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Review Article

Chemical Composition and Uses of Wild Edible Mushrooms - A Review

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Abstract

The chemical composition and use of fungi as has been done in relation to the use and content of the chemical composition. The specific nutritional properties of mushroom fruiting bodies, along with their texture and flavor, are one reason why they are consumed and considered a delicacy. In this review, we collected data from several scientific studies that focused on the chemical composition and various uses of wild edible mushrooms. Other uses are briefly described.

Keywords: *Chemical Composition; Fungi; Minerals; Health*

What are mushrooms?

Fungi are succulent species of plants belonging to the group of fungi. Fungi are non-chlorophyll organisms and are incapable of photosynthesis [1]. They got their energy through biochemical decomposition processes. Mushrooms usually grow in cool, humid places [2]. They are most often found in meadows, meadows and forests. On a commercial scale, mushrooms are grown in caves, shelves filled with indoor plants and greenhouses with low average temperatures [3].

Figure 1: *Mushrooms.*

Wild edible mushrooms are valued not only for their texture and taste, but also for their chemical and nutritional properties [4]. Cultivated mushrooms are high in protein and minerals, low in fat and rich in vitamins B, D, K and sometimes A and C [5].

Knowledge of chemical composition enables wild mushrooms to be used as food or bioactive resources, benefiting local economies related to non-timber forest product extraction, gastronomy and healthcare [6]. Diversified use of these resources will facilitate better management and protection of the habitats in which they grow.

Wild mushrooms are known as a delicacy in many countries due to their high protein and trace element content [7].

They are used in the treatment and prevention of diseases and exhibit various biological properties such as antibacterial, antimutagenic, antitumor and antiviral activity [8].

Environment for mushroom growth

Fungi are a type of fungi that feed on decaying bark and other materials [9]. Unlike plants, mushrooms do not contain chlorophyll and do not require sunlight to grow. Whether grown indoors or in the wild, mushrooms have specific light, water, warmth, and medium requirements to grow and bear fruit [10].

Light: Mushrooms do not contain chlorophyll, so they grow without the need for light or photosynthesis. Mushrooms need as dark an environment as possible to breed, but even a little light does not affect growth. Fungi require low light to form fruiting bodies, but only a few hours a day are required for successful fruiting [11].

Water and moisture: Mushrooms need moisture to bear fruit. However, because it has no skin, it loses moisture easily [12]. For this reason, mushrooms require a high humidity environment to avoid water loss. Mushrooms breathe and exchange gases with the atmosphere, so you can "drown" them. When growing mushrooms indoors, the soil should be moist, not moist [13]. Wild mushrooms grown outdoors may disappear in dry weather and reappear when moisture and humidity levels improve.

Growing medium: Some decompose, decompose manure, mulch, soil, or compost, and feed on the carcasses and rotting matter of these materials. Commercially grown mushrooms are often grown with a combination of manure and straw. The growing medium for free-growing mushrooms may not be easily visible. B. Dead vegetation in subsoil [14].

Temperature: Fungi prefer cool environments around 70 degrees Fahrenheit [15]. Mushrooms form fruits or visible parts when temperatures reach 50 to 70 degrees Fahrenheit. Commercially grown mushrooms prefer temperatures around 55 degrees Fahrenheit and rarely exceed 60 degrees Fahrenheit [16].

Nutrients: Fungi synthesize the nutrients they need from organic matter [17]. The specific nutrients they need to grow are sugar, starch, lignin, fat, protein and nitrogen. Compost from manure and straw contains ideal amounts of these nutrients for mushroom cultivation, while shiitakes are able to extract the nutrients they need from the wood of logs or sawdust where they grow [18].

Chemical composition

Studies evaluating the composition of fungi have yielded surprising results regarding the various compound classes identified in terms of their frequency. It is known that the chemical composition of mushrooms, and thus their nutritional value, depends on a number of factors, including the type of mushroom, the soil in which the plant grows the maturity stage of the soil, and the climate.

Major minerals in mushrooms

Since the 1970s, many studies have been performed in the literature to quantify the elemental content of wild mushrooms. Several articles and review articles with numerous references provide important information on the mineral content of mushrooms [19].

In addition, mushrooms contain many essential minerals such as iron, phosphorus, copper, potassium and selenium. Potassium is an important mineral that helps with fluid retention, which helps control blood pressure. Phosphorus combined with calcium forms the structure of our teeth and bones [20].

Foods and grains of animal origin are sources of selenium, but only mushrooms are an excellent source of selenium in production [21].

