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Nutrient composition in wild and cultivated edible mushroom, *Lentinus tuberregium* (Fr.) Tamil Nadu., India

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Abstract: *Lentinus tuberregium*, isolated from the wild and cultivated was analysed on dry weight basis for their proximate nutrient compositions. The cultivated mushroom accumulated higher concentrations of carbohydrates (58.05%), protein (25%), moisture (12.51%), total ash (5.14%), crude fibre (14.69%), fat (1.54%), potassium (90.8 mg/gm), calcium (87 mg/gm), magnesium (30.4 mg/gm), sodium (37.3mg/gm), iron (6.5 mg/gm), copper (1.0 mg/gm), zinc (4.9 mg/gm), manganese (1.7 mg/gm), energy (338 kcal). Of the nutritive value analysed, potassium was the most dominant with concentration as high, followed by calcium, magnesium, sodium respectively. Where as the wild mushroom proximate value such as carbohydrates (55.8%), protein (25%), moisture (9.4%), total ash (4.7%), crude fibre (3.6%), fat (1.6%), potassium (7.53 mg/gm), calcium (2.66 mg/gm), magnesium (2.45mg/gm), sodium (1.2mg/gm), iron (0.53mg/gm), copper (0.11 mg/gm), zinc (0.41 mg/gm), manganese (0.08 mg/gm), energy (331 kcal).

Keywords: *Lentinus tuberregium*, proximate analysis, wild mushroom, cultivated mushroom

Introduction

Edible mushrooms are sources of food and delicious all over the world. They have a high nutritional value almost twice that of any vegetable or fruit. They are rich in vitamins B, C and D and mineral elements (Fasidi *et al*., 1990; Sivrikaya *et al*., 2002) and the bioavailability of some elements depend on the level of interactions with various nutrients. Apart from their use as food, sufficient evidences suggest that many species contain substances that may prevent or reducing cancer, heart diseases, diabetes and viral infections (Genders, 1974; Oei, 1991). *Lentinus tuberregium* which is primary wood rot fungus is well known edible mushroom in different parts of the world (Kues and Liu, 2000). *Lentinus tuberregium* is highly appreciated for its meaty taste and biting texture. However, with rapid urbanisation, their habitats with suitable climatic conditions are being destroyed alongside the germplasm of this fungus. Agricultural wastes such as (paddy straw, rice husk, wheat husk saw dust) available in India in large quantities. After the removal of the grains (rice, wheat, maize etc), they are sometimes fed to livestock or simply burnt off since they could constitute a nuisance to the environment. However, this waste could be effectively exploited to useful food that can improve human nutrition and the remaining material after harvesting the mushroom can be composted and applied directly to the soil as organic fertilizer. A comparative evaluation of the nutritional values of *Lentinus tuberregium* cultivated on paddy straw and isolated from the wild is reported in this paper.

Materials and Methods

Experimental material included fruit bodies of *Lentinus tuberregium* on paddy straw were cultivated from Centre for Advanced studies in Botany, University of Madras, whereas wild strain isolated from Keeriparai forest of Kanyakumari District, Tamil Nadu, India. For production of cultivation of wild mushroom , paddy straw was obtained from farmers in Namakkal District, Tamil Nadu, India, were screened and cleaned to remove extraneous substances, shredded into pieces of between 1-3 cm long and soaked in water to achieve moisture content of about 60-65%. Polypropylene bags were then filled with moist paddy straw substrate, sterilized at 121ºC for 15 min and after cooling inoculated with the mushroom spawn, watered regularly (24h to 48h) and 24ºC to 26ºC for 30 days and the emerging fruit bodies were harvested, and oven-dried at 60ºC and powdered in a mortar and pestle. Moisture content was determined by the direct oven drying method. The weight loss after oven drying of each sample (1g) at 105°C to constant weight was expressed as % moisture content (Sivrikaya, 2002). Protein content was determined using the micro-Kjeldahl method. Since mushroom has significant content of

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non-protein nitrogen, the protein was determined using the adjusted conversion factor 4.38 for mushroom protein (Shashireha, 2002). Crude fat was determined by using the Soxhlet extraction method using petroleum ether as the solvent (AOAC 1984). Ash content of 1 g powdered sample was determined as the residue of incineration at 550^0C in a muffle furnace (AOAC, 1984). Total carbohydrate was determined by 2 g of each sample in 50 ml distilled water of which 0.2 ml was diluted ten-fold. To 1 ml of the resulting solution and serial dilutions of glucose stock (10 mg/100 ml) solution, 4 ml of anthrone reagent was added and absorbed the solutions were measured by a spectrophotometer at 620 nm against a reagent blank (Plummer, 1971). General metabolisable energy was estimated by multiplying the crude protein, fat and carbohydrate by 16.75(kJ g^{-1}), 37.6(kJ g^{-1}) and 16.75 (kJ g^{-1}) respectively (Murray, 2001). The solution of ash dissolved in a drop of trioxonitrate (V) acid made up to 50 ml with deionised water was analysed for Ca, Mg, Cu and Zn using the atomic absorption spectrophotometer, for Na and K using a flame photometer, and for P using UV-Visible spectrophotometer at 436 nm after making ammonium vanadate molybdate complex according to established procedures of Perkin- Elmer (Perkin-Elmer, 1982). All samples were analysed in triplicates and results were recorded as mean ± S.D. All glassware's used were washed in glass-distilled water and the chemicals used were analytical grade.

