



DIVERSITY OF LIGNICOLOUS MARINE FUNGI RECORDED FROM MUTHUPET ENVIRONS, EAST COAST OF INDIA

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ABSTRACT

The marine fungi occurring on the wood samples were studied. Diversity of marine fungi colonizing the lignicolous wood samples was assessed and their distribution pattern was determined. Sixteen species of marine fungi were recorded from the wood samples collected from the intertidal regions of the Muthupet mangrove environment. They are categorized in to common (31-40%), frequent (21-30%), occasional (11-20%) and rare (1-10%). *Cystophora rhizophorae* was recorded as common, *Coronopapilla mangrovei*, *Camarosporium* sp., *Lignicola laevis*, *Veciulina enalia*, *Savoryella lignicola* as frequent, *Aigialus* sp., *Lulworthia* sp. and *Sphaerulina albispiculata* as occasionally and the remaining species as rare.

Keywords: fungi, driftwood, mangroves, lignicolous.

INTRODUCTION

Mangrove forests are the “hot spots” of biodiversity and also for marine fungi. Mangroves are highly productive ecosystem next to the coral reefs and provide energy to marine habitats through production and decomposition of plant detritus [1, 2]. They are the open systems with respect to both energy and matter and thus can be considered “interface” ecosystems coupling upland terrestrial and coastal estuarine ecosystems.

Mangrove swamps are one of the richest and most productive areas of organic detritus and form the base of the food chain. Marine fungi play an important role in nutrient regeneration cycles as decomposers of dead and decaying organic matter in the estuaries. Although mangroves are the dominant features of Indian coastline and provide niches and habitats for many marine organisms. Nevertheless very little is known about the fungi associated with them till recently.

Drift woods are one the important and interesting objects for the study of fungal colonization as their origin is unknown and can be drifted to any part of the coast by wind in the breakdown of driftwood and thus in the nutrient cycles of marine habitat. Drift wood fungi f, wave action and water movements. They get exposed to sunlight and atmosphere at a frequent interval due to tidal variations. Further, the study would provide information regarding the role of fungi rom west coast has been reported recently. However, fungi on mangroves of east coast remain unexplored. The marine fungi occurring on the drift wood samples collected from Muthupet mangrove environment are dealt with in this article.

MATERIALS AND METHODS

Muthupet mangrove forest situated in Thiruvarur district, Tamil Nadu, South India (Lat.10°20'; Long.79°35' N) is covering an area of about 20,000 ha. The rivers, Paminiyar, Koraiyar, Kilaithangiyar and Maraka Koraiyar, flow through the Palk Strait.

The mangrove always is an association of halophyte trees, shrubs and other plants growing in brackish to saline tidal water of tropical and subtropical coastlines. Muthupet mangrove is a reserve forest. *Avicennia marina* (95%) is the dominant element of the forest and the trees to the height of 20 feet.

The drift wood samples were collected in sterile polythene bags and sterilized 50% seawater was added to each bag in order to maintain moisture condition. The bags were tied with a string and incubated at room temperature for 7 days.

After incubation, the wood samples were taken out from the bags and allowed to air dry. Then, the wood samples were examined under dissection microscope for the development of ascocarps, basidiocarps, pycnidia or conidia. The reproductive structures were transferred with a needle to a microscopic slide, torn apart in a drop of water to expose the spores and carefully squeezed under a cover glass.

Morphology and septation of ascospores / basidiospores / conidia were used for their identification. In some cases, asci and sterile elements of the ascocarps such as paraphyses and pseudoparaphyses of the fruit bodies were used as characters for identification. The fungi were identified with standard manuals of Marine Mycology-The Higher Fungi [3] and the publication [4].

Percentage frequency was calculated as follows:

$$\% \text{ frequency} = \frac{\text{No. of wood samples in which a particular fungus occurred}}{\text{Total No. of wood samples examined}} \times 100$$



RESULTS

Diverse filamentous fungi were recovered on the drift wood of Muthupettai mangroves along the East of India. (16 fungi belonging to 14 genera comprising 12 ascomycetes one basidiomycete and 3 deuteromycetes) (Table-1, Figures 1 and 2).

