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A New Black Mildew Fungi (*Meliola cyamopsidis* sp. nov., Ascomycetes, Meliolales) From Malabar Wildlife Sanctuary, India

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ABSTRACT

A new fungal species, *Meliola cyamopsidis*, infected on the leaves of *Cyamopsis tetragonoloba* (L.) Taub. (Fabaceae) was collected and identified from Malabar Wildlife Sanctuary in Kozhikode district of Kerala State has been described and illustrated in detail.

Key words: Black mildew, *Cyamopsis*, *Meliola*, new species, Western Ghats

INTRODUCTION

During a plant exploration survey of the leaf infecting fungi in Western Ghats region of Malabar Wildlife Sanctuary (MWS) in Kerala State, India, a black mildew fungus was collected from the leaves of *Cyamopsis tetragonoloba* (L.) Taub. (Fabaceae). Microscopic studies of the infected leaf lamina revealed that it is an un-described species of the genus *Meliola* Fries. (Meliolaceae)

Black Mildews

These are obligate biotrophic (few are necrotrophs) black colony forming fungi belong to different taxonomic groups such as Asterinales, Englerulales, Meliolales, Hyphomycetes, etc. Black mildew causing fungi distinct from the saprophytic sooty moulds, which grow on the secretions of insects or nectar produced by glands of plants. These fungi have specific hosts with a very narrow host range (Florence, 2004). Therefore, the host identity, at least up to species level,

essential for the proper and correct identification of black mildew groups.

There is a great role for fungi in the formation and functioning of ecosystem. They also developed neutral (saprophytism), positive (mutualism) and negative (parasitism) relationship with plants and other organisms. Most of the organisms directly or indirectly depend on specific plants for their food and habitat. The annihilation of plant diversity also adversely affects the diversity of microorganisms. Most often, there may be a chance that we may lose species to extinction much before they have been discovered. In tropical evergreen forests like Western Ghats, Fungi are important components of biodiversity (Cooke, 1880; Kapoor, 1967). The knowledge regarding the systematics and biology of tropical fungi need immediate attention for the control of harmful interactions. The harnessing of useful fungi and their activities for human welfare, is also very important and essential. This problem can be tackled only with the help of fungal taxonomists. Therefore, this work also becomes the baseline data

for the identification of the black mildew fungi of the area.

Study Area

The MWS forms a part of Nilgiri Bio-sphere Reserve of the Southern Western Ghats, a biodiversity hotspot, situated in Koorachund and Chakkittapara revenue villages of Koylandy Taluk in Calicut district, Kerala State. It lies between 11° 75' and 11° 76' north and 76° 20' and 75° 38' east, the forests lie on the Northwest slopes of the Western Ghats contiguous with the forests of Kurichiar mala of Kalpetta Forest Range and Ladysmith Reserve Forests of South Wayanad Forest Division. The sanctuary lies along the boundary of Calicut district with Wayanad district to the north of the Tamarassery – Kalpetta Ghats. The sanctuary occupies an area of 74.22 sq. km., altitude ranges from 40 to 1506 m, temperature ranges from 16 to 35°C and annual rainfall about 2800mm. The Kakkayam forests is contiguous with the unique mountain systems of Banasuramala, Kakkannamala, Kurichyarmala, Vannathimala and Vellarimala. Therefore, the study area occupies a unique position in the Southern Western Ghats of Kerala State. Different types of vegetations such as West-coast Tropical Evergreen, West-coast Semi evergreen, Southern Moist Mixed Deciduous, Southern Hill-top Evergreen forests, Grasslands, and Marshy grasslands (Vayals) were present in the study area. This diverse of vegetation groups harbours around 700 species of angiosperm plants out of which 226 species endemic to southern Western Ghats (about 30%). The terrain, steep hills, deep valleys, marshy lands etc. with hillocks, perennial water sources combined with altitudinal variations make it an ideal habitat for a variety of flora and fauna.

