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## Mushrooms of tribal importance in Wayanad area of Kerala

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The paper deals with the traditional knowledge about the wild edible mushrooms used by the various tribal population of the Wayanad area of Kerala. A total of 21 species used by the ethnic communities are enlisted in this paper.

**Key words:** Traditional knowledge, ethnic communities, wild edible mushrooms, Ethnomycology, Wayanad, Western Ghats

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### INTRODUCTION

Human use of mushrooms extends back to Paleolithic times. Mushrooms have played pivotal roles in ancient Greece, India and Mesoamerica. The study of psychoactive mushrooms and their uses in different societies begins with Gordon Wasson (1957, 1968). It was with him that the discipline of Ethnomycology—the branch of mycology that deals with the study of uses of fungi in various cultures as well as the legends associated with them began. Wasson is also credited with coining the term 'Ethnomycology'. The link between human being and fungi has started with the prehistoric man and probably extends back to many hundred thousand years.

Ethnobotanical studies in Kerala have revealed that rural and tribal people of this region know the medicinal usage of several mushrooms. The Western Ghats, one of the biodiversity hot spots is rich in mushroom diversity with unique indigenous knowledge of many species (Balakrishnan and Anil Kumar, 2001). Manilal (1981) has suspected that umbrella stones, a unique megalithic burial monuments, found in northern Kerala have got their architectural concept from hallucinogenic mushrooms consumed by many tribal in rituals.

Wayanad, one of the hill stations of Kerala is located in the lap of Western Ghats of Kerala

state. A large portion of the population of Wayanad is tribal and consists of various sections like Paniya, Kuruma, Adiya, Kurichya, Oorali, Kattunaikkar and Kadar. These people with their traditional communities and cultures represent vast body of knowledge system and the realization that such knowledge system is being depleted at a faster rate since natural ecosystem and culture are being destroyed by the encroachment of developments. However, no serious Ethnomycological investigation has been carried out in this region except that of a preliminary report by Anil *et al.* (2008). The present paper lists the wild edible mushrooms of Wayanad used by the ethnic communities and also the locals.

### MATERIALS AND METHODS

#### *Study area*

Wayanad, the green paradise is located at a ht of 700-2100 m above sea level at the northern part of Kerala state and lies between north latitudes 11°27' 15°28' and east longitudes 75°47' and 70°27'. The total geographic area of Wayanad is 2124 sq. km which forms 5.48% of the state. The vegetation is characteristic of Western Ghats and it includes moist deciduous forest, semi evergreen, evergreen, shoals, grasslands and plantations. The average rainfall is 3000 mm and the mean maximum and minimum temperature are 29° and 18° C respectively.

### **The tribal communities**

Wayanad together with the adjoining regions of Tamil Nadu is the homeland of probably the most primitive and the smallest tribal communities on the Indian mainland. The number of tribal communities in Wayanad is 11 and total tribal population is 121 362. The native adivasis mainly consists of various sections like Paniya, Kattunaikkar, Kuruma, Adiya, Kurichya, Oorali, Kadar etc. Among these, the first three groups of people are the known wild mushroom collectors. The Paniya is the largest and constitute 46% of the total number of families. The other major groups are Kurichya (16.8%), Kuruma (14.6%), Kattunaikkar (11%), Adiya (7.4%), Oorali (1.8%) and Ooralikurumar (1.5%). The tribes Vallukurumar, then Kurumar, Naykkar and Mullukurumar form 0.9% of the total number of families.

### **Methodology**

Extensive field survey and collections of mushrooms were carried out during the monsoon months of 2006-2008. Ethnomycological information was collected using various techniques such as direct interviews/discussions with local/tribal groups and by direct observations on the way different mushrooms are being collected and used. The documented information was verified by cross questioning relevant literature and key informants like village heads/ elders. Species level identification was done by following standard taxonomic methodology (Singer, 1986; Largent *et al*, 1977). The colour codes in descriptions were based on Kornerup and Wanscher (1978). A herbarium of the collections were made by drying the specimens at 40-50 °C over night in a hot air oven and then packed in paper packets and stored in controlled temperature. All specimens collected are deposited at the Mycological Herbarium of TBGR1 (TBGT).

### **RESULTS AND DISCUSSION**

The study was carried out in conjunction with the floristic study of mushrooms of Wayanad area. Though more than 600 collections were made during a two year period, around 20-25 species were known to be consumed by the tribal people of the area. It includes the more common species of *Termitomyces*, *Pleurotus* and *Lentinus*. Of these, majority of species belonged to the *Termitomyces*

group and all the five species consumed by the tribal are quite common and are extensively collected and consumed by the tribal as well as the local people. However, the species of *Cantharellus*, *Phlebopus*, *Oudemansiella*, *Russula*, *Lepista* etc are uncommon and knowledge about their edibility are restricted to the tribal.

Of the various tribal groups, Kattunaikkar has more knowledge on various species than any other tribal group and it is followed by Paniya and Kurumar. Kattunaikkar consumed more species than any other tribal group. The community considered those species of mushrooms coming in association with termite colony as edible and children are found to consume it even raw. This tribal group has knowledge about the medicinal value of some mushrooms and they use different species for different ailments which include body pain, arthritis, stiffness etc.

