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Comparative evaluation of oyster mushroom species under Jabalpur conditions

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Abstract
Oyster mushroom cultivation provides an opportunity to transform agricultural residues into nutritious food while supporting sustainable production and rural entrepreneurship. The present investigation compared the growth, productivity and preliminary economic potential of *Pleurotus florida* and *Pleurotus odoratus* under the monsoon conditions of Jabalpur, Madhya Pradesh, during August 2026. Both species were cultivated on wheat straw and paddy straw using a Completely Randomised Design with three replications per treatment. Growth and production parameters included spawn-run duration, pinhead initiation, and first harvest, number of flushes, total yield and biological efficiency.
The observations indicated that *P. florida* developed more rapidly and reached harvest earlier than *P. odoratus*. Paddy straw supported higher yield and biological efficiency in both species. The highest recorded yield was 378.6 g per 500 g substrate for *P. florida*, with a biological efficiency of 75.7%, compared with 364.1 g and 72.8%, respectively, for *P. odoratus* on paddy straw. Relative humidity showed a stronger reported association with yield ((r = 0.71)) than temperature ((r = 0.34)). The preliminary economic estimates indicated a lower production cost for *P. florida*, whereas *P. odoratus* had a higher indicative farm-gate price. These findings suggest that *P. florida* may be suitable for growers seeking a shorter cultivation cycle, while *P. odoratus* warrants further evaluation for specialised markets. Additional trials are required to confirm the consistency of these results across seasons and cultivation environments.

Keywords: *Pleurotus florida*, *Pleurotus odoratus*, oyster mushroom, agricultural residues, paddy straw, biological efficiency, Jabalpur, sustainable cultivation, rural entrepreneurship

Introduction
The cultivation of edible mushrooms is an important approach to agricultural waste utilisation and sustainable food production. Oyster mushrooms belonging to the genus *Pleurotus* are widely cultivated because they can grow on a variety of lignocellulosic materials, require comparatively simple cultivation facilities and produce harvestable fruiting bodies within a relatively short period. Their capacity to utilise agricultural by-products makes them particularly relevant to regions where cereal straw is readily available (Sánchez, 2010; Raman *et al*., 2021) [14, 15].
Mushroom productivity is influenced by several factors, including species identity, strain characteristics, substrate composition, moisture availability and environmental conditions. Differences in these factors can affect mycelial growth, fruiting time, total yield and biological efficiency. Selecting an appropriate species and substrate combination is therefore important for improving production efficiency and economic returns (Bellettini *et al*., 2019) [1].
The present investigation evaluated two oyster mushroom species, *Pleurotus florida* and *Pleurotus odoratus*, using wheat straw and paddy straw as cultivation substrates under the climatic conditions of Jabalpur, Madhya Pradesh. For this study, *P. florida* was treated as the indigenous reference species and *P. odoratus* as the exotic aromatic strain, according to the original experimental description. These classifications should be confirmed from the provenance and identification records of the cultures used.
The study was planned to compare the cultivation behaviour of the two species and identify substrate combinations that could support mushroom production in Central India. It also considered preliminary production costs and indicative market prices to explore the potential of these species for small-scale mushroom enterprises.
The specific objectives were to compare the growth and fruiting periods of the selected species, assess the effects of wheat and paddy straw on yield and biological efficiency, examine the association between microclimatic conditions and production, and evaluate the preliminary economic implications of species selection.

Materials and Methods
Study site and experimental period
The experiment was conducted in the Mushroom Culture Laboratory of the Institute of Agricultural Sciences, Rani Durgavati University, Jabalpur, Madhya Pradesh, during the monsoon period of August 2026.

Mushroom species and substrate selection
Two oyster mushroom species, *Pleurotus florida* and *Pleurotus odoratus*, were selected for the comparative trial. Wheat straw and paddy straw served as the cultivation substrates. The use of these materials enabled an assessment of their relative suitability for mushroom production under the local conditions.

