



Research Paper

STUDY THE DIVERSITY OF VAM FUNGI IN SALT MARSH PLANTS OF SOUTH EAST COASTAL AREA OF MUTHUPET AND SOIL PARAMETERS STUDY

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Abstract

In this study are investigate rhizosphere soils and ten dominant plant species in saline soil tested for the occurrence and distribution of vesicular - arbuscularmycorrhizal fungi and determined the impact of the physico chemical factors in relation to the quantitative and qualitative assessment of AM fungi in saline soils. 10 species of AM belonging to five genera viz., *Glomus*, *Sclerocystis*, *Acaulospora*, *Gigaspora* and *Scutellospora* were recorded and identified. *Glomus aggregatum* and *Glomus mossae* was noticed as the most dominant saline tolerant strain of AM fungi in soils. In all the plant species were colonized with VAM fungi.

Key words: Saline soil, VA mycorrhizae, *Glomus aggregatum*, *Glomus mossae*.

INTRODUCTION

The symbiotic association between certain plants and microorganisms and important role in soil fertilization and improves their growth and mineral nutrition. Among the different microorganisms Arbuscularmycorrhizae (AM) are beneficial symbionts for plant growth. They are associate with higher plants by a symbiotic association, the symbiotic association between vesiculararbuscularmycorrhizal in soil results in greater efficiency of nutrient absorption particularly for slowly diffusing mineral ions, especially phosphorous (17). Coastal sand dunes are of great ecological significance. They act as barriers against the action of waves and tides. Dune vegetation helps in the formation and stabilization of sand dunes Arbuscularmycorrhizal (AM) fungi play a very important role in stabilization, uptake of water and nutrient by plants and binding sand grains (16) AM fungi also play a vital role in primary and secondary succession of plant species, especially in low nutrient ecosystem (e.g. coastal sand dunes) Increased nutrient supply, salinity tolerance, reduced a biotic stresses and formation of wind resistant aggregates are the major benefits derived by the sand dune plant species through AM fungal association (1).

Coastal environment plays a vital role in nation's economy by virtue of their sources, productive habitats and rich biodiversity. India has a coastline of about 7,500 kms. The coastline of Tamil Nadu has a length of about 1076 kms constitutes about 15% of the total coastal length of India and stretches along the Bay of Bengal, Indian Ocean and Arabian Sea. (6). AM in dune systems contribute to binding of sand grains into large aggregates and to improving soil structure, factors that can influence plant succession, Because mycorrhizae (AM) are important for the survival and growth of plants and for stabilizing sand grains, In the case of saline and sodic soils, drainages poor and salt accumulates on the surface of the soil, thus adversely

affecting the plant growth. The application of AM fungi is the best simple way to improve the survival of the vegetations, because these organisms are important components to the long-term health and stability of maritime sand dunes (9).

MATERIALS AND METHODS

Selection of study sites

Three different coastal study sites were selected at Muthupet mangrove soil forest of Muthupet coastal town present in Tamlinadu, India. Common vegetations in all three sites were observed, and soil samples from the root zone area and vegetation root samples were collected. Ten dominant plant sp. were selected from each study sites based on the relative abundance. (Sites are namely, Site 1-Mutupet, Site-2, Jambuvanodai, and Site -3, Thuraikkadu).

Collection of soil and root samples

Plants were surveyed for colonization by AM fungi at three different study sites of Muthupettai of Tamil Nadu .At each study site all area of 3m² was chose for sampling .Both the study site plant root sample and rhizosphere soil were selected for the study .The soil samples were examined for AM spore numbers after wet sieving and decantation (2). The root samples were stained with trypan blue in lactophenol (5). Percentage of root colonization was calculated (4). The isolated AM fungal species were brought in to pot culture studies with plants of *Allium cepa* L. After 90 days, the spore and sporocarps were reisolated for identification (7). Study site soils were examined by standard physic chemical method (3).

RESULT AND DISCUSSION

Soil physic-chemical characteristics of the three study sites were found to be alkaline (Table -1).The alkaline nature of the mangrove soil has already been reported (9). All these study sites were generally deficient in phosphours .The other soil elements showed only minor variations, have reported imbalance and distribution of microbial ecosystem in soil. At the three study sites, all the plants were mycorrhizal. The present root colonization among the plants ranged from 22% in *Avicennia marina* to 89 % in *Agicerascornicutaum*.

