

Four New Reports of Tomentelloid Fungi from India

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ABSTRACT

Four species of tomentelloid fungi i.e. *Tomentella alutaceoumbrina* (Bers.) Bourdot & Galzin, *T. fuscocinerea* (Pers.: Fr.) Donk, *Tomentellopsis echinospora* (Ellis) Hjortstam and *T. pusilla* Hjortstam are illustrated and described for the first time from India based on specimens collected from Kullu district of Himachal Pradesh.

Keywords: Agaricomycetes, Basidiomycota, Himalaya, Ectomycorrhiza, Wood rotting fungi.

INTRODUCTION

Tomentelloid fungi (*Thelephoraceae*, *Thelephorales*) are peculiar in having resupinate, somewhat loosely attached and usually dark coloured basidiocarps. These fungi are characterized by monomitic to dimitic hyphal system with simple-septate or clamped generative hyphae. The basal hyphae usually appear dark coloured in 3% potassium hydroxide solution. These fungi are unique in having echinulate, colourless to yellowish or even brownish basidiospores (Köljalg, 1996). In addition to their wood decaying properties these fungi also form an integral component of the ectomycorrhizal communities in the forest ecosystems (Köljalg *et al.*, 2000). The diversity of tomentelloid fungi has been explored from time to time from different parts of India. Earlier workers i.e. Rattan (1977), Sharma (2012), Dhingra (2014), Dhingra *et al.*, (2014) and Manoharachary *et al.*, (2022) have reported/listed 50 species of these fungi from various parts of India.

During the fungal forays conducted in different localities of Kullu District (Himachal Pradesh) authors collected some interesting specimens of tomentelloid fungi belonging to two species each of genus *Tomentella* i.e. *T. alutaceoumbrina* (Bers.) Bourdot & Galzin, and *T. fuscocinerea* (Pers.: Fr.) Donk, and *Tomentellopsis* i.e. *T. echinospora* (Ellis) Hjortstam and *T. pusilla* Hjortstam. The specimens were worked out for their morpho-taxonomic details and identified by consulting published literature (Wakefield, 1969; Rattan, 1977; Köljalg, 1996; Bernicchia and Gorjon, 2010; Sharma, 2012). In this manuscript all the four

species are illustrated and described for the first time from India (Manoharachary *et al.*, 2022).

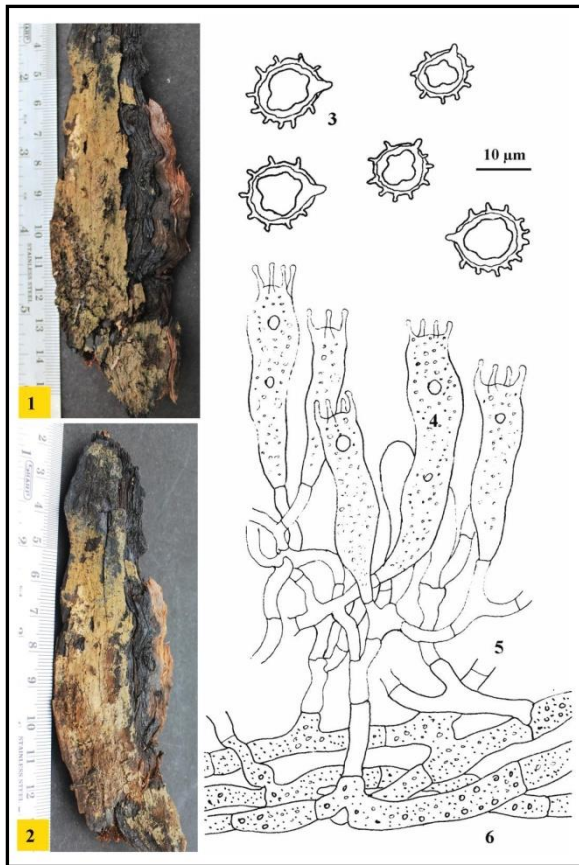
MATERIAL AND METHODS

The specimens of tomentelloid fungi were collected during the collection trips carried out in various localities of Kullu District (Himachal Pradesh, India) during the rainy months of 2017-2019. The macroscopic characters of basidiocarp, colour of different sporophore parts, nature of hymenophore, and type of margins were recorded carefully. The colour standards used were according to Kornerup and Wanscher (1978). The micro-morphological features were studied from crush mounts and free hand cut sections of the material mounted in water; 3%, 5%, and 10% KOH solutions; cotton blue (1% in lactophenol); congo red (1% in distilled water); phloxine (1% in distilled water); sulphovanillin (0.5 gm vanillin + 4.0 ml conc. Sulphuric acid + 2.0 ml distilled water) and Melzer's reagent (0.5 gm iodine + 1.5 gm KI + 20 gm chloral hydrate + 20 ml distilled water). The outline of microscopic structures was drawn with the help of a camera lucida at 100X, 400X, and 1000X magnifications using compound microscope. The investigated specimens were deposited in the Herbarium of Botany Department, Punjabi University, Patiala, Punjab under PUN numbers.

