ISSN NO – 2321-5488
Vol: 6 Issue: 4, October, 2018

Fresh Water Ascomycetes Fungi from Jalgaon District

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Abstract

Five species of genus ***Savoryella*** are reported for the first time on submerged wood sample found in fresh water from region of Jalgaon district. All the five species of genera ***Savoryella*** were identified. All the species namely ***Savoryella fusiformis, Savoryella limnetica, Savoryella verrucos, Savoryella aquatica*** and ***Savoryella lignicola*** are new addition to the fungi of Jalgaon district. Brief note are given for each taxon, photo plates, Camera Lucida drawing also provided.

Keywords: *Savoryella fusiformis, Savoryella limnetica, Savoryella verrucosa, Savoryella aquatic, Savoryella lignicola*

Introduction

The freshwater ascomycetes were reviewed by Shearer (1993 a) and much new data has since becomes available. In particular studies by Hyde and co – workers (eg. Hyde, 1996; Hyde and Aptroot, 1998 and Tsui *et al.* 2001 a, b, 2002) and Sivichai and co – workers (eg. Sivichai *et al.,* 2000, 2002) have increased our knowledge from the tropics. Shearer (1993 a) defined freshwater ascomycetes in a broad ecological sense as "all ascomycetes that occur on submerged or partially submerged substrata in the aquatic habitats".

Shearer, (1993a) argued that the freshwater ascomycetes had probably evolved from terrestrial ancestors through several evolutionary pathways. One pathway is that when the plants invaded freshwater habitats, they brought with them their associated pathogens, endophytes and saprobes. Some of these fungi may have successfully become adapted to the water and are the ancestors of present day freshwater fungi. Some other possible ways for terrestrial fungi to reach freshwater may have occurred when trees and litter fell into water or rain water or sediments were washed into rivers.

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Material & Methods:

Wood analysis:

Collected submerged wood samples were placed in polythene bags and sealed well to prevent loss of moisture. On return to the laboratory, specimens examined for sporulating structures (ascomata, conidia). Collections contaminated by sediments or fouling organisms were washed with sterile freshwater and then incubated in plastic boxes. Incubation promotes sporulation of fungi present in the substratum as mycelium. Samples of wood were incubated in sterile plastic boxes containing layer of blotting paper or sterile sand moistened with sterile freshwater. Sterile sand has advantage in that it remains moist and does not decompose as invariably happens with blotting papers, especially if samples incubated for up to 4 months or more.

Suitable incubating temperature for tropical freshwater fungi ranges from 20- 25^0C. Sterile distilled water added, as it is necessary to prevent the substratum form drying out. The water sprayed on with a fine aerosol spray. Plastic boxes sealed with cellophane tape and placed in polythene bags, so as to conserve a humid atmosphere within a box.

Incubated material periodically examined for the presence of fungi; especially sporulating structures, which are required for their identification. A small Naphthalene balls are placed in a suitable container in side of the plastic box, to kill any insect present in the wood. These may tunnel the wood and consume speculating structures.

Material observed initially under Boush-Lamb Zoom microscope. Fruiting structures then removed with a fine pair of forceps or needle with a fine point. Fungi were identified under compound research microscope. Characters used for the identification of ascomycetes include ascocarp structure, ascocarp wall (number of layers), ascus structure (unitunicate, bitunicate, deliquescing asci), and ascospore phenology (colour, septation, appendages).

Sporulating material mounted in the first instance in freshwater, so that any appendages present can get dilated and their true morphology determined. For some fungi Delafield's Haematoxyline stain and India ink are used to detect the presence or absence of gelatinous or mucilaginous sheaths or appendages of the spores. Cango - red and Melzer's reagent were also used to study the ascus morphology.

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In some ascomycetes, material was very sparse and no asci could be observed. However, features of ascospores in some freshwater ascomycetes are so characteristic of each species that there was little difficulty in assigning them to their respective species.

Permanent mounts of the fungi were done by replacing the Lacto phenol (with or without Cotton blue) in place of freshwater, by placing a drop of the mounting fluid to one side of the cover glass so that it sleeps under the cover glass. Excess mounting medium was cleaned away by blotting paper. The cover glass was sealed with nail polish or D.P.X. Nail polish was suitable for temporary mounts.

Result & Discussion:

Genus ***Savoryella*** Jones and Eaton

Trans. Br. Mycol. Soc, **52:** 161, 1969.

