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Taxonomic Study on Some Agaricales of Rajasthan, India- New Reports

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ABSTRACT

Keywords

Mushrooms, India,
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Mycofloristic surveys carried out in Mount Abu locality of Rajasthan, India have revealed the occurrence of many diverse mushrooms. This paper deals with study of taxonomy of four taxa namely *Gymnopilus zenkeri* (Henn.) Singer, *Leucocoprinus birnbaumii* (Corda) Singer, *Leucocoprinus zeylanicus* (Berk.) Boedijn, and *Inocybe rimosa* (Bull.) P Kumm are reported for the first time from Rajasthan, North West India.

Introduction

Rajasthan is the largest state of India and covers a geographical area of 342,239 square kilometres. Most of the part of the state is under arid climate which experience high wind velocity, extreme dryness, average rainfall below 200mm and temperature reaching 48°C during summer season from April to August. Inspire of this, monsoon rains witness abundant growth of diverse mushrooms.

Mount Abu, the only hill station of Rajasthan, situated at an altitude of 1350 meters above mean sea level, experiences very different climatic conditions from the rest of the state. It receives good amount of rainfall during the

season and the relative is also very high. Luxuriant growth of Gymnosperms, Pteridophytes, angiosperms and mushrooms is seen here giving scenic beauty to this hill station amidst the state which is famous for its Thar desert with xerophytic vegetation.

The mushroom flora of Mount Abu is diverse (Chouhan *et al.*, 2010) and as it is generally seen that pigmentation increases with altitude, some very brightly coloured mushrooms have been collected after good monsoon rains in the month of August and September.

During the present research work, mycofloristic surveys carried out in this region have revealed the occurrence of many fleshy fungi including basidiomycetous gill

fungi, aphylophorales, puff balls and some ascomycetous genera as well. In the present communication, five taxa namely *Gymnopilus zenkeri* (Henn.) Singer, *Leucocoprinus birbaumii* (Corda) Singer, *Leucocoprinus zeylanicus* (Berk.) Boedijn and *Inocybe rimosa* (Bull.) P. Kumm are being described.

Materials and Methods

Mushrooms were collected from various localities of Mount Abu where natural vegetation was in abundance. Field notes were prepared relating to various characters like morphology, size, shape, colour, substrate of growth according to mushroom identifier key (Jordan 1995, Pegler 1977). Ethnobotanical information and local uses were also noted along with date and time of collection. Field photography was done for all the mushrooms in their natural habitat. The specimens were carefully dug out and cleaned gently with the help of brush to remove soil particles and litter. The specimens were then placed in small card board boxes or paper bags after assigning a specimen number and a label with necessary information. Further, macroscopic and microscopic observations were made in the laboratory by using specific terminology and characters. (Singer 1962, Pegler, 1977). All the collections have been deposited under JNV/Mycl in the Herbarium of Botany Department, Jai Narain Vyas University, Jodhpur, Rajasthan (India).

During the present investigation, authentic names, basionym and synonyms of the investigated taxa are according to the Dictionary of Fungi (Kirk *et al.*, 2008) and Mycobank (www.mycobank.org). Mushroom photographs of the field and microscopic photographs with section of gills and spores have been given with this communication. All photographs are copyright of the author Reenu Chouhan and Charu Panwar.

