Studies of fresh water foam fungi of Uttara Kannada, Karnataka

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ABSTRACT: Foam formed in aquatic ecosystems acts as a trap for many fungal spores and in particular of aquatic Hyphomycetes. Therefore foam samples collected were scanned for a period of two years. This survey revealed the presence of 36 species of foam flora out of which 8 species are new to Karnataka and 9 species are new additions to the fungi of India. However spores of Beltrania, Curvularia and Tetraploa were also observed. All the fungi observed have been discussed in the paper.

Key words: Conidial fungi, foam spora, Karnataka

INTRODUCTION

Foam formed in well aerated streams, rivers at barriers, stones and below water falls acts as a trap for many fungal spores of aquatic and non aquatic origin. Many fungal spores are readily captured by air bubbles. Mycoflora of foam has been studied in various parts of the world (Ingold, C.T 1967, 1974, 1975a, 1975b, 1977). However, little information is available regarding foam mycoflora from India Manoharachary and Murthy, (1981); Subramanian and Bhat (1981); Bhat et al., (2003).

The present paper represents a survey of aquatic fungal foam spores from different locations in the Uttara Kannada region of Karnataka.

MATERIALS AND METHODS

All the specimens described in the present work have been collected by the authors. Frequent visits were made to the different areas in the locality (Uttara Kannada) during different seasons.

Analysis of Natural Foam Samples [Iqbal and Webster (1973)]

In studying the aquatic fungal spores of particular stream, pond or river, analysis of naturally formed foam is of great interest. Conidia, on liberation, are carried away down streams by water current. These are remarkably trapped and concentrated by air bubbles which often aggregate together as persistent foam along the edges, rocky crevices or adjacent to the plant debris at the water level. The ability of conidia to get trapped varies with their shape, the tetraradiate shape being captured most readily by the bubbles, Iqbal and Webster, (1973).

If the foam is collected in a jar and briefly agitated, it soon breaks down into bubbles free liquid without any treatment if a drop of this is mounted on a slide and examined microscopically, it will normally be found to contain several conidia of aquatic Hyphomycetes. Since most of these conidia are easily identifiable down to the species, examination of foam represents a rapid way of finding out what species constitute the aquatic mycoflora in a stream. Often, foam contains conidia that are not truly aquatic but of terrestrial origin eg: conidia of Aspergillus, Curvularia, Drechslera, Tetraploa etc. Besides conidia of Hyphomycetes, foam also contains spores of Aquatic Hyphomycetes and Coelomycetes.

Fresh foam is generally white in color and contains recently liberated and accumulated conidia. This is ideal for sampling often one could notice oily or brown coloured foam cakes. Collections of aquatic foam were made during and after the rainy
season of 1993 from different locations in fresh water streams Kali, Panda, Bidaralla and Magod streams of Uttara Kannada district, Karnataka. These streams are flowing in the western ghat forest region and lined by thick vegetation including cultivated crops and the streambeds are mostly rocky and muddy.

Foam was scooped up in small plastic vials and immediately fixed by adding a few drops of formalin-acetic acid-alcohol mixture. They were later scanned under the microscope in the laboratory for the spores of aquatic Hyphomycetes.

RESULTS AND OBSERVATION

Conidia of Aquatic Hyphomycetes were found repeatedly in many samples of water from streams. In all spores of more than 36 Hyphomycetes were identified and assigned to 25 genera. The remaining are not assignable to known taxa. Conidia of a few Coelomycetes were also observed. Brief notes and illustrations and details of distribution are given for each taxon.


Conidia tetraradiate, central region brown and spherical, 48-mm diam; four divergent arms, 1-4 separate 55-100x 6-7mm occurring in Kali, Panda and Magod streams. (Fig 1)


Conidia hyaline, sigmoid, 95-115x 8-15mm, 6-10 septate. Occurring in Kali, Panda, Magod and Bidaralla streams. (Fig 2).


Conidia hyaline, 200-250x3mm, septate converging towards the apex. Small out growth on side of spore near base, becoming more or less parallel with sides of spore. Occurring in Kali and Bidaralla streams. (Fig 3).


