

Volvariella volvacea (Straw Mushroom)

A Hope for Sustainable Farming

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ABSTRACT

Volvariella volvacea is a widely cultivated and naturally grown wild mushroom of tropical regions of Asia. In India this mushroom is commonly cultivated and found growing in wild due to favourable climatic condition and availability of huge number of different agro-wastes. The mycelium of this fungus is very fast colonising. Paddy straw mushroom is a highly rich source of protein and having great therapeutic and medicinal values. It is a

significant and viable crop for rural farmers and women entrepreneurs. This article includes a brief overview of its taxonomy, nutritional composition, therapeutic effects, growing methods, and future possibilities. The development of improved strains and cultivation techniques could overcome the constraints like short shelf life and low productivity. The *V. volvacea* has a great potential for long-term agricultural diversification.

Introduction

The paddy straw mushroom (*Volvariella volvacea*) belongs to the family Pluteaceae and is widely cultivated in Southeast Asia and India (Singer, 1961). These mushrooms have short cropping cycle, tasty flavor, and ease of growing, which led to its popularity. The initial documented cultivation in India occurred in 1943 at Coimbatore (Thomas et al., 1943). Currently, it ranks as the third most widely consumed mushroom worldwide, following button (*Agaricus bisporus*) and oyster (*Pleurotus* spp.) mushrooms (Roy et al., 2015).

Its production necessitates neither fertile soil nor substantial capital expenditure, rendering it suitable for landless farmers and rural women (Pathak et al., 2000). Straw mushroom flourishes under high temperatures (30-40°C) and humidity levels (85-90%), making it ideally suited for tropical and subtropical regions (Kumar et al., 2018). The best agroclimatic conditions for its cultivation are found in states like Odisha, Andhra Pradesh, Tamil Nadu, and portions of Eastern Uttar Pradesh (Ahlawat & Tewari, 2007; Maurya et al., 2020).

Nutritional Profile

A nutrient-dense diet high in protein, vitamins, minerals, and bioactive compounds is paddy straw mushrooms. Its moisture content is around 90.4% of its fresh weight, and for every 100 g of dry weight, it contains 30-43% protein, Fat: 0.25-6%, 12-48% carbohydrates, Fiber: 4-10% and Ash: 5.13%. Furthermore, it offers vital micronutrients such as ascorbic acid, riboflavin, niacin, potassium, phosphorus, iron, calcium,

thiamine, and phosphorus (Maurya et al., 2020). For those with dietary restrictions such as diabetes and hypertension, these qualities make it a highly recommended food (Manzi et al., 2004; Wasser, 2010). *V. volvacea* has a superior amino acid profile and a higher rate of protein digestion than other mushrooms (Mattila et al., 2002). Additionally, it possesses antioxidant

polyphenols, which add to its reputation as a functional food (Ferreira et al., 2010).

Medicinal Values

Paddy straw mushrooms are not only nutritional, but also medicinally beneficial. Regular inclusion in the diet may enhance cardiovascular health, reduce inflammation, and improve liver function (Lindequist et al., 2005; Kumari et al., 2018). Studies have demonstrated the occurrence of substances with:

- **Antioxidant properties:** Protect against oxidative stress-related disorders (Kalac, 2013).

- **Antidiabetic effects:** Helps manage blood glucose by regulating insulin sensitivity (Chang & Miles, 2004).
- **Antimicrobial activity:** Effective against numerous gram-positive and gram-negative bacteria (Barros et al., 2007).
- **Anticancer potential:** Bioactive proteins and lectins display cytotoxicity against tumor cells (Zaidman et al., 2005).
- **Immunomodulatory effects:** β -glucans boost innate immunity (Wasser, 2011).

CULTIVATION TECHNIQUES

Substrate and Spawn Preparation

The different agro-wastes could be used for the cultivation of *V. volvacea* mushrooms viz., paddy straw, wheat straw, cotton waste, and banana leaves are commonly utilized substrates. But most widely used substrate was paddy straw and hence known as the paddy straw mushroom. The bundles are soaked in water with 1% Bavistin and drained. The prepared straw is laid in bamboo-framed beds, switching the direction with each layer. Spawn is prepared on wheat, barley, oats, paddy grains which is available very easily and spawn is prepared by following the methods given by Kumar and Suman (2014) and Kumar and Chhetri (2024). Spawn (3% of wet weight) is placed between layers (Maurya et al., 2020). The optimum conditions include:

- Temperature: 30-35°C.
- Relative Humidity: 90-100%.
- Spawn run: 7-10 days.
- Fruiting: 3-4 days after pinhead formation.
- Harvesting: At egg stage (10-12 days after spawning).

The other maintenance requirements are same as required by other mushroom species like proper hygiene, good-quality spawn, and maintaining ideal moisture are critical to prevent contamination (Ahlawat & Kumar, 2005). Maintaining these conditions would lead to the production of a higher yield. Regular monitoring of temperature and humidity levels is essential for successful cultivation, as fluctuations can lead to undesirable outcomes.

Yield optimization

The strain selection, substrate management, and hygienic practices significantly affect output of these mushrooms and its production would vary

depending upon these factors' quality (Sahoo, 2014; Zhanxi & Zhanhua, 2000, Acharya & Sarangi, 2019).

Future Scope

V. volvacea is having a very short shelf life i.e., 24-48 hours (Roy et al., 2015), very inconsistent yields, and spawn degeneration affects fruiting body development over time (Singh et al., 2017). The constraints would offer a future plan of research for strain improvement through hybridization and molecular breeding (Upadhyay et al., 2002), post-harvest technologies for drying, canning, and modified atmosphere packaging (Kumari et al., 2018),

biotechnological interventions such as tissue culture and cryopreservation (Sangeetha et al., 2004), integration into agroforestry systems for year-round production (Pathak et al., 2000) and skill training and micro-financing for rural youth and women (FAO, 2013). With better institutional support, value chain integration, and research, paddy straw mushroom can play a transformative role in sustainable agriculture.

Conclusion

Paddy straw mushrooms are an excellent crop for nutritional security, rural livelihood, and agro-waste management. Its cultivation is straightforward, rapid, and environmentally beneficial. Despite constraints like as short shelf

life and strain sensitivity, advances in biotechnology, post-harvest handling, and training programs can lift *V. volvacea* to the forefront of climate-resilient farming systems in tropical countries.

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