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Household and Small-Scale Cultivation of Button Mushroom (*Agaricus bisporus*): An Effective Approach for Income Enhancement among Rural Women and Farmers

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Button mushroom (*Agaricus bisporus*) is one of the most widely cultivated and commercially important edible mushrooms in the world. In India, it plays a dominant role in total mushroom production and offers significant opportunities for income generation, especially for small-scale farmers, rural women, and unemployed youth. The present article describes the complete cultivation process of button mushroom under household and small-scale conditions, including compost preparation, spawning, casing, and crop management practices. Emphasis has been given to the use of locally available materials for low-cost infrastructure, such as thatched mushroom houses, and the effective utilization of agricultural residues. Suitable environmental conditions, including temperature and humidity, along with proper management practices, are essential for achieving higher yield and quality production. In addition, necessary precautions to prevent disease spread and ensure crop health have been discussed. Mushroom cultivation not only provides economic benefits but also contributes to nutritional security due to its high protein and medicinal value. Considering its increasing demand and wide range of applications, button mushroom cultivation can be adopted as a sustainable and profitable enterprise in rural areas.

Keywords: Button mushroom, *Agaricus bisporus*, small-scale cultivation, composting, spawning, casing, rural employment, income generation, mushroom production.

Introduction

The white button mushroom (*Agaricus bisporus*) is one of the most extensively cultivated edible mushrooms in the world and holds substantial commercial value. In India, it is the most widely grown and preferred mushroom species, contributing nearly 73% of the total mushroom production (**Sharma *et al.*, 2017; Rangnamei *et al.*, 2024**). Historically, the white button mushroom originated as a selected strain from brown mushroom varieties in the United States around 1926 (**Singh *et al.*, 2021**). Its cultivation involves four essential stages, namely compost preparation, spawning, casing, and crop management. The crop requires a temperature range of 14–18°C for both vegetative growth and fruiting, along with a relative humidity level above 85–90%. Although its cultivation generally demands considerable capital investment and technical expertise, it can be successfully grown during the period from October to February under suitable environmental conditions (**Rangnamei *et al.*, 2024**). Globally, China is the largest producer and consumer of mushrooms, followed by the United States and the Netherlands, which together account for more than 60% of the world's total mushroom production. Among the diverse mushroom types, seven major genera—*Agaricus*, *Lentinus*, *Volvariella*, *Pleurotus*, *Auricularia*, *Flammulina*, and *Tremella*—contribute nearly 89% of global output (**Pradeep *et al.*, 2023**).

In India, approximately 700 million tonnes of agricultural residues are generated annually; however, only a very small fraction (about 0.03%) is currently utilized for mushroom cultivation, producing nearly 1.2 lakh tonnes annually, which represents around 1% of the global mushroom production. The per capita consumption of mushrooms in India is relatively low, estimated at about 30–40 grams per year. Despite being a tropical country, India predominantly cultivates the temperate button mushroom (*Agaricus bisporus*). Mushroom cultivation offers immense potential for income generation, particularly for small and marginal farmers, landless laborers, rural women, and unemployed youth, while also contributing to nutritional security. At the commercial level, there is significant scope for the cultivation of four major types of mushrooms in India, namely button mushroom, oyster mushroom, paddy straw mushroom, and milky mushroom **(Pradeep *et al*., 2023).**

Method of Cultivation of Button Mushroom (*Agaricus bisporus*)

Compost Preparation

For the cultivation of button mushroom (*Agaricus bisporus*), the first and most important step is the preparation of compost. Properly prepared compost provides the essential nutrients required for the growth and development of the mushroom. In this section, the compost preparation process is explained for 5 kg spawn at a small-scale level.

