



**Biotica
Research
Today**
Vol 4:5
2022

341
343

Fungiculture - An Importance and Its Nutritive Value

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Keywords

Mushroom, Nutrition, Protein, Vitamins

Article History

Received on: 29th December 2021

Revised on: 22nd May 2022

Accepted on: 23rd May 2022

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How to cite this article?

Sahila *et al.*, 2022. Fungiculture - An Importance and Its Nutritive Value. *Biotica Research Today* 4(5):341-343.

Abstract

Mushroom, a nutrient-dense multipurpose food can share some of the benefits of fruits and vegetable and balance almost any everyday meal. Mushrooms are a group of fleshy macroscopic fungi. Mushrooms are being used as food since time immemorial. Due to culinary, nutritional and health benefits, the mushroom market is expected to grow as “a food, a tonic and a medicine”. These are rich in protein, carbohydrate and vitamins. Mushrooms are low in caloric value and hence are recommended for heart and diabetic patients.

Introduction

“Fungiculture” means cultivation of mushrooms and other fungi. Cultivating fungi can yield food, medicine, construction materials and other products. Mushroom is being widely used as food and food supplements from ancient times. It lacks chlorophyll and synthesizes enzymes like cellulose and hemicellulose which bring the substrate to available forms. It grows on dead organic matter. The edible part constitutes the fruit body. It varies widely in size and shape in different mushrooms. Most of the mushrooms belong to the sub-division Basidiomycotina and a few belong to Ascomycotina. Out of 1.5 million species of fungi, about 10,000 are fleshy macrofungi. About 2,000 species from more than 30 genera are regarded as prime edible mushrooms, 80 of them are grown experimentally, 40 cultivated economically, 20 cultivated commercially and 4-5 are produced on an industrial scale. Commercially cultivated mushrooms such as Oyster mushroom, Milky mushroom, Button mushroom, Paddy straw mushroom, Jews ear mushroom and Shitake mushroom. Mushrooms are recognized as the alternative source of good quality protein and are capable of producing the highest quantity of protein per unit area and time from the worthless agro-wastes (Kakon *et al.*, 2012). Amongst edible mushrooms have anti-fungal, anti-bacterial, anti-viral, anti-tumour and other properties of pharmacological values. They are rich in proteins, vitamins, minerals, fiber and they contain abundance of all essential aminoacids (Sadler, 2003). Therefore, mushrooms can be a good supplement to cereals, fruits and vegetables.

India is primarily agriculture-based country blessed with a varied agro-climate, abundance of agricultural waste and manpower, making it most suitable for cultivation of all types of temperate, subtropical and tropical mushrooms. It can profitably be started by landless farmers, unemployed youths and other entrepreneurs. It requires less land as compared to other agricultural crops and is basically an indoor activity. These are the ideal tools for recycling the agricultural wastes which otherwise may pose problem of disposal and atmospheric pollution. The technology can

also limit air pollution associated with burning agriculture wastes as well as to decrease environmental pollution due to unutilized agricultural wastes (Syed Abrar *et al.*, 2009). Therefore, mushroom cultivation is not only of economic importance but also has important role to play in integrated rural development programme by increasing income and self-employment opportunities for village youths, woman folk and housewives to make them financially independent.

Importance of Mushroom Cultivation

- Mushroom possesses unique flavor and exotic taste.
- It is a rich source of quality proteins (20-35% on dry weight basis), which is higher than the protein content of vegetables and fruits.
- Have a high percentage of all the nine essential amino acids and are rich in lysine and tryptophan, the two deficient in cereals.
- They are almost free from fat except for linoleic acid, but are richer in water soluble vitamins; B₁ (thiamine), B₂ (riboflavin), B₃ (niacin), B₅ (pantothenic) acid and B₁₂, also contain vitamin C (ascorbic acid), vitamin K and of course vitamin A, D* and E appear to be present in low amounts.