Conidia hyaline, sigmoid or falcate, 150-750x5-6mm broad in the middle at the apex 2.5-3mm, 6-10 celled. Occurring in Panda and Magod streams (Fig 4).


Conidia hyaline, curved or sigmoid 200-350mm long 5-6mm broad in the middle region, tapering to 3-4mm broad at the ends, 6-10 septate. Occurring in Kali, Panda and Magod streams (Fig 5).

**Articulospora moniliforma** Ranzoni *Farlowia 4*: 353-398, 1953.

Aleuriospores terminal, colorless, composed of four divergent branches, first formed branch clavate, 13-16mm long, 2.5-4.0mm wide, tapering to 1.5mm at the tips, separated from the first branch by narrow isthmus. The four branches arise in succession. Occurring in Kali stream only (Fig 6).


Occurring in Panda stream only (Fig 7).


Conidia biconic, pale brown hyaline transverse band in the middle, 15-25x8-13mm, apical appendage 6-20mm long, 1.5-2mm wide at the base. Occurring in Kali, Panda and Magod streams (Fig 8).

**Campylospora chaetocladia** Ranzoni *Farlowia 4*: 353-398, 1953.

Conidia hyaline, tetraradiate appendages extend from the central primodium 20-40mmx1.5-4mm. Occurring in Kali and Magod streams (Fig 9).


Conidia hyaline, tetraradiate, appendages thin, extend from the current primodium 20-40mmx1.5-4mm. Occurring in Kali and Magod streams (Fig 9).


Conidia hyaline, tetraradiate, main body 5mm wide at the base, broadening to 19mm above, arms 80-115x2.5-3.0mm. Occurring in Kali, Panda and Magod streams (Fig 11).
Fig. 1-12. Conidia of Aquatic fungi from foam samples.

1. *Actinospora megalospora* Ingold.
2. *Anguillospora curvula* Iqbal.
5. *A. longissima* Ingold.
8. *Beltrania rhombica* Subram.
10. *C. filic/adia* Nawawi.
11. *Clavariana aquatica* Nawawi.

**Clavatospora tentaculal** Nilsson.

Conidia hyaline, tetraradiate, main body 45-58mm long, 1mm broad at the base, widening 6-7mm at the apex, 3 appendages 40-50x1-1.5mm. Occurring in Kali stream only (Fig 12).


Conidia two armed, 5 of its cells are brown but the basal cell is colorless and each arm is
terminated by a thin hyaline appendage, 20-40mm width from tip to tip, basal cell 2-4x2-2.5mm. Occurring in Kali river, Panda and Magod streams (Fig 13).


Occurring in Kali, Panda and Magod streams (Fig 14).


Conidia hyaline, multiradiate, main axis 15-30x2-3mm, terminal cell 2-3mm diam, 6-9 laterals arms 50-90x4-6mm, 8-16 septate. Occurring in Kali, Panda, and Magod and Bidaralla streams (Fig 15).


Occurring in Kali, Panda and Bidaralla streams (Fig 16).


Occurring in Panda, Magod and Bidaralla streams (Fig 17).


Conidia solitary, holoblastic, aerogenous hyaline, composed of more or less fusiform septate, 60-90x5-6mm, central body, to which H-shaped branched formation is attached directly or through a short cell. The branches are septate with pointed body axes, 40-60x4-5mm and connected by a short cell. Occurring in Kali stream only (Fig 18).


Conidia hyaline, tetraradiate, main axis 20-28mm, long 2.5-3.0mm wide at the top, 1.5mm at the base, 2-3 septate, 3-4 laterals, 65-85x4-5.0mm, 8-10 septate. Occurring in Kali, Panda and Magod and Bidaralla streams (Fig 19).


Conidia hyaline, consists of 6-celled main axis 70-95mm long with a bend in the sub-basal cell, bigger cell 14-17mm broad, apex cell 2.4x15-22mm 2-4 laterals 40-120x1.5-2mm 2-3 septate. Occurring in Magod stream only (Fig 20).


Conidia hyaline, triradiate, main axis 6-7x1-1.5mm, 3 laterals 8-12x3.5x4mm. Occurring in all Kali, Panda, Magod and Bidaralla streams (Fig 21).


