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MUSHROOM (PLEUROTUS SPP.): NUTRITIVE AND MEDICINAL FOOD

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ABSTRACT

Mushroom belongs to the group fungi. Some of them are poisonous but some are edible. However mushrooms are part of table delicacy but there is need to popularize it as a part of common food. It is also a nutraceutical as it is nutritive and medicinal food. Present paper deals with the properties of *Pleurotus* spp. mushroom and exploring need of its artificial cultivation to reduce its cost.

KEYWORDS: nutraceutical, *Pleurotus* spp. Mushroom.

INTRODUCTION

Food gives us energy to work and it is basic need for human to live. So Food production is a top most necessity of the world as food is very important. But food should be nutritious as it has multidimensional effect on the progress of any country. When Shri Atal Bihari Vajpayee's asserted "Jai Jawan Jai Kisan and Jai Vigyan" definitely their thought behind will be based on the development of country in terms of self dependence in food production, its strong defense system and its scientific achievements. The slogan demonstrate the interconnection between the role of scientist, hard-work of farmers and tough job of soldiers as they are all correlated with each other and has important role in development of any country.

On the Planet Earth food can be synthesized only by green plants so plant kingdom plays very important role because only they can fix the CO_2 into glucose, they perform oxygenic photosynthesis so able to fix carbon dioxide and releases oxygen. Mushrooms belong to the group fungi in Plant Kingdom. They do not have the chlorophyll so can't synthesize their food and depends for their food on dead and decaying organic material. Reproductive structures of mushrooms may be like umbrella annulus, Cup volva etc. These beautiful fruiting bodies produce millions of spores, through which a new organism germinates. The world of mushroom has always been fascinating and mystic to man owing to their sudden appearance in number, groups, rings, bunches and also in isolation as a single attractive and fascinating structure. Mushroom are generally found to grow in place where that remains of plants such as leaves, straws, logs etc. are decaying in forest, fields and meadows, due to its saprophytic nutritional habit, in these habitats mushroom grows in abundance.

Mushrooms: food for Human

In the post-COVID phase, consumers are much aware about their dietary pattern for gaining good immunity. The era of health conscious consumers has also influenced food industries to introduce health food according to the demand. Health food may be expressed as the nutritious, prevent diseases and maintain health. In this concern as a nutritive food mushrooms are good choice as they are good in protein. Mushrooms being more palatable flavor and tasty have received much attention. FAO has also recommended mushroom as food contributing to protein nutrition. The trends of consumption of cultivated mushrooms are rising.

In most ancient literature in Vedas and Bibles, references about the mushroom are available. Mushroom were the plants of immortality as per the ancient Egyptians believe. Russia, China, Greece Mexico, Latin America had rituals about the people expected to gain super human strength. In Vikings mythology, this magic fungus considered as a gift from God, used to gain their fighting frenzy known as Berserk. In Guatemala (100 B.C.) mushroom shaped stone artifacts have been found. The food value of mushroom also wrote by Theophrastus, the great Greek philosopher.

All mushrooms are not edible and some of them are highly poisonous too. The toxic species are commonly called as toad stools. Even after so many researches on mushroom, till date no any proper test is available to distinguish between edible and poisonous mushrooms and may be the reason itself mushroom eating could not

be popularized. But after its artificial cultivation it became more successful as food. Out of 2,50,000 species of fungi about 2000 species are considered as prime edible mushrooms but only about a dozen of fungal species can be currently produced for food with industrial and economic basis (Ramirez et al. 2000). During last centuries particularly after the artificial cultivation of white button mushroom i.e. *Agaricus* spp. in France 1650, it has household popularity in Europe and America. Chinese were able to cultivate some other mushrooms much before the white button mushroom cultivation.

Pleurotus spp. mushroom are gaining more attention as health food with its number and quality of vitamins, minerals, amino acids, trace elements, essential fatty acids (Tam et al. 1986, Solomko et al. 1988, Sturion & de Camargo 2000 and Mattila et al. 2001). *Pleurotus* species mushroom are generally known as oyster and locally called as Dhingri. They are easy to grow in tropical and subtropical climate where it can be grown all round the year.

Nutritive and Medicinal Importance of *Pleurotus spp* mushroom

Justo et al. (1998) mentioned *Pleurotus* mushroom as supplement of food. *Pleurotus* species mushrooms are not only very delicious but very nutritive also. *Pleurotus* species are having good quality protein and *Pleurotus* proteins are a good complement of cereals, so it is considered as nutritive and healthy food (Bano and Rajarathnam 1988, Justo et al. 1998). There are also some findings proved that *Pleurotus* spp is good source of all essential amino acids in comparison to common vegetables (Volz 1972, Mattila et al. 2002).