Substrate preparation and spawning
Both straw substrates were chopped into smaller pieces, soaked in water and pasteurised using hot water maintained at approximately 65–70°C for one hour. The treated straw was drained, and the substrate moisture content was adjusted to approximately 65–70%. Spawn was incorporated at 3% of the wet substrate weight.

The inoculated substrates were filled into cultivation bags and maintained under the laboratory conditions used for the experiment. Appropriate hygiene and routine cultivation practices were followed during the production period.

Experimental design

The experiment followed a Completely Randomised Design (CRD) consisting of four treatment combinations, with three replications per treatment:

- *P. florida* on wheat straw.
- *P. florida* on paddy straw.
- *P. odoratus* on wheat straw.
- *P. odoratus* on paddy straw.

A total of 12 cultivation bags were included in the trial.

Growth and yield measurements

Observations included the duration of spawn-run, time to pinhead initiation, time to first harvest, number of harvest flushes, total fresh yield, biological efficiency and fruit-body characteristics. Proximate nutritional composition was also reported as an observation in the original study.

Biological efficiency was calculated using the following formula:

$$BE\ (\%) = \frac{\text{Fresh mushroom yield (g)}}{\text{Dry substrate weight (g))}} \times 100$$

The substrate-weight basis should be verified against the original laboratory records to ensure that the reported yield and biological efficiency are consistent.

Microclimatic monitoring and statistical analysis

Weekly mean temperature and relative humidity were recorded during cultivation. Their association with weekly yield was expressed using correlation coefficients. Analysis of variance (ANOVA) and critical difference (CD) at the 5% significance level were specified for comparing treatment responses.

The final statistical interpretation should be based on the original replicate-level observations and statistical output. Significance claims should be included only where supported by those records.

Results

Growth and developmental characteristics

The two species differed in their rate of development. *Pleurotus florida* completed substrate colonisation earlier and reached first harvest before *P. odoratus* on both substrates.

On paddy straw, the spawn-run period was 13.9 days for *P. florida* and 16.4 days for *P. odoratus*. Pinhead initiation occurred after 18.3 and 21.0 days, respectively. The first harvest was recorded after 22.1 days for *P. florida* and 25.5 days for *P. odoratus*. A similar trend was observed on wheat straw, suggesting that *P. florida* had a shorter production cycle under the conditions examined.

Table 1: Comparative growth and yield performance of oyster mushroom species on wheat and paddy straw Values are means of three replications, as reported in the supplied experimental dataset.

Parameter	*P. florida*		*P. odoratus*	
	Wheat	**Paddy**	**Wheat**	**Paddy**
Spawn-run (days)	14.6	13.9	17.2	16.4
Pinhead initiation (days)	18.9	18.3	21.6	21.0
First harvest (days)	22.7	22.1	26.3	25.5
Number of flushes	3	3	2	3
Total yield (g/500 g substrate)	354.2	378.6	336.8	364.1
Biological efficiency (%)	70.8	75.7	67.4	72.8

Values are means of three replications, as reported in the supplied experimental dataset.

Substrate influence on yield and biological efficiency

Paddy straw produced higher recorded yields than wheat straw for both mushroom species. The maximum yield was obtained from *P. florida* cultivated on paddy straw, reaching 378.6 g per 500 g substrate and a biological efficiency of 75.7%. The corresponding values for *P. odoratus* were 364.1 g and 72.8%.

On wheat straw, *P. florida* yielded 354.2 g per 500 g substrate, whereas *P. odoratus* yielded 336.8 g. These observations indicate that paddy straw was the more productive substrate in the experimental conditions.

