Indian J. Innovations Dev., Vol. 1, No. 1 (Jan 2012) ISSN 2277 - 5390

Cultivation of Oyster Mushroom (*Pleurotus tuber-regium*) on supplemented Corncob with Rice Bran substrate

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Abstract

This study evaluated the effect of supplementary corncob substrate with rice bran on yield of Pleurotus tuber-regium. 30% supplementation gave the best yield in terms of number of fruit bodies produced and weight of fruit bodies produced as 54g. 5 fruit bodies were produced each on 20% and 10% supplementation respectively. The least number of fruit bodies was produced (diameter of pileus, colour, and time of primordial appearance) on 0% supplementation. On the other parameters considered, there was no significant difference observed among the treatments. Further study in the effect of substrate supplementation on sustained yield of edible mushrooms in various harvests with regards to commercial production is recommended.

***Keywords*:** Edible mushroom; Cultivation; Corncob; Rice bran; Fruit bodies.

Introduction

In Nigeria, with population in excess of 100 million but without corresponding increase in agricultural production, any effort to increase food production is to be encouraged. The adverse consequences of demographic pressure are reflected in the poor health of the citizens especially among the rural poor. There is particularly high demand for protein sources, such as, milk and meat, which has now become a virtual preserve of the well to do in Nigeria. Many people in the rural areas have become under nourished and predisposed to many diseases. It is therefore imperative to look for alternative sources of protein. In this regard, the effort of the federal Government to boost the production of soya beans is commendable. Such effort also should be extended to other sources of protein such as mushrooms.

Many mushroom species rank above all vegetables and legumes (except soya beans) in protein content (Kurtzman, 1975: Hayes and Haddad, 1976; Chang and Hayes, 1978) with 30-40% on dry weight basis (Chang, 1972). Mushroom protein contains all eight essential amino acids and can be classified as being intermediate between (low-grade) vegetable protein and (high-grade) meat protein (Lim, 1978).

The commercial production of edible mushrooms should be encouraged in Nigeria, considering its potential contribution to agricultural production, research, pollution control, waste management, medicine, economy, poverty alleviation and is potentials as cheap source of protein. The present study, therefore, evaluates the use of substrate (corncob) supplementation in the cultivation of *Pleurotus tuber-regium.*

Materials and methods

The spawn of *Pleurotus tuber-regium* used for this work was supplied by Chief M. M. Chinda of Diplomat Farms and Services Limited, Rivers State University of Science and Technology Port Harcourt. Rice bran and lime used for this study were also obtained from Diplomat Farms.

Preparation of substrates for cultivation

The dried corncob was chopped into small pieces of about 2.4cm long. 250g of dry corncob was weighed out and soaked over-night in 750ml of water in each experimental vessel – a 4 litre transparent white polypropylene bucket, which was uniformly perforated from the midpoint to the

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upper part of the bucket. On the next day, the corncob had absorbed the water. The rice bran was ground into powder, weighed and added to the wet corncob in various proportions as to derive different percentages of corncob and rice bran for different treatments as follows:

1. 100% Corncob = T_o (non supplemented corncob = 0% supplementation).
2. 90% Corncob +10% rice bran = T_1 (10% supplementation).
3. 80% corncob + 20% rice bran = T_2 (20% supplementation).
4. 70% corncob + 30% rice bran = T_3 (30% supplementation).

The substrate materials were mixed thoroughly, pressed down, covered and then pasteurised at 70^0C for one hour. After cooling, inoculation was done with grain spawn of 12.5g in each experimental vessel, that is, 5% spawn. The spawn was then mixed with various levels of substrates' supplementation contained in the vessels which were pressed down and covered. The covering was necessary to reduce contamination, minimize the escape of water vapour and trap carbon dioxide, which helps to stimulate vegetative growth (Zadrail, 1975). The doors and windows of the growth room were shut and the floor was watered once every day from the day of inoculation, to maintain the humidity of the room. After 6 days, the vessels were opened to increase the circulation of air. The windows were opened at intervals to increase ventilation.

