

# *MUSHROOM CULTIVATION*



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# Introduction

- ❖ Mushroom is a fungi producing a fleshy fruiting body, especially one consisting of a stalk with an umbrella cap.
- ❖ It has two part : cap like structure is known as *PILEUS*, attached with thread like structure *MYCELIA*.
- ❖ Mycelia absorb nutrient from soil , it do not require sun light for their growth.



# Types of Mushrooms

## White button

The most popular mushroom, white buttons represent about 90 percent of mushrooms consumed in the United States.



## Crimini

Also known as baby bellas or browns, criminis are similar in appearance to whites, but have a light-tan to rich-brown cap and a firmer texture.



## Portabella

A larger relative of criminis, Portabellas have tan or brown caps and measure up to 6 inches in diameter.



## Shiitake

Shiitakes are tan to dark brown and have broad, umbrella-shaped caps, wide open veils, tan gills and curved stems that should be removed.



## Oyster

Oysters can be gray, pale yellow or even blue, with a velvety texture.



## Enoki

Enoki have tiny, button-shaped caps and long, spindly stems.



## Beech

Beech mushrooms are petite with either all-white or light-brown caps.



## Maitake

Maitake appear rippling and fan-shaped, without caps. They are also called "Hen of the Woods."



# Types of Mushrooms



Oyster Mushroom



Straw Mushroom



Reishi Mushroom



Enokitake Mushroom



Shitake Mushroom



Wood Ear Mushroom

# Poisonous Mushrooms

❖ Poisonous Mushrooms look like edible mushroom in their morphology and lifecycle. However They can be distinguished by following features:

- ❖ Brightly coloured fruit bodies.
- ❖ Greenish tinge on gills and Yellow-Green spores.
- ❖ Pink coloured spores in gills.
- ❖ Presence of Vulva and Annulus on the Stalk.
- ❖ Oozing of milky or coloured latex at damaged portions
- ❖ Unpleasant odour

E.g. *Amanita phalloides*

*Tricholoma muscarium*



# Edible Mushroom

- ❖ Edible mushrooms are consumed by humans for their nutritional value and they are occasionally consumed for their supposed medicinal value.
- ❖ Edibility may be defined by criteria that include absence of poisonous effects on humans and desirable taste and aroma .
- ❖ Edible mushrooms include many fungal species that are either harvested wild or cultivated



# Nutritional Value of Mushrooms

- ❖ **Protein** - Most mushrooms have a high protein content, usually around 20-30% by dry weight.
- ❖ **Fiber** - Helps lower cholesterol and is important for the digestive system.
- ❖ **Vitamin D** - Essential for the absorption of calcium.
- ❖ **Copper** - Aids in helping the body absorb oxygen and create red blood cells.
- ❖ **Selenium** - An antioxidant that helps neutralize free radicals, thus preventing cell damage and reducing the risk of cancer and other diseases. Mushrooms contain more selenium than any other form of produce.
- ❖ **Potassium** - An extremely important mineral that regulates blood pressure and keeps cells functioning properly
- ❖ **Other important minerals** - Such as phosphorous, zinc, and magnesium.
- ❖ **Low levels of fat, calories, and sodium**
- ❖ **No cholesterol**

# What Is the Nutritional Value of Mushrooms?

❖ Mushrooms are low in calories, high in fiber, and contain many important vitamins and minerals. Some also have medicinal properties such as complex carbohydrates that strengthen the

*They are an excellent source of protein, in some regions they are known as vegetable meat for their high protein content. They contain all the essential amino acids needed for your body.*

**The percentage of protein in dry mushrooms could be between 10% and 30% of the total mushroom weight.**



**They have a high concentration of carbohydrates at 57% and 14% raw fiber. Most of those carbohydrates are complex sugars that will help you regulate insulin and sugar levels because they are low-glycemic sugars.**



# Key steps in mushroom production

- ❖ The key generic steps in mushroom production – a cycle that takes between one to three months from start to finish depending on species – are:
- ❖ identifying and cleaning a dedicated room or building in which temperature, moisture and sanitary conditions can be controlled to grow mushrooms in choosing a growing medium and storing the raw ingredients in a clean place under cover and protected from rain.

