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A review on Oyster Mushroom (*Pleurotus* spp)

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Abstract

The oyster mushroom (*Pleurotus* spp) is a popular mushroom due to its tremendous stability of cap and stem, cooking qualities and longer shelf life. Among the consumers, where *Pleurotus* spp *mushrooms* is very trendy, but currently this mushroom is not cultivated in large scale. Due to its gradual depletion of nutrients due to their subsequent utilization of mushroom mycelium. Hence good growth and better yield of mushroom can be achieved when different substrates are supplemented. The basic plant substrates that can be used for oyster mushroom cultivation are saw dust, wheat straw, rice husk , Mango, Jackfruit, Coconut, hulls, straw, stalk ,paper corn cobs, waste cotton, leaves and pseudo stem of banana, water hyacinth, duck weed, rice straw etc. This substrate does not require costly processing method and enrichment material which helps in supporting the growth. Among the different substrates used the study has revealed that faster mycelial growth is consistent with better yield and highest biological efficiency.

Key words: Mushrooms ; *Pleurotus* spp; substrate

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Introduction

Mushrooms are a good source of protein, vitamins and minerals and are known to have a broad range of uses both as food and medicine. These are often found as saprophytes on soil, open fields, farm lands, wood and roadsides. The fruiting bodies are large enough to be visible to the naked eyes. They belong to the class Basidiomycetes, order; Agaricales. Mushroom provides a variety of tastes, flavour and texture. Fresh mushroom contain about 80-95% moisture,3%protien,0.3-0.4% fat and 1% minerals and vitamins. The vitamins of mushrooms are not destroyed by cooking, drying and freezing (Nair, 1982).Edible mushrooms are recommended by the FAO as food, contributing to the protein nutrition of developing countries dependent largely on cereals. Presently three Mushrooms namely *Pleurotus* species (Oyster Mushroom), *Volvariella volvaceae* (Straw Mushroom) and *Auricularia spp* (Ear Mushroom) are under commercial cultivation.

Oyster mushroom is cultivated worldwide, especially in Southeast Asia, India, Europe and Africa. They can be cultivated under both temperate and tropical climatic conditions and harvested all over the year .The oyster mushrooms (*Pleurotus* spp) are in the third place after the white button and shiitake among the world mushroom production (Gyorfi et al., 2007).Oyster mushrooms are the easiest and least expensive commercial mushrooms to grow because they are well known for conversion of crop residues to food protein .They are also rich source of proteins, minerals and vitamins (Caglarirmak, 2007).

Mushroom cultivation represents the only current economically viable biotechnology process for the conversion of waste plant residues from forests and agriculture (Wood and Smith, 1987). Culture of Oyster mushroom is becoming popular throughout the world because of abilities to grow at a wide range of temperatures and to utilize various lignocelluloses. *Pleurotus* species have extensive enzyme systems capable of utilizing complex organic

compounds that occur as agricultural wastes and industrial by-products.

These mushrooms are also found to be one of the most efficient lignocelluloses solid state decomposing types of white rot fungi (Baysal *et al*., 2003). Due to the presence of its lignocellulolytic enzymes which helps it convert cellulose and lignin into useful carbohydrates such as glucose, that can be used as energy source for fungi. Any agriculture waste that contains cellulose and lignin is possible substrates for growing these fungi. Compost or un compost wheat and paddy straw, banana leaves, sugarcane bagasses and leaves, wheat bran, rice husk, sawdust etc can be used as substrate for growing mushroom (Gupta, 1986).

Also, mushroom production gives additional or alternative income to farmers looking for a value-added product and a way to supplement farm income while making use of by-products or co-products from other crops. In addition, mushrooms are excellent source of food to address the problem of malnutrition in developing countries.

Also, the demand of mushroom has been escalating due to changing consumer behaviour, development and market expansions in recent times. However, development of cost-efficient and alternate substrate to cultivate oyster mushroom without sacrificing mushroom quality is a major focus of many researchers and growers.

Oyster mushroom can help in solving the problems of malnutrition and disease. The present study of review work has showed that different substrates are for their effective utilization by cultivation of oyster mushroom.

Review of literature

Mushrooms, a highly priced delicacy for more than two thousand years, are now consumed by many people. Mushroom cultivation is profitable agribusiness. Many agricultural and industrial wastes can be utilized as substrates for production of *Pleurotus* species (Zadrazil & Brunnert, 1981).

