

Ethno-Morphological Studies of Mushrooms Collected From Soon Valley

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Abstract: Soon Valley Sakasar located in District Khushab of the province Punjab, Pakistan coordinates 72°00' and 72°30' E longitudes 32°25' and 32°45' N latitudes with diversified ecosystem. The ethnomycological study of soon valley has been strongly neglected in the past. So, the survey was conducted during 2010-11 in four villages i.e. Nowshehra, Dhaka, Sakhiabad and Knaty garden of the Soon Valley. A total of 25 mushroom species belonging to 9 families and 14 genera were identified from the study area. Among the collected mushroom species *Agaricus* was found as most dominant genus (36%) followed by *Innocybe* (12%). All the mushroom species exhibited remarkable variation in terms of habitat, season and locations. Ethnological survey revealed that 12 species are edible, 9 inedible and 4 act as poisonous ones.

Key Words: Soon Valley, Mushroom, Ethnological Study, Village, Survey

I. Introduction

Mushrooms are fleshy, sometime tough umbrella like sporophores that bear holobasidia on the surface of gills or lamellae that hang down from the cap (2). Wild mushrooms have a intense biological as well as economical impact and constitutes a long relationship with humankind. Wild edible mushrooms have a worldwide distribution and their annual consumption may exceed due to nutritional value i.e. large amount of protein and low fat (5; 13; 8) and pharmacological characteristics. They act as an important therapeutic agents in tumor, cardiovascular, hypertension and cancer (6). There are about 2166 worldwide recognized edible species and about 470 species are possessing medicinal properties. Harvesting pressure has increased in many parts of the world (4) and mushroom diversity is claimed to have decreased over the past decades (3; 20). Presence or absence of mushroom species is a useful indicator to evaluate the damage or the maturity of an ecosystem.

The work regarding to mushroom species has been documented by several researchers all over the Pakistan. Shibata (16) recorded fifty one species of higher Basidiomycetes from province of Punjab and Khyber Pakhtoon Khawa. Forty nine species belongs to Agaricales, seven to Aphylophorales and one to Auriculariales. Hattori & Murakami (9) recorded 11 species of Aphylophorales fungi from Pakistan; three species i.e. *Inonotus triqueter*, *Microporellus violaceocinerascens* and *Phylloporia weberiana* were new to Pakistan. Murakami (14) reported seventy six species of *Agaricus* and allied fungi from northern parts of Pakistan. Ahmed *et al.*, (1) have catalogued 323 species of Aphylophorales belonging to 103 genera and 12 families. Gardezi (11) recorded 12 species of Aphylophorales, belonging to 9 genera and 3 families, collected from different areas of Azad Jammu and Kashmir. Sultan (17) recorded thirty six species of mushrooms from Margalla Hills National Park and adjacent areas including three species of *Gasteromycetes*, one *Bolete* and twenty five species of *Agaricus*. Sultana *et al.*, (18) reported 20 species of mushrooms and toadstools from Multan district. But, mushrooms of the Soon Valley are still unrevealed; so the current study was planned to prepare an inventory of mushrooms found in study area and conduct their ethnological studies.

II. Materials And Methods

Collection site

Soon Valley Sakasar is a mountain range located in District Khushab of the province Punjab, Pakistan. Among the rangelands of Pakistan, the Soon Valley of Salt Range co-ordinates 72°00' and 72°30' E longitudes 32°25' and 32°45' N latitudes, an area of 35 km in length and 9 km in breadth and with average elevation of 762 m. Relatively average annual rainfall is 500mm or less, average minimum temperature is 1°C in January and average maximum temperature is 36°C in June (10). The study area includes four villages i.e. Nowshehra, Dhaka, Sakhiabad and Knaty garden of the Soon Valley.

Mushroom collection

Different species exhibit different fruiting phonologies, which vary from month to month and at different altitudes and regions. The mushrooms were collected in different seasons of the year; rainy season (July and August), winter (December and January), spring (March and April) and summer (May and June) during 2010-11. Soft mushrooms were collected carefully by using forceps/free hand while the mushrooms growing on wood were collected along with small part of wood. The photograph was taken in their natural habitat. Each sample was wrapped in the paper envelop along with field notes, date of collection, habitat, locality and specimen number on tag.

Mushroom identification

The collected specimens were brought to the laboratory. The measurements of various parts of mushrooms were recorded and morphological features were observed. Then, spores of collected mushrooms were mounted on slide by DPX (Distrene 80, Plasticizer and Xylene) for their size measurement. The mushrooms were identified up to species level with the help of available literature (12) based on the features of mature mushrooms.