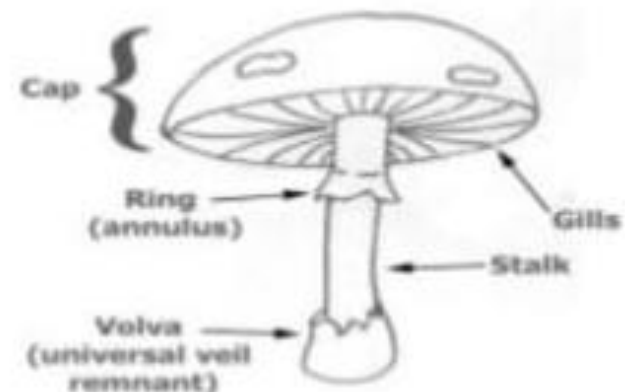
### *Agaricus bisporus* :

- ❖ Also known as 'the white cultivated mushroom'. *Agaricus bisporus* is grown on composted cereal straw and animal manure.
- ❖ *Agaricus bisporus* is the most extensively cultivated mushroom in the world, accounting for 38% of the world production of cultivated mushrooms.

### *Volvariella volvacea* :

- ❖ The 'Chinese' or 'paddy straw' mushroom. *Volvariella volvacea* is a high temperature mushroom grown largely in tropical and subtropical regions of Asia e.g. China, India.
- ❖ This mushroom can be grown on a variety of agricultural wastes. *Volvariella* mushrooms account for 16% of total production of cultivated mushrooms in the world.

- ❖ A mushroom typically consists of a stalk (stipe) and a cap (pileus).
- ❖ As the mushroom develops from an underground mycelium and pushes upward, it is protected by a thin membrane which eventually ruptures, leaving fragments on the cap.
- ❖ Another membrane, attaching the cap to the stalk, also ruptures, allowing the cap to expand and leaving a remnant ring (annulus) on the stalk.
- ❖ Radiating rows of gills are found on the cap's undersurface; these bear the club-shaped reproductive structures (basidia) which form minute spores known as basidiospores, of which a single mushroom may produce millions.



# Spawn Preparation

(i) **Preparation or procurement of spawn:** Mother spawn can be procured from any mushroom research center and primary culture of spawn can be prepared by following procedure: **(Mushroom Growers Handbook)**

