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Original Research Article

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## CULTIVATION OF OYSTER MUSHROOM (*PLEUROTUS FLORIDA*) IN VARIOUS SEASONS ON PADDY STRAW

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**ABSTRACT:** Mushroom cultivation is one of the most profitable and environment friendly enterprises, among the various horticultural crops in India. Oyster mushrooms (*Pleurotus sp*) are widely cultivated all over the world. It's a subtropical edible mushroom, is suitable for cultivation in summer and rainy season. Its production is remarkably affected by the environmental conditions like temperature and relative humidity. In a study the temperature ( $^{\circ}\text{C}$ ) and relative humidity (% RH) of culture house in each seasons, and parameters of mushroom production were recorded. Analysis of data indicated that the crop raised higher yield levels obtained during the period from rainy season (August to November) was found to be the appreciable recorded comparatively higher biological efficiency 80.71% of Biological efficiency than summer, post summer and winter seasons. The production was found minimum during the cultivated time (March – May) recorded a modest yield of 46.37% of biological efficiency. **Keywords:** Different seasonal conditions, Temperature, Relative humidity, Growth and yield, Biological efficiency.

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### 1.INTRODUCTION

Mushroom cultivation is one of the most profitable and environment friendly enterprises, among various horticultural crops in India. It is mainly cultivated indoors in cropping rooms where fluctuations in climatic conditions like drought and rains have little impacts on its production. Mushrooms are being recognized as important food items from ancient times. Their usage is being

increased day by day for their significant role in human health, nutrition and disease. Mushrooms of *Pleurotus sp.* are commonly known as oyster mushrooms which occupy the second position among cultivated edible mushrooms worldwide due to their nutritional and medicinal values [5]. Oyster mushroom commonly referred as 'Dhingri' in India, is a basidiomycetes and belongs to the genus '*Pleurotus*'. It is lignocellulolytic fungus that grows naturally in the temperate and tropical forests on dead, decaying wood logs, sometimes on drying trunks of deciduous or coniferous trees. It can also grow on decaying organic matter. The fruit bodies of this mushroom are distinctly shell, fan or spatula shaped with different shades of white, cream, grey, yellow, pink or light brown depending upon the species. However, the colour of the sporophores is extremely variable character influenced by the temperature, light intensity and nutrients present in the substrate. The name *Pleurotus* has its origin from Greek word, 'Pleuro' that means formed laterally or lateral position of the stalk or stem. The environmental factor is very important for the production of oyster mushrooms. Various mushrooms are known to be sensitive to the climatic conditions [16]. The major environmental factors like temperature, humidity, fresh air and compact materials affect in mushroom production [13]. It's a subtropical edible mushroom, is suitable for cultivation in summer and rainy season. Its production is remarkably affected by the environmental conditions like Temperature and relative humidity [16]. *Pleurotus sp.* grows in wide range of temperature (15-30°C) [8]. which also varies from species to species. In this context, the present study was undertaken to ascertain the seasonal productivity of oyster mushroom under natural conditions and yield with the prevalent weather conditions.

## 2. MATERIALS AND METHODS

The entire work was carried out in laboratories of Unit of Rural biotechnology, Department of Botany, Saraswathi Narayanan college, Madurai, Tamil Nadu, India. For this study, selected species of oyster mushroom such as, *P. florida*, were cultivated in the culture house of the centre.

### **Mushroom house**

15x10x6 feet brick walled house, roofed with palm leaves, was used as mushroom house. The floor of the house was spread with 4-6cm river sand bed to increase the humidity. The inside of the walls were lined with gunny sheets. Water was sprinkled over the gunny sheets and the floor to maintain the optimum temperature and humidity for the growth of mushroom. Mushroom beds were orderly arranged in the mushroom house. The temperature and humidity both inside and outside of mushroom house were recorded on daily basis using thermo hygrometer. A thermo hygrometer was fixed inside the mushroom house to take observations of temperature and humidity. During experiment various parameters viz., spawn running, completion of spawn running, first primordial (or) pin head formation, number of sporopores in each bunch of mushroom, period required for the first, second and third harvests were recorded and tabulated.

### Watering

Water was sprinkled over the gunny sheets and the floor, sand twice a day in order to maintain room temperature and relative humidity.

