Mitosporic fungi from mangrove ecosystem of Wandoor - Andaman (India)

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ABSTRACT

The present study deals with marine fungi from Wandoor -Andaman. The dead, decaying, intertidal and submerged mangrove wood samples were collected from Wandoor. These samples examined for colonization of marine fungi. Total 10 species of Mitosporic marine fungi (Alternaria sp., Bactrodesmium linderii, Camarosporium roumeguerii, Clavatospora bulbosa, Halenospora varia, Hydea pygmea, Periconia prolifica, Trichocladium achrasporum, Trichocladium alopallonellum and Trichocladium lignicola) were encountered. Out of these fungi Alternaria sp. is very common fungi reported from most of the wood samples in Wandoor Island.

Keywords: Mangrove, Marine Fungi, Mitosporic fungi, Wandoor and Andaman.

INTRODUCTION

Wandoor is in the Andaman and it enjoys tropical wet and dry climate. Marine ecosystem is 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 generation cycles as decomposers of dead and decaying organic matter. Although mangroves are the dominant features of Indian coastline and provide niches and habitats for many marine organisms.

Number of species of marine fungi from mangroves have been reported in recent years [Borse and Borse (2005), Kohlmeyer and Kohlmeeyer (1979), Kohlmeeyer (1984), Kohlmeeyer (1985), Kohlmeeyer and Volkmann-Kohlmeeyer (1987), Hyde, (1988), Hyde and Mouzouras (1988), Hyde and Jones (1989), Kohlmeeyer and Volkmann- Kohlmeeyer (1990), Scott (1988), Hyde and Lee (1995), Sridhar and Prasannaraj (2001), Borse and Borse (2005) and Borse et. al (2012)]. To some extent Chinnaraj (1993) reported some marine Fungi from different coastal area of Andaman and Nicobar Islands. Ten species of Mitosporic marine fungi from Wandoor -Andaman were isolated and illustrated in this paper.
MATERIAL AND METHODS

The samples of dead and decaying mangrove substrates were collected from Wandoor -Andaman coast- India. All the collected samples were observed directly for the fungal fructification under microscope and incubated in plastic boxes. Incubated material was periodically examined for the occurrence of fungi. The permanent slides were prepared as per suggested by (Volkman- Kohlmeyer and Kohlmeyer, 1996; Kohlmeyer and Kohlmeyer 1972). The measurements of various parts of fungi were taken with the help of ocular micrometer and stage micrometer. The photomicrographs were taken. The identification of the fungi were made with the help of Kohlmeyer and Kohlmeyer, 1979; Kohlmeyer and Volkman-Kohlmeyer, 1991; Hyde and Sarma 2000; Hyde et al., 2000 and other relevant literature.

RESULTS AND DISCUSSION

During the present work Total 10 species of Mitosporic marine fungi were encountered, these include Alternaria sp., Bactrodesmium linderii, Camarosporium roumeguerii, Clavatospora bulbosa, Halenospora varia, Hydea pygmea, Periconia prolifica, Trichocladium achrasperorum, Trichocladium alopallonellum and Trichocladium lignicola. Out of these fungi Alternaria sp. is very common fungi reported from most of the wood samples in Wandoor-Andaman. Chinnaraj (1993) isolated 63 marine fungi from mangroves of Andaman and Nicobar Islands.

Taxonomic Account

1. Alternaria sp. (Fig.1)
Conidiophores: cylindrical, septate, simple or irregularly branched, straight or curved, basal cell occasionally swollen, smooth, yellowish to brown, singly. Conidia: enteroblastic- tretic, ovoid, obclavate, obpyriform or ellipsoidal, with a basal pore, tapering or not into an apical beak, muriform, constricted at the septa, smooth or rough, olivaceous to brown.

Material examined: - on intertidal stem of Acanthus ilicifolius, Aegiceras corniculatum, Avicennia marina, Bruguiera gymnorrhiza, Rhizophora apiculata, Intertidal mangrove wood and Foam sample from Andaman.


Remark: -This fungus is very common from Andaman (14.49%).

2. Bactrodesmium linderii (Crane and Shearer) Palm and Stewart (Fig. 2) Mycotaxon, 15: 319-325, 1982.
Trichocladium linderii Crane and Shearer Mycologia, 70: 866, 1978.

