
**MAHARAJA DHIRAJ UDAY CHAND
WOMEN'S COLLEGE**

**HEALTH BENEFITS OF OYSTER MUSHROOM
AN OVERVIEW ON WEALTH TO HEALTH**

**DISSERTATION PRESENTED BY
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REGISTRATION NO- 202001010200 OF 2020-2021

B.SC, SEM-VI (GEN)

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ABSTRACT

Pleurotus mushrooms are the most popular edible fungi which is suitable for wide range of age group. It produces high quantity of quality food which has high biological value grown on many substrates. Mushrooms constitute an integral part of the normal human diet and in recent times, the amounts of consumption have been raised greatly, which includes variety of species. Mushrooms of Pleurotus genus are popularly consumed all over the world due to their taste, flavour, high nutritional values, and some medicinal properties. Pleurotus genus are famous precious functional food ingredients due to the calories, carbohydrates, fat and sodium etc. Side by side, they offer crucial nutrients including amino acids, physiologically important, fatty acids, dietary fibers, important minerals, proteins, riboflavin, Selenium, Potassium, niacin and some vitamins. Several species of this mushrooms have been reported to have anticancer, anti-aging, anti-hypertensive, anti-hypercholesterolemic, anti-diabetic, anti-obesity, anti-oxidant, hepatoprotective, anti-microbial, anti-allergic, anti-viral activities. The high nutritional value and potential medicinal uses suggest that the Pleurotus mushrooms are important functional foods or nutraceuticals. This project has focussed the medicinal importances of different species of Pleurotus and also highlighted the cultivation process of the mushrooms in nutshell.

Oyster Mushroom Classification

Kingdom: Fungi

Division: Basidiomycota.

Class: Agaricomycetes.

Order: Agaricales

Family: Pleurotaceae.

Genus: Pleurotus.

Species: Pleurotus ostreatus.

(Jacq. ex Fr.) P. Kumm. (1871.)



INTRODUCTION

Mushroom is fleshy spore-bearing organ or fruiting body of higher fungi belonging to Basidiomycotina and rarely to Ascomycotina which can either be epigeous or hypogeous. The mushrooms were used as food since long back, probably from 3000 B.C. as per ancient India literature since that time, the mushrooms are being consumed in different countries like Greece, Egypt, France etc. The Greeks and Romans described mushrooms as "Food for the god". During that period, people consumed the mushrooms after collecting them from their natural habitat.

The part we see and call a mushroom is really just the fruiting body of fungus. The main body is thread like mycelium present under the substratum. Mushroom do not contain chlorophyll and obtain their own food from decay of organic matter on which they grow. Majority of mushrooms are saprophytes, yet there are some mushrooms which grow as parasites or in symbiotic association with living plants, like plant roots as mycorrhizas. Mushrooms are described as highly tasty and nutritious food by many populations around the world.

Mushrooms have been used traditionally by ancient people as a source of foods and in their religious activities. Mushrooms nutritionally contain carbohydrate, protein, Vitamins, essential-oil, fibers, unsaturated fatty acid, enzymes and minerals. They considered as a good source for many bioactive compounds that used for medical purpose. Among the most cultivated edible fungi, Pleurotus is a particularly interesting genus due to its nutraceutical properties linked to the polysaccharide fraction. Many studies on the health effects of pleurotus species have been report, such as immune-stimulating activity, antimicrobial and antiviral, hypoglycemic, anti-cancer, neuroprotective activities, hypocholesterolemic, anti-neoplastic, hypotensive, anti-inflammatory anti-oxidant and hepatoprotective affects and anti-allergic properties.

Health Benefits of Oyster Mushroom

- Rich in Minerals
- Rich Vitamin - D source



- Low in calories, Fat
- High in Fibers, Protein
- Boosts Immune system.
- Prevents Cancer, Good for Diabetes, Reduces Blood Pressure.
- Manages weight, Increases Metabolism.



