SEM VI GENERAL
BOTANY DISSERTATION (DSE)
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MUSHROOM,AN AMAZING HERBAL FOOD: CULTIVATION IN INDIA

SUBMITTED BY: SRABANI ROY
UNIVERSITY ROLL NO: 180611610026
REGISTRATION NO:201801010747
SUPERVISED BY: DR. SUNITA BONDHOPADHYA, DEPARTMENT OF BOTANY, M.U.C. WOMENS COLLEGE, BURDWAN
THE UNIVERSITY OF BURDWAN

India is an angrichlturally important Country. Taso Thirds of il's Population is engaged in agricultural activities. Agriculture is a Primary acilivity, cohich Produces most of the food that ase Consume. Besides food ghains, it also Produces raae material for various industries.

Introduction

■ Cohat is mushroom :~

A mushroom is the reproductive Structure Produced by Some fungi. It is Some cohat like the fouit of a Plant, except that the 'seeds'. It Produces are in fact millions of microscopic Spores that from in the gills or Pores underneath the mushroom's Cup.

■ Tzpes :~

Mushrooms may be edible or poisonous. A relatively feas Species are delicious, many are edible but tough or of an unremarkable flaver, Some are in edible and Produce varzing degrees of illnesses Some Commonly known foud Stood are violentlz deadlz Poisonous.

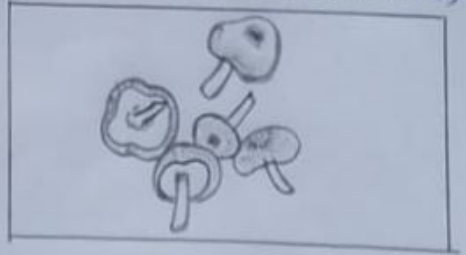
Kingdom : Fungi

Genus

- A garius
- Amanita
- Ganoderma
- Polyporous

■ Edible Mushroom :~

Enoki also known as Enokitake, cointer mushrooms, cointer fungus, the edible variety of these mushroom is small, shinz cohile caps attached tothim Stems, and is Crunchz. These mushrooms are usually used in



East Asain food and cooking. Enokitake mushroom are also called golden needle mashrooms.

■ Poisonous mashroom :~

Mushrooms with white gills are often poisonous. So are those with a ring around the stem and those with a volva. Because the volva is often undergorund, it's important to dig around the base of a mushroom to look for it. Mushroom with a red colour on the cap or stem are also either poisonous or strongly hallu -cinogenic.

Poisanous mushrooms, such as Amanita sp. and others, can cause acute fetal livers necrosis. Intoxication by Amanita Phalloides, known as the death cap, is caused by a group of toxins termed toxic cyclopeptides.

■ Why edible mushroom are important :~

Mushroom are edible fungus can Provide several important nutrients. Nowadays, mushrooms are Popular valuable foods beause they are low in Colories, Carbohydrates, fat. and Sodium. also, they are in cholesteral free. Besides, mushrooms Provide important nutrients including Selenium, Potassium, riboflavin, niacin, vitamin D, Proteins, and fiber.

■ Nutrient Content of edible mushroom :~

- Amount Pers 100 grams.

Calories 22

	% Daily value
Total Fat 0.3gm	0%
Saturated fat 0.1g	0%
Cholesterol 0mg	0%
Sodium 5 mg	0%
Pottassium 318 mg	9%
Total Carbodhydrate 3.3g	1%

Dietary fiber 1g	4%	Vitamin C	3%
Sugar 2g		iron	2%
Protein 3.1g	6%	vitamin B-6	5%
Calcium	0%	Magnesium	2%
vitamin D	1%	Cobalamin	0%

Percent Dairy values are based on a 2,000 Caloric diet. your daily value may be higher or lower depending on your Caloric needs.

■ Medicinal values of mushroom :~

More than 100 medicinal functions are Produced by mushrooms and fungi and the key medicinal uses are antioxidant, anticacer, antidiabetic, antiallergic, immunomodulating, Cardiovascular Prolector, anticholesterolemic, antiviral, antibacterial, antiparasitic, antifungal, detoxification and hepataprotective effects.

