



## Research Paper

### Climate-Resilient Oyster mushroom cultivation technology for central India

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Received: 29/05/2026

Revised: 07/06/2026

Accepted: 17/06/2026

**Abstract:** Climate variability, including increasing temperature, irregular rainfall, changing humidity and extreme weather events, poses a significant challenge to sustainable agricultural production in Central India. Diversification of farming systems through climate-resilient enterprises can help reduce production risks and improve farm income. Oyster mushroom (*Pleurotus* spp.) cultivation is a promising technology because it requires limited land, can utilize locally available agricultural residues and can be undertaken under protected or semi-controlled conditions. The present paper evaluates the potential of climate-resilient oyster mushroom cultivation technology for Central India with emphasis on seasonal species selection, substrate utilization, microclimate management and low-cost production practices. Published results indicate that wheat straw and paddy straw are promising substrates for oyster mushroom cultivation. A study conducted at Jabalpur reported a fresh yield of 902.10 g per bag and biological efficiency of 90.21% with 100%

wheat straw, while another Jabalpur study reported 997.28 g yield and 99.73% biological efficiency with wheat straw. Seasonal variation also strongly influenced production, with higher yield during cooler months than during extreme summer conditions. The integration of suitable *Pleurotus* strains, locally available residues, humidity and temperature management, efficient water use and recycling of spent mushroom substrate can provide a practical climate-resilient production system for small and marginal farmers in Central India.

**Keywords:** Climate resilience, oyster mushroom, *Pleurotus*, agricultural residues, wheat straw, paddy straw, Central India, biological efficiency, microclimate management.

#### Introduction:

Agriculture in Central India is strongly influenced by seasonal climatic conditions. Variations in temperature, rainfall and humidity can affect crop productivity and farm income. Therefore, agricultural

diversification through enterprises that are less dependent on open-field climatic conditions is increasingly important. Oyster mushroom cultivation provides an opportunity because mushrooms require comparatively little land and can be produced using agricultural and agro-industrial residues.

Oyster mushroom belongs to the genus *Pleurotus*, which contains species with different temperature requirements. This species diversity allows farmers to select suitable strains according to seasonal conditions. Barh et al. (2020) reported that species such as *P. ostreatus*, *P. eryngii* and *P. citrinopileatus* are suitable for cooler conditions, whereas *P. sajor-caju*/*P. pulmonarius* and *P. djamor* are more suitable for comparatively warmer conditions. Thus, seasonal species selection can support round-the-year production.

### Methodology:

Oyster mushroom (*Pleurotus* spp.) cultivation was evaluated using locally available agricultural residues such as wheat straw, paddy straw, chickpea straw and other suitable substrates. The substrates were chopped into approximately 1–2 cm pieces, soaked in water and pasteurized, with hot-water pasteurization carried out at about 80°C for 2 hours. After cooling and draining, the substrate was adjusted to approximately 65% moisture content.

The prepared substrate was filled into polythene bags at about 1 kg substrate per bag and inoculated with healthy mushroom spawn at approximately 5% of the wet substrate weight. Bags were maintained under suitable conditions for spawn running, generally around 24–28°C, followed by

fruiting under appropriate temperature, relative humidity, ventilation and light conditions. Low-cost climate-management practices such as shade netting, ventilation, water spraying and wet-floor cooling were used to reduce heat stress during warmer periods.

Mushrooms were harvested at the appropriate stage and the fresh mushroom yield per bag was recorded. Biological efficiency (BE) was calculated as:

