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Impact of Agnihotra in Mushroom Cultivation Technology

V. INDIRA., P. DHASARATHAN* AND M. ANANDADEVI

Department of Biochemistry, Sri Parasakthi College, Courtallam- 627 801, India

*Dept. of Biotech., Prathyusha Institute of Tech. & Management, Thiruvallur – 602 025.

Abstract

The present study has been undertaken to prepare mother cultures, to find out the effect of Agnihotra ash on the growth of spawn, to select the suitable culture medium for profuse Mycelial growth, To find out the effect of Agnihotra ash and other supplements on the growth and yield of mushroom compared to unsupplemented paddy straw. The result of the present study on the evaluation of different spawn supplements and cultivation supplements of *Pleurotus sajor-caju* are presented and discussed as follows. Maximum yield were obtained from supplementing the straw substrate with Agnihotra ash (97.5%) and cotton seed powder 90% (B. E) rates of supplementation respectively. Paddy straw soaked for 18 hours was found to be the best maximum yield(235 g) and biological efficiency (78.3%) of fruit bodies from the three flushes. 10 hrs soaking gave the minimum yield(145 g) and biological efficiency (48.3%) of fruiting bodies were seen. In the present study find-out *Pleurotus sajor-caju* gave shorter spawn run on paddy straw supplemented with Agnihotra ash (15 days).

Key words: *Pleurotus sajor-caju,* agnigotrha and mushroom technology.

*For correspondence: dhasa_rathan@yahoo.co.in

Introduction

Agnihotra is a type of homa 'agni' means 'fire' and 'hotra' means 'healing'. Agnihotra is one of the most ideal methods; it is a process in the science of bio energy given through the Vedas. The aim of Agnihotra therapy farming is, to heal and improve the lands, to grow superior crops without the use of chemical fertilizers, pesticides and herbicides and protect and heal the environment (Rama sundara Lakshmi (2005). Agnihotra is turned to circadian biorhythms of nature viz, sunrise and sunset. Agnihotra purifies the atmosphere from pollutants and neutralizes harmful radiation. There sultant atmosphere gives nourishment to plant life. Present encouragement and the fast growing interest towards the ancient medical system namely ayurveda, nature cure, yoga and the like is an indication that there is need for a better and effective medical system. Agnihotra ash used for homa-therapy in human beings like skin fungus, pain in kidney, gastritis, extreme menstrual bleeding, wound healing effect and hyperactive children (Vani Therese, 2005).

Mushroom cultivation marketing offers greater opportunities for the unemployed youth and rural people. This can be made in to an economically viable part-time activity. It is estimated that there is a world market for 20 lakh tones for annum. In the domestic market also the

availability of mushroom is limited to cities and big towns only. Mushrooms can be not only in raw form but also in dried form. Mushrooms were considered to be a luxury food, especially among the rich community because of their unique flavour and excitingly different taste (Raj *et al.,* 1988). Today, culinary value but also to their potential as a rich protein (3.1 gm/100 gm of edible protein), vitamins such B, C and D. Mushrooms are low in sugar, starch and calories. Nearly 11 crores of children under the age of five suffer from moderate to severe mal-nutrition. Further 3 million pregnant women die every year during delivery from preventable diseases and infection. Consumption of mushroom has significant health promoting effects and can reduce the incidence of cardio vascular diseases, diabetes, obesity, cancer and various other degenerative diseases (Indira, 2005). Hence, in the present study has been undertaken to find out the impact of agnihotra ash on the growth of spawn, mycelial growth and yield of mushroom.

Materials and Methods:

Agnihotra ash preparation

For performing Agnihotra the copper pot, completely dried cow dung cakes, cow's ghee were used. Rice husk only removed and used to preparation of agnihotra. Agnihotra fire was prepared in a small copper pyramid of fixed shape and size. Agnihotra fire was to be prepared with dry cow dung cakes, copper pot and placed pieces of cow dung at the bottom; inside the copper pyramid other pieces of cow dung were arranged around the sides in a way that air can pass through freely. Applied ghee to a small piece of cow dung and lighted with match sticks, and inserted in to the dung arranged in a pyramid. Rice grains with ghee was put on the fire exactly at sunrise added to first portion of rice with first mantra; added the remaining rice in the fire with the second mantra. Agnihotra pyramid is a generator of life sustaining energies. Agnihotra ash used to produce spawn and bed preparation of mushrooms.

The mantras are given in the following.

At sunrise

Suryaya Svaaha. Suryaya Idham Na Mama. Prajapathaye Svaaha. Prajapathaye Idham Na Mama.

