Comparative Study on the Growth and Yield of *Pleurotus Sajor-Caju* Mushroom Cultivated on *Pennisetum Purpureum* (Elephant Grass) and Saw Dust of *Triplochiton Scleroxylon* as an Environmental Control Measure

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***Abstract*: - This paper highlights cultivation procedures of *Pleurotussajor-caju*as a source of food, income in home gardens and making good use of materials that are termed waste which could be hazardous to the environment when not recycled. Cultivation of Oyster mushroom (*P.sajor-caju*) with commercial viability has been prepared in a way of model, keeping in view the agro-climatic conditions and other related aspects for successful cultivation of the mushroom. Evaluation on the growth, yield and biological efficiency of *P.sajor-caju*cultivated on *Pennisetumpurpureum* (Elephant grass) was investigated. The sawdust of *Triplochitonscleroxylon* was used as a control measure for mushroom cultivation. Each treatment was replicated three times. Each of the sample consisted of 400g weight of substrate per bag. The produce of the mushroom, mycelia growth, diameter of the pileus, length of stipe, mushroom height were analyzed. The results indicated that the mean yield (g) produced from elephant grass substrates, though not higher than the saw dust, but it is enough weight for a better yield 48.65±7.87 and sawdust with their yield values of, 53.95±4.62 respectively. The biological efficiency (%) obtained is an indication that the *P.sajor-caju* utilizes the given substrates effectively. The highest B.E was found in elephant grass followed by sawdust which is the control with mean value of 95.29, and 40.05% respectively. The length of stipe, diameter of pileus and mushroom height showed that the mushroom produced from the two substrates used were of good sizeable stage.**

***Keywords: Pleurotussajor-caju*, Biological efficiency, Mushroom**

I. INTRODUCTION

Commonly, saw-dust is the major substrate used in mushroom cultivation in Nigeria. But at present, saw dust are been used for lots of other things like the production of briquette, shelf, board, office table and furniture generally [4]. The trend now of mushroom as a high source of protein with low cholesterol content which over ride meats and other fatty foods may soon diminish due to the foreseen scarcity of the sawdust [3]. Likewise, with excessive logging of the forest so as to get more sawdust, needs to be discouraged. Hence, forest fruit wastes such as pawpaw leaves, coconut husk, Elephant grass, corn cob, which are not in high demand presently, can be a remedy for the above mentioned problems. With unemployment on the increase in developing countries, small-scale mushroom cultivation with these agriculture and forest fruit wastes could serve as a means of employment and for more income generation [2]. Also, the recycling use of these by-products has helped in getting rid of some waste materials in circulation from man, thereby making the environment free of trash around that could cause environmental hazards due to the disposal methods.

Elephant grass is one of such abundantly available natural material which derives its name from being a favorite food and hiding place for elephants. It is also known a Napier grass and scientifically termed as *Pennisetumpurpureum*, a series of tropical African grasslands which is also found in many parts of Australia, America and Asia. It has low water nutrients and can make use of otherwise uncultivated lands. Unfortunately, some African countries including Nigeria see this natural gift as a waste in the forest and instead of making use of them for erosion control and other benefits it stands for, this wonderful grasses are rather removed, thrown away and also burnt. In the light of this, the work is meant to evaluate the yield of mushroom produce from Elephant grass, and also to make farmers or people understand that there is wealth in waste and the need for the populace not to cause environmental hazards with them.

II. MATERIALS AND METHODS

Culture preparation

The pure culture of *Pleurotussajor-caju* was obtained from Pathology section of Forestry Research Institute of Nigeria, Jericho, Ibadan. Nigeria. The cultures were maintained on Potato dextrose agar slants at 4^{o}C.Sub culturing were done after 15days.

Spawn preparation

Spawn was prepared in jam bottles. Whole wheat grains were soaked in cold water overnight, washed and drained of excess water. The grains were boiled in water bath for 15min.Wheat grains then packed (250g) in jam bottles and sterilized in an autoclave at 121^{o}C for 30min. After sterilization, the bottles were inoculated with actively growing mycelium of the *Pleurotussajor-caju* from the slants and incubated at (27 ± 2^{o}C) for mycelia growth without anylight for 10-15days until the mycelium fully covered the grains.

Substrates preparation and Cultivation

The fresh sawdust of *Triplochitonscleroxylon* (Obeche) was collected from sawmill in Ibadan, Oyo State, South western Nigeria and made into heap, water was added gradually for mixture and allowed to drain to about 65% moisture content. The sawdust was mixed with 5% wheat bran, 1% lime (CaCo3) and 1% sugar respectively. Composting of the sawdust was done for 30days and interval being turned over at every five days until rancid odour disappeared and 65-70% moisture content was attained. Fresh leaves of *Pennisetumpurpureum* (Elephant grass) was collected from wild life garden, Forestry Research Institute of Nigeria, Ibadan, South Western Nigeria. The elephant grass was air dried, chopped to 1-2 cm pieces and soaked overnight to moisten it and after drying, drained of excess water and pasteurized. Furthermore, 1% CaCo3 and 5% wheat bran were added to the substrate (elephant grass), to enhance the mushroom growth. The substrates were then steam sterilized at 121^{0}C for 20min in an autoclave. The polythene bags of size 15 x 35cm were filled with sterilized substrates and multi layered technique was adopted for spawning.

