



## MUSHROOM DIVERSITY OF KONKAN REGION OF MAHARASHTRA, INDIA

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**Abstract:** The forays conducted in the diverse habitats of the Konkan region of Maharashtra for four consecutive monsoon seasons during 2008–2012, revealed the occurrence of 29 mushrooms. Among the collected mushrooms, six belonged to the family Agaricaceae, five to Lyophyllaceae, two each to Pleurotaceae, Hygrophoraceae, Marasmiaceae and Tricholomataceae; one each to Phallaceae, Physalacriaceae, Xylariaceae, Tremellaceae, Sclerodermataceae, Decrymycetaceae, Cantharellaceae, Entolomaceae, Plutaceae and Ganodermataceae. The morphology of *Tremella*, *Dictyophora*, *Daldinia*, *Pisolithus* and *Calocera* were quite distinct and interesting.

**Keywords:** Agariaceae, Lyophyllaceae, macrofungi, morpho-taxonomy, mushroom diversity, Western Ghats.



DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
DD	LC	NT	VU	EN	CR	EW	EX

*Hygrocybe miniata*



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**Author Contribution:** PB and SN contributed in surveying, collection, identification and microscopic characterization of mushrooms and preparation of manuscript. AD contributed to the specific identification of mushrooms, confirming the names of mushrooms and guidance during this research work.

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## INTRODUCTION

The macrofungal diversity is depleting fast due to deforestation, urbanization, climate change and unsystematic exploitation through collection of wild mushrooms. This situation demands an urgent need to collect, document and conserve this group. Most macrofungi are cosmopolitan, occurring both in tropical and temperate regions. They occur seasonally all over the world in various habitats such as humus rich soils, decaying plant litter and wood logs in forests as well as in meadows and even in sandy and other soils. Some species, particularly mycorrhizal mushrooms are on the verge of extinction.

India, being one of the top 10 mega diverse nations of the world, has ample species of wild mushrooms which occur mainly during the rainy season. The diversity of geographical, ecological and climatic conditions prevailing in India has made this country a natural habitat for a large number of fungal species. Six regions, viz., Eastern Himalayan, northwest Himalayan, Indo Gangetic Plain, Western Ghats, southern India and Rajasthan have been explored by a number of workers throughout the country as hot spots of mushroom diversity, since 1825.

The work on collection and taxonomic studies of mushrooms in Maharashtra started as late as 1974. Prof. A.V. Sathe and his team recorded 75 species distributed in 43 genera from the collections made from the states of Maharashtra, Karnataka and Kerala during 1978–1980. This collection was documented in the form of a monograph on Agaricales. As far as the collection of macrofungi from Maharashtra is concerned, mostly it remained confined to western Maharashtra. Very few mushrooms viz., *Fistulina hepatica*, *Entyloma achrospora*, *E. strictus*, *Rhodophyllus achrosporus* and *R. overeemi* were recorded from the Konkan region, is a narrow strip of 720km comprising four districts, viz.: Thane, Raigad, Ratnagiri and Sindhudurg. On the eastern side of the region lies the Sahyadri mountain range which is a part of the Western Ghats. The Sahyadri mountain range is bestowed with rich flora and fauna.

## MATERIALS AND METHODS

Mushrooms from four districts of Konkan region viz., Thane, Raigad, Ratnagiri and Sindhudurg were collected for four consecutive monsoon seasons in the years from 2008 to 2012. Selected spots included Amboli, an area with well-known high altitude biodiversity, sea shore area like Murud, horticultural plantations with mango,

cashew, coconut and arecanut at Wakavali, Kelshi, Inampangari, lateritic soil vegetation in Sindhudurg District comprising places like Kudal, Malvan, Pandur, Koloshi and Kanakvali and black soil area such as Wada and Palghar in Thane District and thick forest areas in Rajapur, Lanja, Sangameshwar, Ratnagiri, Chiplun and Dapoli tahasils. Identification of the collected mushroom specimens was done on the basis of their macroscopic (morphological) and microscopic characters. For recording field observations, a pro-forma was prepared (as per George Mimes "Principles of Mushroom Identification") (Tibuhwa et al. 2010). At the time of collection of mushrooms, date of collection, locality and habitat were recorded. Every specimen was recorded with a collection number. Descriptions are based on fresh collections made from Konkan regions. Microscopic observations were made from free hand sections mounted in lectophenol cotton blue. All collections studied are deposited at the Mycological Herbarium of Department of Plant Pathology, Dr. B.S. Konkan Krishi Vidyapeeth Dapoli, Ratnagiri, Maharashtra, India.

## RESULTS

Twenty-nine mushrooms from different families were collected during these surveys (Table 1; Images 1–19).

The mushrooms collected from different locations in Konkan region (Appendix 1 and 2) include: *Agaricus splacomycetes*, *Lepiota* spp., *Pleurotus* spp., *Marasmius haematocephalus*, *Lepista nuda*, *Tremella fuciformis*, *Pisolithus tinctorius*, *Armillaria tebescens* and *Calocera cornea*. *Termitomyces heimii*, *T. microcarpus*, *Leucocoprinus birnbaumii*, *Pleurotus pulmonarius*, *Dictyophora duplicata* and *Entoloma roseoflavum*.

The mushrooms, viz., *Agaricustri sulphuratus*, *Daldinia concentrica* and *Pleutus cervinus*, were found to occur only in Ratnagiri District and all the collected mushrooms occur in Ratnagiri District. The morphological description of these mushrooms is as follows:

### *Armillaria tabescens* (Scop.) Emel. (Physalacriaceae) (Image 1)

Synonym: *Clitocybe tabescens* (Scop.) Bres

Habitat: Growing on bamboo roots, caespitose clusters.

Pileus: Bright yellow ochraceous brown in age, 6cm in diameter, glabrous, convex to shield shaped with entire to undulate margin.

Stipe: Equal, eccentric, concolorous with pileus

Table 1. Occurrence of naturally growing mushroom flora in four districts of Konkan

	Scientific name	2008				2009				2010				2011				2012				
		Si	Rt	Rg	Th																	
1	<i>Armillaria tabescens</i>	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	0	0	0
2	<i>Agaricus arvensis</i>	-	-	-	-	-	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-
3	<i>Agaricus placomyces</i>	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	-	-	-	-	-
4	<i>Agaricus trisulphuratus</i>	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	0	0	-	-	-
5	<i>Calocera cornea</i>	-	0	-	-	0	0	-	-	0	0	-	0	0	0	0	-	0	0	-	0	0
6	<i>Clitocybe</i> spp.	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	-
7	<i>Creterellus tubaeformis</i>	-	0	-	-	0	0	0	0	0	0	-	-	-	-	-	-	-	0	0	-	-
8	<i>Daldinia concentrica</i>	-	-	-	-	-	-	-	-	0	-	0	0	0	-	0	0	-	-	-	-	-
9	<i>Dyctiophora duplicate</i>	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	-
10	<i>Enoloma roseoflavum</i>	-	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	-
11	<i>Ganoderma lucidum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	-	-
12	<i>Hygrocybe Conica</i>	-	0	-	-	0	0	0	0	0	0	-	-	0	0	0	0	0	0	-	0	0
13	<i>Hygrocybe miniata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	<i>Lepiota</i> spp.	-	0	-	-	0	0	-	-	0	0	-	0	0	0	-	-	0	0	-	0	0
15	<i>Lepista nuda</i>	-	-	-	-	0	0	-	0	0	0	-	0	0	0	-	0	0	0	0	-	-
16	<i>Leucocoprinus birnbaumii</i>	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
17	<i>Macrolepiota procera</i>	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	<i>Maramiallus ramealis</i>	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0
19	<i>Marasmius haematocephalous</i>	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	0	0	0
20	<i>Pisolithus tinctorius</i>	0	0	-	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	-	-	-
21	<i>Pleurotus ostreatus</i>	-	-	-	-	0	0	-	0	0	0	-	0	0	0	-	0	0	0	0	0	0
22	<i>Pleurotus pulmonarius</i>	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	<i>Pluteus cervinus</i>	-	-	-	-	-	0	-	-	-	0	-	-	0	0	-	0	0	-	0	0	0
24	<i>Termitomyces clypeatus</i>	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	<i>Termitomyces heimii</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0
26	<i>Termitomyces logiradicata</i>	-	-	-	-	0	0	-	-	0	0	-	-	0	0	-	-	-	0	-	-	-
27	<i>Termitomyces microcarpus</i>	-	-	-	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	0	-	-
28	<i>Termitomyces umkowaani</i>	-	-	-	-	0	0	-	0	0	0	-	0	0	0	-	0	0	0	0	0	0
29	<i>Tremella fuciformis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Si - Sindhudurg; Rt - Ratnagiri; Rg - Raigad; Th - Thane; 0 - Observed; - Not observed

