Three new species of Meliolaceous fungi from Kolhapur District (Maharashtra)

Abstract

An attempt has been made to explore black mildew microfungi from order Meliolales, from forests of Kolhapur district. Three new species of genus *Appendiculella, Asteridiella* and *Irenopsis* are described and illustrated. These are *Appendiculella hosagoudiana, Asteridiella indicae* and *Irenopsis leeae-indicae*.

Keywords- *Appendiculella*, *Asteridiella*, Black mildews, *Irenopsis*, Kolhapur, Meliolales

Introduction- Kolhapur is the extreme southern district of the Maharashtra state which is an irregular belt of Deccan plateau lying along the east of Sahyadri ranges. The climate of the district is tropical monsoon, pleasant and healthy and blessed with adequate climatic conditions with average rainfall of 1645 mm and vegetation of tropical semi-evergreen, tropical moist deciduous and open scrub jungles. An attempt was made to explore black mildew microfungi from the district. Patgaon from Bhudargad tehsil is situated at 16^0 6'25. 26" N and 73^0 57' 18. 11" E, 606 m above mean sea level in Western Ghats region of the district, provided with rich vegetation of tropical-semievergreen forest where black mildew flourished well.

The black mildew microfungi from order meliolales are obligate biotrophs usually occurring on dicotyledonous plants. They are believed to have high degree of host specificity. (Hansford, 1961; Hosagoudar, 1996, 2008; Hongsanan et al., 2015; Mibey and Hawksworth, 1997). During the survey within Kolhapur district, at Patgaon forest from Bhudargad Tehsil, three black mildew specimens were collected and microscopic examination revealed that, these are undescribed and accommodated here as species new to science.

Materials and Methods- Infected angiosperm hosts like *Microcos paniculate* L. and *Leea indica* (Burm.f.) merr. were collected in the month of December 2019. The specimens were collected in pre-sterilized high density polythene bags separately and brought to laboratory, Hosts were identified using regional floras (Yadav and Sardesai, 2002; Singh et al., 2000), pressed to dry in blotting papers and dried specimens are deposited in standard size packets. Each specimen separately used for slide preparation after treating with 5 & KOH and replaced

by cotton blue (in lactophenol) stain and slides were made semipermanent by following method of Patil and Patil (2017).

Black mildew fungi were identified using monographs Hansford (1961), Hosagoudar (1996, 2013) and Hosagoudar and Agrawal (2008). Identified specimen's data was deposited online on Mycobank and specimens were deposited at national mycological herbarium of Agharakar Research Institute, Pune and procured accession numbers to deposited specimens morpho-taxonomical characters of each species were photomicrograph under Leica D M 2000 fluorescence microscope equipped with digital camera (Abbot DEC 2000).

Result and Discussion

1. Asteridiella indicae Bharti S. Dopare and Chandrahas R. Patil sp. nova.

Mycobank#844233

Etymology- The specific epithet is based on the name of host species.

Colonies on upper leaf surface, scattered, sub dense, crustose, 5 mm in diam. Mycelial hyphae sub straight, opposite to unilateral at acute angles, loosely or closely reticulate, dark brown. Cells 24–28 × 11–13 µm. Appressoria alternate to unilateral, distantly placed, antrorse, 22–28 µm long. Stalk cells short, cylindrical to cuneate, 11–13 × 7–8 µm. Head cells globose to ovate, entire to angular, 15–19 × 20–24 µm; Phialides unilateral, ampulliform, mixed with appresoria, pale brown, 22–26 × 11–13 µm. Perithecia loosely grouped at center, globose, conoid, 266 µm in diam. Ascospores oblong, cylindrical, 5-celled, constricted, 39–48 × 19–22 µm.

Specimen Examined: On living leaves of *Leea indica* (Burm. F.) Merr. (Leeaceae) Patgaon, 16° 6'25.26"N 73°57'18.11"E, 606 m above MSL, 1/12/2019, Western Ghats MH 2120, B.S. Dopare.

Distribution: India (Maharashtra, Tamil Nadu).

Taxonomic Notes: Hansford (1961) described *Asteridiella leeicola* Hansf. on *Leea sp.* from Philippines. The present collection on *Leea indica* differs from former species in all morphotaxonomic characters in having opposite and unilateral branching of hyphae, hyphal cells larger insize, appressoria alternate and unilateral, spreading and larger in size, phialides larger in size, perithecia larger, ascospores oblong, cylindrical and larger. Therefore, it is reported as species new to science and found to be reported first time from India on present host.

2. *Appendiculella hosagoudiana* Bharti S. Dopare and Chandrahas R. Patil sp. nova.

