

Full Length Research Paper

Proximate and mineral composition of four edible mushroom species from South Western Nigeria

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Results of proximate analysis of four edible species of mushroom collected from Akoko land in Ondo state, Nigeria indicate that *Termitomyces mammiformis* was a very good source of crude protein (37%), crude fiber (7%), ash (10%), calcium (216 g/kg dry weight) and manganese (136 mg/kg dry weight (dw)). *Russula vesca* was the richest in carbohydrate (71%) and magnesium (14 g/kg), while *Lactarius trivialis* was richest in moisture content (37%), iron (1230 mg/kg) and copper (8 mg/kg). It is also a good source of carbohydrate (64%), calcium (210 g/kg) and manganese (120 mg/kg). *Lentinus tigrinus* was, however, the richest in dry matter (94%), and is also rich in carbohydrate (62%), magnesium (11 g/kg) and copper (6 mg/kg). It was observed that lipids, sodium and phosphorus contents of the four species were generally very low.

Key words: Edible mushrooms; food composition.

INTRODUCTION

Mushrooms are saprophytes. They include members of the Basidiomycota and some members of the Ascomycota. Mushrooms have been a food supplement in various cultures and they are cultivated and eaten for their edibility and delicacy. They fall between the best vegetables and animal protein source. Mushrooms are considered as source of proteins, vitamins, fats, carbohydrates, amino acids and minerals (Jiskani, 2001). All essential amino acids are present as well as water-soluble vitamins and all the essential minerals (Buigut, 2002). Mushroom are good sources of vitamins like riboflavin, biotin and thiamine (Chang and Buswell, 1996). Ogundana and Fagade (1981) indicated that mushroom is about 16.5% dry matter out of which 7.4% is crude fiber, 14.6% is crude protein and 4.48% is fat and oil. Protein contents vary between 4 to 9% in *Auricularia* sp. and between 24 to 44% in *Agaricus* species. The protein value of mushrooms is twice as that of asparagus and potatoes, four times as that of tomatoes and carrots, and six times as that of oranges (Jiskani, 2001). Their energy value also varies

according to species, which is about equal to that of an apple.

Pleurotus tuber-regium is a common species in southern part of Nigeria and it is useful in some combinations to cure headache, stomach ailments, colds and fever (Oso, 1977) asthma, smallpox and high blood pressure (Fasidi and Olorunmaiye, 1994; Oso, 1977), while *Lentinus tuber-regium* and *L. tigrinus* are used for treating dysentery and blood cleansing respectively. *Auricularia* species have been traditionally used for treating hemorrhoids and various stomach ailments (Chang and Buswell, 1996). Chanterelles, *Boletus edulis* and *Lactarius* spp. are used for killing flies, while the puffballs are used for healing wounds (Harkonen, 1998; Delena, 1999). They are also recommended to diabetic and anemic persons, owing to their low carbohydrate and high folic acid content. Some mushrooms are reputed to possess anti-allergic, anti-cholesterol, anti-tumor and anti-cancer (Jiskani, 2001).

In recent times, mushrooms have assumed greater importance in the diets of both rural and urban dwellers, unlike previously when consumption was confined to rural Nigerians. Mushrooms are now marketed along major highways and urban centers. They are also relatively much cheaper than beef, pork and chicken that contain