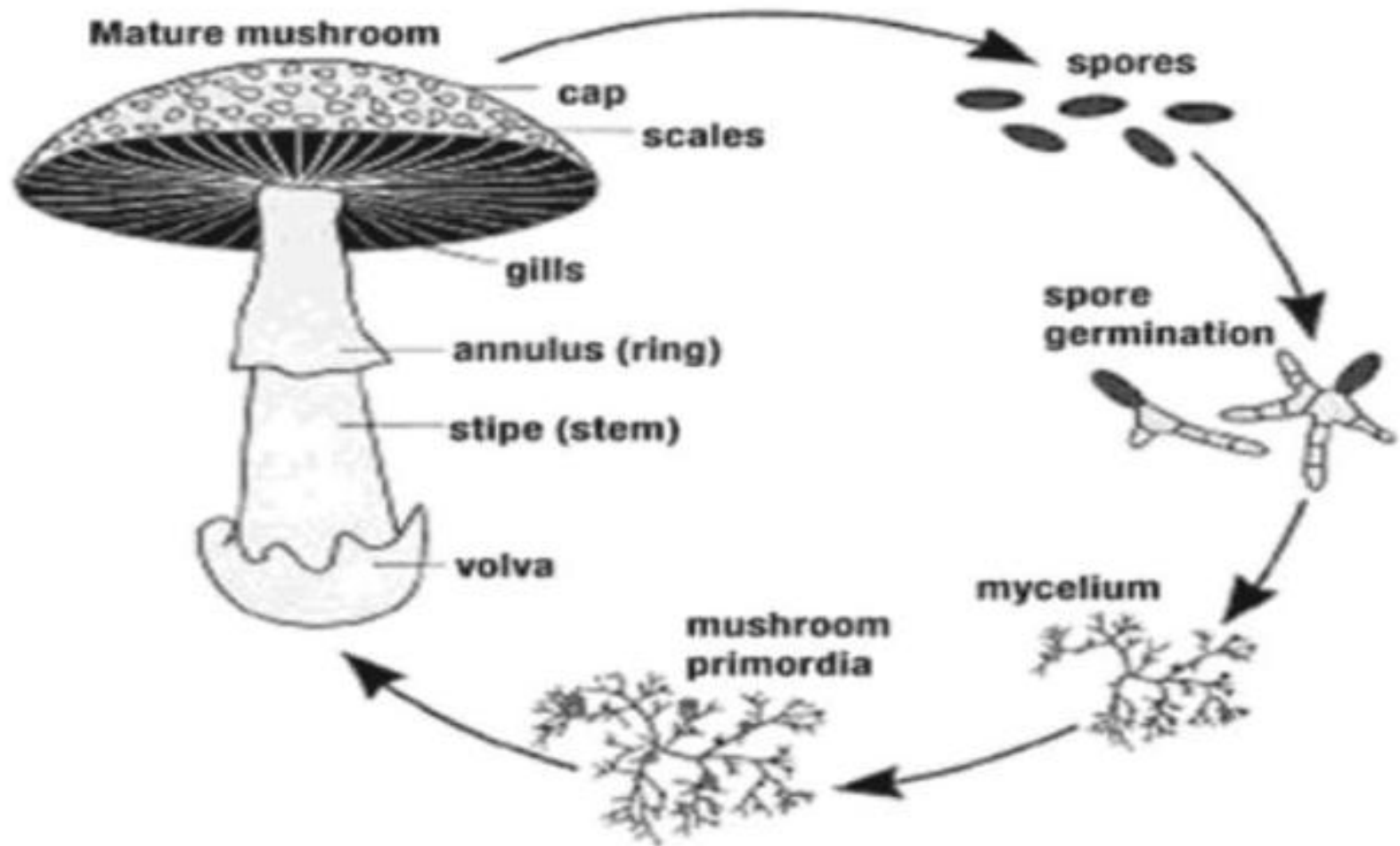
1. Select good quality jowar or wheat grains free from pest and moulds.
2. Boil the grains submerged in clean water for 20-30 minutes. When the grains become soft, remove and spread evenly on a cotton cloth to drain out the water and cool the grains.
3. Mix 3% chalk powder (30g/ kg of grain) for adjusting the pH and to keep the grains loose.
4. Fill 250gms of grain in cleaned and dried glucose bottle of 500ml capacity or propylene bags and plug the mouth of the bottle tightly with non-absorbent cotton.
5. Sterilize the bottles in autoclave by exposing to 121°C and 15lbs pressure/sq inch for 20 minutes. After cooling, transfer the bottles to inoculation chamber.
6. Transfer few grains with mycelial growth into sterilized substrate bottle under aseptic condition and plug it with cotton.
7. Shift the inoculated bottles to spawn running room having temperature range of 25-30°C.

- ❖ seeding the beds with spawn (spores from mature mushrooms grown on sterile media);
- ❖ maintaining optimal temperature, moisture, hygiene and other conditions for mycelium growth and fruiting, which is the most challenging step; adding water to the substrate to raise the moisture content since it helps ensure efficient sterilization;
- ❖ harvesting and eating, or processing, packaging and selling the mushrooms;
- ❖ cleaning the facility and beginning again.

- ❖ pasteurizing or sterilizing the medium and bags in which, or tables on which, mushrooms will be grown (to exclude other fungi that would compete for the same space – once the selected fungi has colonized the substrate it can fight off the competition).



# Mushroom Lifecycle



# Poisonous Mushrooms





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