JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Yield performance of *Pleurotus sajor- caju* on different agro- wastes.

S. S. Patil and M.M. V. Baig[1]

Head, Department of Botany, Sharadchandra Arts, Commerce and Science College Naigaon Bz., Dist- Nanded (MS). India-431709.
[1]Department of Botany Yeshwant Mahavidyalaya Nanded.-431602.

Abstract:
Substrate type is one of the major factors affecting the growth and yield of oyster mushroom (*Pleurotus sajor caju*). Seven substrates, *viz*. Wheat, paddy straw, maize, jowar, soybean straw green gram and black gram straw were evaluated to study the productivity of oyster mushroom on these substrates. Among the seven substrates evaluated for yield of mushroom, maximum yield was reported (830.66 gm/kg straw) with 83.06 % B.E. when mushroom grown on soybean straw , followed by yield on wheat straw (791.66 gm/kg straw) with 79.16 % B.E. and the minimum yield was reported (625.99 gm/kg straw) on maize straw with 62.59 % B.E.

Key words: *Pleurotus sajor-caju*, mushroom, substrates, B.E., yield.

Introduction:
Mushrooms are fleshy fruiting bodies that belong to the members of Basidiomycotina. Mushroom mycelium grows in and around the substrate, then produces enzymes to digest the food externally, and mycelium absorbs the nutrients (Yafetto, 2018).The oyster mushroom is the third largest cultivated mushroom in the world. Pleurotus is an efficient lignin-degrading mushroom and can grow well on different types of lingo-cellulosic materials. Among all cultivated mushrooms, Pleurotus has the maximum number of commercially cultivated species suitable for year-round cultivation. Different Pleurotus species can be commercially cultivated during the summer months are *P. flabelltus, P. sajor-caju, P. sapidus, P. membranaceous, P. citrinopileatus, P. eous etc., and cultivated during the winter are P. ostreatus, P. florida, P. cornucopiae, P.fossulatus, P. eryngii* etc. (Chitra *et al*., 2021). Among these mushroom species, *Pleurotus sajor caju* is largest cultivated mushroom throughout the world. *P. sajor-caju* can easily grow on the by-products or wastes rich in cellulose and lignin, therefore a large number of agricultural and agro-industrial by-products can be used for its cultivation. Large scale cultivation of *P. sajor-caju* using suitable substrates can help people in rural areas to raise their income. According to Chang and Miles nutrient content of substrates affects the growth and formation of fruit bodies of Pleurotus species. Biological efficiency is a major parameter to measure the potentiality of various strains of mushrooms,grows on different substrates (Biswas and Layak, 2014). Biological efficiency (BE) is defined as the ratio of the weight of freshly harvested basidiocarp by dry weight of the substrate, expressed in percentage.Now-a-days the Biological efficiency, production and productivity of both of the mushrooms are decreasing and a lot of factors such as the methods of bed preparation, quality of spawn and substrate, several competitor molds and fungi, environmental factors etc. are responsible for this. A number of scientists are involved to find more potential and efficient way to increase the biological efficiency through various mushroom based researches. Objective of this work was to access the productivity of *Pleurotus sajor caju* grown on different locally available substrates.

Material and Methods:

Strains of Mushroom:

Pleurotus sajor-caju strain was obtained from National Centre for Industrial Microbes, National Chemical Laboratory, Pune, India. The cultures were preserved on 2 % malt extract agar slants at 4º C. Sub-culturing were done after every 15 days interval.

Spawn Preparation.

Spawn was prepared in polythene packets. Sorghum grains were boiled in water bath for 10-15 min in the ratio of 1:1 (Sorghum grains: water) and mixed with 4% (w/w) $CaCO_3$ and 2% (w/w) $CaSO_4$. Sorghum grains were then packed (250g) in polythene bags (of 200x300 mm. size) and sterilized in an autoclave at 121^0C for 30 min. After sterilization, the bags were inoculated with actively growing mycelium of the *P. sajor-caju* from malt extract slants and incubated (at 27±2 ºC) for mycelial growth without any light for 10-15 days until the mycelium fully covered the grains.

Experimental details.

Experiment was conducted in Randomized block design with five replications.

Cultivation of Mushroom.

