



Diversity of Marine mitosporic fungi from Maharashtra Coast (India) - II

Gosavi SA¹, Pawar NS² and Borse BD³

¹Sathaye (Parle) College, Vile-Parle (East), Mumbai (M.S), India*

²Arts, Comm. & Science College, Shindakheda, Dhule, (M.S.), India

³U. P. Arts & Science College, Dahiwel, Dhule, (M.S.), India

Email id :sunilgosavi69@gmail.com / Mobile : 86558822489

Manuscript details:

Available online on
<http://www.ijlsci.in>

ISSN: 2320-964X (Online)

ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:

Gosavi SA, Pawar NS and Borse BD (2018) Diversity of Marine mitosporic fungi from Maharashtra Coast (India) - II, *Int. J. of Life Sciences*, Special Issue, A9: 84-88.

Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

ABSTRACT

Present paper deals with six marine mitosporic fungi viz., *Bactrodesmium linderii*, *Cirrenalia basiminuta*, *Clavatospora bulbosa*, *Halenospora varia*, *Hydea pygmea* and *Matsporium tropicale* which were isolated from intertidal wood samples from the coast of Thane District of Maharashtra. The data provides information on the distribution of these fungi in India, apart from description and illustrations. This data will be useful in the compilation of aquatic fungal biodiversity of India.

Keywords: Hyphomycetes, Biodiversity, Intertidal wood, Marine fungi.

INTRODUCTION

Marine fungi can be defined based on their morphology, physiology and ecology and their ability to reproduce in the marine environment. Early physiological studies of marine fungi focused on their salinity tolerance (Jennings, 1986a, b), temperature requirement (Jones, 1971), nutrient requirement (Amon, 1986), enzyme production (Schaumann and Molitoris 1986), aspects of wood decay (Leightly, 1980) and ability to grow on different polysaccharides (Meyers, 1971). Garzoli, et al. (2015) updated knowledge on marine fungi associated with wood substrates in the Mediterranean Sea and hints about their potential to remediate hydrocarbons.

MATERIAL AND METHODS

The study involved the frequent visits to collection sites located in and around coastal region in Thane district of Maharashtra to collect the intertidal drift wood, woody debris, dead stem, root, leaves, fruits of mangroves. specimens were returned to the laboratory and observed

under research microscope for the presence of sporulating structure like mycelium, conidiophores and conidia of Hyphomycetes.

The permanent slides were prepared as suggested by Volkmann- Kohlmeyer and Kohlmeyer (1996). Identification of marine fungi were confirmed with the help of monographs and illustrated keys provided by Kohlmeyer and Kohlmeyer (1979). Hyde et al (2000), and Jones et al (2009). Reports of fungi from India and Maharashtra were confirmed with the help of Kamat et al. (1971), Bhide et al. (1987), Bilgrami et al. (1979, 1981, 1991), Jamaluddin et al. 2004 and Borse et al. (2012, 2013) and other relevant literature.

Taxonomic account-

1) *Bactrodesmium linderii* (J.L. Crane & Shearer) Palm & Stewart

Mycotaxon, **15**- 319-325 (1982). (Photo.1; Fig.1)
= *Trichocladium linderii* J.L. Crane & Shearer, *Mycologia*, **70**- 866 (1978).

Mycelium is composed of branched, septate, hyaline to brown hyphae, *Conidiophores* are macronematous, mononematous, smooth, thin-walled and hyaline or thick-walled and brown. *Conidiogenous cells* are holoblastic, integrated, terminal or intercalary, smooth, cylindrical, determinate. *Conidia* are solitary, subglobose to obpyriform, 1-2 septate, without constriction, 18-27 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, wall unequal in height, hence the base of the conidia become curved.

Material examined-

On driftwood, Bordi- Dahanu; S. A. Gosavi 1118 (PGDB), 3 April 2013.

Distribution in India- East coast- Andhra Pradesh. **West coast-** Maharashtra, Goa, West Bengal and Kerala (Source- Borse et al. 2012, 2013).

Remarks- The measurements of conidia are agreed with that of *B. linderii* (J.L. Crane and Shearer) Palm and Stewart (Crane and Shearer, 1978). Therefore, it is assigned to that species. It is being reported for the first time from Thane district.