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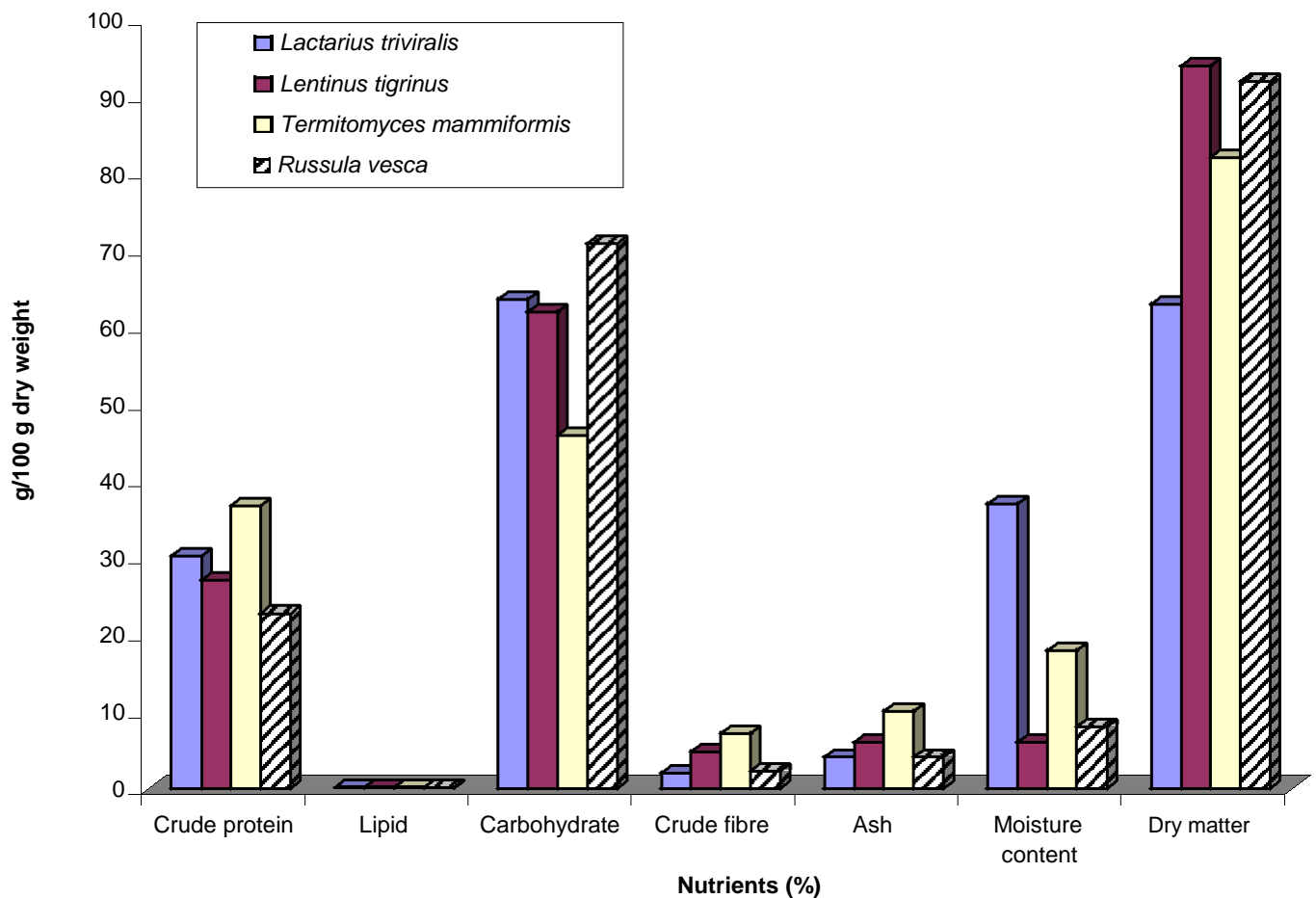


Figure 1. Proximate analysis of four mushrooms in Akoko land.

similar nutrients. The objective of this study was to determine the relative nutritive qualities of some edible species in order to encourage people to embark on their husbandry.

MATERIALS AND METHODS

Collection of mushrooms

The fully matured mushroom species were collected from different parts of Akoko land which include the farmlands at Okusa, the University football field and female hostel, gardens at Etioro, and markets at Ibaka, Erusu, Omu Akoko and Igashi. Collections were made at different times of the day: morning, afternoon and sometimes mid-day by uprooting its substratum with the aid of a scalpel.