Data collection

The yield of *Pleurotus tuber-r*egium on the different levels of substrate supplementation was determined by recording the number, weight and size of fruit bodies after sprouting. The measurements from the various replicates were added and the average value determined. The following parameters of growth/yield were determined:

Number of fruit bodies: This was done by directly counting the fruiting bodies on each substrate.

Height of fruit bodies: The height was measured in centimetres using metre rule from the base of the stipe to the pileus.

Diameter of the pileus: This was also measured in centimetres with metre rule from one edge of the pileus across the stipe to the other edge.

Fresh weight of fruit bodies: This was done using an electrical weighing balance.

Results

In this study, each experiment was performed in three replicates. The results were summarised in Table 1. Primodia appearance was observed on T_0 and T_3 after 28 days of incubation of the inoculated substrates whereas it appeared on T_1 and T_2 after 29 days of incubation. Time of flushing was 30 days for T_0, 32 days for T_1 and 31 days for T_2 and T_3. In terms of number of fruit bodies, 2 were recorded for T_0, 5 each for T_1 and T_2 and 6 for T_3. Weight of fruit bodies were 18g for T_0, 45g for T_1, 41g for T_2 and 54g for T_3.

In terms of diameter of pileus, 4.8cm was recorded for T_0, 4.9cm for T_1, 4.5cm for T_2 and 4.7cm for T_3. In terms of height of stipe, 3.4cm was recorded for T_0, 4.1cm for T_1, 3.9cm for T_2 and 4.2cm for T_3. The colour for all treatments was cream.

Discussion

For all treatments, the time of Primordia appearance did not show any significant difference. T_0 and T_1 shared significant difference in terms of time of flushing whereas T_1, T_2 and T_3 had no significant difference. In terms of number of fruit bodies, there was significant difference between T_0 as against T_1, T_2 and T_3. Substrate supplementation of T_1, T_2 and T_3 had better yield in terms of number of fruit bodies than T_0 (non-supplemented corncob). Weight of fruit bodies was highest with T_3 and lowest with T_0. There was no significant difference in terms of diameter of pileus and Height of Stipe for all treatments. Mushroom cultivation therefore deserves great attention in both basic and applied research, since it has been demonstrated that mushrooms can be channeled towards serving as additional source of food

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Table 1. Effects of supplementation of substrates on P. tuber-regium

Treatment (%)	Time of Primodia Appearance (Days)	Time of Flushing (Days)	Number of Fruit Bodies	Weight of Fruit Bodies (g)	Average diameter of pileus (cm)	Average Height of Stipe (cm)	Colour
100% corn Cob (T_0)	28	30	2	18	4.8	3.4	cream
90% corn Cob + 10%	29	32	5	45	4.9	4.1	cream
Rice bran(T_1) 80% corn Cob + 20%	29	31	5	41	4.5	3.9	cream
Rice bran(T_2) Cob + 30%	28	31	6	54	4.7	4.2	cream

Note: The result stated above is the average of three replicates

protein for consumption as well as its potential of conversion of agricultural and industrial wastes into food. Subsequently, the necessity of producing cheap and palatable food, acceptable to indigenous populations, will largely depend on how cheaply mushrooms can be produced. Although information on mushroom cultivation exist in the developed countries, in the developing countries especially Nigeria, there is dearth of information on mushroom cultivation.

Therefore, it is advocated that with further research promotions, it is hoped that in the nearest future, mushrooms can be widely cultivated in different climates and can be supplied as cheaply as other common vegetables in both basic and applied research, since it has been demonstrated that mushrooms can be channelled towards serving as additional source of food protein for consumption as well as its potential of conversion of agricultural and industrial wastes into food. Subsequently, the necessity of producing cheap and palatable food, acceptable to indigenous populations, will largely depend on how cheaply mushrooms can be produced. Although information on mushroom cultivation exist in the developed countries, in the developing countries especially Nigeria, there is dearth of information on mushroom cultivation.

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Conclusion

Supplementation was found to improve mushroom yield in terms of number of fruit bodies and weight of fruit bodies which was in line with a similar study on cultivation of Oyster mushroom *(Pleurotus tuber-regium)* on Amended Corncob substrate conducted by (Stanley and Awi-Waadu, 2005).

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