Mycelium: composed of branched, septate, at first hyaline, latter sub hyaline to light brown hyphae, Conidiophores: macronematus, mononematus, smooth, thin-walled and hyaline or thick-walled and brown. Conidiogenous cells: holoblastic, integrated, terminal or intercalary, smooth, cylindrical, determinate. Conidia: solitary, subglobose to obpyriform, 1-2 septate, without constriction, 18-27 μm x 8-18 μm, becoming 3-6 μm wide at base, apical cell larger, dark brown to black, 11-16 μm high, basal and sub-basal cells smaller, light brown.

Material examined: on drift wood of Avicennia officinalis, Rhizophora apiculata, Rhizophora mucronata, Intertidal mangrove wood and Foam sample from Andaman.


Remark: In present study this fungus is rare in occurrence from Andaman.

3. Camarosporium roumeguerii Sacc. (Fig.3) Michelia 2: 112, 1880.

Pycnidia: 90-210 μm x 85-260 μm, globose to ellipsoidal or lenticular, immersed, ostiolate, short papillate, coriaceous, yellow brown to olivaceous, dark at the ostiole, solitary or gregarious, venter filled with a mucilage. Peridium: 7-12 μm thick at base, 12-20 μm at ostiole. Paraphyses: simple filiform, hyaline, non Septate, Conidiogenous cells: phialidic, flask shaped, simple, hyaline. Conidia: 10-20 μm x 7-13 μm, enteroblastic, monophilidic, initially one celled, hyaline mature conidia subglobose, ovoid, ellipsoidal or irregular, muriform, with (1)-3 transverse and 1 or 2 longitudinal or oblique septa, slightly constricted at the septa, composed of 2 to 8 cells, smooth, gold.
Material examined: - on intertidal stem of *Acanthus ilicifolius*, *Aegiceras corniculatum*, *Avicennia marina*, *Avicennia officinalis*, *Rhizophora apiculata*, *Rhizophora mucronata*, and Intertidal mangrove wood from Andaman.


Remark: - The fungus is occasional in occurrence from Andaman (1.24%).

4. *Clavatospora bulbosa* (Anast.) Nakagiri and Tubaki (Fig.4) *Bot. Mar.*, 28: 489, 1985.


Hyphae: 2.5-4 μm in diameter, septate, ramose, and fuscous. Conidiophores: 18-78 μm x 2-4.5 μm, cylindrical, septate, simple or branched, hyaline. Conidia: tetra radiate, septate, slightly constricted at the septa, hyaline to light brown, basal arm one-septate, proximal cell 8-16 μm x 4-9 μm ellipsoidal or ovoid, truncate at the base, light brown, distal cell 7-12 μm x 6-14 μm , cylindrical or shortly three branched, fuscous, three divergent arms arising simultaneously from the inflated distal cell of basal arm, 20-60 μm x 4-6 μm, cylindrical, one-to-five septate and light brown. One armed conidia: Conidia consisted of only single arm also observed, these are grey brown, 5-10 celled, 54-60 μm x 6.5-9 μm, constricted around septa, basal and apical cells lighter color.

**Material examined:** - on intertidal wood of *Aegiceras corniculatum*, *Avicennia marina*, *Avicennia officinalis*, *Rhizophora apiculata*, *Sonneratia alba*, and Foam sample from Andaman.

Distribution in India: - East Coast: Tamilnadu (Raghukumar, 1973 and Nambiar et al., 2008); Orissa (Borse et al., 2001b); West Bengal (Borse et al., 2001a). West Coast: Kerala (Kohlmeyer et al., 1967); Maharashtra (Borse, 1984),;Karnataka (Sridhar and Kaveriappa, 1991); Kerala (Nambiar and Raveendran, 2007, 2008b, 2009a and Nambiar et al., 2008); Goa (Nandan et al, 1993 and Borse and Tuwar, 2006);

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**Fig. 1** Mitosporic Marine fungi from Wandoor-Andaman. A. *Alternaria* sp. B. *Bacterodesmium linderi* C. *Camaosporium roumeguerii* D. *Clavatospora bulbosa* E. *Halenospora varia* F. *Hydea pygmea* G. *Periconia prolifica* H. *Trichocladium achrasporum* I. *Trichocladium alopallonellum* J. *Trichocladium lignicola*. 
Gujarat (Patil and Borse, 2001); Mahe Pondicherry (Borse and Pawar, 2005, Nambiar and Raveendran, 2008d) and Andaman and Nicobar Islands (Chinnaraj1993).
Remark: - The fungus is occasional in occurrence from Andaman (1.57%).