Results and Discussion

Taxonomic observations

Gymnopilus zenkeri (Henn.) Singer

Basionym and Synonym: *Pholiota zenkeri* Henn., Bot. Jahrb. f. Syst. Pflanz. Und

Pileus 2-15 cm diameter, convex becoming applanate, ferruginous, ochraceous tawny, sometimes darkening to cinnamon brown, ornamented with minute, fibrillose squamules which are erect and abundant at the disc while appressed and sparse towards the entire, undulating, non-striate margin. Stipe length-breadth dimensions 2-10.5 cm x 0.3- 1.0 cm, swollen at the base upto 18mm from soil level, light ochraceous buff, ex annulate without any trace of veil, smooth, tough. Lamellae adnate to subdecurrent, arcuate, ochraceous-orange, crowded, pruinose. Context well developed, firm, of densely interwoven thin walled hyphae. Spore dimensions 3 - 4 x 3.5-4.0µm, short, ellipsoid, lacking a germ pore, rusty mellous with a complex wall and a fine verrucose ornamentation. Basidia clavate bearing four sterigmata 17-20 x 4- 6.5µm. Cheilocystidia 16 -20 x 5-7.5µm, clavate, hyaline, ventricose. Pleurocystidia present, 17-23 x 4.5-7 µm, clavate, heavily encrusted with a brown resinous pigment. Hymenophoral trama regular, pale brown, of thin walled hyphae. Pileal surface of freely interwoven hyphal chains, terminal elements pileocystidioid which are clavate with rounded apices, erect hyphal elements with thickened walls, heavily encrusted with pigment [Plate 1(a-c)].

Material examined – India, Rajasthan, Mount Abu growing in caespitose clusters on dead stumps of trees with mossy vegetation in Sunset point area, 15 August 2018, Reenu Chouhan JNV/Mycl / 201.

Discussion – The genus *Gymnopilus* Karst is represented by 200 species in the world (Kirk *et al.*, 2008) out of which 16 species have been reported from various parts of the country (Indian Wild Mushroom Database, Manikandan and Rajeev Sharma, 2012). The above examined collection belongs to *Gymnopilus zenkeri* (Henn.) Singer. It is a new fungus record for Rajasthan, North West India. It has been described South India from lignicolous habitat.(Vrinda *et al.*, 1997) and from North western Himalayas (Upadhyay *et al.*, 2007) The details are in complete agreement with those given from Africa (Pegler, 1977)except for the size of spores which are slightly smaller in comparison to the taxon described by him.

Two species belonging to genus *Gymnopilus* P. Karst namely. *G. pampeanus* (Speg.) Singer and *G. russipes* Pegler have been taxonomically described and illustrated for the first time from India and one species *G. spectabilis* (Weinm.) A.H. Sm. has been first time recorded from North India. (Kaur *et al.*, 2015) in addition to *Gymnopilus terricola*, *G. dilepis* and *G. bryophilus* from Kerala state. (Thomas *et al.*, 2003).

***Inocybe rimosa* (Bull.)P Kumm**

Basionym and Synonym: *Agaricus rimosus* Bull.Herb.de la France 9:388(1789)

Pileus 2-6 cm, campanulate, then expanding but retaining a prominent central pointed area, yellowish brown to ochraceous brown, slightly darker at the disc, radially fibrillose, margin at first retaining white cortinoid remnants. Stipe length- breadth 4-8 x 0.3 x 1.0 cm, cylindrical, surface white to pale ochraceous, white pruinose at the apex, veil cortinoid, white, fugacious. Lamellae adnexed to adnate, pale whitish to ochre yellow, moderately crowded. Spore dimensions 8-14 x

4-7µm brown, oblong ellipsoid, smooth walled. Basidia 4-spored. Cheilocystidia 30 - 65 x 10-22 µm, globose to obpiriform, hyaline, thin walled, abundant [Plate 2(a-c)].

Material examined: India, Rajasthan, Mount Abu growing in caespitose manner on humus rich soil and amongst leaf litter in Dhobi Ghat area, 24 July 2018, Reenu Chouhan JNV/Mycl / 223.

The genus *Inocybe* (Fr.)Fr. is represented by 700 species in the world (Kirk *et al.*, 2008, Matheny *et al.*, 2009) out of which several species have been reported from various parts of the country (Horak, 1981; Manjula, 1983; Pradeep *et al.*, 1996; Vrinda *et al.*, 1997 a,b,1999, 2000,2001, Natrajan *et al.*, 2005, Matheny *et al.*, 2012 b, Farook *et al.*, 2013, Gogoi & Parkash 2015, Latha and Manimohan 2015, Pradeep *et al.*, 2016, Yangdol *et al.*, 2016). The above examined collection belongs to *Inocybe rimosa* (Bull.) P Kumm. It is a new fungus record for Rajasthan, North West India. The details are in complete agreement with those given for this taxon from Africa (Pegler, 1977).

