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Short Communication

Proximate and mineral composition of four edible mushroom species from South India

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Results of proximate analysis of four edible species of mushroom collected from different parts of IIT Chennai, Tamil Nadu, India., indicate that *Auricularia polytricha* was a very good source of crude protein (37%), crude fiber (21.97%), ash (6.87%), calcium (607 mg/g dry weight) and manganese (136 mg/kg dry weight (dw)). *Macrolepiota rhodocus* was the richest in carbohydrate (48%) and magnesium (250 mg/g), while *Clitocybe sp* was richest in moisture content (21%), iron (1230 mg/g) and copper (9.0 mg/g). It is also a good source of carbohydrate (42%), calcium (208 mg/g) and manganese (120 mg/g). *Lentinus tigrinus* was, however, the richest in dry matter (94%), and is also rich in carbohydrate (60%), magnesium (14 mg/g) and copper (1.2 mg/g). It was observed that lipids, sodium and phosphorus contents of the four species were generally very low.

Key words: Edible mushrooms; food composition.

INTRODUCTION

Mushrooms are saprophytes. They include members of the Basidiomycota and some members of the Ascomycota. Mushrooms have been a food supplement in various cultures and they are cultivated and eaten for their edibility and delicacy. They fall between the best vegetables and animal protein source. Mushrooms are considered as source of proteins, vitamins, fats, carbohydrates, amino acids and minerals (Jiskani, 2001). All essential amino acids are present as well as water soluble vitamins and all the essential minerals (Buigut, 2002). Mushroom are good sources of vitamins like riboflavin, biotin and thiamine (Chang and Buswell, 1996). Ogundana and Fagade (1981) indicated that mushroom is about 16.5% dry matter out of which 7.4% is crude fiber, 14.6% is crude protein and 4.48% is fat and oil.

Protein contents vary between 4 to 9% in *Auricularia* sp. and between 24 to 44% in *Agaricus* species. The protein value of mushrooms is twice as that of asparagus and potatoes, four times as that of tomatoes and carrots, and six times as that of oranges (Jiskani, 2001). Their energy value also varies according to species, which is about equal to that of an apple. *Pleurotus tuber-regium* is a common species and it is useful in some combinations to cure headache, stomach ailments, colds and fever (Oso, 1977) asthma, smallpox and high blood pressure (Fasidi and Olorunmaiye, 1994; Oso, 1977), while *Lentinus tuber-regium* and *Lentinus tigrinus* are used for treating dysentery and blood cleansing respectively. *Auricularia* species have been traditionally used for treating hemorrhoids and various stomach ailments (Chang and Buswell, 1996). Chanterelles, *Boletus edulis* and *Lactarius* spp. are used for killing flies, while the puffballs are used for healing wounds (Harkonen, 1998; Delena, 1999).

They are also recommended to diabetic and anemic persons, owing to their low carbohydrate and high folic acid content. Some mushrooms are reputed to possess anti-allergic, anticholesterol, anti-tumor and anti-cancer (Jiskani, 2001). Mushrooms are now marketed along major highways and urban centers. They are also relatively much cheaper than beef, pork and chicken that contain similar nutrients. A comparative evaluation of the nutritional potentials of four edible mushrooms is reported in this paper.

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Table 1. Proximate compositions of four wild mushrooms (per 100 g of sample).

Parameters	*Auricularia polytricha*	*Macrolepiota rhacodes*	*Clitocybe Sp.*	*Lentinus tigrinus*
Moisture (%)	6.48	11.10	21.0	2.51
Ash %	6.87	11.80	15.73	5.14
Crude fibre (%)	21.97	4.78	13.04	14.69
Fat (%)	0.74	2.25	1.24	2.25
Protein (%)	37	34.31	24.8	18.07
Carbohydrate (%)	38.48	48	42	60
Sodium (mg/100g)	858.4	274.4	858.4	37.3
Potassium (mg/100g)	588.4	294.3	1369.1	90.8
Calcium (mg/100g)	607	195	208	248
Magnesium (mg/100g)	136	250	120	14
Copper (mg/100g)	0.3	9.0	9.0	1.2
Manganese (mg/100g)	1.3	3.4	2.7	0.6
Zinc (mg/100g)	1.0	3.8	6.2	4.9
Iron (mg/100g)	16.3	85.6	61.4	36.2
Energy (kcl)	274	260	265	318

MATERIALS AND METHODS

Sampling of mushrooms

The fully matured mushroom species were collected from different parts of IIT Chennai, Tamil Nadu, India. Collections were made at different times of the day: Morning, afternoon and sometimes mid-day by uprooting its substratum with the aid of a scalpel.

