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Nutritional analysis and organoleptic evaluation of paddy straw mushroom (*Volvariella* sp.)

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Mushroom is regarded as one of the highly priced delight of vegetarians. Mushroom is the only non animal source of vitamin D with various nutritional advantages. It has found a prominent place in the kitchens of majority of people in the world. Nowadays mushrooms are gaining paramount importance as a low calorific food with good quality protein and high fibre content. Edible mushrooms are additionally exploited for their medicinal properties in the present age as it has already proven as promising with hepato–protective, anticancer, antioxidant, antiviral, hypoglycaemic and hypercholesterolemia effects. In this context, nutritional analysis of paddy straw mushroom was performed and the content of various proximate constituents like carbohydrates, protein, lipids, fibre and ash were evaluated and sensory evaluation was carried out in comparison with button mushroom, oyster mushroom and milky mushroom using two recipes. Paddy straw mushroom recipe was liked very much by most of the evaluators. Paddy straw mushroom was found to possess better quality with respect to nutritional value and organoleptic acceptability.

Key Words : Paddy straw mushroom, Nutritional analysis, Organoleptic evaluation

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INTRODUCTION

Mushrooms are one among the exotic food source and addition to any diet or menu. Mushrooms as vegetarian food have gaining priority day by day (Wakchaure, 2011). With their catchy flavour, taste and nutritional value, less dependence on land for growth and ability to grow on variety of agricultural residual wastes, mushrooms are exploited greatly in developed and developing countries all over the world (Chang, 1980). Beyond tasting great, mushrooms are also a very nutritious addition to any cuisine (Wasser, 2010; Mortimer *et al.*, 2012 and Hilden *et al.*, 2013). Nutritionally, mushrooms are low in energy, cholesterol and fat but possess high protein, carbohydrates and fibre (Hsu *et al.*, 1997; Cheung *et al.*, 2003 and Badalyan, 2012). The protein content of mushrooms is much higher than that present in various meat products and it is of high quality and rich in different essential amino acids (Fasidi and Kadiri, 1990; Stroh, 1998; Ziegenbein *et al.*, 2006 and Julita and Marek, 2007). Edible mushrooms are additionally exploited for their medicinal properties in the present age as it has already proven as promising with hepato–protective, anticancer, antioxidant, antiviral, hypoglycaemic and hypercholesterolemia effects (Badalyan, 2000; Barros *et al.*, 2007; Oyetayo, 2009 and

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Villares *et al.,* 2012). Based on the availability different mushrooms have been utilized in different parts of the world.

Paddy straw mushroom (*Volvariella* sp.) is one of the cosmopolitan mushrooms which ranks sixth among the various cultivated mushrooms of the world. The mushroom is characterized with a basal thick, membranous volva. Even though the mushroom is having lower shelf-life, it is blessed with a unique taste and aroma. The mushroom has a more preferable place among the mushroom lovers in the world.

METHODOLOGY

Nutritional analysis:

The content of different proximate constituents like moisture, carbohydrate, protein, fat, fibre, lipids and ash in the mushroom sporocarp were estimated and expressed on per cent basis. Moisture content was estimated as loss of weight of dried sporocarp to the fresh weight expressed in percentage. Carbohydrate was estimated by anthrone method (Aminoff *et al.,* 1970). The protein content of the mushroom fruiting body was estimated according to the Bradford's calorimetric method (Bradford, 1976). Lipid content was estimated using Soxhlet extraction apparatus (Lees, 1975). Crude fibre content in *Volvariella* mushroom sporocarp was done by following the steps described by De (1965). Ash content was estimated according to Raghuramulu *et al*. (1983).

Sensory evaluation:

Sauted mushroom and soup were prepared from four different mushrooms *viz*. paddy straw mushroom (*Volvariella* sp.), button mushroom (*Agaricus* sp.), oyster mushroom (*Pleurotus* sp.) and milky mushroom (*Calocybe* sp.) They were subjected to organoleptic evaluation using the nine point Hedonic scale (Amerine *et al.,* 1965 and Jellinick, 1985). The evaluation was carried out by a panel of twelve judges comprising of the faculty and students of Department of Community Science.

Statistical analysis:

The data were analyzed using Kruskal Wallis test. The results were tabulated and radar charts were constructed based on the data. Level of significance was accepted at $p \leq 0.05$.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads, Tables 1 to 5 and Fig. 1 to 3.

