Cultivation Of Mushroom (Pleurotus Florida) By Using Two Different Agricultural Wastes In Laboratory Condition

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Citation

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Abstract

An approach for cultivation of paddy straw and cotton mushroom (Pleurotus florida) was experimented in our lab condition. The result of trail conducted during the month of March 2008 reveled the possibility of culturing Pleurotus florida in our lab conditions.Mushroom packs or mushroom beds with paddy straw and cotton as a substrates were put in the lab and maintained temperature at 23C and humidity 80% for 4 weeks for paddy straw and for cotton 7 weeks. An average yield of ½ kg/pack was obtained in 4 weeks in paddy straw and 1 kg was obtained in cotton waste after 7 weeks. So cotton waste gave more amount of mushrooms comparatively paddy straw mushroom.

INTRODUCTION

Mushroom is a non-traditional horticultural crop having high quality of proteins, high fibre value, vitamins and minerals. World produces 61.16 lakh of cultivated mushroom annually. Paddy straw mushroom (Pleurotus florida) is an edible mushroom of the tropic and sub tropic region. Most of the edible fungi have strong enzyme system and are capable of utilizing complex organic compounds, which occur as agricultural wastes and industrial by product. these can be used as bedding material for mushroom cultivation. An attractive feature of this group of mushroom is that they can utilize a large variety of agricultural waste products and transform lignocellulostic biomass in food highly quality, flavor and nutritive value. In world mushroom production, plerotus rate second, after Agarics biporus .In 1986,plerotus sp. Production accounted for approximately 7% of the total world production of edible mushroom. By 1990, production of Pleurotus sp. reached one million metric tones and accounted for 24% of total mushroom production.

This Mushroom is widely grown for food in the orient owing its excellent flavor, taste and nutrients compared to any other edible mushroom. Pleurotus florida belongs to the family Basidomycetes. Basidomycetes play an important role in nature by recycling Carbohydrate through lignin degradation by the white – rot Basidomycetes is achieved through lignolytic enzymes such as laccase, lignin, peroxidase, and Magnesium peroxidase. The nutrional requirements and the limits of the physical environment for mycelia growth and fruiting have been investigated for many Pleurotus sp. Recent studies have indicated that cotton waste also a good substrate for the cultivation of Pleurotus sp.

Paddy straw and cotton is available abundantly in Pollachi region in Tamil nadu, India. In this study we used water hyacinth as a supplement to paddy straw to evaluate this aquatic plant on the of production Pleurotus florida mushroom.

MATERIALS AND METHODS

ORGANISM AND CULTURE CONDITIONS

The Basidomycetes Pleurotus florida strain isolated from samples obtain from TamilNadu Agricultural University (TNAU). They were maintained on 1.8% Agar plates constiting of yeast extract, beef extract, NaCl, Peptone.

PADDY STRAW CULTIVATION METHOD

Fresh, good quality paddy starw bits (4.5cm) were soaked in water for upto 12 – 24 hrs and dried. Paddy straw packed into 2 meters height of polypropylene bags and autoclaved at 150 pressure.

Sterilized paddy straw is filled in fresh polythene bags of size about 5cm height. A layer of spawn is added above

paddy straw layer. The procedure is repeated until 3/4th height of polythene bag is filled up. Then the holes are made through out the bag to allow aeration. The filled bags are incubate 21 C - 23 C with sufficient light and humidity for 20 – 30 days and water sprayed the bags twice a day through out spawn running period.

COTTON WASTE CULTIVATION METHOD

The Materials was taken cotton waste (2500g), wheat bran (25g). The waste materials were then thoroughly mixed with water until adequate moisture content was obtained. After mixing, the substrate was then packed in small nylon bags (400g), tied with rubber bands, and sterilized.

After sterilization, the bags were allowed to cool in the laboratory and each bag was inoculated with 40g spawn (1% total weight). The inoculated substrate bags were placed on the laboratory bench and covered with dark polythene sheet for incubation.