Preservation

The mushroom species were dried in hot air oven at 50-60⁰ C and preserved in solution of F.A.A. (Formalin; 5ml, Acetic acid; 5ml and Alcohol; 90ml).

Ethnological study

Ethnological utilization of wild mushrooms was recorded from the selected areas of soon valley by using randomly recruited semi-structured questionnaire. Fifty people including men and women were interviewed for getting information about the uses of the mushrooms.

III. Results And Discussion

Soon Valley remains unexplored in terms of existing mushroom flora and their potential use. Therefore a survey was conducted in four villages i.e. Nowshehra, Dhaka, Sakhiabad and Knaty garden of the soon valley during different seasons of the year 2010-11. A total of 25 mushroom species belonging to 9 families and 14 genera were identified from the study area (Fig.1). All the species were identified on the basis of their morphological characters as well as spore size. All information about mushrooms such as scientific name, family, location, habitat, season, spore size and morphological characters were presented in (Table.1). The study revealed that *Agaricus* was found as most dominant genus (36%) in the study area represented by 9 species followed by *Inocybe* (12%) as second major genus represented by 3 species (Fig.2). Murakami (14) reported 30 species of *Agaricus* from northern parts of Pakistan. Recently 228 species of *Agaricus* was reported from different areas of kaghan valley ranging from 5000 to 9000 feet having thick forest cover (19).

Mushrooms may occur on variety of habitats i.e. soil, dung, wood etc. In this study, soil was found as major habitat as 16 species were explored growing on the ground/in the fields, while 8 species were identified growing on the wood and 1 species on dung (Fig.3). This variation in presence of mushroom species in different habitat was due to their particular mode of nutrition. Mushrooms growing on the soil are symbiotic, on dung and dead wood are saprophytic and on living plants are parasitic. Occurrence of mushroom greatly varies between different locations of the study area. 16 species were recorded from Nowshehra, 2 species from Sakhiabad, 2 from Dhaka and 5 from Knaty garden (Fig.4). This variation may be due to difference in soil composition, amount of moisture in the soil, availability of dead remains of plants and animals as well as suitable temperature. It was observed that 18 species were found during rainy season, 5 species were recorded during summer, 1 species during winter and 1 species during spring (Fig.5). Mushrooms were in abundance during rainy season. Climate greatly influenced the variation and distribution of mushrooms worldwide as different species exhibited different fruit phonologies in different season of the year.

Ethnological studies of mushrooms

The history of mushroom is as old as the dawn of human civilization. Mushrooms have been used by the human beings to fulfill their basic needs such as food and medicine. Due to deforestation and urbanization, existence of different groups of the organisms are threatened and has resulted in the loss of traditional knowledge about uses of those organisms which is acquired over hundreds years of experience and understanding of environment. In this regard, ethnological survey was conducted in selected areas of Soon Village through a semi-structured questionnaire, which was randomly recruited. A total of 50 informants from 4 localities were interviewed, though bulk of those interviewed was from Nowshehra and Dhaka. The ethnological inventory of mushrooms is alphabetically arranged including information about their scientific name, local name, season and edibility (Table.2). In this ethnological study, 25 mushrooms species belonging to 9 families

and 14 genera had been recorded, out of which 12 species were used by local people fulfilling their daily life food requirements. 9 species of mushrooms were not used, while 4 species were suspected as poisonous by the local people living in various locations of the Soon Valley (Fig. 6). No medicinal uses were noted. In Soon Valley, mushrooms were known to be frequently grown during rainy season. The edibility of common *Agaricus spp.* was confirmed from all localities. Seven edible *spp.* were recorded from Multan district and 24 from kaghan valley by (18). Edible purpose of mushroom by local people were also reported by (21; 7; 15). Those species which were not utilized by the local people were grown on plants and decaying wood. 4 species were considered as poisonous because of their different colors. Mushroom nomenclature is not well developed in any of the four localities as shown by the fact that many mushroom species including edible ones don't have specific local name, but generally referred by a general term "Khuman /Khumbian". Older people had more information than younger ones. Women working in fields appeared to be slightly more knowledgeable than men. According to local people, mushrooms come out of the ground by cracks resulted from lightning and thundering. But this was not practically confirmed during research.

IV. Conclusion

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 ethnology and inventory of mushrooms of soon valley. This research would serve as baseline information for the future researchers in the study area.

