

# MUSHROOM CULTIVATION ON COCONUT WASTE



CPCRI

**INSTITUTION VILLAGE LINKAGE PROJECT**

(National Agricultural Technology Project)



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## MUSHROOM CULTIVATION ON COCONUT WASTE

Mushroom is a delicious, nutritionally rich and medicinally important food item consumed by man from the time immemorial. Natural habitat was the only source of mushroom in the past. It is now possible to cultivate edible mushroom in our house-holds utilizing locally available agricultural waste as substrates. A low cost technology has been developed at CPCRI for profitable cultivation of oyster mushroom (*Pleurotus spp.*) using coconut waste such as leafstalk, bunch waste and leaflets; + bunch waste mixture as substrate. Approximately eight tonnes of above mentioned waste biomass is available from a hectare of coconut plantation annually. Oyster mushroom cultivation is done by the following four steps:

1. Preparation of spawn
2. Substrate preparation
3. Spawning of substrate
4. Crop management

### **1. Preparation of spawn**

Spawn, the seed material for mushroom cultivation can be procured from CPCRI, Agricultural Universities or reliable private agencies. It is available in 300 g quantity in bottles or polypropylene bags. The first generation fungal culture called the mother spawn, can be used by the farmers for production of large quantities of spawn up to third or fourth generation.

The following procedure may be followed for spawn multiplication: Paddy, wheat, sorghum or maize grains are commonly used as substrates for spawn production. The grains are cooked in water for 30 minutes, excess water drained and the grains are allowed to cool by spreading over a clean surface/wire net frame. Calcium carbonate at the rate of 20-30 g/kg of grain is added and mixed well. These grains are filled in polythene bags or in empty bottles up to 3/4<sup>th</sup> level and plugged tightly with cotton. A paper cap is placed over the cotton plug and sterilized in a pressure cooker or autoclave for a period of two hours at 1.02 kg cm<sup>2</sup>

pressure. The bottles after cooling are inoculated with discs (6-8 mm diameter) of fungal growth using a sterilized cork borer or inoculation needle. Also a portion of mother spawn can be inoculated for further multiplication of the spawn. The inoculated bottles are incubated at room temperature for 15 to 20 days. The white mycelial growth covers the grains and the spawn is ready for use.



*Spawn production in bottles*

## **2. Substrate preparation**

Partially dried leaves and bunch waste of coconut removed during the harvest of nuts from palms are chopped to 5-7 cm long pieces and sun dried. Chaff cutters capable of cutting coconut leaves, petiole and bunch waste can also be employed for this purpose to reduce the labour cost. The chopped substrates are soaked in clean water overnight. Excess water is drained off in the next morning. Substrates are then sterilized either by hot water treatment or by steam pasteurization. Hot water treatment is given by immersing presoaked wastes in boiling water for one hour. Excess water is drained off so that the substrate maintains a moisture content of 70%. Steam pasteurization for 1½ hours can be done using a simple low cost autoclave which can be fabricated locally by farmers using 200 l capacity petrol drums provided with a detachable lid. Coconut wastes such as husk or shell can be used as fuel to generate steam.

## **3. Spawning of substrate**

Polythene bags of 60 x 45 cm size of 100-150 gauge are suitable for bed preparation. About 10 holes of 0.5 cm diameter should be made on the polythene bags for aeration. Tying the bottom of the bag with jute thread helps to provide flat circular bottom for the bed.

Spawn which is 20-30 days old is collected from bottles or polypropylene bags in a plastic tray cleaned with 1% dettol (1 ml in 100 ml water) solution. The spawn from one bottle (300 g) is divided into three equal parts and again one portion



*Multi layered spawn in polythene bag*

can be apportioned into four equal parts for preparing bed.

Multilayered spawning technique may be followed to inoculate the substrate with the spawn @ 100 g per bag containing 3 - 3.5 kg substrate. Addition of sterilized rice bran at the rate of 5% (150 g) per bag is necessary. The sterilized substrate is filled in polythene bags up to 5 cm height, a layer of rice bran is spread over this followed by sprinkling of a portion of spawn along the periphery. Four such layers are made with 3 - 3.5 kg substrate and the tip of the bag is tied with jute thread.

#### **4. Crop management**

After spawning, the bags are kept for spawn run in a mushroom house. Low cost mushroom sheds can be built inside coconut garden with coconut wood and pleated coconut leaves. Multitier racks made of coconut reapers are fixed inside the shed to place the mushroom beds. The river sand is spread on the floor.



*Low cost mushroom house*

Gunny bags are lined on the sides and moistened periodically to maintain 80 - 85 % relative humidity. Ventilators

with insect proof plastic net must be provided on the sides for aeration.

The mushroom beds are kept for spawn run, for a period of 20 days inside the mushroom house. During this period, the spawn grows as mycelium and covers the entire bed forming a compact white mass. After the spawn run, the polythene cover is ripped open and the compact cylindrical mass is placed on racks.

After 24 hours of removal of bags, water is sprayed twice daily with a sprayer or rose can. The first flush will be ready in 5 to 10 days after opening of the bag. Four to five crops can be harvested from each bed during a period of 50-70 days. The interval between flushes is normally 7-10 days. Spraying the beds with a solution of 1% urea and 1% super phosphate (1 g each in 100 ml water) helps to reduce interval between harvests. Fresh mushroom yield of 600-700 g per bed is obtained from one kg of dry substrate. *Pleurotus* species suitable for cultivation on coconut wastes are *P.florida*, *P.flabellatus*, *P.sajor caju* or *P.eous*. When leaf stalk is used as substrate, *P.florida* or *P.flabellatus* could be used to obtain better yield in a shorter cropping period.

The spent mushroom substrate obtained after mushroom cultivation can be profitably used to produce compost / vermicompost for use as nutrient source in agriculture.

Mushroom should be packed in pin holed polypropylene bags or polyethene bags and sold on the same day. In a refrigerator, it can be stored for three days. Drying in sunlight or mechanical drying in hot air oven at 40-50° C enables storage for 3-4 months. Dried mushroom assume the original shape when rehydrated in lukewarm water for 20-30 minutes. Dishes like soup, fry, foogath (thoran), cutlette, pickle, roast, kurma etc can be prepared using oyster mushroom.

### **Nutritive value**

Mushroom is a highly nutritious food item with a protein content of 20-30% on dry weight basis with all the essential amino acids. Mushroom is also a rich source of minerals (iron, potassium and phosphorus), vitamin C and vitamin B complex. It can be safely

included in the diet of patients with hypertension, obesity and diabetics because of its low sodium-potassium ratio, low starch and caloric value and high fiber content. Besides the attributes which make mushroom “ the ultimate health food”, mushroom also possesses medicinal properties.

Mushroom cultivation is a profitable enterprise as the cost of production for a kg of mushroom is less than Rs. 18/- and the present market rate is around Rs. 40/- per kg. Mushroom cultivation is a simple technique which can be practiced even by farm women in their house-holds without any additional land requirement utilizing the waste materials available in their gardens.



*Mushroom ready for harvest*

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