At sunset

Agnaye Svaaha.Agnaye Idham Na Mama. Prajapathaye Svaaha. Prajapathaye Idham Na Mama.

Culture

The pure culture of *Pleurotus sajar-caju* obtained form the department of plant pathology of the Tamilnadu agriculture university (TNAU), Coimbatore (India) were used for mass culture production and utilized for spawn preparation.

Cultivation methods

Mushroom production involves the four main inter-related procedures. They are tissue culture, spawn manufacturing, fruit body formation and harvesting. The mushroom cultivated in different culture media (agnihotra ash, cotton seed and groundnut cake) for analysis impact of supplementation for mushroom growth. The produced mushroom nutritive value estimated by standard biochemical methods.

Analytical methods

The dried fruit bodies (at 40^0C) of mushroom species were analyzed for carbohydrate, protein content, amino acid content and minerals.

Procedure:

Weigh 100mg of the sample and grind well with mortar and pestle. In 10 ml of extract centrifuge at 3000 rpm for 10 minutes and use the supernatant for carbohydrate estimation. Pipette out 0.2, 0.4, 0.6, 0.8 and 1 ml of the working sample in to a series of test tubes. Pipette out 0.5 ml and 1 ml of the sample extract into separate test tubes. Make up the volume in

both sample and standard tubes to 2 ml with distilled water. Pipette 2 ml of water to separate tube to set a blank. Add 1 ml of alkaline copper tatarate reagent to each test tube. Place the tubes in boiling water bath for 10 minutes. Cool the tubes and add 1 ml of arseno molybdate reagent to all the test tubes. Make up the volume in each tube to 10 ml with water. Read the absorbance of blue color at 620 nm after 10 minutes and calculated total amount of carbohydrate in the sample.

Amino acid separation:

The filter paper is dried in a hot air oven. Then filter paper is dipped for 1 minute in a glass tray containing 200 ml acetone and 1 ml of saturate solution of $AgNo_3$, air dry paper. Dip the paper for 2 minutes in a glass tray containing 0.5N sodium hydroxide solution. At the spots developed remove the paper and drain the liquid. Dip the paper for 5 minutes in 200ml of 2% Sodium thiosulphate solution to stop the reaction and clear the background. Find out the sugars separated from mushroom extracts by comparing the Rf values with standard sugars.

Extraction of protein from sample:

Extraction is usually carried out with buffer used for the enzyme assay. Weight 1g of the sample and grind well with a pestle and mortar in 5-10ml of the buffer. Centrifuge and use the supernatant for protein estimation by standard method.

Results and Discussion:

The result of the present study on the evaluation of different spawn supplements and cultivation supplements of *Pleurotus sajor-caju* are presented and discussed as follows. Homa farming is a system of agriculture that may be added to any organic farming practices (Vani Therese, 2005).

Effect of culture media:

Average growth was observed in plates of potato dextrose agar. Similar result was recorded with *Pleurotus* and *Hypsizygus* by Rama sundara Lakshmi (2005) and with *Pleurotus* by Gupta and Sharma (1994).They proposed PDA and YPDA media for isolation, multiplication and maintenance of mushroom cultures.

Effect of supplement on straw:

Pleurotus gave maximum yield on different supplements. Agnihotra ash significantly superior compared to other supplements for mushroom cultivation (Table-1). Maximum yield were obtained from supplementing the straw substrate with Agnihotra ash (97.5%) and cotton seed powder 90% (B.E) rates of supplementation respectively (Table-2). Increase in yield were generally associated with reduction in protein content of the mushrooms and the highest protein contents were from relatively low yield substrates (Table-2). This observation is similar to one reported previously (Zakia Bano *et al.*, 1978). Increases in yield and protein content of the fruit-bodies have been reported by Schisler and Sinden (1962a, 1962b and 1966), Bech and Rasmussen (1969), Delmar and Laborde (1969) and Mac Canna (1969), in the context of the compost with nitrogen sources.

Table-2 indicates the effect of paddy straw with different organic supplements on number, size (diameter), fresh weight and protein content of fruiting bodies of *Pleurotus*. Fruiting bodies appeared in all beds but maximum number and size of fruit bodies were observed in agnihorta ash supplementation, followed by cotton seed powder whereas minimum in groundnut cake additive. Protein content of the fruit bodies also maximum in agnihotra ash (23.8g) treated straw followed by cotton seed powder (21.7g) and minimum in groundnut cake (18.2g). Paddy straw soaked for 18 hours was found to be the best maximum yield (23.5g) and biological efficiency (78.3%) of fruit bodies from the

three flushes. 10 hrs soaking gave the minimum yield (145g) and biological efficiency (48.3%) of fruiting bodies were seen in (Table-3) so that the yield of mushroom increased with increase of soaking time. Our results coincide with the observations of Indira Rani (2005).