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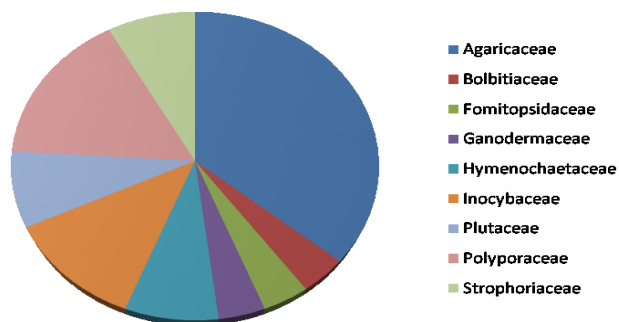


Fig.1. Distribution of mushroom species in different families

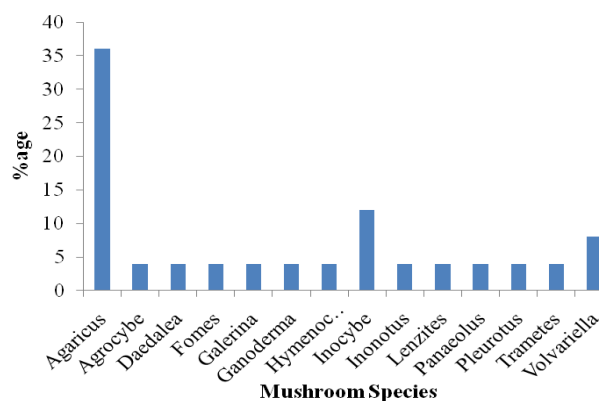


Fig.2. Percentage composition of Mushroom genera recorded

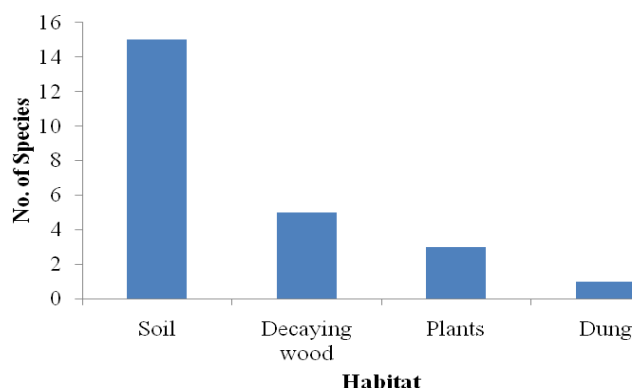


Fig.3. Distribution of mushroom species in various habitats

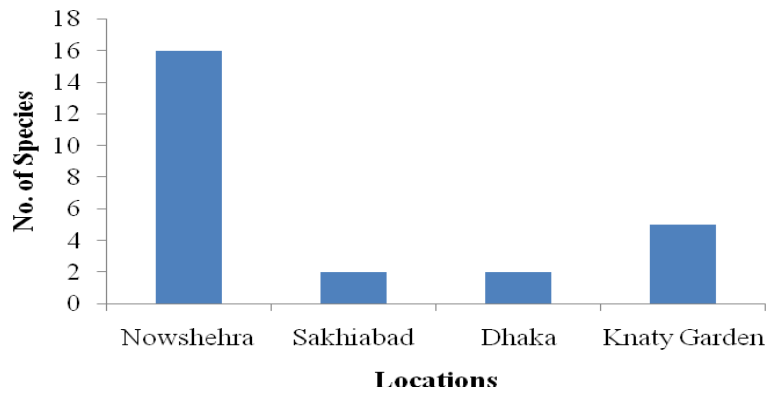


Fig.4. Distribution of mushroom species in various locations of the study area

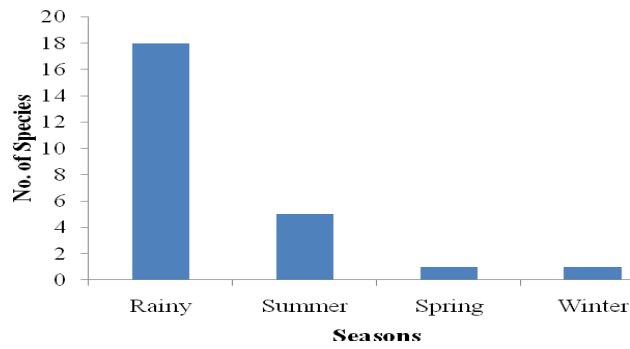


Fig.5: Distribution of mushroom species during various seasons of the year

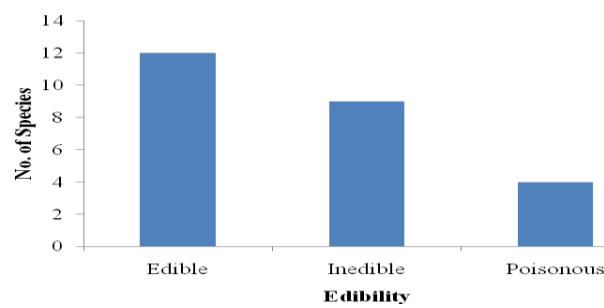


Fig.6: Economic importance of different mushroom species

Table 1: Inventory and Morphological Studies of Mushrooms Collected from Soon Valley