It is quite interesting to note that women have more knowledge and play an important role in collection, processing, preservation and preparation of wild edible mushrooms. Children are also enthusiastic in collection and accompany the elders during collection since some species can be eaten raw. The women in majority of the tribes are well aware about the edibility and toxicity of a species and they distinguish the poisonous ones by their colour, odour, locality etc. In Kuruma group, mushroom hunting is an exclusive job of women and they mainly collect only the safe species of *Termitomyces*. Kuruma women have the knowledge of preserving and storing mushrooms for future use.

More intensive and in depth study of the region will reveal additional interesting species with potential values. A checklist of the important species used by the major tribal groups viz. Kurumar, Paniyar and Kattunaikkar are enumerated below.

#### ***Lentinus squarrosulus* Mont. Ann. Sci. Nat. Bot. Ser. 2, 18:21. 1842**

Pileus 2.5-7 cm diam., convex, infundibuliform; surface white, cream or pale brown covered with appressed to recurved squamules, concentrically arranged, concolourous to the surface or slightly darker, glabrescent; margin regular or lobed. Lamellae deeply decurrent, white to pale buff. Stipe 1.2-3.5 cm x 2-7 mm, typically central often excentric, cylindrical, solid; surface concolourous with

the pileus, covered with irregular floccose squamules, soon glabrescent. Context fleshy, white. Spores (4) 5-7.5 x 1.5-2.5  $\mu\text{m}$ , cylindric, hyaline, thin-walled, smooth. Basidia 17-18 x 4.5-5.5  $\mu\text{m}$ , clavate-cylindric bearing 4 sterigmata. Cystidioles abundant on the sides of the lamellae, clavate to fusiform, sometimes mucronate. Pileal surface an epicutis of radially arranged hyphae. Clamp-connexions present.

**Habit and habitat:** Caespitose on dead wood; Muthanga: 14 Aug. 2007, No. 6532; 3 May 2008, No. 8811.

***Lentinus sajor-caju* (Fr.) Fr. *Epicrisis*. 393.1838**

Pileus 3 - 6.5 cm diam., convex to slightly uplifted with a shallow depression at centre; surface cream to pale brownish with minute appressed squamules towards the centre, dry; margin straight, entire to uplifted. Lamellae deeply decurrent, cream coloured, 2 mm wide, crowded with lamellulae. Stipe 4-6.5 cm x 3-5 mm, central or excentric, cylindric, equal, solid; surface concolourous with pileus, glabrous. Annulus present, superior. Context very thin, white. Spores 5.5-6.5 x 2.5-3.5  $\mu\text{m}$ , cylindric, hyaline, thin-walled, smooth. Basidia 18-20 x 3-4.5  $\mu\text{m}$ , clavate-cylindric, 4-spored. Lamella-edge sterile; cheilocystidia in tufts of agglutinated cystidiform hairs with obtuse or nodulose apices, thin-walled 32-55 x 1.5-5  $\mu\text{m}$  Pleurocystidia absent. Pileal surface an epicutis. Clamp-connexions present.

**Habit and habitat:** In clusters and scattered on dead wood, which is buried under soil; Nadavayal: 13 Nov. 2008, No. 12258.

***Lentinus dicholamellatus* Manim. *Mycotaxon* 90(2): 312. 2004**

Pileus up to 14 cm diam, flabelliform when young, becoming convex to infundibuliform with a depression; surface olive when young becoming olive yellow at maturity, smooth and glabrous, dry; margin wavy, entire to incised. Lamellae deeply decurrent, pastel yellow, up to 3 mm wide, crowded with lamellulae of different lengths, edge concolourous with sides, entire. Stipe 0.7-2.5 cm x 4-9 mm, central or excentric, cylindric, curved, solid; surface concolourous to the pileus. Context white, 3 mm thick. Spores 6.3-9.5 x 3-4  $\mu\text{m}$ , ovoid to ellipsoid to cylindric, hyaline, thin-walled, smooth,

inamyloid. Basidia 20-30 x 5-8.5  $\mu\text{m}$ , clavate-cylindric, 4- spored. Lamella-edge sterile; cheilocystidia 10-40x 4.2-8.5  $\mu\text{m}$ , sinuous-cylindric, nodulose, thick-walled, brown pigment. Pleurocystidia none. Hyphal pegs numerous. Pileipellis a cutis. Clamp-connexions present.