Oyster mushroom are second most popular mushroom in the world due to its ease of cultivation. Oyster mushroom can be cultivated on any low-cost lignocellulosic waste (agricultural, horticultural, domestic waste or any weed.)

The aim of this study is to review the medicinal properties of various species of pleurotus mushroom and to highlight the cultivation process of oyster mushroom.

Methodology

Studies on the medicinal properties and health effects of various species of pleurotus mushroom by researchers have been reviewed by searching literatures in the Google :- 'Research Gate', 'Science Direct', 'PubMed' by using search terms as pleurotus, oyster mushroom, medicinal value, medicinal properties, active principle, health benefit etc.

Oyster Mushroom



↑ Pleurotus Florida



↑ Pleurotus ostreatus

Result and Discussion

Above study on medicinal values of different *pleurotus* spp in this review will increase the public awareness about the medicinal properties of oyster mushroom and make them enthusiastic about the cultivation of this mushroom. The beneficial health effect and positive medicinal properties of *pleurotus* spp. are evident from the published research works. which are summarized along with the active principles in the following table:-

- The nutritional values of *pleurotus* species of *p. florida* is very popular among the mushrooms cultivated in Bangladesh have been determined. This mushroom is rich in proteins (20-25%) and fibers (22-23%) and contain a lower amount of lipid (4 to 4.5%). The carbohydrate contents range from (39 to 43%) (on the basis of dry weight). *pleurotus* *florida* also rich in mineral contents (total ash content is 8-9.5%). *pleurotus* *florida* has anti-oxidant and anti-tumor activities in experimental animals (Nayana, Jamardhanan K.K (2000)).
- *Pleurotus ostreatus* mushroom contain substances that exert direct or indirect anti-viral effect as a result of immune stimulatory activity (Braantl and piraino 2000). The anti-viral activity was due to binding of sulphated & glucans to viral particles thereby preventing them from infecting the host cells. Not only intracellular proteins of *p. ostreatus* but its extra cellular extract also contains polysaccharides that have immuno-modulating effects.



↑ Pleurotus Giganteus



↑ Pleurotus Erynginus



↑ Pleurotus Djamora.



↑ Pleurotus Sajor-Caju.

- Pleurotus sajor-caju is very popular mushroom. This mushrooms is rich in Mg (30.06%), Fe (0.91%), Mn (1.19), Cu (0.37%) Zn (0.68%). This mushroom also rich in proteins having polysaccharide, xylo-glucan, Xyloproteins. P. sajor-caju has Anti-tumor activity in experimental (S.T. Chang, J.A. Buswell, and S.W. Chiu) mushroom Biology and mushroom products.
- The Pleurotus djamor mushroom another name is pink oyster mushroom. The yield of dried mushroom power was 8.54%. oil absorption capacity was 3.34 ml/g and swelling index was 0.33 ml/gm qualitative analysis of myco-constituents revealed that tannins, flavonoids, terpenoids, cardiac glycoside and saponins were present in P. djamor. P. djamor power can be used for lowering the risk of life style diseases including diabetes as well as alleviating malnutrition. P. djamor has Antioxidant determination by the use of stable free radicals. (Biose M.S (2000).
- Pleurotus Eryinus has been shown that the wood rotting. It is able to effectively produce cellulases, xylanase, laccase, and manganese. Peroxidase in submerged fermentation of mandarin peels and tree leaves. Gradual increasing of lignocellulosis substrates concentration from 1 to 4-6% enhanced enzyme accumulation in culture liquid. It has lignocellulolytic enzyme activities of medicinally important basidiomycetes from different ecological niches. (Mikiashvili, Wasser, Nevo, Eliashvili (2004)
- Diabetes mellitus is one of the most common disease that in fact people around the world the disease is caused by a defect of B cells of islets of Langerhans of the pancreas to produce insulin that control blood sugar, Approximatery 150 million



