

Mushroom Production and Processing Technology

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Introduction:

Mushrooms are a nutritious food product used as a tonic, medicine and dietary food item all over the world. It is highly rich in protein (35%), crude fiber (19%), vitamins, carbohydrates, and minerals, but the content of fat and calories are low with no starch which made the delight for the patient suffering from diabetes, blood pressure and hypertension. Mushrooms add flavour to bland staple foods and are a valuable food in their own right. Antiquity mushrooms have been serving mankind not only as delicious dishes but also as a nutritious and medicinal commodity. Because of these virtuous properties, mushrooms were glorified as “Elixir of Life”. Before starting mushroom farming, following factors should be considered to become successful in the commercial mushroom production business:

- The mushroom farm should be closer to the house of the farmer for successful participation and monitoring purposes.
- Availability of lots of water on the farm.
- Easy accessibility to raw materials at competitive prices in the region.
- Access to labour at affordable prices.
- Availability of power at competitive prices, as electricity is a significant input in mushroom cultivation.
- The farm should be away from industrial pollutants such as chemical fumes.
- There should be provision for sewage disposal at farm.
- There should be provision for future growth in the farm.

Mushrooms are one of the most loved food that is consumed in various forms like fresh, pickled, dried, powdered, canned, etc. They can be edible, wild and some of them can be toxic too. It consists of more than 90% water and less than 1% fat, loaded with Vitamin B, copper and selenium and low in sodium. They are a rich source of Vitamin D. It consists copious amount of plant sterol “Ergosterol” precursor of Vitamin D.

Cultivation:

The basic requirements for mushroom cultivation are manure/compost, spawns, optimum temperature and humidity. Favorable growing conditions involve 80-90% of relative humidity, ample ventilation, a temperature range of 20-28°C during spawn run and 12-18°C for reproductive growth. Initially for a week temperature must be maintained at $23 \pm 2^\circ\text{C}$ and then it can be reduced to $16 \pm 2^\circ\text{C}$ for subsequent weeks. The CO_2 concentration should be 0.08-0.15 %.

The following steps are involved for mushroom cultivation:

Compost preparation: The compost (natural or synthetic) utilized for mushroom growth usually consists of wheat straws, rice bran, horse manure, poultry manure, gypsum, etc.

Spawning: Spawning is a process of sowing or mixing spawns in compost. However, mushroom produces spores which acts as a seed for further propagation but are not used generally due to uncertain germination and growth. The spawns are thoroughly mixed with the compost and are covered with newspaper and watered sufficiently to maintain the moisture.

Casing: The casing is a type of sterilized soil or dressing consisting of cow manure that is spread onto the spawn mixed compost. It is applied when the mycelium growth commences on the compost surface. After 15 to 20 days of its application mushroom head or pins start becoming visible on the surface.

Harvesting: Harvesting involves plucking mushroom from soil using hands or the heads are chopped off using a knife. The harvested mushrooms are then subjected to primary processing.

Processing:

Mushrooms are very fragile and have a short shelf life unless consumed fresh. At ambient temperature, they lose their freshness within a day and deteriorate rapidly if not processed or refrigerated. They also tend to turn brown due to the presence of the compound tyrosinase. It converts monophenols to diphenols, which in turn are oxidized to quinones resulting in the formation of an insoluble brown pigment called melanin.

Drying

Drying is the oldest and the basic processing method for various food products. Sundrying is the cheapest and popular method but it produces a much darker product. Mechanical drying is

rapid and is of various types like tray drying, freeze drying, vacuum drying, microwave oven drying, air drying, etc. Dried mushrooms can be rehydrated and further can be used in soups, stews, pickles, etc.

Freezing

As mushrooms contain more than 90% water, hence freezing is the most suitable preservation method. The blast freezing method is commonly employed at temperatures from -25°C to -30°C . Cryogenic freezing extends mushroom's shelf life up to one year when used at -80°C to -100°C for 5-6 minutes.

Sterilization

Sterilization of mushrooms can be done by using chemicals, steam or by irradiation. The shelf life of mushrooms can be extended by applying a radiation dose of 1-3 kGy.

Canning

Canning involves preservation in brine, vinegar, oil or marinades. Freshly harvested mushrooms are cleaned, graded, blanched and then filled into cans along with brine or vinegar followed by lidding. The cans are then exhausted to remove air, heat sterilized, cooled, labelled and packaged for storage or consumption.

Pickling

Pickling is an age-old method that utilizes spice, salt, vinegar and oil as the basic ingredients for mushroom preservation. Pickled mushrooms are made using spices such as turmeric, red chili, garlic, clove along with salt and oil. Pickling induces fermentation which generates a mild flavor.

Post-harvest management

Harvested mushrooms are washed in a solution of 5g of potassium metabisulphite (KMS) in ten litres of water. After washing, remove excess water and pack these mushrooms in the polythene bag. The package practices depend upon the market & your customer demand.

Summary

A lot of mushroom products are currently available in the market such as mushroom pickles, seasonings, beverages, extracts, dried and canned mushrooms, mushroom supplements, cosmetics, etc. Apart from the mushroom food products many innovative products are emerging in other industries as well such as mushroom-based building materials, medicines, mycelium-based platforms, biodegradable packaging, mycelium-based leather, etc.



Mushrooms are easy to cultivate, have quick growth and negligible carbon emission and waste generation. Hence, mushrooms hold a bright future in every aspect owing to their diverse properties.

References

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