Protein content of *Pleurotus* Mushrooms Grown on different Agro wastes.

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Abstract:
Five *Pleurotus* species namely *P. sajor-caju, P. florida, P. eous, P. ostreatus, P. flabellatus* were evaluated for their protein content when cultivated on different locally available substrates(Soybean, paddy, wheat, ground nut, black gram and sunflower stalk). Out of five *Pleurotus* species *Pleurotus eous* had shown highest protein content (38.00 %) during Ist picking, followed by (36.10 %) the protein content during IInd picking when grown on soybean straw. Lowest protein content was recorded when *P. flabellatus* grown on (20.33 %) paddy straw during IInd picking.

Introduction:
Protein is important constituent of food and decides about dietary level of human being. Mushroom protein is intermediate in quality between vegetable and animal protein (Kurtzman, 1976). It is rich in all the essential amino acids (Hayes and Haddad, 1976), Buigut (2002), Stephen et al., (2004). Akindahunsi and Oyetayo (2006) reported the digestibility of mushroom protein ranged between 71 to 90 %. Pleurotus species are valuable for protein requirement for human nutrition (Breene, 1990). Pleurotus species contains 27-29 % protein when grown on different substrates (Patil *et al*., 2006).
As far as the nutrient profile of mushroom are concerned, these are influenced by many factors including the type of substrate on which these are cultivated. There are some differences in the nutrient content of the mushroom cultivated on different substrates(Mabrouk and Ahwanyi, 2008; Akinyele et al., 2011; Kulshreshtha et al., 2013b). However ,this change in nutritional content never found to affect their edibility. Therefore, it is still a beneficial technology because it solves two major problems simultaneously i.e. waste accumulation and shortage of proteinaceous food.

Material and Methods:

Culture and cultivation:
The pure culture of *Pleurotus sajor-caju, P. ostreatus, P. eous, P. florida P. flabellatus* were 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 ºC. Sub culturing were 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 ºC 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 ºC) 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, groundnut straw, black gram straw 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 ºC for 20 min. in an autoclave. The polythene bags of the size 35 x 45 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 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 side of the beds after each harvest. Each of the six treatments was replicated three times.

Protein Estimation:
Nitrogen content was estimated by Micro-kjeldhal method. The protein content was calculated by using the protein conversion factor 4.38 % total N. This estimation of protein was more accurate than the conversion factor 6.25 because of chitin or other N contributor (non protein N) compounds in mushrooms (Dikeman*et al*., 2005).

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:

Protein content of *Pleurotus* species differed significantly when cultivated on different substrates.

Pleurotus sajor-caju shows significantly maximum protein (29.50 %) content during Ist picking when cultivated on groundnut straw, it was found minimum (21.00 %) during IInd picking when grown on paddy straw. Protein content of *Pleurotus ostreatus* was reported significantly maximum (**31.50 %**) during Ist picking when grown on soybean straw whereas it was found minimum on sunflower straw (23.66 %) during IInd picking. The protein content of *P. eous* was reported highest (38.00 %) when grown on soybean straw during Ist picking and it was found lowest on (30.00 %) sunflower stalk during IInd picking. *Pleurotus florida* showed maximum protein content when cultivated on soybean straw (27.50 %) during Ist picking while it was found minimum when grown on (21.85 %) sunflower stalk during IInd picking. Protein content of *Pleurotus flabellatus* was found significantly maximum (25.15 %) during Ist picking when cultivated on soybean straw and it was reported minimum when grown on (20.33 %) paddy straw during IInd picking.

Protein content of *Pleurotus* species reported in this work were generally in accordance with earlier work (Ortega et al., 1992, Khydagi et al., 1998, Patil et al., 2008).

From the result it could be concluded that the protein content of *Pleurotus* species differed from species to species and substrate to substrate used for cultivation purpose.

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Table 1: Protein content of *Pleurotus* species cultivated on different substrates.

Substrate	*P. sajor-caju*		*P. ostreatus*		*P. eous*		*P. florida*		*P.flabellatus*	
	I	**II**	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**
Soybean straw	29.33	27.45	**31.50**	28.46	**38.00**	**36.10**	**27.50**	**25.98**	**25.15**	23.70
Paddy straw	23.90	21.00	24.20	25.66	29.10	31.50	22.50	22.78	22.80	20.33
Wheat straw	28.45	25.80	27.00	24.90	32.33	30.66	23.70	23.25	23.50	**23.90**
Groundnut straw	**29.50**	**28.90**	28.30	**29.70**	37.25	36.00	26.33	25.70	24.55	21.20
Black gram straw	25.70	23.80	28.58	27.50	34.00	34.20	22.80	22.90	23.10	23.00
Sunflower stalk	25.10	22.30	25.00	23.66	31.30	30.00	22.10	21.85	22.30	22.00
S.E. ±	0.57	0.46	0.15	0.27	0.92	0.67	0.45	0.37	0.29	0.34
CD at 5%	1.90	1.27	1.79	1.22	2.65	2.07	1.20	1.19	0.90	1.22

Where I = First Picking, II = Second Picking