**Habit and habitat:** In groups/caespitose on dead and decaying logs; Muthanga: 20 June. 2007, No. 10366.

***Pleurotus flabellatus* (Berk. & Br.) Sacc, *Syll. Fung.* 5: 369. 1887**

Pileus 1.5-12 cm diam., orbicular, reniform to irregularly flabelliform, rarely with an excentric to central stipe; surface convex or depressed, white becoming yellowish with age, glabrous; margin incurved then undulate, sometimes incised. Lamellae decurrent. Stipe absent or reduced; surface white, finely tomentose soon glabrescent. Context thin, white. Spores 7-8.5 (9.5) x 4-5  $\mu\text{m}$ , oblong cylindric, hyaline, thin-walled, smooth. Basidia 19-21 x 3.5-4.5  $\mu\text{m}$ , narrowly clavate bearing 4 sterigmata Gill edge sterile; cheilocystidia 19-35 x 5-9.5  $\mu\text{m}$ , clavate to cylindric, sometimes the apex is attenuated in to an elongate mucronate outgrowth. Pleurocystidia absent. Pileal surface an undifferentiated epicutis. Clamp-connexions present.

**Habit and habitat:** In clusters and scattered on rotting/ fallen tree; Nadavayal: 17 July 2008, No. 11424.

***Pleurotus eous* (Berk.) Sacc, *Syll. Fung.* 5: 361.1887**

Pileus 2.5-6.5 cm diam., flabelliform; surface salmon, yellowish when old; margin incurved, entire to undulating, often hygrophanous. Lamellae decurrent, salmon. Stipe reduced or absent, laterals to excentric; surface dirty white to pink. Context white with a salmon hue. Spores (6.5) 7.5-8.5 (9.5) x (2.5) 3-3.5 (4)  $\mu\text{m}$ , ellipsoid, thin-walled, smooth, inamyloid. Basidia 15-17 x 3-4  $\mu\text{m}$ , clavate, 4-spored. Cheilocystidia 34-36 x 4.5-6.5  $\mu\text{m}$ , fusiform, thin-walled. Pleurocystidia similar to cheilocystidia. Pileipellis a cutis.

**Habit and habitat:** In groups on rotting wood; Muthanga, 9 July. 2008, No. 11318; 22 Sept. 2008, No. 11939; Nadavayal, 3 Dec. 2008, No. 12348.

