

# Urban Mushroom Farming

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## ABSTRACT

Nowadays, mushrooms are gaining popularity in cities due to its high nutritional value and awareness about health. There are several varieties of edible Mushrooms under cultivation but still Button Mushroom' is dominating in terms of production and consumption. People are interested to cultivate button mushrooms on their own but the constraint is heavy initial investment and more space needed for compost making. In the present study, button mushroom composting is carried out by many Mushroom units across India. But only few sells spawned ready to grow compost bags to the urban population for its growing at their houses. Mushroom Club, Pune has initiated this unique kind of concept – 'Urban Mushroom Farming' in Maharashtra in recent years. Necessary training is provided to them so as to acquaint them with the technology. It was found that from a bag of 10 Kg compost which costs Rs.100/- to the grower and in return they were able to harvest around 2 Kgs of fresh Button Mushrooms in just two months time period and earn Rs.260/-. One grower can easily place 300 bags in 300 sq.ft. room. There is a tremendous potential for button mushroom farming in urban areas especially in Societies provided if they can get ready to grow Compost bags through centralized composting facility made to be available in nearby areas. It is concluded that the unemployed youth can raise 'Centralized Composting Unit' (CCU) through Prime Minister Mudra loan scheme and provide compost bags to the urban population to fulfill their need of quality protein rich food and earn handsome income.

**Keywords :** Button Mushrooms, CCU, Spawned bags.

## I. INTRODUCTION

Mushroom is an excellent source of Proteins, vitamins, minerals, antioxidants, fibers and Folic acid. Mushrooms especially button mushroom is gaining popularity due to its more self life and public awareness. In India Cultivation of Button mushrooms under controlled condition is of recent origin. Earlier its cultivation was restricted to hilly regions of Ooty, Solan, Jammu Kashmir, Dehradun etc. as seasonal growing.

Now a day, button mushrooms are commercially cultivated throughout the year in various states like Maharashtra, Tamil nadu, AP, MP, UP, Delhi and

Gujarat using controlled climatic conditions and modern technology to fulfill the market demand. Mushroom cultivation has now become a household name in almost all regions in India Mehta et.al. (2011). Urban Farming is gaining popularity in India for growing varieties of organic and exotic vegetables in densely populated cities. Growing relatively expensive vegetables on open terrace, balcony and at unused space saves money as well as on bartering of produce. Urban people generally spend a substantial part of their income (50 – 70%) on food and growing own food can help to save household expenditures. Urban farming is a profitable option when producing products are perishable and with high demand.

Growing vegetables is comparatively cheaper than cultivation of Mushrooms. Attempts were made before to cultivate Oyster mushrooms at home on large scale but lack of market for its production declined. On the other hand, for Button mushrooms, market is at door step. But the difficulty in urban area is space and investment for the preparation of compost. Considering this, exclusive CCU (Centralized Compost Unit), nearby city area can cater as a facilitator among City Growers. Demand of pasteurized and synthetic compost for white button mushroom is increasing day by day near the towns because of urban people accepted mushroom cultivation as kitchen garden. People who have not the facilities of pasteurization want to cultivate mushroom. Establishment of synthetic compost or pasteurized compost preparation unit could be a choice for entrepreneur or self-employment generation Kumar et.al. (2013).

## II. MATERIALS AND METHODS

During experiment in the years 2015-2016, composting was carried out at Mushroom Division, Agricultural College, Pune whereas growers were carried out Button Mushroom Growing at their premises located at Mahableshevar, Panchgani and Pune City. Standard Compost Bags of 10 Kg each mixed with 100 gm spawn (Seed) were distributed to the individual grower, Women Self Help Groups and Farmers. Proper onsite training was given to them by Mushroom Club, Pune to improve mushroom quality and yield. Different compost batches were made and monitored on a regular basis by our technical team and mushroom yield was measured time to time.

### **Compost Batch:**

Raw materials used - Wheat Straw, Chicken Manure, Gypsum and De Oiled Cake (DOC). All these raw materials were procured locally.

### **Compost Preparation:**

**Formulation** –Wheat Straw 6.5 Tons, Chicken Manure 3.5 Tons, Gypsum 500 Kgs and DOC 500 Kgs.

**Formulation Nitrogen = 1.75 % and C: N Ratio = 24: 1**

### **Phase I – Composting**

**1 to 5 days- Pre Wetting**, Mixing and Heap Making, Turnings while Heap Shifting etc. were made on a concrete platform using Goody Pit water (recycled). Manual process are used to avoid expensive machineries like JCB, Mixing and Turning machines due to a trial and smaller volume batch. During phase I days, Compost Heap Moisture (60%) and the Temperatures (50°C,) were monitored and maintained to built up microbial mass.

**6 to 15 days - Bunkering**. Partially decomposed compost was filled into a specially built open type Bunkers having an aeration system underneath. After every 3 days, manual shifting of compost made from one Bunker to another. Total 2-3 shifting is necessary to get better caramelization of compost. During bunkering period, Compost Moisture (75%) and temperature (80°C,) were closely monitored and controlled.