↑ Hypsizygus Ulmarius



↑ Pleurotus Flabellatus



↑ Pleurotus Nebrodensis

- People around the world suffering from diabetes mellitus and it is expected that the number will increase to 300 million in 2025. *Hypsizygus ulmaris* has anti-diabetic Activity. Antidiabetic effect of aqueous extract of *Hypsizygus ulmaris* on streptozotocin Nicotinamide induced diabetic rats. (Meeraks, Dr. G. Sudha, Rajathi K, Manjusa GV. (2011))
- Pleurotus flabellatus is an edible mushroom. possessing high nutritive as well as medicinal values. preliminary mycochemical screening revealed the presence of secondary metabolites such as flavonoids, diterpenoids, triterpenoids, alkaloids, phenols, carbohydrates, proteins, etc. *P. flabellatus* exhibited broad-spectrum of anti-microbial activity against test pathogens probably due to presence of several bioactive compounds that may serve as potential anti-microbial agents. [Yamashita, Bilgili F (2006)].
- The mushroom pleurotus nebrodensis hemolysin is a monomeric protein with a molecular weight of approximately 27K Da as determined by gel filtration and SDS-PAGE. It was found that this hemolysin induced apoptosis in L929. Moreover, this hemolysin was shown to possess anti-HIV-1 activity in CEM cell culture. A variety of proteins like ubiquitin-like proteases, proteoglycans, ribosome activating proteins have been isolated from this mushroom. [AN, Tie, Liu, Jin, Zhi, Wu, Chuan-Fang (2006)].
- Pleurotus salmonic stramineus or *Pholiota nameko*, is determined, Protein Sugars and fat contents ranged between 16.2 to 26.6, 52.7 to 64.9 and 2.3 to 3.5 g/100g dry mushroom, respectively. and also great source of polysaccharides, (37-48%) fibers (13-24%) vitamins and minerals and some secondary metabolites, including phenolic compounds, polyketides, terpenes and steroids etc. From the health perspective mushroom have been recognized for anti-bacterial and anti-viral properties. [Wani BA, Bodha RH, Wani AH (2010)]



↑ Pleurotus Salmonicolor
Stramineus.



↑ Pleurotus Nebrodensis

- Two strains of Pleurotus giganteus (commercial and wild) were tested for their ability to induce neurite out growth in rat pheochromocytoma (PC12) and mouse neuroblastoma (N2a) cells. It has linoleic acid present in the ethanol extract promoted NGF biosynthesis when augmented with low concentration of NGF (5 mg/ml). The two strains of mushroom were found to be high in protein (1st- 192 g kg⁻¹), total polysaccharides phenolics, and flavonoids as well as vitamins B1, B2 and B3. Pleurotus giganteus has the anti-oxidant and anti-candida activity. To conclude, P. giganteus could potentially be used in well balanced diet as a source of dietary anti-oxidant to promote neuronal health.

[C.W. Phan, G.H. Lee, J.G. Maereadic, S. Malek, (2013)].

