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VESICULAR ARBUSCULAR MYCORRHIZA (VAM) ASSOCIATION OF MOUNTAIN FLORA OF JABALPUR REGION

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INTRODUCTION

Mycorrhizas are broadly classified into endomycorrhiza present on. the externally and internally, respectively. The endomycorrhizae are aseptate fungi forming vesicles .and arbuscules hence the name VAM. VAM are obligate symbionts, nonhost specific, and .occur over a broad ecological range from aquatic to desert environment. They are common in tropical temprate and arctic regions.Exploration and exploitation of mountain plants by the tribals of the region is one of the practices in the cultivation of herbal plants to maintain a steady supply to support the increasing demand due to a decline in their natural population. Vesicular arbuscular mycorrhizal fungi are associated with more than 80% of terrestrial plant families. (Rinaddi *et al* 2008) and have unique properties of enhancing plant establishment, growth and disease resistance. (Smith *et al* 2006) Also, VAM fungi are known to improve the survival and establishment of tissue culture plantlets, (Verma *et al* 1994) The purpose of the present Paper was to investigate the VAM fungal association in certain mountain plants of the district, Jabalpur so that VAM fungi could be exploited in future.

Jabalpur is a city of rock. The mountain ranges are presented in the boundries of the township and even in the mid of the city. There are mountain with soft and hard rocks. The mountain at pachpedi is of soft rock, lime stones, clay and sand. Massing sand stones , quarts, feldstar is the main composition of mountain of Patan. Granite, Quartz, ALkaly feldstar is present in Madan Mahal and Ghamapur mountains. The Barela and Dumna mountains have Besalt, Augite and Feldstar. The soil composition of these mountain may be considered as infertile

and not a favorable for the vegetation. Still, the population of some herbaceous plants and trees attracts the concentration of a botanists to study the microflora of these mountains, so as to understand tha matural composition of microbes which act to provide nutrition to the plant in such barren land.

KEYWORDS: Vesicular Arbuscular Mycorrhiza, Mountain flora, Jabalpur.

MATERIAL AND METHOD

Survey of Vam Flora in the Mountain Range of Jabalpur

To study indigenous species richness and diversity of VAM fungi associated with different flora in soil samples were collected all session from various Mountain sites of Jabalpur city. Natural habitat sites of 35 plant species were selected and from each location five replicates of (covering the whole rhizosphere) one kg soil (10-30 em below the surface) together with fine feeder roots were collected in polythene bags and shade dried.

Large pieces of organic matter and leaves were manually removed from soil and stored at 5^{0C} until further use. Spores were recovered from the soil by wet sieving (sieves 700 - 45 urn pore size) and decanting method. (Gerdemann *et al* 1963) followed by density gradient centrifugation. (Ohms *et al* 1957) and filtering over a gridded ordinary filter paper and counted under a dissecting microscope and expressed as spores/50 gm soil sample. Intact spores were picked up using a wet dissecting needle in lactophenol or polyvinyl lactic acid and Melzer's reagent and observed under a compound microscope for intact spores, broken spores under cover slip and for Melzer's reagent treated spores. Spores of VAM fungi were identified according spore morphology and wall characters. (Schenck *et al* 1990)

Collection of Soil Sample

'From each site, ten replicates of 500 gm rhizospheric soil was collected from a depth of 10-30 cm in sealed polythene bags. Each sample was labeled giving details of collection, like sample number, harvesting date location, habitat, type of soil, condition of site, etc. Each soil sample was divided into four sub samples for estimation of rhizosphere edaphic features, spore counting, root infectivity and identification of AMF spores.

Extraction of Vam Fungi from Soil

Large pieces of organic matter and leaves were manually removed from soil and stored at 5^{0}C until further use. Spores were recovered from the soil by wet sieving (sieves 700 - 45µm pore

size) and decanting method' followed by density gradient centrifugation' and filtering over a gridded ordinary filter paper and counted under a dissecting microscope and expressed as spores/50 gm soil sample. Intact spores were picked up using a wet dissecting needle in lactophenol or polyvinyl lactic acid and Melzer's reagent and observed under a compound microssope for intact spores, broken spores under cover slip and for Melzer's reagent treated spores. Spores of VAM fungi were identified according spore morphology and wall characters".

