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A Contribution to the Previous Study for Genus Agaricus in and around Ayubia National Park, Pakistan

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Abstract
Agaricus is among the most valuable and familiar genera belonging to Basidiomycota. These are known to have a partial veil on their stipe, which helps to protect the gills when they are immature. Escalating human activity and distribution pattern of the species has introduced some new one in the territory while pushing the previously reported one to extinction. Ayubia Nationa Park always remains a suitable place for mushroom hunters and number of species of plants and fungi has already been reported. The present survey was aimed at improving the previous collection and also to check the certain characters of the genus *Agaricus.*
Keywords: Genus *Agaricus,* Ayubia National Park

Introduction

Ayubia National Park is situated in the gullies forest division of Abottabad between 34-1 to 34-3.8 N latitude and 73-22.8 to 73-27.1 E longitude over an area of 1684 hectares. The park headquarter is at Dunga gali. The study area Ayubia National Park is the only moist temperate forest in Pakistan with a high diversity of vulnerable plant and animal species have been recorded in park (Farooque, 2002).

The park is surrounded by seven major villages and three small towns including Nathia gali, Ayubia and Khanspur. Geographically Khanspur is the part of Ayubia National Park and a reserve forest. Terraced agricultural fields are located mostly on valley bottoms. Most, if not all, of the vegetation in and around the Ayubia National Park and reserve forest is heavily influenced by the human activities.

Due to overexploitation, overgrazing and recreation at the expense of environment the natural habitat of certain macromycetes has been transformed unfavorable for them. It is contended that highly unique and endemic macrofungal biodiversity is being pushed towards local extinction and many new species are establishing to the detriment of the native ones (Nasim, 2006; Nasim, 2008).

Most species of the genus *Agaricus* are edible and are being cultivated all over the world according to the trade interest and growing conditions (Groves *et al*., 1979). These can be observed and picked easily due to their eye catching and colorful basidiocarp. Number of species were recorded form the park as well as from the surroundings of Khanspur, they are easy to identify because the brown colored and crowded gills and sometimes may be confused with *Leucoagaricus sp.*

Number of species fit in the genus *Agaricus* had reported but the present survey focus on the revision of the previous study and addition of some new species from Ayubia National Park.

Materials and Methods

The park was visited twice a year and fungi collected were identified following the authentic literature available (Ahmed Iet al., 1997; Peterson & Olexia, 1967; Peterson, 1969,1972,1974,1975). A synoptic key was developed to facilitate the process of identification and characterization in the field.

Results and Discussions

The description of seven species of *Agaricus* previously reported from Pakistan is described below. These species are now rarely being observed in this area. Instead, three previously undocumented species have been discovered and are reported here as new record from the area.

Previously reported species of *Agaricus*

1. *Agaricus alphitochrous*

Pileus surface breaking into dark vinaceous brown scales on pale vinaceous pink background; epicutis of short, infaltted, interwoven hyaline elements which produce an epithelium of one layered structure. Context white, changes into blood red on bruising. Cheilocystidia subglobose, pyriform to clavate, hyaline, thin walled. Spores are ovoid to ellipsoid. (Ahmed, 1980).

2. *Agaricus bitorquis*

Pileus white, convex to expanded. Lamellae grayish when young, become dark brown are blackish at maturity. Cheilocystidia clavate. Context not changes color when bruised, stipe comparatively short, bulbous at bas, sometime rooting below annulus basal. Appearing like a volva, with a free margin. Upper part of the stipe covered with incomplete bands rarely with distinct ring in the upper part of the stipe. (Ahmed, 1980).

3. *Agaricus endoxanthus*
Pileus expanded, with a low obtuse umbo, cuticle breaking up into blackish scales, marging appendiculate. Lamellae free, annulus attached close to the stipe apex. Context white, cheilocystidia fusiform. Spores are ovoid to ellipsoid. (Ahmed, 1980).

4. *Agaricus hemilassius*
Pileus surface breaking into dark brown scales. Epicutis thick of radially arranged, parallel hyphae. Context thick, composed of interwoven inflated hyphae, constricted at septa. Lamellae free, cheilocyctidia produced as chain of globose to pyriform elements which easily become detached. (Ahmed, 1980).

5. *Agaricus semotus*
Pileus white, smooth and glabrous. Cheilocystidia obovate. (Ahmed, 1980).

6. *Agaricus woodrowii*
Pileus expanded, slightly depressed in the center, dark brown. Stipe white, with a ring near the top. (Ahmed, 1980).

7. *Agaricus trisulphuratus*
Pileus convex then expanded off, white to brown flesh, fading to pale cappucine orange on drying and even paler in the herbarium. Surface covered with loose fibrillose scales or meal which is caduceus. Stipe conclorous, covered with similar mealy or frufuraceous scales. Lamellae free, fuscous. Cheilocystidia clavate. Spores phaseoliform, with a thick endosporium. (Ahmed, 1980).

Newly reported species

1. *Agaricus augustus*
Pileus with orange brown scales which are present in the form of rings, pileus margins with the remains of veil, center of the pileus is of darker color. Pendant annulkus present on the ring, fleshy stem is pink towards base. Stem ring has scales on underside. Gills are free, cream to brown colored with white edges and very crowded. (Cappelli, 1984).

2. *Agaricus sylvaticus*
Pileus is 40-80 cm broad, convex to umbonate with radiating scales on surface, centrally dark brown in color. Stipe is 100-160 x 10-15 cm having fibrous scales on the surface with wide base. There is a pendant ring on the brown stipe. Gills are free and crowded with chocolate brown color at maturity while pale grey at young stages. (Breitenbach, 1995).

Key to newly reported *Agaricus* species

- ❖Phenol turns the pileus blood colored…….*Agaricus alphitochrous*
- ❖Pileus does not show any chemical reaction
  - ❖Fleshy stem is pink towards base…….*A. augustus*
  - ❖Stem is not characterized as above
    - ❖Faint carrot red stain on stem when bruised……*A. biporus*
    - ❖Stem does not stain on bruising
      - ❖Elarged skirt like veil around the stipe…….*A. silvatycus*
      - ❖Stem ring is of normal size
        - ❖Lamellae not free……*A. woodrowii*
        - ❖Lamellae free
          - ❖Stipe comparatively short…….. *A. bitorquis*
          - ❖Stipe is not as above mentioned
            - ❖Spores phaseolifrom with endosporium……..*A. trisulphuratus*
            - ❖ Spores are not as above mentioned
              - ❖Stipe turns yellow when bruised……..*A.endoxanthus*
              - ❖Stipe is not as above mentioned
                - ❖ Cheilocystidia globose to fusiform…….*A. hemilasius*
                - ❖ Cheilocystidia obvate……*A. semotus*

Species of *Agaricus:* A & A1: *Agaricus augustus;* **B**: *Agraricus sylvaticus* (Bar= 2.5cm)

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