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Growth and yield performance of four oyster mushroom species cultivated on paddy straw

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Abstract
Oyster mushroom is grown commercially in India as well as Orissa. The present investigation was carried out to evaluate spawn running, pin head, fruiting body formation, and yield performance of four different species of oyster mushroom *viz.*, *Pleurotus florida*, *Pleurotus sajor-caju*, *Pleurotus ostreatus* and *Pleurotus fossulatus* using paddy straw as substrate. Time required for spawn run, pin head formation and fruting body formation was fastest in *P. florida* followed by *P. sajor-caju*, *P. ostreatus* and *P. fossulatus*. Among different species of oyster mushroom, highest yield and biological efficiency was recorded in *P. florida* followed by *P. sajor-caju*, *P. ostreatus*, and *P. fossulatus*, respectively.

Keywords: *Pleurotus species*, growth, yield, biological efficiency

Introduction
Mushrooms are macrofungi which can be seen with naked eye. Like any other fungus, the vegetative parts of mushroom consists of thread like thin mycelia which under favourable conditions form fruiting bodies (basidiocarp). The oyster mushroom consists of three primary parts- an umbrella shaped cap, a short stalk called stipe and gills which are situated underside the cap. Gills are important for spore dispersal and species identification. They can be found as saprophytes on fields, pastures, wooden logs. Most of the mushrooms belong to the sub-division Basidiomycotina and a few belong to Ascomycotina. Oyster mushrooms (*Pleurotus* species) are important edible mushrooms which are cultivated commercially throughout the world due to their ability to grow at a wide range of temperature (Sharma *et al.*, 2013) [13]. The different species of *Pleurotus* grow within temperature range of 20-30 °C. Production of oyster mushroom is increasing day by day in India as well as Orissa due to its good taste, flavor, high nutritional value and medicinal value.
Oyster mushrooms are efficient lignin degraders which can grow on different agricultural wastes. Oyster mushrooms are good sources of high quality proteins and contain 25-30% protein (dry weight basis). They are rich in vitamins and minerals and contain two essential amino acids such as lysine and tryptophan which are deficient in cereals (Chang and Mshigeni, 2001; Caglarirmak 2007) [3, 1]. Thus they helps in overcoming problem of malnutrition of poor people in developing countries. Several species of mushrooms such as *Ganoderma*, *Lentinula* are important for their medicinal properties. Several species of *Pleurotus* have been reported to have therapeutic activities such as antitumour, anti-inflammatory, antihypertensive, antibacterial, antifungal (Gunde- Cimerman,1999) [5]. They are also considered as ideal food for patients suffering from heart diseases and diabetes (Chang and Mshigeni, 2001) [3].
Oyster mushrooms can be grown on different lignocellulosic materials like rice straw, wheat straw, sugarcane bagasse, paper, saw dust, leaves, barley straw, Soybean straw, maize stem, banana leaf mid ribs (Shah *et al.*, 2004; Hasan *et al.*, 2010; Sharma *et al.*, 2013; Hanafi *et al.* 2018; Cao *et al.* 2019; Hossain 2018) [12, 7, 13, 6, 2, 9]. There are more than 12 species of *Pleurotus* which are commercially cultivated in India. It is very much essential for finding best species of oyster mushroom for commercial cultivation. Therefore the present investigation was carried out to evaluate performance of four different *Pleurotus* species in terms of yield and biological efficiency on paddy straw.

Materials and Methods
The present work was undertaken during winter 2021 at Department of Plant Pathology, College of Agriculture, Chiplima, Sambalpur. Pure culture of our different species of *Pleurotus viz., Pleurotus florida, Pleurotus sajor-caju. Pleurotus ostreatus* and *Pleurotus*

fossulatus was obtained from Orissa University of Agriculture and Technology, Bhubansewar.

Spawn was prepared as per the method described by Michael *et al.* (Michael *et al.* 2011) [10] with slight modifications. Good quality mould free wheat grains were soaked overnight in water and then grains were boiled, removed excess water and grains were spread on blotting paper and air dried. Grains were mixed with calcium carbonate at the rate of 2 % on dry weight basis of the grains. The grains were then filled into bottle, plugged with cotton and sterilized in autoclave at 121 °C for 30 min. Grains were then inoculated with mycelium of different species of *Pleurotus* and incubated at 25 °C for 15 days.

