

MUSHROOM CULTIVATION TECHNOLOGY

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Introduction

Mushrooms may be edible and non-edible. Mushroom is the reproductive structure of edible fungi that belong to *Basido mycotina*, these may epigeal or hypogaeal. Mushrooms are fungi which lack chlorophyll and can't manufacture their food material, however, mushrooms can produce a wide range of enzymes that degrade the complex substrate on which they grow. Techniques to grow oyster mushrooms from culture to harvest were evaluated using locally available materials. Wheat straw, Paddy straw, and waste grass are used as substrates, Spawn for *Pleurotus sajor caju* was prepared from wheat and green gram. The effect of temperature and relative humidity on the growth of mushrooms was evaluated. Pinhole size, high temperature (25°C), and high relative humidity were optimal for oyster growth. 25°C is optimal for spawn running both in cultivation and spawn production. Wheat straw, Paddy straw, and waste Grasses were used as substrates; waste grass alone yielded more oysters than wheat straw, paddy straw.

Material and methods:-

Materials-

Spawn (Source: - College of agriculture Alani, Osmanabad) Paddy Straw, Wheat Straw, and Grass, Water bath, Hot Air Oven, Plastic Bags, etc.

Chemicals- Malathion 30 EC, Carbendazim (Bavistin), Formalin, spirit etc.

Methods

Collection of Substrate: -The paddy straw was collected from the nearest Agriculture Research Station, Tuljapur (Osmanabad). Grasses were collected from barren land near College of Agriculture Alani, Osmanabad.

Sterilization: - Sterilization is the process that is involved in the killing of micro-organisms

Heat Sterilization: Sterilization requires a minimum of 121°C steam at 15Psi (1 atm pressure) for 15-20 minutes in autoclave or dipping in boiling water of 100 °C for 30 min.

CHEMICAL STERILIZATION:

Straws were dipped in the solution prepared by mixing 50 ml Malathion, 15 gm Bavistin, and 100 ml formalin in 100-liter water for 24 hrs.

Spawning:- 15 days old spawn with mycelium formed complete coating around the grain, the spawning is done thoroughly, before filling the substrate in polythene bags, holes of about 1 cm, and diameter is made at 10-15 cm distance all over the surface for free diffusion of gases and heat generated inside.



Incubation:-

Filled bags were incubated for the first 20 days in a dark room, after 20 days of incubation they were shifted to light (cultivation) room on a hanging bed, and watering was done daily after shifting to the light room and done arrangements to maintain 98% humidity and temperature 22-24 °C.

	
<p>Incubation in a dark room</p>	<p>Incubation in light (production) room</p>

Providing light, proper temperature, and humidity are major challenges in light room. The humidity was maintained by arranging cooler and watering on daily basis.

Biological efficiency:- The total weight of all the fruiting bodies harvested from all three pickings was measured as the total yield of mushrooms. The biological efficiency (yield of mushroom per kg substrate on dry wt. basis), was calculated by using the following formula (Chang *et al.*, 1981).

$$\begin{array}{r}
 \text{Fresh weight of mushroom} \qquad \qquad \qquad 699.1 \text{ gm} \\
 \text{B.E. (\%)} = \frac{\text{Fresh weight of mushroom}}{\text{The dry weight of substrate}} \times 100 \qquad \text{B. E} = \frac{699.1}{100} \times 100 \text{ B. E} = \mathbf{69 \%}
 \end{array}$$

Observations :-

Spawn running: -Spawn running took 2-3 weeks after inoculation. All substrates were inoculated on the same day. Colonization of substrate was completed in 20 days all the bags were opened for primordial formation on the same day. These results agree with the findings of Tan *et al.*, (1981) who reported that the spawn running took three weeks and fruiting bodies appeared after 2-3 days. Kumari and Achal (2008) stated that colonization of the substrate was completed within 20 days of inoculation.

Pinheads formation: - The pinheads formation is the second stage of mycelial growth during the cultivation of mushrooms. Small pinheads like structures were observed, these pinheads were formed 6-7 days after the spawn running. These results are in agreement Ahmad (1986) who stated that *Pleurotus ostreatus* completed spawn running in 17-20 days on different substrates and time for pinheads formation was noted as 23-27 days. Pinhead formation starts after 8 days of spawn run 2 kg of wheat straw and is followed by an increase in pinhead



formation Shah *et al.*, (2004) reported that primordial formation of *P. ostreatus* appears 27-34 days of inoculation which is consistent with the results of this study.



Fruiting bodies formation and yield of Oyster mushroom:-

This is the third and final stage during the cultivation of mushrooms. The fruiting bodies appeared 10 days after pinhead formation. These findings confirm with Quimio (1978) who reported that fruiting bodies 3-4 weeks after inoculation of spawn. The crop of Oyster

mushroom was harvested in three flushes. Maximum average yield was estimated with an average size of 402.9gm of paddy straw, 324.5 gm of wheat straw, 561.4 gm of grass were obtained from a bed in the first flush.

Results and Discussion:

Table no. 2

Harvesting	Paddy straw (gm)	Wheat straw(gm)	Grasses (gm)
First	358.4gm	217.9gm	499.1gm
Second	483.5gm	431.2gm	623.8gm

Result (table no.2) revealed that the weight of Grass substrate mushroom harvesting (i.e. first and second) 499.1 gm and 623.8 gm, Wheat straw substrate mushroom harvesting (i.e. first and second) 217.9gm and 431.2 gm, Paddy straw mushroom harvesting (i.e. first and second) 358.4 gm and 483.5 gm respectively. Substrate where in which Grass substrate was used yielded that is 499.1 gm and 623.8 gm mushroom and which is highest as compared with wheat and paddy Substrate. However this result was confirmed by the growth of mushrooms were the highest that is 480.2 gm per 2 kg of Grass substrate (Cohen *et al.*, 2002).

Conclusion:-

While maintaining temperature (20-25°C), relative humidity (90-98%) and light have played an important role in the growth of mushrooms. Substrate where in which Grass substrate was used yielded that is 499.1 gm and 623.8 gm mushroom and which is highest as compared with wheat and paddy Substrate. Therefore cultivation of oyster mushrooms on agricultural wastes grasses provides multi-disciplinary advantages for the human being, animals as well as the ecosystem. The observed differences in the substrate's yield may be due to the percentages content of cellulose materials and essential nutrients that are important for the growth of oyster mushrooms.

Problems and Solutions

Table no 1

Problems	Solutions
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Poor ventilation	Cooler was used
Light source	100-watt bulbs (03) were used
Maintain of Humidity	Regular watering in the room and on bed
Pest attack	Spray with malathion 30 EC @ 2 ml/liter of water should be done about 2 -3 spraying according to infestation

Based on the result of this study, the following recommendations are given:

- (i) For sustainable oyster mushroom production, a Combination of cellulose and nutrient-containing substrate formulation must be used.
- (ii) Humidity and temperature availability places an important role therefore they must be maintained by necessary adjustments.
- (iii) Proper cleaning & sanitization are important to prevent bed spoilage and contamination
- (iv) Use of safest pesticides i.e. insecticide, fungicide, and disinfectant to avoid the residual effect.

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