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CLASSIFICATION AND SPECIES: MUSHROOM

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ABSTRACT

Wild mushrooms are frequently utilized in literature worldwide and are regarded as more beneficial food due to their low calorie and fat content. Because of their high nutritional content, abundant supply of fiber (beta-glucans and chitin), and protein, mushrooms are one of the foods that promote health the most. Additionally, it might include the majority of necessary minerals, such as vitamins, selenium, potassium, copper, etc. Interestingly, due to the necessary chemicals that are described in the human diet, humans are more closely related to the fungus group. However, certain bioactive substances (polysaccharides, low-molecular-weight proteins, glycoproteins, etc.) have also been discovered in medicinal mushrooms and have a variety of therapeutic benefits.

Keywords: mushrooms; nutritional; diet; benefits

INTRODUCTION

According to the literature, a range of characteristics, such as species, type of variety, including its developmental stage, coupled with environmental conditions, have a significant impact on the nutritional and medicinal value or source of mushrooms. The most well-known example of a medication derived from a mushroom that could be used to treat cancer, diabetes, high cholesterol, depression, etc. In conclusion, numerous types of mushrooms have demonstrated their economic value and are widely known. One type of mushroom, *Cordyceps sinensis*, is a fungus that feeds on insects and has been primarily identified in high-altitude areas of the Indo-Tibet region. Similar to this, it's possible that another variety of mushrooms exists and that it has been determined that it benefits human health **[1, 2].**

The oyster mushroom, also known as *dhingri* in India, is a species of *Pleurotus* that belongs to the *Basidiomycetes* class and the *Agaricaceae* family. It is primarily found in temperate and tropical forests, especially on decaying organic materials. Major components of oyster mushrooms are described in the literature as having a spatula-shaped top (pileus), a central stalk (stipe; short or long), and lengthy ridges along with furrows beneath the pileus (i.e., gills or lamellae), but this species' mycelium is completely white in color. The button mushroom, on the other hand, is a well-known species of mushroom that has already been reported in practically every country in the world (*Agaricus* species; family *Agaricaceae*). In India, production of this species earlier was limited up to the winter season, but with advancements and development in technology, these are produced and reported throughout the year **[3, 4].**

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The fleshy, umbrella-shaped, fruiting body (spore-bearing) of a fungus that is normally developed above the soil surface or on self-food supply is known as a mushroom or toadstool. It belongs to the phylum *Basidiomycota* and the kingdom Fungi. The term "mushroom" is most customarily used for fungus *(Basidiomycota*, *Agaricomycetes*) that have gills (lamella) on the underside of the cap, a stem (stipe), and a cap (pileus). In other words, the term "mushroom" describes the fleshy fruiting bodies, with or without stems, of a variety of *Ascomycota* and other gilled fungi **[5].** Small spores produced by these gills help the fungus spread across the surface of the earth or its host. Bolete, puffball, stinkhorn, and other names for forms that vary from conventional morphology are a few examples. Gilled mushrooms are frequently called "*Agaricus*" itself. In contrast, the term "mushroom" is applied to describe the complete fungus as it is grown, the species itself, the thallus called (a mycelium), or the fruiting bodies known as mushrooms **[6].** Mushroom mycelia may live for hundreds of years or die in a matter of months, depending on the accessibility of food. A mycelium will produce a fresh crop of sporophores each year during its fruiting season if food is available and temperature and moisture are favorable. All mushrooms can be grouped into a select few major categories. These categories overlap as well because some mushrooms frequently fall under more than one heading. For instance, oyster mushrooms can be found in the wild in addition to being grown all over the world. The following categories apply to mushrooms **[7-9]:**

