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ORIGINAL ARTICLE

SEASONAL DIVERSITY OF AM FUNGI IN MANGROVES OF SOUTH EAST COSTAL AREA OF MUTHUPET, INDIA

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ABSTRACT

Seasonal diversity of Arbuscular mycorrhizal (AM) fungai in *Avicennia marina* (Forssk) Vierh plant species was investigated in three sites at Muthupet of Thiruvarur district, India. The rhizosphere soils of ***Avicennia marina*** in different seasons were tested for the occurrence and distribution of arbuscular mycorrhizal fungi. Totally eighteen AM fungal spore were observed in the rhizosphere soil of mangrove plant, collected from all the study sites in different seasons belonging to five genera viz *Glomous, Acaulospora, Gigaspora, Selerocyctis and Scutellospora*. From this study *Glomus conitrictum, Acaulospora bireticulata, A.delicuta, A.spinosa and Sclerosystis rubiformis* were recorded in all the season. Multivarible analysis revealed that the season and physico-chemical character of soil influenced on AM spore diversity.

Keywords: *Avicenna*, AM fungi. Glomus. Mangrove. South east cost

1.INTRODUCTION

Mangroves have become the center of many conservation and environmental issues because of the beneficial effects of the coastal environmental, Mangroves are facultative halophytes, characterized by regular tidal inundation and fluctuating salinity. Mangroves are a type of coastal woody vegetation that brings muddy saline shores and estuaries to tropical and subtropical regions (Gildon and Tinker.1981). They are characterized by high levels of productivity and fulfill essential ecological functions, harboring precious natural resources (Wang, *et.al*., 2010). Recent evidence suggests that growth of mangroves is limited primarily by phosphorus (P) availability as it is absorbed and co precipitated within carbonate-dominated environments (Lovelock *et al*., 2004). The occurrence of arbuscular mycorrhizal fungi has been reported in many plant communities such as forest (Raman *et al*., 1993; Sengupta and Chandhuri, 1990), grasslands, stepper and prairies (Sanders and Filtter, 1992) and mangroves (Sengupta and Chandhuri, 1989). The main advantage of mycorrhiza is its greater soil exploration and increasing uptake of N.P.K. Zn, Cu, S, Fe, Mg, Ca & Mn and the supply of these nutrients to the host roots (Sundar *et al*., 2010; Javot *et al*., 2007).

Arbuscular Mycorrhizal Fungi (AMF) can also induce changes in the accumulation of secondary metabolites, including phenolics in host plant roots (Vierheiling *et al*., 2000; Devi and Reddy 2002; Yao *et al*., 2003). Phosphate solubilizers, N fixers and AM fungi are known to interact in the rhizosphere soils (Alongi 2002), They play a crucial role in determining plants diversity production and species composition (Vander Heijden *et al*., 1998). The seasons are a result of the till of earth's axis that causes variation in environmental conditions and spore density and community composition of AM fungi are influenced by these changes. However, the AM spore population and colonization of plants roots may vary in different soils and also with various edaphic factors (Jackson and Nielson 1983). Seasonal variation can have a remarkable influence on the occurrence of AM fungi (Mallesha and Bagyaraj, 1991).

Although AMF require oxygen to thrive and assumed to be of little relevance in aquatic anaerobic conditions, recent studies proves that AMF survive and colonize many halophytes (Mathur *et al*., 2007). Therefore, The present study aims to investigate the diversity of AM fungi in *Avicennia marina* (Forssk.) Vierh. at Muthupet Mangroves.

2.MATERIALS AND METHODS

STUDY AREA

Three *Avicennia marina* growing sites viz. Site I Chef corner, Site II-Sethukoda and Site III-Thuraikadu in Muthupet mangroves in Thiruvarur District, Tamilnadu were selected for the study of AM fungi. The study plant

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Avicennia marina is commonly known as grey mangrove or white mangrove. At each study site an area of $3m^2$ was chosen for sampling. The root and rhizosphere soil samples were collected from South west monsoon (June to September), North east monsoon (October to December), winter season (January to February) and Hot weather season (March to May) of the year 2014 to 2016.