The U.S. Food and Drug Administration recently praised its disease-fighting ability, stating, "A diet containing foods that are good sources of potassium and low in sodium may reduce the risk of high blood pressure and stroke". Some mushrooms provide more potassium than food and are well-known sources of this mineral. A serving of white mushrooms contains more potassium than oranges or tomatoes. Portabella mushrooms contain more than a glass of orange juice [22].

Mineral elements	Range of literature value (mg/100 g dry wt)	Reference
Potassium	2500-4100	[23]
Phosphorus	120.0-2000	[24]
Calcium	1.8-59.0	[24]
Sodium	6.0-92	[24]
Magnesium	60-250	[23]
Iron	1.46-83.5	[25]
Zinc	2.98-15.8	[26]
Copper	7.1-9.5	[25]
Manganese	1.81-10.3	[27]
Selenium	1-5	[28]
Nickel	0.118-0.514	[25]
Lead	0.286-0.688	[26]
Cadmium	0.271-0.75	[26]

Table 1: *Range of reported literature values (mg/100g dry weight basis) in mushroom.*

Fungal lipids

Non-polar lipid content varied from 2.0 (*Leccinum aurantiacum* and *Boletus erythropus*) to 5.4% (w/w) d.w. (*Suillus grevillei*) with an average value of 2.9% [29]. More than 25 different MKs have been found in fungal lipids. Unsaturated fatty acids, especially linoleic and oleic acids, accounted for about 83% of total fatty acids, with palmitic acid being the most important saturated FA [29]. Several FAs have been identified in Boletaceae and higher basidiomycetes (cis-11,12-methyleneoctadecanoic acid, 7-cis,10-cis-hexadecadienoic acid) or fungi (cis-11,12-methyleneoctadecanoic acid) [29].

The most abundant fatty acids were oleic acid (9-18:1, 15 - 42%), linoleic acid (9.12-18:2, 38 - 58%) and palmitic acid (16:0, 7 - 17%), but a large variation in ester composition was found from one to another [30]. The composition of neutral lipids, glycolipids, polar lipids and fatty acids in four species was compared.

Among polar lipids, diacylglyceryltrimethylhomoserine and phosphatidylcholine were found as major components [31].

Natural flavor and aroma compounds in mushrooms

Different chemical compounds are responsible for different types of flavors. Flavor compounds are present naturally (e.g. in fruits, vegetables, meat and mushrooms) or are added to different foods from different sources [32].

Chemical analysis of samples revealed compounds responsible for the characteristic taste and odor. The most characteristic aromatic compounds are found to be defined primarily by volatile C8 compounds. Among all C8 compounds, Oct-1-en-3-ol, Octan-3-ol, Octan-3-one, and Oct-1-en-3-one are the most important for mushroom flavor. Mushrooms and mushrooms allow for the biotechnological production of some flavor components. *Nidula niveotomentosa* in water culture produces raspberry ketones, which are characteristic raspberry compounds. Biotechnological production can also provide the rare and delicious biomass of forest mushrooms.

G. porcini mushroom [33].

Application of mushroom as food

Mushrooms have a unique texture, pleasant aroma, flavor and taste that distinguish them from other edible plants [34].

Mushrooms are a nutritious, low-calorie food containing high-quality proteins, vitamins and minerals [35]. Mushrooms are an important natural resource for food and medicine. Due to their high fiber content and low fat and starch content, edible mushrooms were considered an ideal food for overweight people and diabetics to prevent hyperglycemia. It is also known to have antioxidant, cardiovascular, hypercholesterolemic, antibacterial, hepatoprotective and anticancer properties.

More than 3,000 species of mushrooms are mainly edible species, but only 100 species are grown commercially, only 10 species are used on an industrial scale, and have limited food and pharmaceutical value. Its global and economic value is now slowly increasing as nutritional value [36].

Health benefits of mushroom

For thousands of years, edible mushrooms have been revered and widely used in folk medicine for their immense health benefits. Certain biochemical compounds in fungi play a role in improving human health in many ways [37]. These bioactive compounds include polysaccharides, triterpenoids, glycoproteins and immunomodulatory compounds. Therefore, mushrooms have been shown to support immune function. Strengthen your health. Reduces cancer risk. Inhibits tumor growth. Helps balance blood sugar; protects against viruses, bacteria and fungi; reduces inflammation. Supports the body's own detoxification mechanisms.

Growing awareness of mushrooms as an adjunct to conventional medicines is also known to fight many diseases [38].

