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ARBUSCULAR MYCORRHIZAL FUNGI IN THE RHIZOSPHERE OF SOLANUM TUBEROSUM

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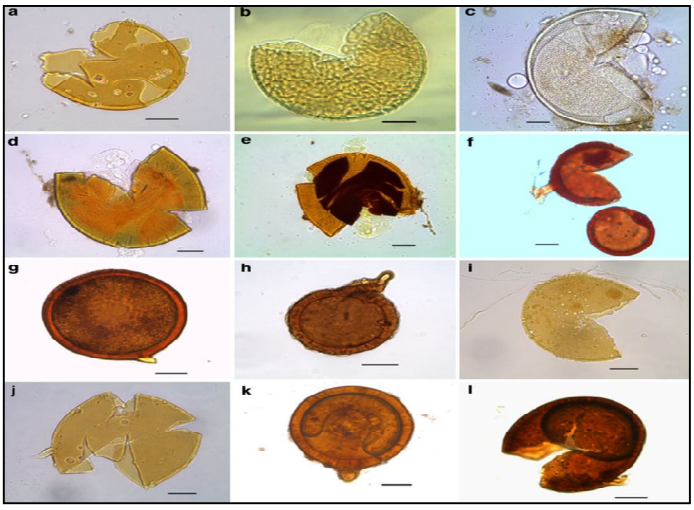
ABSTRACT

Data on qualitative composition and specific association with host plant has been generated. Ecological studies on the community structure of arbuscular mycorrhizal fungi are generally restricted to the main rooting zone from 10 to 25 cm soil depth A total number of 10 species of fungi were isolated and the number of fungi was found to be maximum in rhizosphere region than the non-rhizosphere region. Soil temperature along with soil moisture exerts a major influence on mycorrhizal colonization of plants The study confirmed that the biodiversity of mycoflora differs in rhizosphere and rhizoplane of selected plant. *Glomus mosseae* and *Acaulospora laevis* were found dominant mycorrhizal species in the rhizospheric soil of plant . Totally 10 VAM fungal species were isolated which belongs to four genera (*Aculospora, Gigaspora, Glomus* and *Scutellospora*) and among them *Glomus* was dominant genera.The microorganisms, on a continuous scale forms parasitic to mutualistic association with plant. Plant was investigated for VAM fungal association. Presence of 10 VAM fungi associated with the plant was identified up to species level. Rhizosphere and rhizoplane of most of the plant is always rich in various populations of microorganisms. The rhizosphere soils of all these plants were supported by a good number of VAM propagules. The soil pH was also determined.some genera were reported in both rhizosphere and rhizoplane region, yet a few forms like *C.globosum, Stachybotrys atra Chaetomium spirale,*and *Royella albida* were confined only to rhizoplane.



KEY WORDS:, Rhizosphere, Rhizoplane, Mycoflora.

INTRODUCTION

The plant symbionts range from bryophytes to angiosperms. Septate hyphae enter the root cortical cells and form characteristic arbuscules and vesicles but, they do not enter the vascular system. VAM fungi colonize the fine absorbing roots of plants, invade into the cytosol of cortical cells and form specialized

structures intracellular and intercelluarly known as arbuscules and vesicles, respectively. VAM fungi act as soil conditioner and play an important role in preventing rapid degradation of environment [1]. The spore count, root colonization, species diversity and dominant species, varies with the region and soil nutrient conditionsMycorrhizal fungi are key components of soil microbiota and obviously interact wi th other microorganisms in rhizosphere. Mycorrhizal association changes several aspects of plant physiology, nutritional and physical properties of the rhizosphere soil. Different types of mycorrhizal association have been observed in a wide range of land plants. Endomycorrhizae (arbuscular mycorrahizal fungi) belong to phylum Glomeromycota..VAMfungi increases tolerance to heavy metals,]salinity and drought . The results are represented as per [2]. Altogether 13 VAMfungal species belonging to five genera were isolated from the rhizosphere soils of plant formation in legumes by non- pathogenic rhizobia [3].The establishment of symbiotic association of AM fungi with plant roots has much similarty to nodule The Himalayan state of Uttarakhand is very rich in medicinal and aromatic plants [4] VAM fungal structures, i.e. arbuscules vesicles intra radical aseptate hyphae and appressoria were observed in all plant specie.However, the colonization patteren and rate varried among the plant species. Vesicles and aseptate hyphae were the most frequent structures present in the plants studies. Vesicles were observed in the roots of all species, where as, arbuscules were observed only in plant . The fine roots that perform most of the uptake process are symbiotically associated with fungi which improve nutrient uptake, drought and frost tolerance and protect higher plants against pathogens. The fungi withdraw glucose from plant roots and act as a significant sink for carbohydrates .As a rule the fungus is strongly or wholly dependent on the higher plant, whereas the plant may or may not benefit .