### Preparation of liquid disinfection

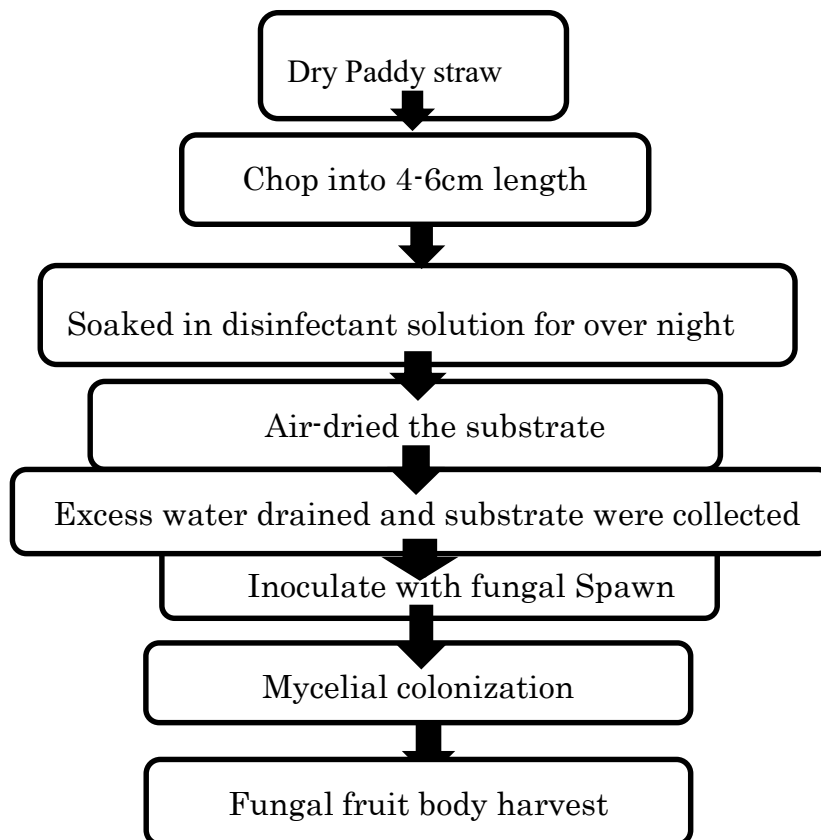
To disinfect Paddy straw, a solution was prepared by mixing 200ml of commercial grade formaldehyde and 4g of bavistin (commercial fungicide) powder in 50liter water. First 10lit .of tap water was taken in a plastic bucket in which formaldehyde was added, the resultant mixture was agitated well by using a wooden stick. Similarly, in another bucket the bavistin was added along with 10liter of tap water. Then, these two liquids were mixed together and its final volume made in to 50 liter and called liquid disinfectant

### Harvesting

Mushroom was harvested before the fruiting body showed any splitting on the edges. The yield of mushroom and their different quality parameters; days required to first primordial initiation, number of fruit bodies and biological yield were recorded regularly [8]. Biological efficiency (BE) was determined by the following formula:

$BE = (\text{wt. of fresh mushroom fruit bodies}) \times 100 / \text{wt. of dry substrate}$