■ Some references of cultivation of different types of mushroom worldwide :~

The world mushroom industry is dominated by five species : Shiitake (Lentinula sp.) (20%), Oyster mushrooms (Pleurotus spp.) (19%), wood ear mushroom (Auricularia spp.) (17%), Common or white button mushroom (Agaricus bisporus (Lange) Imbach) (15%) and Enoki mushrooms (Flammulina velutipes (Curtis) Singer) (11%) with China accounting for 87% of total Production (Royse et al. 2017). Outside of Asia, A. bisporus is the dominant species grown in North America and Europe (Royse et al. 2017) and the main horticultural Crop in the Republic of Ireland (Alexander 2015). Cultivation of A. bisporus relies upon the use of a hybrid strain that was developed in 1980s, the Horst-U1 strain varieties.

■ Types of mushroom cultivation in India :~

There are three sorts of Mushroom that are being cultivated in India, they are button mushroom, straw mushroom and Oyster mushroom. Paddy straw mushrooms can develop in temperatures ranging from 35° to 40°C. Button mushrooms grow at some point of winter. Oyster mushrooms are grown in the northern plains.

■ Cultivation of Mushroom :~

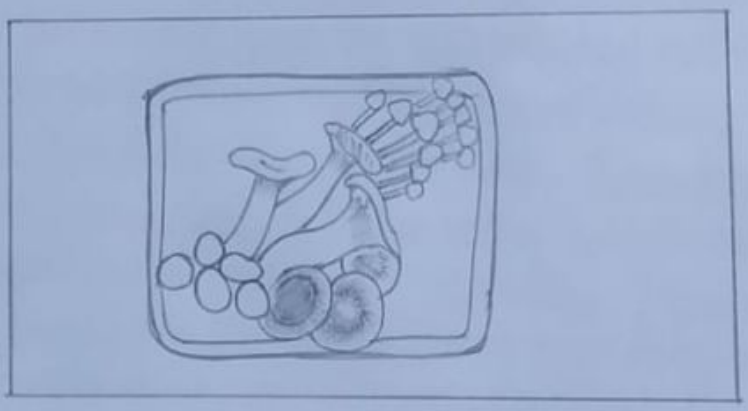
▲ Why Cultivation of mushroom become popularized/ advantages of Mushroom cultivation :~

Mushroom is a popular food due to their special flavour, nutritive value and medicinal Properties. There are many varieties of raw materials that could be used in oyster mushroom cultivation such as crops, corn cob, Peanut hull, Sawdust, Straw, dried mushroom residue, vegetable leaves etc.

▲ Ease of Cultivation :~

Mushroom cultivation is an indoor activity and does not require cultivable land. The relative ease with which mushroom can be mass multiplied on lignocellulosic wastes with minimal water requirement makes them a befitting nutrition source under adverse conditions.

▲ Photos of different types of cultivated mushrooms in other Parts of world:



Objective

▪ To Produce Protein-rich food for family consumption :~

Mushroom is an excellent source of nutrition, tonic, medicine and dietary food items being produced and consumed all over the world. Mushrooms are rich in crude fibre, Protein, vitamins, minerals, contain low fat, calories and no starch. They Provide Carbohydrates of high quality ~~one~~ enhancing the human health. Mushrooms are considered as substitute for meat and its nutritional value is comparable to several vegetables. It is now considered as an important activity for recycling of agro-waste to Provide better nutrition and medicinal attributes to the vegetarian Population. Mushroom growing is a Potential acitivity to convert waste into best nutritional food with high Protein conversion efficiency.

▪ To Produce herbal, medicinal food at low cost :~

People have used mushrooms medicinally and as food for thousands of years. The oldest written refernence to people using mashrooms medicinally is from an Ayurvedic source from 5000 BP. Medicinally Mushroom have an established history of use in traditional oriental medicine. Many traditionally used mushrooms from genera, Auricularia, Flammulina, Ganoderma, Grifola, Lentinus, Trametes (coriolus) and Tremella have been demonstrated to Possess significiant medical Properties. More then 100 medicinal functions are produced by mushrooms and fungi and the key medicinal uses are antionidant, anticancer, antidiabetic, antiallergic, immunomodulating, Cardiovascular Protector, antichales teralemic, antiviral, anti bacterial, antiparasitic, antifungal, detonification and hepataprotective effects.

