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Screening of substrate supplementation on some physiological and biochemical parameters of *Pleurotus sajor-caju* in Darjeeling hill

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The growth attributes of Pleurotus sajor-caju exhibited more with the introduction of *Evodia fraxinifolia* dust to rice straw as a source of nutrition. The high yield and large of the fruit bodies established the nutritional importance of *Evodia fraxinifolia* dust for mushroom cultivation. The carbohydrates,protein, free amino acids and ironcontents were enhanced in mixed compost produced mushroom. The enzyme activities revealed that the higgest catalase and α -amylase activities in first flush of mixed compost.The dried tissue shoed gradual decline of biochemical constituents but the vitamin-c content was not effected in respect of tissue nature, substrate composition and harvesting period.

Key words : Substrate supplimention, *Evodia fraxinifolia* dust, *Pleurotus sajor-caju*.

INTRODUCTION

The edible mushroom, *Pleurotus sajor-caju*, has a good food value. (Chang, 1978; Roy and Samajpati, 1976; 1977, 1979; Roy *et.al*., 1978; Singh, 1994; Rai and Saxena, 1994). In the present investigation attempts have been made to find the effect of supplementation on rice straw for cultivation of *Pleurotus sajor-caju*, and also to determine the biochemical changes taking place during cropping of mushroom.

MATERIALS AND METHODS

Two types of bio-organic composts were used. Firstly, the most popularly accepted 'rice-straw compost' and other was the mixed compost of rice-straw with locally available decayed plant stem or branch of *Evodia fraxinifolia* (fam. Rutaceae). *Evodia fraxinifolia* has a good water retaining capacity in the woody part. The decaying vegetative part of the tree is best for mushroom cultivation. The easy availability of the plant in the hill locality enhanced it's importance as substrate substitute. The rice-straw compost was done according to the method described by locally and nationally developed method from Solan, Himachal pradesh. The mixed compost was prepared as follows : the decayed moisturised woody parts were cut into smaller pieces and mixed with rice straw in the ratio of 1:1. These two types of composts were used as the substratum for mushroom cultivation. Spawn was purchased from local market of Darjeeling town.

The growth attributes of the mushroom was recored on and from the inception of first fruit body emergence. The fruit body hight, size of the cap, length and breadth of the stipe and dry and fresh weight were noted. Carbohydrates levels (both soluble and insoluble fractions) were determined following the method of Mc Cready *et.al* (1950). Protein levels of the tissues were estimated following the method of Lowry *et. al.* (1951). Free amino acids were determined by the method of Moore and Stein (1948). Iron and ascorbic acid levels were determined following the method of Singh (1982) with minor modifications and Plummer (1979) respectively. Extraction and estimation of enzymes catalase, peroxidase and α-amylase were made following the colorimetric of method of Kar and Mishra (1976) and Khan and Faust (1967), respectively. For the assay of the enzymes the blank was taken as zero control. The activity of each enzyme was expressed as AxTV/(txv), where A is the absorbance of the sample after incubation minus the absorbance of the zero time control. TV is the total volume of filtrate, t is the time (minutes) of incubation with the substrate and

v is the volume of the filtrate taken for incubation.

The physiological and biochemical data recorded in this investigation were statistically analysed at the replication levels and the least significant difference (LSD) was calculated at 95% confidance limits (Panse and Sukhatme, 1967)

RESULTS AND DISCUSSION

The growth attributes revealed that the size of fruit body was large, more in length and breadth in mixed compost of *Evodia fraxinifolia* and rice straw. The recorded three flushes of the mushroom production exhibited that the first flush showed superior quality and quantity too. The yield decreased gradually with the extention of plucking time. The water percentage in the tissue showed indifference with different composts and time of plucking (Table1).

