©IDOSR Publication
International Digital Organization for Scientific Research ISSN: 2579-079X
IDOSR JOURNAL OF SCIENCE AND TECHNOLOGY 4(2): 15-20, 2019.

Comparative Studies of The Igbo's Indigenous and Modern Mushroom Cultivations

Ogbu Kenneth Idika

Department of Biotechnology, Ebonyi State University Abakaliki/Biotech Research and Development Center EBSU.

ABSTRACT

Mushrooms cover a large nutritional need of many of the populace in the Igbo speaking people of Southeast Nigeria with special focus on some of the common wild edible types. Many of the older women tries to cultivate mushrooms in a subsistence scale to reduce the stress of going to the forests for mushroom hunting. The local traditional Igbo method of mushroom cultivation was carried out. Three different large mounds were made numbered Beds 1 – 3, each containing different type of substrates. Bed 1- contains palm fruit holder, Kitchen ash, dry palm leaves and wetted with palm wash liquor (*Oguru*), Bed 2 – contains saw dust, kitchen ash, dry leaves and wetted with water while Bed 3 – contains mashed papers, kitchen ash and water. The cultivation procedure was also done in fifteen perforated pots divided into three groups, with each group having five pots each. Group 1 contained garden soil, dry palm leaves, ash and palm wash liquor, group 2 contained rice straw, ash and water while group 3 contained sawdust, ash and water. The pot arrangements were placed closer to an old mushroom site for proximity to mushroom spores. Wet and dry season cultivations were observed, a scientific method of mushrooms cultivation was also carried out. The results showed that there was no evidence of mushroom growth on the garden soil-beds nor on the pots during the dry season after 35 days. However, few mushrooms grew on the garden soil-bed 1 after 35 days of wetting during the wet season and very few mushrooms grew on the soil-bed 2after about 40 days although their edibility was not confirmed. People from this area and other mushroom lovers should learn new and better ways of mushroom cultivation.

Key words: Mushroom cultivation, Traditional Igbo method, limitation, Dry Season, Wet season, Garden soil-bed, Biotech Research Development Center.

INTRODUTION

Mushroom is the fruit body of some fungi of the genus *Basidiomycetes* [1]. Some of them are edible. The edible ones have become a large nutritional source for a major population in the world [2]. Hence it has formed a large source of employment as many people are now engaged in the business of mushroom cultivation. Over 100 countries are involved in the cultivation of edible mushroom and the production is increasing at the rate of 7 per cent per annum [3]. China and India are the major producers with China producing over 14 million tonnes of edible mushroom in 2006 alone (UNESCAP). Many of these mushrooms have been highly valued for their medicinal properties, exhibiting hematological, antihypertensive, antiviral, antitumor, antibiotics, antibacterial, hypocholesterolic, and immunomodulating activities [4], [5], [6].

The saying in Igbo language that food and medicines are brothers can be strengthened by the fact that edible mushrooms have shown confirmation. Mushrooms are the only organism known to have shown potency against such health challenges as HIV-1 and cancer that have proven incurable. Examples of such mushrooms include *Trametes versicolor and Flammulinavelutipes*etc [7]**.** Definitely

mushrooms are not known to possess chlorophyll and that means that it does not require the energy of sun light to grow except temperature, humidity and certain degree of light.Therefore, the cultivation is usually done in an enclosure so every woman can actually take advantage of this and cultivate it just behind the house for richer meals as it requires low resources input and little space.

There is no known record estimate of the quantity of mushrooms produced in Nigeria. But indeed, there are places in Nigeria where some species of mushrooms are cultivated, such as (OTA FARM, NIHORT, FIRO etc). However, there are currently two places in Aba, Abia State Ministry of Agriculture and Ebonyi State Mushroom Farm where mushrooms are being cultivated in the south east of Nigeria, comprising the five states of Abia, Anambra, Ebonyi, Enugu and Imo states. This leaves the region at the mercy of wild mushroom foraging.

There are many lovers of mushrooms in Igbo speaking arears of Nigeria. However, this population usually depend on wild mushrooms for their meal. Recently, some families have resorted in local cultivation of mushrooms to meet their need.

Aim and Objective

The aim of this work is to cultivate mushroom through the traditional Igbo local method and investigate the limitations of this method.

MATERIALS AND METHODS

Materials: The samples used in this work include palm wash liquor (*oguru*), some dried palm leaves, fresh and old kitchen ash, sawdust, rice straw and waste paper. Others include garden soil, buckets and flat mounds. Additionally, PDA, Spawn of *Pleurotussajorcajor*, soda ash, wheat grains, transparent polythene bags, bottles and dark cupboard.

The method used for the work was the type laid down in most of the Igbo speaking areas in Nigeria, especially in Ebonyi, Enugu, Abia, Imo and Anambra States. This method does not require the careful introduction of mushroom spores but the spores are allowed to land or naturally inoculate on well prepared soil-beds with the mushroom substrates by the help of spore dispersals.

