



6

CULTIVATION OF MILKY MUSHROOM

In the first lesson you learnt that there are four types of mushrooms under cultivation in India. We have already discussed about the cultivation of three of them, namely button, oyster and paddy straw mushroom. In this lesson we will discuss about cultivation of milky mushroom. Milky mushroom (*Calocybe indica*) is a tropical edible fungus. In nature, milky mushrooms grow on humus rich soil in agricultural fields or along the roadside in tropical and subtropical parts of India, especially in the plains of Tamil Nadu and in Rajasthan.



OBJECTIVES

After reading this lesson you will be able to

- prepare substrate using different methods;
- follow steps in cropping from spawn run to casing to harvesting;
- increase shelf life of milky mushroom.

6.1 CULTIVATION OF MILKY MUSHROOM (*CALOCYBE INDICA*)

This mushroom was collected and cultivated for the first time in our country. It can be cultivated at temperature of 30-35°C. Its cultivation is similar to oyster mushroom with a difference that bags are cased and mushrooms appear on the top side only. Its high biological efficiency, better keeping quality, simple cultivation technique and white attractive colour are major factors for its popularity. It is more popular in South India in Tamil Nadu, Karnataka and Andhra Pradesh.



6.1.1 Substrate and its Preparation

The mushroom can be grown on a wide range of substrates like straws of paddy, wheat, ragi, maize, bajra, cotton stalks and leaves, sugarcane bagasse, cotton and jute wastes, etc. However, cereal straws (paddy/wheat), which are easily available in abundance, are favoured. Straw is chopped in small pieces (2-4 cm size) and used for cultivation. Substrates do not need to be composted but those exposed to rain or harvested prematurely (i.e. green in colour) are not desirable. Substrate is soaked in fresh water for 8-16 hours. This period can be reduced when pasteurization is to be done by steam. It is easier to soak straw if it is first filled in gunny bag and dipped in water.

6.1.2 Pasteurization/Sterilization

Pasteurization/sterilization can be achieved by any of the following ways.

(a) Hot water treatment

Water is boiled and chopped wet straw filled in gunny bag is submersed in hot water for 40 minutes to achieve pasteurization. This is very popular method particularly with small growers.

(b) Steam pasteurization

Wet straw is filled inside insulated room either in perforated shelves or in wooden trays. Steam is released from a boiler and temperature inside substrate is raised to 65°C and maintained for 5-6 hours. Air inside the room is circulated to achieve uniform temperature in the substrate.

(c) Autoclaving

Substrate is filled in polypropylene bags (35 x 45 cm, holding 2-3 kg wet substrate) and sterilized at 15 psi for 1 hour. Once pasteurization/sterilization is over straw is shifted to spawning room for cooling and spawning.

(d) Chemical sterilization technique

Technique defined for oyster mushroom (straw soaked in solution having 75 ppm bavistin and 500 ppm formalin) can also be used. In South India many farmers are using this technique. However in 5-10% of bags, spawn run may not be complete and *Coprinus* appears in such cases.

6.1.3 Spawning and Spawn Running

Spawning methods are similar to that mentioned for oyster mushroom. However, layer spawning is most commonly used in milky mushroom. Higher spawn dose



Notes

of 4-5% (wet wt. basis) is used which is almost double than that we use in oyster mushroom. Normally a bag having 5 kg wet substrate (= 2 kg dry substrate) may require about 200 gram spawn. Moisture content in the substrate is highly important and it should be around 60%. Higher moisture leads to incomplete spawn run. After spawning bags are shifted to spawn running room and kept in dark where temperature between 25-35°C with 80% RH is maintained. It takes about 20 days for substrate to get colonised and after that bags are ready for casing.

6.1.4 Casing

Casing means covering the top surface of fully colonised bags, with pasteurized casing material. After complete spawn run, the bags are cut open from the top and are cased. The pond soil and sand, or coir pith, FYM and other materials can be used for casing. Casing thickness is 3-4 cm. The pH of casing material is adjusted to 7.8-7.9 with chalk powder. The casing is sterilized by autoclaving or using chemicals. It is either sterilized in autoclave at 15 psi for one hour or chemically treated with formaldehyde solution (2%) about a week in advance of casing. Temperature of 30-35°C and RH 80-90% are maintained thereafter for entire cropping cycle. When long bags are used, these are cut into two at the time of casing (Fig. 6.1).



Layer spawning in long bags

Bag is cut into two after spawn run



Each bag is cased

Bags ready for shifting to sheds

Fig. 6.1 Different steps in spawning and casing of milky mushroom



6.1.5 Cropping

It takes about 10 days for mycelium to reach to top of the casing layer, thereafter fresh air is introduced and minimum 3-4 air changes per hour are required. The bags are watered regularly as the good moisture and humidity is important. Similarly, diffused light is also important for the initiation and growth of the fruit bodies. Light should be provided for maximum duration during entire cropping period. It is believed that blue light is more useful for induction of pinheads. These changes in environment result in the initiation of fruiting bodies within 3-5 days.

The mushrooms appear on the top of bag just like that in button mushroom within two weeks. Mushrooms are harvested by twisting, cleaned and packed in perforated polythene/polypropylene bags for marketing. The mushrooms keep on growing but it is advised to harvest these when these are about 10 cm long (Fig 6.2). The bigger mushrooms become fibrous. The mushroom has white colour as indicated by its name and has good keeping quality. The fruit bodies can be easily kept at room temperature for 3-4 days. The mushrooms can be used for making pickles or cooked just like other mushrooms. Due to strong aroma, it is advisable to boil these fruit bodies in water for 10-15 minutes and discard the water before their use in different recipes.