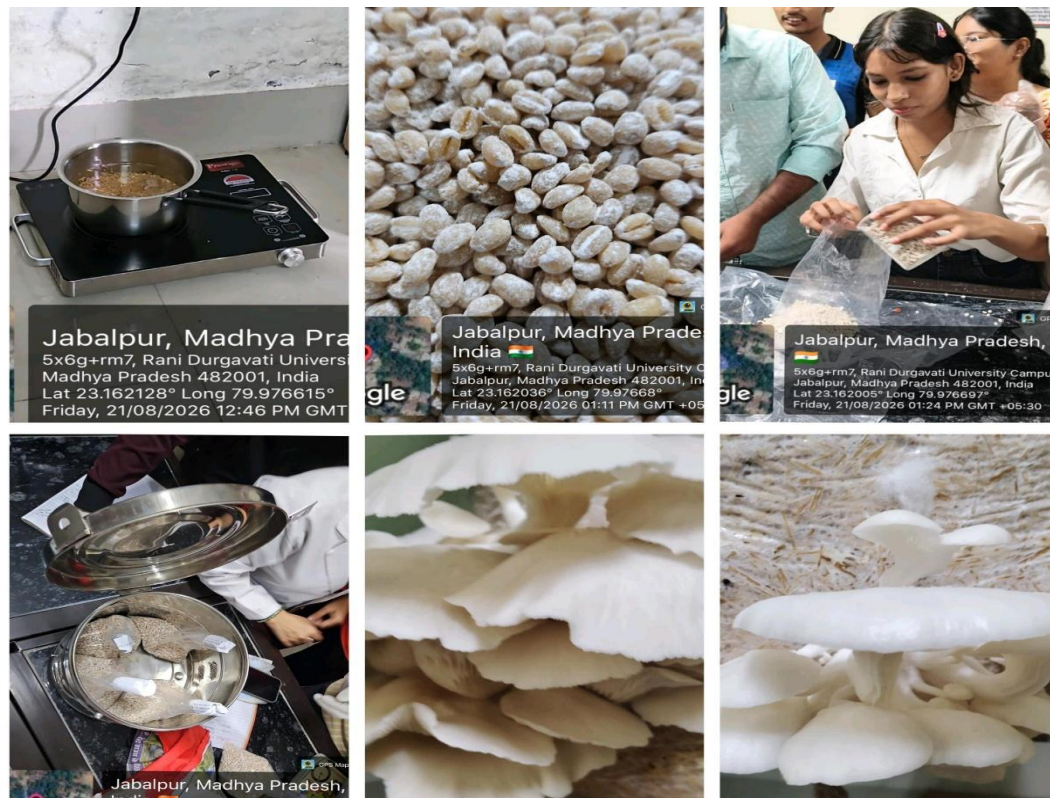
Biological Efficiency (%) = (Fresh mushroom yield / Dry weight of substrate) × 100

The performance of different substrates, cultivation periods and environmental management practices was compared to identify suitable and climate-resilient cultivation practices for Central India.

### Results:

Wheat straw was found to be a highly suitable substrate for oyster mushroom cultivation under Central Indian conditions. In the Jabalpur study, 100% wheat straw produced 902.10 g fresh mushroom yield per bag with 90.21% biological efficiency, while sawdust-based substrate produced comparatively lower yield. Another study reported 997.28 g yield per bag and 99.73% biological efficiency on wheat straw. Paddy straw also performed well, producing 858.33 g per bag with 85.83% biological efficiency. Cultivation season strongly influenced yield; November spawning recorded the highest yield (920.83

g/bag; 92.08% BE), whereas May cultivation showed very poor performance (90 g/bag; 9% BE) (Rout et al., 2016; Kumawat et al., 2024, 2025).



### Discussion:

The results indicate that substrate type and seasonal temperature are major factors affecting oyster mushroom productivity. Wheat straw performed better because it provides a suitable lignocellulosic substrate for *Pleurotus* growth. The marked reduction in yield during May highlights the adverse effect of high temperature and unsuitable humidity on fruiting. Therefore, selection of locally available straw, appropriate seasonal scheduling and low-cost climate-management practices such as shade, ventilation and moisture regulation are important for maintaining production under Central Indian conditions. The use of different *Pleurotus* species according to seasonal temperature can further support round-the-year cultivation (Barh et al., 2020). These practices make oyster

mushroom cultivation a promising climate-resilient enterprise for small and resource-poor farmers.

### Conclusion:

Climate-resilient oyster mushroom cultivation has considerable potential for Central India because it combines agricultural-residue utilization, seasonal adaptability and low-cost environmental management. Wheat straw and paddy straw are promising substrates, while the selection of suitable *Pleurotus* species according to seasonal temperature can help maintain production across different periods of the year. The results from Jabalpur and other Central Indian locations demonstrate the practical potential of this technology.

### Acknowledgements:

The authors sincerely acknowledge the guidance and support received from the faculty and institution during this study. We also thank the researchers and organizations whose published work contributed valuable information to this paper.

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