International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 2 Mar-Apr 2022, pp: 27-34 www.ijprajournal.com ISSN: 2456-4494

Oyster mushroom: cultivation and processing practices

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Submitted: 01-03-2022 Accepted: 13-03-2022

ABSTRACT
A mushroom or boletus is that the fleshy, spore-bearing plant organ of a plant life, generally created higher than ground, on soil, or on its food supply. It's contain very important supply of nutrition to poor peoples and nutrition properties conjointly terribly high compare to ivied inexperienced vegetables. Globally mushrooms are cultivated from ancient time. In India tiny scale farmers improve their keep by cultivating of mushroom. Its play crucial role to those farmers whose farm productivity was less. Cultivation of mushroom increase the farmers financial gain in conjunction with farm product.

I. INTRODUCTION

Mushrooms produces countless minute seeds, that area unit known as spores appear as if powder. The spores germinate beneath favorable condition on appropriate substrate (wood, soil, compost etc.) and provides rise to new mushroom plant structure that once more produces mushroom in season. In some reasonably mushrooms, mature bodies area unit fashioned underground e.g. Tuber spp. Oyster mushroom belonging to class Basidomycetes and family Agaricaceae. Its grow naturally in the temperate and tropical forests on dead and decaying wooden logs or sometimes on dying trunks of deciduous or coniferous woods. The fruiting body divided into three parts a fleshy shell, central stalk and lamellae. Mushrooms vary in size, shapes and color. They grow in a very type of environmental condition and on varied styles of soil and different substrate. In season they're ordinarily seen. Globally oyster mushroom are the third largest cultivated mushroom. China is the largest producer captured around 85% of global markets. In India oyster mushroom production was very less compare to china due to low demand. The economic importance of mushroom depends on human consumption. The total production in India between 2010 to 2017 was approximately 0.13 million tons, 4.3% increase in the average production rate of mushrooms per annum. It has high amount of protein and vitamin C and B complex and also contain good amount of folic acid which helps to cure anemia and suitable for people suffering for hyper tension, obesity and diabetes. Used paddy straw can be recycled and converted to livestock feed and organic compost.

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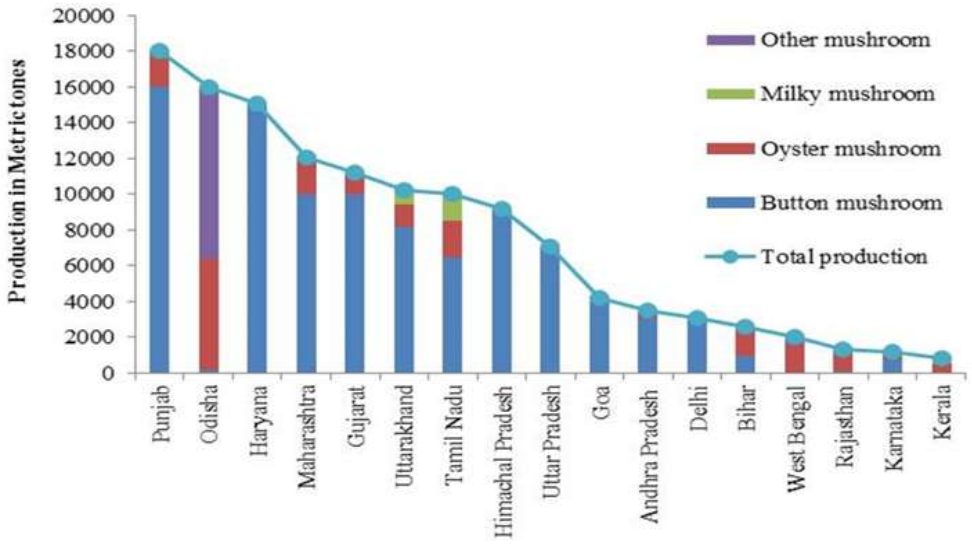
Fig: Economic contribution and cultivated mushroom species



Source: Directorate of Mushroom Research (ICAR), Solan, India

There are edible and non-edible mushroom. Some of the edible mushrooms are:

- Agricus arvensis
- Agricus bisporus
- Amanita caesaria
- Coprinus atramentarius
- Pluerotus otreatus
- Lentinula edodes

Nutritional properties of edible mushrooms

Mushroom is good source of energy. Mushroom is a good source of carbohydrates, fats, minerals, protein, vitamins.

