

Diversity of wild mushroom in Himachal Pradesh (India)

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ABSTRACT: Wild mushrooms are most valued in Western Europe particularly France, Germany, Italy and Switzerland. So now it's time to value the wild mushrooms in India for their bioactivities. As we know the ratio of well investigated mushroom is low. This study reveals the full use of bioactive compounds isolated from edible and inedible fleshy fungi. 65 mushroom samples were collected from month July to October from different ecological regions (Kangra, Kullu, Shimla, Solan and Lahaul Spiti) of Himachal Pradesh in 2012 (India). They were identified by Traditional method. A total 66 samples out of which 55 samples belonged to 30 genera, 15 families, 11 orders, 1 class of mushroom were identified in Himachal Pradesh (India).

KEYWORDS: Mushrooms, collection and identification, Himachal Pradesh, India.

I. INTRODUCTION

Although mushrooms can be found anytime in the year, there appears generally in two distinct seasons. Agarics brought about by monsoon rains after relatively dry periods of several weeks [1]. Mushroom growth has no bars of climate to grow weather it is in desert or in cold regions. First time 35 specimens of wild and edible mushrooms were encountered from Lahaul valley Himachal Pradesh in India. Belonged to species mostly *Lactarius*, *Laetiporus*, *Laccaria*, *Stropharia*, *Marasmius*, *Cortinari*, *Ramaria*, *Russula* and *Strobilomyces*. During the winter season, valley received 3-6ft snowfall and when no fresh vegetables were found [2]. Mushroom did not over power only the Indian land but also provided the good effect in other countries also. The most import or efficient work had done by China. It was estimated that more than 25 million farmers in China engaged in the collection, cultivation processing and marketing of mushrooms. Therefore the value of mushroom amounted to 149 billion in 2011 such as such as *Tricholoma matsutake*, *Tuber sinense*, *Ophiocordyceps sinensis*, *Morchella conica*, *Lactarius delciousus*, *Lentinus edodes*, *Pleurotus ostreatus*, and *Thelephora ganbajun*. [3].The mushroom contributed a major role in economic development in small scale industry [4], [5] Several reports on mushroom have been conducted from two regions for example north western region of India included Punjab, Haryana and Chandigarh.

Eastern Himalaya included the northern parts of Assam, Arunachal Pradesh and Sikkim, and North-Eastern regions of Nagaland, Meghalaya, Manipur, Mizoram and Tripura [6]. From Northern India, 262 higher fungi have been recorded from Kashmir valley [7]. In India the total recorded mushrooms are approximately 850 species [8]. There are references for the use of mushrooms as food and medicine in India in the ancient medical treatise, Charaka Samhita (3000±500 BC). Mushrooms had very tight corners history. Due to lack of knowledge and research, communication facilities which are now these days easily approachable Butler and Bisby were the first who published the list on Indian Fungi [9].

Mushrooms are widely appreciated all over the world not for their nutritional value but more often for medicinal properties. They are poor people's protein and have low fat, high fiber, protein, vitamins, minerals contents which make them enriched food [10]. Himachal Pradesh is best known for beauties of mountain, which provides a favorable environment for mushroom growth. As we know the ratio of well investigated mushroom is low.

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Therefore, in this study we focused on the awareness for wild mushrooms as biologically active compounds with medicinal potential.

II. MATERIAL AND METHOD

Collection of sample

The field survey was conducted during the spring session for the collection of wild strain of fleshy fungi from different ecological regions of Himachal Pradesh. The forests of Kangra, Mandi, Kullu, Solan and Lahul Spiti districts become the naturally growing mushroom flora during the rainy season.

During collection, soil was removed using a soft brush [11]. Specimens were wrapped in aluminum foil as they provide a good protection. These specimens were brought to the lab for identification.

Maintenance of fruiting body

Collected sample were carefully dissected and cleaned with disinfectant. Then they were placed in plastic bags for further identification in the laboratory [12]. Small sterilized biodegradable bags and boxes were used for woody and fleshy fungi. Care was taken to avoid damage of fleshy fungi. These samples were properly labeled and picture of samples were taken for further studies. The samples were dried at 60 °C and preserve at 4 °C for further use [13].

III. RESULT

Morphological identification of mushrooms

In total, 135 samples were collected. At preliminary level we had identified the collected sample on the basis of morphology. Out of 135 samples, 66 samples were found to be survived due the reason of environmental condition (Temperature and pH), few of them were perishable. Therefore rest of the sample discarded from the study. The collected fleshy fungi were studied for their morphology details, habit, habitat, naming of the samples closely related genus and other demographic details noted in fresh form as following:

1. Sample Number: 1/12- Sample 1/12 was collected from Solan district. The **pileus** diameter of 5.1 cm, color orange, cap shape umbonate, margin striated, surface on touch smooth, Cuticle half fully peeling. **Gill** color dark brown, closed, consistency coriaceous, sets attachment adnate. Grown on the dead barks of pine tree. **Stipe** size 4.2 cm, Context stuffed, attachment central, color golden, Stipebase Bulbous, consistency cartilaginous, surface Smooth fibrous Basal association mycelial. Natural habitat was tree trunk of pine tree (**Figure I-1**).

2. Sample Number: 2/12 (*Pholiota populnea*)- Sample 2/12 was collected from the silly forest in Solan district. **Pileus** 3-10 cm, hemispheric to convex campanulate, smooth margin, color was grey, dry with whitish woolly and frayed scales that are left grow on edge and full of scales light grey, shiny. **Gills** were subdecurrent, close, and orange or rust-colored. **Stipe** 2 to 5 cm long, grey in color, floccose ring with some impression was found at the stipe top and the bottom the stipe became globose in shape. Stipe was short, sturdy, curved and scaly with very bulky base, Strong odor. Not found in decayed pine tree but at the fresh trunk of pine (**Figure I-2**).

3. Sample Number: 4/12- Sample 4/12 was collected from the silly forest in Solan district. **Pileus** diameter 2.5 to 5.1 cm, Color orange, Cap shape umbonate, margin striated, surface on touch smooth, Cuticle half fully peeling. **Gill** color dark brown, consistency coriaceous, sets Attachment adnate. Grows on dead barks of pine tree on the ground vegetation. **Stipe** size 3 to 7 cm, Context stuffed, attachment central, color golden, Stipebase Bulbous, consistency cartilaginous, surface Smooth fibrous basal association mycelial (**Figure I-3**).

4. Sample Number: 6/12(*Tubaria furfurace*)- Sample 6/12 was collected from the silly forest in Solan district. **Pileus** were 2 to 4 cm across, convex then flattened or centrally ovated, striated from margin outward a ring like formation at the margin of pileus, moist and slightly scurfy, orange in color. **Gills** distant and adnate to slightly decurrent. **Stipe** was 3 to 6 cm, orange in color. Flesh concolorous. Habitat on twigs and woody debris. Usually found in autumn to early winter. Not edible (**Figure I-4**).

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5. Sample Number: 7/12- Sample 7/12 was collected from the silly forests of Solan. **Pileus** was 7 cm across, convex then flattened or centrally knob like projection, margins were smooth but a prominent inward separation in pileus, moist and fleshier, milky white in color. **Gills** were closed, crowded, adnate. **Stipe** was 10 cm long, white in color. Fleshy, not straight in length, habitat on twigs, dry place with earth crust (**Figure I-5**).

6. Sample Number: 8/12- Sample 8/12 was collected from the silly forests of Solan. **Pileus** was 3-7 cm across, convex then flattened, circular margins were smooth, dome shaped pileus, moist and more fleshy, milky white in color. **Gills** were closed, distant, adnate. **Stipe** was 5-7 cm long, white in color. Fleshy, not straight in length, Habitat on twigs, wet place with decayed leaves (**Figure I-6**).

7. Sample Number: 9/12 (*Macrolepiota procera*)- Sample 9/12 was collected from the silly forest in Solan district. **Pileus** was 8– 12 cm in diameter, Generally ovoid to hemispherical when young, becoming convex to plano-convex with age, white to whitish, covered with scattered, grayish orange to light brown patch Squamules, which got detachable from the pileus later on. **Gills** were free, normally crowded, white when young, became white to cream colored when mature. **Stipe** whitish, sub cylindrical, 10 to 13 cm long, hollow. Annulus was ascending, whitish, membranous, brownish patchy Squamules on the underside; movable when mature. Context was white to and spongy; color was unchanged when cut, odorless (**Figure II-7**).