5. Halenospora varia (Anastasiou) E. B. G. Jones (Fig.5) Fungal Diversity, 35:154, 2009.

Hyphae: septate, branched, immersed, hyaline, Conidiophores: up to 30 μm long, 2-3 μm in diameter, micromenatous, simple, cylindrical, septate, sometimes absent, superficial, hyaline to light olive colored. Conidia: 14-62 μm x 13-44 μm, solitary, irregularly helicoid or coiled in three planes, forming a knot or ball of about 10 to 28 cells. Conidial filament lateral, rarely branched or subtending an additional conidium, thick-walled, smooth, brown to dark brown, appearing black in mass. Cells 6-13μm x 4-11μm.

Material examined: on intertidal stem of Acanthus ilicifolius, Avicennia marina, Rhizophora apiculata, Rhizophora mucronata, Intertidal mangrove wood and Foam sample from Andaman.

Distribution in India: - East coast: Tamilnadu (Raghukumar, 1973 and Nambiar et al., 2008); Andhra Pradesh (Sarma and Vittal, 2000); Orissa (Borse and Borse, 2005); West Bengal (Pawar and Borse, 2005b).

West coast: Maharashtra (Borse, 1984; Shrivastava, 1994; Shindikar and Borse, 2002); Karnataska (Sridhar and Kaveriappa, 1991); Daman (Borse et al., 2000b); Gujarat (Patil and Borse, 2001); Goa (Nandan et al., 1993); Kerala (Prasannarai and Sridhar, 2001, Raveendran and Kaveri, 2002); Goa (Borse and Borse, 2000a); Maharashtra (Borse, 1984, 1988; Borse and Borse, 1986; Ramesh and Borse, 1989); Kerala (Nambiar and Raveendran 2007, 2008a, b, 2009b; Nambiar et al., 2006 and 2008); Goa (Nandan, et al., 1993), Pondicherry and Mahe (Nambiar and Raveendran, 2008d); Lakshadweep Islands (Chinnaraj 1992) and Andaman and Nicobar Islands Chinnaraj (1993).
Remark: - The present fungus is frequent in occurrence from Andaman (8.99%).

6. Hydea pygmea (Kohlmeyer) Pang and Jones (Fig.6)

Cirrenalia pygmea (Kohlmeyer) Pang and Jones

Hyphae: 2-4 μm in diameter, septate, ramose, fuscous. Conidiophores: obsolete. Conidia: acrogenous, solitary, helicoid, contorted ½ or 1 time, three or four septate, not or slightly constricted at the septa, fish-shaped or reniform, black or fuscous, fulgent, spirals 25-30 μm x 26-32 μm, terminal cell 14-20 μm in diameter, subglobose to reniform, basally flattened basal cells 3-5.5 μm in diameter and central cells irregularly conical or almost wedge-shaped.

Material examined: on intertidal stem of Acanthus ilicifolius, Avicennia marina, Rhizophora apiculata, Rhizophora mucronata, Intertidal mangrove wood and Foam sample from Andaman.

Distribution in India: - East coast: Andhra Pradesh (Sarma and Vittal, 98-99, 2000 and 2001); Tamilnadu (Ravikumar and Vittal, 1996 and Nambiar et al., 2008); Orissa (Borse and Borse, 2005); West Bengal (Pawar and Borse, 2005b). West coast: Gujarat (Patil and Borse, 2001); Pirotan Islands (Borse, et al., 2000a); Maharashtra (Borse, 1984, 1988; Borse and Borse, 1986; Ramesh and Borse, 1989); Kerala (Nambiar and Raveendran 2007, 2008a, b, 2009b; Nambiar et al, 2006 and 2008); Goa (Nandan, et al., 1993), Pondicherry and Mahe (Nambiar and Raveendran, 2008d); Lakshadweep Islands (Chinnaraj 1992) and Andaman and Nicobar Islands Chinnaraj (1993).
Remark: - The present fungus is very common from Andaman (14.16%).

