

Xylariales of Sharavathi wild life sanctuary Karnataka

■ DAYANAND NEJAKAR, POORNAPRAJNA BELUR, SUJATA MALI AND RAHUL PATIL

SUMMARY

A detailed floristic monograph of 33 Xylariales species of Sharavathi wild life sanctuary (SWLS) was presented along with cultural nature of few taxa. These taxa belongs to 4 genera viz., *Xylaria*(13), *Hypoxylon*(10), *Rosellinia*(5) and *Nemania*(5). It includes both annulated and non-annulated/erect taxa.

Key Words : *Xylaria*, Xylariales, *Hypoxylon*, *Rosellinia*, *Nemania*

How to cite this article : Nejakar, Dayanand, Belur, Poornaprajna, Mali, Sujata, and Patil, Rahul (2012). Xylariales of Sharavathi wild life sanctuary Karnataka. *Internat. J. Plant Sci.*, 7 (1) : 97-110.

Article chronicle : Received : 15.07.2011; Sent for revision : 20.08.2011; Accepted : 30.11.2011

Xylariales is oldest group belongs to the class Pyrenomycetes. It is considered as one of the specialized order in Ascomycetes exhibits a wide range of morphological variations. It includes 48 genera and 386 species (Kirk *et al.*, 2001). The history of Xylariales is as old as the history of fungi in general. The earliest record of Xylariaceous fungus in India seems to be *Sphaeria (Cordyceps) nigripes* Klotzsch, who described it on the basis of a collection sent to him by Wright from Belgaum (Karnataka). The floristics of Xylariales in India has never been specifically studied, and whatever was known is through the scattered reports of different workers of fungi in general. Many members of the family were reported with different names, from time to time (Dargan, 2006). Most of the members of this order are grow in wet and shady places, either on dead wood or litter. Some members are known to be pathogenic inciting wood rots and cankers (Pande,

2005).

Xylariales play a primary role because, they act as decomposers. They found in associate with algae to form lichens, act as parasites to cause damage to plants, and in association with roots of plants as mycorrhizae. Additionally, they may play an unquantified but crucial role in the carbon cycle (Senkowsky, 2006). All the members of Xylariales have the capacity to degrade lignin and cellulose. The enzymatic activity of these fungi is widely exploited except for the endophytic species (Pande, 2005).

Important morphological characteristics of Xylariales are: stomata usually well developed, made up of only fungal tissue; ascocarps perithecial; rarely clestothecial, globose, superficial or immersed in stroma; generally black, thick walled with plane, irregular, or wrinkled surface; perithecia spherical, obovoid, or tubular; ostiolate; paraphyses simple; asci cylindrical, persistant, thick walled, apical structure complex; ascospores are light brown, brown, dark brown, or blackish brown, ellipsoid-inequilateral or crescent shaped; germ slit conspicuous, inconspicuous straight, or sigmoid with spore length or less than spore length; conidiogenous structure are *Sporothrix*, *Virgariella*, *Nodulisporium*, or *Perioniella* like (Pande, 2008).

The present study attempts a detail account of 33 species of Xylariales, belongs to genera *Xylaria*, *Hypoxylon*, *Rosellinia* and *Nemania*. Telomorphic details were given for all the species, along with cultural details for few species.

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :

DAYANAND NEJAKAR, Hongirana Independent College, Amatekoppa, SAGAR (KARNATAKA) INDIA
E-mail: dayu2120@yahoo.co.in

Address of the co-authors:

POORNAPRAJNA BELUR, Naturalist and Freelance Journalist, Sagar, BELUR (KARNATAKA) INDIA

SUJATA MALI, P.G. Department of Economics, Mount Carmel College, BENGALURU (KARNATAKA) INDIA

RAHUL PATIL, Department of Botany, Karnataka Science College, DHARWAD (KARNATAKA) INDIA

MATERIALS AND METHODS

The survey for Xylariales was carried out from January to June in Sharavathi Wild Life Sanctuary (SWLS). SWLS located very near to world famous Jog falls and Linganamakki dam. It having 431 Sq. Kms of total area with core zone (74.33 Sq. Kms), buffer zone (170.67 Sq. Kms), and tourism zone (57.53 Sq. Kms) and remaining area submerged under Sharavathi back water. It is situated between latitude 13° to 14° 15' North and longitude 74° 30' to 75° with rich diverse, evergreen and moist deciduous forest. SWLS divided in to Kargal and Kogar as two zones. During survey the average temperature 27.3°C, humidity 70-80 per cent and light intensity 1123 (x10) Lux. Plants like *Dipterocarpus indicus*, *Calophyllum tomentosum*, *Alstonia scholaris*, *Atrocarpus* sp., *Syzygium* sp., and animals like *Carvus unicalour*, *Tragulus maninna*, *Canis aurus*, *Varanus grisena*, *Refuta indica*, *Macaca radiate*, *Acridontheres fuscus*, *Upupa cops* are important species. Loin-Tailed Macaques and Malabar Giant Squirrel are the threatened species of wild life sanctuary.

Repeated field tours were conducted to collect specimens in telomorphic condition. Detail field observations were made such as habitat/substrata, colour, shape and size of the specimens noted immediately since they are sure to be drying and shrinking by the time of specimen reach the laboratory. Locality and collection number also documented. Specimens were collected in polythene/tea bags, dried in shade/low temperature heat using electric bulbs. After processing specimens were preserved in thick khaki packets with herbarium details like- species name, substrate, family, altitude, locality, date of collection, collection number, collectors name, herbarium number (like 230(XH)) and important note. The essential data of specimen recorded using standard diagnostic sheet (Ju and Roger, 1996) and deposited in college herbarium. Microscopic observations were done under 400x magnification power in bright field microscope. By using Melzer's iodine reagent bluing or non bluing nature of apical ring was also tested. Conidiogenous structures of few species were seen on oat meal agar (OA).

RESULTS AND DISCUSSION

Thirty three species belongs to 4 genera were identified using standard manual and papers. Conidiogenous nature of 14 species was seen on OA. Author citations of isolated species were abbreviated according to <http://www.indexfungorum.org>.

Taxonomic descriptions :

Hypoxylon nicaraguense ellis and everh. (Fig. D) :

Stromata peltate, sessile, with entire margins, inconspicuous perithecial mounds, 1-3cm diam x 6-8mm high;

surface brown; dark brown granules immediately beneath surface. Perithecia long tubular, 0.3-0.4mm diam x 1-1.5mm high. Ostioles slightly higher than the stromatal surface. Asci fragmentary, apical ring bluing in Melzer's iodine reagent, discoid, 1µm high x 2-3µm broad. Ascospores brown to dark brown, unicellular, ellipsoid-inequilateral, with narrowly rounded ends, (11-) 12-15 (-16) x 5-6µm, with straight germ slit nearly spore length.

Specimens examined :

Kargal RF (range forest):

Aralagodu, on dead wood of *Dipterocarpous* sp., Dayanand Nejakar, 229 (XH), May 2011, Elevation (E): 421⁰⁴'.

Muppane, on the bark of dead dicot wood, Dayanand Nejakar, 232 (XH), January 2011, E: 398⁰⁹'.

Kogar RF :

Kanur, on the bark of *Hopea* sp., Dayanand Nejakar, 231 (XH), April 2011, E: 314⁰⁷'.

Xylaria cubensis (Mont.) Fr. :

Stromata stipitate, cylindrical, unbranched, discoid base, 2.8cm long x 1cm diam; surface brown-black, wrinkled; interperithecial tissue white, solid. Perithecia globose, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, 167-172µm high x 6-7µm broad. Ascospores brown, ellipsoid-inequilateral, rounded ends, (8-) 9.2-9.6 (-10.5) x 4-5µm, straight germ slit spore length.

Culture :

Mycelium grey, powdery; conidia colourless, (4-) 4.6-5 (-6) x 1.5-2 µm on OA.

Specimens examined :

Kargal RF:

Vatemakki, on wood of *Myristica* sp., Dayanand Nejakar, 239 (XH), June 2011, E: 409⁰¹'.

