

NEW RECORDS OF AGARICACEAE FROM PAKISTAN

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Abstract

Four species of mushrooms belonging to family Agaricaceae viz., *Agaricus silvicola*, *Chlorophyllum molybdites*, *Lepiota sistrata* and *Macrolepiota rachodes* have been recorded from Gilgit-Baltistan that appears to be new records from Pakistan. The cap of *Agaricus silvicola* is convex to flat, expanded with white fibrous scales; Stipe grayish, cylindrical, bulbous at the base and rings are attached with stipe. Gills gray-brown to chocolate brown, producing ellipsoid, smooth and brown spores. *Chlorophyllum molybdites* has broadly conical cap, which becomes umbonate with concentric rings of dark brown scales. Stem cylindrical and equal, ring present; gills free and crowded, producing ellipsoid and smooth spores. *Lepiota sistrata* is known by its mealy cap that is initially markedly umbonate, and scaly but soon reveals smooth. Stem slender, equal, slightly pink-violet, ring mealy or absent. Gills are white and free producing ellipsoid and smooth spores. The cap of *Macrolepiota rachodes* is at first closed, then conically bell-shaped, and finally becoming flat, covered with overlapping scales. Gills are at first white, bruising reddish, crowded and free. Stem is fairly stout, bulbous at base with large, double and movable ring. Spores are broadly ellipsoid, smooth and colourless.

Introduction

Fungi constitute a very large group of organisms found in virtually every ecological niche. Hawksworth (1991) estimated that on a worldwide basis there are about 1.5 million species of fungi. However, other estimates ranged from 0.5–9.9 million species. Hawksworth (2001) calculated that there must be a minimum of 0.6 million species, using criteria that most mycologists would regard as excessively conservative to establish a lower boundary figure. The researches have shown that fungal species richness was much higher than that of the plants demonstrating that tree species diversity was a good predictor of macro fungal diversity which supported the use of ratio estimates to measure fungal species richness which were consistent with the high estimates of species numbers made by Hawksworth (1991). Accepting the 1.5 million estimated and 100,000 described species implies that only 7% of the world's fungi have so far been described which is a small increase on the 5% hypothesized by Hawksworth (1991). The tremendous discrepancy between the numbers of known versus estimated species appeared to be related to the fact that there has been woefully inadequate sampling of fungi in many parts of the world most notably from tropical and subtropical regions. In the case of tropical and subtropical regions, it would indeed be a tragedy to lose species to extinction before we even have determined that they exist. Phylum Basidiomycota is a common group of fungi found all over the world that includes at least 22,244 species (Hawksworth *et al.*, 1995). The group is large and divers, comprising of forms commonly known as mushrooms, boletus, puffballs, earthstars, stinkhorns, birds nest fungi, jelly fungi, bracket or shelf fungi, rust and smut fungi (Alexopoulos *et al.*, 1996). Basidiomycetes are characterized primarily by the sexual spores (basidiospores) being produced on a cell called a basidium, usually in four. Many but not all have septal structures called a clamp connection during most of the life cycle. No other group of fungi has these. Basidiomycetes are well known for their ability to cause disease, their food value and production of a wide variety of interesting secondary products noted for

their scents, tastes, colours, and toxic properties (Gallois *et al.*, 1990). Rust and smut fungi cause plant diseases that destroy many millions of dollars worth of crops annually. Many others attack a large variety of food and ornamental plants. Several Basidiomycetes are significant in causing disease of forest and shade trees. Many other Basidiomycetes are directly responsible for the destruction of a wide variety of wood products. Basidiomycetes that attack dead woody plants are the principal agents that decay cellulose and lignin and are essential components of forest ecosystems. Some species of Basidiomycetes are human pathogens, particularly in aids patient, like *Filobasidiella neoformans* (Alexopoulos *et al.*, 1996). Several Basidiomycetes are sought eagerly by mushrooms lovers the world over. The cultivation of mushrooms for food has developed into an industry of considerable proportions in the United State, Europe and Asia growing continuously. Besides the edible members, several mushrooms are toxic or hallucinogenic. A review of literature regarding the diversity of fungi in Pakistan shows that there is need to explore the Basidiomycetes in Pakistan since out of more than 22,244 species, only about 630 species have been reported from various parts of Pakistan (Ahmad *et al.*, 1997). Gilgit-Baltistan area appears to be ignored by pervious workers since reports on fungi from Gilgit are rather scanty. The present report describes some members of Agaricaceae from Gilgit-Baltistan area that appears to be new records from Pakistan not hitherto reported.

