



**GOVERNMENT DEGREE COLLEGE FOR MEN
SRIKAKULAM**

DEPARTMENT OF BOTANY

(AFFILIATED TO Dr. BRAU, SRIKAKULAM, AP)

(2022-2023)

Project work

ON

MUSHROOMS



GOVERNMENT DEGREE COLLEGE FOR MEN SRIKAKULAM

(Affiliated to Dr BR Ambedkar University, Srikakulam. AP)

DEPARTMENT OF BOTANY

CERTIFICATE

This is to certify that Mr/Kum _____
of III BSc, Group _____ has done the project
work on **“MUSHROOMS”** with the Registered number
_____ of **Sem-VI, Paper-VII** during the
academic year **2022-2023**.

Signature of the Lecturer

Signature of the HOD

Submitted for the exam on - _____

Examiners

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1. LIST OF SOME EDIBLE MUSHROOMS

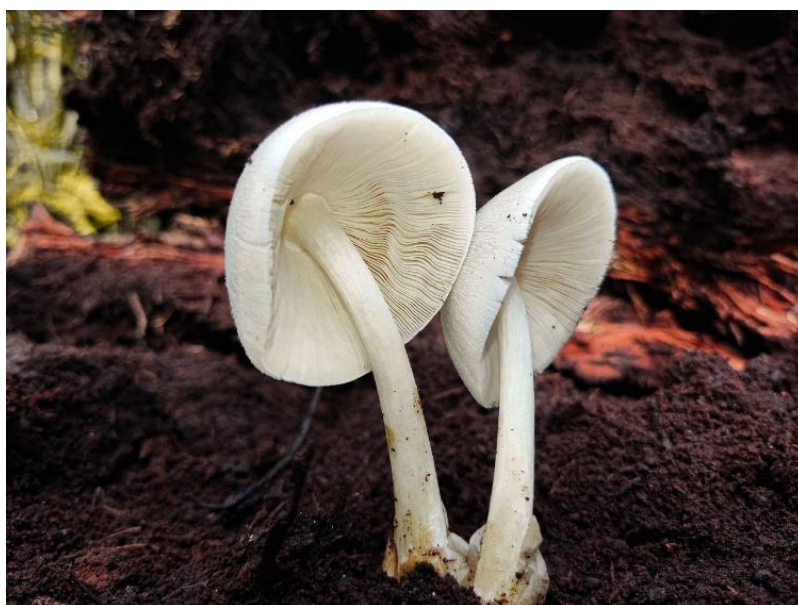
S.NO	BOTANICAL NAME	COMMON NAME
1	<i>Agaricus bisporus</i>	Button mushroom
2	<i>Volvariella volvacea</i>	Paddy straw mushroom
3	<i>Pleurotus soar-caju</i>	Oyster mushroom
4	<i>Lentinus edodes</i>	Shiitake mushroom
5	<i>Morchella esculenta</i>	Morel mushroom
6	<i>Flammulina filiformis</i>	Enoki mushroom
7	<i>Hericium erinaceus</i>	Lion's mane mushroom
8	<i>Hydnum repandum</i>	Hedgehog mushroom
9	<i>Boletus edulis</i>	Porcini mushroom
10	<i>Grifola frondosa</i>	Maitake mushroom

EDIBLE MUSHROOMS

1. *Agaricus bisporus* (Button mushroom)



2. *Volvariella volvacea* (Paddy straw mushroom)



EDIBLE MUSHROOMS

3. *Pleurotus soar-caju* (Oyster mushroom)



4. *Lentinus edodes* (Shiitake mushroom)



EDIBLE MUSHROOMS

5. *Morchella esculenta* (Morel mushroom)



6. *Flammulina filiformis* (Enoki mushroom)



EDIBLE MUSHROOMS

7. *Hericium erinaceus* (Lion's mane mushroom)



8. *Hydnum repandum* (Hedgehog mushroom)



EDIBLE MUSHROOMS

9. *Boletus edulis* (Porcini mushroom)



10. *Grifola frondosa* (Maitake mushroom)



2. LIST OF SOME POISONOUS MUSHROOMS

S.NO	BOTANICAL NAME	COMMON NAME
1	<i>Amanita phalloides</i>	Death cap
2	<i>Amanita muscaria</i>	Fly Agaric
3	<i>Boletus satanus</i>	Devil's Bolete
4	<i>Conocybe filaris</i>	Fool's cone cap
5	<i>Cortinarius rubellus</i>	Deadly web cap
6	<i>Omphalotus illudens</i>	Jack-O' lantern
7	<i>Chlorophyllum molybdites</i>	False parasol
8	<i>Echinoderma asperum</i>	Freckled dapperling
9	<i>Hypholoma lateritium</i>	Brick cap
10	<i>Scleroderma citrinum</i>	Earth ball

POISONOUS MUSHROOMS

1. *Amanita phalloides* (Death cap)



2. *Amanita muscaria* (Fly Agaric)



POISONOUS MUSHROOMS

3. *Boletus satanus* (Devil's Bolete)



4. *Conocybe filaris* (Fool's cone cap)