▪ To make People aware about the importance of consumption of mushroom :~

Nowadays, mushrooms are popular valuable foods because they are low in calories, carbohydrates, fat and sodium : also, they are cholesterol free. Besides, mushrooms provide important

nutrients, including (Selenium, Potassium, riboflavin, niacin, vitamin D, Proteins and fiber. In other hand there is no requirement of agricultural field and sunlight for its cultivation. The cost of Cultivation is nominal. you also don't have to spend a lot of time looking after it But mushrooms have many benefits. So if we can grow mushroom in our garden with a little care, then what is bad! It is now Popular all over the world due to their delicious food quality. But even today there is very little awareness and Publicity about the benefits of eating mushrooms in this Country.

- To get trained to become self employed by cultivating mushroom at Pilot or Commercial Scale :-

Starting a Mushroom Farming Business in 6 Easy Steps Growing Oyster Mushrooms

1. Get your spawn and substrate. you'll need a spawn to start the culture.
2. Prepare the substrate. First, chop the straw into short Pieces.
3. Pack the plastic bags.
4. Incubation.
5. Fruiting.
6. Harvest.

In around one square meter of mycelium, we can grow 30 kg of mushrooms. In order to produce 1 kg of mushroom 2.2 kg dry sub strate materials are required.

- To encourage empowerment of women and unemployed youth (especially from rural areas) :-

Mushroom cultivation - A women Friendly Profession. Mushroom growing is one of the agricultural activity in which women can play a vital role without sacrificing their household responsibilities. Mushroom Cultivition is simple, low cost, and suitable for rural areas. It is labour intensive and provide employment in both the semi-urban and rural areas. Mushroom

Materials and Methods

▪ Materials :

• Mushroom Strains :

Spacons of Pleurotus Sajor caju or P. Ostreatus or P. Florida, Agricus bisporus, volvariella volvacea (as applicable) Procured from Commercial Cultivar.

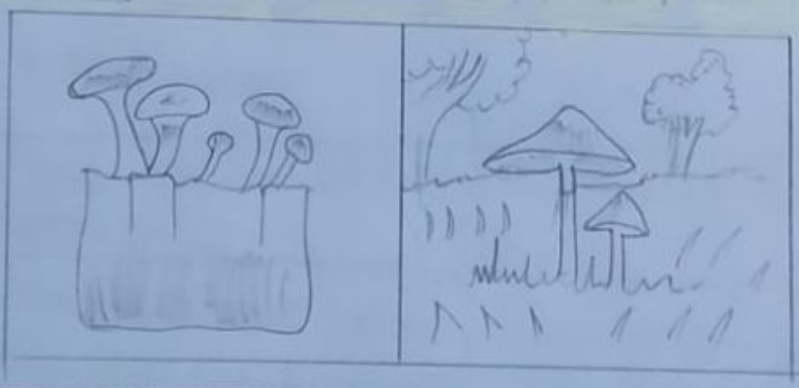
• Substrate :

Paddy straco collected from farmers of nearby villages.

▪ Methods :

• Mushroom bed preparation by (Photos of different types of beds) :

Soak the straco bundles in water for 12-18 hr. Place the bundles over the plantfrom with their butt end on one side. Place the small quantity of spacon 8-12 cm inside the margin at an interval of 10-15cm all along the periphery. Apply a spoonful of coarsely powdered dhal Powder before Placing spacon.



• Polythene bag/ tray method for oyster mushroom :

Spacon can be mixed thoroughly or mixed in layers. Spawned substrates can be filled in polythene bags (60×45 cm) of 125-150 gauze thickness. Ten to 15 small holes (0.5-1.0 cm dia) should be made on all sides especially two to four holes in the bottom to leach out excess water.

• Compost Preparation for button mushroom :-

Mushroom should be grown on on artificially Prepared substrate called 'compost', and is prepared by two methods, viz, long method and short method. The compost preparation by short method is relatively more expensive and technical, and therefore, may not be economical for seasonal growers. The long method of compost Preparation is most suitable for seasonal growers.