fibrous and hollow in the centre; 5.5cm length and 2cm in width.

Lamellae: Yellow then discoloured, close, adnate. Spore print was white, annulus and volva not observed.

Microscopic features: Spores hyaline, globose, thin walled and measured 5µm. Basidia measured 10x2.50 µm, cystidia measured 17.50x5 µm.

#### ***Agaricus arvensis* Schaeff (Agaricaceae) (Image 2)**

Habitat: Growing in decaying plant litter of perennials.

Pileus: Fleshly, 15–16 cm in diameter, buff brown with brown spot in centre, glabrous, convex in shape becoming plano-convex in age with entire margin.

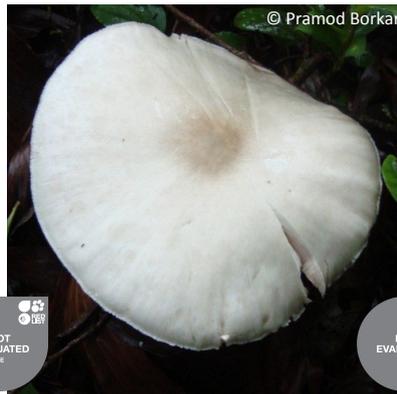
Stipe: Concolorous with pileus, equal, slightly swollen at the base, fibrous, fleshy in texture, measuring: 10–12 cm in length and 2-3 cm in width.

Lamellae: Crowded, free, light brown initially, becoming pinkish in age. Spore print dark brown. Annulus present, persisting like frill; volva absent.

Microscopic features: Spores dark brown, oval to ellipsoid, thin walled measuring 7x2.5 µm. Basidia measured 12.5x5 µm while cystidia not observed.

#### ***Agaricus placomyces* Peck. (Agaricaceae)**

Habitat: Solitary or in cespitose clusters, in plant debris.

Image 1. *Armillaria tabescens*Image 2. *Agaricus arvensis*Image 3. *Calocera cornea*

Pileus: Diameter 10cm, buff white with prominent central dark brown spot and conspicuous brown to black squamules, granulose, convex with entire margin.

Stipe: Buff white, fibrous, equal throughout the length but with abruptly bulbous base measuring 7–8 cm in length and 3cm in width.

Lamellae: pink, free, crowded. Spore print pinkish. Annulus: membranous, veil present initially rupturing at maturity and volva absent. Mushroom with strong odour of turpentine (phenolic compounds).

Microscopic features: Spores brown, ellipsoid  $5 \times 2.5 \mu\text{m}$  (L X B). Basidia measuring  $15 \times 5 \mu\text{m}$ , cystidia not observed.

#### ***Agaricus trisulphuratus* Berk. (Agaricaceae)**

Habitat: Growing in soil, solitary. Also found on the roots of members of Palmaceae (coconut and arecanut).

Pileus: Diameter 2.5–3 cm, bright orange, fibrillose (flocculose), with imbricate, appressed squamules, convex, with crenate margin.

Stipe: Concolorous with pileus, equal, hollow measuring 4–5.5 cm in length and 2.5–3 mm in width.

Lamellae: Pale pinkish, crowded, freely attached. Spore print: dark brown. Annulus, present; volva, absent.

Microscopic features: Spores dark brown, oval to ellipsoid, measuring  $5 \times 2.5 \mu\text{m}$ . Basidia:  $12.5 \times 2.5 \mu\text{m}$ . Cystidia not observed.

#### ***Calocera cornea* (Batsch.) Fr. (Decrymycetaceae) (Image 3)**

Habitat: Lignicolous on dead, decaying bark less wood logs. Caespitose, gregarious

Fruit body: Small, bright yellow coloured fruit bodies, forked in the upright top portion. About 2–3 or sometimes up to 8cm in length. Gelatinous but firm.

Microscopic features: Spores hyaline or white, oval

to cylindrical measured  $5 \times 2.5 \mu\text{m}$ . Basidia measured  $30 \times 5 \mu\text{m}$  while cystidia not observed.

#### ***Clitocybe* sp. Fr. (Tricholomataceae)**

Habitat: On decaying wood logs.

Pileus: Infundibuliform, granulose to fibrillose scaly creamy measured 4.5–6.1 cm in diameter with undulate margin.

Stipe: Thin, papery with lemon smell, cylindrical and concolorous with pileus, fleshy with 3.2cm in length.

Lamellae: Crowded, decurrent and concolorous with pileus. Spore print was creamy white annulus and volva not observed.

Microscopic Features: Spores hyaline cylindrical to allantoid; measuring  $8.13 \times 2.5 \mu\text{m}$  basidia measured  $7.5 \times 1.25 \mu\text{m}$  while, cystidia not observed.

#### ***Craterellus tubaeformis* (Fr.) Quel. (Cantharellaceae) (Image 4a,b)**

Habitat: In plant debris of perennials.

Pileus: 1.5–2.5cm in diameter, yellow with brown to black tiny spots, fibrillose surface umbilicate to convex with crenate margin.

Stipe: Equal when young, broadening apically in age, twisted and slightly flattened at the base; Yellowish-green, hollow measured 7–9 cm in length and 1.5mm in width.

Lamellae: Distant, adnexed to decurrent, creamy. Spore print was white; annulus and volva not observed.

Microscopic features: Spores hyaline, globose to sub-globose, measuring  $3.75 \times 2.5 \mu\text{m}$ . Basidia measured  $20 \times 2.5 \mu\text{m}$  while cystidia not observed.

#### ***Daldinia concentrica* (Bolton) Ces. & De Not. (Xylariaceae) (Ascomycota)**

Habitat: Gregarious on dead wood.

Image 4a,b. *Craterellus tubaeformis*Image 5. *Dictyophora duplicata*

Fruit body: Pale violet to light purple colored, nearly spherical, tuber like, hard. Surface smooth on upper side, rough and tanned black on underside. About 7cm in diameter; black, concentric, zonate rings in transverse section. Spore print was black.

