Research Article

Morphological study of edible and non-edible mushrooms, district Swabi, Khyber Pakhtunkhwa, Pakistan

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Abstract

District Swabi is located in the province Khyber Pukhtoonkhawa, Pakistan coordinates with Sawabi is lies at '34°7'0N 72°28'0E' with diversified ecosystem. The mushroom identification of Swabi has not been consider important in the past in this matter. Thus survey was conducted during 2014-15 in different areas of the District Swabi. Twenty two mushroom species belonging to 13 families and 18 genera were collected and investigated from the area. Among the collected mushroom species *Polyporaceae* was found as most predominant genus (25%) followed by *Agaricaceae* (20%). There is a great variation in all species because of habitats, seasons and location.

Keywords: Swabi; Mushroom; *Agaricaceae*; *Agaricaceae*; Habitats

Introduction

Sawabi is a District of Khyber Pakhtunkhwa province of Pakistan. It lies at "34°7'0N 72°28'0E". Total area of District Swabi is 1,543 Km² (595.8 Sq. mi) and in 2005 survey total populations is 1, 826,804. Cash crop of Swabi is tobacco, along with others vegetables and cereals. It's suited for citrus specially, but some other fruits are also grown [1]. Mushrooms are eukaryotic classified in the kingdom Fungi. Recent estimates suggest that there are 5.1 million fungi species worldwide [2]. Mushrooms are macro fungi belong to basidiomycota or ascomycota which may be hypogeous or epigeous, in the form of and above ground

and underground seen with the naked eye and picked up by hand [3]. The fruiting bodies are the morphological indices which having spores and said to be mushrooms. Mushrooms are diverse group of fungi. mushroom can be edible or inedible regardless of its form and type. According to the mode of life mushrooms are recognized as saprotrophs, parasites, and mutualists ectomycorrhizal symbionts [4]. "Among the unexplored and unexamined mushrooms, if the proportion of useful mushroom is 5%, it suggests that 7000 undiscovered species would possibly provide benefit to mankind" [5]. Edible mushrooms have been traditionally

appreciated due to their best characters, like their unique fragrance and flavor [6]. Cultivated and wild edible mushrooms have been showing health enhancement benefits [7]. The most dominant and cultivable mushroom is *Agaricus bisporus*, followed by *Lentinus edodes*, *Pleurotus spp*, and *Flammulina velutipes* [8-10].

Materials and methods

Collection site

Samples of mushrooms were collected from different areas of District Swabi of province Khyber Pakhtunkhwa, Pakistan. It lies at 34°7'0 North 72°28'0 East and total area of district swabi is 1,543 Km². Relatively average annual rainfall is 639 mm. The annual average temperature of Swabi district is 28.6°C and minimum is 10.2°C and maximum is 32.9°C (Climate. Data.Org).

Collection of mushrooms

Various species adopted various fruiting bodies phonologies, which are different from season to season and locality to locality. Collections of mushrooms were made in different seasons (July -August), winter (December.-Jan.), spring (March.-April.) and summer (May and June) 2014-15. Mushrooms were collected carefully by using forceps and hand while the mushrooms growing on their host/habitat were collected along with them. The photographs were made in their natural habitat. Every species was wrapped in the

paper envelop along with date of collection, habitat, locality and specimen number.

Identification

The collected specimens were brought to the laboratory. The phonological characters were recorded for identification and up to species level with the help of available literature, based on the mature mushroom characters [11].

Preservation

Mushroom species preserve by wet and dry method. For wet preservation mushroom species were kept in bottles and preserved in solution of Formalin.

Results and discussion

Swabi remains unexplored in terms of existing mushrooms and their potential use. Therefore, a survey was conducted in different areas during different seasons (2014-15). Total of 22 spp. *Agaricus arvensis*, *Coprinus comatus*, *Lepiota oreadiformis*, *Chlorophyllum brunneum*, *Coprinellus disseminatus*, *Coprinellus micaceus*, *Coprinopsis atramentaria*, *Fomes fomentarius*, *Polyporus alveolaris*, *Trametes gibbosa*, *Trametes versicolor*, *Spongipellis pachyodon*, *Pleurotus ostreatus*, *Fomitopsis pinicola*, *Daldinia concentrica*, *Bolbitius titubans*, *Ganoderma applanatum*, *Coprinus sterquilinus*, *Abortiporus biennis*, *Panellus mitis*, *Laccaria amethystine*, belong to 13 (families) and 18 (genera) were investigated (Table 1 and Figure.1). All data regarding phonological features were shown (Table1).