### **Phase II – Pasteurization.**

On 16<sup>th</sup> Day, after all the quality parameters check at QC Lab, fully caramelized compost from Bunker is filled into a Pasteurization Chamber (Tunnel). Different temperatures at various stages like Leveling, Warming Up, Pasteurization, Conditioning, Cooling down were maintained strictly in a 7 days cycle. Major part of Phase II – ‘Pasteurization’ is done at 58 to 60°C for about 8 to 10 hours depending on the disease level of the farm.

**Spawning:** Pasteurized compost is being mixed with about 1% spawn (strain-Sylvan A15 Intermediate hybrid) at a very hygienic place and condition. Spawn is made available locally from a Hind Mushroom Spawn Lab. Rajgurunagar. About 10 Kgs compost is filled in a specially designed HD bags having few small holes to avoid water condensation due to its self heat process.

**Growing:** Spawn mixed bags were shifted to the cleaned Mushroom growing units with proper handling method. Special care always was taken that; compost temperature should not cross beyond 30°C. Button Mushroom Growing is total 60 days cycle

and the stages were Spawn Run (15 days at 27°C Temp), Case Run (8 days at 25°C.Temp.),Flushing/Pinning (12 days at 20°C. Temp.) and later Mushrooms Harvesting (20 days at 18°C Temp.). Rest 4-5 days needed for the surplus operations like delayed stages and rooms fumigation etc.

During cropping period, regular watering practices were carried out as per the QC standards. Also there was a Pest and Disease management schedule, Post Harvest management practices like packing, cold storage, transport etc.

**Button Mushroom Production:** Button mushroom production is totally depends on the quality of compost, Spawn and the growing parameters. Here we have conducted two trials using same quality compost and spawn. Only the growing climatic conditions were differs like - 1) Women Self Help Groups and the Farmers from Mahableshewar and Panchgani grown mushrooms using natural environment without using air coolers and AC's. Whereas 2)City grower, Dr. Swati and Mr. Mahesh Kulkarni from Pune have successfully grown good quality button mushrooms using Air Conditioner to control climate throughout crop cycle.

### III. RESULTS AND DISCUSSION

Nearly One to Two Kg button Mushrooms were harvested from a single compost bag. Hilly areas like Mahableshewar and Panchgani growers were obtained average 1.47 kg mushroom per bag with low cost growing method i.e. without any cooling arrangement. Whereas grower from Pune Dr. Swati and Mr. Mahesh Kulkarni obtained average 1.95 Kg Fresh mushrooms/bag from 100 bags as cooling facility was available in growing room during fruiting. It is found that commercial button mushroom production is possible with low investment if spawned compost bags are readily available. It was also found that transportation of compost bag is possible immediately

after spawning without affecting quality and quantity of the produce.

Urban Mushroom farming is possible through centralized composting units. In India under National Horticulture Mission, financial assistance up to Rs.20 lac is available for Centralized composting unit and it is 100% of the cost to public sector and in case of private sector, 50% of cost, as credit linked back ended subsidy. Mushroom cultivation through centralized composting unit can provide income opportunities to urban youth. Similar findings are reported by Easin et.al. (2017) while studying Mushroom Cultivation as a small-scale family enterprise for the alternative income generation in rural Bangladesh. Celik and Peker (2009), reported that, price determination is the most important input in the mushroom production mainly the "Compost". Producers face various problems in making good quality and homogeneous compost. To eliminate this deficiency from mushroom cultivation, establishment of Centralized Composting Unit is of paramount importance.

In this present study, the cost of compost bag of 10 kg. is considered around Rs.100/- whereas cost of 3 kg casing soil is Rs.20. Total cost of the bag was around Rs.140/- including transportation cost from Centralized Composting Unit. One bag produced around 2 Kg of fresh button mushrooms. The mushrooms were sold by the growers at a wholesale rate of Rs.120/- per Kg. and the growers can earn Rs.100/- per bag. Apart from this, spent compost (waste compost at the end of crop) is also converted into organic fertilizer and sold at retail rate of Rs.10/- per Kg. Roy et.al (2015), reported that use of spent compost as a bio fertilizer and improvement in the growth of *Capsicum annum* L. crop.

It was also found that in a room of 100 sq.ft. area, one can accommodate 100 bags and earn Rs.12,000 in a month. Zhang et.al. (2014), describes the rapid growth of mushroom cultivation and its contribution to food

security and rural sustainable development and also examined the roles of bio-innovation, technological dissemination, and marketing.

#### IV. CONCLUSION

Button mushroom cultivation is possible without heavy initial investment in urban areas if centralized composting facility is available in nearby area. It was also found that, if someone provides ready to grow compost bags to the city growers, they can easily grow even better quality button mushrooms provided if split AC is available to maintain temperature during fruiting. It was also recorded that transportation of compost bags immediately after spawning is possible without any reduction in yield.

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