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Mushrooms of Kashmir VI

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Abstract: Five species of mushrooms of family Tricholomataceae, Russulaceae, Cortinariaceae and Agaricaceae were described for the first time from Azad Jammu and Kashmir. These were *Pleurotus porrigens*, *Hypsizygus tessulatus*, *Lactarius acris*, *Pholiota caperata* and *Agaricus subrufescens*. Two species of mushroom *Pleurotus ostreatus* and *Agaricus silvicola* were redescribed from Kashmir. Different macro- and microcharacters are taken into consideration for their proper identification and biochemical analysis of few species was also performed.

Key words: Tricholomataceae, russulaceae, species, mushrooms, Kashmir

Introduction

Azad Jammu and Kashmir is in the form of a long, narrow, strip, which lies on the north-east side of Pakistan. It lies between 730-750 longitude and 330-360 latitude with an area of 13, 297 square Kilometers (Anonymous, 1994). Its topography is mainly hilly and mountainous with valleys and stretches of plains. The area is full of natural beauty with thick forests, fast flowing rivers and winding streams. The main rivers are Jhelum, Neelum and Poonch. Its climate is of sub-tropical highland type with an average annual rainfall of 150 cm. The elevation ranges from 360 meters in the south to 6325 meters in the north. The snow line in winter is around 1200 meters above sea level, while in summer it rises to 3300 meters (Anonymous, 1994). The soil is clayey (pH: 6.5-7.5. Gardezi, 1993).

Ahmad (1980) contributed to the study of mushroom flora of Pakistan. He described 183 species belonging to 60 genera and 13 families for the order Agaricales (Khan *et al.*, 1980) reported four edible fungi from Baluchistan, these were: *Agaricus rodmani*, *Coprinus atramentarius*, *Phellorina inquinans* and *Podaxis pistillaris*. Gardezi (1993) reported six species of the genus *Agaricus* from Rawalakot Azad Kashmir. Gardezi and Ayub (1996) reported three edible species of mushrooms for the first time from Azad Jammu and Kashmir. Gardezi and Khan (1999) collected and described five edible mushrooms from Azad Jammu and Kashmir. These are *Armillaria mellea*, *Cantharellus cibarius*, *Craterellus cornucopioides*, *Flammulina velutipes* and *Macrolepiota procera*. Siddique and Gardezi (1999) described two edible species from Azad Jammu and Kashmir. These are *Pleurotus dryinus* and *P. pulmonarius* reported for the first time from Azad Jammu and Kashmir. Gardezi (2002a, b, c) reported following mushrooms from Kashmir (a) *Amanita elliptica* sp. nov. (b) *Amanita muscaria* var.

Alba, *Ramaria aurea*, *R. botrytis*, *Phallus impudicus*, *Morechella elata* and *M. semilibra*. (c) *Amanita ceciliae*, *A. Subglobovia* sp. nov., *A. pantherina*, *A. virsoa*, *Volvariella bombycina* and *V. speciosa*. The taxonomy of mushrooms from various regions of the world has been described by several authors. The present investigation includes the general survey and description of various species of mushrooms from Azad Jammu and Kashmir. The area is famous for mushrooms abundance and diversity. The investigation is first of its kind in the area. Therefore, most of the species described are either reported first or are studied in detail using available resources.

The present studies were carried out to collect and identify new mushrooms and investigate their characteristics.

Materials and Methods

Specimens were dug out of the ground with care to avoid damage to the volva and soil was removed by washing with water. Smell was noted at the time of collection and again in the laboratory. Field notes on the macrocharacters and habit were completed and the collection were individually wrapped, brought in the laboratory and dried in the oven at temperature of 45°C. All measurements were taken and illustrations of microcharacters were made with the aid of camera lucida. Spore size range was obtained by measuring twenty mature spores. Reagents used during studies were 3% KOH and Melzer's reagent as described by Ainsworth and Bisby (1971). Cultures were routinely attempted. Mushrooms were collected from Muzaffarabad, Mirpur, Poonch, Kotli and Bagh from the years 1994-97. Colour standard and nomenclature were used that Ridgway (1912). Previously described keys were used and local name are given in parentheses. The bio-chemicals

contents were calculated on dry matter basis at National Agricultural Research Centre (NARC) Islamabad. The specimens were collected and identified by following Anonymous (1970), Neuner (1978), Arora (1986) and deposited in the collections of Herbarium of Department of Plant Pathology, University College of Agriculture, Rawalakot, Azad Jammu and Kashmir.

