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A GUIDE TO MILKY MUSHROOM CULTIVATION

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Agri-business solutions that are commercially, technically, and economically viable must be adopted by the agriculture sector in India. This is because of the recent changes in consumer behaviour, which have increased demand for high-quality niche products (Shirur *et al.*, 2016). Mushroom cultivation is one of the most profitable Agri-business industries. Mushrooms are increasingly being regarded as a future vegetable due to their medicinal and nutritional properties, and consumer demand also increased significantly in recent years. Because they are so easily digestible, mushrooms are being considered as a possible alternative to muscle protein (Pavel, 2009) and are a great source of vitamin-D, which is not available in other food supplements (Pehrsson *et al.*, 2003). The large-scale recycling of agricultural waste in India may benefit from microbial technology. Milky mushroom (*Calocybe indica*) is becoming more popular due to its strong, fleshy, and milky white sporophore. It gives people access to an additional high-quality vegetable and enriches their diet (Vijaykumar *et al.*, 2014).



Milky Mushroom

Classification

Kingdom	Fungi
Division	Basidiomycota
Class	Agaricomycetes
Order	Agaricales
Family	Lyophyllaceae
Genus	<i>Calocybe</i>
Species	<i>indica</i>

Milky Mushroom

Scientifically it is known as *Calocybe indica* and belongs to the family Lyophyllaceae. It is also called as swetha mushroom due to its pure white in appearance. It was formally described in 1974 based on the data gathered in Calcutta. Botanists R. P. Purkayastha and Aindrila Chandra observed it to be a popular mushroom in West Bengal markets. It has a firm consistency. It grows well in hot and humid climates. It can be grown

throughout the year when conditions are favourable. It is an excellent edible mushroom with high fibre content.

Status of Mushroom Production

- There are mainly 5 mushroom species are grown in India, they are milky mushroom (*Calocybe indica*), oyster mushroom (*Pleurotus spp*), white button mushroom (*Agaricus bisporus*), paddy straw mushroom (*Volvariella volvaceae*), shiitake mushroom (*Lentinula edodes*) (sharma *et al.*, 2017).
- Milky mushroom is indigenous tropical mushroom of our country (Kumar *et al.*, 2017). However, their production is commercially restricted to south Indian states and contributing up to 3% to the total mushroom production (Sharma *et al.*, 2017).

Scope and Importance

Milky Mushroom has excellent medicinal properties. They are high in nutrients and a source of revenue for Indian markets. It can be used for treating diabetes and joint pain. It has high fibre content and used by constipation patients to promote free bowel movement. It is also high in protein and amino acids. It also offers numerous job opportunities. After paddy straw, the milky mushroom is the second most common tropical mushroom.

Nutritional value (on dry weight basis)	
Carbohydrates	64.26%
Protein	17.2%
Fat	4.1%
Vitamins	Vit-A, Vit-C, Vit-E and Vit-D
Minerals	Ca, K, Mg, Na, P, Cu, Fe, Mn and Zn
Crude fibre	3.4%
Soluble sugars	4%
Starch	2.9%

Source: Kumar *et al.*, 2017

Cultivation of Milky Mushroom

The cultivation of milky mushroom includes following steps:

1) Climatic requirements

They mainly gives good yield at mild hot and humid climatic areas. The most suitable temperature for growing mushrooms is 25⁰-35⁰ C and the relative humidity of 85-90%. Total life cycle completes in between 40-45 days under ideal conditions when the climatic conditions are not favourable, then there is a delay of 5-10 days.

2) Spawn Procurement

Spawn is the basic most seed material for growing mushroom. Elite spawn should be selected for mushroom cultivation. Good quality spawn will give good yield and care should be taken that the spawn is not contaminated. Spawn should be milky white in color with uniform appeal. Discoloured or dull coloured spawn should be avoided and not to be used for cultivation. Spawn can also be produced from the mother spawn under controlled conditions.

3) Substrate Preparation

- **Chaffing**

For chaffing, the substrates used are paddy straw and wheat straw, mainly paddy straw is used. Paddy straw of less than 1 year age should be selected for cultivation because as it is fresh with good amount of storage materials. The selected paddy straw

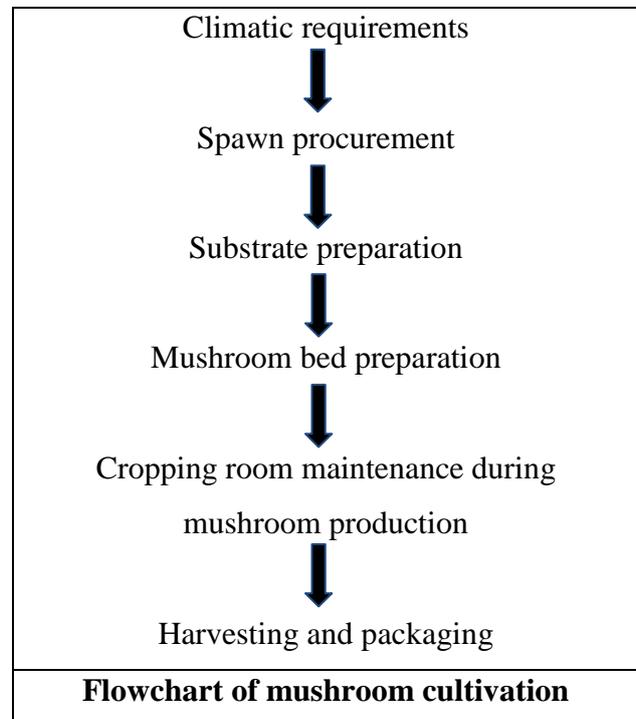
should be of good quality and it should be devoid of any type of weeds. Chaff cutter can be used for chaffing of paddy straw into fine and uniform pieces of 5-6 cm.