MATERIALS AND METHODS

Infected leaves and twigs were collected from the field, field notes were made regarding the nature of colonies, infection pattern and locality. A separate field number was given for each collection. The infected plant parts were collected separately in polythene covers along with the host twig (preferably with the reproductive parts to facilitate the identity of the corresponding host). The infected plant parts were pressed neatly and dried in-between blotting papers. After proper drying, they were used for microscopic study. Scrapes were taken directly from the infected host and mounted in 10% KOH solution. KOH was replaced by Lactophenol after 30 minutes. Both the mountants work well as clearing agents and made the septa visible for taking measurements. Colonies with hyper parasites showing a woolly nature were avoided. A drop of high quality transparent nail polish was applied to the selected colonies and carefully thinned with the help of a fine brush without disturbing the colonies to study the entire

colony in its natural condition. The treated colonies along with their host plants were kept in dust free chamber for half an hour.

When the nail polish on the colonies dried fully, a thin, colorless film or flip was formed with the colonies firmly embedded in it. In case of soft host parts, the flip was lifted off with a slight pressure on the opposite side of the leaves and just below the colonies. In case of hard host parts, the flip was eased off with the help of a razor or scalpel. A drop of DPX was spread on a clean slide and the flip was spread properly on it. One or two more drops of DPX were added additionally on the flip and a clean cover glass was placed over it. By gently pressuring on the cover glass, excessive amount of DPX was removed after drying. Care was taken to avoid air bubbles (Hosagoudar and Kapoor, 1985).

These slides were labeled and placed in a dust free chamber for one to two days for drying. These permanent slides were then used for further studies. For innate fungi, sections were made and stained in cotton blue. After the study of each collection, part of the material was retained in the regional herbarium, Mar Thoma College Herbarium, Thiruvalla (MTCHT).

RESULTS

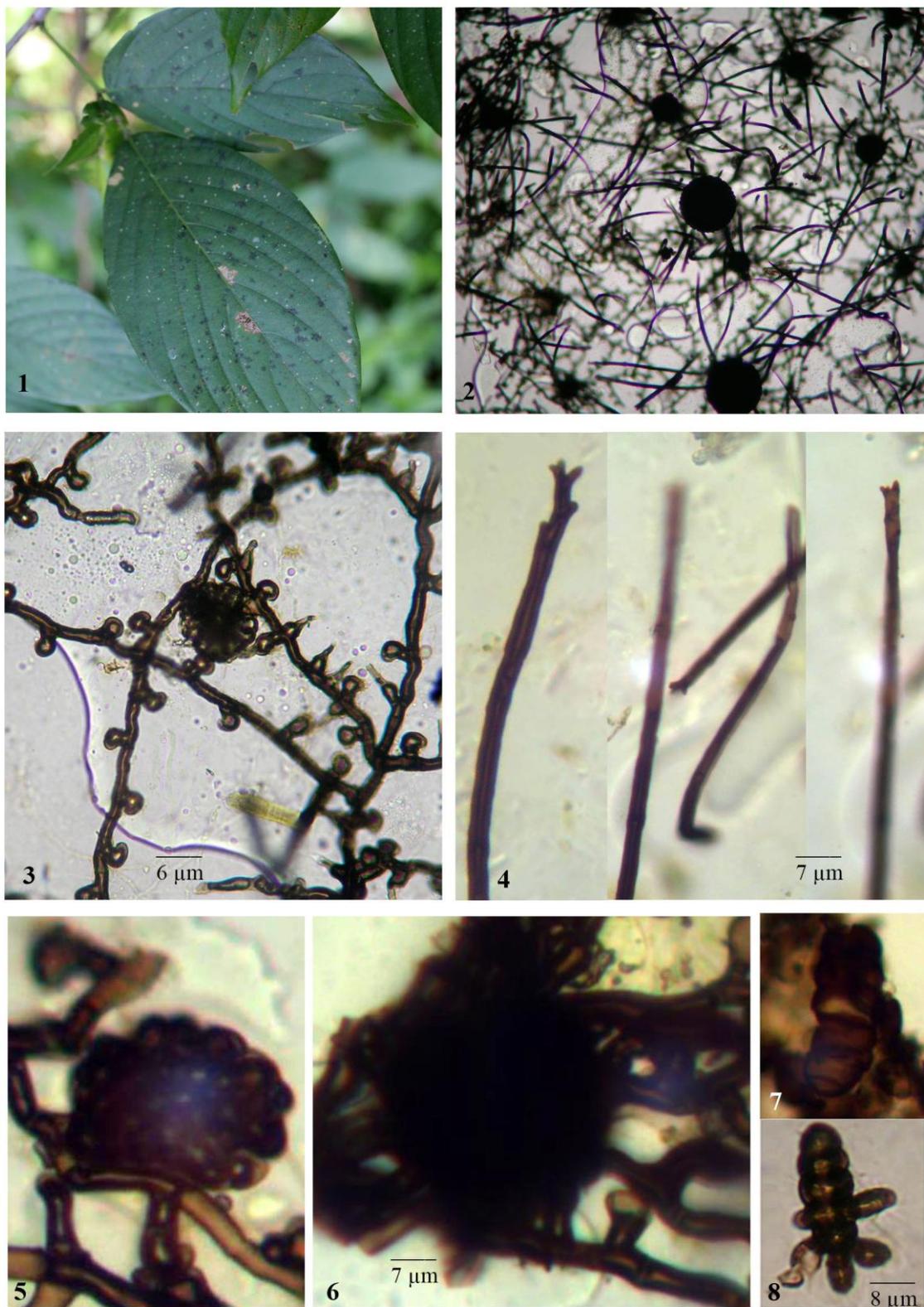
Meliola cyamopsidis sp. nov. Lini K. Mathew (Fig. – 1) (Plate – 1)

