

# Morphological and Biochemical Characterization of Different Oyster Mushroom (*Pleurotus spp.*)

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Article Info	Summary
<b>Article History</b> Received : 08-03-2011 Revised : 12-05-2011 Accepted : 12-05-2011	Mushrooms have medicinal as well as nutritive value and extensively used as human food from the time immortal. In order to determine the genetic diversity among <i>Pleurotus</i> species of mushroom using morphological and random amplified polymorphic DNA (RAPD) markers, about seven different species were collected. Out of the seven, five species, naming <i>Pleurotus citriopileatus</i> , <i>Pleurotus djamor</i> , <i>Pleurotus Florida</i> , <i>H. ulmarius</i> and <i>Pleurotus sajor-caju</i> were selected. Five different morphological traits i.e., mycelial growth (mm), stipe length(cm), cap diameter (cm), margin of fruit body, colour of fruit body, total yield (kg), carbohydrate content(%) and protein content (%) were recorded. Results indicate that all the five species of <i>Pleurotus</i> shows great diversity in their morphological characters and biochemical parameters. Thus all these species have a great genetic diversity.
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## Introduction

In spite of the excellent climatic conditions, multiple cropping possibilities, low cost of production and better shelf-life oyster mushrooms are cultivated on a limited scale. This is mainly due to non-availability of suitable strains with attractive colour, fleshy sporophore, economic yields and temperature tolerance.

*Pleurotus* species is one of the choice edible mushrooms which can be cultivated in the tropics. It has gained importance only in the last decade and is now cultivated in many countries in the subtropical and temperate zones. Generally *Pleurotus* is referred to as 'oyster mushroom' over the world while in China it is known as 'Abalone mushroom' and 'Dhingri' in India.

According to the systemic position, *Pleurotus* belongs to the phylum Basidiomycota; It grows naturally on tree stumps and dead wood logs. However, the first successful attempt to grow *Pleurotus ostreatus* for human consumption was made by Falck [1] in Germany. The process of cultivation on readily available substrate was taken up earlier on paddy straw [2]. This attracted attention of researcher's world over and today various species of the genus *Pleurotus* are appreciated for their culinary attributes and broad adaptability under varied agro-climatic conditions.

*Pleurotus* species is ranked third in global production contribution 14.2 per cent to the total annual world figures of 6160.8 thousand metric tones as against 31.81 per cent of *Agaricus bisporus* and 25.2 per cent of *Lentinula edodes* [3].

## Materials and Methods

Spawn (mushroom seeds) were taken from Mushroom Research and Training Centre, GBPUA&T, Pantnagar and selection of the five species (*P. sajor-caju*, *P. florida*, *P. djamor*, *P. citrinopileatus* and *H. ulmarius*) has been done on the basis of yield and morphological parameters of sporophore.

## Spawn preparation

Wheat grain spawn was prepared using the standard methodology of Garcha . The spawn prepared for commercial use was on sterilized grain in bags inoculated with mother spawn.

## Substrate preparation

The substrate used for this experiment was wheat straw. It was soaked in a tank with solution of Carbendazim (75 ppm) + Formalin (500 ppm) for 18 hrs (tank should be covered with polythene sheet to prevent the evaporation of formalin [4]. Thereafter, straw was taken out from the solution and kept for 2-3 hours to drain out the excess water.

## Spawning

The grain spawn of *Pleurotus* spp. was mixed thoroughly at the rate of 3 per cent in the substrate prepared as above and filled in 5 kg in the polythene bags of 45 × 30 cm in size. The bags were stapled after making 10-12 holes of 3-4 mm thickness in each bag. All the treatments were replicated four times.

## Spawn run

After spawning, the bags were kept in the crop room for spawn run at a temperature range of 22-28°C. After completion of spawn run, the polythene bags were removed by cutting with a sterilized blade. Spraying of fresh water was done to maintain the relative humidity of crop room upto 75-80 per cent.

## Yield

The yield data for five flushes in a period of 30 days from first flush were recorded in terms of average number, average weight and average weight per fruit body.

## Result and Discussion

Among the five oyster mushroom spawn run period, the *P. sajor-caju* took significantly less period (10.5 days) while other species of the fungus, *P. florida* and *P. djamor* completed spawn run in a period of 13 and 13.5 days, respectively. The number of fruiting bodies varied significantly between the species. Maximum,

105 numbers of fruiting bodies were produced by *P. sajor-caju* and next in rank was *H. ulmarius* producing 18.75 numbers of fruiting bodies. The maximum average yield of 855.52 g per kg dry substrate was recorded from *H. ulmarius* followed by *P. sajor-caju* 742.98g/kg dry wt substrate, respectively (Table 1).

Table 1: Yield performance of different *Pleurotus* spp.

Sl. No.	Species	Av. No. of fruit bodies	Av. yield g/kg dry substrate	Av wt./fruit body
1.	<i>P. sajor caju</i>	21.48	742.98	34.59
2.	<i>P. djamor</i>	17.35	656.09	37.81
3.	<i>P. florida</i>	12.67	650.46	51.34
4.	<i>H. ulmarius</i>	18.71	855.52	45.73
5.	<i>P. citriopileatus</i>	16.06	681.72	42.45

Table 2. Morphological characters of *Pleurotus* species

Sl. No.	Parents	Stipe length (cm)	Pileus length (cm)	Pileus width (cm)	Margin of fruit body	Colour of fruit body
1	<i>P. sajor caju</i>	4.70	6.42	7.25	Dentate	Grey
2	<i>P. djamor</i>	0.91	4.72	7.40	Wavy	Pink
3	<i>P. florida</i>	4.80	6.71	7.90	entire, enrolled	Creamy White
4	<i>H. ulmarius</i>	3.60	5.36	7.85	entire	blue
5	<i>P. citriopileatus</i>	3.50	5.04	6.95	entire	white

### Morphological characters

Macro morphological characters varied among the five *Pleurotus* species, and their hybrids also differ in their macromorphological characters as depicted in table 2.