Mycobank- MB#843278

Etymology- The specific epithet named after scientist name V. B. Hosagoudar.

Colonies hypophyllous, dense, scattered, 4mm in diam.; Mycelial hyphae straight, opposite to irregular, acute to wide angles, loosely reticulate. Cells 11–43 × 8–9 µm; Appressoria alternate, bent or spreading, 22–23 µm long. Stalk cells cylindrical to cuneate, 8–9 × 8–9 µm. Head cells globose, ovate, entire 13–14 × 12–14 µm; Phialides ampulliform, mixed, alternate, 17–24 × 9–11µm. Perithecia scattered, verrucose, measuring to 318 µm in diam. Perithecial appendages numerous, broad based, larviform, 36 × 12–16 µm; Ascospores oblong, straight to curved, acute at both ends, 4-septate, constricted, 44 – 46 ×16–20 µm.

Specimen examined: On the living leaves of *Microcos paniculati* (=*Grewia nervosa*) L. (Malvaceae) Patgaon, 16° 6'25.26"N 73°57'18.11"E, 606 m above MSL, 1/12/2019 Western Ghats MH 2256, B.S. Dopare.

Distribution: India (Maharashtra)

Taxonomic Notes: It is evident from the literature survey (Hansford, 1961; Hosagoudar, 1996, 2008; Hosagoudar and Agarwal, 2008; Hosagoudar and Sabeena 2014; Mycobank, Fungal Database) that, there is no earlier report of Appendiculella on hosts of family Tiliaceae. Therefore, based on the host specificity, the present collection is treated as species new to science and it is for the first reported on the present host from India.

3. *Irenopsis leeae- indicae* Bharti S. Dopare and Chandrahas R. Patil sp. nova.

Mycobank#844225

Etymology- The specific epithet is based on the names of the genus and species of host.

Epiphyllous colonies, dark black, circular to spreading, confluent, 5mm in diam. Mycelial hyphae brown, straight to flexuous, opposite branching at wide angles, loosely reticulate. Cells 20–29 × 7–8 µm; Appressoria alternate or unilateral, closely antrorse, straight to curved, 29–32 µm long. Stalk cells cylindrical to cuneate, 11–13 × 8–11µm; Head cells globose to shallowly lobate, 17–21 × 14–16µm.; Phialides mixed, opposite to unilateral, ampulliform, 14–23 × 5 µm; Perithecia globose, scattered to grouped at the center of colony, verrucose, 93 µm in diam. Perithecial setae grouped around perithecium, straight to flexuous, simple, spreading, dark at base and pale at apex, obtuse, 110 × 9–13µm long. Ascospores obovoidal, 4-septate, constricted at septum, 32–38 × 14–18 µm.

Specimens examined: On living leaves of *Leea indica* (Burm.f.) Merr. (Leeaceae), Patgaon, 16° 6'25.26"N 73°57'1.11"E, 606 m above MSL, 1/12/2019, Western Ghats MH 2120, B.S. Dopare.

Distribution: India (Maharashtra, Tamil Nadu).

Taxonomic Notes: Hansford (1961) described *Irenopsis leeae* Hansf. on *Leea guineensis* from Uganda, Gold Coast and *Irenopsis leeae* Hansf. var. javensis Hansf. on *Leea aquatica* from Java and *L. philippinensis* from Philippines. The present collection on *Leea indica* does not matches with these two species and quietly differs from them in having thin, circular spreading colonies on upper surface, hyphae straight to flexuous and larger hyphal cells; appresoria alternate and unilateral, larger and head cells globose to shallowly lobate; smaller perithecia (only 93µm in diameter), while perithecial setae 9 and measuring 110×9-13µm; ascospore obovoidal. Therefore, based on major differences the present collection is treated as species new to science and first time reported on present host.

Table 6: Comparison between Irenopsis spp. and present collection Irenopsis leeae-indicae sp. nova.