Materials and Methods

Samples of Basidiomycetous fungi were collected from different areas of Gilgit-Baltistan. These fungi were photographed in their natural habitat and macroscopic details along with altitude and latitude (using a GP model Lowrance ifinder) were recorded. The samples were brought to Department of Biological Sciences, Karakoram International University and identified up to species level after reference to Ahmad *et al.*, (1997), Demoulin & Mirriott (1981), Surcek (1988), Buczacki (1989),

Leelavathy & Ganesh (2000), Swann & Taylor (1993), Shibata (1992) and Sultana *et al.*, (2011). The specimens were dried at room temperature to make a herbarium for future reference.

Microscopy: An Olympus Bx51 microscope equipped with bright field and camera Olympus DP 12 was used to examine and photograph the fungi.

Results

During the present studies, four species *viz.*, *Agaricus silvicola*, *Chlorophyllum molybdites*, *Lepiota sistrata* and *Macrolepiota rachodes* were recorded for the first time from Pakistan.

Agaricus silvicola Fr. *Hym. Eur.* P. 280, Saccardo, *Syl. Fung.*, Vol. 5. 1887. p. 998.

Distinguishing characters: Cap creamy white, 6-8cm wide, first convex then flat expanded with white fibrous scales. Gills grayish pink when young, becoming gray-brown then chocolate brown. Stipe 8-10cm long, 1-2cm thick, cylindrical, bulbous at the base and rings are attached with stipe. Taste pleasant with eminiscent smell. Flesh yellowish. Spores 6-8x4-5mm, ellipsoid, smooth, brown (Fig. 1A-C).

Season: July-August

Occurrence: Specimens were collected from village Dashkin, District Astore, Gilgit, alt 2578m, N=35 °40, E=74 °50.

Ethnic uses/Importance: Edible with pleasant taste.

Habit/Habitat: This species grows almost exclusively in the fallen leaves of plants.

Chlorophyllum molybdites (G. Mey.) Masee, *Bull. Misc. Inf.*, Kew: 136 (1898)

Synonym: *Agaricus molybdites* G. Mey., *Prim. fl. esseq.*: 300 (1818)

Lepiota molybdites (G. Mey.) Sacc., *Syll. fung.* (Abellini) 5: 30 (1887)

Mastocephalus molybdites (G. Mey.) Kuntze, *Revis. gen. pl.* (Leipzig) 2: 860 (1891)

Leucocoprinus molybdites (G. Mey.) Pat., *Bull. Soc. mycol. Fr.* 29: 215 (1899)

Macrolepiota molybdites (G. Mey.) G. Moreno, Bañares & Heykoop, *Mycotaxon* 55: 467 (1995)

Distinguishing characters: It is distinguished by greenish olive spores. It has a broadly conical cap, which becomes umbonate; the colour is white to cream and there are concentric rings of dark brown scales. Stem 8-10cm long and 2-3cm thick, cylindrical, equal, and has prominent movable brownish ring. Flesh white. Gills free, first white then cream, crowded. Spores ellipsoid, smooth, olive green, 8-10x4-6µm in size (Fig. 1 D-E).

Season: July- August.

Occurrence: It was collected from Gilgit airport, alt 2044m, N=36°70, E=74°40.

Ethnic uses/Importance: Inedible. Pegler (1983) noted that in some countries the fungus was regarded as edible. In Gilgit valley it is considered as poisonous.

Habit/Habitat: It grows on lawns and pastures, usually in groups.

Lepiota sistrata Fr. *Syst. Myc. I*, p. 24, Saccardo, *Syl. Fung.*, V.5. 1887. p. 50

Distinguishing characters: Cap 2-5cm, mealy, markedly umbonate, and scaly but soon reveal smooth. Stem 2-5cm long and 1cm thick, slender, equal, slightly pink-violet, ring mealy, rapidly vanishing and often absent. Gills white and free. Smell indefinite. Flesh white, pinkish in stem. Spores ellipsoid, smooth, 3-5x2-3µm in size (Fig. 1F-G).

Season: July- August.

Occurrence: This species was collected from Nultar, District Gilgit, alt 2422m, N= 35°26, E=74 °44.

Ethnic uses/Importance: Inedible.

Habit/Habitat: Usually in small groups on soil among the grasses.