Microscopic features: Spores amber in colour, subglobose and measured 5x2.5 µm.

#### ***Dictyophora duplicata* (Bosc.) E. Fish (Phallaceae) (Image 5)**

Fruit body: Fruit body developing from a white egg. Head, dark brown, bell shaped, 2.5–3 cm. Attached to the hollow stem at centre by an indusium (skirt like membranous outer growth) resembling a net. Indusium, 4.5–6 cm, white initially, turning brown in age. Stipe, white hollow, 15–20 cm long, composed of sponge like tissues. After emergence of fruit body, the egg portion remains attached at the stipe base as volva. Flies are attracted due to the strong unpleasant odour of the fruiting body.

Microscopic features: Spores hyaline, ellipsoid to cylindrical and measured 2.5x1.25 µm.

#### ***Entoloma roseoflavum* Noordeloose. (Entolomaceae) (Image 6)**

Habitat: Roots of perennial plants.

Pileus: 3–4 cm in diameter, creamy white, glabrous, depressed with entire to undulate margin.

Stipe: Equal to tapered, concolorous with the cap, hollow; 3–5 cm in length and 1cm in width.

Lamellae: Crowded, free, concolorous with pileus; spore print was pinkish-brown. Annulus and volva not observed.

Microscopic features: Spores hyaline, angular, mostly pentagonal measuring 7.5µm; basidia measured 20x7.5 µm while cystidia measured 25x11.25 µm.

#### ***Ganoderma lucidum* (Curtis) P. Karst. (Ganodermataceae) (Image 7)**

Habitat: Growing on decaying wood logs of perennials like mango, areca nut etc.

Pileus: 25–27 cm in diameter or more, white initially, then forming zonate rings of reddish-brown to dark brown, glabrous initially then becoming rough and corky, depressed, hemispherical, fan shaped brackets with undulate margin.

Stipe: Present in young fruit bodies growing in association with plant roots. Absent on stems. White initially, shiny red turning brown with age, hard, corky; 4–5 cm in length and 1.5–2 cm in width when present.

Lamellae: Absent. Spores released through poroid lower surface. Spore print was light brown to pink. Annulus and volva were absent.

Microscopic features: Spores rusty brown, oval, truncated, double walled, with a row of pillars between the walls and measured 7.5x6.25 µm. Basidia and cystidia not observed.

#### ***Hygrocybe conica* (Schaeff.) P. Kumm. (Hygrophoraceae) (Image 8)**

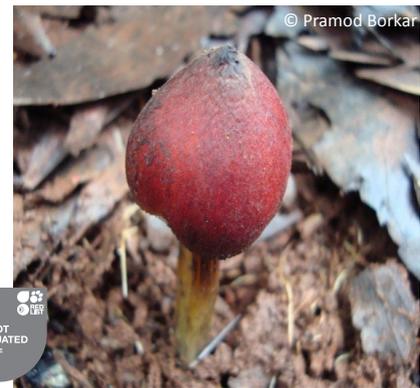
Habitat: Plant debris of perennials.

Pileus: Red to maroon, 5cm in diameter, striate to plicate with small dark spots; conical splitting at maturity, margins eroded with striations at rim of pileus.

Stipe: Cylindrical initially yellow then becoming concolorous with pileus with longitudinal groves along the total length. Fibrous with hollow centre measured 4–6cm in length and 1.8–2.1 cm in width.

Lamellae: Subdistant, adnexed, creamy initially black at maturity. Spore print was white. Annulus and volva not observed.

Microscopic features: Spores hyaline, globose, apiculate, measuring 5.63µm. Basidia measured 10x5

Image 6. *Entoloma roseoflavum*Image 7. *Ganoderma lucidum*Image 8. *Hygrocybe conica*

$\mu\text{m}$  while cystidia not observed.

***Hygrocybe miniata* (Fr.) P. Kumm. (Hygrophoraceae) (Image 9a,b)**

Habitat: Decaying plant litter of perennials. Solitary or cespitose, gregarious.

Pileus: 1.5–3.5 cm indiameter, scarlet, shiny; glabrous, umbilicate with depressed centre, remaining surface plane with denticulate margin.

Stipe: Equal, yellow, hollow measured 3.5–4 cm in length and 2–3 mm in width.

Lamellae: Distant adnate and yellowish to creamy. Spore print was white. Annulus and volva not observed.

Microscopic features: Spores hyaline, globose, measuring 8.75 $\mu\text{m}$ . Basidia measured 42.5x5  $\mu\text{m}$  and cystidia not observed.

***Lepiota* spp. (Agaricaceae) (Image 10)**

Habitat: Plant debris. Solitary or gregarious in pastures.

Pileus: 13–15cm in diameter, white to buff, with prominent brown spot in centre, Squarrose with distant squamules all over the surface; hemispherical, becoming

convex to planoconvex in age, slightly umbonate, eroded margins with remnants of veil.

Stipe: Equal, concolorous with pileus, fibrous, more than 30cm in length and 2.5–3.5 cm in width.

Lamellae: Crowded free and creamy white in colour. Spore print was white. Annulus was present, covering the gills completely, then tearing off and persisting like a frill at maturity and volva absent.

Microscopic features: Spores hyaline, ellipsoid to oval, thick walled measured 5x3.75  $\mu\text{m}$ ; basidia measured 5x2.5  $\mu\text{m}$  while cystidia measured 8–10x4.5  $\mu\text{m}$ .

***Lepista nuda* (Bull.) Cooke (Tricholomataceae) (Image 11)**

Habitat: Growing on coconut roots, soil in banana plantation.

Pileus: Violet, and shiny when young discoloured gradually and 5–5.5 cm in diameter. Glabrous, umbilicate with entire to undulate margin.

Stipe: Cylindrical, concolorous with pileus, fleshy 4.5–5.5 cm in length and 2–2.5 cm in width.

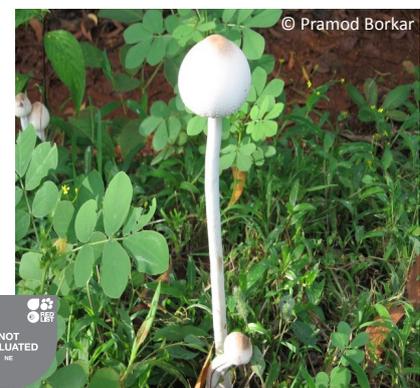
Image 9a,b. *Hygrocybe miniata*Image 10. *Lepiota* spp.

Image 11. *Lepista nuda*Image 12. *Leucocoprinus brinbaumii*Image 13. *Pleurotus ostreatus*

Lamellae: Crowded, adnexed to decurrent and violet. Spore print pinkish; annulus and volva absent.

Microscopic features: Spores hyaline, globose to ellipsoid measured  $5 \times 2.5 \mu\text{m}$ ; basidia measured  $23.75 \times 2.5 \mu\text{m}$  while cystidia not observed.

***Leucocoprinus brinbaumii* (Corda) Singer (Agaricaceae) (Image 12)**

Habitat: Growing in coco peat.

Pileus: Lemon yellow, 3–4 cm in diameter, fibrillose, striate to plicate, conic, with a blunt umbo becoming convex in age, with a crenate, striate to sulcate margin.

Stipe: Concolorous with pileus, equal, slightly broad at the base, hollow, 3–4 cm in length and 1–1.5 mm in width.

Lamellae: Concolorous with pileus, free. Spore print white. Annulus present, moving freely all along the stipe length and volva absent.

