

Overview on Button Mushroom Cultivation

J.K. Jeyavarshini and J. Vinodhini*

Department of Plant Pathology, The Indian Agriculture College, Radhapuram-627 111,
Tirunelveli (Tamil Nadu).

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Introduction

Button mushroom (*Agaricus* spp.) is a widely cultivated and consumed mushroom in the world. Earlier, the production of button mushroom in India was limited due to its seasonal preference. Currently, with a technical advancement the mushroom is being cultivated in a large scale throughout the year under various conditions. The most cultivated species with long cultivation history is white button mushroom (*Agaricus bisporus*). Originally *Agaricus* was described by J.E. Lange, a Danish mycologist named it as *Psalliota bisporus*. The most of basidiomycetes have four spores per basidia, but button mushroom have a distinctive character of two spores per basidia. Hence, it was named as *bisporus* (*bi*-two; *sporus*-spored). As they lack chlorophyll unlike plants, it can grow on dead and decayed organic materials. It absorbs nutrients from the organic substrate by thread like mycelium which penetrates and grown through the substrate. Then, it forms the reproductive structure which comes out of substrate and forms umbrella like fruiting body is known as mushroom. Besides, it comprised of cap/pileus, stalk/stripe, veil/annulus and cup/vulva involves in life cycle of mushroom. It is an excellent source of vitamin D, vitamin B, riboflavin, niacin, pantothenic acid and ergocalciferol nutrient values.

Taxonomy of button mushroom:

Kingdom	: Fungi
Phylum	: Basidiomycota
Class	: <u>Agaricomycetes</u>
Subclass	: Agaricomycetidae
Order	: <u>Agaricales</u>
Family	: <u>Agaricaceae</u>
Genus	: <i>Agaricus</i>
Species	: <i>Agaricus bisporus</i> (J.E. Lange) Pilat



In India, button mushrooms are grown seasonally and in environment controlled cropping houses. White button mushroom requires 20-28°C for vegetative growth (spawn run) and 12-18°C for reproductive growth. Besides that it requires relative humidity of 80-90% and enough ventilation during cropping. Seasonally, it is grown during the winter months in the north-west plains of India and for 8-10 months in a year on the hills. However, with the advent of modern cultivation technology it is now possible to cultivate this mushroom anywhere in India. In India, button mushrooms are grown seasonally and in environment controlled cropping houses. White button mushroom requires 20-28°C for vegetative growth (spawn run) and 12-18°C for reproductive growth. Besides that it requires relative humidity of 80-90% and enough ventilation during cropping. Seasonally, it is grown during the winter months in the north-west plains of India and for 8-10 months in a year on the hills. However, with the advent of modern cultivation technology it is now possible to cultivate this mushroom anywhere in India. In India, button mushrooms are grown seasonally and in environment controlled cropping houses. White button mushroom requires 20-28°C for vegetative growth (spawn run) and 12-18°C for reproductive growth. Besides that it requires relative humidity of 80-90% and enough ventilation during cropping. Seasonally, it is grown during the winter months in the north-west plains of India and for 8-10 months in a year on the hills. However, with the advent of modern cultivation technology it is now possible to cultivate this mushroom anywhere in India.

Cultivation Technology

In India, its grown seasonally also in controlled environmental conditions which requires 20-28°C for vegetative (spawn) growth and 12-18°C for reproductive growth with 80-90% relative humidity. The mushroom cultivation steps are spawn production, compost preparation, spawning, spawn running, casing and fruiting.

Spawn production

Spawn is produced from fruiting culture / stocks of selected strains of mushrooms under sterile conditions. Stock culture may be produced in the lab or may be obtained from other reputed sources. Fruiting culture is mainly imported from various places including foreign sources which give higher yield than Indian strains and the spawn is produced in the lab. The spawn should be

of good quality in terms of flavour, texture and size apart from having potential for high yield and longer shelf life. Spawn is produced from fruiting culture / stocks of selected strains of mushrooms under sterile conditions. Stock culture may be produced in the lab or may be obtained from other reputed sources. Fruiting culture is mainly imported from various places including foreign sources which give higher yield than Indian strains and the spawn is produced in the lab. The spawn should be of good quality in terms of flavour, texture and size apart from having potential for high yield and longer shelf life.

