KAVAKA 62(1):39-43(2026) DOI: 10.36460/Kavaka/62/1/2026/39-43

Morphological Investigations of Three Species of the Genus *Conocybe* from Maharashtra

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(Submitted on June 27, 2025; Accepted on March 18, 2026)

ABSTRACT

In the present investigations the authors explored the morpho-taxonomic characteristics of three species of *Conocybe* i.e. *Conocybe albipes*, *C. apala* and *C. rickenii,* collected from animal dung from Amravati region of Maharashtra (India). The study that describes and differentiates these three species based on morphological features such as cap shape, colour, gill arrangement, and spore morphology. The taxonomic descriptions are accompanied by illustrations depicting their morphological and anatomical characteristics.

Keywords: *Conocybe*, Fungal-taxonomy, Coprophilous

INTRODUCTION

The genus *Conocybe* Fayod, characterized by small, saprotrophic carpophores growing on soil, dung, decaying wood, and grasslands. *Conocybe* species have small basidiomata with a pileus that is conical to campanulate, thin-fleshed, and hygrophanous. The pileus is usually pale yellow to ochraceous brown. The lamellae are attached to the narrowly adnate and turn rusty brown. The stipe is thin, hollow, and weak, and it usually doesn't have a permanent annulus. Microscopically, the genus is characterized by a rusty brown spore print, smooth, thick-walled basidiospores featuring a distinct germ pore; and typically, lecythiform cheilocystidia, which constitute a significant diagnostic characteristic (Singer, 1986; Hausknecht, 2009). It plays a vital role in nutrient cycling. Species such as *Conocybe apala*, commonly found in grassy areas, *C. rickenii*, associated with organic-rich soils, and *C. tenera*, thriving in decaying plant matter, demonstrate the genus's ecological significance. However, the overall species diversity and distribution of *Conocybe* remain unclear in many regions despite their enviornmental importance and adaptive versatility.

Conocybe is found all over the world, including in Europe, North America, South America, Africa, Asia, and Australia. Species of this genus are frequently found in nutrient-dense substrates like grasslands, lawns, compost, and feces. Extensive taxonomic analyses from Europe and North America (e.g., Hausknecht, 2009; Singer, 1986) demonstrate that the genus exhibits significant diversity in temperate regions. Recent phylogenetic research has elucidated species boundaries within Bolbitiaceae, affirming the extensive biogeographical distribution of *Conocybe* (Tóth *et. al*., 2013). It has been documented in various ecological zones in India, including Punjab, West Bengal, Tamil Nadu, Kerala, and certain areas of the Himalayan region. Bilgrami *et al*. (1991) and Jamaluddin et al. (2004) incorporated various species of Conocybe in their collections of Indian

Several species of *Conocybe* have been reported across India, contributing to the understanding of coprophilous fungal diversity. *C. microspora* was reported by Singh and Atri (2009), while *C. pediades* was documented by Sharma *et al.,* (2014). *C. brunneidisca* was described by Sathe and Daniel (1980) from Maharashtra. *C. siliginea* and *C. arrhenii* were reported by Manimohan and Leelavathy (1989) from South India. Additionally, *C. tenera* was recorded by Das *et al.,* (2005) from West Bengal.

Reports of *Conocybe* in Maharashtra are few and far between. Most fungal surveys in the state have concentrated on larger macrofungi, resulting in an underrepresentation of small, ephemeral agarics. The existing literature and regional checklists (Patil *et. al*., 2015; Senthilarasu, 2015) reveal insufficient documentation of Bolbitiaceae members from the state, with comprehensive accounts from the Vidarbha region, particularly Amravati district, being predominantly absent. This shows that there is a clear lack of records of fungal biodiversity in the area. In the present study, three dung-inhabiting species of the genus *Conocybe* – *C. apala*, *C. rickenii*, and *C. albipes* have been collected from Amravati region. Their detailed descriptions are provided herein.

MATERIAL AND METHODS

Mushroom specimens were collected from various dung-rich sites in Amravati during field surveys conducted over 2022-24. Fresh samples were examined for macroscopic characteristics, including pileus and stipe shape and dimensions, surface texture, colour variations, lamellar arrangement, and attachment, along with habitat and substrate details. Field documentation was carried out using standard protocols (Atri & Saini 2000, Atri *et al.,* 2005). The colour descriptions followed the terminology established by Kornerup and Wanscher (1978) so as to ensure consistency in recording pileus, lamellae, and spore print colours (Amandeep *et. al.* 2015). The collected specimens were hot air-dried and sealed in moisture-proof cellophane packets, labelled with collection numbers. The dried specimens were preserved with small quantities of 1-4 Paradichlorobenzene crystals to prevent insect infestation (Atri & Saini 2000).