Key to the species of *Leucocoprinus*

Basidiocarp uniformly white or yellow, pileus and stipe base covered by loose granular, furfuraceous, squamules

Basidiocarp picric yellow, bearing loose scattered, concolorous, floccose squamules, cheilocystidia pyriform to lageniform, spores 7-10 x 4.5- 6.0µm *Leucocoprinus birnbauhii*

Basidiocarp pale brown, bearing dark brown umbo with sparsely arranged blackish- brown squamules, cheilocystidia cylindrical with mucronate apex, spores 8.5- 10.5 x 5.0- 6.6µm *Leucocoprinus zeylanicus*,

Plate.1 (a) Habit (b) Section of gills showing basidia and cystidia (c) Spores

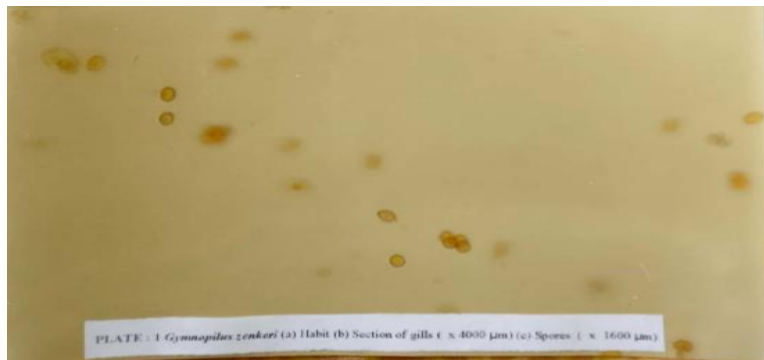


Plate.2 (a) Habit (b) section of gills showing basidia and cystidia (c) Spores



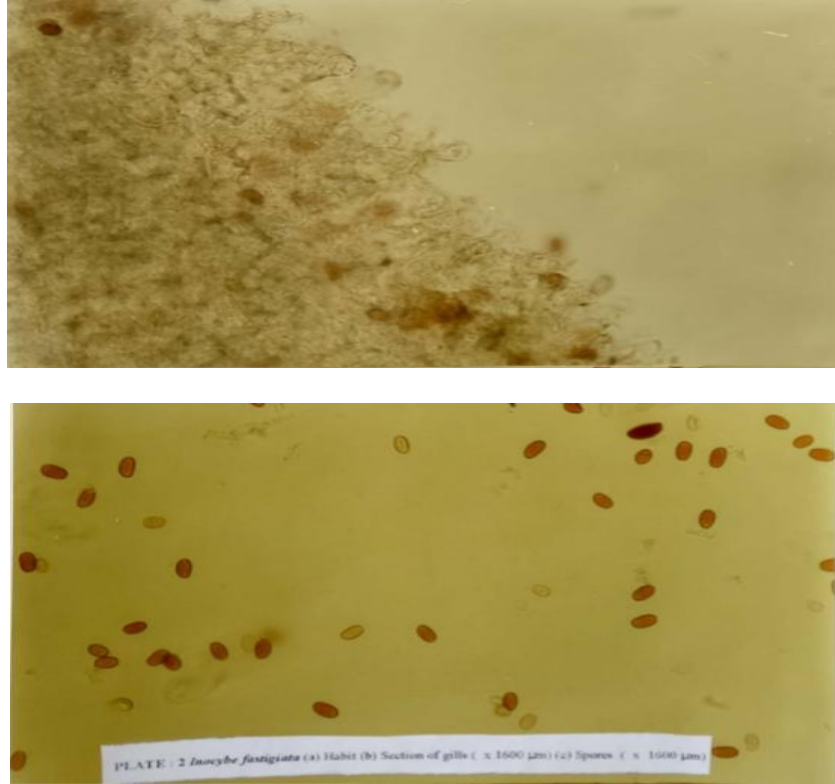
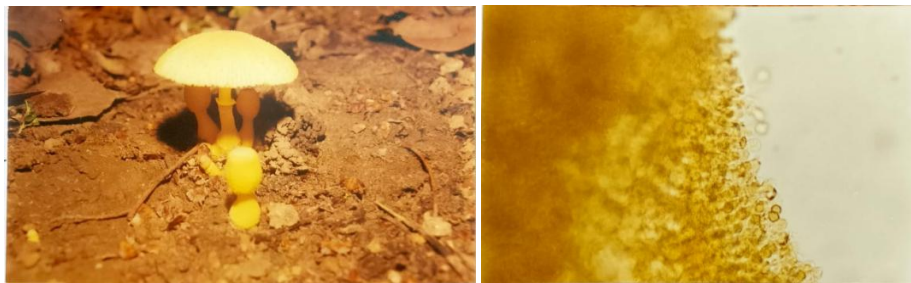