6.1.6 Water Management

Water management is very important for a good and healthy crop. During spawning the water content should be low (around 60-62%) as there are problems in spawn run if water content is high. Also, during rainy season controlled watering is required and watering once in a day may be enough. During winter watering twice may be sufficient. However during summer as water loss is high, it becomes very difficult to maintain required RH and moisture of the substrate. During such period one should spread sand on floor and use mist sprayer 3-4 times and frequently check the moisture of the casing by touch so as to maintain RH of at least 80-85% inside cropping room. The mushroom is cultivated in huts made of coconut leave or other materials. To maintain high humidity the bags are kept below ground for homogeneous temperature and humidity (Fig. 6.2). The cost of production depends upon the cost of raw material, yield/unit, production level and the wholesale price.

6.1.7 Strains and Nutritive Value

ICAR-DMR Solan has released a variety DMR-Milky 334. The fruit body weight is 33-38 g. The fruit body colour is white with yield around 74-82 kg/100 kg of dry wheat /paddy straw. Another strain of *Macrocybe* mushroom viz., DMR-*Macrocybe*-1 has also been released. This species is similar to milky mushroom and



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method of cultivation is same. This species, however, does not have the off smell and this strain can be stored up to 10 days in refrigerator and 3-4 days at room temperature (20-26°C).



Sheds made of plastic and coconut leaves layer



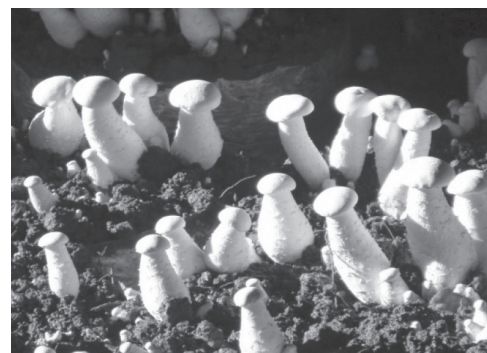
After casing bags are kept as single



Bags in fruiting (below ground and blue light)



Mushrooms are picked by rotating



Mushrooms appear in flushes



Recipes of milky mushroom

Fig. 6.2: Different steps in cultivation of milky mushroom

Milky mushroom is rich in both the essential and non essential amino acids that make it a perfect source of quality protein. It can be easily preserved for a longer period of time as compared to other mushrooms. The very important property of

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this mushroom is that it is rich in the anti-oxidant i.e. ergothioneine which helps in replenishing the organs of the body like bone, kidney, liver, etc. It is a rich source of riboflavin and selenium.



Notes



INTEXT QUESTIONS 6.1

Answer the following questions

- (i) What is the temperature required for spawn run?
- (ii) What is the temperature required for fruiting?
- (iii) How much moisture is desirable at the time of spawning?
- (iv) How much spawn we use for one kg of wet straw?
- (v) This mushroom has good shelf life. (State True or False)
- (vi) In which country it was cultivated for the first time?
- (vii) In which part of India it is more popular?
- (viii) It is better to autoclave the casing soil. (State True or False)
- (ix) Light is required for the formation of normal fruit body. (State True or False)
- (x) What should be the optimal length of fruit body at the time of its harvest?



WHAT YOU HAVE LEARNT

Let us recapitulate the important points you have learnt in this lesson:

- Milky mushroom is a tropical mushroom growing at temperature of 30-35 °C and was cultivated for the first time in our country.
- Its culture and spawn may not be stored at temperatures below 16 °C.
- It can be grown on paddy or wheat straw after its pasteurization or autoclaving in a method similar to that of oyster mushroom.
- The spawn requirement is almost double than that in oyster mushroom and one kg wet straw may need around 40-50 g of spawn.
- It is important the moisture of straw should not be high and may preferably be 60%.
- The substrate needs to be cased after complete spawn run and casing soil is generally autoclaved.
- Fresh air and diffused (preferably blue) light is required for the formation of fruit body.



Notes

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- Fruit body is harvested when it is about 10 cm long as very long fruit bodies become fibrous.
- Milky mushroom has good keeping quality and can be kept in good shape for 3-4 days at room temperature.
- Mushroom is good for making pickle, and for making vegetable it is boiled in water for 15 minutes or so and the water is discarded.



TERMINAL EXERCISE

1. What are the common substrates used for milky mushroom cultivation?
2. Describe different methods of preparation of substrate.
3. What precautions should be taken for maintaining culture, storing spawn and at the time of spawning?
4. How water, air and light should be managed for proper cropping and at what stage mushroom should be harvested?
5. Write down the different steps in spawning and casing of milky mushroom.



ANSWERS TO INTEXT QUESTIONS

6.1

- (i) 30°C (ii) 30-35°C (iii) 60% (iv) 40 g (v) True
(vi) India (vii) South India (viii) True (ix) True (x) 10 cm

SUGGESTED ACTIVITY

Search the net for related species that can be cultivated and find that if there are any species which do not have strong aroma but can be cultivated in the same way as milky mushroom.

Key Learning Outcomes

- Prepare substrate and manage milky mushroom crop.
- Pick, grade and pack the harvested milky mushroom.