

Mushroom Production Processes:

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INTRODUCTION

Mushroom production is a continuous cycle especially if it's being done as a business and each stage leads to the next.

In growing mushroom, the core detail to note is that mushroom mycelia (strands) secrete enzymes that break down compounds such as cellulose and lignin present in the substrate. The degraded compounds are then absorbed and the mycelium enlarges on feeding on the lignin in the substrate thus growing out the mushrooms.

STEP 1 FORMULATION OF SUBSTRATE

Materials Needed:



Wheel Barro



Shovel



Weigh Scale



Rice Bran



Caciumcabinate



Sawdust

1. Substrate bags: is use for bagging of mushroom
2. Spawn: is the main ingredient use to facilitate the sprout and growing of mushroom
3. Caciumcabinat: This is use to kill all bacterial and fungi
5. Weigh scale: This is use for weighing of caciumcabinat
6. Wheel Barrow: This is use for measuring of rice bran and sawdust
7. Shovel: This is use for missing
8. Sawdust: Is the main ingredient for mushroom
9. Rice bran: Is also the main ingredient for mushroom
10. Firwood: Is use for heating

STEP 2 COMPOSTING



Compost

Mushroom compost is formed when the chemical nature of the raw ingredients is converted by the activities of microorganisms, heat, and some heat-releasing chemical reactions.

The mixture composition is as following;

- Sawdust ----300kg wheel barrow) could produce 400-500 bags
- Rice bran----90kg Lime (CaCo_3) ----300g This is mixed with a few shovels full in a basin Gypsum ---150g Salt (MgS) -----250g (excess causes contamination) – added to one paint bucket of water.

- The mixture stays for 3 to 4 weeks with constant turning once in three days and this is referred to as the compost.

Turning and watering are done at approximately 2-3 days intervals, but not unless the pile is hot (145° to 170°F). Turning enable easier watering, aerating, and mixing of the ingredient, as well as the relocation of the straws or hay from a cooler to a warmer area in the pile.

Water addition is crucial since too much will exclude oxygen by occupying the pore space, and too little can limit the growth of bacteria and fungi. At the last turning before Phase II composting, water can be applied generously so that when the compost is tightly squeezed, water drips from it. There is a link between water, nutritive value, microbial activity, and temperature, because it is a chain, when one condition is limiting for one factor, the whole chain will cease to function.

The same quantity of the salt, lime added initially is also added to the mixture just before bagging.

STEP 3 BAGGING

Material needed for Bagging:



Compost



Rubber Band



**Plastic Pipe Cutouts
Bowl**



**Foam Cutouts
Substrae Bag**





Methylated Spirit



Spoon

Mixture of Compost

1. The mixture of compost
2. Substrate bags
3. Rubber-ring
4. Foam
5. Plastic pipe cutouts



Bagging Process



Bagging Process

The bagging of mushroom is done systemically under clean environmental conditions, it is advisable to bagged mushroom after all the process

Bagging process;

This involves budling the substrate with nylon, polythene bags or sacks as the case may be. The material used are; Nylon (nylon bag), Plastic pipe cutouts, Rubber bands, Foam/Cotton wool, the compost/ substrate is packed with palm full into the nylon bag and compressed intermittently till 3/4 of the bag size. Plastic pipe cut out is inserted to the mouth of the nylon with the nylon opened over the pipe cutout with rubber band wound around it and corked with foam or cotton wool. Note that you leave no room for air and the sides of the bag must be firm.



STEP 4 PASTEURIZATION

Material needed for Pasteurization:



Bowl



Locally Oven (Drum)



**Bags of Mushroom leady
for Pasteurization**



Fire Wood



Hand glove



Matches Sticks



Drum



Bagged Mushroom

1. Drum
2. Water
3. Firewood
4. Bagged mushroom
5. Sack
6. Matches stick
7. Bowl
8. Hand glove

Pasteurization process

Types of oven:

1. Locally oven (Drum)
2. Autoclave oven

This is the process of heat treating the substrate bags for partial sterilization in order to destroy the harmful living microorganisms in the bags to make it incapable of infecting the bags.

COOLING

Cooling is a process in which you leave the heated bags to cool for 24 hours before taking them to inoculation room for inoculation.

MATERIAL NEEDED ARE

1. Table or clean sack/Nylon
2. Hand glove



Hand glove



Table



Shelve

INOCULATION

Materials Needed During Inoculation



Cutout Paper



Izal



Bowl



Cutout Nylon



Rubber Band



Spoon



Spirit



Plastic Pipe Cutout



Hand Glove



Spawn



Inoculation Process



Inoculation Process

1. Spoon
2. Bowl
3. Methylated spirit (disinfectant)
4. Spawn
5. Rubber ring
6. Plastic pipe cutouts
7. Spray Bottle
8. Marker
9. Surface/Table with Izal
10. Paper
11. Cotted Nylon

This involves the introduction of mushroom spawn into the pasteurized bags and usually involve the use of some of the following materials; ·Spawn, Bowl, spoon, Bag, Methylated spirit, Spray Bottle, Marker, Table (Tiled or with Formica). The hands are sterilized with methylated spirit (disinfectant) and the surface/table with Izal. The bags are compressed to compact, opened while holding the mouth and then spawn is sprinkled on the top layer of the bags with spoon (500g for 15-20 bags for Fast colonization). The bags are covered back, labeled with marker (spawn type, Date of process and name of the person) the inoculated bags are then after taken to the Incubation room.