Table 1. Morphological studies of Mushrooms collected from District Swabi

S.No	Scientific Name	Family	Location	Habitat	Season	Edibility
1	<i>Agaricus arvensis</i>	Agaricaceae	Swabi	Fields and grassy areas	March-August	Use for the treatment of ulcers
2	<i>Coprinus comatus</i>	Agaricaceae	Swabi	Green areas	October-November	Inedible
3	<i>Lepiota oreadiformis</i>	Agaricaceae	Swabi	On ground, in humus	July-December	Inedible
4	<i>Chlorophyllum brunneum</i>	Agaricaceae	Swabi	Near compost heaps	September-December	Edible
5	<i>Coprinellus disseminatus</i>	Psathyrellaceae	Swabi	Wood and shaded hedgerow	October-November	Edible
6	<i>Coprinellus micaceus</i>	Psathyrellaceae	Swabi	On buried wood	July-December	Inedible

7	<i>Coprinopsis atramentaria</i>	Psathyrellaceae	Swabi	buried wood and grassland	December-March	Edible, poisonous
8	<i>Fomes fomentarius</i>	Polyporaceae	Swabi	Grows on wood	July-December	Inedible
9	<i>Polyporus alveolaris</i>	Polyporaceae	Swabi	on dead hard wood	February-May	Inedible, antifungal
10	<i>Trametes gibbosa</i>	Polyporaceae	Swabi	stumps and dead wood	July-December	Inedible
11	<i>Trametes Versicolor</i>	Polyporaceae	Swabi	Grows in tiled layers	July-December	anti-cancer,
12	<i>Spongipellis pachyodon</i>	Polyporaceae	Swabi	Parasitic on oaks and wood	March-February	Inedible
13	<i>Pleurotus ostreatus</i>	Pleurotaceae	Swabi	Decomposer of wood	July-December	Edible
14	<i>Fomitopsis pinicola</i>	Fomitopsidaceae	Swabi	On live conifer, eucalyptus	February-April	Inedible
15	<i>Cantharellus cibarius</i>	Cantharellaceae	Swabi	On low-growing herbs	June-July	Antioxidant Anti-microbial
16	<i>Daldinia concentrica</i>	Xylariaceae	Swabi	Lives on dead and decaying wood	July-December	For fire lighting
17	<i>Bolbitius tibubans</i>	Bolbitiaceae	Swabi	Dung or heavily fertilized soil	October-November	Poisonous
18	<i>Ganoderma applanatum</i>	Ganodermataceae	Swabi	Decaying logs and stumps	July-December	Inedible
19	<i>Coprinus sterquilinus</i>	Coprinaceae	Swab	Horse manure and straw	September-November	Edible
20	<i>Abortiporus biennis</i>	Meruliaceae	Swabi	Dead and living trees	September-December	Inedible
21	<i>Panellus mitis</i>	Mycenaceae	Swabi	On woods	September-December	Inedible
22	<i>Laccaria amethystine</i>	Hydnangiaceae	Swabi	In woods, On ground	September-December	Edible

Figure 1. Mushroom are show Percentage composition

Data showed that *Polyporaceae* was dominant family (25%) represented by 5 spp. followed by *Agaricaceae* (20%) as another major family with 4 species and *Psathyrellaceae* is the third major family of the study area (Table1 and Figure. 2) there is

great variations among mushrooms species these differences were seen in their edibility (30%), non ediable (50%) and poison (20%%) form which show their economics importance (Figure 3) our results match with the statement [12].

Figure 2. Occurrence of mushroom spp. in various Families

Mushrooms lifestyle unique lives as symbiotic, saprophytic and parasitic. These variation because of variation in soil structure, soil texture, soil moisturizing, saprobes and as temperature. In present work, wood was pronounced habitat, 14 spp. were present on living and dead woods, while 7 spp. were investigated on soil and 1 spp. on dung (Figure 4). These variations in various habitat were because of their

specific nutritional mode. Results correlate with [13-15]. Mushrooms used and consumed throughout the year, but mostly mushrooms are collected in the rainy seasons, which show their value of rain fall patterns in phenology also match with the findings of authors [16]. Who worked on the diversity of macro fungi that Some species were present in both rainy seasons and early dry seasons.

Figure 3. Economic importance of different mushroom species

Figure 4. Mushroom Percentage affected by different habitat

Conclusion and recommendations

Population of study area is not highly dependent on wild mushrooms as they used only those mushrooms as food which is available during rainy season. They have no knowledge regarding to their medicinal value. Mushroom flora is going to extinct due to deforestation, urbanization and less interest of peoples. Moreover, regular studies should be conducted to keep the record of mushroom flora of the area. This

was first report on record of mushrooms of Swabi. This research would serve as baseline information for the future researchers in the study area.

Authors' contributions

Conceived and designed the experiments: T Yaseen & M Khan, Performed the experiments: M Khan, Analyzed the data: T Yaseen & M Khan, Contributed reagents/materials/ analysis tools: M Shahkeel & H Ara, Wrote the paper: T Yaseen & M Khan.

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