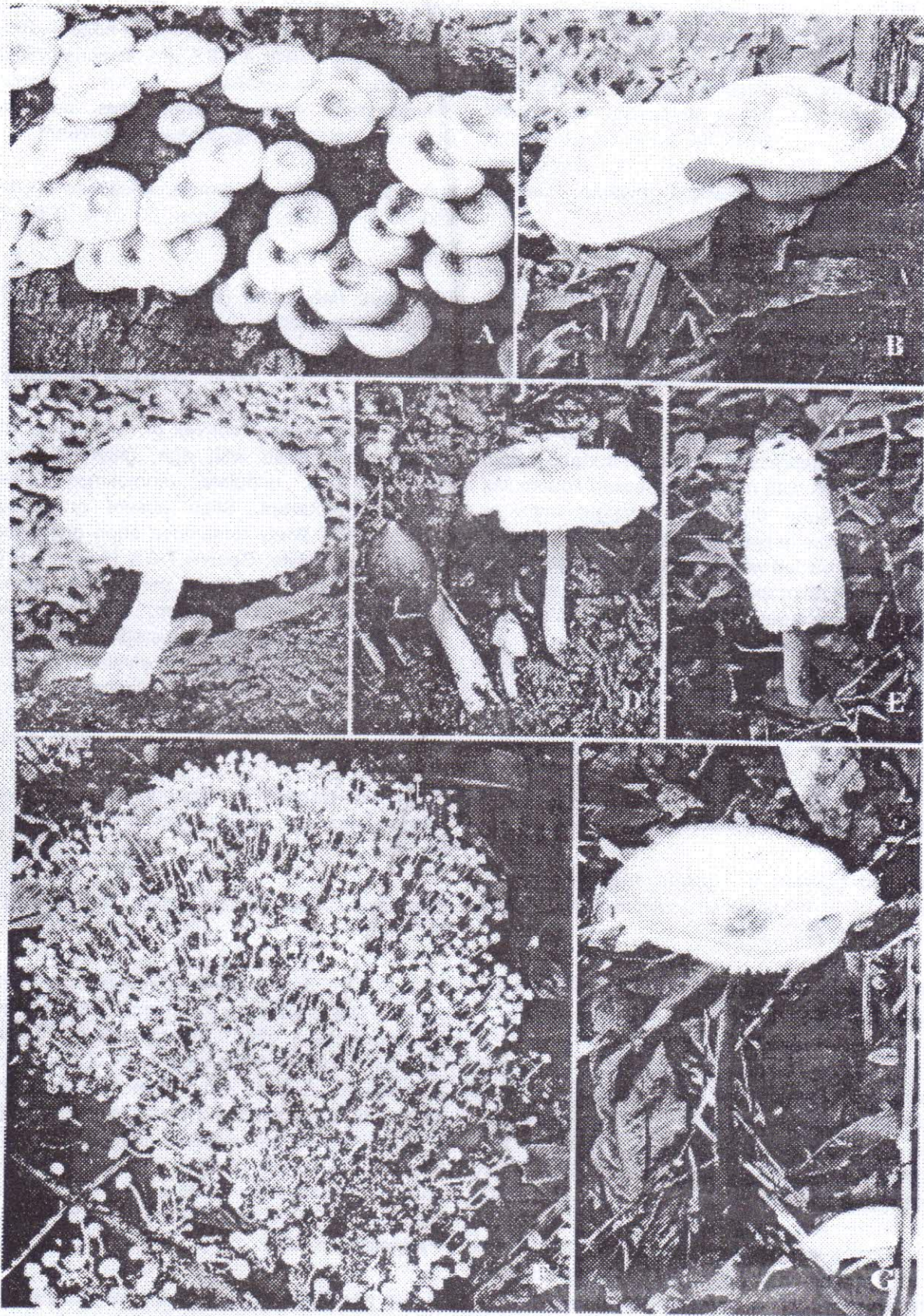


Fig 1. A. *Lentinus squarrosulus*, B. *Lentinus dicholamellatus*; C. *Oudemansiella canarii* D. *Termitomyces clypeatus*; E. *Coprinus comatus*; F. *Termitomyces microcarpus*, f. *elongatus*; G. *Oudemansiella radicata*

***Pleurotus sp.***

Pileus 4-10 cm diam., orbicular, reniform to irregularly flabelliform, convex with a shallow depression to infundibuliform; surface mouse grey, sometimes paler near centre, moist to slimy when wet, glabrous; margin straight, folded entire to incised and pellucid striate. Lamellae deeply decurrent, white, up to 5 mm wide, crowded with lamellulae. Stipe 1-3.5 cm x 4-13 mm, lateral to eccentric, solid, cylindrical; surface white, glabrescent. Context white, 4 mm thick. Spores 7-8.5 (9.5) x 4-5  $\mu\text{m}$ , oblong cylindrical, hyaline, thin-walled, smooth. Basidia 19-21 x 3.5-4.5  $\mu\text{m}$ , narrowly clavate, 4-spored. Gill edge sterile; cheilocystidia 19-35 x 5-9.5  $\mu\text{m}$ , clavate to cylindrical, sometimes the apex is attenuated in to an elongate mucronate outgrowth. Pleurocystidia absent. Pileal surface an undifferentiated epicutis. Clamp-connexions present.

**Habit and habitat:** In clusters and scattered on rotting/ fallen tree; Nadavayal: 14 Nov. 2008, No. 12259.

***Cantharellus cibarius Fr., Syst. Mycol. 1:318. 1821***

Pileus 3-10 cm diam., convex, at first becoming applanate, disc shallowly depressed at time finally broadly infundibuliform; surface deep yellow, butter yellow, fading on age and dry weather, moist or dry, hygrophanous, glabrous; margin incurved and inrolled when young remaining so for some time, non-striate. Hymenophore decurrent, concolourous with pileus, up to 3 mm wide, widely spaced, thick, forked. Stipe 2.5-6.5 cm x 7-22 mm, central, cylindrical to compressed, solid; surface concolourous with the pileus, glabrous. Context butter yellow, thick, firm. Odour pleasant, often like apricots when dried. Spores 7.5-12 x 5-6.54  $\mu\text{m}$ , broadly ellipsoid, smooth, and inamyloid. Basidia 64-72 x 8-9.6  $\mu\text{m}$ , 4-spored. Cystidia absent. Pileal cuticle a repent epicutis. Clamp-connexions present.

**Habit and habitat:** Solitary to scattered on soil in association with *Myristica*, *Hopea*, *Carallea* etc.; Muthanga, 15 Aug. 2007, No.11411; 16 July 2008, No.11411; Ponkuzhy, 12 Aug. 2008, No. 11715; 24 Sept. 2008, No. 12007.

***Cantharellus minor Peck. Ann. Rep. New York State Cab. 23: 122. 1872***

Pileus 1-3 cm diam., convex, umbonate, shallowly depressed at time, becoming infundibuliform in some; surface orange yellow, fading yellowish white, dry, glabrous; margin narrowly recurved and finally arched, undulate. Hymenophore decurrent, maize yellow, fading yellowish white, up to 3 mm wide, sub distant, thick with lamellulae. Stipe 2-3.5 cm x 4-7 mm, central, cylindrical, equal, stuffed; surface concolourous with the pileus, glabrous. Context butter yellow, up to 2 mm wide, soft. Spores 5-7.5 x 4.5-5.2  $\mu\text{m}$ , broadly ellipsoid, smooth, and inamyloid. Basidia 40-65.5 x 4-6  $\mu\text{m}$ , 4-spored. Cystidia absent. Hymenophoral trama is of interwoven hyphae. Pileal cuticle a repent epicutis. Clamp-connexions present.

**Habit and habitat:** Solitary to scattered on soil in association with *Myristica*, *Hopea*, *Carallea* etc.; Ponkuzhy, 7 Nov. 2007, No. 10748.