- ✓ **Cultivated mushrooms-** Commercially grown mushrooms are referred to as "cultivated mushrooms." Mushroom producers use a wide range of diverse techniques and settings to take care of their crops as they cultivate mushrooms in large quantities for consumers. Any variety of mushrooms that customers can purchase at the market is considered to be cultivated. These include shiitake, oyster mushrooms, enoki, portabello, etc.
- ✓ **Wild mushrooms-** Those mushrooms are obtained by mushroom shikarionce from their natural growing spot in undomesticated areas. Some mushroom varieties, like those that enlarge on the living root structures of trees, only originate in nature. While some mushrooms are grown commercially, others are foraged by foragers from the wild. Many times, the qualities of wild mushrooms that can only be found in nature make it difficult or practically impossible to cultivate them on a large-scale agricultural scale. It is difficult to recognize the species of mushroom before harvesting. You must be mushroom hunting alongside an expert who can confirm your findings and make sure your finds are safe to eat if you don't have experience recognizing mushrooms. Most of the wild mushrooms are poisonous but exactly look like edible mushrooms.
- ✓ **Medicinal mushrooms-** In literature, varieties of mushrooms were reported and showed several health advantages. Shiitake, lion's mane, and porcini are a few well-known edible mushrooms with health advantages. Other medicinal mushrooms cannot be consumed because they are either too bitter or too woody. To benefit from the health advantages of these kinds, are prepared into teas and used as supplements or capsules.
  Reishi, turkey tail mushrooms are examples of beneficial fungi. Scientific studies have demonstrated the numerous advantages and applications of medicinal mushrooms, from the treatment of cancer to the boosting of the immune system.
- ✓ **Poisonous mushrooms-** Several wild varieties of mushrooms are identified as poisonous species; it is essential to make sure those foraged specimens are positively recognized without a doubt before ingesting them. Poisonous mushrooms can cause a person to become extremely unwell or even permanently harm their organ systems. Some poisonous mushrooms have the potential to be fatal if eaten.

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- ✓ **Useful mushrooms-** While some types of mushrooms are not consumed by people, they nonetheless serve a vital purpose, such as breaking down oil and other environmental pollutants or being added to compost. Every year, new ideas utilizing mushrooms are made and launched by scientists, including the use of mushrooms in biofuels, packaging, cleaning goods, and other applications.
- ✓ **Psychoactive mushrooms-** Mushrooms that can induce hallucinations and have a psychotropic impact are known as psychoactive mushrooms. The hallucinogenic component psilocybin is present in most of them. Most nations forbid the cultivation of certain kinds of mushrooms, and doing so can be harmful to people's health.

CONDITIONS ARE REQUIRED FOR MUSHROOM GROWTH

The general requirements for growing mushrooms are stated below, however, bear in mind that each variety has specific needs [**1-5**].

- ❖ **Light**: Although mushrooms don't need darkness to thrive, mushrooms don't need light either. However, darkness promotes the moist conditions that mushrooms require, individuals frequently grow mushrooms in low light or complete darkness.

- ❖ **Moisture**: The key condition for healthy mushroom growth is moisture. Mushrooms should be kept out of direct sunlight to promote wetness. A wet growing medium, such as manure or compost, is beneficial for button mushrooms. On logs, shiitake mushrooms thrive best with dry bark and moist internals. Every time the logs start to dry out, soak them for 48 hours to bring the moisture level back to 35 to 45 percent.

- ❖ **Nutrients**: Mushrooms obtain their sustenance through the breakdown of organic matter, as opposed to plants, which obtain it through photosynthesis. In addition to lipids, lignin, nitrogen, protein, starch, and sugar are required for mushroom growth.

- ❖ **Temperature**: The improper temperature can assassinate growing mushrooms, therefore it's crucial to keep an eye on this situation, adjusting the temperature as necessary with heaters or fans, and protecting mushrooms from draughts and direct heat. The temperature range that button mushrooms require to survive is between 55 and 60 degrees Fahrenheit, where most species thrive. Shiitakes thrive in temperatures between 72 and 78, but can survive between 40 and 90 degrees. The ideal air temperature for enoki mushrooms is 45 degrees.

This mushroom is usually found in fields and grassy areas around the world after rain, particularly when combined with manure, from late spring to October. It is frequently harvested and consumed throughout most of the world, despite similarities to dangerous or lethal look alikes. *Amanita* species can be confused with ordinary mushrooms in their juvenile forms, but you can distinguish them by their volva or cup at the base of the mushroom and their pure white gills (as opposed to the pinkish or brown of *A. bisporus*). As a result, it is crucial to always clean away debris, look at the base of identical mushrooms, and sever the gills of immature specimens to inspect them. In addition to flourishing in mossy forests, the destructive angel gets along well with spruce. *Agaricus xanthodermus*, an inedible mushroom that can be found in grassy areas all over the world, is a more frequent and less hazardous mistake than *A. bisporus*. *A. xanthodermus* has a phenol-like odour, and when damaged, its flesh turns yellow. Some persons who have this fungus experience nausea and

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vomiting **[10, 11].**

Mushrooms are among the most fascinating plant species, which are commercially grown variations, wild varieties, or even both. Antioxidant-rich edible mushrooms add an earthy flavor to practically any prepared food. However, many mushrooms are either dangerous or tasteless. Given that there are 10,000 different kinds of mushrooms known to exist, a complete list of all of them would be impossible to maintain. However, some of them **[12-15]** as mentioned below-

- **Button mushroom (*Agaricus bisporus*)-** known as white mushrooms are the most frequently convenient mushrooms in the food mart. However, their resemblances are extremely poisonous in the wild.