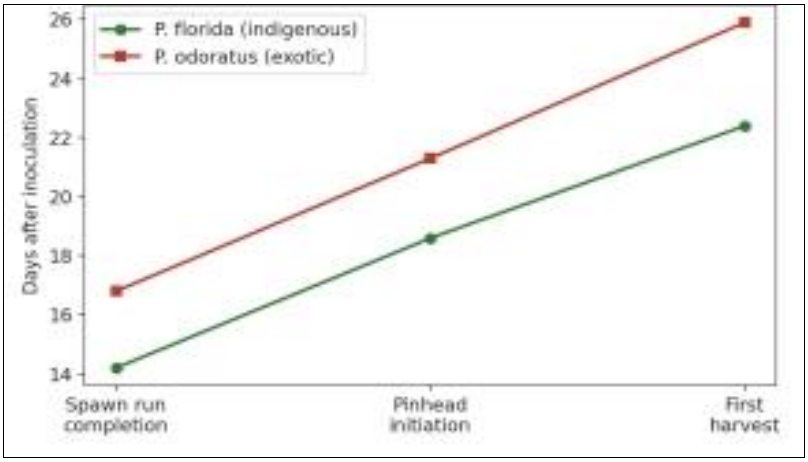


Fig 1: Developmental time-line: spawn-run, pinhead initiation and first harvest Flush-wise yield distribution

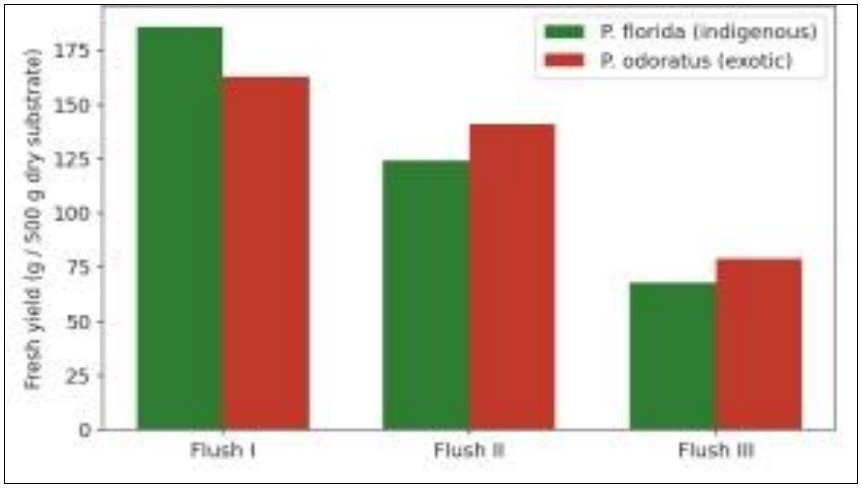


Fig 2: Flush-wise yield performance

Flush-wise yield distribution

The reported observations indicated that *P. florida* produced its largest yield during the first flush. In contrast, *P. odoratus* showed a more extended yield distribution, with a substantial contribution from later flushes. This difference may be relevant when planning cultivation schedules and harvest management.

Figure 1. Comparative developmental timeline showing spawn-run, pinhead initiation and first harvest in both species.

Figure 2. Flush-wise yield distribution of *P. florida* and *P. odoratus* on the two substrates. The graph should be prepared from the original flush-wise measurements.

Microclimate and mushroom yield

During the observation period, mean weekly temperature ranged from 27.6 to 29.1°C, while relative humidity varied between 78% and 85%. The reported correlation coefficient for relative humidity and yield was 0.71, compared with 0.34 for temperature.

Table 2. Weekly temperature, relative humidity and yield response during cultivation

Week	Mean temperature (°C)	Mean RH (%)	*P. florida* yield (g)	*P. odoratus* yield (g)
1	28.4	78	0.0	0.0
2	29.1	82	142.6	38.4
3	27.6	85	168.9	176.3
4	28.0	83	67.1	150.1

The reported results indicate a stronger association between relative humidity and weekly yield than between temperature and yield. However, this relationship should be interpreted cautiously because the observation period was short and other factors, including developmental stage, substrate moisture and species-specific growth patterns, may have contributed to the observed response.

Nutritional profile

The original study reported high moisture content in the fresh fruiting bodies of both species. *P. florida* was described as having slightly higher crude protein and crude fibre, whereas *P. odoratus* was reported to contain marginally fatter.