SAMPLE COLLECTION

Extensive field survey will be carried out in order to collect the root and rhizosphere soils samples of *Avicennia marina* plants from Muthupet Coastal region. Mangroves species were identified using the Gambel flora.,(2013). Subsamples from each of the study sites were collected in polyethylene bags from depth of 0-30 cm and air-dried in the laboratory before passing through a 2mm sieve and mixed thoroughly to obtain composite samples.

SOIL ANALYSES

Soil pH was measured in rhizosphere soils using a pH meter (L1 120 Elico. India). Electrical conductivity (EC) was measured at room temperature in a 1:5 soil suspension using a conductivity meter (CM-180 Elico, India) standard soil analysis techniques, viz, (Walkley and Black 1934) rapid titration method and Bray and kutz methods (1945) were employed for determination of organic carbon and available P respectively available potassium was estimated by the ammonium acetate method (Hanway and Heidel 1952) using a flame photometer (Systronic 112). Available Zinc, Copper, Manganese and Iron were Quantified by the DTPA-$Cacl_2$-TEA method (Lindsay and Novell 1978) using an Atomic Absorption Spectrophotometer.

COLLECTION OF ROOT SAMPLES

To analys the mycorrhizal status of the *Avicennia marina* root, young and lateral root samples were collected, washed to remove attached soil particles, cut into several small (1 cm) fragments and fixed in FAA (Phillips and Hayman 1970) in the field itself.

QUANTIFICATION OF AM FUNGI ROOT SAMPLES

The procedure adopted by Phillips and Hayman (1970) was followed by clearing and staining the roots for rapid assay of AM colonization.

ISOLATION OF AM SPORES BY WET SIEVING AND DECANTING METHOD

Root zone soil samples were analysed for AM fungi spore. Intact spores of substending hyphae free from debris were transferred to clean microscopic slides with the help of a fine needle and mounted on lactophenol. Semipermenant slides were made by sealing the edge of the cover slips with DPX mountant. (Gardemann and Nicolson 1963).

IDENTIFICATION OF AM FUNGI

Based upon microscopic character, the AM spores were identified by using the keys and manuals provided by Schenck and Ferez (1987), Microphotographs were taken with help of Olympus microscope. Altogether 18 AM fungal members were isolated and brought to pot culture studies with plant of onion *(Allium cepa.L)*. After plants were 90 days old, the spore and sporocarps were re-isolated for identification

3.RESULTS AND DISCUSSION

The present survey was conducted to study the seasonal flaxuations of AM fungal distribution in rhizosphere soils of ***Avicennia marina*** plant at three different localities namely, Chef corner, Sethukoda and Thuraikadu in Muthupet mangroves. Soil physico-chemical characteristics of the three study localities were found to be brown clay loam soils. Other properties of rhizosphere soils were seasonally slightly varied in all the study sites. Highest P^H (8.27) was occurred in Sethukuda study site and lowest P^H (7.30) was occurred in Chef Corner study site. Electrical conductivity (EC) ranged from (3.8 to 4.42dsm^{-1}). Organic carbon content was higher in winter season at Sethukuda study sites. In all the study sites, soil sample were deficient in P. and Sodium content was higher in hot weather season. Total nitrogen and potassium content of the soils slightly varied. The level of micronutrients such as CU,Mn,Ca,Mg,Zin, and Fe varied between the seasons in study sites (Table 2 to 4) During the study periods maximum rainfall was noted in north east monsoon 884.70mm and 763.50mm in the year of 2014 and 2015 respectively and lowest rainfall in winter season 142 mm in 2015.(Table 1)

Seasonal AM fungal spore diversity and density:

The plant in all the study sites were positive for AM colonization in the roots. The root zone soils of ***Avicennia marina*** plants harboured AM fungal structues. The AM structures were including sporocarps and spores belonging to different AM fungal species. The AM fungal species isolated from the study sites belonging to five genera viz ., Glomus, Sclerocystis, Acaulospora,Gigaspora, Scutellospora. (Table 5 to 7). Similar results were observed different medicinal plants (Selvaraj, 1989). The seasonal variations in spore diversity of AM fungi in the three mangrove study sites were mentioned in Table 5 to 7. Percentage of VAM fungal infection higher in Sethukuda study site (53.7$\pm$1.9)at winter seasion and least infection in Chef corner study site (22.0$\pm$1.9).Spore density significantly varied in the seasons and study sites. In all the study sites, the mean spore density was significantly higher in north east monsoon season (288 spores 100^{-1}) at chefcoener sites. Compare to other seasons the maximum spore diversity in winter season at Sethukuda sites (13 species) and minimum spore diversity in northeast monsoon at Chef Corner study sites (6 species)was observed in *Avicennia marina* collected from three different localities (Table 5). In the Chef coner study site, totally 9 AM fungal species were recorded belongs to four genera, Sethukuda site 14 species belongs to four genera and also Thuraikadu site 13species belongs to five genera were recorded. From all this study sites totally 18 AM fungal spore were observed in the rhizosphere soil of mangrove plant collected in all the seasons. Total 18 AM fungal species belonging to five genera viz *Glomous, Acaulospora, Gigaspora, Selerocyctis and Scutellospora*. From this study *Glomus conitrictum, Acaulospora bireticulata, A.delicuta, A.spinosa and Sclerosystis rubiformis* were recorded in all the seasons.

Table - 1 Rainfall of during the study periods June 2014 to May2016 in Muthupet rainquase station in mm

S.NO	RAIN FALL	SWMS		NEMS		WS		HWS	
		2014	2015	2014	2015	2015	2016	2015	2016
1	MUTHUPET RAINFALL	181.60	410.50	884.70	763.50	0.00	142.00	437.40	250.42

SWMS – South West Monsoon
NEMS – North East Monsoon
WS – Winter Season
HWS – Hot Weather Season

Table 2 SOILS PHYSICAL AND CHEMICAL PARAMETERS OF *Avicennia merina* (Forssk) Vierh in Chef corner study site.

S.no		SWMS		NEMS		WS		HWS	
	YEAR	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**
1	**Soil pH**	7.3±2.00	7.89±1.5	8.04±1.2	8.12±11	8.20±2	8.23±1	7.80±2	7.91±2
2	**Soil colour**	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
3	**Soil texture**	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
4	**EC (dsm-1)**	4.02±1.00	4.2±1.02	4.72±1.0	4.60±0.9	4.3±1.12	4.4±1.0	4.1±1.21	4.21±1.10
5	**Sodium mg/kg**	87.0±2.00	85±1.3	83.0±2	85±1.1	79.0±1.7	80±2	88.5±1.72	89±1.80
6	**o.c (%)**	4.52±0.12	4.63±0.12	4.52±0.12	4.42±0.14	6.52±0.12	5.52±1.12	5.50±0.92	4.52±1.10
7	**Total Nitrogen mg/kg**	54±0.02	60±0.01	73±0.21	84±0.2	89±2.0	95±1.2	119±0.03	139±0.02
8	**Total Phosphorus mg/kg**	19±0.12	22±0.07	12.0±0.10	14.0±0.2	15±0.01	13±0.02	17.0±0.09	15±0.03
9	**Potassium mg/kg**	140±1.20	147±2.0	128±1.71	127±1.01	131±2.0	133±2.0	111±0.21	117±1.21
10	**Calcium mg/kg**	10.2±1.02	11.0±2.1	13.0±1.21	12.9±1.72	14.2±2.0	15.3±1.8	17±1.20	16.9±1.62
11	**Magenism mg/kg**	42.0±0.04	41.2±0.20	40.20±0.17	39.20±0.30	37.28±0.03	39.2±0.2	41.30±0.21	43.2±0.121
12	**Zine mg/kg**	220.2±2.0	222.1±0.19	190.3±1.0	197.5±2.0	230.2±1.7	233±2.1	260.7±2.0	256.3±2.1
13	**Copper mg/kg**	6.90±1.4	6.52±1.0	4.32±1.2	4.91±1.32	3.21±1.7	3.71±1.0	5.72±1.62	5.92±1.91
14	**Manganus mg/kg**	4.2±0.01	4.3±0.02	2.9±0.30	3.0±0.2	2.72±0.01	3.01±1.3	3.20±1.21	3.22±0.91
15	**Ferrous mg/kg**	121.0±0.2	128.0±0.7	132.0±0.21	135.0±0.09	137.0±0.21	135.0±0.06	133.0±0.06	135.0±0.02

Table 3. SOIL PHYSICAL AND CHEMICAL PARAMETERS OF *Avicennia merina* (Forssk) Vierh in Sethukuda study site.

