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Manglicolous Marine Fungi of Kerala (South India)

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Abstract: Twenty six manglicolous marine fungi comprising 20 Ascomycetes, 1 Basidiomycete and 5 Mitosporic fungi were isolated from the mangrove forests of Kerala, South India. Average isolates per wood sample and percentage colonization were 1.54 and 81.25 respectively. Based on the percent frequency of occurrence, *Lulworthia grandispora* (13.19%), *Dactylospora haliotrepha* (12.09%), *Savoryella lignicola* (10.99%) and *Cirrenalia pygmea* (10.99 %) were the most frequent species.

Key words: *Mangrove forest · Detritus · Decomposition · Marine fungi*

INTRODUCTION

Tropical coastlines are covered by large expenses of mangrove forests which play significant roles in supporting planktonic and benthic communities and nutrient cycles, much of it through decomposition of detritus [1, 2]. Dead leaves, woody debris, animal remains and other materials constitute the main sources of organic matter, mostly produced *insitu* and some imported through inflowing freshwater streams. In terms of above-ground production and biomass, wood dominates detritus supply in mangroves [3]. Although wood tends to decompose slowly, it is an important component of food webs and nutrient cycles of terrestrial and fresh water ecosystem [4]. Degradation of woody substrates in aquatic ecosystem includes physical fragmentation and biological decomposition by bacteria and fungi [5, 6].

Although wood is reported to be high in mangrove ecosystem, little is known about its production [7, 8]. The exact proportion of wood maintained as biomass and the proportion of wood that enter the detritus path way in each year is unknown [9]. Measurements of standing timber stock on the forest floor are also not known [10]. This dead wood is likely to serve as an important energy source for primary consumers. Therefore detailed studies of the organisms involved in wood decay are necessary to gain a better understanding pathway of energy flow in mangrove ecosystem [11].

Mangrove trees are able to grow at salinities ranging from full sea water to fresh water, thus a different fungal flora can be expected with in this salinity gradient [12]. 54 mangrove trees with 60 associates were listed by Tomlinson [13]. 200 higher marine fungi were encountered form fifty five mangroves and their associates [14]. A total of 165 marine fungi encompassing 111 ascomycetes, 1 basidiomycete and 53 mitosporic fungi were reported form Indian mangroves [15]. Chinnaraj [16], Ravikumar and Vittal [17], Borse *et al* [18], Sarma and Vittal [19, 20], Sarma *et al*, [21], Maria and Sridhar [22- 24], Pawar and Borse [25], Raveendran and Manimohan [26], Gayatri and Raveendran [27- 29], Sridhar [30] etc have published reports on manglicolous marine fungi from Indian Peninsula. During marine mycological survey of Kerala coast (Arabian Sea), data on the frequency of occurrence of marine fungi were recorded and the results were presented in this paper.

MATERIALS AND METHODS

Collection and Treatment of Wood Samples: Wood samples were collected from the mangrove forests of Kavvai-Kunhimangalam backwater, the longest backwater stretch of northern Kerala, falls with in the geographic coordinates 11°59' 52"- 12°4' 36"N latitude and 75°06' 48" - 75°15' 40"E longitude. Sample collection was carried out during May 2007 -June 2008. Collected samples include decaying intertidal woods, drift woods and mangrove woods. They were washed well, placed in sterile polythene bags and were brought to the laboratory. After the preliminary screening for marine fungi under stereomicroscope, the wood samples were incubated at room temperature. Periodical isolation of marine fungi from

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Table 1: List of manglicolous marine fungi from Kerala