Biological profile:

Carbohydrate was found to be a major constituent in Pleurotus species (Bano and Rajarathnam, 1982). The values obtained in the present study 24.1% for *P. sajorcaju* (Table-4). Similar or slightly higher or lower values were reported for *P. sajorcaju* by several investigators (Bano *et al.,* 1981; Bano and Rajarathnam,1982; Raj *et al.,* 1988). *P. eurotus sajor-caju* can compensate for those common foods that are defective in amino acid composition by supplying the essential nutrients in effective amounts in areas where rice serves as the main stable food. Edible fungi are also helpful in improving the nutritive condition of diets when they are consumed as a vegetable in daily life (Wang *et al.,* 1990).

Bio-efficiency:

The conversion percentage from dry substrate to fresh mushroom is indicated by a term 'biological efficiency'. The biological efficiency was calculated using the formula.

$$\text{Biological efficiency (\%)} = \frac{\text{Wt. of fresh mushroom harvested}}{\text{Wt. of dry substrate used} \times 100}$$

The data on sporophore yield of *P. sajorcaju* on different supplements is changed (data not shown). The data show that Agnihotra ash supported the maximum yield (1255g/kg) which was about 10% more than the traditional unsupplemented straw.

Time cost:

Pleurotus sajor-caju was cultivated on the various wastes using the bag method in a period of 47-54 days, during which three flushes were harvested. Table-5 illustrates the growth period of the *Pleurotus sajor-caju* from spawn into full oyster mushroom formation on different supplements. *Pleurotus sajor-caju* gave shorter spawn run on paddy straw supplemented with Agnihotra ash (15 days). From the results the agnihotra ash to be used to mushroom cultivation technology, it will helpful to increase the yield as well as nutritive value for the same.

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Table - 1. Effect of enriching paddy straw with different organic supplements on mycelial growth and fruiting bodies of *pleurotus*

Treatments	Spawn running (days)	Yield (g/kg)	B.E.(%)	% increase over control
C – control (Unsupplemented straw)	19	700	70	0
T_1 – Agnihotra ash	15	975	97.5	39
T_2 – Horsegram powder	18	600	60	14.29
T_3 – Groundnut cake	19	475	47.5	32.14
T_4 – cotton seed powder	17	900	90	28.57

All data are mean value of three replicates (Mean ± SD)

Table 2. Effect of supplementing the straw substrate on mushroom yield and protein content of *Pleurotus*

Treatments	Diameter of Fruit body (cm)	No. of fruit bodies	Fresh wt fruit bodies/ bed (g)	Protein g (%)	% increase over control
Control(Unsuppl. straw)	3.04 ± 0.08	19 ± 1	43 ± 2	17.5	0
T_1 – Agnihotra ash	4.51 ± 0.13	30 ± 1	108 ± 5	23.8	36
T_2 – Horsegram powder	3.16 ± 0.17	70 ± 2	70 ± 2	18.9	8
T_3 – Groundnut cake	2.60 ± 0.04	38 ± 2	32 ± 2	18.2	4
T_4 – cotton seed powder	3.62 ± 0.08	60 ± 4	66 ± 2	21.7	24

All data are mean value of three replicates

Table – 3. Effect of soaking time of paddy straw on the yield and biological efficiency of *Pleurotus sajorcaju*

Substrate	Soaking time (hours)	Average mushroom yield (g)				B.E. (%)
		I flush	II flush	III flush	Total	
Paddy straw	10	65	50	30	145	48.3
	12	80	45	35	160	53.3
	14	90	50	30	170	56.6
	16	105	70	25	200	66.6
	18	135	70	30	235	78.3

All data are mean value of three replicates

Table 4: Proximate composition of *Pleurotus sajorcaju* **(%)**

Species	Protein	Carbohydrate	Aminoacid	Ascorbic acid
Pleurotus sajorcaju	29.1	24.1	15.2	8.1

All data are g/ 100g dry weight.

Table 5:. Reduction of time cost (%) in different supplements

S.No	Treatment	Upto button stage (days)	Upto harvesting stage (days)
1.	Control (Unsupplemented straw)	20	25
2.	T_1 – Agnihotra ash	15	20
3.	T_2 – Horsegram powder	18	24
4.	T_3 – Groundnut cake	19	26
5.	T_4 – cotton seed powder	17	22