MUSHROOM CULTIVATION

A LUCRATIVE OCCUPATION

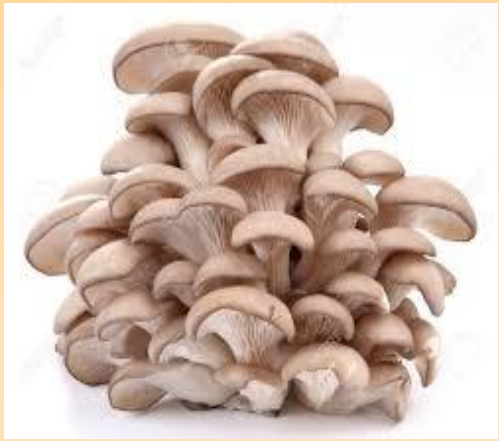
What is Mushroom?

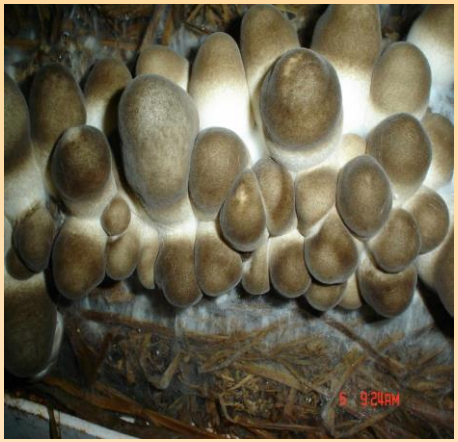
Mushrooms are the eukaryotic, spore bearing organisms, macro-fungi lacking chlorophyll and grow on dead decomposed matter as saprophytes. They derive nutrients through their mycelia. This mycelium forms the fleshy structures, the fruit bodies, which are generally called the mushrooms.

There are more then 10,000 verities of mushroom out of which only 200 verities identified as edible verity.

Verities of Mushroom

- We can grow four verities of mushroom depending upon the climatic condition of Assam as
- Oyster Mushroom (Sept-April)
- Paddy Straw Mushroom (May-Sept)
- Milky Mushroom (Sept-April)
- Button Mushroom
- (Nov-Feb)





Nutritional Values of Mushrooms

- Indian diet is primarily based on cereals (wheat, rice and maize), which is deficient in protein. Supplementation of mushroom recipe in Indian diet will bridge protein gap and improve the general health of socio-economically backward communities. Earlier mushrooms were considered as an expensive vegetable and were preferred by affluent peoples for culinary purposes. Currently common populace also considers mushroom as a quality food due to its health benefits.
- Mushroom is considered to be a complete, health food and suitable for all age groups, child to aged people. The nutritional value of mushroom is affected by numerous factors such as species, stage of development and environmental conditions. Mushrooms are rich in protein, dietary fiber, vitamins and minerals. The digestible carbohydrate profile of mushroom includes starches, pentoses, hexoses, disaccharides, amino sugars, sugar alcohols and sugar acids. The total carbohydrate content in mushroom varied from 26-82% on dry weight basis in different mushrooms. The crude fibre composition of the mushroom consists of partially digestible polysaccharides and chitin.
- Edible mushrooms commonly have insignificant lipid level with higher proportion of polyunsaturated fatty acids. All these result in low calorific yield from mushroom foods. Mushrooms do not have cholesterol. Instead, they have ergo sterol that acts as a precursor for Vitamin D synthesis in human body. Similarly, ergo sterol in button mushroom is converted in to vitamin D2 when exposed to UV radiation or sunlight. The protein content of edible mushrooms is usually high, but varies greatly. The crude protein content of mushrooms varied from 12-35% depending upon the species. The free amino acids composition differs widely but in general they are rich in theronine and valine but deficient in sulphur containing aminoacids (ethionine and cysteine).

Nutritional Values of Mushrooms

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Mushroom	Carbohydrate	Fibre	Protein	Fat	Ash	Energy K cal
Agaricus bisporus	46.17	20.90	33.48	3.10	5.70	499
Pleurotus sajor-caju	63.40	48.60	19.23	2.70	6.32	412
Lentinula edodes	47.60	28.80	32.93	3.73	5.20	387
Pleurotus ostreatus	57.60	8.70	30.40	2.20	9.80	265
Volvariella volvaceae	54.80	5.50	37.50	2.60	1.10	305
Calocybe indica	64.26	3.40	17.69	4.10	7.43	391
Flammulina velutipes	73.10	3.70	17.60	1.90	7.40	378
Auricularia auricula	82.80	19.80	4.20	8.30	4.70	351

