

Title of the technology

Isolation and mass multiplication of VAM for improvement of planting stock in forest nurseries

A. Nature of technology

Mass multiplication of VAM

B. Process in brief:

Rhizosphere soil samples were collected from forest nurseries and plantations of the selected arid and semi-arid tree species viz., *Ailanthus excelsa*, *Azadirachta indica*, *Prosopis cineraria*, *Tecomella undulata*, *Acacia catechu*, *A. senegal*, *A. nilotica*, *Dalbergia sissoo*, *Eucalyptus spp.* and *Sapindus indica* from various districts/divisions from Rajasthan and Gandhinagar, Baroda, Rajpipla, Banaskatha in Gujarat. The rhizosphere soil samples were analysed for isolation of spores by wet sieving and decanting technique. Thirty six AM fungi were isolated and identified on the basis of size, shape, colour and attachment of subtending hyphae and with the help of synoptic keys available on taxonomy. Pure inoculum of most dominant AM fungi i.e., *Glomus fasciculatum* and *G. aggregatum* were prepared by collecting 500 viable spores by using funnel technique. Pure inoculum prepared by funnel technique was transferred to bigger pots by using autoclaved sand +soil mixture (1:1 v/v). *Zea mays* and *Cenchrus ciliaris* were used as a host for mass multiplication in pots and beds. *Pennisetum glaucum* (Bajra) was also used as a host for mass multiplication of inoculum and it has reduced the multiplication period about one and half months earlier than normal course (use of maize or *Cenchrus ciliaris* as host).

The doses of inoculum were also standardized in forest species. 20 g inoculum/plant in root trainer (150 CC) and 100 g inoculum in polypots (1500 CC) with standard potting media containing 500 viable spores was found the best for growth and vigour of plants. The inoculum was applied by side banding method in root trainer and poly bags and in young saplings 100 gm inoculum/plant was provided in root zone. VAM inoculation experiments in nursery and demo trials were laid out on various trees species in Rajasthan and Gujarat. The inoculated seedlings of *Ailanthus excelsa*, *Azadirachta indica* and *Acacia catechu*, with VAM showed enhanced growth (35-40%) in all parameter i.e., shoot height, percentage of infection, number of spore population and increase in P content in leaves of *A. excelsa*, *A. indica*, *A. catechu*, *Prosopis cineraria*, *Tecomella undulata* and *Dalbergia sissoo* (Fig. 1). Application of VAM in farmers field by broadcasting method (consortium inoculum mixed in compost [1: 100]) has increased crop yield by 40-50% particularly of bajra, cotton and maize crops (Fig. 2).

C. Beneficiaries of the technology

1. Prominent beneficiaries/ user groups

State Forest Department of Rajasthan, Gujarat and Dadar Nagar Haveli and farmers of these states.

2. No. of clients to whom technology has been transferred/ sold

Training on VAM technology was imparted to forest officials of Rajasthan & Gujarat, NGOs and farmers time to time (Fig. 3). AM inoculum was provided to 227 farmers for the various crops viz., maize, oat, jowar, bajra, cotton, brinjal, wheat, tobacco and green chilly in Palaj, Dashela, Vasna, Gandhinagar, Mahesana, Junagarh, Rajkot, Bhavnagar, Kutchh, Deesa, Mansa in Gujarat. Technology developed has been used for the mass multiplication of VAM by the SFD Gujarat and used in nursery and plantations for the better survival and growth of the plants.



Fig. 1 - VAM inoculation in nursery



Fig. 2 - Demonstration trial in farmers field



Fig. 3-Training on VAM technology

3. Potential for further dissemination (As the case may be)

Technology has been adopted by the SFD Gujarat. It has been proposed that this practice can also be replicated at forest nurseries of Rajasthan for producing fortified seedlings with VAM for new planting areas under afforestation programmes.

Publications

1. Srivastava, K.K., Mohan, V. and Verma, N. (1999). Impact of VAM inoculation on some arid tree species. *Indian Forester*, 127: 936-940.
2. Verma, N., Srivastava, K.K., Tripathi, S.P. and Mohan, V. (1999). Endomycorrhizal studies on *Prosopis cineraria* (L) Druce. in Rajasthan. *Myforest*, 34: 875-880.

3. Srivastava, K.K., Srivastava, H.P. and Kumar, S. (2004). Standardization of Inoculum Dose in *Tecomella undulata* seedlings. *Indian Forester*, 130: 1316-1318.
4. Srivastava, K.K. and Srivastava, H.P. (2006). Selection of efficient isolate of VAMF for *Tecomella undulata* (Sm.) Seem. *Indian Journal of Forestry*, 29: 335-337.
5. Verma, N., Tarafdar, J.C. and Srivastava, K.K. (2010). Role of Arbuscular Mycorrhiza trains on biomass production and P, Cu, Zn uptake in *Prosopis cineraria*. *Indian Forester*, 136: 205-214.

D. Economic significance

1. Potential to address Livelihood issues and generate additional income

Application of natural products like biofertilizers is demand of today. Our technology can easily be adopted by the forest officials, farmers and NGOs and produce indigenous inoculum in their nursery or field and generate additional income.

2. Productivity enhancement and economic benefits over replaced technology

Application of VAM increased seedling growth of the selected tree species by 35-40% whereas application of VAM enhanced crop yield by 40-50%.

3. Impact of the technology (As the case may be)

VAM inoculum was provided to 227 farmers for the various crops viz., maize, oat, jowar, bajra, cotton, brinjal, wheat, tobacco and green chilly in different places i.e., Palaj, Dashela, Vasna, Gandhinagar, Mahesana, Junagarh, Rajkot, Bhavnagar, Kutchh, Deesa, Mansa in Gujarat. Technology developed has been used for the mass multiplication of VAM by the SFD Gujarat and used in nursery and plantations for the better survival and growth of the forestry plant species.

E. Developed by {Name of Scientist(s)/ Officer (s)}

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