Microscopic features: Spores hyaline, ellipsoid  $5 \times 2.5 \mu\text{m}$ . Basidia and cystidia not observed

***Macrolepiota procera* (Scop.) Singer (Agaricaceae)**

Habitat: Solitary, in woods.

Pileus: Fleshy, buff to light brown, 13.5 cm in diameter, squarrose with dark brown shaggy scales, campanulate becoming convex in age with rimose margin.

Stipe: Light brown with prominent brown scales, cylindrical, fibrous, hollow measuring 16.5–18 cm in length and 1.5–1.8 cm in width.

Lamellae: White initially becoming dirty yellow at maturity, close, free. Spore print white. Annulus moving freely along the stipe and volva absent.

Microscopic features: Spores hyaline, broadly ellipsoid to oval, apiculate measured  $9.25 \times 5 \mu\text{m}$ , basidia admeasuring  $17.5 \times 2.5 \mu\text{m}$  while cystidia measured

$26.25 \times 10 \mu\text{m}$ .

***Marasmiellus ramealis* Bull. Fr. (Marasmiaceae)**

Habitat: Gregarious on dead, decaying coconut stump.

Pileus: White turning dirty light brown with age, 3–4 cm in diameter, glabrous to membranous, convex to umbilicate with undulating margin.

Stipe: Equal, concolorous with cap, hollow measuring 1.5–2 cm in length and 0.5 mm in width.

Lamellae: Distant, adnate and white in colour. Spore Print was white. Annulus and volva not observed.

Microscopic features: Spores hyaline, ellipsoid to cylindrical, measuring  $12.5 \times 5.5 \mu\text{m}$ . Basidia measured  $27.5 \times 2.5 \mu\text{m}$  while cystidia not observed.

***Marasmius haematocephalus* f. *haematocephalus* (Mont.) Fr. (Marasmiaceae)**

Habitat: Hidden in grass, gregarious.

Pileus: Reddish-brown to maroon, 3–4 cm in diameter, striate to plicate, convex with crenulate margin.

Stipe: Filiform, hollow, more or less equal, frequently undulate; the base slightly swollen, dark coloured than the pileus, hard, fibrous measured 4.2 cm in length and 2–3 mm in width.

Lamellae: Distant, adnexed and creamy, purplish in colour. Spore print was white, annulus and volva absent.

Microscopic features: Spores hyaline, spherical to globose, measuring  $11.25 \mu\text{m}$ . Basidia measured  $18.75 \times 2.50 \mu\text{m}$  while cystidia measured  $20 \times 5 \mu\text{m}$ .

***Pisolithus tinctorius* (Fr.) Pilat. (Sclerodermataceae)**

Habitat: Growing on leaf litter of *Acacia mangium* plantation and forming mycorrhizal association with *Acacia* roots.



Image 14. *Termitomyces clypeatus*

Fruit body: Ball shaped, 20cm wide. Peridium whitish to yellowish-brown, fragile, thin, smooth exposing cinnamon coloured spore mass on rupturing. Stem about, 2–3 cm. Gleba composed of white to yellowish brown cavities developing in dark brown to black gelatinous matrix.

Microscopic features: Spores hyaline, spherical to circular and measured 5.0µm

***Pleurotus ostreatus* (Jack.) P. Kumm., Family Pleurotaceae (Image 13)**

Habitat: On decaying wood logs, dead cactus.

Pileus: Beige white, 5–7 cm in diameter, glabrous and depressed; typical oyster shape with undulate margin, basidioma dimidiate.

Stipe: Rudimentary.

Lamellae: Concolorous with pileus, close, decurrent. Spore print was white, annulus and volva not observed.

Microscopic features: Spores hyaline, subglobose to ellipsoid, measured 5x2.5 µm. Basidia measured 18.75x2.5 µm, cystidia not observed.

***Pleurotus pulmonarius* (Fr.) Quel. Champ. (Pleurotaceae)**

Habitat: Lignicolous, on dead wood.

Pileus: Light brown, 3.5–4.5cm in diameter, glabrous, convex, becoming depressed (typical oyster shaped) in age with entire margin.

Stipe: Equal, central, white. Fleshy 2.5–2.7cm in length and 2mm in width.

Lamellae: close decurrent, white. Spore print was white. Annulus and volva not observed.

Microscopic features: Spores hyaline, ellipsoid to cylindrical measured 7x2.5 µm. Basidia measured 20x5µm, cystidia measured 25x5 µm.

***Pluteus cervinus* (Schaeff.) P. Kumm. (Plutaceae)**

Habitat: Soil.

Pileus: Dark brown to grey brown, 7.5cm in diameter; surface glabrous initially, striate in age; umblicate with undulating margin.

Stipe: Bulbous and radicating below soil level, brown fleshy measuring 16.1cm in length and 3–3.5 cm in width.

Lamellae: Close, free and white. Spore print was white. Annulus and volva not observed.

Microscopic features: Spores hyaline globose to sub-globose, apiculate and measured 12.5µm. Basidia measured 27.5x10 µm while cystidia measured 20x12.5 µm.

***Termitomyces clypeatus* R. Heim (Lyophyllaceae) (Image 14)**

Habitat: In soil, gregarious.

Pileus: 3.5–5.7 cm in diameter, greyish to brown, conical with spiniform perforatorium, splitting at the margins with age.

Stipe: long, equal, concolorous with pileus, hollow, 12–15 cm in length and 2–3 cm wide. Lamellae, sub distant, free, light brown with brown spore print.

Microscopic features: Basidia measured 14x2.5 µm, while cystidia were not observed. Basidiospores were hyaline, cylindrical measuring 7.5x2.5 µm.

***Termitomyces heimii* Natarajan (Lyophyllaceae) (Image 15)**

Habitat: Gregarious, cespitose on a termitorium soil.

Pileus: 7cm in diameter, white, glabrous, convex to planoconvex with eroded margin.

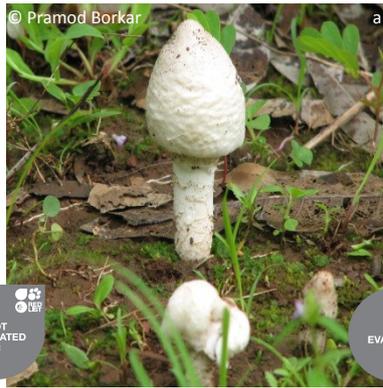
Stipe: White equal and fleshy measuring 18cm in length and 2cm in width. Lamellae, white, crowded and free. Spore print pink, with a brownish tinge. Annulus present, volva absent.

Microscopic features: Spores hyaline, ellipsoid, thin walled measuring 7.50x5 µm. Basidia measured 15x3.75 µm and cystidia 22.5x7.50 µm.

***Termitomyces longiradicatus* Sathe & Daniel (Lyophyllaceae) (Image 16a,b)**

Habitat: In soil Solitary or gregarious.

Pileus: 6cm in diameter white in colour Surface granulate, campanulate in shape when young becoming planoconvex at maturity. Perforatorium mammiform,

Image 15. *Termitomyces heimii*Image 16a,b. *Termitomyces longiradicatus*

margin crenulated, splitting at maturity.

Stipe: White, fibrous Equal above ground; pseudorrhiza long below soil level, 19–20 cm in length 3cm above ground and more than 16cm below ground and 3.5cm in width.

