Environtropica, April - June 2006, Vol.3, No 1, 000 – 000.

SHORT COMMUNICATION

NAMIBIAN EDIBLE MUSHROOMS: PRELIMINARY STUDY ON THE NUTRITIVE VALUE OF OYSTER (*Pleurotus ostreatus*) AND BUTTON (*Agaricus bisporus*) MUSHROOMS.

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Accepted on November 07, 2006.

Abstract

Samples of oyster mushroom (*Pleurotus ostreatus*) and the button mushroom (*Agaricus bisporus*) were analyzed for their nutrient substances. *P. ostreatus* contained *9.95% dry matter* which contained as much as *27.06% crude protein, 19.21% crude fibre, 0.43% phosphorus, 0.8% ether extract* and *7.76% ash*. *Agaricus bisporus* contained *7.85% dry matter*, of which the *crude protein* was as high as *37.46%*. Its *crude fibre* is similarly as high as *14.38%*. It also had *0.64% phosphorus, 1.7% ether extract* and *11.19% ash*. Although, the residual matter of the button mushroom was lower than that of oyster mushroom, its crude protein surpassed that of oyster mushroom by at least *10%;* while all other nutrient components, except the crude fibre were higher. Samples from the two types of mushrooms contained high amounts of total and reducing sugars.

Keywords: Namibia, button mushroom, oyster mushroom, nutrient substances.

Introduction

The white or pigmented fruit bodies of oyster mushroom (*Pleurotus spp.*) are widely cultivated in Europe, Canada and the U.S.A. (Eger, 1979; Zadrazil, 1974), in Hungary (Heltay, 1979, in Japan and Taiwan (Kurtzman, Jr., 1979). The genus contains some of the most valuable edible mushrooms grown and sold in big supermarkets in Namibia. Similarly, species of button mushroom, particularly *A. bisporus* are a well known table delicacy in many parts of the world. This species is grown commercially and also sold in big supermarkets in Namibia. Oyster mushroom has been shown as a good source of non-starchy carbohydrate, dietary fibre (that can help in reducing the plasma cholesterol), most of the essential amino acids, minerals and vitamins of B group; and folic acid (necessary to counteract pernicious anemia) in particular (www.whfoods.com/genpage.html). Oyster mushroom is also rated high in taste, amino-acid composition and keeping quality (Kurtzman, 1975). The present

preliminary investigation was therefore carried out to determine the nutritive value of these most cherished mushrooms of Namibia, which has a semi-arid to desert environment known to influence its terrestrial biological production since oyster mushroom is usually cultivated in temperate areas of the world (Quimio, 1978).

Materials and Methods

The oyster mushroom for the study was obtained from the University of Namibia Mushroom House, while the button mushroom was bought from a big supermarket (Pick'n Pay) in Windhoek, Namibia. All samples were oven dried and ground into fine particles before use.

Determination of nutrients components

Five hundred grams (500g) of the button mushroom sample were cut into small pieces and blended using the 'Waring Commercial Blendor'. In the case of the oyster mushroom, only the pileus was employed in the investigations. Six grams (6g) of each sample were then placed in triplicate in the oven at 100°C overnight (for 24hrs) to determine the moisture content. The remaining samples which were further dried at 80°C for another 24hrs were used for the analysis of the nutrients composition. The samples were then ground with homogenizer, and sieved through a mesh, using pores with a diameter of 1.0 mm.

Crude protein and ether extract were determined by the methods of the AOAC (1975); and the crude fibre and ash contents were also determined according to the AOAC methods of analysis (AOAC, 1970).

Total nitrogen determinations were based on the Kjeldahl method (Kirk, 1950); while the determination of phosphorus was carried out using the Agricultural Laboratory Association of South Africa [ALASA] technique (1989).

The methods used for total sugars were those of Dubois *et al.* (1951) and the reducing sugars estimated by Somogyi –Nelson procedures (Hestrin *et al.*, 1955)

The qualitative analysis of the sugars was then carried out using the methods of Dubois *et al.* (1956) as modified by Faparusi (1970) whereby 0.01 ml of the sugar extract of each mushroom was spotted in triplicate on Whatman No. 1 chromatography paper and the chromatogram developed for 72 h in 1-butanol-acetic acid-water (4-1-1, by volume). After drying, one of the triplicate columns was cut off and the sugars on it located. The sugar spots were used to mark the regions of these spots on the duplicates, and corresponding areas removed and eluted for 3 h with 5 ml distilled water. To 2 ml of the eluate was added 0.05 ml of 80% (w/v) aqueous phenol reagent followed by a rapid addition of 5 ml of concentrated H_2SO_4. After the sample had stood at room temperature (25°C) for 30 min, the optical density was determined at 480 nm, and the concentration of each sugar was calculated from the standard

curve. All blanks were read against a blank containing distilled water in place of the sugar solution.