After full ramification, the bags were exposed in the growth room by removing the rubber bands and opening the top of the nylon bags. Watering was adequately done to increase the relative humidity of the environment to enhance sporophore emergence

RESULT AND DISCUSSION

The results indicated that the spawn running was completed in the bags 10 to 14 days and pinheads appeared on the 19th – 20th. Pinheads turned into leaf like 23rd day and the first harvest was made at about 26 – 28 days. The second harvest will be another 4 or 5 days.

In order to find out the effective bag, observations on the mushroom formed in the each side of the bags were recorded.

The results were good in irrespective period. The mean yield of trial was ½ kg/bag. The C:B ratio worked out of 1:2.3(table 1).

Figure 1

Table -1 cost benefit ratio

Cost of production Rs./ Bag	Yield Kg/ Bag	SellingPrice @(Rs.100perkg)	Benefit	Cost: bene-fit ratio
22	0.5	50	28	1:2.3

The growth of Pleurotus florida in Cotton waste mixed with wheat bran produced higher yield (74.35g) than Paddy straw (51.38g). The incubation period to the emergence of sporophores was longer for cotton waste mixed with wheat bran (seven weeks) compared to that for the Paddy straw (Four weeks). The main substrate material alone sometimes cannot provide enough nitrogen required for optimal growth of mushrooms. Additives such as rice or wheat bran provide a nitrogen source (Choi, 2004). Amounts of supplements that should be added varies with the substrate chosen. Oei (2003) suggested a range of 5-10% wheat bran. Choi (2004) also reported that if cotton waste is chosen as the main substrate material for Oyster mushroom cultivation, a nitrogen source such as rice bran should be supplemented. Nitrogen is converted to ammonia nitrogen and Beyer and Wilkinson (2002) found a direct correlation between substrate ammonia content and subsequent growth of mushrooms.

Figure 2

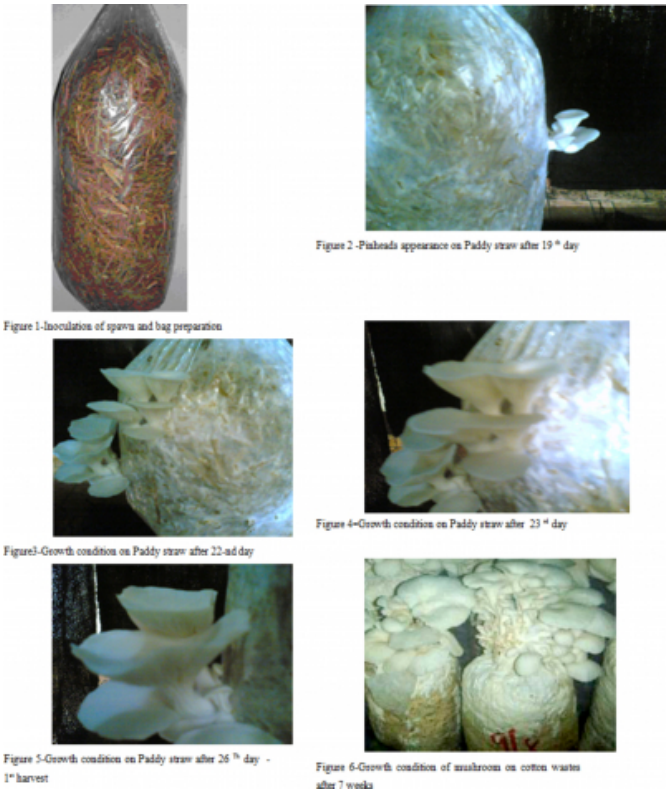

Figure 1-Inoculation of spawn and bag preparation

Figure 2 -Pinheads appearance on Paddy straw after 19 th day

Figure3-Growth condition on Paddy straw after 22-nd day

Figure 4=Growth condition on Paddy straw after 23 rd day

Figure 5-Growth condition on Paddy straw after 26 Th day - 1st harvest

Figure 6-Growth condition of mushroom on cotton wastes after 7 weeks

Cotton waste is the material that is discarded during the processing of harvested cotton seed to produce oil and other materials in the industry. Cotton waste is readily available in Pollachi, especially in the north where the majority of cotton is grown. Wheat bran is the outer part of the wheat grain removed during processing. Addition of this very inexpensive supplement increases the dietary fibre of the produced mushroom. Utilization of agro-industrial wastes makes mushroom cultivation a good fit in sustainable

farming (Oei, 2005).