Results and Discussion

Family Tricholomataceae Roze: Bull. Soc. Bot. Fr. 23:51 (1876) (ut. Tricholomees).

***Pleurotus* (Fr.) quel.:** Champ. Jura Vosg., pp: 62. 1872-1873, em., nom. conserv.

Type species: *P. ostreatus* (Jacq. et Fr.) Kummer.

Key to the Kashmiri species of the genus *Pleurotus*: 1. Basidiocarp imbricate. Pileus 6-9 cm diameter, at first spathulate then reniform, sessile or with a short stipe, cadmium yellow to strontium yellow, basidiospores. 6-8 X 2.5-3.8 µm, broadly ellipsoidal ----- *P. ostreatus*

1. Basidiocarp caespitose. Pileus 2-18 cm diameter, centrally at first stipitate to laterally stipitate, stipe lacking, white to cream or pale ochraceous, basidiospores 7-11 X 3-4 µm, oval-----*P. porrigens*

***Pleurotus ostreatus* (Jacq. ex Fr.) Kummer, Fuhr Pilzk., 55 (1871)**

(Sirry)

Basidiocarp imbricate, occurring in large numbers. Pileus 6-9 cm, at first spathulate then reniform, conchiform to dimidate, sessile with narrow basal attachment or with a short stipe, smooth, surface brightly colored, cadmium yellow to strontium yellow, paling to pale buff at the base and from the margin inward on drying, smooth, glabrous, dry with fine radial striae, margin thin, enrolled, entire or lobed. Lamellae adnato-decurrent, moderately crowded with lamellulae of four length, thin 2-5 mm wide, white drying pink, edge concolorous, entire. Stipe absent or short lateral, 2-9 X 1-2 mm, cylindrical, solid, white tomentose, Context thin over the lamellae but up to 5 mm thick at the base, white becoming yellowish towards the pileal surface, fleshy, homogenous with a monomitic hyphal system of hyaline uninflated generative hyphae 3-9 µm diam., thin-walled or with a slightly thickened wall, septate with clamp connections. Odour and taste pleasant. Spore print cream colour to ivory yellow. Basidiospores 6-8 X 2.5-3.8 µm, broadly ellipsoidal, hyaline, thin-walled, with a few granular contents. Basidia 25-27 X 4-6 µm, clavate, cylindrical, bearing four short

sterigmata. Cheilocystidia abundant, forming a sterile lamellae edge, 20-24.8 X 2-6.5 µm, irregularly fusoid, at time nodulose, hyaline, thin-walled with few contents. Pleurocystidia numerous to occasional 24- 40 X 4.5-7.5 µm, extending up to 16 µm beyond the basidial layer, cylindrical to subfusoid with a rounded apex, thin-walled, with hyaline or yellowish brown vacuolar contents, originating in the trama. Hymenophoral trama regular to irregular, not at all bilateral, hyaline, with thin-walled hyphae 2-9 µm diam. Subhymenial layer will developed 9-12 µm diam., broad, pseudoparenchymatous. Pileal surface an undifferentiated epicutis of more or less radially arranged, parallel haphae 2-45 µm diam., with a fine encrusting pigment. (Fig 1).

Edibility: Edible. Taste mild.

Chemical composition (%): Protein 18.17, fiber 14.34, moisture 12.11, ash 4.78, fat 2.35.

Habitat and distribution: Found single or in dense overlapping clumps on walnut, poplar tree etc. Dhirkot Aug. 5, 1995, alt. 1676 m.

Lectotype: Gardezi 747. Rawalakot Aug. 10, 1996, alt. 1615 m, Gardezi 748. Nar Sher Ali Khan Aug., 8, 1996, alt. 1770 m, Gardezi 749.