Aleuriospore unicellular, crescent shaped or sigmoid, 70-90mm long, 4-5mm broad in its middle region tapering to 1.5mm at its ends, with a row of conspicuous vacuoles, attached at a point along its convex surface to the stalk cell, Aleuriospore liberated by the break down of the stalk cell. Liberated spore with an inconspicuous hilum where it was originally attached to the stalk cell. Occurring in Kali, Panda and Magod streams (Fig 22).


Conidia holoblastic, hyaline, aseptate, fusiform, curved narrowed more towards the base than apically, guttulate, 15-18x6-8mm with single apical and basal appendages and two lateral appendages, filiform simple, cellular, 15-24mm (apical) 5-22.5mm (basal) and 12-28mm long (lateral) and 0.5mm diameter. Lateral appendage originate on opposite sides of the conidium in a slightly supramedian position. Occurring in Kali, Panda, Magod and Bidaralla steams (Fig 23).

**Pestalotia** Sp.

Occurring in Kali, Panda and Magod streams (Fig 24).


Conidia pale brown, main axis 80-120mm length laterals 40-60mm, individual cells of conidia 8-10x2-4mm. Occurring in Kali, Panda, Magod and Bidaralla streams (Fig 25).

Conidia hyaline branched chains of conidia attached to one another by connectives. 7-10x3.5-4mm, branches 35-50mmx3.5-4mm. Occurring in Kali, Panda and Magod streams (Fig 26).

S. pedatospora Tubaki, Ellis, M. B. 1976. More...
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25. Phalangispora constricta Nawawi and Webster.
27. S. pedatospora Tubaki.
29. Tetraploa aristata Berk and Br.
31. T. splendens Ingold.
33. Triscelophorus acuminatus Nawawi.
35. T. monosporus Ingold.

28. Tetracodium setigerum Ingold.
30. Tricodium angulatum Ingold.
32. Tripospermum camelopardus Ingold.
34. T. konajensis Sridhar and Kavari.
36. Wiesneriomyces javanicus Koorders.


Conidium consisting of four divergent arms 20-40mm long, each tapering from 3mm near the central region of the spore to 1mm near its tip, and of three of elongated, parallel finger like processes, 12-15mm long, 3-9mm broad, two of which are inserted just above the point of divergence of the four arms and the third a short distance along one of the arms. Occurring in Kali and Panda streams (Fig 28).

Conidia pigmented, tetraradiate, basal region consists of 4 cells to each column, 25-28x8-14mm, 4 laterals 50-7-mm long, 5-7mm thick at the base, 2-3.5mm thick at the apex, septate. Occurring in Kali, Panda and Magod streams (Fig 29).


Occurring in Kali, Panda and Magod streams (Fig 30).


Occurring in Kali, Panda and Magod streams (Fig 31).


Occurring in Kali, Panda and Magod streams (Fig 32).


Conidia hyaline, tetraradiate, main axis 43-62mm long, 3.5-4.5mm at the widest point, 0.5mm at the apex, up to 8 septate, 3 laterals 22-55x2-2.5mm. Occurring in Kali, Panda, Magod and Bidaralla streams (Fig 33).


Conidia hyaline, terminal, septate, main arm 20-35mm long, 3.5-4mm broad, 1-3 septate, 3 secondary laterals 15-30mm long, 2-2.5mm broad, 0-2 septate. Occurring in Kali, Panda, Magod and Bidaralla streams (Fig 34).


Conidia hyaline, branched, aseptate tapering to 1.5mm at the truncate base, secondary ramuli in whorl of three, arising at a distances of 3-5mm from the base of the main axis 40-50mm long 2.0-2.5mm broad near the base tapering to 1.5mm at the apex, base abruptly constricted to 1mm. Occurring in Kali, Panda and Magod streams (Fig 35).


Conidia hyaline unbranched chain of conidia of 6-14 attached to one another by narrow connectives, 8-12x3-4mm. Occurring in Kali, Panda and Magod and Bidaralla streams (Fig 36).

REFERENCES


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