S. N O	SCIENTIFIC NAME	FAMILY	LOCATI ON	HABIT AT	SEASO N	CAP DIAMET ER	CAP SHAPE	CAP COLOU R	STIPE LENG TH	STIPE COLO UR	SPO RE SIZE
1	<i>Agaricus abruptibulbus</i> Peck	Agaricaceae	Nowshehr a	On soil	Rainy	8 cm	Convex	White	10 cm	white	6x 4µm
2	<i>Agaricus sp.</i>	Agaricaceae	Nowshehr a	On ground	Rainy	4 cm	“	White	5 cm	white	6x 3
3	<i>Agaricus arvensis</i> Schaeff. ex Secr.s.	Agaricaceae	Nowshehr a	On soil containin g organic matter	Rainy	8 cm	“	White colored becomin g yellow	8 cm	White at first then flesh pink	7 x5
4	<i>Agaricus bisporus</i> (Lange) Pilát	Agaricaceae	Nowshehr a	On ground under the shade of plants	Rainy	4-10 cm	“	Grayish	4.5 cm	White	6x5
5	<i>Agaricus bitorquis</i> (Quél.) Sacc.	Agaricaceae	Nowshehr a	On soil having organic matter	Rainy	4-7 cm	Convex somewha t flat	White	5 cm	“	5x 4
6	<i>Agaricus campestris</i> L. ex Fr.	Agaricaceae	Nowshehr a	On the land	Rainy	3 cm	Convex	“	3-7 cm	“	7x5
7	<i>Agaricus comtulus</i> Fr.	Agaricaceae	Nowshehr a	On ground	Rainy	12 cm	“	White to cream colored	4 cm	“	4.5x 3
8	<i>Agaricus excellens</i> (Møller) Møller	Agaricaceae	Nowshehr a	On ground	Rainy		“	White	12 cm	“	10x 6
9	<i>Agaricus leucotrichus</i> Møller	Agaricaceae	Nowshehr a	On soil	Rainy	10 cm	Ovate	“	10 cm	“	6.5 x5
10	<i>Agrocybe pediades</i> (Fr.) Fayod	Strophoriaceae	Nowshehr a	In fields	Rainy	2 cm	Convex	Brown	4 cm	Pale	9x 7.5
11	<i>Daedalea quercina</i> L. ex Fr.	Fomitopsidaceae	Dhaka	On wood	Winter	7.5-20 cm	bracket	Wood colored	----- -	----- ---	6x 3.5
12	<i>Fomes fomentarius</i> (L. ex Fr.)	Polyporaceae	Nowshehr a	Main stem of <i>Populus spp</i>	Summer	5-35 cm	Hoof shaped	“	----- --	----- ---	15x7
13	<i>Galerina cinctula</i> Orton Gurtel-Haubling.	Strophoriaceae	Sakhiaba d	On ground in open fields	Summer	1.5 cm	Convex	White, yellow from the centre	2 cm	White	10x5
14	<i>Ganoderma lucidum</i> (Curt. ex Fr.) Karst.	Ganodermaceae	Knaty Garden	On woods of dead plants	Spring	8 cm	Kidney shaped	Dark red	4 cm	Dark red	11x7
15	<i>Hymenochaete sp</i>	Hymenochae taceae	Sakhiaba d	On stem of <i>Melia azdarach ta</i>	Rainy	3-8 cm	Carpoph ore	Dark brown	-----	-----	----- --
16	<i>Inocybe adaequata</i> (Britz.) Sacc.	Inocybaceae	Nowshehr a	On ground	Rainy	4 cm	Somewh at bell shaped	Reddish brown	5 cm	White	10x5
17	<i>Inocybe cincinnata</i> (Fr.) Quél.	Inocybaceae	Nowshehr a	Woods as well as ground	Rainy	2 cm	“	“	2.5 cm	“	8x5
18	<i>Inocybe geophylla</i> (Sow. ex Fr.) Kummer.	Inocybaceae	Dhaka	“	Rainy	3 cm	Somewh at cone shaped	White	4.5cm	“	9x5.5
19	<i>Inonotus hispidus</i> (Bull. ex Fr.) Karst.	Hymenochae taceae	Nowshehr a	On wood	Summer	10-30 cm	Bracket shape	Yellow	-----	----- --	9x7
20	<i>Lenzites betulina</i> (Fr.) Fr.	Polyporaceae	Knaty Garden	On decaying wood	Winter	2.5-10 cm	Convex	White to pale yellow	-----	----- --	5x2
21	<i>Panaeolus campanulatus</i> (Bull. ex Fr.)	Bolbitiaceae	Nowshehr a	On plant manure	Rainy	2 cm	Convex companu late	Dark brown	8 cm	Grey	10 Page 7

