DOI: 10.15740/HAS/AU/12.TECHSEAR(3)2017/622-625 *Agriculture Update*
Volume **12** | TECHSEAR-3 | 2017 | 622-625
Visit us : *www.researchjournal.co.in*

RESEARCH ARTICLE :

Proximate constituent analysis of *Agaricus bisporus* cultivated on pearl millet compost in Kerala

■ **N.P. LISHMA AND LULU DAS**

ARTICLE CHRONICLE :
Received :
10.07.2017;
Accepted :
25.07.2017

SUMMARY : This study was aimed to find out the proximate constituents of *A. bisporus*. The findings revealed the nutrient composition of *A. bisporus*as having 90.03 % moisture (fresh weight), 29.1% protein, 9.37% ash, 22.63% fibre, 2.10% fat, 4.58% carbohydrate, 3.76% nitrogen, 0.58% phosphorus and 1.54% potassium (dry weight basis).

How to cite this article : Lishma, N.P. and Das, Lulu (2017). Proximate constituent analysis of *Agaricus bisporus* cultivated on pearl millet compost in Kerala. *Agric. Update*, **12**(TECHSEAR-3) : 622-625; **DOI: 10.15740/HAS/AU/12.TECHSEAR(3)2017/622-625.**

KEY WORDS :
A. bisporus, Proximate constituents, Pearl millet compost

Author for correspondence :
N.P. LISHMA
Regional Agricultural Research Station, WAYANAD (KERALA) INDIA
Email : itsmelishma@gmail.com

See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

Mushrooms are becoming more important in our diet due to their nutritional value, related to high protein and low fat / energy contents (Agahar-Murugkar and Subbulakshmi, 2005). Singh *et al.* (1999) reported that *Agaricus* contains 90.10 % moisture, 3.75 % protein, 0.53 % crude fibre and 4.59 % carbohydrate.Masamba and Mwale (2010) estimated the nutrient and mineral contents of *A. bisporus* and they concluded that the *A. bisporus* was found to contain 3.0 % protein, 0.8 % fat and 2.2%, 8.4%, 0.2% calcium, iron and magnesium, respectively on wet basis.Manzi *etal*. (2001) studied the nutritional content of *A. bisporus* and reported that it consists of dietary fibres, chitin and beta glucans in variable amounts. Several studies have analyzed proximate constituents in the white button mushroom *A. bisporus* with change in mineral contents (Mattila *et al.*, 2001 and Vetter, 2003).

Mushrooms are highly nutritive, low-calorie food with good amount of proteins, vitamins and mineral contents (Khatun *et al.*, 2012). Koyyalamudi *et al.* (2013) analyzed the *A. bisporus* obtained from two farms for minerals; white button mushroom was seen to contain Copper at level of more than 30%, Selenium at level of more than 13% and Molybdenum at level of 6.4 – 10% of daily Required Dietary Intake as defined by Australian National Health and Medical Research Council.

RESOURCES AND METHODS

Estimation of moisture content :

Ten grams of mushroom sample was dried in an oven until constant weight was obtained. The initial and final weights were

noted. The difference between the two weights gives the result, which can be converted into per cent.

Estimation of protein :

Protein content of *A.bisporus* was estimated using the standard method described by Bradford (1976).

One gram of mushroom sample was ground in 10 ml of 0.1 M acetate buffer (pH 4.7). The materials were centrifuged at 5000 rpm for 15 min at 4 ºC. The supernatant liquid obtained was used for further analysis. A reaction of mixture consisting of 0.5 ml enzyme extract, 0.5 ml of distilled water and 5 ml of Coomassie brilliant blue G-250 was used for analysis. The reaction mixture was essayed for the absorbance of 595 nm against reagent blank. Standard graphs were prepared using the Bovine serum albumin. Using this graph, the protein content was determined as microgram albumin equivalent of soluble protein on dry weight basis.

Estimation of fat :

The extraction of fat was carried out using Soxhlet extraction apparatus (Sadasivam and Manikam, 1992).

