

The genus *Asterina* and its anamorph on *Elaeocarpus* species in Southern Western ghats of peninsular India

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Abstract : The present study observed that the family Elaeocarpaceae comprises three genera: *Elaeocarpus*, *Sloanea* and *Muntingia* in India. Of these, *Elaeocarpus munronii*, *E. serratus*, *E. tectorius* and *E. tuberculatus* were found infected with *Asterina gamsii*, *A. elaeocarpi* var. *ovalis*, *A. elaeocarpicola* and *Asterostomella elaeocarpi-serrati* in the Southern Western Ghats of peninsular India. All these species are described and illustrated in detail.

Keywords : Fungi, Black mildews, *Asterina*, *Elaeocarpus*, Southern western ghats

INTRODUCTION

The family Elaeocarpaceae comprises three genera, namely, *Elaeocarpus*, *Sloanea* and *Muntingia*. The genus *Sloanea* is distributed in North and North-eastern states, while *Muntingia* is an introduced and cultivated ornamental plant for its profuse showy flowers. The genus *Elaeocarpus* comprises about 200 species, and of which 29 are represented in India. These are confined to north eastern and southern India, while few are in Andaman and Nicobar Islands. They prefer warm humid climate and occur at an altitude between 200 to 2000 m. About twelve species are known from the southern Western Ghats (Murti, 1993) and of which, *Elaeocarpus munronii* (Wight) Masters, *Elaeocarpus serratus* L., *Elaeocarpus tectorius* (Lour.) Poiret and *Elaeocarpus tuberculatus* Roxb. were found infected with *Asterina* species.

The genus *Asterina* belongs to the family Asterinaceae of the order Asterinales. It is characterized by an ectophytic, septate, brown, branched, appressoriolate mycelium. Ascoma is flattened with radiating cells is called thyriothecium. Thyriothecium orbicular, flattened, with upper radiating cells, fimbriate to crenate at the margin, dehisce stellately at the centre. Asci globose, bitunicate, mostly octosporous, persistent. Ascospores brown, two celled.

Type: *A. melastomatis* Lev.

The genus *Lembosia* is allied to *Asterina*, belongs to the family Lembosiaceae but differs from it in having ellipsoidal to elongated thyriothecia which splits vertically (in contrast to stellately) at the centre (Hosagoudar *et al.*, 2001).

Asterinaceous fungi are obligate biotrophs that cause

least apparent damage to the host plants but bring biochemical changes as is evidenced in the case of *Santalum album* infected with *Asterina congesta* Cooke (Hosagoudar *et al.*, 1997). These biochemical changes, which occur in the plants, may be of immense use as in the case of 'ergot' caused by *Claviceps purpurea* Cooke. Keeping this in view, the present study has been undertaken with the taxonomic aspect of the *Asterina* spp. infecting the species of the host genus *Elaeocarpus*

KEY TO THE ASTERINA SPECIES

1. Present only in anamorph state
... *Asterostomella elaeocarpi-serrulati*
1. Present in teleomorph state ...2
2. Appressoria cylindrical, straight, flexuous, unciniate, often forked
... *Asterina elaeocarpicola*
2. Appressoria not so ...3
3. Appressoria cylindrical, tubular, elongated, rounded at the apex
... *Asterina elaeocarpi* var. *ovalis*
3. Appressoria ovate to cylindrical, entire, rounded at the tip ...
Asterina gamsii

Enumeration of the species

1. *Asterina gamsii* Hosagoudar (2005) (Fig.1).

