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MORPHOLOGICAL DIVERSITY AND ECOLOGICAL DISTRIBUTION OF *PERICONIA* SPECIES ASSOCIATED WITH DECAYING PLANT MATERIALS IN MAHADEVPUR FOREST, TELANGANA, INDIA

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ABSTRACT

Dematiaceous hyphomycetes are melanized saprobic fungi that play an important role in the decomposition of plant litter and nutrient cycling in forest ecosystems. This study assessed the diversity and morphological characteristics of *Periconia* species associated with decaying plant materials in Mahadevpur Forest, Telangana, India. Fungal specimens were collected from dead leaves, stems, twigs, bark, and woody debris, and identified using standard morphological characters and published taxonomic keys. Five species, *Periconia byssoides*, *P. hispidula*, *P. pseudolateralis*, *P. minutissima*, and *P. ramostipitata*, were recorded. The investigation revealed a diverse assemblage of dematiaceous hyphomycetes inhabiting different lignocellulosic substrates, with leaf litter and dead stems supporting the highest fungal diversity. Representative taxa included *Periconia byssoides*, *P. hispidula*, *P. pseudolateralis*, *P. minutissima*, and *P. ramostipitata*, which

exhibited distinct morphological characteristics useful for taxonomic identification. Variations in colony morphology, conidiophore architecture, conidial dimensions, and surface ornamentation facilitated species differentiation and reflected adaptation to diverse ecological niches. The predominance of these fungi on decomposing plant materials highlights their important role in litter decomposition and nutrient recycling within tropical forest ecosystems.

KEYWORDS: Dematiaceous hyphomycetes; fungal biodiversity; tropical deciduous forest; saprobic fungi.

1. INTRODUCTION

Dematiaceous hyphomycetes constitute a morphologically diverse group of melanized asexual fungi that are widely distributed in terrestrial ecosystems (Sutton et al., 2009). These fungi are characterized by darkly pigmented hyphae and conidia resulting from the deposition of melanin in their cell walls, which provide protection against environmental stresses such as ultraviolet radiation, desiccation, and microbial antagonism (Eisenman et al., 2020). They are predominantly saprobic and colonize dead leaves, stems, bark, twigs, woody debris, and other decaying plant materials, where they play a fundamental role in the decomposition of lignocellulosic substrates and nutrient recycling. Their ecological significance extends beyond decomposition, as several species are reported as endophytes, weak pathogens, and producers of biologically active metabolites with potential agricultural, industrial, and pharmaceutical applications (Preethi et al., 2021).

India is recognized as one of the world's megadiversity countries, possessing a wide range of climatic conditions and vegetation types that support an exceptionally rich fungal diversity (Manoharachary et al., 2005). Tropical deciduous forests are particularly important reservoirs of microfungi because continuous deposition of leaf litter and woody debris provides abundant substrates for fungal colonization. Although considerable taxonomic work has been carried out on dematiaceous hyphomycetes in different parts of India, many forest ecosystems remain inadequately explored, particularly in the state of Telangana. Consequently, information on the diversity, distribution, and ecology of these fungi from this region remains fragmentary.

Mahadevpur Forest, situated in the Godavari River basin of Telangana, represents an ecologically significant tropical deciduous forest with diverse vegetation and abundant

decomposing organic matter. Seasonal rainfall, high humidity during the monsoon, and continuous accumulation of plant litter create favourable microhabitats for saprobic fungi. The forest supports a wide variety of woody and herbaceous plant species that provide suitable substrates for colonization by dematiaceous hyphomycetes throughout the year. Despite these favourable ecological conditions, systematic studies on the diversity and ecological distribution of these fungi from Mahadevpur Forest are limited.

Morphological taxonomy remains an indispensable tool for the identification of dematiaceous hyphomycetes (Phookamsak et al., 2024). Diagnostic characters such as colony morphology, conidiophore structure, conidiogenous cell arrangement, conidial morphology, septation, pigmentation, and wall ornamentation continue to form the basis of species identification, particularly in biodiversity surveys where molecular data may not be available. Careful examination of these characters enables reliable identification and facilitates comparison with previously described taxa. Documentation of fungal diversity through standardized taxonomic methods also provides essential baseline information for future molecular, ecological, and conservation studies.