Taxonomic characters	*Irenopsis leeae* Hansf.	*I. leeae* var. *javensis*	Present collection *I. leeae- indicae* sp. nova.
Host	*Leea guineensis*	*Leea philippinensis* *Leea aquatic*	*Leea indica*
Colonies	Hypophyllous, 3mm diam.	Epiphyllous, 1mm diam.	Epiphyllous, 5mm diam.
Hyphae	Undulate, sinuous, cells 17–25 × 6–8 µm branching opposite, irregular.	Crooked, cells 15–20 × 7–8 µm branching opposite.	Straight, flexuous, cells 20–29 × 7–8 µm branching opposite.
Appresoria	Opposite, ovate, clavate, 15–20 µm long, head cells angulose.	Alternate, spreading 13–20 µm long. Head cells globose and angulose. 9–15 × 10–16 µm	Unilateral or alternate. Closely antrorse, straight or curved, 29–32 µm long, Head cells shallowly lobate, 17–21 × 14–6 µm.
Phialides	Mixed with appresoria, opposite or alternate 14–23 × 7–10µm	Mixed with appresoria, 16-22 × 7–9µm	Mixed with appresoria, opposite or unilateral, 14–23 × 5 µm
Perithecia, Perithecial setae	160 µm diam. 9-15 erect, 2-3 septate, 160 × 7–9µm.	150µm diam. 0-6 erect, spreading, 2-3 septate, incurved, 130 × 7–9 µm.	93 µm diam. verrucose, perithecial setae up to 9 in number, up to 110 × 9–13µm.
Ascospores	Oblong, ellipsoidal, obtuse, 31–35 × 12–15µm.	Ellipsoidal, obtuse, 30-35 × 14–15µm.	Obovoidal, 4-septate, 32–38 × 14–18µm.

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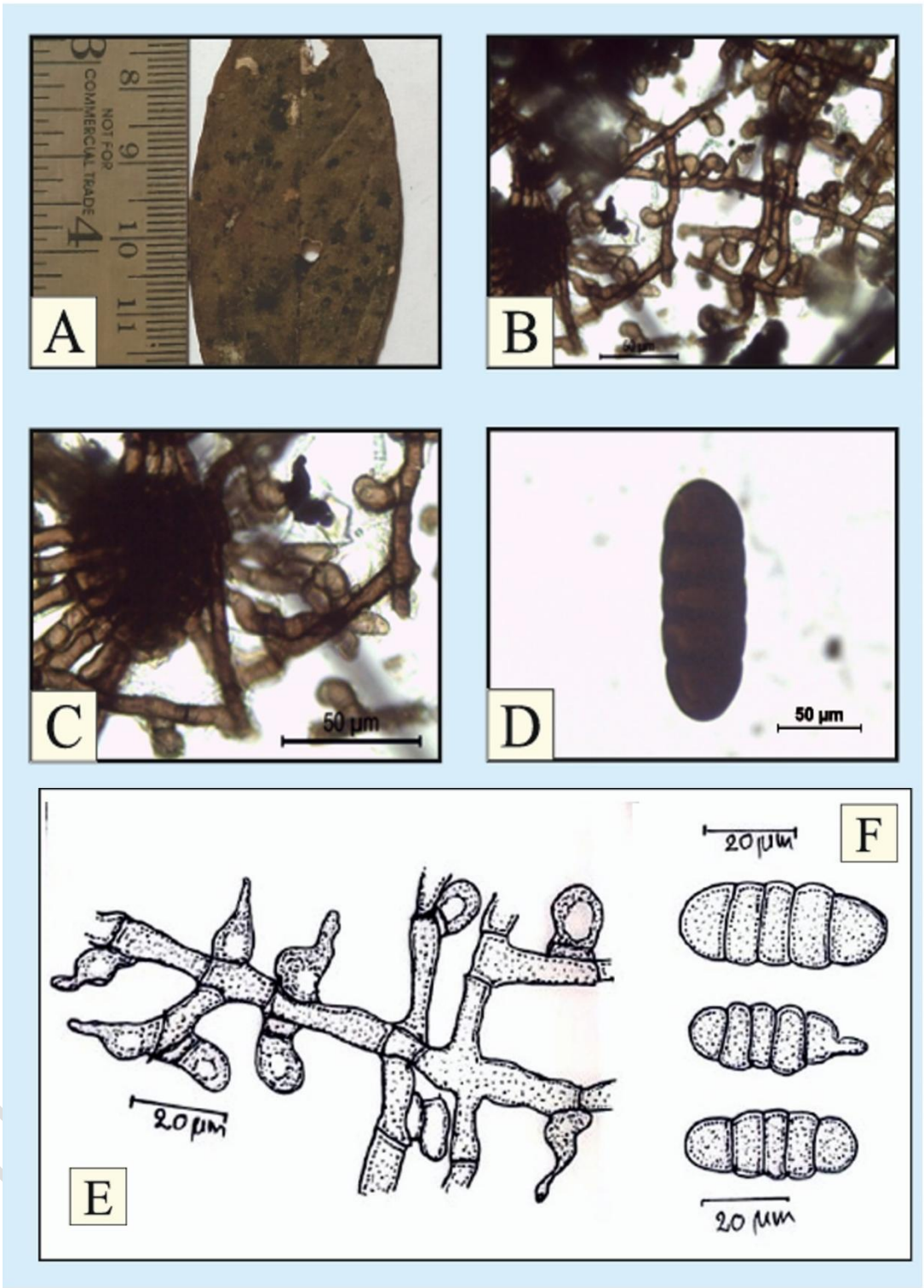

