



Research Paper

Evaluation of Proximate and Mineral Composition of Indigenous and Exotic Mushroom Propagated In Forestry Research Institute of Nigeria

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Abstract: This trial evaluated proximate and mineral composition of one indigenous mushroom, *Pleurotus tuber regium* and two non indigenous species, *Pleurotus sajor (Fries)* and *Pleurotus florida (kummer)*. Samples of each mushroom (15grams) were processed and analysed in triplicates for their proximate constituents and concentration levels of Na, K, Mg, Ca, Fe and Zn. *Pleurotus tuber regium* had highest level of crude protein, 35.85 \pm 0.45% while *pluerotus florida* had theleast (26.40 \pm 0.49%). Highest level of crude fibre (13.2 \pm 0.27%), ash (7.90 \pm 0.10g/100g), Ca (0.037 \pm 0.001ppm), and Mg (0.172 \pm 0.001ppm) were recorded for *Pleurotus sajor (Fries)* followed by *Pleurotus florida* 13.03 \pm 0.15%, 4.10 \pm 0.10%, 0.027 \pm 0.002ppm, and 0.167 \pm 0.001ppm respectively. All mushroom studied had comparable and low levels of ether extract and concentrations of Na and K. However, the three species are rich in nutrients and therefore fit for human consumption.

Keywords: Mushroom species, Indigenous and exotic mushroom, proximate composition, mineral concentration.

Introduction

Mushroom is a non traditional horticultural crop, having high quality protein, fibre and minerals. Most edible fungi have strong enzyme system and are capable of utilizing organic compounds, agricultural waste and industrial by products. They can transform lignocellulostic biomass into highly quality food, with good flavour and nutritive value^[7].

In the world mushroom production, *Pleurotus* are rated second after *Agaries lioporus*. In 1986 *pluerotus spp* production accounted for approximately 7% of the total world production of edible mushroom, by 1990, it moved to 24%. The consumption of mushroom in Nigeria is still very low and restricted to the rural areas, since it is still perceived as delicacy for the poor. In order to fully maximise the benefits derived from mushroom consumption and its economic value, intensive effort has been directed towards the training of farmers by the Forestry Research Institute of Nigeria, in modern methods of its propagation, to produce affordable mushroom for Nigerians.

The proximate and mineral composition of locally available mushroom, are speculative. It is a common sight

in the rural areas in West Africa for women to gather mushroom^[7]. A critical factor is the identification of non poisonous species, traditional and rural settlers consume mushroom, due to its availability because it grows naturally on deadwood and organic materials. Modern science has shown that mushroom strengthens immune system, increases antibody level and helps to lower blood pressure, because of its low level of sodium. Its hypoglycaemic effect was confirmed in diabetic induced rats^[6]. Results of investigations have shown that some varieties inhibit tumour, reduced blood cholesterol, they are also used in the treatment of duodenal ulcers, gives body resistance against fever, helps in the maintenance of healthy lungs and also used in reducing bleeding.

Conflicting values of the nutritional potential of mushroom have been reported, which has been attributed to strains, composition of growth substrate, method of cultivation, stage of harvesting and specific portion of the fruiting body used for analysis^[4]. This study attempted to evaluate proximate and mineral composition of one indigenous and two exotic mushrooms, these are *Pluerotus tuber regium*, *Pluerotus sajor caju (fries)* and *Pluerotus florida kummer*, all propagated in FRIN.

Material and Methods

The fresh fruiting bodies of *Pleurotus tuber regium* (indigenous), *Pleurotus sajor caju* (fries) and *Pleurotus florida kummer* were collected from the pathology department, Forestry Research Institute of Nigeria, Ibadan. The samples were thoroughly washed with double distilled water. These were then dried in an oven at 80°C for 24 hours. The dried samples were ground and homogenised using pestle and mortar and then stored in a polyethylene. Thereafter, the samples were submitted for onward analysis at the Department of Animal Science, University of Ibadan.

Proximate Analysis: Crude proteins were determined using the microkjedahl method as described by AOAC (1990). Determination of total ash, moisture and total lipid contents were carried out as described by AOAC (1990)^[3]. Crude fibre analysis was done as described by Yeshajaga and Clifton(1996)^[11]. Carbohydrates were estimated by difference (AOAC, 1990)^[3].

Mineral Composition Analysis: Total Ca and Mg concentrations were determined by EDTA complexometric titration method as described by Harbourne (1973)^[8]. Na

and K concentrations were determined by flame photometry as described by Onwuka (2005). The heavy metals Zn and Fe concentrations were determined by the Atomic Absorption Spectrophotometer technique as described by Onwuka (2005)^[10].

Data Analysis: All data were subjected to analysis of variance (ANOVA) with a post test of Duncan.

Results and Discussion

The proximate contents and evaluated mineral concentrations for both indigenous and exotic mushrooms investigated are presented in Table 1 and 2 respectively.