S.no		SWMS		NEMS		WS		HWS	
	YEAR	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**
1	**Soil pH**	8.20±0.1	8.18±0.2	7.91±0.2	7.90±0.2	7.82±0.2	7.92±1.6	7.98±1	8.27±0.21
2	**Soil colour**	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
3	**Soil texture**	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
4	**EC (dsm-1)**	3.88±1.0	4.01±0.1	4.12±0.3	4.19±1.2	4.10±1.3	4.12±0.30	4.19±0.31	4.21±0.01
5	**Sodium mg/kg**	90±2.0	88±0.19	87±1.30	88±2.0	70.21±0.3	74.13±0.1	77±0.3	74±1.3
6	**o.c (%)**	3.22±0.1	4.03±0.21	5.32±0.2	5.42±1.04	6.42±1.1	4.51±10.12	5.70±1.22	4.12±0.10
7	**Total Nitrogen mg/kg**	56±01	57±0.9	58±01	60±0.8	61±1.3	58±0.3	57±01	58±0.3
8	**Total Phosphorus mg/kg**	24±0.3	27±0.1	25±0.3	26±0.9	25±0.3	27±0.3	25±0.10	26±0.3
9	**Potassium mg/kg**	160±0.3	154±0.3	150±1.2	150±1.3	161±0.4	131±1.3	123±1.01	174±0.12
10	**Calcium mg/kg**	12.1±0.1	13.0±2.0	15.2±1.3	13.0±1.0	12.1±0.3	10.7±0.1	11.9±1.3	12.4±1.2
11	**Magenism mg/kg**	39.7±0.1	40.5±0.2	44.3±1	42.3±1.0	41.2±1.0	44.7±0.1	44.3±1.4	42.7±1.4
12	**Zine mg/kg**	231.0±1.2	217.4±1.3	219.0±1.2	231.2±0.2	228.7±1.7	240.7±1.3	249.6±1.8	241.4±1.6
13	**Copper mg/kg**	9.10±0.3	8.9±0.8	7.9±1.2	8.0±1.3	7.8±1.0	8.3±1.2	8.9±1.2	8.8±1.3
14	**Manganus mg/kg**	4,3±0.01	4.7±1.0	44±1.2	4.7±1.2	5.0±1.3	4.8±1.7	4.9±1.6	4.7±1.2
15	**Ferrous mg/kg**	146.6±1.2	142.4±1.0	141.3±1.3	143.3±1.6	140.1±1.4	147.2±1.3	140.1±1.2	138.6±1.6

Table 4-SOIL PHYSICAL AND CHEMICAL PARAMETERS OF *Avicennia merina* (Forssk) Vierh in Thuraikadu study site.

S.no		SWMS		NEMS		WS		HWS	
	YEAR	2014	2015	2014	2015	2014	2015	2014	2015
1	Soil pH	7.89±0.1	7.90±0.1	7.86±0.1	7.92±0.2	8.0±0.2	8.1±0.1	7.93±0.1	7.90±0.1
2	Soil colour	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
3	Soil texture	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
4	EC (dsm-1)	4.20±1.0	4.12±0.2	4.19±0.1	4,42±0.2	4.18±0.12	4.21±0.22	4.19±0.012	4.31±0.03
5	Sodium mg/kg	86.4±0.3	89±1.72	86.3±0.31	89.4±1.3	90.3±1.3	89.4±0.6	80.4±0.3	79±0.1
6	o.c (%)	4.92±1.1	4.73±0.11	4.92±1.2	5.62±0.74	5.72±1.1	5.50±0.12	5.98±1.02	4.18±1.1
7	Total Nitrogen mg/kg	60±0.03	66±0.13	76±1.2	79±0.6	70±1.2	69±1.0	64±0.9	66±0.1
8	Total Phosphorus mg/kg	20±0.3	23±0.1	25±1.3	27±0.4	28±0.12	32±0.9	30±0.1	29±0.3
9	Potassium mg/kg	110±1.3	130±0.1	144±0.3	141±0.12	136±1.3	156±1.4	144±0.12	143±0.1
10	Calcium mg/kg	16±1.0	16.7±0.1	13.2±0.1	10±0.12	11.4±0.13	12.7±1.5	11.8±1.3	10.1±0.1
11	Magenism mg/kg	47.0±2.0	41.2±0.1	43±0.2	40.2±1.0	42.2±1.21	44.2±1.0	39.7±1.2	36.1±1.1
12	Zine mg/kg	213±1.4	220.1±1.0	234.1±1.0	233.2±1.0	235.4±1.6	230.7±1.4	232.4±1.6	227.6±1.6
13	Copper mg/kg	7.21±0.01	7.12±0.4	7.0±1.1	8.0±1.2	7.6±1.3	7.9±1.4	7.3±1.3	7.9±1.0
14	Manganus mg/kg	4.4±1.0	4.2±1.3	5.1±1.0	5.3±1.3	4.1±1.0	44.1.3	4.7±1.6	4.4±1.2
15	Ferrous mg/kg	113.1±1.0	117.0±1.0	140.3±1.0	138.4±1.6	143.2±2.0	140.1±2.0	139.2±1.4	135.7±1.6