Approximation analysis of edible mushrooms fresh weight basis percent:

Mushrooms	Moisture	Ash	Protein	Fat	Crude fibre
Agricus bisporus	89.5	1.25	3.94	0.19	1.09
Pleurotu ssp	90.0	0.97	2.78	0.65	1.08
Pleurotus ostreatus	92.5	-	2.15	-	-
Volvariella diplasia	90.4	1.10	3.90	0.25	1.57
Volvariella volvacea	88.4	1.46	4.98	0.74	1.38

Mushrooms which are brought to artificial cultivation:

Oyster mushroom is being fully grown up and mature in Arunachal Pradesh like Calocyb indica and Lentinula edodes are grown on experimental basis. Mushroom development centre, Itanagar, offer coaching and steerage. The target of selecting the course was to find out cultivation techniques of fashionable mushrooms. Cultivation of agaric Pleurotus is the scientific name for the mushroom which is called the "Oyster Mushroom" and components of Republic of India because the "Dhingri". This mushroom includes several species e.g. Pleurotus ostreatus, O.sajorcaju, P.Florida,

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P.sapidus, P.Flabellatus, P.Eryngii and plenty of different edible species. Oyster mushroom is changing into fashionable worldwide and has additional potential in Republic of India. It ranks second once button in terms of production. Agaric grows well in moderate vary temperature i.e. 22-28°C and needs 80-85% ratio. It's primarily big on paddy straw beneath indoor condition. It's got many blessings over different cultivated mushrooms thanks to low value and simple growing technology. It may be simply dried and canning isn't essential. It may be cultivated on most jargon plastic waste by-products like paddy straw saw mud, maize cobs (hearts) pulp etc. once cultivation these spent cypher may be used as bovine feed or manure as a result of Oyster mushrooms have capability of reducing organic and increasing the atomic number 7 content of plant residues. it's many different blessings over different cultivated mushrooms. It may be cultivated in poly-bags, trays, baskets etc. These may be organized on shelves in growing rooms therefore vertical area may be used. It grows quickly and 1st crop may be harvested inside a pair of week once spawning (seeding). It may be simply sun dried/oven dried and canning isn't needed. It additionally has wonderful style, flavor and texture. Thanks to increasing quality of victuals in recently there's a decent scope for growing and mercantilism this mushroom. Presently it's big in industrial scale in metropolis. It's obtaining fashionable in province and north-eastern hill states as a result of favorable climate and simple availableness of paddy straw.

Growing Season: March to October in mid hills and November to March in valleys.
Crop Duration: 45-60 days
Yield: 800-900g fresh Wt/kg of dry paddy straw.
Growing Methods: Poly-bags and block culture methods are common. The latter is more suitable for commercial cultivation because it is faster and cheaper.

Materials required:
1. Moulds free and dry golden yellow paddy straw should be kept at moisture free place.
2. Plastic Sheets of 4 hundred gauge thickness-1Sq.m. of plastic sheet is necessary for buil done block.
3. wood mould- wood moulds of 45x30x15 cm=ms size each having no prime or bottom but having a separate wood cowl 44x29 cm dimension.
4. Hand chopper or Chaff cutter required for cutting the straw.
5. Proclamation for boiling straw (minimum two times).
6. Jute rope, coconut ropes/plastic ropes, gunny bags also required
7. Mother spawn or mushroom seeds- These mother spawn is in addition get from the assistant specialist, Mushroom Development Centre, Itanagar and one packet required for each block.
8. One sprayer
9. Straw Storage Shed 10x8 size.
10. Mushroom homes or rooms.