- **Oyster (*Pleurotus ostreatus*)-**These mushrooms have an intricate look and a flavorful, mild flavor. They are readily available in stores and simple to cultivate at home. Despite not being the most popular oyster mushroom in the world, *Pleurotus populinus* and *Pleurotus pulmonarias* are both nonetheless regarded as oyster mushrooms.

- ***Portabello*-**This big, muscular mushroom may spread out to a maximum of 6 inches. They are frequently used as a meat replacement and taste great when grilled.

- ***Morel (Morchella*)-**Early to late April is when this delectable, edible mushroom blooms in forest regions. It appears to be a sponge. Though toxic, false morels look like morels.

- **Reishi (*Ganodermalucidum*)- is** renowned as a medicinal fungus with immune-boosting antioxidant qualities.

- **Burnt matches (*Eutypellascorpia*)-** resemble a bunch of burnt paper matches and is typically seen in winter on sticks and branches.

- ***Chanterelle* (*Cantharellus*)-**is called a first class mushroom. It has a powerful flavor, is brilliant orange or yellow, and has a soft texture. Chanterelle is gathered in the fall from the ground beneath hardwood trees like oaks, identical are toxic.

- ***Laetiporus sulphureus* -**Unsurprisingly, this mushroom also known as the chicken mushroom, tastes like chicken. Depending on the species, these mushrooms are typically discovered in big, fan-shaped clusters that are occasionally linked to some kind of tree, either alive or dead. Mushrooms are frequently vividly colored and appear in orange and yellow tones.

- **Cordyceps (*Cordyceps militaris*)-**is a type of edible fungus that is mostly renowned for its therapeutic uses. It has been researched for its potential anti-inflammatory and anti-cancer properties.

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- **Enokitake-** These tiny edible mushrooms may be purchased in most stores and are easily recognised by their thin, pin-like form and white color. Enoki mushrooms are used in a variety of ways, such as pickled or quickly fried, to give any dish a texture.

- **Giraffe Spots (*Endophora albobadia*)-**Frequently observed in winter on the ground's sticks and branches look like a giraffe's coat.

- **Destroying Angel (*Amanita sp.*)**- From summer to fall, this extremely deadly mushroom thrives in woodlands. It resembles edible button mushrooms that you can get at the supermarket almost exactly. It is deadly, as the name suggests.

- **Green-spored Lepiota (*Chlorophllum*)-**This white, upright mushroom, which can be found in grassy regions, can get up to 8 inches across. Grey-green spores are what it leaves behind. Avoid interacting with this dangerous species.

- **Matsutake mushroom-** In contrast to its relative obscurity in the west, the matsutake, or pine, mushroom is highly used in the east. Since it exclusively grows under specific trees and is sometimes hidden by leaves and other vegetation on the forest floor, the matsutake is an uncommon find in the wild. Since rabbits, deer, squirrels, and other animals frequently consume pine mushrooms before they can be harvested, humans are not the only species to desire them. The matsukate cultivar has a strong spicy flavor and aroma.

- **Shiitake mushroom (*Lentinula edodes*)-** is an Asian mushroom that is well renowned for its culinary versatility as well as its therapeutic properties.

- **Truffles-** Despite being difficult to come by, the truffle mushroom is called one of the best tastings in the world. These fungi lie underground and used by specially trained canines with exceptionally refined senses of smell. As the underground fruiting body of a fungus, truffles are difficult to see with the human eye because they lack an external stem or cap that would protrude from the ground. Truffles are fairly unsightly and knobby, yet foodies all over the world adore their rich, nutty, earthy flavor.
- **Shimeji-** Identifiable characteristics of these little edible mushrooms include their tall stems and concave, tight caps. Mushrooms should never be eaten raw since they can be hard to digest until they have been roasted for a while. They respond well to practically all cooking methods, whether they are used at high, low, quick, or slow temperatures. So go ahead and fried or braises them and enjoy the delicate earthy taste of the shimeji.

