

Original Research Article

<https://doi.org/10.20546/ijcmas.2021.1001.274>

Year Round Performance of Different Varieties of Oyster Mushroom (*Pleurotus spp.*) in the Lakhimpur District of Assam

Himadri Gogoi^{1*}, B.C. Deka², J.K. Dutta², A.Chakraborty² and B. Bora³

¹ARYA Project, KVK, Lakhimpur, India

²KVK, Lakhimpur, India

³Biswanath College of Agriculture, Assam Agricultural University, India

*Corresponding author

ABSTRACT

Mushroom cultivation is a highly profitable enterprise with a least cost and high profit combinations. Temperature and relative humidity has large impacts on cultivation of mushroom. Among all the mushrooms *Pleurotus spp.* are second highest cultivable mushroom in the world. Sub-tropical climates are found suitable for its cultivation. The present study was conducted to evaluate the year round performance of different varieties of oyster mushroom viz. *P.ostreatus*, *P. florida* and *P. sajor-caju* in the Lakhimpur district of Assam under ARYA (Attracting and retaining Youth in Agriculture) project of ICAR implemented by KVK, Lakhimpur. The study comprised of five youth groups under the project. The spawns are obtained from Biswanath College of Agriculture under Assam Agricultural University, Jorhat and Spawn Production Unit of Krishi Vigyan Kendra, Lakhimpur. 120 packets of spawn per unit were provided to each youth groups/unit. Each unit has a capacity to run 240 beds/crop cycle and a total of 4 crop cycle were run at 4 different seasons viz. winter season, summer season, monsoon and post monsoon seasons of the year. All the 3 species of oyster mushrooms performed well throughout the year. The yield of *P.ostreatus*, *P. florida* and *P. sajor-caju* are found to be highest in the post monsoon season. The lowest yield of *P. ostreaatus* and *P. florida* was obtained in the summer season (March-May) whereas for *P. sajor caju* lowest yield was obtained in the monsoon season (June-September). The performance of *P. ostreatus* was found to be better as compared to the *P. florida* and *P. sajor-caju* throughout the year. For the development of entrepreneurship through year round production of oyster mushroom in the Lakhimpur districts of Assam, cultivation of *P. ostreatus* was found to be more profitable followed by *P. sajor-caju*.

Keywords

ARYA, Oyster mushrooms, Entrepreneurship development

Article Info

Accepted:
15 December 2020
Available Online:
10 January 2021

Introduction

Mushroom is an edible, fleshy fruiting body of fungus belonging to the subdivision Basidiomycotina with rich in nutritional and

medicinal properties. These are saprophytic fungi growing on dead organic matters of vegetative origin and can utilize almost all forest and agricultural residues as substrates (Adejoye *et al.*, 2006). It is considered to be a

complete, health food and suitable for all age groups, child to aged people. Mushrooms are becoming more important in our diet due to its nutritional value, related to high protein, dietary fibre, vitamin, minerals and low fat / energy contents (Agahar-Murugkar and Subbulakshmi, 2005). It has tremendous health benefits (Table.1) and extensively used in folk medicine. Mushroom cultivation not only helps to reduce the protein deficiency in developing countries like India but also increase the income of the rural poor people (Sharma *et al.*, 2013). It can be a big source of income through rural development programme for farmers if they are made aware its cultivation process and its importance. Besides selling fresh mushroom, the value-added products of mushroom can bring more profit to the farmer's especially rural youth and migrant workers (Wakchaure. G.C.,2014). Among all the cultivated mushrooms *Pleurotus spp*, commonly known as oyster mushroom (known as 'Dhingri' in India) occupied second position in the world and known for its nutritional and medicinal values (Khan *et al.*, 2008). The word 'Pleuro' is derived from Greek word which means formed laterally or lateral position of the stalk or stem (Mahalakshmi *et. al.*,2019) Cultivation of Oyster mushroom with agricultural residues, such as rice and wheat straw is a value added process to convert these materials into human food (Pokhret *al.*,2013). Environment and mushroom cultivations both are co-related. Environmental factors such as temperature, humidity, fresh air, light intensity affects the formation, colour and growth rate of mushrooms in many ways (Stamets *et. al.*, 1993). *Pleurotus spp* are subtropical edible mushroom and very much affected by temperature and relative humidity. It can be grown in wide range of temperature (15-30°C) that varies from species to species (Van Peer *et al.*, 2009 & Uddin *et al.*, 2011). In the present study, the performance of different

varieties of oyster mushrooms *viz P. ostreatus*, *P. florida* and *P. sajor caju* were observed at various seasons in the Lakhimpur district of Assam.