***Laccaria laccata (Scop.: Fr.) Syst. Kiycol. 1: 106. 1821***

Pileus 1-2 cm diam., convex to applanate often slightly depressed; surface reddish brown, hygrophanous, drying pale ochraceous, and weakly striate, glabrous, occasionally becoming fibrillose scaly. Lamellae subdecurrent, dull reddish. Stipe 2-4 cm x 1-2 mm, equal to slightly clavate, fibrous; surface concolourous with the pileus. Spores 7.5-9.5 (11) x (5) 6.5-7.5 (8.5)  $\mu\text{m}$ , subglobose to ellipsoid, echinulate. Basidia 21.5-48 x 7-16.5  $\mu\text{m}$ , clavate, 4-spored. Lamella-edge sterile; cheilocystidia 25-70 x 2-7.5  $\mu\text{m}$ , filamentous, hyaline. Pleurocystidia absent. Pileipellis of interwoven hyphae.

**Habit and habitat:** Scattered on riverine soil under Dipterocarpaceous trees; Ponkuzhy, 8 Nov. 2007, No. 10750; 16 July 2008, No. 11399; 24 Sept 2008, No. 12007.

***Oudemansiella canarii (Fungh.) Hohn. Akad. Wiss. Wien. Math. Naturw. Kl. 118: 276. 1909***

Pileus 1-9 cm diam., convex then applanate; surface white to deep sepia, often darker at the centre, becoming paler, translucent striate, glutinous when moist, smooth to rugulose, at first covered with detersile velar squamules; margin down-curved. Lamellae adnexed to adnate, white to pale greyish. Stipe 1-6 cm x 1.5-8 mm, central, cylindrical, attenuates above; surface white, shiny, finely

satiata. Context fleshy, white, soft. Spores (12) 15-24 x 10-22  $\mu\text{m}$ , globose to subglobose, hyaline, thin-walled, inamyloid, smooth. Basidia 64-80 x 18-24  $\mu\text{m}$ , clavate, 4-spored. Lamella-edge sterile; cheilocystidia and pleurocystidia similar, 80-150 x 12-40  $\mu\text{m}$ , ventricose fusoid with a broadly rounded apex, hyaline. Pileal surface an epithelium of globose to pyriform or lageniform elements, hyaline or with brownish contents embedded in a gelatinized matrix.

**Habit and habitat:** Scattered/in groups on rotting wood; Nadavayal, 17 July, 2008, No. 11432.

***Oudemansiella radicata* (Rehl. ex Fr.) Singer in Ann. Mycol, Bert. 34:333.1936**

Pileus 3 cm diam., applanate, umbonate; surface yellowish grey, viscid when moist, ridged rugulose at centre; margin thin, straight. Lamellae adnate, white. Stipe 5 cm x 7 mm, central, cylindrical, elongate, attenuate above, fistulose then hollow; surface concolourous with the pileus, paler towards the apex, fibrillose strigose with a long pseudorrhiza. Context thin, white. Spores 13-20 x 9-13  $\mu\text{m}$ , ovoid to ellipsoid, hyaline, smooth. Basidia 60-70 x 12-16  $\mu\text{m}$ , clavate, 4-spored. Lamella-edge sterile; cheilocystidia 50-70 x 14-25  $\mu\text{m}$ , clavate, thin-walled, hyaline or with a brown vacuolar pigment. Pleurocystidia 60-120 x 8-35  $\mu\text{m}$ , cylindrical to clavate or lageniform, pedicellate, hyaline, thin-walled or with a brown vacuolar pigment. Pileal surface hymeniodermic.

**Habit and habitat:** Solitary on ground; Meppadi, 21 June, 2008, No. 10373.

***Lepista sordida* (Fr.) Sing. Lilloa 22 : 193. 1951**

Pileus 1-6.5 cm diam., convex with a shallow depression; surface greyish violet, paler when dry, smooth and glabrous; margin straight, entire. Lamellae adnate, pale violet, 6 mm wide, crowded. Stipe 2-7.5 cm x 2-11 mm, central, cylindrical, fistulose surface concolourous with the pileus, paler towards the apex. Context thin, 2.5 mm thick, pale violet. Spores 5-7 x 3-4.5  $\mu\text{m}$ , ellipsoid, hyaline, with distinct rugulose ornamentation. Basidia 20-26 x 5-7  $\mu\text{m}$ , clavate. 4-spored. Lamella-edge fertile. Pileipellis a repent epicutis.

**Habit and habitat:** In groups on rubbish heaps, on

humus rich soil; Muthanga 12 June. 2008, No. 11068.

***Termitomyces eurrhizus* (Berk.) Heim in Arch. Mus. Nat. Hist, ser, 6, 18: 140.1942**

Pileus 7-18 cm diam., convex to applanate with a broadly umbonate perforatorium; surface date brown at the disk, paler elsewhere, smooth and glabrous, slimy when wet, margin crenate becoming incised. Lamellae free, pinkish cream. Stipe 7-22 cm x 1-2 cm above ground level, equal, attenuating below ground to an elongated black pseudorrhiza, cylindrical, firm, solid; surface white, fibrillose striate. Veil present as a membranous cortinoid annulus. Context white, thick, firm. Spores 6-8 (9) x 4-5 (6)  $\mu\text{m}$ , ovoid to ellipsoid, inamyloid, thin-walled, hyaline. Basidia 20-30 x 6-8  $\mu\text{m}$ , clavate, 4-spored. Lamellae edge heteromorphous. Cheilocystidia and pleurocystidia similar, 16-40 x 9-15  $\mu\text{m}$ , clavate to pyriform, slightly thick-walled. Pileal surface an epicutis.

