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FACULTY OF AGRICULTURE AND ANIMAL SCIENCES

DEPARTMENT OF CROP PRODUCTION AND MANAGEMENT.

EFFECT OF LOCALLY AVAILABLE SUBSTRATES ON THE MINERAL AND BIOACTIVE COMPOUNDS OF OYSTER MUSHROOMS (*Pleurotus ostreatus)*

BY

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DECLARATION

I, AKURUT ESTHER hereby declare that this research proposal was written by me with the guidance of my supervisor and it has never been submitted anywhere before for any award of academic paper.

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APPROVAL

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ii

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LIST OF ABBREVIATIONS

C: N	Carbon to Nitrogen ratio
CV	coefficient of variation,
S. E	Standard error,
L.S. D	Least significant differences.
$gQEkg^{-1}DW$	grams of quercetin equivalent per kilogram of dry weight
$gGAEKg^{-1}DW$	grams of garlic acid equivalent per kilogram of dry weight
g/kgDW	grams per kilogram of dry weight
AOAC=	

LIST OF TABLES AND FIGURES

Table 1: Experimental layout in the mushroom growing house

Table 2: Results for the substrates analysis

Table 3: The mean of different minerals in oyster mushroom grown under different substrates

Figure 1: Showing experimental layout

Fig 2: Effect of different substrates on flavonoid content in oyster mushrooms.

Fig 3: Effect of different substrates on phenolic content in oyster mushrooms

Fig 4: Effect of different substrates on vitamin C content in oyster mushrooms

Fig 5: Preparations of samples for analysis

Table of content

DECLARATION .....**Error! Bookmark not defined.**

APPROVAL .....**Error! Bookmark not defined.**

ACKNOWLEDGEMENT iii

LIST OF ABBREVIATIONS iv

LIST OF TABLES AND FIGURES v

Table of content vi

ABSTRACT vi

CHAPTER ONE ..... - 1 -

INTRODUCTION ..... - 1 -

1.1. Background of the study ..... - 1 -

1.2. Problem statement ..... - 2 -

1.3. Justification of the study ..... - 3 -

1.4. Objectives of the study ..... - 3 -

1.4.1. General objective ..... - 3 -

1.4.2. Specific objectives ..... - 3 -

1.5. Hypothesis of the study ..... - 3 -

1.6. Significance of the study ..... - 4 -

1.7. Scope of the study ..... - 4 -

CHAPTER TWO: LITERATURE REVIEW ..... - 5 -

2.1. Origin of Oyster mushroom ..... - 5 -

2.2. Production trends of mushrooms ..... - 5 -

2.3 Importance of oyster mushroom ..... - 5 -

2.4. Growth requirements of oyster mushroom ..... - 6 -

2.4.1. A grow climatic requirements of oyster mushroom ..... - 6 -

2.5. TYPES OF SUBSTRATES FOR MUSHROOM GROWTH ..... - 6 -

2.6. Effects of growth media on the quality of mushroom ..... - 7 -

CHAPTER THREE ..... - 8 -

MATERIALS AND METHODOLOGY ..... - 8 -

3.1 Study site ..... - 8 -

3.2 Research experimental design ..... - 8 -

3.3 Experimental layout ..... - 8 -
3.4. Preparation of the substrates. ..... - 9 -
3.5. Spawning and incubation ..... - 9 -
3.6. Harvest and drying of oyster mushroom. ..... - 9 -
3.7.0 Parameters for Analysis ..... - 10 -
3.7.1 Determination of mineral composition in dried Oyster mushroom ..... - 10 -
3.7.2 Determination of vitamin c concentration ..... - 10 -
3.7.3 Determination of total phenolics content ..... - 11 -
3.7.4 Determination of total flavonoid content ..... - 11 -
3.8. DATA ANALYSIS ..... - 12 -
CHAPTER FOUR ..... - 13 -
4.0 RESULTS ..... - 13 -
4.1. Nutrient composition and pH of the substrates ..... - 13 -
4.2. The effect of substrates on mineral contents of oyster mushroom grown under different substrates. ..... - 13 -
4.3. The effect of substrates on bioactive compound contents of oyster mushroom grown under different substrates. ..... - 14 -
4.3.1 Flavonoids content ..... - 14 -
4.3.2 Phenolic content ..... - 15 -
4.3.3. Vitamin C (Ascorbic acid) content ..... - 16 -
5.1. The effect of substrates on mineral contents of oyster mushroom grown under different substrates. ..... - 18 -
CHAPTER SIX ..... - 21 -
CONCLUSION AND RECOMMENDATION ..... - 21 -
6.1. Conclusion ..... - 21 -
6.2. Recommendation ..... - 21 -
References ..... - 22 -
APPENDICES ..... - 27 -