Proximate analysis

Four edible mushroom species were analyzed for food composition according to the Association of Official Analytical Chemists (AOAC, 1995). These include the determination of crude protein, crude fat,

moisture content, dry matter, ash, crude fiber, carbohydrate and minerals. The minerals include sodium, potassium, calcium, phosphorus, magnesium, iron, copper and manganese. Values for, Fe, Cu and Mn were read on Atomic Absorption Spectrophotometer after standardizing with respective elements. The percentage of all the fractions (crude protein, crude fat, minerals and ash) were added together and subtracted from 100 to obtain the total carbohydrate percentage, while the nitrogen free extract (dry weight) was calculated as the percentage of the total carbohydrate and crude fiber.

RESULTS AND DISCUSSION

Proximate analysis was carried out on four edible mushroom species: *Termitomyces mammiformis*, *Lactarius trivialis*, *Russula vesca* and *Lentinus tigrinus*. They were selected based on their availability at the time of analysis. Results of proximate composition are presented in Figure 1. *T. mammiformis* had the highest concentration of protein (36.8%) followed by *Lactarius trivialis* and *Lentinus tigrinus*, while *Russula vesca*

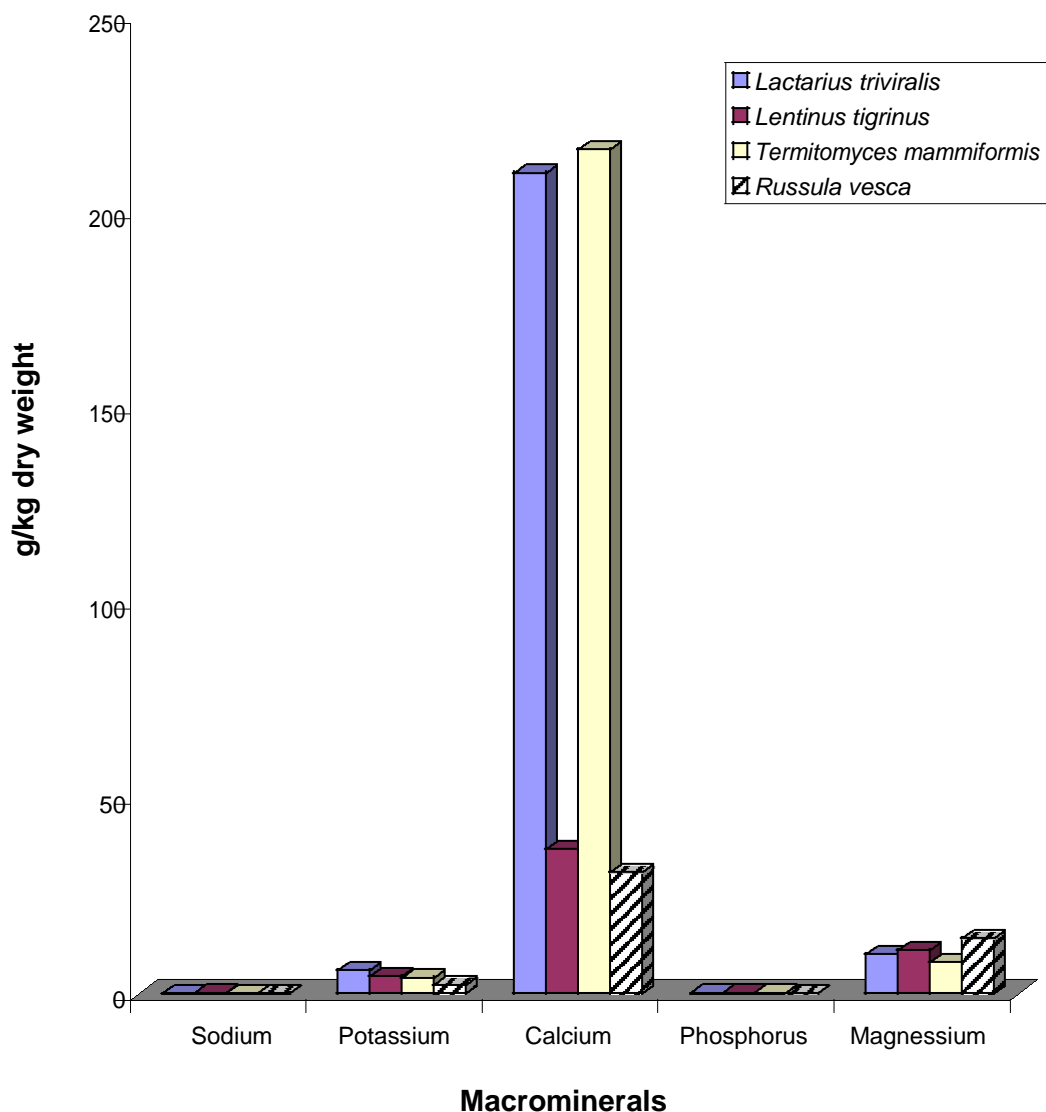


Figure 2. Macrominerals of four species of mushrooms in Akoko land.