Nuclear culture

The spawn produced from the fruiting culture of selected disease free mushroom strains. A well grown mushroom split open into two halves and a small piece of tissue from amidst of pileus and stipe transferred to petriplate containing potato dextrose agar medium. The plates were incubated for 10 days for complete fungal growth. This base spawns or nuclear cultures used for mother spawn preparation.

Mother spawn

Mother spawn is that the fungus grown on a well-filled, disease- free sorghum grains based substrate medium. As for that, sorghum grains were cooked for 30 min and spread over the clothes/papers to dry out the excess water. The shade dried grains mixed with 20g/kg of CaCO_3 and then filled in polypropylene bags and the edges sealed with PVC rings. The cotton plugged bags were autoclaved at 20ls pressure for 20 mins. After proper sterilization, the grains were inoculated with the respective mushroom nuclear culture and incubated at room temperature for 10 days.

Compost preparation

The compost substrate prepared from plant waste like cereal straw, bran waste and salts like urea, gypsum and ammonium sulphate/calcium sulphate. Compost is a substrate material in which mycelium grows and produces fruiting bodies. The quality of compost directly influences the mushroom yield. C:N ratio of the substrate has to 25-30:1 at the time of staking and 16-17:1 at the time of final compost with 67-70% of moisture content. The composting can be done as long method which takes up to one to one and half months and short method which completed within three weeks. In plain cement floor, first layer of wheat or paddy straw (250 g) up to 8-10 inch thickness prepared and sprayed with water. These

processes repeated up to 3 – 4 times in a day and thoroughly mixed together then covered with wet jute bags for the next 16-18 hours. Subsequently, 3g of urea, 25 kg of wheat bran and calcium ammonium nitrate was added and evenly mixed. Make it as a heap (1×1×1m) and turn the mixture periodically on every 3-4 days. 10 kg of gypsum mixed after the third turning (18-21 days) and the rest amount of gypsum added after the 4th turning (26-28 days) of the heap. Any nematicide can be added at 5th turn and if the substrate has the smell of ammonia, then revert back to heap for 2-3 days. In case of short method, barley and chicken manures added to wheat/paddy straw and stacked at 3.3 X 2.5 X 1m size. Turnings can be given on the 2, 4, 6 and 8th days and then the compost subjected to pasteurization. Steam pasteurization done to develop an aerobic fermentation and temperature maintained at 52 -60° C inside the compost.

Spawning

There are different methods of spawning has been followed as single layer spawning in which the spawn is scattered uniformly all over the surface of compost; double layer spawning is filled completely with compost and spawn is applied as above and covered with a layer of spawn; mixed spawning is certain quantity of spawn mixed with the compost; spot spawning in which 5g of spawn filled in the holes and covered with a thin layer of compost. The spawn running will be completed in 15 days then ready for casing.

Casing and fruiting

Casing is very crucial for fruiting and after 12-15 days of spawning, the compost turn from dark brown to whitish color. An equal mixture of FYM and loamy soil with 2% of formalin and covered in a polythene sheet for 10-15 days. Casing has to be prepared before 15 days in advance. The casing soil applied to a thickness of 3-4 cm and pressed gently. Around 24°C with 100% humidity maintained for a week and after the mycelium impregnated into the casing soil, it maintained at 14-18 °C. The pin heads starts to appear within 7-10 days and mature after few days. The pin heads become fully grown mushroom after 2-5 days and harvested by gently twisting the fully-grown mushroom. The harvested has to be consumed or sold as immediately since it is perishable vegetable.

Conclusion

At present, mushroom cultivation is increased considerably over the past years and the production is increasing at the rate of 7%. The growth in India is about 30-40% and



expected to reach up to 6 lakh metric tonnes by 2025. Though mushroom farming is became one of the most profitable agri-business, with evolving technical advancement, it is vital to maintain the mushroom species in their natural environment.