Fig. 1. ***Asteridiella indicae*** Bharti S. Dopare and Chandrahas R. Patil sp. nova., **A.** Infected leaf, **B.** & **E.** Mycelium with appressoria and phialides, **C.** Perithecium with radiating mycelium, **D.** & **F.** Ascospore

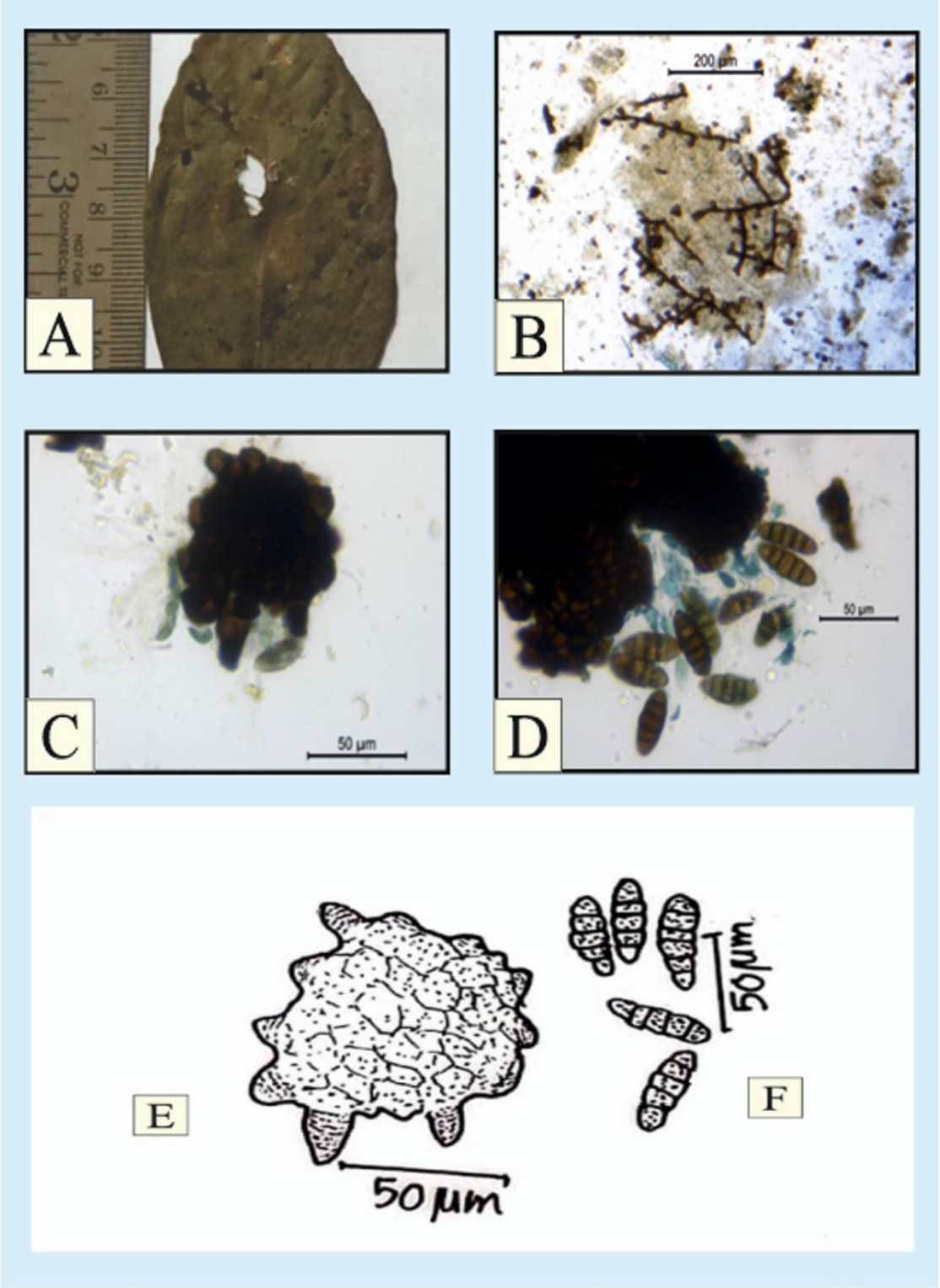

Fig. 2. ***Appendiculella hosagoudiana*** Bharti S. Dopare and Chandrahas R. Patil sp. nova., **A.** Infected leaf, **B.** Mycelium with appressoria and phialides, **C.** & **E.** Perithecium with appendages, **D.** & **F.** Ascospore