Mould free, hand threshed paddy straw was used as cultivation substrate. The straw was chopped into 2-3 cm pieces and soaked in 100 liters of water for overnight. 10 g of carbendazim were mixed with water. After soaking, straw was taken out and excess water was drained. The substrate was spread as thin layer on polythene sheet and shade dried to get 60% moisture capacity.

To prepare the beds, the sterilized straw was filled in polythene bag of the size of 35 x 45 cm. One kg of substrate was used to fill up in each bag and spawn was inoculated on the surface of the substrate at the rate of 2 % of wet substrate. Four replications were done for each treatment. The inoculated bags were kept in the spawn running room in dark at room temperature (20 to 28 °C). After 20 days when the bags were fully impregnated with white mycelium, the bags were shifted to cropping room in the thatched shed. Then polythene covers were removed fully. Water was sprayed on the bed from second day of opening using an atomizer. Data on spawn run period, pin head formation, fruiting body formation and yield of different species were recorded. Total yield of mushroom fruiting body from each bed was recorded immediately after harvest. Biological efficiency was calculated by dividing average yield of mushroom per bed by dry weight of substrate.

$$\text{Biological efficiency} = \frac{\text{Fresh weight (g) of mushrooms harvested}}{\text{Dry weight (g) of substrate}} \times 100$$

Results and discussions

Spawn run, pin head formation and fruiting body formation

Different species of *Pleurotus* was grown on paddy straw and duration of time for spawn run, pin head and fruiting body formation are presented in Table 1. The number of days taken for completion of spawn run for all the *Pleurotus* species ranged from 18.4 days to 25.6 days. Shortest time required for completion of spawn run was recorded in *P. florida* (18.4 days) followed by *P. sajor-caju* (21.3 days), *P. ostreatus* (22.3 days), *P. fossulatus* (25.6 days), respectively. The number of days taken for initiation of pin head formation on paddy straw by different species of *Pleurotus* ranged from 22.8 days to 31 days. The time required for pinhead formation was fastest in *P. florida* (22.8 days) followed by *P. sajor-caju* (25.5 days), *P. ostreatus* (28 days) and *P. fossulatus* (31 days). Time required for fruiting body formation by different *Pleurotus* species ranged from 26.50 to 35.90 days. Holkar and Chandra (2016) [8] studied spawn run period of five *Pleurotus* species *viz., P. sajor-caju, P. florida, P. eryngii and P. ostreatus* and *P. flabellatus.* They observed almost similar results that *P. florida* took 19 days, *P. ostreatus* took 20 days and *P. sajor-caju* took 21 days to complete spawn run period.

Table 1: Days for completion of spwan run, pin head formation and fruiting body formation by different *Pleurotus* species

***Pleurotus* species**	**Spawn running (days)**	**Pinhead formation (days)**	**Fruiting body formation (days)**
Pleurotus sajor-caju	21.30	25.50	28.80
Pleurotus ostreatus	22.30	28.00	33.40
Pleurotus florida	18.40	22.80	26.50
Pleurotus fossulatus	25.60	31.00	35.90
SEm±	0.26	0.38	0.47
CD at 1% level	1.14	1.66	2.04

All the observations are average of four replications.

Mushroom yield and biological efficiency

Data on yield and biological efficiency of five different species of *Pleurotus* on paddy straw are presented in Table 2. Crop was harvested in three flushes. Total yield was calculated using the sum of three flushes. Among different species of oyster mushroom, highest yield was obtained from *P. florida* (820.0 g) followed by *P. sajor-caju* (784.25 g), *P. ostreatus* (763.60 g), respectively. Lowest yield was obtained from *P. fossulatus* (713.50 g). Highest biological efficiency was recorded in *P. florida* (82.00 %) followed by *P. sajor-caju* (78.43 %), *P. ostreatus* (76.36 %) and *P. fossulatus* (71.35 %), respectively. Our results are in line with Holkar and Chandra (2016) [8] who evaluated five different *Pleurotus* species viz., *P. sajor-caju, P. florida, P. ostreatus, P. flabellatus and P. eryngii* for yield performance and biological efficiency using wheat straw as a substrate and obtained maximum total yield and highest biological efficiency from *P. florida* followed by *P. flabellatus*, *P. sajor-caju*, *P. ostreatus* and *P. eryngii*. Dundar *et al.* (2008) [4] conducted an experiment to study the yield performance of three different species of oyster mushroom viz., *P. sajor-caju*, *P. ostreatus* and *P. eryngii* on wheat stalk and obtained highest total yield from *P. sajor-caju.* Our data also supports that *P. sajor-caju* produces more yield as compare to *P. ostreatus.*