Lamellae: white, crowded with free attachment. Spore print brownish to pink. Annulus present and volva not observed.

Microscopic features: Spores hyaline, sub-globose, thin walled measuring 5x3.75  $\mu\text{m}$ . Basidia measured 12.5x5  $\mu\text{m}$  cystidia 17.5x5  $\mu\text{m}$ .

***Termitomyces microcarpus* (Berk. & Broome) R. Heim (Lyophyllaceae) (Image 17)**

Habitat: On decaying plant litter in soil, gregarious.

Pileus: 2cm in diameter, white, glabrous initially convex in shape becoming planocconvex in age. Margins eroded.

Stipe: Concolorous with pileus, equal, hollow measuring 4.3–5.1 cm in length and 2mm in width.

Lamellae: Concolorous with pileus, sub-distant and free, spore print pink. Annulus and volva not observed.

Microscopic features: The basidia measured 15x5  $\mu\text{m}$  and the measurement of cystidia was 25x6.25  $\mu\text{m}$ , annulus and volva absent, basidiospores, hyaline, globose or reniform measuring 5x2.5  $\mu\text{m}$ .

***Termitomyces umkowaani* (Cooke & Masee) (Lyophyllaceae) (Image 18)**

Habitat: In soil, solitary.

Pileus: 7cm in diameter, light brown, perforatorium spiniform. Surface, glabrous, shiny, due to oily layer on whole surface. Campanulate to conical in shape which becomes convex in age with crenate margins.

Stipe: Radicate in shape, 7.5cm in length and 4cm in width, swollen near the base white and fleshy. Pseudorrhiza, dark brown, radicating below the ground.

Lamellae, crowded white and freely attached. Spore print pink. Annulus and volva absent.

Microscopic features: Spores light brown, globose to oval, thin walled with an apical pore, measuring 7.5x5 $\mu\text{m}$ . Basidia 22.5x5  $\mu\text{m}$  and cystidia 20.75x9.25  $\mu\text{m}$ .

***Tremella fuciformis* Berk. (Tremellaceae) (Image 19)**

Habitat: Gregarious on wild dead wood of mango, acacia.

Fruit body: Fruit body composed of gelatinous, translucent whitish, firm, graceful lobes 1–1.5 cm wide, 3.5–5 cm in length. Each lobe dichotomously branched in apical region. Surface smooth, shiny.

Microscopic features: Spores hyaline, spherical to globose measured 5.75 $\mu\text{m}$  while basidia cystidia not observed.

**DISCUSSION**

Forays conducted in different habitats of Konkan region of Maharashtra during monsoon seasons of 2008, 2009, 2010, 2011 and 2012 revealed the repeated occurrence of 30 macrofungi in the region. These macrofungi were identified on the basis of their morphological characters described by earlier scientists.

Kuo (2004) has described *Armillaria tabescens* whereas; Gerault (2005) has considered *A. tabescens* synonymous to *Clitocyb etabescenes*. Burdsall & Volk (1993) mentioned that in *A. tabescens* the annulus is lacking and the mushroom occurs in caespitose clusters. Tsykun et al. (2010) have described morphology of *A. tabescens*. On comparing the morphological description of the collected specimen with the description of previous workers the mushroom was identified as *A. tabescens*.

Image 17. *Termitomyces microcarpus*Image 18. *Termitomyces umkowaani*Image 19. *Tremella fuciformis*

The family Agaricaceae is the largest mushroom family with most of the members in the genus *Agaricus*. Many Indian mycologists have reported different species of this genus from different states of the country (Pegler 1977; Sathe & Rahalkar 1978; Sathe & Deshpande 1979; Sathe 1979; Sathe & Kulkarni 1987; Saini et al. 1988; Nag et al. 1991; Devi 1995; Lakhanpal 1995; Saini & Atri 1995; Verma et al. 1995). Patil et al. (1995) reported that, 41 species of this genus were recorded from Maharashtra. Purkayastha & Chandra (1976) described four species of *Agaricus* viz.: *A. arvensis*, *A. campestris*, *A. sylvaticus*, and *A. trisulphuratus* from West Bengal. The members of the genus recorded from Rajasthan include, *A. abruptus*, *A. arvensis*, *A. campestris*, *A. bisporus*, *A. bitorquis*, *A. placomyces*, *A. sylvaticus* and *A. silvicola* (Doshi & Sharma 1997). Morphological characters of the three species of this genus collected during the present research are discussed here. As per Nair (1990), *A. arvensis* has sub-globose, silky pileus with velar remains at margin. The pileus flattens in age. The gills are crowded, free, white when young turning blackish-brown with age. Stipe is cylindrical to club-shaped, thick, white, smooth, and stout with a large annulus. The description was matched as given on the website of Mycoweb ([www.mycoweb.com](http://www.mycoweb.com)) and by Kuo (2007). The second mushroom belonging to the genus *Agaricus* and collected from Konkan was *A. placomyces*. This mushroom was earlier reported from Kerala, northwestern Himalaya and Rajasthan (Devi 1995; Lakhanpal 1995; Doshi & Sharma 1997) and Kuo (2007). The morphological characters of the collected specimen matched with those reported by earlier workers. Phonolic odor of the fruit body was the most striking character. The collected specimen was therefore, identified as *A. placomyces*. The morphological characters of *A. trisulphuratus* were also in conformity with those reported by earlier workers

(Saini et al. 1991; Kumar & Sharma 2009).

The macrofungus *Calocera cornea* was reported from India by Verma et al. (1995) from northeastern Hills. Recently, it has been reported from Coromandel Coast of Tamil Nadu by Mani & Kumerasen (2009). As per the description given by Kuo (2008), the fruit body is cylindrical with rounded to sharpened tips occasionally shallowly forked near the tip. Orange to yellow. In the current study the specimen was collected from bark less stem of perennial plant. The fruit body was forked, bright yellow coloured and gelatinous. Gibson (2007) in his key to club shaped fungi in Pacific North West (South Vancouver Island, Canada) has described the sporocarp of this mushroom as cylindrical forked structure fruiting on bark less hard wood. The morphological features of collected specimen were in concurrence with the description given by other workers.

One mushroom of the genus *Clitocybe* was reported by Sathe et al. (1980). Their description of the mushroom states, pileus 1–4 cm in diameter, apricot yellow in colour, margin wavy, and centrally depressed becoming deeply infundibuliform. The mushroom was found on dead coconut stump. These characters match with collected features of *Clitocybe*.

The mushroom *Creterellus tubaeformis* was reported by different workers under different names. In some reports it has been mentioned as *Cantherellus cantharalloids*. It is also reported as *Merulius cantharalloides*. The mushroom was always found in the decaying plant litter of trees like *Terminalia elliptica* and *T. paniculata*, in close proximity of *Hygrocybe miniata*. Castellano et al. (2003) reported that cystidia are absent in this fungus, spore print white to creamy white. Kuo (2008) has mentioned that this fungus is often saprobic or mycorrhizal. Growing alone or gregariously. Spore print white to buff yellowish in colour. Corner (1966),

in his monograph of Cantharelloid fungi, described this mushroom with similar morphology under the name *Canthrallus tubaeformis*. The morphological features of collected mushroom are in concurrence with those reported in reviewed literature.

The genus *Daldinia* was monographed by Child in 1932 (Alexopoulos et al. 2004). The fruit bodies are found on dead wood (Lee 2004). The morphology of collected specimen was the same as described in reviewed literature.

