Original Article

Assessment of Nutrient Profiles in Pleurotus eryngii Cultivated on Various Substrates Composted for Five Months

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Studies on the evaluation of nutrient composition of pleurotus eryngii cultivated on five months composted substrate were carried out at Dilomat Farms and Services Limited, Rivers State University. Sawdust and mangrove wood were both obtained from Timber market Mile II Diobu. Mangrove woods were later burnt for ash collection. Healthy spawns of Pleurotus eryngii as well as rice bran were bought from Dilomat Farms and Services Limited, Rivers State University for the study. The above materials were all conveyed to the experimental site at Dilomat farms and allowed to compost for five months. The method of the Association of Official Analytical Chemist (AOAC) was adopted for nutrient and anti-nutrient composition of the cultivated mushroom. Nutrient assessment revealed the presence of proximate, mineral and vitamin constituents. Highest proximate composition value was recorded for moisture (52.2±0.74%) while ash recorded lowest content (0.50±0.00%) Phosphorus recorded highest concentration (442.00±0.81mg/100g) for mineral investigation while iron gave the lowest value for mineral (4.00±0.00 mg/100) Thiamine was the only vitamin recorded with 0.89±0.04 values. Antinutrient screening showed the availability of glycoside, oxalate, saponin, tanmin, polyphenol, flavonoid and lignant in mineral concentration. Although, highest (13.29±0.04mg/100g) and lowest (0.00±0.00 mg/100g) values were recorded for lignant and tanmin respectively. Generally, P. eryngii is endowed with valuable nutrient and antinutrient.

Keywords: Pleurotus eryngii, Nutrient Composition, Substrate and Composting.

INTRODUCTION

Pleurotus eryngii, also referred to as the "King Oyster," is a species of edible and medicinal fungus native to the Mediterranean region of Europe. It is currently gaining popularity throughout the world, particularly in China, Japan, the Middle East, and Indo-Pak (Iqbal *et al*., 2018). It belongs to the family Pleurotaceae and is one of two species of the weak parasitic genus *Pleurotus* that may grow on the roots or stem bases of alive plants (Zervakis, 2001a; Lewinsohn *et al*., 2002). Significant morphological, biochemical, and genetic variety has been observed in the P. eryngii taxon due to its wide geographical spread. As a result, relationships within it and its classification are still up for debate and the subject of numerous investigations.

Pleurotus eryngii, on the other hand, is gaining popularity throughout the world due to its exceptional stem and cap homogeneity, culinary qualities, and long shelf life. It has been suggested that this mushroom holds great promise for improving health because it is a great source of vitamins, minerals, protein, fiber, and carbs (Alam *et al*., 2009). Additionally, it contains a variety of amino acids, including glutamic acid, aspartic acid, and arginine (Manzi *et al*., 1999). Iqbal *et al*. (2018) claim that *P. eryngii* has commercial significance because of its use in industries, as it has been in various pharmacological, medical, and biotechnological investigations. Moreover, it is capable of producing a wide range of physiologically active chemicals and has an advanced ligninolytic enzyme system that aids in the breakdown of lignin and other aromatic compounds (Cohen et al., 2002). According to Yin *et al*. (2002), adding *P. eryngii* ethanolic extract to maize emulsion oil at 600C considerably prolonged the time it took for lipids to oxidize. Furthermore, *P. eryngii* has seen a sharp rise in commercial production over the past two decades due to its exceptional flavor and excellent nutritional content (Manzi *et al*., 1999).

Globally, there are numerous commercially developed strains of *Pleurotus eryngii* being farmed in a large scale. Regarding mycelium growth, yield, and quality, various strains react differently to varying environmental factors, substrates, supplements, and their dosage (Zervakis, 2001b). For the King Oyster and other oyster mushroom strains, the ideal temperature range for the development of their fruiting bodies is 12–17°C. When compared to other oyster mushroom strains like *P. florida, P. sajor-caju* and *P. ostreatus, P. eryngii* is more challenging to cultivate extensively year-round since it needs controlled conditions (Gregori *et al*., 2007).

A variety of substrates, including sawdust, rice and wheat straw, cotton seed hulls, sugarcane bagasse, corn and their mixtures in varying proportions with soybean, wheat bran, and peanut meal, can be utilized as commercial growing media for King oyster mushrooms (Igbal *et al*., 2018). However, there is limited information on the nutrient composition of *P. eryngii* as influenced by time of substrate composting. It is on this premise this research was carried out in Port Harcourt.

