

Original Research Article

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Comparative Study on Growth Parameters and Yield Potential of Two Species of *Pleurotus* Mushroom (*Pleurotus florida* and *Pleurotus sajor-caju*)

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ABSTRACT

Oyster mushrooms are well known worldwide for their health promoting as well as their easily cultivable nature with minimum requirements. The study was undertaken to observe the comparative growth behavior and yield potential of two different species of oyster mushroom viz., *Pleurotus florida* and *Pleurotus sajor-caju*. *Pleurotus florida* and *Pleurotus sajor-caju* mushrooms were grown separately in wheat substrate in dark growing chamber with temperature and relative humidity ranges maintained in between 20-25°C and 80-85% respectively. Data obtained suggested *Pleurotus florida* showed faster spawn run period along with early pin head initiation than in *Pleurotus sajor-caju*. The total crop periods were recorded as 43 days and 49 days in *Pleurotus florida* and *Pleurotus sajor-caju* respectively. The yield potential of *Pleurotus florida* (1363 g per kg of dry substrate) was also found to be better than *Pleurotus sajor-caju* (940 g per kg of dry substrate). The results further obtained in *Pleurotus florida* showed average stalk length (3.5 cm), average stalk diameter (1.2 cm), average cap diameter (7.7 cm), maximum weight of fruiting body (40 g), minimum weight of fruiting body (34.3 g) with total number of fruit bodies recorded to be 48. Whereas, the results of *Pleurotus sajor-caju* showed average stalk length (2.8 cm), average stalk diameter (1.1 cm), average cap diameter (6 cm), maximum weight of fruiting body (34 g), minimum weight of fruiting body (28.6 g) with total number of fruit bodies recorded to be 37. Data obtained suggested that *Pleurotus florida* was better performing than *Pleurotus sajor-caju* in context to both growth behaviour and yield potential. Significance and impact of study: Thus the results obtained from the present study can help the mushroom growers in selection of *Pleurotus* mushroom species for obtaining better growth and yield.

Keywords

Comparative study,
Growth analysis,
Oyster mushroom,
Pleurotus florida,
Pleurotus sajor-caju,
Yield potential

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Introduction

Oyster mushrooms are the third largest cultivated mushroom in the world; China being the world leader in its production.

Oyster mushroom is rich in Vitamin B and C complex and the protein content varies

between 1.6 to 2.5 percent. The niacin content is about ten times higher than any other vegetables. The folic acid present in oyster mushrooms helps to cure anemia. It has most of the mineral salts required by the human body. A polycyclic aromatic compound Pleurotin has been isolated from *P. griseus* which possess antibiotic properties.

Cultivation of a sp. of oyster mushroom (*Pleurotus ostreatus*) was initiated on experimental basis in Germany by Flack during the year 1917 on tree stumps and wood logs.

Growing technology was perfected in USA by Block, Tsao and Hau. Cultivation of different varieties of oyster mushroom was initiated in India in the early sixties. Commercial cultivation began in mid-seventies.

The crop has got a number of varieties which can be cultivated throughout the year under varied agro-climatic conditions. Faster growth rate and early cropping is observed in oyster mushrooms. About 5 to 6 crops can be taken in a year as the total cropping period is 60 days.

Among all the cultivated mushrooms *Pleurotus* has maximum number of commercially cultivated species suitable for round the year cultivation. All the varieties or species of oyster mushroom are edible except *P. olearius* and *P. nidiformis* which are poisonous. Species commercially cultivated all over the world includes *P.ostreatus*, *P. florida*, *P. flabellatus*, *P. sajor caju*, *P. sapidus*, *P. membranaceous*, *P. citrinopileatus*, *P. eous*, *P. cornucopiae*, *P. fossulatus*, *P. eryngii* etc.

Cultivation of this mushroom on commercial basis would be more profitable as compared to other mushroom due to its low capital costs.

The cultivation of this variety of mushroom is very simple and economical in rural areas where raw materials and facilities required are easily available as it does not require complicated substrate preparation technique unlike in case of button mushroom.

It is in fact the cheapest and easiest to grow among all the cultivated edible mushrooms.

Materials and Methods

Mushroom culture

The cultures of the two species of oyster mushroom viz., *Pleurotus florida* (PL3 strain) and *Pleurotus sajor-caju* (Psc1 strain) were cultured, sub-cultured and maintained on PDA medium in a B.O.D. incubator at 25±2° C temperature. The study was conducted in the Mushroom Spawn Laboratory, Department of Mycology and Plant Pathology, B.H.U. Varanasi.