In all, 10 AM fungal species were observed in the rhizosphere soil of plants collected from the mangrove site (Table-3). The AM fungal species isolated from the study sites belonging to five genera viz ., *Glomus*, *Sclerocystis*, *Acaulospora*, *Gigaspora*, *Scutellospora*. Of all the AMF species isolated *Glomus aggrigatum* *Glomus mossae* was aencountered in all the study sites (Table 2). In the present study indicates a predominance of *Glomus* over other genera isolated. Similar observation have been already reported (13), (14). The possible reason for the predominance of *Glomus* is known to be more common in natural and slightly alkaline soils (12). The number of spores in root zone soil ranged from 263 to 579. There was an impact of soil physic-chemical characters on the distribution of AM spores in rhizosphere soil sites. The numbers of AM spores were more in site 2, there was certain specificity among the different sites. Variation in spore density and colonization of AM associated with different host plant species may be generated by a variety of mechanisms, including variation in host species and their phenology, mycorrhizal dependency, host mediated alterations of the soil microenvironment or other host plant traits (10),(11).

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Table – 1 Physico-chemical characteristics of the different Muthupet study soils

S. No.	PHYSICAL&CHEMICAL PHARAMETERS	Results		
		Site 1	Site 2	Site 3
1.	pH	8.04	7.89	8.27
2.	Soil colour	Brown	Brown	Brown
3.	Soil texture	clay	clay	clay
4.	Sodium,mg/kg	87.0	83.0	89.0
5.	Total nitrogen,mg/kg	139	127	142
6.	Total phosphorous, mg/kg	16.40	14.30	17.20
7.	Potassium, mg/kg	127	119	130
8.	Calciam, mg/kg	14.7	13.2	15.9
9.	Magesium, mg/kg	40.15	37.42	44.18
10.	Zinc, mg/kg	260	224	275
11.	Copper, mg/kg	1.27	1.07	1.37
12.	Manganus, mg/kg	BDL	BDL	BDL
13.	Aluminium	2.2	1.24	2.3

BDL: Below detective level

General nutrient status of the soils (Anonymymous,1988)

	N	p205	K20
Low	<140	<24.2	<140.7
Medium	141-280	243-32.2	140.8-281.6
High	>280	>32.2	>281.6

Table – 2 percentage of root colonization and spore density of AM fungi in Muthupet Mangrove

Plant Botanical Name	% of AM Root Infection			Spores		
	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
<i>Avicennia marina (Forssk)Vierh.</i>	22	34	48	125±1.29	79±0.52	57±0.71
<i>Suaeda maritime L</i>	75	72	69	395±1.08	472±1.54	469±0.93
<i>Agiceras cornicutaum L</i>	79	89	84	460±1.58	493±0.88	519±1.58
<i>Cynodon dactylon L pers.</i>	55	48	52	373±0.93	324±1.22	320±1.41
<i>Eleocharis calva R.Br.</i>	64	27	29	266±0.52	275±1.16	260±0.78
<i>Azima tetracantha Lam</i>	52	33	37	357±1.74	333±1.08	350±1.24
<i>Acanthu ilicifolius L</i>	69	79	74	430±1.58	457±1.79	465±.70
<i>Suaeda maritime L. Dumort</i>	52	37	36	376±1.85	429±1.70	426±0.96
<i>Crambe maritime L</i>	22	27	23	326±2.12	348±1.98	336±1.56
<i>Suaeda monoica Forssk.ex.j.Gmelin</i>	49	46	34	421±1.33	468±1.52	458±0.60

Table - 3 VAM fungal species identified in the root-zone soils at three coastal study sites in muthupet

S. No.	Identified VAM fungal species	Abbreviation
1	<i>Gigaspora gigantea</i>	GGGT
2	<i>Gigaspora margarita</i>	GMRG
3	<i>Glomus aggregatum</i>	LAGR
4	<i>Glomus fasciculatum</i>	LFSC
5	<i>Glomus geosporum</i>	LGSP
6	<i>Glomus macrocarpum</i>	LMCC
7	<i>Glomus mosseae</i>	LMSS
8	<i>Scutellospora nigra</i>	CNGR
9	<i>Acaulospora bireticulata</i>	ABRT
10	<i>Acaulospora scrobiculata</i>	ASCB

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