• Compost Preparation by Long method

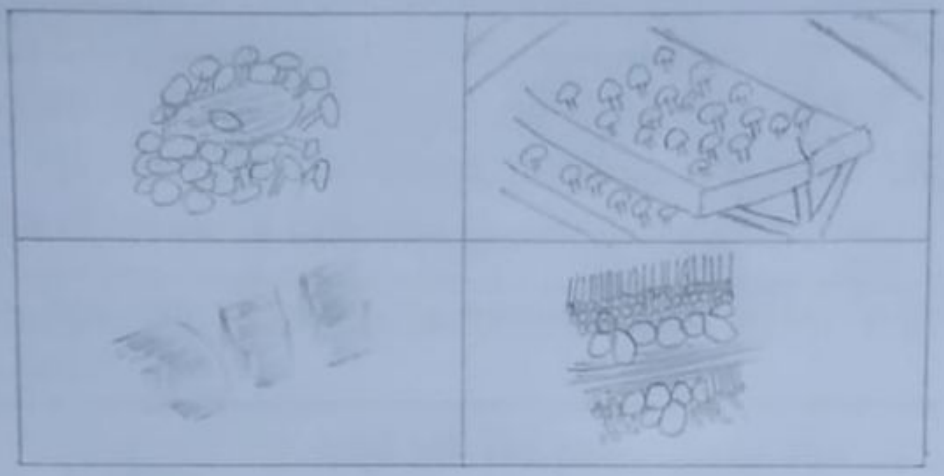
Ingredients

• Wheat Straw	300kg
or	
Paddy straw	400kg
• Calcium Ammonium Nitrate	9 kg
• Urea	3 kg
• Muriate of Potash	3 kg
• Single Superphosphate	3 kg
• Wheat bran	15 kg
• Gypsum	30 kg
• BHC or Lindane Dust(5%)	250 gms
• Molasses	5 kg.

• Cris-Cross method of bed preparation for paddy straw mushroom :-

Soak the straw bundles in water for 12-18 hr. Place the bundles over the platform with their butt end on one side. Place the a small quantity of spawn 8-12 cm inside the margin at an interval of 10-15 cmall along the periphery. Apply a spoonful of Coarsely Powdered dhal Powder before Placing spawn.

Temperature and other favourable conditions for each type of mushrooms



Most mushroom farmers harvest for 35 to 42 days, although some harvest a crop for 60 days, and harvest can go on for as long as 150 days. Air teperature during cropping should be held between 57° to 62° F for good results.

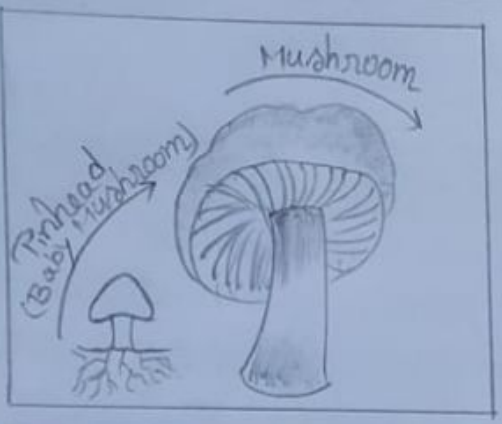
Mushrooms, like all fungi, thrive in moist environments. Button mushrooms need moist growing media such as compost or manure. Shiitake mushroom logs should be kept at a moisture level from 35 to 45%, which requires soaking for 48 hours in the event the logs become dry.

Results

■ Mushroom pin-heads appear on the beds after 12-15 days of Spawning :-

Spawn run takes place after 12-15 days of Spawning and dark brown Compost turns Whitish. At this Stage, application of Casing Soil is essential for fruiting.

■ Pin headed mushrooms become mature after 7-10 days more :-



Not all the pins from the mycelium Colony with grow, most of them will Stop growing. This makes it easier to 'Pin' Point the healthy pins that will eventually Sprout into full-grown mushrooms, where a new mushroom like cycle will begin.

■ Full bloom mushrooms harvested by twisting method :-

The mature fruiting bodies Should be carefully Separated from the beds/Substrate by lifting and Shaking Slightly left or right and then twisting them off.

■ Mushroom Collected upto 3rd flush :-

During the 3rd flush mushrooms take most of their water from the Compost. Excess water in the Casing Soil doesn't have to be evaporated then. Only Sprinkle after the Second flush if the Casing Soil appears fresh and the mycelium is vigorous.

Mushroom cultivation consists of 5 Phases

▪ Establishment of fruiting culture

1. Growing out a chosen mushroom culture on an agar filled Petri dish.
2. Transferring the mushroom culture (known as mycelium) onto sterilized grain.
3. Expanding the grain jar exponentially to create grain spawn.
4. Spawning the grain into a suitable substrate and fruiting container.

