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MUSHROOM PRODUCTION IN THE FACULTY OF AGRICULTURE TEACHING AND RESEARCH FARM, UNIVERSITY OF PORT HARCOURT, NIGERIA

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ABSTRACT
The study was carried out in the Teaching and Research of the Faculty of Agriculture, University of Port Harcourt, Nigeria. The main objective was to conduct an economic assessment of mushroom production in the farm. The study utilized secondary data generated from the farm record of the farm. Gross margin model was the analytical used. The results indicated that total variable cost spent in the production of mushroom in 2015 was ₦131,090.00, out of which, cost of energy for sterilization that is industrial gas constituted ₦54, 450.00. The result shows that the quantity of mushroom harvested was estimated at 619.8 kg. A kilogram of mushroom was sold for ₦750.00 and the total revenue generated was ₦464, 850.00 with a net return of ₦333,759.00. The result further showed that the Total Variable Cost was estimated as ₦127, 000.00 in 2016. Out of which cost of energy for sterilization was ₦46, 500.00. The quantity of mushroom harvested during the period was estimated at 403.0 kg. A kilogram of mushroom was sold for ₦1000.00 with estimated total revenue as ₦403,000.00 showing a net return of ₦276,000.00. The energy source of gas for sterilization in 2015 was 41.5% of the total cost of production while in 2016; it was 36.2% of the total cost of production. A positive return in the production of mushroom in the study area implies that if the scale of mushroom production is increased, it will definitely increase the quantity of mushroom harvested which will increase the revenue.

Key words: mushroom production, teaching and research farm

INTRODUCTION

Mushrooms are unique non- green vegetable which are highly prized for various values attributed to them. Research on mushroom cultivation, by-products, value addition as well as developments of new equipments and tools is on the rise in Nigeria and globally. Mushroom growing can improve food security as well as general livelihoods of individuals engaged in it. Mushrooms are cultivated worldwide for their taste, nutritional attributes and potential application in industries (Sunagawa and Magae, 2005; Mata et al., 2005). Mushrooms have various usefulness in medicine and alternate medicine (Wong et al 2012, Kues and Liu, 2000), food formulation (Summers *et al*. 2015, Singdevsachana *et al*. 2016), as soil amendment (Rinker et.al, 2002) and bioremediation (Adenipekun and Fasidi, 2005) among other uses.

The Mushroom Unit of the Faculty of Agriculture Demonstration Farm in the University of Port-Harcourt serves the dual roles of student training and production of mushroom to the University community. Mushrooms are produced in the farm using global standard method of mushroom production as reported Stamets (2000). The method is modified from time to time to suit the farm need. The production process in the mushroom cultivation using the steam sterilization method involved six stages namely: substrate gathering and preparation, sterilization, inoculation with mushroom spawns, incubation, fruiting and harvesting and packaging. The major substrate used is sawdust gathered from sawmill. The sterilization method is steam sterilization with the use of fabricated sterilising unit. Energy source is gas purchased from gas stations. Mushroom spawns are produced for each production cycle. Incubation is at 27±2◦C. Fruiting is usually within 30 days of inoculation of substrates with mushroom spawn.

Various optimization activities are being carried out in the farm to maximise production activities in order to serve the University community and beyond. The broad objective of this study was to assess the steam sterilization method used in the mushroom production. Specifically the study;

(i) examined the method of steam sterilization in mushroom cultivation
(ii) estimated cost and returns of mushroom cultivation

METHODOLOGY

Study Area

The study was conducted in the Faculty of Agriculture Teaching and Research Farm in the University of Port Harcourt. The University of Port Harcourt is a university in the Nigerian city of Port Harcourt. It was established in 1975 as University College and was given university status in 1977. It is situated along east-west road of Rivers State, Nigeria. Faculty of Agriculture started in 2005 with a Teaching and Research Farm as a unit for carrying out the various practical for the students.

Data Collection

Data for the analysis was generated from the faculty of Agriculture teaching and Research Farm record for 2015 and 2016 production year.

Method of Data Analysis: The study utilized the gross margin method to estimate the cost and returns in mushroom production during the period of study.

Model Specification:

Gross Margin model

$GM = \sum TR - \sum TVC$

$TR = P_Y . Q$

Where

GM = Gross Margin
TR = Total Revenue
Py = Price mushroom product per kg in (₦)
Q = Quantity of mushroom produced in kg
TVC = Total Variable Cost (₦)

Where TVC includes cost of purchasing variables inputs used in the mushroom cultivation during the period.

RESULTS AND DISCUSSION

The method used for the steam sterilization in the production of mushroom was wet heat with the aid of fabricated sterilizing unit Plate (1). The substrates were kept in the sterilizing container and source of heat was gas using industrial gas cooker. Duration for heat application was four hours to ensure elimination of thermophilic microorganisms which could otherwise compete with the desired organism. The major challenge however was the cost of gas refill. The substrate bags were allowed to cool and inoculated with spawns of the mushroom after which incubation was carried out. Fruiting of mushrooms began after three weeks in the fruiting room Plate 2.

