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Saprobic Litter Fungi: New Additions to Indian Mycobiota

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ABSTRACT

In this contribution, 04 species of litter microfungi associated with plant debris are registered for the first time to the Indian mycobiota viz., *Acanthostigma perpusillum* De Not. 1865; *Angustimassarina italica* Tibproμma, Camporesi & K.D. Hyde 2017; *Hermatomyces sphaericoides* Koukol & G. Delgado 2018; *Paradictyoarthrinium hydei* N.G. Liu & J.K. Liu, 2018. For the 04 species recorded in the present study, descriptions, illustrations and information about their substrates and geographical distribution are provided. Reference material was deposited in the Herbarium of the Botanical Survey of India, WRC, Pune.

Key words: Microfungi, New Records, Sanjay Gandhi National Park (SGNP), Maharashtra, India.

INTRODUCTION

Sanjay Gandhi National Park (SGNP) is one of the national parks of Maharashtra lying on the north coast of Mumbai Metropolitan Region. The National Park lies between longitude 72º53' E to 72º58' E and latitude 19º8' to 19º21' N (Khawarey 2000), and covers 103.09 km^2 of area spanning over three districts *viz.*, Mumbai Suburbs, Thane and Palghar. Considering the variety of natural environments in Sanjay Gandhi National Park, a significant work was undertaken which resulted in the diversity of litter fungal species with a record 04 saprobic microfungi previously unknown in India. Hence, in present paper those 04 litter microfungal species are duly described along with their nomenclature, taxonomic position and distribution.

MATERALS AND METHODS

To study the diversity of litter fungi, samples of plant debris consisting of leaf litter, dead branches, dead bark, and dead wood were collected from three different forest ranges (Tulsi, Krishangiri and Yeoor) and adjoining areas of the National Park in different seasons viz., monsoon, post-monsoon, winter and summer. Global Positioning System (GPS) coordinates of collection locations were also recorded. QGIS 3.14 'Pi' version was used for plotting GPS data, to prepare a survey map showing collection sites along with range map of SGNP (source: forest authorities) which is shown in Fig. 1. The slides showing asexual and sexual structures of fungi were observed under Olympus compound microscope model CX-41 attached to DP22 and DP27 cameras. Fungi belonging to Ascomycetes were identified by Dennis (1978), Pande (2008), Hanlin (1998). Bitunicate Ascomycetes were studied by the help of Sivanesan (1983).

The isolates were assigned to respective genera and species using aforementioned approaches based on morphology. The recent taxonomic position of fungal taxa was verified from the online databases such as Index fungorum (http://www.Index fungorum.org) and Mycobank (http://www. mycobank. org).

RESULTS

1. *Acanthostigma perpusillum* De Not., *Hedwigia* 4: 28 (1865) **Fig. 2 (A-D)**

Position in classification:

Fungi,Ascomycota,Pezizomycotina,Dothideomycetes, Pleosporomycetidae,Tubeufiales, Tubeufiaceae.