2) *Cirrenalia basiminuta* Raghukumar & Zainal (Photo 2; Fig. 2)

In- Raghukumar et al. *Mycotaxon*, **31**- 163 (1988).

Hyphae are 2.5–4.5 µm in diam., septate, pale brown. *Conidiophores* are terminal, integrated, monoblastic, determinate, 8-27 x 1 µm, conidia borne laterally and directly on conidiophore, solitary, helicoid, 28-38 µm x 20-32 µm. *Conidia* are 3-4 septate, constricted at the septa, cells increasing in size from base to apex, apical cell 10-14 x 10-13 µm, subglobose, basal cell cylindrical and tapering, 7-14 x 2-6 µm, pigmentation of cells increasing from base to apex, the apical cell light brown with a reddish tinge.

Material examined- On intertidal wood of *Rhizophora mucronata*, Bordi; S. A. Gosavi 1119 (PGDB), 15 Feb. 2012.

Distribution in India- East coast- Orissa **West coast-** Goa, Kerala, Gujarat and Maharashtra (Source- Borse et al. 2012, 2013).

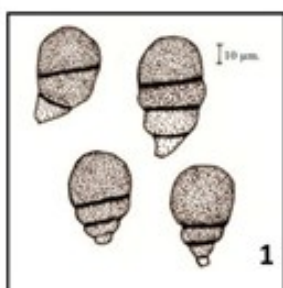
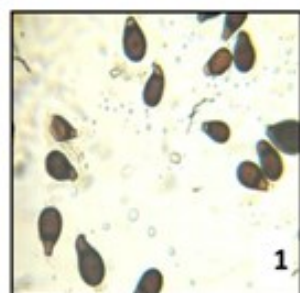
Remarks- The descriptions of conidia are agreed with that of *C. basiminuta* Raghukumar and Zainal (In- Raghukumar et al. 1988). Therefore, it is assigned to that species. It is an addition to the fungi of Thane district.

3) *Clavatospora bulbosa* (Anast.) Nakagiri & Tubaki. (Photo 3; Fig. 3).

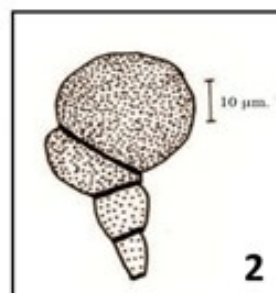
Bot. Mar., **28**- 489 (1985).
= *Clavariopsis bulbosa* Anastasiou, *Mycologia*, **53**- 11, 1961.

Hyphae are 2.5-4 µm in diameter, septate, ramose, and fuscous; *Conidiophores* are 18-78 x 2-4.5 µm, cylindrical, septate, simple or branched, hyaline. *Conidia* are tetra radiate, septate, slightly constricted at the septa, hyaline to light brown, developing by transformation of the inflated apex of the conidiophore, basal arm one-septate, proximal cell 8-16 x 4-9 µm ellipsoidal or ovoid, truncate at the base, light brown; distal cell 7-12 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 x 4-6 µm, cylindrical, one-to-five septate, light brown.

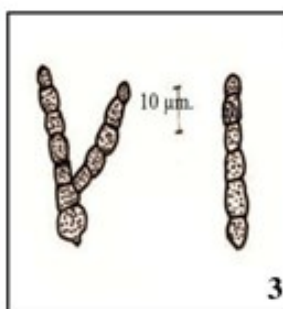
Photo and Figure plates of :



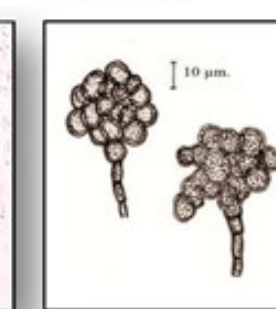
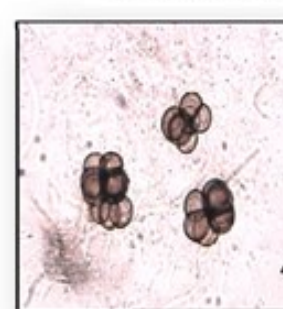
Conidia of *Bactrodesmium linderii*



