Nutritional security by using agricultural by-products as casing in white button mushroom (*agaricus bisporus*) production: a review

Malik Umar Bashir
Department of Agriculture, Gulzar School of Management , Khanna.
Email: umarorgan@gmail.com

Shilpa Thakur
Department of Agriculture, Gulzar School of Management, Khanna.
Email: Shilpathakur1289@gmail.com

Hardeep Kaur
Department of Agriculture, Gulzar School of Management, Khanna.
Email: tarmankaur1993@gmail.com

Abstract - The globe over, white button mushrooms are produced and used as dietary foods, medications, tonics, and sources of excellent nourishment. Mushrooms contain a lot of protein, crude fibre, vitamins, and minerals while being low in fat, calories, and carbohydrates. They offer superior carbohydrates that improve human health. Due to its nutritional value, which is comparable to that of several veggies, mushrooms are used as a meat alternative. Recycling agricultural by-products is currently regarded as a crucial practice for giving vegetarians better nutrition and therapeutic benefits. Growing mushrooms is an activity that has the ability to transform waste into the healthiest meal possible with high protein conversion efficiency.

Keywords: White Button Mushroom, nutrition, vitamins, agricultural by-products

I. INTRODUCTION

Worldwide, people utilise mushrooms as food, medicine, and nutritional supplements because they are incredibly nutrient-dense. It is incredibly abundant in protein (35%) and crude fibre (19%) as well as vitamins, cabs and minerals; yet, the low fat & calorie content and lack of starch make it a delight for those with diabetes, high blood pressure, or hypertension, and essential amino acid content as well as their usage in the treatment of numerous ailments like cancer and heart disease, edible mushrooms are a vital part of a balanced diet (Taherzadeh and Jafarpour, 2013).

The button mushroom, commonly known as *Agaricus bisporus* L. is broadly grown and ingest fungus that accounts for 40% of all global production of mushrooms (Giri and Prasad, 2007). Compost used to grow white button mushrooms includes straw-bedded horse manure, wheat straw, chicken manure and gypsum (Straatsma *et. al.,* 2000).

Casing layer is a crucial component of the entire substrate in artificial button mushroom cultivation. Along with genetic considerations, the growth and development of mycelium in mushrooms is also influenced by environmental, chemical, and microbiological variables (Pardo *et. al.,* 2004). The casing soil maintains the mushroom in opposition to pests and diseases safeguards the compost from drying out and encourages the development of sporophores and provides a gas exchange for development and growth of mushrooms (Colauto *et. al*., 2011). Many different materials, either by itself or in combination, have been employed as casing in commercial and experimental settings, but only a very small number have demonstrated promising outcomes that can be used in real-world settings (Gulser and Peksen, 2003). Additionally, the soil is always accessible, and its low cost has advantages like simple management. It is possible to lower production costs and pollution by using discarded mushroom compost as a casing soil material (Pardo-Giménez & Pardo-González, 2008). Several agricultural by-products are also used as casing.

II. BENEFITS OF MUSHROOM

According to Alispahic *et. al.,* (2015), the six main components of mushrooms is proteins, carbs, water, fat, fiber, and ash in addition to essential amino acids minerals. A cheap dietary option and are good protein source for those fighting malnutrition. According to

Aida *et. al.,* (2009), antioxidants and antibacterial can stop damage that is brought on by phenolic chemicals, free radicals, both other factors. Additionally, it is believed that they are able to lower cholesterol, deal with stress, and prevent some diseases. According to Goyal *et. al.,* (2015), the crude *A. bisporus* fibres are a useful source of dietary fibres since their 30 calories or less per 100 grammes (fresh) with low calorie content—help to prevent several prevalent disorders like obesity disease.

III. NUTRITIONAL VALUE OF AGARICUS BISPORUS

Along with carbohydrates, fats, fibre, vit., macro and micro-components (Owaid 2015), according to Muslat *et. al*., (2014) and other researchers. *Agaricus sp.* contains a significant amount of phosphorus. In general, proteins reconcile between 34% -44% of all dry matter in *A. bisporus* fruiting bodies (Grube *et. al*., 2001). Stearic, oleic, linoleic, and palmitic acids are among the diverse mixture of unsaturated fatty acids found in *A. bisporus* (Sadler, 2003). According to Tsai *et. al.*, (2007), the content of dried extract of fruits' ranged from 38 to 48 percent carbohydrates, 21 to 27 percent crude protein, 17 to 23 percent crude fibre, and 3 to 4 percent crude fat. Vitamins are plentiful in *A. bisporus*. It contains important A. acids that are good for human health K, Fe, Zn, Cu, Na, Se, Co, and Mn are found in *A. bisporus* (Owaid 2015).

