



# How to Start Mushroom Cultivation, Growing, Processing and Packaging – Food and Agriculture

(Poisonous Mushroom, Edible Mushroom,  
Button Mushroom, Oyster Mushroom,  
Straw Mushroom)



# Introduction

Mushroom is a nutritious vegetarian delicacy and has many varieties. Most of them are edible. It contains many vitamins and minerals but very low on sugar and fat. It is easily digestible. It is very popular in most of the developed countries and is being accepted in many developing countries. Market for mushroom is growing rapidly because of its rich nutritional value and special taste aroma, flavor etc. Many exotic preparations are made from them like soup, pickles, it can be cooked in traditional way as standard vegetable. It is also used as stuffing for various food preparations and for garnishing.

Its consumption is basically confined to the urban region. It has a very short life after being harvested and are sold in fresh form. Their shelf life is enhanced by processing and properly packing in good quality polythene or proper canning. This can then be stored and transported for selling in far of markets. The global mushroom market is primarily driven by the increasing demand for the organic products. Mushrooms are highly popular in Asian countries such as China, India, and Japan.

Mushroom cultivation can directly improve livelihoods through economic, nutritional and medicinal contributions. However, it is essential to note that some mushrooms are poisonous and may even be lethal, thus the need for extra caution in identifying those species that can be consumed as food. Mushrooms are a good source of vitamin B, C and D, including niacin, riboflavin, thiamine, and folate, and various minerals including potassium, phosphorus, calcium, magnesium, iron and copper.





Mushrooms are the health food of the world. These are that fast growing basidiomycetous fungi which produce fleshy fruit bodies. They are rich in proteins, vitamins and minerals, so they are consumed as energy rich food. Mushroom has been attracting attention of mankind since ancient times and use of mushroom, as food is as old as human civilization. Mushrooms are superior to many vegetables and beans in their nutritive value. It is very rich in protein, vitamins and minerals. Fresh mushrooms contain about 85% water and 3.2% protein.

But dried mushrooms water content is low and protein level is high as 34 to 44% and the fat content is less than 0.3%. There are about 100 species of edible mushrooms all over the world. But only three of them are cultivated in India which are Agaricus bisporus, Volvariella volvacea and pleurotus sajor caju. Unfortunately, it is realized that mushrooms did not receive universal acceptance over the years since a number of naturally growing mushrooms are poisonous. Now the situation has been changed because the cultivated edible mushrooms are totally safe for human consumption.



Mushroom cultivation fits in very well with sustainable farming and has several advantages: it uses agricultural waste products, a high production per surface area can be obtained, after picking; the spent substrate is still a good soil conditioner. They have less carbohydrate so they are believed to be suitable for diabetic patients. Fresh mushrooms have very limited life and hence they need to be consumed within few hours. But processing and canning increases their shelf life to few months. Osmotic dehydration is one of the important methods of processing mushroom which involves drying technology of mushroom.



Some of the fundamentals of the book are nutritive value of edible mushrooms, medicinal value of mushrooms, advantages of mushrooms, symptoms of mushroom poisoning, morphology of common edible mushrooms, classification of fungi a brief survey, chemical composition, anti nutritional factors and shelf life of oyster mushroom , osmotic dehydration characteristics of button mushrooms, mushroom cultivation, cultivation of white button mushroom (*agaricus bisporus*), factors determining the amount of spawn needed, fungicides for mushroom diseases insecticides for mushroom pests etc.

The present book contains cultivation, processing, dehydration, preservation and canning of various species of mushrooms. It is resourceful book for agriculturists, researchers, agriculture universities, consultants etc.

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Common Morel

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**(Berk.) E. Fischer**

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**Fleecy Milk Cap**

**Lactarius vellereus (Fr.) Fr.**

**Woolly Milk Cap**

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**Xerocomus rubellus**

## Red-cracked Boletus

*Xerocomus chrysenteron* (Bull ex St. Amans) Quel

*Xerocomus subtomentosus*

(L. ex Fr.) Quel.

*Xerocomus porosporus* Imler

*Chalciporus piperatus*

(Bull. ex Fr.) Sing

*Boletus Lupinus* Fr. SS. Romagnesi

## Red-stalked Boletus

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*Boletus Luridus*

Schaeff. ex Fr.

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*Boletus Impolitus* Fr.