Etmology: The specific epithet is based on the host genus.

Coloniae epiphyllae, tenues, usque ad 1 mm in diam diam. Hyphae subrectae vel leniter flexuosae tortuosae venire serrulam, alternate vel opposite acuteque vel laxae ramosae, laxae reticulatae, cellulae 9 – 21 x 3 – 5 µm. Appressoria alternata, antrorsa vel retrorsis vestiti, lineae et varieiein curvatis, quarum 6 – 12 µm longae; cellulae basillares cylindratae vel cuneatae, 2-3 µm longa; cellulae apicales globosae vel subglobosae, tenuiter angulares, rectae vel leniter curvulae, integrae, 6 – 9 x 6 – 9 µm. Phialides paucae, appressoriis, alternatae vel oppositae, ampulliformes, 9 – 14 x 3 – 7 µm. Setae vix, simplices, rectae, acutae vel dentatae ad apicem, ad 300 µm long. Peritheciis globosis, ad 120 µm diam; ascosporae filiformes vel ellipsoideis, IV-septatae, constrictae ad septa, 28-32 x 13-16 µm.

Colonies epiphyllous, thin, up to 1 mm in diameter, confluent. Hyphae flexuous to slightly crooked, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 9 – 21 x 3 – 5 µm. Appressoria alternate, antrorse to retrorse, straight to variously curved, 6 – 12 µm long; stalk cells cylindrical to cuneate, 2-3 µm long; head cells globose to subglobose, slightly angular, straight to slightly curved, entire, 6 – 9 x 6 – 9 µm. Phialides few, mixed with appressoria, alternate to opposite,

PLATE - 1



Meliola cyamopsidis sp. nov. Lini K. Mathew, Neeta N. Nair and Swapna S.

1. Infected leaf of *Cyamopsis tetragonoloba* (L.) Taub.(Fabaceae), 2. Colonies with perithecia, 3. Appressoriate mycelium with phialides and developing perithecium, 4. Aipcal portion of the mycelial setae, 6. Young perithecium, 8 Mature perithecium, 7. Ascospore, 9. Germinating to colony forming ascospore.

ampulliform, $9 - 14 \times 3 - 7 \mu\text{m}$. Mycelial setae scarce, simple, straight, acute to dentate at the tip, up to $300 \mu\text{m}$ long. Perithecia scattered, globose, up to $120 \mu\text{m}$ in diameter; ascospores cylindrical to ellipsoidal, 4-septate, constricted at the septa, $28-32 \times 13-16 \mu\text{m}$.

Materials examined: On leaves of *Cyamopsis tetra gonoloba* (L.) Taub. (Fabaceae) Near Forest Station, Peruvannamuzhy, Malabar Wildlife Sanctuary, Calicut, Kerala, December, 26, 2014, Lini K. Mathew, MTCHT 107 (Type), TBGT 6999 (Isotype).