Microscopic features were studied by preparing hand-cut sections of the pileus, gills, and stipe region. Dried specimens were revived using a 10% KOH solution, and sections were stained with 1% cotton blue or 2% Congo Red for enhanced visualization. Camera Lucida drawings of microscopic structures were prepared under oil immersion, with magnifications noted for each species (Simarro 2025). Taxonomic identification follows the Dictionary of Fungi (Kirk *et al.,* 2008).

RESULTS AND DISCUSSION

***Conocybe apala* (Fr.) Arnolds, Persoonia 18 (2): 225 (2003). – *Agaricus apala* Fr., Observationes Mycologicae 2: 142 (1818).**

Pileus 12–26 mm in diameter, conical to campanulate, expanding slightly with age; surface smooth, pale whitish to light beige (4A2-4B2), sometimes with a faint ochraceous tint; margin entire, becoming slightly eroded with age, hygrophanous, often appearing translucent-striate when moist. **Lamellae** adnexed to free, initially whitish, turning pale ochre to cinnamon-buff (5C4-6D6) with age; crowded, with variable 4 length, up to 2.5 mm wide, edges smooth. **Stipe** 76–122 × 2–3 mm, cylindrical, fragile, hollow, slightly widening at the base; surface smooth, whitish to pale cream (3A2), sometimes with faint fibrillose striations; base often with slight yellowish discoloration, easily collapsing when handled. **Pileus context** thin, white to pale cream, quickly deteriorating; entire basidiome delicate and ephemeral, often disappearing within a day. **Basidiospores** 8-13 × 5-7.5 µm, ellipsoid to ovoid, smooth, thick-walled, rusty brown in mass.

Collections examined – India, Maharashtra, Amravati, Near Morshi (21°17'24.5"N 78°02'18.3"E) on cattle dung and humus-rich soil, scattered to gregarious, 15.08.2023.

Remarks - In Indian mycological studies, *C. apala* has been found to occur in lawns, grasslands, and humus-rich/dung-enriched soils during the monsoon season. This species appears to function as a small, ephemeral saprotroph and contributes to the quick decomposition of organic materials. While specific records of this species in Maharashtra may not exist, its presence in similar types of grasslands in the region can be inferred.



Figure 1: *Conocybe apala* in natural habitat

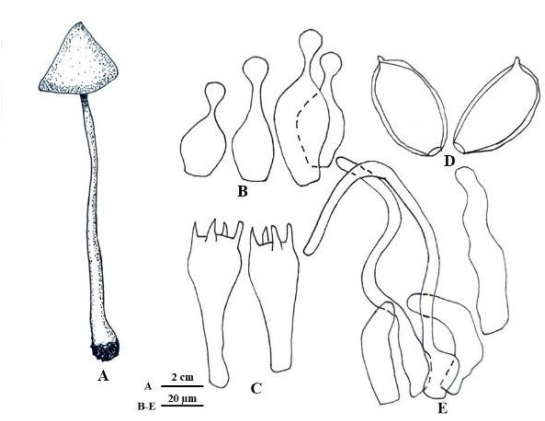


Figure 2: *Conocybe apala.* A, Fruit bodies; B, Cheilocystidia; C, Basidia, D, Spores, E, Caulocystidia

***Conocybe rickenii* (Jul. Schäff.) Kühner, Encyclopédie Mycologique 7: 115 (1935).**

Pileus 08–25 mm in diameter, conical to campanulate, sometimes expanding slightly with age; surface smooth to finely fibrillose, pale yellowish-brown (5C4-6C5) to ochraceous (5D6), becoming slightly darker at the centre; margin entire, slightly translucent-striate when moist, hygrophanous, fading to a lighter cream shade when dry. **Lamellae** adnate to free, crowded, in pale cream (4A2); length variable, up to 2.5 mm wide, edges finely serrulate. **Stipe** 44–135 × 3–5 mm, cylindrical, slightly tapering at the apex, fragile, hollow; covered with fine, fibrillose striations; base slightly swollen, often with a mycelial mat. **Pileus context** thin, whitish to pale yellow, fragile, bruising slightly darker with age; entire basidiome delicate and short-lived. **Basidiospores** 9-15 × 5-8 µm, ellipsoid to ovoid, smooth, thick-walled, reddish-brown in mass.

Collections examined – India, Maharashtra, Amravati, Paratwada, Bahiram Karanja (21°20'58.1"N 77°26'41.1"E) on cattle dung and humus-rich soil, solitary, 22.07.2024.

Remarks - *Conocybe rickenii* has been recorded in India mainly in coprophilous environments, specifically on cattle dung in northern states. This points to its substrate specificity and its ecological adaptation to nutrient-rich cattle dung. There are no detailed reports from Maharashtra state regarding *C. rickenii.* Suitable habitats containing cattle dung may support the occurrence of the fungus.



