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Nutrient and antinutrient distribution of edible mushroom, *Pleurotus tuber-regium* (fries) singer

A.A. Akindahunsi[a,*], F.L. Oyetayo[b]

[a]*Department of Biochemistry, Federal University of Technology, Akure, Nigeria*
[b]*Department of Biochemistry, University of Ado-Ekiti, Ado-Ekiti, Nigeria*

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Abstract

Edible mushroom *Pleurotus tuber-regium*, separated into cap, stalk, and tuber, was analysed. The macronutrient profile (g/100 g) showed crude protein ranging from 4.1 to 13.8, with the highest concentration in the cap (13.8) than any of the other parts and total carbohydrates from 34.0 to 56.2, while the crude fat and ash contents were generally low. Potassium, the most abundant nutritive element was found to be the highest concentration (mg/g) in the stalk (3.3) while copper was found in trace amounts in all the parts. The total cyanide (mg/100 g), phytate (mg/100 g) and tannin (%TA) concentrations were all below levels considered harmful. Amino acids analysis show that the protein contained all essential amino acids while the calculated amino acids scores showed the sulphur containing amino acids to be most limiting. The foregoing highlights the high nutritive values of the major parts of the edible mushroom, *Pleurotus tuber-regium*.

Keywords: *Pleurotus tuber-regium*; Macronutrient; Micronutrient; Total cyanide; Phytate; Tannin

1. Introduction

Mushrooms are important for both nutritive and medicinal values (Bonatti, Karnopp, Soares, & Furlan, 2004; Agrahar-Murugkar & Subbulakshmi, 2005; Cheung & Cheung, 2005). *Pleurotus* spp., commonly known as oyster fungus, grows wildly in tropical and subtropical rainforests, and can be artificially cultivated. It has high levels of proteins, carbohydrates, minerals (calcium, phosphorus, iron) and vitamins (thiamin, riboflavin and niacin) as well as low fat (Justo et al., 1998; Manzi, Gambelli, Marconi, Vivanti, & Pizzoferrato, 1999).

Pleurotus tuber-regium (Fries) Singer is a tropical sclerotal mushroom, which has a unique ability to produce sclerotium: an underground tuber and fruitbody/mushrooms. The tuber, ovoid, irregularly shaped and cream coloured (Alofe, Odu, & Illoh, 1998) is produced and initially embedded within the remains of the much decayed prostrate log of trees. Both the fruitbody and tuber are edible. The tuber is highly nutritive and very rich in proteins and considered a delicacy (Okhuoya & Okogbo, 1990). Though wildly obtained and consumed, the cultivation of *Pleurotus tuber-regium* has been considered most primitive in Nigeria (Oso, 1977). The tubers are obtained from their natural habitats, planted and watered to induce mushroom fruitbody growth, which occurs within a relatively short period of 14–21 days (Patrabansh & Madan, 1997). This ensures a ready and regular supply of fresh mushrooms since rapid deforestation is destroying their natural habitat.

Thus, *Pleurotus tuber-regium* constitutes an important addition to diets in a world threatened by food crisis and ever increasing population. The fruitbodies and tuber have also been reported to possess medicinal

*Corresponding author. Tel./fax: +234 803 3883820.
E-mail addresses: aakin@ictp.trieste.it, aaakindahunsi@yahoo.co.uk (A.A. Akindahunsi).