Pure, pale and graceful, the oyster mushroom is easily distinguished by its white gills, tender flesh, smooth pileus and shelf like growth habit on wood. The pileus colour and position of the stem depend to some extent on the location of fruiting body. This species closely resembles with *P. columbinus* is a rare species with a bluish or greenish tinted pileus but is otherwise very similar described by Arora (1986). Gardezi (1986) reported this species from Kashmir.

New record: All the above localities. New from the localities where collection was made.



Fig. 1: *Pleurotus ostreatus*

Type: *Pleurotus ostreatus* (Jacq. ex.Fr.) Kummer

Pleurotus porrigens (Pers. Ex. Fr.) Kuhn & Romazn.

(Sirry)

Pleurotellus porrigens Pers. ex. Fr.

Pleurocybella porrigens (Pers. ex. Fr.) Sing

Basidiocarp caespitose. Pileus 2-18 cm diam., ranging from centrally stipitate to laterally stipitate and spathulate, at first covered by a white, floccose-tomentose which may persist towards the umbilicus but otherwise datersible to reveal a smooth, white to cream or pale ochraceous, dry surface with fine, radial grayish-brown striations, margin very thin, membranous, frequently lobed or incised, incurved only in very young specimens. Lamellae deep decurrent, narrow, very crowded with lamellulae of up to 7 mm length, sometimes intervened toward the base, very narrow (1-2 mm wide), thin, white, then cream buff, edge entire, frequently retaining persistent velar remnant. Stipe lacking. Context thin up to 4 mm at the base, white, fleshy coriaceous, a monomitic hyphal system of hyaline generative hyphae 4-12 μm diam., highly branched, with a thin to slightly thickened wall (1 to 2 μm), septate with clamp connections. Odour and taste not distinctive. Spore print white. Basidiospores 7-11 X 3-4 μm , oval, hyaline, thin-walled, smooth, with few contents. Basidia 20-23 X 3.5-4.5 μm , narrowly clavate, bearing four short sterigmata. Cheilocystidia crowded to form a sterile lamella edge but soon collapsing. 18-33 X 5-10 μm , clavate to cylindrical, sometimes constricted, with a broad obtuse apex but at times attenuated into an elongate, mucronate out growth up to 1.5-2 μm . Pleurocystidia absent. Hymenophoral trama subregular to irregular, hyaline, similar to the context. Subhymenial layer well developed, up to 15 μm wide, pseudoparanchymatous. Pileal surface an undifferentiated cutis of repent, parallel hyphae, similar to underlying context.

Chemical composition (%): Protein 29.92, fiber 14.63, moisture 12.04, ash 11.74, fat 0.23.

Edibility: Edible.

Habitat and distribution: Found in shelving clumps on conifers and hardwoods, Kahuta June 7, 1995, alt. 1820 m,

Lectotype: Gardezi 750. Hajipir Aug. 2, 1996, alt. 1950 m, Gardezi 751. Raikot Aug. 10, 1996, alt. 1950 m, Gardezi 752. *Pleurotus porrigens* is a common sub-tropical continental highland species. It is often confused with *Pleurotus ostreatus*. Arora (1986) reported that this species can be distinguished from other types of *Pleurotus* by thin, pliant, white fruiting body and narrow crowded lamellae.

Other species *P. lignatilis* is similar (whitish with narrow, crowded lamellae and a more prominent stipe).

New record: This species has been record for the first time from Azad Jammu and Kashmir.

Type: *Pleurotellus porrigens* Pers. ex. Fr.

Hypsizygus Sing.

Mycologia 39: 77. 1947.

Type species: *H. tessulatus* (Bull. ex Fr.) Sing

Hypsizygus tessulatus (Bull. Ex. Fr.)

