BIRSA AGRICULTURAL UNIVERSITY,RANCHI
TILKA MANJHI AGRICULTURE COLLEGE,GODDA

EXPERIMENTAL LEARNING PROGRAMME (ELP)

MODULE-1

MILKY MUSHROOM PRODUCTION

SUBMITTED TO:-

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ROLL NO-36
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INTRODUCTION

- Scientifically known as *Calocybe indica.*
- First indigenous mushroom to be commercialized in the country.
- It is robust,fleshy,milky white,umbrella like mushroom.
- Suitable for hot and humid climate.
- Grown on pasteurized or sterilized wheat or paddy straw.
- Optimum temp. requirement is 30-35^{o} C

- Can be cultivated throughout the year.
- Cultivation is simple and less cost required.
- Crop cycle 45-50 days.
- Shelf life 3-5 days.
- Can be marketed as fresh,dry or as mushroom powder.
- Spent mushroom substrate(SMS) can be used as an excellent organic manure or for vermicomposting.
- It is an excellent edible mushroom with high fibre.

Scientific classification

- **Kingdom**: Fungi
- **Division**: Basidiomycota
- **Class**: Agaricomycetes
- **Order**: Agaricales
- **Family**: Lyophyllaceae
- **Genus**: Calocybe

Nutritive value:

- They are an excellent source of vitamins B2,E, and A.
- Also contains P, K ,Ca , Vit. C , Fe & Zn.
- Contains highest protein 17.2%.
- Low in Calories ,fat and sodium.
- High in Crude fiber and essential minerals.
- Also contain 12 essential Amino acids.

Activity schedule:-

PHASES	WORK	DATE	WEEK
ORIENTATION CLASSES:		20/03/2022 - 27/03/2022	1st week
PREPATORY PHASE:			
	Spotting of site	28/03/2022 - 29/03/2022	2nd week
	Site cleaniness	30/03/2022 - 01/04/2022	2nd week
	Rack preparation	02/04/2022 - 05/04/2022	2nd week to 3rd week
	Sterlization of room	06/04/2022 - 07/04/2022	3rd week
	Raw material collection	08/04/2022 - 15/04/2022	3rd week to 4th week

PHASES	WORK	DATE	WEEK
	Straw sterlization	16/04/2022 - 18/04/2022	4th week to 5th week
	Drying	19/04/2022	5th week
	Bagging	20/04/2022 - 24/04/2022	5th week
	Moisture maintenance	24/04/2022 to till continued	Since 5th week to till continued
INCUBATION PHASE			
	Collection of raw material for casing	12/05/2022 - 14/05/2022	8th week
	Soil sterilisation	15/05/2022 - 18/05/2022	8th week to 9th week

PHASES	WORK	DATE	WEEK
	Casing	19/05/2022 -20/05/2022	9th week
	Pin head starts	31/05/2022 – till continued	Since 11th week till continued
PRODUCTION PHASE			
	Mushroom ready to harvest	01/06/2022	11th week
	Oyester mushroom production	20/05/2022 -02/06/2022	9th week

Raw materials

- Wheat straw
- Spawn
- Soil
- Polyethylene bags
- Drums
- Tarpaulin cover
- Formalin

- Jute bags
- Rubber bands and Nails
- Weighing Balance
- Indofil M-45
- Sprayer

FLOW CHART

Preparation of rack

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Sterlisation of room and rack

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Soaking of straw in chemically treated water

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Drying for drainage of excess water

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Bagging alternating with straw and spawn

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Maintenance of moisture

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Soil sterilization and Casing

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Moisture maintenance in well ventilated room

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Production and Harvesting

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MARKETING

STEPS:-

- **Preparation of rack**

Sterlisation of room and rack

First of all we need to sterlise the dark room and the racks where mushrooms were going to be kept

Sterlisation of straw

Soaked the paddy straw with chemically treated water(125 ml Formalin & 7.5 g Indofil M-45/ 100 lt of water) and sealed the drum with polythene sheet rest for 15-18 hrs.


