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TWO NEW BLACK MILDEW FUNGI FROM BHIMASHANKAR, MAHARASHTRA, INDIA

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Abstract: **The present paper deals with two new Black Mildew Fungi, namely *Meliola bhimashankarensis sp. nov.* and *Prillieuxina dichapetali sp. nov.* belongs to family Meliolaceae and Asterinaceae, respectively. These Black Mildews occur on the leaves of *Dichapetalum gelonioides* (Roxb.) Engl (Dichapetalaceae), collected from Bhimashankar. The detail morphological description, colour photographs, line drawings and discussions are provided here.**

Keywords: **Bhimashankar Wildlife Sanctuary, Black Mildew, Fungi, Taxonomy.**

Abbreviations: IARI= Indian Agricultural Research Institute; HCIO= Herbarium cryptogammae indiae orientalis.

I. INTRODUCTION

Bhimashankar Wildlife Sanctuary is situated on the boundaries of Thane and Pune Districts in Maharashtra state. It is one of the five wildlife sanctuaries located along the Northern Western Ghats in Maharashtra [11]. The sanctuary spreads on near about 130.78 square kilometer area and covered by evergreen, semi-evergreen, moist deciduous forests along with large no. of plateau vegetation. The sanctuary shows unique environmental conditions such as high altitude, heavy rainfall and specific humidity, which favours the rich floristic diversity and hence it provides more suitable conditions for the growth and development of Black Mildew Fungi.

Black Mildews are black colony forming fungi and they infect mostly leaves, soft stems and petioles. They are obligate, superficial and most probably host specific in nature. They are categorized into different taxonomic groups like Meliolaceous, Asterinaceous, Schiffnerulaceous, and Hyphomycetous fungi [6], [8]. During exploration of black mildews from study area, the *Dichapetalum gelonioides* (Roxb.) Engl found infected with two black mildews. This plant specimen was thoroughly observed, examined and classified under the genus *Meliola* and *Prillieuxina*. Till date, there were two reports of genus *Meliola* on the same plant while the genus *Prillieuxina* was reported on a wide range of angiospermic plants from tropical and subtropical regions [4]; there are 79 epithets of genus *Prillieuxina* have been reported from world, among which 13 different species are reported from India [5].

II. MATERIAL AND METHODS

The leaves and young twigs of *Dichapetalum* was found infected with Black Mildew Fungi, were collected from sanctuary area in winter season (2017-2018) in separate polythene bags. This infected sample was tagged with field number, brought in to laboratory, pressed neatly and dried in between blotting papers and kept in standard size envelops within butter paper for further studies. The host plant was identified and confirmed by referring Flora of Maharashtra [12] and by consulting with angiosperm taxonomist. Type specimens were deposited at Herbarium Cryptogamae Indiae Orientalis (HCIO), IARI, New Delhi (India). For detail taxonomical description, macro-morphological as well as micro-

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morphological characters were studied well. The morphological structure of fungal colonies was observed with the help of hand lens. In the laboratory, for further examination of micro-morpological characters, mounting and slide preparation technique [10] was used and observed under compound light microscope. For microscopic dimension study, at least 20 measurements were taken; illustrations were prepared with Camera Lucida and photographed under Leica DM 2000 fluroscence microscope equipped with digital camera. The detail taxonomic description, beeli formula for Meliola, colour photographs, line drawings, comparative account and discussion are provided in this paper. The identification and confirmation of fungal species was done by using relevant standard literature [1], [2], [3], [5], [6], [8], [13].

III. RESULTS

Taxonomy:

1. *Meliola bhimashankarensis* Lonkar, Patil & Salunkhe *sp.nov.*

MycoBank MB 825480

Beeli Formula: 3111:4232

Type: India, Maharashtra: Bhimashankar Wildlife Sanctuary, on living leaves of *Dichapetalum gelonioides* (Roxb.) Engl (Dichapetalaceae); 08/01/2018, HCIO 52172.

Etymology: The specific epithet is based on name of the type location (Bhimashankar).

