

## From Waste to Wealth: Scientific Oyster Mushroom Cultivation

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Oyster mushrooms are popularly known as 'Dhingri' in India. The common name for the species is *Pleurotus ostreatus*. *Pleurotus ostreatus* was first cultivated in Germany as a subsistence measure during World War I and is now grown commercially around the world for food. They are widely and most easily cultivated edible mushrooms after button mushroom and shiitake mushroom and requires low-cost technology. It grows naturally on variety of agriculture waste and near trees in temperate and subtropic forests worldwide. For oyster mushroom cultivation the ideal temperature range is 20-33°C and the preferred pH range is 6.5-7.0. Consumption of oyster mushroom extract lowers cholesterol levels, an effect linked to their content of beta-glucans. A total of 17 amino acids, including all the essential amino acids, qualitatively identified in oyster mushrooms. Therefore, oyster mushrooms are widely cultivated and consumed worldwide for both culinary and medicinal purposes. Adding oyster mushrooms to a cereal diet might aid in overcoming the lack of lysine, an essential amino acid.

### Nutritional composition of oyster mushroom

Oyster mushrooms are a low-calorie, fat-free, fiber-rich food, high in several vitamins and minerals such as phosphorus, copper and niacin.

|               |         |
|---------------|---------|
| Calories      | 28      |
| Sodium        | 15.5mg  |
| Fat           | 0.3g    |
| Carbohydrates | 5.2g    |
| Fiber         | 2g      |
| Sugar         | 0.95g   |
| Protein       | 2.9g    |
| Niacin        | 4.27mg  |
| Potassium     | 361.2mg |
| Vitamin B2    | 0.3mg   |
| Vitamin B3    | 4.3mg   |
| Vitamin B5    | 1.1mg   |

### Oyster Mushroom Cultivation

**Step 1: Substrate preparation:** Well-grown various substrates like paddy straw, wheat straw, maize stalk/cobs, vegetable plant residues, etc. can be used for mushroom cultivation. Paddy straws are cheap, easily available and widely used in India. Paddy straw should be fresh and well-dried combined with various agricultural wastes.

**Step 2: Paddy Straw Soaking Process:** Chop straw into 3-5 cm pieces. Soak in fresh water for 8-16 hours. Soak maize stalks/cobs for 24-48 hours. Drain excess water on the raised wire mesh frame.

**Step 3: Sterilization and Pasteurization:** Sterilization can be done in two ways-

**(a) Pasteurization:** Boil water in a wide mouth container. Fill wet substrate in a bag or basket. Dip bag in hot 80-85°C water for 10-15 minutes. Press bag to prevent floating and drain excess hot water for reuse. Maintain hot water temperature at 80-85°C for all sets.

**(b) Sterilization by Chemicals:** Use 90 litres of water in a 200-litre drum and steep 10 kg of paddy straw. Mix 125ml of formaldehyde and 7g of Bavistin in 10 litres of water. Pour solution into drum and cover drum with polythene sheet. Remove straw after 12 hours.

Spread the pasteurized or chemically sterilized straw on neat and clean cement flooring or raised wire mesh frame, inside the bag filling and chamber.

**Step 4: Pasteurized substrate for spawning:** Pasteurized substrate should be kept at room temperature and have a moisture content of about 70%. Polythene or polypropylene bags can be used for cultivation. Spawning can be done in layer or through spawning. Layer spawning involves filling the substrate in bags, pressing it to a depth of 8-10 cm and spreading a handful of spawn above it. Through spawning involves mixing pasteurized straw with 2% spawn and filling bags, then closing the bags for spawn running. Spawning bags should be stacked clean, closed and maintained at 15-25°C and 70-85% humidity. The major nutrients required for oyster mushroom mycelium is Carbon. Mycelium decomposes the substrate into usable nutrients. The bags should be fully covered with white mycelium within 20-22 days.



