

Diversity of Arbuscular mycorrhizal (AM) fungi in some common plants of marathwada region

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Abstract

Four angiospermic plants belonging to two different families were studied for their AM association. All test plants were growing and distributed in Osmanabad district of Marathwada region in Maharashtra state. The result showed that all the four plants viz. *Annona squamosa*, *Annona reticulata*, *Tinospora cordifolia* and *Cocculus hirsutus* had AM fungal association in the roots and spore population in the rhizosphere soil. However, maximum percent root colonization of AM fungi was observed in *Tinospora cordifolia* (92 %) followed by others, while minimum in *Annona reticulata* (57.33 %). *Tinospora cordifolia* (320) showed more spore density whereas less in *Annona squamosa* (59). Total five genera of AMF was identified up to species level in which *Acaulospora* spp were found dominate followed by *Glomus* spp, *Sclerocystis* spp, *Entrophosphora* spp and *Gigaspora* spp were found poorly distributed.

Keywords: Plants, Root colonization, AM fungi

INTRODUCTION

Arbuscular mycorrhizal fungi (AMF) form a symbiotic association with majority of land plants improving plant growth. More than 80% of all plants are associated with AMF in their root system (Smith and Read, 1997[13]). These well established AMF contribute to the phosphorus nutrition of plants by enhancing phosphorus uptake from the soil (Draft and Nicolson, 1966[2]). Marathwada region forms the part of the Vast Deccan Plateau of India and is one of the four divisions of Maharashtra state. The rivers and rivulets which are dry for major part of the year. This enormously powerful during monsoon and flow with great speed. This results loss of soil cover and exposes bare rocks at many places. Recently, there have been some serious efforts to control this enormous soil erosion. Until AMF is too low to contribute to the successful establishment of plant species which can help to improve recovery rate of the soil system. *Annona squamosa*, *Annona reticulata*, *Tinospora cordifolia* and *Cocculus hirsutus* are multipurpose plant species commonly found in Maharashtra state. Hence a study survey was conducted around Osmanabad district in Marathwada region, where the plant is grown throughout the year to observe AM fungal genera and species that are associated with four plants.

MATERIALS AND METHODS

Roots and rhizosphere soil samples of four plants (viz.

Annona squamosa, *Annona reticulata*, *Tinospora cordifolia* and *Cocculus hirsutus*) were collected and in each plant three replications were taken. Root samples were brought to the laboratory which were then washed in tap water and cut in to 1 cm pieces in length. Root samples were cleared and stained using Phillips and Hayman (1970[9]) technique. Root colonization was measured according to the Giovannetti and Mosse (1980[5]) method. Hundred grams of rhizosphere soil samples were analyzed for their spore isolation by wet sieving and decanting method Gerdman and Nicolson, (1963[4].) Identification of AM fungal genera up to species level by using the Manual for identification Schenck and Perez (1990) [11].

RESULTS AND DISCUSSION

The data of percent of colonization and spore number associated with four different plants are presented in table 1. The result shows that all the tested plants were colonized by AMF. Maximum percent of colonization were found in *Tinospora cordifolia* (92%) than other three plants whereas, minimum percentage was found in *Annona reticulata* (57.33%). Hyphal and vesicular types of colonization were found in roots of different plants. Hyphae were almost common in all tested plants. More number of spores (320) was observed in rhizosphere soil of *Tinospora cordifolia* than *Annona squamosa*, *Annona reticulata* and *Cocculus hirsutus*. Total five genera were observed viz., *Acaulospora* spp *Glomus* spp, *Sclerocystis* spp, *Entrophosphora* spp and *Gigaspora* spp. Highest number of AMF genera and species was associated with *Tinospora cordifolia* while the lowest number of AM fungal genera and species were recorded in other three plant species. Among AM fungal species *Acaulospora* spp were found dominate followed by *Glomus* spp, *Sclerocystis* spp, *Entrophosphora* spp and *Gigaspora* spp were found poorly distributed. Most plant species are typically mycorrhizal with approximately 4/5 of all land plants forming AM associated (Molloy et al., 1980), because of greater efficiency in

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nutrient uptake from soil (Draft and Nicolson 1966[2]). The occurrence of AMF in medicinal plants has reported earlier by Taber and Trappe (1982) [15], Udea et al., (1992) [16], Muthukumar and Udaiyan (2001) [7], Selvoraj et al., (2001) [12] and Rani and Bhaduria (2001) [10]. Recently, Bukhari et al., (2003) [1], Muthukumar et al., (2006) [8] and Swapana and Ammani (2009) [14], reported the occurrence of AMF in medicinal plants from India. The result obtained from the study suggests that the colonization

percentage and number of AM fungal spores differ with different four common plants. Among the five genera *Acaulospora* spp was found much more frequent than other genera.. The highest number of mycorrhizal spores in rhizosphere soil and AM fungal infection in the roots of *Tinospora cordifolia* indicated that these plant species might be considered good host for AMF under natural conditions. Therefore, here concluded that, occurrence or distribution of AMF varies with host ranges.

Table1. Percent root colonization and spore population in four common plants

Sr. No	Plant species	Family	*Colonization (%)	Types of colonization	*Spore population	AM fungal genera
1	<i>Annona squamosa</i> L.	Annonaceae	63	H	59	<i>Glomus</i> spp <i>Acaulospora</i> spp
2	<i>Annona reticulata</i> L.	Annonaceae	57.33	HV	120	<i>Glomus</i> spp <i>Acaulospora</i> spp <i>Gigaspora</i> spp
3	<i>Tinospora cordifolia</i> (Willd) Miers	Menispermaceae	92	HV	320	<i>Glomus</i> spp <i>Acaulospora</i> spp <i>Sclerocystis</i> spp, <i>Entrophosphora</i> spp
4	<i>Cocculus hirsutus</i> (L.) Diels	Menispermaceae	62	HV	210	<i>Glomus</i> spp <i>Entrophosphora</i> spp <i>Acaulospora</i> spp

*Mean of three samples, H- Hyphae V- Vesicular

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