

NUTRITIONAL COMPOSITION AND CELLULOSE DEGRADING ABILITY OF *HYPSIZYGUS ULMARIUS*.

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Abstract: Fruit bodies of *Hypsizygus ulmarius* (Bull.) Redhead contains 23.01 per cent protein, 52.50 per cent carbohydrate (dry weight basis). Moreover, it also contains 12.20 per cent crude fiber and 22.05 per cent ash. The total moisture content was 89.68 per cent (fresh weight basis). The analysis reveals that the fruit bodies were quite rich in trace elements content viz. copper 33.8 ppm, iron 70.55 ppm and manganese 30.00 ppm. *Hypsizygus ulmarius* possessed higher cellulose degrading ability and produced more mycelium as compared to control.

Keywords: *Hypsizygus ulmarius*, protein, carbohydrate, crude fiber, cellulose degrading ability

INTRODUCTION

According to Weil (2006) *Hypsizygus ulmarius* the name itself is a mouthful and over the years, this mushroom has been called by several other names including 'elm oyster' which is probably the earliest to remember. Although it is edible and cultivated as a food mushroom in Japan. *Hypsizygus ulmarius* is one of the several mushrooms included in a line of innovative skin care products. One of these products is Plantidote™ Mega-Mushroom Face Serum, which combined *Hypsizygus ulmarius* with Cordyceps and reishi mushrooms ginger, turmeric, holy-basil, reserved argan nut oil to maximize the skin defenses against aging (Weil, 2006). None of reference is available regarding the nutritional composition and cellulose degrading ability of *Hypsizygus ulmarius*. Therefore, the experiments were planned to carry out the nutritional composition and cellulose degrading ability of *Hypsizygus ulmarius*.

MATERIAL AND METHOD

Estimation of Protein: Protein was estimated by the following formula: Total Protein = Total N x 6.25

Estimation of nitrogen: Nitrogen determination in mushroom sample was done by colorimetric methods given by Snell and Snell (1939).

Estimation of Total Carbohydrate: The total carbohydrate was determined by anthrone method described by Snell and Snell (1939).

Estimation of copper, Iron and Manganese: Copper, iron and manganese were analyzed from fruit bodies of *Hypsizygus ulmarius* by Lindsay and Norvell (1978) method.

Estimation of Crude Fiber and Total Ash: The methods were used for estimation of crude fiber and total ash as followed by Thimmaiah (1999).

Estimation of Moisture Content: The method of Allen *et al.* (1974) was followed to find out the moisture content of the fruit bodies of *Hypsizygus ulmarius*. Hundred gms of fresh samples were weighed and then oven dried at 100°C overnight till the constant weight was obtained. Moisture percentage was calculated by the following formula: Moisture content (%) = (Weight of fresh sample – Weight of dry sample / Weight of fresh sample) x 100.

Find Out The Cellulose Degrading Ability: The method adopted by Garret (1963) and Bhandari and Singh (1981) for find out the cellulose degrading ability of *H. ulmarius*. A circular piece of Whatman No.1 filter paper (of known weight) was kept suspended to each of 250 ml Erlenmeyer flask containing 100 ml of the medium. After autoclaving, the flasks were inoculated with a circular 5 mm mycelial bits cut from the margin of 7 days old culture of *H. ulmarius*. The flasks were incubated at 25±2°C (room temperature) for 30 days and were given a constant shaking by swirling the flasks daily. The experiment was run in four replicates and control was kept. After 30 days of incubation, the filter papers were taken out from each flask, washed with distilled water, dried at 60°C and weighed to determine the loss in weight. The fungal mycelium obtained from the culture medium was also collected, washed, dried and weighed.

RESULT AND DISCUSSION

Nutritional Composition of Fruit Bodies of *Hypsizygus ulmarius*: In the present investigation,

the fruit bodies of *H. ulmarius* were analysed for their protein, carbohydrate, trace elements i.e. (copper, iron and manganese), crude fibers, ash and moisture content by different biochemical methods. The results thus obtained are presented in Table 1. The fruit bodies of *Hypsizygus ulmarius* contain 23.01 per cent protein on dry weight basis. The mature fruit bodies of *H. ulmarius* contain 52.50 per cent carbohydrate, 12.20 per cent crude fibers and 22.05 per cent ash. This species of mushroom contains 89.68 per cent moisture in fresh fruit body. The fruit bodies of *H. ulmarius* also contain 33.8 ppm copper, 70.55 ppm iron and 30 ppm manganese on dry weight basis. These results are in confirmation of various workers. Jandaik (1976) and Khan (1989) with slight variation in crude protein content may be due to different analytical procedure used.

Sporophore of *Coprinus cinereus* contain 91 per cent moisture, 5 per cent carbohydrate, 15 per cent protein, 0.6 per cent crude fibre, 0.5 per cent fat and 14 amino acids (Geetha and Nair, 1991b). Khaleil *et al.* (1989) studied nutrient composition of *Podaxis pistillaris* having 76 per cent moisture, 5 per cent total nitrogen, 22.37 per cent total crude protein and 18.5 per cent carbohydrates. They also estimated the mineral content such as K, Na, Fe, Mg, Mn, Ca, Zn content. Harada *et al.* (2003) investigated free amino acids and soluble carbohydrate in three developmental stages of *H. marmoreus*. Harada *et al.* (2004) further studied the cultivation medium and chemical composition of three commercially cultivated strains in Japans namely HM 88-8, HM 00-1 and HM 00-5.

Table 1. Nutritional analysis of fruit bodies of *Hypsizygus ulmarius*.

Component	Content (dry weight basis)
Protein	23.01%
Carbohydrate	52.50%
Crude fiber	12.20%
Ash	22.05%
Copper (Cu)	33.8 ppm
Iron (Fe)	70.55 ppm
Manganese (Mn)	30.00 ppm
Moisture content	89.68% (fresh weight basis)

Cellulose Degrading Ability of *Hypsizygus ulmarius*: *H. ulmarius* possess 11.35 per cent cellulose degrading or utilizing ability and produced more mycelium as compared to control due to presence of cellulose sources in the medium (Table 2). Bhandari and Singh (1981) studied the cellulose degrading ability of *Pleurotus sajor-caju* (Fr.) Singer and fungal contaminants of its substrate. According to them *P. sajor-caju* posses higher cellulose

degrading and utilizing ability and produce more mycelium as compared to control and other fungal tested. In present investigation the same method was adopted and found that *Hypsizygus ulmarius* posses highest cellulose utilizing ability with cellulase followed by without cellulase, respectively. It was concluded that *H. ulmarius* produced more mycelium (with cellulose) as compared to *H. ulmarius* (without cellulose) due to the presence of cellulose source.

Table 2: Cellulose degrading ability for the production of mycelium of *Hypsizygus ulmarius*

Mushroom	Cellulose utilize (%) loss in filter paper in mg*	Average dry weight of mycelium in mg*	
		With cellulose	Without cellulose
<i>Hypsizygus ulmarius</i>	11.35	39.95	19.95

* Average of four replications.

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