PERFORMANCE OF OYSTER MUSHROOM (*PLUROTUS SAJORCAJU)* ON DIFFERENT AGRICULTURAL WASTES

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Abstract.
A laboratory study was conducted in Completely Randomized Block Design during 2003 for comparative assessment of different agricultural wastes for the cultivation of Oyster mushroom (***Pluorotus sajor caju***). The ***Pleurotus sajor caju*** was successfully grown on all the agricultural wastes. However, the paddy straw resulted the highest yield (1733.60 g/bed) followed by wheat straw (1627.49 g/bed), black gram straw (1401.09 g/bed). The quickest spawn run (19.00 days), days of first harvest (24.00 days) were also recorded with paddy straw. The ***pleurotus sajorcaju*** resulted highest biological efficiency (86.62 percent) with paddy straw which was at par with wheat straw (81.39 percent) and significantly surpassed over rest of the treatments. Though the lower yield of ***Pleurotus sajorcaju*** was obtained on other agricultural wastes but their successful cultivation on all the agricultural wastes proved an economical and most viable venture. The correlation coefficient between yield and diameter of fruit was highly significant at all stages of harvest. The multiple regressions equation model $Y=a+b_1x_1+b_2x_2+b_3x_3+b_{4X4}$ was best fitted between yield and different independent variables(X_1=days of spawn run, x_2=days of harvest $X_{3=}$number of fruits/bed, X_4=diameter of fruits) with R^2 value0.85 and 0.82 at first and second harvest respectively. At third harvest the R^2 value (0.67) was found insignificant. Significantly highest contribution in yield (93.84 percent) was recorded with number of fruits at first harvest. Where as at second and third harvest the highest contribution in total yield was recorded with diameter of fruits, 82.71 and 67.23 percent respectively.

Key words: Agricultural wastes, Spawn run, Diameter, Correlation, Biological efficiency.

INTRODUCTION

The large amount of agricultural wastes and congenial climatic conditions provide tremendous scope for Oyster mushroom cultivation in Munger division. Its cultivation is a proposition for bioconversion of lingo cellulosic wastes into edible protein. Kumar ***et al.2004*** Chandra ***et al***. 1998 reported the successful cultivation of ***Pleurotus sp*** on conventional substrates sufficiently available in this region which are not utilized properly. These wastes are neither used as fodder nor as other useful material except as fuel. Traditionally the Oyster (***pleurotus sajor caju*)** is largely grown on paddy and wheat straw which is becoming costlier because of it's several other uses. The above conditions call for a search of certain alternative materials which should be available in sufficient quantity throughout the year at a relatively cheaper price. Keeping in view the present investigation was carried out to search out non-conventional Agricultural waste for the successful cultivation of Oyster mushroom.

MATERIAL AND METHODS

A laboratory experiment was conducted at Regional Research Sub-Station Munger during the Nov. 2003 with an objective to access the efficiency of different Agricultural wastes to improve the yield parameters and yield of Oyster mushroom **(*pleurotus Sajorcaju*)**. The spawn of ***pleurotus Sajor caju*** was obtained from NRCM Solan (H.P).The agricultural wastes namely T_1-Wheat straw, T_2-Paddy straw, T_3-Sugarcane baggases, T_4-Sugarcane leaves, T_5-Black gram straw, T_6-Sorghum leaves, T_7-Maize heart, T_8-Ashoka leaves, T_9-Banana leaves, T_{10}-Barley straw, T_{11}-Sorghum stalks and T_{12}-Mustard straw were sun dried and chopped in 2-3 cm size pieces and thoroughly washed and soaked in fresh water for 24 hours. Then it was pasteurized at 75 ± 5^0C for 1 hour. After cooling transparent polythene bags of 30 x 50 cm size were filled separately using 2-5 kg moist substrate as per treatment. Multilayer spawning @ 3% was done to inoculate the substrates. The experiment was laid out in Randomized Block Design and replicated thrice. Immediately after spawning the bags were incubated in the dark and well ventilated room at ambient temperature of $18\text{-}20^0$C. After complete spawn run the bag were transferred to cropping room. The cropping room temperature was maintained between 22±6 ^{0}C and relative humidity 80 percent. The polythene bags were removed by sterilized sharp blade and cubes were kept on bamboo racks. After 2 to 3 days of removal of polythene bags. Sufficient numbers of pin heads were observed which were allowed to mature for 3-4 days more. The matured mushrooms were harvested at 3-6 days interval. Data on period of spawn run, days of first harvest, diameter and number of fruiting bodies yield and dry yield were recorded. Biological efficiency of mushroom on fresh weight basis was calculated by formula (Chang and Miles, 1989).Correlation and regression analysis was done between yield and different independent variables(days of spawn run, initiation of sporophore,days of harvest, diameter of sporophore).The multiple regression analysis was done by using the formula $\mathbf{Y=a+b_1x_1+b_2x_2+b_3x_3+b_{4X4}}$.