Change & Miles (2004) have reported that the pileus of *Dictyophora duplicata* is 2–4 cm long. The hymenium is attached to the surface of the pileus. Stipe is cylindrical in shape, hollow, white, with spongy texture and the skirt opens when fruit body is mature. The openings of the indusium are rounded, ellipsoidal or polyhedral. The long skirted species is *D. indusiata* and short skirted is *D. duplicata*. The volva is formed from the universal veil which ruptured by the emergence of the stalk and pileus. Spores are circular to ellipsoidal. Anonymous (2004) has reported that the fruit body arises from a sub-spherical to ovoid egg. Outer surface of the cap is covered with brownish, slimy mass. The fruit body has strong offensive odor ([www.mycobank.org/mycologytaxo.aspx](http://www.mycobank.org/mycologytaxo.aspx)). Kuo (2011) also reported similar observations. In India, this mushroom was reported earlier by Devi (1995) and Doshi & Sharma (1997). The morphological characters of collected specimen of *Dictyophora duplicata* were in total agreement with those described by previous workers.

Doshi & Sharma (1997) reported *Entoloma nidorosum* from Udaipur while Sathe & Kulkarni (1980) reported *E. achrospora* and *E. strictus* from Sawantwadi (Konkan). Most striking feature of this fungus was its angular basidiospores, mostly pentagonal measuring 7.5µm. Noordeloos (2004) has described the general characteristics of the members of the genus *Entoloma*. He has classified the angular spores observed in different species into four categories such as isodiametrical (5 angled), heterodimetrical (6 angled), subisodiametrical (7 angled) and star shaped or cruciform. Manimohan et al. (2006) have provided a key to *Entoloma* species occurring in Kerala. Noordeloos & Morozova (2010) have described *E. roseofulvum*. These morphological details are mostly in agreement with those of the collected specimen. Therefore, the fungus was identified as *Entoloma roseoflavum*.

Review of literature revealed that the genus *Ganoderma* has a worldwide distribution. It grows on a numerous perennials, coniferous and palmaceous hosts. Some *Ganoderma* species are wood rotting

fungi, many are pathogenic to economically important crops causing root and stem rots. In forest ecosystem they play an important role in breakdown of lignin of woody plants. *Ganoderma* is the largest genus in order Aphyllophorales with more than 300 species. In 1881, Karsten established the genus with the type species *G. lucidum* and a number of species has been described in the genus thereafter. Different taxonomic characters were used for identification by various authors like Murill, Atkinson, Coleman, Corner, Steyaert etc. Moncalvo & Ryvarden (1977), published a world list of *Ganoderma* species (Bhosle et al. 2010). Fifteen species of *Ganoderma* were reported from Western parts of Maharashtra by Bhosle et al. (2010), with the help of a key prepared to differentiate the species on the basis of morphological characters. Tiwari et al. (2005) has provided a taxonomic overview of *Ganoderma* and described nine species on 91 hosts from India. Later on they described 17 species of the genus from central India with photographs and host details (Tiwari et al. 2013). The basidiocarps were designated as laccate and stipitate for *G. lucidum* complex and non laccate and generally astipitate for *G. applanatum* complex. Muthelo (2009) followed Adaskaveg and Gilbertson's key considering context colour and basidiospores size to differentiate the species of *Ganoderma*. Bhosale et al. (2010) described *G. lucidum*. Muthelo (2009) stated that the context colour of *G. lucidum* is tan to brown. Petersen (1983) reported that *Ganoderma* can be recognized by the shiny orange red wax crust and presence of stipe.

Perennial trees such as Ain (*Terminalia elliptica*) and Kinjal (*T. paniculata*) are of common occurrence in all the forests of the Konkan region. In decaying plant litter of these trees, *Hygrocybe miniata* was repeatedly observed during the present study. The other member of this genus collected during the surveys was *Hygrocybe conica*. But it occurs in forests as well as in open fields. The reports of occurrence of both these members of Hygrophoraceae and their morphological features are discussed here. Doshi & Sharma (1997) reported four species of the genus *Hygrocybe*, viz., *H. eburnea*, *H. russula*, *H. sulphureus* and *H. benzoninum* from Rajasthan. *H. ceracae*, *H. indica*, *Hygrophorus partensis* were reported from Maharashtra (Patil et al. 1995). Verma et al. (1995) also reported *H. miniata* from northeastern hills of India. The species of this genus occurring in northwestern Himalaya were, *H. conica*, *H. miniata*, *H. psittacina* and *H. calopus* (Lakhanpal 1995). Natarajan (1995) reported *H. ceracae*, *H. chlorophena*, *H. fornicata*, *H. miniata* and *H. westii* from southern India while Devi (1995) reported *H. calyptraeformis*, *H. conicus*,

and *H. puncia* from Kerala. The morphological features of the collected macrofungi are in agreement with those described earlier. The fungus was therefore, identified as *Hygrocybe miniata* (Fr.) Kummer. Morphological features of the collected fungus *Hygrocybe conica* are in conformity with those described on authentic macrofungi websites.

A single member of the genus *Lepiota* was collected during present studies. Metzler & Van (1992) mentioned that the diversity of *Lepiota* extends to edibility as well as morphological features. Large sized species of the genus are often robust, creamy to white with very noticeable scales or patches on cap that do not wash off. The presence of scales or patches on cap is one of the best distinguishing features. Eight species of the genus *Lepiota* were reported by Devi (1995). Patil et al. (1995) mentioned eleven species of the genus recorded from Maharashtra. Many other workers have reported *Lepiotas* from different states of the country (Natarajan 1995; Rafique & Patel 1995; Saini & Atri 1995; Verma et al. 1995). The morphology of the collected fungus was in concurrence with the description in earlier reports.

The pileus, lamellae and stipe of *Lepista nuda* were violet in colour and this was a very peculiar characteristic of this mushroom. Mirko (1975) described the morphological features of this fungus as, fruit body amethyst purple when young. Colour of cap and gills disappears with age and changes into cloudy purple or beige brown. Flesh has a pleasant smell. Purple colour of the stipe is retained for long time and this fungus was earlier reported by Sathe & Deshpande (1980) from Panchagani, Maharashtra as *Lepista nudoidea*. Often slightly bulbous at the base, bluish-lilac. Flesh thick, bluish-lilac. Gills crowded, bluish-lilac (<http://www.rogersmushrooms.com>) or in fairy rings under a variety of hardwoods and conifers ([http://www.mykoweb.com/CAF/species/Clitocybe\\_nuda.htm](http://www.mykoweb.com/CAF/species/Clitocybe_nuda.htm)). On the basis of comparison between the morphological characters of the collected specimen with the description in reviewed literature, the fungus is identified as *Lepista nuda*.

Singer (1986) recognized 13 species in genus *Leucocoprinus* while Wasser (1993) mentioned 18 species. According to recent literature (Kirk et al. 2008) there are 40 species in this genus. Manjula (1983) listed five species from India, Natarajan et al. (2005) listed six species, and Kumar & Manimohan (2009) reported a new species from Kerala State. Only one species has been reported from Karnataka (Pushpa & Purushothama 2011) with conical pileus becoming campanulate with age, membranous; surface yellow, floccose squamulose; plicate striate, with velar remains.

Members of the genus *Macrolepiota* are of worldwide occurrence. Like many other countries this mushroom was reported by a number of workers from India. Collected specimen of *Macrolepiota* is in agreement with the description reported by Nair (1990).