Preparation of mushroom spawn

Well cleaned and healthy wheat grains were boiled for 30 minutes or until they become soft. Excess water was drained off after boiling and the grains were cooled in wooden/plastic tray. These cooled grains were mixed with 2% calcium carbonate and 2% calcium sulphate on dry weight basis of grains to avoid clumping of grains. Boiled wheat grains were filled (300 g/ bottle) in clean 500 ml saline bottle and polypropylene bags and plugged with non-absorbent cotton plugs. These wheat grain filled bottles/ bags were sterilized in autoclave at 15 lb pressure (121°C) for one hour and then allowed to cool at room temperature. These sterilized and cooled grain filled bottles/ bags were aseptically inoculated with mycelium bits of 7-10 days old mushroom culture. These inoculated bottles were incubated at 26°C in B.O.D. incubator for mycelia growth. These bottles were shaken at 4 days interval to allow proper spread of the mycelium between the grains. These bottles were then completely colonized by mushroom mycelium in two weeks.

Preparation of substrate

For preparation of substrate, wheat straw was soaked in water for 18-20 hours and then excess water was drained off. The moist

substrate was then sterilized by steaming under pressure inside an autoclave for 20 minutes at 10 lb pressure. After pasteurization substrate was taken out of the autoclave and allowed to cool down at room temperature.

Spawning

For spawning, completely colonized fresh spawn were mixed thoroughly with the prepared substrate at a rate of 4% (w/w) on weight basis.

The wheat straw substrate was mixed with spawn. 2 kg spawned substrates were filled in polyethylene bags (40cm x 30cm) and mouth of each bag was bind with thread and 8-10 small holes (0.5-1.0 cm dia.) were made at 10 cm apart from each other for aeration.

Cropping

The spawn bags were placed in dark growing chamber where temperature and relative humidity ranges between 20-25°C and 80-85% respectively. Spawned bags were kept vertically on a raised platform in cropping chamber for mycelia colonization of the substrate. After complete colonization of the mushroom bed, the polythene bags were cut off and removed and these blocks of compact substrate were arranged on the shelves.

Humidity was maintained by sprinkling water on the floor and walls frequently. After completion of spawn running, pin heads

Harvesting

The fruiting bodies of *Pleurotus florida* (PL3 strain) and *Pleurotus sajor-caju* (Psc1 strain) were harvested after one week and 6 days of pin heads initiation respectively. Picking was done by twisting the mushroom gently so that it was pulled out without leaving any stub, and also the surrounding fruiting bodies were not

disturbed. Three successive harvesting were done from each bag.

Observation and measurement

The following parameters were observed during comparison of *Pleurotus* species.

Growth behaviour in days

Spawn run period.
Initiation of pinhead
First harvesting
Second harvesting
Third harvesting
Total cropping period

Yield potential

Yield from each flush and total yield (in gm)
Total no. of fruiting bodies
Maximum weight of fruit bodies (in gm)
Minimum weight of fruit bodies (in gm)
Average stalk length (in cm)
Average diameter of stalk (in cm)
Average diameter of cap (in cm)
Total length of mushroom (in cm)

Total yield was calculated as the fresh weight of mushrooms harvested up to 3rd flush per 500 g of dry substrate used for cultivation. Biological efficiency (B.E.) was determined by the ratio of fresh weight (g) of mushrooms (up to 3rd flush) to the dry weight (g) of substrate and expressed as percentage.

$$\text{B.E.} = \frac{\text{Fresh weight of mushroom per bed}}{\text{Dry weight of substrate per bed}} \times 100\%$$

Statistical analysis

The experiment was laid out in completely randomized design with three replications. The data obtained from experiment were analyzed statistically and analysis of variance (ANOVA) was done to observe the critical

difference between the two species of *Pleurotus* with respect to size, weight and yield of fruit bodies in the first study. All the analysis was carried out at 5% level of significance.

Results and Discussion

Comparative growth behaviour of two species of *Pleurotus* mushrooms (*Pleurotus florida* and *Pleurotus sajor-caju*)

The results obtained in the study were presented in table 1 and figure 1.

Data obtained revealed that the performance of growth behavior of *Pleurotus florida* was better than that of *Pleurotus sajor-caju*.

Spawn run period

The spawn run periods was fast in *Pleurotus florida* which was 13 days in comparison to *Pleurotus sajor-caju* (15 days).

Initiation of pin head

The initiation of pin head appeared early (15 days) in *Pleurotus florida* while *Pleurotus sajor-caju* pin heads appeared in 18 days.

Harvesting of flushes and total crop period

The harvesting of 1st, 2nd and 3rd flushes was completed early (21, 30 and 43 days) from *Pleurotus florida* followed by *Pleurotus sajor-caju* (25, 35 and 49 days).

The fruiting bodies were not produced after harvesting of 3rd flush and finally total crop periods 43 days and 49 days were recorded in *Pleurotus florida* and *Pleurotus sajor-caju* respectively.

The present study showed the confirmative results with finding of Kumar *et al.*, (2009) who evaluated two species *viz.*, *Pleurotus*

florida and *Pleurotus sajor-caju* for biological efficiency on six locally available plant materials.