Name of mushrooms	Medicinal value	Journals	Reference
1. <i>Pleurotus ostreatus</i>	Anti-viral	World Journal 2012	Brandt and piraino (2000)
2. <i>Pleurotus Florida</i>	Anti- oxidant and Anti-tumour	Bangladesh - 2007	Nayana, Janardhanan K.K (2000)
3. <i>Pleurotus sajor-caju</i> .	Anti-tumour	Journal of Mycology 2016	S.T. Chang, J.A. Buswell and S.W. chiu. (1993)
4. <i>Pleurotus Eryngii</i>	Anti- oxidative and Anti-tumour	Journal of Korean Science- 2004	Kimjy, Kang H1, Park Ku (2004)
5. <i>Pleurotus cornu-copiae</i> .	Anti-cancer	Agricultural and food chemistry-2013.	Singh Shreya, Shreyans and Jain- (2023).
6. <i>Pleurotus Djamor</i> .	Anti- oxidant and Hypoglycemic Agent.	Medicinal Mushrooms 2021.	Bloise MS. (2000).
7. <i>Pleurotus cystidiosus</i>	Anti- oxidative Activity.	International Journal of Medicinal Mushrooms 2012	Menikpwage I, Soysa SSS BDP, Abeytunga DTU, (2008).
8. <i>Pleurotus Eryinus</i>	Lignocellulolytic enzymes.	Enzymes and Microbial technology - 2006	Mikashvili, Wassers SP, Nevo E, Elisashvili - (2004).
9. <i>Pleurotus pulmonarius</i> .	Anti-viral, Anti-bacterial and hepatoprotective	International Journal of Medicinal Mushrooms (2011)	Jaeg. Fr, P. Kumm. (2000).
10. <i>Pleurotus citrinopileatus</i>	Anti-hypelipidemic and Anti-oxidant effects.	International Journal of Medicinal Mushrooms - (2022)	Hu SH, Liang ze, Chia Ye, Lien-JL, Chen KS, Lee My, Wang Je (2006)
11. <i>Pleurotus varicolambeinus</i>	Anti-oxidant and Anti-microbial.	Journal of Anti-biotics - 2021.	M. Khaki, J. A. (2017).
12. <i>Pleurotus Eunomus</i> .	Anti-tumor protein.	Forest Products Journal - 2004.	Kawamura, Y, M. Mana be and M. Kitta. (2000).
13. <i>Pleurotus Tuber-regium</i> .	Anti-tumor, and (Anti-viral) Activity	Journal of Agricultural and food chemistry - (2001)	Zhang, M, P.C.K. cheung and L. Zhang (2001).
14. <i>Pleurotus Flabellatus</i> .	Anti-microbial Activity	Journal of vegetos(34) (2021)	Yamae M, Bilgili F (2006).
15. <i>Pleurotus calyptatus</i> .	Anti-fungal	Journal of food science - (2016)	Homolka and Nenud (2006).
16. <i>Pleurotus nebrodensis</i>	Anti-HIV- I Activity	Journal of Phytomedicine - 2009	Jie, Liu, Jin-zhi, Wu, Chuan-fang (2006).
17. <i>Pleurotus salmoneostramineus</i>	Anti-bacterial and Anti-viral	Journal of food science - 2015.	Wani BA and Bodha RH. (2010).
18. <i>Pleurotus giganteus</i>	Anti-candida Activity	The Scientific world Journal - (2014)	Cuphan, GH Lee and EG Macne adie (2013)
19. <i>Pleurotus squarrosulus</i>	Anti-oxidantism-free radical Activity	Indian Journal of Experimental Biology 2010.	NIKIE, Shimaski Hand Minoh (2010)
20. <i>Hypsizygus ulmarius</i>	Anti-diabetic Activity	World Journal of Pharmaceutical Research - 2011	Meena KS, Dr. G. Sudha and Rajathi K (2011)
21. <i>Pleurotus florida</i>	Anti-hypercholesterolemic and reduce LDL-cholesterol	unspecified bioactive	Bandopadhyay et.al., 2009

Table : Review on medicinal values of *Pleurotus* spp.

Medicinal Values

Most of the mushroom have high medicinal value to reduce blood pressure, obesity, constipation, atherosclerosis (fat deposition inside blood vessel) etc.

Boost the Immuno Response :

Mushrooms increase immune activity at all gut lining, increasing the release of anti-bodies to fight infection and promote the growth of healthy gut bacteria. Mushrooms stimulates our lymphocytes and macrophages to defend against multidrug resistant bacteria, viruses and other pathogens.

Help reduce the risk of several cancers, specifically breast, gastric and colon cancers.