Results and Discussion

Table 1and 2 represents the proximate compositions (g/100 g) (on dry weight basis) of cultivated and wildly isolated *Lentinus tuberregium* fruit bodies. Moisture content distribution ranging from 12.51±0.01% in the cultivated mushroom whereas in the wild (9.4±0.01%). The cultivated variety had higher concentration of protein (25±0.01) than the wild one (18.07±0.02) showing the cultivated variety as a better source of protein than the wild one. This type of distribution is in agreement with the reports of (Fasidi and Kadiri, 1990) for *Volvariella esculenta* and (Ola and Oboh, 2001) for *Termitomyces robustus* and *Lentinus subnudus*, which showed higher protein concentration. Our results were in agreement with earlier studies (Bahl, 1998; Oei, 1991) which showed that mushrooms are generally low in crude fat concentration. (Ragunathan and Swaminathan, 2003) obtained low fat concentration in three species of *Pleurotus* grown on various agro-wastes. In our study, the fat concentration in the cultivated variety (1.54±0.01) was lower than that in the wild one

Table 1. Proximate analysis of cultivated *Lentinus tuberregium* on paddy straw

Parameters	Proximate composition of cultivated edible mushroom *Lentinus tuberregium* (%)	Minerals	Proximate composition of cultivated edible mushroom *Lentinus tuberregium* (%)
Total carbohydrates	58.05±0.01	Potassium	90.8mg
Total protein	25±0.01	Calcium	87mg
Total crude fibre	14.69±0.01	Sodium	37.3mg
Total ash	5.14±0.01	Iron	6.5mg
Total fat	1.54±0.01	Magnesium	30.4mg
Moisture	12.51±0.01	Copper	1.0mg
Energy value(Kcal)	338	Manganese	1.7mg
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Analysed on dry weight basis, (mean ±SD).

Table 2. Proximate analysis of wild *Lentinus tuberregium*

Parameters	Proximate composition of wild edible mushroom *Lentinus tuberregium* (%)	Minerals	Proximate composition of wild edible mushroom *Lentinus tuberregium* (%)
Total carbohydrates	55.8±0.01	Potassium	7.53mg
Total protein	25±0.01	Calcium	2.66mg
Total crude fibre	3.6±0.01	Sodium	1.2mg
Total ash	4.7±0.01	Iron	0.53mg
Total fat	1.6±0.01	Magnesium	2.45mg
Moisture	9.4±0.01	Copper	0.11mg
Energy value(Kcal)	338	Manganese	0.08mg
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Analysed on dry weight basis, (mean ±SD).

(1.6±0.10). Hence the cultivated variety will be more useful in the formulation of weight restriction diets than the wild one. The cultivated variety was found to contain higher crude fibre content (14.69±0.08) than the wilder one (3.6± 0.04). This is expected considering the fact that the cultivating variety grows on prostrate decaying logs from which they directly obtain nutrients and this could be their source of high fibre content. This is in agreement with the results of (Fasidi and Kadiri, 1990) and (Oei, 1991) who found various edible mushrooms higher crude fibre concentration. Fibres are an essential part of a healthy diet (Oei, 1991) and have an important preventive action in colorectal carcinoma (Miuzino, 1996). Based

on the crude protein, carbohydrate and fat contents the energy values (kcal/100 g) of the mushrooms were calculated. The cultivated mushroom would be a better energy source (338 kcal) than the wildly obtained one (318 kcal). (Fasidi and Ekuerre, 1993) and (Manzi *et al*., 1999) also reported that potassium was the most abundant mineral element in various species of edible mushrooms. In our study potassium concentration in the cultivated mushroom (7.53) was higher than in the wild (90.8). Mushrooms are generally low in sodium concentration (Bahl, 1998). The low sodium and high potassium concentration is of significance as a Na/K ratio less than 0.6 (Nieman, 1992) suggests that the mushrooms will be suitable for diet formulation. Zinc was distributed such that the cultivated variety had a higher concentration (4.9) than the wild one (0.41). The results of the present study indicate that mushrooms are rich in nutrients and minerals and low in fat, and contents of nutrients are not in sufficient quantities to result in toxicity or poor mineral bioavailability.

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