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Drying of straw

After 22 hrs the excess water is drained out and straws were dried under the sun until it got the moisture content upto 20%

Bagging

- Prepared the beds by filling paddy straw and spawn layer by layer.
- For one bag we used 3 kg of wheat straw and 200 g spawn.
- In each bag there were 4 layers of wheat straw and 3 layer of spawn.

Moisture maintenance

- Keep the prepared bags in dark room for 14-20 days for spawn growth.
- Maintain the temp.(25-35 C) and humidity(80-90%) in dark room for proper development of spawn.

Mycelial growth

CASING

Prepared the soil for casing, we used well dried fine soil and vermicompost in ratio.
Then we sterilized it with 4% formaline with water and rest it for a week.

PRODUCTION AND HARVESTING

In 45-50 days of cultivation process complete harvest of milky mushroom can be done and later could be sold in the market.


2022/06/27 10:00

MUSHROOM BAGS AND COST

- Bags for practice(M0): 24
- Per group bags:
  - Group 01(M1)=30 Bags
  - Group 02(M2)= 30 Bags
  - Group 03(M3)= 30 Bags
- Disease and Contaminated bags: 27
- Monitor lizard attacked bags: 50
- Oyester bags: 12
- Milky mushroom bags:75

TOTAL BAG FOR CULTIVATION= 87 BAGS

COST OF 1 KG OYESTER MUSHROOM- Rs 180

COST OF 1 KG MILKY MUSHROOM – Rs 140

COSTING AND PRODUCTION OF MILKY MUSHROOM

S. NO.	MATERIAL	QUANTITY	PRICE(Rs)	SOURCE
1.	STRAW	250 Kg @Rs 8/kg	2000	Rampur
2.	SPAWN	25 kg @Rs 120 /kg	3000	Agrobiotech lab Ranchi
3.	P.P BAG + COTTON	3 kg @Rs 300 /kg	900+60	Godda market
4.	BAMBOO	25-30 piece @Rs 150-200/2 piece	3000	Godda
5.	LABOUR (2 LABOUR FOR 3 DAYS)	@ Rs 550/day	1650	Godda
6.	CHEMICALS (INDOFIL M-45 , FORMALIN)	100 g @Rs 175 1 bottle @ 100	175 600	Godda
7.	VERMICOMPOST	60 Kg (Rs 20/kg)	1200	Godda
8.	MISCELLANEOUS		500	Godda
9.	DRUM	Rs 1200/drum(2 pc)	2400	Godda
	TOTAL COST		15685	

COSTING AND PRODUCTION OF MILKY MUSHROOM

YIELD\GROUP.	GROUP1(M1)	GROUP2(M2)	GROUP3(M3)	TOTAL
1st yield	3.635kg	2.726kg	1.635kg	7.997kg
2nd Yield	3.180kg	2.373kg	1.424kg	6.997kg
3rd Yield	3.261kg	2.446kg	1.469kg	7.176kg

GRAND TOTAL= 22.170kg

AVERAGE YIELD= 295.6g / per bag

Sale of Milky Mushroom @Rs 140/kg= Rs3103.8

Costing and production of oyster mushroom

YIELD/GROUP	GROUP1(M1)	GROUP2(M2)	GROUP3(M3)	TOTAL
1st Yield	0.431kg	0.379kg	0.680kg	1.490kg
2nd Yield	0.379kg	0.284kg	0.170kg	0.510kg
3rd Yield	0.194kg	0.170kg	0.306kg	0.670kg
TOTAL	1.490kg	1.117kg	0.670kg	3.280kg

Grand total= 3.28kg

Average yield= 3.28/12 =273.3gm/bag

Sale of Oyster Mushroom @Rs 180/kg= Rs 590.4

Total sale of milky + oyster mushroom= Rs3694.2

IPDM

DISEASES	CASUAL ORGANISM	SYMPTOMS	MANAGEMENT
• Bubble disease	*Mycogone Perniciosa*	Dense white mat of mycelium	✓ Beds sterlised at 2% Formalin
• Inky cap 	*Coprinus lagopus and C. comatus*	Appearance of long cylindrical stalk with small thin cap and turns into black inky liquid	✓ Use properly pasteurized compost and casing soil ✓ Rogue out young fruit bodies of the weed fungus to avoid its further spread.

