THE EFFECT OF SIX SUBSTRATES ON THE GROWTH AND YIELD OF AMERICAN OYSTER MUSHROOMS BASED ON JUNCAO TECHNOLOGY

J. C. Rajapakse[1], P. Rubasingha[2] and N. N. Dissanayake[3]

ABSTRACT

Mushroom cultivation in Sri Lanka is a popular cottage industry having oyster mushrooms as the most preferred variety. An investigation was carried out to study the suitability of five different plant substrates (dried banana leaves, coconut leaves, kakilla leaves (Dicranopteris dicnotonoma), paddy straw and sugar cane bagasses) for oyster mushroom cultivation in comparison with standard saw dust media as the control. Best substrate for oyster mushroom cultivation was adjudged by comparing the mycelial growth rate and the fruiting body yield values in different substrates. Although the highest mycelial growth rate was recorded in banana leaf substrate followed by paddy straw and bagasses mixtures, higher mushroom yields were recorded only in mixtures with paddy straw and bagasses which showed no significant difference to the control. Therefore it could be concluded that paddy straw and sugar cane bagasses are equally good substrates as the traditionally used saw dust media for oyster mushroom cultivation in Sri Lanka.

Key words: Oyster mushrooms, mycelial growth, fruiting body.

INTRODUCTION

Pleurotus ostreatus (oyster mushroom) is a commercially important edible mushroom highly acclaimed for its nutritional and medicinal properties. Like other edible mushrooms, Pleurotus species too can be grown on various agricultural waste products without the addition of enrichment materials (Rajaratnam and Bano, 1987). In China different agricultural waste products that can be used for mushroom cultivation was popularly known as "Juncao" ((Zhanxi, 1999). The procedure based on Juncao for mushroom cultivation was defined by Zhanxi (1999) as Juncao technology.

However in Sri Lanka the main ingredient frequently used in the mushroom cultivation process is sawdust. The information on the potential use of other locally available substrates is scarce.

MATERIALS AND METHODS

The present study was undertaken to test the suitability of some plant matter freely available in Sri Lanka as alternative substrates to the frequently used saw dust media in the cultivation of oyster mushroom. The following five plant materials ((dried banana leaves (BL), coconut leaves (CL), kakilla leaves (Dicranopteris dicnotonoma) (KL), paddy straw (PS) and sugar cane bagasses (BAG)) were compared as the main component with sawdust as the control. The experiment was laid on a Complete Randomized Design with six treatments. Twelve and half kilograms of the above six ingredients were used separately as the main component with the addition of rice bran, Calcium Carbonate, Magnesium Sulphate and soy flour according to the rates recommended by the Department of Agriculture. The compost preparation was filled into 200gauged polypropelene bags with the dimension of 32.5cmx17.5cm and

[1]*Research Officer, Agricultural Research Station, Department of Agriculture Telijjawila, Sri Lanka*
[2]*Research Officer, District training center, Agunukolapallassa, Sri Lanka*
[3]*Technical Officer, Dept of Agric Biology, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya, Sri Lanka*

was subjected to steam sterilization for 2-3 hours. Once sterilized the compost bags were kept over night to let it cool before grain spawns were introduced (inoculated) under sterile conditions to the substrate. The inoculated compost mixtures were incubated under dark conditions in the room temperature for a period of four weeks during which period the weekly mycelia growth was measured. Subsequently the bags were cut open and placed on a rack in a cool shed in which the humidity was well maintained. Once the fruitification commenced, the weekly mushroom yield were recorded. Data was analyzed on computer using SAS soft ware package.

RESULTS AND DISCUSSION

Highest mycelial growth was recorded in the compost mixture with BL (Figure 01) while the mean values obtained from PS, Bag, KL and CL substrates were not significantly different from the control (Table 01).

Better mushroom yields were obtained from substrates containing SD, PS and Bag respectively (Figure 02) in comparison with the CL, BL and KL amended substrates.