It is found to be good source of vitamin B complex group particularly thiamine, niacin and folates (Solomko & Eliseeva 1988, Mattila et al 2001) however Vitamin E content was not detected in *Pleurotus* spp. (Ching & Mohamed 2001).

As compared to other food material *Pleurotus* spp. have low Na and high K in mineral composition that is beneficial for the patients of hypertension (Tam et al. 1986, Sturion & de Camargo 2000). It is rich in P, Zn & Cu though iron is in low quantity (Mattila 2001). Low fat content in *Pleurotus* spp. was observed in the studies of by Justo et al. (1998) though it is rich in linoleic acid which is an essential fatty acid for our body.

Cholesterol is the dreaded sterol for the heart patient, and most importantly it is absent in *Pleurotus* spp. mushroom and even all mushroom , on the place of cholesterol, ergosterol is found in mushrooms which could be converted to vitamin D by the body (Ginterova & Janotkova 1981) and have good impact. Presently diabetes is the most common disease in India and with no starch and very low sugar they are delight food for diabetic (Chorvathova et al. 1993).

It is one of the established food sources of vitamins, fats and minerals. It is a best alternate protein source in present time. In the comparison of most vegetables, the protein content of fresh *Pleurotus* spp. is almost twice (Matilla et al. 2001).

It considered as not only a table delicacy in parting a particular aroma to the food but nutritious too (Tam et al. 1986, Solomko et al. 1988, Justo et al. 1998, Sturion & de Camargo 2000 and Mattila et al.2001).

Tremendous nutrition potentials of *Pleurotus* spp. have led to several studies on its significant pharmacological properties. Its Hypocholestrolemic effect was reported by Bobek et al. (1991a, 1991b), Opletal (1993), Khanna et al. (1993), Bobek et al. (1994), Opletal et al. (1997), Bajaj et al. (1997), Bobek et al. (1998) and Hossain et al. (2003).

Many mushrooms have traditional been used as medicine and tonic in China, Japan and Korea. Researchers have proved that species of the mushroom is potential antifungal (Wang & Ng 2004). Its antivirus (Wang & Ng 2000, Zhang et al. 2004) and antimicrobial (Cohen et al. 2002, Ngai & Ng 2004) activities were also recorded.

Antitumor activity of it was registered by Yoshioka et al. (1975), Zhuang et al. (1993), Chang (1996), Zhang et al. (2001) and Mahajan et al.(2002).

Choravathova et al. 1993 was recorded Hypoglycemic effect of *Pleurotus* spp. Its immunomodulatory property was observed by Tedesco et al. (1983), Paulik et al. (1992) and Chang (1996). Besides *Pleurotus* spp. also has antiplatelet aggregation activity (Jose et al. 2004) and blood pressure reducing quality (Tam et al. 1986). In the case of fungal allergy Horner et al. (1988) found that allergen extract of plural species was effective. Positive results of *Pleurotus* spp. feeding have also been reported in ulcerative colitis (Nosalva et al. 2001) and in atherosclerosis (Bobek & Galbavy 1999).

The demand supply of *Pleurotus* spp. mushroom is increasing due to its nutritive and medicinal importance at global level as well as domestic level. It has immersed as a popular item in soups and for vegetable purpose even having high prices. With rise in the acceptance of *Pleurotus* spp. mushroom the production and productivity is increased making the commodity as a vegetable, its demand is expected to pick up fast. It should be popularized as a nutritious source in human food.

CONCLUSION

In the present scenario of post-COVID era *Pleurotus* spp. mushroom can be suggested as a health food, full of nutrition and exhibits various pharmacological properties. In Indian food culture there is a need to more popularize it as the food in common food pattern. In modern societies it is only used in fine dine culture of

upper classes. The reason of this pattern may be its high prices that can be controlled only by increasing its artificial cultivation. Its more production is required to reduce its cost and there is need to develop various culture strategies having low cost method.