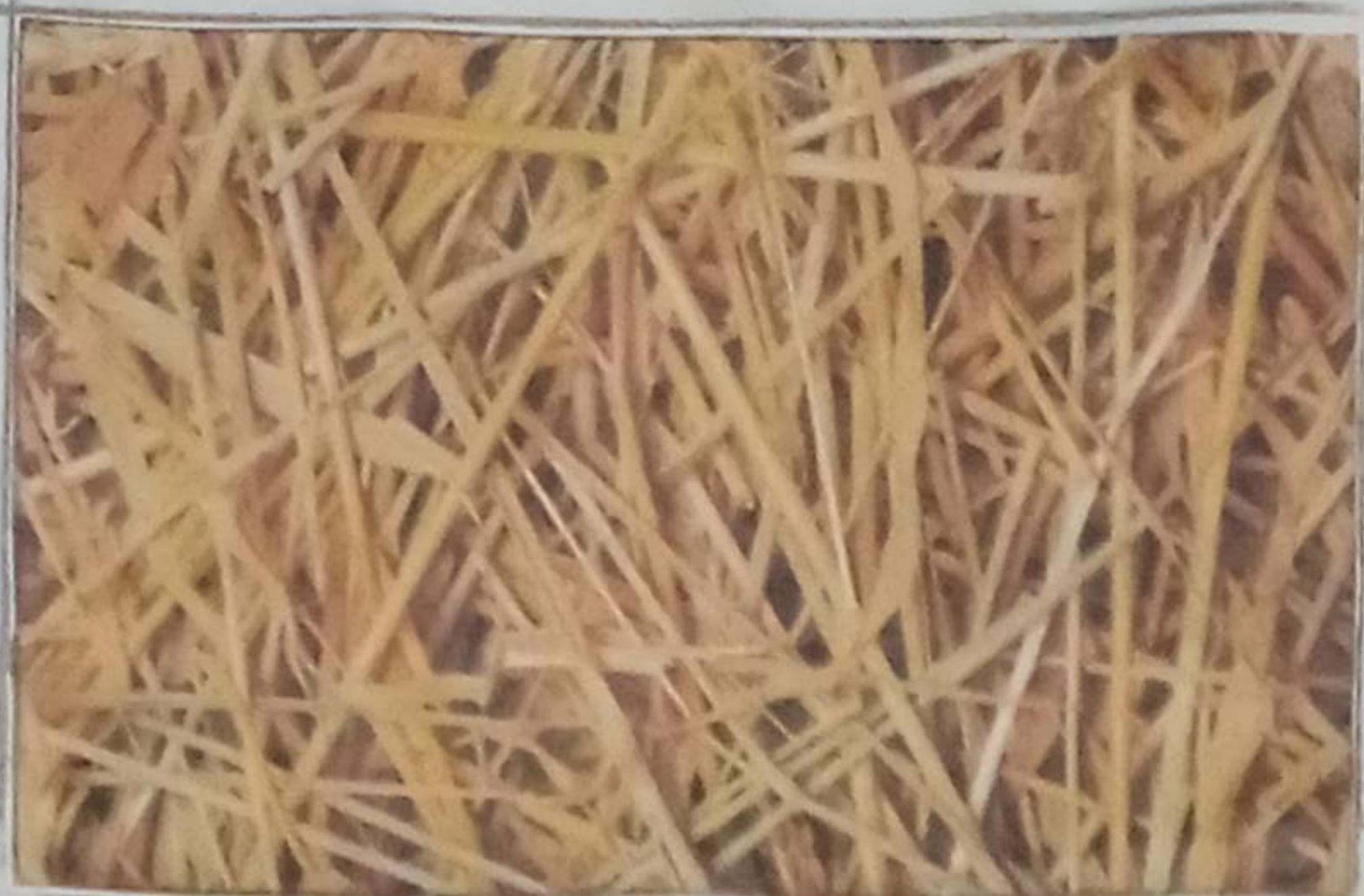
Support weight loss because their two unique fibers, beta-glucans and chitin, have been shown to reduce appetite, increase feeling of satisfaction and weight loss.

