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STUDIES ON GROWTH OF *PLEUROTUS OSTREATUS* (JACQ. EX. FR) KUMMER, ON DIFFERENT SUBSTRATE

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Pleurotus ostreatus was grown on 4 different substrate (i.e. mixed wild grass, wheat bhoosa, wheat straw and cotton waste) in mushroom growth room. Cotton waste proved to be the best growth substratum for the fungus and gave a significantly higher yield than wheat straw. While it gave a non-significantly different yield than mixed wild grass and wheat bhoosa and wheat straw. However, it is medium as a source of micronutrients. Uptake of micronutrients by the fungus was noted to be better in case of mixed wild grass. As the yield is non-significantly related to cotton waste as substrate: it can be recommended that on the whole mixed wild grass is a suitable medium for the fungus.

Key words: *Pleurotus ostreatus*, Substrate, Micronutrient.

Introduction

In hilly areas oyster mushroom (*Pleurotus* spp.) grows naturally on falling oak (*Quercus* spp.) tree leaves and on mulberry (*Morus alba*) stump and hence known as wood fungus. Presently it is one of the popular edible fungi cultivated in many countries in the sub-tropical and temperate zones. Due to the ease of substrate preparation for the majority of pleurotus varieties this fungus is getting popularity in Europe and America as well as, in far Eastern countries. If the annual production rate continue to increase at the present rate. *Pleurotus* spp. will soon be the third most important artificially cultivated mushroom behind *Agaricus bisporus* and *Lentinus edodes*.

In Pakistan, mushroom cultivation is still in its infancy. However a small farmer can easily grow this crop and thus improve his socio-economic conditions within a short span of time. Experiments on various mushroom species have been carried out to find out suitable substrate for better yields of *Pleurotus* spp. under Islamabad conditions. The present study elucidates a comparison of different substrate for the growth of oyster mushroom.

Review of literature. Kurtzman and Zadrazil [6] have found that *Pleurotus* spp. required good quality of substrate component with no rotted or spoiled lignocellulose containing plant wastes material. Bano and Srivastava [3] have observed that straw can also be used as a substrate for the cultivation of oyster mushroom. Carcha and *et. al.* [5] have evaluated the different organic residues of agricultural origin like cereal straw maize bajra menths and groundnut stalks berseem and bagasse and vegetable wastes for cultivation of *Pleurotus* spp. Bano and Rajarathram [2] has also observed an increase in the nitrogen content for the fruit bodies of Pleurotus sajor-caju when the substrate were supplemented with alfalfa and soyabean meal.

Material and Methods

Four types of substrate namely wheat straw, wheat Bhoosa, mixed wild grass and cotton waste were used in the experiment. Mixed wild grass commonly found in mountainous and sub-mountainous regions of AJK, NWFP and Punjab was collected during the month of October 1987. Cereals substrate were chooped into small pieces of 3-4 cm lengths. These substrate were then soaked in boiling water for 25-30 minutes one by one to get rid of insect and saprophytic micro-organism.

These substrate were taken out from the water and spread out on cemented floor to remove the excess water. When the temperature of the substrate dropped down to about 20° and moisture content became 65-70% these substrate were filled in 25 x 35 cm size plastic bags.

Blow gutter cotton waste was soaked in water for overnight. Excessive water was drenched out of the cotton and was gathered in a heap. The heap was covered with plastic sheet and kept for 3-4 days for composting. The heap was turned upside down after every 3rd day. On the 10th day. Furadon (nematicide) was also added at the rate of 0.1% of the cotton compost and were filled in polythene bags of 25 x 35 cm size.

