RESEARCH ARTICLE

Field examination of *Glomus*, a mycobiont

Menon Shailaja S and Padalia Unnati

Department of Microbiology, K. J. Somaiya College of Science & Commerce, Vidyavihar, Mumbai-77.
Email: shailajasmenon1961@gmail.com , unnati.p@rediffmail.com

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ABSTRACT

Biofertilizers are the boon to the agricultural sector. The search for the proper living organisms to be supplemented to the crop plants gave fuel to the findings of mycobionts of the symbiotic association of Mycorrhiza. Field examination along the coastal line of Mumbai and suburbs reveal the abundance of the genus *Glomus*, one of the most important fungal partner in these localities. The current study deals with the findings of these microbes in specific geographical area, their presence in higher plants and identification.

Key words: Mycobiont, Mycorrhiza, *Glomus*

INTRODUCTION

The study gave the status of Arbuscular Mycorrhizal association in the geographical area from Mira Road to Bandra, the Western Suburbs of Mumbai. The Western Coast is generally sandy and stony. In The soil cover is largely sandy because of its proximity to the sea. Its geography states that the underlying rock of the expanse is made of Black Deccan Basalt flows and their acid and basic variants. Soil cover in the suburbs is largely alluvial and loamy. Mycorrhizal association is an integral component of soil micro flora. Mycorrhiza is an assemblage of a fungal partner and the roots of higher plants. This association proves to be beneficial to the host plants as it improves the mineral uptake there by the productivity of the host plant. Present study reveals the presence of a mycobiont, *Glomus* in various edaphic conditions. Identification of Arbuscular Mycorrhizal Fungi is based on their morphological characteristics namely, Hyphal mantle, Arbuscules, Vesicles and Spores.

The spores collected from pure lines of Vesicular Arbuscular Mycorrhizal Fungi are maintained on certain host plants cultivated in soil, pot culture or in nutrient solutions, hydroponic culture, under

sterile conditions. These spores are very useful in identifying Vesicular Arbuscular Mycorrhizal Fungal genera as they are definite structures with unique morphological characters (Maggirwar et al., 2013; Gerdemann and Trappe, 1974; Hall, 1977; Schenck and Smith, 1982; Morton, 1985; Walker, 1983). In the soil, the spores are generally produced singly on the hyphae and in living as well as dead roots (Koske, 1985; Morton and Walker, 1984; Mehrotra and Baijal,1993). The morphological characteristics of spore which are used in their identification are Colour, Size, Shape, Wall structure, Number, width, position and ornamentation of wall layers.

MATERIAL AND MATERIALS

Sampling:

The wild plants were used as samples, collected from ten different locations of the Western Suburbs of Mumbai. The locations were Mira Road East, Dahisar East, Gorai, Malad, Goregaon, Andheri, Juhu, Santacruz East, Bandra East and Bandra West.

Screening of roots:

This was done as per the method suggested by Koske (1985). Screening of both the roots and the rhizosphere soil of all the plants was done to determine the Arbuscular Mycorrhizal colonization in the roots, rhizosphere soil or in both. The roots were cut and washed thoroughly with water. The roots were kept in running water overnight to separate the adherent soil particles. The screened roots were subjected to pretreatment for staining. The sequential steps for pretreatment are as follows. Fixation and preservation, clearing of tissue, rinsing and bleaching, acidification washing and staining.

Isolation and quantification of Arbuscular Mycorrhizal spores:

Isolation and quantification of Arbuscular Mycorrhizal spores was carried out from hundred grams of oven-dried rhizosphere soil of plants collected from ten different locations by the wet-sieving and decanting method (Gerdemann and Nicolson, 1963).

Taxonomy of Arbuscular mycorrhizal Fungi: Arbuscular mycorrhizal spores were identified using the manual described by Schenk and Perez (1989).