8. Sample Number: 10/12 (*Trametes spp.*)- Sample 10/12 was collected from the silly forest in Solan district. The **bracket** 5–10 cm, woody color, corky, horizontal, explanted, reniform, sub sessile, azonate, finely pubescent, was becoming smooth, margin thick when young becoming acute later stages. **Pores** were round to linear and labyrinth form, the dissepiments always obtuse and never lamellate. Stipe was Lateral, rudimentary or absent. It was very common, found on old logs. You will see the beginning of the growth in the spring as a round white nodule which develops slowly. It finishes its growth in the fall when it has become explanted and horizontal, depressed above and with a thin margin. When fresh and growing it is of a rich cream-color and has a soft and velvety touch and a pleasant fragrance. It is inedible (**Figure II-8**).

9. Sample Number: 11/12 (*Pleurotus spp.*)- Sample 11/12 was collected from the forests of Solan. **Pileus** 2-12 cm, convex in shape, became flat and somewhat depressed, lung-shaped to semicircular, or nearly circular, fresh fruiting body was shiny, fairly smooth, whitish the margin were rolled to inner side when young, later wavy. **Gills** were running down the stem, close, dark brown at the margins. Stipe was absent lateral attachment to the wood. *Pleurotus* are Saprobic and white rot fungi, Edible, white rot fungi. Mainly found on dead wood of pines and continued in to fall of winter in the mid of October (**Figure II-9**).

10. Sample Number: 13/12- Sample 13/12 was collected from the forests of Kasauli, in Solan district. **Pileus** diameter 7 cm, Color light brown, Cap shape flat, margin striated, smooth, center zone dark brown in color. Cuticle half peeled. **Gill** earthy white, consistency coriaceous, sets Attachment adnexed. Grown on soil, damp area full of algae, mixed forest. **Stipe** size 5 cm, Context stuffed, attachment central, Stipebase slightly bulbous, consistency cartilaginous, surface Smooth fibrous basal association mycelial (**Figure II-10**).

11. Sample Number: 14/12 (*Hygrocybe flavescens*)- Sample 14/12 was collected from silly forests of Solan. **Pileus** was 3-4 cm, convex but latter on become depressed at the center. Slimy and sticky when fresh not fragile but easily peel, orange in color when become mature and margin became yellow. **Gills** were narrow in attached to the stem, or attached by a notch, very close, short-gills frequent. **Stipe** were 4-7 cm long, equal or slightly tapering at the base, dry especially on handling but not slimy, bright yellow, fading somewhat, fragile and easily splitted, Fleshy thin and yellowish. Found in the decayed pine tree in damp place (**Figure II-11**).

12. Sample Number: 25/12 (*Agaricus arvensis*)-The features observed like **Pileus** diameter 5.3 cm, Color burnt black, Cap shape ovate, margin appendiculate, surface on touch velvety, Cuticle fully peeling. **Stipe** size 7 cm, Context stuffed, attachment central, ivory white, Stipebase Bulbous, consistency cartilaginous, surface Smooth fibrous Basal association mycelial. **Gill** color black, consistency membranous, sets, attachment

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adnexed. veil appendiculate, occurred gregariously in places, Saprobic in nutrition. The sample was found growing on the decaying leaves and roots in silly forests of Solan and Kasauli village (**Figure II-12**).

13. Sample Number: 28/12 (*Tricholoma vaccinum*)-Sample 28/12 was collected from the silly forests of Solan district. **Pileus** diameter 3.3 cm, Color patchy grey, Cap shape flat, margin wavy, surface on touch spongy, Cuticle half peeling. **Stipe** size 7 cm, Context stuffed, attachment central, ivory white, Stipebase Bulbous, consistency cartilaginous, surface Smooth fibrous Basal association mycelial. **Gill** color dark ivory white, consistency membranous, sets Attachment adnate. It was found in solitary on the ground in mixed tree leaves (**Figure III-13**).

14. Sample Number: 29/12 (*Coprinus silvaticus*)-Sample 29/12 was collect from Solan. **Pileus** was 5 to 6 cm. broad, convex, bell shape at the younger stage. Membranaceous, plicate-striate on margin, light earthy, very thin, fleshy. **Gills** were sub-distant, narrow, adnexed, brownish or dark black in color. **Stipe** 5 cm, long, hollow, slender, fragile, smooth, white. Found on the damp ground and decaying leaves, mycorrhizal in association (**Figure III-14**).

15. Sample Number: 30/12 (*Panaeolus acuminatus*)-Sample 30/12 was collected from the Kufri village of Shimla district. **Pileus**, 1-2 cm in diameter, fragile, bell-shaped, broadly bell-shaped, dry and smooth; dark brown, faded to brown color, change in color markedly as it dries out. Margin was crenated. **Gills** attached to the stem and pulled away from it with maturity (adnate), crowded, dark brown in color no color change was distinguished in later stage. **Stipe** was 8-12 cmlong, mostly smooth not hair like brittles seen reddish brown colored more or less like the cap; darkened toward the base with maturity or on handling. It is inedible and found solitary not more moist place but more often found near the dung (**Figure III-15**).

16. Sample Number: 31/12- Sample 31/12 was collected from the forest of Kufri village in Shimla district. **Pileus** diameter 4.1 cm, Color cream , Cap shape flat, margin rimose, surface on touch moist, Cuticle half peeling Stipe size 5.9 cm, Context stuffed, attachment lateral, dusty white, **Stipe** base straight consistency cartilaginous, surface Smooth fibrous Basal association mycorrhizal. **Gill** color dark brown, consistency membranous, sets Attachment adnexed. Found solitary in the ground (**Figure III-16**).

17. Sample Number: 32/12- Sample 32/12 was collected from Kufri village in Shimla district. Pileus were 2 cm to 4.5 cm in length, not regular in shape or round but forked like projection developed on four sides, color was creamy and at the center a small brown colored knob. Gills were closed, free, four sides and margins were crenulated. Stipe was not to long about 3 to 4 cm long, white in color. These were more prominently and frequently found day after the rain. Therefore readily demolished on the onset of sunlight by excluded water from the fruiting body and made them slimy. Mainly found on Pine tree bark and leaves, on the day after rain (**Figure III-17**).

18. Sample Number: 33/12 (*Agrocybe* spp.)- Sample 33/12 was collected from Shimla. **Pileus** diameter 2.3 cm, Color orange, Cap shape ovate, margin scalloped, surface on touch coriaceous. **Stipe** size 3.9 cm, Context stuffed, attachment central, dusty white, Stipebase straight consistency cartilaginous, surface Smooth fibrous Basal association mycorrhizal. **Gill** dark orange, consistency fleshy, sets Attachment sub Decurrent. Saprobic in nutrition and grown alone (**Figure III-18**).

19. Sample Number: 34/12(*Aariscalpium* spp.)- Sample 34/12 was collected from the Kufri village in Shimla. **Pileus** was 1-3.3 cm across, broadly convex or flat, kidney-shaped or almost circular in outline, dry, hairy, velvety, reddish brown to dark brown or nearly black. **Spines** 1.1 mm long, white in color and crowded. 2-5 cm long **Stipe**, usually lateral, tough, reddish brown to dark brown, hairy, sometimes attached to a spongy underground portion Flesh: Whitish to brownish; tough and thin. Found on the ground on the dead wood flakes and leaves (**Figure IV-19**).

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20. Sample Number: 35/12 (*Bovista* sp.)- The common name of *Bovista* is puffball. Fruiting body 3–6 cm across, subglobose, slightly pointed below, without a sterile base but attached to the ground by a single mycelial cord. The outer body full of small protrudes or rough in texture, highly dendroid, white in color. The inner section of puffball was fleshy egg like. Habitat on grass. Found in late winters November. The sample was collected from Shimla district (**Figure IV-20**).

21. Sample Number: 39/12 (*Tubaria furfuracea*)- Pileus 3–4 cm in diameter, convex then flattened, striate from margin inwards when moist drying pale buff and slightly scurfy, orange in color, dry surface. **Gills** broad, distant, slightly adnexed, thin-walled. **Stipe** 5 cm long, hollow cylindrical but swollen and remain white at the base. Found in sandy soil with lots of moisture. And did not lose the texture eventually remained the same. Collected from Kufri village in Shimla (**Figure IV-21**).

22. Sample Number: 40/12- Pileus 3 to 8 cm in diameter, moist, irregular, inward folding, margins were serrated and toned, orange in color, center of pileus slightly depressed and dark colored. No color change. **Gills** were free and distant, compressed with pileus, orange in color. **Stipe** was 6 to 8 cm long, smooth, Tapered towards the top. Found in moist soil. Sample 40/12 was collected from Kufri village in Shimla district (**Figure IV-22**).