Plate.3 (a) Habit (b) Section of gills showing basidia and cystidia (c) Spores



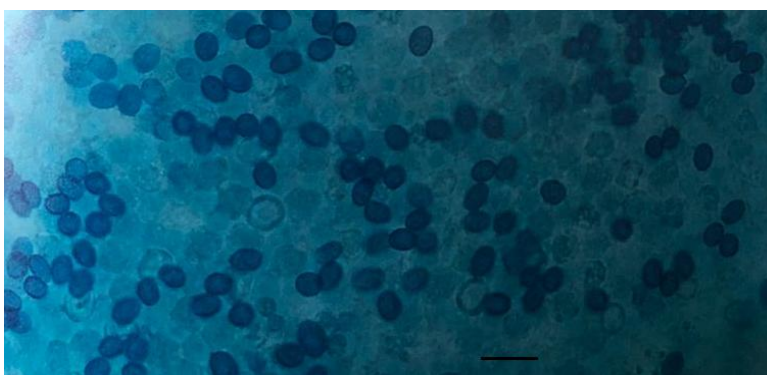
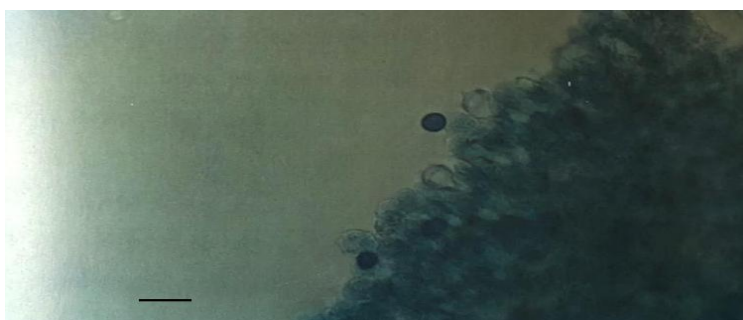
(a.)

(b.)



(c.)

Plate.4 (a) Habit (b) Section of gills showing basidia and cystidia Scale 1cm= 15µm (c) Spores
1cm = 10µm



***Leucocoprinus birnbaumii* Corda (Singer),
Sydowia 15(1-6): 67 (1962)**

Basionym: *Agaricus birnbaumii* Corda,
Icones fungorum hucusque cognitorum 3:48,
t.8:122(1839)

Synonyms: *Bolbitius birnbaumii* Sacc, &
Traverso in *Syll.Fung.*19:151(1910)

Agaricus luteus Bolton, *An History of
Fungusses, Growing about Halifax* 2:50,
(1788)

Agaricus flos-sulphuris Schnizl. *Deutschl.
Flora*:2 (1851)

Lepiota aurea Masee, *Bulletin of Miscell.
Info. of the Royal Bot. Gardens. Kew*
189:1912

Lepiota coprinoides Beeli, *Fl.icon.
Champ.Congo*:42(1936)

