



## Three new asterinaceous fungi from western ghats, India

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### Abstract

In present paper two species and a variety are taxonomically described as new to science belonging to the genus *Asterina*, namely, *A. latifoliae* sp. nov., *A. lanceolatae* sp. nov. and *Asterina dissiliens* (Sydow) Doidge var. *celastrii* var. nov. Comparative account of each new taxa is provided.

**Key words** – *Asterina* – taxonomy – Western Ghats

### Introduction

Asterinaceous fungi are one of a groups belonging to black mildew fungi; occur luxuriantly and prominently on a wide range of tropical plants of the world. They are found to be very common in the forest of Western Ghats of India. From India, number of researchers studied Asterinaceous fungi and contributed much to this group (Hansford & Thirumalachar 1948, Kar & Maity 1970, Thite & Kulkarni 1976, Patil & Thite 1977, 1978, 1981, Hosagoudar & Hanlin 1995, Hosagoudar & Goos 1994, 1996, Hosagoudar et al. 2011).

From India, 207 species of *Asterina* were reported (Hosagoudar 2012). During an explorations of foliicolous fungi in the Western Ghats region of south-western Maharashtra State, India, several specimens of black mildew fungi infected host plants were collected. After the detail morphotaxonomical study of collected specimen's, authors identified few undescribed black mildew fungi. These interested specimens are thoroughly examined and identified under genus *Asterina* belong to family *Asterinaceae*. The detail literature survey and microscopic observation of each specimen does not match to any species and variety, which was reported earlier on the host plants belonging to same family (Hosagoudar 2012, Farr and Rossman 2013). Therefore, present paper proposes two new species of the genus *Asterina*, namely; *Asterina latifoliae* sp. nov., *Asterina lanceolatae* sp. nov. and a new variety of *Asterina dissiliens* (Sydow) Doidge var. *celastrii* var. nov. subsequently, compared with the closely related species from same host family from India.

### Materials & Methods

The plant leaves, infected with black superficial fungal colonies were collected from Petlond (Sangli District), Patgaon (Kolhapur District) and Mahabaleshwar (Satara District) of Maharashtra state, India in 1984, with separately in polythene bags along with a host twigs. These

collections were pressed neatly and dried in-between blotting papers. The well dried specimens were kept in standard size herbarium packets. The host plants were identified by referring the regional flora (Cooke 1901-08, Singh et al. 2000, 2001, Yadav and Sardesai 2002) and also by consulting the angiosperm taxonomists. In the laboratory, the peeling solution (Xylene-thermocol) was used to study the micro-morphological characters of the fungi. Holotype specimens were deposited in Herbarium Cryptogamae Indiae Orientalis (HCIO), IARI, New Delhi (India).

## Results

### Taxonomic Descriptions

#### *Asterina latifoliae* Patil, Bhise & Patil, **sp. nov.**

Figs 1–5

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Etymology – Named after the host species.

Colonies epiphyllous, thin, upto 4 mm in diameter. Mycelium superficial on host surface, with many thyriothecia, branching alternate to irregular, loosely reticulate, hyphae cells 13–17 × 2 µm, partially hyaline or olive brown or paler, straight, thin-walled. Appressoria upto 4.5 µm long, few, unicellular, unilateral, spreading, semicircular, very small. Thyriothecia upto 200 µm diameter, solitary, gregarious, superficial, orbicular, flattened, black, with simply dehisced stellately, sometimes irregular fissures or by large central pore, margin fimbriate. Asci 20–43 × 20–30 µm, 8-spored, numerous, bitunicate, fissitunicate, obovoid to broadly clavate. Ascospores 13–17 × 5–7 µm, oblong, 1-septate, light brown to olive brown, constricted at septum, more or less equal celled or lower cell slightly broad, margin entire, smooth-walled.

Material examined – India, Maharashtra, Sangli, Petlond, Chandoli Wildlife Sanctuary, on the leaves of *Elaeagnus conferta* (= *Elaeagnus latifolia*), 20 March 1984, Patil C.R., HCIO 40032 (holotype).

Notes – *Asterina elaeagni* (Sydow) Sydow & Petrak is known on *Elaeagnus kologa* from Karnataka, India (Hansford & Thirumalachar 1948, Hosagoudar 2012). However, the present collection differs in having small sized hyphae cells, appressoria, thyriothecia, asci, ascospores and its host species (Table 1).

