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## Distribution of Medicinally Important Mushrooms of Mountainous/Northern Areas of Pakistan

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**Abstract:** Pakistan has very significant mountain ranges; the Hindukush, Karakurm and Himalaya. Hindukush mountain ranges further extend from the northeast to the southeast to the southwest upto Koh-Safed. These mountain ranges contain some of the highest peaks of the world i.e., K2 (9861 m), NangaParbat (8126 m), Rakaposhi (7788 m), Trich Mir (7690 m) and Deosai Plateau (4333-5333 m). The most of the flora of Pakistan (About 70%) occur in the mountains, in diverse ecological zone or habitats. The following important areas with natural vegetation have been surveyed during rainy season: North Chitral, North Swat, Kaghan Valley, Gilgit and Skardu including Deosai Plateau. The natural lakes of the same areas were also surveyed such as Saif ul Maluk, Lulusar, Sadpapa, Kachura, Shoezal. Their natural vegetation/forests were mostly consists of *Pinus wallichiana*, *P. roxburghi*, *Abies pindrow*, *Quercus incana*, *Juglan regia*, *Juniper*, *Betula utillis*, shrubs, herb and grasses. They were growing at various altitudes and ecozones: Sub-tropical pine zone 12 species; Temperate zone 24 species, Sub- alpine 20 species; Alpine zone 10 species. There are number of medicinal mushrooms, common genera were: *Agaricus*, *Clitocybe*, *Calvatia*, *Coprinus*, *Coriolus*, *Fomes*, *Ganoderma*, *Morchella* and *Podaxis*. The terrestrial environment under these forests was rich in organic matter, which was derived by the activity of a number of organisms: fungi, bacteria and invertebrate etc. More than fifty species of medicinally important Mushrooms belonging to 40 genera have been recorded. They may be Mycorrhizal, parasitic, saprophytic, terrestrial/coprophillous in their habitat.

**Key words:** Medicinal, mushrooms, mountainous, northern area, Pakistan

### INTRODUCTION

Fungi in healing are mentioned as far back as Hipocrates the recognized of medicine, right around 45 B.C. Certainly ancient Chinese text go back much further yet so the mushrooms have been used for untold centuries as food and medicines through out the world. In Asia the Aryans swept from northwest into Afghanistan and then valley of the Indus. They were warrior people of Indo-European of Language-Vedic tongue-Sanskrit and worship *Amanita muscaria* as the god of fire etc. With the time it was called as Fly agaric, A book of 380 pages entitled Soma (Divine mushroom of immortality) R. Gordon Wasson, mostly on the history of Amanita. In Asia the mushrooms were traditionally used as herbal medicine alone or in combination. It may be that mushrooms were used in much a different way. To day we know that many mushrooms show a marked ability to assist the body in healing from some of our most complex and damaging ailments such as cancer AIDS, diabetes, heart diseases and many others (approved by research). Out of 1.5 million fungi (28700 Pak.) 38000 sp world species of mushrooms and toad stools.

Their medicinal value refers to folklore, that calvacin from *Calvatia* emerged indirectly from the application and verification of folklore by (Lucas, 1959). It is considered as promising source of medicine. The mushrooms have properties: antifungal, antibacterial, antiprotozoa, antitumor and antiviral (Table 1).

Table 1: Medical effects (activities) of mushrooms

Antifungal	Antiprotozoa
<i>Boletus edulis</i>	<i>Clitocybe illudenia</i>
<i>Coprinus comatus</i>	<i>Plasmodium gallinaceum</i>
<i>Lentinus edulis</i>	
<i>L. lepideus</i>	
<i>Oudemansiella radicata</i>	
<i>Sparassis crispa</i>	
Antibacteria	Antitumor
<i>Agaricus bisporus</i>	<i>Agaricus bisporus</i>
<i>Daedalea</i>	<i>Auricularia auricula</i>
<i>Flammulina velutipes</i>	<i>Boletus edulis</i>
<i>Fomes</i>	<i>Calvatia</i> sp.
<i>Polyporus squamosus</i>	<i>Coriolus versicolor</i>
<i>Psathyrella</i> sp.	<i>Flammulina velutipes</i>
<i>Trametes</i>	<i>Fomes</i>
<i>Tricholoma</i>	<i>Ganoderma applanatum</i> '
	<i>Lentinus edodes</i>

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Table 1: Continued

Antiviral	Antitumor
<i>Agaricus campestris</i>	<i>Pholiota nameko</i>
<i>Armillaria mellea</i>	<i>Piptoporus betulinus</i>
<i>Calvatia gigantea</i>	<i>Pleurotus ostreatus</i>
<i>Coprinus micaceus</i>	<i>Polyporus</i>
<i>Lentinus edodes</i>	<i>Poria corticola</i>
<i>Panaeolus sphinctrimus</i>	<i>Poria obliqua</i>
<i>Russula emetica</i>	<i>Volvariella volvacea</i>
<i>Stiellus</i> sp.	