TAXONOMIC DESCRIPTIONS

1. *Tomentella alutaceoumbrina* (Bers.) Bourdot and Galzin, *Hyménomycètes de France*: 477 (1928) [MB#250626].

Basionym: *Hypochnus alutaceoumbrinus* Bers., *Annals Mycologici*, **1** (2):109 (1903). [MB#172476] (Figures 1-6)



Figures 1-6: *Tomentella alutaceoumbrina*; 1, Basidiocarp showing hymenial surface (fresh); 2, Basidiocarp showing hymenial surface (dried); 3, Basidiospores; 4, Basidium; 5, Subhymenial generative hyphae; 6, Basal generative hyphae.

Basidiocarp annual, resupinate, loosely adnate, effused; up to 110 µm thick in section. Hymenial surface smooth, pulverulent; light brown (6D8) to caramel brown (6C6) when fresh, no prominent change after drying. Margins filamentous, concolorous. Hyphal system monomitic. Generative hyphae branched, simple-septate, up to 6 µm wide, thin-walled; less branched, long-celled and parallel to the substrate in the subiculum; vertical, thin-walled, short-celled, much branched in the subhymenium. Basidia clavate, without basal clamp, with granular contents and small oil droplets, 30–62 × 6.5–10 µm, 4–sterigmata; length of sterigmata up to 5 µm. Basidiospores broadly ellipsoid to subglobose, thick-walled, echinulate, aculei up to 1 µm long, 10–12.5 × 9–11.5 µm, light brown in 3% KOH solution, spore wall shows no reaction in cotton blue and Melzer's reagent.

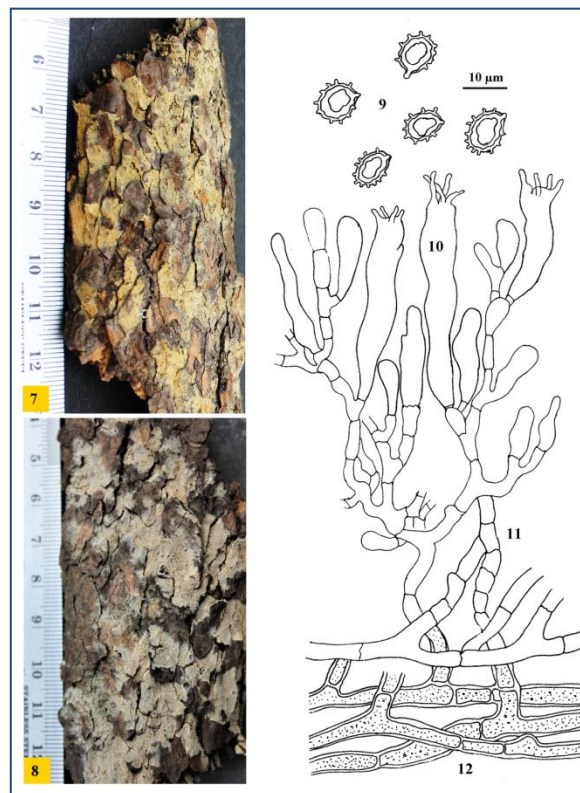
Material studied: Himachal Pradesh, Kullu, Banjar, on the way to Khanag, 2223 MAMSL, on

burnt coniferous wood, September 8, 2019, Ellu 11143 (PUN).

Remarks: *Tomentella alutaceoumbrina* is peculiar in having light brown to caramel brown basidiocarp, simple septate generative hyphae and broadly ellipsoid to sub globose, thick-walled, echinulate basidiospores. It resembles *T. fuscocinerea* (Pers.:Fr.) Donk in morphology but later differs in having in having ellipsoid to broadly ellipsoid basidiospores (Wakefield, 1969). Earlier it has been recorded from England and North Ireland, where it was described as *T. macrospora* (Wakefield, 1969). As per Mycobank (2023), the current name of the species is *T. alutaceoambrina*.