Mushroom cultivation, apart from being a source of food production, can be a means of livelihood and a source of economic empowerment for women in both urban and rural areas, and for small holder farmers.

The present results indicate that paddy straw mushroom can be cultivated in laboratory condition. This will enable the farmer to get extra income and more protein harvest from his agricultural waste. This system will minimize the cost of production compared with other mushroom cultivation method.

References

r-0. A.S.Krishnamoorthy (2005), Outdoor cultivation of mushroom as intercrop in maize field, Mushroom Research International journal, Volume 14(1) 9-12, 2005
r-1. Thomas KM, RAmakrishnan TS and Narasimhan IL1943.Paddy straw mushroom. Madras AgricJ 31:57-59.
r-2. M. Nageswaran et. al, Evaluation of Water hyacinth and Paddy Straw Waste for Culture of Oyster Mushrooms, J. Aquat. Plant Manage. volume 41: 122-123.
r-3. R. Naraian et.al, Influence of different nitrogen rich supplements during cultivationof Pleurotus florida on corn cob substrate, EnvironmentalistDOI 10.1007/s10669-008-9174-4
r-4. V. Mehta, J.K. Gupta and S.C. Kaushal, Cultivation of Pleurotus florida mushroomon rice straw and biogas production from the spent straw, World Journal of Microbiology and Biotechnology 6, 366-370.
r-5. G. Venkateshwarlu et.al, Volatile flavor compounds from oyster mushroom(Pleurotus florida) in submerged culture, FLAVOUR AND FRAGRANCE JOURNAL
r-6. Flavour Fra`r[J[1999^ 04] 219_211 “1999#.
r-7. Hüseyin SIVRIKAYA et.al, Cultivation of Pleurotus florida on Forest and Agricultural Wastes By Leaves of Tree and Wood Waste,Tr. J. of Agriculture and Forestry 23 (1999) 585-596
r-8. Alofe, V.F., O. Odeyemi, and O.L. Oke. 1996. Three edible wild mushrooms from Nigeria. Their proximate and mineral composition. Plant Food for Human Nutrition, 49:63-73.
r-9. Beyer, D.M. and V.L. Wilkinson. 2002. Spawn, spawning and spawn growth. Mushroom Science and Technology. 7p.
r-10. Boa, E. 2004. Wild edible fungi. Non-Wood Forest Products,17. Food and Agriculture Organization, Rome, 147 p.
r-11. Borchers, A.T, C.L. Keen, and M.E. Gershwin. 2004. Mushrooms, tumors and immunity: An update. Experimental Biology and Medicine, 229(5):393-406.
r-12. Breen, W.M. 1999. Nutritional and medicinal values of exotic mushrooms. IN Shitake Mushrooms. Proc. Nat. Symp., May 3-5 1989, St Paul, Minnesota, p. 87-105.
r-13. Chang S.T. 1999. World production of cultivated edible and medicinal mushrooms in 1997 with emphasis on Lentinus edodes in China. International Journal of Mushrooms, 1:139-46.
r-14. Choi, K.W. 2004. Shelf cultivation of oyster mushrooms. http:/www.mushworld.com:1508/service/handbook/2004/chapter-7-2.pdf
r-15. Daodu, O.O. 2003. Effect of different lime concentrations on the cultivation of an edible fungus (Pleurotus sajor caju; Oyster mushroom). M.Sc. Thesis, University of Ibadan, Nigeria.
r-16. Ekpo, E.N. and A.P. Aluko. 2002. Cultivation strategies and nutritive values of edible mushrooms (Lentinus tuber-regium) as a component of sustainable livelihood. Proc. 28th Ann. Conf., Forestry Assoc. of Nigeria.
r-17. Oei, P. 2003. Mushroom Cultivation. Appropriate Technology for Mushroom Growers, 3rd ed. Backhuys Pub., Leiden, Netherlands, 426 p.
r-18. Oei, P. 2005. Small scale mushroom cultivation. Agrodok 40. CTA Pub., Wageningen, The Netherlands, 86 p.

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