**Habit and habitat:** Solitary on forest floor in association with termite nest; Muthanga, 16 July 2008, No. 11414.

***Termitomyces clypeatus* Heim in Bull. Jard. Bot. Brwe. 21: 207.1951**

Pileus 4-9 (11) cm diam., at first pointed conical, expanding to convex with a prominent pointed perforatorium; surface grey brown, dry, silky smooth, becoming fibrillose; margin incurved, irregularly lobed. Lamellae free, pinkish, crowded with lamellulae. Stipe 3-12 cm x 3-13 mm, central, cylindrical, solid; surface whitish, longitudinally fibrillose. Pseudorrhiza long, tapering towards the base. Annulus absent. Context white, thick. Spores 6-7.5 x 4.5-5  $\mu\text{m}$ , ovo-ellipsoid, inamyloid, thin-walled, hyaline. Basidia 18-26 x 4.5-7.5  $\mu\text{m}$ , clavate bearing 4 sterigmata. Lamella-edge sterile; cheilocystidia 15-35 x 10-22  $\mu\text{m}$ , broadly clavate to pyriform, hyaline, thin-walled. Pleurocystidia scattered, similar to cheilocystidia, 20-30 x 13-18  $\mu\text{m}$ . Pileipellis an epicutis. All hyphae lacking clamp-connexions.

**Habit and habitat:** Solitary on forest floor in association with termite nest; Muthanga: 07 Nov. 2007, No. 10734.

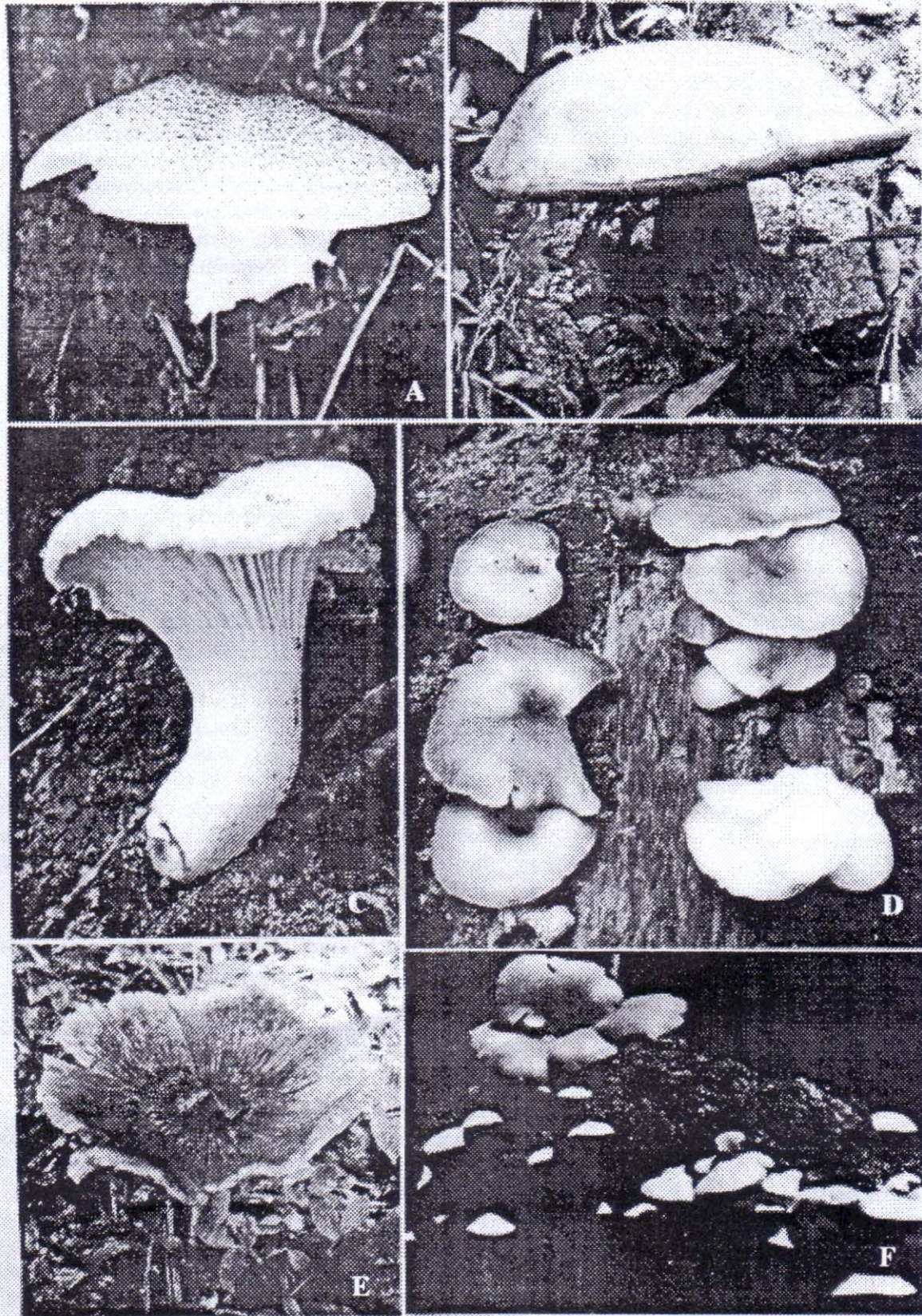


Fig 2. A. *Agaricus silvaticus*; B. *Phlehopus portentosus*; C. *Cantharellus cibarius* D. *Pleurotus sp.*; E. *Termitomyces eurrhizus*; F. *Pleurotus eous*.