Figure 3: *Conocybe rickenii* in natural habitat

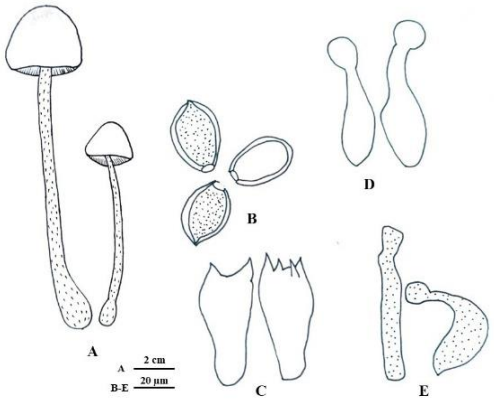


Figure 4: *Conocybe rickenii.* A, Fruiting Body; B, Basidiospores; C, Basidia; D, Cheilocystidia; E, Pileocystidia

***Conocybe albipes* Hauskn., Österreichische Zeitschrift für Pilzkunde 7: 102, 1998.**

Pileus 8–26 mm in diameter, conical to campanulate, sometimes expanding slightly with age; surface smooth, yellowish-white (4A2), often becoming slightly darker at the centre; margin entire, slightly translucent-striate when moist, hygrophanous, fading to an off-white shade when dry. **Lamellae** adnexed to free, crowded, cinnamon-brown (6D7); with variable 4 length, up to 3 mm wide, edges finely serrulate. **Stipe** 40–110 × 2–5 mm, cylindrical, slightly tapering at the apex, fragile, hollow; surface whitish to pale yellow (3A3-4A3), covered with fine, fibrillose striations; base slightly swollen, often with a faint mycelial mat. **Pileus context** thin, whitish, fragile, bruising slightly darker with age; entire basidiome delicate and short-lived. **Basidiospores** 8-13 × 5-7.5 µm, ellipsoid to ovoid, smooth, thick-walled, reddish-brown in mass.



Figure 5: *Conocybe albipes* in natural habitat

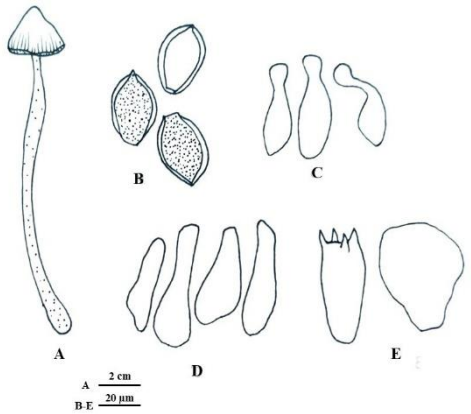


Figure 6: *Conocybe albipes.* A, Fruiting Body; B, Basidiospores; C, Cheilocystidia; D, Caulocystidia; E, Basidia

Collections examined – India, Maharashtra, Amravati, Melghat forest (21°17'25.3"N 78°01'15.4"E) on humus-rich soil and grassy fields, solitary, 16.09.2023.

Remarks - In Indian mycological literature, *C. albipes* has been reported from Punjab on dung and grass-rich habitats, representing a new record for India and confirming its saprobic role. Although detailed reports from Maharashtra are lacking, similar pale *Conocybe* species have been observed in grassland and dung-rich substrates, indicating a wider but under-documented distribution.

ACKNOWLEDGEMENTS

The author extended their gratitude toward the Department of Botany, Shri Shivaji Science College, Amravati, for their laboratory facilities provided during research work.

REFERENCES

Amandeep K., Atri N.S., Munruchi K. 2015. Diversity of species of the genus *Conocybe* (Bolbitiaceae, Agaricales) collected on dung from Punjab, India. *Mycosphere*, **6:**19–42; doi: 10.5943.

Amandeep K., Atri N.S. & Munruchi K. 2015. Taxonomic study on the coprophilous mushrooms from Punjab, India: new records of family Agaricaceae. *Current Research in Environmental & Applied Mycology* **5(1):27–45**; doi: 10.5943/cream/5/1/5.

Atri, N.S., and Saini, S.S. 2000. Taxonomic studies on North Indian agarics: Collection and preservation techniques. *Mushroom Research*, **9(1):**35–40.

Atri, N.S., Kaur, A., Saini, S.S. 2005. Taxonomic studies on Agarics: Collection and description methodology. *Mushroom Research*, **14(2):**66–70.

Das, K., Chakraborty, D., Paloi, S. 2005. Contribution to the agaric flora of West Bengal, India – II. *Indian Journal of Mycology and Plant Pathology*, **35(1)**:75–77.

Davis, R.M., Sommer, R., Menge, J.A. 2012. Field Guide to Mushrooms of Western North America. University of California Press.