Hypoxylon fragiforme Pers. (Fig. A) :

Stromata spherical, sessile with conspicuous perithecial mounds, 2-10mm x 1.5-5mm thick; surface dark brick; white granules between perithecia. Perithecia obovoid, 0.2-0.4mm diam x 0.5-0.6mm high. Ostioles lower than the stromatal surface. Asci 155-170µm length x 6.5-8µm broad, the spore bearing parts about 85µm long, stipes 80-90µm long, with apical ring bluing in Melzer's iodine reagent, discoid, 1µm x 2.4-2.8µm broad. Ascospores dark brown, ellipsoid-inequilateral, with narrowly rounded ends, (10.5-) 11-15 x 5-6(-7)µm, with straight germ slit spore length.

Culture :

The conidiogenous structure *Nodulisporium* like on OA.

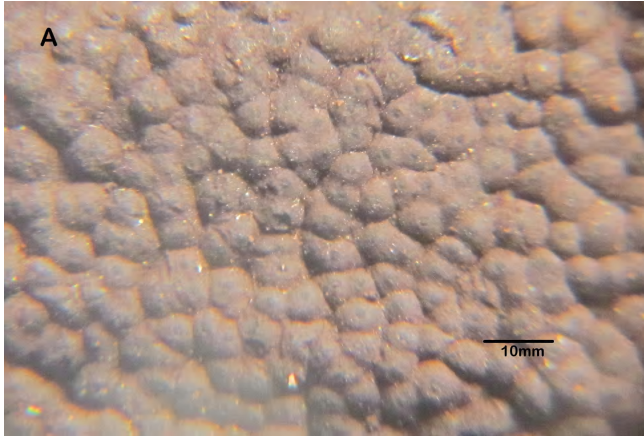


Fig. A : *Hypoxylon fragiforme* Pers.

Specimens examined :

Kargal RF:

Near to Kalamanchi, on dead angiospermic stem, Dayanand Nejjakar, February and March 2011, 236 (XH).

***Hypoxylon monticulosum* Mont. (Fig. C) :**

Stromata pulvinate, conspicuous to perithecial mounds, 0.2-4cm long x 0.2-1cm broad x 0.5-1(-1.5)mm thick; surface blackish, carbonaceous tissue immediately beneath surface; tissue below the perithecial layer inconspicuous. Perithecia spherical 0.2-0.5mm diam x 0.3-0.5mm high. Ostioles higher than the stromatal surface. Asci 100-120µm length x 4.5-6µm broad, apical ring bluing in Melzer's iodine reagent, discoid, 1µm high x 2µm broad. Ascospores brown to dark brown, unicellular, ellipsoid-inequilateral, with narrowly rounded ends, 7-11 x 3.5-4.5 (-5)µm with straight germ slit spore length.

Culture:

The conidiogenous structure *Virgariella* like on OA.

Specimens examined :

Kargal RF:

Near the circle of Linganamakki and Kargal, on dead stem of *Terminalia* sp., Dayanand Nejjakar, February and March 2011, 238 (XH), E: 508°2'.

***Hypoxylon michelianum* Ces. and De Not. (Fig. B) :**

Stromata pulvinate, with perithecial mound, 1-2mm thick; surface more or less whitish; tissue below the perithecial layer dark brown. Perithecia spherical, 0.5-0.6mm diam. Ostioles conical, truncatum- type disc 0.2 mm diam. Asci 200-250µm length x 5-6µm broad, apical ring bluing in Melzer's iodine reagent, discoid, 1µm high x 2µm broad. Ascospores brown to dark brown, unicellular, ellipsoid-inequilateral, with narrowly rounded ends, 11-15 x 4.5-5.5 (-6)µm with straight germ slit spore length.

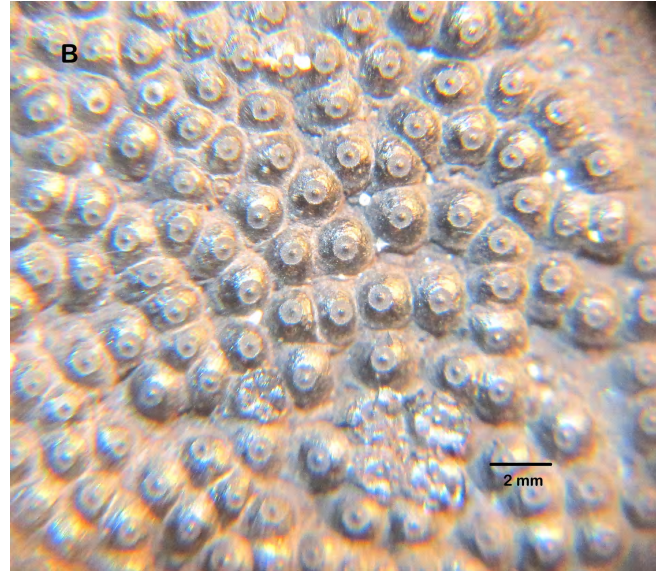


Fig. B : *Hypoxylon michelianum* Ces. and De Not.

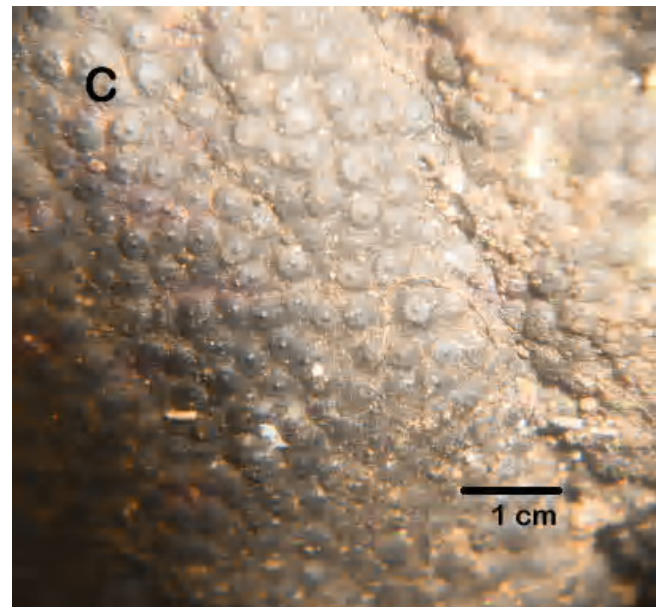


Fig. C : *Hypoxylon michelianum* Mont.

Specimens examined :

Kargal RF:

On the bark of *Bombax ceiba*, Dayanand Nejjakar, 241 (XH), February 2011, E: 427°5'.

Kogar RF:

In between Kanur fort and Hebbainakere, on dead dicot wood, Dayanand Nejjakar, 244 (XH), April 2011.

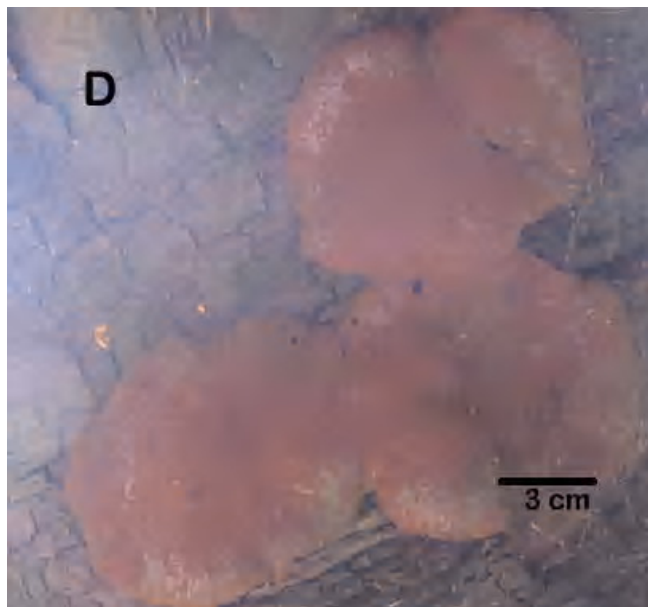


Fig. D : *Hypoxylon nicaraguense* ellis and everh

***Hypoxylon perforatum* (Schwein.: Fr.) Fr. (Fig. E)**

Stromata hemispherical, pulvinate, with inconspicuous perithecial mounds, 1-20mm long x 1-10mm broad x 0.5-1mm thick; surface dark brick; the tissue below the perithecial layer dark brown, about 1mm thick. Perithecia spherical 0.1-0.3mm diam. Ostioles lower than the stromatal surface. Asci 110-130µm length x 6-9µm broad, with apical ring bluing in Melzer's iodine reagent, discoid, 0.5- 1.8µm high x 2-2.5µm broad. Ascospores brown to dark brown, unicellular, ellipsoid-inequilateral, with narrowly rounded ends, (8-) 10-12 (-13) x 4-6µm with sigmoid germ slit spore length.