MATERIALS AND METHODS

Sample Collection

Rhizophora racemosa wood and sawdust were acquired from Timber Market Mile II Diobu. As soon as possible, the *R. racemosa* forests were chunked and burned to collect ash. Healthy *Pleurotus eryngii* spawning and rice bran were purchased from Dilomat Farms and Services Limited at Rivers State University. For additional research, all experimental materials were shipped to the Dilomat Farms at Rivers State University.

Cultivation Studies

To prevent experimental bias, this study used completely randomized design (CRD) and the culture techniques described by Chinda & Chinda (2007). Rice bran, wood ash, and sawdust were the substrate materials that were combined and repeated five times.

Substrate composition per bag= 700g sawdust + 100g rice bran + 1g wood ash

The setup was permitted to compost for 150 days (5 months) from February to June of 2022, with weekly rotations of the compost. The bags were injected with 36.05±2.25g of weighted spawn. After being weighed, the inoculation bags were brought to the incubation chamber, where they were placed and their growth was observed. For 38 days, the bags were incubated at 25±3 0C. Before the bags were cut open, the colonized ones were immediately trimmed and watered for three days. Three days after sprouting, mature mushrooms were manually harvest by hand picking.

Determination of nutrients and antinutrients of cultivated *Pleurotus eryngii*

Samples of harvested *Pleurotus eryngii* were sent to the Food Science and Technology Laboratory for the determination of nutrient composition. The methods of AOAC, (2005) was adopted for the analysis.

Statistical analysis

Data obtained were subjected to mean and standard deviation analysis with the aid of SPSS software version 22.

RESULTS AND DISCUSSION

Table 4.1: Proximate composition of cultivated *Pleurotus eryngii*.

Parameters	Composition (%)
Moisture	52.2±0.74
Ash	0.51±0.00
Lipid	2.73±0.05
Fibre	0.98±0.06
Carbohydrate	18.33±0.16
Protein	26.06±0.54

Table 2: Mineral and vitamin composition of cultivated *Pleurotus eryngii*.

Parameters	Composition (mg/100g)
Calcium	236.00±1.63
Iron	4.00±0.00
Magnesium	217.00±0.81
Phosphorus	442.00±0.81
Potassium	183.00±0.81
Sodium	76.33±1.24
Thiamine	0.89±0.04

Table 3: Antinutrient composition of cultivated *Pleurotus eryngii.*

Parameters	Composition (%)
Glycoside	0.003±0.00
Oxalate	0.004±0.00
Saponin	0.35±0.00
Tannin	0.00±0.00
Polyphenol	7.43±0.16
Flavonoid	7.28±0.16
Lignant	13.29±0.04

The result of proximate composition presented in Table 1 shows Moisture Ash, Lipid, Fibre, Carbohydrate and Protein to be present in *Pleurotus eryngii*. Research has indicated that the Pleurotus genus, along with other mushrooms possess significant amounts of protein, carbohydrates, lipids, fiber, and very little ash (Agbagwa et al 2020a&b). Yang *et al.*, (2019) and Vetter *et al*. (2015) also reported lower values for moisture and ash contents respectively. Notwithstanding, the lipid and protein values of the present study are similar to those documented by Yang *et al*. (2019). Mehmet and Seven (2009) revealed that the nutrient composition of mushroom could be influenced by time of harvest and nature of substrate.

The result of Mineral and vitamin composition of *Pleurotus eryngii* presented in Table 2 reveals the presence of Calcium, Iron, Magnesium, Phosphorus, Potassium, Sodium, and Thiamine to be present in *Pleurotus eryngii*. Vetter et al. (2015) reported same mineral components in P. eryngii.

However, they showed higher values for calcium, iron, sodium and potassium. Higher magnesium content was also documented by Yang et al. (2019). The difference in these values could be as a difference in environment and composting time. However, minerals play major role in the human body as it supports cellular functions and impulse transmission (Tandogan and Ulusu, 2005).

The result of anti- nutrient composition of *Pleurotus eryngii* presented in Table 4.3 shows Glycoside, Oxalate, Saponin, Tannin, Polyphenol, Flavonoid and Lignant to be present in *Pleurotus eryngii*. The highest and lowest anti-nutrient compositions were found in tannin (0.00±0.00) and lignin (13.29±0.04), respectively. The values reported in the present study are higher than those documented by Vetter et al. (2015) for P. eryngii. Antinutrients play vital role for protection as they support the immune system to fight invading pathogens and they have been reported in several edible mushrooms (Alam et al., 2009; Agbagwa et al., 2022).

CONCLUSION

Pleurotus eryngii contains vital nutrients and anti nutrients at varying concentrations. However, this study has revealed that the concentration of these constituents could be influenced by the substrate composting time.

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