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Study of Edible Mushroom Grown on *Eucalyptus camaldulensis* Trunk and under the Soil of *Albizzia procera*

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Abstract: Two local varieties of mushroom were collected , identified, analysis proximate for their food value and tested in three way for their toxic effect. They found to be edible with high food value.

Key words: Mushroom, toxic effect, protein

Introduction

Mushrooms are in general term applied to the fruiting bodies of the fleshy Macro fungi, which are directly involved with economics, ecological and medical benefits. The use of mushrooms as human food dates back to antiquity. In ancient cultures such as the Indian, Greek and Roman mushrooms have been described as sophisticated delicacies associated with royal class (Bahl, 1994). Today with the development of better technologies and greater realization of their nutrient values, mushrooms have come to occupy an important place in food habits of people in several parts of the world. With all their historical background and nutritive importance, it is unfortunate that in Bangladesh mushrooms have not caught the imagination of the public at large to become an important food items. Among the many novel sources of food, particularly of protein, is to bridge the protein gap. Mushrooms apart from being famous for their appetizing flavour, offer themselves as potential protein source. The great advantage is that mushrooms have the capacity to convert nutritionally valueless substances into high protein food (Chang and Hayes, 1978). The digestibility of mushroom protein was high as 72-83% (Lintzel, 1941). It is reported that mushrooms are suitable as addition to all kinds of fodder and for medical and pharmaceutical purposes. Mushrooms are useful for diabetic and heart patients and an important source of nutritive proteins and minerals to the vegetarians (Bahl, 1994).

On an area basis mushrooms are a more valuable source of protein than either cattle or fish (Cooke, 1977). Hence it is necessary that a large number of people are made aware of the edible mushroom. To create awareness of edible mushroom two varieties of local edible mushrooms were collected, identified and proximate analysis were done for their nutritive value and toxicity were also tested.

Materials and Methods

Mushroom collection: Two local varieties of mushrooms were collected from BCSIR campus, one was grown on Eucalyptus tree, and the other was grown under the soil of *Albizzia procera* tree.

Toxicity test: Toxicity test was done in three ways: 1) Chemical 2) Cooking and 3) Rat feeding.

Chemical: A drop of juice is pressed out of the fresh fruit body on a piece of newspaper. So the juice is sucked in. After the spot has been left to dry, hydrochloric acid is dropped on it. If it turns blue, the fungus contains toxic substance amanitins and hence is deadly poisonous (Svrcek, 1998).

Cooking: Mushroom was cut in small pieces and cooked with other vegetable. The mushroom does not need peeling, a wipe with a damp cloth is sufficient, but carefully checked to make sure that there was no maggot infestation. The stem was trimmed carefully and slice through the centre-no maggots observed. The mushrooms are then cooked with other vegetables like carrot, cauliflower, cabbage etc. After cooking it was eaten by different people for organoleptic taste.

Rat feeding experiment: The experiment was conducted at Animal House, IFST, BCSIR according to the methods of Miller and Bender (1955); Mitchell and Carman (1926).

Table 1: Composition of cultivated mushroom and some common vegetables per 100 gm (Wooster, 1954)

Name of the vegetable	Moisture (%)	Fat (%)	Carbohydrate (%)	Protein (%)
(Dry weight basis)				
Beet root	87.6	0.1	9.6	12.9
Brinjal	92.7	0.2	5.5	15.1
Cabbage	92.4	0.2	5.3	18.4
Cauliflower	91.7	0.2	4.9	28.8
Green beans	88.9	0.2	7.7	21.6
Green peas	74.3	0.4	17.7	26.1
Potatoes	73.8	0.1	19.1	7.6
Mushrooms	91.1	0.3	4.4	26.9

Table 2: Proximate annual yield dry protein (kg/ha)

Different types of protein sources	Protein (kg/ha)
Beef, cattle conventional agriculture	78
Fish, intensive pond rearing	675
Agaricus, bisporus	65,000

Table 3: Result of rat feeding trial with *Pleurotus ostreatus* grown on trunk of *Eucalyptus camaldulensis*

Test No	1	2
Sex of the rat	F	M
Total diet given in gm	470	470
Residual diet in gm.	178	182
Total diet consumed in gm.	292	288
Diet consumed by rat/ day in gm.	9.125	9.0
Body weight		
Initial	249	244
Final	295	282
Body weight gain by 4 rats/ 8 days	46	38
Body weight gain by rat/day	1.4975	1.1875
Moisture of fresh diet	12.631	13.963
Comments	Body weight gained	

Table 4: Results of rat feeding trial with *Agaricus campestris* grown under *Albizzia procera*

Test No.	1	2
Sex of the rat	F	M
Total diet given in gm.	440	400
Residual diet in gm.	172	148
Total diet consumed in gm.	268	292
Diet consumed by rat/ day in gm.	8.375	9.125
Body weight		
Initial	465	525
Final	407	443
Body weight gain by 4 rats/8 days	-58	-82
Body weight gain by rat/day	-1.8125	-2.5625
Moisture of fresh diet	18.325	17.421
Comments	Body weight gained	

For feeding experiment diets were prepared with mushroom. The diets were supplemented with minerals and vitamins. Rats of 2 months aged, well nourished, healthy from the laboratory colony (Long Evans) used in the experiment and were divided into 2 groups with weight and sex distributions. In each group there were 4 rats used for each diet. Each group of rat was housed in a separate cage. The feeding was conducted for 10 days. Cleaning of the cage, diets and water were given daily and timely. Body weight of the rats and residual diet were determined after 2 days.