Proximate analysis

Four edible mushroom species were analyzed for food composition according to the Association of Official Analytical Chemists (AOAC, 1995). These include the determination of crude protein, crude fat, moisture content, dry matter, ash, crude fiber, carbohydrate and minerals. The minerals include sodium, potassium, calcium, phosphorus, magnesium, iron, copper and manganese. Values for, Fe, Cu and Mn were read on Atomic Absorption Spectrophotometer after standardizing with respective elements. The percentage of all the fractions (crude protein, crude fat, minerals and ash) were added together and subtracted from 100 to obtain the total carbohydrate percentage, while the nitrogen free extract (dry weight) was calculated as the percentage of the total carbohydrate and crude fiber.

RESULTS AND DISCUSSION

Proximate analysis was carried out on four edible mushroom species: *Auricularia polytricha, Macrolepiota rhodocus*, *Clitocybe sp.* and *L. tigrinus*. They were selected based on their availability at the time of analysis. Results of proximate composition are presented in Table 1. *A. polytricha* had the highest concentration of protein (37%) followed by *M. rhodocus* and *L. tigrinus*, while *Clitocybe sp.* had the least (24.8%). With respect to moisture content, *Clitocybe* had the highest value (21.0%) and *A. polytricha* the least value (6.48%). *M. rhodocus* had the highest carbohydrate (48%) and crude fiber was highest in *A. polytricha* (21.97%). Results in Table 1 show values of the macro mineral compositions. Calcium content was 208 mg/g dry weight for *Clitocybe sp.*, and 195 mg/g dw for *M. rhodocus*. *Clitocybe sp* and *A. polytricha* had the highest sodium content of 858.4 and 296 mg/g dry weights, respectively. *Clitocybe sp.* had the higher potassium concentration (1369.1 mg/g) and *M. rhodocus* had the least content (294.3 mg/g). *L. tigrinus* had the highest fat content (2.25%), followed by *Clitocybe sp.* and *A. polytricha*. *M. rhodocus* had the highest magnesium content (250 mg/g). Table 1 shows micromineral composition. Iron content varied from *A. polytricha* with 16.3 mg/g dw to *M. rhodocus* with 85.6 mg/g. Copper content ranged from *A. polytricha* (0.3 mg/g) to *M. rhodocus* 9.0 mg/g. Manganese content in *M. rhodocus*, *Clitocybe sp*, *A. polytricha*, and *L. tigrinus* were 3.4, 2.7, 1.3 and 0.6 mg/g, respectively. The results of mineral values of the four edible species of mushrooms clearly indicate the potential for their use as sources of good quality food. The crude protein, ash and crude fiber values of most mushrooms compared favourably with and in some instances surpassed those reported for most legumes except groundnut and soybeans grown in West Africa (FAO, 1970; Aletor and Aladetimi, 1995). The mineral levels, mainly potassium, phosphorous, sodium and iron in these mushrooms were higher than those reported for several cowpea varieties (Aletor and Aladetimi, 1989), but lower than those reported for fish, snails and broiler meat (Imevbore, 1992). Using this proximate analysis, the mineral and analytical food value as approximate indices of nutritional quality, it would appear that some of these mushrooms fall between most legumes and meat. In earlier studies, Gruen and Wong (1982) indicated that edible mushrooms were highly nutritional and compared favorably with meat, egg and milk. Some of the mushrooms are known to possess

antitumorigenic and hypocholesterolaemic agents, which implies that mushrooms could hold special attraction for and may be recommended for people with cholesterol-related ailments (Chihara, 1993). The moisture contents of some of the mushrooms analyzed are high, indicating that mushrooms are highly perishable. High moisture contents promote susceptibility to microbial growth and enzyme activity. However, among those mushrooms analyzed *A. polytricha* had the highest protein content, followed by *M. rhodocus* and *L. tigrinus*, and then *Clitocybe* sp. The author reported 21.97% fiber and 6.87% ash contents for *A. polytricha*. The results of nutritionally valuable minerals show that the four mushroom species were rich in potassium, calcium, magnesium, iron and manganese. This is in agreement with the report of analysis of some cultivated mushrooms like *Agaricus bisporus*, *Lentinus edodes*, and *Pleurotus ostreatus* (Mattila et al., 2001). They were generally low in sodium, phosphorus and copper. Minerals in the diet are required for metabolic reactions, transmission of nerve impulses, rigid bone formation and regulation of water and salt balance among others. From the study, it was observed that these four edible mushrooms hold tremendous promise in complementing the protein and mineral supply deficits prevalent in developing countries. Edible mushrooms are grown with little efforts in their husbandry: They are grown on strawbased compost, and sawdust supplemented with other nutrients. For their full nutritional potentials to be realized, intensive efforts must be geared towards their husbandry and popularization of the more nutritious species like *Agaricus* spp., *P. tuber-regium* and *Termitomyces* spp.

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