Jones and Eaton described the genus *Savoryella* (Losiophaeriaceae, Sordariales)

In 1969 with *Savoryella lignicola* Jones and Eaton as its type species. The genus is represented by five marine and seven freshwater species (Chang *et al*., 1998, Abdel – wahab and Jones, 2000). The genus is characterized by having **Ascomata:** solitary to gregarious, immersed, partly immersed to superficial, ostiolate, periphysate, papillate, membranous and brown. **Peridium:** of *textura anularis* when viewed from the surface and in section composed of several layers of angular cells. Paraphyses present in young ascomata, wide and septate. **Asci:** 2 to 8-spored, cylindrical to clavate, short, pedunculate, unitunicate, persistent with a non-amyloid apical thickening containing a pore. **Ascospores:** ellipsoidal, triseptate, central cells brown, end cells hyaline with or lacking polar appendages.

1. ***Savoryella aquatica*** Hyde (Fig. 1; Plate fig.1,2,3.)

Aust. Syst. Bot, **6:** 165- 167, 1993**.**

Ascomata: 195 - 260 µm long, 91 - 130 µm diameter, semi immersed or superficial, coriaceous, pyriform, brown or black, astiolate, papillate, periphysate, solitary or gregarious.

Necks: short, up to 68-µm diameter, hyaline, bending up towards the light. **Peridium:** thin of *textura angularis* in surface view and brown. Paraphyses few with rounded cells.

Asci: 106 - 140 X 26 - 34 µm, 8 - spored, clavate, thin-walled with short peduncle, apically thickened with a ring and pole/plug. Few matur**e** asci are contained within the ascoma as they mature successively. Large numbers of old asci are often present. **Ascospores:** 29- 38 X 13.5- 17

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µm, ellipsoidal, biseriate, hyaline to olive green when immature, central cells dark brown when mature, end cells hyaline, constricted weakly at the septa, central septa appearing as a distinct band and highly guttulate.

Habitat: On submerged wood, Grina river, 16 / 01 / 2005; 27 / 11 / 2006; Suki Dam, 16 / 11 / 2005; Tapi river, 20 / 08 / 2004; Leg. R. S. Patil.

Distribution in India : Maharashtra **(**Borse and Pawara , 2007)

Remark:

This fungus is common in occurrence. The descriptions and measurement of Ascomata, Ascospores and Asci are completely agree with that of *Savoryella aquatica* Hyde (1993). Therefore, it is assigned to that species. It is being collected for the first time from Jalgaon District.

2. ***Savoryella fusiformis*** Ho, Hyde and Hodgkiss (Fig. 2; Plate fig. 4, 5, 6.)

Mycol. Res, **101:** 803- 809, 1997**.**

Ascomata: 130 - 190 µm long, 70 - 90 µm diameter, immersed or superficial, coriaceous, pyriform, dark brown, papillate, axis horizontal or vertical to the host surface, solitary or gregarious.

Necks: 70 - 120 µm long, 35 - 50µm diameter, cylindrical, slightly tapering towards the apex, brown, periphysate, mostly pointing upwards with hyaline apex.

Asci: 80 - 120 X 9 -14 µm, cylindrical or clavate, unitunicate, 8- spored, thin-walled, short pedicillate.

Ascospores: 25 - 35 X 6 - 9.6 µm, biseriate, fusiform, three-septate, slightly constricted at the septa, smooth, thin-walled, central cells brown, apical cells 4 - 4.8 µm long, 4 - 4.8 µm wide, hyaline.

Habitat: On submerged wood, Hatnur Dam, 15 / 11 / 2005; Tapi river, 18 / 09 / 2005; Leg. R. S. Patil.

Remark:

The present fungus is occasional in occurrence. The measurement of Ascomata, Asci, Ascospores and descriptions are completely agree with that of *Savoryella fusiformis* Ho, Hyde and Hodgkiss (1997). Therefore, it is assigned to that species. This makes new addition to fungi of Jalgaon District.

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3. *Savoryella lignicola* Jones and Eaton (Fig. 3; Plate fig. 7, 8, 9.)

Trans. Br. Mycol. Soc., **52:** 161, 1969.

Ascomata: 170 - 350 µm high, 120 - 250 µm diameter, globose, subglobose or ellipsoidal, immersed, partly immersed or superficial, ostiolate, papillate, membranous and pale to dark brown.