(Cochran, 1978)

**EDIBLE/MEDICINAL MUSHROOMS  
(HARD OR BRACKET FUNGI)**

Edible/medicinal mushrooms (hard or bracket fungi) are categorized under the following four major groups along with their occurrence on wood (W) and Soil (S):

**Agaricales**

Name of Mushroom	Altitude feet	Saprophytic		Mycorrhizal
		Wood/Soil	Medicinal/Edible	
<i>Agaricus bisporus</i>	1800-13500	s	Edible	
<i>Agaricus silvaticus</i>	1500-12000	s	Edible	
<i>Amanita battaræ</i>	2000-5000	s	Medicinal	
<i>Amanita ceciliae</i>	2000-5000	s	Medicinal	
<i>Amanita flavipes</i>	7000	s	Medicinal	
<i>Amanita pantherina</i>	7500	s	Medicinal	
<i>Amanita rubescens</i>	7500	s	Medicinal	
<i>Armillaria mellea</i>	1800	w	Medicinal	
<i>Boletus edulis</i>	6500-8000	s	Edible	
<i>Boletus erythroporus</i>	7000	s	Edible	
<i>Krombholziella aurantiaca</i>	6000-13000	s	Edible	
<i>Krombholziella scabra</i>	6000-13000	s	Medicinal	
<i>Lactarius species</i>	6000-10500	s	Edible	
<i>Lepista inversa</i>	6500-9500	s	Edible	
<i>Lepista nuda</i>	6000-	s	Edible	
<i>Leucopaxillus giganteus</i>	5000-9000	s	Edible	
<i>Leucopaxillus paradoxus</i>	5000-9500	s	Edible	
<i>Megacollybia platyphylla</i>	4000-8000	s	Edible	
<i>Oudemansiella radicata</i>	1800-5000	s	Edible	
<i>Pleurotus ostreatus</i>				
<i>Pleurotus</i> sp.	1000-7500	w	Edible	
<i>Rhodocybe popinalis</i>	4500-8000	s	Edible	
<i>Rhodocybe truncatus</i>	4500-8000	s	Edible	
<i>Russula amara</i>	2000-8000	s	Edible	
<i>Stiellus collinitus</i>	5000-	s	Edible	
<i>Stiellus granulatu</i>	2900-7500	s	Edible	
<i>Termitomyces</i> species	1800-	s	Edible	
<i>Volvariella speciosa</i>	1000	s	Edible	
<i>Xerocomus chrysenteron</i>	8000-	s	Edible	

**Aphyllorphales**

<i>Auricularia auricula-judae</i>	1800-	w	Edible and Medicinal
<i>Auricularia polytricha</i>	800-8500	w	Edible and Medicinal
<i>Cantharellus cibarius</i>	7000-9000	s	Edible/ Medicinal
<i>Coltricia cinnamomea</i>	1800-	w	Medicinal
<i>Coltricia perennis</i>	1800	w	Medicinal
<i>Coltricia tomentosa</i>	1800	w	Medicinal
<i>Coniophora betula</i>	10,000	w	Medicinal
<i>Coniophora fusispora</i>	9000	w	Medicinal
<i>Coriolus brevis</i>	1800-8000	w	Medicinal