**Table 1** Comparative account of *Asterina elaeagni* and *Asterina latifoliae* sp.nov.

| S. No. | Morphotaxonomic characters | <i>Asterina elaeagni</i> (Sydow) Sydow & Petrak                         | <i>Asterina latifoliae</i> sp.nov.                           |
|--------|----------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------|
| 1.     | Host Plant                 | <i>Elaeagnus kologa</i>                                                 | <i>Elaeagnus conferta</i>                                    |
| 2.     | Colonies                   | Epiphyllous, up to 3 mm diam.                                           | Epiphyllous, up to 4 mm diam.                                |
| 3.     | Mycelium & Hyphae cell     | Branching alternate to irregular, acute to wide angles, 25–42 × 3–4 µm. | Branching alternate or irregular, 13–17 × 2 µm.              |
| 4.     | Appressoria                | Alternate to unilateral, subglobose, 5–7 × 5–10 µm.                     | Unilateral, semicircular, upto 4.5 µm.                       |
| 5.     | Thyriothecia               | Orbicular, up to 350 µm diam.                                           | Orbicular or flattened, upto 200 µm diam.                    |
| 6.     | Asci                       | Numerous, globose, 42–62 × 12–30 µm.                                    | Numerous, obovoid or broadly clavate, 20–43 × 20–30 µm.      |
| 7.     | Ascospores                 | Constricted at septum, 20–22 × 9–11 µm, smooth-walled.                  | Constricted at septum, 13–17 × 5–7 µm, thin & smooth-walled. |

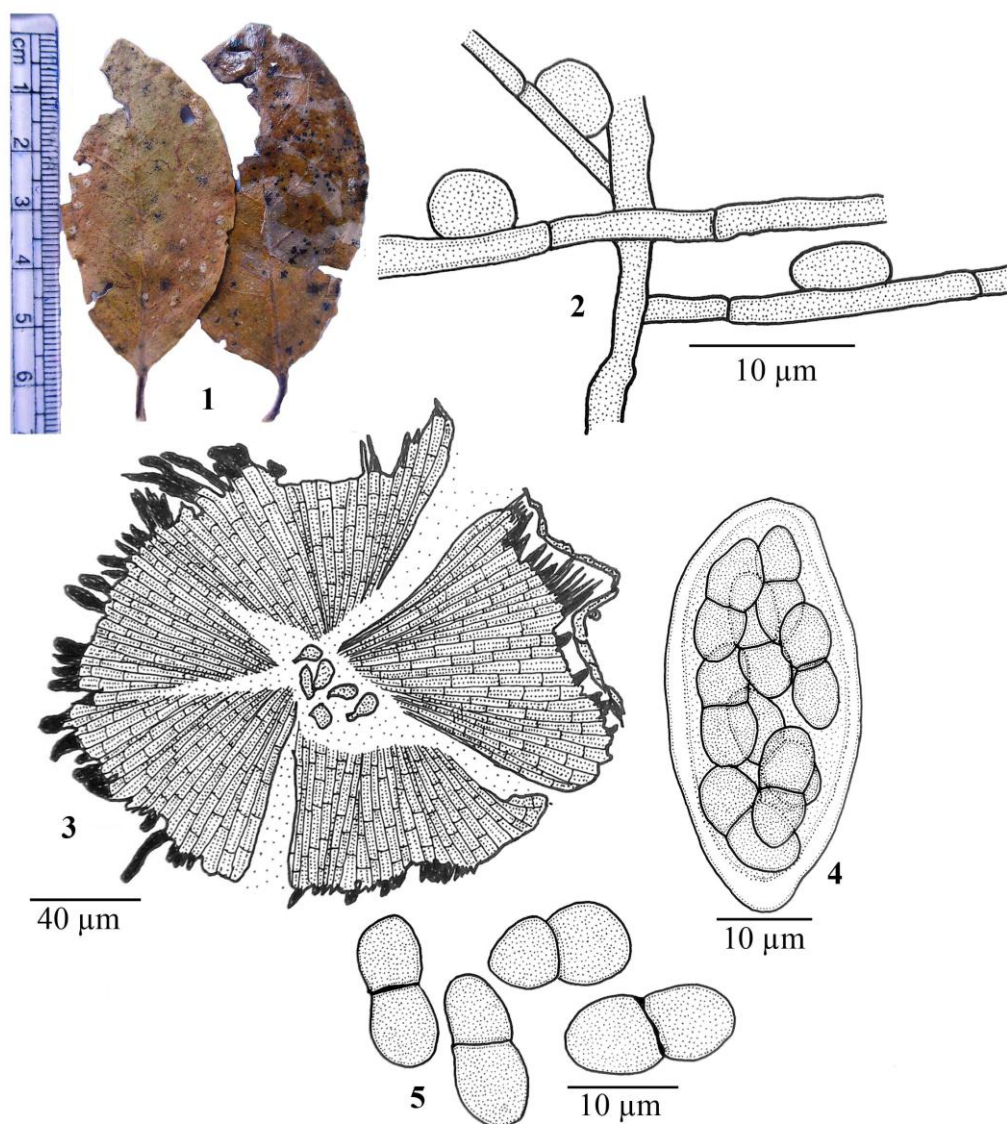
#### *Asterina lanceolatae* Patil, Bhise & Patil, **sp. nov.**

Figs 6–10

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Etymology – Named after the host species.