*Boletus aereus* Bull. ex Fr.

*Boletus Aestivalis*

(Paulet) ex Fr.

**Edible Boletus, Cepe**

**Boletus edulis Bull. ex Fr.**

**Bitter Boletus**

**Tylopilus felleus (Bull. ex Fr.) P. Karst.**

**Krombholziella Aurantiaca**

**(Bull. ex St. Amans) R. Maire**

**Krombholziella Rufescens**

**(Konr.) Sut.**

**Krombholziella Oxydabilis (Sing.) Sut.**

**Brown Birch Boletus**

**Krombholziella Scabra (Bull. ex Fr.) R. Maire**

**Paxillus involutus**

**(Batsch ex Fr.) Fr.**

**Paxillus Atrotomentosus**

**(Batsch ex Fr.) Fr.**

**False Chanterelle**

**Hygrophoropsis aurantiaca (Wulf. ex Fr.) R. Maire**

**Omphalotus Olearius**

(DC. ex Fr.) Sing.  
Gomphidius Roseus  
(Fr.) P. Karst.  
Gomphidius Glutinosus  
(Schaeff. ex Fr.) Fr.  
Chroogomphus Rutilus  
(Schaeff. ex Fr.) O.K. Miller  
Ivory Wax Cap  
Hygrophorus eburneus (Bull. ex Fr.) Fr.  
Goat Moth Wax Cap  
Hygrophorus Cossus (Sow. ex Fr.) Fr.  
Pinewood Wax Cap  
Hygrophorus Hypothejus (Fr.) Fr.  
Hygrophorus marzuolus  
(Fr.) Bres.  
Camarophyllus Pratensis  
(Pers. ex Fr.) Kumm.  
Hygrocybe nigrescens

**Omphalina epichysium**  
(Pres. ex Fr.) Quel.  
**Gerronema chrysophyllum**  
(Fr. ) Sing.  
**Laccaria amethystina**  
(Huds. ex Hook) Cooke  
**Laccaria laccata**  
(Scop. ex Fr.) Cooke  
**Clitocybe odora**  
(Bull. ex Fr.) Kumm.  
**Clitocybe clavipes**  
(Pers. ex Fr.) Kumm.  
**Clitocybe geotropa**  
(Bull. ex St. Amans) Quel.  
**Clitocybe maxima**  
(F. Wett. ex Fr.) Kumm.  
**Common Funnel Cap**

*Clitocybe gibba* (Pers. ex Fr.) Kumm.

*Clitocybe cerussata*  
(Fr.) Kumm.

*Clitocybe candicans*  
(Pers. ex Fr.) Kumm.

*Clitocybe brumalis*  
(Fr. ex Fr.) Kumm.

*Lepista nebularis*  
(Batsch ex Fr.) Harmaja

Wood Blewitt, Blulette, Blue Leg

*Lepista nuda* (Bull. ex Fr.) W. G. Smith  
Blewitt, Blulette, Blue Leg

*Lepista saeva* (Fr.) P. D. Orton

*Tricholomopsis rutilans*  
(Schaeff. ex Fr.) Sing.

*Tricholoma caligatum*  
(Viv.) Ricken

*Tricholoma colossus* (Fr.) Quel.

Tricholoma Fulvum

(DC. ex Fr.) Sacc.

Tricholoma Vaccinum

(Pers. ex Fr.) Kumm.

Tricholoma Portentosum

(Fr.) Quel.

Tricholoma flavovirens

(Pers. ex Fr.) Lund.

Tricholoma sejunctum

(Sow. ex Fr.) Quel.

Sulphurous Tricholoma

Tricholoma Sulphureum (Bull. ex Fr.) Kumm.

Tricholoma Columbetta

(Fr.) Kumm.

Tricholoma Terreum

(Schaeff. ex Fr.) Kumm.

Honey Fungus, Honey Agaric, Shoestring Mushroom

Armillaria mellea (Vahl. ex Fr.) Kumm.



Lyophyllum connatum  
(Schum. ex Fr.) Sing  
Lyophyllum fumosum  
(Pers. ex Fr.) Orton  
Tephrocybe atrata  
(Fr. ex Fr.) Donk  
St. George Mushroom  
Calocybe gambosa (Fr.) Donk  
Giant Clitocybe  
Leucopaxillus giganteus (Sibth. ex Fr.) Sing.  
Melanoleuca brevipes  
(Bull. ex Fr.) Pat.  
Catathelasma imperiale  
(Fr.) Sing.  
Wood Woolly-foot  
Collybia Peronata (Bolt. ex Fr.) Kumm.  
Russet Shank  
Collybia Dryophila (Bull. ex Fr.) Quel.