Tsykun et al. (2010) described *Marasmius ramealis* with the following characters. Conical to hemispherical when young, convex to conical later and having ochraceous yellow to brown. Lamellae with adnate to decurrent attachment; stipe; without annulas, cylindrical slightly broad at the base. The morphological features of the collected specimen are in conformity with those described Wannathes et al. (2009) and Antonin & Buyck (2006). Five species of *Marasmius* including *M. haematocephalus* were reported from Maharashtra (Patil et al. 1995). On the website of Rogers mushrooms, the description of *M. ramealis* says that the cap is convex to flattened, centrally depressed, whitish pink in colour, membranous and wrinkled. Gills are distant, white to pinkish and the spore print is white. All these characters are matched with collected specimens of *M. ramealis*.

During the forays it was observed that at some locations the fruit bodies of *Pisolithus tinctorius* were larger than those normally observed. Sometimes these fruit bodies grow on the underground roots of *Acacia* plants along the roadside and during the period development, they grow out by breaking the soil surface or even the tar roads and hence locally called as *bhuiphoda* (land breaker). The review of literature revealed that, this fungus is in mycorrhizal association with the roots of the members of families such Fabaceae and Myrtaceae. On the basis of morphological and cultural studies and polypeptides analysis of 100 specimens, Burgess et al. (1995) described the variation in basidiome and basidiospore morphology of *P. tinctorius* isolates mycorrhizal with *Eucalyptus*, *Pinus casuarhina* and *Acacia*. The morphological characters of the basidiome of the collected specimen were in concurrence with those mentioned by Burgess et al. (1995) but the basidiospores were smaller in size than the four ranges mentioned by them. So also the spines on the basidiospores were not observed under 100X. This points out that the species collected in the present study was different than those studied by Burgess et al. (1995), Razzaq & Shahzad (2004) for the first time reported occurrence *P. tinctorius* in *Eucalyptus* plantations in sandy soils of Karachi in summer season. The morphological description of collected fungi was in agreement with that reported by earlier workers. On this basis the fungus was identified as *P. tinctorius*. The occurrence of this fungus in Maharashtra was reported

by Pande (1972). Recently, it was reported by Mani & Kumaresen (2009) from Tamil Nadu, by Hedawoo (2010) from Amaravati region and by Karwa & Rai (2010) from Melghat region of Maharashtra.

The genus *Pleurotus* is a vast genus comprising about 766 species ([www.indexfungorum.org/names/Names.asp](http://www.indexfungorum.org/names/Names.asp)). The species in this genus are difficult to differentiate taxonomically because of the variability in fruit body morphology. Several species have been described under more than one name all over the world (Buchanan 2001). The morphology of three species of *Pleurotus* collected during the present study is discussed below. The stipe of *P. pulmonarius* is typically eccentric than lateral while in *P. ostreatus* it is more lateral than eccentric (Buchanan 2003). All the two species of *Pleurotus* collected during the present study were morphologically different. The basidiocarp of *P. ostreatus* was astipitate, dimidiated and nearly white. The pileus of *P. pulmonarius* was light brown with small stipe. Many workers in the country had reported different species of *Pleurotus* (Singh 1977; Devi 1995; Patil et al. 1995; Verma et al. 1995; Doshi & Sharma 1997; Tanti et al. 2011). Two species of the genus *Pluteus*, viz., *P. articipillus* and *P. salmoneus* were reported by Sathe et al. (1980) from Maharashtra. The former was recorded in Pune while the later was observed at Castle Rock. In respect of *P. articipillus*, Sathe et al. (1980) reported that the mushroom is commonly known under the name *P. cervinus* all over the world. Further they have mentioned that it is an edible mushroom. Natarajan & Raman (1980) reported *Pluteus* from southern India. The morphology of collected mushroom in respect of colour, shape and surface of the pileus, gill attachment, and stipe was in conformity with the description mentioned above. On the basis of morphological characters it was identified as *Pluteus cervinus*.

Most of the recorded species of the genus *Termitomyces* genus all over the world occur mainly in Asian and African countries. All the species of this genus are reported to be in symbiotic association with termites and hence the genus is named as *Termitomyces*. Some of the members grow on epigeous termite mounds while others grow on the termitoria formed very deep below the soil level. In case of such mushrooms the pseudorrhiza (root like structure of the mushroom fruit body) is quite long. The lateritic soils of Konkan region are conducive for growth of termites. As a result, all the dried plant litter in fruit orchards and plantations is attacked by termites. Sometimes the termites grow on the trunks of live plants. During the present investigation, five species of the genus were

collected from all the four districts of the Konkan region. Several species viz., *T. albuminosa* *T. cartilagineus* *T. clypeatus* *T. mammiformis* *T. microcarpus* *T. poonensis* *T. robustus* *T. eurhizus*, *T. heimii*, *T. radicans*, *T. robustus* and *T. stiatius* *T. indicus*, *T. rabuorii*, *T. microcarpus* f. *santalensis*, *T. letestui*, (Sathe et al. 1980; Nair 1990; Devi 1995; Natarajan 1995; Saini & Atri 1995; Doshi & Sharma 1997; Verma et al. 1995; Purkayastha & Chandra 1985; Tanti et al. 2011) had been reported from India. Tang et al. (2005) reported that a total of 68 species of this genus have been recorded worldwide. Macro-morphological characteristics of *Termitomyces* provide more reliable taxonomic information to delineate most of the species in the genus than micro-morphology. The micro-morphology is less informative and ambiguously used by many workers (Tibuhwa et al. 2010). In his monograph on the genus *Termitomyces*, Heim (1977) has given a detailed account of the species of this genus occurring all over the world. A key to the species of *Termitomyces* from India by Vrinda & Pradeep (2009) includes morphological characters of sixteen previously reported species as well as a lesser known species, *T. sagittiformis*. According to the key, the mushroom with straw coloured to brownish pileus, pointed perforatorium, black pseudorrhiza and absence of annulus is *T. umkowaani*. Morphological features of the collected specimen matched with that of Sathe & Daniel (1980). They have also mentioned that *T. longiradicatus* is closer to *T. heimii* but differs in having long radicating stipe. The fungus was therefore, identified as *T. longiradicata*. *T. heimii* was first described by Natarajan (1979) the morphological features of the specimen recorded in the present study are in conformity with those given by Natarajan (1979) and Sathe & Daniel (1980). According to Vrinda & Pradeep (2009), *T. longiradicatus* is a synonym of *T. heimii*. In the present study, the pileus of *T. longiradicata* was granulose and that *T. heimii* was glabrous. So also the stipe length of *T. longiradicata* was less above ground and pseudorrhiza was long. In *T. heimii* the stipe was 18cm above the soil. Due to this difference in morphological characters of both these mushrooms, it is appropriate to consider them as separate species. *T. microcarpus* was reported by most of the workers in the country. Nair (1980) described this mushroom as per the key given by Vrinda & Pradeep (2009). Kesel (2011) mentioned that, the fruit body of *T. microcarpus* has very small cap and the pseudorrhiza is absent. Tibuhwa et al. (2010) reported that the pileus of *T. microcarpus* is white, small, stipe, white, annulus and pseudorrhiza absent. Atri et al. (1995) described this fungus with 1cm broad, yellowish-white pileus,