The agro waste soybean straw, paddy straw, wheat straw, jowar straw, maize straw, green gram straw and black gram straw were collected from local farms and were used as cultivation substrate. The substrates were chopped to 2-3 cm. pieces and soaked in water over night to moisten it and excess water was drained off. After soaking, the substrate was steam sterilized at 121 ºC for 20 min. in an autoclave. The polythene bags of the size 35 x 45 cm were filled with sterilized substrates and a multi layered technique was adopted for spawning. Each bag was filled with 1 kg dry substrate and the spawn was added at the rate of 2% of the wet weight basis of substrate.

After inoculation, the bags were kept in house where the temperature and humidity were maintained around 25 ºC and 80 to 90 % respectively with sufficient light and ventilation for 20 days. The spawn run was completed within 18 days. The polythene bags were tear-off following the spawn run. Formation of fruit bodies was evident within 3-4 days after removal of poly bags. The beds were maintained up to the harvest of the third flush, which was completed in 35 days after spawning. A small layer of substrate was scrapped off from all the sides of the beds after each harvest. Each of the seven treatments was replicated three times.

Yield and Biological efficiency:

The total weight of all the fruiting bodies harvested from all the three pickings were measured as total yield of mushroom. The biological efficiency (yield of mushroom per kg substrate on dry weight basis) was calculated by the following formula Chang *et al*. (1981).

$$\textbf{Biological Efficiency (\%)} = \text{Fresh weight of mushroom} / \text{Weight of Air-dried substrate} \times 100$$

Statistical Analysis:

The recorded data in the present study was subjected to statistical analysis as per the procedure recommended by Panse and Sukhatme (1978).

Result and Discussion:

Substrate	Yield (gm/Kg) dry straw			Total	B.E.(%)
	Ist Picking	2nd Picking	3rd Picking		
Soybean straw	385.00	293.66	152.00	830.66	83.06
Wheat straw	356.00	285.66	150.00	791.66	79.16
Paddy straw	289.33	258.00	170.00	717.33	71.73
Maize straw	260.66	225.00	140.33	625.99	62.59
Jowar straw	282.00	220.33	135.00	637.33	63.73
Green gram straw	290.00	251.33	185.33	726.66	72.66
Black gram straw	305.00	285.33	172.33	762.66	76.26
SE ±	6.36	7.42	3.82	-	-
CD at 5%	16.52	21.22	12.18	-	-

The results reveal the yield, biological efficiency (B.E.) of the *P. sajor-caju* cultivated on different agro wastes (Table 1). Soybean straw recorded a significantly maximum yield at Ist picking (385.00 gm/kg straw) and it was reduced to 293.66 gm/kg at 2nd picking and 152 gm/kg straw at 3rd picking. The net yield of mushrooms on soybean straw was 830.66 gm/kg straw with 83.06 % B.E. Result of the present study reveals that soybean straw favors to give maximum yield and Telang *et. al.* (2010) also observed highest yield of *Pleurotus eous* when grown on soybean straw.

Wheat straw showed maximum yield (356 gm/kg straw) during Ist picking which was reduced to 285.66 gm/kg straw during 2nd picking and 150 gm/kg straw during 3rd picking and B.E. of Pleurotus fruiting bodies cultivated on wheat straw was 79.16 %. These results are in accordance with the findings of S.S. Patil, (2012). Highest yield of Pleurotus fruiting bodies (289.33 gm/kg straw) were reported during Ist picking on paddy straw followed by 258 gm/kg straw during 2nd picking and lowest yield 170 gm/kg straw was recorded during 3rd picking. Earlier Patil, S.S. (2013) also studied *Pleurotus sajor-caju* grown on different substrate with such findings. Khanna and Garcha (1982); Jain and Vyas, 2005 reported paddy straw are better substrate for Pleurotus cultivation. Maize straw showed a maximum yield (260.66 gm/kg straw) at Ist picking, followed by 225 gm yield at 2nd picking and minimum yield was reported (140.33 gm/kg straw) at 3rd picking and the overall Bioefficiency of maize straw was 62.59 %. Babar Iqbal et. al., (2016) reported 96 % biological efficiency of *Pleurotus florida* grown on maize straw. Jowar straw showed maximun (282 gm/kg straw) yield during Ist picking, it was reduced to 220.33 gm yield during 2nd picking and 135 gm yield was reported during 3rd picking. These results are in accordance with the findings of Telang *et. al.*, (2010) who obtained similar findings when P. sapidus grown on jowar straw. Green gram showed 290 gm yield at Ist picking, 251.33 gm yield at 2nd picking and 185.33 gm yield at 3rd picking with 72.66 % B.E. Earlier Survase, D.M. (2012) also studied *Pleurotus sajor-caju* on green gram straw with similar findings. Black gram showed maximum 305 gm yield during Ist picking followed by 285.33 gm yield during 2nd picking and 172.33 gm yield during 3rd picking with