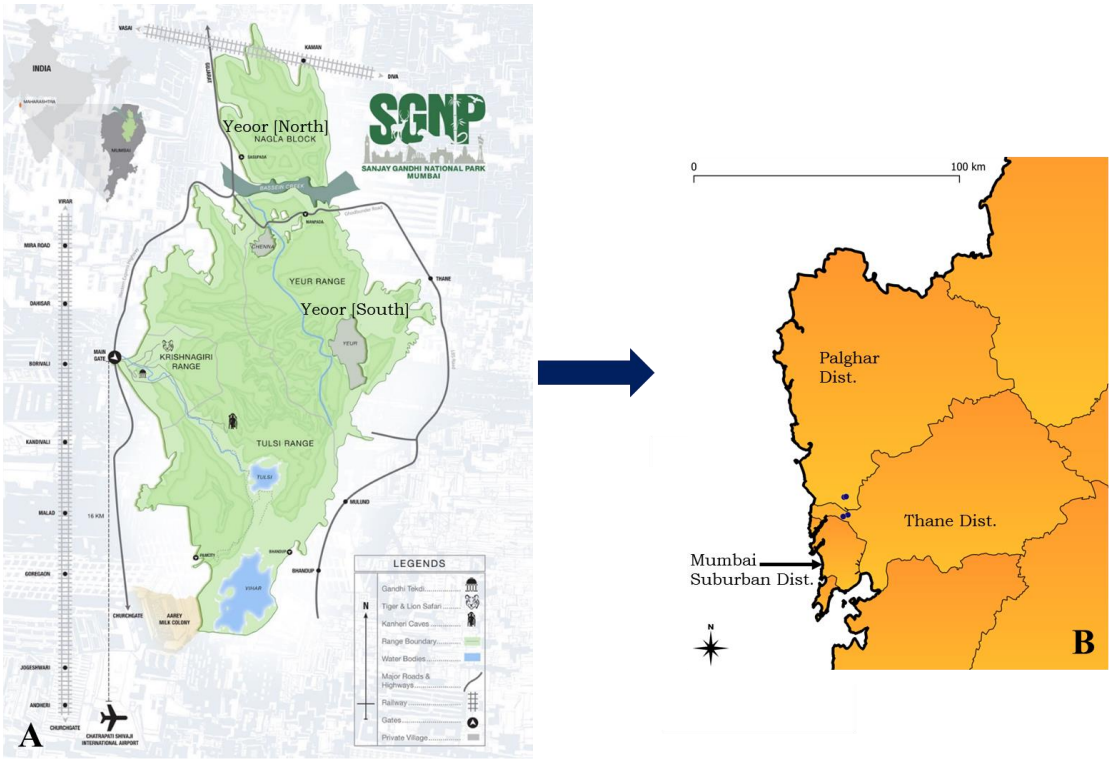

Fig. 1. Map of SGNP showing collection locations: A Map of SGNP ranges provided by forest authorities. B. Survey map prepared by plotting GPS of collection locations using QGIS 3.14 'Pi' version.

Saprobic on dead bark. Ascomata 100–110 µm high × 150–155 µm diam, superficial, scattered, globose to subglobose, reddish-brown to dark brown, collabent towards when dry, sparsely setose on the upper part. Setae 1-celled, dark brown, opaque, acute, (28–97 µm long × 5–6 µm wide at the base. Peridium 15–22 µm thick, comprising 3–4 layers of polyhedral, pale brown to brown, thick-walled cells. Hamathecium 2–3.5 µm wide, numerous, cellular, branched, anastomosing pseudoparaphyses developing from the basal hymenium. Asci 77–79 ×14–16 µm, 8-spored, bitunicate, fissitunicate, cylindro clavate, broadly rounded and thickened at the apex, ocular chamber not observed, short-pedicellate. Ascospores 30.5–35.5(−42) × 5–6 µm, 2–4-seriate in the ascus, fusiform to clavate, narrowly rounded at both ends, one of middle cells often broader than the others, (5–) 6–7(−8)-septate, straight or slightly curved, not-constricted or slightly constricted at the septa, hyaline.
Material examined: On Bark litter, near Chena Lake, Yeoor Range [South], SGNP, Thane, Maharashtra, India, date 21/08/2017, RD, 209294 BSI (WC), Accession no. BSI-F711.
Geographical Distribution: Earlier reported from France, Italy and USA (Réblová & Barr 2000).

2. *Angustimassarina italica* Tibpromma, Camporesi & K.D. Hyde, *Fungal Diversity* 83:33. (2017)
Fig. 2 (E-H)

Position in classification:

Fungi,Ascomycota,Pezizomycotina,Dothideomycetes, Pleosporomycetidae,Pleosporales, Amorosiaceae

Saprobic on dead bark, Ascomata 127–159 µm high, 97–131 µm diam. semi-immersed to erumpent through host tissue, solitary, uniloculate, globose to subglobose, black, without hairs, with long ostiole in the center. Peridium 25–40 µm wide, comprising several layers of hyaline to pale brown cells of textura angularis. Hamathecium 1.1–1.9 µm wide, comprising numerous, aseptate, unbranched, pseudoparaphyses. Asci 75–100 × 10–12 µm, 8-spored, bitunicate, cylindrical with bulbous pedicel, rounded at the apex, with a well-developed ocular chamber. Ascospores 15–22 × 3–6 µm, overlapping 1-seriate, hyaline, 1-septate, constricted at centre, swollen above centre septum, conical at the ends, guttulate, surrounding by a large mucilaginous sheath, smooth-walled. Asexual morph Undetermined.
Material examined: On Decaying bark, Sarjamori, North of Vasai Creek, Yeoor Range [North], SGNP, Palghar Dist., Maharashtra, India, date 20/12/2017 RD, 209263 BSI (WC), Accession no. BSI-F603.
Geographical Distribution: Earlier reported from Italy (Tibpromma et al. 2017).