Colonies amphigenous, mostly epiphyllous, thin, circular to spreading, crustose, few, dark black, up to 6 mm in diameter. Hyphae brown to black, substraight, slightly undulate, margin crenate, branching opposite to alternate at wide angles, closely reticulate, forming mat like structure, cells 11–36 × 8–16 µm. Appresoria bicelled, alternate, few unilateral, closely placed, antrorse to spreading, straight, 20–30 × 11–23 µm; stalk cells cylindrical to cuneate, 4–11 × 9–13 µm; head cells oblong, obovate, cylindrical, margin crenate, shallowly lobed, straight, 13–21 × 11–23 µm. Phialides mixed with appresoria, opposite to alternate, conoid to ampulliform, neck long, in most of phialides neck is on lateral side, 20–29 × 9–11 µm. Mycelial setae many, simple, straight, apex acute, up to 449 µm. Perithecia globose, closely aggregated at the centre, up to 227 µm. Ascospores cylindrical to oblong, 4-septate, end cells are rounded, slightly constricted at septa, margin smooth, 39–45 × 16–20 µm.

Habitat and Distribution: Inhabiting living leaves of *Dichapetalum gelonioides* along the stream at Gupt Bhimashankar, Bhimashankar Wildlife Sanctuary, Maharashtra, India.

TABLE I: Comparative account of Meliola dichapetali Hansf. & Thirum; M. scott-elliotii Hansf. & Deight. and M. bhimashankarensis Lonkar, Patil & Salunkhe sp.nov

Sr.No.	Morpho-taxonomic characters	*Meliola dichapetali*	*Meliola scott-elliotii*	*Meliola bhimashankarensis sp.nov.*
1.	Host Plant	*Dichapetalum gelonioides*	*Dichapetalum toxicarium*	*Dichapetalum gelonioides*
2.	Colonies	Epiphyllous, dense, up to 3 mm in diam.	Dense, up to 3 mm in diam.	Amphigenous, mostly epiphyllous, thin up to 6 mm in diam.
3.	Hyphae	Branching opposite, cells 10–20 × 6–8 µm.	Branching opposite, cells 20–30 × 7–9 µm.	Branching opposite to alternate, cells 11–36 × 8–16 µm.
4.	Appresoria	Opposite to alternate, ovate-piriform, slightly bent, 15–20 × 9–13 µm long.	Alternate, 5% opposite, globose to elongate, piriform, bent, 18–28 × 8–14 µm long.	Alternate, unilateral, oblong, obovate, cylindrical, margin crenate, shallowly lobed, straight, 20–30 × 11–23 µm long.
5.	Phialides	13–20 × 7–9 µm.	--------	20–29 × 9–11 µm.
6.	Mycelial setae	Up to 280 µm.	Up to 350 µm.	Up to 449 µm.
7.	Perithecia	Up to 180 µm.	---------	Up to 227 µm.
8.	Ascospores	Cylindric, obtuse, 39–44 × 15–17 µm.	Oblong to subellipsoid, 37–42 × 15–16 µm.	Oblong to cylindrical, 39–45 ×16–20 µm.

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2. *Prillieuxina dichapetali* Lonkar, Patil & Salunkhe *sp.nov.*

MycoBank MB 825481

Type: India, Maharashtra: Bhimashankar Wildlife Sanctuary, on living leaves of *Dichapetalum gelonioides* (Roxb.) Engl (Dichapetalaceae), 08/01/2018, HCIO 52168.

Etymology: The specific epithet is based on name of the host genus.

Colonies amphigenous, often hyphophyllous, thin, very few, circular to spreading, crustose, black, up to 7 mm in diameter. Hyphae brown, thin, substraight to crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 9–29 × 4–7 µm. Appresoria and setae absent. Thyriothecia many, orbicular, closely aggregated, scattered over the colony, stellately dehisced at the centre or cut off central portion, orbicular when single & slightly irregular when attached with other thyriothecia, margin fimbriate, fringed hyphae flexuous, exappresoriate, up to 245 µm in diameter. Asci few, globose, octosporous. Up to 47 µm. Ascospores oblong, elliptic, uniseptate, constricted at septum, smooth to tuberculated, 27–34 × 13–16 µm.