RESULTS AND DISCUSSION

The bulk of known species belong to the family Glomaceae (Pirozynski and Dalpé, 1989) which includes the genera *Glomus* and *Sclerocystis*. The spores are single-celled structures, of generally globoid shape, with thick walls made up of several layers of different textures, connected to the filamentous network by a suspensor Hypha of varied morphology.

Five species of *Glomus*, namely *Glomus aggregatum Glomus Mossae, Glomus macrocarpum, Glomus fasciculatum, Glomus multicaule* were observed in the wild plants collected from various locations of Mumbai and its suburbs. This is in confirmation with findings of Mulani & Prabhu (2002) and Mulani *et al*. (2004). Most species of the genus *Glomus* produce spores singly in the soil. One to several spores develop on aseptate hyphae, sometimes flared towards the point of attachment. At maturity, the spores get detached from the hyphae. Spores of *Glomus* species develop basically at the end of a sporogenous hypha. The surface of spores of *Glomus* species appeared smooth (Pawaar and Kakde, 2012). This field study highlight the abundance of the genera, *Glomus* which can enhance the productivity in Crop plants when introduced as they are not host specific like the Leguminocean Plants and can easily form the natural biofertilizer, Mycorrhiza.

CONCLUSION

The plants in the western suburbs and the soil thereby are rich in spores of genus *Glomus*.

Table 1: Comparison of Arbuscular Mycorrhizal association for the same Genus at different locations

Sr. No.	Host	Location	pH	% colonization	Arbuscular Mycorrhizal fungi
1	*Physalis minima*	Mira road E Juhu Bandra E.	6.2 7.1 6.6	56 0 58	*Glomus aggregatum* *Nil* *Glomus aggregatum*
2	*Eclipta alba*	Mira road E Goregaon	6.2 6.2	47 0	*Glomus aggregatum* *Nil*
3	*Vernonia cineria*	Mira road E Gorai Bandra W	6.2 6.4 6.5	62 0 58	*Glomus mossae* *Nil* *Glomus macrocarpum*
4	*Tridax procumbens*	Mira road E Bandra W	6.2 6.5	40 45	*Glomus fasciculatum* *Glomus aggregatum*
5	*Urena lobata*	Dahisar E Andheri Bandra W	6.4 6.5 6.5	42 72 33	*Glomus mossae* *Glomus fasciculatum* *Glomus aggregatum*
6	*Euphorbia hirta*	Dahisar E	6.4	50	*Glomus macrocarpum*
7	*Boerhaavia diffusa*	Goregaon Gorai Andheri	6.2 6.4 6.5	66 36 40	*Glomus mossae* *Glomus mossae* *Glomus fasciculatum*
8	*Cyperus rotundus*	Gorai Andheri Bandra W	6.4 6.5 6.5	43 75 0	*Glomusmulticaule* *Glomus fasciculatum* Nil
9	*Achyranthes aspera*	Malad, Santa cruz E Bandra E Bandra W	6.3 6.8 6.6 6.5	0 0 0 0	Nil Nil Nil Nil
10	*Aegeratum sps.*	Goregaon Bandra W	6.2 6.5	0 59	*Nil* *Glomus macrocarpum*
11	*Sida acuta*	Andheri Santa cruz E	6.5 6.8	0 52	*Nil* *Glomus mossae*
12	Cynodon dactylon	Juhu Bandra (W)	7.1 6.5	55 71	*Glomus aggregatum* *Glomus macrocarpum*

Table 2: Taxonomy and Morphology of *Glomus* species

Mycobiont	colour	shape	size (µm)
Glomus aggregatum	pale yellow to yellow brown	globose to sub-globose, obovate, to irregular in shape	40-120
Glomus Mossae	pale yellow to golden yellow	Globose to subglobose	80-280
Glomus macrocarpum	yellow brown to brown	sub-globose to globose	90-180
Glomus fasciculatum	Pale yellow to pale yellow-brown	ellipsoidal Spore wall	60-100
Glomus multicaule	Dark brown	Ellipsoid, broadly ellipsoidal, sub-globose, or occasionally triangular	140 -160

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