

Mushroom Cultivation and Processing

Uddeshy Singh

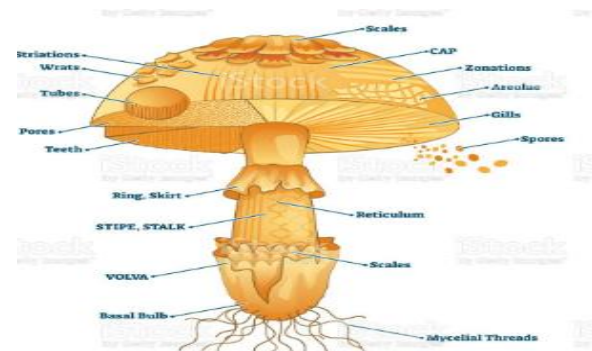
Professor Rajju Bhaiya State University Prayagraj, Uttar Pradesh, India

*Corresponding author email: uddeshysingh61238@gmail.com

Agriculture has the potential to ensure food security and generate income, thereby contributing to economic prosperity in rural and urban areas. These mushrooms are grown on sawdust, wood, cereal straw or millets such as rice, bajra, jowar and rye, as well as calcium products (chalk powder and gypsum). The substrate used to grow these mushrooms is heat pasteurized/sterilized and no chemicals/pesticides are used in growing these mushrooms. Almost all specialized fungi are oligotrophic fungi, meaning they love lignin. The culture medium is sterilized in a bottle-proof glass or polypropylene bag at 121°C and 15 cycles of pressure or 100°C for two hours and inoculated with pure primary culture rules of Agaricus Bosporus. The culture medium is incubated at 25 °C and rapidly impregnated with fungal mycelium. Sphagnum moss is the most commonly used ground cover. Mushrooms, which can be harvested 18 to 21 days after planting, have the potential to improve food security and generate income, contributing to economic prosperity in rural areas and cities. These mushrooms are grown on sawdust, wood, cereal straw or millets such as rice, bajra, jowar and rye, as well as calcium products (chalk powder and gypsum). The growing environment of these mushrooms is pasteurized/sterilized in the oven and no chemicals/pesticides are used in the growing process of these mushrooms.

Introduction

Mushrooms are one of the most popular foods not only because of their exotic nature but also because of the benefits they bring. Fresh, pickled, dried, powder, canned etc. It can be used in many forms. Mushrooms are fleshy fungi (Basidiomycota, Agaricomycetes) with a stem, cap, and gills under the cap. They are edible in the wild, and some can be poisonous. It contains more than 90% water and less than 1% fat, is rich in B vitamins, copper and selenium, and is low in sodium. Generally, vegetables, dairy, and other foods are fortified with vitamin D through irradiation or direct supplementation, but mushrooms are unique in that they are rich sources of vitamin D obtained from animals or poultry. The reason for this is that it contains plenty of plant sterol "ergosterol".



Mushrooms are so popular that they can be grown by people without land and can also use waste products to produce high protein foods (Ambili and Nitya). The use of mushrooms as food and nutraceuticals has been known since ancient times, originating from the sayings described in the ancient epics, the Vedas and the Bible. Early civilizations still value mushrooms for their delicious taste and medicinal values.

Mushrooms are grown almost everywhere in the world, in recent years mushroom production in the world has reached a growth rate of approximately 10%. In India, many warm, tropical and subtropical mushroom species are grown in the country due to the diverse agricultural climates and abundance of farms.

Types of Mushrooms



Mushrooms are easy to grow in mountainous areas due to sufficient moisture, but they can also grow in industrial areas with the right temperature and humidity. Species should be clearly identified as some can cause food poisoning or allergies when eaten. Some of the major species in India are:

Button Mushroom



Button Mushroom (*Agaricus bisporus*) belongs to the class Basidiomycetes and family Oleaceae and is native to Europe and North America. There are two types: white and brown, the white mushroom is mostly found in India. According to ICAR

Directorate of Mushroom Research, these species contribute more than 85% to mushroom production. It is most popular in restaurants and homes.

Shiitake mushrooms



Shiitake mushrooms are native to Southeast Asia and are widely consumed in Asian countries. They grow easily on deciduous and hardwood trees such as oak, chestnut and maple, and they need moist and warm weather. In rare cases, they can cause allergic reactions such as itching, but this can be eliminated by clean cooking. These are used in Asian cuisine and traditional medicine.

Oyster Mushrooms



Pleurotus ostreatus belongs to the genus *Pleurotus ostreatus*. In India it is called "Dhingri" and has a fan or clam-shaped headdress. They grow easily on rotting wood or straw.