Habitat and Distribution: Inhabiting living leaves of *Dichapetalum gelonioides* (Roxb.) Engl along the stream at Gupt Bhimashankar, Bhimashankar Wildlife Sanctuary, Maharashtra, India.

TABLE II: Comparative account of present taxon with *Asterina dichapetali* & *Prillieuxina* on family Rutaceae.

Sr. No.	Morpho-taxonomic characters	*Asterina dichapetali*	*Prillieuxina citricola*	*Prillieuxina aeglicola*	*Prillieuxina dichapetali sp. nov.*
01.	Host Plant	*Dichapetalum gelonioides*	*Citrus aurantifolia*	*Aegle marmelos*	*Dichapetalum gelonioides*
02.	Colonies	Epiphyllous, up to 5 mm in diam.	Epiphyllous	Epiphyllous to hypophyllous, up to 4 mm in diam.	Amphigenous, up to 7 mm in diam.
03.	Hyphae cells	15–20 × 4–5 µm	6–11 × 2.75–4.5 µm	5.5–10 × 2.75–6.05 µm	9–29 × 4–7 µm
04.	Appresoria	Present	Absent	Absent	Absent
05.	Thyriothecia	Up to 130 µm	Up to 143 µm	Up to 114 µm	Up to 245 µm
06.	Asci	20-30 µm	Up to 30.8 µm	Up to 22 µm	Up to 47 µm
07.	Ascospores	20–24 × 10–12 µm	11–16.5 × 4.4–6.05 µm	7.7–15.4 × 3.3–7 µm	27–34 ×13–16 µm

IV. CONCLUSION

Meliola dichapetali Hansf. & Thirum. from India and *Meliola scott-elliotii* Hansf. & Deight from Sierra Leone are reported on genus *Dichapetalum* [6], [7]. However, the new species differs from the related species described on *Dichapetalum* (Table 1) in having larger colony size, hyphal cells, appresoria, phialides and perithecia. Also, it differs from earlier described species in having crenate margin of hyphal cells and appresoria. The appresoria are obovate, oblong, shallowly lobed and straight in this species. Therefore, present species is treated as new to science. The genus *Prillieuxina* is reported for the first time on *Dichapetalum* (Dichapetalaceae) and treated as new species to science.

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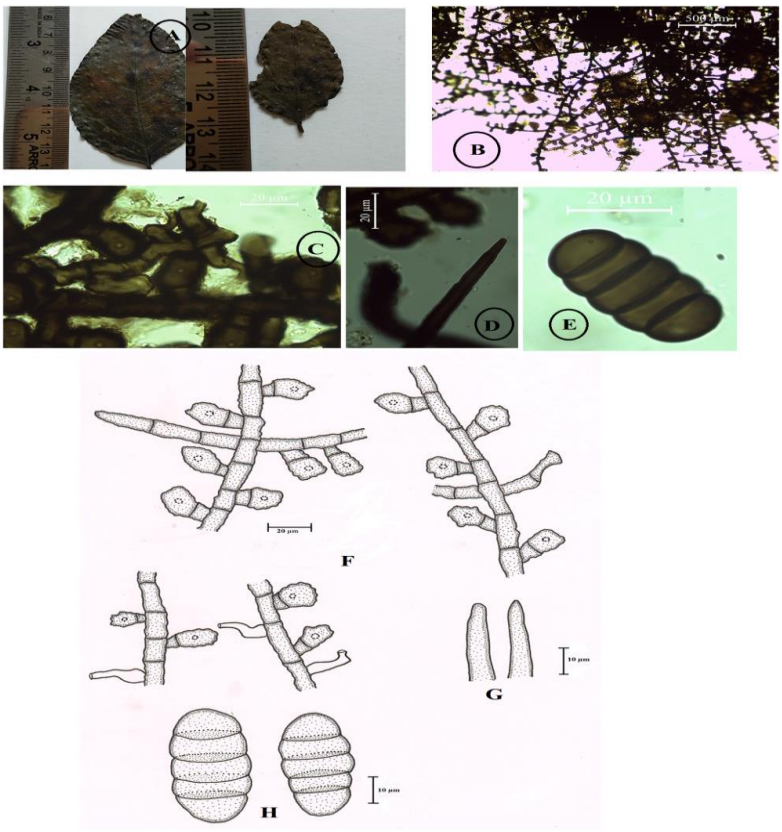

Fig. 1 *Meliola bhimashankarensis* (Holotype)
A. Infected leaves; B. Mycelial colony with thyriothecia; C,F. Mycelium with appresoria and phialides; D,G. Apex of mycelial setae; E, H. Ascospores.