Raw Materials Required for 5 kg Spawn

The following materials are required for compost preparation:

1. Wheat straw – 3 quintals
2. Urea – 5 kg
3. Single Super Phosphate (SSP) – 3 kg
4. Potash – 3 kg
5. Jaggery – 5 kg
6. Wheat bran – 30 kg
7. Gypsum – 30 kg
8. Phalidol – 250 g
9. Malathion – 250 g

Compost Preparation Process (Day 0)

After arranging all the required raw materials, the composting process begins with proper wetting of the wheat straw. About 3 quintals of wheat straw should be thoroughly moistened by sprinkling water uniformly until it becomes adequately soaked. The wetted straw is then spread on a clean surface, and urea (5 kg), SSP (3 kg), potash (3 kg), and wheat bran (30 kg) are evenly distributed over it. Jaggery (5 kg) is dissolved in water to prepare a solution, which is then sprinkled uniformly over the straw. All the ingredients are mixed thoroughly to ensure uniform distribution. The mixed material is then piled into a heap. The height of the heap should not exceed 1.5 meters, although the length can be adjusted as required. This stage is considered as Day 0 of composting.

Turning Schedule of Compost

Proper turning of the compost heap is essential for uniform decomposition, aeration, and moisture regulation.

First Turning (Day 6)

The first turning is carried out on the 6^{th} day. If the compost appears dry, water should be sprinkled to maintain adequate moisture. The heap should be thoroughly mixed during turning.

Second Turning (Day 10)

The second turning is performed on the 10^{th} day (i.e., four days after the first turning). Moisture should be adjusted by sprinkling water if required.

Third Turning (Day 14)

The third turning is done on the 14^{th} day. During this stage, gypsum (30 kg) is added and mixed thoroughly throughout the heap. Water should be added if moisture is insufficient.

Fourth Turning (Day 18)

The fourth turning is carried out on the 18th day. From this stage onwards, no additional water should be added to the compost.

Fifth Turning (Day 22)

The fifth turning is done on the 22nd day. During this turning, Phalidol (250 g) is evenly sprinkled over the heap and mixed thoroughly.

Sixth Turning (Day 26)

The sixth turning is carried out on the 26th day, during which Malathion (250 g) is added and mixed properly.

Seventh Turning (Final Turning – Day 30)

The final turning is done on the 30th day. After this stage, the compost is considered ready for use.

Identification of Well-Prepared Compost

The prepared compost should be dark brown in color, soft in texture, and free from any foul smell. If any ammonia odor is detected, one additional turning should be carried out to allow proper decomposition and removal of excess ammonia.

Temperature and Humidity Requirements

For successful cultivation of button mushroom (*Agaricus bisporus*), maintaining appropriate environmental conditions is essential. The temperature should generally be maintained between 18–30°C, while the relative humidity should remain in the range of **80–90%**. Proper regulation of these factors ensures healthy mycelial growth and good yield.

Construction of Low-Cost Mushroom House (Thatched Structure)

For small-scale or household-level cultivation, a low-cost mushroom house (kaccha structure) can be constructed using locally available materials such as bamboo, unburnt bricks, straw, rope, mud plaster, and polythene sheets. A hut-like structure can be built with doors and windows of suitable size as per requirement. All openings should be covered with mesh to prevent the entry of insects. The recommended dimensions of the structure are approximately 30 feet in length, 20 feet in width, and 12 feet in height. The structure should preferably be oriented in the east–west direction to maintain a suitable internal environment. After construction, a working space of about 2–2.5 feet should be left along all four sides inside the structure. Raised platforms or frames should then be prepared using bamboo at about 1 foot above ground level, with a width of approximately 4 feet and a depth of about 8 inches. The length of the frames can be adjusted according to the size of the structure. Two to three such frames can be constructed, leaving 2–3 feet space between them to facilitate easy movement and management operations.

Spawning Method

The prepared compost is thoroughly mixed with 5 kg of button mushroom spawn to ensure uniform distribution. After proper mixing, polythene sheets are spread over the bamboo frames, and the compost–spawn mixture is filled up to a thickness of about 4 inches.

The filled beds are then covered with newspaper sheets. Before covering, the newspapers should be treated with a formalin solution (4 ml per litre of water) by dipping them in the solution. The treated newspapers should be dried in sunlight and then used for covering the beds to minimize contamination.

Crop Management and Mushroom Growth

From the next day onwards, the newspaper covering should be kept moist by spraying water. Care should be taken to avoid excessive wetting; water should not drip from the paper. Moistening should be done at an interval of about three days. After 12–14 days, white cottony mycelial growth appears beneath the paper. At this stage, the newspaper is removed. Once the crop develops and the first harvest is completed, a casing layer of about 2 inches thickness is applied over the beds, followed by light watering. Water spraying should be continued as required to maintain moisture. However, once the fruiting bodies start emerging again, watering should be temporarily stopped. After harvesting, light watering can be

resumed. It is important to note that water should not be sprayed directly on the crop during active fruiting, as it may damage the mushrooms.