Collection of Root Sample

The finer feeder roots were collected for mycorrhizal assessment in roots, because these roots are the preferential sites for VAM development. Sample collected from different mountain sites viz. Sita Pahadi, Pathbaba Range (Cold Atmosphere), Lal maati , Sidhbaba Range, Barela and other collection area. The collected roots were washed even and cut into 1-2 cm pieces and stored at room temperature in individual vials containing formallin, acetic acid and alcohol (FAA) solultion. Clearing and staining of roots was done as suggested by Philips & Hayman, Stained roots were mounted in clear lacto Phenol solution on microscopic slide.

Estimation of Relative Frequency of VAM Species

Percentage root infection was calculated using gridline intersecting method. (Giovannetti *et al* 1980)

$$\text{The percentage of root length colonized} = \frac{\text{Total number of infected segments}}{\text{Total number of segments observed}} X\ 100$$

Identification of Am Fungi

In the process of observation and isolation spores were separated into individual groups according to morphological features (size, colour, morphologically similar hyphal connections and spore surface characteristics) different species of VAM fungi were identified with the help of synoptic key of Trappe (1982), Manual of Scheneck and perez (1987); Scheneck (1982).

RESULT AND DISCUSSION

In present study 35 forest trees were examined for study of AM association. 4 genera and 11 VAM species were recorded in summer & Winter season. Some VAM fungi were specific for some particular host and season. Some species were found in restricted to a particular host species, while others could infect a wide range of hosts. This ability can be attributed to the

ability of VAM fungi for root colonization and occurrences, their colonization differ to from species to species (Jamaluddin *et al.* 1997). More abundant VAM fungi species was recognized by relative frequency summerized in Table-1. The percentage frequency of *Glomus* sp. and *Glomus mosseaeare* maximum (65.7%), followed *Gigaspora* sp. (45.71%) *Acaulospora* sp. (37.14%), Scutelospora sp. (25.71%), Glomus aggrigatus (8.57%) and minimum frequency showed by *Glomus fasciculatum* (5.7%) *Glomus macrocarpum* (5.7%) and *Glomus microcarpum* (5.7%).

High frequency of *Glomus mosseae* was recorded by Pratiksha *et al.* (1998), she had found out 100%'frequency of *Glomus mosseae* during whole all season in survey place mountain site in Jabalpur. (Verma *et al*., 2009) Study on "Diversity of VAM fungi in forest of central India" by Verma (2009) he was also reported that *Glomus* spp. was more frequently in study area).

Table 1 - Relative Frequency of Vam Species in Different Host Species.

S. No.	Name of AM fungi	Total no. of host plant	AM fungi present in host	(%) frequency
1.	*Glomus* sp.	35	23	65.7%
2.	*Glomus etunicatum*	35	5	14.28%
3.	*Glomus fasciculatum*	35	2	5.7%
5.	*Glomus aggrigatum*	35	3	8.57%
6.	*Glomus macrocarpum*	35	2	5.7%
7.	*Glomus microcarpum*	35	2	5.7%
8.	*Gigaspora* sp.	35	16	45.71%
9.	*Acaulospora* sp.	35	13	37.14%
10.	*Acaulospor scrobiculata*	35	3	8.57%
11.	*Scutelospora* sp.	35	9	25.71%

Hamikumar and Bagyaraj (1988) studied the effect of annual seasons of mycorrhizal colonization and sporulation by native mycorrhizal fungi in *Mycorrhizal indica* and *Leucaena leucocephala* and reported that maximum colonization and sporulation occurred during winter (November to January) months whereas summer months (April to June) were unfavorable for and proliferation of VAM fungi. There was a positive correlation between relative humidity and mycorrhizal activity; excessively high soil moisture may substantially reduce the infection by VAM fungi (Khan, 1972). In present study, we observed that in this

season (summer & winter) the distribution, root colonization and population of associated VAM fungi on different forest trees are very low.

CONCLUSION

Therefore present works understand the agents making nutrients available to the vegetation growing in these mountains.

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