Medicinal Values

- Mushrooms have been shown to promote immune function; boost health; lower the risk of cancer; inhibit tumor growth; help balancing blood sugar; ward off viruses, bacteria, and fungi; reduce inflammation; and support the body's detoxification mechanisms. Increasing recognition of mushrooms in complementing conventional medicines is also well known for fighting many diseases.
- *1. Good for heart*
- *2. Low calorie food*
- *3. Prevents cancer*
- *4. Anti-aging property*
- *5. Regulates digestive system*
- *6. Strengthens immunity*
- *7. Improve anaemia*
- *8. Remove constipation*
- *9. Improve - IQ*
- *10. Good protein source for diabetic & TB patient.*

Global and National Scenario of Mushroom Industry

World production of mushrooms (metric tons)

Countries	1997	2007
China	5,62,194	15,68,523
United States of America	3,66,810	3,59,630
Netherlands	2,40,000	2,40,000
Poland	1,00,000	1,60,000
Spain	81,304	1,40,000
France	1,73,000	1,25,000
Italy	57,646	85,900
Ireland	57,800	75,000
Canada	68,020	73,257
United Kingdom	1,07,359	72,000
Japan	74,782	67,000
Germany	60,000	55,000
Indonesia	19,000	48,247
India	9,000	48,000
Belgium	NA	43,000
Australia	35,485	42,739
Korea	13,181	28,764
Iran	10,000	28,000
Hungary	13,559	21,200
Viet Nam	10,000	18,000
Denmark	8,766	11,000
Thailand	9,000	10,000
Israel	1,260	9,500
South Africa	7,406	9,395
New Zealand	7,500	8,500
Switzerland	7,239	7,440
Other countries	85911	59297
Total World Production	21,86,222	34,14,392

Source: *Table 50, World mushroom & truffles: Production, 1961-2007; United Nations, FAO, FAOStat (8/28/2009)*

Per capita consumption of mushrooms (kg)

Country	1996 Total	2007 Fresh	Canned	Total
UK	3.35	2.81	0.20	3.01
BelgiuM	3.90	3.77	0.69	4.46
Netherlands	2.80	11.62	0.00	11.62
Germany	3.83	1.27	1.20	2.47
Italy	2.60	1.56	0.06	1.62
France	3.03	2.58	0.14	2.72
Spain	-	3.11	0.00	3.11
Denmark	2.90	3.22	0.66	3.89
Ireland -	-	6.05	0.05	6.10
Poland -	-	0.35	0.00	0.35
USA -	-	1.27	0.22	1.49
Canada -	-	1.71	0.59	2.30
Japan -	-	0.60	0.26	0.86
China -	-	1.16	0.00	1.16
India	0.03	0.04	0.00	0.04

Source: ***2007 World population data sheet, Population Reference Bureau, 1975 Connecticut Ave., NW, Washington, DC-20009, USA; Table 50-World mushroom and truffles: Production, 1961-2007, Table 51a-World mushrooms and truffles: Export volume, 1970-2007, Table 52a- World mushroom: Canned export volume, 1970-2007, Table 54a-World mushrooms and truffles: Import volume, 1970-2007, Table 55a-World canned mushroom import volume, 1975-2007, United Nations, Food and Agriculture Organization, FAOStat (08/31/2009).***

Present State-Wise Mushroom Production In India (tons) (2010)

State	Button Mushroom	Oyster	Milky	Other	Total Production
1. Andhra Pradesh	2,992	15	15	0	3,022
2. Arunachal Pradesh	20	5	0	1	26
3. Assam	20	100	5	0	125
4. Bihar	400	80	0	0	480
5. Chattisgarh	0	50	0	0	50
6. Goa	500	20	0	0	520
7. Gujarat	0	5	0	0	5
8. Haryana	7,1 75	0	3	0	7,178
9. Himachal Pradesh	5,864	110	17	2	5,993
10. J&K	565	15	0	0	580
11. Jharkhand	200	20	0	0	220
12. Karnataka	0	15	10		25
13. Kerala	0	500	300	0	800
14. Maharashtra	2,725	200	50	0	2,975
15. Madhya Pradesh	10	5	0	0	15
16. Manipur	0	10	0	50	60
17. Meghalaya	25	2	0	0	27
18. Mizoram	0	50	0	0	50
19. Nagaland	0	75	0	250	325
20. Orissa	36	810	0	5,000	5,846
21. Punjab	58,000	2,000	0	0	60,000
22. Rajasthan	100	10	0	10	120
23. Sikkim	1	2	0	0	3
24. Tamil Nadu	4,000	2,000	500	0	6,500
25. Tripura	0	100	0	0	100
26. Uttarakhand	8,000	0	0	0	8,000
27. Uttar Pradesh	7,000	0	0	0	7,000
28. West Bengal	50	50	0	0	100
Union Territories					
1. A&N Islands	0	100	0	0	100
2. Chandigarh	0	0	0	0	0
3. Dadar & Nagar Haveli	0	0	0	0	0
4. Daman & Diu	0	0	0	0	0
5. Delhi	3,000	50	20	0	3,070
6. Lakshadweep	0	0	0	0	0
7. Puducherry	0	0	0	0	0
Total	**1,00,683**	**6,399**	**920**	**5,313**	**1,13,315**

