

Productivity and proximate content of *Pleurotus sajor-caju*

Patil S S

Department of Botany, Sharad Chandra Mavidyalaya, Naigaon, Dist- Nanded (MS).
shyampatilss@yahoo.co.in

ABSTRACT

Experiment was conducted to study the effect of different agro wastes viz. soybean straw, paddy straw, wheat straw, jowar straw, sunflower stalk and pigeon pea stalk on productivity and proximate content of *Pleurotus sajor-caju*. Soybean straw showed significantly highest yield (with 83.00% B.E.), maximum protein (25.80%), fat (2.82%), and ash (7.30%) content. Significantly maximum moisture content was found (88.25%) on wheat straw, carbohydrate content on Jowar (58.50%) straw, crude fiber content (7.90 %) on paddy straw.

Key words: *P. sajor-caju*, B. E., yield, agro waste, fruiting body.

INTRODUCTION

Mushrooms are the reproductive structure of fleshy macro fungi and rich with protein, vitamin and minerals. More than 2000 species of edible mushrooms are known, out of which only few species have been cultivated commercially by preparing beds (Nair, 1994). Among the various edible mushroom types, *Pleurotus* species have become more popular and widely cultivated throughout the world particularly in Asia and Europe as they have simple and low cost production technology shows higher bio efficiency. *Pleurotus* species are rich source of vitamin C, B-complex (thiamin, riboflavin, folic acid and niacin), minerals (Ca, P, Fe, K and Na) and protein (Sturion and Otterer, 1995; Justo *et al.*, 1998; Manzi, *et al.*, 1999; Caglarirmak, 2007). *Pleurotus* species content high potassium: sodium ratio, (Mandhare, 2000) which makes mushrooms an ideal food for patients suffering from hypertension and heart diseases. (Rai *et al.*, 1998). The cultivation of edible mushroom offers one of the most feasible and economic method for the bioconversion of agro-lignocellulosic wastes Bano *et al.* 1993; Cohen *et al.*, 2002). The technology can also limit air pollution associated with burning agriculture wastes as well as to decrease environmental pollution due to unutilized agricultural wastes. Aim of this work was to evaluate the substrate for cultivation and nutritional quality of *Pleurotus sajor-caju*.

MATERIAL AND METHODS**Culture and cultivation:**

The pure culture of *Pleurotus sajor-caju* was obtained from National Collection of Industrial Microorganisms (NCIM) National chemical laboratory (NCL), Pune, India. The cultures were maintained on 2% malt extract agar slants at 4 °C. Sub culturing was done after every 15 days.

Spawn Preparation:

Spawn was prepared in polythene packets. Sorghum whole grains were boiled in water bath for 10 to 15 min. at the ratio of 1:1 (sorghum grain: water) and mixed with 4% (w/w) CaCO₃ and 2 % (w/w) CaSO₄. Sorghum grains then packed (250g) in polythene bags (200 x 300mm. size and sterilized in an autoclave at 121 °C for 30 min. After sterilization, the bags were inoculated with actively growing mycelium of the *Pleurotus* from the malt extract slants and incubated (at 27 ± 2 °C) for mycelial growth without any light for 10-15 days until the mycelium fully covered the grains.

Cultivation:

The agro waste, soybean straw, paddy straw, wheat straw, jowar straw, Pigeon pea stalk and sunflower stalk were collected from local farms and were used as cultivation substrate, following the method prepared by Bano and Shrivastava (1962) with slight modifications. 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 °C for 20 min. in an autoclave. The polythene bags of the size 35x45 cm were filled with sterilized substrates and 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 °C 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 side of the beds after each harvest. Each of the six treatments was replicated three times.