Table 2: Comparative performance of different Pleurotus species for yield and biological efficiency

***Pleurotus* species**	**Yield* (g/Kg dry substrate)**	**Biological efficiency (%)**
Pleurotus sajor-caju	784.25	78.43
Pleurotus ostreatus	763.60	76.36
Pleurotus fossulatus	713.50	71.35
Pleurotus florida	820.00	82.00
SEm±	4.23	
CD at 1% level	18.30	

* Average of four replications

Conclusion

In this study, it was observed that *P. florida* was the best Pleurotus species among four different species tested in terms of yield and biological efficiency on paddy straw. So this species can be used for commercial cultivation in overcoming problem of malnutrition among poor people in our country.

References

1. Caglarirmak N. The nutrients of exotic mushrooms (*Lentinula edodes* and *Pleurotus* species) and an

estimated approach to the volatile compounds. Food Chemistry. 2007;105:1188-1194.
2. Cao G, Song T, Shen Y, Jin Q, Feng W, Fan L, *et al.* Diversity of bacterial and fungal communities in wheat straw compost for *Agaricus bisporus* cultivation. Horticultural Science. 2019;54:100-109.
3. Chang ST, Mshigeni KE. Mushroom and their human health: their growing significance as potent dietary supplements. Windhoek: The University of Namibia; c2001, p. 1-79.
4. Dundar A, Acay H, Yildiz A. Yield performances and nutritional contents of three oyster mushroom species cultivated on wheat stalk. African Journal of Biotechnology. 2008;7:3497-3501.
5. Gunde-Cimerman N. Medicinal value of the genus *Pleurotus* (Fr.) P. Karst. (Agaricales s.I., Basidiomycetes). International Journal of Medical Mushroom. 1999;1:69-80.
6. Hanafi FHM, Rezania S, Taib SM, Din MFM, Yamauchi M, Sakamoto M, *et al.* Environmentally sustainable applications of agro-based spent mushroom substrate (SMS): an overview. Journal of Material Cycles Waste Management. 2018;20(3):1383-1396.
7. Hasan MN, Rahman MS, Nigar S, Bhuiyan MZA, Ara N. Performance of oyster mushroom (*Pleurotus ostreatus*) on different pretreated substrates. International Journal of Sustainable Crop Production. 2010;5:16-24.
8. Holkar SK, Chandra R. Comparative evaluation of five different *Pleurotus* species for their growth behavior and yield performance using wheat straw as a substrate. Journal of Environmental Biology. 2016;37:7-12.
9. Hossain MM. Effect of different substrates on yield of *Pleurotus ostreatus* mushroom Environment and Ecology 2018;36(1A):312-315.
10. Michael HW, Bultosa G, Pant LM. Nutritional contents of three edible oyster mushrooms grown on two substrates at Haramaya, Ethiopia and sensory properties of boiled mushroom and mushroom sauce. International Journal of Food Science and Technology. 2011;46:732-738.
11. Randive SD. Cultivation and study of growth of oyster mushroom on different agricultural waste substrate and its nutrient analysis. Advances in Applied Science Research. 2012;3:1938-1949.
12. Shah ZA, Ashray M, Ishtiod M. Comparative study on cultivation and yield performance of oyster mushroom (*Pleurotus ostreatus*) on different substrates. Pakistan Journal of Nutrition. 2004;3:158-160.
13. Sharma S, Yadav RKP, Pokhrel CP. Growth and yield of oyster mushroom (*Pleurotus ostreatus*) on different substrates. Journal on New Biological Reports. 2013;2:3-8.