Comparative study on growth parameters and yield potential of two species of *Pleurotus* mushrooms (*Pleurotus florida* and *Pleurotus sajor-caju*)

The results presented in table 2 revealed the studies on growth parameters and yield potential of two species of *Pleurotus* mushrooms (*Pleurotus florida* and *Pleurotus sajor-caju*).

The result showed that *Pleurotus florida* was better performing than *Pleurotus sajor-caju*.

Total number of fruit bodies

Pleurotus florida yielded more fruit bodies in total which is 48 than compared to that of *Pleurotus sajor-caju* which is 37.

Maximum and minimum weight of fruit bodies

Maximum weight of *Pleurotus florida* fruiting body was observed to be 40 g whereas that of *Pleurotus sajor-caju* was observed to be 34 g. Minimum weight of fruiting body *Pleurotus florida* was recorded to be 34.3 g and that of *Pleurotus sajor-caju* fruiting body was observed to be 28.6 g.

Stalk length

Average stalk length of *Pleurotus florida* was observed to be 3.5 cm whereas that of *Pleurotus sajor-caju* was 2.8 cm.

Diameter of stalk

Average diameter of stalk were recorded to be 1.2 cm and 1.1 cm of *Pleurotus florida* and *Pleurotus sajor-caju* respectively

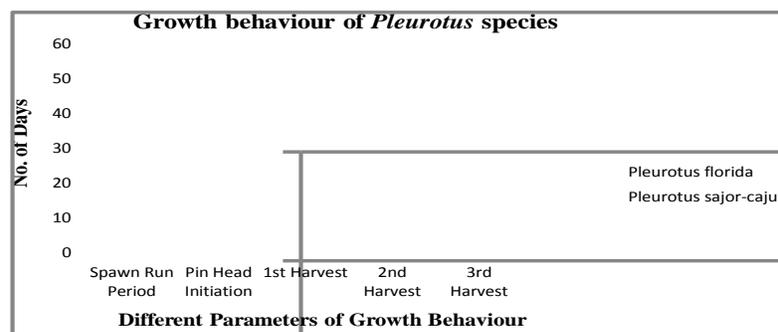
Table.1 Comparison of two species of *Pleurotus* for growth behaviour

| Growth Parameters | <i>Pleurotus florida</i> | <i>Pleurotus sajor-caju</i> |
|--------------------------------------|--------------------------|-----------------------------|
| Days for completion of spawn running | 13 | 15 |
| Days for pin head initiation | 15 | 18 |
| First harvesting | 21 | 25 |
| Second harvesting | 30 | 35 |
| Third harvesting | 43 | 49 |
| SEM | 0.60 | 1.07 |
| CD at 5% level | 2.53 | 3.37 |

Table.2 Comparison of yield performance of *Pleurotus florida* and *Pleurotus sajor-caju*

| Parameters | <i>Pleurotus florida</i> | <i>Pleurotus sajor-caju</i> |
|----------------------------------|--------------------------|-----------------------------|
| Total yield (g) | 1363 | 940 |
| Total no. of fruit bodies | 48 | 37 |
| Maximum weight of fruit body (g) | 40 | 34 |
| Minimum weight of fruit body (g) | 34.3 | 28.6 |
| Average stalk length (cm) | 3.5 | 2.8 |
| Average diameter of stalk (cm) | 1.2 | 1.1 |
| Average diameter of cap (cm) | 7.7 | 6 |
| Total length of mushroom (cm) | 4.3 | 4.2 |
| Biological efficiency (%) | 136.3 | 94.0 |
| SEM | 1.15 | 1.93 |
| CD at 5% level | 3.23 | 4.19 |

Fig.1 Comparison of two species of *Pleurotus* for growth behaviour



Cap diameter

The average diameter of cap was recorded to be 7.7 cm in case of *Pleurotus florida* whereas in case of *Pleurotus sajor-caju*, it was measured 6 cm.

Total yield

Pleurotus florida was the higher yielder with a yield of 1363 g/kg of dry substrate than that of *Pleurotus sajor-caju* which is 940 g/kg of dry substrate with a biological efficiency of

136.3% and 94.0% respectively. The analysis of variance showed that results of treatments varied significantly.

This investigation is confirmative with findings of Kumar *et al.*, (2009) who evaluated two species *viz.*, *Pleurotus florida* and *Pleurotus sajor-caju* for biological efficiency on six locally available plant materials.

The demand for oyster mushroom in the global market has been increasing day by day. Though there are many varieties of oyster mushroom, *Pleurotus florida* and *Pleurotus sajor-caju* are among the most common and easily cultivable ones.

Based on the present investigation, it can be concluded *Pleurotus florida* species of oyster mushroom is obtained best for both growth behaviour and yield potential for mushroom growers. It also shows that growth parameter for *Pleurotus florida* were better than *Pleurotus sajor-caju*. Therefore present investigation will help the mushroom growers for selection of *Pleurotus florida* for the better growth behaviour and yield potential.

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