Yield and Biological efficiency:

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 wt. basis) was calculated by the following formula Chang *et al.* (1981)

$$B.E. \% = \frac{\text{Fresh weight of mushroom}}{\text{dry weight of substrate}} \times 100$$

Moisture content: The moisture content of mushroom was also expressed in percent and calculated by the formula-

$$\text{Moisture content (\%)} = \frac{\text{weight of fresh sample} - \text{weight of dry sample}}{\text{weight of fresh sample}} \times 100$$

Nutritional Analysis:

Protein, fat, ash and total carbohydrate were determined with the procedure recommended by AOAC (1995) and Wankhede *et. al* (1976). The crude fiber was determined with procedure recommended by Ranganna (1986). The recorded data in the present work was subjected to statistical analysis as per the procedure given by Panse and Sukhatme (1978).

RESULT AND DISCUSSION

The results reveal the yield, biological efficiency (B.E.) of the *P. sajor-caju* cultivated on different agro wastes (Table 1). Soybean straw showed significantly maximum yield (830.00 gm/kg straw, with 83.00 % B.E), protein (25.80 %), fat (2.82%) and ash (7.30 %) content of *P. sajor-caju*. Similar results were reported with *P. sajor-caju* by Dias *et. al.* (2003). Superiority of soybean straw over paddy, wheat, jowar straw in terms of yield was reported earlier by Patil and Jadhav, (1999). Comparing the six lignocellulosic residues as substrates for the cultivation of *P. sajor-caju* shows that, soybean straw supported best growth of *P. sajor-caju* as evidenced by completed and heavy colonization of substrates forming a compact white mass of mycelium within 2 weeks of inoculation.

Table 1: Effect of different substrate on yield of *P. sajor-caju*

Substrate	Yield (gm) / Kg dry straw			Total	B.E.(%)
	Ist Picking	IInd Picking	IIIrd Picking		
Soybean straw	360.00	300.00	170.00	830.00	83.00
Paddy straw	370.00	310.33	109.00	789.33	78.33
Wheat straw	330.33	260.33	158.00	748.66	74.86
Jowar straw	310.00	252.33	146.00	708.33	70.83
Sunflower stalk	305.33	215.00	111.00	631.33	63.13
Pigeon pea stalk	270.00	290.00	194.33	754.33	75.43
S.E.+	15.70	7.12	3.58	-	-
C.D. at 5%	54.40	23.40	14.28	-	-

Maximum moisture content was 88.25 % when *P. sajor-caju* was grown on wheat straw. Carbohydrate content of *P. sajor-caju* was 58.50 % grown on Jowar straw being the highest followed

by on (56.00 %) paddy straw. These results are confirmed with the findings of Patil *et. al* (2008). The % content of protein and fat were similar as reported in earlier studies (Syed Abrar *et.al*, 2009).

Observed values of crude fiber and ash content in present study are in accordance with the previous studies Khydagi *et. al* (1997) and Bonatti *et. al* (2004). The variation in these nutrients content

might be due to the quality and quantity of nutrients available in substrates Patil, (2012).

ACKNOWLEDGEMENT: This work was funded by University Grant Commission, New Delhi.

Table 2 : Effect of different substrates on Nutritional content of *P.sajor-caju*.

Substrate	Moisture (%)	Total carbohydrate (%)	Protein(%)	Fat (%)	Crude fibre (%)	Ash (%)
Soybean straw	86.40	52.20	25.80	2.82	6.70	7.30
Paddy straw	88.00	55.00	23.40	2.40	7.90	6.85
Wheat straw	88.25	56.00	22.90	2.55	7.10	6.65
Jowar straw	86.25	58.50	23.10	2.62	7.30	7.10
Sunflower stalk	87.50	50.70	21.00	2.75	7.65	6.90
Pigeon pea stalk	84.10	48.20	24.20	2.45	7.78	6.80
S.E.+	0.46	0.68	0.58	0.10	0.12	0.14
C.D. at 5%	0.84	2.36	1.68	0.19	0.28	0.48