Fig. 1: *Pleurotus ostreatus* naturally grown on the trunk/ stump of *Eucalyptus camaldulensis*

Fig. 2: *Agaricus campestris* naturally grown under *Albizzia procera*

Table 5: Proximate analysis (%) of mushrooms in local two varieties

Mushroom	Weight basis	Moisture	Protein	Fat	Ash	Crude fibre	Carbohydrate
Pleurotus Ostreatus	wet	85.92	4.6725	1.1325	0.9085	0.9730	6.6335
Pleurotus Ostreatus	dry	not done	33.1853	8.0833	6.4524	6.9105	47.1129
Agaricus campestris Pileus (cap)	wet	93.0059	3.8340	0.5610	0.9447	0.0034	1.651
Agaricus campestri Stipe (stalk)	wet	92.9392	2.9959	0.7589	0.8799	0.00379	2.4267
Agaricus campestri Pileus (cap)	dry	not done	54.8497	8.0257	13.5150	0.0486	23.6194
Agaricus campestri Stipe(stalk)	dry	not done	42.4348	10.7492	12.4631	0.05368	34.3725

Proximate analysis: Proximate analysis of mushroom is done by standard methods(AOAC, 1984).

Results and Discussion

Mushrooms were identified as to their morphological and microscopical analyses.

Description: Mushroom collected from the trunk of *Eucalyptus camaldulensis* tree.

Habitat: They grow on the cut tree trunk in large masses during rainy season. They usually grew in favourable condition. They grew in groups and bunches. It was carefully removed from the tree which is usually very clean for experimental purpose.

Shape of the fruit body

Pileus (cap) and stipe (stalk): Pileus (cap) was convex at first, expanding to broadly convex, eventually flat and even upturned in age. The cap was 6-12 cm across. It was shaped rather like a fan and larger specimens may have fluted edges. The colour was white. They had slender stipe (stalk). The gills run down the stalk, pure white at first, they turn cream with age. The flesh was white with a pleasant smell.

Fungi under microscope

Spore: Subcylindrical
Spore print: White.

Pleurotus ostreatus grown on trunk of *Eucalyptus camaldulensis*: (Fig. 1)

From the above findings the mushroom resembles *Pleurotus ostreatus*.

Mushroom collected from under the soil of *Albizzia procera* tree.

Habitat: It is found to grow under the soil of *Albizzia procera* tree. They can grow any time from early summer through the late autumn.

Shape of the fruit body

Pileus (cap) and stipe (stalk): The pileus (cap) was 3-12 cm. across. It retains its dome shape for sometime before opening out fully. It was silky white, ageing to light brown, slightly convex. The gills were on the underside of the cap and are not attached to the stipe. The gills were pinkish tone in mature. The stipe was 3-10 cm, white, tapering to the base and had a thin ring which was often torn away. Fruit body had a pleasant smell.

Fungi under microscope

Spore: Globose.
Spore print: White.

***Agaricus campestris* grown under *Albizzia procera*:** (Fig. 2)

From the above findings the mushroom resembles *Agaricus campestris*.

In toxicity test, there is no toxicity found in chemical, cooking and rat feeding trial. After cooking it was consumed by different people and there is no inconvenience reported. The result of rat feeding was given in Table 3 and 4.

From Table 4 it can be seen that *Pleurotus campestris* grown on *Eucalyptus camaldulensis* help to gain body weight, whereas *Agaricus campestris* grown under Albizzia *procera* (Koroi/Siris tree) reduces body weight and it has no toxic effect on rat.

Proximate analysis of two mushrooms are given in Table 5. It can be said from the result that the local varieties has good nutritive values and can be easily consumed instead/along with vegetables. It was also evident that mushrooms provide high protein. In literature the dry weight basis protein analysis of *Pleurotus ostreatus* was found to be 15 - 35% (Chang

and Hayes, 1978). It is also reported that total protein in meat is 83.7% (Singer, 1961).

Mushroom provide a rich addition to the diet in the form of proteins and carbohydrates. Protein is the most critical component contributing to the nutritional value of food. Varying opinions have been expressed regarding the true nutritive value of edible mushrooms. Historically, mushrooms have been equated to vegetable, beefsteak. Sufficient food supply is a country's most precious asset, with increasing population and conventional agricultural methods cannot cope with the food problem. In view of the current energy food crisis it has become most important to make a substantial breakthrough in the technology of food production to meet a serious food deficit situation. Protein deficiency is an existing reality also. So it can be concluded that collected local two varieties of mushrooms are edible and their nutritional value can meet the protein deficiency.

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