

MUSHROOM GROWING

Mushrooms belong to the kingdom of Fungi. a group very distinct from plants, animals and bacteria. Fungi lack the most important feature of plants: the ability to use energy from the sun directly through chlorophyll. Thus, fungi depend on other organisms for food, absorbing nutrients from the organic material in which they live

Fungus ecology

Fungi depend on other organisms for their food. Three modes of living can be recognized i.e.

Saprophytes these degrade already dead material.

Symbionts: these live together with other organisms (especially trees) in a close, mutually beneficial relationship

Parasites: these live at the expense of other organisms. They extract their nutrients from other organisms.

Mushrooms, though classified vegetables in the food world, are not technically plants. They belong to the fungi kingdom and although they are not vegetables, they provide several important nutrients.

Commonly cultivated edible Fungi include

- Button Mushrooms (*Agaricus spp*).
- Oyster Mushrooms (*Pleurotus spp*).
- Shiitake (*Lentinula edodes*)
- Reishi or Ling Chi (*Ganoderma ucidum*)
- Lion's Mane (*Hericium erinaceus*)
- Nameko (*Pholiota nameko*)
- Ears (*Uricularia spp*).
- Chicken-of-the-woods (*Polyporus Sulphureus*)

Varieties of Oyster mushrooms grown

- Gray oyster mushroom (*Pleurotus sajor caju*).
- Cherry oyster mushroom (*Pleurotus cystidiosus*)
- King oyster mushroom (*Pleurotus eryngii*)
- White oyster mushroom (*Pleurotus florida*)
- Yellow oyster mushroom (*Pleurotus citrinopileatus*)
- Pink oyster mushroom (*Pleurotus djamor*)

Importance of oysters/ mushrooms

- Mushrooms are rich in vitamin B, vitamin D, minerals, have very low carbohydrates, unsaturated fat and adds immunity to HIV patients.
- Mushrooms offer medicinal importance; they are important in liver disorders, diabetes, asthma, respiratory disorders, hepatitis hypertension management, obesity, normalize cholesterol levels, increases ATP production, strength and

endurance, and has anti-aging effects, Breast Cancer & Prostate Cancer presence of Beta-Glucans and conjugated Linoleic Acid, which both have anti-carcinogenic effects, ulcers, blood pressure and bone health. Immune system strength: Ergothioneine, a powerful antioxidant present in mushrooms, is very effective in providing protection from free radicals as well as boosting the immune system. They contain natural antibiotics (similar to penicillin, which itself is extracted from mushrooms), which inhibit microbial growth and other fungal infections.

- Mushrooms are sold for income by the farmers hence boosting their earnings.
- Mushroom growing is a source of employment to the mushroom growers.

Factors considered when choosing the mushroom species to grow

- ✓ **The waste materials readily available to use as a growth medium;** Oyster (Pleurotus) grows best on rice straws, wheat straw, cotton wastes and coffee pulp while Shiitake (Lentinus) grows best on logs.
- ✓ **Available environment for growing the mushrooms;** outdoor production of mushrooms require limited knowledge and demand for limited monitoring of the growth conditions for Shiitake (Lentinus) while indoor production of mushrooms requires manipulation of the growth conditions for species Oyster (Pleurotus).
- ✓ **Cost of equipment needed;** cleaning equipment or respirators are necessary in order to safely work in the production facility for Oyster since some farmers are allergic to their spores, mushroom driers and storage equipment.
- ✓ **Skill required to manage the life cycle of the fungus;** most shiitakes (Lentinus) and many other mushroom species are raised on a sterilized sawdust substrate. Although this method allows a much faster fruiting cycle and a high level of return (110% or more of initial dry weight), demands a greater capital investment and more skillful management than log production.
- ✓ **Market demand for the species;** organically grown Button Mushrooms (Agaricus spp.), oyster mushrooms Pleurotus spp.), Shiitake (Lentinula edodes) are more marketable than other species

Advantages of oyster mushroom (Pleurotus spp) production

- ✓ They require a small space to rise. This makes it possible to grow them in urban and peri-urban areas.
- ✓ They grow and mature fast thus giving fast financial returns (in 15 days).
- ✓ They have a high germination percentage thus high yields and profitability to the farmers.
- ✓ They don't require a lot of labour to manage indoors.
- ✓ They are not much affected by diseases and pests.

Challenges that face mushroom production in Uganda

- ✓ **Perishability** of mushrooms that calls for cold storage and rapid processing or marketing. This causes high losses to the mushroom farmers.
- ✓ **Low quality substrate** due to inadequate skills in substrate preparation

and preparation of the growing houses.

- ✓ **Pests and diseases** that attack the spawn especially those grown out door.
- ✓ **Inadequate supply of quality spawn (seed)** for raising quality organic mushrooms that are highly demanded on the market.
- ✓ **Low prices** for mushrooms given to the farmers by middlemen. 'The farmers who sale unprocessed mushrooms are given low prices and this discourages commercial oyster production.
- ✓ **Harsh climatic conditions** characterized by dry and hot conditions that discourage quality production of oysters.
- ✓ Indoor mushroom production requires a large supply of **highly skilled and use of specialized equipment** that are expensive to most farmers.
- ✓ **Inadequate research** and extension on mushroom growing in Uganda. This is because this is a new enterprise in Uganda and little has been about the species, diseases and pests of mushrooms.

