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## Assessment of different substrates for production of oyster mushroom (*Pleurotus florida*)

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### Abstract

The work to assess the impact of different substrates for production of oyster mushroom (*Pleurotus florida*) was conducted in the Shahdol Tribal District (MP). The aim of this study is to evaluate different substrates for the growth and production of *Pleurotus florida* and to find their economic viability. This study was conducted in farmhouses at different locations to determine the effect of different agricultural substrates (wheat straw, rice straw and soybean straw) on the growth, yield and quality of *Pleurotus florida*. It takes less time for the mushroom pinhead appearance i.e. 26 days, 30 days and 38 days for soybean straw, wheat straw and rice straw respectively. The maturation time of the mushroom is short 28 days for soybean straw, 31 days for wheat straw, and 38 days for rice straw. The maximum yield of the soybean straw is 1805 grams. The first flush provided the greatest yield from all substrates, and successive decrease in the yield was observed. Net profit from 30 bags was Rs 8630/-, Rs 7680/- and Rs. 6410/- on soybean, wheat and rice straw respectively with subsequent B: C ratio of 4.92, 4.58 and 3.91.

**Keywords:** Evaluation, substrates, growth, production, effect, oyster mushroom, B:C ratio

### Introduction

District Shahdol is placed in Chhattisgarh hilly region and is blessed with forest. District is divided in five blocks with a dominance of tribal populace and with poor resources. Those tribal peoples are marginal farmer with low assets and often depending on forest for survival and for their livelihood. The problem of low income of farm women is diagnosed through PRA and group meeting in adopted villages. Through mapping of resources KVK identified Oyster Mushroom as one of an option for income generating for Farm women. Thus KVK intervene with Demonstration of Oyster Mushroom production on different substrates for income generation. Hand son training and technique Demonstration were done on Mushroom production for livelihood security of farmwomen. The demonstration on mushroom production technology carried out in Bhamraha village of Sohagpur Block in the year 2021-22 and 2022-23. Important input like proper fine spawn, fungicides (Bavistin), formalin, polythene bags and rubber band were provided by KVK. Technical guidance on cultivation and harvesting of mushroom has been given to farm women. Pamphlets have been also furnished during the training programs to disseminate the mushroom manufacturing technology.

Three substrates (wheat straw, paddy straw and soybean straw) were collected at individual households. These substrates were sundried and cut into small pieces. Thus prepared 40 Kg straw was soaked in 100 litres water containing mixture of 7.5 - 10 g of Bavistin and 125 ml formalin for overnight (12 hours). The excess water is drained in next morning and the straw was dried so as to obtain optimum moisture content. Then spawning was done in layer of straw in a polythene bag of length Approx 30 cm and width 20 cm. The polybag was tied by a rubber band and 30-40 holes all over the polybags were made. The polythene bag was tied to a wooden rack. The bags were watered daily so as to maintain the moisture.

### Materials and Methods

The work was done at household level of Bhamraha village of Sohagpur Block of Shahdol District (M.P.).

### Substrates Preparation

Three substrates (wheat straw, paddy straw and soybean straw) have been collected at household level. Those substrates have been sundried and cut into small portions. Forty Kg straw being soaked in one hundred litres water containing combination of 7.5-10 g of Bavistin and one hundred twenty five ml formalin for overnight (12 hours).

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The extra water is drained in subsequent morning and the straw dried to attain most optimum moisture content. Then spawning was carried out in layer of straw in a polythene bag of Approx 30 cm and width 20 cm. The polybag were then tied by a rubber band and 30-forty holes were made everywhere in the polybags. The polythene bag tied to a wooden rack. The bags have been watered day by day in an effort to maintain the moisture.

### Incubation

The mushroom spawn inoculated bags had been then kept for spawn running in a dark room at an ambient temperature.

### Crop developing

White mycelia completely covered the substrates in about 16-18 days. The polybags were then torn apart to open the compact substrates. The compact substrates have been then irrigated two times through sprinkling clean water through a small sprayer. After 7–8 days of the bags opening small pin head appeared (4-5 cm) in diameter on all the bags. Those pinheads attained the full size in about four-five days. The fruiting bodies at fully matured stage were then harvested. The time taken for pin heads appearance and maturity were recorded for all the 3 substrates.

### Data Recording

Information were recorded on the following parameters

#### Time of Pinhead Appearance

The times taken for pinhead appearance in all the three substrates were recorded.

#### Time to maturity

The time taken by the pinheads to reach the maximum size was recorded (days) for all of the 3 substrates.

#### Yield

The weight of mushroom from the harvesting of individual flushes was recorded in gram for all the three substrates.

#### Total yield

The total yields of mushroom harvested were measured flush wise for each substrate. The total yield was calculated manually by the cumulative addition of all the 5 flushes for all the 3 substrates individually.

#### Economics of mushroom cultivation on different substrates

The economics of growing of oyster mushroom production in 30 bags had been also calculated for all of the three substrates.

### Results and Discussion

The experiment was carried out to evaluate various substrates i.e. wheat straw, rice straw and Soybean straw for oyster mushroom production.