DISEASES	CASUAL ORGANISM	SYMPTOMS	MANAGEMENT
• Green mould 	*Trichoderma viridae*	✓ Dark green mould patches on casing spreading to lesion On stems	✓ Cover spots with NaOCl soln. salt,lime or gypsum.

INSECTS PESTS		SYMPTOMS	MANAGEMENT
Sciarids	*Lycorella fenestralis*	✓ Makes tunnel shaped cavity in mushroom	✓ Strict hygiene ✓ Drenching of malathion@0.01%
Spring tails	*Megaselia nigra*	✓ Mostly feed on the mycelium and attack stalk and caps.	✓ Clean cultivation, ✓ Proper pasteurization of compost and casing material

Value addition in mushroom

MUSHROOM IN CANS

Mushroom pickles

Dehydrated mushroom

Frozen mushroom

Mushroom jams/sweets

Problems faced

- Bags attacked by monitor lizards , rats
- Mixing of spawn
- Wheat grains lead to the formation of grass inside the bags.
- Unhealthy spawn
- Uneven maintenance of moisture
- Attack by diseases like green mould and inky cap

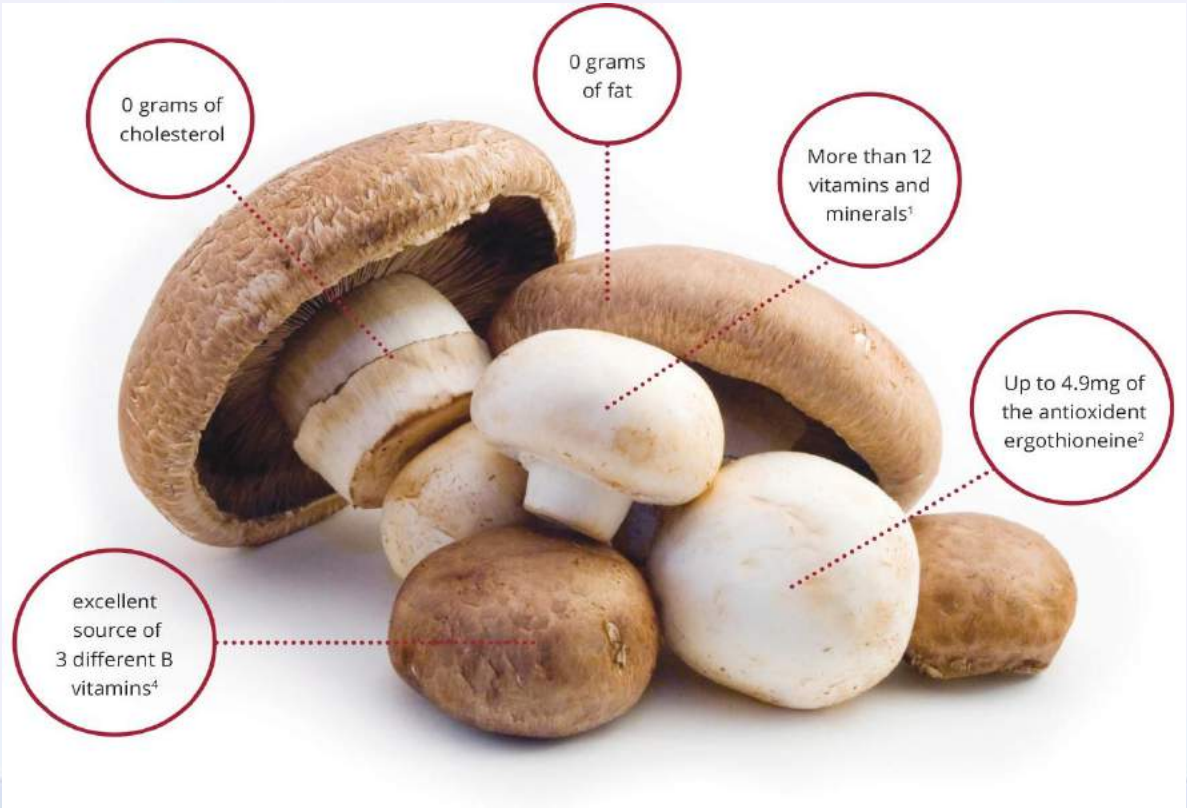
BUTTON MUSHROOM

INTRODUCTION

- White button mushroom , scientifically known as *Agaricus bisporus*.
- It is tiny thumbnail sized mushrooms with smooth rounded caps and short truncated stems.
- One of the most cultivated varieties in world & widely used member of Agariceae family.