Materials and Methods

A study was conducted under ARYA (Attracting and Retaining Youth in Agriculture) project of ICAR implemented by Assam Agricultural University (AAU) through KVK, Lakhimpur. Five rural youth groups from Rangati, Karunabari, Bholabori, Gosaichuk and Handohkhowa villages of Lakhimpur district were selected under this project. The cultivation techniques were adopted as per the standard Oyster mushroom cultivation practices (Singh *et al.*, 2011). The spawn of 3 varieties of oyster mushroom *viz. Pleurotus ostreatus*, *Pleurotus florida* and *Pleurotus sajor-caju* were obtained from Biswanath College of Agriculture, under Assam Agricultural University, Jorhat and spawn production unit of Krishi Vigyan Kendra, Lakhimpur. The standard size of the 5 entrepreneurial units in the present work was 15 ft x 10 ft x 8 ft and all the bags were hanged in a vertical line comprised of total 5 bags per line. The minimum bag to bag distances were maintained and a total of 240 bags were hanged per unit. The temperature and humidity in both inside and outside of the house were recorded by using thermo hygrometer. Data on various parameters *viz.* fresh yield, dry yield, fresh to dry yield ratio, cost of production, total production, gross return were recorded to evaluate the performance of 3 different varieties of *Pleurotu spp.* namely *P. ostreatus*, *P. florida* and *P. sajor-caju* throughout the year at four different seasons *viz.* Post summer (October-November), Monsoon (June- September), Winter (Dec- February) and summer seasons (March-May). Yield was determined by weighing the fruiting bodies of both fresh and dry mushroom and the total yield was

determined by adding the yield of 3 flushes of mushroom. The Biological efficiency was determined by adopting the following formula.

Biological efficiency (BE) =

$$\frac{\text{Fresh weight of harvested mushrooms}}{\text{Dry weight of substrate}} \times 100$$

The average profitability index of each entrepreneurial unit was calculated by estimating the benefit cost ratio (BCR).

Results and Discussion

The data presented in table 2 revealed that all the 3 species of *Pleurotus* spp viz. *P. ostreatus*, *P. florida* and *P. sajor-caju* performed well in all the seasons. However, the fresh yield of all the 3 species of *Pleurotus* spp was found to be highest in the post-monsoon season (Figure 1). Though the yield performance of all the species are satisfactory at various seasons but the yield of *P. ostreatus* was found to be highest in all the seasons as compared to the *P. florida* and *P. sajor-caju*.

Data presented in table 2 indicated the yield performance of different *Pleurotus* spp throughout the year. The fresh yield obtained from the total 3 flushes of *P. ostreatus*, *P. florida* and *P. sajor-caju* was recorded in the range from 1420-1480 g/ bed, 1137-1290 g/bed and 1147-1280 g/bed, respectively. The *P. ostreatus* and *P. florida* gave the maximum yield (1480 g and 1290 g) and lowest yield (1420 g and 1137 g) in Post Monsoon season (October-November) and summer season (March-May), respectively whereas, *P. sajor-caju* produced the maximum yield (1280 g and 1270 g) in Post Monsoon season (October-November) and winter season (December –January), respectively. *P. sajor-caju* produced lowest yield (1147 g) in the

Monsoon season (June-September).

The yield of *P. ostreatus* was found to be higher in all the seasons of the year as compared with the *P. florida* and *P. sajor-caju* (Table 2, Fig 1). Similar observation was also observed by Mahalakshmi *et al.*,(2019) in their study on seasonal performance of oyster mushroom where they found the yield performance of oyster mushroom was poor in the summer season. They have also found lowest primodial fruit bodies in the summer season. Upadhyay *et al.*,(2003) and Tripathi *et al.*, (2005) also reported that the maximum yield of *Pleurotus membranaceous* in October to January. In the present study, the maximum yield was obtained in the post monsoon season (Oct-Nov) followed by winter season (Dec-Feb) in case *P. ostreatus* and *P. sajor-caju*. Das *et al.*,(1991) reported that seasonal variations affect the number, weight, crop production period and yield of mushroom.

The data presented in Table 3 indicated the variations in the biological efficiency among the 3 varieties of oyster mushroom in various seasons. Analysis of data indicates that among the 4 seasons, the biological efficiency of all the 3 varieties viz. *P. ostreatus*, *P. florida* and *P. sajor-caju* were found to be highest (98.06 %,85.89% and 85.31%), respectively in the post summer season (October-November) which recorded the average temperature and relative humidity inside the house of 27° C and 82.10%, respectively. The lowest biological efficiency for *P. ostreatus* and *P. florida* were found to be minimum (94.66 % and 73.55 %), respectively in the summer season when average temperature and relative humidity inside the house were recorded to be 25.59 ° C and 81.93 %, respectively and for *P. sajor-caju*, the minimum (76.43 %) BE is found in the monsoon season (June-September) when average temperature of 27.98 ° C and relative humidity of 82.70% were recorded inside the house.