7. Periconia prolifica Anastasiou (Fig. 7)

Conidiophores: 5-180 μm x 3 μm; cylindrical, septate, simple or branched, hyaline. Conidiogenous cell: ellipsoidal or ovoid, hyaline, produced acrogenously. Conidia: 6.5-8.5 μm in diameter, one-celled, subglobose or ovoid, smooth, thick-walled, light brown with a reddish or dark brown, developing basipetically, catenulate, cells finally separating.


Distribution in India: - East coast: Tamilnadu (Raghukumar, 1973 and Nambiar et al., 2008); Andhra Pradesh (Sarma and Vittal, 2000); Orissa (Borse and Borse, 2005); West Bengal (Pawar and Borse, 2005b). West coast: Maharashtra (Borse, 1984; Shrivastava, 1994; Shindikar and Borse, 2002); Karnataska (Sridhar and Kaveriappa, 1991); Daman (Borse et al., 2000b); Gujarat (Patil and Borse, 2001); Goa (Nandan, et al., 1993); Kerala (Prasannarai and Sridhar, 2001, Raveendran and Kaveri, 2002); Goa (Borse and Borse, 2000a); Maharashtra (Borse, 1984, 1988; Borse and Borse, 1986; Ramesh and Borse, 1989); Kerala (Nambiar and Raveendran 2007, 2008a, b, 2009b; Nambiar et al, 2006 and 2008); Goa (Nandan, et al., 1993), Pondicherry and Mahe (Nambiar and Raveendran, 2008d); Lakshadweep Islands (Chinnaraj 1992) and Andaman and Nicobar Islands Chinnaraj (1993).
Remark: - The present fungus is frequent in occurrence from Andaman (8.99%).
Hyaline to light brown. Conidiophores: 4-8 μm x 3-6 μm, macronematous, simple, one-to two-celled, smooth, hyaline to light brown, lateral, short. Conidia: 12-18 μm x 14-20 μm, obpyriform, ovoidal or subglobose, one-to two-celled, fuscous, when two-celled, apical cell larger (8-16 μm x 6-12 μm), fuscous, basal cell, smaller, obconical to cylindrical, light brown.

**Material examined:** On intertidal stem of *Avicennia marina* and *Rhizophora apiculata* from Andaman.

**Distribution in India:** East coast: Orissa (Borse and Borse, 2005) West Bengal (Pawar and Borse, 2005b), Tamilnadu (Ravikumar and Vittal, 1996; Nambiar et al., 2008), Andhra Pradesh (Nambiar and Chinnaraj, 1997), Gujarat (Borse and Borse, 2005b), Karnataka (Prasannarai and Sridhar, 1997), Gujarat (Borse et al., 2000a, Patil and Borse, 2001), Goa (Nandan et al., 1993).

**Remarks:** The present fungus is rare in occurrence from Andaman (0.79%).

10. **Trichocladium lignicola** Schmidt (Fig. 10)


Hyaline to light brown. Conidiophores: 4-6 μm x 3-6 μm, macronematous, simple, one-to two-celled, smooth, hyaline to light brown, lateral, short, indistinct. Conidia: middle brown, 3-6 celled, 24-30 μm x 13-15 μm, constricted around septa, single cell nearly globular.

**Material examined:** On intertidal stem of *Avicennia officinalis* and Foam sample from Andaman.

**Distribution in India:** East coast: Orissa (Borse and Borse, 2005); West Bengal (Pawar and Borse, 2005b); West coast: Kerala (Prasannarai and Sridhar, 2001). Remark: The present fungus is occasional in occurrence from Andaman (1.69%).

**SUMMARY AND CONCLUSION**

The results of our investigation Total 10 species of Mitosporic marine fungi were encountered from Wandoor-Andaman Out of these fungi *Alternaria* sp. is very common fungi reported from most of the wood samples in Wandoor-Andaman.

**Conflicts of interest:** The authors stated that no conflicts of interest.
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