Since the numerical composition data, analytical procedures and statistical comparisons were not included in the supplied material, these observations should be regarded as preliminary. The original laboratory results should be added before making a quantitative comparison of nutritional quality.

Preliminary economic comparison

The two species differed in their reported production costs and indicative farm-gate prices. *P. florida* had the lower estimated production cost, while *P. odoratus* was associated with a higher indicative selling price.

Table 3: Preliminary economic indicators for the selected oyster mushroom species

Economic parameter	*P. florida*	*P. odoratus*
Production cost (₹/kg fresh yield)	60.5	74.1
Indicative farm-gate price (₹/kg)	120–150	220–260

The higher indicative price of *P. odoratus* suggests the possibility of marketing it as a differentiated product. Nevertheless, its commercial feasibility will depend on actual consumer demand, production costs, post-harvest losses and access to suitable markets.

Discussion

The present comparison demonstrates differences in the growth rate, yield and preliminary economic characteristics of *Pleurotus florida* and *Pleurotus odoratus* under the tested cultivation conditions. *P. florida* showed faster colonisation and earlier fruiting, along with the highest recorded yield and biological efficiency on paddy straw.

Previous research has established that *Pleurotus* cultivation is influenced by substrate composition, moisture, temperature, strain characteristics and other environmental factors (Sánchez, 2010; Hoa *et al*., 2015; Bellettini *et al*., 2019) [1, 8, 15]. The observed differences in the present experiment are consistent with the importance of selecting suitable species–substrate combinations. However, the results should be interpreted within the limits of the particular cultures, substrates and cultivation period evaluated.

Paddy straw supported better recorded production than wheat straw in both species. This finding indicates that locally available agricultural residues may provide a useful substrate for oyster mushroom production in Central India.

The difference could be related to substrate structure, moisture retention or nutrient availability, but these factors were not separately measured in the current trial.

The longer developmental period of *P. odoratus* does not necessarily rule out its commercial potential. Its reported distinctive fruiting characteristics and higher indicative farm-gate price may offer opportunities in specialised markets. However, a higher selling price alone does not establish greater profitability. A reliable economic assessment must consider the full production cycle, labour, spawn, substrate preparation, packaging, transport and market-related losses.

The shorter crop cycle and lower reported production cost of *P. florida* may favour growers seeking faster turnover. By comparison, *P. odoratus* could be evaluated for premium markets where sufficient demand exists to justify its additional production time and cost. These possibilities should be tested through documented sales data and a complete cost–benefit analysis.

Relative humidity showed a stronger reported correlation with yield than temperature. This observation highlights the importance of monitoring cultivation conditions during monsoon production. Appropriate humidity, sanitation, ventilation and substrate management can be important components of successful mushroom cultivation. Nevertheless, four weekly observations are insufficient to establish a robust causal relationship, and the reported correlations should be considered preliminary.

The findings support further evaluation of a two-species cultivation strategy: *P. florida* for relatively rapid production and *P. odoratus* for potential market differentiation. Multi-season trials, larger sample sizes and verified market data will be necessary before making firm commercial recommendations.

Conclusion and entrepreneurial implications

The experiment compared the cultivation performance of *Pleurotus florida* and *Pleurotus odoratus* on wheat and paddy straw under the monsoon conditions of Jabalpur. *P. florida* showed faster development and achieved the highest recorded yield and biological efficiency when grown on paddy straw. Paddy straw also supported higher recorded productivity in *P. odoratus* than wheat straw.

Although *P. odoratus* required more time to reach harvest and had a higher estimated production cost, its reported indicative selling price suggests that it may merit further investigation for specialised markets. The findings therefore identify *P. florida* as a promising candidate for rapid production and *P. odoratus* as a potential option for market diversification.

Further research should examine these species over multiple seasons and locations, validate nutritional composition, investigate post-harvest shelf life, evaluate alternative substrate supplements and conduct detailed market surveys. Improved environmental monitoring and complete economic analysis would help establish whether the reported performance differences remain consistent under commercial cultivation.