In addition, *Pleurotus ostreatus*, is an edible fungus also called as the tree oyster mushroom or pearl oyster mushroom. Today, it is produced commercially for food all around the world. It belongs to the family *pleurotaceae*, the genus *Pleurotus*, the *basidiomycota* division, the class *agaricomycetes*, the order *agaricales*, and the kingdom of fungi.

One of the more popular wild mushrooms is the oyster mushroom, though it can be grown on straw and other materials. It has an odor like benzaldehyde, which is bittersweet (which is also

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characteristic of bitter almonds). Greek term "pleurotus" relates to the stem's lateral extension concerning the cap, whilst the Latin term "ostreatus" (and the English common name, "oyster") alludes to the shape of the cap that resembles the bivalve of the same name. Many people also say that the name is appropriate because the food has an oyster-like flavor **[2-5].**

A natural mushroom varies in color white to grey or tan to dark brown. The mushroom is a broad, fan- or oyster-shaped cap that is 5–25 cm long. The edge is smooth when young, but is frequently slightly lobed or wavy. Due to the configuration of the stipes, the flesh is white, hard, and varies in thickness. In many temperate and subtropical woods around the world, oyster mushrooms are common in the Pacific Northwest of North America, *P. pulmonarius* and *P. populinus* have taken their place. It is a saprophyte that mostly decomposes wood, notably beech trees and other deciduous trees. This fungus causes white-rot wood degradation. The oyster mushroom is one of the few known predatory mushrooms. It is believed that the mushroom obtains its nitrogen through the ability of its mycelia to kill and digest nematodes **[4-7].**

The oyster mushroom can be found in a diversity of habitats, although other closely related species, like the branching oyster mushroom, can only be found on trees. In the UK, they can be spotted all year long. Although dead hardwood trees have been seen to have this fungus growing on them, it does so saprophytically rather than parasitically. As the tree dies for other reasons, P. ostreatus grows rapidly on the pile of dead and dying wood. By rotting the dead wood, they replenish the ecosystem with essential nutrients and minerals that may be used by other plants and animals.

As a delicacy, the oyster mushroom is extensively utilized in cuisine. It is typically consumed alone, in soups, stuffed, or soy sauce-based stir-fry dishes. In some cases, oyster mushrooms are turned into an oyster sauce-like sauce that is utilized in Asian cuisine. The flavor of the mushroom has been characterized as moderate, with a faint anise-like aroma. The oyster mushroom is finest when collected when it is still young because as it ages, the meat gets tough and loses flavor **[6-9].**

In Kerala, India, pearl mushrooms are extensively cultivated and utilized in a wide range of recipes. The majority of oyster mushrooms are raised in large, clear polyethylene bags that have been divided into layers with hay and spawn. Oyster mushrooms contain very small amounts of arabitol, a sugar alcohol that some individuals may find upsetting.

Scientists are now learning what herbalists have known for centuries. In addition to being a vital source of nutrients, mushrooms can also boost the immune system, aid in the treatment of cancer, lower blood sugar and excessive cholesterol in diabetics, and even fight the HIV virus. The porcinis mushrooms are known as a good sources of antioxidants that prevent aging and may even lower the risk of neurological disorders like Parkinson's and Alzheimer's.

Recent studies have found a link between the most often consumed mushroom, the white button mushroom, and has the potential to cure breast cancer and prostate cancer. One of the few foods that naturally contain vitamin D, button mushrooms are also high in antioxidants that fight inflammation and promote good health. The shiitake mushroom, one of the most widespread in Asia, has gained attention due to lentinan, a polysaccharide found in shiitakes that has been used against cancer patients' lives, eradicating tumours and reduce the likelihood of tumors recurring. Additionally,

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shiitake mushrooms have an ingredient as correlating compound, called active hexose which is the second most widely utilized complementary treatment for cancer treatment in Japan.

Patients with modern stomach cancer who received chemo coupled with shiitake-derived chemicals lived longer than those who received chemotherapy alone. The maitake mushroom, commonly known as hen of the woods, has a long history of being beneficial in the treatment of cancer patients. Researchers found that maitake extract reduced malignant tumors by 75% when paired with low doses of interferons. Maitake and shiitake mushrooms, which are also rich sources of minerals including B vitamins, have also been linked to the immune system.

In conclusion, it is fascinating to speculate about potential future applications for mushrooms as study advances. Additionally, rich in fiber and low in fat, mushrooms also have vitamin D in them. They also include a tonne of healthy chemicals and antioxidants, as well as the nutrients copper, niacin, phosphorus, potassium, and selenium. It is understandable why mushrooms have been used in traditional medicine for so long.

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