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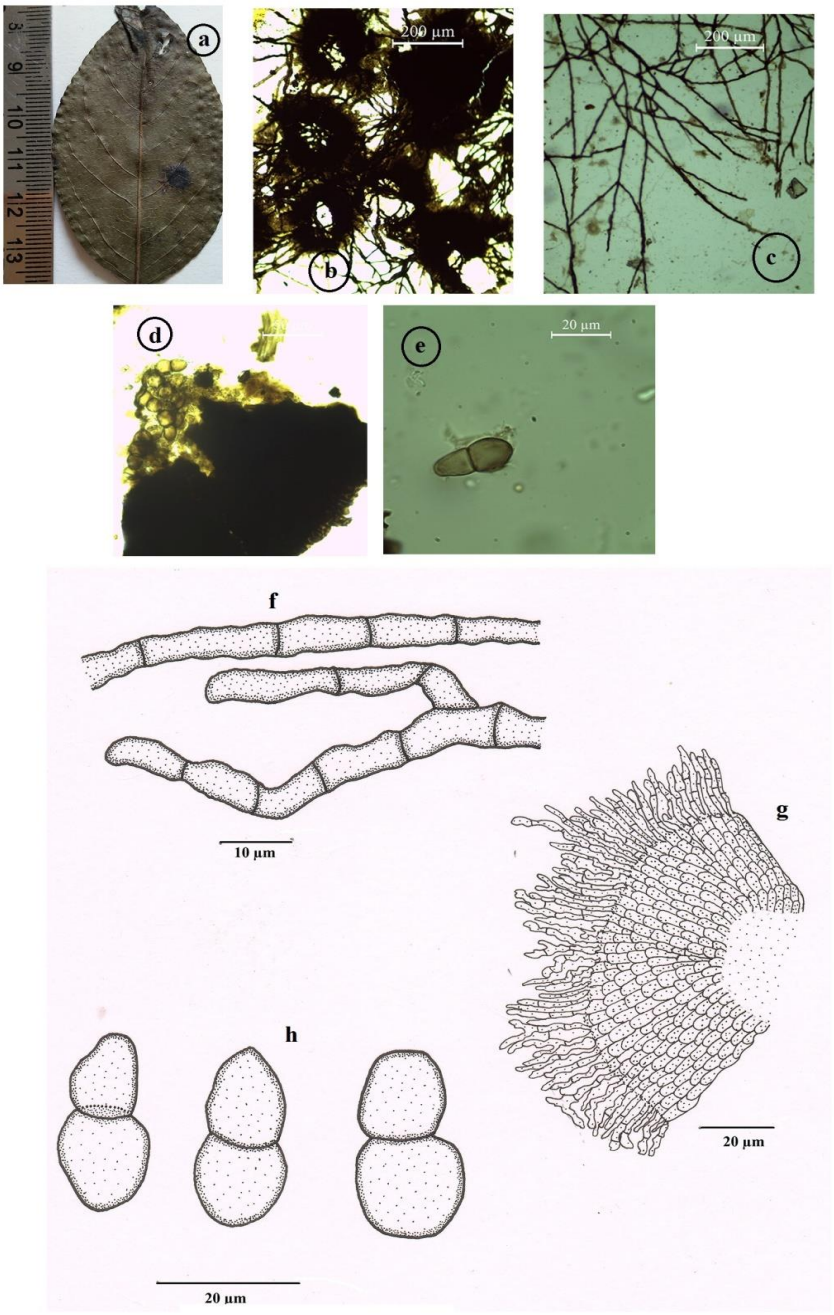

Fig. 2 *Prillieuxina dichapetali* (Holotype)
a. Infected leaf, b. Mycelium with thyriothecia; c, f. Mycelium; g. Part of thyriothecium; d,e,h. Ascospores.