

BEHAVIOUR OF DIFFERENT SPECIES OF *PLEUROTUS* IN CULTIVATION AND CULTURE

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With a view to find out a suitable substitute of *Pleurotus sajor-caju*, which produces fruit bodies of undesirable greyish colour, different parameters of four *Pleurotus* spp. on quality of mushroom, behaviour in cultivation and culture were investigated. *Pleurotus flabellatus* and *P. florida* showed better performance during cultivation and culture than *P. sajor-caju* as they produced white mushroom of higher yield with shorter spawn run period and higher linear growth rate; but they did not produce mushroom of all the desirable market quality.

Key words : Oyster Mushrooms, Quality, Behaviour, Cultivation, Culture

INTRODUCTION

Pleurotus sajor-caju, most widely cultivated species of oyster mushroom in India, has a good demand in the market because of its large size, fleshiness and short stalk (Kaul, 1983). But the fruit bodies do not have good appearance because of its greyish colour specially when dried. So some species of oyster mushrooms having white fruit bodies such as *P. flabellatus*, *P. florida*, *P. citrinopileatus* (Ghosh & Chakrabarty, 1986) and *P. membranous* were selected and different parameters of these fungi on quality of mushroom, behaviour in cultivation and culture were investigated with a view to find out a suitable substitute of *P. sajor-caju*. As temperature of spawn run was found to have significant effect on the behaviour in cultivation of the different species, the above comparison was done under different temperatures of spawn run. The results are presented in this paper.

MATERIALS AND METHODS

An isolate of *Pleurotus citrinopileatus* was received from culture collection, All India Co-ordinated Mushroom Improvement Project, B.C.K.V., Kalyani, Nadia and *P. florida*, *P. flabellatus*, *P. sajor-caju* and *P. membranous* isolates were collected from type culture collection, Indian Agricultural Research institute, New Delhi.

Linear Growth Measurement

Poured petri-plates with PDA medium were inoculated with uniform mycelial disc (4 mm diameter) cut by a cork borer. The inoculated plates were kept for

incubation at two different temperatures of 25°C and 30°C. After 3 days of incubation, the area covered by the mycelial growth was measured from four different angles as :

- i) Maximum diameter,
- ii) At right angle to maximum diameter,
- iii) Minimum diameter,
- iv) At right angle to minimum diameter.

From the average diameter, the area covered by mycelial growth was calculated.

Cultivation Technique

Small polypropylene packets (25 cm × 15 cm) with 300 g sterilised substrate, inoculated with spawn 3% on wet weight basis, were divided into two groups containing equal number of packets. One group of packets were incubated at 25°C and the other at 30°C, to study the comparative spawn run of different species of *Pleurotus*. After 5 days, percentage spawn run coverage of the substrate was measured. After full colonisation, colonised blocks were removed from the packets and were placed on the wooden rack inside the moist chamber. Mushrooms were harvested when the fruit bodies were fully open. After harvesting the following measurements of the fruit bodies were recorded.

- i) The total weight of the fruit bodies i.e. yield,
- ii) Individual stalk length of the fruit body,
- iii) Individual cap diameter of the fruit body measured from four different angles as :
 - a) Maximum diameter,
 - b) At right angle to maximum diameter,
 - c) Minimum diameter,
 - d) At right angle to minimum diameter.

RESULTS

The spawn run of different species of *Pleurotus* in substrates were conducted at 25°C and 30°C. The average fruit body weight, cap diameter and stalk length are presented in Table 1.

The comparative evaluation showed that *P. membranous* produced lowest fruit body weight, cap diameter and stalk length. At 25°C all the species except *P. sajor-caju* produced heavier fruit body, larger cap diameter and longer stalk length than at 30°C.

Among the different species, fruit body weight was found to be highest in *P. florida* whereas cap diameter and stalk length were found to be largest in *P. flabellatus*.

Table 1. Comparative evaluation in quality of mushroom of five species of *Pleurotus* at different temperatures of spawn run

Species	25°C			30°C		
	Fruit body wt. (g)	Cap diameter (mm)	Stalk length (mm)	Fruit body (g)	Cap diameter (mm)	Stalk length (mm)
<i>P. membranous</i>	0.7	22.092	8.74	0.304	17.831	7.274
<i>P. citrinopileatus</i>	1.41	31.968	21.506	0.874	0.00	16.72
<i>P. sajor-caju</i>	2.13	32.936	20.615	2.15	32.094	27.30
<i>P. flabellatus</i>	2.46	39.996	33.052	3.184	28.91	28.402
<i>P. florida</i>	32	30.893	25.492	2.59	27.516	18.68
S. Em $\pm$	0.018	0.75	0.534	0.111	0.705	0.386
C.D. at 5%	0.402	2.25	1.6	0.33	2.114	1.15

At 25°C, there was no significant difference in fruit body weight in *P. sajor-caju* and *P. flabellatus* but in case of *P. florida* there was heavier fruit body. The cap diameter was largest in *P. flabellatus* and there was no significant difference in cap diameter among *P. sajor-caju*, *P. florida* and *P. citrinopileatus*. Regarding stalk length *P. citrinopileatus*, *P. florida* and *P. flabellatus* were found to have longer stalk length than *P. sajor-caju*.