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22	<i>Pleurotus dryinus</i> (Pers. ex Fr.) Kummer	Polyporaceae	Knaty Garden	On wood	Rainy	7 cm	Convex	White	7.5 cm	White	12x3
23	<i>Trametes gibbosa f. tenuis</i> Pilát	Polyporaceae	Knaty Garden	On wood	Rainy	16 cm	----- -	Grey	7.5 cm	“	5x2
24	<i>Volvariella gloiocephola</i> (DC.) Wasser	Pluteaceae	Knaty Garden	On ground in fields	Rainy	8 cm	Convex	White	12 cm	“	14x9
25	<i>Volvariella speciosa</i> (Fr.) Singer	Pluteaceae	Nowshehra	On ground in fields	Rainy	7.5 cm	“	“	8 cm	“	15x8

Table2: Ethnological Study of Mushrooms Collected from Soon Valley

S.NO	SPECIES	LOCAL NAME	SEASON	EDIBILITY	PART USED
1	<i>Agaricus abruptibulbus</i> Peck	Khuma / Khumbian	Rainy	Edible	Whole
2	<i>Agaricus</i> sp.	Khuma / Khumbian	Rainy	Edible	Whole
3	<i>Agaricus arvensis</i> Schaeff. ex Secr. s.	Khuma / Khumbian	Rainy	Edible	Whole
4	<i>Agaricus bisporus</i> (Lange) Pilát	Khuma / Khumbian	Rainy	Edible	Whole
5	<i>Agaricus bitorquis</i> (Quél.) Sacc.	Khuma / Khumbian	Rainy	Edible	Whole
6	<i>Agaricus campestris</i> L. ex Fr.	Khuma / Khumbian	Rainy	Edible	Whole
7	<i>Agaricus comtulus</i> Fr.	Khuma / Khumbian	Rainy	Edible	Whole
8	<i>Agaricus excellens</i> (Möller) Möller	Khuma / Khumbian	Rainy	Edible	Whole
9	<i>Agaricus leucotrichus</i> Möller	Khuma / Khumbian	Rainy	Edible	Whole
10	<i>Agrocybe pediades</i> (Fr.) Fayod	Dabay	Rainy	Inedible	-----
11	<i>Daedalea quercina</i> L. ex Fr.	Kirar dabay	Winter	Inedible	-----
12	<i>Fomes fomentarius</i> (L. ex Fr.)	Dabay	Summer	Inedible	-----
13	<i>Galerina cinctula</i> Orton Gurtel-Haubling.	Dabay	Summer	Poisonous	-----
14	<i>Ganoderma lucidum</i> (Curt. ex Fr.) Karst.	Kirar dabay	Spring	Inedible	-----
15	<i>Hymenochaete</i> sp	Kirar dabay	Rainy	Inedible	-----
16	<i>Inocybe adaequata</i> (Britz.) Sacc.	Dabay	Rainy	Poisonous	-----
17	<i>Inocybe cincinnata</i> (Fr.) Quél.	Dabay	Rainy	Poisonous	-----
18	<i>Inocybe geophylla</i> (Sow. ex Fr.) Kummer.	Dabay	Rainy	Poisonous	-----
19	<i>Inonotus hispidus</i> (Bull. ex Fr.) Karst.	Kirar dabay	Summer	Inedible	-----
20	<i>Lenzites betulina</i> (Fr.) Fr.	Kirar dabay	Winter	Inedible	-----
21	<i>Panaeolus campanulatus</i> (Bull. ex Fr.)	Dabay	Rainy	Inedible	-----
22	<i>Pleurotus dryinus</i> (Pers. ex Fr.) Kummer	Khuma / Khumbian	Rainy	Edible	Whole
23	<i>Trametes gibbosa f. tenuis</i> Pilát	Kirar dabay	Rainy	Inedible	-----
24	<i>Volvariella gloiocephola</i> (DC.) Wasser	Khuma / Khumbian	Rainy	Edible	Whole
25	<i>Volvariella speciosa</i> (Fr.) Singer	Khuma / Khumbian	Rainy	Edible	Whole