INCUBATION



Arrangement of inoculated bags is in process



Incubation in process (This process last for the period 2-3 weeks before final cropping)

MATERIALS NEEDED FOR CROPPING



Inoculation Bags



Raffia

1. Straw/Raffia mat for wall
2. Racks/shelves
3. Inoculated bags
4. Roofing Basin for sterilizing hands Netted
5. Binding wire
6. Black net

The inoculated bags are moved to the incubation room where they are stacked/arranged on racks/shelves for about 4 weeks to be incubated/ colonized by the mycelium. However, a normal room could also be used.

If the atmosphere is drying up, water is spread on the floor to increase the moisture level and reduce the heat as this could be observed also by the yellowing of the colonizing bags showing stress.

CROPPING AND MANAGEMENT OF MUSHROOM

Harvesting period during the cropping cycle is repeatedly 3-5 days and it is termed flush, break or bloom. This is followed by a few days when mushrooms are not available for harvest. This cycle repeats itself in a rhythmic fashion, and harvesting can go on for as long as mushrooms continue to mature. Most mushroom farmers harvest for 35 to 42 days, although some harvest for 60 days, and harvest can go on for as long as 150 days.

Outside air is used to control both the air and compost temperatures during the harvest period. Outside air also displaces the carbon dioxide given off by the growing mycelium.

Mushrooms are harvested in a 7-10days cycle but this may be longer or shorter depending on the temperature, humidity, cultivar, and the stage when they are picked, when mature mushrooms are picked, an inhibitor to mushroom development is removed and the next flush moves toward maturity.

Mushrooms are normally picked at a time when the veil is not too far extended.

Knife, Baskets, Watering, material (water hose, knapsack sprayer, direct wetting) Disinfectant Racks After incubation, the bags are transferred to the cropping house where the bags are arranged on the racks with the mouth opened for sprouting. Wetting is done to prevent drying and dying of the pinheads and once a pin head is dead, it should be scraped off to allow for newer growth to sprout. The bags could be wet with hose, with the foam at the tip wetted properly. The wetting is done from top bags downward. The bags are arranged slanting slightly downward for water to flow off easily to avoid water logging.

HARVESTING OF MUSHROOM

Material needed for Harvesting



Knife



Basket



Hand Glove

1. Knife: This is use for Harvesting of Matured Mushroom
2. Baskets: This is use to carry mushroom during harvesting
3. Hand glove: This is to avoid direct contact with mushroom.



Harvested Dry Mushroom



Drying process



Harvested Fresh Mushroom

During harvest, matured mushroom is identified by its rough tip, thin tip or size and this is harvested from the substrate by putting the palm at the base and fingers within the branches and twist slowly sideways to prevent dislodgement of the substrates.

The maturity of a mushroom is assessed by how far the veil is stretched, and not by how large the mushroom is.

Consequently, mature mushrooms are both large and small, although farmers and consumers alike prefer medium- to large-size mushrooms. The root section that contains a number of debris is cut off gently into a basket; the mushroom is then weighed and recorded before drying or sale.

Conclusion

It takes approximately 14 weeks to complete an entire production cycle, from the start of composting to the final steaming off after harvesting has ended. For this work, a mushroom grower can expect anywhere from 0 to 8 lb per ft²; the national average for 2006 was 5.92 per square foot. Final yield depends on how well a grower has monitored and controlled the temperature, humidity, pests, and so on. All things considered, the most important factors for good production appear to be experience plus an intuitive feel for the biological rhythms of the commercial mushroom. The production system used to grow a crop can be chosen after the basics of mushroom growing are understood.

SALES/MARKETING;

Potential customers need to be identified and there is a need to set the price that they are willing and able to pay. So also, is deriving the best ways to get the mushroom product to them by Informing and attracting them to buy. Packaging and good thinking are some of the key ingredients to good sales in mushroom production.

**Commercialization of mushroom;
Cost of production;**

S/N	Items	Quantity	Rate	Duration	Total
1	Construction	1	-	10 years	-
2	Sawdust	50bags	200	6months	10,000
3	Rice bran	5bags	1,000	6months	5,000
4	Substrate bags	5bags	-	One cycle	5,000
5	Spawn	20	2,000	One cycle	40,000
6	Firewood	10	500	One cycle	5,000
7	Labor	500	20	One cycle	10,000
8	Binding wire	2 rows	1,500	One cycle	3,000
	Total	-	-	-	78,000

REVENUE;

S/N	Description	Quantity	Price per kg	Total
1	Fresh mushroom	50kg	₦3,000	₦150,000
2	Dry mushroom	7	13,000	₦91,000

Revenue - Total cost of production
 ₦150,000 - ₦78,000 = ₦72,000. (For fresh mushroom.)
 ₦91,000 - ₦78,000 = ₦13,000 (for dry mushroom)

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