Cultivation

The basic requirements for planting are manure/compost, culture, temperature and moisture. Optimum growing conditions include 80%-90% relative humidity, adequate ventilation and a temperature of 20-28°C during the breeding season and 12-18°C for young development. The temperature should be kept at 23 ± 20 C in the first week, and can be reduced to 16 ± 20 C in the following weeks. CO₂ concentration should be 0.08-0.15% [13]. If the above conditions are managed properly, the needles will begin to emerge within a few days and mature to the button stage. In addition to these pesticides, nutrients such as nitrogen, vermiculite and water are also needed for health. The following steps should be followed in mushroom cultivation:

Compost Preparation Technique

Compost (synthetic or natural) used for growing mushrooms is usually wheat straw, horse manure, poultry manure, rice bran, gypsum, etc. Contains. We take care to protect the raw straw from outside rain or moisture because it will harm the bacteria. Mix chopped rice straw or rice bran with horse manure, sprinkle with water and place in a pile for fermentation. The fermentation process breaks down compounds into their smaller components along with the production of heat. Turn and water frequently at specific times to prevent the fertilizer from drying out. Gypsum is sometimes added to manure to reduce oil and provide greater aeration. Within 15 to 20 days, the compost is ready to be used as bedding and is then spread on wooden pallets and cultured seeds.

Spawning

Spawning refers to carefully propagated mycelium on agar or grain. Spawning is the process of planting or mixing eggs into manure. Although spores produced by fungi serve as seeds for subsequent propagation, they are not often used due to the uncertainty of germination and growth. Mix the fish well with the compost, cover with newspaper and water well to retain moisture. Keep the soil moist throughout the planting period to prevent waterlogging. They gradually turn into white cotton like mycelium development.

Casing

Mulch is a sterilized soil or cover containing cow manure spread in a compost mixture. Use it when mycelium begins to grow on the leaves. After 15 to 20 days of use, mushroom heads or needles will begin to appear on the surface. They are allowed to grow for a certain period of time and harvested without opening the bottle. Mushrooms with open caps (which look like hats when the cap is opened) are frowned upon and considered unhealthy.

Harvesting

Harvesting is done by pulling them from the soil by hand or by cutting off the heads with a knife. Then the collected mushrooms will be taken for the first time.

Processing

Mushrooms are very fragile and have a short shelf life unless consumed fresh. At high temperatures, if it is not processed or cooled, it loses its freshness within a day and spoils quickly. They also tend to turn brown due to complex tyrosinase. It converts monophenols to diphenols, which in turn oxidize to quinones and produce an insoluble brown pigment called melanin. The first step is to wash the mushrooms to

remove any adhering soil or manure, then blanch them for a few minutes to inactivate the enzymes. It is treated with brine, salt, or citric acid before canning or packaging to prevent discoloration. The following are commonly used processing and storage methods:

Drying

Drying or dehydration is the oldest and most successful process for many foods. Moisture is the optimal environment for microbial growth and development, so removing moisture will weaken or gradually weaken microbial activity. Mushrooms can be dried in the sun or in a dryer. Solarization is the cheapest and most popular method but produces dark colored products. Dryers can be used in disc drying, freeze drying, suction drying, microwave drying, air drying, etc. There are different speeds and types such as. Dried mushrooms can be rehydrated and used in soups, stews, marinades and more.

Freezing

Freeze Since mushrooms contain more than 90% water, freezing is the best way to preserve them. They are subjected to various pre-treatments to minimize the effects of freezing. According to Czapski and Szudyga (2000), the color of *Agaricus bisporus* becomes better when treated with metabisulfite and bleached. The shock freezing method is generally used between -25°C and -30°C (Sobkowska and Wozniak 1974, Czapski and Szudyga 2000) [20]. According to Kondratowicz and Kowalko (2000), cryogenic freezing can extend the shelf life of mushrooms up to one year when used for 5-6 minutes at a temperature of -80°C to -100°C.

Sterilization

Sterilization of mushrooms can be done using chemicals, steam or electricity. According to Kashif Akram and Joong-Ho Kwon (2010), the shelf life of mushrooms can be extended using 1 - 3 kg radiation.

Canning

Preserving involves preserving or marinating in brine, vinegar and oil. Freshly harvested mushrooms are used for canning. It is washed, sorted, blanched, then placed in jars with brine or vinegar and closed with lids. The cans are then removed to remove air, heat to sterilize, cool, label, and package for storage or consumption.

Conclusion

Mushrooms are one of the most popular and versatile gifts. It can be mixed into food preparation or processed into fresh produce. Today on the market there are mushroom pickles, seasonings, drinks, extracts, dried and canned mushrooms, fungicides, cosmetics, etc. There are many mushroom products. In addition to mushroom food, mushroom household products, medicine, mycelium platforms, biodegradable packaging, mycelium leather, etc. Many new products have emerged in other industries as well.