(Bora sirry)

Pleurotus tessulatus (Fr.) Gill

Pleurotus ulmarius (Fr.) Kummer

Basidiocarps imbricate. Pileus 4-10 cm diam., subglobose to flabelliform or spathulate, surface whitish, yellowish with age but paler at margin, glabrous, smooth, finally radially striate, margin becoming lobed or splitting. Lamellae decurrent, whitish to cream, crowded, with lamellulae of five lengths. Stipe lateral, usually very short 1-3 cm X 4-8 mm, cylindrical, solid, surface white, inamyloid, homogeneous with a monomitic hyphal system of hyaline, thin to slightly thick-walled, generative hyphae 3-11 μm diam., with prominent clamp connections. Odour faintly farinose. Basidiospores 7.5-11.5 X 3.5-8 μm , clavate, cylindrical, hyaline, thin-walled, with refractive guttulate contents. Basidia 21-24 X 6-7.5 μm , clavate, bearing four sterigmata. Lamella edge sterile, with crowded cheilocystidia. Cheilocystidia 13-17 X 6-8 μm , many lecythiform, bearing a small capitellium, others ovoid or mucronate, hyaline, thin-walled, with few contents. Pleurocystidia absent. Hymenophoral trama compactly irregular, with hyphae similar to those of the context. Subhymenial layer will developed, pseudoparanchymatous 6-12 μm , wide. Pileal surface a thin repent epicutis, up to 12 μm thick, thin-walled, parallel, hyaline hyphae 3-6 μm diam. Unedible, therefore, bio-chemical analysis was not carried out.

Edibility: Unedible.

Habitat and distribution : Usually solitary, but sometimes 2 to 3 specimens appear in a clump, usually from old branch stubs of decaying hardwood trees often it is common on street trees in towns. Rawalakot Aug. 5, 1995, alt. 1615 m.

Lectotype: Gardezi 753. Raikot Aug. 10, 1995, alt. 1950 m. Gardezi 754. Ali Sojal Aug. 12, 1996, alt. 1901 m, Gardezi. 755.

Hypsizygus tessulatus differs from *P. ostreatus* in clavate oblong, cylindric, hyaline, thin-walled spores with refractive guttulate contents. Int resembles with the descriptions of Arora (1986). *Pleurotus ulmarius* is similar to *H. tessulatus*.

New record: This species has been recorded for the first time from Azad Jammu and Kashmir.

Type: *Pleurotus tessulatus* (Fr.) Gill.

Family Russulaceae Pers. ex. S.F. Gray

Nat. Arrang. Brit. P1. 1: 918 (1821)

Lactarius (D.C. ex) S.F. Gray

Nat. Arr. Brit. P1. 1 : 623. 1821.

Types species: *L. torminosus* (Schaeff. ex. Fr.) S.F. Gray

Lactarius acris Fr. Epicr. Syst. Myc.: 342 (1838)

(Drag) Pileus 5-12 cm diam., infundibuliform, flabelleform, frequently splitting from the margin almost to the disc, soft and flaccid when fresh then drying hard and coriaceous, isabellin gray, pale purple of vinaceous, often slamon pink to ochraceous orange, viscid, gelatinous, appressed tomentose, cobwebby fibrillose, glabrescent, acute. Lamellae deeply decurrent, subdistant, narrow, venose to linear, up to 1 mm wide, concolorous with pileus, edge entire. Stipe 4-10 cm X 3-9 mm, cylindrical or flattened, fistulose, surface concolorous with the pileus, glabrous, arising from a white fibrous, discoid base. Context thick, pinkish to pale brown, translucent, composed of very thin-walled hyphae, 2-5 µm diam., inflating to 25 µm diam. Spore print pale cream, Basidiospores 5.5-6.5 X 3.2-6 µm, ovoid to ellipsoid within acute base, hyaline, thin-walled with pseudocystidia. Pseudocystidia numerous 45-76 X 3-8 µm, laticiferous, cylindrical to elongate fusiform, at time constricted, submucronate, with an obtuse or acute apex, hyaline thin walled, projecting up to 23 µm beyond the basidia. Hymenophoral trama irregular to subregular, hyaline, with thin-walled haphae 1.5-6 µm diam., with numerous laticiferous elements. Subhymenial layer interwoven, 9-11 µm wide. Pileal surface a disrupted trichodermial palisade, with numerous tufts of hairs, 34-14 X 3-8 µm, subhyaline to pale brown, with an obtuse apex. Unedible, therefore, bio-chemical analysis was not carried out. (Fig 2).