### Cultivation of *Pleurotus florida* on Paddy straw

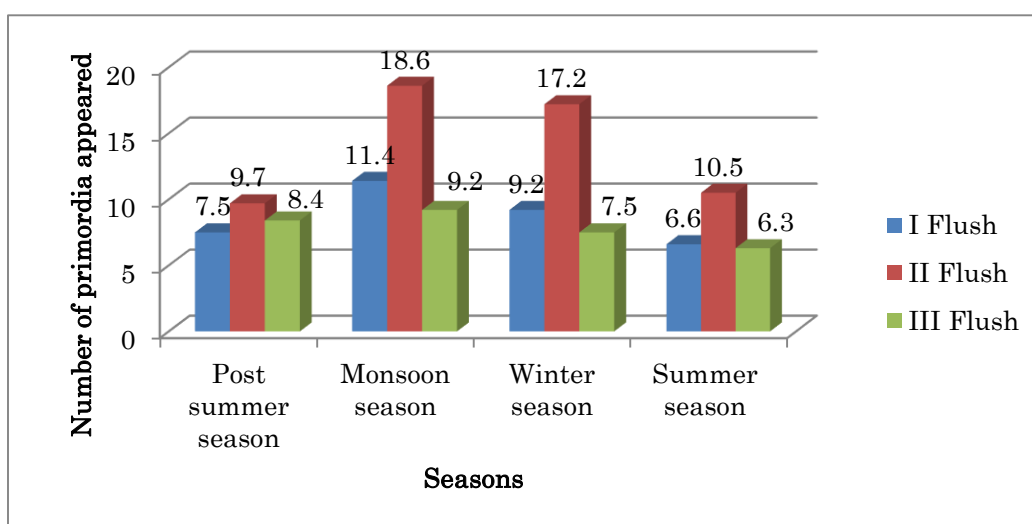


### 3. RESULTS AND DISCUSSION

**Table 1: Temperature, relative humidity and biological efficiency for oyster mushroom cultivation in various seasons**

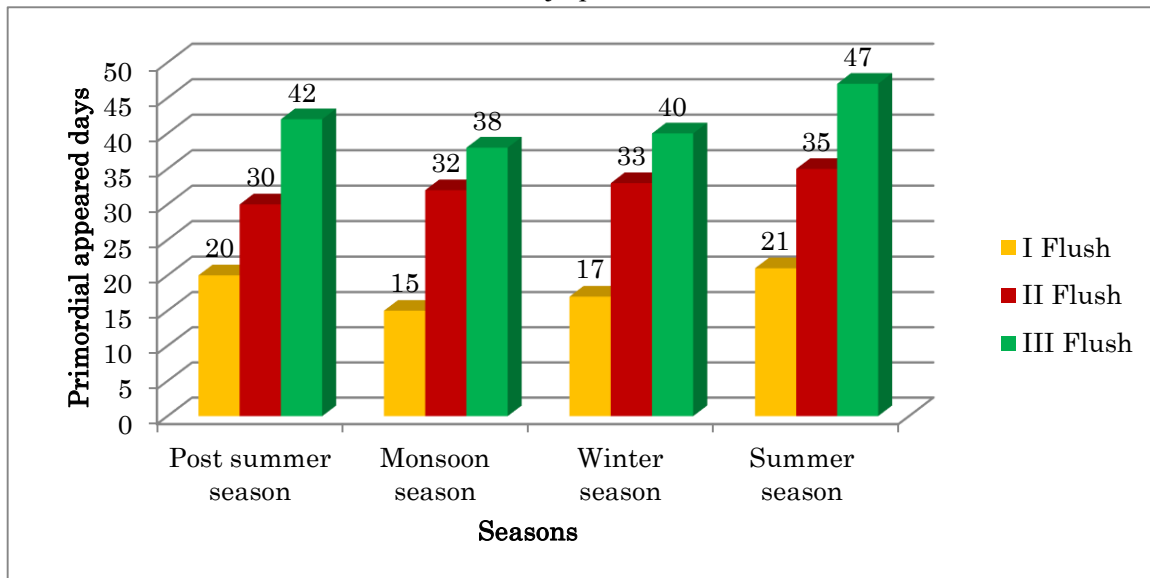
S. No	various seasons	Mean day Temperature in culture house(°C)		Mean relative humidity (%)	Biological efficiency (%)
		Inside	Outside		
1	<b>Post summer season</b>	29.71±0.62	32.48±1.78	68.18±2.01	66.92
2	<b>Monsoon season</b>	26.14±0.26	29.92±0.87	80.63±1.55	80.71
3	<b>Winter season</b>	27.28±0.91	30.71±0.72	78.16±1.07	76.04
4	<b>Summer season</b>	30.56±0.52	33.28±0.68	65.2±1.64	46.37

The data indicated that the daily atmospheric temperature, humidity for mushroom cultivation in various seasons. Analysis of data indicated that in summer season (March – May) relative humidity is very low 65.2%, in this summer season minimum biological efficiency for *Pleurotus* fungus in 46.37% of BE comparatively winter, Post summer and Monsoon season. In winter season (December – February) average relative humidity for 78.16%. and the BE was 76.04% and in monsoon season during (August – November) relative humidity is higher than winter and summer seasons, whereas, it was 80.63%.



**Figure 1: Number of Primordial appeared in *Pleurotus* fungus in various seasons**

Fig -1 shows that the total number of primordial fruit bodies, in four seasons ranged from 23.4-36.2. The highest number of primordial fruit bodies 36.2 was produced in *P.florida* in monsoon season and the lowest primordial fruit bodies 23.4 was produced in *Pleurotus* fungus in summer season.