Biological efficiency of all the 3 species was found to be good throughout the year at different seasons although biological efficiency of *P. ostreatus* was found to be highest in all the season. The present findings was in conformity with the findings of Tripathi *et al*, (2005) who suggested that the better growth of *Pleurotus* fungus was found in temperature range of 14-27⁰ C with relative humidity of 70-80%.

Data presented in the table 4 revealed that the cost involved in preparation of mushroom bed in all the seasons remains the same for all the 3 species of *Pleurotus* spp in all the locations. The average production of *P. ostreatus* was found in the ranges from 1.42-1.48 Kg/bed with average net return ranges from Rs. 249 to Rs. 261/bed in all the four seasons and the average profitability index (B:C ratio) of *P. ostreatus* was found to be highest in the post monsoon season(8.45) followed by winter season (8.34), respectively. The gross return obtained from the production of *P. ostreatus* with 4 crop cycles @ 240 beds/crop cycle were Rs. 70,080, Rs. 68,160, Rs.69,600 and Rs.71,040 in winter, summer, monsoon and post monsoon season, respectively with a total

average return of Rs. 2,78,880/year. Similarly, the average production of *P. florida* was also found to be in the ranges from 1.13-1.29 Kg/bed with average net return ranges from Rs. 191 to Rs. 223/bed in all the four seasons and the average profitability index (B:C ratio) of *P. florida* was found to be highest in the post monsoon season (7.37) followed by monsoon season(6.97),respectively.

The average return from *P. florida* and *P sajo-rcaju* were found to be Rs. 2,31,360/year and Rs. 2,34,720/year, respectively with an average cost of Rs. 33,600/year which reaffirmed mushroom cultivation as a least cost and high profit enterprise. Dhondayal, (1989) studied the input output relationship of mushroom based on production function expressed it as a least cost and high profit combinations. Similar observation was also made by Elsamma *et al*, (2010) in their study and they found a low input to high output ratio in cultivation of oyster mushroom and proved mushroom cultivation as a profitable enterprise which was in conformity with the findings of our present investigation.

Table.1 Moisture content (%) and Nutritive values of 3 species of Oyster mushrooms (g/100g dried sample)

Mushroom Species	Moisture (%)	Carbohydrate (g/100g of dried sample)	Fibre (g/100g of dried sample)	Protein g/100g of dried sample)	Fat (g/100g of dried sample)	Ash (g/100g of dried sample)
<i>Pleurotus. ostreatus</i>	86.5 ± 0.8	39.4 ± 5.9	27.0 ± 2.2	23.5 ± 2.9	2.6 ± 0.2	7.4 ± 0.9
<i>Pleurotus florida</i>	87.4 ± 1.1	40.3 ± 4.5	26.8 ± 1.9	20.6 ± 2.6	3.9 ± 0.2	8.3 ± 0.2
<i>Pleurotus sajo-rcaju</i>	87.2 ± 0.5	37.2 ± 4.2	26.2 ± 2.0	24.5 ± 2.9	4.0 ± 0.6	8.0 ± 0.3

(Source: Khan *et al.*, 2008)

Table.2 Yield performance of *P. ostreatus*, *P. florida* and *P. sajor- caju* in various seasons

Sl. No	Various season	<i>P. ostreatus</i>			<i>P. florida</i>			<i>P. sajor caju</i>		
		Total Wt. Of Fresh fungal fruit body in 3 flushes (FW) (g)	Total Wt. Of Dry fungal fruit body in 3 flushes (DW) (g)	FW:DW	Total Wt. Of Fresh fungal fruit body in 3 flushes (FW) (g)	Total Wt. Of Dry fungal fruit body in 3 flushes (DW) (g)	FW:DW	Total Wt. Of Fresh fungal fruit body in 3 flushes (FW) (g)	Total Wt. Of Dry fungal fruit body in 3 flushes (DW)(g)	FW:DW
1.	Winter season	1460	142.30	10.26	1180	109.91	10.81	1270	123.35	10.29
2.	Summer season	1420	137.8	10.30	1137	107.19	10.60	1190	110.53	10.76
3.	Monsoon season	1450	140.7	10.31	1228	120.16	10.21	1147	109..27	10.49
4.	Post monsoon season	1480	145.96	10.13	1290	121.58	10.61	1280	123.56	10.35

