

Mushrooms: Nature's Boon

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Abstract

Mushrooms represent important but least utilized resources of nature. They have a wide variety and still many need to be discovered. They have a great nutritional value besides having medicinal use. These have a low glycemic index most suited to people affected by diabetes. Mushrooms are used as antioxidant and deliver surprising array of essential vitamins and minerals. These are excellent choice for lowering uric acid levels in people suffering from gout. Besides augmenting the food availability its production is a great boost enriching the ecosystem by the utilization of tremendous agricultural and human waste which otherwise would have only resulted in the production of green house gases.

Key words: Mushrooms, nutrition, Waste utilization, medicinal value, recycling, culinary, nutraceutical.

Mushrooms a group of fleshy macroscopic fruiting bodies of fungi have been considered to be a complete food since time immemorial. These have been and are being utilized extensively in many cuisines as these are rich source of proteins, vitamins dietary fibres and essential minerals. Some of them have medicinal properties. References related to mushrooms are available is classical religious writings of Babylonians, Greeks and Romans. In India according to Charak samhita mushrooms are classified into three categories, edible, non-edible and medicinal²².

It is because of their culinary, nutra-

ceutical potential and awareness among people nowadays that mushrooms occupy a prime place in the dietary system as food supplement. India being a country of different climatic regions is a suitable place for cultivation of mushrooms. One of the reasons for their dietary supplement besides nutritive value is the ease with which these can be cultivated. These methods have been made easy after lot of research.

Many edible mushrooms include button mushrooms (*Agaricus bisporus*), summer white button mushrooms (*Agaricus bitorquis*), Black ear or wood ear mushroom (*Auricularia sps*), Shitake mushroom (*lentinula*

edodes), Kabul Dhingri (*Pleurotus eryngii*) & Dhingri (*P sajour caju*) are some of the temperate mushrooms grown usually in Northern India. The tropical and subtropical mushrooms like oyster (*Pleurotus sps*), Paddy straw (*Volvariella sps*), Reishi (*Ganoderma sps*), Wood ear (*Auricularia sps*) etc are not cultivated on a large scale. (Table-1). At present mushrooms are grown only seasonally. In order to keep the supply of mushrooms available throughout the year all the varieties can be grown as per their specific temperature requirements.

Lot of work has been carried out on the nutritional composition of mushrooms. They have been found to contain high proportion of protein and very low or negligible amount of fat, high proportion of polyunsaturated fatty acids. (Table-2). Mushroom protein contains all the nine essential amino acids required by humans. In place of feeding trials, alternative methods have been utilized to determine the nutritional value of mushrooms on their content of essential amino acids pattern based on known adult human dietary requirements. Crisan and Sands, 1987 proposed the use of a nutritional index for mushrooms. From these studies it was found that most nutritive mushrooms (highest values) rank alongside meat and milk in potential nutritive value and more than legumes and vegetables, while as, least nutritive mushrooms rank lower but are still comparable to some of the common vegetables⁵⁻⁸.

Mushrooms instead of cholesterol contain ergosterol and in presence of sunlight (uv light), ergosterol gets converted into ergocaliferol, *i.e.*, it ultimately helps in generating vitaminD. It can thus supplement all vitamin D requirements of the body¹⁸.

Moreover the vitamin D in mushroom is easy to absorb and effective in improving vitamin D status⁴. Mushrooms naturally produce vitamin D, which helps in the absorption of calcium, which in turn maintains bone density, prevents Rickets & Osteoporosis. Normal Vitamin D levels decreased risk of heart disease, type 2 diabetes, and hypertension. and colorectal cancer^{9,19,21,27} and prostate cancer¹. Studies have shown that two carbohydrates found in mushrooms inhibited breast cancer cell growth in laboratory^{9,13,17}. Mushroom intake can also improve lipid metabolism lower cholesterol levels, uric acid levels and also prevent the development of atherosclerosis^{3,14}.