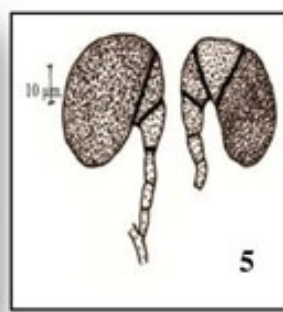
Conidia of *Cirrenalia basiminuta*



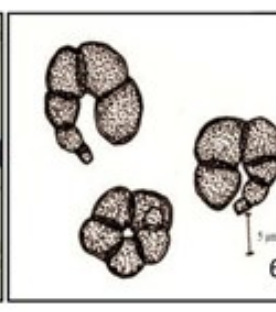
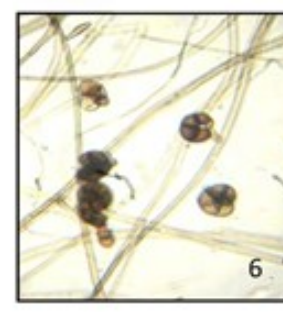
Conidia of *Clavatospora bulbosa*



Conidia of *Halenospora varia*



Conidium and Conidia of *Hydea pygmaea*



Conidia of *Matsusporium tropicale*

Material examined- On intertidal wood of *Rhizophora apiculata*, Mahim; S. A. Gosavi 1120 (PGDB), 20 April 2014.

Distribution in India- East coast- Tamil Nadu, Orissa and West Bengal. **West coast-** Maharashtra, Kerala, Goa, Gujarat and Pondicherry-Mahe (source- Borse et al 2012, 2013)

Remarks- The descriptions and measurements of conidia are completely agreed with that of *Cavatospora bulbosa* (Anast.) Nakagiri & Tubaki (Anastasiou, 1961). Hence, it is assigned to that species. It is being recorded for the first time from Thane district.

4) Halenospora varia (Anastasiou) E.B.G. Jones (Photo.4; Fig. 4).

In- Jones et al. *Fungal Diversity*, **35**- 154 (2009).

= *Zalerion varium* Anastasiou, *Can. J. Bot.*, **41**- 1136 (1963).

Hyphae are septate, branched, immersed, and hyaline, *Conidiophores* are upto 30 µm long, 2-3 µm in diameter, micronematous, simple, cylindrical, septate, sometimes absent, superficial, hyaline to light olive coloured. *Conidia* are 14-62 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 6-13x 4-11µm.

Material examined- On intertidal stem of *Avicennia marina*, Bordi; S. A. Gosavi 1122 (PGDB), 15 Octo. 2013.

Distribution in India- East coast- Tamil Nadu, Orissa and West Bengal **West coast-** Maharashtra, Goa, Daman, Gujarat and Kerala (source Borse et al 2012, 2013)

Remarks- The descriptions and measurements of conidia are agreed with that of *H. varia* (Anastasiou) E.B.G. Jones (Jones et al. 2009). Therefore, it is assigned to that species. It is being reported for the first time from Thane district.

5) *Hydea pygmea* (Kohlm.) K.L. Pang & Jones (Photo.5; Fig. 5)

In- Abdel-Wahab et al. *Mycol. Progress*, **9**- 549 (2010). = *Cirrenalia pygmea* Kohlm., *Ber. Dtsch. Bot. Ges.*, **79**- 35 (1966).

Hyphae are 2.2-4.5 µm in diam, septate, ramose and fuscous. *Conidiophores* are obsolete. *Conidia* are acrogenous, solitary, igantean, contorted ½ or 1 time contorted, 3-4-septate, not or slightly constricted at the septa, hooked appearance, black or fuscous, fulgent (upper three cells dark, lower two or three cells light-coloured); cells increasing in diameter from base to apex, distinctly dissimilar; spirals 25.5- 31 x 28.5-34 µm; terminal cell 16-23 µm in diam, subglobose to reniform, basely flattened; basal cells 3.5-5.5µm in diam; central cells irregularly conical or almost wedge-shaped. *Note-* It is a common species on mangrove wood, especially *Rhizophora* species, growing on the bark, with slow growth in culture but sporulates readily. It differs from all othe *Cirrenalia* like species by the dark-brown to black hooked nature of the conidia.

