

Mushroom cultivation

❖ There is huge demand of Mushrooms in food industry as they are culinary delicacy, nutritionally rich with health benefits. These are fruiting bodies of many basidiomycetes species

❖ These are rich in protein, carbohydrate and vitamins. Mushrooms are low in caloric value and hence are recommended for heart and diabetic patients. They are rich in proteins as compared to cereals, fruits and vegetables. In addition to proteins, they also contain minerals vitamins as thiamine (vitamin-B1), riboflavin (B2), niacin, pantothenic acid, biotin, folic acid, vitamin C, D, A and K. Since mushrooms possess low caloric value, high protein, high fibre content and high K: Na ratio, they are used in diet. They are also reported to possess anticancer activities.

❖ India is primarily agriculture based country blessed with a varied agro-climate, abundance of agricultural waste and manpower, making it most suitable for cultivation of all types of temperate, subtropical and tropical mushrooms.. It requires less land as compared to other agricultural crops and utilizes agricultural wastes which otherwise may pose problem of disposal and atmospheric pollution.

❖ Therefore, mushroom cultivation is not only of economic importance but also has important in integrated rural development program by increasing income and employment opportunities for village and environmental benefits by utilizing agro wastes

❖

❖ Mushrooms are saprotrophic and cultivation on commercial scale is commonly done using agricultural wastes as wheat, cereal straw, bagasse leading to better waste management

❖ Exotic fungi are also commercially produced due to their uses in medicine eg shiitake and oyster mushrooms are used during cancer treatment

❖ Most popular mushrooms used for commercial cultivation are:

- Button mushroom (*Agaricus bisporus*)
- Oyster mushroom (*Pleurotus ostreatus*)
- Milky mushroom (*Calocybe indica*)
- Shiitake mushroom (*Lentinula edodes*)
- Paddy straw mushroom (*Volvariella volvaceae*)

❖ Of all the mushroom button mushroom is most common all throughout due to its heavy demand in food industry

❖ **Commercial Production of *Agaricus* requires different stages**

1. **Spawn preparation**

Spawn is a pure culture of secondary mycelium grown on special media under controlled laboratory conditions



2. **Compost Preparation:** The substrate is selected on high cultivation would be done. It is rich in cellulose, lignin, Nitrogen containing compounds, so that the fungus can derive nutrition from it.

➤ The compost is sterilized using autoclave or by heating in water or boiling etc. After cooling spawning done



3. **Spawning:** The mixing of spawn and compost is done and these are packed in plastic bags or trays and further kept in a place specified for incubation, commonly mushroom house. This area provides shade, proper humidity and temperature which are well maintained



4. In 2-3 weeks, the mycelium grows throughout the compost

5. The tray or bags are ready for casing

6. **Casing:** The surface of trays or bags or beds are moistened and covered with 1.5 – 3 cm thick layer of soil. This is an important step for induction of fruiting bodies/basidiocarps



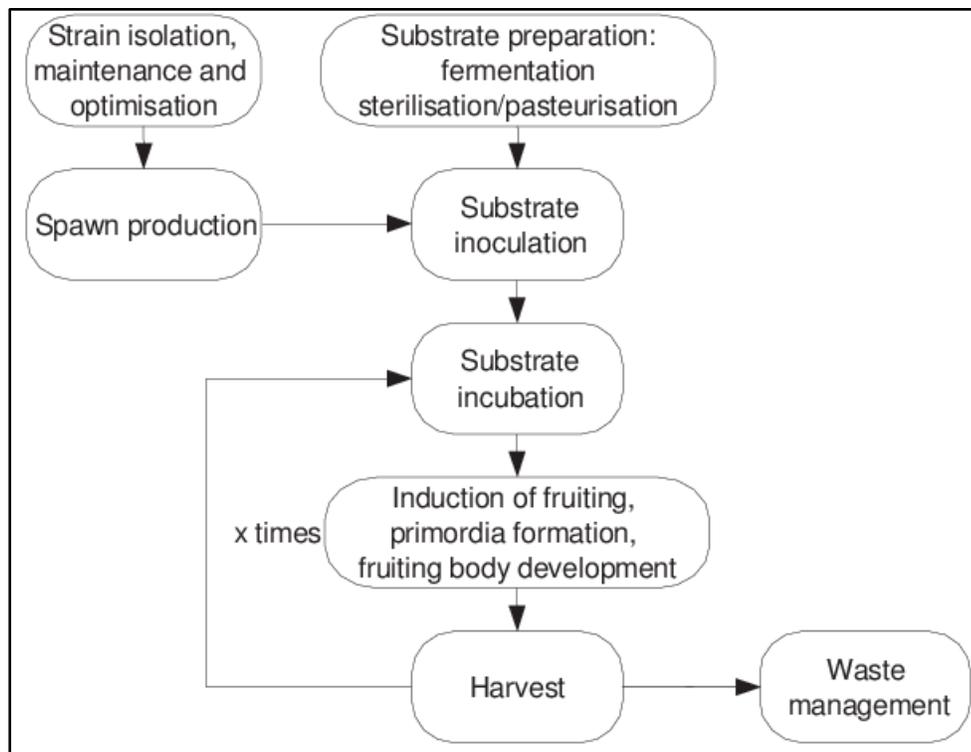
7. **Pinning:** The earliest stage when the fruiting bodies start emerging is called Pinning