Steps required for cultivation of oyster mushroom

STEP – I

Objective: Preparation of Potato dextrose agar (PDA) Media Requirements:

a. Potato - 250g
b. Glucose/ Dextrose - 20g
c. Agar-agar - 15g
d. Distilled water (DW) - 1 liter

e. Conical Flask
f. Test-tube
g. Beaker
h. Cotton plug
i. Muslin cloth
j. Measuring cylinder
k. Oyster species/pure culture
l. Laminar air flow
m. Needle
n. Burner
o. Disinfectant 70% ethyl alcohol.

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STEP – II

Objective: Isolation and culture mushroom fungus

Procedure:

a. In a clean and sterilized laminar air flow the test tubes are then introduced with small amounts of culture of mushroom in front of a burner so as to avoid contamination.
b. The test tubes are kept in cold storage and incubated at a constant temperature of 26° C.
c. If mushroom cultures are not available, isolation can be made from fruit body of mushroom by transferring small bits of surface sterilized mushroom to culture media.

STEP – III

1. Making the spawn ready

a. Clean a plastic receptacle with dettol answer (1 milliliter dettol in one hundred milliliter of water). Wash hands with dettol answer.
b. Clean the hooked iron rod with dettol (option).
c. Swab the surface of the spawn bottle with the on top of answer. take away the cotton plug and insert the hooked iron rod into the spawn bottle and take away the spawn (option).
d. Collect the spawn within the disinfected receptacle and break the solid spawns with fingers to individual grains.
e. Divide the spawn into 2 equal halves.
f. Once more some one 1/2 spawn into 5 equal components.

2. Making the polythene bags ready

a. Take polythene bag of 60 x 30 cm size. Put two holes of 1 cm diameter in the Centre of the bag on each side. These holes may also be provided after the completion of bed.
b. Tie the bottom of the bag with jute thread, this provides flat circular bottom for the bed when prepared.

Fig: Making the polythene bags ready

Source: Saharanpur KVK, Uttarpradesh

STEP-IV

Spawning the bed:

a) Chop the straw either manually or automatically into bits 3-5 cm long and packed in sacking luggage.
b. Boil water in an exceedingly drum. Once the water involves boiling, place the sacking bag together with the straw within the boiling water and boil for concerning 15-20 minutes. Then take away the sacking bag from the drum and leave intrinsically for 8-10 hrs to permit the surplus water to get away and conjointly for the straw to cool down.
c. Once spawn running, take away the rope also as from the block. Tie the block the plastic sheets vertically with coconut rope and suspend it in cropping area. From this stage fodder the ratio of the area shouldn't be but eighty fifth. This could be maintained by sporadically spraying water on the walls and floor on one area. If it a cemented floor, it's recommended to pour water on the ground so

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water forever remains on the ground. If the block show signs of drying light-weight spraying are often through with the assistance of a sprayer.
d. With every week to ten days, small pins heads are going to be seen on the surface of the block and these can grow into full size mushrooms inside every day or 2.
e. once fruit bodies begin forming the need of air is inflated. Therefore, once fruit bodies begin forming it's essential that there's associate exchange of contemporary air each 6-12 hrs, by gap the ventilator provided at the front and back facet of the area.
f. The mature bodies (mushrooms) area unit prepared for selecting simply once the outer boundary of the cap starts turning upwards. This may be evident as tiny crinkles on the perimeters of the plant structure (cap).
g. to reap the mushroom take hold of the stem (stalk) at the bottom with thumb and fore finger and with a delicate dextrorotary twist, the mushroom is showing neatness detached from the straw while not worrisome the straw or any tiny mushroom growing aboard.
h. Don't use knife of scissors fir gathering. The blocks can once more return to mature once a couple of week. Spawn running area is one wherever the beds area unit unbroken for spawn running. This area desires ventilation however doesn't need light-weight. Temperature within the area ought to be between twenty four to 28°C.

Mushroom Shed:

Mushroom shed ought to be desirable thatched. It ought to have a door. The thatched parts are often coated with chicken mesh to stop entry of snakes, rats and squirrels. The ground of the shed could also be stuffed with sand to a height of fifteen cm and patterned. Racks area unit to be erected within the mushroom house to accommodate the mushroom beds. The inner facet of the mushroom shed are often lined with sacking luggage and patterned double daily to stay the area cool. The shed could also be ordered in east west to avoid direct result of sun and to scale back the temperature within the cropping area.