- **Straw Sterilization**

After chopping of paddy straw, it should be sterilized and it is done by two methods.

I. Chemical Method

In this method nearly 125 ml Formalin and 8 g Bavistin diluted in 100 lit water containing drum to sterilize 15 kg of paddy straw. Straw should be soaked in this solution for about 24 hrs or soaked overnight. After soaking water should be drained and the paddy straw is spread on tarpaulin sheet for drying under sunlight. The straw should be dried to retain 30-50% moisture for filling the bags.



II. Autoclaving

Substrate is filled in polypropylene bags and sterilized in an autoclave at 121⁰ C at 15lbspsi for 15-20 minutes. Once it is completed then bags containing straw are shifted to spawning room for cooling, bag filling and spawning.

- **Draining and Drying**

Straw has to be taken out from the drums and drained for removal of excess water. Then straw has to be allowed to dry up till to get required moisture for bed preparation.

4) Mushroom bed preparation

Spawn filling should be done in polythene bags of 12x22, 14x20, 16x20 inches. Size is based on availability and with a thickness of 120 gauge. Open end of the bags is closed by Rubber band after its proper packing small holes were made for aeration.

A layer of spawn should be filled in polybag and is covered by 2nd layer of paddy straw. Another layer of spawn is placed on paddy straw which is again followed by layer of paddy straw in the process of bedding 5–6 layers of paddy straw and spawn was filled in polythene bag and the thickness of paddy straw should be around 5-7 cm. Label the mushroom beds and place them in incubation chamber (dark room) and should be monitored regularly.

5) Cropping Room Maintenance during Mushroom Production

- **Incubation in the dark room**

The inoculated labelled beds were kept in a dark room over a period of 20-25 days. The average temperature has to be maintained at 28⁰-35°C and optimum humidity of 80% to get good yields.

- **Casing**

After 21 days, when the mycelial growth developed fully then the beds have to be shifted into the light room for casing. The beds used for casing has to be made into two equal halves. Casing can be laid by using black or red soil and they have to be sterilized with either formaldehyde or solar sterilization. The layer thickness of the black or red soil has to be around 2-3cm.

- **Incubation in light room**

The beds will be then shifted to light room after casing for the further growth of mushrooms. Proper lighting facilities and aeration has to be provided. If there is no proper light facilities available then artificial light has to be provided.

- **Watering**

The beds are sprinkled with water every day in order to avoid drying. Care should be taken while watering, excess watering should be prevented as it allows the growth of contaminants/disease causing organisms. Poor moisture content leads to cracking of mushroom caps.

- **Fruiting**

After 12-14 days of casing, mushroom starts attaining pin head stage and the formed small pin head sized fruiting bodies will attain the harvestable size within 4-7 days.

6) Harvesting and Packaging

Mushrooms with 6-8 cm diameter caps are harvested by gently twisting them in clockwise direction with hand. Harvested mushrooms should be neatly packed. Fresh mushrooms should never be kept in plastic bags, as this accelerates deterioration.

Mushrooms can be stored for 2-3 days under normal conditions and under refrigerated conditions it can be stored for 4-7 days.

Pre-Requisites in Mushroom Cultivation

- Hygienic conditions should be maintained.
- Maintaining the incubation rooms with optimum humidity and regular sprinkling of water on beds to avoid drying.
- Hand gloves and face masks should be used while preparing beds or any other type of activity in mushroom unit and foot dip should be done before entering into mushroom unit.
- Paddy straw should be soaked in water which is mixed with Bavistin and formalin and it should not be dried on the ground, it should be dried on the tarpaulin sheet.
- Entire mushroom unit should be sprayed with insecticide Malathion and some disinfectants and the unit should be sterilized properly.

Conclusion

Mushroom cultivation can be a highly profitable source of income with little investment. They can be commercially cultivated round the year in humid tropical and subtropical regions of the world with average temperatures between 25⁰C and 35⁰ C and these conditions are highly suited for their production (Navathe *et al.*, 2014). It can also be cultivated in the backyard of house by maintaining even in a small room. They are more popular on the global market because of its morphological appearance, longer shelf life, higher productivity, white colour, and low production cost. The mushroom resembles the button mushroom, which might once more aid in increasing global demand for this particular mushroom. Besides being commercially viable, it can also help in maintaining good health being endowed with proteins, vitamins and minerals. Owing to its numerous benefits, profitability and easy cultivation, milky mushroom cultivation can be a potential source of income generation cultivation.

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