The present investigation was undertaken to assess the morphological diversity and ecological distribution of dematiaceous hyphomycetes associated with naturally decaying plant materials in Mahadevpur Forest, Telangana. The study aims to document the diversity of representative taxa, evaluate their substrate preferences and ecological distribution, compare important morphological characteristics, and contribute to the existing knowledge of fungal biodiversity in tropical deciduous forests of India.

2. MATERIALS AND METHODS

2.1 Study Area

The investigation was carried out in Mahadevpur Forest, located in the Godavari River basin of Jayashankar Bhupalpally District (formerly Karimnagar District), Telangana, India. The forest is characterized by tropical deciduous vegetation comprising species of *Tectona*, *Terminalia*, *Anogeissus*, *Boswellia*, *Madhuca*, bamboo, and several associated shrubs and climbers. The region experiences a tropical climate with distinct summer, monsoon, and winter seasons, receiving an average annual rainfall of approximately 900–1200 mm. Seasonal humidity and continuous accumulation of plant litter create favourable conditions for the growth of saprobic fungi.

2.2 Collection of Specimens

Extensive field surveys were conducted during different seasons to maximize the collection of fungal specimens. Naturally decaying leaves, stems, twigs, bark, and woody debris exhibiting fungal growth were collected from different locations within the forest. Each specimen was carefully transferred to sterile paper packets, labelled with collection number, locality, substrate, date, and field observations, and transported to the laboratory for detailed examination.

2.3 Laboratory Examination

The collected specimens were examined under a stereoscopic microscope to locate fungal colonies. Microscopic preparations were made using lactophenol cotton blue, and observations were carried out under a compound research microscope (Dring, 1971; Agu & Chidozie, 2021). Morphological characteristics including colony appearance, mycelium, conidiophores, conidiogenous cells, conidia, septation, pigmentation, and surface ornamentation were carefully recorded. Measurements were obtained from multiple mature structures using an ocular micrometer to minimize observational errors.

2.4 Identification of Fungi

Identification was based primarily on morphological characters following standard taxonomic monographs, identification keys, and published descriptions of dematiaceous hyphomycete (Refai & El-Yazid, 2014). Diagnostic features were compared with available literature to confirm species identity. Current fungal nomenclature was verified using internationally accepted taxonomic databases where appropriate (Wang et al., 2023). Morphological characteristics were compared to identify diagnostic features of representative taxa, and the frequency of occurrence on different substrates was used to assess ecological distribution within the study area.

3. RESULTS

3.1 Diversity of Dematiaceous Hyphomycetes

Systematic surveys conducted in Mahadevpur Forest revealed a rich assemblage of dematiaceous hyphomycetes associated with naturally decaying plant materials. The fungi were collected from different forest localities, including Kamalapur, Mahadevpur, Pulitogulu, Jeelapally, Polarum, and Nastoorpally. Most collections were obtained from dead leaves, stems, twigs, bark, and woody debris during the post-monsoon season when environmental conditions favored fungal growth and sporulation. The occurrence of these fungi on a wide

range of lignocellulosic substrates demonstrates their ecological importance in the decomposition of forest litter and nutrient recycling (Fig 1).

The collected fungi exhibited remarkable morphological diversity with respect to colony characteristics, conidiophore organization, conidiogenous cell arrangement, conidial morphology, pigmentation, septation, and wall ornamentation. These diagnostic characters enabled reliable identification of the taxa using standard taxonomic literature. Members of the genus *Periconia* were among the most frequently encountered fungi and represented an important component of the saprobic fungal community. The present collections included *Periconia byssoides*, *P. hispidula*, *P. pseudolateralis*, *P. minutissima*, and *P. ramostipitata*, each exhibiting distinct morphological characteristics and substrate preferences(Table1).

Table 1: Representative dematiaceous hyphomycetes recorded from Mahadevpur Forest.

