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Effect of Supplementation of wheat straw with dried leaves of some trees on the growth and Production of *Pleurotus sajor-caju*

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Abstract

The supplementation of dried leaves of some trees viz., Tectona grandis,Shorea robusta, Madhuca indicia was done. These are important high lignin containing timber yielding trees of tropical forest of our country. The dried leaves of these trees were applied to the mother substrate (wheat) in three different (5%,10% and 15%) proportions. Among these the dried leaves of Tectona grandis was found most effective in respect of speedy mycelial running, high production and biological efficiency of *Pleurotus sajor-caju*. These dried leaves were most effective in their lower proportions than the higher ones. It was found that the lower proportion of these supplements except Madhuca indica were most effective than the control.

Key words: Lignin, tropical forests, biological efficiency and supplements

Introduction

Oyster mushroom occupy first rank among cultivated mushrooms because of their wide range of preferability for exploitation of lignocelluloses as their substrate to grow them. These mushrooms have comparatively rich enzyme profile and a wide range of temperature for their growth and frutification. These are known for high protein contents in them with low calories and excellent aroma. Thus the increase the production of such potential food is main objective before the people who are interested in raising of their regular crop. The approaches are continuously being made for high yield and biological efficiency of these mushroom species by supplementing the mother substrate (wheat straw) with different agro-wastes inorganic nitrogenous chemicals, organic nitrogenous sources different promoters and vitamins in different concentrations. In present communication dried leaves of three different trees were supplemented to mother substrate in different proportions for their screening for good production of Pleurotus sajorcaju.

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Material and methods:

Collection of germplasm:

The culture of *Pleurotus sajor-caju* was obtained from mushroom cultivation centre – Takha Village, Bharatpur (Raj.).

Preparation of Pure Culture:

Pureculture was maintained by sub-culturing the above mentioned culture, every fortnight on potato dextrose agar (PDA) and Malt extract and Yeast extract agar (MEYEA) medium at 22^0c in culture tubes.

Preparation of Culture Medium:

The culture medium (PDA and MEYEA) was autoclaved at 126^0c temperature and 20 Ibs/inch square for 45 minutes inside cotton plugged flasks, transferred into petridishes and inoculated with a bit of hyphae at laminar flow work station. Now these inoculated petridishes were incubated at 25^0c (1^0c) in BOD incubator to obtain pure culture.

Spawn preparation:

Overnight water-soaked wheat grains were boiled and after drying mixed thoroughly with 2% (w/w) Gypsum and 4% (w/w) lime. Boiling was done to split the grains, gypsum was to prevent sticking and lime was used to maintain pH. Now 200-250 gram of complete mixture was filled in glass bottles, plugged with nonabsorbent cotton and allowed to autoclave at 126^0c temperature at 20Ibs/inch square pressure for 60 minutes. After sterilization the bottles were cooled overnight and on the next day inoculated by hyphae of Pleurotus sajorcaju, obtained from pure culture. These inoculated bottles were incubated for one week at 13-140c in BOD incubator. During this period bottles were shaken daily to insure uniform mycelial growth.

Collection and sterilization of mother substrates:

During this study, wheat straw was used as mother substrate supplemented with dried leaves of selected trees. Dried leaves were chopped to form 2-3" sized particles and mixed with mother substrate of conventional size in different proportions. These werewater soaked overnight in 2% formaldehyde solution (to sterilize) and 0.05% Bavistin (to prevent arthopodal infection).On the next day the mixture of substrates were filtered and partially dried to make them ready for spawning.

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Spawning:

The bed was prepared by layer spawning (adopted by Bano, 1971) 14 in perforated and small sized reusable buckets which were guarded by lids. The perforation in buckets was necessary for proper ventilation and their small size was for compact packaging of spawned substrate. During spawning 2kg mother substrates including supplemented leaves was inoculated by 5% of spawn. Now the spawned substrate in plastic buckets were incubated in cultivation room at 25-30^{0}c for 21-22 days till the mushroom mycelium completely cover the substrate. After 24-25 days the pinheads began to appear which can be seen through the perforation of buckets. After that the spawned substrate were carefully removed from the bucket by gently opening of their lids. Now the empty buckets were put apart safely for their further use. The beds were irrigated regularly 3-4 times in day with water sprayer to keep them wet and to maintain 80-85% humidity. Usually the fruiting bodies were evident within 3-4 days after removal from buckets. The beds were maintained up to the harvest of fourth flush. A small layer of substrate was scrapped off from all the sides of the beds just after second flush to rejuvenate the mycelium and to remove unwanted microbial flora. The fruiting bodies were harvested by twisting them and taken out manually so that the broken remains left out. Biological yield and Biological efficiency: Total weight of all the fruiting bodies harvested from all the four flushes were measured as total biological yield of mushroom. The biological efficiency (yield of mushroom per kg substrate on dry weight basis)was calculated by the following formula:

B.E.(%) = Fresh weight of mushroom/ Dry weight of substrate □ 100

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Observation:

Table – 1

Cultication of Leurotus sajor-caju on dries leaves of selected plants

Supplements	% of supplemtns	Time requires in spawn run (Days)	Time required in pin head initiation (Days)	Total No. of flushes	Total Yield (gm.)	Biological efficiency (%age)
Tectona grandis	5%	22	24	4	1230	61.50%
	10%	22	24	4	1220	61.00%
	15%	23	25	4	1200	60.00%
	Control	23	25	4	1210	60.50%
Shorea robusta	5%	23	25	4	1200	60.00
	10%	24	26	4	1150	55.25%
	15%	24	26	4	1150	55.25%
	Control	23	25	4	1210	60.50%
Madhuca indica	5%	24	26	4	1220	61.00%
	10%	24	26	4	1150	55.25%
	15%	15	27	4	1100	55.00%
	Control	23	25	4	1210	60.50%

Result and Discussion

The data in observation table show that the supplementation of dried fresh leaves to wheat straw enhanced, the growth and production of mushroom in their lower proportions. The dried leaves in their high proportions took more time in colonisation and development of mycelial.

The supplementation with 5% dried leaves of Tectona grandis showed good result both in the respect of the yield and biological efficiency. The 10% supplementation with dried leaves of Tectona and 5% of Madhuca occupied second rank in this respect. However rest of the experimental sets showed comparatively lesser yield and biological efficiency in mushroom crop.

These leaves are found in huge amount on the floor of the forest which are left as such without any use. These accumulate on the ground to decompose in form of compost. Thus enormous amount of simple organic and inorganic compounds are produced in ty forest which flow down to the ponds or lakes, resulting in eutrophication and leading to increase in BOD of water reservoir. By the use of these leaves as supplements this problem can be solved up to some extent. The tribal people who lives in forest villages near the forests or those who are related with Taungya system may cultivate mushroom by supplementing these dried leaves to mother substrate to fulfill protein deficiency of their diet.

Conclusion:

The cultivation of mushroom is an eco-friendly trend of production of proteinaceous diet. This cultivation also follow the rules of sustainable development. As we know that the wheat straw is not available everywhere in fair amount specially in or near forest areas, therefore we can minimise the need of wheat straw by supplementing it with dried leaves of forest trees. The production of this valuable proteinaceous diet in form of mushroom by supplementing the mother substrate may be proved as a boon for malnutrition facing tribes of forest areas. This cultivation also raised their economic status by selling them in surrounding areas at better price.

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