Material examined- On decaying driftwood in the intertidal zone, Dahanu; S. A. Gosavi 1123 (PGDB), 5 Mar. 2014.

Distribution in India- West Coast- Gujarat, Maharashtra, Goa, Pondicherry Mahe and Kerala. **East Coast-** Tamil Nadu, Pondicherry, Andhra

Pradesh, Orissa and West Bengal (Source - Borse et al .2012, 2013)

Remarks- The descriptions and measurements of conidia are agreed with that of *H. pygmea* (Kohlm.) K.L. Pang and E.B.G. Jones (Kohlm. and Kohlm., 1979). Therefore, it is assigned to that species. It is an addition to the fungi of Thane district.

6) *Matsusporium tropicale* (Kohlm.) Jones & K.L. Pang

Mycol. Progress, **9**-550 (2010). (Photo -6; fig. - 6).

= *Cirrenalia tropicalis* Kohlm. *Mycologia*, **60**- 267 (1968).

Hyphae are 2-5 µm in diam., septate, superficial or immersed, brown. *Conidiophores* are 24-40 x 2.5-4.5 µm, cylindrical, 0-4-septate, simple, acrogenous or lateral, often remaining connected with detached conidia, sometimes obsolete, straight or curved, light brown. *Conidiogenous cells* are monoblastic, integrated, terminal, and determinate. *Conidia* are acrogenous, solitary, regularly or irregularly helicoid, mostly 1 to 1 ½ times contorted, rarely semicontorted, six - twelve septate, not or slightly constricted at the septa, umber to reddish brown; cells increasing in diameter from base to apex, distinctly dissimilar; spirals 22-35µm in diameter; terminal cell 8.5-14.5 x 11-20 µm, subglobose to ellipsoidal, basally flattened; basal cells 5-10 x 4-5.5 µm; cylindrical; central cells subglobose, obtusely conical or dolliform.

Material examined-On intertidal wood of *Avicennia marina*, Mahim; S. A. Gosavi 1124 (PGDB), 15 Oct. 2013.

Distribution in India-East coast- Orissa, West Bengal **West coast-** Goa, Kerala- Maharashtra (Source - Borse et al.2012, 2013)

Remarks-The descriptions of conidia are agreed with that of *Matsusporium tropicale* (Kohlm.) Jones and Pang (Kohlmeyer,1968). Hence, it is assigned to that species. It is an addition to the fungi of Thane district.

Acknowledgement -

Authors are thankful to Incharge Principal of Sathaye college Vile Parle (East) Mumbai. Dr. M.N.Joshi and Miss J.S. Gaikwad (HOD, Botany), The management of N.S. Sanstha Dhule's U. P. College, Dahiwel, Tal.-Sakri, Dist.-

Dhule, Maharashtra for providing necessary laboratory facilities.