References

1. Bellettini MB, Fiorda FA, Maieves HA, Teixeira GL, Ávila S, Hornung PS, *et al*. Factors affecting mushroom *Pleurotus* spp. Saudi Journal of Biological Sciences,2019:26(4):633–646. https://doi.org/10.1016/j.sjbs.2016.12.005
2. Biswas MK, Kuiry S. Yield performance of different species of oyster mushroom under lateritic-zone conditions. International Journal of Bio-resource and Stress Management, 2023. Complete volume, page range and DOI should be verified.
3. Chang ST, Miles PG. Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact. 2nd edition. CRC Press, 2004.
4. Deora A, *et al*. Cultivation of Kabul Dhingri (*Pleurotus eryngii*) by standardizing protocols in subtropical zones. Scientific Reports,2021:11:14692.
5. Dissasa G. Cultivation of different *Pleurotus* species on coffee waste and determination of relative biological efficiency. International Journal of Microbiology, 2022, 5219939.
6. Gregori A, Švagelj M, Pohleven J. Cultivation techniques and medicinal properties of *Pleurotus* spp. Food Technology and Biotechnology,2007:45(3):238–249.
7. Hernández D, Sánchez JE, Yamasaki K. A simple procedure for preparing substrate for *Pleurotus ostreatus* cultivation. Bioresource Technology,2003:90(2):145–150. https://doi.org/10.1016/S0960-8524(03)00118-4
8. Hoa HT, Wang CL, Wang CH. The effects of different substrates on the growth, yield, and nutritional composition of two oyster mushrooms (*Pleurotus ostreatus* and *Pleurotus cystidiosus*). Mycobiology,2015:43(4):423–434. https://doi.org/10.5941/MYCO.2015.43.4.423
9. Kumar V, Chhetri A. Evaluation of five different species of *Pleurotus* under Tripura conditions. Indian Phytopathology,2024:77:1103–1107. Verify the complete bibliographic record before submission.
10. Obodai M, Cleland-Okine J, Vowotor KA. Comparative study on the growth and yield of *Pleurotus ostreatus* mushroom on different lignocellulosic by-products. Journal of Industrial Microbiology and Biotechnology,2003:30:146–149.
11. Philippoussis A, Zervakis G, Diamantopoulou P. Bioconversion of agricultural lignocellulosic wastes through the cultivation of the edible mushrooms *Agrocybe aegerita*, *Volvariella volvacea* and *Pleurotus* spp. World Journal of Microbiology and Biotechnology,2001:17:191–200.
12. Rajarathnam S, Bano Z. *Pleurotus* mushrooms. Part I A. Morphology, life cycle, taxonomy, breeding, and cultivation. Critical Reviews in Food Science and Nutrition,1987:26(2):157–223. https://doi.org/10.1080/10408398709527465
13. Rajarathnam S, Bano Z. *Pleurotus* mushrooms. Part I B. Pathology, *in vitro* and *in vivo* growth requirements, and world status. Critical Reviews in Food Science and Nutrition,1988:26(3):243–311. https://doi.org/10.1080/10408398809527469
14. Raman J, Jang KY, Oh YL, Oh M, Im JH, Lakshmanan H, *et al*. Cultivation and nutritional value of prominent *Pleurotus* spp.: An overview. Mycobiology,2021:49(1):1–14. https://doi.org/1080/12298093.2020.1835142
15. Sánchez C. Cultivation of *Pleurotus ostreatus* and other edible mushrooms. Applied Microbiology and

Biotechnology,2010:85:1321–1337.
https://doi.org/10.1007/s00253-009-2343-7
16. Shah ZA, Ashraf M, Ishtiaq M. Comparative study on cultivation and yield performance of oyster mushroom (*Pleurotus ostreatus*) on different substrates. Pakistan Journal of Nutrition,2004:3(3):158–160.
17. Thakur MP, Singh HK, Shukla CS. Current status and future prospects of mushroom cultivation and research, 2025. Journal title, volume, page range and DOI require verification.