- Also known as Table mushrooms.
- Depending on when they are harvested they are either stark white in colour or earthern brown like a crimini mushroom.
- Requires 20-28^{o}C for vegetative growth and 12-18^{o}C for reproductive growth.

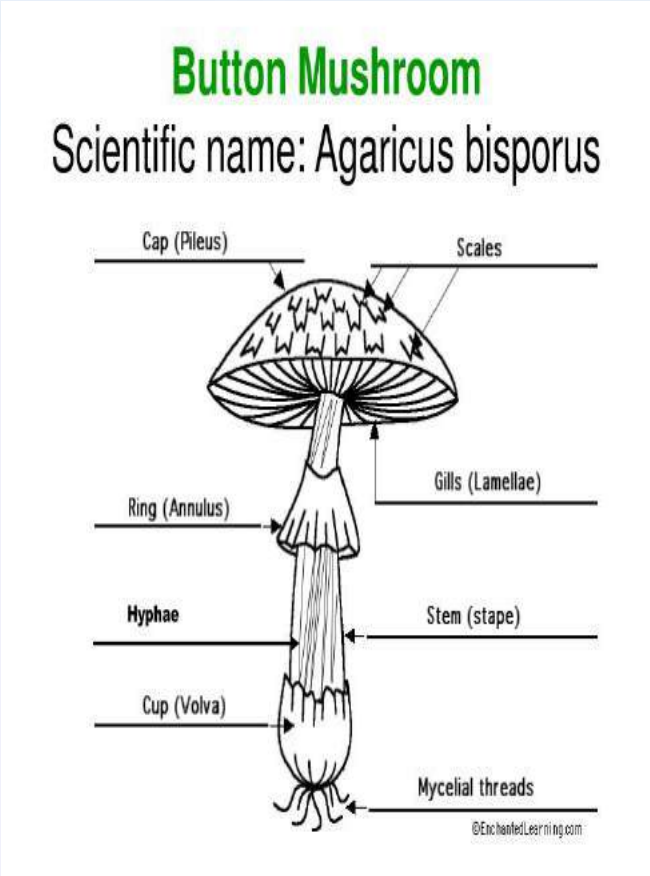
- Growers can take on average 3-4 crops of button mushrooms in a year depending on the type.

NUTRITIONAL VALUE:-



Scientific Classification

KINGDOM: Fungi
PHYLUM: Basidiomycota
CLASS: Agaricomycetes
ORDER: Agaricales
FAMILY: Agaricaceae
GENUS: Agaricus
SPECIES: A. bisporus



METHODS OF CULTIVATION

- COMPOSTING
- SPAWNING AND SPAWN RUN
- CASING AND CASE RUN
- PIN HEAD FORMATION
- PRODUCTION & HARVESTING
- MARKETING

Composting

- ✓ Wheat straw are spread on well cleaned floor and wetted thoroughly for 48 hrs to attain 70-75% moisture.
- ✓ After that,by each turning other raw materials like urea, gypsum,rice bran ,Poultry manure etc are mixed.

There are two important method of Composting:-

- Long method of composting
  It is a primitive method and takes a period of 1 month or one

and half month.
It usually practiced in areas where facilities for steam pasteurization is not available.