Colonies epiphyllous, dense, velvety, up to 3 mm in diameter and cover an entire upper portion of the leaves. Hyphae straight to substraight, branching irregular at acute angles, loosely to closely reticulate, cells 16-23 x 4-7 µm. Appressoria alternate, unilateral and about 20% opposite to subopposite, mostly straight, subantrorse to rarely retrorse, ovate to cylindrical, entire, rounded at the apex, 8-13 x 6-8 µm. Thyriothecia closely scattered, orbicular,

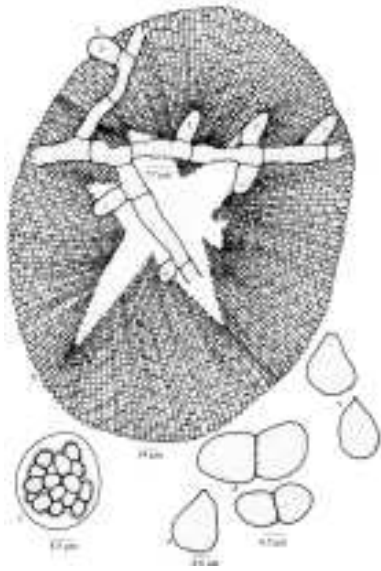


Fig. 1. *Asterina gamsii* Hosagoudar
a. Appressoriolate mycelium, b. Thyriotheceum,
c. Ascus, d. Ascospores, e. Pycnothyriospores

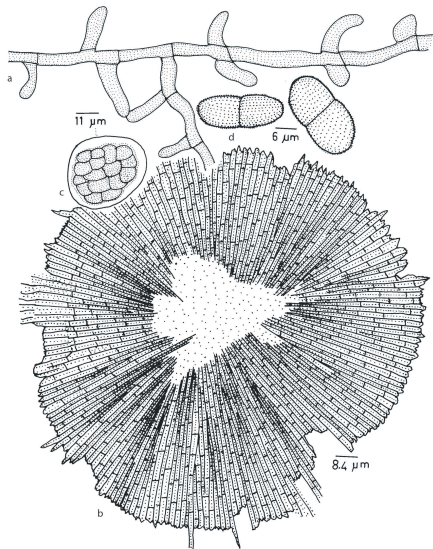


Fig. 2. *Asterina elaeocarpi* Sydow var. *ovalis* Kar and Maity
a. Appressoriolate mycelium, b. Thyriotheceum,
c. Ascus, d. Ascospores

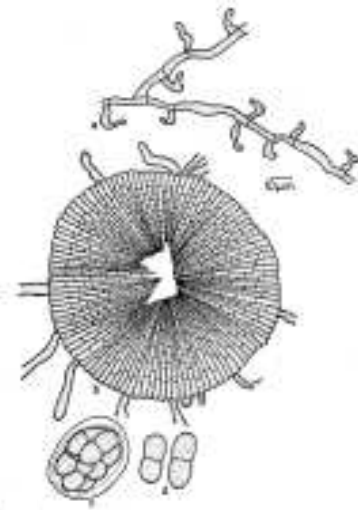


Fig. 3. *Asterina elaeocarpicola* Hansford
a. Appressoriolate mycelium, b. Thyriotheceum,
c. Ascus, d. Ascospores

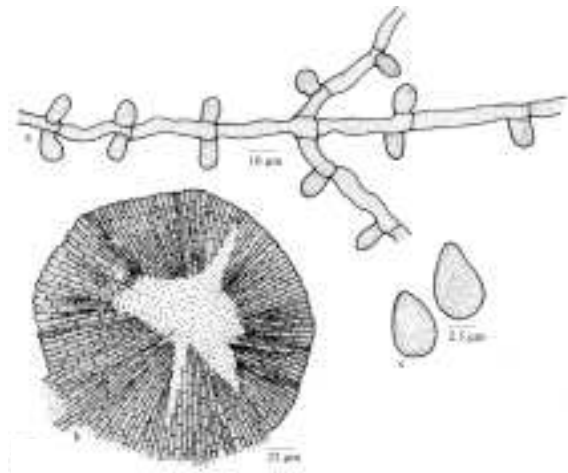


Fig. 4. *Asterostomella elaeocarpi-serrati* Hosagoudar
a. Appressoriolate mycelium, b. Pycnothyrium,
c. Pycnothyriospores

up to 300 μm in diameter, stellately dehiscid at the centre, crenate to fimbriate at the margin, fringed hyphae flexuous; asci few to many, globose, octosporous, up to 38 μm in diam.; ascospores oblong, brown, uniseptate, constricted at the septum, 32-36 x 11-18 μm , wall smooth. Pycnothyria similar to thyriotheceia, smaller; pycnothyriospores pyriform, apiculate, brown, 22-26 x 16-18 μm .