Edibility: Unedible.

Habitat and Distribution: Solitary, scattered or in small groups on humus under hardwoods. Hullar July 6, 1995, alt. 1333 m.



Fig. 2: *Lactarius acris*

Lectotype: Gardezi 756. Mujahid abad July 12, 1996, alt. 1840 m, Gardezi 757.

The collected specimens of the species closely resemble with *Lactarius argillaceifolius* var. *megacarpus* described by Arora (1986) but its spore size is bigger than *L. acris* i.e. 7-11 X 6-9 µm, ellipsoidal to nearly round, with amyloid warts and ridges.

New record: this species has been recorded for the first time from Azad Jammu and Kashmir.

Type: *Lactarius acris* Fr.

Family Cortinariaceae Roze

Bull. Soc. Bot. Fr. 23: 113(1876)

Phlliota caperata (Pers. ex. Fr.) Karst

(Til-chhatri)

Rozites caperatus

Pileus 5-10 cm broad, soft and fleshy, at first broadly campanulate then expanding to plano-convex, obtuse, glabrous, surface dry, non-hygrophanous, pruinosity or whitish flocci on and near the disc, yellow, flesh white, initially covered by a dark brown cuticle paling to wood brown, soon breaks up to from to vinaceous fawn, revolute squamules concentrated around unbo, entire, rest surface covered by minute, fibrillose, floccose, deciduous, vinaceous buff squamules on pale ochraceous buff background. Margin at first ascending and whitish, adnate, becoming black with age, side vertically wrinkled, edged eroded, somewhat pappery in texture and breaking

easily, ventricose up to 12 mm broad, with lamellulae of five lengths. Stipe 2-12 cm X 2-6 mm thick, separable from the pileus, straight or flexuous, expanding below into a more or less basal bulb which remain below soil level, cylindrical, soon fistulose, fibrous, surface whitish then pale grayish brown, silky and glabrous above the annulus, covered with fine whitish fibrils below the annulus. Annulus superior, attached to the upper third of the stipe but the later moveable, thick fleshy, double up to 8 mm wide, pale vinaceous buff, with a brown, fimbriate rim. Context of pileus up to 15 mm thick at the disc, floccose, pale pinkish at black with age, noamyloid, firmly interwoven, thin-walled hyphae 3-8 μm diam., inflated to 25 μm diam., constricted the septa. Context of stipe rough-fibrous, ochraceous buff in the upper half, pale vinaceous fawn below. Odour pleasant, faintly of mushroom when fresh, stronger when dry. Basidiospores 12.5-16.5 X 5.5-7 μm , brownish-ferruginous, subelliptic, rough with closely-placed, fine dull, short pointed. Lamella edge sterile, Basidia 20-28 X 6-10 μm , inflated, clavate, bearing four short sterigmata up to 4 μm long. Cheilocystidia 24-40 X 9-10 μm varying from pyriform, cylindrical to ventricose, hyaline, thin-walled, with little or no contents. Pleurocystidia absent. Hymenophoral trama narrow, almost regular becoming irregular with age, well developed, 12-18 μm wide, pseudoparenchymatous. Pileal surface an epicutis formed by a trichodermial palisade of erect, septate hyphae 4-7 μm diam., with a slightly thickened, pale brownish wall, non-agglutinated tufts. Clamp connections present in all tissues (Fig 3).



Fig. 3: *Pholiota caperata*

Edibility = Edible

Chemical composition (%): protein 28.12, fiber 14.46, moisture 11.12, ash 21.32, fat 4.08.

Habitat and distribution: Found growing in woods, mossy swamps and open places. Chakar Aug. 5, 1995, alt. 1828 m,

lectotype: Gardezi 787. Raikot Aug. 10, 1995, alt 1950 m, Gardezi 788. Anyaree Aug. 2, 1996 alt. 1640 m, Gardezi 789. The species reported exactly tallies with published descriptions of Krieger (1967) and the related species is *Rozites caperata*.