Colonies amphigenous, mostly epiphyllous, thin to subdense, upto 10 mm in diameter. Mycelium superficial on host surface, blackish-brown, densely reticulate, branching opposite to



**Figs 1–5** – *Asterina latifoliae* sp. nov. 1, Infected Leaves. 2, Mycelium with appressoria. 3, Thyriothecium. 4, Ascus. 5, Ascospores.

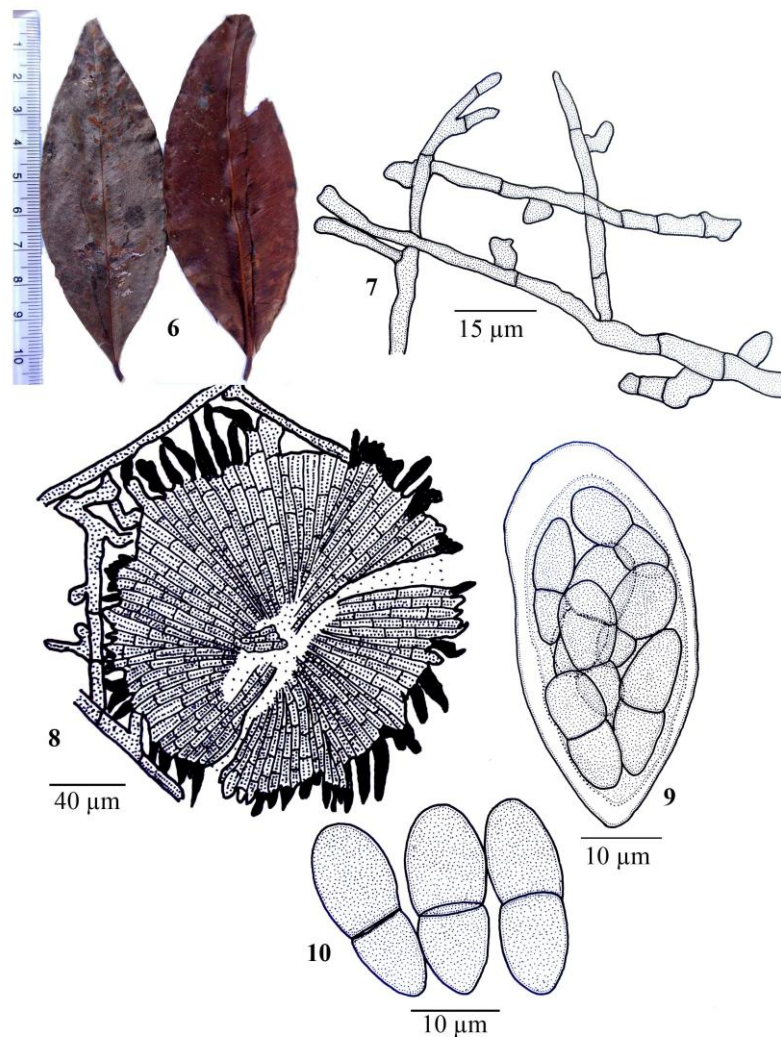
alternate or irregular, loosely reticulate, hyphae cells  $10\text{--}28 \times 3\text{--}5 \mu\text{m}$ , substraight to undulate. Appressoria  $5\text{--}10 \mu\text{m}$  long, unicellular, alternate to unilateral, straight to rarely subantrorse, conoid, with rounded apex. Thyriothecia up to  $240 \mu\text{m}$  in diameter, dimidiate, scattered, globose to orbicular or flattened, with simply dehisced stellately, sometimes irregular fissures, margin fimbriate. Asci  $35\text{--}53 \times 25\text{--}43 \mu\text{m}$ , 8-spored, bitunicate, globose, ovate to broadly clavate, sessile. Ascospores  $20\text{--}22.5 \times 9.5\text{--}12.5 \mu\text{m}$ , oblong, dark brown to blackish-brown, 1-septate, slightly constricted at septum, more or less equal celled, apices rounded, spores dark at both ends and on either sides of septum, smooth-walled.