Hallen, H.E., Watling, R., Adams, G.C. 2003. Taxonomy and toxicity of *Conocybe lactea* and related species. *Mycological Research*, **107(8):**969–979.

Han, J., Li, Y., Yang, Z., *et al.,* 2025. Four new species of *Conocybe* from the Qinghai-Xizang Plateau, China. *Journal of Fungi*, **11(1):**45; doi: 10.3390/j11010045.

Jordan, M. 2004. The Encyclopedia of Fungi of Britain and Europe. David & Charles.

Karun, N.C., Bhagya, B.S., Sridhar, K.R. 2018. Biodiversity of macrofungi in Yenepoya campus, Southwest India. *Microbial Biosystems*, **3:**1–11.

Khatua, S., Paul, S., Acharya, K. 2013. Mushroom as the potential source of new generation of antioxidant: A review. *Research Journal of Pharmacy and Technology*, **6(5):**496–505.

Kirk, P.F., Cannon, P.F., Minter, D.W. *et al.,* 2008. Dictionary of Fungi, 10th edition, CABI.

Kornerup, A., Wanscher, J.H. 1978. Methuen Handbook of Colour (3rd ed.). Eyre Methuen.

Lu, Q., Zeng, J., Zhang, S., *et al.,* 2024. New species of *Conocybe* (Bolbitiaceae, Agaricales) from Southwest China. *New Zealand Journal of Botany*, **62(1):**27–39; doi: 10.1080/0028825 X.2024.2327117

Manimohan, P., Leelavathy, K.M. 1989. Some agarics from South India – II. *Kavaka*, **14(1–2):**29–36.

Melo, R.F.R., Chikowski, R.D.S., Miller, A.N., *et al.,* 2016. Coprophilous Agaricales (Agaricomycetes, Basidiomycota) from Brazil. *Phytotaxa*, **266(1):**1–14.

Pegler, D.N. 1977. A Preliminary Agaric flora of East Africa. *Kew Bulletin,* **6**:1-615.

Pegler, D.N. 1986. Agaric flora of Sri Lanka. *Kew Bulletin,* **12**:1-514.

Rukhsar, S., Saeed, S., Usman, M., *et al.,* 2023. First report of milky cone cap (*Conocybe apala*) from Punjab, Pakistan. *Journal of Plantarum*, **5:**99–108.

Sathe, A.V. and Daniel, J. 1980. Agaricales of Maharashtra – I. MACS Research Institute, Pune.

Senthilarasu, G. and Kumaresan, V. 2016. Diversity of agaric mycota of Western Ghats of Karnataka, India. *Current Research in Environment & Applied Mycology*, **6:**75–101.

Sharma, B., Atri, N.S., Kaur, M. 2014. Coprophilous mushrooms of Punjab – I. *Mushroom Research*, **23(2):**117–122.

Shiryaeva, O.S., Malysheva, E.F. 2018. The genera *Conocybe* and *Pholiotina* (Bolbitiaceae, Agaricales) in the Sverdlovsk Region. *Novosti Sistematiki Nizšyx Rastenij*, **52(2):**387–396.

Simarro, R. 2025. Fungi: Methods and protocols. Methods in Molecular Biology series. Springer Nature.

Singer, R. 1986. The Agaricales in Modern Taxonomy (4th ed.). Koeltz Scientific Books, Germany, pp.981-996.

Singh, H. and Atri, N.S. 2009. Taxonomic studies on coprophilous agarics from Punjab – II. *Mushroom Research*, **18(2):**75–80.

Siquier, J.L., Salom, J.C. 2021. Contributo alla conoscenza dei Generi *Conocybe* (II) e *Pholiotina* (II) delle Isole Baleari (Spagna). *Conocybe parapilosella* sp. nov. *Rivista di Micologia*, **31:**131–155.

Smith, A.H. 1949. Mushrooms in Their Natural Habitats. Hafner Publishing Company.

Song, H.B. and Bau, T. 2023. *Conocybe* Section *Pilosellae* in China: reconciliation of taxonomy and phylogeny reveals seven new species and a new record. *Journal of Fungi*, **9(9):**924.

Ullah, T., Ullah, K., Saba, M., *et al.,* 2023. *Conocybe karakensis* sp. nov. (Bolbitiaceae, Agaricales) from Pakistan. *Phytotaxa*, **584(3):**135–148.

Wang, K., Liu, S.L., Liu, X.Z., *et al.,* 2024. Catalogue of fungi in China 3. New taxa of macrofungi from southern Xizang, China. *Mycology*.

Watling, R. 1982. British Fungus Flora: Agarics and Boleti. Vol. 3. Bolbitiaceae: Agrocybe, Bolbitius, & Conocybe. Royal Botanic Garden, Edinburgh.