Various mushroom derived compounds include polysaccharides, triterpenoids, lectins, steroids, proteins and protein bound polysaccharides, which constitute anticancer, antiviral, immunomodulatory, and hypocholesterolaemic and hepatoprotective agents. These compounds which can be consumed daily as dietary supplements are called mushroom nutraceutical^{5-8,11}. The Glycemic index (GI), of mushrooms is low thus can be consumed by diabetics. Mushrooms have been shown to lower blood cholesterol and blood glucose levels in laboratory animals¹⁶. Being a source of Potassium and virtually salt free, mushrooms help reducing blood pressure and are used to control weight¹⁰. Mushrooms have also been found to be rich source of anti-oxidants thus increase the anti cancer immune response²⁴.

The time is not far away when mushroom industry will play a vital role in nutraceutical and pharmaceutical industry^{25,26}. Besides generating quality healthy food and

Table-1 Some of the mushrooms with their common and Scientific Names

S. No.	Scientific Name	Common Name
1.	<i>Agaricus bisporus</i>	White Button Mushroom
2.	<i>Agaricus bitorquis</i>	Summer White Button Mushroom
3.	<i>Agrocybe aegerita</i>	Black Poplar Mushroom
4.	<i>Auricularia spp</i>	Black Ear/Wood ear mushroom
5.	<i>Calocybe indica</i>	Milky/Dudhiya mushroom
6.	<i>Coprinus lagopus</i>	Ink Caps, Dung mushroom
7.	<i>Dictyophora duplicata</i>	Bamboo Sprouts/Flower of the Fungi
8.	<i>Flammulina velutipes</i>	Winter mushroom/velvet stem
9.	<i>Ganoderma lucidum</i>	Reishi mushroom
10.	<i>Lentinula edodes</i>	Shitake/Black Mushroom
11.	<i>Pleurotus spp.</i>	Oyster Mushroom
12.	<i>Pleurotus eryngii</i>	Kabul Dhingri
13.	<i>Pleurotus flabellatus</i>	Dhingri(<i>flabellatus</i>)
14.	<i>Pleurotus florida</i>	Dhingri(<i>florida</i>)
15.	<i>Pleurotus sajor cajo</i>	Dhingri
16.	<i>Tremella fuciformis</i>	Silver Ear/white jelly fungus
17.	<i>Volvariella volvacea</i>	Paddy straw mushroom/Tropical mushroom

Table-2 Nutritive values of different mushrooms
(dry weight basis g/100g)(ICAR.2011)

Mushroom	Carbohydrate	Fibre	Protein	Fat	Ash	Energy kcal
<i>Agaricus bisporus</i>	46.17	20.90	33.48	3.10	5.70	499
<i>Pleurotus sajor-caju</i>	63.40	48.60	19.23	2.70	6.32	412
<i>Lentinula edodes</i>	47.60	28.80	32.93	3.73	5.20	387
<i>Pleurotus ostreatus</i>	57.60	8.70	30.40	2.20	9.80	265
<i>Volvariella volvaceae</i>	54.80	5.50	37.50	2.60	1.10	305
<i>Calocybe indica</i>	64.26	3.40	17.69	4.10	7.43	391
<i>Flammulina velutipes</i>	73.10	3.70	17.60	1.90	7.40	378
<i>Auricularia auricula</i>	82.80	19.80	4.20	8.30	4.70	351

In addition Vitamins C, B, Folic Acid, Thiamine, Riboflavin, Niacin, minerals like Potassium, Sodium, Phosphorus & essential minerals like Copper, zinc, Magnesium in traces are present. (ICAR.2011)

job opportunities both for skilled and unskilled people are environment friendly. These can be cultivated on a number of substrates or materials including waste material. India produces about 600 million tonnes of agricultural waste per annum and a major part of it is either allowed to waste naturally or sometimes incinerated without any utility¹⁵. This waste can be recycled with the help of mushrooms. Public awareness will render a great help in increase in its consumption, demand and supply which in turn will lead to development of this industry.

There is a need to grow mushrooms economically and in an ecofriendly manner throughout the year at a very large scale culminating in making it an Industry. Since mushroom cultivation requires both skilled and unskilled people, people in rural, urban and remote villages can be trained to grow these at small as well as large scale level. This way both malnutrition as well as unemployment can be taken care of in a sustainable manner and India can be at par with other countries like USA, Japan and especially China where it is the sixth largest industry.

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