had the least (22.8%). With respect to moisture content, *Lactarius trivialis* had the highest value (37.0%) and *Lentinus tigrinus* the least value (6.0%). *R. vesca* had the highest carbohydrate (70.9%) and crude fiber was highest in *T. mammiformis* (7.2%). The ether extract (Lipid) of *T. mammiformis*, *Lactarius trivialis*, *R.vesca* and *Lentinus tigrinus* were generally 0.1%.

Results in Figure 2 show values of the macro mineral compositions. Calcium content was 216 g/kg dry weight for *T. mammiformis*, and 31 g/kg dw for *R. vesca*. *Lentinus tigrinus* and *R. vesca* had the highest sodium content of 0.2 and 0.12 g/kg dry weights respectively. *Lactarius trivialis* had the highest potassium concentration (5.8 g/kg) and *R. vesca* had the least content (2.2 g/kg). *Lactarius trivialis* had the highest

phosphorus content, followed by *Lentinus tigrinus* and *T. mammiformis*. *R. vesca* had the highest magnesium content (14 g/kg).

Figure 3 shows micromineral composition. Iron content varied from *Lentinus tigrinus* with 497 mg/kg dw to *Lactarius trivialis* with 1230 mg/kg. Copper content ranged from *T. mammiformis* (4 mg/kg) to *Lactarius trivialis* (8 mg/kg). Manganese content in *T. mammiformis*, *Lactarius trivialis*, *R. vesca*, and *Lentinus tigrinus* were 136, 120, 52 and 50 mg/kg, respectively.

The results of mineral values of the four edible species of mushrooms clearly indicate the potential for their use as sources of good quality food. The crude protein, ash and crude fiber values of most mushrooms compared favorably with and in some instances surpassed those