**Aphyllorphorates**

<i>Coriolus hirsutus</i>	1800-	w	Medicinal
<i>Coriolus tephroleucus</i>	1800-8000	w	Medicinal
<i>Coriolus versicolor</i>	1800-	w	Medicinal
<i>Deadalea albida</i>	6000-8500	w	Medicinal
<i>Deadaleopsis styracina</i>	1800-7000	w	Medicinal
<i>Fomes allardii</i>	6000-	w	Medicinal
<i>Fomitopsis annosus</i>	8000-	w	Medicinal
<i>Fomitopsis browneonensis</i>	8000-10000	w	Medicinal
<i>Fomitopsis fomentarius</i>	8000-10000	w	Medicinal
<i>Fomitopsis pinicola</i>	8000-	w	Medicinal
<i>Fomitopsis robustus</i>	8000-	w	Medicinal
<i>Fomitopsis rosea</i>	8000-	w	Medicinal
<i>Ganoderma applanatum</i>	4000-6000	w	Medicinal
<i>Ganoderma lucidum</i>	1800-	w	Medicinal
<i>Gloeophyllum striatum</i>	2000-	w	Medicinal
<i>Gloeophyllum subferugineum</i>	4000-9000	w	Medicinal
<i>Hericum ramosum</i>	2000-	w	Medicinal
<i>Heterobasidion insulare</i>	1800-8700	w	Medicinal
<i>Hirschioprus abietinus</i>	7000-	w	Medicinal
<i>Hirschioprus pargamentus</i>	4000-	w	Medicinal
<i>Hymenochaete cruenta</i>	3000-8000	w	Medicinal
<i>Hymenochaete rheicolor</i>	2000-7000	w	Medicinal
<i>Inonotus radiatus</i>	5000	w	Medicinal
<i>Laetiporus sulphureus</i>	6000-	w	Medicinal
<i>Lenzites betulina</i>	2000-	w	Medicinal
<i>Lenzites platyphylla</i>	1800-7000	w	Medicinal
<i>Merulius aureus</i>	2000-	w	Medicinal
<i>Merulius lacrymans</i>	2000-	w	Medicinal
<i>Phellinus pini</i>	1500-	w	Medicinal
<i>Phellinus linteus</i>	7000	w	Medicinal
<i>Polyporus adustus</i>	1800-	w	Medicinal
<i>Polyporus biennis</i>	1800-	w	Medicinal
<i>Polyporus fibrillosus</i>	1800-	w	Medicinal
<i>Polyporus squamosus</i>	2000-	w	Medicinal
<i>Schizophyllum commune</i>	1800	w	Medicinal
<i>Sparassia crispa</i>	7000-9000	w	Edible
<i>Sparassia laminosa</i>		w	Medicinal
<i>Stereum hirsutum</i>	2000-8000	w	Medicinal
<i>Stereum ostrea</i>	2000-	w	Medicinal
<i>Stereum venosum</i>	2000-	w	Medicinal
<i>Trametes insularis</i>	2000-	w	Medicinal
<i>Trametes suaveolens</i>	1800-	w	Medicinal
<i>Xylobolus subpileatus</i>	5000-	s	Medicinal

**Gasteromycetes**

<i>Bovista bovistoides</i>	1800-	s	Medicinal
<i>Bovista nigrescens</i>	1800-	s	Medicinal
<i>Bovista perlatum</i>	1800-	s	Medicinal
<i>Bovista plumbea</i>	1800-	s	Medicinal
<i>Calvatia</i> species	10,000	s	Medicinal
<i>Geastrum celandii</i>	1800-	s	Medicinal
<i>Geastrum fimbriatum</i>	2000-	s	Medicinal
<i>Geastrum hygromitricum</i>	3000-	s	Medicinal
<i>Geastrum nanum</i>	1800	s	Medicinal
<i>Geastrum rufescens</i>	1800	s	Medicinal
<i>Geastrum saccatum</i>	12000	s	Medicinal
<i>Geastrum schmidelli</i>	1000	s	Medicinal
<i>Geastrum sessile</i>	1000	s	Medicinal
<i>Geastrum triplex</i>	1800	s	Medicinal
<i>Lycoperdon</i> species	200-	s	Medicinal
<i>Phallus impudicus</i>	4000-8000	s	Medicinal
<i>Phallus rubicundus</i>	4000-8000	s	Medicinal

**Ascomycetes**

<i>Morchella</i> species	2000-8000	s	Medicinal
<i>Rhizopogon flavus</i>	2000-10500	s	Medicinal
<i>Rhizopogon obtextus</i>	7000	s	Medicinal
<i>Scleroderma</i> species	7000	s	Medicinal
<i>Tuber puberlam</i>	2000-9500	s	Medicinal

All the medicinal mushroom have polysaccharides proteins which control the different diseases by activating or enhancing the immunity of the body. They are used to reduce the after effects of radiation alone or with other medicines. As a diet their fatty fractions consist predominantly of unsaturated fatty acids such as linoleic acid, so it is true that mushrooms may also be the perfect food for staying trim and maintaining the health of heart and cardiovascular system. The mushrooms provide the wealth of protein, fiber and vitamins.

Mushrooms that are generally medicinally recognized as immune stimulants, an active constituent known, as polysaccharides are present that are very similar to those found in popular immune stimulating medicinal herb such as *Echinacea* and *Astragalus*. Polysaccharides have been shown to increase white blood cells abilities to deal with invading germs. The following ten mushrooms are detailed below:

**Reishi mushroom (*Ganoderma lucidum*) divine mushroom:** In the last 20 years, reishi has been tested in human clinical studies and is thought to be beneficial for a wide variety of disorders: It is a very good overall tonic for many chronic ailments. It has also found a use in treating anorexia, retinal pigment degeneration and progressive muscular dystrophy (Chang and But, 1987; Chang *et al.*, 1984; Huidi and Zhiyuan, 1984). It has also shown favorable results in treating hepatitis; It also controls ulcers, reducing cholesterol and high blood pressure (hypertension). Its antihistamine actions make it a good choice in long-term treatment of allergies and it has been effective in treating Chronic Fatigue Syndrome (CFS) and nervous and adrenal exhaustion. Reishi is also seen as a partner in treating cancers and immune system difficulties. Climbers rely on it for its ability to squelch altitude sickness. It is especially useful for treating all ailments of the respiratory system. A protein in reishi may also be effective in preventing organ transplant rejection.