Material examined – India, Maharashtra, Kolhapur, Patgaon, on the leaves of *Syzygium lanceolatum* (= *Eugenia lanceolata*), 7 February 1984, Patil C.R., HClO 40026 (holotype).

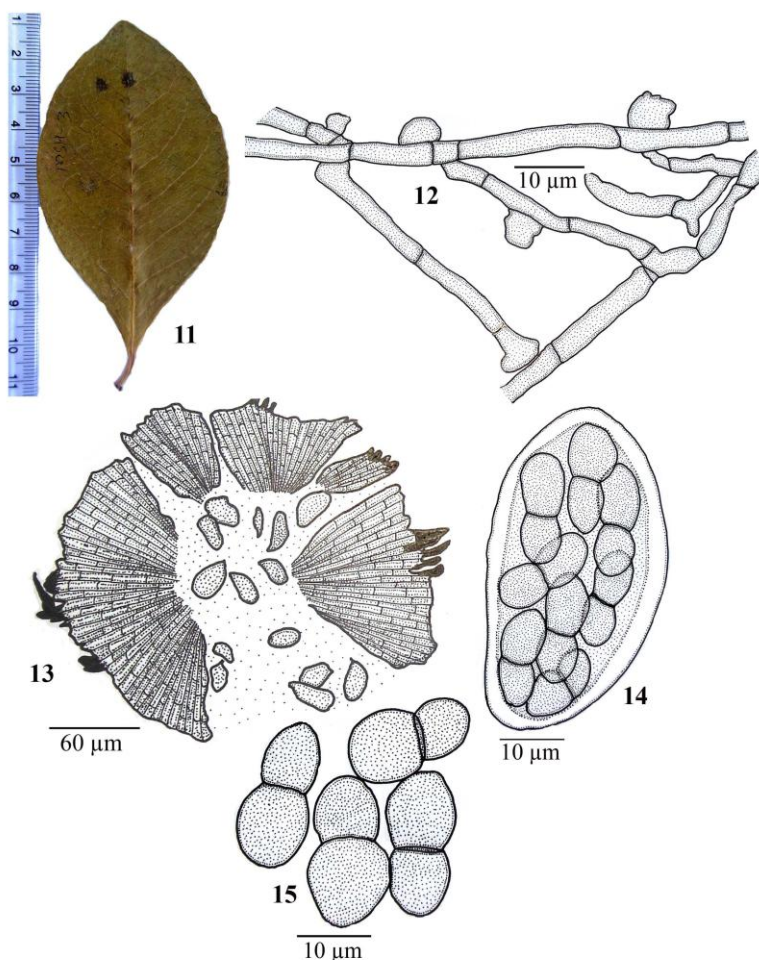
Notes – About 30 species of the genus *Asterina* are known on the members of Myrtaceae and from these 4 species of *Asterina* have been found on *Syzygium* from India (Hosagoudar 2012). However, the present collection is differs in large size of colonies, hyphae cells and ascospores (Table 2).

**Table 2** Comparative account of *Asterina gopalakrishnanii*, *A. claviflori* and *A. lanceolatae* sp.nov.

| S. No. | Morphotaxonomic characters | <i>Asterina gopalakrishnanii</i><br>Nair & Kaul | <i>Asterina claviflori</i> Kar & Maity                                                         | <i>Asterina lanceolatae</i> sp. nov.                             |
|--------|----------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 1.     | Host Plant                 | <i>Syzygium cumini</i>                          | <i>Syzygium zeylanicum</i> ,<br><i>S. cumini</i> , <i>S. mundagam</i> ,<br><i>S. jambolana</i> | <i>Syzygium lanceolatum</i>                                      |
| 2.     | Colonies                   | Amphigenous.                                    | Epiphyllous, up to 2 mm diam.                                                                  | Amphigenous, up to 10 mm diam.                                   |
| 3.     | Mycelium & Hyphae cell     | 20–25 × 5–7 µm.                                 | Branching alternate,<br>25–32 × 4–8 µm.                                                        | Branching opposite to alternate or irregular,<br>10–28 × 3–5 µm. |
| 4.     | Appressoria                | Alternate, unicellular,<br>5–7 µm.              | Alternate to unilateral,<br>unicellular, 9–18µm.                                               | Alternate to unilateral,<br>unicellular, 5–10 µm.                |
| 5.     | Thyriothecia               | 226–240 µm diam.                                | Orbicular, up to 250 µm diam., margin fimbriate.                                               | Orbicular, up to 240 µm diam., margin fimbriate.                 |
| 6.     | Asci                       | Ovate, 50–65 × 25–50 µm.                        | Globose to ovate, 30–45 µm in size.                                                            | Globose to ovate,<br>35–53 × 25–43 µm.                           |
| 7.     | Ascospores                 | 12–16 × 30–45 µm, margin spiny, thick walled.   | 14–18 × 11–13 µm, oblong, smooth-walled to slightly verrucose.                                 | 20–25 × 11–13 µm, conglobate, smooth-walled.                     |