#### Pinhead appearance and Days to maturity of oyster mushroom

Table 1 showed the time taken by different substrates for the pinhead appearance and their maturity. It was observed that time taken for appearance of pinhead was quickest (26 days) in soybean straw, followed by wheat straw (30 days) and

paddy straw (38 days). In case of the maturity of pinheads minimum days for pinheads to the maturity of pinheads was taken by soybean straw (28 days) followed by wheat straw (31 days) and paddy straw (38 days). There may be distinction in the advent of pinheads on various substrates as studied by different researchers. The difference in time period was located by mean of many employees for pinheads look of various mushroom species. Khan *et al.* (1981)<sup>[5]</sup> observed the advent of 30 pin-heads of *P. ostreatus* (stress,-467) in 36 days, the identical of *P. sajarcaju* and *P. ostreatus* in 40 and 46 days, after spawning. Ramzan (1982)<sup>[8]</sup> observed the growth of five strains *P. ostreatus* strains on wheat and rice straw and found it to be 20-40 days. Patra and Pani (1995)<sup>[7]</sup> observed the time taken to be 20-24 days for the mushroom growth on paddy straw.

**Table 1:** Days to maturity and pinhead appearance of oyster mushroom

S. No	Substrate	Appearance of pinheads (Days)	Maturity (Days)
1	Soybean straw	26	28
2	Wheat straw	30	31
3	Paddy straw	38	38

#### Flush wise and total yield of Oyster mushroom

Table 2 showed the averages of flush wise yield, averages of overall yield and their mean yield of oyster mushroom grown on soybean straw, wheat straw and paddy straw. Soybean straw gave average flush yield as 660, 435, 270, 225 and 215 gram respectively. Wheat straw gave an average flush yield of 625, 390, 255, 210 and 200 gram in Flush 1 to Flush 5 respectively. Paddy straw confirmed the lowest yield having mean flush yield of 510, 370, 210, 180 and 165 gram respectively from Flush 1 to Flush 5. Ramzan (1982)<sup>[8]</sup> also acquired 3-5 flushes from wheat and paddy straw whereas Bhatti (1984)<sup>[3]</sup> got 4-6 flushes. The mean yield of 5 flushes in Soybean, wheat and paddy straw has been 361, 336 and 287 gram respectively. All of the substrate confirmed highest yield in first flush and lowest in fifth flush. The total maximum yield turned of soybean straw (1805 gm), accompanied by wheat straw (1680 gram) and paddy straw (1435 gm). Wheat straw is the natural substrate on which oyster mushrooms could be cultivated Fasidi (1996)<sup>[4]</sup>.

**Table 2:** Yield Analysis of Oyster mushroom on Different substrate

S. No.	Treatments	Flush 1	Flush 2	Flush 3	Flush 4	Flush 5	Total yield	Mean Yield
1	Soybean straw	660	435	270	225	215	1805	361
2	Wheat straw	625	390	255	210	200	1680	336
3	Paddy straw	510	370	210	180	165	1435	287

Table 3 showed that price of growing of oyster mushroom in 30 bags had been Rs 2200 for all of the three substrates. The Gross returns of oyster mushroom from 30 bags had been Rs 10830, Rs 10080 and Rs 8610 respectively for soybean, wheat and paddy straw. Arora R.K. (2015)<sup>[1]</sup> and Nagraj *et al.*, (2017)<sup>[6]</sup> found that vocational training had increased the knowledge of farmers, farm women and rural youth with all the subcomponents of mushroom production in tribal areas. Bajpai D. *et al.* (2021)<sup>[2]</sup> observed that socioeconomic conditions of the farmers is uplifted along with nutritional

security from mushroom production. Vishwakarma N. *et al.* (2023) <sup>[9]</sup> advised that Mushroom production in rural and semi-rural are as offerSa simple and low input technology manner to combat poverty and create employment for educated unemployed youth.

**Table 3:** Cost Economics of Mushroom Cultivation on different substrates

Parameters	Substrate		
	Soybean	Wheat	Paddy
Cost of cultivation (Rs./30 bags)	2200	2200	2200
Days of first picking	38	41	45
No. of pickings	05	5	5
Market rate (Rs/kg)	200	200	200
Gross return (Rs./30 bags)	10830	10080	8610
Net return (Rs./30 bags)	8630	7880	6410
Cost benefit	4.92	4.58	3.91

All the three substrate available in abundance in rural house hold sand the results confirmed their potential as substrate for Oyster mushroom production for income generation. In addition from the research work, it can be inferred that Shahdol (M.P.) is appropriate to oyster mushroom production for nine months i.e. from July 1st week to March last week. Now more than 25 girls of the district is generating mushroom within the village by efforts of KVK scientist. These farm women are working as mushroom entrepreneur in the district. These women effortlessly learnt the skill of mushroom production from the demonstration carried out by KVK. Finally it could be concluded that oyster mushroom production is a feasible alternative of livelihood for farm women utilizing the local resources.

### Conclusion

Soybean straw was found most suitable substrate for mushroom cultivation. The appearance and maturity of pinheads was fastest in soybean straw followed by wheat straw thereby paddy straw. Soybean straw also showed the highest flush wise yield, total yield and mean yield. Also the B: C ratio was 4.92, 4.58 and 3.91 for soybean straw, wheat straw and paddy straw which proves them to be good substrate for oyster mushroom production. Thus all the three substrates showed their potential for oyster mushroom production.

### Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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