Factors necessary for oyster mushrooms (Pleurotus spp) production

- ✓ **Temperature:** the incubation period requires a temperature of 20C 30C, and 15°C to 30°C at fruiting.
- ✓ **Humidity:** high humidity of [80-90%](#) at fruiting to avoid drying out of substrate and the mushroom.
- ✓ **Ventilation:** both low oxygen and carbon dioxide concentration favors mycelia growth. At fruiting, the carbondioxide concentration should be reduced since it leads to long small stems with no caps.
- ✓ **Moisture content of substrate:** moderate moisture content of 70%. High moisture above 80% clogs air flow while too low water content below 60% prevents mushroom growth.
- ✓ **Light:** Light is needed for fruiting. Little light leads to long stems and small heads. However, darkness is needed for spawn running.
- ✓ **Substrate:** fermentation of the substrate makes nutrients available to the oysters. Oysters grow well on a variety of substrates.
- ✓ **pH:** of the substrate; oysters require a medium pH of between 6 and 7.
- ✓ **Spawn:** good quality spawn (seeds) from high yielding and clean oysters are required.

Factors considered when siting mushroom farms.

- ✓ **Distance to the market:** the site should be near the market since mushroom are highly perishable and need to be delivered to the market immediately after harvest.
- ✓ **Availability of good quality substrate material;** the materials should be sterilized and highly nutritious to provide necessary nutrients for spawn growth.
- ✓ **Transportation of both product and substrate material;** the farm should be located near an accessible road for easy transportation of substrates and mushroom products to the market.

- ✓ **Availability of clean water for wetting the substrate for spawn germination;** since mushrooms absorb whatever substance in the material they grow on.

Note

- Substrates that are commonly used in raising mushroom include: Wheat straw, pea nut straw, sugar cane waste, soya bean straw, sunflower waste, maize waste, logs, bagasse and molasses, horsemanure, water hyacinth, paper, among others.
- It's important to eat only organically grown mushrooms because they absorb and concentrate whatever they grow in.
- Mushrooms are known to concentrate heavy metals, as well as air and water pollutants, so healthy growing conditions is a critical factor.

Steps followed to raise mushrooms

- ✓ Chop the straw or substrate and soak it in clean water for 24 hours.
- ✓ Sterilize the substrate against any bacterial infections and pack in air tight polythene papers or casings.
- ✓ Drain to 70% of moisture
- ✓ Introduce spores spawns (used for planting) and move casings to a dark incubation room and keep the substrate until it is covered with white growth.
- ✓ Keep the temperatures of the incubation room at around 11° C - 15°C and check the casings for any contaminations and discard if decomposing.
- ✓ Introduce little light and keep watering during growing period, raise temperatures to around 19°C and high humidity.
- ✓ After three weeks, mushrooms are ready for harvest at the umbrella stage.
- ✓ Harvest mushrooms when they are at umbrella stage.
- ✓

Note

To produce spawns; you inoculate a pasteurized medium with the sterile culture of a particular mushroom species. After the culture has grown throughout the medium, it is called spawn. After having colonised the substrate, the mycelium is capable of producing fruiting bodies. The number and quality of the fruiting bodies will depend on the environment.

Precautions taken while raising mushrooms

- Incubate in a dark room to encourage spawn growth.
- Do not introduce holes in polythene Papers before white growth to avoid bacterial and fungal infection
- .Maintain moisture content of substrate to avoid desiccation.
- Moderate temperatures to avoid shrinkage and low quality.

- Do not water directly but introduce a mist to avoid rotting and fungal infection of substrate.
- Maintain favourable humidity to avoid dessiccation.
- Harvest immediately to avoid rotting and lose of quality.

Pest control

Integrated pest management (IPM) is a least-toxic approach for managing any pest. IPM views pests as a natural part of the farm environment. The integrated management of a pest is accomplished altering the environment to the disadvantage of that pest.

Processing and marketing mushrooms

The available marketing strategies include:

- Market the fresh or dried product directly to your customers.
- Add value to the mushroom by creating processed products (mushroom sauces, dried entrée, mixes, teas, extracts).
- Wholesale as fresh produce (on contract or by the batch).

Revision questions

- (a) What are the advantages of growing mushrooms compared to other crops?
- (b) Describe the procedure of raising oyster mushrooms indoors as a high value crop.
- (c) Explain the considerations made when choosing the species of mushrooms to be grown on the farm.
- (d) Describe the post-harvest handling practices for pepper to maintain its quality.
- (e) Discuss the agronomic practices involved in rising passion fruits up to harvesting.
- (f) What conditions may lower the market value of passion fruits after harvesting?.