Table-2, 3, and 4 showed the levels of carbohydrates (soluble & insoluble), protein, and free amino acids, iron and ascorbic acid from fresh and dried tissue of mushroom at three different flushes which ranged from 30-d to 70-d (recorded from the day of spawning). The first flush (30±5-d) exhibited good content of all the above constituents in mixed compost, while iron content was more from the mushroom grew from rice straw, Comparatively, the contents of all the constituents were more in fresh tissues than that of the dried tissues. The enzyme activities were considered from both fresh and dried tissues (Figs. 1, 2 and 3). Mixed compost product gave excellent activities of catalase, peroxidase and α-amylase in fresh tissue whereas dried tissue showed less catalase activity. Similarity was seen in peroxidase and α-amylase activities. The rich contents of all the important food constituents in oyster developed from mixed compost suggested that the introduction of new substratum for cultivation of mushroom is economically, and commercially viable.

Table 1: Influence of rice straw (RS) and rice straw + *Evodia fraxinifolia* (RS+ED), on different growth parameters of fruit bodies as well as percentage of moisture in *Pleurotus sajor-caju*

Flushes	Composts	Pileus		Stipe			% Water Content
		Circumference (cm.)	Diameter (cm.)	Length (cm)	Breadth (cm)	Girth (cm)	
1st	RS	36.11	11.5	5	2.2	6.2	90.37
	RS+ED	37.68	12.0	7	2.5	5.5	90.64
2nd	RS	28.26	9.0	4	2.0	5.0	90.37
	RS+ED	32.18	10.2	5.5	2.3	5.0	90.64
3rd	RS	23.55	7.5	3	2.3	4.0	90.36
	RS+ED	26.69	8.5	4.5	1.8	3.0	90.64
LSD (P=0.05)		1.02	0.94	1.32	0.27	1.28	NS*

NS* = Non significant; data are mean of five replications.

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Table 2: Influence of rice straw (RS) and rice straw + *Evodia fraxinifolia* (RS+ED), on soluble and insoluble carbohydrate (mg/g wt.) contents in fresh and dried tissues of *Pleurotus sajor-caju* mature fruit bodies

Flushes	Composts	Carbohydrate			
		Soluble		Insoluble	
		Fresh tissue (mg/g fr wt)	Dried tissue (mg/g dry wt)	Fresh tissue (mg/g fr wt)	Dried tissue (mg/g dry wt)
1st	RS	57.5	42.2	118.7	93.6
	RS+ED	95.0	78.2	180.4	172.4
2nd	RS	31.1	26.0	103.5	76.2
	RS+ED	46.9	32.7	124.7	120.7
3rd	RS	27.5	20.1	82.4	53.6
	RS+ED	32.0	23.0	100.0	91.3
LSD (P=0.05)		3.88	3.05	18.05	15.94

NS* = Non significant; data are mean of five replications.

Table 3: Influence of rice straw (RS) and rice straw + *Evodia fraxinifolia* (RS+ED), on protein (mg/g wt.) and Free amino acids (mg/g wt.) contents in fresh and dried tissues of *Pleurotus sajor-caju* mature fruit bodies.

Flushes	Composts	Protein		Free Amino Acids	
		Fresh tissue (mg/g fr wt)	Dried tissue (mg/g dry wt)	Fresh tissue (mg/g fr wt)	Dried tissue (mg/g dry wt)
1st	RS	99.4	94.7	6.8	5.4
	RS+ED	119.4	91.8	4.3	4.7
2nd	RS	90.5	83.5	3.9	4.7
	RS+ED	121.7	91.5	4.3	3.2
3rd	RS	67.3	65.9	3.1	2.2
	RS+ED	91.5	76.8	3.7	2.7
LSD (P=0.05)		15.65	5.08	0.35	0.32

NS* = Non significant; data are mean of five replications.

Table 4. Influence of rice straw (RS) and rice straw + *Evodia fraxinifolia* (RS+ED), on iron and ascorbic acid (mg/g fr wt.) contents in fresh and dried tissues of *Pleurotus sajor-caju* mature fruit bodies.