Values are average of 5 youth groups selected under ARYA

Table.3 Effect of temperature and relative humidity on biological efficiency of *P. ostreatus*, *P. florida* and *P. sajor- caju* in various seasons

SL. No	Various Seasons	Mean day temperature (°C) (Sd±Mean)		Mean relative humidity (%) (Mean± Sd)	Biological efficiency (%)		
		Inside (Mean± Sd)	Outside (Mean± Sd)		<i>P. ostreatus</i>	<i>P. florida</i>	<i>P. sajor caju</i>
1.	Winter season	24.76±0.31	27.19±0.71	79.00±2.31	97.33	78.60	84.66
2.	Summer season	25.59±0.49	28.59±2.47	81.93±3.84	94.66	73.55	79.33
3.	Monsoon season	27.98±1.71	31.71±1.84	82.70±3.94	96.16	81.83	76.43
4.	Post monsoon season	27.01±1.02	30.76±1.82	82.10±1.85	98.06	85.89	85.31

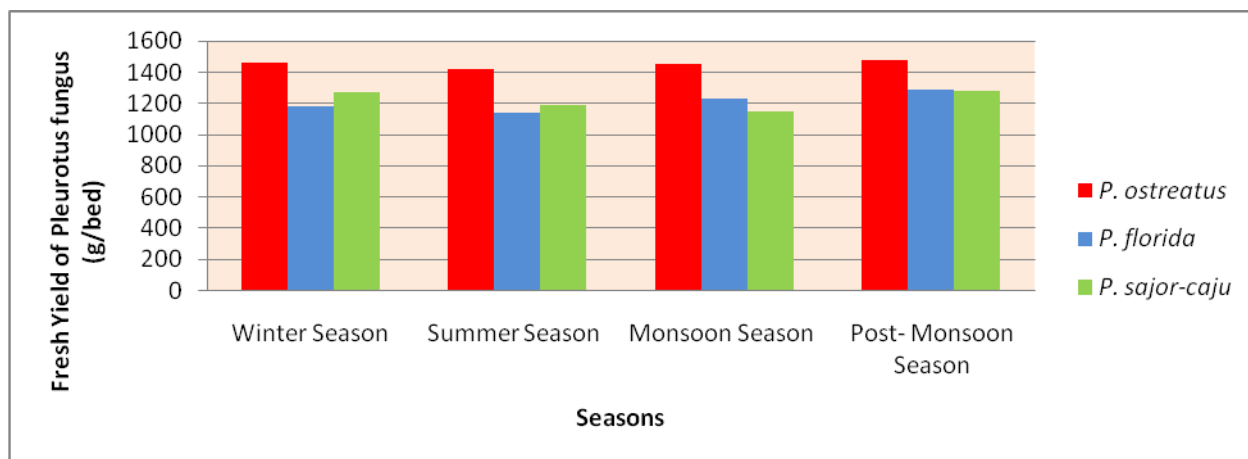
Values are average of 5 youth groups selected under ARYA

Table.4 Economic analysis of *P. ostreatus*, *P. florida* and *P. sajor- caju* in various seasons

Sl No	Various Seasons	<i>P. ostreatus</i>					<i>P. florida</i>					<i>P. sajor caju</i>				
		Total Cost (Rs.)/bed	Total Production (Kg)/bed	Gross return (RS.)	Net return (RS.)	B:C	Total Cost (Rs.)/bed	Total Production (Kg)/bed	Gross return (RS.)	Net return (RS.)	B:C	Total Cost (Rs.)/bed	Total Production (Kg)/bed	Gross return (RS.)	Net return (RS.)	B:C
1	Winter	35.00	1.46	292.00	257.00	8.34	35.00	1.18	236.00	201.00	6.74	35.00	1.27	254.00	219.00	7.25
2	Summer	35.00	1.42	284.00	249.00	8.11	35.00	1.13	226.00	191.00	6.45	35.00	1.19	238.00	203.00	6.8
3	Monsoon	35.00	1.45	290.00	255.00	8.28	35.00	1.22	244.00	209.00	6.97	35.00	1.15	230.00	195.00	6.57
4	Post Monsoon	35.00	1.48	296.00	261.00	8.45	35.00	1.29	258.00	223.00	7.37	35.00	1.28	256.00	221.00	7.31

Values are average of 5 youth groups selected under ARYA

Figure.1 Fresh yield of *Pleurotus spp* in various seasons



In conclusion, all the 3 species of oyster mushroom viz. *P. ostreatus*, *P. florida* and *P. sajor-caju* performed well in the Lakhimpur district of Assam throughout the year. Out of all, *P. ostreatus* yielded relatively higher than *P. florida* and *P. sajor-caju* in all the seasons. Climatic conditions of the districts are also suitable for the cultivation of oyster mushrooms. Hence, mushroom cultivation could be a promising, profitable agricultural enterprise for the unemployed rural youth of the district.