23. Sample Number: 41/12 (*Psathyrella multipedata*) - Sample 41/12 was collected from Kufri village in Shimla district. **Pileus** diameter 6.1 cm, Color dusty, Cap shape hemispherical to convex, campanula, Hygrophagous cuticle margin striate, surface on touch fleshy. Color brown, ochre clay and finally, cream white. **Stipe** size 8.4 cm, Context hollow, attachment central, white, Odorless **Stipebase** straight, Emarginated consistency, surface Smooth, fibrous Basal association mycorrhizal. **Gill** light brown, consistency fleshy, sets Attachment adnexed (**Figure IV-23**).

24. Sample Number: 42/12- Pileus 3 cm, mamelonated to convex but not funneled, incurved edge, thin. Finely scaly cuticle, color between light and dark brown hazel. Margins were seriated. **Stipe** was 4.4 cm, elastic consistency, concolorous with pileus. **Gills** were regular to stipe, were brown, pale yellow, farinaceous smell. Found in soil in conifer forest of Solan (**Figure IV-24**).

25. Sample Number: 43/12 (*Panaeolus rickenii*)- Pileus 2 to 4 cm across, convex to conical with prominent umbo, dark brown and shiny dry surface of pileus, flushed. **Stem** 10.5 to 11 cm, dark brown, Flesh was thin. Smell was not distinct. **Gills** were adnate, dark chocolate brown. Spore print black. Found in dry soil. Found growing in solitary. Sample 43/12 was collected from Shimla region (**Figure V-25**).

26. Sample Number: 44/12 (*Pluteus aurantiorugosus*)- Pileus were 2-5 cm, convex but umbonate with slightly knobbed at the center, margins were crenulated, dry or moist, flora orange, breaks in pilus, fleshy. **Gills** were free from the stem, close or nearly crowded, short-gills frequent, whitish, becoming pinkish at the edges. **Stipe** were 4 to 6 cm long, white in color, smooth, straight and fleshy. Found on the ground in the soil. This sample was collected from Kufri village in Shimla district (**Figure V-26**).

27. Sample Number: 45/12- Pileus diameter 6.7 cm, Color mud like, Cap shape flate, margin striate and sulcate, surface on touch sticky. **Stipe** size 7.1 cm, Context stuffed than hollow, attachment central, brown half and white, **Stipebase** blunt, consistency, surface hairy. Basal association with mycelial threads. **Gill** light, consistency fleshy, Attachment ascending. Mycorrhizal in association. Found in soil full of moisture (**Figure V-27**).

28. Sample Number: 46/12 – (*Coprinus* spp.) - The **pileus** was 4.5 to 6 cm in diameter, very thin, brittle, and moist, becoming bell-shaped, seldom expanded, splitting at the margin along the line of the gills, adorned with scattered white snowflakes, surface shaggy. **Pileus** separates easily from the stem. Shed liquid drops. The **gills** are free, equal, creamy white then black, closely pressed together, and dripping an inky fluid. The **stipes** were

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three to 6 to 8 cm long inches long, hollow, smooth, or slightly fibrillose, creamy-white, brittle, easily separating from the cap. Shed liquid drops. Coprinus is from a Greek word meaning dung. This genus can be readily recognized from the black spores. Most of the species grow in dung, or on ground. Some grow on grasslands, or where there has been a fill, or on dumping grounds, some grow on wood and around old stumps. The spores, with few exceptions, are black. Most of the species are edible, but many are of such small size that they are easily overlooked. Found in district Kangra (**Figure V-28**).

29. Sample Number: 47/12 (*Gymnopilus* spp.)- Pileus 3 to 12 cm, convex with an incurved margin, becoming broadly convex, nearly flat in younger stage later on depressed at the center, dry, densely covered with orange in color, shiny waxy, margins were sinuated. Gills were attached to the stem, close or crowded, orange in color. Stipe 4 to 6 cm long, woody dark brown at the top of stipe, globose at the top and go tapered at the bottom. Found in groups in the dead wood of pines in Solan (**Figure V-29**).

30. Sample Number: 48/12 (*Trametes* sp.)- Gender *Trametes* is characterized by its flattened configuration and fragile, with pileus that develop fan-shaped, thin and wavy margin. Velvety and visibly zoned area in shades of gray and brown, with clear edge. Pores and tubes of white or cream color (**Figure V-30**).

31. Sample Number: 49/12 (*Camarophyllus lacmus*)- Pileus diameter 10 cm, Color dust like, Cap shape depressed, margin rimose, surface on touch moist, Cuticle fully peeling. Stipe size 5 cm, Context stuffed, attachment lateral, color ivory white, Stipe base Bulbous, consistency cartilaginous, surface Smooth fibrous Basal association mycelial. Gill color light cream, consistency fleshy, sets Attachment sinuate, shape normal. Veil present, patchy, partial, white in color. This sample was collected from the silly forests of Solan (**Figure VI-31**).

32. Sample Number: 50/12 (*Volvariella* spp.)- Sample 49/12 was collected from Solan. Pileus 4-6 cm, Expanded to convex, when matured became flat, with a paler marginal area; soft; the margin not lined, but often splitting with age. Gills were free from the stem; light brown becoming pink; close or nearly crowded. Stipe 4-10 cm long, tapering gradually to apex, with a swollen base, dry; whitish, silky the base encased in a thick. Saprobic, growing in clusters on the decayed pines (**Figure VI-32**).

33. Sample Number: 51/12 (*Chlorophyllum molybdites*)- Sample 51/12 was collected from the forests of Solan. Pileus diameter 10 cm, Color orange, Cap shape convex, margin regular, surface on touch velvety, Cuticle fully peeling, scales present. Stipe size 7 cm, Context stuffed attachment central, color Pale yellow. Stipe base Bulbous, consistency cartilaginous and surface Smooth fibrous Basal association mycelial. Gill color Green, consistency fleshy, sets Attachment adanate; shape normal ring Annulus present, veil Universal present volva (**Figure VI-33**).

34. Sample Number: 55/12 (*Coprinellus* spp.)- Pileus was minute 2 cm, oval when young, expanding to broadly convex. At the young stage center was grayish in color white towards the margin, smooth, margins were serrated. Gills attached to the stem white but soon gray, distant. Stipes were 1.5 to 4 cm long, thin, equal, curved, hollow. Found in the groups on the decayed part of conifer trees. Found in Solan on the onset of rainy season (**Figure VI-34**).

35. Sample Number: 59/12- Pileus about 5 cm across, flattened at the top, margin were regular, center was black with small lack colored scales all over the pileus, background whitish, surface dry, soft. Gills were free, crowded, brown in color. Stipe was 8 cm in color, light earthy in color, stuffed, Tapered at the top, club-shaped at base, movable annular ring, found solitary in mixed forest (**Figure VI-35**).

36. Sample Number: 63/12- Pileus diameter 4.2 cm, Color Milky white, Cap shape convex, margin regular, surface on touch sticky, Non hydrophanous. Stipe size 3 cm, Context hollow, attachment central, color white,

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Stipebase blunt, consistency fragile, surface smooth, Basal association mycorrhizal, color white. **Gills** were distant consistency membranous Attachment Adnexed, shape, sets (**Figure VI-36**).

37. Sample Number: 67/12 (*Pluteus salicinus*) - Pileus 3–9 cm across, convex, brown velvety scales, regular in shape, shiny and moist. Varying in color between pink sheets Flesh white Cap cuticle filamentous and brown, with darker center and tight, white turning to; the scales formed of slightly fusiform or elongated clavate. **Gills** Free, closed whitish. Habitat on rotting deciduous wood. **Stipe** was 3-9 cm long purely white and shiny, Hollow. Found at the trunk of pine tree (**Figure VII-37**).

38. Sample Number: 70/12 (*Boletus sp.*) - Pileus was 6 cm with fragrant section. Contrast brown cap, convex to flattened, thick edge with yellow pores. Sturdy hat, wavy and often irregular. Velvety cuticle, Bright white, rub needles turning brown, **stipe** was short about 4cm, sturdy, cream in colour, Compact flesh, pale yellow. Odor was unpleasant. Found in the decayed leaves with soil association (**Figure VII-38**).