Name of fungi	No: of isolates	Frequency of occurrence
Ascomycetes		
Aigialus grandis Kohlm. *et* Schatz	3	3.30
Aniptodera chesapeakensis Shearer *et* Miller	4	4.39
Aniptodera haispora Vrijmoed, Hyde *et* Jones	1	1.10
Aniptodera mangrovei Hyde, Farrant *et* Jones	6	6.59
Aniptodera salsuginosa Nakagiri *et* Ito	3	3.30
Ascocratera manglicola Kohlm.	1	1.10
Biatriospora marina Hyde *et* Borse	2	2.20
Dactylospora haliotrepha Kohlm. *et* Kohlm) Hafellner	11	12.09
Halorosellinia oceanica (Schatz) Whalley, Jones, Hyde *et* Laessoe	6	6.59
Halosarpheia marina (Cribb *et* Cribb) Kohlm	5	5.49
Halosarpheia minuta Leong	2	2.20
Leptosphaeria australiensis (Cribb *et* Cribb) Hughes	8	8.79
Lignincola laevis Hohnk.	9	9.89
Lignincola tropica Kohlm.	6	6.59
Lulworthia grandispora Meyers	12	13.19
Marinosphaera mangrovei Hyde	5	5.49
Panorbis viscosus (Schmidt) Campb. anderson *et* Shearer	4	4.39
Savoryella paucispora (Cribb *et* Cribb) Koch	6	6.59
Savoryella lignicola Jones *et* Eaton	10	10.99
Verruculina enalia (Kohlm) Kohlm *et* Kohlm	7	7.69
Basidiomycete		
Halocyphina villosa Kohlm *et* Kohlm	5	5.49
Mitosporic fungi		
Cirrenalia pygmea Kohlm.	10	10.99
Periconia prolifica Anastasiou	6	6.59
Phoma sp	2	2.20
Trichocladium alopallonellum (Meyers *et* Moore) Kohlm *et* V.kohlm	4	4.39
Zalerion varium Anastasiou	2	2.20

these wood samples were carried out for six months. Identifications of marine fungi were done using taxonomic keys [26, 31-33].The marine fungi thus identified were tabulated and recorded (Table 1).

Presentation of Data

- Percent frequency of occurrence (FO) = Number of isolates of a particular species divided by total number of wood samples supporting marine fungi X 100.

On the basis of percentage occurrence, the marine fungi were classified as very frequent (occurring in > 10 % samples), frequent (in 5- 10 %), infrequent (in 3- 5 % samples) and rare (in < 3 %).

- Mean number of fungi per sample = Total number of fungal isolates divided by total number of wood samples supporting marine fungi.
- Percentage colonization = Total number of wood samples supporting marine fungi divided by total number of wood samples examined x 100.

RESULTS AND DISCUSSION

Altogether 26 manglicolous marine fungi comprising 20 Ascomycetes, 1 Basidiomycete and 5 Mitosporic fungi were encountered. Average isolates per wood sample and percentage colonization were 1.54 and 81.25 respectively.

Based on percent frequency of occurrence, *Lulworthia grandispora* (13.19%), *Dactyl ospora*

haliotrepha (12.09%), *Savoryella lignicola* (10.99%) and *Cirrenalia pygmea* (10.99 %) were the most frequent species. Among the eleven frequent species isolated, *Lignincola laevis* (9.89%) showed maximum value. Five species, namely *Aniptodera chesapeakensis*, *Panorbis viscosus*, *Trichocladium alopallonellum*, *Aigialus grandis* and *Aniptodera salsuginosa* were occasionally isolated. While *Biatriospora marina*, *Halosarpheia minuta*, *Phoma* sp, *Zalerion varium*, *Ascocratera manglicola* and *Aniptodera haispora* were found sporadic.

Among the fungal species in a community, core-group fungi (frequency > 10%) exert major influence on turnover of litter in mangrove ecosystem [34]. Only 4 core group fungi were obtained in the present study. Ravikumar and Vittal [17] also obtained 4 core group fungi from Pichavaram mangrove forest of south east India. However, Maria and Sridhar [22] encountered 13 core-group fungi from west coast of India. The percentage colonization in the present study is higher than those seen in the Philippines (80%) [10] and Malaysia (80.4%) [35] but lower than Singapore (85%) [36]. The mean number per samples obtained in this study was higher than Mauritius (1.1) [37] and Seychelles (1.1) [38] but similar to Malaysia (1.5) [36].Borse *et al*, [18] reported *Julella avicenniae* and *Aigialus parvus* as the most frequent fungi in Gujarat, *Verruculina enalia* from east coast of India [39], *Leptosphaeria australiensis* and *Halocyphina villosa* in Malaysia[40]. However, *Dactylospora haliotrepha* was recorded most frequently from North Sumatra [41, *Savoryella lignicola* in Thailand [42] and *Lulworthia grandispora* in Seychelles [43].

The study supports that the occurrence of manglicolous marine fungi of Kerala is similar to other parts of Indian Ocean. However, the species composition is relatively poor. This could be attributed to limited number of samples examined. In addition, the availability of substrata, host specificity, tissue or organ preference, temperature, salinity, succession and seasonality may also influence marine fungal communities [44].

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