Supports Bone Health : Just like our skin cells, the cells of mushrooms manufacture their own vitamin D when exposed to sun/UV light, which in turn raises our vitamin D levels, essential for the absorption of calcium.

Help lowers blood pressure and reduce cholesterol :

Mushrooms contain a compound that has the ability to relax blood vessels, thus lowering blood pressure.

Lower Risk of Diabetes: Mushrooms are a good source of fiber, which has many health benefits, including a lower risk of type 2 diabetes, lowered cholesterol levels, improved weight control.



①

Figure:



②



④

cultivation



③



⑤

of



⑥



⑧

Pleurotus



⑦



⑨

Mushroom



⑩

CULTIVATION

The noteworthy medicinal values of Pleurotus spp. promotes the need of cultivation of this mushroom. The cultivation process is easy and cost-effective as noted from literature search (Bandopadhyay, 2013) and survey of different small scale mushroom farms and/or self-help-Group (SHG)s activities. The cultivation process is presented through the flow-chart.

paddy straw chopped (4-5 cm).

Dip overnight in water + 2% formaldehyde.

Packed in polypropylene (PP) bag.

Mix/spread with spawn in layering method.

Tie the mouth of the bag with thread and keep in cropping room at 20-28°C and 70-75% humidity.

spray water at 2-days interval.

Pin heads come out after 3 weeks of spawning.

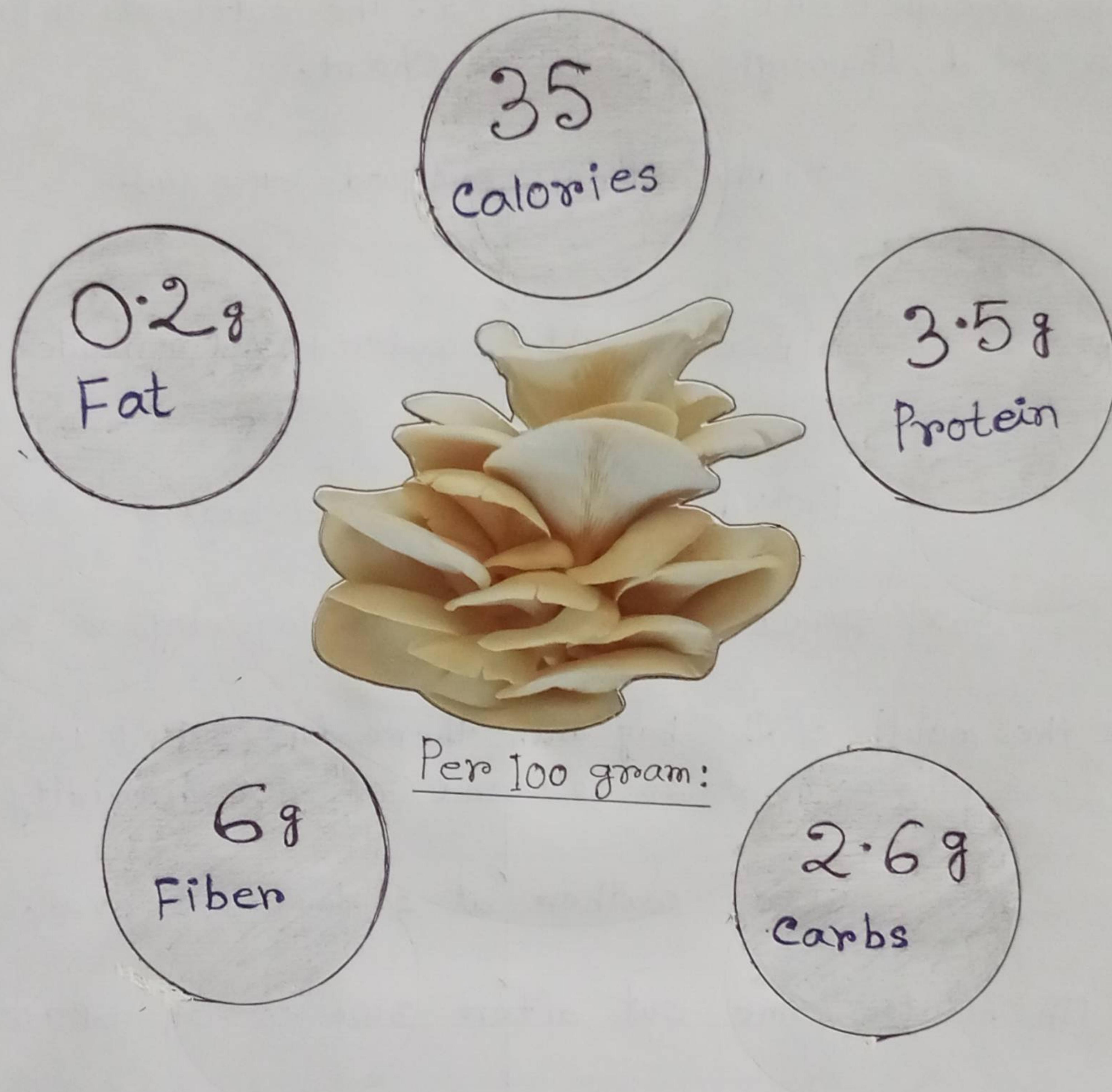
Mature, full-blume mushrooms come out with 2-3 days.