- **Short method of composting**

  It gets completed in 3 weeks.

  The short-term compost involves two phases of operation, Outdoors composting and steam pasteurization

Spawning and spawn run

✓ Good quality compost with temp. of 25^{o}C
✓ Mixing of grain based spawn of *A.bisporus* under clean conditions.

- ✓ Filling of spawned compost into polythene bags or beds and loosely closing the mouth of bags
- ✓ Shift the filled bags in room with RH:95% & Co2 Conc. 1-1.5% for 12-14 days.
  (Change of dark brown compost into light brown in colour).

Casing and Case run

- ✓ It is a 3-4 thick layer of soil applied on the top of spawn run.

- ✓ Presently, Peat is the most desirable casing material worldwide with excellent mushroom yields and superior fruit body quality but, it is not available in india hence ,FYM, SMC are used

Pin head formation

- ✓ After case run , Pinhead formation appears in 3-4 days.
- ✓ Pinhead to Solid button shaped mushroom after 3-4 days.

Production and harvesting

- ✓ Mushrooms with 4-5 cm in diameter with hard pileus and closed veil are ready for the harvest & marketing.
- ✓ It can be stored at $4^{o}C$ for a few days.

MARKETING OF MUSHROOM

- ✓ Selling of mushroom will be done when they are in the fresh form or when they are freeze dried form.
- ✓ A mushroom which is fresh is packed in polyethylene bags whose density is low and sold in the market.
- ✓ The shelf life of the mushroom is approximately 48 hrs.
- ✓ The mushroom which is freeze-dried will remain almost for 1 year but the technology of freeze drying the mushroom will be costly one.

COST ANALYSIS

- Dimension of the unit = 60 ft × 60 ft
- 1 cycle runs for 2 months so, total 6 cycles in a year.
- In each cycle= 830 bags/round
  So for 6 cycle = 830 × 6 = 5000 bags(approx.) annually
- Space required for 6 bags = 6 sq. ft
  So, for 1 bag = 6/6= 1 sq. ft
  For 5000 bags= 5000 sq. ft
- Each bag gives a yield of 2 kg so, total yield = 10,000 kg/annually

S. no.	Raw materials	Price /unit(Rs)	Quantity	Total price(Rs)
1	Straw	Rs 6/kg	6 kg/bag	1,80,000
2	Spawn	Rs 150/kg	350 g/bag	1,87,500
3	Chemicals			9,000
4	Polybag	For 1 cycle Rs 3500	6 cycle	21,000
5	Miscellaneous			30,000
	TOTAL			**4,27,500**

Packaging:-

For 1 kg = 5 bowl (200 gm each)
for 10000 kg = 5× 10000 = 50,000 bowls
Each bowl cost Rs 1
so, 1× 50000 = Rs 50,000

Plants & Machinery	Price (Rs)
Straw cutter	30,000
Sealing machine	1,50,000
Refrigerator	30,000
Pasteurization machine	3,00,000
AC	70,000
Humidity controller	30,000
Weighing machine	10,000
TOTAL	**6,20,000**

Electricity establishment
= Rs 80,000

Electricity (rent) = Rs 2500×12
= Rs 30,000

Labour Charges:-
1 day =Rs 300
Total = 5 labour
so, 5× 300=Rs1500
For 365 days = 365× 1500
= Rs 5,47,500

Building(rent)= Rs 8,40,000
For, 5000 sq. ft = 70,000/month

Water supply = Rs 2,50,000

PROFIT AND LOSS STATEMENT

(in lakhs)