Nutritive value of paddy straw mushroom:

The various proximate constituents present in the mushroom sporocarp (fruiting body) were estimated. The mushroom possessed a higher moisture content of 90.11% on fresh weight basis which points out the succulent nature of the mushroom. Total carbohydrate content was estimated as 22.17% on dry weight basis which is preferably higher than that of meat products. The protein content of the *Volvariella* mushroom analyzed was 41.36% on dry weight basis which is appreciably higher even compared to the *Pleurotus ostreatus* (33.3%) and *Agaricus bisporus* (28.1%) mushrooms which are highly prized for their protein content (Usha and Suguna, 2014). The crude fibre content was estimated on dry weight basis as 16.98%. The total lipids content on dry weight basis was estimated as 4.98 % and the ash content on dry weight basis was evaluated as 7.25%. Paddy straw mushroom was found to be high in terms of carbohydrates, protein and fibre content. The contents of various proximate constituents were shown in Fig. 1.

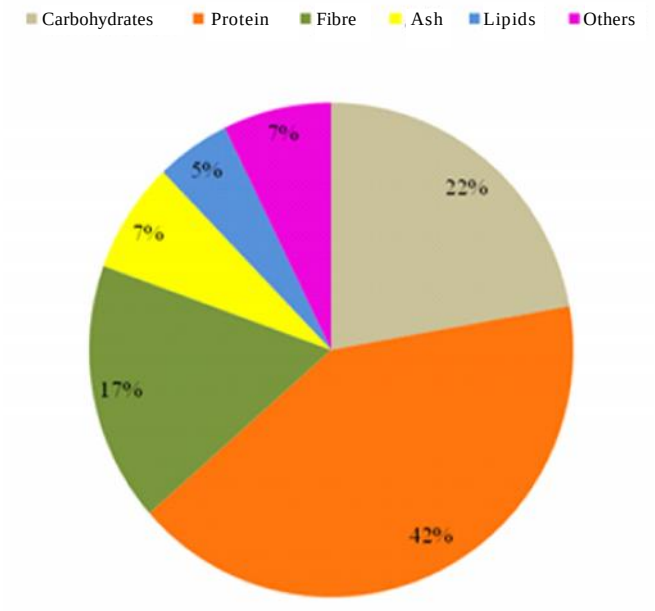

Fig. 1 : Percentage of proximate constituents present in the sporocarp of paddy straw mushroom