From the Koriyar station 8 species belonged to 7 genera were recorded. Among the total isolates 5 species / 4 genera were belonged to Ascomycetes, 1 species / 1 genus was belonged to basidiomycete and 2 species/2 genera were Deuteromycetes.

Altogether 9 species belonged to 9 genera were recorded from the station Xavier Munai. Among them 7 species / 7 genera were assignable to Ascomycetes and 2 species / 2 genera were belonged to Deuteromycetes and Basidiomycetes was not recorded.

Totally 6 species belonged to 6 genera were recorded in both Vembai Udaippu. And kadalmunai among them, 5 species belonged to 5 genera were assignable to Ascomycetes and 1 species belonged to 1 genera was assignable to Deuteromycetes in Vembai Udaippu. In Kadalmunai station, 4 species / 4 genera were belonged to Ascomycetes, 2 species / 2 genera were belonged to Deuteromycetes and Basidiomycetes was not recorded.

The species *Cystophora rhizophorae* was commonly occurred. Frequently occurred species were *Coronopapilla mangrovei* (28.25%), *Leptosphaeria* sp. (26.25%), and *Camarosporium* sp. (25.0%). Occasionally occurred species were *Aigialus* sp. (11.25%), *Lulworthia* (19.5%) and *Sphaerulina albispiculata* (12.75%). The percentage occurrence of all other fungi were less (10.00%) and also rare. The species *Leptosphaeria albopunctata* has been recorded for the first time in Muthupet environs (Table- 2, Figures 1 and 2).

DISCUSSIONS

Mangrove is a unique habitat where there are diverse niches for fungi. Hence the fungi present in that habitat are also unique physiological groups adapted to the peculiar environment. The drift woods of marine environment are inhabited only specific group of fungi, which colonize the woods because of their genetics potentiality, a battery of enzyme producing abilities and adaptability to the changing physico chemical condition of the environment. In the present investigation totally 16 species of fungi belonged to 14 genera were encountered (Ascomycotina (12), Basidiomycotina (1), Deuteromycotina (3)). Although a wide range of fungi belonged to three groups were recorded, Ascomycotina were the most prevalent group of fungi. The abundance of this group of fungi on marine and mangrove substrates has been reported by Hyde and Jones [5], and this might be due to their spores show adaptation to the marine ecosystem by way of production of appendages, which provide buoyancy in water, entrapment and adherence to substrates, as reported in mangrove wood [6, 7, 8], driftwood [9, 10] and animal substrates [11]. Besides Ascomycetes also possess enzyme producing ability and

hence they could potentially colonize the lignocellulosic woody substrates.

The present study also deals with the pattern of distribution of different species of obligate marine fungi. The pattern of distribution has been categorized into common, frequent, occasional and rare. Species of *Coronopapilla mangrovei* and *Camarosporium* sp. were frequently occurred. Similar types of results have also been reported by Ravikumar and Vittal [6].

The identification of these fungi was confirmed with the help of Kohlmeyer and Kohlmeyer [3]. There is no previous record for this species from Muthupettai mangroves. Therefore this is addition to the fungi in Muthupettai mangroves.

Among the fungal species identified upto species level, the fungus *Leptosphaeria albopunctata* was reported for the first time in Muthupettai mangrove. Substrate availability and climate change are the delimiting factors for the geographical distribution of fungi [12, 13], and it has been rightly suggested that the examination of more and more substratum is needed to understand the complete biodiversity status of marine fungi of India. Raghukumar [14] pointed out that a thorough understanding of various niches occupied by marine fungi should be given newer thrust in the areas of Indian mycological research. In this context, the present investigation has brought out new record on the distributional pattern of marine fungi in India, and also emphasizes the need for intensive investigation of marine fungi in relation to spatial, temporal and functional aspects.

Hence it could be concluded that there is no uniformity in the diversity of marine fungi and their distribution pattern in different geographical regions. Extent of salinity, kind of substrates, position of intertidal region, nature of floor, pH and oceanic region affect the occurrence and diversity of marine fungi in the mangrove ecosystem. They are dependent on the nature of the substrate and temporal regions that favour the colonization, growth and substrate possession of the fungi.