Pileus 1.5 cm diameter, ovoid, then conical,
finally expanding to campanulate with a
truncated apex, surface picric yellow, bearing

loose scattered, concolorous, floccose squamules, closely plicate – striate half way to the disc. Stipe length- breadth dimensions 4-8 cm x 0.2 – 0.4 cm diameter, cylindric with a prominent swollen base upto 5-6 mm diameter. Annulus membranous, concolorous with the pileus, superior. Lamellae free, sulphur yellow, broad thin, moderately crowded. Context is thin, soft, concolorous with the pileus. Spore dimensions 7-10 x 4.5-6.0µm, ovoid to ellipsoid, truncated at the apex by a small but distinct germ pore, hyaline, strongly dextrinoid with a complex thin wall. Basidia inflated, clavate bearing four sterigmata, 20-22 x 8.0 - 9.3µm. Lamellae edge sterile. Cheilocystidia thin walled, hyaline, varying from short, inflated, piriform, 15-20 x 10-15 µm at the base to elongate, lageniform 40-45 x 11-13 µm. Pleurocystidia absent. Pileal surface an epicutis of loose branching chains of cylindric thin walled elements 20-85 x 2-10µm with thin walled hyaline to yellowish wall [Plate 3(a-c)].

Material examined – India, Rajasthan, Mount Abu growing in caespitose manner on humus rich soil and amongst leaf litter in Dhobi Ghat area, 24 July 2018, Reenu Chouhan JNV/Mycl / 224.

Discussion – The genus *Leucocoprinus* is represented by 24 species in the world (Kirk *et al.*, 2008) out of which several species have been reported from various parts of the country (Tripathi *et al.*, 2017). The above examined collection belongs to *Leucocoprinus birnbauhii* Corda (Singer). It is a new fungus record for Rajasthan, North West India. It has been described from Gujarat (Vasava *et al.*, 2017), Jabalpur, Madhya Pradesh by Parihar *et al* 2012, Central India (Verma & Pandro 2018) from Western Ghats (Vrinda *et al.*, 1997, Vrinda *et al.*, 2003, Pradeep & Vrinda 2011), from Kerala (Florence 2004, Sankaran & Florence

1995) and from West Bengal (Dutta *et al.*, 2011)

The details are also in complete agreement with those given for this taxon from Africa (Pegler 1977).

***Leucocoprinus zeylanicus* (Berk.):** Boedijn, Bulletin du Jardin Botanique de Buitenzorg 16 (4): 407 (1940)

Basionym: *Agaricus zeylanicus* Berk., London Journal of Botany 6: 480 (1847)

Synonym: *Lepiota zeylanica* (Berk.) Sacc., Sylloge Fungorum 5: 45 (1887)

Pileus 2-11 cm diameter, cylindric- conical at first, soon campanulate and finally expanding to plano-convex retaining a prominent umbo, surface white to pale yellowish or light brownish with more dee, bearing loose scattered, concolorous, floccose squamules, closely plicate – striate half way to the disc. Stipe length- breadth dimensions 2-11 x 0.2-0.8 cm diameter, surface white or creamish, soon reddening on bruising.

Spore dimensions 8.5- 10.5 x 5.0- 6.6µm, ovoid to ellipsoid, with small germ pore, hyaline, dextrinoid with a complex thin wall. Basidia broadly clavate bearing four sterigmata, 20-22 x 8.0 - 9.3µm. Lamellae edge with abundant cheilocystidia which are cylindrical with mucronate apex, thin walled, hyaline, 20-22 x 8.0 - 9.0µm. Pleurocystidia absent. Pileal surface an epicutis of loose branching chains of cylindric thin walled elements 20-85 x 2-10µm with thin walled hyaline to yellowish wall [Plate 4a-c].

Material examined – India, Rajasthan, Mount Abu growing on *Salvadora* tree solitary or in small group, 24 July 2018, Reenu Chouhan JNV/Mycl / 225.

Discussion: *Leucocoprinus zeylanicus* (Berk.) has been reported earlier from Kerala State in south India (Vrinda *et al.* 1997, 2003) but it is a new report of species from Mount Abu of Rajasthan State which has been least explored for mushrooms.

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Conflict of interests

The author declares that there are no conflicts of interest.

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