#### a. Stipe length

Among the five *Pleurotus* species, *P. florida* produced fruit bodies with significantly longer stipe (4.80 cm) which was as par with *P. sajor caju* (4.70 cm). *H. ulmarius* produced fruit bodies having 3.60 cm long stipes, which were significantly longer than *P. citriopileatus* (3.50 cm), data showed in table 2.

#### b. Pileus length

Pileus length was maximum in case of *P. florida* (6.71 cm) and this character was inherited to its hybrids, *P. sarjo caju* (6.42 cm) and *H. ulmarius* (5.36 cm), data showed in Table 2.

#### c. Pileus width

*P. Florida* fruit bodies with maximum pileus width (7.90cm) followed by parent *H. ulmarius* (7.85 cm), *P. djamor* (7.40 cm), and *P. sajor caju* (7.25 cm) which were at par to each other but significantly wider than remaining other species (Table 2).

#### d. Pileus thickness

*P. Florida* produced fruit bodies with maximum pileus thickness (6.90 mm) and it was significantly more than other species. Among the species maximum pileus thickness was observed in case of *P. florida* (7.10mm) which was at par with *P. djamor* (7.00mm).

#### e. Margin of fruit body

*P. citrinopilatus* and *H. ulmarius* produced fruit bodies with entire and smooth type of pileus margins. *P. sajor caju*, *P. djamor* and *P. florida* produced fruit bodies having dentate, wavy and entire, enrolled type pileus margins respectively (Table- 2).

#### f. Colour of fruit body

Table 2 showed that all the five parents varied in terms of colour of the fruit bodies viz. *P. sajor-caju* produced grey colour fruit bodies, *P. djamor* generated pink colour fruit bodies while, fruit bodies of *P. florida* and *P. citrinopilatus* were white and creamy white in colour. Rest of the *H. ulmarius* produced blue fruiting bodies.

### Biochemical Characterization

The biochemical components like total soluble sugars, reducing sugars, non-reducing sugars and crude protein were estimated from five different *Pleurotus* species and results are given in table 3.

Table-3. Total soluble sugars, reducing sugars, non reducing sugar and crude protein depend on used substrates, supplements, environmental conditions and genetic constitution of species

Sl. No.	Parents	Total soluble sugar	Reducing sugar	Non-reducing sugar	Protein content
1	<i>P. sajor caju</i>	15.75	0.032	17.12	21.45
2	<i>P. djamor</i>	13.05	0.031	15.17	20.40
3	<i>P. florida</i>	14.75	0.033	17.22	20.83
4	<i>H. ulmarius</i>	17.15	0.026	17.02	17.58
5	<i>P. citriopileatus</i>	19.28	0.035	17.24	18.53

The data revealed that the total soluble sugars varied between 19.28 – 13.05 percent on dry weight basis. The maximum total soluble sugars content was found in strain *Pleurotus citrinopilatus* (19.28per cent) followed by *H. ulmarius* (17.15 per cent), *P. sajor caju* (15.75 per cent), *P. florida* (14.75 per cent), *P. djamor* (13.05 per cent) which were statistically similar to each other in terms of TSS content. However, significantly poor TSS content (13.05 per cent) was estimated from the strain *P. djamor*.

Reducing sugars content varied between 0.026-0.035 per cent on dry weight basis. Maximum reducing sugar content 0.035 per cent was found in strain *P. citrinopilatus* and *P. florida* (0.033 per cent) followed by *P. sajor caju* (0.032 per cent), *P. dajamor* (0.031 percent) and *H. ulmarius* (0.026 per cent) which were statistically similar to each other.

The content of Non-reducing sugars was varied among the strain from 15.17 - 17.24 per cent on dry weight basis. The maximum content was found in the *P. citrinopilatus* (17.24per cent) followed by *P. florida* (17.22per cent), *P. sajor-caju* (17.12per cent), *H. ulmarius* (17.02per cent) and *P djamor*(15.17per cent) which were at par to each other.

Whereas the poor content was recorded from the strain *P. djamor* (15.17 per cent).

The data showed that protein content was found maximum in *P. sajor-caju* (21.45per cent) which was significantly higher than the protein content of other species.

The remaining other species are varied significantly to each other.

#### References

- [1] Falck, R. 1917. Uber die walkulter des Austernpilzes (*Agaricus ostreatus*) auf laubholzstubben z. *Forst. Jagdwes*, 49:159-165.
- [2] Bano, Z. and Srivastava, H.C. 1962. Studies on cultivation of *Pleurotus* spp. on paddy straw : *Food Science*, 11 : 363-365.
- [3] Chang, S.T. and Miles, P.G. 1991. Recent trends in world production of cultivated edible mushrooms. *Mushroom J.*, 504 : 15-18.
- [4] Vooticumpee, P. 1996. Studies on isozyme patterns, morphology, physiology and yield of *Pleurotus sajor-caju*, *Pleurotus* sp. and *Pleurotus ostreatus*. Bangkok (Thailand).