



## POPULAR SCIENCE ARTICLE

## White Button Mushroom (*Agaricus bisporus*): A Valuable Functional and Commercial Food

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### Abstract

The white button mushroom (*Agaricus bisporus*) is one of the most widely cultivated and consumed edible mushrooms worldwide due to its high nutritional value, medicinal properties, and economic importance. It belongs to the phylum Basidiomycota and class Agaricomycetes and is commonly cultivated under controlled environmental conditions using composted agricultural wastes. The present paper provides a comprehensive overview of *Agaricus bisporus*, covering its taxonomic position, morphology, life cycle, nutritional composition, medicinal benefits, cultivation practices, post-harvest handling, and economic significance. White button mushrooms are rich in proteins, dietary fiber, vitamins, and essential minerals while being low in fat and calories, making them an ideal health food. Their antioxidant, immune-boosting, and cholesterol-lowering properties further enhance their medicinal value. Increasing demand in India and other countries highlights its role in nutritional security, employment generation, and sustainable agriculture. Overall, *Agaricus bisporus* represents a valuable functional food with significant potential for commercial cultivation and rural development.

**Keywords:** *Agaricus bisporus*, demand, morphology, life cycle, nutrition, cultivation, economic importance

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### Introduction

The white button mushroom (*Agaricus bisporus*) is one of the most widely cultivated and consumed edible mushrooms in the world. It belongs to the phylum Basidiomycota and class Agaricomycetes. Owing to its pleasant flavor, high nutritional value, medicinal properties, and commercial importance, *Agaricus bisporus* occupies a dominant position in global mushroom production. Based on developmental stage, it is marketed as white button (immature), cremini (semi-mature), and portobello (fully mature).

In India and many other countries, white button mushroom cultivation has emerged as a profitable agribusiness and an important source of nutritional security. Cultivation is generally carried out indoors under controlled environmental conditions using composted agricultural wastes.

### Demand Status and Market Trends

#### Demand in India

White button mushrooms dominate the Indian edible mushroom market, contributing approximately 60–70% of total mushroom

production and consumption. In recent years, production and consumption have increased steadily due to rising health awareness, growing preference for plant-based foods, and improved understanding of their nutritional benefits.

Market reports indicate that the Indian mushroom market, largely driven by white button mushrooms, is expected to grow at a compound annual growth rate (CAGR) of about 18–20%, particularly in urban and semi-urban regions. Factors such as lifestyle changes, adoption of Western food habits, expansion of supermarkets, improved cold-chain infrastructure, and rising disposable income have significantly boosted demand. Fresh button mushrooms are preferred over processed forms because of their superior taste and nutritional value.

#### Demand in Other Countries

Globally, the demand for white button mushrooms is also increasing. China is the world's largest producer and consumer, accounting for a major share of global production, with a very high per-capita consumption compared to India. In Europe, countries such as Germany,

France, and the United Kingdom show consistently strong demand, mainly driven by vegetarian and vegan dietary trends. North America represents another major market, where mushrooms are increasingly recognized as functional and plant-based foods.

Overall, both domestic and international markets indicate a positive and growing demand for *Agaricus bisporus*.

#### Taxonomic Position

- Kingdom: Fungi
- Phylum: Basidiomycota
- Class: Agaricomycetes
- Order: Agaricales
- Family: Agaricaceae
- Genus: *Agaricus*
- Species: *Agaricus bisporus*

The species name *bisporus* refers to the formation of two spores per basidium.

#### Morphology and Structure

##### Vegetative Structure (Mycelium)

The vegetative body consists of well-developed, branched, septate, and hyaline mycelium that grows extensively in compost. It absorbs nutrients and decomposes organic matter.

##### Reproductive Structure (Basidiocarp)

The edible basidiocarp consists of:

- **Pileus (Cap):** White, smooth, fleshy; hemispherical when young
- **Gills:** Pink initially, turning chocolate brown at maturity
- **Stipe:** Short, cylindrical, solid
- **Annulus:** Present, membranous
- **Volva:** Absent (important diagnostic feature)

#### Life Cycle

The life cycle of *Agaricus bisporus* is predominantly sexual and typical of basidiomycetes:

1. Basidiospore germination
2. Formation of primary (monokaryotic) mycelium
3. Plasmogamy and formation of dikaryotic mycelium
4. Basidiocarp development
5. Karyogamy and meiosis in basidium
6. Formation and release of basidiospores

#### Nutritional Value

##### Macronutrients

- High protein content (20–30% dry weight)
- Low fat
- Moderate carbohydrates
- High dietary fiber

##### Micronutrients

- Vitamins: B-complex, Vitamin D (after UV exposure)
- Minerals: Potassium, phosphorus, calcium, iron, zinc, selenium

Because of its nutritional richness, it is often called “vegetable meat.”