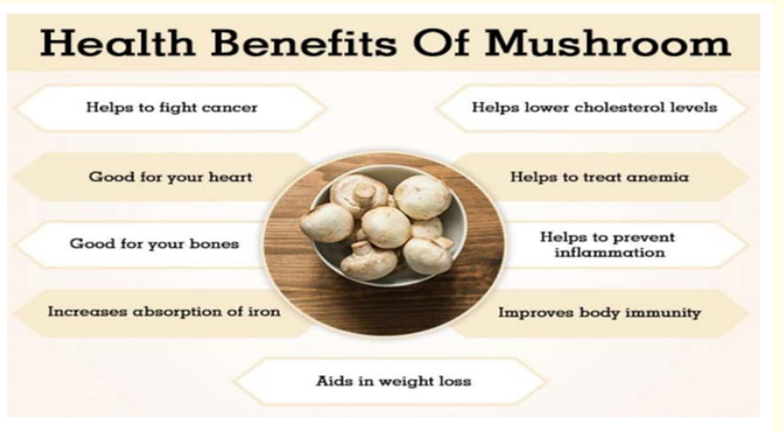

Figure 2: *Health benefits of mushrooms.*

Here are the best health benefits of Mushroom. You can make healthy mushroom snacks, soups and recipes offer right amount of nutritional value.

Mushrooms helps in the fight against cancer

Mushrooms are rich in antioxidants that fight harmful free radicals in the body. Left untreated, these free radicals tend to damage the cells of the body and can eventually lead to cancer. Selenium is a mineral found in mushrooms that promotes the function of enzymes in the liver. And helps detoxify some of the cancer-causing substances in the body. Vitamin D, also found in mushrooms, regulates cell growth cycles and prevents cancer cells from growing [39].

Mushrooms good for cholesterol

Mushrooms have no cholesterol or fat and are very low in carbohydrates. However, they contain fiber and other enzymes that help lower cholesterol levels. Mushrooms are also rich in lean protein, which helps burn cholesterol. Therefore, consuming mushrooms can help regulate cholesterol levels and protect the heart [40].

Mushrooms good for heart disease

Mushrooms contain dietary fiber, vitamin C and potassium, which help prevent cardiovascular disease. Mushrooms are high in potassium and low in sodium and this combination helps lower blood pressure. This helps you avoid the risks associated with high blood pressure and cardiovascular disease. Cream of Mushroom Soup can be consumed for heartburn and heartburn [41].

Mushrooms help treat anemia

Anemia is caused by iron deficiency and is characterized by fatigue, headaches, digestive problems, and decreased nerve friction. Reishi soup is rich in iron, which helps prevent these symptoms. Iron helps the formation of red blood cells, keeping us healthy and fully functioning [42].

Mushrooms good for bone and osteoporosis problems

Mushrooms contain calcium, which strengthens bones and helps in bone formation. Therefore, by including mushrooms in your diet, you can get the calcium that is essential for your bones. This can delay or prevent the onset of diseases such as osteoporosis and other diseases associated with bone loss such as sedentary lifestyles and joint pain [43].

Mushrooms help prevent inflammation

Mushrooms contain a powerful antioxidant called ergothioneine, which helps prevent inflammation. A special type of mushroom known as reishi mushrooms fights disease, reduces inflammation, suppresses tumor growth and allergic reactions. These reishi mushrooms have been used for thousands of years in Asia for their anti-inflammatory properties [44].

Mushrooms increase the absorption of iron

It promotes proper use by aiding proper absorption of iron and releasing iron from the body's major stores such as the liver. Copper and iron work together in mushrooms to ensure healthy bones and prevent anemia [45].

Reishi mushrooms for immune system

Contain ergothioneine, a sulfur-containing amino acid that is a powerful antioxidant and helps boost the body's defenses. This compound helps remove all free radicals that tend to cause various diseases in our bodies [46]. Mushrooms contain natural antibiotics that prevent microbial growth and other fungal infections. is also included. Additionally, mushrooms are excellent immune supporters and the vitamins A, B-complex and C in mushrooms also help boost the body's immunity [47].

Mushroom diet for weight loss

Mushrooms are high in protein and fiber, but very low in carbohydrates and very little in fat and cholesterol. Beta-glucan and chitin are two types of fiber found in mushrooms that help increase satiety and suppress appetite. This fiber in mushrooms helps keep you feeling full and reduces your caloric intake [48]. You can cook various mushroom recipes for weight loss. Add this amazing vegetable to your diet.

Conclusion

Mushrooms have a long association with humankind and provide profound biological and economic impact. From ancient times, man has consumed wild mushrooms with delicacy probably, for their taste and pleasing flavor. They can be used as source of alternative food and have medicinal values. mushrooms contain components with outstanding properties to prevent or treat different type of diseases. Generally, mushrooms are a rich, low calorie source of fiber, protein, and antioxidants. They may also mitigate the risk of developing serious health conditions, such as Alzheimer's, heart disease, cancer and diabetes.

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