Biological efficiency

Parameters such as length of stipe, height, diameter of Pileus and total weight of the fruiting bodies harvested were measured as total yield of the mushroom. The biological efficiency (yield of mushroom per gm of substrate on dry wet basis) was calculated using the formula by [1]

$$\text{B.E. \%} = \frac{\text{Fresh weight of mushroom}}{\text{Dry weight substrate}} \times 100$$

III. RESULTS AND DISCUSSIONS

The performance of the mycelia growth (%) of *Pleurotussajor-caju* in the two substrates was observed for four weeks. The result obtained (table 1) showed that elephant grass and saw dust as control substrate reached their maximum ramification stage on week 3 attaining 100% ramification. This is an indication that *Pleurotussajor-caju* can perform in the substrates selected. Analysis of variance was conducted for the yield of the fruiting body of *Pleurotussajor-caju* in elephant grass and sawdust (control) substrates, and this indicated that there is significant difference in the yield produced by different substrates ($P<0.05$). The follow up test carried out using Duncan Multiple Range Test (DMRT) to separate the mean showed that mushroom produced from elephant grass substrate though close, but has the best yield (table 2) followed by mushroom produced from sawdust with their mean yield values of 48.65±7.87 and 45.15± 3.48 respectively. Also the biological efficiency (%) was calculated and the result obtained showed that the*P.sajor-caju* utilizes the given substrates effectively as this was evident in the yield obtained. The highest B.E was found in elephant grass followed by sawdust (control) with value of 95.29 and 40.05% respectively. With this result, there is an indication that elephant grass as a substrate for mushroom cultivation is suitable. A finding by [2] was also recorded when the issue of the effect of different supplement on the yield of *Pleurotusflorida* was addressed. They discovered that supplements such as lime and wheat bran contributed to the high yield of mushroom and also aids sporophore emergence. The diameter of pileus, length of stipe (cm) and height (cm) of the mushroom are parameters used to measure the quality of the fruiting bodies gotten from the substrates that support the growth of the mushroom.There was five times harvest of the mushrooms and the mean length of the stipe (cm) per flush indicated that the length ranges from 5.6 to 7.2cm (table 3).Subsequently, from the result obtained the highest mean length of stipe was found in mushroom produced from sawdust for flush 1. While mushroom produced from elephant grass has the highest length of stipe for flush 2, 3, 4 and flush 5 (table 3). Furthermore, the mean diameter of the Pileus and mushroom height encountered (table 4 and 5) indicated that the values obtained were good for the mushrooms produced from the two substrates used (Elephant grass and saw dust as control). Considering the mean height of mushroom obtained indicated that the mushrooms produced from the two substrates are relatively close (table 5). Therefore, considering all the parameter used for the production of the mushroom indicated that these substrates support the growth of mushrooms, hence there could be more value placed on the produce.

Table 1: The mean mycelia growth (%) exhibited by the two substrate on weekly basis

Substrate	Week 1	Week 2	Week 3	Week 4
Elephant Grass	7.1	9.12	100	100
Saw Dust (Control)	5.05	10.45	100	100

Table 2: The mean yield of fruiting body of *Pleurotussajor-caju*in the two substrate

Substrate	Means (gm)	S.E	Duncan grouping	B. E (%)
Elephant Grass	48.65	4.95	a	95.29
Saw Dust (Control)	45.15	3.52	b	40.05

Table 3: The mean length of stipe (cm) per flush

Substrate	Flush 1	Flush 2	Flush 3	Flush 4	Flush 5
Elephant Grass	5.9	7.2	5.6	6.1	6.2
Saw Dust (Control)	6.2	6.1	6.2	7.1	6.7

Table 4: The mean diameter of pileus (cm)

Substrate	Flush 1	Flush 2	Flush 3	Flush 4	Flush 5
Elephant Grass	6.2	6.3	5.4	5.0	6.4
Saw Dust (Control)	6.3	6.1	5.8	7.1	6.9

Table 5: The mean mushroom height (cm)

Substrate	Flush 1	Flush 2	Flush 3	Flush 4	Flush 5
Elephant Grass	8.1	9.2	7.6	8.7	8.1
Saw Dust (Control)	7.3	8.3	7.1	9.1	8.5

IV. CONCLUSION

Comparative Study on the growth and yield of *Pleurotussajor-caju* Mushroom cultivated on *Pennisetumpurpureum*(Elephant grass) as an environmental control Measure was established in this study. Elephant grass was used as a substrate and sawdust of *Triplochitonscleroxylon*, was used as control in cultivating*Pleurotussajor-caju*. The result of the proximate analysis showed that elephant grass which can be termed as a waste by people or farmers can definitely be used for the growth of mushroom instead of getting rid of them and causing environmental hazard. The saw dust of *Triplochitonscleroxylon* used serves as a control measure to check and compare the difference or possibility of elephant grass as substrate for thr cultivation of *Pleurotussajor-caju*.

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