Five gram of mushroom sample was weighed into an extraction thimble and placed in the extractor so that top of the thimble is over the bent siphon tube outside extractor. The extractor was connected to previous weighed extraction flask. Sufficient quantity of petroleum ether was poured into the extractor. The extractor was attached to the condenser with a constant flow of cold water. The flask was heated on a water bath. The extraction was carried out till the liquid became colourless. The flask was removed and the solvent was evaporated in an oven at 105 ºC. It was dried until a constant weight was obtained. The increase in weight of flask gives the amount of fat obtained.

Estimation of total sugars or carbohydrates :

Total carbohydrate content was estimated by anthrone method (Sadasivam and Manikam, 1992).

One hundred mg of *Agaricus* mushroom powder was weighed and transferred into boiling tubes. It was hydrolyzed by keeping it in a boiling water bath for 3 hours with 5 ml of 2.5 N hydrochloric acid, cooled to room temperature and neutralized with sodium carbonate till the effervescence was ceased. The tissue was ground and volume was made upto 100 ml and centrifuged at 5000 rpm for 15 min. The supernatant was collected and was used as an aliquot for analysis. From the supernatant, 0.5 ml of aliquot was taken and made upto 1 ml by adding distilled water. The reaction mixture containing 0.5 ml of aliquot, 0.5 ml distilled water and 4 ml of anthrone reagent was added to the tubes and heated for 8 minutes in boiling water bath. The reaction mixture was cooled and colour read at 630 nm in a spectrophotometer (Systronics UV-VIS spectrophotometer 118). The amount of carbohydrate present was calculated from the standard graph prepared using glucose and expressed in terms of milligrams of glucose equivalent per gram of sample on dry weight basis.

Estimation of crude fibre :

Crude fibre content was estimated by a standard method described by Sadasivam and Manikam(1992).

One gram of filtered dried sample was ground with ether to remove fat. After ether extraction the dried sample was boiled with 100 ml of concentrated sulphuric acid (1.25 %) for 3 minutes by adding bumping chips. The digested sample was filtered through a muslin cloth and washed with boiling water until the washings were no longer acidic. The sample again boiled with 100 ml sodium hydroxide (1.25 %) for 30 min. The digested samples were again filtered through a muslin cloth and washed with boiling water until the washings were not alkaline. The sample was washed with 25 ml of boiling 1.25 % sulphuric acid, 50 ml of water and 25 ml of alcohol. The residue was removed and transferred to preweighedashing dish (W_1). The residue was dried at 130 ºC for two hrs, then cooled the dish in desiccator and weighed (W_2). The residue was further ignited at 600 ºC which was cooled and weighed.

$$\text{Per cent of crude fibre} = \frac{\text{Loss in weight x 100}}{\text{Weight of the sample}}$$

Estimation of ash :

Three gram sample was transferred to a weighted silica dish. It was heated on a Bunsen burner at a low flame and when the substrate charred the dish was transferred to a muffle furnace. It was heated at 500 to 550 º C for about 2 hrs till a white ash was obtained. It was then cooled in desiccator and weighed. The difference between two gives the result, which can be converted into per cent.

Estimation of nitrogen :

Digestion of the sample was carried out using kjeldhal's digestion assembly. Nitrogen content in the *A.bisporus* was estimated using Kjeldhal' smicro distillation unit.

$$\text{Percentage of nitrogen} = \frac{(y - x) \times 0.02 \times 0.014 \times 100 \times 100}{0.5 \times 10}$$

Weight of sample taken = 0.5g
Normality of H_2SO_4 = 0.02N
Aliquot taken = 10ml
1ml of 1N H_2SO_4 = 0.014 of nitrogen
Blank value = x
Titre value = y

Estimation of phosphorus :

For the preparation of standards took 2,4,6,8 and 10ml of 50 ppm standard phosphorus solution in a volumetric flask to get 2,4,6,8 and 10ppm phosphorus. Then took 10ml of digest in a 50ml standard flask. Added 10ml of Barton's reagent and made upto 50ml. Then allowed 30 minute for full colour development. It will be stable for two months, if phosphorus concentration is less it will be stable for only two weeks. Prepared a blank and read the intensity of colour in the spectrophotometer at 470nm

Percentage of total phosphorus = x×50/10×100/0.5×1/10000

x = Concentration of total phosphorus.