Source: RMCU, DMR, Solan, 2010

Future Prospects

India has tremendous potential for mushroom production and all commercial edible and medicinal mushrooms can be grown. There is increasing demand for quality products at competitive rate both in domestic and export market. Though growth of mushroom will depend on increasing and widening domestic market in coming years, export market will be equally attractive. To be successful in both domestic and export market it is essential to produce quality fresh mushrooms and processed products devoid of pesticide residues and at competitive rate. It is also important to commercially utilize the compost left after cultivation for making manure, vermi compost, briquettes, etc. for additional income and total recycling of agro wastes.

NUTRITIONAL VALUE OF OYSTER MUSHROOM:-

Sr. No.	Nutrient	Quantity
1.	Water	76.69 gm
2.	Enegry	28 kcl
3.	Protein	2.85 g
4.	Lipid(Fat)	0.35 g
5.	Ash	0.87 g
6.	Carbohydrate	5.24 g
7.	Fiber	2.0 g
8.	Sugar	0.95 g

Economics of Mushroom

- **Fixed capital**

i)	House	= 30,000.00
ii)	Chouka (smoke less)	= 6000.00
iii)	Drum	= 2000.00
iv)	Polythene sheet 10x12ft 2nos	= 1000.00
v)	Sprayer	= 700.00
vi)	Plastic bucket 2 no	= 600.00
vii)	Machete	= 200.00
viii)	Sealing machine	= 3400.00
ix)	Physical balance	= 1500.00

Total cost = Rs.45400.00

- Working capital

i) Paddy straw 3 trucks @ Rs.7000/ truck = 21000.00
ii) Polythene bag 2400 no @ Rs.2/ bag = 4800.00
iii) Spawn 1500 pkt/(200grm pkt) @ Rs.15/pkt = 22500.00
iv) Wood (Fuel) LS = 3000.000
v) Pesticide LS = 1000.00
vi) Packeting bag LS = 2000.00

Total cost = Rs.54,300.00

Grand total

Exp=(45400+54300)=Rs.99700.00

Economic Benefit of Mushroom

Room size	=25ftx15ftx8ft
Capacity	=400 bags(at a time)
Crop duration	=2months
Total no of bags produced in a year	=400x6=2400 bags
Production per bag	=2kg
Total production in a year	=2x2400 =4800kg
Considering 5% production loss	=240kg
Net production	=4800-240=4560kg
Selling price @Rs.80 per kg(Raw)	
Total selling price	=4560x80=Rs.364000/-
Total expenditure	=Rs.99700/-
Total profit (yearly)	=(364000-99700)=Rs.264300/-
Cost : benefit	=1:2.6

Some of the suggestions to solve the marketing problems of mushrooms in Assam are given below:

1. Expand the market area and strengthen the demand:

a. Popularize mushrooms using ICT as delicacy with nutritive and medicinal value, on mass media like Doordarshan ,radio also ads. and posters.

b. Break consumer resistance by creating awareness in new areas. Demonstration of recipes and free samples in new areas. Free recipe booklet.

2. Form cooperatives for sale:

a. Create cold storage facility

b. Create refrigerated transport facility

c. Create processing facility

d. Create distributor function for big cities.

3. Decrease the cost of production and bring down the sale price to boost the demand.

4. Good pre packs for eye appeal.

5. Train retailers about handling, storage, food value and recipes.

6. Approach supermarkets, chain vegetable stores, mother dairy retail counters for retail sale.

7. States should fix minimum support price.

8. Public sector marketing, processing and export organisations should come forward.

9. Assured supply throughout the year at a reasonable constant price is key to good marketing. Efforts should be made to diversify and cultivate different mushrooms throughout the year along with cultivating some of the important mushroom during off-season under controlled condition.

10. In a limited area, say a village or a cooperative, the crops should be time-scheduled to get a daily reasonably uniform production to avoid glut on a day, this is required to meet the commensurate demand.

11. Star hotels can be invited to popularise the different recipes made out of mushrooms among the customers

12. Dietacians of different nursing home or medicals can be invited and make them understand about the mushroom which provide a rich addition to the diet in the form of protein ,carbohydrate, valuable salt, vitamins &minerals, amino acid and energy.