Sl. No.	Species	Substrate	Collection locality
1	*Periconia byssoides*	Dead leaves	Kamalapur
2	*Periconia hispidula*	Dead stem	Mahadevpur
3	*Periconia pseudolateralis*	Dead stem	Kamalapur
4	*Periconia minutissima*	Dead stem	Mahadevpur
5	*Periconia ramostipitata*	Dead leaves	Kamalapur

3.2 Morphological Diversity

The collected fungi exhibited considerable variation in colony morphology and microscopic characters. Colonies ranged from dark brown to black and varied from hairy to velvety in texture. Conidiophores were macronematous, septate, darkly pigmented, and either simple or branched depending on the species. Considerable variation was observed in conidiophore length, branching pattern, and conidiogenous cell arrangement, all of which proved valuable for taxonomic identification (Fig. 2). Conidia were predominantly globose to subglobose, brown, and distinctly ornamented, although their dimensions differed among species. Larger conidia were observed in *P. byssoides* and *P. hispidula*, whereas *P. minutissima* and *P. ramostipitata* possessed comparatively smaller conidia. Surface ornamentation ranged from verrucose to echinulate, providing additional diagnostic characters for species separation (Table 2). The diversity of these morphological features reflects the taxonomic richness of dematiaceous hyphomycetes inhabiting the forest ecosystem.

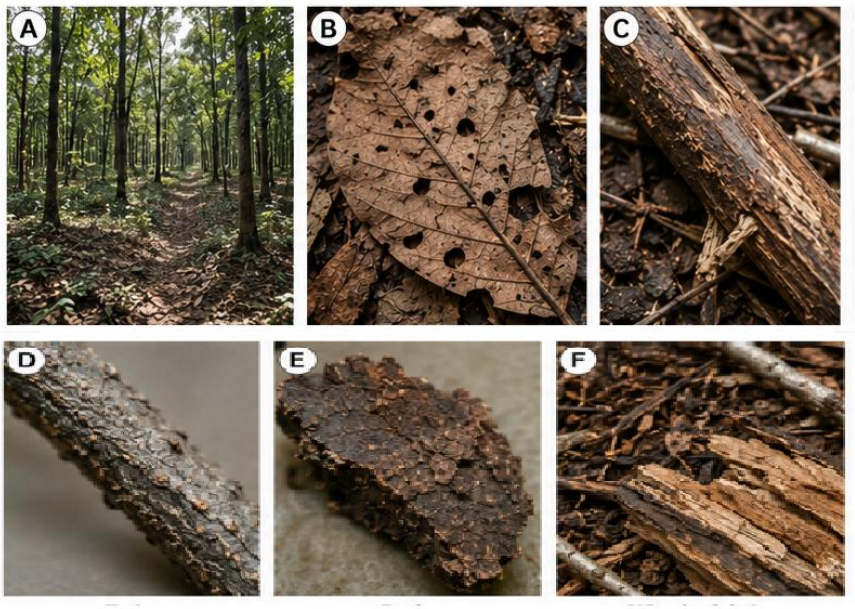

Fig. 1: Study area and substrate collected from Mahadevapura forest (A). Tropical deciduous vegetation (B). Decaying leaves (C). Decaying stem (D). Twig (E). Bark (F). Woody debris.

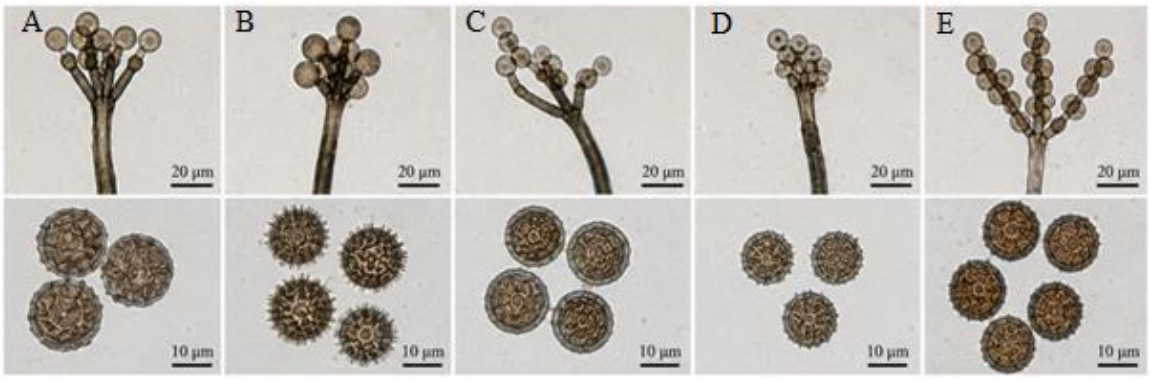

Fig. 2: Conidiophores with conidiogenous cells (Upper row), and conidia (Lower row) of representative *Periconia species* (A). *P. byssoides* (B). *P. hispidula*, (C) *P pseudolateralis*. (D). *P. minutissima* (E). *P. ramostipitata.*

Table 2: Comparative morphological characters of representative *Periconia* species.