Estimation of potassium :

Set up the flame photometer and aspirated working standards. Pipetted out 5ml aliquot from sample extract to 50ml volumetric flask and made up the volume. After aspiration of working standards, aspirated the sample and noted the readings.

Percentage of K = x×50/5×100/0.5×1/10000

OBSERVATIONS AND ANALYSIS

The moisture content of *Agaricus* was found to be 90.03 per cent (fresh mushroom), 29.1 per cent protein, 9.37 per cent ash, 22.63 per cent fibre, and 2.10 per cent fat, 4.58 per cent carbohydrate, 3.76 per cent nitrogen, 0.58 per cent phosphorus and 1.54 per cent potassium. This study was supported by the results of experiments done by Singh *et al*. (1999) on nutritive content of *Agaricus* and they stated that it consisted of 90.10 per cent moisture, 3.75 per cent protein, 0.53 per cent crude fibre and 4.59 per cent carbohydrate.

Table 1 : The proximate constituents present in *Agaricusbisporus*

Sr. No.	Proximate constituent	Percentage (%)
1.	Moisture	90.03
2.	Protein	29.10
3.	Carbohydrate	4.58
4.	Fibre	22.63
5.	Ash	9.37
6.	Fat	2.10
7.	Nitrogen	3.76
8.	Phosphorus	0.58
9.	Potassium	1.54

This study was also supported by Masamba and Mwale (2010); estimated the proximate constituents of *A. bisporus* and they concluded that this mushroom consisted of 3 per cent protein, 0.8 per cent fat, 2.2 per cent calcium, 8.4 per cent iron, and 0.2 per cent magnesium on wet basis.

Authors' affiliations :

LULU DAS, College of Agriculture, THIRUVANANTHAPURAM (KERALA) INDIA

REFERENCES

Agahar-Murugkar, D. and Subbulakshmi, G. (2005). Nutritional value of edible wild mushrooms collected from the Khasi hills of Meghalaya. *Food Chem*., **8**: 599-603.

Bradford, M.M. (1976). A rapid and sensitive method for quantification of microgram quantities of protein utilizing the principle of protein – dye binding. *Ann. Biochem.*, **72** : 248.

Khatun, S., Islam, A., Cakilcioglu, U. and Chatterjee, N.C. (2012). Research on Mushroom as a Potential Source of Nutraceuticals: A Review on Indian Perspective. *Am. J. Exp. Agric*., **2**(1): 47-73.

Koyyalamudi, S.R., Jeong, S. C., Manavalan, S., Vysetti, B., and Pang, G. (2013). Micronutrient mineral content of the fruiting bodies of Australian cultivated *Agaricusbisporus* white button mushrooms. *J. Food Composition Anal.*, **31**: 109-114.

Manzi, P., Aguzzi, A., and Pizzoferrato, L. (2001). Nutritional value of mushrooms widely consumed in Italy. *Food Chem.*, **73**: 321-325.

Masamba, K.G. and Mwale, R.K. (2010). Determination and comparison of nutrient and mineral contents between cultivated and indigenous edible mushrooms in Central Malawi.*African J. Food Sci*., **4**(4): 176-179.

Mattila, P., Konko, K., Eurola, M., Pihlava, J.M., Astola, J.,

Vahteristo, L., Hietaniemi, V., Kumpulainen, J., Valtonen, M., and Piironen, V. (2001).Contents of vitamins, mineralelements and some phenolic compounds in cultivated mushrooms.*J. Agric. Food Chem.*, **49** : 2343-2348.

Sadasivam, S. and Manikam, A. (1992).Biochemical Method for Agricultural Sciences. Wiley Eastern Limited and Tamil Nadu Agricultural University Publication, Coimbatore, pp. 11-20.

Singh, A.K., Sharma, H.P., Kumar, P. and Singh, B. (1999). Physico-chemical changes in white button mushroom (*Agaricus bisporus*) at different drying temperature. *Mushroom Res.*, **8**: 27-29.

Vetter, J. (2003).Chemical composition of fresh and conserved *Agaricusbisporus* mushroom.*European Food Res. Technol.*, **217**: 10-12.