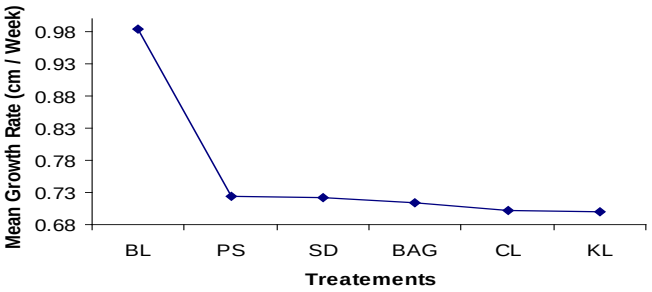

Figure 01: Mean mushroom mycelial growth rate in different treatments

Table 01: Mean values of the mycelial growth corresponding to each treatment

Treatment	Mean value
Banana leaves (BL)	0.9838 $_{b}$
Paddy straw (PS)	0.7238 $_{a}$
Bagasses (Bag)	0.7133 $_{a}$
Kakilla leaves (KL)	0.7008 $_{a}$
Coconut leaves (CL)	0.7026 $_{a}$
Saw dust (SD) **control**	0.7213 $_{a}$

(Calculated LSD value for mycelial growth was 0.2559
Mean values denoted by the same letters are not significantly different at 0.05 alpha levels)

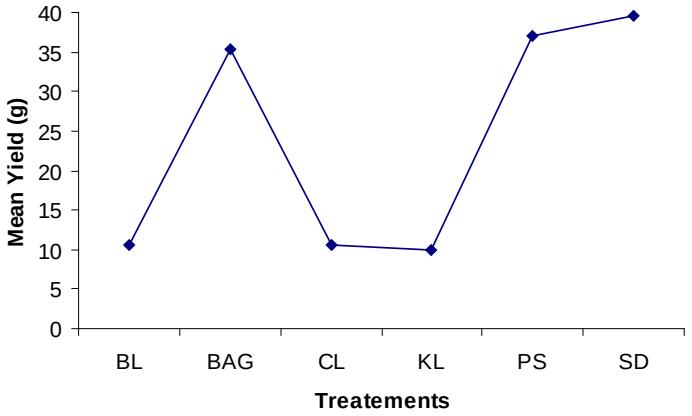

Figure 02: Mean mushroom yields in different treatments

Table 02: Mean mushroom yields in different treatments

Treatment	Mean Yield
Banana leaves (BL)	10.5556 $_{b}$
Paddy straw (PS)	37.0556 $_{a}$
Bagasses (Bag)	35.3889 $_{a}$
Kakilla leaves (KL)	9.8889 $_{b}$
Coconut leaves (CL)	10.6111 $_{b}$
Saw dust (SD) **control**	39.5556 $_{a}$

(Calculated LSD value for mushroom yield was 23.81
Mean values denoted by the same letters are not significantly different at 0.05 alpha levels)

However the mean mushroom yield values in PS and Bag media are not significantly difference with the control (Table 02) which gave the highest yield.

Based on the mycelial growth rate and the fruiting body yield, paddy straw based substrate was the best among the six treatments tested. Furthermore sugarcane bagasses too can be effectively used for mushroom production.

CONCLUSION

It can be concluded that paddy straw and bagasses are good substitutes to saw dust in substrate preparation to cultivate oyster mushrooms.

References

Anon, (1995). Bimmal Wagawa,. Department of Agriculture, Peradeniya.

In Chang, S. T., and P.G. Miles, (2004). (Eds.) Mushrooms: Cultivation, Nutritional Values, Medical Effects and Environmental Impact. Second edition, CRC Press.

In Chang, S. T., J. A. Buswell, , and S.W. Chiu, (Eds.) (1993). Mushroom biology and mushroom products, (1993). Chinese University Press, Hong Kong.

Suguimoto, H. H., A.M. Barbosa, , R.F.H. Dekker, , J.H. Castro-Gomez, (2001). Veratryl alcohol stimulates fruiting body formation in the oyster mushroom, Pleurotus ostreatus. FEMS Microbiology letters. Vol. 194, Issue 2 pg235.

Udugama, S., P. Premaratne, S. Etampawala, and N. Seneviratne, (2006). Hybrid and edible mushrooms in recycling agricultural wastes.

Zhanxi,L., and L. Zhanhua, (1999). In Juncao Technology, Fujian Agricultural University, Fujian, China.