39. Sample Number: 75/12 - Piles 4-10 was hemispherical and plano-convex, margin were round slightly wavy, depressed in the outskirts of the pileus. Upper surface was velvety, covered with bloom (dust) whitish. Pores were cream coloured. **Stipe** was 10 cm and thick, smooth, yellow. Fungal pleasant smell. Found in soil with decayed leaves in mixed forest found in Kangra (**Figure VII-39**).

40. Sample Number: 88/12 (*Collybia confluens*)- Pileus 2-6 cm across, bell shaped, Smooth surface and margins, dull brown, margins with white colored projections clinged, glabrous. **Gills** almost free, closed, narrow, Stem 5 to 10 cm often flattened, brown. **Stipe** 7 cm long, light brown tint with white color at the top of stipe, stuffed, smooth and shiny, Habitat in dense clumps on fallen leaves or needles. Found widely in conifers forest of Kangra (**Figure VII-40**).

41. Sample Number: 89/12 (*Tricholoma album*)- Pileus 4–5 cm across, flattened convex, grey color sprayed over the pileus, darker towards the center, covered in blackish scales, soft, fleshy. **Stipe** 4 to 5 cm long, white in color covered in fine blackish-brown scales. Flesh whitish to grey. **Gills** Adnate or sinuate sheets were whitish. Spore print white. Habitat was conifer in soil with decayed leaves. Aromatic smell. This sample was collected from the forests of Kangra (**Figure VII-42**).

42. Sample Number: 90/12 (*Coprinus comatus*)- Pileus was 3 to 8 cm in diameter, milky white in color, skin wall peeled off easily in layers, conical in shape in young stage latter on became bell shape, and margins were dentate, velvety in texture, flares or feathery, **Gills** were adnate, white in color. **Stipes** were 3 to 6 cm long with annular ring, hollow inside. Tapering at top and globose at the base. Smell was mild. Fleeting and delicate. Found in mixed forest. This sample was collected from the forests of Kangra (**Figure VIII-43**).

43. Sample Number: 91/12- Sample 91/12 was collected from the forests of Kangra. **Pileus** 5 to 10 cm across, convex, cream, becoming lighter brown or scattered color, margin were created. **Gills** free, crowded, creamy. Smell was mild. **Stipe** 5 to 8 cm, base usually bulbous, upper surface white, lower brown in color, fleshy, white, prominent annular ring attached with the stipe. Found in the dead leaf in mixed forest. Habitat in mixed forest and deciduous woods (**Figure VIII-43**).

44. Sample Number: 92/12- Pileus diameter 3.2 cm, Color White grey, margin irregular, surface on touch Dry, hard attachment eccentric, pores present (**Figure VIII-45**).

45. Sample Number: 96/12 (*Cantharellus cinereus*)- Pileus were diameter 2.3-4.2 cm, Color Dark brown, Cap shape infundibuliform, margin lobed, Hydrophanous. **Stipe** size 4 cm, Context hollow, attachment lateral, color dark brown, Stipebase pseudorrhizia, consistency Paper like, surface scaly. Ridges present color Brown,

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consistency membranous, confluent, Attachment Sub Decurrent, wrinkles look like gills--but are actually false gills species appeared to be mycorrhizal, found in clusters (**Figure VIII-46**).

46. Sample Number: 101/12 (*Phellinus* sp.) - Fruiting body was dark brown to black color in latter stage, **Bracket** 4-12 cm across, hoof-shaped, fan-shaped, shelf-like, with the margin often brighter, hard, crusty, generally curved at the surrounding. Tubes were not deep across the flesh of the cap. Habitat mainly in rows on dead coniferous trunks. A very destructive fungus that attacks the heartwood of living trees (**Figure VIII-47**).

47. Sample Number: 102/12- **Pileus** diameter 10 cm, Color dust like, Cap shape depressed, margin rimose, surface on touch moist, Cuticle fully peeling. **Stipe** size 5 cm, Context stuffed attachment lateral, color orange, **Stipe** base Bulbous, consistency cartilaginous, surface Smooth fibrous Basal association mycelial. **Gill** color light cream, consistency fleshy, sets Attachment sinuate, shape normal. Veil present, partial, and white in color (**Figure VIII-48**).

48. Sample Number: 103/12 (*Inocybe geophylla*)-The **pileus** 3.7 cm, fleshy, conical, convex, obtusely gibbous and prominent knob at the pileus sprinkled with fibrous scales; margin were, grayish-brown. The **gills** are rounded near the stem, quite crowded, tinted brown. The **stipe** was 6.5 cm was straight, whitish but paler than the pileus, with small fibers. It is found on the ground in damp conifer leaves. Collected from Kangra (**Figure VIII-48**).

49. Sample Number: 104/12- **Pileus** diameter 4.1 cm, light golden yellow, cap shape rimose, irregular, margins, surface on touch normal Hygrophagous. **Stipe** size 7.1 cm, Context hollow attachment lateral, color earthy, **Stipe** base blunt, consistency hairy, basal association mycorrhizal. **Gills** present, color orange tint membranous, sets, attachment sub decurrent. Mycorrhizal association. Found in Kasauli (**Figure IX-49**).

50. Sample Number: 110/12 (*Trametes* sp.) -**Bracket** 1.5-5 cm across, 5.5-8.1 cm wide, 0.3-1 cm thick, in circular clusters, often overlapping, woody colour or yellow and dry, downy to velvety to almost rough, radially lined toward the margin. Pores were present. Stem none or rudimentary. Flesh tough and watery, drying rigid, reviving; white. Habitat in clusters on dead wood of deciduous trees. Found in Mandi Not edible (**Figure IX-50**).

51. Sample Number: 111/12 (*Ganoderma carnosum*)- **Cap** was shiny and zoned brown or light woody color on the out surface of cap whereas the inner zone of the cap was dark brown with a distinct stem in similar colors. Size of cap was 2.5 to 4.6 cm across. stem was lateral in some samples were absent. *Ganoderma carnosum* was very similar to *Ganoderma lucidum* which is found on decayed wood of pines and mainly found from August till late fall in the conifer trees. *Ganoderma* species as white-rot ones and inedible. Found in Kasauli (**Figure IX-51**).

52. Sample Number: 112/12 (*Gloeophyllum sepiarium*)- **Pileus** diameter 4.6 cm, color chocolate brown, Non-Hygrophagous. Attachment eccentric, associated with pine wood. Gills present color brown, consistency coriaceous. Found in Kasauli (**Figure IX-52**).

53. Sample Number: 113/12- **Pileus** 3-8 cm in diameter, fragile, bell-shaped, broadly bell-shaped, dark yellow and change in color markedly as it dries out. Margin were crenated. **Gills** attached to the stem and compressed with pileus, crowded, dark yellow in color no color change was distinguished in later stage. **Stipe** was 6-10 cm long, mostly smooth, and annular ring present not prominent. It is inedible and found solitary in moist place. Found in Kasauli (**Figure IX-53**).

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54. Sample Number: 115/12 (*Russula* sp.)- Pileus was 8 cm, convexes with a central depression and minor rolled margin, smooth creamish in color, the margin were not lined. **Gills** attached to the stem, crowded or close; white at first, later creamy to pale yellow, Stipe 3-5 cmlong, 2.5-4 cm thick, sturdy and solid, more or less equal, dry, smooth, whitish, fleshy and hard. Mycorrhizal association with conifers trees; grown alone, scattered. Odor was not distinctive. Found in Lahul Spiti (**Figure IX-54**).

55. Sample Number: 117/12 (*Boletinus* sp.)- These species had very viscid cap. I found the specimens in Figure 4.52 growing on Kasauli Hill, near Solan in confers forest. They were growing near and under pine trees, both in dense groups and separately. The caps were very viscid, yellow with a slight tint. The **pileus** was 3.3 cm to 6.5 cm, thin at first convex in shape but latter on became irregular not fine convex, very viscid when moist, especially on the margin and yellow color become streaked with maturity of fruiting body. The tube-surface quite large, angular, pale yellow, becoming a dull ochraceous. The **stipe** 3.2 cm, slender, equal or tapered upward, firm, with no trace of a ring. Yellow, often brownish toward the base (**Figure X-55**).

56. Sample Number: 118/12 (*Amanita battarae*) - The **pileus** was 5.5 cm, brown colored, planar, smooth, viscid, sunshine, and beard two circular zones. The margin of the cap was striated. From Figure, we could concluded that volva are at was absent from the cap. The center of the cap was very likely to be darkening zone. The **gills** are white and crowded. The ring like **stipe** is said to be white, very long about 10 cm and cylindrical fleshy and stuffed. The stipe was smooth. Found in Kasauli (**Figure X-56**).