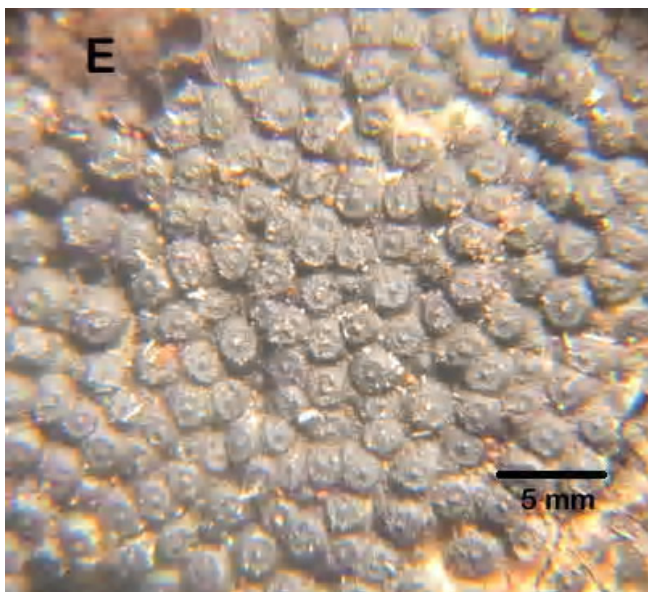


Fig. E : *Hypoxylon perforatum* (Schwein. : Fr.) Fr.

Culture:

The conidiogenous structure *Virgariella* like on OA.

Specimens examined :

Kargal RF:

On the way of Muppene nature camp, on dead *Vitex* stem, Dayanand Nejakar, 245 (XH), February 2011.

***Hypoxylon petriniae* stadler and fournier. (Fig. F) :**

Stromata elongate, with inconspicuous perithecial mounds, 10-50mm long x 5- 21 (-23)mm broad x 0.3-0.8mm thick; surface yellowish brown; the tissue below the perithecial layer inconspicuous. Perithecia spherical, 307-365µm diam x 227-432µm high. Ostioles umbilicate. Asci 119-138µm length x 7-9.5 broad, discoid, 1µm high x 3-3.4µm broad. Ascospores brown, ellipsoid-inequilateral, 8.8-11 (-13) x 4.8-6µm, with straight germ slit spore length.

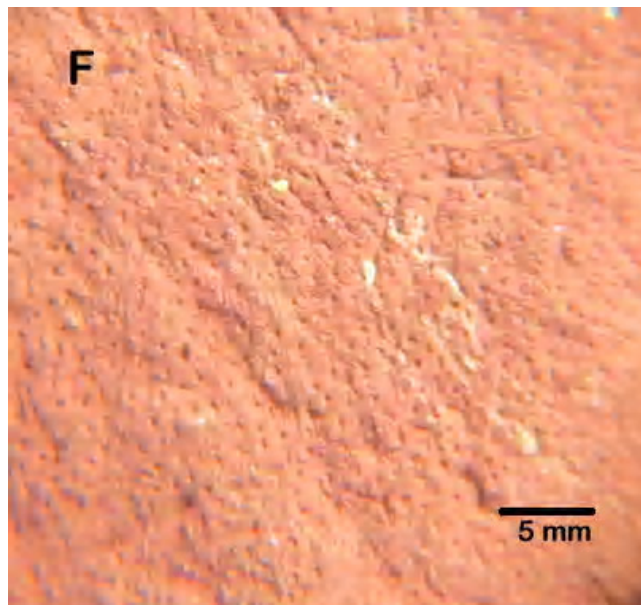


Fig. F : *Hypoxylon petriniae* stadler and fournier

Culture:

The conidiogenous structure *Virgariella* like on OA.

Specimens examined :

Kargal RF:

On the way of Kanur fort, on dead *Olea* stem, Dayanand Nejakar, 243 (XH), February 2011, E: 314⁰⁹.

***Xylaria tuberiformis* Berk :**

Stromata stipitate, gregarious, cylindrical, sometimes slightly curved, discoid base, 6-10mm high x 5-8mm diam; surface blackish brown, wrinkled; interperithecial tissue white, solid. Perithecia oval-slightly round, completely immersed. Asci

cylindrical, apical ring bluing in Melzer's iodine reagent, 4-6µm high x 3-4µm wide. Ascospores brown, ellipsoid-inequilateral, rounded ends, (20-)21.2-24.6(-26) x (6-)7.5-9.4(-10)µm, straight germ slit spore length.

Culture :

White colony, conidia hyaline, 6-10 x 3-4 µm on OA.

Specimens examined :

Kargal RF:

Biligar, on wood of *Randia* sp., Dayanand Nejakar, 267 (XH), April 2011, E: 372⁰⁶'.

***Hypoxylon salicicola* Granmo. (Fig. G) :**

Stromata effused, inconspicuous perithecial mounds, 42-57mm long x 7-13mm broad x 0.4-0.5mm thick; surface dark brick; the tissue below the perithecial layer inconspicuous. Perithecia spherical 230-334µm diam. Ostioles lower than the stromatal surface. Asci 110-121µm length x 6µm broad, discoid, 0.6µm high x 2µm broad. Ascospores brown, ellipsoid, 7.5-9 x 3.5-4µm, with straight germ slit spore length.

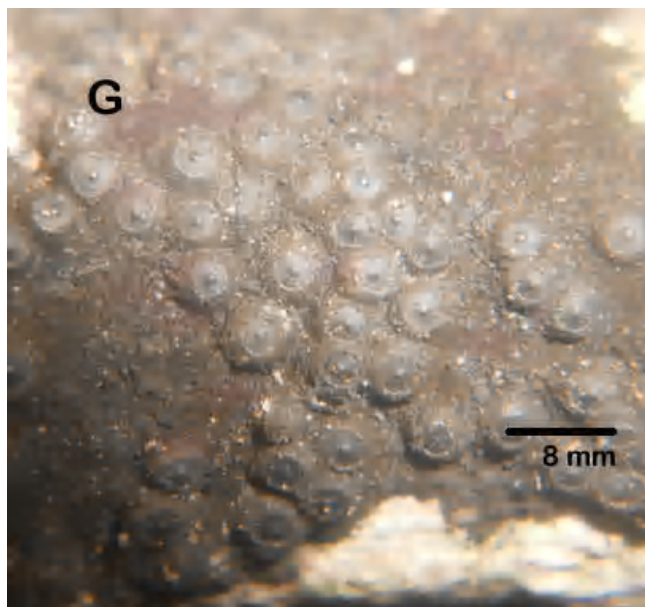


Fig. G : *Hypoxylon salicicola* Granmo

Culture:

The conidiogenous structure *Nodulisporium* like on OA.

Specimens examined :

Kargal RF:

Iduvaani, Aralagodu and on way to Tumbri, on dead angiospermic wood, Dayanand Nejakar, March and April 2011, 231 (XH).

Kogar RF :

Biligar, on bark of dead dicot stem, Dayanand Nejakar, 229 (XH), May 2011, E: 357⁰³'.

