

Table 3: Cost of production of 100 beds of Oyster mushroom

Inputs			
Materials	Quantity	Rate (Rs.)	Amount(Rs.)
Paddy straw	300 kg	1.50	450.00
Mushroom spawn	100 bottles	15.00	1500.00
Wheat	20 kg	25.00	500.00
Polyethylene 600 sq. ft (life span-2 cycles)	300 sqft	2.00	600.00
Labour			
Cutting of paddy straw, soaking and removal, bed preparation, watering, plucking and packing	10 MDYS	250.00	2500.00
Total cost of Production			5400.00
Average Yield 1.5-2.0 kg/bed			150.00 kg
Gross return @ Rs.80/kg			12000.00
Net return			6600.00
B:C ratio			2.22

Edible mushroom cultivation by using available paddy straw in rice growing regions of Odisha is an eco-friendly and economically feasible allied agricultural activity which will mobilize the farmwomen for farm activities for enhancing their income and achieving household sustainability. It is more reliable for small and marginal farmers particularly in the tribal belt to increase their income besides meeting the nutritional requirement.

Edible Mushroom Cultivation for Enhancing Income of Small and Marginal Farmers of Odisha



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Edible Mushroom Cultivation for Enhancing Income of Small and Marginal Farmers of Odisha

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Cultivation of edible mushroom is one of the cheapest and economically viable options for the bioconversion of lingo-cellulosic waste materials. Mushrooms have capacity to convert nutritionally low value substances like paddy straw in to valuable and nutritious human food and animal feed. Climatic condition and food habit favour mushroom farming in Odisha. Odisha is contributing about 10% of total production of edible mushroom in India. Mushroom can be cultivated in all the districts of Odisha. Generally there are three main types of edible mushroom i.e (i) Paddy straw mushroom (ii) Oyster mushroom and (iii) Button mushroom which are suitable for commercial cultivation. Mushroom is popular for its low calorific value, high biological efficiency, rich in protein, vitamins and minerals. Mushroom farming is gaining popularity due to its characters like short production period, suitable for indoor and outdoor production, women friendly, high market demand and protein source for vegetarians. Promotion of edible mushroom cultivation by using available paddy straw in rice growing regions of Odisha will ensure efficient and eco-friendly use of farm waste and it will be helpful in increasing the income of farmers.

Nutrition and food value of edible mushrooms

Mushroom is considered as delicious food rich in nutrients. Detail nutritional composition of different mushrooms is described in Table 1.



Table 1: Nutritive value of different types of mushroom

Content	Composition (Quantity per 100 g of fresh mushroom)		
	Paddy straw mushroom	Oyster mushroom	Button mushroom
Moisture	90.40 (g)	88.8 (g)	89.0 (g)
Fat	0.25 (g)	0.41 (g)	0.4 (g)
Protein	3.90 (g)	3.31 (g)	3.1 (g)
Crude fibre	1.87(g)	2.3 (g)	1.0 (g)
Ash	1.10 (g)	0.87 (g)	0.97 (g)
Phosphorous	0.10 (g)	120 (mg)	86 (mg)
Potassium	0.32 (g)	420 (mg)	318 (mg)
Iron	1.70 (mg)	1.33 (mg)	0.5 (mg)
Calcium	5.60 (mg)	3.0 (mg)	0.0 (mg)
Thiamine	0.14 (mg)	0.13 (mg)	0.08 (mg)
Riboflabin	0.61 (mg)	0.35 (mg)	-
Niacin	2.40 (mg)	4.9 (mg)	3.6 (mg)
Ascorbicacid	18.00 (mg)	0.0 (mg)	-

Paddy straw mushroom

Paddy straw mushroom (*Volvariella* spp) is also known as “warm mushroom” and commercially cultivated in states like Odisha, Andhra Pradesh, Tamil Nadu, Kerala and West Bengal. There is tremendous potential and scope for cultivation in Odisha due to the easy availability of basic substrate like paddy straw.



Paddy Straw Mushroom

Materials required for paddy straw mushroom

Substrate

Manually harvested paddy straw bundles having less than 12% moisture, free from any mould are suitable for paddy straw mushroom.

Mushroom spawn

- Three to four week old non-contaminated spawn around 200 g (one bottle) mushroom cultures is required to prepare one bed (60 x 60 cm).

Substrate supplementation

- About 200 g of gram powder or rice bran mixed with gram powder is required for one bed.

Polyethylene

- Semi transparent polyethylene sheet to cover mushroom beds (about 12 sq ft per bed) Miscellaneous items like rose cane, water tank etc.

Steps for cultivation of Paddy straw mushroom

- Prepare paddy straw bundles of size 60 cm x 15 cm (0.4 to 0.5 kg weight) by discarding the top portion of paddy straw.