2. *Tomentella fuscocinerea* (Pers.:Fr.) Donk *Med. Bot. Mus. Her. Rijks-univ. Utrecht* **9**: 30. 1933. [MB#439164].

Basionym: *Thelephora fuscocinerea* Pers., *Mycologia Europea*, **1**: 114 (1822). [MB#235982] (**Figures 7-12**)



Figures 7-12: *Tomentella fuscocinerea*; 7, Basidiocarp showing hymenial surface (fresh); 8, Basidiocarp showing hymenial surface (dried); 9, Basidiospores; 10, Basidium; 11, Subhymenial generative hyphae; 12, Basal generative hyphae.

Basidiocarp annual, resupinate, adnate, effused, crustose; up to 140 µm thick in section. Hymenial

surface smooth to somewhat colliculose; greyish white (1B1) when fresh, brownish orange (6C8) after drying. Margins byssoid, whitish to somewhat yellowish to determinate. Hyphal system monomitic. Generative hyphae branched, simple-septate, thin- to thick-walled, up to 5 μm wide; less branched, long-celled and parallel to the substrate in the subiculum; vertical, thin-walled, short-celled, much branched in the subhymenium. Basidia subclavate somewhat sinuous, without basal clamp, 27.5–47.5 \times 6–9 μm , 4–sterigmate; length of sterigmata up to 7 μm . Basidiospores ellipsoid to broadly-ellipsoid, thick-walled, echinulate, aculei up to 1 μm long, pale brown in 3% KOH, 8.5–11 \times 6–7.5 μm , spore wall shows no reaction in cotton blue as well as Melzer's reagent.

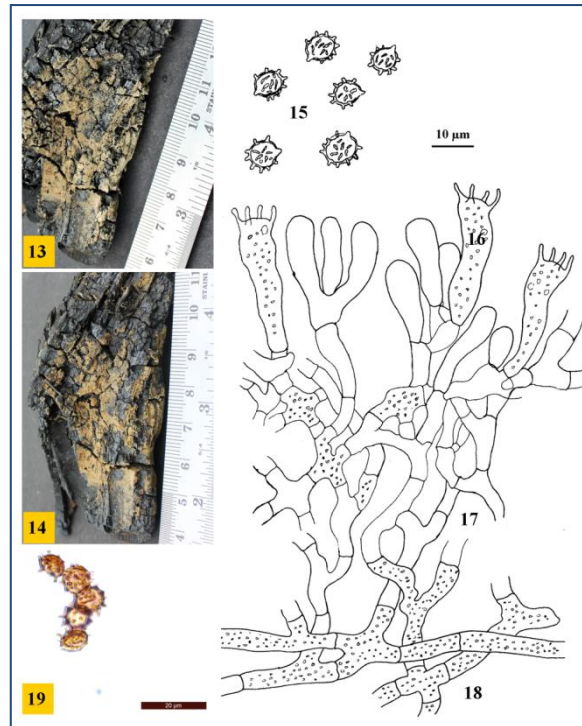
Material studied: Himachal Pradesh, Kullu, Anni, Chowai, 2086 MAMSL, on the bark of *Cedrus deodara* log, 22 September, 2017, Ellu 11145 (PUN).

Remarks: *Tomentella fuscocinerea* differs from *T. macrospora* in having smooth to colliculose, greyish brown hymenophore and ellipsoid to broadly ellipsoid basidiospores (Wakefield, 1969). Previously, it has been recorded from various parts of Northern hemisphere (Mycobank, 2023).

3. *Tomentellopsis echinospora* (Ellis) Hjortstam, *Svensk Bot. Tidskr.* **64** (4): 426 (1970). [MB#324693]

Basionym: *Corticium echinosporum* Ellis, *Bull. Torrey Bot. Club* **8**: 64 (1881). [MB#236913] (**Figures 13-19**)

Basidiocarp annual, resupinate, adnate, effused, easily separable; up to 230 μm thick in section. Hymenial surface arachnoid to somewhat pelliculose; yellowish white (2A2) when fresh, brazen yellow (4C7) after drying. Margins fibrillose, paler concolorous. Hyphal system monomitic. Generative hyphae branched, simple-septate, thin-walled, cross-shaped branching common, up to 5.5 μm wide; less branched, long-celled and parallel to the substrate in the subiculum; vertical, thin-walled, short-celled, much branched in the subhymenium. Basidia subutriform, somewhat sinuous, without basal clamp, 29–32 \times 6.5–8 μm with 4–sterigmate; length of sterigmata up to 6 μm . Basidiospores irregularly globose, thin-walled, echinulate, aculei up to 1 μm long, hyaline in 3% KOH solution, 6.6–7 \times 5–6 μm , spore wall shows no reaction in cotton blue and Melzer's reagent.