##### Medicinal and Health Benefits

- Antioxidant activity
- Immune system enhancement
- Cholesterol-lowering effects
- Anti-inflammatory properties
- Potential anticancer effects

#### Cultivation of White Button Mushroom (*Agaricus bisporus*)

White button mushroom is cultivated indoors under controlled environmental conditions using composted agricultural wastes. Cultivation involves several well-defined stages.

##### I. Selection of Site

- Cultivation is carried out in **growing rooms, trays, shelves, or polyhouses**
- Requires control over **temperature, humidity, ventilation, and light**
- Clean and hygienic conditions are essential to prevent contamination

##### II. Compost Preparation (Substrate Preparation)

Compost provides nutrients for mushroom growth. **Wheat straw** is the most commonly used base material.

##### Common Ingredients

- Wheat straw
- Poultry manure or horse manure
- Gypsum
- Water

#### Composting Phases

##### Phase I: Outdoor Composting

- Wheat straw is soaked in water for 24–48 hours
- Mixed with manure and gypsum
- Piled and turned regularly for **7–10 days**

- Temperature rises to **65–70°C** due to microbial activity

### Phase II: Indoor Composting

- Compost is pasteurized at **58–60°C** to kill pests and pathogens
- Conditioning is done at **45–50°C** to remove ammonia
- Final compost becomes dark brown, soft, and free from ammonia smell

### III. Spawning

Spawning is the process of **mixing mushroom spawn** (mycelium grown on grains) with compost.

- Spawn rate: **0.5–1% of wet compost**
- Spawn is evenly mixed or layered in compost
- Compost is filled into **trays or beds**

### IV. Spawn Run (Mycelial Growth)

- Trays are kept in **dark conditions**
- Temperature: **22–25°C**
- Relative humidity: **90–95%**
- Mycelium spreads throughout compost in **10–15 days**
- White cottony growth indicates successful spawn run

### V. Casing

Casing is the application of a **moist, nutrient-poor soil layer** over fully colonized compost.

#### Casing Material

- Garden soil + farmyard manure
- Peat soil or cocopeat + lime

#### Purpose of Casing

- Maintains moisture
- Stimulates fruit body formation
- Supports mushroom development

### VI. Fruiting (Pinhead Formation)

- Temperature reduced to **14–18°C**
- Relative humidity: **85–90%**
- Proper ventilation required to remove CO<sub>2</sub>
- Small pinheads appear within **7–10 days**

### VII. Harvesting

- Mushrooms are harvested at **button stage**
- Cap should remain closed
- Harvesting is done by gentle twisting and pulling

- Multiple flushes can be obtained from one compost bed

### VIII. Post-Harvest Handling

- Mushrooms are cleaned without washing
- Stored at **0–4°C**
- Packed in perforated polythene or trays
- Shelf life: **3–5 days (fresh)**

#### Environmental Conditions

Stage	Temperature	Humidity
Spawn run	22–25°C	90–95%
Fruiting	14–18°C	85–90%

#### Economic Importance

- Generates employment
- Utilizes agricultural waste
- Provides additional income to farmers
- High domestic and export demand
- Contributes to nutritional security

#### Advantages

White button mushroom offers nutritional, medicinal, economic, environmental, and culinary benefits, making it one of the most valuable cultivated mushrooms.

#### Disadvantages

Cultivation requires controlled conditions, technical expertise, high initial investment, and proper storage. It is highly perishable and susceptible to contamination if poorly managed.

#### Conclusion

The white button mushroom (*Agaricus bisporus*) is a nutritionally rich, economically important, and globally demanded edible fungus. Its increasing demand in India and abroad highlights its potential role in sustainable agriculture, food security, and rural development. Scientific cultivation practices can effectively minimize its limitations. The cultivation of white button mushroom requires scientific management, controlled environmental conditions, and quality compost. Despite higher initial investment, it offers high yield, quick returns, and strong market demand, making it a profitable agribusiness.