Character	***P. byssoides***	***P. hispidula***	***P. pseudolateralis***	***P. minutissima***	***P. ramostipitata***
Colony colour	Black	Dark brown-black	Black	Dark brown	Brown-black
Conidiophore	Simple	Simple	Simple	Branched	Profusely branched
Conidial shape	Globose	Globose	Globose	Globose	Globose
Conidial ornamentation	Verrucose	Echinulate	Verrucose	Verrucose	Minutely verrucose
Habitat	Leaves	Stem	Stem	Stem	Leaves

3.3 Diagnostic Features of Representative Taxa

The five *Periconia* species recorded during the present study could be distinguished by a combination of conidiophore architecture, conidial dimensions, and ornamentation. *Periconia byssoides* was characterized by long, unbranched conidiophores and comparatively large, verrucose conidia. *P. hispidula* differed in possessing shorter conidiophores and echinulate conidia. *P. pseudolateralis* was readily recognized by the lateral arrangement of conidiogenous cells. *P. minutissima* produced the smallest conidia among the recorded taxa, whereas *P. ramostipitata* exhibited profusely branched conidiophores, making it morphologically distinct from the remaining species.

4. DISCUSSION

Dematiaceous hyphomycetes constitute an ecologically important group of saprobic fungi that actively participate in the decomposition of lignocellulosic plant materials and the recycling of nutrients in forest ecosystems. The present investigation revealed that Mahadevpur Forest supports a diverse assemblage of these fungi on naturally decaying leaves and stems, indicating that the tropical deciduous forests of Telangana provide favourable microhabitats for their growth and reproduction (Manoharachary et al., 2005).

The predominance of *Periconia* species observed in the present study agrees with earlier reports describing the genus as a common saprobe on dead plant materials in tropical and subtropical regions. Morphological characters such as colony pigmentation, conidiophore architecture, conidiogenous cell arrangement, and conidial size and ornamentation proved reliable for species identification and remain fundamental diagnostic features in the taxonomy of dematiaceous hyphomycetes (Mahadevakumar et al., 2025). The variation observed among the recorded species reflects their adaptation to different substrates and ecological niches within the forest ecosystem.

Dead leaves and stems supported the highest fungal diversity, emphasizing the importance of plant litter as a major reservoir of saprobic fungi (Cannon & Sutton, 2004). Similar substrate preferences have been reported from other tropical forests of India, where leaf litter provides favourable moisture, nutrients, and surface area for fungal colonization (Osono, 2020). The occurrence of morphologically distinct taxa on different substrates also suggests a degree of ecological specialization among dematiaceous hyphomycetes.

Although the present work is based on morphological taxonomy, future studies integrating

molecular phylogenetic techniques with ecological observations will further improve species delimitation, clarify evolutionary relationships, and enhance understanding of fungal diversity in tropical forest ecosystems.

5. CONCLUSION

The present investigation provides a systematic account of the morphological diversity and ecological distribution of dematiaceous hyphomycetes associated with decaying plant materials in Mahadevpur Forest, Telangana. The study demonstrates that tropical deciduous forests harbour a rich assemblage of saprobic fungi that play a significant role in litter decomposition and nutrient cycling. The recorded taxa exhibited considerable variation in colony morphology, conidiophore structure, and conidial characteristics, enabling reliable identification using conventional taxonomic methods.

The comparative morphological observations, and ecological information generated through this study provide a useful foundation for future taxonomic, ecological, and molecular investigations. Continued exploration of under-studied forest ecosystems is expected to reveal additional fungal diversity and strengthen conservation efforts for India's rich mycobiota.

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