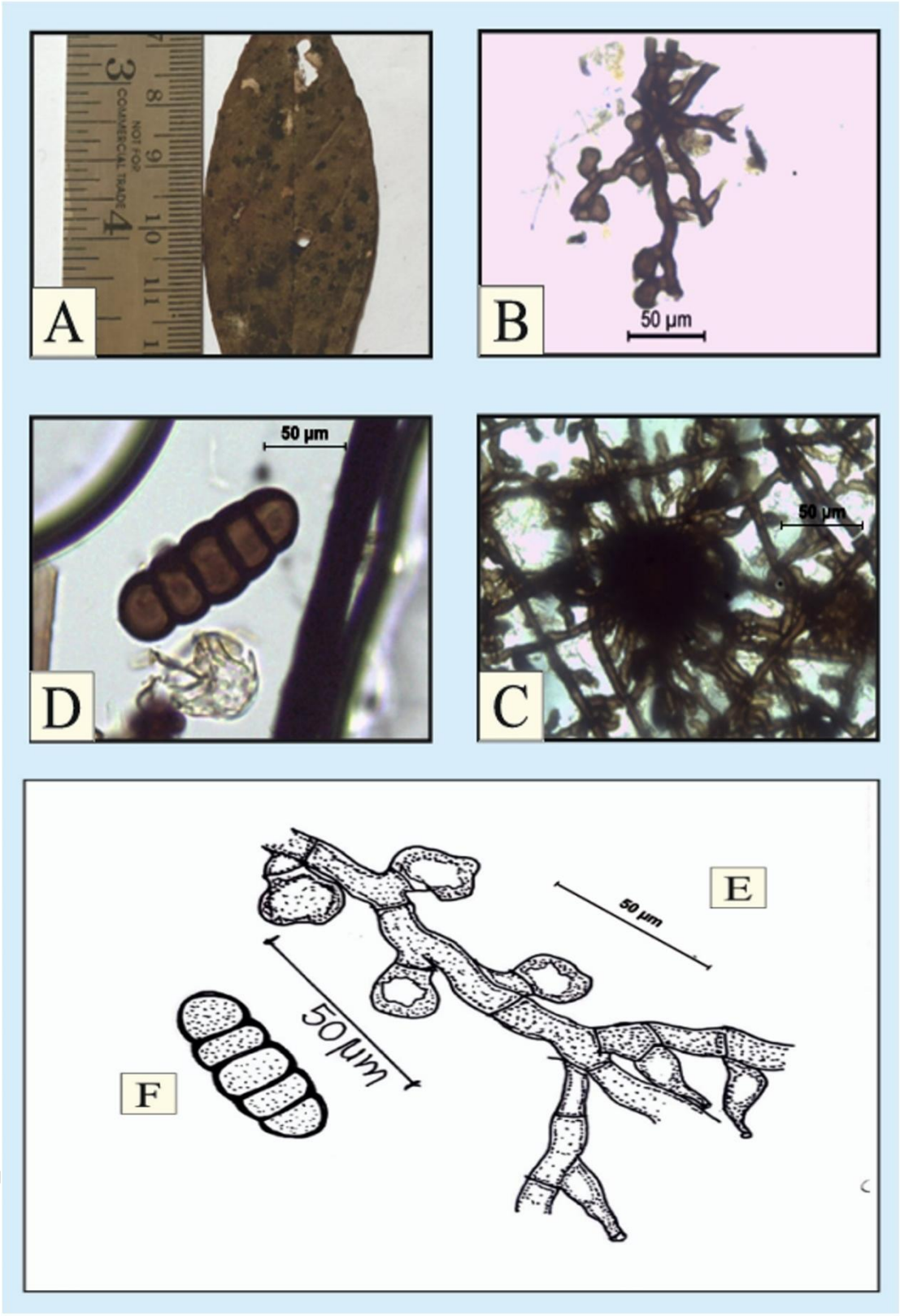

Fig. 3. ***Irenopsis leeae- indicae*** Bharti S. Dopare and Chandrahas R. Patil sp. nova., **A.** Infected leaf, **B.** & **E.**, Mycelium with appressoria and phialides, **C.** Perithecium, **D.** & **F.** Ascospore