Cropping room:

Cropping area is one wherever the opened mushroom beds area unit unbroken once completion of spawn running. The temperature ought to be between twenty three to 25°C. Most of the growers use a similar area for spawn running and cropping. The mushroom beds with excess wetness can cause contamination. Pin heads seem on third or fourth day of gap of the beds and grownup mushroom seem inside 3 to four days look of pin heads. The mushroom ought to be harvested early morning before watering the bed. Once the primary harvest is completed the beds area unit scrapped one to 2 cm deep from the complete surface of the bed. The second crop seems inside another week. 3 to four crops of mushroom are often over in concerning 35-40 days for white Pleurotus ostreatus (days dissent as per variety). The harvested mushroom are often keep for one to a few days underneath refrigeration. The time period is concerning 12-16 hours at temperature (differs as per variety).

Fig: Cropping room and fruiting of oyster mushroom

Source: Directorate of mushroom research, solan, India

Diseases and control measurement

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If the compost, casing materials and the room for keeping mushroom beds are made germ free, the incidence of diseases will not take place. The excess humidity, temperature and poor ventilation are likely to cause disease infection. The clean and tidy environment helps to keep diseases at bay.

Some of the important diseases and their control measure are given in the table below:-

Disease	Casual organism	Symptoms	Control
Cobweb	Cladobotrym apiculatum C.verticillatum C.variospermum	White cottony growth on the substrate, small brown irregular sunken spots or fluffy growth on fruit bodies, soft rot and decay of sporophores emitting foul smell	Spray bavistin @0.05%
Green Blotch	Gliocladium virens G.deligeuscens	Fruits bodies Covered mycelium and green spots; young pin heads become soft, brown, pale yellow and decay. Mature fruit bodies show brown spots enclose by yellow halo.	Spray bavistin Or benomyl @0.01%
Brown rot	Arthrobotrys pleuroti	Fluffy growth on substrate and fruit bodies, infected tissues turn yellow, water logged and rot.	Spray bavistin @0.05%
Sibirina Rot	Sibirina fingicola	Powdery white growth on stipe, gills and the primordia, primordia shows brownish discolouration and soft rot and mature bodies turn fragile	Proper aeration and RH is essential, spray benomyl twice.

Yield:

Mushrooms seem in flushes. Regarding 2-3 flushes could also be harvested from one cube. The yield of the primary flush is additional then step by step decreases, giving a complete yield of 1.5 kilo to two kilo, of recent mushroom kind one cube. Then the cube is discarded and dump during a pit situate far away from the cropping space or may be used as a manure in garden field.

Preservation:

Mushrooms may be consumed recent or could also be dried. Since they're putrescible in nature, thence it's necessary to preserve the manufacture for additional use or for distant markets. The oldest and least expensive methodology of protective Pleurotus ostreatus is by sun drying. Hot air drying is effectively used, whereby mushrooms are dried in instrumentality known as "Dehydrator" (locally designed equipment). Once drying it may be hold on in air tight containers or seal din poly bags for 6-8months.

II. CONCLUSION:

Mushroom is additionally known as white vegetables or deboned eater meats contain ample amounts of proteins, vitamins fibers and medicines.

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Mushroom contains 20-35% protein (dry weight) that is more than those of vegetables and fruits and is of superior quality. It's thought-about ideal for patients of hyper-tension and diabetics. Plant residues like straw, leaves and conjointly wastes from agriculture, forest and trade largely stay unused. These are disposed of by burning another wasteful ways. But these residues may be reborn into substrate for the cultivation of mushroom and also the spent substrate may be utilized as manure .Another advantage of mushroom is that they're full-grown in rooms, that the barren could also be utilized. Being full-grown in vertical stacks, mushroom inherit production terribly speedily create mushroom growing a profitable venture. Mushroom encompasses a vast domestic and foreign market. It's calculable that there's a world marketplace for 20 lakh tones every year within which the contribution of India is negligible. Within the domestic market conjointly the supply of mushroom is proscribed to cities and massive city solely.