the overall 76.26 % bio efficiency. Pardeep Kumar (2017) reported 78 % biological efficiency of Pleurotus sajor caju on black gram straw.

ACKNOWLEDGEMENT: This work was funded by Swami Ramanand Teerth Marathwada University Nanded vide their letter no.APDS/Uni.MRP-VII/Sci. & Tech.-Botany/2022-23/444 dated 17/06 -2022.

References:

Babar Iqbal, Hakim Khan, Saifullah, Imran Khan, Bismillah Shah, Ahmad Naeem, Waseem Ullah, Nangial Khan, Muhammad Adnan, Syed Rizwan Ali Shah, Khwaja Junaid, Nazeer Ahmed, Mazhar Iqbal (2016). Substrates evaluation for the quality, production and growth of oyster mushroom *(Pleurotus florida* Cetto).J.Entomology and Zoology Studies. 4(3): 98-107.

Biswas, M.K., Layak, M. (2014). Techniques for increasing the biological efficiency of paddy straw mushroom (Volvariellavolvacea) in eastern India. Food Sci. Technol.2:52– 57.

Chang, S.T. and P. G. Miles (2004). Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact (IInd edition), CRC Press, New York, .

Chang ST, Lau OW and Cho KY.(1981). The cultivation and nutritive value of *P. sajor-caju* . European J. Appl. Micro boil. Biotechnol., 12 : 58-62.

Chitra, K., Dhanalakshmi, K., Indra, N. and Ambethgar, V. (2021). Oyster Mushroom Cultivation with Reference to Climate. International Journal of Current Microbiology and Applied Sciences. 10(10): 307-313.

Jain, A.K. and Vyas, D. (2005). Comparative study on the yield of three Pleurotus sp. grown in several lignocelluloses Byproducts. J. Basic Appl. Mycol. 4: 155-157.

Khanna P, Garcha HS.(1982). Utilization of paddy straw for cultivation of Pleurotus species. Mush Newslett Trop.: 2(1):5–9

Panse VG and Sukhatme PV (1978). Stat. Math. Agri. work. ICAR publication, New Delhi.

Patil, S.S.(2012).Cultivation of Pleurotus sajor-caju on different agro-waste Science Research Reporter 2(3): 225-228.

Pardeep Kumar (2017). Effect of Different Agricultural Substrates on Yield of *Pleurotus sajor caju*.*J Krishi Vigyan*, 6(1) : 61-64.
DOI : 10.5958/2349-4433.2017.00051.4

Patil, S.S. and Baig, M.M.V. (2020). Productivity and nutritional value of *Pleurotus eous*. *BIOINFOLET*,17(2), 343-345.

Survase D.M.(2012). Bioconversion of agro waste into edible protein rich mushroom by pleurotus sajor-caju (Fr.) singer. Trends in biotechnological research. www.sciencejournal.in

Telang, S. M.,Patil, S.S. and Baig, M.M.V. (2010). Comparative study on yield and nutritional aspect of *Pleurotus eous* mushroom cultivated on different substrate., *Food Sci. Res.* .1., 1 (2) : 60-63.

Telang, S. M.,Patil, S.S. and Baig, M.M.V. (2010). Biological efficiency and nutritional value of *Pleurotus sapidus* cultivated on different substrates. *Food Sci. Res. J* .1 (2) : 127-129.

Yafetto, L. (2018). The structure of mycelial cords and rhizomorphs of fungi: A mini-review. Mycosphere. 9(5) : 984–998.