New record: This species has been recorded for the first time from Azad Jammu and Kashmir.

Type: *rozites caperatus*.

Family Agaricaceae Fr.

Cyst. Nycol. 1: 5. 1821; Karst. Didr. Finl. Folk 32 xxv, 1879.

Type species: *A. campestris* L.ex. Fr.

Key to the Kashmiri species of the genus *Agaricus*:

1. Pileus 8-20 cm diam, at first sublobose then expanding, disc sometimes truncate or slightly depressed, basidiospores 6-10 X 3.6-7 μm , broadly ellipsoid to ellipsoid----- *A. silvicola*

1. Pileus 5-12 cm diam, convex when young becoming semiplane, disc inately appressed, basidiospores 5-8 X 4-6.2 μm , oblong ellipsoid to oval

----- *A. surbrufescens*

Agaricus silvicola Vitt. Fungi Mang. (1835) Mhl (1679).

(**Tile-chhatri**)

pileus 8-20 cm diam, at first subglobose then expanding, the disc sometime truncate or slightly depressed, surface dry, variably fibrillose-squamulose, 6 mm long, 4-18 mm broad, appressed, sometimes concentrically arranged or the aquamulose obscurae and the surface essentially fibrillose, colour pale buff when young and deep brown with age, back ground white, becoming light reddish to slightly vinaceous when exposed especially above stipe and below disc, moderately firm. Odour fruity. Lamellae free, close, when young pallid pinkish, becoming deep dingy pinkish with a slightly paler margin, then bruising rose colour, later becoming drab brown. Stipe 7-13 cm long, 1-4 cm wide, clavate or essentially equal above a moderate to indistinct bulb, interior white, lustrous becoming uniformly medium red, stuffed hollow, surface glabrous with fine striations, white, becoming bright reddish orange, sometimes bright orange yellow below, when bruised. Veils moderately thin, pendant, subapical

white annulus with a thick grooved, often brownish, concolorous, margin forming a white, appressed volval boot, brown-tipped rings or only an obscure velar remnant above the base. Odour anise. Spore print purple brown. Basidiospores 6-10 x 3.6-7 μ m, dark brown, broadly ellipsoid to ellipsoid. Basidia 18-20 x 5-7 μ m, clavate, bearing four small sterigmata. Lamella edge sterile. Cheilocystidia abundant, 14-26 x 7-12 μ m, subglobose, pyriform or clavate, hyaline, thin-walled, with few contents. Pleurocystidia absent. Hymenophoral trama regular, soon subregular, hyaline, thin-walled hyphae 2.5-6 μ m diam. Subhymenial layer 6-9 μ m thick, pseudoparenchymatous. Pileal surface a disrupted pellicle formed by the unexpanded universal veil. Clamp connection not present (Fig. 4).

Edibility: Edible

Chemical composition (%): Protein 22.13, fiber 15.68, moisture 14.91, ash 15.64, fat 2.48.

Habitat and distribution: Found scattered or grouped under hardwoods. Hajipir July 5, 1995 alt. 1950 m.

Lectotype: Gardezi 790. Bonjosa July 10, 1996, alt. 1950 m, Gardezi 791, Khuiratta Aug. 10, 1996, alt. 825 m, Gardezi 792.

Arora (1986) reported that it is recognized by its white pileus, tendency to stain or age yellow, anise odour, skirt like annulus, dark brown spores and woodland milieu and closely related species is *Agaricus chionodermus*. Gardezi (1993) reported this species from Kashmir.



Fig. 4: *Agaricus silvicola*

New record: All the above localities. New from the localities where collection was made.

Type: *Agaricus silvicola* Vitt.