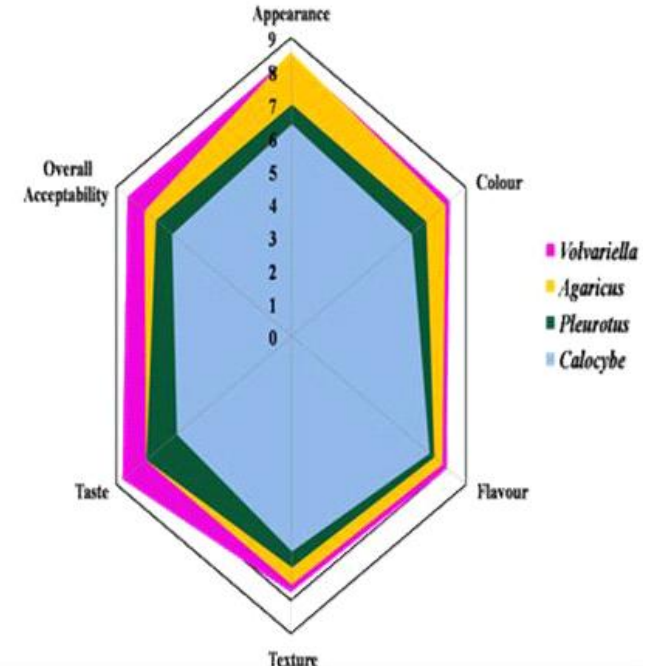

Fig. 2 : Mean score of organoleptic evaluation of sauted mushroom recipe

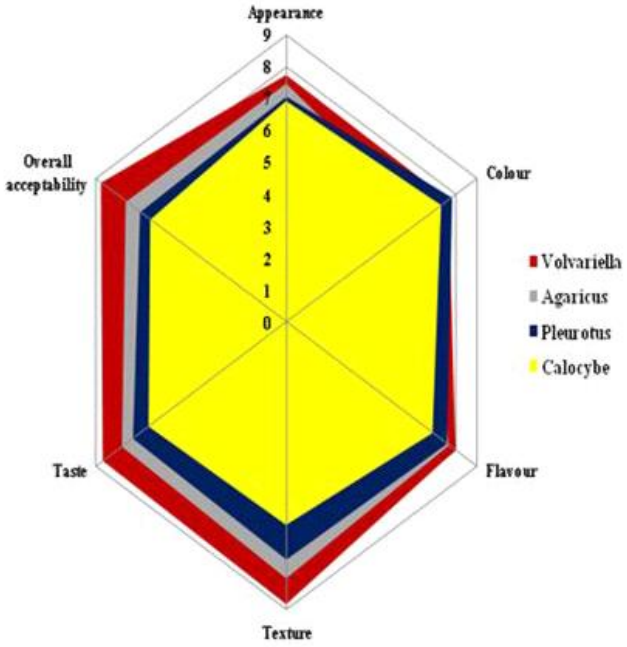

Fig. 3 : Mean score of organoleptic evaluation of mushroom soup recipe

Table 1 : Sensory scores (mean values) of sauted mushroom developed from different mushrooms

Sample	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score
Volvariella	34.042	8.5	35.583	8.17	31.375	8.00	34.375	7.75	39.667	8.67	40.167	8.41
Agaricus	35.250	8.58	32.042	7.92	27.042	7.75	29.250	7.50	24.875	7.50	29.125	7.58
Pleurotus	16.500	7.00	18.542	6.92	21.500	7.33	20.958	7.00	24.500	7.50	19.750	7.00
Calocybe	12.208	6.42	11.833	6.17	18.083	7.08	13.417	6.50	8.958	5.92	8.958	6.17
K value	27.60		24.85		7.88		18.70		30.96		35.75	
C.D. (P=0.05)	7.815											

Table 2 : Sensory scores (mean values) of mushroom soup developed from different mushrooms

Sample	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score
Volvariella	32.88	7.75	29.17	7.67	32.33	8	38	8.83	38.67	8.67	40.13	8.75
Agaricus	27.75	7.5	13.17	6.5	26.83	7.67	26.04	8	27.63	7.75	26.54	7.58
Pleurotus	19.42	7.08	31.17	7.83	24	7.58	20.79	7.41	21.33	7.25	18.71	6.92
Calocybe	17.96	6.92	24.5	7.33	14.83	6.92	13.17	6.33	10.38	6.5	12.63	6.42
K value	10.88		13.3		11.56		21.32		27.46		27.66	
C.D. (P=0.05)	7.815											

Sensory evaluation:

The mushrooms were sauted following uniform procedures, with respect to ingredients, mixing and cooking time. The products were evaluated by a panel of 12 semi trained members. The parameters of appearance, colour, flavour, texture, taste and overall acceptability were rated on a 9 point hedonic scale. The mean scores and mean rank were worked out (Kruskal Wallis test).

All the parameters of *Volvariella* based sauté ranked highest, except for appearance. However the rank for appearance was on par with that of the second acceptable product. As for overall acceptability, *Volvariella*-saute scored significantly higher than all other sautés.

Soup was also prepared using a standard recipe. Analysis of sensory evaluation of mushroom soup made from the four different types of mushrooms revealed that *Volvariella* based soup scored the highest mean rank for appearance, flavour, texture, taste and overall acceptability. The values were all significantly higher than other samples.

Conclusion:

The nutritional analysis of paddy straw mushroom revealed that the mushroom sporocarp is rich in carbohydrates, protein and fibre with lower content of lipids. The protein content of the mushroom is exceptionally higher pointing it as a promising food item to fight against malnutrition. Organoleptic acceptability of sauted mushroom and mushroom soup was analysed by a panel of 12 semi trained members and it was concluded that sauted mushroom developed from paddy straw mushroom had better sensory characteristics than those developed from button, oyster and milky mushroom and also soup product of paddy straw mushroom is superior to others. So it can be inferred that paddy straw mushroom (*Volvariella* sp.) recipes are rich in protein and fibre content with more acceptable sensory qualities and it can be suggested to people of all age group as a promising food item.

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