Evaluation of the chemical potential of feedstuffs provide information about their nutritive benefits and toxicological effects. This will guide in feedstuff screening and implication of consuming such in human nutrition. Table 1 shows a significantly ($P < 0.05$) higher crude protein, for *Pleurotus tuber regium*, $35 \pm 0.45\%$. This value compares well with several leguminous seeds such as cowpea and groundnut, thus confirming the observations of Adejumo and Awosanya (2004)^[1], Akindahunsi and Oyetayo (2006)^[2], that mushroom is highly nutritive.

Table 1
Proximate analysis of indigenous and exotic mushroom

Mushroom spp	Crude Protein (%)	Crude Fibre (%)	Ether extract (%)	Ash (g/100g)	NFE (%)
<i>Pleurotus tuber regium</i> (indigenous)	35.85 ^a ±0.45	12.27 ^c ±0.25	4.72 ^b ±0.04	3.27 ^c ±0.25	49.59 ^b ±0.04
<i>Pleurotus sajor aju</i> (fries)	29.75 ^b ±0.25	13.21 ^a ± 0.27	4.71 ^c ±0.02	7.90 ^a ±0.10	44.44 ^c ±0.02
<i>Pleurotus florida</i> (kummer)	26.40 ^c ±0.49	13.03 ^b ±0.15	4.76 ^a ±0.03	4.10 ^b ±0.10	51.71 ^a ±0.03

Note: a, b, c- Mean with different superscript(s) in within the same column are not significantly different ($p < 0.0$).

Table 2
Estimated mineral concentrations of indigenous and exotic mushrooms

Mushroom spp	Ca (ppm)	Mg (ppm)	Na (ppm)	K (ppm)	Fe (ppm)	Zn (ppm)
<i>Pleurotus tuber regium</i> (indigenous)	0.010 ^c ±0.001	0.124 ^b ±0.002	0.011 ^c ±0.001	0.013 ^a ±0.001	236.00 ^b ±2.00	73.70 ^b ±0.15
<i>Pleurotus sajor aju</i> (fries)	0.037 ^a ±0.001	0.172 ^c ±0.001	0.014 ^a ±0.002	0.011 ^c ±0.01	232.00 ^c ±1.00	91.00 ^a ±1.00
<i>Pleurotus florida</i> (kummer)	0.027 ^b ±0.002	0.167 ^a ±0.001	0.013 ^b ±0.001	0.012 ^b ±0.10	299.00 ^a ±1.00	44.20 ^c ±0.20

Note: a, b, c- Mean with different superscript(s) in within the same column are not significantly different ($p < 0.05$).

This is further confirmed by the utilization of mushrooms in rural and semi urban areas, where it is regarded as meat for the poor. The present trial revealed that the three species had high fibre contents, which ranges between 12.26 ± 0.25 % to 13.03 ± 0.15 %; these values were higher than 10.86 ± 0.53 % obtained by Akindahunsi and Oyetayo, (2006) ^[2] for *Pleurotus tuber regium*. Akindahunsi and Oyetayo (2006) however, opined that high crude fibre value in mushroom could aid bowel movement and reduce incidence of colon cancer, if incorporated in the diet of man. Epidemiological studies have found an association between high fibre diets and a lower incidence of cardio vascular diseases and large bowel cancers ^[9], thus, confirming an earlier observation reported by Chang in 1996 that mushrooms are very effective in reducing total plasma cholesterol and triglyceride level.

The potential nutritional benefits of the three mushrooms could be further optimized due to their generally low levels of ether extract, which position mushroom as a delicacy for hypertensive and people suffering from other blood related ailments. The reported values, for ash in this study ranged between 3.27 ± 0.25 % and 7.90 ± 0.10 % and the soluble carbohydrate ranged between 44.44 ± 0.02 % and 51.71 ± 0.03 %; these low values qualified mushrooms as a good diet for diabetic, without any risk of mineral toxicity. The observed variations in the proximate constituents of the mushrooms could be attributed to the composition of growth substrate, method of cultivation, stage of harvesting and specific portion harvested for analysis ^[4].

Mineral evaluation of the mushrooms shows that *Pleurotus sajor (fries)* had the highest level of Ca (0.022 ± 0.01 ppm), Mg (0.124 ± 0.048 ppm) and Zn (91.00 ± 1.00 ppm). The three mushrooms are low in Na and K.

Conclusion

In conclusion, the low levels of Na and K coupled with high levels of crude protein and fibre in the mushroom studied, makes it good for hypertensive treatment, they can be regarded as supplementary sources of identified mineral salts. The trial shows that *Pleurotus tuber regium*, *Pleurotus sajor* and *Pleurotus florida* are fit for human consumption, because they are rich in nutrients and

potentially possess some medicinal values.

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