Neck: 80 - 165 µm long

Asci: 180 X 16 - 24 µm, 8 - spored, cylindrical or clavate, short stalked, unitunicate, persistent with or apical truncate non amyloid apical thickening containing a pore. **Ascospores:** 24 - 36 X 8 - 12 µm, uni or biseriate, ellipsoidal, triseptate, not markedly constricted at the septa, central cells brown (10.6 - 16.0 µm), apical cells smaller and hyaline (2.6 - 6.0 µm).

Habitat: On submerged wood**,** Girna river, 1 / 08 / 2004; Hatnur Dam, 9 / 01 / 2005; 20 / 04 / 2006; Tamaswadi Dam, 1 / 11 / 2005; Leg. R. S. Patil.

Distribution in India: Marine Habitat: Tamil Nadu (Raghukumar, 1973); Maharashtra (Borse, 1987); Lakshadweep Islands (Chinnaraj, 1992); Andaman and Nicobar Islands (Chinnaraj, 1993); Goa (Borse *et al*., 1999 a); Karnataka (Prasannarai *et al*., 1999); Orissa and West Bengal (Borse *et al*., 2000 a); Daman (Borse *et al*., 2000 b); Andhra Pradesh (Sarma and Vittal, 2000); Gujrat (Patil and Borse, 2001); Kerala (Prasannaraj and Sridhar, 2001).

Fresh Water Habitat: Karnataka **(**Ramesh and Vijaykumar, 2000); Maharashtra (Borse and Pawara, 2007)

Remark:

The present fungus is common in occurrence. The measurement of Ascomata, Asci, Ascospores and descriptions are completely agree with that of *Savoryella lignicola* Jones and Eaton (1969). Therefore, it is assigned to that species. It has been reported for the first time from Jalgaon district.

4. *Savoryella limnetica* Chang and Hsieh (Fig. 4; Plate fig. 10, 11.)

Mycol. Res., **102:** 709- 718, 1998.

Ascomata: 251- 301 X 157- 214 µm, partly or fully immersed in wood, oblique to horizontal, dark brown to black, globose to sub-globose, ostiolate and periphysate. **Peridium:** *textura angularis* with brown, septate, unbranched hyphae on the surface and neck.

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Necks: 150- 342 X 57- 92 µm, lateral and periphysate. Paraphyses broad, up to 8 µm, deliquescing early, hyaline, rarely branched.

Asci: 145- 150 X 10.4- 11.4 µm, unitunicate, long cylindrical with a short foot, apices truncate with non-amyloid apical thickening containing a pore, pedicillate with an annulus 3.1- 3.4 X 0.2- 0.7 µm.

Ascospores: 20.1- 25.6 X 7- 9 µm, ellipsoidal, 3- septate, non constricted, central cells brown, end cells smaller and hyaline to sub hyaline.

Habitat: On submerged wood, Manu Devi, 11 / 09 / 2005, , Leg. R. S. Patil.

Remark:

The present fungus is occasional in occurrence. The measurement of Ascospores, Asci and descriptions are completely agree with that of *Savoryella limnetica* Chang and Hsieh 1998. Therefore, it is assigned to that species. This makes new addition to the fungi of Jalgaon district.

5. *Savoryella verrucosa* Minoura and Muroi (Fig. 5; Plate fig. 12, 13, 14.)

Trans. Mycol. Soc. Japan, **19:** 129- 134, 1978.

Ascomata: 170 - 320 µm long, 160 - 300 µm broad, sub-globose to ovoid, immersed to partly immersed, necks protruding from substratum, pale to dark brown, smooth and solitary to gregarious.

Neck: 55 - 70 µm diameter, cylindrical, smooth, sub-hyaline to pale brown with periphyses.

Peridium: In surface view *textura epidermoidea.*

Asci: 187 - 215 X 23 - 35 µm; cylindrical to clavate, unitunicate, 8- spored with a short stalk.

Ascosopres: 29 - 38 X 13 - 18 µm, uni- biseriate, ellipsoidal, triseptate, verrucose, constricted at the septa, central cells brown, apical cells hyaline.

Habitat: On submerged wood, Manu Devi, 17 / 09 / 2006, Leg. R. S. Patil.

Remark:

The present fungus rare in occurrence. The descriptions and measurement of Ascomata, Asci and Ascospores are completely agree with that of *Savoryella verrucosa* Minoura and Muroi (1978). Therefore, it is assigned to that species. It is being reported for the first time in Jalgaon district.

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Acknowledgment:
The author is thankful to Principal Dr. B.D. Borse (Uttamrao Patil Arts & Science College Dahivel) for guidance and motivation and Mr. Nitin Patil (Kisan Arts, Commerce & Science College, Parola) for technical support.