Flushes	Composts	Iron Content		Ascorbic Acid Content	
		Fresh tissue (mg/g fr wt)	Dried tissue (mg/g dry wt)	Fresh tissue (mg/g fr wt)	Dried tissue (mg/g dry wt)
1st	RS	148.0	115.2	10.8	10.8
	RS+ED	111.2	96.0	12.6	12.6
2nd	RS	112.0	73.5	12.1	12.2
	RS+ED	101.0	85.2	12.2	11.2
3rd	RS	94.0	76.2	11.2	11.2
	RS+ED	62.2	53.7	11.2	11.2
LSD (P=0.05)		9.03	7.05	NS	NS

NS* = Non significant; data are mean of five replications.

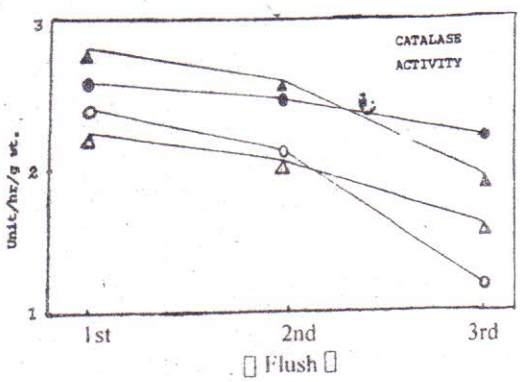

Fig. 1: Effect of rice straw and rice straw supplemented with *Evodia fraxinifolia* composts on the catalase activity of fresh and dried basidiocarps of *Pleurotus sajor-caju*.
● = Fresh; O = Dried mushroom of rice straw
□ = Fresh ; Δ = Dried mushrooms of rice straw + *E. framinifolia*

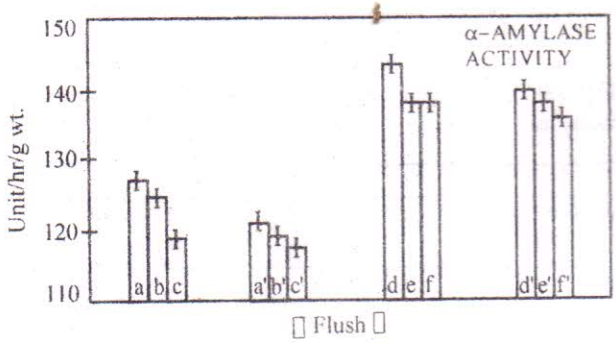

Fig. 2 : Effect of rice straw and rice straw supplemented with *Evodia fraxinifolia* composts on the α-amylase activity of fresh and dried basidiocarps of *Pleurotus sajor-caju*.

a (1st), b (2nd), c (3rd) and d (1st), e (2nd), f (3rd) of fresh tissues and dried tissue of mushroom of rice straw, respectively;
a' (1st), b' (2nd), c' (3rd) and d' (1st), e' (2nd), f' (3rd) of fresh tissue and dried tissues of mushroom of rice straw + *E. fraxinifolia* compost, respectively.

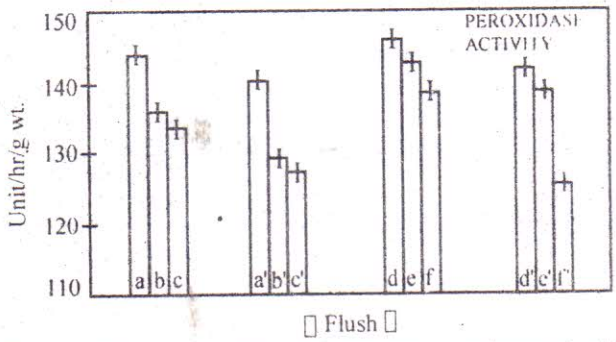

Fig. 3 : Effect of rice straw and rice straw supplemented with *Evodia fraxinifolia* composts on the peroxidase activity of fresh and dried basidiocarps of *Pleurotus sajor-caju*.

a (1st), b (2nd), c (3rd) and d (1st), e (2nd), f (3rd) of fresh tissues and dried tissue of mushroom of rice straw, respectively;
a' (1st), b' (2nd), c' (3rd) and d' (1st), e' (2nd), f' (3rd) of fresh tissue and dried tissues of mushroom of rice straw + *E. fraxinifolia* compost, respectively.

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