**Figs 6–10** – *Asterina lanceolatae* sp. nov. 6, Infected leaves. 7, Mycelium with appressoria. 8, Thyriothecium. 9, Ascus. 10, Ascospores.



**Figs 11–15** – *Asterina dissiliens* (Sydow) Doidge var. *celastrii* var. nov. 11, Infected Leaves. 12, Mycelium with appressoria. 13, Thyriothecium. 14, Ascus. 15, Ascospores

Etymology – Named after the host family.

Colonies epiphyllous, thin, upto 5 mm in diameter. Mycelium superficial on host surface, brownish, branching subopposite, loosely reticulate, hyphae cells  $16.5\text{--}23 \times 3.5 \mu\text{m}$  long, substraight to slightly undulate, thick walled. Appressoria  $4\text{--}10 \mu\text{m}$  broad, few, unicellular, sessile, alternate to unilateral, mostly unilateral, irregularly broadly lobed with convex to rounded apex. Thyriothecia upto  $250 \mu\text{m}$  in diameter, orbicular to flattened, radiate, with simply dehisced stellately, sometimes irregular fissures, margin fimbriate. Asci  $26\text{--}50 \times 20\text{--}30 \mu\text{m}$ , 8-spored, numerous, bitunicate, ovoid to obovoid, sessile. Ascospores  $16\text{--}20 \times 7 \mu\text{m}$ , oblong, brownish, 1-septate, septum dark, constricted, one cell slightly smaller than other, terminal cell with rounded apex, basal cell with convex apex, smooth-walled.

Material examined – India, Maharashtra, Satara, Mahabaleshwar, on the leaves of *Maytenus puberula* (= *Gymnosporia puberula*), 1 February 1984, Patil C.R., HClO 40034 (holotype).

Notes – *Asterina dissiliens* (Sydow) Doidge found on *Maytenus ovate* and *Maytenus rothiana* (= *Gymnosporia rothiana*) from Salem, Tamil Nadu and Bhimashankar, Pune, Maharashtra (India) respectively (Hosagoudar 2012). However, the present collection differs from the var. *dissiliens* in having smaller asci, dark septate ascospores with colonies only epiphyllous (Table 3).

**Table 3** Comparative account of *Asterina dissiliens* var. *dissiliens* and *Asterina dissiliens* var. *celastrii* var. nov.

| S. No. | Morphotaxonomic characters | <i>Asterina dissiliens</i> (Sydow) Doidge var. <i>dissiliens</i>                 | <i>Asterina dissiliens</i> (Sydow) Doidge var. <i>celastrii</i> var. nov.              |
|--------|----------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1.     | Host Plant                 | <i>Pleurostyliia opposita</i> , <i>Maytenus ovata</i> , <i>Maytenus rothiana</i> | <i>Maytenus puberula</i>                                                               |
| 2.     | Colonies                   | Amphigenous, mostly epiphyllous, up to 5 mm diam.                                | Epiphyllous, up to 5 mm diam.                                                          |
| 3.     | Mycelium & Hyphae cell     | Branching alternate to opposite, 12–22 × 3–5µm.                                  | Branching subopposite, 16.5–23 × 3.5 µm.                                               |
| 4.     | Appressoria                | Very few, mammiform, entire to sublobate, 4–7 × 6–10µm.                          | Unicellular, irregularly broadly lobate, rarely alternate, mostly unilateral, 4–10 µm. |
| 5.     | Thyriothecia               | Numerous, circular, up to 265µm diam.                                            | Orbicular or flattened, radiate, upto 250 µm diam.                                     |
| 6.     | Asci                       | Numerous, globose to ovoid, 43–47 × 21–28 µm.                                    | Numerous, ovoid to obovoid, 26–50 × 20–30 µm.                                          |
| 7.     | Ascospores                 | Deeply constricted at the septum, 24–28 × 8–10µm.                                | Constricted at septum, 16–20 × 7 µm, smooth-walled.                                    |

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