***Hypoxylon subticinense* Y. M. Ju and J. D. Rogers. (Fig. H) :**

Stromata effused-pulvinate, with inconspicuous perithecial mounds, 2-4cm diam x 0.7 mm thick; surface dark brick; the tissue below the perithecial layer black. Perithecia obovoid, 0.3mm diam x 0.4mm high. Ostioles same level as the stromatal surface. Asci 140-152µm length x 5µm broad, with apical ring bluing in Melzer's iodine reagent, discoid, 1µm high x 2µm broad. Ascospores brown to dark brown, unicellular, ellipsoid, 7-9 (-11) x 4-5µm, with straight germ slit spore length.

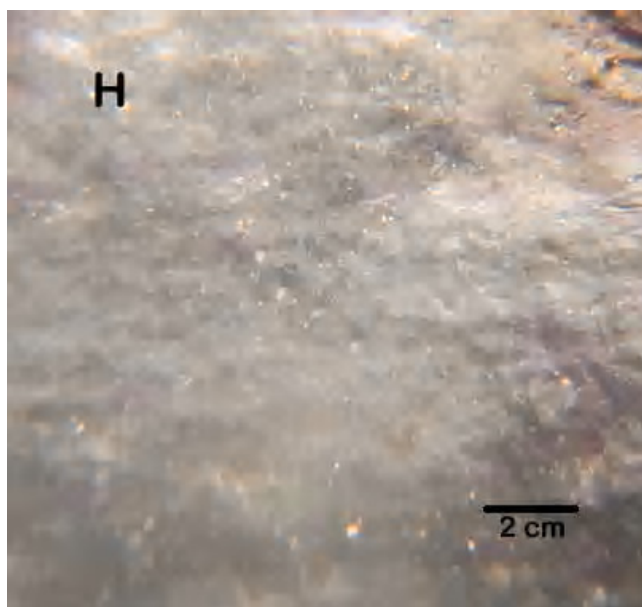


Fig. H : *Hypoxylon subticinense*

Culture:

The conidiogenous structure *Virgariella* like on OA.

Specimens examined :

Near the main road of Kogar, on bark of *Terminalia* sp., Dayanand Nejakar, 268 (XH), February 2011.

***Nemania effusa* (Nitschke) Pouzar. (Fig. J) :**

Stromata effused, conspicuous perithecial mounds 20-27mm long x 5-9mm broad x 0.5-0.8 mm thick, carbonaceous; surface blackish brown; interperithecial tissue white. Perithecia subglobose, 0.4-0.6mm diam x 0.5mm high. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 2µm high x 1.5-1.7µm broad. Ascospores brown, ellipsoid-inequilateral with broadly rounded ends, 6-7.3 (-8) x 3-3.5µm, with straight germ slit spore length.

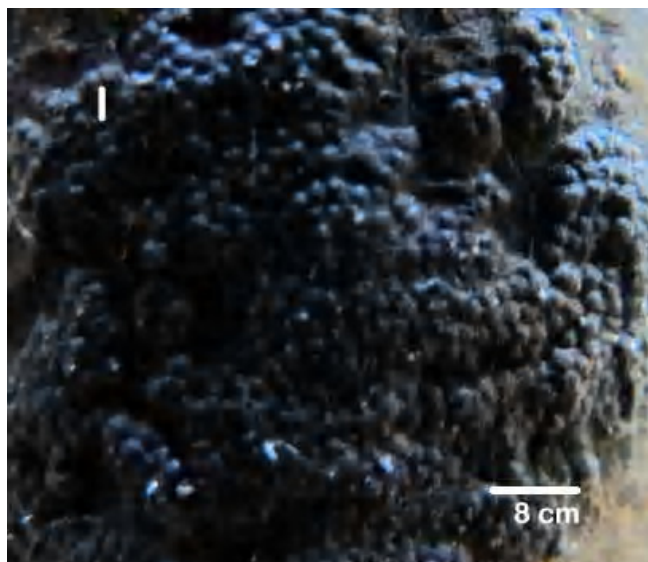


Fig. I : *Nemania atropurpurea*

Culture:

Dull black mycelium, light brown conidiophores, linear chain conidiogenous cells; conidia brown, elliptic with blunt ends.

Specimens examined :

Kargal RF:

Kalasavalli, on dead angiospermous stump, Dayanand Nejakar, 260 (XH), June 2011.

Xylaria schreuderiana van der Bijl :

Stromata stipitate, gregarious, branched or unbranched, club shape, acute, discoid base, 1-2cm high x 0.5-1cm diam; surface grey or dull black, wrinkled; interperithecial tissue white, solid. Perithecia oval, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, 3-4µm high x 2µm wide. Ascospores brown, ellipsoid-inequilateral, rounded ends, 16-20 x 6-8µm, straight germ slit spore length.

Culture:

White cottony mycelium, conidia hyaline, 5-6 x 1-2µm on OA.

Specimens examined :

Kargal RF:

Kalasavalli, on dead angiospermous stump, Dayanand Nejakar, 247 (XH), February 2011.

Nemania gwyneddii (Whalley, Edwards and Francis) Pouzar. (Fig. K) :

Stromata superficial, ellipsoid - elongate, inconspicuous

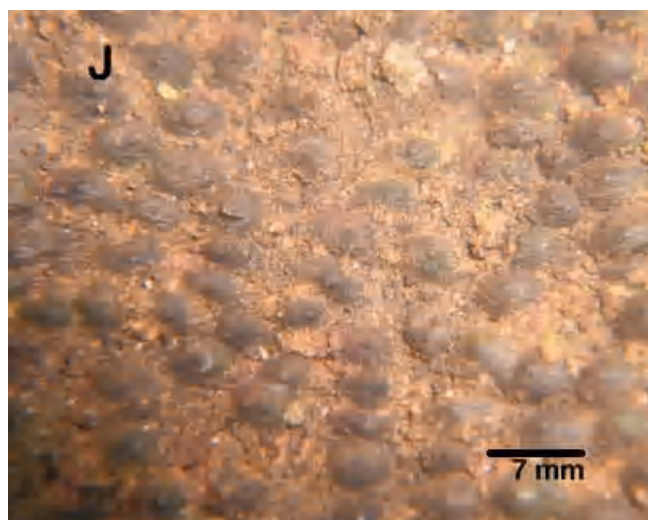


Fig. J : *Nemania effusa (Nitschke) Pouzar*

Specimens examined :

Kogar RF:

Hebbainakere, on dead wood, Dayanand Nejakar, 242 (XH), February 2011, E: 311⁰⁴.

Xylaria apiculata Cooke :

Stromata stipitate, cylindrical, branched or unbranched, acute, discoid base, 4-6cm high x 1.5-2cm diam; surface brown, wrinkled; interperithecial tissue white, solid. Perithecia globose, completely immersed. Ostioles non-papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, 4-5µm high x 3-4µm wide. Ascospores brown, ellipsoid-inequilateral, rounded ends, (16-) 18.4-22.8 (-26) x 6-8µm, sigmoid germ slit.

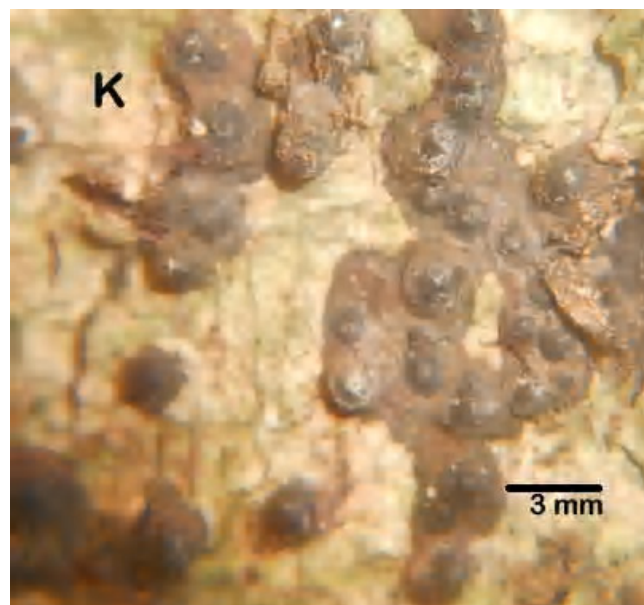


Fig. K : *Nemania gwyneddii*

perithecial mounds, 13 - 19mm long x 3-4mm broad x 0.6mm thick carbonaceous; surface blackish brown; interperithecial tissue soft. Perithecia subglobose, 0.5mm diam. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 7µm high x 3-4µm broad. Ascospores brown, ellipsoid-inequilateral with broadly rounded ends, 23-26 (-28) x 8-11µm, with straight germ slit spore length.