At 30°C, there was no significant difference in fruit body weight in *P. sajor-caju* and *P. flabellatus* but *P. florida* produced significantly heavier fruit body. The cap diameter was largest in *P. sajor-caju* and there was no significant difference in cap diameter between *P. flabellatus* and *P. florida*. It was found that *Pleurotus flabellatus* produced longest stalk, there being no significant difference between *P. flabellatus* and *P. sajor-caju*.

Results on comparative evaluation of behaviour in cultivation of five species of *Pleurotus* at different temperatures of spawn run are presented in Table 2.

Table 2. Comparative evaluation of behaviour in cultivation of five species of *Pleurotus* at different temperatures of spawn run

Species	25°C		30°C	
	Spawn run coverage of the filtrate	Yield (g)	Spawn run coverage of the substrate	Yield (g)
<i>P. membranous</i>	0.49	31	0.49	20.6
<i>P. citrinopileatus</i>	0.65	34.8	0.67	29.0
<i>P. sajor-caju</i>	0.60	40.6	0.74	34.0
<i>P. flabellatus</i>	0.62	38.6	0.69	34.2
<i>P. florida</i>	0.75	41.2	0.71	33.0
S. Em $\pm$	0.031	1.10	0.024	1.09
C.D. at 5%	0.094	3.18	0.072	3.29

The spawn run coverage of substrate in *P. sajor-caju* was significantly lower than *P. florida*, *P. citrinopileatus* and *P. flabellatus* at 25°C but significantly higher at 30°C. At both the temperatures spawn run coverage was lowest in *P. membranous*. But *P. florida* and *P. flabellatus* produced highest yields at 25°C and 30°C respectively. However, at both the temperatures of spawn run there was no significant difference in yield among *P. florida*, *P. sajor-caju* and *P. flabellatus*.

Results on comparative evaluation of behaviour in cultures of five species of *Pleurotus* at different temperatures of spawn run are presented in Table 3.

Table 3. Comparative evaluation of linear growth in culture (mm²) of five species of *Pleurotus* at different temperatures of incubation

Species	25°C	30°C
<i>P. membranous</i>	185.98	157.66
<i>P. citrinopileatus</i>	381.66	294.78
<i>P. sajor-caju</i>	438.04	440.47
<i>P. flabellatus</i>	424.43	412.34
<i>P. florida</i>	506.15	409.77
S. Em ±	38.715	20.772
C.D. at 5%	126.25	67.74

Pleurotus florida and *P. sajor-caju* produced highest linear growth at 25°C and 30°C respectively. At 25°C there was no significant difference in linear growth among *P. florida*, *P. sajor-caju*, *P. flabellatus* and *P. citrinopileatus*. At 30°C, there was no significant difference among *P. sajor-caju*, *P. flabellatus* and *P. florida*.

DISCUSSION

Oyster mushrooms of good market quality should have (i) large and flashy cap, (ii) shorter stalk length and (iii) white colour. For large and flesh cap, the cap diameter should be large and weight per unit cap area should be high. *Pleurotus sajor-caju* was found to possess most of these good market qualities except that the colour of the mushrooms were greyish. In the present investigation, the best performance of the *Pleurotus* spp. with respect to the market qualities (except colour of fruit body) can be summarised in the following table :

Spawn run at	Large cap diameter	More fleshy cap	Short stalk length
25°C	S, FB	S, FR	M, S
30°C	S, FB	S, FR	M, C

N. B : S—*P. sajor-caju*, M—*P. membranous* C—*P. citrinopileatus*, FR—*P. florida*
 FB—*P. flabellatus*

Regarding behaviour in cultivation, the parameters that are to be given major emphasis are: (i) yield and (ii) spawn run period. The best performance of the *Pleurotus* spp. with respect to the cultivation behaviour can be summarised as follows:

Spawn run at	Shorter spawn run period	High yield
25°C	C, FB	S, FR
30°C	FR, S	S, FB

N. B : S—*P. sajor-caju*, FR—*P. florida* C—*P. cirtinopileatus*, FB—*P. flabellatus*

A critical evaluation of the above two tables show that though *P. flabellatus* and *P. florida* (Zadrazil and Schliemann, 1975) produced white mushrooms, they did not possess all the other desirable market qualities. Both of them produced mushrooms of longer stalk length. Mushrooms of *P. flabellatus* possessed larger but less fleshy cap. Mushroom of *P. florida* had smaller but more fleshy cap. So all the desirable market qualities of mushroom could not be found in a single oyster mushroom species.

However, *P. flabellatus* and *P. florida* showed better performance during cultivation and culture as they produced higher yield and had shorter spawn run period, as well as higher linear growth rate. As these two species produced white mushrooms they may be considered as suitable substitute of *P. sajor-caju*, though they did not produce mushrooms of all the other desirable market qualities.

REFERENCES

- Ghosh, N. and Chakrabarty, D. K. (1986). Introduction of a new Indian Edible mushroom (*Pleurotus cirtinopileatus*) for cultivation. *Indian Agric.* 30: 125-131.
- Kaul, T. N. (1983). Cultivated edible mushroom. In *Frontiers of Research in Agriculture*, ed. by S. K. Roy, Indian Statistical Institute Calcutta, pp. 549-564.
- Zadrazil, F., and Schliemann, J. (1975). Einfluss der Temperatur auf Habitus und Farbloung des Basidiocarps Von *Pleurotus florida* (Austern-Seitling) *Naturwis. Senschaften* 62. 139.

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