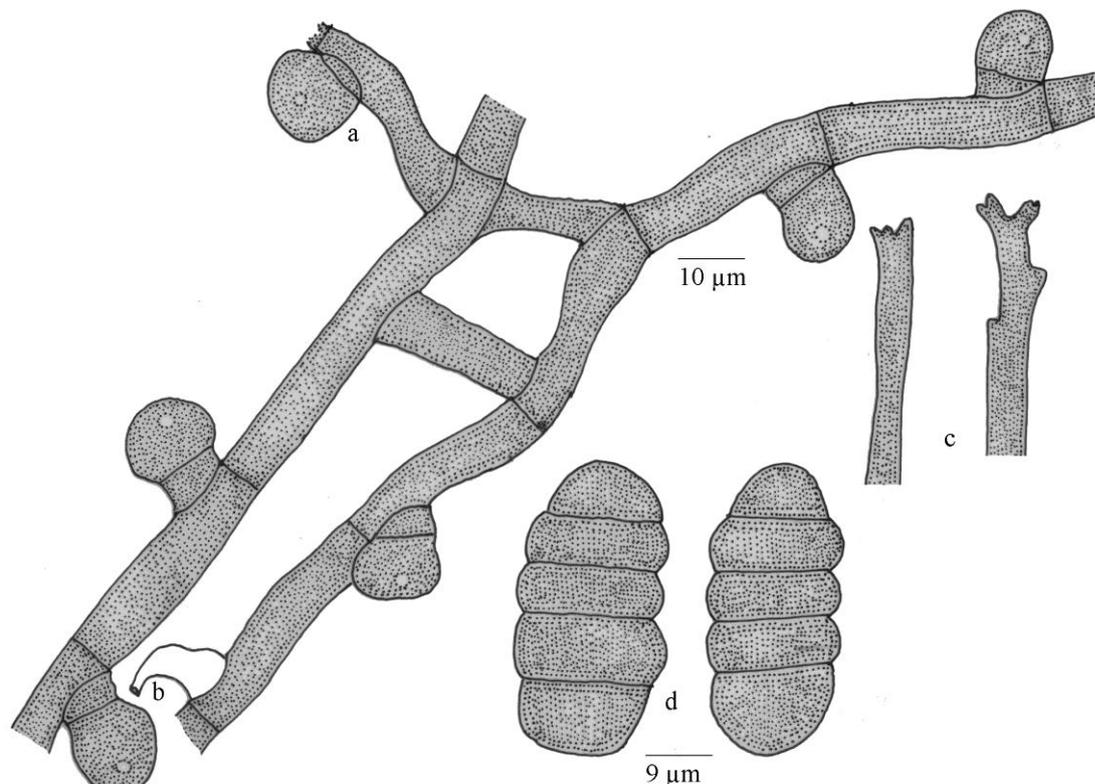


Fig. - 1. *Meliola cyamopsidis* sp. nov. Lini K. Mathew

DISCUSSION

The Beeli formula of *Meliola cyamopsidis* $31\frac{1}{3}.3222$ and it can be compared with a variety of *Meliola* species having the same or near to same Beeli formula, which are infecting on the host family (*M. atylosiae* - $31\frac{1}{3}.3221$, *M. desmodii-triangularis* - $31\frac{1}{3}.3231$, *M. desmodii-velutini* - $31\frac{1}{3}.3222$, *M. dolichi* - $31\frac{1}{3}.3222$, *M. flemingicola* - $31\frac{1}{3}.3222$, *M. franciscana* - $31\frac{1}{3}.3222$, *M. geissaspidis* - $31\frac{1}{3}.3222$, *M. lonchocarpicola* - $31\frac{1}{3}.3222$, *M. mucunae-acuminatae* - $31\frac{1}{3}.3221$, *M. mucunae-acuminatae* var. *indica* - $31\frac{1}{3}.3221$, *M. teramni* var. *milletiae* - $31\frac{1}{3}.3223$) (Hansford, 1961; Hosagoudar, 1996, 2008, 2011).

But based on the specificity of host and smaller ascospores, it can be accommodated in a new species.

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