Plate 1: Fabricated Wet Steam Sterilizing Unit. UNIPORT Mushroom Unit

Plate 2: Fruiting Mushroom Bags
Adedokun, 2012

The results of the two year study are represented in Tables 1 and 2

Table 1: Cost of production and revenue of mushroom production in 2015

S/N	Variable Inputs	Quantity	Unit cost in (₦)	Total cost in (₦)
1	Gas Refill (55kg)	3	18,150	54,450
2	Wheat bran (50kg)	3	2833.33	8499
3	Cotton wool	23rolls	333.33	7666.59
		9		
4	Rubber band	packets	350	3150
5	Masking tape	7	275	1925
6	Disinfectant	1	2500	2500
7	Ethanol (2.5L)	4	4000	16000
8	Mentholated spirit	1	4000	4000
9	Kitchen Napkin	2	100	200
10	Bagging bags	22 rolls	1000	22000
11	Matches	1 packet	200	200
12	Razor blade	1 packet	500	500
		7		
13	Detergent	packets	500	3500
14	Transportation	3	1500	4500
15	Substrate	1	2000	2000
16	Grand Total Cost (₦)			**131,090**
17	**Total Revenue in (₦)**			**464,850**
18	Bags of mushroom packs sold at 150 per 200g		3099	
19	Quantity of mushroom harvested in Kg		619.8	
20	**Unit Price / kg in (₦)**		750	
21	**Net Returns in (₦)**			**333,759**

Source: Estimated from farm record, 2015

Note: Farm labour is supplied from the Demonstration Research Farm Unit

The result in Table 1 showed the cost and returns of mushroom production in 2015. It was found that the Total Variable Cost was estimated as ₦ 131,090.00. Out of which, cost of energy for sterilization which was the purchase of industrial gas constituted ₦54, 450.00 and substrate bags accounted for ₦ 22,000.00. Cost of wheat bran and cotton wool was ₦ 8,499 and ₦7,666.59 respectively. ₦19,823.41 was spent for the purchase of the other variable inputs as indicated in Table (1).

The result further showed that a total number of 3099 mushroom bags of 200 grams were produced during the production year and the quantity harvested was estimated at 619.8 kg of mushroom. A kilogram of mushroom was sold for ₦750.00 and the total revenue generated was ₦464,850.00 with a net return of **₦333,759**.00. A positive sign in the cost and return analysis implies that production of mushroom is a viable venture. It also implies that if the scale of mushroom production is increased, the quantity of harvested mushroom will increase which definitely increase the revenue earnings of the farm.

Table 2; Cost and returns of mushroom production in 2016

S/N	Variable Cost	Quantity	Unit cost in (₦)	Total cost in ₦
1	Gas refill (55kg)	3	15500	46,500
2	Wheat bran (50Kg)	2	3250	6500
3	Rubber band	7 packets	400	2800
4	Guinea corn (50kg)	2bags	7000	14,000
5	Substrate bags	23 rolls	1000	23,000
6	Ethanol (2.5L)	3bottle	4666.7	14,000
7	Bleach (Jik) 500ml	1 bottle	400	400
8	Cotton wool	21 rolls	350	7350
9	Sawdust (conveyance)			1500
10	Methylated spirit (Moko)	8 bottles	300	2400
11	Detergent	1 packet	500	500
12	Matches	1 roll	50	50
13	Transparent nylon	10 yards	200	2000
14	Transportation	3	2000	6000
15	**Grand total cost in (₦)**			**127,000.00**
16	**Total Revenue in (₦)**			**403,000.00**
17	Net Returns in (₦)			276,000.00
18	No of 200g packs of mushroom			**2017**
19	Qty of mushroom harvested in Kg			403.0
20	Unit price /kg Mushroom in (₦)			N1000.00

Source: Estimated from farm record, 2016

Note: Farm labour supplied from the Research Farm Unit

The result as indicated Table 2 showed the cost and returns of mushroom production in 2016. It was found that the Total Variable Cost was estimated as ₦ 127, 000.00. Out of which, cost of energy for sterilization which is the cost of the industrial gas constituted ₦46, 500.00 and the cost of substrate bags accounted for ₦ 23,000.00. Cost of wheat bran, guinea corn, ethanol and cotton wool was ₦ 6,500, ₦14,000.00, ₦14,000 and ₦7,350.00 respectively and cost of other variable inputs was estimated as ₦15, 650.00 as indicated in Table (2).

The result further showed that a total number of 2017 harvested 200 grams of mushroom bags were produced during the production year and the quantity of harvested mushroom was 403.0 kg. A kilogram of mushroom was sold at ₦1000.00 and the total revenue realized was estimated as ₦ **403,000.00 with a net return of** ₦276,000.00. The result indicated a positive return in the production of mushroom which implies that an increase in the scale of production will increase the quantity of mushroom which will increase the volume of harvested mushroom. The increased revenue will enable the farm pay for the cost of hired labour. It was observed that the energy source of gas in 2015 was 41.5% of the total cost of production while in 2016; it was 36.2% of the total cost of production.

Conclusively mushroom cultivation is a viable venture because the project showed a positive value in the cost and return analysis during the period under review despite the high cost of energy used in the sterilization. It is recommended that an alternative cheaper source of energy should be used for sterilization to reduce the cost of production. Also the scale of production should be increased for higher output which will increase the revenue in mushroom production.

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