▪ Spawn/Seed/inoculum preparation

In the spawn-production process, mycelium from a mushroom culture is placed onto steam sterilized grain, and in time the mycelium completely grows through the grain. This grain/mycelium mixture is called spawn, and spawn is used to "seed" mushroom compost.

▪ Compost preparation

It is the product of a fermentation process brought out by a number of mesophilic and thermophilic and thermophilic microorganisms that decompose plant residues and other organic and inorganic matters. The quality of compost influences the yield of mushroom. Compost prepared out of horse manure and wheat straw is ideal one.

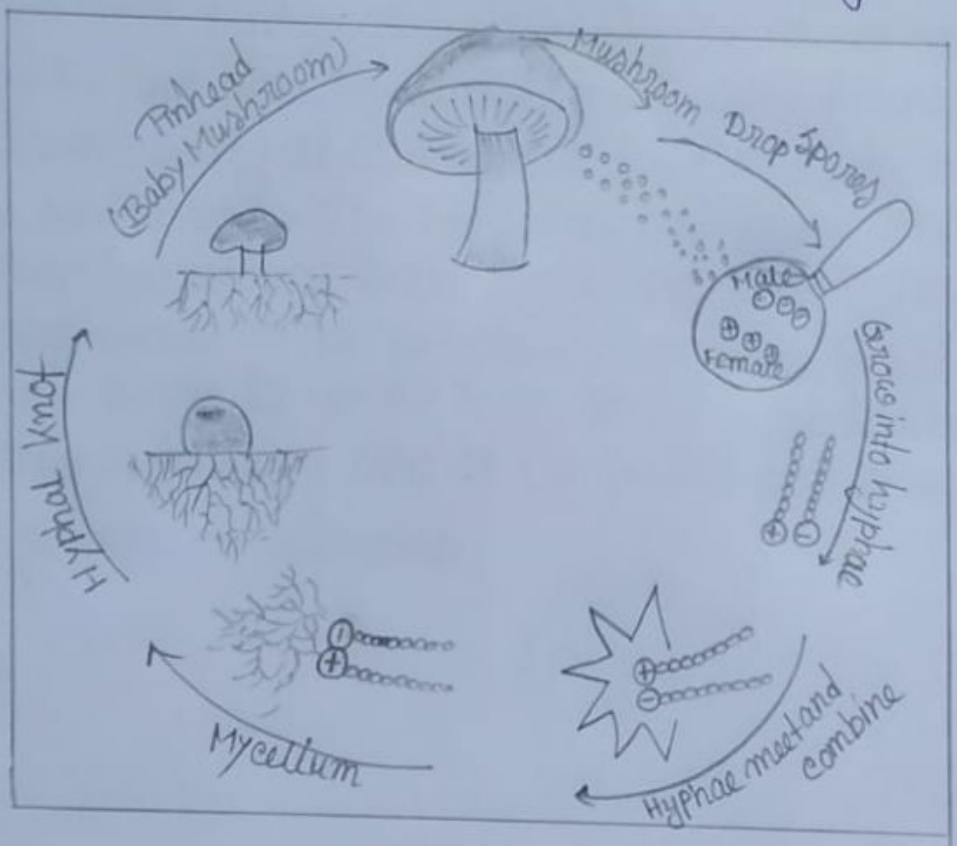
▪ Spawn running:

After spawning, come spawn-run or the stage where the spawn or the mycelium is allowed to grow through the substrate. Thus, as the mycelium develops, the substrate starts to break down and becomes available to the growing mycelium. This period is also called the

vegetative growth or incubation.

Mushroom development

A mushroom develops from a nodule, or pinhead, less than two millimeters in diameter, called a primordium which is typically found on or near the surface of the substrate. It is formed within the mycelium, the mass of threadlike hyphae that make up the fungus.



Conclution

As we know cultivation of mushrooms and in particular the tropical mushrooms is the easiest way of agro-waste utilization in the shortest possible duration with an additional advantage of producing a quality food, possessing good proportion of essential amino acids, elements, fibre, ash and fatty acids. The additional advantage with Paddy straw mushroom is, its shorter life cycle, fast growth, simple cultivation technique and high acceptability at consumers' level because of its unique texture and aroma. The bottle-neck of lower biological efficiency has almost been sorted out after bringing in of the cotton waste as the substrate, however, much more research work is needed to be done for developing suitable processing technology like of the button and other commercially grown mushrooms.

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THANK YOU