Specimens examined :

Kargal RF:

Bidaruru, on *Mangifera* bark, Dayanand Nejakar, 237 (XH), April 2011, E: 413⁰⁸.

Kogar RF :

Near Kanur RF office, on dead *Atrocarpous* stem, Dayanand Nejakar, March 2011, E: 488⁰¹.

***Nemania maritime* Ju and Rogers. (Fig. L) :**

Stromata scattered, uniperitheciate, surrounded by a waxy whitish tissue, 0.5-0.7mm diam, carbonaceous; surface dark brown; interperithecial tissue black. Perithecia subglobose, 0.5mm diam. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 1.5µm high x 2µm broad. Ascospores brown, ellipsoid-equilateral, with broadly rounded ends, 10-12 (-13) x 4.8-5.2µm, with straight germ slit spore length.

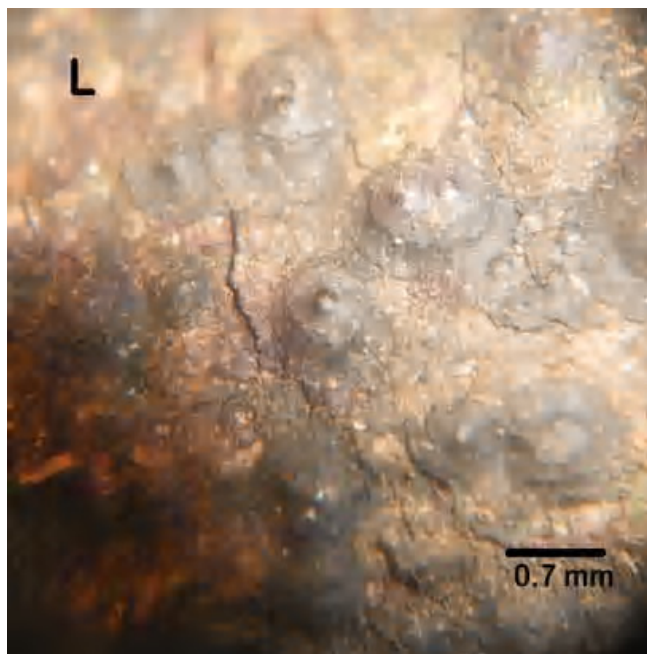


Fig. L : *Nemania maritime*

Specimens examined :

Kargal RF:

Near to entry gate of wild life sanctuary, on bark of

Dalbergia sp. and in Mandalli, Dayanand Nejakar, 251 (XH), May 2011.

***Xylaria hypoxylon* (L.: Fr.) Grev :**

Stromata stipitate, gregarious, branched or unbranched, cylindrical, acute, discoid base, 1-3cm high x 0.5-1cm diam; surface light brown, wrinkled; interperithecial tissue white, solid. Perithecia globose, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, 172-198µm length. Ascospores brown, ellipsoid-inequilateral, rounded ends, 12.4-14.8 x 4-6µm, straight germ slit spore length.

Culture :

Grayish colony, conidia hyaline, 6-8 x 2µm on OA.

Specimens examined :

Kargal RF:

Ambargodlu, Muppene, Aralagodu and Kalamandji, most common on dicot and monocot wood, Dayanand Nejakar, 255 (XH), January-June 2011.

Kogar RF :

Biligar, on dead wood, Dayanand Nejakar, 248 (XH), June 2011, E: 367⁰².

***Rosellinia aquila* (Fr.: Fr.) De Not. (Fig. M) :**

Stromata scattered, uniperitheciate, 1-1.2mm high x 1.1-1.3mm diam, carbonaceous; surface black; interperithecial tissue brown-black. Perithecia subglobose. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 5.2-6.7µm high x 4.4-5.1µm broad. Ascospores dark brown, ellipsoid-

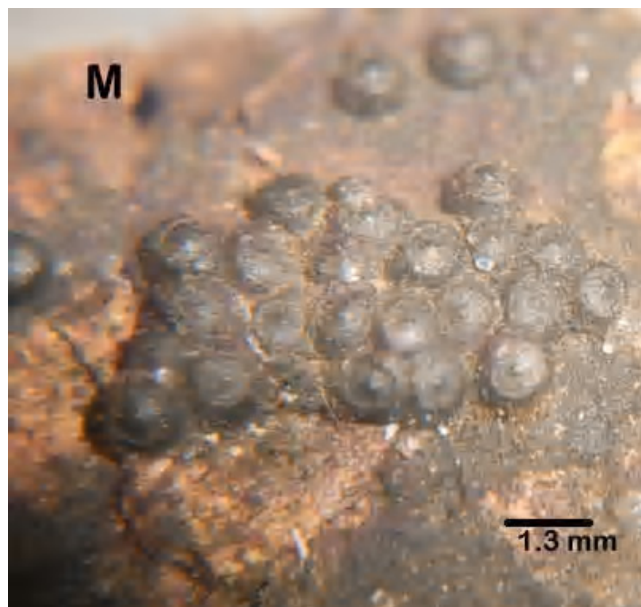


Fig. M : *Nemania aquila*

inequilateral with narrow rounded ends, (17-) 19.7-21.2 x 6-8µm, with straight germ slit spore length.

Culture :

The conidiogenous structure is *Geniculosporium* like on OA.

Specimens examined :

Kargal RF:

Way to Nagavalli, on dead stem of monocot, Dayanand Nejakar, 264 (XH), April 2011, E: 423⁰⁷.

***Rosellenia mammaeformis* (Pers.: Fr.) Ces. and De Not. (Fig. N) :**

Stromata scattered, subglobose, uniperitheciate, carbonaceous, 0.9mm diam x 0.6mm high; surface dark brown; interperithecial tissue black. Perithecia subglobose. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 3.8-4µm high x 3.2-3.5µm broad. Ascospores brown, ellipsoid-inequilateral, (18-) 19.3-20.8 x 6.6-7µm, with straight germ slit spore length.

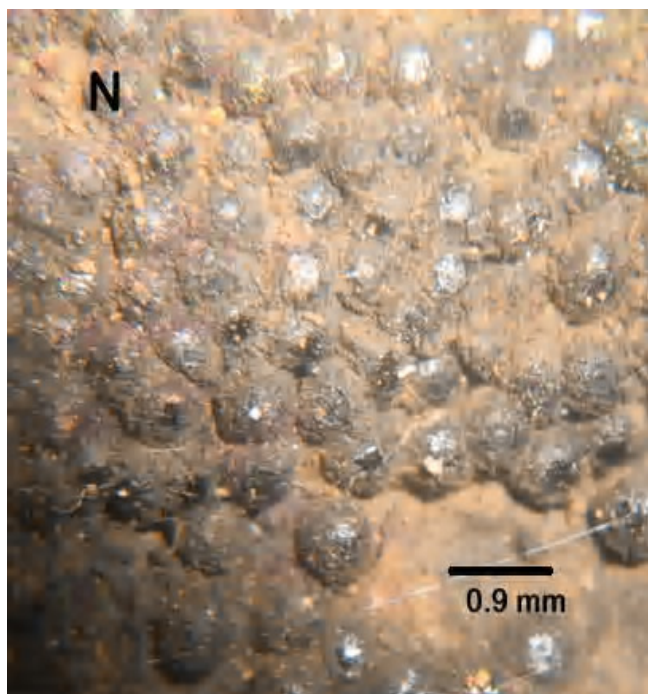


Fig. N : *Rosellenia mammaeformis*

Specimens examined :

Kogar RF:

Karani, on dead dicot wood, Dayanand Nejakar, 261 (XH), April 2011, E: 363⁰².