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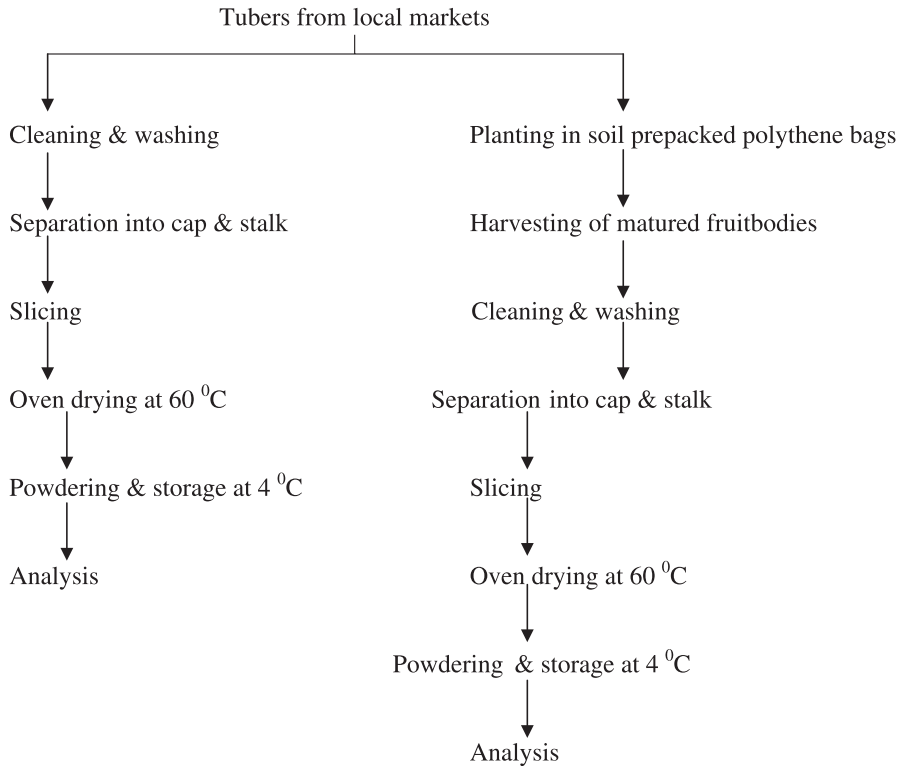
properties. In combination with various herbs, they have been used to cure asthma, small pox, and high blood pressure (Fasidi & Olorunmaye, 1994). Since both parts are widely accepted and locally available, an understanding of the chemical composition and nutritional significance of the three separate parts, the cap, stalk, and tuber, is of importance. Earlier work of Ogundana and Fagade (1982) was done on the cap only. Hence, the foregoing seeks to evaluate the relative nutrient and antinutrient qualities of these mushroom parts and to encourage efforts towards the husbandry if worthwhile.



2. Materials and methods

2.1. Sample collection and preparation

Fresh tubers of *Pleurotus tuber-regium* weighing 350–500 g were obtained from local farm markets around Ado-Ekiti, Nigeria, pooled and divided into two parts. One part was separated into cap and stalk, cleaned and washed many times, blotted dry, sliced, oven dried at 60 °C, powdered in a moulinex blender and kept in airtight containers at 4 °C prior to analysis. The second part was planted in polythene bags prepacked with soil buried very close to the soil surface, which were watered every day to keep the environment moist. After 14–21 days, fruitbodies emerging from the tubers, harvested at full maturity, were washed, and cleaned to remove extraneous materials, and separated into cap and stalk. The samples oven-dried at 60 °C were powdered in a moulinex blender and kept in airtight containers at 4 °C prior to analysis. All the samples were analysed in triplicates and results were recorded as mean ± SD. The above process is depicted in a flow diagram below:

All the glasswares used were washed in glass-distilled water and the chemicals used were of analytical grade.

2.2. Macronutrient estimation

Moisture content was determined by the direct oven drying method: the loss in weight after oven-drying 1 g each of the sample at 105 °C to constant weight was expressed as % moisture content (AOAC, 1990). Nitrogen was determined by the micro-Kjeldhal method. Because of the significant content of non-protein nitrogen in mushrooms, the protein was determined by using the adjusted conversion factor (4.38) for mushroom protein (Oei, 1991; Shashirekha, Rajathnam & Bano, 2002). Crude fat was determined by using the soxhlet extraction method using petroleum ether as the solvent (AOAC, 1984). Ash was determined as the residue of incineration of 1 g powdered sample in a crucible of known weight at 550 °C in a muffle furnace (AOAC, 1984). Total carbohydrate was determined by