***Termitomyces microcarpus* (Berk. & Br.) Heim in Mem. Acad. Sc. Inst. Fr. 64: 72.1941**

Pileus 1-3.5 cm diam., convex then applanate often umbonate; surface greyish at the disk, whitish elsewhere, streaked with grey, dry, smooth and glabrous; margin straight, entire. Lamellae free, white then pinkish, up to 3 mm wide, crowded with lamellulae. Stipe 1.5-5 cm x 1-4.5 mm, equal or attenuated towards the base, central, cylindrical; surface white, fibrous, smooth. Annulus absent. Pseudorrhiza absent. Context white. Spores 6-8 x 3.5-4  $\mu\text{m}$ , ovoid to ellipsoid, inamyloid, thin-walled, hyaline. Basidia 22-28 x 5-8  $\mu\text{m}$ , clavate, 4-spored. Lamellae-edge heteromorphous. Cheilocystidia and pleurocystidia similar, 18-42 x 10-15  $\mu\text{m}$ , pyriform to cylindrical with a slightly thickened wall. Pileal surface an epicutis.

**Habit and habitat:** Scattered in groups in association with termite nest; Muthanga, 15 Aug. 2007, No. 10465; 07 Nov. 2007, No. 10735.

***Termitomyces microcarpus* (Berk. & Br.) Heim f. *elongatus* Heim in Arch. Du Museum Nat. Hist. Natur. 18: 132.1942**

Pileus 1.5-3 cm diam., convex then applanate often umbonate; surface greyish at the disk, whitish elsewhere, streaked with grey, dry, smooth and glabrous; margin straight, entire. Lamellae free, white then pinkish. Stipe 1.5-5.5 cm x 1.5-4 mm, equal or attenuated towards the base, central, cylindrical; surface white, fibrous, smooth. Pseudorrhiza absent. Context white, thin. Spores 6-8.5 x 3.5-4.5  $\mu\text{m}$ , ovoid to ellipsoid, inamyloid, thin-walled, hyaline. Basidia 20-30 x 6-8  $\mu\text{m}$ , clavate, 4-spored. Lamellae edge heteromorphous. Cheilocystidia and pleurocystidia similar, 16-40 x 9-15  $\mu\text{m}$ , pyriform to cylindrical with a slightly thickened wall. Pileal surface an epicutis.

**Habit and habitat:** In groups on ejected termitaria; Nadavayal, 27 Sept. 2007, No. 10590.

***Termitomyces heimii* Natarajan in Mycologia 71 (4): 853.1979**

Pileus 5-16 cm diam., convex to applanate with a broadly umbonate perforatorium; surface white, grey at the centre, smooth or cracked to appear sub squamulose. slimy when wet; margin at first incurved then fissile. Lamellae free, white. Stipe 6-

15 cm x 1-2 cm, central, cylindrical, firm, solid; surface white, smooth-striate. Below ground level the stipe attenuates in to an elongated white pseudorrhiza. Veil present, superior, membranous. Context fleshy, white. Spores 4-6.5 (7) x 3.5-5  $\mu\text{m}$ , ovoid to ellipsoid, pinkish with a slightly thickened, smooth, inamyloid wall. Basidia 14-20 x 6-7.5  $\mu\text{m}$ , clavate 4-spored. Lamella-edge sterile. Cheilocystidia 18-50 x 10-22  $\mu\text{m}$ , inflated, ovoid to pyriform, hyaline, with a thin wall. Pleurocystidia scattered, 20-61 x 10-25  $\mu\text{m}$ , inflated clavate. Pileipellis an epicutis.

**Habit and habitat:** Gregarious on soil, on ground; Muthanga, 15 Aug.2007, No. 10479; 23 Sept 2008, No. 11968.

***Coprinus comatus* (Muell.Fr.) S. F. Gray in Sylloge Fung. 5: 1079. 1887**

Pileus 2 cm diam., ovoid becoming expanded and finally revolute; surface pale greyish with dark brown conical squamules at the disk, becoming appressed and sparse at the margin; margin striate. Lamellae free, black, up to 4 mm thick. Stipe 9.2 cm x 6 mm, central, cylindrical, equal, hollow; surface white, finely floccose then glabrescent. Context thin, white. Annulus absent. Spores 9.5-12 x 6-8  $\mu\text{m}$ , ovoid to short ellipsoid with a broad apical germ pore, smooth with a thickened wall. Basidia dimorphic,; large basidia 15-27 x 10-12  $\mu\text{m}$ , bearing 4 sterigmata. Lamella-edge sterile, cheilocystidia soon collapsing, 25-60 x 15-30  $\mu\text{m}$ , clavate, subglobose, hyaline, thin-walled. Pleurocystidia none. Pileal surface an epicutis.