***Xylaria castorea* Berk :**

Stromata stipitate, solitary, cylindrical-flattened slightly, unbranched, obtuse, (1-) 2.5-3.4 (-6)cm long x 7-13mm wide x 4-6mm thick; surface dull black, wrinkled; interperithecial tissue white, solid. Perithecia globose, complete immersed. Ostioles papillate. Asci cylindrical, bluing in Melzer's iodine reagent, (130-) 132-136 (-140)µm high x 5-7µm broad. Ascospores dark brown, ellipsoid-inequilateral, rounded ends, (8-) 10-11 (-12) x 5-6µm, straight germ slit spore length.

Culture :

White cottony mycelium with hyaline conidia on OA.

Specimens examined :

Kargal RF:

Muppene, on angiospermous stump, Dayanand Nejakar, 235 (XH), June 2011, E: 451⁰³.

Kogar RF:

Megane, on dead monocot stem, Dayanand Nejakar, 240 (XH), February 2011.

***Xylaria anisopleura* (Mont.) Fr. :**

Stromata stipitate, gregarious, club shape-slightly flattened, discoid base, 3-4cm high x 1.5-2cm diam; surface brown-black, wrinkled; interperithecial tissue white, solid. Perithecia oval, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, 5-6µm high x 4-5µm wide. Ascospores brown, ellipsoid-inequilateral, rounded ends, (20-) 23.5- 24.5 (-26) x 6-8µm, sigmoid germ slit.

Culture:

White cottony mycelium with hyaline conidia, 11-12 x 3-4 µm on OA.

Specimens examined :

Kargal RF:

Ambaragodlu, on dead dicot wood, Dayanand Nejakar, 250 (XH), May 2011, E: 403⁰².

***Rosellinia mycophila* (Fr.: Fr.) Sacc. (Fig. O) :**

Stromata fused, uniperitheciate, subglobose, 0.7mm high x 1mm diam; surface dark brown-black; interperithecial tissue brown. Perithecia subglobose. Ostioles conical. Asci cylindrical, apical apparatus amyloid, 6µm high x 4.8µm broad. Ascospores dark brown, ellipsoid-inequilateral, narrow rounded ends, (17-) 19-21 x 5.5-6.1µm, with straight germ slit spore length.

Specimens examined :

Kargal RF:

Vatemakki, on dead wood of *Carryota* sp., Dayanand

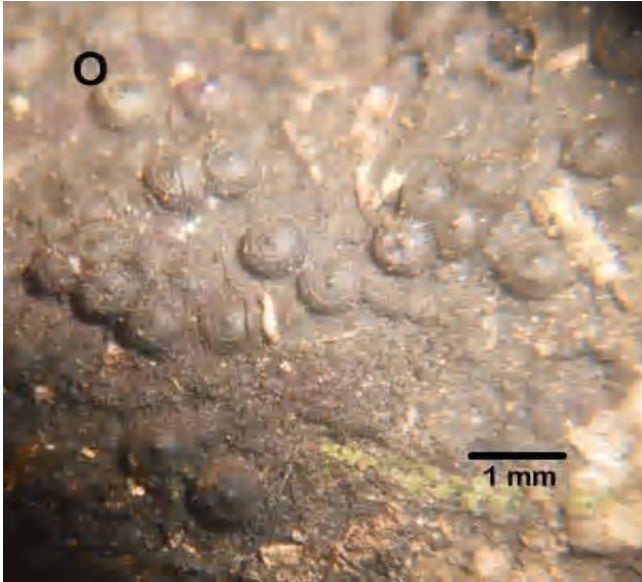


Fig. O : *Rosellenia mycophila*

Nejekar, 246 (XH), February 2011, E: 402⁹'.

***Rosellenia necatrix* Prillieux. (Fig. P) :**

Stromata gregarious, subglobose, uniperitheciate, carbonaceous, 1.5mm high x 1.6mm diam; surface black; interperithecial tissue dark brown. Perithecia subglobose. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 6-8 μ m high x 4.7-5.2 μ m broad. Ascospores brown-dark brown, ellipsoid-inequilateral, rounded ends, 36.7-40.1 x 5.5-5.9 (-8) μ m, with straight germ slit spore length.



Fig. P : *Rosellenia necatrix* Prillieux

Culture:

The conidiogenous structure is *Dematophora* like on OA.

Specimens examined :

Kargal RF:

Aralagodu, Mandalli, Muppene and Kalamangi, on angiospermic wood, Dayanand Nejekar, 259 (XH), January, February, April and June 2011.

Kogar RF:

Hebbainakere, Kanur and Nagavalli, on dead dicot wood, Dayanand Nejekar, 256 (XH), February, March and June 2011.

***Xylaria filiformis* (Alb. and Schw.: Fr.) Fr. :**

Stromata stipitate, solitary, unbranched, cylindrical thread like, acute, 6-8cm high x <0.5 diam; surface black; interperithecial tissue white, solid. Perithecia globose, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, (166-) 167.5- 168.2 (-169) μ m high x 88.3-102 μ m wide. Ascospores brown, ellipsoid-inequilateral, rounded ends, 13.6-18 x 5-8 μ m, straight germ slit spore length.

Specimens examined :

Kargal RF:

Vatemakki, on dead leaf of dicot, Dayanand Nejekar, 258 (XH), June 2011, E: 401⁶'.

***Rosellenia submilis* Karsten and Starb. (Fig. Q) :**

Stromata scattered, uniperitheciate, subglobose, 0.5 mm high x 0.7mm diam; surface black; interperithecial tissue dark brown. Perithecia subglobose. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 7.3-8.4 μ m high x 4.2-

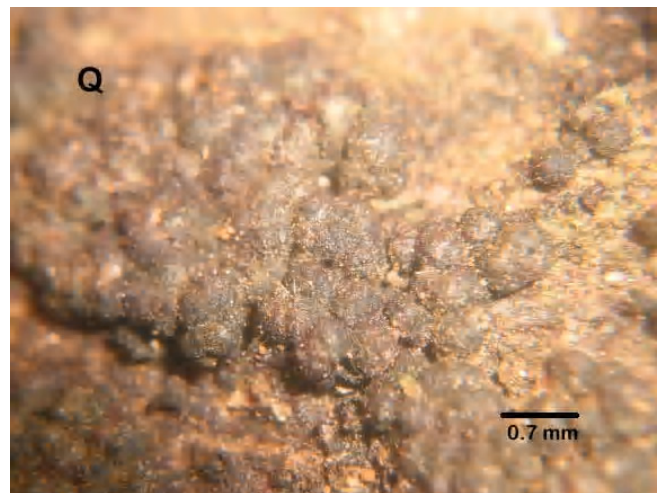


Fig. Q : *Rosellenia submilis* Karsten and Starb

5.1µm broad. Ascospores brown, ellipsoid-inequilateral with broadly rounded ends, 26 µm x 7.1-7.8µm, with straight germ slit spore length.

Specimens examined :

Kogar RF:

Hebbainakere, on dead wood of *Careya* sp., Dayanand Nejakar, 263 (XH), February 2011.

Rosellinia callosa G. Winter. (Fig. R) :

Stromata scattered, subglobose, uniperitheciate, 0.6-0.7mm high x 0.8mm diam; surface dark brown; interperithecial tissue light brown. Perithecia subglobose, 0.5-0.6mm diam. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 6µm high x 3.7-3.9µm broad. Ascospores dark brown, ellipsoid-inequilateral, narrow rounded ends, (21-) 23-27 (-28) x (6.5-) 6.8-7.2 (-7.5)µm, with sigmoid germ slit.