The traditional simulation of traditional mushroom cultivation was done in two sets during the windy dry harmattan period: The first was done on a soil-bed or tilled mounds, the second was done in perforated pots. The traditional cultivation was done as described by Local Women who practice mushroom growing in a subsistent level at their leisure time behind their homes. The age of women interviewed for the method ranged between 45-70 years. Younger women had little idea and the older women are fast aging and dying.

Soil-Bed Cultivation

Three mushroom beds were tilled behind the Biotech and Research Development Center (BRDC), and were numbered 1-3

Beds 1-3: Measured 215cm with pH and temperature of the soil recorded for one week (5day). The three beds contained different substrate:

Bed1: contained 1kg of kitchen ash, 1500g Palm fruit holder, all covered with dried palm leaves. 500ml of palm wash liquid (*oguru*) was applied to the bed daily for fourteen days.

Bed 2: contained 1kg of kitchen ash, 1500g sawdust, and 500ml of water daily for fourteen days.

Bed 3: 1kg of crushed white papers, left to soak for 72 hours and applied to the bed. 500ml of water was also applied daily for fourteen days.

Before the application of these materials to the beds, a random sample of the palm fruit holder, saw dust, and waste white paper were microscopically examinedfor the presence of mushroom spores, and cultured on potato dextrose agar (PDA) to see if mushroommycelium, would grow.

Pot Method of Mushroom Cultivation

In the pot method, almost a similar procedure was followed as that of the beds; except that these were done in

perforated pots at a different location and a change of one of the substrates (white paper was replaced with rice straw)

Fifteen perforated pots were used. The pots were divided into three groups; five pots for each group to contain a separate substrate.

The first five pots contained garden soil, 200g kitchen ash, palm fruit holder, and daily application of 100ml of palm wash liquid for fourteen days.

The second group of five pots contained: half pot full of saw dust, 200g kitchen ash, and 100ml of daily water supply for fourteen days.The third group of five pots contained: half pot full of chopped rice-straw, 200g of kitchen ash and 100ml of water applied daily for fourteen days.These arrangements were allowed and observed for thirty days before readings were recorded.

The above procedures were also repeated during the wet season.

Laboratory Cultivation of Mushrooms

The mushrooms were cultivated in the laboratory following the modified method of [8].

Rice straw was used as the substrate for the cultivation. Since the period was during the dry season of the year, there was a lot of rice straw available in different parts of Ebonyi State.

Rice straw was collected from Biotechnology Research Center investigation farm located in PRESCO campus of Ebonyi State University and cut into small pieces using cutlass and soaked in water containing 3ml of formaldehyde over-night and drained. After draining the water, the rice straw was packed in a jutt-bag and autoclaved for 1 hour. The autoclave was allowed to cool and the water in the straw drained so that there was no water coming out when it was pressed together with the hand. Then the spawn was mixed with the prepared straw and packed in transparent polytene bags in 3 layers. The poly-bags were incubated in dark cupboards for 30 days for spawn running. Then small holes were made on the polythene bags after spawn running to allow air exchange. The bags were hung on a line in the tissue culture room (BRDC-EBSU). Water was poured on the floor of the culture room to keep the room moist and humid. This was repeated each time the water dried so that the substrate would not dry out. Twenty days (20 days) later, sprouts of mushrooms began to appear in the substrate bags. The weight of the bags were recorded to know the amount of mushrooms that sprouted per day. Five days sprouting was recorded; for the bags that sprouted

RESULTS

Table 1. pH and Temperature of garden soil used for Growth of Mushrooms on Bed (Dry season)

Day	Temperature (^{0}C)			pH			presence of Mushroom
	B1	B2	B3	B1	B2	B3	
1	30	30	30	6.31	6.58	6.45	0
2	30	31	30	6.89	6.87	6.87	0
3	28	28	28	7.23	7.31	7.25	0
4	30	28	28	7.33	7.32	7.28	0
5	28	28	28	7.32	7.32	7.31	0
6	28	28	28	7.35	7.32	7.32	0
7	28	28	28	7.36	7.32	7.32	0
8	28	27	28	7.35	7.32	7.33	0
9	29	28	28	7.34	7.33	7.32	0
10	29	29	28	7.34	7.33	7.32	0
11	29	29	29	7.34	7.33	7.34	0
12	30	29	29	7.33	7.33	7.33	0
13	29	30	29	7.32	7.32	7.33	0
14	29	30	30	7.33	7.32	7.34	0

The temperature and pH of the soil of the bed is shown on the table above as measured for two weeks. The growth of mushrooms on the bed were recorded (0) for no growth observed. There was no mushroom growth on the beds as indicated on the table during the dry season. This was a simulation of the traditional method of mushroom cultivation bed. It showed that uninoculated bed made for mushrooms during the dry season could not grow due to lack of mushroom spores to seed the bed. The temperature and pH were measured to determine their values at the time of growth.