57. Sample Number:119/12 (*Marasmius* sp.) - **Pileus** diameter 2.3 cm, Color Dark brown, Cap shape umbonate, margin rimose, non hydrophanous. **Stipe** size 4.4 cm, Context hollow, attachment central, color soil color, Stipebase myceloid, consistency Paper like, surface dry and basal association leaf litter. **Gills** present, color earthy, consistency brittle sets, attachment adnexed Marasmius species were tiny However, they were an essential saprobic role. Found in Kasauli (**Figure X-57**).

58. Sample Number:121/12 (*Psilocybin* spp.) - **Pielus** 5 cm, widely bell shaped, smooth, hygrophanous, dark brown to cinnamon brown, changing to light brown, **Gills** were notched, attached to the stem, pulling away from the stem, brown, becoming darker brown, sometimes with a mottled appearance, closed. **Stem** 3-8 cmlong, sometimes with an enlarged base; smooth; fragile; pale, becoming white in color. Mycorryzal in association. Found in damp area in Solan (**Figure X-58**).

59. Sample Number: 122/12 (*Lepiota* sp.) - **Pileus** about 8 cm across flattened at the top then became convex in mature stage. Flat umbonate with an uplifted margin, background whitish, center was deep black to chestnut like color surface dry, smooth and brown all over, then breaking into flat. **Gills** free close. **Stipe** was white, 7 cm in length, stuffed at the top of attachment to gill but at the base were hollow, club-shaped at base, Habitat singly, scattered, in soil, compost, leaf litter, widely distributed in conifer forest. Found in Kasauli (**Figure X-59**).

60. Sample Number: 123/12 (*Trametes* sp.) - **Bracket** 4 to 8 cm across, 2-4 cm wide, overlapping groups, upper surface covered in silvery hairs, concentrically zoned and contoured, whitish to golden yellow. Flesh tough and leathery, smell slightly of mild when fresh. No stipe present, lateral attachment. **Pores** 2-4 per mm, sub circular, white at first later cream. Habitat on dead wood of deciduous trees especially on fallen trunks was exposed. Not edible. Found in Kangra (**Figure X-60**).

61. Sample Number: 125/12 (*Boletus* sp.) - **Pileus** 5-10 cm, convex, becoming broadly convex, dry, bald or very finely velvety, often covered with dirt, pitted, pale brown. **Tube Layer** was covered by thin, whitish, tubes was 1-3 cm deep, curved, yellowish becoming olive brown. **Stipe** was 2-6 cmlong, smooth and large, Fleishy. Mycorrhizal growing alone found in the Solan (**Figure XI-61**).

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62. Sample Number: 126/12 (*Russula californiensis*)- The **pileus** was 5-6 cm broad, convex, became nearly plane, or slightly depressed; at first viscid when fresh, soon dry after picking up, became slightly striated on the margin, red in color. The **gills** are moderately close, nearly entire, rounded behind and slightly adnexed, ventricose, white not purely white. The **stipe** was 5 cmlong, slightly tapering upward, stuffed. It was growing in the hard ground with earth crust. It was found in August. Found in Kasauli (**Figure XI-62**).

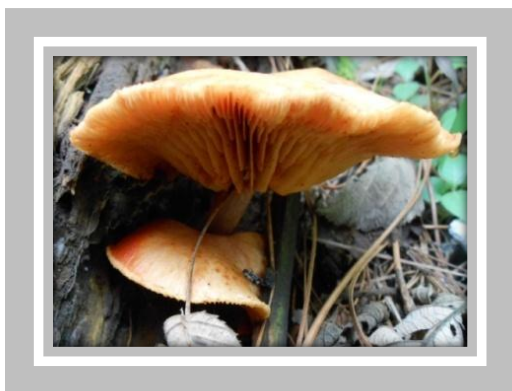
63. Sample Number: 130/12 (*Gymnopusa cervatus*)- **Pileus** was 2-5 cm, convex, became plan convex; smooth; earthy brown and moist when young and fresh, but soon fading to brownish color in to white. **Gills** were attached to the stem broadly; they were close or crowded, white when young, developed pink tones. **Stipe** 2-12 cmlong; up to about 6 mm thick; more or less equal; dry; hollow; smooth except for whitish fuzz near the base; reddish brown to purplish brown; not fading as quickly as the cap. Flesh was thin and white in color. Saprobic in nutrition, mycorrhizal association. Found in Kasauli (**Figure XI-63**)

64. Sample Number: 133/12 (*Inonotus sp.*)- **Bracket** up to 7 cm across, Irregular with a central depression; yellowish brown to wood yellow, Pores were present, angular. **Stipe** 1.5 cm lateral, firm fibrous lower layer; yellowish brown. Found in coniferous wood. Found in Kasauli. Not edible (**Figure XI-64**).

65. Sample Number: 134/12 (*Ganoderma adpersum*)- **Bracket** 2- 3.5 cm across, 3-5 cm wide, upper surface with a thick dark brown hard crust which is concentrically ridged, margin thick and obtuse. Flesh dark brown, thicker. **Pores** present, pale yellow, discolouring when handled. Habitat on deciduous trees, usually found on the lower part of the trunks; the cocoa-like spore deposit is often very dense on top of the cap and on the wood above it. Not edible. Found In Kasauli (**Figure XI-65**).

66. Sample Number: 135/12 (*Conocybe tenera*)- **Pileus** was 3 cm broad, 2.9 cm high, conical, surface dry, dark brown, smooth; margin were regular, not splitted at maturity and non striate; cuticle not peeling; flesh thin, unchanging; pileus veil was absent; taste and odor not distinctive. **Gills** edges were smooth Lamellae adnexed, equal. **Stipe** was central 15.1 cmlong, cylindrical, with bulbous base, hollow, surface light brown, fibrillose. Found in Kasauli (**Figure XI-66**).

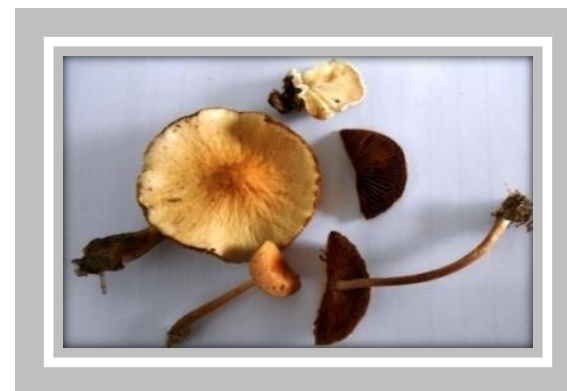
The data presented in **Table 1** illustrated the distribution and frequency of wild mushrooms which were collected from Himachal Pradesh. 12 samples were unknown did not resemble to any genus. A total of 66 samples out of which 54 sample belonged to 30 genera, 15 families, 11 orders, 1 class of mushroom were identified in Himachal Pradesh (India). The identified samples and varieties spread over in following genera For example, *Pholiota populnea*, *Tubaria furfuracea*, *Macrolepiota procera*, *Trametes sp.*, *Pleurotus sp.*, *Hygrocybe flavescens*, *Agaricus sp.*, *Tricholoma vaccinum*, *Coprinus silvaticus*, *Panaeolus acuminatus*, *Agrocybe sp.*, *Aariscalpium sp.*, *Bovista sp.*, *Tubaria furfuracea*, *Psathyrella multipedata*, *Clitocybe squamulosa*, *Panaeolus acuminatus*, *Pluteus aurantiorugosus*, *Agaricus sp.*, *Coprinus sp.*, *Gymnopilus sp.*, *Trametes sp.*, *Camarophyllum lacmus*, *Volvariella sp.*, *Chlorophyllum molybdites*, *Coprinellus sp.*, *Pluteus salicinus*, *Boletus sp.*, *Boletus sp.*, *Collybia confluens.*, *Tricholoma album*, *Coprinus neveys*, *Cantharellus cinereus*, *Phellinus*, *inocybe geophylla*, *Trametes sp.*, *Ganoderma carnosum*, *Gloeophyllum sp.*, *Russula sp.*, *Boletinus sp.*, *Amanita battarae*, *Marasmius sp.*, *Marasmius sp.*, *Psilocybin sp.*, *Lepiota sp.*, *Trametes sp.*, *Boletus sp.*, *Russula californiensis*, *Gymnopus acervatus*, *Inonotus sp.*, *Ganoderma adpersum* and *Conocybe tenera*