3. *Hermatomyces sphaericoides* Koukol & G. Delgado, in Koukol, Delgado, Hofmann & Piepenbring, *IMA Fungus* 9(1): 122 (2018)
Fig. 2 (I-K)

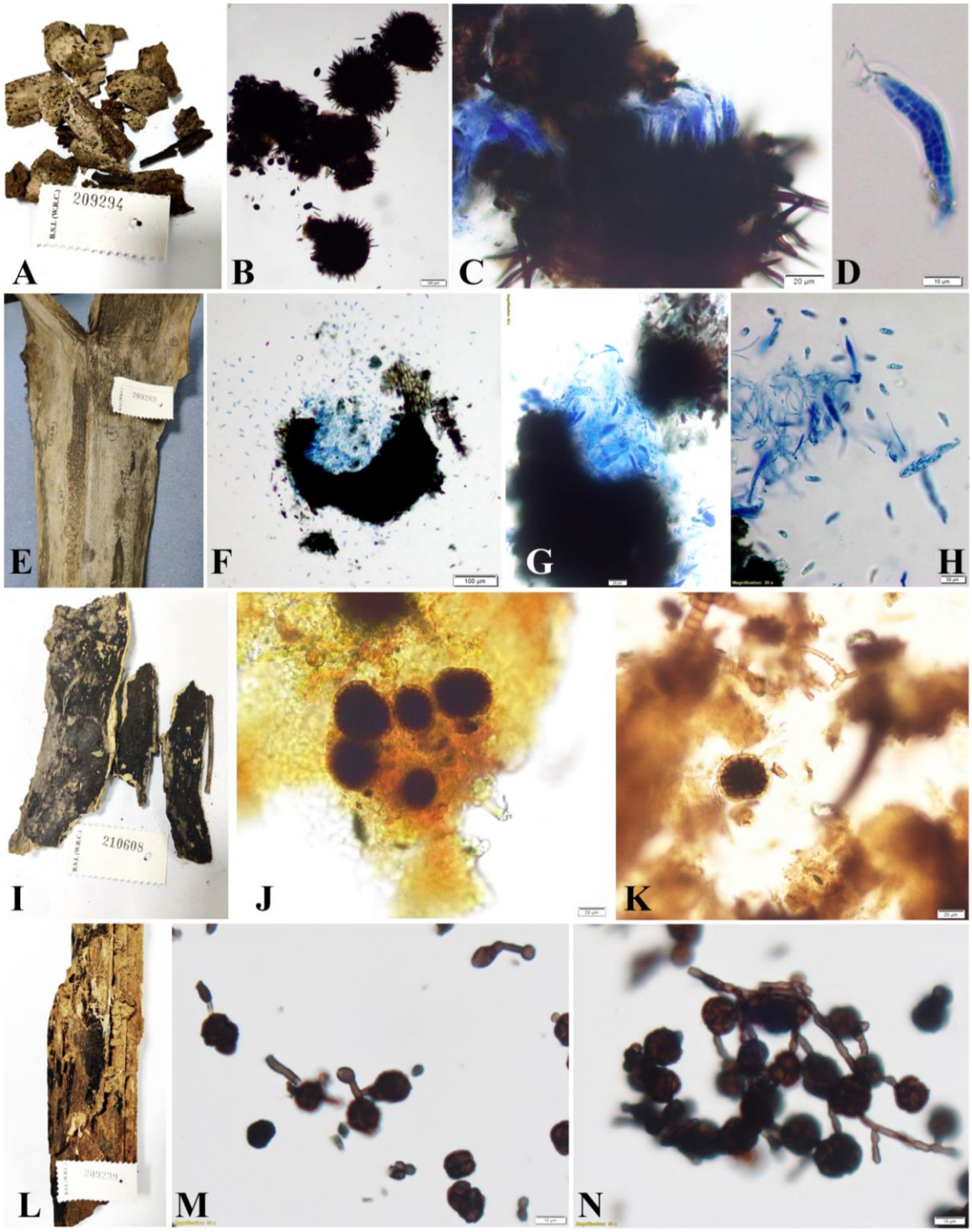

Fig. 2. New records of fungi: A-D. ***Acanthostigma perpusillum***: A. Fallen bark; B, D. Ascomata; F. Ascospore. E-H. ***Angustimassarina italica***: E. Decaying bark; F, G. Ruptured Ascomata with Asci and ascospores; H. Ascospores. I-K. ***Hermatomyces sphaericoides***: I. Fallen bark; J-K. Conidia. L-N. ***Paradictyoarthrinium hydei***: L. Fallen bark; M-N. Conidia. Scale bars: B, F = 100 µm; C, G, H, J, K = 20 µm; D, M, N = 10 µm.

Position in classification:

Fungi,Ascomycota,Pezizomycotina,Dothideomycetes,Pleosporomycetidae,Pleosporales,Hermatomycetaceae.

Colonies on the natural substrate forming sporodochial, subiculate conidiomata, superficial, scattered, dark grey-black, consisting of a velvety, dense, thick, annular, oval or lobed by confluence, Mycelium superficial, composed of a compact network of repent, branched, septate, smooth, pale

brown or brown hyphae, 1.5–3.5 µm wide, Conidiophores inconspicuous, up to 14 µm long and 3.5 µm wide, often corresponding to conidiogenous cells. Conidiogenous cells monoblastic, determinate, spherical, subspherical, pale brown, smooth or finely verruculose, 3–7 × 2–5 µm. Conidia, solitary, dry, globose, subglobose, muriform, sometimes slightly constricted at the septa, finely verruculose, central cells dark brown to blackish brown, peripheral cells narrow and brown, ellipsoidal or oblong in side view where two distinct adpressed halves can be recognized, each half seen laterally as a row of 5–7 cells, end cells pale brown to brown, middle cells dark brown to blackish brown, 24.5–28 × 23–26 µm.