8. The **harvesting** is done of different fruiting bodies though they appear at different intervals



SUMMARY



❖ Topic II :Fairy rings

- ❖ Many Agaricomycetes members have their fruiting bodies emerge in concentric rings
- ❖ Mycelium of these species grow in grasses, lawns, grasslands , rangeland or in forested areas produces fruiting bodies at periphery of the colonies thus appearing as circles or rings
- ❖ Wherever this This ring or arc of mushroom is seen , the vegetation becomes dead and necrotic'Thus in earlier times it was linked to mythology and superstitions and was considered as a curse rather than good fortune by people.
- ❖ Over 50 species of the ring fungi have been identified
- ❖ Most common species are
 - *Marasmius oreades* : popularly known as fairy ring mushroom

Some other genera forming fairy rings are :

- *Agaricus arvensis*
- *A Campestris*
- *A tabularis*
- *A xanthodermus*
- *Amanita muscaria*
- *Coprinus atramentarium*
- *Clavulinopsis*
- *Clitocybe*
- *Hygrocybe nivea*
- *Lepista saevum*
- *Leucopaxillus gigantean*
- *Lycoperdon depressum*
- *Scleroderma verucosum*
- ❖ It can also grow deep into the soil forming a dense thread like network of white mycelium
- ❖ as the colony increases in size, the older mycelium in the central region begins to die continuously as nutrients within the soil get exhausted
- ❖ Fruiting bodies are only formed at outer ring of annulus and so marks its limits
- ❖ They have radial growth ,
- ❖ Fairy rings normally re occur each year
- ❖ . These remarkably regular rings can vary in diameter from a few cmtrs to several mtrs (over 1 km)
- ❖ Fairy rings survive by decomposing the debris in the soil such as dead roots and shoots and other wood debris in soil. Mycelium derives its nutrition from organic matter

of dead plant material, & also uses inorganic nutrients and water from soil, thus there is competition between vegetation and mycelium. It also decomposes roots of vegetation especially of grasses & Damage can be seen as a band of unsightly large arcs of circle of dead grass

- ❖ . So fairy rings can be detected by basidiocarps in rings or arcs or arcs of dead effect on vegetation in which they are growing

- ❖ 3 concentric rings can be observed at soil surface
 1. Outer zone of the ring where basidiocarps are growing, the vegetation in this spot is taller and deeper green
 2. Middle zone, interior to outer zone , the area enclosed by the ring may consist of bare earth, particularly if the diameter of the ring is small and the season is dry
 3. Inner zone, of stimulated growth when the central part of the bare area may be colonized by plants, provided this area is relatively large.

- ❖ Bareness of the center region in older rings and death of the grass is due to:
 1. The interference with water percolation as dense mat of fungus mycelium in the soil
 2. toxic substances(e.g. ,cyanide) produced by the fungus in the soil.
 3. As it uses inorganic nutrients and water from soil, thus there is competition between vegetation and mycelium, thus the plants face severe water stress and nutrient deficiency, nitrogen deficiency and die
 4. Mycelial growth is dense so the hyphae block soil pores, there is no aeration, root growth stops

- ❖ The stimulation of grass in the outer part of ring is associated with rapid decomposition of soil organic matter and release of nutrients.
 - The darker green color of grass as abundant nitrogen bioavailable to plants because of saprotrophic activity of fungus which releases nitrogen compounds
 - Many fungi also produce hormones, which promote plant growth root tips.