LITERATURE CITED

- AOAC, 1995.** Official methods of analysis. Association of official analytical chemists. 16th Ed., Arlington, VA.
- Bano Z and Shrivastava HC, 1962.** Studies in the cultivation of *Pleurotus* sp. on paddy straw. *Food Sci.*, **12**:363-368.
- Bano Z, Shashirekha MN. and Rajarathan S, 1993.** Improvement of the bioconversion and biotransformation efficiencies of the oyster mushroom (*Pleurotus sajor-caju*) by supplementation of its rice straw with oil seed cakes. *Enzymes and microbial technology*, **15**: 985-989.
- Bonatti M, Karnopp P, Soares HM and Furlan SA, 2004.** Evaluation of *Pleurotus ostreatus* and *P. sajor-caju* nutritional characteristics when cultivated on different lignocellulosic wastes. *Food Chemistry*, **88** : 425-428
- 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.
- Cohen R, Persky L and Hadar Y, 2002.** Biotechnological applications and potential of wood degrading mushrooms of the genus *Pleurotus* . *Applied Microbiology and Biotechnology*, **58**:582-594.
- Pati SS, 2012.** Cultivation of *P. sajor-caju* on different agro wastes. *Science Res. Repoter*, **2**(3) : 225-228.
- Caglarirmak N, 2007.** The nutrients of exotic mushrooms (*Lentinula edodes* and *Pleurotus* sp.) and an estimated approach to the volatile compounds. *Food chemistry*, **105**(3):1188-1194.
- Dias ES, Koshikumo EMS, Schwan R F and Silva R, 2003.** Cultivation of mushroom *P. sajor-caju* on different agricultural residues. *Ciencia-e- Agro Tecnologia*, **27** (6):1363-1369.
- Jesto MB, Guzman GA, Mejia EG, Diaz CLG, Martinez G and Corona EB, 1998.** Composition quimica de tres cepas mexicanas de setas (*Pleurotus ostreatus*). *Archivos Latinoamericanos de Nutricon*, **48** (4):359-363.
- Khydagi KS, Sharada GS and Meera Rao, 1998.** Proximate composition of oyster mushrooms. *Karnataka J. Agri. Sci.*, **11**(2): 548.
- Manzi P, Gambelli L, Marconi S, Vivanti V and Pizzoferrato L, 1999.** Nutrients in edible mushrooms. An inter species comparative study. *Food Chemistry*, **65**(4):477-428.
- Mandhare VK, 2000.** *Productivity of Pleurotus sp. On different substrates and its effect on nutritional indices of spent straw.* Ph.D. thesis , Marathwada Agriculture University, Parbhani.
- Panse VG and Sukhatme PV, 1978.** *Stat. Math. Agri. work. ICAR publication*, New Delhi.
- Patil MB and Jadhav VT, 1999.** Studies on productivity of oyster mushroom on different agro wastes under Marathwada condition. *J. Maharashtra Agri. Univ.*, **24**(2):162-163.

Patil SS, Kadam RM, Shinde SL and Deshmukh SA, 2008. Effect of different substrate on productivity and proximate composition of *P. florida* . *Int. J. Plant sci.* **3**(1): 151-153.

Ranganna S, 1986. "Hand book of analysis and quality control for fruit and vegetable products". pp.25-26.

Rai RD, Ahlawat OP and Verma RN, 1998. Nutritional value and post harvest technology of mushroom. In: Recent advances in cultivation technology of edible mushroom, NRCM, Solan (HP). (Eds. Rai RD, Dhar BL and Verma RN) pp. 241-242.

Sturion GL and Oetterer M, 1995. Composicao Quimica de Cogumelos comestiveis (*Pleurotus sp.*) originados de cultivos em diferentes substrates. *Ciencia e Tecnologia de Alimentos*,**15**: (2), 189-193.

Syed Abrar A, Kadam J A, Mane VP, Patil SS and Baig MMV, 2009. Biological efficiency and nutritional contents of *P. florida*(Mont.) Singer cultivated on different agro wastes. *Nature and Sci.*, **7** (1): 44-48.

Wankhede D B and Tharanthan RN, 1976. Sesame (*Sesamum indicum*) carbohydrates. *J. Agri. Food Chem.*, **24**: 655-659.

How to Cite this Article:

Patil SS, 2013. Productivity and proximate content of *Pleurotus sajor-caju*. *Biosci. Disc.*, **4**(2):169-172.