REFERENCES

1. Bajaj, M., S. Vadhera, A.P. Brar and G.L. Soni, (1997). Role of oyster mushroom (*Pleurotus florida*) as hypocholesterolemic/antiatherogenic agent. Indian J. Exp. Biol, 35: 1070-1075.
2. Bano, Z. & Rajarathnam S. (1988) *Pleurotus* mushrooms (Part II) Chemical composition, nutritional value, post-harvest physiology, preservation, and role as human food. Crit Rev Food Sci Nutr, 27(2): 87-158. doi: 10.1080/10408398809527480. PMID: 3053051.
3. Bobek, P. and S. Galbavy, (1999). Hypocholesterolemic and antiatherogenic effect of oyster mushroom (*Pleurotus ostreatus*) in rabbits. Food/Nahrung, 43: 339-342.
4. Bobek, P., Ozdin, L. & Kuniak, L. (1994). Mechanism of hypocholesterolemic effect of oyster mushroom (*Pleurotus ostreatus*) in rats: reduction of cholesterol absorption and increase of plasma cholesterol removal. *Zeitschrift für Ernährungswissenschaft*, *33*(1): 44-50.
5. Bobek, P., Ginter, E., Kuniak, L., Babala, J., Jurcovicova, M., Ozdin, L. & Cerven, J. (1991). Effect of mushroom *Pleurotus ostreatus* and isolated fungal polysaccharide on serum and liver lipids in Syrian hamsters with hyperlipoproteinemia. *Nutrition (Burbank, Los Angeles County, Calif.)*, *7*(2): 105-108.
6. Bobek, P., Ginter, E., Jurčovičová, M. & Kuniak, L. (1991). Cholesterol-lowering effect of the mushroom *Pleurotus ostreatus* in hereditary hypercholesterolemic rats. *Annals of Nutrition and Metabolism*, *35*(4): 191-195.
7. Bobek, P., Ozdín, L. & Galbavý, Š. (1998). Dose- and time-dependent hypocholesterolemic effect of oyster mushroom (*Pleurotus ostreatus*) in rats. *Nutrition*, *14*(3): 282-286.
8. Chang, R. (1996). Functional properties of edible mushrooms. *Nutrition Reviews*, *54*(11): S91.
9. Ching, L. S. & Mohamed, S. (2001). Alpha-tocopherol content in 62 edible tropical plants. *Journal of Agricultural and food Chemistry*, *49*(6): 3101-3105.
10. Chorvathova, V., Bobek, P., Ginter, E. & Klvanova, J. (1993). Effect of the oyster fungus on glycaemia and cholesterolaemia in rats with insulin-dependent diabetes. *Physiological research*, *42*: 175-175.
11. Cohen, R., Persky, L. & Hadar, Y. (2002). Biotechnological applications and potential of wood-degrading mushrooms of the genus Pleurotus. Applied microbiology and biotechnology, 58(5): 582-594.
12. Ginterová, A. & Janotková, O. (1981). Utilization of fat and degradation of cholesterol by *Pleurotus* spp. *Folia microbiologica*, *26*(3): 228-231.
13. Horner, W. E., Ibanez, M. D., Liengswangwong, V., Salvaggio, J. E. & Lehrer, S. B. (1988). Characterization of allergens from spores of the oyster mushroom, *Pleurotus ostreatus*. *Journal of allergy and clinical immunology*, *82*(6): 978-986.
14. Hossain, S., Hashimoto, M., Choudhury, E. K., Alam, N., Hussain, S., Hasan, M. ,Choudhary, S.K. & Mahmud, I. (2003). Dietary mushroom (*Pleurotus ostreatus*) ameliorates atherogenic lipid in hypercholesterolaemic rats. *Clinical and Experimental Pharmacology and Physiology*, *30*(7): 470-475.
15. Jose, N., Ajith, T. A. & Janardhanan, K. K. (2004). Methanol extract of the oyster mushroom, *Pleurotus* florida, inhibits inflammation and platelet aggregation. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*, *18*(1): 43-46.
16. Justo, M. B., Guzmán, M. A., de Mejía, E. G. & Díaz, C. G. (1998). Chemical composition of three Mexican strains of mushrooms (*Pleurotus ostratus*). *Archivos latinoamericanos de nutricion*, *48*(4): 359-363.
17. Khanna, P. K., Bhandari, R., Soni, G. L., Singh, C. K., Garcha, H. S. & Mittar, D. (1993). Role of mushroom (*Pleurotus florida*) as hypocholesterolemic/hypolipidemic agent. *Indian J Exp Biol*.
18. Mahajan, R. G., Patil, S. I., Mohan, D. R. & Shastry, P. (2002). *Pleurotus* Eous mushroom lectin (PEL) with mixed carbohydrate inhibition and antiproliferative activity on tumor cell lines. *Journal of Biochemistry, Molecular Biology, and Biophysics: JBMBB: the Official Journal of the Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB)*, *6*(5): 341-345.
19. Mattila, P., Könkö, K., Eurola, M., Pihlava, J. M., Astola, J., Vahteristo, L., Hietaniemi, V., Kumpulainem, J., Valtonen, M. & Piironen, V. (2001). Contents of vitamins, mineral elements, and some phenolic compounds in cultivated mushrooms. *Journal of agricultural and food chemistry*, *49*(5): 2343-2348.
20. Mattila, P., Salo-Väänänen, P., Könkö, K., Aro, H. & Jalava, T. (2002). Basic composition and amino acid contents of mushrooms cultivated in Finland. *Journal of Agricultural and Food Chemistry*, *50*(22): 6419-6422.
21. Nosál'ová V, Bobek P, Cerná S, Galbavý S, Stvrtina S. (2001) Effects of pleuran (beta-glucan isolated from *Pleurotus ostreatus*) on experimental colitis in rats. Physiol Res, 50: 575-81.
22. Opletal, L. (1993). Phytotherapeutic aspects of diseases of the circulatory system. 2. The oyster mushroom and its potential use. *Ceskoslovenska Farmacie*, *42*(4): 160-166.