**Oyster (*Pleurotus ostreatus*):** It is extremely delicious as well as conferring various health-giving properties. Traditionally, it has been used to strengthen veins and relax tendons. In China oyster mushroom is indicated for joint and muscle relaxation (Yang and Jong, 1989). A product containing oyster mushroom, called Tendon-easing powder, is effective in the treatment of lumbago, numbed limbs and tendon and blood vessel discomfort.

In the Czech Republic, extracts have been made from the fruiting bodies as the main ingredient in dietary preparations recommended for prevention of high cholesterol (Opletal, 1993). The dried oyster mushrooms are said to be high in iron, so they are potentially good blood builders.

***Armillaria mellea*:** Honey mushroom Growing around popular tree and *Braussonetia papyrefera* in Islamabad.

This genus spreads over hundreds of square miles and is considered as the largest living organism on the planet and is a marauding parasite. As medicine it is used to reduce renal hypertension and of neurasthenia, improves vision and counteract ophthalmic and night blindness. It helps in the blood flow towards brain and heart without increasing blood pressure, decrease heart rate also protects against ionizing effects of radiation.

***Auricularia auricula* (Jelly fungi):** Jelly cup shape ear like mushroom, ochraceous to blackish purple, brittle on drying. It is commonly used as herbal medicine in China for increasing the fluidity of blood. It improve breathing, blood circulation and inhibits blood clotting and makes the body well being. It is best for patients suffering from arteriosclerosis, where it helps those with blood vessel disease, strokes, heart attacks and moderate ingestion. It has soothing effect when it is used as vegetable during bad cold and allergies.

Commonly growing on debris under moist conditions, Islamabad to upper northern area Such as Kaghan, Chitral, Gilgit.

***Coriolus versicolor* (Turkey tail) krestin-japan**

***Trametes versicolor* immune stimulating compound:** It is woody bracket fungus with concentric rings of different colours with a mixtures of browns, yellow brown, grays, purple, greenish and black rings but always with extreme margin paler or white.

Medicinally is unique with extensive use both in traditional Chinese and Japanese Medicine and modern clinic practice. It is one of the best researched nutraceuticals in the world. For health treatment it is used in the form of Supplement form 1:2 ratio. It has shown anti-tumor activity in animals with adenosarcoma, fibrosarcoms and many others including colon and lung cancer. It also improve the chemotherapy rate when it is used in combination with other medicines (42 to 72%) Ref. PSK.

***Lentinus edode*:-Shitake-immune enhancer:** The oldest cultivated gilled mushroom has drawn the attention about the curation of cancer etc., 1975 by Japanese. Its drug is called as lentinan, it is prescribed for primary cancer therapy. It contains vitamins B1, B2, B6, B12 and D2 with high amount of riboflavin and niacin and has been regarded as GINSENG of mushrooms. It is should avoided when a person is on blood thinning medicine. It has the characters: anti bacterial, anti-cancer, anti-viral, anti-tumor act as growth hormone, moderate blood sugar, prevent blood clots and thromboses, Kidney and liver tonic and potentate sexuality.

***Morchella sp. guchii***: It is soft light weight mushroom, commonly growing from Harripur, Murree toward upper northern area. It is considered as back bone of northern Pakistan and an export item. It is edible and used in the variety of dishes rice, pizza, nuddles etc. As medicine it is tonic to the intestines and stomach, reduce phlegm and regulate the flow of vital energy. It is rich in interferon used to treat leukemia, improve the infertility in men (Japanese research repot, 1994) and hepatitis B, Lower down blood pressure etc.

***Chantharellus cibarium chanterelle***: It is bright or yellow fading colored mushroom, with thick gill like ridges. It contains 8 essential amino acids and vitamins A. It is used as vegetable throughout the world and inhibits the tumor growth and improves the skin dryness. Its more use may control the infection of respiratory tract and also improves night blindness, inflammation of the eyes and sarcoma.

***Calvatia sp.-puff balls***: Traditionally it is a folklore fungus, its calvacin actively controls cancer, active against Gram positive and negative bacteria and various fungi. Also used as styptic to stop bleeding, coughs, sore throat, hoarseness etc.

***Podaxis pistilaris (Khumb) and puffballs***: These gasteromycetous fungus, appearing during rainy season in plain grassy and sandy areas of Pakistan and used are vegetable by the locals.

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