

SPAWN PRODUCTION TECHNOLOGY OF MUSHROOMS

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INTRODUCTION

Mushrooms often called as ‘Queen of vegetables’, are in fact a group of higher fungi, belonging to the class Basidiomycetes or Ascomycetes. More than 2000 edible mushrooms have been reported throughout the world while in India 283 have been recorded and eight are being cultivated commonly (Maria *et al.*, 2000). Three types of mushroom are cultivated widely in India namely button mushroom, paddy straw mushroom and oyster mushroom (Payel Mago *et al.*, 2014). Pleurotus mushrooms also known as oyster or dhingri mushrooms belong to the genus *Pleurotus*. Approximately 70 species of *Pleurotus* have been recorded throughout the world (Won-Sik, 2004) while twenty five species of *Pleurotus* have been reported from India. *P. flabellatus* syn *P. djamor*, *P. ostreatus*, *P. cornucopia*, *P. sajor-caju*, *P. platypus*, *P. sapidus* and *P. pulmonaria* are under cultivation in India (Jandaik, 1997). Edible mushroom containing high protein and low fats, essential amino acids, vitamins and mineral elements needed by human body. The natural air-dried fruit body contains crude fat 2.63 per cent, crude protein 24.69 per cent, acidity 0.18 per cent, ash 9.43 per cent, reducing sugar 0.50 per cent, total amino acid 17.60 per cent which include seven kinds of essential amino acids, such as isoleucine, leucine, phenylalanine, lysine, threonine, valine, methionine and 10 kinds of non-essential amino acids, besides containing vitamin B1, B2, C and E and potassium, phosphorus, sodium, calcium, magnesium, as well as trace element zinc, iron, copper and manganese. They offer lucrative business as they require no arable land for production, and provides benefit such as increased income, employment, and food and nutritional security (Sanchita, 2008).

Spawn production

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Seed or planting material of mushroom is called spawn, consists of mycelia of the fungus multiplied on suitable substrates like cereal grains. The mycelia of mushroom fungus cannot be propagated as such; hence the mycelia are multiplied on a carrier like cereal grains. Like in all other crop production systems, seed or spawn is the key input in mushroom cultivation. Non-availability of quality spawn is the major constraint in mushroom production.

Good quality spawn conform to

- i) high yield potential,
- ii) absence of contaminants,
- iii) better economic benefit.

Spawn production primarily depend on the easy availability of spawn substrates. A good source of fruit body supplies and laboratory conditions for a sterile environment are needed. The process requires special technical skill and a laboratory for quality and economic spawn production.

The basic steps involved in spawn production are:

1. Pure culture preparation
2. Mother spawn preparation
3. Spawn multiplication/commercial spawn preparation.

Pure culture preparation

Pure culture of mushroom species can be obtained either by spore culture or tissue culture. Although mushrooms are spore bearing fruit bodies of macro fungi, all spores are seldom vigorous and the pure cultures obtained show variations because of genetical reasons. In tissue culture, a well grown mushroom fruit body is collected (usually from the first flush harvest). The fruit body is longitudinally split open into two halves. A small bit of tissue from the inside of the junction area of the pileus/cap and stalk is taken aseptically with forceps and placed over potato dextrose agar (PDA) or malt extract agar (MEA) media in slants or petri plates. These are incubated at $25\pm 2^{\circ}\text{C}$ and after a week's time the tissue generates mycelium

which cover up the entire media surface and the cultures become ready. The first generation (T1) pure culture prepared from mushroom fruit body tissue is called mother culture.



Pure Culture



Master culture

Spawn preparation

Criteria for base material selection along with the steps involved in spawn preparation are: Jowar (sorghum) and bajra (pearl millet) are considered best as spawn substrate, while wheat is the next best cereal. In the region, wheat is not readily available and costlier than paddy grains. Moreover, bacterial contamination of spawn is less in paddy grains as compared to wheat. This is due to presence of a harder husk in paddy. Maize grains are also abundantly available in the hilly areas and serve as very good base material. Maize grain is one of the best substrate to be used for mother spawn production. However, maize grains are not preferred for planting spawn due to bigger size and less surface area. There is a negative correlation between the protein content of grain used for spawn and the yield of mushroom. The protein content of paddy is 7% and that of wheat is 12%. However, wheat is the best substrate for button mushroom spawn

- I. The suitable substrate is prepared by cleaning, washing and cooking for about thirty minutes. After draining off the excess water, 20g pharmaceutical grade calcium carbonate (CaCO_3) is mixed with per kg of the cooked cereal grain. The grains are coated with CaCO_3 to raise the pH above 7; to accelerate the growth of the spawn. Sometimes the reason for slow growth of spawn is due to use of cheaper grade of CaCO_3 or French chalk.
- II. The processed substrate is either filled polypropylene bags (15x21cm size) to hold 200g/bag for mother spawn and planting or commercial spawn. The open end of the bags are plugged with cotton plugs and covered with butter paper.
- III. The filled bags are then sterilized in an autoclave at 121°C (15 lb pressure/sq. inches) for about 1-1½ h.
- IV. Mother spawn is the T2 generation prepared by aseptically inoculating the substrate in saline bottles with the T1 mother culture.
- V. Spawn is used by the mushroom growers for planting the mushroom beds. This planting spawn is prepared aseptically by multiplying from the mother spawn up to the third (T3) or fourth (T4) generation on substrate prepared

as mentioned earlier. Sub culturing of the spawn from T4 generation usually reduces the efficiency and vigour of the spawn which leads to reduction in mushroom production.

- VI. The mother and planting spawn should be properly labelled with the species name, generation and date. Spawn of fifteen to twenty days old is the best for planting.

Storage

Storage temperature of $25\pm 2^{\circ}\text{C}$ or at room temperature spawn can be stored up to 30 days, from the date of inoculation. Under refrigerator conditions, spawn can be stored for another 3 months. However, there will be some decrease in yield of mushroom with increased storage time above 2 months.

Contamination or spoilage

Growth of the mycelia gets restricted in the substrate when bacteria or moulds over grow the mycelia and the spawn is gets contaminated or get spoilt. Bacterial contamination in spawn packets is generally found as patches of slimy fluid on the substrate where the mycelium growth ceases. Spoilage caused by the moulds *Aspergillus* sp., *Pencillium* sp., *Rhizopus stolonifer* and *Trichoderma* sp., can be seen when the substrate has patches and at times much of it colonized with different coloured mycelia or spores other than white. The factors like excess moisture in the grains, bad quality grains, improper sterilization and high temperature during storage contribute to spoilage of spawn.

Desired traits of planting spawn

Spawn should always be procured from reliable and authentic sources as it is the key input for successful mushroom production. Time, labour and money are lost when good quality spawn is not used for planting. While procuring spawn few things are to be taken care of like the species of mushroom, generation and date of inoculation. A good spawn is white in colour with profuse mycelia run and without any speck or blemish. Never the less spawn production in itself is a promising venture of agri-preneurship.

References

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