References

- Adejoye, O. D. Adebayo-Tayo, B. C., Ogunjobi, A. A., and Olaoye, O. A. 2006. Effect of Carbon, Nitrogen and mineral sources on growth of *Pleurotus florida*, Nigeria edible mushroom. *African Journal of Biotechnology*, 5:1355-1359.
- Agahar-Murugkarand, D., Subbulakshmi, G (2005). Nutritional value of edible wild mushrooms collected from the Khasi hills of Meghalaya. *Food Chem*, 89:599-603.
- Das TK, Sharma R, Singh B, Some Principles in Mushroom Growing and Spawn Mocking. US Department of Agriculture Tech., USA, Bull 1991; 85, 1.
- Dhondyal, S.P. 1989. Farm management an economic analysis. *Friends Publication*, p137-151.
- Job, E., & Geetha, D. (2010). Economic analysis of oyster mushroom production in Kerala. *Mushroom Research*, 19(2), 94-100.
- Khan, A., Alam, N., Amin, R., Ara, I., Shim, M. J., Lee, M. W., & Lee, T. S. (2008). Nutritional analysis of cultivated mushrooms in Bangladesh—*Pleurotus ostreatus*, *Pleurotus sajor-caju*, *Pleurotus florida* and *Calocybe indica*. *Mycobiology*, 36(4), 228-232.
- Mahalakshmi, A., Suresh, M., & Rajendran, S. (2019). Cultivation of oyster mushroom (*Pleurotus florida*) in various seasons on paddy straw.
- Pokhrel, C. P., Kalyan, N., Budathoki, U., Yadav, R. K. P. 2013. Cultivation of *Pleurotus sajor-caju* using different agricultural residues. *International Journal of Agricultural Policy and Research* 2:19-23.
- Pokhrel C. P. Yadav, R. K. P. and Ohga S. 2009. Effects of physical factors and synthetic media on mycelial growth of *Lyophyllum decastes*. *Journal of Ecobiotech* 1: 046-050.
- Sharma, S. Yadav, R. K. P. and Pokhrel, C. P.

2013. Growth and Yield of Oyster mushroom (*Pleurotus Osteratus*) on different Substrate. *Journal of New Biological Reports* 2 (1):3-8.
- Singh, M., Vijay, B., Kamal, S., & Wakchaure, G. C. (2011). Mushrooms: cultivation, marketing and consumption. *Mushrooms: cultivation, marketing and consumption*.
- Stamets, P., 1993. Growing gourmet and medicinal mushrooms. A companion guide to the mushroom cultivation. 3rd Edn. *Tenspeed Press. California*.
- Stamets, P. E. (2005). Notes on nutritional properties of culinary-medicinal mushrooms. *International Journal of Medicinal Mushrooms*, 7(1&2).
- Tripathi DP, Mushroom Cultivation Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, 2005; pp. 17 and 210.
- Uddin, M. N., Yesmin, S., Khan, M. A., Tania, M., Moonmoon, M., & Ahmed, S. (2011). Production of oyster mushrooms in different seasonal conditions of Bangladesh. *Journal of scientific Research*, 3(1), 161-161.
- Upadhyay RC, Singh SK, Rai RD, Current Vistas in Mushroom Biology and Production Mushroom Society of India, 2003; pp. 164 and 246.
- Van Peer, A. F., Muller, W. H., Boekhout, T., Lugones, L. G., & Wosten, H. A. (2009). Cytoplasmic continuity revisited: closure of septa of the filamentous fungus *Schizophyllum commune* in response to environmental conditions. *PLoS one*, 4(6), e5977.
- Wakchaure. G. C. 2011. Mushrooms-cultivation, marketing and consumption, Chapter: Mushrooms- Value Added Products, pp.233-238.

How to cite this article:

Himadri Gogoi, B.C. Deka, J.K. Dutta, A. Chakraborty and Bora, B. 2021. Year Round Performance of Different Varieties of Oyster Mushroom (*Pleurotus* spp.) in the Lakhimpur District of Assam. *Int.J.Curr.Microbiol.App.Sci*. 10(01): 2368-2375.
doi: <https://doi.org/10.20546/ijcmas.2021.1001.274>