Materials examined: On leaves of *Elaeocarpus tectorius* (Lour.) Poir (*E. oblongus* auct. non Gaertn.), Sairandhri, Silent valley, Palghat, Kerala, Dec. 13, 2003, V.B. Hosagoudar and al TBGT 1502, HClO 45753; Chempatty, Silent Valley, Palghat, Kerala, Dec. 14, 2003,

V.B. Hosagoudar & al TBGT 1900, HClO 46137; Moozhiyar forest, Pathanamthitta, Kerala, Dec. 14, 2004, V.B. Hosagoudar & al TBGT 1861, HClO 46098.

There are five species, namely, *Asterina borneensis* Hansf., *A. elaeocarpi* Sydow, *A. elaeocarpi* Sydow var. *ovalis* Kar & Ghosh, *A. elaeocarpicola* Hansf. and *A. elaeocarpi-kobemochi* Yamam., known on the members of the family Elaeocarpaceae (Hosagoudar and Abraham, 2000). *Asterina gamsii* differs from *A. elaeocarpicola* and *A. borneensis* in having octosporous asci and straight appressoria (Hansford, 1954). It differs from *A. elaeocarpi* in having opposite appressoria and larger ascospores. It also differs from *A. elaeocarpi* var. *ovalis* in having ovate appressoria in contrast to longer and cylindrical ones (Kar and Ghosh, 1986). In *A. elaeocarpi-kobemochi* appressoria are predominantly opposite and oblong and ascospores are smaller (Yamamoto, 1957).

2. *Asterina elaeocarpi* Sydow var. *ovalis* Kar and Maity (1986); Hosagoudar, Balakrishnan and Goos (1996) (Fig.2).

Colonies epiphyllous thin to subdense, up to 2 mm in diameter, confluent and cover the entire upper surface of the leaves. Hyphae straight to substraight, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 8-13 x 3-4 μm . Appressoria alternate, opposite to subopposite, ovate to oblong, long, elongated, unicellular, entire, 4-24 x 4-5 μm . Thyriothecia scattered to connate, orbicular, up to 160 μm in diameter, stellately dehisced at the centre, crenate to fimbriate at the margin, fringed hyphae flexuous; asci few to many, globose to ovate, octosporous, 35-45 μm in diameter; ascospores oblong, conglobate, deep brown, uniseptate, constricted at the septum, 22-24 x 9-13 μm , wall coarsely echinulate.

Materials examined: On leaves of *Elaeocarpus tuberculatus* Roxb., Karingundru, Valparai, Anamalai, Coimbatore, Tamil Nadu, Dec. 26, 1990, V.B. Hosagoudar HClO 30961; Athirumala, Neyyar Wildlife Sanctuary, Thiruvananthapuram, Kerala, March 26, 1996, V.B. Hosagoudar TBGT 48, HClO 42176; Periya, Wyanad, Kerala, Feb. 6, 2002, M. Kamarudeen TBGT 622, HClO 44297; Dec. 27, 2002, M. Kamarudeen & P.A. Jose TBGT 1024, HClO 44787; Sairandhri, Silent valley, Palghat, Kerala, Dec. 13, 2003, V.B. Hosagoudar & al TBGT 1521, HClO 45772; Tirunelly, Wyanad, Kerala, May 20, 2002, S. Shiburaj TBGT 920, HClO 44638; Attayar, Thiruvananthapuram, Kerala, March 19, 1997, V.B. Hosagoudar TBGT 485, HClO 44077; Moozhiyar forest, Pathanamthitta, Kerala, Dec. 14, 2004, V.B. Hosagoudar & al TBGT 1644, HClO 46232; Kakki dam, Moozhiyar forest, Pathanamthitta, Kerala, Dec. 14, 2004, V.B. Hosagoudar TBGT 1750, HClO 45986; *Elaeocarpus* sp., Shendurney, Kollam, Kerala, Jan. 14, 2003, V.B. Hosagoudar TBGT 41, HClO 44854; Sairandhri, Silent valley, Palghat, Kerala, Dec. 13, 2003, V.B.