Figures 13-19: *Tomentellopsis echinospora*; 13, Basidiocarp showing hymenial surface (fresh); 14, Basidiocarp showing hymenial surface (dried); 15, Basidiospores; 16, Basidium; 17, Subhymenial generative hyphae; 18, Basal generative hyphae; 19, Photomicrograph showing basidiospores.

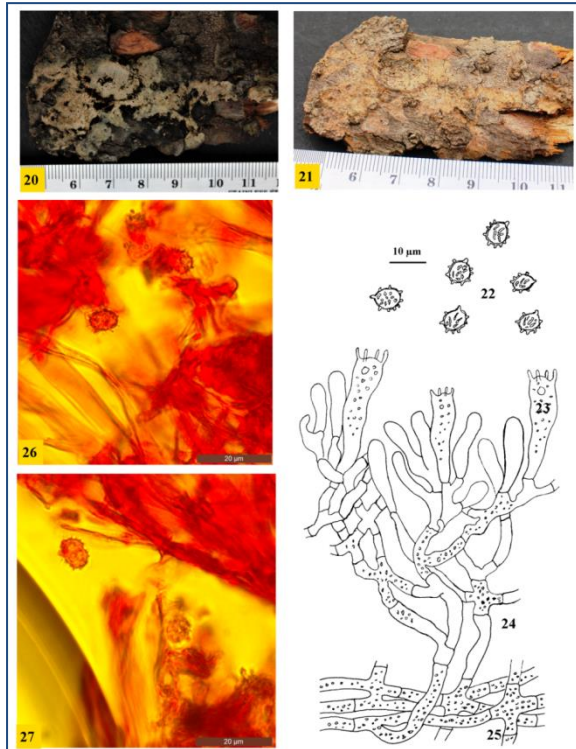
Material studied: Himachal Pradesh, Kullu, Banjar, Tandi, 2218 MAMSL, on *Cedrus deodara* stump, 19 September 2018, Ellu 11147 (PUN).

Remarks: *Tomentellopsis echinospora* is peculiar in having arachnoid to somewhat pelliculose, yellowish white hymenial surface, absence of hyphal cordons, irregularly globose, thick-walled, echinulate basidiospores that are hyaline in KOH solution. It differs from *T. pusilla* in having yellowish white hymenial surface and has been reported to be commonly encountered tomentelloid fungus in Europe and temperate region of Asia (Köljalg, 1996; Mycobank, 2023).

4. *Tomentellopsis pusilla* Hjortstam, *Svensk Bot. Tidskr.* **68** (1): 53(1974). [MB#324695] (**Figures 20-27**)

Basidiocarp annual, resupinate, effused, easily separable; up to 230 μm thick in section. Hymenial surface arachnoid to pelliculose; yellowish brown (5E8), no prominent change after drying. Margins fibrillose, paler concolorous. Hyphal system monomitic. Generative hyphae branched, simple septate, thin-walled, cross-shaped branching

common, up to 5 µm wide; less branched, long-celled and parallel to the substrate in the subiculum; vertical, thin-walled, short-celled, much branched in the subhymenium. Basidia subclavate, somewhat sinuous, without basal clamp, with oily contents, 24.5–39 × 6–8 µm, 4–stergimate; length of sterigmata up to 5 µm. Basidiospores broadly ellipsoid, thin-walled, echinulate, aculei up to 1 µm long, hyaline in 3% KOH solution, 6–7 × 4.5–6 µm, spore wall shows no reaction in cotton blue and Melzer's reagent.



Figures 20-27: *Tomentellopsis pusilla*; 20, Basidiocarp showing hymenial surface (fresh); 21, Basidiocarp showing hymenial surface (dried); 22, Basidiospores; 23, Basidium; 24, Subhymenial generative hyphae; 25, Basal generative hyphae; 26-27, Photomicrographs showing Basidiospores.

Material studied: Himachal Pradesh, Kullu, Banjar, Jalori Paas, 3120 MAMSL, on *Cedrus deodara* stump, September 8, 2019, Ellu 11148 (PUN).

Remarks: *Tomentellopsis pusilla* differs from *T. echinospora* in having brownish hymenophore and smaller basidiospores and has been reported earlier from temperate region of Asia (Kõljalg 1996).

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