- They are good source of minerals (P, K, Fe, Na, Ca, and Mg). However, Na and P level decreases as the mushroom matures. K:Na ratio is very high.
- Mushrooms are probiotic and cultivation process is easy and simple.
- Mushrooms have a short crop cycle.
- Absence of crop competition in mushroom.
- Its cultivation is labour intensive and offers vast employment opportunities in rural areas and can be taken up by farmers as cottage industry and as a source of additional income.
- It is a good enterprise for farm women. About 80% of the work force engaged in mushroom cultivation worldwide constitute of ladies.
- Farm wastes are recycled to produce additional food in the form of mushrooms. In the process environmental pollution is contained.
- Water productivity can be scaled up through mushroom cultivation.
- The spent mushroom substrate (SMS) can be utilized for manuring, fertilizing the horticultural crops and feed for animals.

Table 1: Climatic requirements, crop duration and cropping cycle for commercially cultivated mushroom

Mushroom	Temp (°C)	Relative Humidity	Light (lux)	pH	Substrate moisture	Crop duration (days)	Crop cycleb (days)
Oyster	20-30 °C	> 75%	200	6.5-7.0	65%	21	45
Milky	25-38 °C	> 80%	200	6.5-7.0	65%	40	60
Paddy straw	25-38 °C	85-90%	1000	6.5-7.0	65%	15	21
Button							
1. Vegetative	20-22 °C	80-90%	200	7.5	70%	60	90
2. Fructification	14-18 °C						

Nutritional Value of Mushroom

Edible mushrooms have high nutritional value, especially proteins, carbohydrates, essential aminoacids, minerals, vitamins *etc.*, in adequate quantities and low in sugars and as such are selective medicinal food for diabetics. May be because of this fact that the FAO has recommended mushrooms as food, especially for the underdeveloped countries where the protein malnutrition has become a real threat to human health. Production of mushroom protein

is a costly affair as compared to other sources of protein. Its protein value lies somewhere between that of meat and vegetables and moreover, it is a very good food for most of the vegetarians in India. Mushrooms also rank highly for their vitamin content and a good source of minerals. Various types of mushrooms are known to differ in their nutritional content but all are known to be good source of protein, carbohydrates, thiamine (vitamin B₁), riboflavin (B₂), niacin, pantothenic acid, biotin, folic acid, vitamin C, D, A and K.

Table 2: Nutritive values in various types of mushroom (Rahi and Malik, 2016)

Species	Moisture	Carbohydrate	Protein	Crude fibre	Fat	Ash
<i>Pleurotus florida</i>	87.5	42.83	20.56	11.5	2.31	9.02
<i>Pleurotus ostreatus</i>	88.5	50.9	32	6.2	3.1	6.1
<i>Agaricus bisporus</i>	78.3-90.5	51.3-62.5	23.9-34.8	8.0 -10.4	1.7-8.0	7.7-12.0

Species	Moisture	Carbohydrate	Protein	Crude fibre	Fat	Ash
<i>Volvariella volvaceae</i>	89.1	-	25.9	9.3	2.4	8.8
<i>Lentinan edodes</i>	90-91.8	67.5-78.0	13.4-17.5	7.3-8.0	4.9-8.0	3.7-7.0
<i>Flammulina velutipes</i>	89.2	73.1	17.6	3.7	1.9	7.4

Note: All data are presented as percentage of dry weight except moisture (percentage of fresh weight) and energy value (Kcal per 100 g dry weight)

Conclusion

Mushroom cultivation is most suitable and profitable in all three climatic conditions like tropical, subtropical, and temperate regions. They may be grown on diversified agro substrates, according to easy availability in different regions of the world. It helps in recycling agricultural wastes and their conversion into protein-rich food. They play an essential part in the forest ecosystem, which may restore and stabilize the forest communities (Jegadeesh *et al.*, 2021). It is a treasure for nutrition and can substantiate the sufferings from malnutrition to some extent. It contains more protein, in comparison to other animal and plant food, low carbohydrate, and that too is not in the form of starch rather than in the form of glycogen, zero fat and adequate vitamins & minerals which is higher than vegetables and fruits and is of superior quality. They are good source of high quality fibers & low caloric food. So, mushroom is an alternative rich source of meat, fish, vegetables, fruits *etc.* There is a great scope to use of mushroom as an alternative food and ensure food security for the people. Mushroom farming is a labor-intensive activity that can improve income generation and provide livelihoods, especially in developing countries.

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