**Greasy Tough Shank**

*Collybia butyracea* (Bull. ex Fr.) Quel.

**Spotted Tough Shank**

*Collybia maculata* (Alb. et Schw. ex Fr.) Kumm.

**Hohenbuehelia Petaloides**

(Bull. ex Fr.) Schulz.

**Megacollybia Platyphylla**

(Pers. ex Fr.) Kotl. et Pouz.

**Slimy Beech Tuft**

*Oudemansiella mucida* (Schrad ex Fr.) Hoehn.

**Rooting Shank**

*Oudemansiella radicata* (Relhan ex Fr.) Sing.

**Strobilurus Esculentus**

(Wulf. ex Fr.) Sing.

**Little Wheel Toadstool**

*Marasmius rotula* (Scop. ex Fr.) Fr.

*Marasmius scorodonius* (Fr.) Fr.

Fairy Ring Fungus, Fairy Ring Champignon, Scotch Bonnet

*Marasmius oreades* (Bolt. ex Fr.) Fr.

Lilac *Mycena*

*Mycena pura* (Pers. ex Fr.) Kumm.

*Mycena rosea*

(Bull.) ex Sacc. et Dalla Costa

*Mycena fagetorum*

(Fr.) Gill.

*Xeromphalina campanella*

(Batsch ex Fr.) R. Maire

Velvet Shank, Winter Fungus

*Flammulina velutipes* (Curt. ex Fr.) Sing.

The Miller

*Clitopilus prunulus* (Scop. ex Fr.) Kumm.

*Nolanea verna*

(Lundell) Kotl. et Pouz.

Livid *Entoloma*

*Entoloma lividum* (Bull. ex St. Amans) Quel.

**Entoloma nidorosum**

**(Fr.) Quel.**

**Entoloma hirtipes**

**(Schum. ex Fr.) Moser**

**Volvariella speciosa**

**(Fr.) Sing.**

**Pluteus cervinus**

**(Schaeff. ex Fr.) Kumm.**

**Grisette**

**Amanita vaginata (Bull. ex Fr.) Vitt**

**Amanita umbrinolutea Secr.**

**Fly Agaric**

**Amanita muscaria (L. ex Fr.) Hook**

**Amanita regalis**

**(Fr.) Michael**

**Caesar Mushroom, Imperial Mushroom**

**Amanita caesarea (Scop. ex Fr.) Grev.**

**Panther Cap**

*Amanita pantherina* (DC. ex Fr.) Krombh.

*Amanita gemmata*  
(Fr.) Gill.

Death Cap

*Amanita phalloides* (Fr.) Link

Destroying Angel

*Amanita virosa* (Fr.) Bertillon

False Death Cap

*Amanita citrina* (Schaeff) ex Roques

*Amanita porphyrea*

(Alb. et Schw. ex Fr.) Schummel

*Amanita spissa* (Fr.) Opiz

Blusher

*Amanita rubescens* (Pers. ex Fr.) S. F. Gray

*Agaricus brunnescens* Peck

Red-staining Agaric Wood Mushroom

*Agaricus silvaticus* (Schaeff. ex Krombh) Kumm.

Common Field Agaric, Meadow Mushroom

*Agaricus campestris* L. ex Fr.

*Agaricus augustus* Fr.

*Agaricus abruptibulbus* Peck

Horse Agaric, Horse Mushroom

*Agaricus arvensis* Schaeff. ex Fr.

Yellow Stainer

*Agaricus xanthoderma* Genev.

*Lepiota cristata*

(Alb. et Schw. ex Fr.) Kumm.

*Lepiota clypeolaria*

(Bull. ex Fr.) Kumm.

Parasol Mushroom

*Macrolepiota procera* (Scop ex Fr.) Sing.

Shaggy Parasol

*Macrolepiota rhacodes* (Vitt.) Sing

*Macrolepiota excoriata*

(Schaeff. ex Fr.) Acker-Sch.