lamellae subdistant, and spore print light orange. The morphological characters of the fungus collected during present study are in concurrence with those described by earlier workers. The fifth species of the genus *Termitomyces* collected from the Konkan region was *T. clypeatus*. Nair (1980), in his description of this species, mentioned that the pileus is conical at first with strongly spiniform perforatorium, expanding with age. As per Froslev (2000) the perforatorium of this mushroom is strongly spiniform. The perforatorium of *T. clypeatus* is grayish to buff brown paling towards margin, stem white pseudorhiza present, annulus absent (Tibuhwa et al. 2010). Perforatorium spiniform with grayish brown pileus (Kesel 2011). According to Wei et al. (2006) the spiniform perforatorium, smooth and non-annulate stipe surface, and pale stipe and pseudorhiza indicate that it is a collection of *T. clypeatus*. Furthermore, the microscopic characters of the type, e.g., size and form of basidiospores, basidia and cystidia, are in agreement with that of *T. clypeatus*. Hence the fungus described by Zang (1981) as *Sinotermitomyces taiwanensis* is *T. clypeatus*. Considering all the morphological characters described by previous workers and comparing them with the morphology of the collected specimen, this fungus was identified as *T. clypeatus* Heim.

Chang & Miles (2004) described two types of fruiting bodies in *Tremella fuciformis*. The nut gall type has folds or lobes and the other type looks like a cock's comb. As per Kuo (2008), the fruit body is composed of graceful lobes, transparent, whitish, up to 7cm across and 4cm high and shiny. Anonymous (2000) described the fruit body as a basidiocarp with lobes which were forked with incised crenate margin gelatinous, firm and up to 5cm in height. The spores are ellipsoid, smooth and hyaline. The basidiocarps are cespitose ([www.mycobank.org](http://www.mycobank.org)). The collected mushroom was identified as *T. fuciformis* on comparing the characters of collected specimens with the description given by previous workers.

The present study does not include all the macrofungi occurring in the region. It is just an effort to peep into the hidden treasure of these colorful and fascinating fungi.

## CONCLUSIONS

Forays conducted during monsoon of 2008, 2009, 2010, 2011 and 2012 revealed the presence of 29 mushrooms belonging to different families. Among these, six species of Agaricaceae and six of Lyophyllaceae from one-third of the total collection.

The noteworthy outcome of the present study was the occurrence of five species of *Termitomyces*, *Pleurotus pulmonarius*, *Lepista nuda*, *Tremella fuciformis*, *Dictyophora duplicata* and *Pluteus cervinus* which are edible and *Tremella* is a medicinally important mushroom. There is a vast scope for documentation of macrofungi from this region in future.

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## Appendix 1. List of mushrooms described

	Species	Family
1	<i>Agaricus arvensis</i> Schaeff	Agaricaceae
2	<i>Agaricus placomyces</i> Peck.,	Agaricaceae
3	<i>Agaricus trisulphuratus</i> Berk.,	Agaricaceae
4	<i>Armillaria tabescens</i> (Scop.) Emel	Physalacriaceae
5	<i>Calocera cornea</i> (Batsch.)Fr.	Decrymycetaceae
6	<i>Clitocybe</i> spp. Fr.	Tricholomataceae.
7	<i>Craterellus tubaeformis</i> (Fr.) Quel.	Cantharellaceae
8	<i>Daldinia concentrica</i> (Bolton) Ces. & De Not.	Xylariaceae
9	<i>Dictyophora duplicata</i> . (Bosc.) E. Fish	Phallaceae
10	<i>Entoloma roseoflavum</i> Noordeloose	Entolomaceae
11	<i>Ganoderma lucidum</i> (Curtis.) P. Karst.	Ganodermataceae
12	<i>Hygrocybe conica</i> (Schaeff.) P. Kumm	Hygrophoraceae
13	<i>Hygrocybe miniata</i> (Fr.) P. Kumm	Hygrophoraceae
14	<i>Lepiota</i> spp. (Pers.) Gray	Agaricaceae
15	<i>Lepista nuda</i> (Bull.) Cooke	Tricholomataceae
16	<i>Leucocoprinus brinbaumii</i> (Corda) Singer	Agaricaceae
17	<i>Macrolepiota procera</i> (Scop.) Singer	Agaricaceae
18	<i>Marasmiellus ramealis</i> Bull. Fr.	Marasmiaceae
19	<i>Marasmius haematocephalus</i> f. <i>haematocephalus</i> (Mont.) Fr.	Marasmiaceae
20	<i>Pisolithus tinctorius</i> (Fr.) Pilat	Sclerodermataceae
21	<i>Pleurotus ostreatus</i> (Jack.) P. Kumm.	Pleurotaceae
22	<i>Pleurotus pulmonarius</i> (Fr.) Quel. Champ	Pleurotaceae.
23	<i>Pluteus cervinus</i> (Schaeff.) P. Kumm.	Plutaceae
24	<i>Termitomyces heimii</i> Natarajan	Lyophyllaceae
25	<i>Termitomyces longiradicatus</i> Sathe & Daniel	Lyophyllaceae
26	<i>Termitomyces microcarpus</i> (Berk. & Broome)	Lyophyllaceae
27	<i>Termitomyces umkowaani</i> (Cooke & Massee)	Lyophyllaceae
28	<i>Termitomyces clypeatus</i> R. Heim	Lyophyllaceae
29	<i>Tremella fuciformis</i> Berk.	Tremellaceae

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## Appendix 2. List of localities tapped with latitude and longitude.

	Locality	Lat. and Long.
1	Alore	17°45'N & 73°05'E
2	Amboli	17°57'52"N 73°23'50"E
3	Anjarle	17.85°N & 73.09°E
4	Chiplun	15°57'45"N & 73°59'52"E
5	Dapoli	17°45'32"N & 73°11'8"E
6	Devrukh	17°46'45"N & 73°7'9"E
7	Enampangari	17°44'39"N & 73°17'13"E
8	Guhagar	16.85°N & 73.55°E
9	Harne	16.00°N & 73.75°E
10	Jamsande	17.187°N & 73.553°E
11	Kanakvali	17°03'54"N 73°36'57"E
12	Kolad	16°59'54"N & 73°41'48"E
13	Koloshi	17°0'41"N & 73°29'33"E
14	Kudal,	17°43'58"N & 73°15'39"E
15	Lanja	16.00°N & 73.687°E
16	Mahad	16.05°N & 73.46°E
17	Malvan,	16°4'7"N & 73°42'33"E
18	Murud	16°23'33"N & 73°38'29"E
19	Palghar	16.285°N & 73.68°E
20	Pali	19°39'9"N & 73°8'48"E
21	Pandur	19.69°N & 72.76°E
22	Pedhambe	16.67°N & 73.52°E
23	Poynad	17.53°N & 73.52°E
24	Prabhanwalli	17.47°N & 73.2°E
25	Rajapur	16°51'32"N 73°42'6"E
26	Sakharpa	16°24'5"N & 73°25'51"E
27	Sangameshwar	15.85°N & 73.63°E
28	Sawantwadi	17°24'54.5"N & 73°32'19.3"E
29	Sawarde	17.47°N & 73.62°E
30	Shrivardhan	18.083°N & 73.417°E
31	Umberghar	18°24'0" N & 73°12'0"E
32	Vengurle	18°40'58"N & 72°59'26"E
33	Wada	18.03°N & 73.01°E
34	Wakavali	17°28'51.1"N & 73°35'20.4"E