Material examined: on Leaf litter, Yeoor 1147, Yeoor Range [South], SGNP, Thane, Maharashtra, India, date 18/12/2019, RD, 210608, BSI (WC), Accession no. BSI-F645

Geographical Distribution: Earlier reported from Panama and Thailand (Boonmee & Huanraluek in Boonmee et al. 2021).

4. *Paradictyoarthrinium hydei* N.G. Liu & J.K. Liu, *Phytotaxa* 338(3): 290 (2018)

Fig. 2 (L-N)

Position in classification:

Fungi,Ascomycota,Pezizomycotina,Dothideomycetes, Pleosporomycetidae,Pleosporales,Paradictyoarthriniaceae.

Colonies on natural substrate, superficial, black, gregarious, powdery. Mycelium mostly immersed, composed of pale brown to brown, septate, branched hyphae. Conidiophores 3–6 µm diameter, macronematous, rarely micronematous, short or reduced, dark, straight to slightly curved, branched or unbranched, slightly constricted at the septa, uneven, thick-walled. Conidiogenous cells holoblastic, monoblastic, integrated, determinate, terminal, dark. Conidia 14.5–25 × 12.5–20 µm solitary or developing in chains, muriform, subglobose or irregular, septate, constricted at the septa, dark brown to black, verrucose.

Material examined: On Dead wood litter, Sasunavaghar, North of Vasai Creek, Yeoor Range [North], SGNP, Palghar Dist., Maharashtra, India, date 21/12/2017, RD, 209239 BSI (WC), Accession no. BSI-F678.

Geographical Distribution: Earlier reported from Thailand (Hyde et al. 2020).

Discussion: Based on the reviews published (Bilgrami et al 1979 1981, 1991; Jamaluddin 2004; Maheswari et al 2012; Manoharachary et al 2022), it reveals that all 04 species are a new addition to the mycoflora of India.

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