Fig. R : *Rosellinia callosa*

Specimens examined :

Kargal RF:

Muppene nature camp, on dead stem of *Xylia* sp., Dayanand Nejakar, 253 (XH), March 2011, E: 437⁰².

Xylaria theissenii Lloyd :

Stromata stipitate, solitary, cylindrical, unbranched, fertile part appears as beaded thread, 4-5cm high x 1-2cm diam; surface dull black or grey, wrinkled; interperithecial tissue white, solid. Perithecia globose, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent. Ascospores dark brown, ellipsoid-inequilateral, rounded ends, 35.7-38.3 x 10.6-12.4 µm, straight germ slit spore length.

Specimens examined :

Kogar RF:

Karani, on dead dicot wood, Dayanand Nejakar, 252

(XH), March 2011.

Xylaria aenea Mont. (Fig. S) :

Stromata stipitate, constricted at the base, 4-6cm high x 1.5-2cm thick, smooth, slender stalk; surface black and wrinkled on drying; interperithecial tissue white. Perithecia oval, completely immersed. Ostioles non papillate. Asci cylindrical. Ascospores brown, inequilateral, slightly curved ends, (33-) 35.2-38.9 (-40) x 6.7-7.5µm, sigmoid germ slit.



Fig. S : *Xylaria aenea*

Specimens examined :

Kargal RF:

Vatemakki and Muppene, on dead dicot wood, Dayanand Nejakar, 265 (XH), February and June 2011.

Xylaria arbuscula Sacc. (Fig. T) :

Stromata solitary, unbranched, wrinkled, glabrous, 10-20mm high x 1-1.5mm diam; surface black; interperithecial tissue white. Perithecia completely immersed. Ostioles non papillate.



Fig. T : *Xylaria arbuscula* Sacc.

Asci cylindrical, 171.4-192 μ m length x 5.6-6.8 μ m broad. Ascospores brown, ellipsoid-inequilateral, rounded ends, (12-) 13.4-15.7 (-17) x 5-6 μ m, sigmoid germ slit.

Specimens examined :

Kargal RF:

Vatemakki, on dead dicot wood, Dayanand Nejakar, 234 (XH), June 2011.

***Xylaria grammica* Mont. (Fig. U) :**

Stromata stipitate, unbranched, cylindrical, obtuse apex, smooth, 13.5cm high x 1.5-2cm diam; surface grey-black strips; interperithecial tissue solid, white. Perithecia completely



Fig. U : *Xylaria grammica* Mont.

immersed. Ostioles papillate. Asci cylindrical. Ascospores brown, ellipsoid-inequilateral, rounded ends, (11-)12.2-14.7(-15) x 3.5-4 μ m, sigmoid germ slit.

Specimens examined :

Kargal RF:

Aralagodu, on wood of *Mangifera* sp., Dayanand

Nejakar, 262 (XH), May 2011, E: 428⁰⁷.

***Xylaria polymorpha* (Pres. ex Fr.) Grev. (Fig. V) :**

Stromata stipitate, solitary, club shape, carbonaceous, slightly pointed or obtuse apex, smooth, 4cm high x 1.5-2cm diam; surface black; interperithecial tissue solid, white. Perithecia completely immersed. Ostioles papillate, black. Asci cylindrical. Ascospores dark brown, ellipsoid-inequilateral, rounded ends, (20-) 22.5-28.3 (-30) x (6-)7.1-9.6 (-12) μ m, sigmoid germ slit.

Specimens examined :

Kargal RF:

Mandalli and Vatemakki, on dead wood, Dayanand Nejakar, 257 (XH), February and March 2011.

Kogar RF:

Nagavalli, on angiospermic stump, Dayanand Nejakar, 270 (XH).



Fig. V : *Xylaria polymorpha*

***Xylaria longipes* Nits :**

Stromata stipitate, solitary, slender, flattened, unbranched, slightly acute or obtuse, 3.4-6cm high x 2-2.5cm diam; surface black, wrinkled; interperithecial tissue white, solid. Perithecia subglobose, completely immersed, 427-502µm diameter. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent. Ascospores dark brown, ellipsoid, rounded ends, (9-) 10.4-11.8 (-12.5) x 4-5µm, straight germ slit spore length.

Specimens examined :***Kargal RF:***

Ambargodlu, on dicot wood, Dayanand Nejakar, 254 (XH), February 2011, E: 416⁰⁹.

***Nemania atropurpurea* (Fr.:Fr.) Pouzar. (Fig. I) :**

Stromata superficial, carbonaceous, host surface black, 20cm long x 6-8cm broad x 1mm thick; surface dull black; conspicuous perithecial mounds forming a polyhedral pattern. Perithecia subglobose, 0.6-0.9mm diam. Ostioles papillate. Asci cylindrical, apical apparatus amyloid, 2.2-2.4µm high x 2µm broad. Ascospores dark brown, ellipsoid-inequilateral, narrow rounded ends, (9.6-) 10-11(-11.5) x 4.2-4.8µm, conspicuous short germ slit.

Specimens examined :***Kargal RF:***

Hebbainakere, on dead dicot wood, Dayanand Nejakar, 233 (XH), January 2011, E: 306⁰⁴.

***Xylaria multiplex* (Kze) Fr.:**

Stromata gregarious, acute tip, unequal middle portion, discoid base, 3-5cm high x 2cm diam; surface black, rough; interperithecial tissue white, solid. Perithecia subglobose, dark brown, completely immersed. Ostioles papillate. Asci cylindrical, apical ring bluing in Melzer's iodine reagent, (80-) 83.4-88.6(-90)µm high x 4-5µm wide. Ascospores dark brown, fabiform, rounded ends, (8-) 9.5-10(-12) x 3-4(-4.5)µm, straight germ slit spore length.

Specimens examined :***Kargal RF:***

Muppene, on dead dicot wood, Dayanand Nejakar, 249 (XH), June 2011, E: 446⁰¹.

Kogar RF:

Karani, on dead wood of *Syzygium* sp., Dayanand Nejakar, 270 (XH), February 2011.

In present study totally 33 species belongs to 4 genera were collected. *Xylaria* was the dominant genera and available in all study area. *Xylaria hypoxylon* (L.: Fr.) Grev. was the dominant species and found in all the months, followed by *Rosellinia necatrix* Prillieux. *Xylaria filiformis* (Alb. and Schw.:

Fr.) Fr. was the only species collected on dead dicot leaf and remaining from dead dicot and monocot stems.

Conclusion :

Majority of the mushroom are available only in rainy season but almost all Xylariales members available throughout the year. As per our earlier study September to February was the perfect time to get telomorphs (Nejakar and Nejakar, 2009).

Thus, the study provides magnificent opening for further study. The results reveal that their still a lot of varied investigated groups. In the word of Rogers (2000) "Almost every collecting box of specimens received from correspondents reveals new taxa and other surprises. Although I have not collected in India, *Xylaria* collections from both areas contain a high percentage of taxa unknown to me".

Acknowledgement :

The work was carried out with the grants from ATREE, Bangalore under the Scheme of Small Grants-2010. The authors are thankful to faculty members of Kuvempu University, Karnataka University, Hongirana and L. B. College Sagar. Special thanks to Karnataka Forest Department and staff members of SWLS. Thanks to Dr. J. S. Dargan, Retd. Professor, Punjabi University, Patiala for providing useful monographs.