Table 5.VAM Fungal species identified in the root-zone soil of *Avicennia marina* (Forssk) Vierh. At Chef corner study site in Muthupet Mangroves.

S.No.	VAM fungal name	SWMS		NEMS		WS		HWS	
		2014	2015	2014	2015	2015	2016	2015	2016
01	*Glomus aggregatum*	31±1.2	34±1.3	-	38±1.9	27±1.0	25±1.4	-	-
02	*Glomus mossae*	30±1.5	36±2.0	-	-	29±1.7	22±1.6	22±1.2	34±0.9
03	*Glomus fasiculatum*	-	-	44±1.5	45±2.0	24±1.05	26±2.1	-	28±1.0
04	*Glomus geosporum*	27±1.3	32±1.8	41±1.3	45±2.1	-	28±1.8	23±1.6	-
05	*Glomus microcarpum*	35±1.8	37±1.7	-	-	26±1.04	27±1.2	-	-
06	*Acaulospora bireticulata*	34±0.9	31±1.4	49±1.7	44±1.5	28±1.07	24±1.0	29±1.7	30±1.7
07	*Sclerosystis rubiformis*	28±1.0	30±1.6	51±1.6	40±1.7	27±1.5	27±1.4	27±1.5	24±1.2
08	*Gigaspora margarita*	34±1.22	37±1.4	47±1.3	42±1.8	28±1.04	-	29±1.3	33±1.4
09	*Gigaspora decepiens*	-	-	48±1.02	34±0.9	25±1.7	22±1.6	28±1.5	27±1.4
10	Percentage	22.0±1.9	27.2±1.2	35.3±1.8	38.0±1.2	52.0±1.0	53.0±1.8	26.2±4	21±1.6
	Total	219	237	280	288	215	201	158	176

Table 6. VAM Fungal species identified in the root-zone soil of *Avicennia marina* (Forssk) Vierh. At study Sethukoda site in Muthupet Mangroves.

S.No.	VAM fungal name	SWMS		NEMS		WS		HWS	
		2014	2015	2014	2015	2015	2016	2015	2016
01.	*Glomus aggregatum*	08±1.2	15±1.1	-	10±1.6	15±1.1	14±0.9	-	-
02.	*Glomus mossae*	13±1.8	17±1.2	-	-	23±1.0	20±1.2	18±1.3	21±1.7
03.	*Glomus geosporum*	18±1.4	26±1.5	7±1.2	16±1.2	-	24±1.4	19±1.4	-
04.	*Glomus formosanum*	-	-	13±1.5	15±1.1	25±1.2	23±1.5	-	28±1.2
05.	*Glomus consitrictum*	20±0.8	27±1.7	11±1.2	12±1.0	19±1.8	22±1.7	19±1.2	27±1.4
06.	*Glomus maculosum*	21±1.5	19±1.2	-	17±1.2	27±0.9	25±1.5	17±1.2	26±1.2
07.	*Acaulospora bireticulata*	17±1.4	18±1.1	12±1.1	15±1.4	24±1.5	20±1.7	38±1.0	23±1.1
08.	*Acaulospora delicuta*	15+1.2	18±1.6	8±1.7	14±1.6	26±1.7	24±1.6	29±1.7	22±1.0
09.	*Acaulospora mellea*	-	15±1.7	13±1.4	18±1.0	22±1.8	26±1.3	15±1.3	29±1.2
10.	*Acaulospora spinosa*	14±.08	16±1.0	12±1.2	16±1.0	23±2.1	25±0.9	18±1.2	32±1.2
11.	*Scutellospora heterogama*	16+1.2	-	10±1.3	12±1.7	20±2.0	20±1.0	-	-
12.	*Gigaspora albida*	10±1.1	-	12±1.7	-	-	18±1.4	32±1.1	19±1.1
13.	*Gigaspora decepiens*	-	-	15±1.4	14±1.4	19±1.8	19±1.3	16±1.0	18±1.0
14.	*Gigaspora margarita*	8±1.2	14±1.0	7±1.1	12±1.6	17±1.0	-	22±1.1	21±1.0
15	Percentage	35.4±1.6	36.7±1.8	38.4±1.8	35.8±1.6	40.8±1.8	53.7±1.9	33.5±2.0	38.1±1.4
	Total	160	185	120	171	260	280	243	266