The medicinal plants in the region occur naturally and most of them propagate vegetatively by underground rhizomes, stems and bulbs or corms. This herbal wealth is being used not only by developing countries but also by developed countries for their health care systems. A bulk of our rural population relies on drug resources of plant origin. this research was carried out to study their associated VAM fungi and various factors which affected their growth. The value of these plant has been utilized since Vedic period [5,6].

MATERIALS AND METHODS

Collection of the samples

Collection of medicinal plants with their roots and soil was done in study area . After bringing these plants to Lab the roots were separated and analyzed when fresh. Soil samples were collected, air-dried and then stored in plastic bags till processing. The host plants Identification was confirmed by Gamble[7]. The pH of soil samples was determined (soil-water suspensions 1:5) with the help of pH meter .

Estimation of Root Colonization

The root samples were cleared and stained in tryphan blue with a modified version of the Phillips and Hayman's method[8]. AM fungal colonization was visualized in the root tissue of plant species by using frequency distribution method proposed Each root was divided into ten 1cm long segments, which were then cleared, stained and arranged on slides. The slides were observed under compound microscope . Based upon microscopic characters, the AM fungal spores were identified. For identification and nomenclature, keys of Raman and Mohankumar15; Schenk and Perez17 were followed. Identification of AM fungal spores based on colour, size, shape, hyphal attachment, structure,general nature of the spore contents.Root samples were rinsed with tap water, cleared in 10% KOH (30 min, 900C), acidified in lactic acid (10 min) and stained with 0.5% Trypan blue Fifty pieces of 0.5-to-1-cm root segmentswere examined per sample for their vesicular arbuscular mycorrahizal status and presence of fungal structures under a compound microscope. Rhizosphere soil samples of plant was collected from different wet-sieving and decanting method. A maximum level of propagules was recorded in the samples of followed by and the minimum of propagules were in the soil samples of Among 13 VAM fungal species which were isolated in this study, was represented by .This data shows the predominance of Glomus and species in the rhizosphere soils of plants. **Assessment of AM Fungal Colonization:** Roots were collected from the soil blotted dry to determine fresh and dry root weight, P content and mycorrhizal root colonization. Mycorrhizal root colonization was done by the rapid clearing and staining method , The percentage of AM root colonization was determined as under:-Percent root colonization = Number of root segments colonized/ Number of root segments *100

RESULTS AND DISCUSSION

These edaphic and rugged climatic conditions induce growth of an assorted flora and plantation crops. The present study reveals that species investigated are mycorrhizal. Percent root colonization and rhizospheric spore number seem to show no correlation. The findings here are to some extent in agreement with those of Mohan *et al*., Sudha and Ammani and Gaur and Kaushik [14-16].The percent root colonization, spore density and its richness has been correlated with climatic and edaphic factors of the study area and also with the host dependence of AMF species. Mycorrhizal spore density was found to be higher in wild plant species as compared to cultivated species. These observations could be attributed to the undisturbed nature of the ecosystem. *Glomus* was found to be the most dominant genus and the most dominant AM fungal species is *Glomus fasiculatum* [9] In a survey on AM association in three different species of *Cassia* viz. *Cassia alata*, *Cassia sophera* and *Cassia occidentalis* by [10], it was found that all of the three species possess AM were found to be dominant followed by *Acaulospora* sps,association under natural conditions. Similarly, [11] found *Gigaspora* sps, *Scutellospora* sps, *Paraglomus* sps and the AM association with some important medicinal plants *Pacispora* sps. They are found in most of the ecosystems in Suburban area of Mumbai. [12], The variation in soil composition and texture are classified as poor in nutrients like nitrogen, medium in phosphorus and organic carbon and just above average for available potash . There are many factors that could disturb spore proliferation in a given host rhizosphere.[13].The area has varied topographical composition of ravines, valleys, many seasonal riverines, hillocks and flat land. This provides for diverse species spectrum , which peaks in the high rain season.

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