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Table-1. List of fungi from wood samples of Muthupettai.

S. No.	Taxa	Spore (μm)	Septa
	Ascomycetes		
1.	<i>Aigialus</i> sp.	35-55 x 10-16	12
2.	<i>Anthostomella</i> sp.	10-15 x 4.7	-
3.	<i>Coronopapilla mangrovei</i>	36-60 x 16-24	2
4.	<i>Heleococcum japonense</i>	16-21 x 8-12	-
5.	<i>Leptosphaeria albopunctata</i>	30-37.5 x 7.5 – 11.5	6
6.	<i>L. australiensis</i>	19-27 x 6-9	2
7.	<i>Leptosphaeria</i> sp.	26-27 x 2.9 – 3.7	4
8.	<i>Liginicola laevis</i>	16-24 x 5-8	2
9.	<i>Lulworthia</i> sp.	200-270 x 2.5 – 5	1
10.	<i>Savoryella lignicola</i>	24-36 x 8-12	2
11.	<i>Sphaerulina albispiculata</i>	32-39 x 5.2 – 6.8	5 to 6
12.	<i>Verculina enalia</i>	16-23 x 7-11	2
	Basidiomycetes		
13.	<i>Halocyphina villosa</i>	3.9 x 4.3	-
	Deuteromycetes		
14.	<i>Camarosporium</i> sp.	21.2 x 24.3 x 7.2 – 10.3	4
15.	<i>Coniothyrium obiones</i>	4.8 x 4.6	-
16.	<i>Cystospora rhizophorae</i>	6.6 – 7.4 x 2.1 – 2.4	1

**Table-2.** List of fungi recorded from wood samples of Muthupettai.

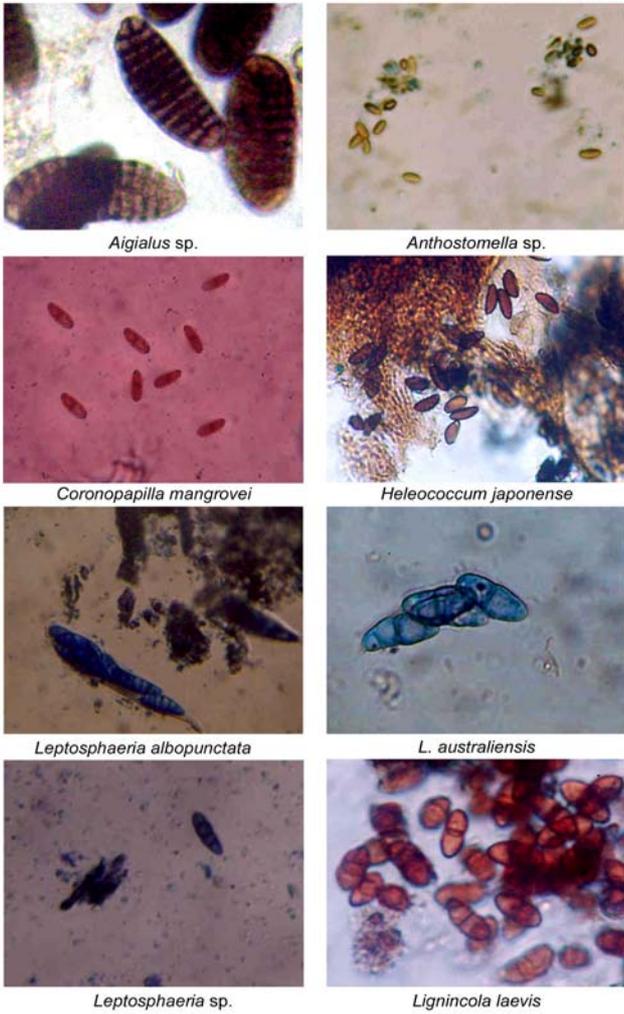
#	Fungal species					Mean % frequency	Frequency class
		Koriyar	Xavier Munai	Vembai Udaippu	Kadalmunai		
	Ascomycetes						
1.	<i>Aigialus</i> sp.	-	26	19	-	11.25	O
2.	<i>Anthostomella</i> sp.	-	24	-	-	3.5	R
3.	<i>Coronopapilla mangrovei</i> (Hyde)	31	-	49	33	28.25	F
4.	<i>Heleococcum japonense</i> , Tubaki	-	13	-	-	3.25	R
5.	<i>Leptosphaeria albopunctata</i> (Westend.)	16	-	-	13	7.25	R
6.	<i>L. australiensis</i> (Cribb et Cribbe) G.C	-	-	31	-	7.75	R
7.	<i>Leptosphaeria</i> sp.	41	25	-	39	26.25	F
8.	<i>Lignincola laevis</i> Hohnk.	-	14	-	-	3.5	R
9.	<i>Lulworthia</i> sp.	31	-	47	-	19.5	O
10.	<i>Savoryella lignicola</i> E.B.G Jones et Eaton	-	-	17	-	4.25	R
11.	<i>Sphaerulina albispiculata</i> Tubaki	17	10	-	24	12.75	O
12.	<i>Verculina enalia</i> (Kohlm.) Kohlm. and Volk - Kohlmeyer	-	14	-	-	3.5	R
	Basidiomycetes						
13.	<i>Halocyphina villosa</i> Kohlm. et. Kohlm	17	-	-	-	4.25	R
	Deuteromycetes						
14.	<i>Camarosporium</i> sp.	54	-	46	-	25	F
15.	<i>Coniothyrium obiones</i> Jaap	-	16	-	24	10.0	R
16.	<i>Cystospora rhizophorae</i> Kohlm. et. Kohlm	36	61	-	43	35.0	C
	Total species / genus	8/7	9/9	6/6	6/6		