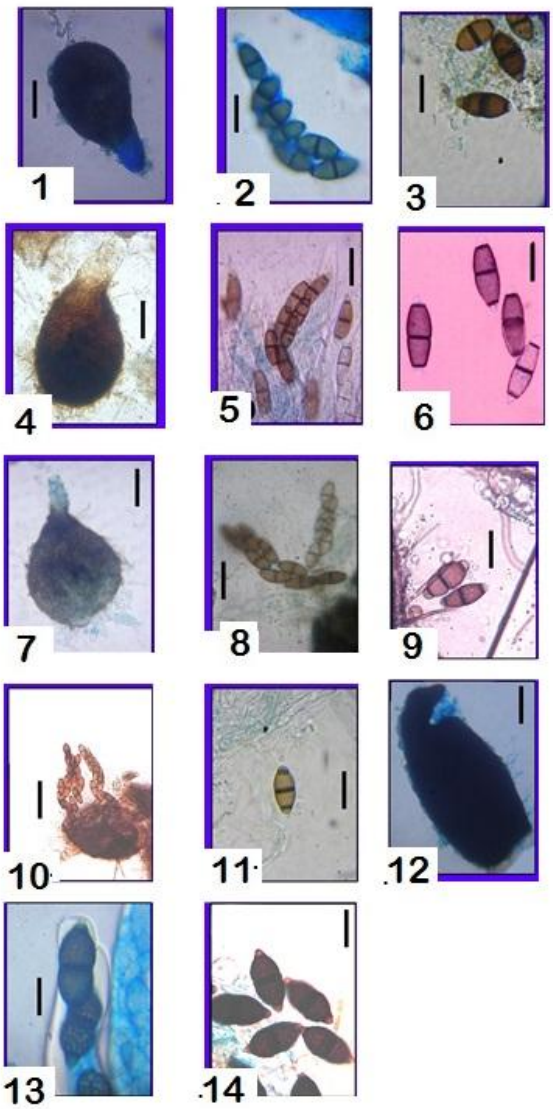
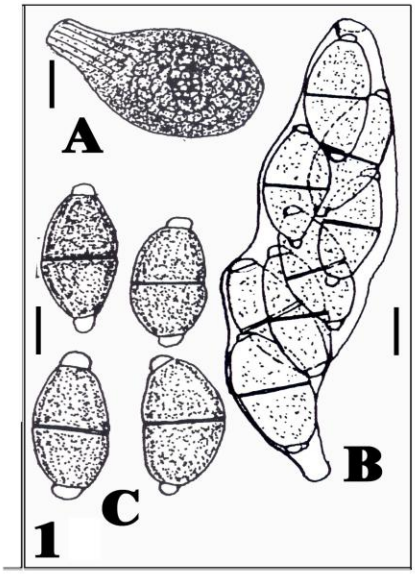


Photo Plate

Fig No. 1 - *Savoryella aquatica* Ascomata
Fig No. 2 - *Savoryella aquatica* Ascus
Fig No. 3 - *Savoryella aquatica* Ascospore
Fig No. 4 - *Savoryella fusiformis* Ascomata
Fig No. 5 - *Savoryella fusiformis* Ascus
Fig No. 6 - *Savoryella fusiformis* Ascospore
Fig No. 7 - *Savoryella lignicola* Ascomata
Fig No. 8 - *Savoryella lignicola* Ascus
Fig No. 9 - *Savoryella lignicola* Ascospore
Fig No. 10- *Savoryella limnetica* Ascus
Fig No. 11- *Savoryella limnetica* Ascospore
Fig No.12 - *Savoryella verrucosa* Ascomata
Fig No.13 - *Savoryella verrucosa* Ascus
Fig No.14 - *Savoryella verrucosa* Ascospore



Camera Lucida Drawing

Fig. No. 1 - *Savoryella aquatica*
A) Ascomata (Scale Bar = 50µm.)
B) Ascus (Scale Bar = 10µm.)
C) Ascospore (Scale Bar = 10µm.