Table 1: Mushrooms' typical nutritional components (Thakur, 2020)

Water	90%	Fat	0.3–0.8%	Ash	1%
Protein	2–3.5%	Dry ash	10%		
Carbohydrate	3–6.5%	Fiber	0 .5-1.5%		

IV. AGARICUS BISPORUS AS MEDICINE

Traditional remedies have traditionally used medicinal mushrooms like *Agaricus bisporus*. With benefits recently shown the utilization of extracts of white button mushroom for their bioactivity in the treatment of coronary heart disease, abnormalities of the immunological system, diabetes, infections and malignancies is growing. (Dhamodharan and Mirunalini 2010). These include antioxidants (Javan *et. al.,* 2015), antibacterial activity, antineoplastic and provocative activity. In their 2010 study, Dhamodharan and Mirunalini described the medicinal benefits of this fungus and its biological uses for treating cancer and chronic inflammation in humans.

bisporus mushroom was chosen by the Canadian Cancer Society because to its potency against human diseases. Cancers of breast, prostate and excessive blood pressure are all major targets of *A. bisporus* (MC 2007). According to Roberts *et. al.,* (2008), They observed a certain UV irradiation of *A. bisporus* fruit bodies in doses advised by (PFRU) results in the building up of significant amounts of vitamin D2, which is necessary for bone health, this mushroom has occurred valued as a source of medicine from thousands of years back.

V. EFFECT ON YIELD BY USING AGRICULTURAL BY PRODUCTS AS CASING IN AGARICUS BISPORUS

In order to assess their influence on yield of *Agaricus bisporus*, Kaur *et. al.,* (2017) set up an experiment at PAU in Ludhiana using six alternative combinations of FYM, biogas slurry, burned R. husk, used compost, C. pith, and S. soil were tested. Casing mixes underwent analyses for mineral analysis, electrical conductivity (EC), bulk density, pH, moisture, and water holding capacity (WHC). The moisture level of the casing combinations ranged from 33-56.3%, with the highest values found in FYM + BS and FYM + CP, which resulted in higher WHC of 160 and 100 percent respectively. The B. density of the various casing mixes ranged from 33.1% -83.3%, with greatest values for the control FYM + SS and FYM + BS. While the pH of the casing combination did not dramatically change, the EC in FYM+BS was significantly greater. The microbial number of the various case mixes ranged from 3.0-5.7105, which was statistically insignificant. 15.1 kg was the highest yield, and the fruit bodies were large came from a blend of FYM + BRH (1:1)

Kumar *et. al*., (2022) conducted an experiment in which they use sewage sludge (SS) as an upgrade to the casing material. *A. bisporus* was grown for 50 days in controlled laboratory environments using a substrate made from composted wheat straw. By combining garden and dried SS, various treatments (0, 50, 100, 150, and 200 g/kg) of casing variables were made, which were then applied to the mushroom substrate after being properly sterilized. According to the findings, adding SS significantly (p 0.05) increased yield with a B.efficiency of 65.02% at a 200 g/kg mixing rate. Additionally, the same treatment led to the greatest bio-accumulation of particular elements (Cu, Mn, Cr, Zn, Cd, and Fe).

In an experiment, Bashir *et. al*., (2023) used eight distinct combinations of rice husk, cocopeat, and farmyard. For every rupee invested in research, a profit of 1.48 was made. The casing variable combination (CP+FYM+RH steam pasteurisation) yielded the highest overall yield. These investigations assist white button mushroom growers in selecting the optimum casing materials. which is more likely to flourish and produce.

VI. CONCLUSION

Agaricus bisporus mushrooms can be cultivated on a variety of composts, including composts made from waste plants, and wheat straw. A few water plants, paper, oat straw, and various agricultural by-products can be used as casing. Because it contains proteins, carbs, few calories, trace minerals, and vitamins, *A. bisporus* has a wide range of dietary applications. This review's objective was to demonstrate the using of agricultural by-products as casing so as to get the maximum profit and synthesize the ecofriendly drugs.

VII. REFERENCES

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