*Cystoderma amianthinum*

(Scop. ex Fr.) Maubl

*Cystoderma cinnabarinum*

(Alb. et Schw. ex Fr.) Maubl

Shaggy Mane, Shaggy Cap, Lawyer Wig

*Coprinus Comatus* (Mull. ex Fr.) S. F. Gray

Common Ink Cap

*Coprinus atramentarius* (Bull. ex Fr.) Fr.

Glistening Ink Cap

*Coprinus micaceus* (Bull. ex Fr.) Fr.

*Panaeolus papilionaceus*

(Bull. ex Fr.) Quel.

*Psathyrella candolleana*

(Fr. ex Fr.) R. Maire

*Psathyrella velutina*

(Pers. ex S. F. Gray) Sing.

Yellow Cow-pat Toadstool

*Bolbitius vitellinus* (Pers. ex Fr.) Fr.



**Agrocybe dura**

**(Bolt. ex Fr.) Sing.**

**Agrocybe praecox**

**(Pers. ex Fr.) Sing.**

**Stropharia rugosoannulata**

**Farlow in Murrill**

**Verdigris Agaric**

**Stropharia aeruginosa (Curt. ex Fr.) Quel.**

**Stropharia albonitens (Fr.) P. Karst.**

**Brick Red Hypholoma, Bricktop, Bricktop Mushroom**

**Hypholoma sublateritium (Fr.) Quel.**

**Sulphur Tuft**

**Hypholoma fasciculare (Huds. ex Fr.) Kumm.**

**Hypholoma capnoides**

**(Fr. ex Fr.) Kumm.**

**Psilocybe semilanceata**

**(Fr. ex Weinm) Kumm.**

**Pholiota destruens**

(Brond) Gill.

**Shaggy Pholiota**

**Pholiota squarrosa (Pers. ex Fr.) Kumm.**

**Pholiota carbonaria (Fr.) Sing.**

**Gymnopilus spectabilis (Fr.) Sing**

**Gymnopilus sapineus (Fr.) R. Maire**

**Kuehneromyces mutabilis**

(Schaeff. ex Fr.) Sing. et Smith

**Tubaria conspersa (Pers. ex Fr.) Fayod**

**Crepidotus variabilis**

(Pers. ex Fr.) Kumm.

**Inocybe patouillardii Bres**

**Inocybe fastigiata**

(Schaeff. ex. Fr.) Quel.

**Inocybe argillacea (Pers. ex Pers.) Sing.**

**Inocybe lacera (Fr.) Kumm.**

*Hebeloma radicosum* (Bull. ex Fr.) Ricken

Jew Ear, Judas Ear

*Hirneola auricula-judae* (Bull. ex St. Amans) Berk.

Yellow Brain Fungus, Witches Butter

*Tremella mesenterica* Retz. ex Hook.

Yellow Chanterelle Pixie Stool

*Cantharellus cibarius* Fr. ex Fr.

*Cantharellus tubaeformis*

Bull. ex Fr.

Oyster Fungus, Oyster-cap Fungus, Oyster Mushroom

*Pleurotus ostreatus* (Jacq. ex Fr.) Kumm.

*Lentinus Lepideus*

(Fr. ex Fr.) Fr.

## 25. GLOSSARY OF BASIC MYCOLOGICAL TERMS

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# Contact us

**Niir Project Consultancy Services**

**106-E, Kamla Nagar, New Delhi-110007, India.**

**Email: [npcs.ei@gmail.com](mailto:npcs.ei@gmail.com) , [info@entrepreneurindia.co](mailto:info@entrepreneurindia.co)**

**Tel: +91-11-23843955, 23845654, 23845886**

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- *Technology Books and Directory*
- *Databases on CD-ROM*
- *Laboratory Testing Services*
- *Turnkey Project Consultancy/Solutions*
- *Entrepreneur India (An Industrial Monthly Journal)*



# How are we different ?

- *We have two decades long experience in project consultancy and market research field*
- *We empower our customers with the prerequisite know-how to take sound business decisions*
- *We help catalyze business growth by providing distinctive and profound market analysis*
- *We serve a wide array of customers , from individual entrepreneurs to Corporations and Foreign Investors*
- *We use authentic & reliable sources to ensure business precision*