Soaking of paddy straw bundles

- Soak the bundles in clean water for 12-18 hours in a cemented/polythene tank.
- Drain out the excess water by placing the bundles on raised platform.
- Make first layer of the bed by placing 4 bundles side by side.
- Put one third of mushroom spawn along the four sides of bed leaving margin of 8-10 cm from edge.
- Spread red gram powder or mixture of red gram powder and rice bran over the spawned surface
- Form second, third and fourth layer by intermittent spawning between first and second, second and third, third and fourth.
- Press the beds from the top and cover with clean plastic sheet for maintaining required humidity (80-85%) and temperature (30-35 °C).



Press the beds from the top and cover with clean plastic sheets



Remove the Polythene cover after 7-8 days of spawning

- Harvest the first flush of mushroom at egg stage which will be ready after 4-5 days of removal of plastic sheet. First flush normally lasts for 3-4 days and contributes 70-90% of total production.



Ideal stage for harvesting of paddy straw mushroom

- With maintenance of temperature and humidity second flush of mushroom contributing 10-30% of total production can be harvested after 3-4 days of first flush.
- Biological efficiency is around 20-25% and farmers will harvest on an average 1.5 kg of mushroom per bed.

Economics

A small farmer can conveniently take up 100 mushroom beds by utilizing the straw produced in his field and will get Rs. 2.2 for every one rupee invested (Table 2).

Table2: Cost of production of 100 beds of paddy straw mushroom

Inputs			
Materials	Quantity	Rate (Rs.)	Amount(Rs.)
Paddy straw bundles	1600 Nos	1.50	2400.00
Mushroom spawn	100 bottles	15.00	1500.00
Redgram+ rice bran powder etc	20 kg	100.00	2000.00
Fungicides 200g			200.00
Polyethylene 1600 sq.ft (life span-2 cycles)	800 sqft	2.00	1600.00
Labour			
Cutting of paddy straw bundles, soaking and removal of bundles, bed preparation, watering, plucking and packing	10 MDYS	250.00	2500.00
Total cost of Production			10200.00
Average Yield 1.5 kg/bed			150.00 kg
Gross return @ Rs. 150/ kg			22500.00
Net return			12300.00
B:C ratio			2.20

Oyster mushroom

Oyster mushroom (*Pleurotus* spp.), also known as 'Dhingiri chhatu' in Odisha which is cultivated during winter months (November-February) only and contributed 33% of the total production of the state. Its biological efficiency is high (100%) and shelf life is better (24 hours) than straw mushroom and completes life cycle is around 45 days.



Oyster Mushroom

Materials required for production of Oyster mushroom

Substrate

Paddy straw having less than 12% moisture, free from any mould is suitable for Oyster mushroom. About 2.5 to 3.0 kg of chopped paddy straw is required per bag of 80 cm x 40 cm size.

Mushroom spawn

Three to four week old non-contaminated spawn @ 10 % of dry weight (around 200 g) of the substrate is required for the purpose. Arrange the spawn of good quality from a reliable source from your locality.

Substrate supplementation

About 200 g of wheat (10% of dry weight of substrate) is required for one bag.

Polythene bag

Transparent polythene tube of 125-150 gauges with a dimension of 80 cm x 40 cm is suitable for oyster mushroom cultivation.

Cultivation procedure of Oyster mushroom

- Good quality paddy straw is chopped to 4-5 cm size by a chaff cutter.
- Soak the chopped paddy straw in freshwater for a period of 10-12 hours.
- The pre-wetted substrate after chopping is soaked in hot water (65-70°C) for one hour.
- The substrate is dried in shade for few hours in order to maintain the moisture level of 55 - 60%.
- After drying the substrate may be divided into four lots.
- One end of the polythene tube is tied with a rubber band and the moistened substrate is put inside to a height of 15 cm.
- Gently press the substrate and one part each of spawn (50 g) and boiled wheat (50 g) spread at the periphery close to polythene.
- Likewise, four such layers are made and the bag is closed at the upper end after pressing the substrate.
- Make 15 - 20 small holes (0.5 cm diameter) on all sides of the bag to facilitate aeration and removal of excess water.
- The bags are then incubated in a well ventilated room at 25°C. During the mycelia growth bags should not be opened.
- Open the bags, once the mycelia growth is completed in 15-16 days.
- Arrange the open bags on shelves at a distance of 20 cm between each bag in the tier or hang with plastic rope.
- Sprinkle the bed with rose cane twice daily depending upon the weather condition to maintain suitable moisture.
- Primordia (small eggs) appear within 4-5 days of opening the bag that comes to the harvestable stage 3-4 days later.
- The second crop appears after 7-10 days. Hence within 45 days crop period, 3-4 crops are expected.
- Under optimum management 1.5 to 2 kg mushroom can be harvested in 3 to 4 flushes and net profit of Rs.6600/- from 100 beds.