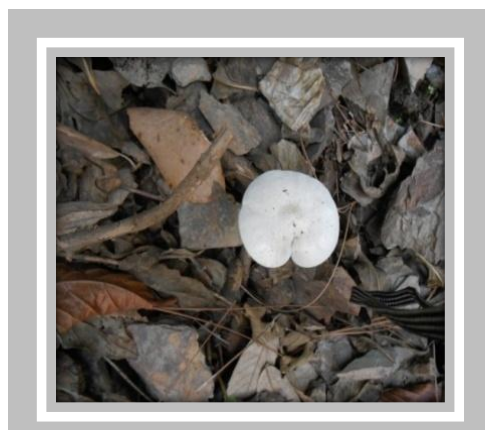
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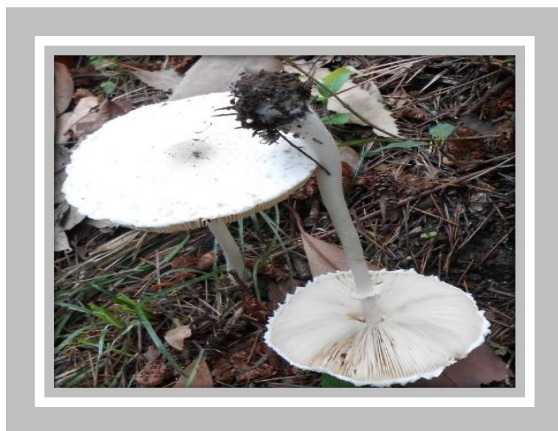


(4)

(5)

(6)

Figure I: Wild mushroom collected from natural Habitat. With Dorsal and front view. 1) 1/12 (unknown), 2) 2/12- *Pholiota populnea* , 3) Fruiting body of 4/12 (unknown), 4) 6/12 - *Tubaria furfurace*, 5) 7/12 (unknown) and 6) 8/12 (unknown)



(7)



(8)



(9)



(10)



(11)



(12)

Figure II: Wild mushroom collected from natural Habitat. With Dorsal and front view. 7) 9/12- *Macrolepiota procera*, 8) 10/12- *Trametes* spp. 9) 11/12 - *Pleurotus* spp., 10) 13/12 (unknown), 11) 14/12 - *Hygrocybe flavescens* and 12) 25/12 - *Agaricus arvensis*



(13)



(14)



(15)



(16)



(17)



(18)

Figure III: Wild mushroom collected from natural Habitat. With Dorsal and front view (13) 28/12- *Tricholoma vaccinum*, (14) 29/12- *Coprinus silvaticus*, (15) 30/12- *Panaeolus acuminatu*, (16) 31/12 (unknown), (17) 32/12 (unknown) and (18) 33/12- *Agrocybe* spp.



(19)



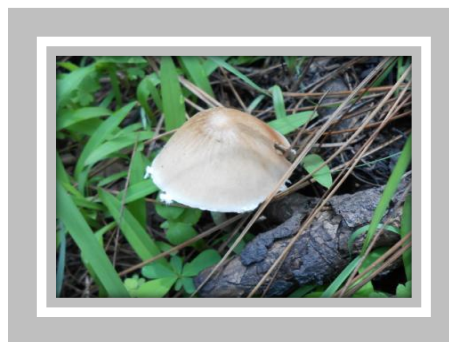
(20)



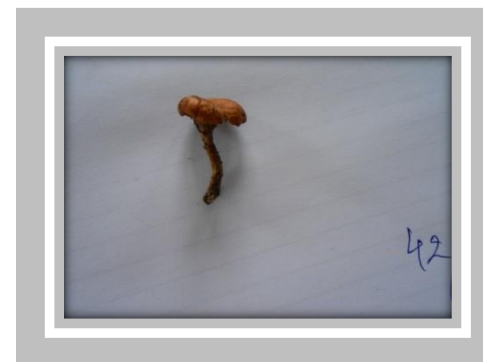
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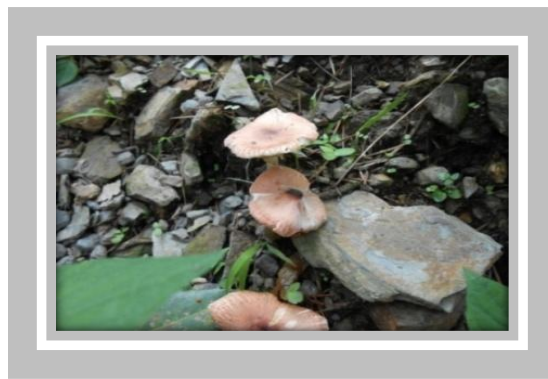


(24)

Figure IV: Wild mushroom collected from natural Habitat. With Dorsal and front view (19) 34/12- *Aariscalpium* spp., (20) 35/12- *Bovista* sp., (21) 39/12 - *Tubaria furfuracea*, (22) 40/12 (unknown), (23) 41/12- *Psathyrella multiple data* and (24) 42/12 (unknown).



(25)



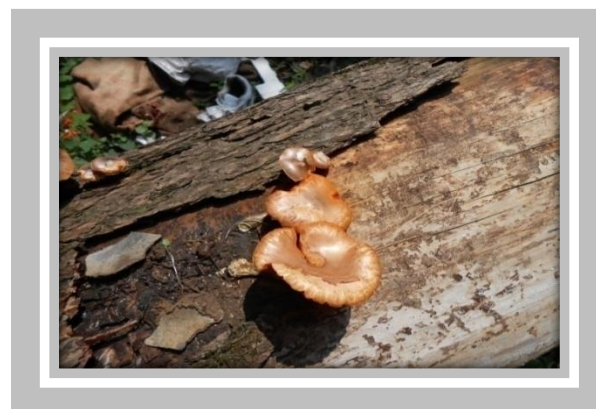
(26)



(27)



(28)



(29)



(30)

Figure V: Wild mushroom collected from natural Habitat. With Dorsal and front view. (25) 43/12 - *Panaeolus rickenii*, (26) 44/12 - *Pluteus aurantiorugosus*, (27) 45/12 (unknown), (28) 46/12 - *Coprinus* spp., (29) 47/12 - *Gymnopilus* spp. and (30) 48/12 - *Trametes* sp.



(31)



(32)



(33)



(34)



(35)



(36)

Figure VI: Wild mushroom collected from natural Habitat. With Dorsal and front view. (31) 49/12 - *Camarophyllus lacmus*, (32) 50/12 - *Volvariella* spp., (33) 51/12 - *Chlorophyllum molybdites*, (34) 55/12 - *Coprinellus* spp., (35) 59/12 (unknown) and (36) 63/12 (unknown).



(37)



(38)



(39)



(40)

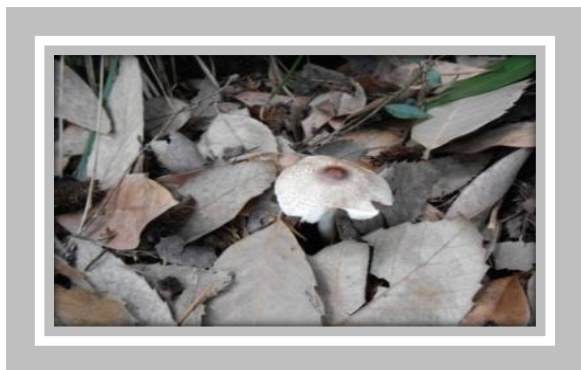


(41)



(42)

Figure VII: Wild mushroom collected from natural Habitat. With Dorsal and front view. (37) 67/12 - *Pluteus salicinus*, (38) 70/12- *Boletus* sp., (39) 75/12 (unknown), (40) 88/12 - *Collybia confluens*, (41) 89/12 - *Tricholoma album* and (42) 90/12 - *Coprinus comatus*



(43)



(44)



(45)



(46)



(47)

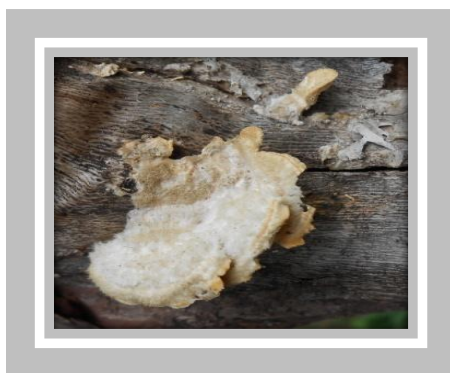


(48)

Figure VIII: Wild mushroom collected from natural Habitat. With Dorsal and front view. (43) 91/12 (unknown), (44) 92/12 (unknown), (45) 96/12 - *Cantharellus cinereus*, (46) 101/12 - *Phellinus* sp., (47) 102/12 (unknown) and (48) 103/12 - *Inocybe geophylla*



(49)



(50)



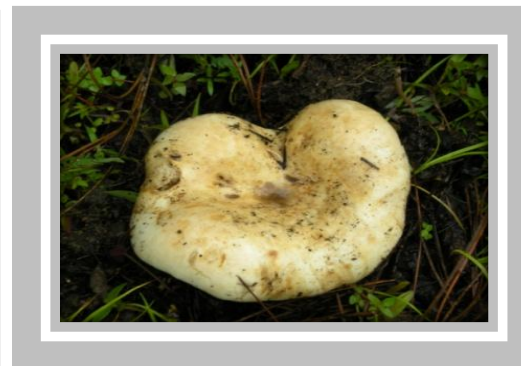
(51)



(52)



(53)



(54)

Figure IX: Wild mushroom collected from natural Habitat. With Dorsal and front view. (49) 104/12 (unknown), (50) 110/12 - *Trametes* sp., (51) 111/12 - *Ganoderma carnosum*, (52) 112/12- *Gloeophyllum sepiarium*, (53) 113/12 (unknown) and (54) 115/12 - *Russula* sp.



