

## Productivity of Oyster Mushroom (*Pleurotus florida*) on Agricultural Wastes in Tripura

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### Abstract

The oyster mushroom, *Pleurotus florida* was cultivated under in house condition at Tripura from January 2005 to December 2007. However, the period from September to January was more favorable for fructification (BE 51.9 to 76.1%) than from February to August. Black gram pod shell, brinjal twig, maize stalk, paddy straw and pea haulms were more or less equal productive substrates of the mushroom. The yield on pineapple leaf waste (BE 42%) was also considerable. Pea haulms required the shortest time period (19 d) for fruit body production. There was no significant difference between the wheat grain spawn and paddy grain spawn, as well as among the spawns prepared from five different paddy varieties. Cylindrical bed prepared using polypropylene packets were to some extent better than cube and cuboid beds.

**Key words:** Oyster mushroom, *Pleurotus florida*, Substrates, Bed shapes, Agrowastes.

The oyster mushroom is generally considered as a good source of protein, vitamins and minerals in addition to their flavor and condiment value. This mushroom is so popularized that during the recent years its global production has increased by 418.3% from that in the base year 1986 to 1997 (5). In Tripura, also state government functionaries have taken up several programmes to produce different species of oyster mushrooms in large scale. Perusal of literature indicates that much progress has been made on the improvement of production technology of oyster mushroom with the use of various agricultural residues, cultivation technologies and strains in different parts of India (2—5). However, so far due attention has not been given in Tripura to evaluate the production efficiency of this mushroom with the use of locally available substrates, except the conventional use of rice straw for its cultivation. Hence, the present study was under taken to understand the productivity of one such species (*Pleurotus florida*) of oyster mushrooms on some locally available agricultural and forest wastes.

### Methods

The oyster mushroom, *Pleurotus florida* (source : Department of Horticulture, Government of Tripura

), was cultivated under in house condition at ICAR Research Complex for NEH Region in Tripura during the period of January 2005 to December 2007. Cultivation of this mushroom was done following the method of Vijay and Sohi (5) with certain modifications. The small pieces/cut substrates were simultaneously water soaked and disinfected chemically by immersing the substrates in the water containing 500 ppm formalin and 75 ppm carbendazim for over night (18—20 h). The excess water was drained out by keeping the wet substrates in heaps on a slanted platform. Thereafter, depending upon the moisture holding capacity, the substrate materials were sun dried for an hour or so to evaporate the excess moisture, thus keeping 60—65% moisture in the substrates at the time of spawning. Mushroom cultivation was done in perforated polythene bags each of which was filled with 1 kg (on dry wt basis) of substrate, except for brinjal twig where 2 kg substrate was used, and one bag (150 g) of spawn in layers. The bags were kept at room temperature in dark for about 18—20 d for mycelial growth. After spawn running, the polythene bags were cut open and the mycelia grown-substrates were allowed for fruit body formation in the mushroom house where humidity was raised by hanging wet gunny cloths and watering on the substrates was done regularly. Fully developed fruit bodies were har-

**Table 1.** Fruit body production of *Pleurotus florida* on rice straw during the year 2005–2007 in Tripura.

Month	Year 2005			Year 2006			Year 2007			Mean		
	Days for first harvest	Yield (g/kg substrate)	Bio-logical efficiency (BE, %)	Days for first harvest	Yield (g/kg substrate)	Bio-logical efficiency (BE, %)	Days for first harvest	Yield (g/kg substrate)	Bio-logical efficiency (BE, %)	Days for first harvest	Yield (g/kg substrate)	BE (%)
January	27	667	66.7	27	470	47.0	31	744	74.4	28	627	62.7
February	25	554	55.4	34	283	28.3	32	209	20.9	30	348	34.8
March	29	318	31.8	27	253	25.3	24	245	24.5	27	272	27.2
April	34	184	18.4	25	354	35.4	20	124	12.4	36	221	22.1
May	36	100	10.0	23	442	44.2	19	350	35.0	26	297	29.7
June	26	184	18.4	22	445	44.5	25	502	50.2	24	377	37.7
July	30	343	34.3	21	358	35.8	22	470	47.0	24	390	39.0
August	25	232	23.2	25	258	25.8	30	210	21.0	27	233	23.3
September	27	497	49.7	24	671	67.1	23	388	38.8	25	519	51.9
October	23	649	64.9	23	644	64.4	19	698	69.8	22	664	66.4
November	25	675	67.5	21	908	90.8	22	701	70.1	23	761	76.1
December	29	663	66.3	37	604	60.4	27	758	75.8	31	675	67.5
CD at 5%	2.94	198.97	–	3.03	92.62	–	2.22	143.04	–	–	–	–

vested and weighed for recording data. The biological efficiency was calculated mathematically to determine production of fresh fruit bodies from 100 kg of dry substrate. Influence of monthly variation on the production of mushroom was studied by preparing mushroom bag on wk 1 of every month with 1 kg of rice straw and 1 bag (150 g) of spawn, and keeping five replicates. Ten different agricultural and forest wastes were used to study their efficacy on the production of oyster mushroom. The experiment was having four replicates in each substrate. To study the effect of different bed sizes, intact disinfected straw was used and the beds were prepared during December 2007 with the use of different carton dices, keeping five replicates in each.