# Our Approach



**Requirement collection**

**Thorough analysis of the project**

**Economic feasibility study of the Project**

**Market potential survey/research**

**Report Compilation**



# Who do we serve?

- *Public-sector Companies*
- *Corporates*
- *Government Undertakings*
- *Individual Entrepreneurs*
- *NRI's*
- *Foreign Investors*
- *Non-profit Organizations, NBFC's*
- *Educational Institutions*
- *Embassies & Consulates*
- *Consultancies*
- *Industry / trade associations*



# Sectors We Cover

- *Ayurvedic And Herbal Medicines, Herbal Cosmetics*
- *Alcoholic And Non Alcoholic Beverages, Drinks*
- *Adhesives, Industrial Adhesive, Sealants, Glues, Gum & Resin*
- *Activated Carbon & Activated Charcoal*
- *Aluminium And Aluminium Extrusion Profiles & Sections,*
- *Bio-fertilizers And Biotechnology*
- *Breakfast Snacks And Cereal Food*
- *Bicycle Tyres & Tubes, Bicycle Parts, Bicycle Assembling*





- *Bamboo And Cane Based Projects*
- *Building Materials And Construction Projects*
- *Biodegradable & Bioplastic Based Projects*
- *Chemicals (Organic And Inorganic)*
- *Confectionery, Bakery/Baking And Other Food*
- *Cereal Processing*
- *Coconut And Coconut Based Products*
- *Cold Storage For Fruits & Vegetables*
- *Coal & Coal Byproduct*

- *Copper & Copper Based Projects*
- *Dairy/Milk Processing*
- *Disinfectants, Pesticides, Insecticides, Mosquito Repellents,*
- *Electrical, Electronic And Computer based Projects*
- *Essential Oils, Oils & Fats And Allied*
- *Engineering Goods*
- *Fibre Glass & Float Glass*
- *Fast Moving Consumer Goods*
- *Food, Bakery, Agro Processing*

- *Fruits & Vegetables Processing*
- *Ferro Alloys Based Projects*
- *Fertilizers & Biofertilizers*
- *Ginger & Ginger Based Projects*
- *Herbs And Medicinal Cultivation And Jatropha (Biofuel)*
- *Hotel & Hospitability Projects*
- *Hospital Based Projects*
- *Herbal Based Projects*
- *Inks, Stationery And Export Industries*

- *Infrastructure Projects*
- *Jute & Jute Based Products*
- *Leather And Leather Based Projects*
- *Leisure & Entertainment Based Projects*
- *Livestock Farming Of Birds & Animals*
- *Minerals And Minerals*
- *Maize Processing(Wet Milling) & Maize Based Projects*
- *Medical Plastics, Disposables Plastic Syringe, Blood Bags*
- *Organic Farming, Neem Products Etc.*

- *Paints, Pigments, Varnish & Lacquer*
- *Paper And Paper Board, Paper Recycling Projects*
- *Printing Inks*
- *Packaging Based Projects*
- *Perfumes, Cosmetics And Flavours*
- *Power Generation Based Projects & Renewable Energy Based Projects*
- *Pharmaceuticals And Drugs*
- *Plantations, Farming And Cultivations*
- *Plastic Film, Plastic Waste And Plastic Compounds*
- *Plastic, PVC, PET, HDPE, LDPE Etc.*

- *Potato And Potato Based Projects*
- *Printing And Packaging*
- *Real Estate, Leisure And Hospitality*
- *Rubber And Rubber Products*
- *Soaps And Detergents*
- *Stationary Products*
- *Spices And Snacks Food*
- *Steel & Steel Products*
- *Textile Auxiliary And Chemicals*

- *Township & Residential Complex*
- *Textiles And Readymade Garments*
- *Waste Management & Recycling*
- *Wood & Wood Products*
- *Water Industry(Packaged Drinking Water & Mineral Water)*
- *Wire & Cable*

# Contact us

**Niir Project Consultancy Services**

**106-E, Kamla Nagar, New Delhi-110007, India.**

**Email: [npcs.ei@gmail.com](mailto:npcs.ei@gmail.com) , [info@entrepreneurindia.co](mailto:info@entrepreneurindia.co)**

**Tel: +91-11-23843955, 23845654, 23845886**

**Mobile: +91-9811043595**

**Fax: +91-11-23841561**

**Website :**

**[www.niir.org](http://www.niir.org)**

**[www.entrepreneurindia.co](http://www.entrepreneurindia.co)**

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# THANK YOU!!!

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