III. ACKNOWLEDGEMENT

We are thankful to the Saharanpur Krishi Vigyan Kendra, Uttarpradesh and all the faculty members and RAWE coordinator for their precious support and motivation and also special thanks to all the members of my department and friends.

REFERENCES

[1]. Ajith TA, Janardhanan KK. 2007. Indian Medicinal Mushrooms as a Source of Antioxidant and Antitumor Agents. J Clin Biochem Nutr. 40: 157-162.

[2]. Annual report 2016 - 2017. All India Coordinated Research Project on Mushroom, ICAR-Directorate of Mushroom Research, Kamal, S. Attri, BL. (ed.), Chambaghat, Solan - 173 213 (HP).

[3]. Annual report 2017- 2018. Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare. Government of India Krishi Bhawan, New Delhi-110 001.

[4]. Chang, ST. 1996. Mushroom Research and Development- Equality and Mutual Benefit. Mushroom Biology and mushroom products, Royse (de.) 1996 pen state University ISBN I-883956-01-3

[5]. Dhar BL. Shrivastava, N. Himanshu, Kumar J, Tyagi S, Atrey P. 2011. Cultivated edible specialty mushrooms -scope in India and EU countries, Proceedings of the 7 International Conference on Mushroom Biology and Mushroom Products (ICMBMP7). pp. 537-547.

[6]. Directorate of Mushroom Research (ICAR), Solan (India). 2011. Mushrooms cultivation, marketing and consumption. Directorate of Mushroom Research (Indian Council of Agricultural Research).

[7]. Prakasam V. 2012. Current scenario of mushroom research in India. Indian Phytopath. 65: 1-11.

[8]. Pratap SD, Prabha R. 2017. Bioconversion of Agricultural Wastes into High Value Biocompost: A Route to Livelihood Generation for Farmers. Adv Recycling Waste Manag. 2: 137-141.

[9]. Sharma SR, Kumar S, Sharma VP. 2006. Physiological requirement for cultivation of Malaysian strain of shiitake, Lentinula edodes. J Mycol Pl Pathol. 36:149-152.

[10]. Sharma VP, Sudheer AK. Yogesh G, Manjit S, Shwet K. 2017. Status of mushroom production in India. Mushroom Research. 26: 111-120.

[11]. Siddiqui SA, Fatima N. 2017. Indian Soils: Identification and Classification. Earth Sci India. 10: 1-14

[12]. Silva EM. 2003. Analyses of crescimento mycelial e das atividades lignocelulolíticas produzidas Durante o cultivable Lentinula edodesemresiduo de Eucalyptus saligna. Dissertacao de Mestrado, FAENQUIL. Lorena.pp: 274-276.

[13]. Singh B, Shan YH, Johnson-beeebout SE, Singh Y, Buresh RJ. 2008. Cropresidue management for lowland rice-based cropping systems in Asia. Adv Agron. 98: 118-199.

[14]. Singh DP, Prabha R. 2017. Bioconversion of Agricultural Wastes into High Value Biocompost: A Route to Livelihood Generation for Farmers. Adv Recycling Waste Manag. 2: 1-5.

[15]. Transparency market research. mushroom market (type - button mushroom, shiitake mushroom, and oystermushroom; form - fresh mushroom and processed mushroom (dried mushroom, frozen mushroom, and canned mushroom); end use - food processing industry, retail outlets, and food service), global industry analysis, size, share, growth, trends and forecast 2016 – 2024. https://www.transparencymarketresearch.com /mushroom- market.html.

[16]. Verma RN. 2002. Recent Advances in the cultivation Technology of Edible Mushrooms, NRCM Solan, 1-10.
[17]. Vibha Dhawan. Water and Agriculture in India, German Asia-Pacific Business Association. January 2017. Page 28.
[18]. Wakchaure GC. 2011. Production and Marketing ofMushrooms: Global and national scenario. Mushrooms cultivation, marketing and consumption global and National Scenario pp.11-2.
[19]. Manjit Singh, Bhuvnesh Vijay, Shwet Kamal, G.C. Wakchaure (ed.), Directorate of Mushroom Research, Solan, Himachal Pradesh-173213,India.