**Figure 2: Number of fruit body initiation days in *Pleurotus* fungus**

Studies on oyster mushroom cultivation, showed that the candidate fungus colonized easily on the paddy straw substrates. Whereas it was slow on summer season. Similarly, the fungus initiated its fruit body on 15 and 17<sup>th</sup> day in monsoon and winter season. Whereas, it was on 21<sup>st</sup> day on summer season. The fungus requires 38 days to complete its three flushes fruit body production on paddy straw in monsoon season. Whereas, it took 42 and 47 days in summer and Post summer season respectively (Figure:2).

Table 2 shows that, yield range of *pleurotus* fungus in different seasons of the year, ranging from 225.34g-274.93g/bag, with the maximum yield in monsoon season compared with winter, post summer and summer seasons and the lowest yield in summer season whereas, it was 8.92% of dry fungal fruit body and 10.62,15.94and 15.46% of dry fungal fruit body in Post summer monsoon and winter seasons respectively.

**Table 2: Yield performance for *Pleurotus* fungus in various seasons**

S. No	Various seasons	No. of fermenters	Amount of substrate in each fermenter (kg)	Total fresh fungal fruit body harvested (g)	Total dry fungal fruit body (g)	% of dry fungal fruit body (g)	Duration of SSF (days)
1	Post summer season	10	1	321.89	34.20	10.62	50
2	Monsoon season	10	1	374.93	59.78	15.94	45
3	Winter season	10	1	359.94	55.68	15.46	47
4	Summer season	10	1	225.34	20.12	8.92	52

❖ Values are average ten fermenters

A study was undertaken on oyster mushroom cultivation on paddy straw with reference various seasons. The results revealed that the yield of mushroom was 80.71% of BE in monsoon season whereas it was 76.04%BE, 66.92%BE and 46.37% in winter, post summer and summer seasons respectively. Among the four seasons poor yield of mushroom was recorded in the summer months. According to Das et al [3] Variations in season seriously affected the number, weight and crop production period of mushroom. They also reported that the favorable temperature and moisture condition enhanced the production of fruit bodies of mushroom. Tripathi [15] suggested the *P. ostreatus* and *P. florida* give very poor yields during summer season. It was suggested that the cultivation of pleurotus species in the temperature zone 14-27<sup>0</sup>C with relative humidity 70-80% are optimum for better growth [8]. Several workers had reported that paddy straw was the best substrate for cultivation of *Calocybe indica* [6] Biswas et al [2]; [9] and [14] However, in this present investigation *Pleurotus florida* was grow on paddy straw substrates. Ahlawat [1] Mohapatra and Niranjanchinara [7] stated that the optimum temperature and humidity for fruitification of *Volvarellavolvacea* was found to be 28-32<sup>0</sup>C and 80%,of Relative humidity respectively under conventional method of cultivation. Similarly, In this study the optimum temperature and humidity for oyster mushroom cultivation, found to be 26-30<sup>0</sup>C and 68-80% of Relative humidity. In this study, we have found that the lowest time for days of primordial initiation was recorded in winter season for the *pleurotus* fungus. Uddin et al [8] reported that the lowest time for days of primordial initiation was recorded in January for the *Pleurotus* species. Sandeep Kumar Suman et al [12] reported that *Calocybe indica* yield was recorded in the treatment of paddy straw 619 gm/kg dry substrate. When compare with paddy straw, the current study also gave almost similar results. Mohapatra and Niranjanchinara [7] also reported that high yield of straw mushroom was obtained from the month in July. Upadhyay et al [9] Tripathi [15] found maximum yield of *Pleurotus membranaceus* in October to January. In this present investigation high yield of oyster mushroom was obtained during the month in september to November in monsoon season. Upadhyay et al [9] Tripathi [15] also reported that minimum yield of *P.membranaceus* in June to September. Tripathi[15] and Das et al [4] suggested that *P.ostreatus*and *P. florida* give very poor yields during summer season. We also recorded poor yield of *P. florida* in summer seasons.

#### **4. CONCLUSION**

The results and observation of our study suggested that *Pleurotus florida* can be cultivated in year round and achieve maximum biological efficiency in monsoon season and minimum in summer season.

#### **ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Not applicable.

#### **HUMAN AND ANIMAL RIGHTS**

No Animals/Humans were used for studies that are base of this research.

**CONSENT FOR PUBLICATION**

Not applicable.

**AVAILABILITY OF DATA AND MATERIALS**

The authors confirm that the data supporting the findings of this research are available within the article.

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**CONFLICT OF INTEREST**

Authors have no conflict of interest.

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