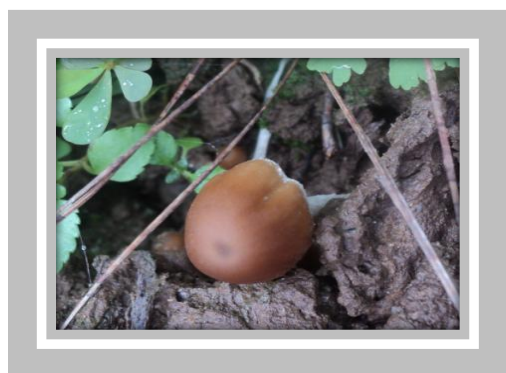
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(57)



(58)



(59)



(60)

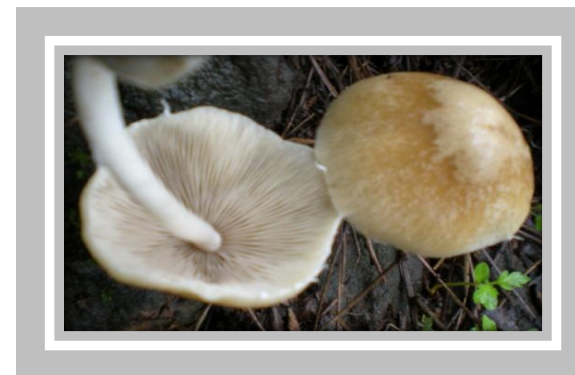
Figure X: Wild mushroom collected from natural Habitat. With Dorsal and front view. (55) 117/12 - *Boletinus* sp., (56) 118/12 - *Amanita battarae*, (57) 119/12 - *Marasmius* sp., (58) 121/12 - *Psilocybin* spp., (59) 122/12 - *Lepiota* sp. and (60) 123/12- *Trametes* sp.



(61)



(62)



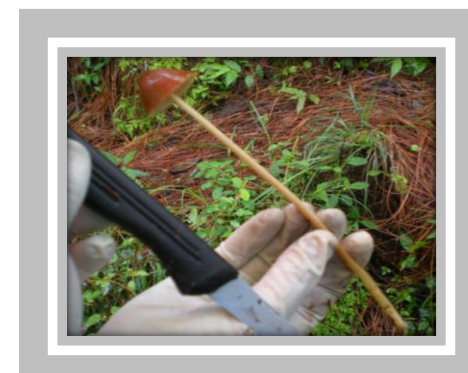
(63)



(64)



(65)



(66)

Figure XI: Wild mushroom collected from natural Habitat. With Dorsal and front view. (61) 125/12- *Boletus* sp., (62) 126/12 - *Russula californiensis*, (63) 130/12 – *Gymnopusa cervatus*, (64) 133/12- *Inonotus* sp., (65) 134/12- *Ganoderma adpersum* and (66) 135/12- *Conocybe tene*

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Table 1.1: Classification of Wild Mushrooms belongs to Kingdom Fungi and Class *Basidiomycotina*. (NI*)

S.No.	Sample No.	Scientific Name	Order	Family
1.	1/12	Unknown	NI	NI
2.	2/12	<i>Pholiota populnea</i>	Agaricales	Strophariaceae
3.	4/12	Unknown	NI	NI
4.	6/12	<i>Tubaria furfuracea</i>	Cortinirales	Crepidotaceae
5.	7/12	Unknown	NI	NI
6.	8/12	Unknown	NI	NI
7.	9/12	<i>Macrolepiota procera</i>	Agaricales	Agaricaceae
8.	10/12	<i>Trametes</i> sp.	Poriales	Coriolaceae
9.	11/12	<i>Pleurotus</i> sp.	Poriales	Lentinaceae
10.	13/12	Unknown	NI	NI
11.	14/12	<i>Hygrocybe flavescens</i>	Agaricales	Hygrophoraceae
12.	25/12	<i>Agaricus</i> sp.	Agaricales	Agaricaceae
13.	28/12	<i>Tricholoma vaccinum</i>	Agaricales	Tricholomataceae
14.	29/12	<i>Coprinus silvaticus</i>	Agaricales	Coprinaceae
15.	30/12	<i>Panaeolus acuminatus</i>	Agaricales	Coprinaceae
16.	31/12	Unknown	NI	NI
17.	32/12	Unknown	NI	NI
18.	33/12	<i>Agrocybe</i> sp.	Agaricales	Bolbitiaceae
19.	34/12	<i>Aariscalpium</i> sp.	Hericiales	Auriscalpiaceae
20.	35/12	<i>Bovista</i> sp.	Lycoperdales	Lycoperdaceae
21.	39/12	<i>Tubaria furfuracea</i>	Cortinariales	Crepidotaceae
22.	40/12	Unknown	NI	NI
23.	41/12	<i>Psathyrella multipedata</i>	Agaricales	Coprinaceae
24.	42/12	<i>Clitocybe squamulosa</i>	Agaricales	Tricholomataceae
25.	43/12	<i>Panaeolus acuminatus</i>	Agaricales	Coprinaceae
26.	44/12	<i>Pluteus aurantiorugosus</i>	Agaricales	Pluteaceae
27.	45/12	<i>Agaricus</i> sp.	Agaricales	Agaricaceae

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28.	46/12	<i>Coprinus sp.</i>	Agaricales	Psathyrellaceae
29.	47/12	<i>Gymnopilus sp.</i>	Cortinariales	Cortinariaceae
30.	48/12	<i>Trametes sp.</i>	Poriales	Coriolaceae
31.	49/12	<i>Camarophyllus lacmus</i>	Agaricales	Hygrophoraceae
32.	50/12.	<i>Volvariella sp.</i>	Agaricales	Pluteaceae
33.	51/12	<i>Chlorophyllum molybdites</i>	Agaricales	Agaricaceae
34.	55/12	<i>Coprinellus sp.</i>	Agaricales	Psathyrellaceae
35.	59/12	Unknown	NI	NI
36.	63/12	Unknown	NI	NI
37.	67/12	<i>Pluteus salicinus</i>	Agaricales	Pluteaceae
38.	70/12	<i>Boletus sp.</i>	Boletales	Boletaceae
39.	75/12	<i>Boletus sp.</i>	Boletales	Boletaceae
40.	88/12	<i>Collybia confluens</i>	Agaricales	Tricholomataceae
41.	89/12	<i>Tricholoma album</i>	Agaricales	Tricholomataceae
42.	90/12	<i>Coprinus neveus</i>	Agaricales	Psathyrellaceae
43.	91/12	Unknown	NI	NI
44.	92/12	Unknown	NI	NI
45.	96/12	<i>Cantharellus cinereus</i>	Cantharellales	Cantharellaceae
46.	101/12	<i>Phellinus</i>	Hymenochaetales	Hymenochaetaceae
47.	102/12	Unknown	NI	NI
48.	103/12	<i>inocybe geophylla</i>	Cortinariales	Cortinariaceae
49.	104/12	Unknown	NI	NI
50.	110/12	<i>Trametes sp.</i>	Poriales	Coriolaceae
51.	111/12	<i>Ganoderma carnosum</i>	Ganodermatales	Ganodermataceae
52.	112/12	<i>Gloeophyllum sp.</i>	Poriales	Coriolaceae
53.	113/12	Unknown	NI	NI
54.	115/12	<i>Russula sp.</i>	Russulales	Russulaceae
55.	117/12	<i>Boletinus sp.</i>	Boletales	Boletaceae
56.	118/12	<i>Amanita battarae</i>	Agaricales	Amanitaceae
57.	119/12	<i>Marasmius sp.</i>	Agaricales	Tricholomataceae