Rare (1-10%), occasional (11-20%), frequent (21-30%) and common (31-40%)



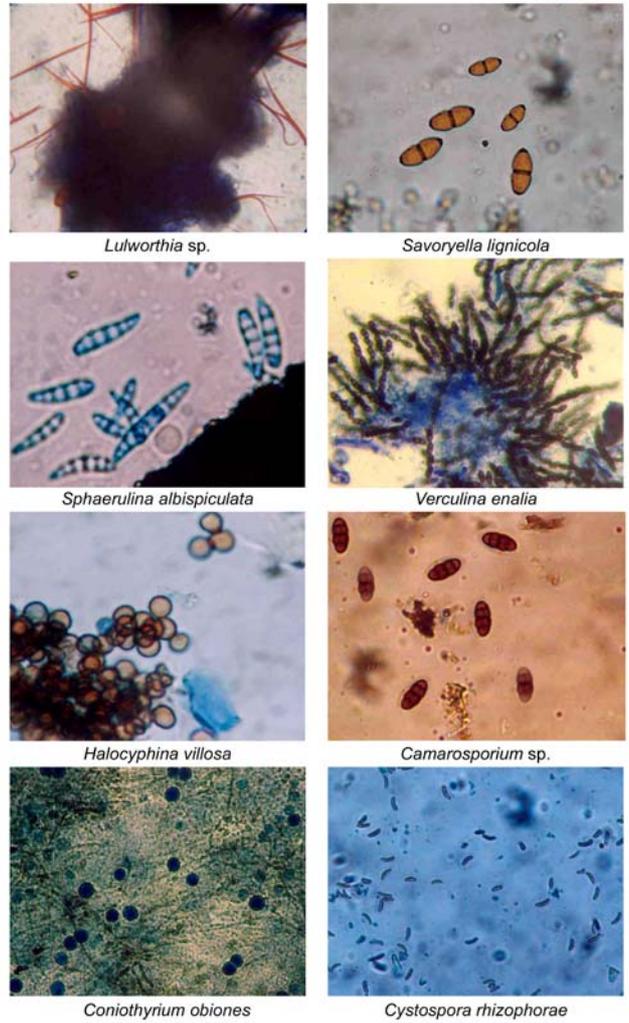
PLATE 5

PLATE 6



Microphotographs of some wood inhabiting fungi (400x)

Figure-1.



Microphotographs of some wood inhabiting fungi (400x)

Figure-2.