it varies with different species confirming the findings of Manjunath and Bagyaraj (1980) who stated that the extent of mycorrhizal infection and the extent to which plants respond to infection varied with the plant species. Spore production by mycorrhizal fungi is governed by many factors such as plant species, soil fertility and climate. In this study all the factors except plant species are identical and hence variation with respect to spore numbers is obviously due to the legume species. There is no direct correlation between spore count and the percentage of VAM infection.

TABLE 1—Percentage of mycorrhizal infection of 4 leguminous cover crops and mycorrhizal spore count in soils under each cover crop.

Cover crop		*Infection* (%)	*Spore*/100 ml soil
M. bracteata	...	83	446
P. phaseoloides	...	64	290
C. mucunoides	...	75	362
C. pubescens	...	55	585
C.D. at 5%	...	4.10	71.5

This is a common phenomenon occurring in acid soils (Hayman & Mosse 1979). Earlier studies with *C. pubescens* (Crush 1974) and *P. phaseoloides* (Waidyanatha *et al* 1979) have clearly revealed the beneficial effect of mycorrhizal fungi and now the existence of the endophyte in all the leguminous covers of rubber grown in acid soils of India is established. The percentage of infection need not always be growth responsive. Therefore detailed investigations are to be conducted to ascertain the extent of beneficial effect of native strains of mycorrhizal fungi in acidic rubber growing soils of India.

Acknowledgements : The authors are thankful to Dr. K. Jayarathnam, Deputy Director, Plant Pathology and M.R. Sethuraj, Director, Rubber Research Institute of India for their keen interest and valuable suggestions in carrying out this study.

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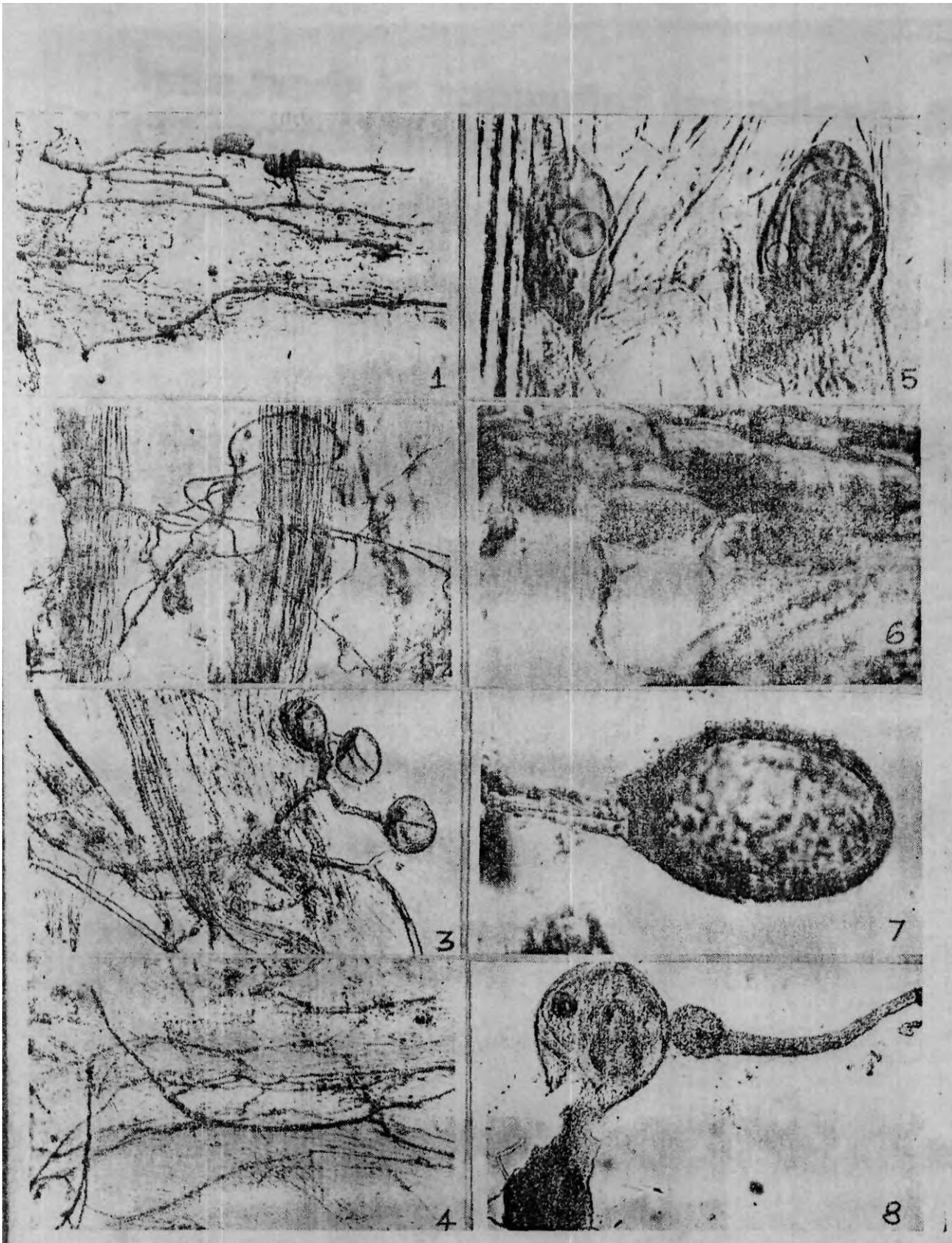

Fig. 1-6—Photomicrograph of mycorrhizal infection in roots of cover crops. Fig. 1—*M. bracteata.* Fig. 2—*P. phaseoloides.* Fig. 3—*C. mucunoides.* Fig. 4—*C. pubescens.* Fig. 5—Vesicles in *P. phaseoloides.* Fig. 6—Arbuscules in *M. bracteata.*

Fig. 7 & 8—Mycorrhizal spores commonly seen in soils. Fig. 7—Spores with straight stalk. Fig. 8—Spores with bulbous base.