	2022-23	2023-24	2024-25	2025-26	2026-27
Sales	20	22.5	25.2	26.5	28
COGS					
Raw materials	4.27	4.8	5.02	5.2	5.5
Packagings	0.5	0.65	0.7	0.8	0.95
Labour	5.47	5.62	5.7	5.75	5.9
Transportation	3	3.5	3.7	4	4.2
Electricity	0.8	1.1	1.3	1.5	2
TOTAL COGS	14.04	15.67	16.42	17.25	18.55
Gross profit	5.96	6.83	8.78	9.25	9.45
Selling expenses	0.2	0.22	0.25	0.26	0.28
EBIT	5.76	6.61	8.53	8.99	9.17

interest on term loan(8%)	1.44	1.44	1.44	1.44	1.44
Interest on WC loan(10%)	0.54	0.56	0.59	0.61	0.63
PBT(profit before tax)	**4.86**	**7.09**	**9.04**	**9.52**	**9.72**
Tax (10%)	0.48	0.7	0.94	0.95	0.97
PAT (Profit after tax)	**4.38**	**6.39**	**8.17**	**8.57**	**8.75**

BALANCE SHEET

(IN LAKHs)

Particulars	2022-23	2023-24	2024-25	2025-26	2026-27
Current assests					
Cash	3.2	4.5	6.2	5.8	6.7
A/R	4	4.5	7.3	6.6	6.5
Inventory	3	5.7	5.3	6.8	6.4
Total Current assest	10.2	14.7	18.8	19.2	19.6

Fixed assessts						
	Plant & M/C	**6.2**	**0.5**	**0**	**0**	**0**
	Building	**8.4**	**0**	**0**	**0**	**0**
	Transportation	**7.2**	**0.5**	**0.6**	**0.65**	**0.7**
	Water supply	**2.5**	**0.3**	**0.35**	**0.4**	**0.5**
	Depreciation(10%)	**2.43**	**0.13**	**0.095**	**0.1**	**0.12**
Total fixed assests		**24.3**	**1.17**	**0.85**	**0.95**	**1.08**
TOTAL ASSESTS		**34.5**	**15.87**	**19.65**	**20.15**	**20.68**
Current liability						
	Account payble	**2**	**2.5**	**2.75**	**4.2**	**4.52**
	Int. on WC Loan	**0.54**	**0.56**	**0.59**	**0.61**	**0.63**
Total current liability		**2.54**	**2.81**	**3.34**	**4.81**	**5.15**
working capital loan		**5.43**	**5.68**	**5.9**	**6.1**	**6.32**
Term loan		**18**	**0**	**0**	**0**	**0**
Promoters capital		**3.2**	**0.8**	**1.2**	**0.5**	**0.3**
PAT		**4.38**	**6.39**	**8.11**	**8.57**	**8.75**
Less drawings		**0.95**	**0.19**	**1.1**	**0.17**	**0.16**
Total liability		**34.5**	**15.87**	**19.65**	**20.15**	**20.68**

CASH FLOW

(IN LAKHS)

Particulars	2022-23	2023-24	2024-25	2025-26	2026-27
Opening balance	0	11.88	22.64	35.21	48.59
INFLOWS					
Revenue	20	22.5	25.2	26.5	28
Promoters capital	3.2	0.8	1.2	0.5	0.3
Term loan	18	0	0	0	0
Cash credit	5.43	5.68	5.9	6.1	6.32
TOTAL INFLOWS	**46.63**	**40.86**	**54.94**	**68.31**	**83.21**
OUTFLOWS					
Raw materials	4.27	4.8	5.02	5.2	5.5
Packaging	0.5	0.65	0.7	0.8	0.95
Building	8.4	0	0	0	0
Transport	3	3.5	3.7	4	4.2
electricity	0.8	1.1	1.3	1.5	2

Labour	5.47	5.62	5.7	5.75	5.9
Plant & machinery	6.2	0.5	0	0	0
Selling expenses	0.2	0.22	0.25	0.26	0.28
Int. on term loan	1.44	0.08	0.08	0.08	0.08
Int. on WC loan	0.54	0.56	0.59	0.61	0.63
Drawings	0.95	0.19	1.1	0.17	0.16
Tax	0.48	0.7	0.94	0.95	0.97
Water supply	2.5	0.3	0.35	0.4	0.5
TOTAL OUTFLOWS	34.75	18.22	19.73	19.72	21.17
CLOSING BALANCE	11.88	22.64	35.21	48.59	62.04

THANK YOU !!