Studies conducted by Tan (1981) revealed that cotton waste was the best substrate for the cultivation of Pleurotus ostreatus. Cereal bran rich in protein is usually added to the substrate in *P. ostreatus* cultivation to stimulate mycelia growth and increase the yield of mushroom (Kinugawa et al., 1994)

Sawdust and sugarcane bagasse were the best substrates for growing of Oyster Mushroom than other agro-based substrates (Ahmed,1998).

Obodai et al. (2002) reported that sawdust substrate for mushroom production should undergo a period of composting to breakdown the cellulose and lignin components of the wood in order to release the essential materials for the establishment of mushroom mycelium. The ligno-cellulosic materials in sawdust are generally low in protein content and thus insufficient for the cultivation of mushrooms, and therefore require additional nitrogen, phosphate and potassium.

Oei (2003) reported that substrate having high quality lignin and cellulose contents takes a longer time to start pinning and fruit body formation.

Baysal (2003) investigated paper waste supplemented with rice husk, chicken manure and peat for *Pleurotus ostreatus* cultivation. Highest yield for fresh weight was recorded as 350.2 grams in the substrate containing 20% rice husk.

The values of commercial cultivation of mushrooms, especially in a developing economy like Nigeria, is the availability of large quantities of several agro–industrial wastes which can serve as substrates for the cultivation of mushrooms .(Banjo et al., 2004) has been reported that mushrooms can grow on chopped cocoa pods, cotton waste, dried chopped maize straw, oil palm (fibre and bunch) wastes, tobacco straw, used tea leaves, rice straw, sugarcane bagasse, newsprint, old rags and sawdust

Silva et al. (2005) reported that mycelium extension is related to bio availability of nitrogen when they found that eucalyptus residues supplemented with cereal bran supported fast growth . However, the low amount of available nitrogen (N) in the ligno-cellulosic substrate of wood components is often considered as a limitation to its use as mushroom substrate.

Pleurotus species are popular and widely cultivated throughout the world mostly in Asia and Europe owing to their simple and low cost production technology and higher biological efficiency (Mane *et al.*, 2007).

Moonmoon *et al., (*2010) studied king Oyster mushroom *Pleurotus eryngii* on saw dust and rice straw in Bangladesh and found that saw dust showed the highest biological efficiency (73.5%) than other strains. He has also reported on saw dust, the yield and efficiency were better than those cultivated on rice straw, however, on straw; the mushroom fruiting bodies were larger in size. This study shows the prospects of *P. eryngii* cultivation in Bangladesh and suggests further study in controlled environment for higher yield and production

Stanley et al., 2011 has evaluated the effect of supplementing corn cob substrate with rice bran on yield of *Pleurotus pulmonarius* (Fr) Quel. Un-supplemented corn cob (0% supplementation) gave the best yield in terms of the mean diameter of pileus 5.50cm, mean fresh weight of fruiting bodies 53.2g, mean height of stipe 3.64cm and number of healthy fruiting bodies as 12. The least yield was recorded with 30% supplementation as follows: mean diameter 3.20cm, mean fresh weight of fruiting bodies 30.0g, mean height of stipe 1.65cm and number of healthy fruiting bodies as 5.in terms of quantity and quality, the un-supplemented substrate produced better edible mushrooms

Nasir Ahmad Khan (2012) has observed that *Pleurotus ostreatus* gave the maximum yield in the first flush followed by second and third flush.The maximum yield was obtained on Kikar sawdust 282.2gm followed by Mango sawdust 257.7gm, mixed sawdust 233gm, Simbal sawdust 216.5gm and Kail 200.5gm.Oyster mushroom showed relatively more yield on control treatment of cotton waste as compared to other substrates. The maximum

biological efficiency was obtained in kikar sawdust which was 70.56 %. The lowest biological efficiency was obtained in kikar sawdust which was 50.12 %. Among all substrates, sawdust of Kikar proved the best substrates for the effective cultivation of Oyster mushroom.

Conclusion

According to this worldwide survey, different kinds of wastes have been proven to be useful for oyster mushroom growing. So, every grower producing oyster mushrooms can make their own best substrate choice from among all those genera or species. The substrates may be useful in the production of a valued protein rich food. Cultivation of oyster mushroom on various agricultural residues offers economic initiatives for agribusiness to examine these residues as valuable resources and use them to produce protein rich mushroom products. This has encouraged investigating the effect of substrate supplementation on sustained yield of edible mushrooms in various harvests with regards to commercial production.

Many factors may be involved in the difference of nutritional composition of mushrooms cultivated in different substrates. We must not be at all surprised that the evaluation of all these kinds of different wastes leads us to a renewed appreciation for what is called a waste. Growing mushrooms gives so much satisfaction and produces so much food and income that further use of this practice can result in a great complete contentment of families and villages.

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