REFERENCES

- Agnihothrudu, V. (1965). Fungi from North India XXII. *Mycopath. Mycol. Appl.*, **23**: 111-115.
- Dargan, J.S. (1980). The family Xylariaceae in India- A Review; *J. Indian Bot. Soc.*, **59**: 53-59.
- Dargan, J.S. (1982). *Xylaria mussooriensis*-a new species from India. *Mycologia*, **64**:523-525.
- Dargan, J.S. (1983). Xylariaceae of India-XIV. Two new species of genus *Xylaria* from India. *J. Biol. Res.*, **3**:43-49.
- Dargan, J.S. (1984). Xylariaceae of India-XIII. *Plant and Nature*; **2**:136-138.
- Dargan, J.S. (1987a). Distribution of Xylariaceae in western Himalayas. *J. Indian Bot. Soc.*, **66**: 40-42.
- Dargan, J.S. (2006). Family Xylariaceae – Status and Progress in India. *Kavaka*; **34**:1-16.
- Dargan, J.S. and Bhatia, M. (1988b). Genus *Eutypella* from W. Himalayas. *Nova Hedwigia*, **47**: 111-117.
- Dargan, J.S. and Mann, S.K. (1985). Pyrenomycetous fungi of Punjab-IV. The family Xylariaceae. *Biologica*, **1**: 146-156.
- Dargan, J.S. and Singh, M. (1982c). Pyrenomycetous fungi of Punjab-III *Xylaria punjabensis*, sp.nov. from India. *Nordic J. Bot.*, **2**: 71-73.
- Dargan, J.S. and Singh, M. (1986). *Hypoxylon nummularium* var. *exutans* and *Hypoxylon albostictum*: Two unrecorded pyrenomycetes from India. *J. Indian Bot. Soc.*, **65**: 411-415.

- Dargan, J.S., Singh, M. and Bhatia, M. (1982). Four new species of genus *Xylaria* from India. *J. Indian Bot. Soc.*, **62**: 4.
- Dargan, J.S. and Thind, K.S. (1979). Xylariaceae of India-VII. The genus *Rosellinia* in the North-West Himalayas; *Mycologia.*, **71**: 1010-1023.
- Dargan, J.S. and Thind, K.S. (1982). Xylariaceae of India-XII; *Indian Phytopath.*, **35**: 92-99.
- Dargan, J.S. and Thind, K.S. (1984). Xylariaceae of India-VIII. Genus *Daldinia* Ces. and de. Not. - A further segregation in to two new subgenera; *Kavaka*, **12**: 113-118.
- Dennis, R.W.G. (1956). Some Xylariaceae of tropical America; *Kew Bull.*, 401-444pp.
- Dennis, R.W.G. (1958). Some Xylosterias of tropical Africa; *Revista de Biologia, Lisboa.*, **1**: 175-208.
- Hyde, K.D., Ho, W.H., McKenzie, E.H.C. and Dalisay, T. (2001). Saprobic fungi on bamboo culms; *Fungal Diversity*; **7**: 35-48.
- Izumi, Okane and Akira, Nakagiri (2007). Taxonomy of An Anamorphic Xylariaceous Fungus from a Termite Nest Found Together with *Xylaria angulosa*; *Mycoscience*, **48**: 240-249.
- Ju, Y.M. and Rogers, J.D. (1996). A revision of the genus *Hypoxylon*; *Mycologia Memoir*, **20**: 1-365.
- Ju, Y.M. and Rogers, J.D. (1999). The Xylariaceae of Taiwan (excluding *Anthostomella*); *Mycotaxon*, **73**: 343-440.
- Ju, Y.M. and Rogers, J.D. (2002). The genus *Nemania* (Xylariaceae); *Nova Hedwigia*, **74**: 75-120.
- Kirk, P.M., Cannon, P.F., David, J.C. and Stalpers, J.A. (2001). Ainsworth and Bisby's Dictionary of the Fungi; *C.A.B. International*; pp. 655.
- Klotzsch, J.F. (1832). Mycologische Berichtigen; *Linnaea*; **7**: 193-204.
- Lakhanpal, T.N. and Mukerji, K.G. (1973). Morphology of some Indian species of Xylariaceae and Clavicipitaceae; *Ceska Mycologie*, **27**: 169-173.
- Liliane, E. Petrini (2003). *Rosellinia* and related genera in New Zealand; *New Zealand J. Bot.*, **41**: 71-138.
- Lloyd, G.C. (1917-19). Synopsis of some genera of the large Pyrenomycetes; pp.32.
- Luttrell, E.S. (1951). Taxonomy of Pyrenomycetes; *Univ. Missouri Stud. Sci. Ser.*, **24**: 1-120.
- Martin, P. (1967). Studies in the Xylariaceae: I. New and old concepts; *J. South African Bot.*, **33**: 205-240.
- Miller, J.H. (1961). A monograph of the world species of *Hypoxylon*. Athens: *University of Georgia Press*; pp.158.
- Mukerji, K.G., Bedi, K., Tiwari, J.P. and Tiwari, I. (1969). Morphology of Indian species of *Xylaria* and *Poronia*; *Phytomorphology*, **19**: 219-224.
- Nejekar, Dayanand and Nejekar, Sujata (2009). Effect of environmental factors on Xylariales in Western Ghats (Ecological economics: An approach towards socio-Economic and Environmental sustainability); *ISEC Publ.*, 248-266pp.
- Pande, Alaka (1974). Behaviour of some species of family Xylariaceae in artificial culture; *J. Univ. Poona Sci. Tech. Sect.*, **46**: 69-72.
- Pande, Alaka and Dighe, Sangeeta (1997). Stromatal pigments in *Hypoxylon* and allied genera collected from Peninsular India. *J. Plant Morph. Taxo.*, **7**: 33-37.
- Pande, Alaka (2005). Family Xylariaceae-An Overview; *Frontiers in Plant Sci.*, 21-34pp.
- Pande, Alaka (2008). *Ascomycetes of Peninsular India*; *Scientific Publishers*. 412-471pp.
- (Penz and Sacc.) Miller-a new fungus record from India; *J. Indian Bot. Soc.*, **61**: 119-121.
- Rogers, J.D. (1983). *Xylaria bulbosa*, *Xylaria curta*, and *Xylaria longipes* in central United States; *Mycologia*, **75**: 457-467.
- Rogers, J.D. (1984). *Xylaria cubensis* and its anamorph *Xylocoremium flabelliforme*, *Xylaria allantoidea*, and *Xylaria poite* in continental United States; *Mycologia*, **76**: 912-923.
- Rogers, J.D. (2000). Thoughts and musings of Xylariaceae; *Mycol. Res.*, **104**: 1412-1420.
- Rogers, J.D. and Ju, Y.M. (2004). *Kretzschmaria varians* sp. nov., *Xylaria coremiifera* sp. nov. and *Xylaria umbonata* sp. nov. from Costa Rica; *Mycological Progress*, **3**: 37-40.
- Rogers, J.D., Miller, A.N. and Vasilyeva, L.N. (2008). Pyrenomycetes of the Great Smoky Mountains National Park. VI. *Kretzschmaria*, *Nemania*, *Rosellinia* and *Xylaria* (Xylariaceae); *Fungal Diversity*, **29**: 107-116.
- Rogers, J.D. and Samuels, G.J. (1986). Ascomycetes of New Zealand 8. *Xylaria*; *New Zealand J. Bot.*, **24**: 615-650.
- Saccardo, P.A. (1882). Sylloge fungorum omnium hucusque cognitorum. Vol. I; Patavii. 786pp.
- Subramanian, C.V. (1972). *Padixonia*, a genus of Hypomycetes; *Current Sci.*, **41**: 282-283.
- Senkowsky, Sonya (2006). Unearthing the secret lives of alaska's mushrooms; *Bio Sci.*, **56**: 99-101.
- Stadler, Marc and Veronika, Hellwig (2005). Chemotaxonomy of the Xylariaceae and remarkable bioactive compounds from Xylariales and their associated asexual stages; *Recent Res. Devel. Phytochem.*, **9**: 41-93.
- Whalley, A.J.S. (1985). The Xylariaceae: Some ecological considerations; *Sydowia*, **38**: 369-382.
- Whalley, A.J.S. (1996). The Xylariaceous way of life; *Mycol. Res.*, **100**: 897-922.

Whalley, A.J.S. and Edwards, R.L. and Francis, S.M. (1983).
Hypoxyton gwynedii sp. nov. from Wales Trans; *Br. Mycol.*
Soc., **81**: 389-392.

WEBLIOGRAPHY

www.indexfungorum.org.

www.pyrenomycetes.free.fr.

