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Mycorrhizal colonization of VAM/AM fungi in roots of medicinal plants grown under foot hills of Himalayas

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Abstract

The present experiment was carried out at HNB Garhwal Central University, Srinagar Garhwal to evaluate the Mycorrhizal association of VAM/AM fungi with roots of different medicinal plants. Twenty nine medicinal plants were selected at two experimental sites i.e., Srinagar and Chauras for the experiment. Roots of selected plants was cut into small segments and after proper staining with trypan blue it was observed under the microscope. The experimental findings demonstrated that the roots of *Apagus spp.* in Srinagar locality had the maximum Mycorrhizal colonization of VAM/AM fungi (85); whereas, the roots of *Ricinus communis*, *Atropa acuminata*, *Beauteamonosperma*, *Artimisia spp.*, *Terminaliachabula*, *Cassia fistula* and *Ocimum sanctum* had no Mycorrhizal colonization of VAM/AM fungi.

Keywords: Mycorrhizal, colonization, VAM/AM, *Terminaliachabula*

Introduction

Symbiotic association of Mycorrhiza with plant roots play an important role in plant growth. VAM particularly dominate warmer and drier soil, temperature and tropical latitudes with higher turnover of organic material. Mycorrhizal association are worldwide distributed and mostly found in cultivated soils, non-cultivated soils, moist forests, scrub, savannah, heaths, grassland sand dune, semi desert and anthracite. Plants with Mycorrhizal association display improved growth in comparison to non-Mycorrhizal ones through increase in uptake of water, phosphorus and other minerals. It has been reported in recent years that the Mycorrhizal confer on host plants several other benefits in addition to enhancement of phosphate uptake. These benefits are biological control of root diseases (Shonbeck, 1979) [5], nodulation and nitrogen fixation in legumes (Mosse *et al.*, 1976) [3], hormone production (Allen *et al.*, 1980) [1], drought resistance (Powell and Bagyaraj, 1984) [4] and increased uptake of several elements such as N, K, Zn, Mg, Ca and S (Hayman, 1982) [3-2]. The co-symbionts used along with VAM leads to synergistic effect with nitrogen fixing bacteria. Positive and significant effect of VAM on growth and survival of forest and agricultural crops have been reported by many scientists. Moreover, the primary seedling establishment, survival and biomass production indicates the potential of VAM fungi to reduce the fertilizers requirements of trees in the degraded lands. Keeping in view the above factors under consideration, the present experiment was conducted to study the association of Mycorrhizal VAM/AM fungi with roots of different medicinal plants.

Material and Methods

The experiment was carried out at HNB Garhwal University, Srinagar Garhwal. For the experiment, soil samples were collected from different sites of Srinagar (Bilkedar and Birla campus) and Chauras Campus of Tehri Garhwal in Garhwal University. To determine the colonization of VAM/AM fungi in roots of selected medicinal plants, the roots of plants was washed thoroughly with running tap water to remove the adhering soil particles from the roots. The washed roots were kept in 10% potassium hydroxide (KOH) for 24 hours. Later the roots were removed from the KOH solution, washed with tap water again and roots were stained with trypan blue. For preparation of the slides, the roots were cut into small segments of 1 cm length and mounted on slide in lacto phenol. These segments were pressed tightly and the slides were observed under the microscope to determine the colonization of the VAM/AM in roots. The root segments showing presence of any structure either hyphae or arbuscules on vesicles were considered as Mycorrhizal ones.

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Result and Discussion

The table 1 shows Mycorrhizal colonization of VAM/AM fungi associated with different medicinal plants. Among the 29 medicinal plants under study, the roots of *Apagus spp.* in Srinagar locality had the maximum Mycorrhizal colonization of VAM/AM fungi (85); whereas, the roots of *Ricinuscommunis*, *Atropa acuminata*, *Beauteamonosperma*, *Artimisia spp.*, *Terminaliachabula*, *Cassia fistula* and *Ocimum sanctum* had no Mycorrhizal colonization of VAM/AM fungi.

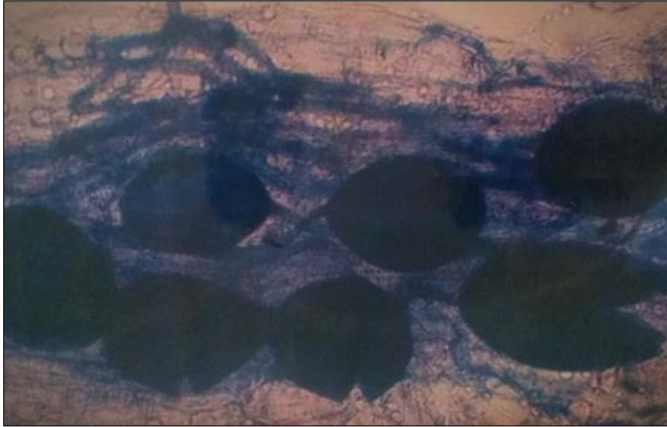


Fig 1: Mycorrhizal colonization in Vascular bundle

Table 1: Mycorrhizal colonization in roots of medicinal plants collected from different locations.

Sl. No.	Medicinal plants	Locality	Percent of Mycorrhizal colonization
1.	<i>Aeglemarmelos</i>	Srinagar	44
2.	<i>Azadiracta indica</i>	Srinagar	68
3.	<i>Cassia fistula</i>	Chauras	60
4.	<i>Daturastramonium</i>	Srinagar	33
5.	<i>Emblicoefficialis</i>	Srinagar	39
6.	<i>Mentha arvensis</i>	Chauras	60
7.	<i>Mentha longifolia</i>	Chauras	64
8.	<i>Ocimum sanctum</i>	Chauras	63
9.	<i>Ricinuscommunis</i>	Srinagar	Nil
10.	<i>Apagus spp.</i>	Chauras	85
11.	<i>Atropa acuminata</i>	Chauras	Nil
12.	<i>Bueteamonosperma</i>	Chauras	Nil
13.	<i>Picrorrhizakuruouia</i>	Chauras	29
14.	<i>Allium sativum</i>	Srinagar	35
15.	<i>Allium cepa</i>	Srinagar	43
16.	<i>Solanum spp.</i>	Srinagar	33
17.	<i>Artimisia spp.</i>	Srinagar	Nil
18.	<i>Amaranthusviridus</i>	Chauras	46
19.	<i>Terminaliachabula</i>	Chauras	Nil
20.	<i>Terminaliabelerica</i>	Srinagar	65
21.	<i>Azadiracta indica</i>	Chauras	68
22.	<i>Ocium sanctum</i>	Srinagar	73
23.	<i>Aegelmarmelos</i>	Chauras	42
24.	<i>Meliaazadiracta</i>	Chauras	48
25.	<i>Juglansregia</i>	Chauras	35
26.	<i>Allium sativum</i>	Chauras	51
27.	<i>Cassia fistula</i>	Chauras	Nil
28.	<i>Ocium sanctum</i>	Srinagar	Nil
29.	<i>Terminaliabelerica</i>	Srinagar	59

Conclusion

From the above study, it can be concluded that Mycorrhizal colonization of VAM/AM fungi was maximum with the roots of *Apagusspp* as compared to other medicinal plants while

other medicinal plants displayed less or no association of VAM/AM fungi with their roots.

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