Table 7. VAM Fungal species identified in the root-zone soil of *Avicennia marina*(Forssk) Vierh. At Thuraikadu study site in Muthupet Mangroves

S.No.	VAM fungal name	SWMS		NEMS		WS		HWS	
		2014	2015	2014	2015	2015	2016	2015	2016
01.	*Glomus aggregatum*	8±0.2	19±1.2	-	27±1.2	20±2.0	28±1.2	-	-
02.	*Glomus mossae*	9±1.2	18±1.8	-	-	21±1.7	23±1.1	23±1.1	31±1.1
03.	*Glomus fasiculatum*	-	-	17±1.0	22±1.0	29±1.2	27±1.1	-	33±1.0
04.	*Glomus microcarpum*	12±1.3	15±1.4	-	-	22±1.4	26±2.1	-	-
05.	*Glomus formosanum*	-	-	14±1.1	15±1.8	17±1.3	22±2.0	-	22±0.8
06.	*Glomus consitrictum*	7±1.5	26±1.7	21±1.8	23±1.2	23±1.9	19±2.1	42±1.0	29±1.2
07.	*Glomus rubiforme*	16±1.2	-	16±1.2	25±2.0	17±2.0	17±1.2	29±1.3	35±1.7
08.	*Glomus maculosum*	19±1.4	20±1.7	-	22±1.8	21±1.7	25±1.1	27±1.2	23±1.1
09.	*Acaulospora delicuta*	16±1.1	28±1.4	11±0.8	19±1.4	19±1.2	28±2.0	28±1.9	37±1.4
10.	*Sclerosystis rubiformis*	17±1.0	32±1.6	9±1.7	24±1.3	18±1.3	21±1.3	35±1.5	21±1.6
11.	*Scutellospora heterogama*	15±1.1	-	17±1.3	16±1.7	19±1.1	20+1.1	-	-
12.	*Gigaspora albida*	11±1.0	-	15±1.5	-	-	24±1.4	38±1.0	17±1.1
13.	*Gigaspora margarita*	10±1.8	12±1.1	19±1.7	19±1.2	14±1.5	-	26±0.8	19±1.7
14	Percentage	40.4±2.0	39.0±1.4	37.2±1.9	39.4±1.2	42.4±1.6	48.8±1.3	50.4±2.0	49.7±1.0
	Total	140	170	139	212	240	280	248	267

They were mass multiplied using suitable compatible host *Allium cepa L* by pot culture method for identification. The Significance of AM in plant ecology is based on its widespread occurrence in natural ecosystems (Kavitha and Nelson, 2013; Hussain and Srinivas, 2013). Two species of dominant AM fungal species such of *Gigaspora margarita* and *G.mosseae* root zone soils of ***Avicennia marina***. In the present study indicates a predominance of Glomus over other genera isolated. Similar observation have been made by Regupathy and Mahadeven (1993), Muthukumar and Udayan (2000). The possible reason for the predominance of Glomus is known to be more common in natural and slightly alkaline soils (Mukerji *et al*. 2002). The number of spores in root zone soil ranged from 120 to 288 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 Chef Corner whereas the lowest occur in Sethukuda (Table 5 to 7). There was a 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 (Eon *et al*., 2000; Lorgio *et al*., 1999).

The results suggested that the variation in soil pH, temperature and other factors seems to be the decisive factors in mangrove soils influencing distribution of AM fungi. It can be concluded that physico chemical factors and season significantly alter the distribution of native AM fungi both quantitatively and qualitatively.

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