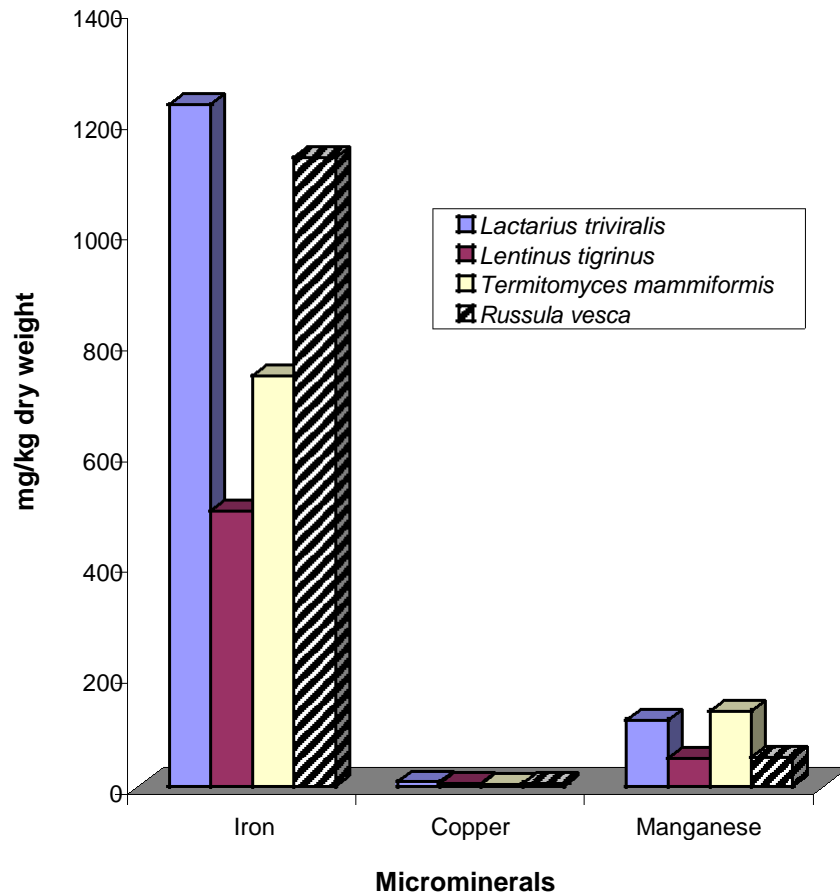


Figure 3. Microminerals of four mushroom species in Akoko land.

reported for most legumes except groundnut and soybeans grown in West Africa (FAO, 1970; Aletor and Aladetimi, 1989). The mineral levels, mainly potassium, phosphorous, sodium and iron in these mushrooms were higher than those reported for several cowpea varieties (Aletor and Aladetimi, 1989), but lower than those reported for fish, snails and broiler meat (Imevbore, 1992).

Using this proximate analysis, the mineral and analytical food value as approximate indices of nutritional quality, it would appear that some of these mushrooms fall between most legumes and meat. In earlier studies, Gruen and Wong (1982) indicated that edible mushrooms were highly nutritional and compared favorably with meat, egg and milk. Some of the mushrooms are known to possess antitumorogenic and hypocholesterolaemic agents, which implies that mushrooms could hold special attraction for and may be recommended for people with cholesterol-related ailments (Chihara, 1993).

The moisture contents of some of the mushrooms analyzed are high, indicating that mushrooms are highly perishable. High moisture contents promote susceptibility to microbial growth and enzyme activity. The protein

contents of the mushrooms were close to those reported by Aletor (1995) in which the author obtained for *Termitomyces robustus* (33.8%), *Psathyrella atroumbonata* (32.8%) and *Schizophyllum commune* (27%). However, among those mushrooms analyzed *T. mammiformis* had the highest protein content, followed by *Lactarius trivialis*, *R. vesca* and *Lentinus tigrinus*. The ash and fiber contents were higher than the ones in previous studies (Aletor, 1995). The author reported 3.7% fiber and 13.9% ash contents for *T. robustus*. The ether extract (lipids) contents of the mushrooms analyzed in this study were the same with those obtained in the previous study for *T. robustus*, *P. atroumbonata* and *Schizophyllum commune* (Aletor, 1995). These amounts of lipids are low but may contribute towards palatability.

The results of nutritionally valuable minerals show that the four mushroom species were rich in potassium, calcium, magnesium, iron and manganese. This is in agreement with the report of analysis of some cultivated mushrooms like *Agaricus bisporus*, *Lentinus edodes*, and *Pleurotus ostreatus* (Mattila et al., 2001). They were generally low in sodium, phosphorus and copper. Minerals in the diet are required for metabolic reactions,

transmission of nerve impulses, rigid bone formation and regulation of water and salt balance among others.

From the study, it was observed that these four edible mushrooms hold tremendous promise in complementing the protein and mineral supply deficits prevalent in developing countries. Edible mushrooms are grown with little efforts in their husbandry: they are grown on straw-based compost, and sawdust supplemented with other nutrients. For their full nutritional potentials to be realized, intensive efforts must be geared towards their husbandry and popularization of the more nutritious species like *Agaricus* spp., *Pleurotus tuber-regium* and *Termitomyces* spp. Detailed amino acid analysis of the four species is suggested to permit direct comparison with more popular food sources.

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