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

REFERENCES

- Abdel-Wahab MA, Pang KL, Nagahama T, Abdel-Aziz FA & Jones EBG (2010) Phylogetic evaluation of anamorphic species of *Cirrenalia* and *Cumulospora* with the description of eight new genera and four new species. *Mycol. Progress*, **9**: 537-558.
- Amon JP (1986) Growth of marine fungi at ambient nutrient levels. In- "*The Biology of marine fungi*," (ed. Moss, S.T.), Cambridge Univ. Press, pp. 70-80.
- Anastasiou CJ (1961) Fungi from salt lakes. I- A new species of *Clavariopsis*. *Mycologia*, **53**: 11-16.
- Bhide VP, Pande Alka, Sathe AV, Rao VG & Patwardhan PG (1987) "*Fungi of Maharashtra*", (Sup-I), Agharkar Res. Institute (MACS) Publication, Pune, Maharashtra, pp. 1-146.
- Bilgrami KS, Jamaluddin S & Rizwi MA (1979) "*Fungi of India*", Part I (List and References). Today and Tomorrow's Printers and Publishers, New Delhi. pp. 1-467.
- Bilgrami KS, Jamaluddin S & Rizwi MA (1981) "*Fungi of India*" Part II. (Host index and Addenda), Today and Tomorrow's Printers and Publishers, New Delhi. pp. 268.
- Bilgrami KS, Jamaluddin S & Rizwi MA (1991) "*Fungi of India - List and References*". Today and Tomorrow's Printers and Publishers, New Delhi. pp. 1-798.
- Borse BD, Borse KN, Pawar NS & Tuwar AR (2012) "*Marine Fungi of India (Monograph)*", Broadway Book Centre Publishers and Distributors, Panjim, Goa, pp. 1-471.
- Borse BD, Borse KN, Pawar NS & Tuwar AR (2013) Marine fungi from India - XII. A Revised check list. *Ind. Jour. Geo-Mar. Sci.*, **42**: 110-119.
- Crane JL & Shearer CA (1978) Two new species of *Trichocladium* (Hyphomycetes) from submerged wood. *Mycologia*, **70**: 866-874.
- Garzoli L, Gnani G, Tamma F, Tosi S, Varese GC & Picco A M (2015) Sink or swim- Updated knowledge on marine fungi associated with wood substrates in the Mediterranean Sea and hints about their potential to remediate hydrocarbons. *Progress in Oceanography*, **137**: 140-148.
- Hyde KD, Sarma VV & Jones EBG (2000) Morphology and taxonomy of higher marine fungi. In- "*Marine Mycology- A Practical Approach*" (eds. K. D. Hyde and SB Pointing), Fungal Diversity Research Series 1, Fungal Diversity Press, Hong Kong. pp. 172-204.
- Jamaludeen S, Goswami MG & Ojha BM (2004) "*Fungi of India (1989-2001)*", Scientific Publishers (India), Jodhpur, pp. 1-308.
- Jennings DH (1986a) Some aspects of the physiology and biochemistry of marine fungi. *Biol. Rev.*, **58**: 423-459.
- Jennings DH (1986b) Fungal growth in the sea. In- *The biology of marine fungi* (ed. Moss, S. T.), Cambridge Univ. Press, pp. 1-10.
- Jones EBG (1971) The ecology and rotting ability of marine fungi. In- *Marine borers, fungi and fouling organisms of wood* (eds. Jones, E.B.G. & Eltringham, S.K.), OECD, Paris, pp. 237-258.
- Jones EBG, Sakayaroj J, Suestrong S, Somrithipol S & Pang KL (2009) Classification of Ascomycota, anamorphic taxa and Basidiomycota. *Fungal Diversity*, **35**: 1-187.
- Kamat MN, Patwardhan PG, Rao VG & Sathe AV (1971) "*Fungi of Maharashtra*", Bulletin No.-I, M. P. Agril. Uni. Pub., Rahuri (M.S.), pp.124.
- Kohlmeyer J & Kohlmeyer E (1979) "*Marine Mycology- The Higher Fungi*", Academic press, New York, pp. 689.
- Leightly, L.E. (1980) Wood decay activities of marine fungi. *Bot. Mar.*, **23**: 387-395.
- Meyers SP (1971) Developments in the biology of filamentous marine fungi. In- *Marine borers, fungi and fouling organisms of wood* (eds. Jones, E. B. G. & Eltringham, S. K.), OECD, Paris, pp. 217-258.
- Raghukumar S, Zainal AK & Jones EBG (1988) *Cirrenalia basiminuta*- A new lignicolous marine Deuteromycete from the tropics. *Mycotaxon*, **31**: 163-170.
- Schaumann K, Mulach W & Molitoris (1986) Comparative studies on growth and exoenzyme production of different *Lulworthia* isolates. In- *The biology of marine fungi* (ed. Moss, S. T.), Cambridge Univ. Press, pp. 49-67.
- Volkman-Kohlmeyer B & Kohlmeyer J (1996) How to prepare truly permanent microscopic slides, *Mycologist*, **10**: 107-108.

© 2018 | Published by IJLSCI

Submit your manuscript to a IJLSCI journal and benefit from:

- ✓ Convenient online submission
- ✓ Rigorous peer review
- ✓ Immediate publication on acceptance
- ✓ Open access: articles freely available online
- ✓ High visibility within the field

Email your next manuscript to IJLSCI
: editorijlsci@gmail.com