POISONOUS MUSHROOMS

5. *Cortinarius rubellus* (Deadly web cap)



6. *Omphalotus illudens* (Jack-O' lantern)



POISONOUS MUSHROOMS

7. *Chlorophyllum molybdites* (False parasol)



8. *Echinoderma asperum* (Freckled dapperling)



POISONOUS MUSHROOMS

9. *Hypholoma lateritium* (Brick cap)



10. *Scleroderma citrinum* (Earth ball)



3. Introduction of Mushrooms

Most of the Mushrooms are that fast growing **Basidiomycetous fungi** which produce fleshy fruit bodies. However, in general the word 'Mushrooms' denotes fruit bodies of such fungi. The mushrooms may be button-like or fan-like or umbrella-shaped. They are rich in proteins, vitamins and minerals. So they are used as energy rich food.

These fungi live as saprophytes in dead organic matter in the form of a mat of interwined hyphae. The hyphae produce white tiny balls called buttons. The buttons consist of a short stalk and a cap called **Pileus**. The buttons get opened towards maturity and forms mature fruit bodies or **Basidiocarps or Mushrooms**.

There are about **100 species of Edible mushrooms** all over the world. However, a few following **Edible species** are being cultivated in large scales:

1. *Agaricus bisporus* (White button mushroom)
2. *Lentinus edodes* (Shiitake or Japanese mushroom)
3. *Volvariella volvacea* (Paddy straw mushroom or Chinese mushroom)
4. *Pleurotus sajor-caju* (Dhingri or Indian oyster mushroom)
5. *Pleurotus ostreatus* (American oyster mushroom)
6. *Auricularia polytricha* (Jew's ear mushroom or wood ear)
7. *Flammulina velutipes* (Winter mushroom)
8. *Pholieta nameko* (Nameko mushroom)

4. Nutritive Value of Edible Mushrooms

1. Mushrooms are superior to many vegetables and beans in their nutritive value. Fresh mushrooms contain about 88.5% water and 3.2% protein. But in dried mushrooms water contents is low and protein level is as high as 34-44%. This protein level is superior to that in most vegetables, beans, peas, fruits, fishes, goat's meat and chicken. Mushroom protein has all essential amino acids in large proportions. The digestibility of mushroom protein is also high (70%).

2. Mushrooms contain about 4.2%-4.4% carbohydrates. The carbohydrates contents is very low when compared to that in beans, peas and vegetables. Crude fibre contents is as high as in vegetables. So it can be provided to diabetic patients. The fat content is less than 0.3%. It is less than that in fish, meat, egg and milk. The fat is rich in ergosterol which is involved in the biosynthesis of vitamin-D in human body.

3. Mushrooms contain high proportion of Thiamine, Ribo- flavin, Niacin and Ascorbic acid.

4. They are also rich in minerals such as Ca, P, Fe, Na and K.

5. Medicinal Value of Mushrooms

1. Fresh mushrooms contain least amount of fat so they can be given to patients suffering from Hyperlipideamia (High blood lipids) & Hypercholesterolemia (High cholesterol).

2. They have less carbohydrates so they are believed to be suitable for diabetic patients.

3. The mushroom *Lentinus edodes* has antitumour property as well as antiviral property.

These properties are due to the presence of lentinans & Emitanin-I in the mushrooms.

Pleurotus sajor-caju also shows some antitumour activity.

4. *Lentinus edodes* reduces high BP, gall stones and numbness of hands & feet.

6. Advantages of Mushrooms

Mushrooms have the following advantages over conventional protein sources and SCP.

- i) Mushrooms can be cultivated in agrowastes, black soils, paper wastes and so on.
- ii) They can be cultivated in a small space without sophisticated instruments, fermenters and complicated chemicals.
- iii) Simple guidance is enough for mushroom culture. Farmers can grow mushrooms in their own land without much skill.
- iv) Mushrooms can be substituted for conventional protein sources such as fish, meat and eggs which are too expensive. They are suitable source of protein for under nutritioned poor people.
- v) Mushroom cultivation converts agrowastes into a good quality manure to enrich the fertility of the soil.

7. How to Avoid Discomfort While Eating Mushrooms?

Edible mushrooms generally do not cause discomfort to the consumers. However, some species cause indigestion and allergy to some healthy people while they are harmless to many people. Mushroom lovers are advised to take the following precautions to avoid discomforts while eating mushrooms-

- i) Indigestible food should be avoided while eating mushrooms.
- ii) Alcoholic drinks should be avoided while eating mushrooms as they cause illness to the consumers.
- iii) Before going to eat a species for the first time, a small piece should be eaten to observe its acceptability.
- iv) Eating bulk amount for the first time should strictly be avoided.

8. Poisonous Mushrooms

Several mushrooms contain toxins called mushroom toxins in their fruit bodies.

Mushroom toxins are poisonous to man. The mushrooms which are not accepted by human body, are known as Poisonous mushrooms or Toadstools. Toadstools do not cause infectious disease in man and domestic animals. But the mushroom toxins cause many disorders in man and even death may result. Generally speaking, coloured mushrooms and mushrooms growing on trees and rotten animal materials are poisonous.