**Step 5: Crop Management:** Remove polythene/polypropylene covers. Keep open blocks in racks 20cm apart, 60cm wide with 50-60cm gap. Maintain temperature range of 20°-33°C. Maintain relative humidity by spraying water twice a day. Avoid block spraying for first 2-3 days. Water blocks as small pinheads appear. Increase watering to 2-3 cm size and stop watering to allow growth.

**Step 6: Harvesting:** Pluck mushrooms before spore shed. Scrape outer layer of block after 1st flush. Initiate 2nd flush after 10 days.

**Step 7: Post Harvesting:** Clean lower stalk with dry cloth. Pack in perforated polythene bags for freshness. Store in refrigerator for enhanced freshness. Sun dries for 2 days. Soak dried mushrooms in water for 10 minutes before use.

### Oyster Mushroom growing conditions

- Grows from cold to temperate, prefers humid conditions.
- Species sustain a wide temperature range.
- Summer species grow from 25-30°C.
- Winter species thrive from 18-22°C with 85-90% humidity.
- 20-25°C temperature is optimal for cultivation.

| S. No. | Summer growing species of Oyster Mushroom                        | S. No. | Winter growing species of Oyster Mushroom                     |
|--------|------------------------------------------------------------------|--------|---------------------------------------------------------------|
| 1.     | Pleurotus flabellatus (Common name - <b>Strawberry Oyster</b> )  | 1.     | Pleurotus cornucopiae (Common name - <b>Branched Oyster</b> ) |
| 2.     | Pleurotus membranaceus (Common name - <b>Membranous Oyster</b> ) | 2.     | Pleurotus fossulatus (Common name - <b>Tree Oyster</b> )      |
| 3.     | Pleurotus citrinopileatus (Common name - <b>Golden Oyster</b> )  | 3.     | Pleurotus ostreatus (Common name - <b>Hiratake</b> )          |
| 4.     | Pleurotus sapidus (Common name - <b>Peppery Oyster</b> )         | 4.     | Hypsizygusul marius (Common name - <b>Blue Oyster</b> )       |
| 5.     | Pleurotuseous (Common name - <b>Pearl oyster</b> )               | 5.     | Pleurotus enyngii (Common name - <b>King Oyster</b> )         |
| 6.     | Pleurotus sajorcaju (Common name - <b>Houbitake</b> )            | 6.     | Pleurotus florida (Common name - <b>White Oyster</b> )        |

## Challenges in Mushroom Cultivation

- Susceptibility to contamination by competing microorganisms like bacteria, mold and other fungi.
- Managing specific temperature and humidity requirements.
- Risk of insects and pests damaging the mushroom mycelium.
- Diseases like mushroom molds and bacterial infections affecting mushroom health and yields.
- Struggles to achieve consistent yields due to environmental conditions.
- Unpredictability of the mushroom market, affecting prices and supply.

## Common Mushroom Issues Troubleshooting

- **Contamination:** Discard affected substrate.
- **Low Yield:** Ensure correct environmental conditions and substrate preparation.
- **Dehydration:** Increase humidity by misting.

## Precautions in Mushroom Cultivation

- Fumigation of rooms with formalin and potassium permanganate.
- Hand and leg cleaning before entering dark or crop rooms.
- Maintaining strict hygienic conditions inside and on farm premises.
- Avoiding dust cleaning with a broomstick.
- Monitoring temperature and humidity in rooms.
- Regular check for contaminated beds.
- Avoiding visitors due to pests.
- Maintaining hope in mushroom production despite time.

## Preservation and Storage of Mushroom

- **Refrigeration:** For moisture, store fresh mushrooms in paper bags.
- **Avoid Plastic Bags:** Use breathable containers like paper bags or perforated containers.
- **Freezing:** Freeze mushrooms after blanching for several months.
- **Drying:** In a cool, dark place, store mushrooms thinly and in an airtight container.
- **Pickling:** Add vinegar and spices for shelf-life extension.
- **Canning:** Use mushrooms within a few days of purchase.
- **Handling:** Clean mushrooms gently, avoid water unless necessary.
- **Storage Duration:** Fresh mushrooms last up to 7 days, frozen mushrooms 6-12 months, dried mushrooms 1 year or more.