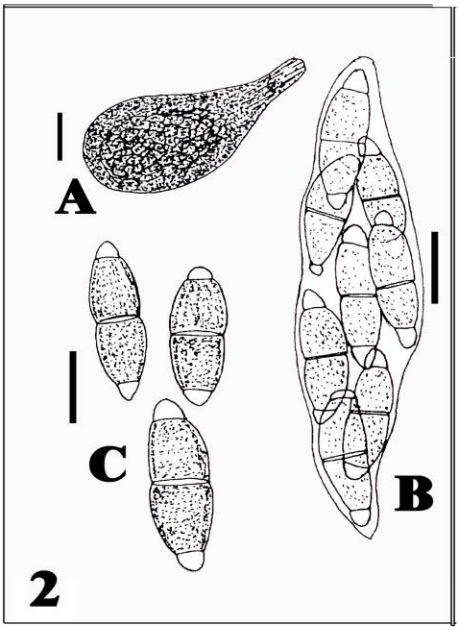


Fig. No. 2 - *Savoryella fusiformis*
A) Ascomata (Scale Bar = 25µm.)
B) Ascus (Scale Bar = 10µm.)
C) Ascospore (Scale Bar = 10µm.)

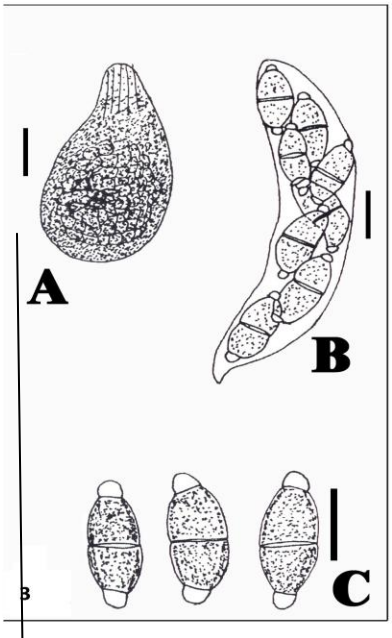


Fig. No. 3 - *Savoryella ligicola*
A) Ascomata (Scale Bar = 25µm.)
B) Ascus (Scale Bar = 20µm.)
C) Ascospore (Scale Bar = 10µm.

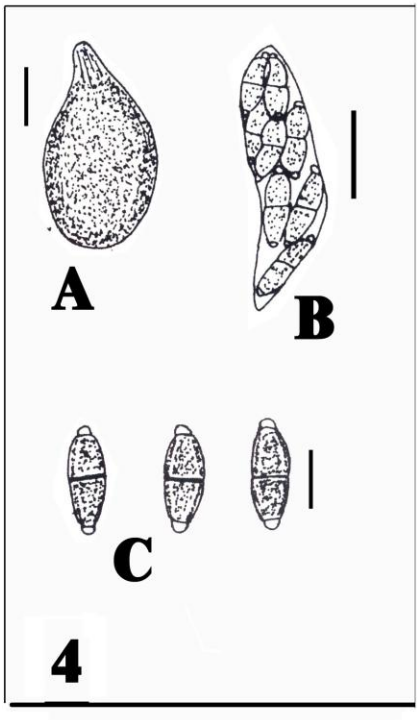


Fig. No. 4 - *Savoryella limnetica*
A) Ascomata (Scale Bar = 75µm.)
B) Ascus (Scale Bar = 40µm.)
C) Ascospore (Scale Bar = 10µm.)

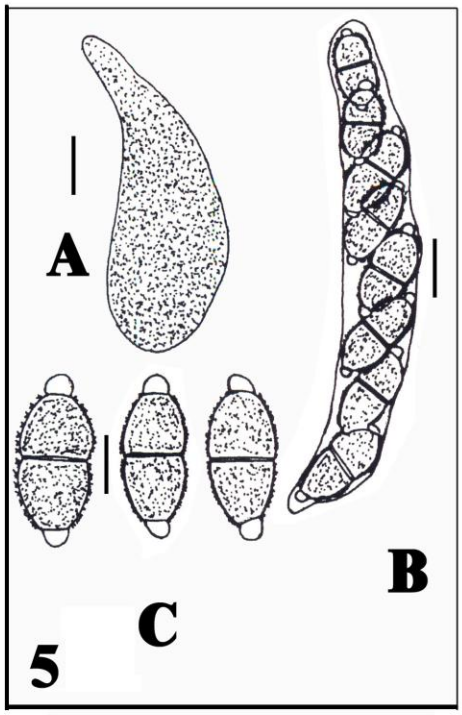


Fig. No. 5 - *Savoryella verrucosa*
A) Ascomata (Scale Bar = 30µm.)
B) Ascus (Scale Bar = 20µm.)
C) Ascospore (Scale Bar = 10µm.

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