**Habit and habitat:** Solitary on soil among grass; Muthanga, 15 Aug.2007, No. 10477.

***Russula congoana* Pat. Bull Soc. Mycol. Fr. 30: 336.1914**

Pileus 2-5 (8) cm diam., at first convex then expanded with slight central depression; surface uniformly 'pastel red' (10A5), smooth, finely striate at the margin, sticky and sometimes therefore bearing soil fragments. Lamellae adnate, white to pale cream, exceeding the gills, up to 7 mm wide, close; edge entire, concolourous to the sides. Stipe 2-4.5 cm x 7-17 mm, central, cylindrical, equal or slightly broader at the base, solid becoming stuffed and hollow; surface creamy white with a pinkish tinge at the base, smooth. Annulus absent. Smell pleasant.





Fig 3. A. *Termitomyces microcarpus*; B. *Lepista sordida*; C. *Pleurotus flabellatus*; D. *Cantharellus minor*; E. *Termitomyces heimii*; F. *Russula congoana*

Context white. Spores 8.5-11 x 7-8.5  $\mu\text{m}$ , subglobose ellipsoid to oblong, densely ornamented with coarse, amyloid, verrucae, interconnected by a reticulate system. Basidia clavate, 30-40 x 12-15  $\mu\text{m}$ , clavate, 4-spored. Macrocystidia scattered on both edges and sides of the lamellae, 45-65 (80) x 8-12 (15)  $\mu\text{m}$ , clavate to fusiform, frequently mucronate, thin-walled. Suprapellis composed of erect, shortly cylindrical elements. Pileocystidia numerous, intermixed with hyphae 35-200 x 4-8  $\mu\text{m}$ , cylindrical clavate or fusiform, obtuse or slightly constricted at large apex. Clamps none.

**Habit and habitat:** Solitary or scattered on soil in close association with *Hopea*, *Myristica*, *Pongamia*, Muthanga, 20 June 2008, No. 10364.

***Phlebopus portentosus* (Berk & Br.) Boedijn, *Sydowia* 5: 218.1951**

Pileus 7-20 cm diam., fleshy, convex becoming piano convex, often with a shallow depression at centre; surface olive brown to sepia brown at disc, paler elsewhere, slimy when wet, soon dry, smooth and glabrous; margin involute, projecting beyond the hymenophore. Hymenophore tubulate, adnexed to adnate, lemon yellow, up to 12 mm wide, darkening on cutting, pores greenish yellow with a brownish tinge, up to 0.6 mm in diam., bluing when injured. Stipe 5-15 cm x 5-10 mm, central, cylindrical, clavate with swollen base, solid; surface concolourous with the pileus, discolouring henna when bruised, sulcate, sticky, smooth above. Context butter yellow, bluing on bruising. Spores 6-9 x 7.5-8.5  $\mu\text{m}$ , ovoid to ellipsoid, olivaceous brown with a smooth outer wall. Basidia 20-34 x 5-11  $\mu\text{m}$ , clavate, 4-spored, thin walled. Pileipellis an indefinite trichoderm, with cystidiform terminal elements, 18-36  $\mu\text{m}$  x 5-7 mm, clavate, thin walled, hyaline. Stipitipellis similar to pileipellis. Oleiferous hyphae present.

**Habit and habitat:** Solitary/scattered on ground; Muthanga, 21 June 2007, No. 10389; Ponkuzhy, 24 Sept. 2008, No. 11983.

***Agaricus silvaticus* Shaeff. ex Seer., *Mycog. Suisse* 1: 98.1833**

Pileus 6-8 cm diam., convex with a broad flat disk at

centre; surface brown to cinnamon brown at centre, white elsewhere, with appressed brown squamules, smooth at centre, dry; margin straight, entire to incised. Lamellae free, up to 6 mm thick, grey becoming brown, crowded with lamellae of different lengths; edge concolourous with sides, entire. Stipe 5-8 cm x 3-6 mm, central, cylindrical, tapering up from a broad base, narrowly hollow; surface white, fibrillose, dry. Context thick, white. Annulus superior, pendant, white, fugacious. Spores 4-6.5 x 3-4.5  $\mu\text{m}$ , ovoid, smooth with a thickened wall. Basidia 15-22 x 5-7  $\mu\text{m}$ , clavate, bearing 4 sterigmata. Lamella-edge sterile, cheilocystidia crowded, 10-15 x 5-8  $\mu\text{m}$ , clavate, subglobose, pyriform, inflated, hyaline, thin-walled. Pleurocystidia none. Pileipellis an interrupted epicutis of radial hyphae, thin walled.

**Habit and habitat:** Solitary on soil among grass; Muthanga, 20 June 2007, No. 10363; 22 June 2007, No. 10390; No. 10391.

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