Mushroom Recipes

1.Mushroom Tomato Soup

- Ingredients:

Fresh Mushroom (Button or Oyster)	-200g (chopped)
Tomatos	-4 (chopped)
Onion	-1 medium (chopped)
Garlic	-3 cloves
Conflour	-3 T.Spoon
Cream	-2 T.Spoon
Butter	-50g
Salt Pepper	-to taste

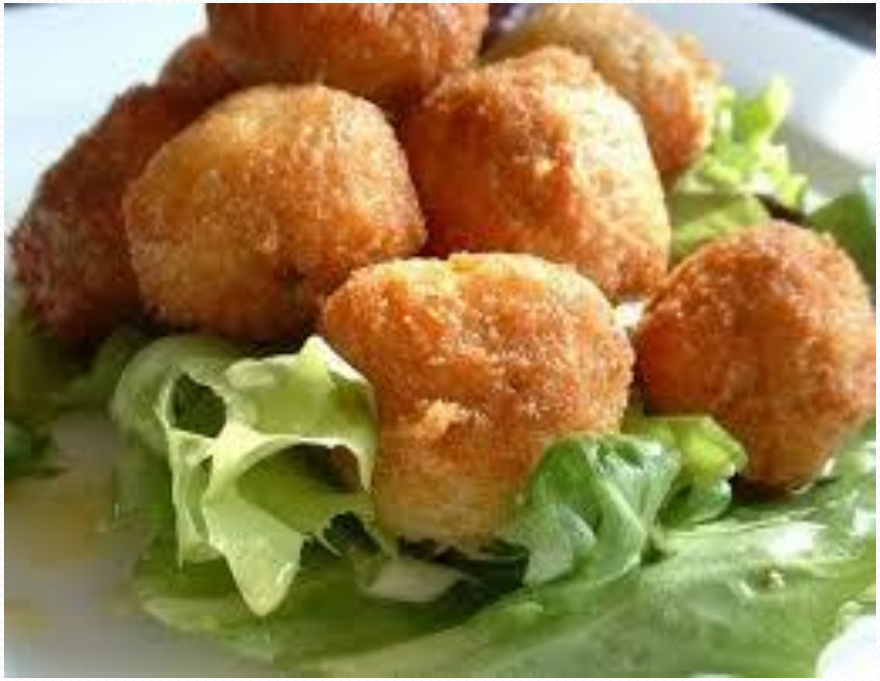
- Method:

Boil tomatoes, onion and garlic in water for 10 minutes. Grind the above material and sieve it. Melt butter in a pan and sautchopped mushrooms for 10 minutes until they become golden brown. Add sieved material to it and sprinkle one T.Spoon of conflour on to mushroom soup to thicken adding salt and pepper to it. Boil for 7-8 minutes and serve hot with cream

2.Mushroom Pakoda

- **Ingredient**

Fresh Mushroom (Button or Oyster or milky)	-500g (chopped)
Onion	-1 big (chopped)
Ginger	-2 tbl
Garam masala	-10g
Anar dana powder	-1 tbl
Gram flour (besan)	-150g
Cooking oil	-100g
Salt, greenchillies	-to taste



- Method place washed mushrooms in 1 litre of water and add salt (half spoon). Boil for 5 minutes and drain the mushrooms and let it dry for by 10 minutes by spreading on a dry cloth. Cut mushrooms into pieces and squeeze properly so that no water remains in mushrooms. Add all ingredients and salt as per your taste in gram flour. Pour little water to make thick paste. Add mushrooms to it and mix well deep fry in hot on medium heat serve hot with pudina chutney.

3.MUSHROOM KOFTA

- Ingredients:

- Fresh mushroom -250g blanched and squeezed-(all types of mushrooms)
- Gram flour (besan) -100g
- Onion -2(grated to prepare gravy)
- Garlic -2Cloves(crushed)
- Ginger -30g(grated)
- Cinnamon -1/2 table spoon
- Turmeric powder -1 table spoon
- Coriander powder -1 table spoon
- Cumin seeds -1 table spoons
- Tomato puree -1 cup
- Cooking oil -100g
- Kasoori methi -to taste

garam masala,red chillies powder and salt

Method:

Grind mushrooms in a mixer, add gram flour, salt, chilly powder, garam masala and little water to make a thick paste. Make round koftas and deep fry the same on the medium heat.When golden brown, take out of the pan and drain extra oil. Heat oil in pan, fry cumin seeds in it. Add onion,garlic and ginger paste and fry on low heat till golden brown. Add tomato puree and cook till the paste thickens and starts leaving oil. Add other ingredients, pour two glasses of water ,stir well and let it boil for 6-7 minutes on high flame. Add koftas and boil 4-5 minutes on low heat. Garnish with coriander leaves. Serve hot with rice or chapati.

Mushroom Recipes