Results

Table 1 shows the results of the analysis of the mushroom samples, presented as percentage of dry matter. The results show that both the wet and residual matters, as well as the crude fibres are higher in *P. ostreatus* than in *A. bisporus*. The ash content of *A. bisporus* is higher than that of *P. ostreatus*.

The crude protein content of the *A. bisporus* was higher than those of *P. ostreatus*. The ether extract of *A. bisporus* doubles those of *P. ostreatus*; however, there is not much difference in the amounts of phosphorus contained in the two mushroom samples.

The qualitative analysis of the sugar content of both mushroom samples shown in Table 2 revealed that the two mushroom samples contain quite high amounts of total and reducing sugars, although *A. bisporus* was found to contain higher amounts.

Discussion

The values of nutrient contents recorded for *P. ostreatus* were those of the pileus only. This is because the species has a rather tough stipe (Zoberi, 1972) which people find difficult to eat; and all attempts to work with both pileus and stipe did not yield reliable results. Attention was therefore focused on the pileus which everybody readily eats.

In the present study the mushrooms investigated contain large amounts of moisture and consequently low in dry matter content. This agrees with the results obtained by Oke (1966) in his study of mixed Nigerian mushroom samples; but the ash and crude fibre contents obtained in this study are higher than those obtained for maize, sorghum and rice (Oke, 1965); Africa's most staple carbohydrate foods that are also considered nutritious for human beings. The crude fibre of *Pleurotus* sp. expected to be higher than that of *Agaricus* sp. because of its tough texture was lower. This is probably due to the waxy substance it contains (Zoberi, 1973).

Each of the *A. bisporus* and *P. ostreatus* contains more than double (37.46% & 27.06% respectively) the value (13%) of crude protein obtained for *Hydnum imbricatum* (Mlodecki *et al.*, 1974), which was, on its own, considered to be sufficiently nutritious. In general, the protein values obtained for the mushrooms lend further support to the assertion of some workers (Fink & Hoppenhaus, 1958; Rafalski *et al.*, 1968) that the protein contents of some mushrooms are as good as animal proteins and even surpass most vegetable proteins.

A comparison of the crude fibre contents of the mushroom samples with animal product shows that the two mushrooms studied contain adequate dietary fibres (Ainsworth, 1965) which makes them healthy foods. The fact that *P. ostreatus* has a

crude fibre content of 19.21% also agrees with the ascertion that oyster mushrooms are a good source of dietary fibres that can help in reducing the plasma cholesterol (www.whfoods.com/genpage.html).

From the results obtained in this study, the oyster and the button mushrooms can be considered as nutritionally good enough to meet the body protein and carbohydrate requirements because Chang & Mshigeni (2004) have shown that oyster mushrooms are rich in proteins, vitamins, carbohydrates and micronutrients. About 20% to 45% of the mushroom's nutrients are protein, on a dry weight basis; and their proteins contain all essential amino acids required in human diet including leucine and lysine, which are often deficient in some of Africa's most staple cereal crops such as maize and millet (Mshigeni *et al.*, 2003). These mushrooms can therefore be recommended as nutritious food and not just eaten because they are considered as delicious.

Acknowledgements

The authors are grateful to Mr. W Gawanab (Senior Agricultural Research Technician), Agricultural Laboratory, Ministry of Agriculture, Water & Rural Development; Republic of Namibia; Windhoek for his technical assistance.

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Table 1. Proximate analysis of two namibian edible mushrooms[a]

Sample	*Dry Matter*	*Ash*	*CF*	*CP*	*EE*	*P*	*TS*	*RS*
Agaricus bisporus	7.85	11.19	14.38	37.46	1.7	0.64	30.1	24.7
Pleurotus ostreatus[b]	9.95	7.76	19.21	27.06	0.8	0.43	20.4	18.4

[a]. All values expressed as percentage of dry matter
[b]. Values recorded were those of pileus only.
Key: CF = Crude fibre; CP = Crude protein; EE =Ether Extract; P = Protein; RS = Reducing sugar; TS = Total sugar.

Table 2. Sugar content of two namibian edible mushrooms

Sample	*Fructose*	*Galactose*	*Glucose*	*Lactose*	*Maltose*	*Sucrose*
A. bisporus	+	++	++	+	++	+
P. ostreatus[a]	-	++	+	+	+	-

[a]Values recorded were those of the pileus only.
Key: + + = high concentration; + = low concentration; - = absent.