23. Opletal, L., Jahodar, L., Chobot, V., Zdanský, P., Lukes, J., Bratova, M. & Patel, A. V. (1997). Evidence for the anti-hyperlipidaemic activity of the edible fungus *Pleurotus ostreatus*. *British journal of biomedical science*, *54*(4): 240-243.
24. Paulik, S., Svrcek, S., Huska, M., Mojzisova, J., Durove, A. & Benisek, Z. (1992). The effect of fungal and yeast glucan and levamisole on the level of the cellular immune response in vivo and leukocyte phagocytic activity in mice. *Veterinarni medicina*, *37*(12): 675-685.
25. Ramírez, L., Larraya, L. M. & Pisabarro, A. G. (2000). Molecular tools for breeding basidiomycetes. *International microbiology*, *3*(3): 147-152.
26. Solomko, E. F. & Eliseeva, G. S. (1988). Biosynthesis of vitamins B by the fungus *Pleurotus ostreatus* in a submerged culture. *Prikladnaia biokhimiia i mikrobiologiia*, *24*(2): 164-169.
27. Sturion, G. L. & de Camargo Ranzani, M. R. (2000). Mineral composition of edible mushrooms cultivated in Brazil--*Pleurotus* spp and other dehydrated species. *Archivos Latinoamericanos de Nutrición*, *50*(1): 102-108.
28. Tam, S.C., K.P. Yip, K.P. Fung and S.T. Chang, 1986. Hypotensive and renal effects of an extract of the edible mushroom. Life Sci, 38: 1155-1161
29. Tedesco, G., Marchi, A. & Gerola, F. M. (1983). Immunological study on the wall proteins of different fruiting portions in *Pleurotus ostreatus* (Jacq. ex Fr.) Kummer and Agaricus bisporus (Lge.) Sing. *Giornale di Batteriologia, Virologia ed Immunologia*, *76*(7-12): 200-206.
30. Volz, P. A. (1972). Nutritional studies on species and mutants of Lepista, Cantharellus, *Pleurotus* and Volvariella. *Mycopathologia et Mycologia applicata*, *48*(2): 175-185.
31. Cohen, R., Persky, L. & Hadar, Y. (2002). Biotechnological applications and potential of wood-degrading mushrooms of the genus Pleurotus. *Applied microbiology and biotechnology*, *58*(5): 582-594.
32. Ngai, P. H. & Ng, T. B. (2004). A ribonuclease with antimicrobial, antimitogenic and antiproliferative activities from the edible mushroom *Pleurotus sajor-caju*. *Peptides*, *25*(1): 11-17.
33. Wang, H. X. & Ng, T. B. (2000). Isolation of a novel ubiquitin-like protein from *Pleurotus ostreatus* mushroom with anti-human immunodeficiency virus, translation-inhibitory, and ribonuclease activities. Biochemical and Biophysical Research Communications, 276(2): 587-593.
34. Wang, H. & Ng, T. B. (2004). Eryngin, a novel antifungal peptide from fruiting bodies of the edible mushroom *Pleurotus eryngii*. *Peptides*, *25*(1): 1-5.
35. Yoshioka, Y., Emori, M., Ikekawa, T. & Fukuoka, F. (1975). Isolation, purification, and structure of components from acidic polysaccharides of *Pleurotus ostreatus* (Fr.) Quél. *Carbohydrate research*, *43*(2): 305-320.
36. Zhang, M., Cheung, P. C. & Zhang, L. (2001). Evaluation of mushroom dietary fiber (nonstarch polysaccharides) from sclerotia of *Pleurotus tuber-regium* (Fries) Singer as a potential antitumor agent. *Journal of Agricultural and Food Chemistry*, *49*(10): 5059-5062.
37. Zhang, M., Cheung, P. C., Ooi, V. E. & Zhang, L. (2004). Evaluation of sulfated fungal β-glucans from the sclerotium of *Pleurotus tuber-regium* as a potential water-soluble anti-viral agent. *Carbohydrate research*, *339*(13): 2297-2301.
38. Zhuang, C., Mizuno, T., Shimada, A., Ito, H., Suzuki, C., Mayuzumi, Y., Li, J. (1993). Antitumor protein-containing polysaccharides from a Chinese mushroom Fengweigu or Houbitake, *Pleurotus sajor-caju* (Fr.) sings. *Bioscience, biotechnology, and biochemistry*, *57*(6): 901-906.