Mushrooms are harvested.

Fruit bodies can stored at 15-18°C for future use or sold fresh as per requirement.

Oyster Mushroom

In Season year Round



CONCLUSION

Above study on medicinal values of different Pleurotus spp in this review will increase the public awareness about the medicinal properties of oyster mushroom and make them enthusiastic about the cultivation of this mushroom. The review in this project therefore, recommends to include pleurotus spp or oyster mushroom in the daily diet (approximately 200 gm/ week) and to stay healthy.

ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my teacher Mrs. Dr. Sunita Bandopadhyay (Mukhopadhyay) as well as our principal sir, who gave me the golden opportunity to do this wonderful project. This project also helped me in doing a lot of research and I came to know about so many new things.

I am extremely grateful to my parents and my friends who gave valuable suggestions and guidance for completion of my project. This cooperation and healthy criticism came handy and useful with them.

Hence, I would like to thank all the above mentioned people once again.

Declaration

I, Kazi Sumaiya yeasmin, Roll No:- 200611610022
do hereby declare that the project work entitled
"Health Benefits of Oyster Mushroom:
An overview on wealth to Health"
Submitted by me to the department of BOTANY
"MUC WOMEN'S COLLEGE, BURDWAN"
I did it myself. I have collect various facts through
my own observation.

The project is done by me under the guidance
and supervision of our teacher Dr Sunita
Bandyopadhyay (Mukhopadhyay)

Kazi Sumaiya yeasmin.

Signature of candidate

Certificate of Guide and Supervision

This is certify that M.S. Kazi Sumaiya Yeasmin is a student of B.Sc 6th Semester (General) of MUC WOMEN'S COLLEGE. Her roll NO is 200611610022 and registration NO is 202001010200. during the academic year (2020-21). She has successfully completed this project entitled "Health Benefits of oyster Mushroom: An overview on welth to Health?"

This project work is the record of authentic work carried out by her under my guidance and supervision.

Date : _____

signature of the teacher
(project Guide)

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I, Kazi Sumaiya yeasmin of Semester 6th B.Sc(Gen)
I have done this project with the help of my
parents, Subject teacher and friends.

I used :-

- Notebook
- www.google.com.
- Site : Google scholar.
- Text book of Botany.

For finalizing this project.

Thank you ...