Some common deadly poisonous mushrooms and their toxins are mentioned below:

Name of Toadstools	Mushroom toxin/s
<i>Amanita phalloides</i> (Death cap)-----	Phallotoxins & Amatoxins-
<i>Amanita verna</i> (Fool's cap)-----	Phallotoxins & Amatoxins
<i>Amanita virosa</i> (Destroying angel)-----	Phallotoxins & Amatoxins
<i>Amanita muscaria</i> (Fly fungus) -----	Muscarine, Mucimol, Muscazone
<i>Galerina autumnalis</i> -----	Cyclopeptides
<i>Galerina venerata</i> -----	Cyclopeptides
<i>Galerina sulciceps</i> -----	Cyclopeptides
<i>Helvella esculenta</i> -----	Gyromitrin
<i>Cortinarius orellanus</i> (Inky cap)-----	Orellanine
<i>Tricholoma muscarium</i> -----	Tricholomic acid
<i>Psilocybe mexicana</i> (Sacred fungi)-----	Psilocybin & Psilocin.

9. Distinctive Features of Poisonous Mushrooms

Poisonous mushrooms look like edible mushroom in their morphology and life cycle. However, they can be distinguished by the following features:

1. Brightly coloured fruit bodies.
2. Greenish tinge on gills and yellow-green spores.
3. Pink coloured spores in gills.
4. Presence of vulva and annulus on the stalk.
5. Oozing of milky or coloured latex from damage portions.
6. Unpleasant odour.

10. Symptoms of Mushroom Poisoning

The symptoms of mushroom poisoning appear only after 8-24 hours of ingesting poisonous mushrooms. By that time the mushroom is fully digested and toxin there in is fully absorbed by the body. So neither vomiting or stomach pump can help to save the life. Mushroom poisoning in most cases therefore leads to death. Mushroom poisoning shows the following symptoms-

- i) Nervous disorder
- ii) Gastric disorder
- iii) Haemolysis
- iv) Muscular disorder
- v) Damage in liver cells.

11. How to Avoid Mushroom Poisoning?

In order to avoid mushroom poisoning, mushroom lovers are advised to take the following precautions:

1. Gathering wild mushrooms should be avoided, as there is a chance to collect poisonous mushrooms unknowingly.
2. Diseased, aged and insect infested mushrooms should be avoided.
3. Uncooked mushrooms should not be eaten.
4. Before going to eat a species for the first time, a small piece of the mushroom should be eaten for knowing its acceptability by the body. Eating bulk amount for the first time should be strictly avoided.

12. Storage Methods of Mushrooms

Mushrooms are very soft type of plant materials liable to perish immediately after harvest. This is mainly due to enzymatic actions and high rate of respiration. Because of these reasons, mushrooms develop brown colour on their surface and emit an unpleasant odour. Therefore, mushrooms are cooked in fresh.

The following methods are adopted to preserve mushrooms for future use:

1. Blanching: In this method fresh mushrooms are kept immersed in a liquid mix containing rice starch, xanthan gum, egg white and water for a few minutes. Then they are immersed in boiling water for 2 minutes. Boiling destroys the enzyme activity.

Meantime, the liquid mix adds taste, odour and texture to the mushroom. In this method mushrooms can be preserved in a refrigerator for more than a week.

2. Steeping: J.S. Pruthi et al. (1978) have formulated a steeping solution having 1% Potassium meta sulphite (KMS) and 0.2% citric acid. The blanched mushrooms are immersed in the steeping solution overnight and dried in the sun. In this method mushrooms can be preserved for more than 6 months.

3. Sun Drying:

Mushrooms are directly dried in the sun until they attain 12% moisture. Then they are preserved in air tight metal containers. By this method mushrooms can be stored up to a year.

4. Canning:

The preservation of mushrooms by canning is called Appertization. The harvested mushrooms are washed with a wash solution containing 0.1 citric acid and 0.3% sodium meta sulphite. The washed mushrooms are kept immersed in boiling water for 2 minutes. After blanching, the mushrooms are dipped in a solution containing 1% sodium chloride and 0.5% citric acid. This chemical treatment reduces the weight of the mushrooms. The mushrooms are later placed into a metal can containing salt solution and the can is kept in boiling water for some time. The can is then sealed and kept dipped in cool water. Such cans can be stored for about 6 months.

5. Pickling:

1.T. Zhunk and colleagues (1991) have adopted pickling method to preserve mushrooms. The harvested mushrooms are washed and blanched in boiling water for 5 minutes. They are cooled and placed in 60% brine solution. The temperature of the vessel is maintained at 15-20°C for 10-15 days. Then about 3.3% sugar is added to the brine salt solution. By this method, mushrooms can be stored for 3 months.

6. Freeze Drying:

Harvested mushrooms are kept in a refrigerator at - 20°C for one day and then immersed in salt solution for dehydration. The mushrooms are gently heated for 12-16 hours to remove about 90% water from them. Then they are kept in a refrigerator for future use. The freeze & dried mushrooms seem to be fresh. but light in weight.

THE END