***Agaricus subrufescens* peck**

(Til-chhatri)

***Psalliota subrufescens*:** Pileus 5-12 cm broad, convex when young, becoming semi-plane, depressed or slightly umbonate disc, surface dry, imately appressed-fibrillose or fibrillose-squamulose, medium brown or paler, becoming darker in age, whitish background. Context white, unchanging when young become orange when exposed. Lamellae free, close, 6-12 mm broad, initially pallid, then gryish- drab, faintly marginate or not, colour unchanging when bruised. Odour pleasant. Stipe 7- 15 X 1-2 cm broad, bulbous to abruptly bulbous, interior white, unchanging when young, becoming orange with age, lustrous, fibrous, stuffed hollow, striate, Veil thin, pendant to pendant-recurved, sub-apical white annulus, margin slightly thicker, somewhat eroded, orange buff. Spore print cylindrical, hyaline. Basidia 18.6-30.5 X 9-12 μ m, dark brown, oblong ellipsoid to cylindrical, hyaline. Basidia 18.6 -30.5 X 9-12 μ m, clavate to oval, four sterigmata. Pleurocystidia absent. Hymenophoral trama regular, pale yellowish brown with thin hyphae 2.8-8 μ m diam. Subhymenial layer indistinct 3-4 μ m wide. All hyphae lacking clamp connections.(Fig 5).

Edibility: Edible

Chemical compositions(%): Protein 18.07, Fiber 8.28, Moisture 13.53, Ash 13.93, Fat 0.74.



Fig. 5: *A. Subrufescens*

Habitat and distribution: Found scattered or grouped under that strong hardwoods. Hajipur July 5, 1995, alt. 1950 m,

Lectotype: Gardezi 793.

Arora (1986) reported that strong almond odour and taste, the robust stature, presence of annulus, darkbrown spores and light brownish pileus make this a fairly easy mushroom to recognize and colour of the pileus is quite similar to *A. hondensis* but the odour and habitat are different.

New record: This species has been recorded for the first time from Azad Jammu and Kashmir.

Type: *Psalliota subrufescens*.

Pleurotus ostreatus causes destructive rot of wood in the trees where it grows (Brightman and Nicholson, 1947). *P. pulmonarius* grown in low temperature and high illumination (Eagar *et al.*, 1976). In *Hypsizygus tessulatus* pileus white to tan, or pinkish tinged, often breaking up to into scales with age, stipe present, found on living hardwoods, often high up in the tree (Arora, 1986). *Pleurotus porrigens* also known as *Pleurocyella porrigens*, can be distinguished from other type of *Pleurotus* by its thin-plaint, white fruiting body and narrow, crowded gills (Arora, 1986). Fruiting bodies of locally collected *Psalliota caperata*, having the Pileus 5-10 cm broad, that is equivalent to the same species reported from USA, soft and fleshy, campanulate then expanding to plano-convex. The lamellae close and adnate. Stipe 2-12 cm, stipe is also similar in size, thick, cylindric, soon fistulose, fibrous. The pileus studied by Krieger (1967) showed 5-10 cm broad, fleshy, firm ovate, campanulate or convex. Lamellae close, adnate, edges eroded, Stipe 5-12 cm long, thick, cylindric, equal. Courtenay and Burdsall (1982) reported *Agaricus silvicola* with Pileus 9-15 cm, silky white or cream, smooth. Lamellae crowded. Stipe 10-19 cm, cream bruising yellow, base sometimes bulbous. Whereas present studies resulted Pileus 8-20 cm approximately equivalent to the one reported by Courtenay and Burdsall (1982) broad, subalobose then convex and expanding. The lamellae free, close. Stipe 7-13 cm, clavate, equal. Gardezi (2002a, b, c) reported mushrooms from Kashmir are *Amanita eliptica*, *Amanita muscaria* var. *Alba*, *Ramaria aurea*, *R. botrytis*, *Phallus impudicus*, *Morchella elata* and *M. semilibra*, *Amanita ceciliae*, *A. subglobosia*, *A. pantherina*, *A. virosa*, *Volvariella bombycina* and *V. speciosa*. Thirteen species of mushroom have been reported, two of them are new to science, nine are new for Kashmir and two are redescribed.

Conclusions of research: Seven species of mushroom

have been reported from Azad Jammu and Kashmir. Five of them are new to the area and two are redescribed. All their macro- and microcharacters were studied for their proper identification.

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