Table 2: Growth of Mushrooms in Pots (Dry season)

S/N	Garden Soil	Rice Straw	Sawdust
1	Nil	Nil	Nil
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0

The simulated cultivation of mushrooms on perforated pots also had no mushroom growth probably by the same reason that they could not grow on the soil bed. The substrates all gave the same results, showing that the inability to grow may not be as a result of the type of substrate but on the season, which was uniform for all of them. Growth was recorded as (0) for no observable mushroom growth.

Table 3: Soil-Bed cultivation (wet season)

Days	No of mushroom in Bed1 (Palm Leaves)	No of mushroom in Bed 2 (Sawdust/dry grass)	No of mushroom in Bed 3 (Waste Paper)
35	11	0	0
36	18	5	0
37	19	9	0
38	25	15	0
39	36	20	0

Some mushrooms began to sprout mainly from the palm substrates from the 35th day of observation and treatment. The number of mushrooms continued to increase until maximum when the soil became too dried. The number of mushrooms dropped drastically as the soil losses moisture. However, results were recoded for five days.

Table 4: Quantity of Mushrooms Produced in Lab.oratory Cultivation

Mushroom Bags	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
					Weight (g)					
Day 21	30.2	20.5	31.3	33.3	22.4	-	-	-	-	-
22	35.1	29.2	33.6	45.3	30.2	-				
23	38.5	34.5	43.2	45.2	33.4	34.2				
24	45.3	37.2	45.5	52.3	33.7	32.6				
25	52.2	43.5	43.7	45.6	35.1	34.3				

Mushrooms cultivated in a scientific way in the laboratory with well inoculated spawn properly prepared, grew and developed some fruit bodies. The weight of the mushrooms was taken and recorded for five days from the day of

commencement fruiting. This showed that mushrooms can grow at all seasons if seeded with known spawn sample(s). Inoculating a certified and known edible mushroom spawn could go a long way to provide mushrooms for the populace at all time and reduce the risk or incidence of poisoning caused by mushroom foraging from unknown possibly toxic substrates which may increase the toxicity of any mushroom. Consumption of mushrooms picked from the wild could expose one to mistaken pick of poisonous mushrooms that sometimes resemble the edible species.

DISCUSSION

The local traditional Igbo method of mushroom cultivation is not reliable. Except that the substrate chosen for the cultivation may conditionally select the type of mushrooms that may be accidentally inoculated, any mushroom spore is free to grow. Additionally, mushrooms can not readily grow on any of the substrates during the dry harmattan seasons despite the level of moisture applied. Those that depend on mushrooms instead of red meat such as the diabetics, the hypertensives [9] and other forms of health challenges may have to wait until the rains return again. Those who eat mushrooms on health ground will have to remain sick for the period of the dry seasons and those who eat it for pleasure must look elsewhere. Mushroom business is a multi- billion-dollar enterprise worth over $40 billion as at 2003 [10]. They are highly nutritious, with the protein content close to that of fish. The cultivation of mushrooms in certified scientific method yielded mushrooms at the same season when the local method could not yield any mushroom. This is an indication that the local Igbo method is not efficient and they therefore must learn a new more efficient method(s). However, the older generations must be commended for developing a method that has lasted for any time in memory.

REFERENCES

1. Ayodelea S.M. and Okhuoya J.A. (2009) Nutritional and Phytochemical Evaluation of Cultivated *Psathyrellaatroumbonatapegler*, a Nigerian edible mushroom. *South African Journal of Science*, 36(8): 268-280.
2. Bipasha C, (2011) Trends in Mushroom Cultivation and Breeding. *Austrian Journal of Agricultural Engineering,* 2(4): 102-109
3. Chang S.T and Buswell J.A (1996). Mushroom Nutriceuticals. *World Journal of Microbiology and Biotechnology,* 12(5):473-6
4. Cohen, S. (2004). Social Relationships and Health. *American Psychologist, 59*(8), 676-684
5. Huang, B. H., Yung K. H. and Chang S. T. (1985). The sterol composition of *Volvariellavolvacea* and other edible mushrooms. *Mycologia* 77:959-963.
6. Mattila, P., Suonpaa, K., Piironen, V (2000). Functional properties of edible mushrooms. *Nutrition*, 16: 7-8
7. Menaga, D., Mahalingam, P.U., Rajakumar, S. and Ayyasamy P.M (2012). Evaluation of phytochemical characteristics and antimicrobial activity of Pleurotusflorida mushroom. *Asian journal of pharmaceutical and clinical research*, 5(4): 102-106
8. Miles, P.G and Chang, S.T (2004). Mushrooms: cultivation, nutritional value, medicinal effect, and environmental impact. Boca Raton, Florida: CRC Press, Pg.2-7
9. Pecchia, J. A., Beyer D. M., Wuest P. J. (2000). "A study on Phase I compost management and odor production." *Mushroom News* 48, no. 9: 16–23.
10. Ramsbottom J. (1954). Mushrooms & Toadstools: a study of the activities of fungi. London: Collins. Pg 56-62.