ABSTRACT

Oyster mushrooms are recognized for its potential to address malnutrition and other health issues due to its rich nutritional content. They are typically cultivated above the ground on various substrates. While different substrates are known to be effective for oyster mushroom production, their impact on the mushroom's nutritive content remains unclear. To fill this knowledge gap, this study investigated the effects of three local substrates on the mineral and bioactive compound content of oyster mushrooms. The research design was a Completely Randomized Design (CRD) and carried out under controlled conditions (Temp of 25-28 ^{0}C and RH of 60-70%). The treatments were millet husk, cotton seed husk, and coffee husk being used as substrates. The results showed that the nutrient composition of each of the substrates was; Coffee Seed husks (N-1.074%, C-6.234%, C: N-5.82, pH-5.2); Cotton Seed husk (N-0.422%, C-13.953%, C: N-33.1, pH-7.01); Millet husks (N-0.792%, C-2.278%, C: N-2.88, pH-7.461). Magnesium content was higher in oyster mushroom produced using cotton seed husks with 23.6mg/100g, millet and coffee husk substrates produced oyster mushroom with the same amount of mg. Cotton husks produced mushroom with higher content of zinc (7.840mg/100g), followed by coffee husk with 6.624 mg/100g and least was Millet husk with (3.838mg/100g.); the content of Cd and pb were below detectable level in oyster mushroom produced using the different substrates. The coffee husks substrates showed a significantly high phenolic and flavonoid contents compared to both millet and cotton seed husk. Additionally, Vitamin C content was significantly higher in both Coffee and millet husks, 4.699g/kgDW and 5.191g/kgDW respectively.

In conclusion, the study suggests that coffee husk is the most effective substrate for producing oyster mushrooms with higher bioactive compound levels, while cotton seed husk is more suitable for maximizing mineral contents. The potential synergies of combining coffee husks and cotton seed husks for oyster mushroom production should be recommended so as to achieve higher quantities of both bioactive compounds and mineral contents in mushrooms.

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Mushroom is fungus of *Basidiomycetes* class with fleshy and spore-bearing fruiting body under the order *Agaricales* in fungal classification and typically produced above the ground on soil or on its food substrate (Estelle & Francis, 2018). Mushrooms are categorized as edible and poisonous mushroom with the edible species including; shitake, oyster spp, and Button among others. Globally, mushroom production is steadily growing as an alternative source of food and providing medicinal purposes. China accounts for about over 30 billion kilograms of global production of edible mushroom and this accounts for about 87% of the world production (Royse et al., 2017). In India *Agaricus bisporus*, *Pleurotus spp*. and *Volvariella volvacea* constitutes 96% of the total mushroom production (Sharma et al., 2017).

Africa contributes to only 0.4% in terms of global mushroom production and other mushroom related products and yet the content contributes up to 25% of the global mushroom diversity (Anchang, 2014). The economic importance of mushrooms in Sub-Saharan Africa (SSA) is increasingly gaining attention on the continent, but there is a paucity of information on the commercial production of edible mushrooms and current research into the cultivation of local mushroom species in SSA.

In Uganda, oyster mushroom production became prominent in the 1990s, and its seen as a potential income generating activity for both rural and urban farmers (Pavlík & Byandusya, 2016). Mushroom production especially oyster mushroom production is gaining steadily since it require less space, easier to grow compared to other species, highly profitable and has a wide range of medicinal and environment benefits (Obaa & Nshemereirwe, 2004). According to Obaa & Nshemereirwe (2004) mushroom production is reported to be a highly profitable venture for both urban and peri-urban farmers such as in the Kabale District. Besides its profitability, mushroom especially oyster mushroom is reported to be highly nutritious and others having good medicinal properties which can be used as preventative treatments for some diseases e.g. Diabetics, cancer etc. (Fernandes et al., 2021). According to Chye et al. (2008), Oyster

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