Spawn was prepared in mushroom culture laboratory at the National Agricultural Research Centre (NARC) on grain. Thorough spawning was done with grain spawn at the rate for 10 g per bag under asceptic condition. The spawned bags were placed in spawn running room under controlled temperature of 25°. Spawn running was completed within 18-20 days. After completion of spawn running the bags were transferred into thatched mushroom house. when the pin

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heads of the mushroom appeared, the mouth of those bags were cut for fructification. The bags were sprayed twice daily with tap water with the help of sprayer to maintain 80-85% humidity. The experiment was lid-out in randomized block design in three replications at NARC during November, 1987. Yield of each treatment was weighed and recorded in grams. The data thus obtained were subjected to statistical analysis.

Results and Discussions

The Table 1 indicates a clear statistical difference in yield with respect to different substrates used for raising the crops of *Pleurotus ostreatus*. Cotton waste substrate gave sig

TABLE 1. MEAN YIELD OF MUSHROOM CROP WITH DIFFERENT SUBSTRATE.

Substrate	Mean* yield (gm)
Mixed wild grass	190 ab
Wheat bhoosa	210 ab
Wheat straw	141 b
Cotton waste	242 a

* Means followed by the same letter do not differ significantly at 5 per cent level.

nificantly higher yield (242 g) as compared to wheat straw (141g) are in agreement with the finding of Chang [4] who recommended the use of cotton waste for commercial production of mushrooms. Not only the yield but textural and flavour characteristics were reported to be improved by addition of cotton seed powder to the substrate Bano [1]. Wheat bhoosa and mixed wild grass when used as substrate gave an average yield of 210 g and 190 g respectively. Minimum yield of 141 g was obtained when wheat straw was used as substrate which did not differ significantly from the yield obtained with mixed wild grass.

Availability of micronutrients in different substrate is evident from Table 2. Mixed wild grass seemed to be a better source of all essential micronutrients. Cotton waste and wheat bhoosa were at intermediate level. While wheat straw was least beneficial. Percent availability of Na and K was maximum in almost all the substrate. Uptake of Na from different substrate was also maximum in cotton waste followed by wheat bhoosa. Uptake of K is antagonistically related to that of Na. Uptake of Zn, Cu and Fe in mixed wild grass was greater with respect to other substrate. Uptake of Cu was non-significantly related in different substrate, while that of Mn was significantly higher in wheat straw (Table 3). Inspite of high availability of Na and K in all the substrate and its uptake by the fungus a considerable quantities of the same were found to be still available in the substrate (Table 2). It shows that release of those ions is greater under

TABLE 2. MINERAL COMPOSITION (PERCENT) IN DIFFERENT SUBSTRATE BEFORE AND AFTER HARVESTING OF OYSTER MUSHROOM CROP.

Mixed wild grass		Wheat bhoosa	Wheat straw	Cotton waste
Before Harvesting				
Zn	0.100	0.100	0.100	0.100
Cu	0.450	0.050	0.045	0.039
Fe	0.303	0.018	0.042	0.406
Mn	0.180	0.235	0.405	0.160
Na	0.625	0.115	0.055	0.789
K	0.990	0.110	0.050	0.662
After Harvesting				
Zn	0.013	0.013	0.004	0.017
Cu	0.047	0.051	0.047	0.045
Fe	0.305	0.021	0.046	0.406
Mn	0.200	0.238	0.071	0.025
Na	0.725	0.115	0.468	0.200
K	0.102	0.200	0.058	0.902

TABLE 3. PERCENT* UPTAKE OF NUTRIENTS BY *PLEUROTUS OSTREATUS* GROWN UNDER DIFFERENT GROWTH SUBSTRATE.

ubstrate	Nutrients					
	Na	K	Zn	Cu	Mn	Fe
Mixed wild grass	0.0862c	1.950a	0.186a	0.033a	0.035b	0.272a
Wheat bhoosa	1.150b	0.0877c	0.145b	0.029a	0.027b	0.270a
Wheat straw	0.0345c	1.170b	0.100b	0.028a	0.054a	0.133b
Cotton waste	3.680a	1.365ab	0.108b	0.028a	0.016c	0.095b

mushroom cultivation. Rest of the elements were still available in sufficient amounts for another crop of the fungus.

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