### Results and Discussion

Table 1 indicates that the oyster mushroom, *Pleurotus florida*, developed fruit bodies in every month through out the year, while that cultivated under in house condition at ICAR research farm in Tripura from January 2005 to December 2007. However, during the years, the period from September to January was more favorable for fructification (BE 51.9 to 76.1%) than the other months from February to August, producing mushroom with BE 22.1 to 39.0%. Mathew et al. (6) reported that *P. florida* was one of

the most suitable oyster mushroom species for cultivation in both the plains and the High Ranges in Kerala. Further, it was found that its production efficiency was comparatively less than that of *P. sajor-caju* (7). In the present study also more or less similar findings were observed. The mushroom can effectively be cultivated in plains during cooler period starting from September (temperature range 21.7–32.2 C) to January (temperature range 9.3–24.9 C), since the mushroom has certain preference to low temperature for its reproductive growth.

**Table 2.** Effect of different agro -forest residues on the yield of oyster mushroom (*Pleurotus florida*) cultivation. \* Four replicates were kept in each case; One kg substrate was used per bed except brinjal twig where two kg was used.

Substrate	Days for first harvest (no.)	Yield/bed (g)	Biological efficiency (BE, %)
Black gram pod shell	25	752	75.2
Brinjal twig	26	1020	50.1
Gram haulms	22	342	34.2
Groundnut haulms	24	325	32.5
Maize stalk	20	544	54.4
Paddy straw	27	645	64.5
Pea haulms	19	815	81.5
Pineapple leaf	24	422	42.2
Saw dust	42	228	22.8
Sesame residues	23	265	26.5
CD at 5%	4	186	–

**Table 3.** Influence of different types of bed shape and sizes on the productivity of oyster (*Pleurotus florida*) mushroom. \* Five replicates were kept in each; figures in parentheses are standard errors (SE) of means.

Bed shape and condition	Date of spawning	Days for first harvest	Yield (g/bed)	Biological efficiency (BE, %)
Cube bed 1, size 31 cm × 31 cm × 31 cm (volume 2,9791 cc, surface area 5,766 cm <sup>2</sup> ), paddy straw-3 kg, spawn 300 g	14.12.2007	31 (± 1)	2025 (± 105)	67.5
Cube bed 2, size 25 cm × 25 cm × 25 cm (volume 15625 cc, surface area 3750 cm <sup>2</sup> ) paddy straw 2 kg, 200g spawn	14.12 2007	32 (± 1)	812 (± 123)	40.6
Cuboid bed, size 50 cm × 40 cm × 16 cm (volume 3,200 cc, surface area 6880 cm <sup>2</sup> ) paddy straw 3.25 kg, 325 g spawn	16.12.2007	31 (± 0)	1824 (± 174)	56.1
Cylindrical, poly bag 23 cm diam × 22 cm height (volume 9,136 cc, surface area 1,626 cm <sup>2</sup> ),paddy straw 1.25 kg, spawn 150 g	16.12.2007	31 (± 2)	883 (± 122)	70.64

As regards the efficacy of different agricultural and forest wastes, such as, black gram pod shell, brinjal twig, gram haulms, groundnut haulms maize, stalk, paddy straw, pea haulms, pineapple leaf, saw dust and sesame residue (stem with capsule shell), it was found that among the ten substrates, black gram pod shell (BE 75.2%), brinjal twig (BE 50.1%), maize stalk (BE 54.4%), paddy straw (BE 64.5%) and pea haulms (BE 81.5%) were more or less equal productive substrates of the mushroom (Table 2). The yield on pineapple leaf waste (BE 42%) was also considerable. Further, pea haulms required the shortest time period (19 d) for fruit body production. Use of different wastes, such as wheat straw (8), paddy straw (6), sugarcane trash (9), cotton waste (10), groundnut seed husk and gram seed husk (11) and water hyacinth (9) have been reported by earlier investigations. The present study reports several additional substrates effective to produce more or equal amount fruit bodies to that as obtained from the conventional substrate like paddy straw. It was further observed that there was no significant difference between the wheat grain spawn and paddy grain spawn and among the spawns prepared from five different paddy varieties, like Swarna Mahsuri, Saitdhari, Pizam, NDR-359 and C-10, grown in Tripura.

The effect of four different bed shapes and sizes, such as cube bed 1, viz. size 31 cm × 31 cm × 31 cm (volume 29,791 cc, surface area 5,766 cm<sup>2</sup>), paddy straw-3 kg, spawn used 300 g; cube bed 2 viz. size 25 cm × 25 cm × 25 cm (volume 15,625 cc, surface area

3,750 cm<sup>2</sup>), paddy straw 2 kg, 200 g spawn; cuboid bed size 50 cm × 40 cm × 16 cm (volume 3,200 cc, surface area 6,880 cm<sup>2</sup>), paddy straw 3.25 kg, 325 g spawn and cylindrical poly bag 23 cm diam × 22 cm height (volume 9,136 cc, surface area 1,626 cm<sup>2</sup>), paddy straw 1.25 kg, spawn 150 g, on oyster mushroom production revealed that cylindrical bed prepared with the aid of polypropylene packet was to some extent higher yielder than others (Table 3). This might be due to more compactness of straw in the poly bag during spawn running stage that creating favorable microclimate for oyster mushroom growth.

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