Macrolepiota rachodes (Vitt.) Singer in *Lilloa* 22: 417 (1951) [1949]

Synonym: *Lepiota rachodes* (Vitt.) Quél., *Mém. Soc. Émul. Montbéliard*, Sér. 2 5: 70 (1872)

Agaricus rachodes Vittad., *Descr. fung. mang. Italia*: 158 (1835)

Distinguishing characters: Cap at first globularly closed, then conically bell-shaped, and finally flat, 5-11cm wide, covered with overlapping scales, pale brown at first then dark brown. Gills at first white, becoming reddish, crowded, and free. Stem 8-12cm long, fairly stout, tapering slightly upwards from slightly eccentric bulbous base with large double movable superior ring. Smell pleasant. Flesh soft, reddish-white when cut. Spores 9-12x6-7µm in size, broadly ellipsoid, smooth and colorless (Fig. 1H-I).

Season: July-August.

Occurrence: It was collected from Dichal nala, District Astore, alt 3384m, N= 35°47, E= 74°52 and also from Nultar, District Gilgit, alt 3072m, N= 35°78, E= 74°45.

Ethnic uses/Importance: Edible.

Habit/Habitat: Usually in small trooping groups on soil among grass.

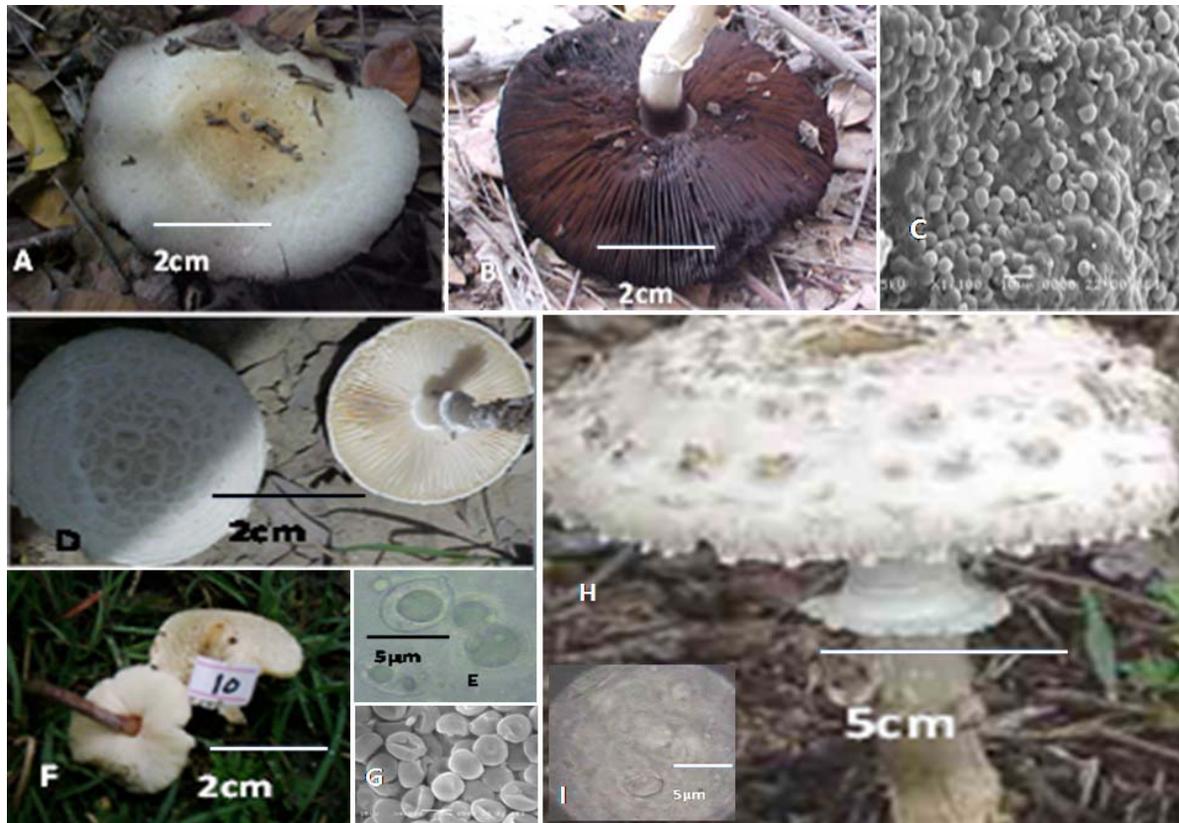


Fig. 1. *Agaricus silvicola* (A-C), *Chlorophyllum molybdites* (D-E), *Lepiota sistrata* (F-G), *Macrolepiota rachodes* (H-I).

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