Casing and Casing Mixture

Casing refers to the process of covering the compost surface with a suitable material, known as casing mixture. About 12–15 days after spawning, the mycelium spreads completely throughout the compost. At this stage, the newspaper or polythene cover is removed, and a 1-2 inch thick layer of casing material is applied.

The casing mixture may consist of well-decomposed farmyard manure mixed with soil, or other materials such as paddy husk ash combined with soil. This layer helps in moisture retention, supports fruit body formation, and improves yield.

Harvesting, Packaging, and Marketing

Mushrooms should be harvested at the proper maturity stage when they are fully developed but still firm. After harvesting, they should be cleaned carefully to remove any adhering particles. Fresh mushrooms should be packed in clean, transparent polythene bags to maintain their appearance and freshness, making them more attractive in the market and ensuring better prices. Button mushrooms are highly perishable and should not be stored for long periods. Prolonged storage reduces their freshness and visual quality, which can lower market demand and result in economic loss. Therefore, it is advisable to market the produce immediately after harvesting.

Precautions

Proper precautions are essential during the cultivation of button mushroom (*Agaricus bisporus*) to ensure healthy crop growth and to minimize the risk of diseases and environmental stress.

Temperature Management

If the room temperature rises above 28°C, it should be controlled by spraying water on the walls and sprinkling water over the roof to maintain a cooler environment. This practice may be carried out two to three times a day, depending on the requirement, to maintain suitable growing conditions.

Provision of Gaps in Beds

While filling the bamboo frames with the compost–spawn mixture, small gaps should be left after every 3-4 feet. This helps in restricting the spread of diseases, ensuring that any infection remains confined to a limited area instead of affecting the entire bed.

Removal of Infected Beds

In case any disease appears in a particular frame and does not respond to treatment, the entire infected compost along with the mushroom crop should be removed immediately. The infected material should be disposed of safely by either throwing it at a distant location or burying it in a pit under the soil. This prevents further spread of infection to healthy beds.

Future Scope of Mushroom Cultivation

Mushrooms are recognized for their high nutritional as well as medicinal value, making them an increasingly important component of modern diets. In recent years, consumer awareness regarding healthy food has grown significantly, leading to a steady rise in the demand for mushrooms in the market. This increasing demand creates a promising opportunity for farmers, rural youth, and unemployed individuals to adopt mushroom cultivation as a profitable enterprise. In addition, it can generate employment opportunities for rural women, thereby contributing to livelihood improvement and socio-economic development. Button mushroom cultivation is particularly suitable during the winter season, when environmental conditions are naturally favorable. Moreover, it can be practiced even at a low investment level, making it accessible to small and marginal farmers. Mushrooms are widely used not only as a food item but also in the preparation of nutritional supplements, medicinal products, and protein-rich powders. Their increasing use in hotels, restaurants, and social functions such as weddings further highlights their expanding market potential. Considering the rising consumer demand, diverse applications, and ease of cultivation, mushroom farming has a

strong future scope as a sustainable and income-generating agricultural enterprise. Adoption of this venture on a larger scale can provide substantial economic benefits to growers and contribute to improved nutritional security.

Conclusion

Button mushroom (*Agaricus bisporus*) cultivation at the household and small-scale level is a practical and profitable agricultural activity. With proper knowledge of compost preparation, environmental management, and crop handling, farmers and rural entrepreneurs can achieve good yields with relatively low investment. The use of locally available resources and simple infrastructure further enhances its suitability for small and marginal farmers. In addition to providing a reliable source of income, mushroom cultivation has the potential to generate employment opportunities, particularly for rural women and unemployed youth. Its high nutritional and medicinal value also make it an important component in improving food security. Given the rising market demand and expanding utilization of mushrooms in food and allied industries, this enterprise holds strong potential for future growth. Therefore, promoting button mushroom cultivation can play a significant role in enhancing rural livelihoods and supporting sustainable agricultural development.

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