Hosagoudar & al TBGT 1825, HClO 46062.

This taxon is distinct from other *Asterina* species reported on the members of the host genus *Elaeocarpus* in having cylindrical to tubular, short to elongated, unicellular appressoria which are broadly rounded at the tip.

This taxon is common on *Elaeocarpus tuberculatus* in the Western Ghats region of Peninsular India.

3. *Asterina elaeocarpicola* Hansford (1954); Hosagoudar and Goos (1996) (Fig.3).

Colonies amphigenous, mostly hypophyllous, subdense, up to 3 mm in diameter, confluent and cover the entire lower surface of the leaves. Hyphae sinuous to crooked, branching irregular at acute angles, loosely reticulate, cells 15-19 x 3-5 μm . Appressoria mostly unicellular, mostly alternate, rarely opposite, cylindrical, straight, flexuous, mostly irregularly uncinuate, rarely forked, 9-19 x 3-5 μm . Thyriothecia closely scattered and often connate, orbicular, up to 186 μm in diameter, margin crenate, rarely fimbriate, dehiscing stellately at the center; asci many, octosporous, globose, 40-44 μm in diameter; ascospores conglobate, brown, 1-septate, 24-28 x 9-13 μm .

Materials examined: On leaves of *Elaeocarpus munronii* (Wight) Masters, Kakachi forest, Tirunelveli, Tamil Nadu, Feb. 21, 1994, V.B. Hosagoudar HClO 41630; Moozhiyar forest, Pathanamthitta, Kerala, Dec. 14, 2004, V.B. Hosagoudar & al. TBGT 1810, HClO 46047; Pachakanam, Moozhiyar forest, Pathanamthitta, Kerala, Dec. 15, 2004, V.B. Hosagoudar & al. TBGT 1808, HClO 46045; *Elaeocarpus* sp., Kakki dam, Moozhiyar forest, Pathanamthitta, Kerala, Dec. 15, 2004, V.B. Hosagoudar & al TBGT 1934, HClO 46288.

Curved to uncinuate appressoria are the characters of this species.

4. *Asterostomella elaeocarpi-serrati* Hosagoudar in Hosagoudar, Biju and Anu Appaih (2006) (Fig. 4).

Colonies amphigenous, dense, up to 1 mm in diameter, rarely confluent. Hyphae straight to flexuous, branching mostly opposite at acute angles, loosely to closely reticulate, cells 8-24 x 5-7 μm . Appressoria alternate, about 30% opposite, unicellular, conoid, ovate, entire, straight, attenuated and broadly rounded at the apex, 8-13 x 6-8 μm . Pycnothyria scattered, orbicular, up to 258 μm in diameter, stellately dehisced at the centre, margin crenate; pycnothyriospores pyriform, brown, 20-26 x 19-21 μm , wall smooth.

Materials examined: On leaves of *Elaeocarpus serratus* L., Abbe falls, Madikeri, Coorg, Karnataka, Nov. 11, 2003, V.B. Hosagoudar & al. HClO 45817, TBGT 1567.

This is an anamorph of the genus *Asterina* and is close to *A. borneensis* Hansf. in having smaller and alternate to opposite appressoria. However, differs from it in having conoid but 30% opposite appressoria (Hansford, 1954).

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