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58.	121/12	<i>Psilocybin</i> sp.	Agaricales	<i>Strophariaceae</i>
59.	122 /12	<i>Lepiota</i> sp.	Cortinariales	<i>Cortinariaceae</i>
60.	123/12	<i>Trametes</i> sp.	Poriales	<i>Coriolaceae</i>
61.	125/12	<i>Boletus</i> sp.	Boletales	<i>Boletaceae</i>
62.	126/12	<i>Russula californiensis</i>	Russulales	<i>Russulaceae</i>
63.	130/12	<i>gymnopus acervatus</i>	<i>Gymnopus</i>	<i>Tricholomataceae</i>
64.	133 /12	<i>Inonotus</i> sp.	Hymenochaetales	<i>Hymenochaetaceae</i>
65.	134/12	<i>Ganoderma adspersum</i>	Ganodermatales	<i>Ganodermataceae</i>
66.	135/12	<i>Conocive tenera</i>	Agaricales	<i>Bolbitiaceae</i>



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IV. DISCUSSION

We have chosen these areas on the basis of their climatic conditions that were favorable for mushroom semi humid, high precipitation occurs and highest annual rainfall, typically occurs from mid-June until mid-September. The range of precipitation in the region varies from 600 to 3200 mm during the monsoon season. The North east India encompasses diverse hills and vales. These areas are rather treasure of diverse flora and fauna Species of mushrooms recorded in the present study are listed in the **Table 1**. The data presented in illustrated the distribution and frequency of wild mushrooms which were collected from Himachal Pradesh. 13 samples were unknown did not resemble to any genus. A total 66 samples out of which 55 samples belonged to 30 genera, 15 families, 11 orders, 1 class of mushroom were identified in Himachal Pradesh (India). For each species, a short description is provided, along with ecological distribution, habitat, notes relating to the mushroom in question and clues used for identification. The climatic conditions vary from hot and sub-humid tropical in the northern high mountains. Lahaul and Spiti experience drier conditions as they are almost cut off by the higher mountain ranges. However, it was a general feeling among the researchers that Lahaul being the dry temperate zone mushroom cultivation is not easy, since to get good temperature and moisture conditions for its successful domestication may not be possible. But according to previous study about 35 specimens of wild and edible mushrooms were collected from five valleys at Sunnam, Tandi, Triloknath, Udaipur, Jahalma, and Kukumseri during the year 2005-06 and again in 2006-07 in Lahaul for the first time belonging to species of *Lactarius*, *Laetiporus*, *Laccaria*, *Stropharia*, *Marasmius*, *Cortinari*, *Ramaria*, *Russula* and *Strobilomyces*. This clearly indicated the suitability region for the occurrence of mushrooms [14]. [15], [16] described the collection of wild edible mushrooms are limited. [17] described 10 species in which four belonging to *Morchella* are edible (1965). But the potentialities of some species are yet to be studied in detail. Assuming that the proportion of useful mushrooms among the undiscovered and 7,000 yet undiscovered species, which if discovered will be provided with the possible benefit to mankind [18]. According to research report of [19]. Due to Traditional mycological knowledge, most of Indian consuming nearly 283 species of wild mushrooms out of 2000 species recorded world over. I have collected different species from different places. The mushroom flora of a particular region largely depends upon type of vegetation, topography and altitude of the region.

V. CONCLUSION

Himachal Pradesh with diverse habitats with varied ecological conditions, harbors wide varieties of mushrooms. But still extensive communication and cooperation among the public required is essential. Scientific community is beginning to develop an appreciation for the biological and economic value of this special resource. Research and monitoring are important factors in developing strategies that will both protect and promote the edible macrofungi of the region in particular and in general in whole of the western Himalaya. Knowledge about the edibility of wild edible macro-fungi is diminishing especially among young generation; therefore, they have to be made aware about it. Also, more attention need be paid towards the conservation of these important species to cater the need of nutritional requirements of the future generation. Therefore our motive was to collect the large variety of wild mushroom different region of Himachal Pradesh. To discovered the new variety of mushroom which had never been discovered before

REFERECES

1. Corner, E.J.H., "The seasonal fruiting of *Agaricus* in Malaya. Gardens Bulletin, Straits Settlements, Vol. (9), pp. 79-88, 1935.
2. Dhancholia , Thakur , V.S., "Preliminary studies on mushroom collection and cultivation in dry temperate zone (cold desert) -Lahaul Valley of Himachal Pradesh", International Journal of Agriculture Science, Vol. (4), pp. 377-380, 2008.
3. Yaoqi. Z., Wei, G., Yueqin, S., Yanling, W., Yu-Cheng, "Edible Mushroom Cultivation for Food Security and Rural Development in China: Bio-Innovation", Technological Dissemination and Marketing Sustainability, Vol. (6), pp. 2961-2973, 2014.
4. Yang, X.F., He, J., Li, C., Ma, J.Z., Yang, Y.P., Xu, J.C. "Matsutake Trade in Yunnan Province, China: An Overview", Economic Botany, Vol. (62), pp. 269-277, 2008.

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5. Xu, J. C., Wilkes, A., "Biodiversity impact analysis in northwest Yunnan, southwest China," Biodiversity Conservation, Vol. (13), pp. 959-983, 2004.
6. Khoshoo, T.N., "Plant diversity in the Himalaya: Conservation and utilization", Govind Ballabh Pant Institute of Himalayan Environment and Development, Kosi, Almora, India, pp. 1-70, 1992.
7. Abraham, S. P., "Kashmir fungal flora-an overview", In: Nair MC editors. Indian Mushrooms. Kerala: Agricultural University Vellanikkara India, pp.13-24, 1991.
8. Deshmukh, S.K., "Biodiversity of tropical basidiomycetes as sources of novel secondary metabolites", In: Jain PC editors. Microbiology and Biotechnology for Sustainable Development. New Delhi, India: CBS Publishers and Distributors. pp. 121-140, 2004.
9. Butler, E.J., Bisby, G.R., "The Fungi of India. Scientific Monograph", Calcutta, India: Imperial Council of Agriculture Research, pp. 237, 1931.
10. Necla, C., "Edible mushrooms: an alternative food item", Proceedings of the 7th International Conference on Mushroom Biology and Mushroom Products (I CMBMP7), 2011.
11. Stojchev, G., Asan, A., Gucin, F., "Some macrofungi species of European part of Turkey,". Turkish Journal of Botany, Vol. (22), pp. 341-346, 1998.
12. Afyon, A., Konuk, M., Yagiz, D., Helfer, S., "A study of Wood Decaying Macrofungi of the Western Black Sea region of Turkey," Mycotaxon. Vol. (93), pp. 319-322, 2005.
13. Yesil, O. M., Yildiz, A., "Contributions to the Macrofungi flora of Batsman Province. F. U. Fen ve Muhendislik Bilimleri dergisi," Vol. 16 (1), pp.11-16, 2004.
14. Dhancholia, Thakur V.S., "Preliminary studies on mushroom collection and cultivation in dry temperate zone (cold desert) -Lahaul Valley of Himachal Pradesh", Internaternational Journal of Agriculture Science, Vol. (4), pp. 377-380, 2008.
15. Christensen, M., Larsen, H.O., "How can collection of wild edible fungi contribute to livelihoods in rural areas of Nepal", Journal of Forest and Livelihood, Vol. 4(2), pp. 50-55, 2005.
16. Sagar, A., Chauhan, A., Sehgal, A. K., "Ethnobotanical study of some wild edible mushrooms of tribal district Kinnaur of Himachal Pradesh", Indian Journal Mushroom, pp. 23: 1-8, 2005.
17. Sohi, H.S., Kumar, S., Seth, P. K., "Some interesting fleshy fungi from Himachal Pradesh," Indian Phytopathology, Vol. (17), 317-322, 1964.
18. Hawksworth, D.L. Mushrooms: the extent of the unexplored potential. International Journal Medicinal Mushroom. 2001; 3: 333-7.
19. Purkayastha, R. P., Chandra, A., "Manual of Indian Edible Mushrooms," New Delhi, India: Today and Tomorrow's Printers and Publishers, 1985.