RESULTS AND DISCUSSIONS

Maximum yield of ***pleurotus sajorcaju*** (1733.60 g/bed) was recorded on paddy straw(Table.1 and 2), which was at par with wheat straw (1627.49 g/bed) and was significantly higher than the other agricultural wastes used as substrates. However, lowest yield was noticed with Ashoka leaves (988.20 g/bed). The maximum yield of ***pleurotus sajorcaju*** on all the substrate was recorded at first harvest which subsequently reduced at second and third harvest. The subsequent reduction in yield during second and third harvest might be due to the consumption of lignocellulonitic material of the waste by ***pleurotus sajor caju*** during the initial period of fruiting. The probable reason for the best performance of ***Pleurotus sajor caju*** on paddy straw might be that the nutrients required for the mushroom particularly for it's spawn run and pin head development were supplied by paddy straw which decomposed quicker than the other agricultural waste material. Where ever the poor yield under Ashoka leaves might be due to lower liqnocellulonitic contents.***Pleurotus sajor caju*** was found to utilize all the agricultural wastes and were observed suitable for spawn run, yield and biological efficiency (Das ***et al***.2000). However, the substrates showed variation in spawn run, days to harvest and other parameters. The quickest spawn run and duration of first harvest (19.00 and 24.00 days respectively) was recorded with paddy straw. The similar results were also reported by Chavan. ***et al***.2003.However, no significant variation in period of spawn run was recorded in different substrate except sorghum stalk, black gram straw and barley straw (24.00, 24.00 and 22.33 days) respectively .Subsequent reduction in no. of fruits/bed, diameter of fruit, fresh and dry weight of sporophore were recorded with increasing days of harvesting. Significant variation in biological efficiency of ***pleurotus sajor caju*** was recorded on different substrates. Highest biological efficiency was observed on paddy straw (86.62%) which was comparable to wheat straw (81.39%). The biological efficiency of other substrates was almost comparable except Ashoka leaves (Pathalk and Goyal., 1988 and Vyas ***et al***.2003).Superiority of paddy and wheat straw was also reported by (Sangeetha and Theradimani,2007, Duvey, 1999). They also reported that paddy straw produced highest no. of sporophore and have maximum biological efficiency. The lower performance, yield and Biological efficiency of different Agricultural wastes might be due to low lignolytic and cellulonitic activity (Pathak and Goel., 1988). However appreciable high and significant performance of other substrates ensures the possibilities of utilizing the locally available substrates for ***pleurotus sajor caju*** cultivation.

The correlation coefficient between yield and diameter of sporophore was found positively significant (0.76 **, 0. 83 ** and 0.73 **) at first second and third harvest respectively (Table 3,4 and 5). At first harvest the correlation coefficient (0.90 **). between yield and number of sporophore was also found highly significant. Multiple regression between yield and independent variables(days of spawn run and harvest, number of sporophore/bed and diameter of sporophore)Y=-425.52+10.69 X_1 +(-7.52)X_2+18.49 X_3+34.22 X_4 ,Y=242.98+2.66 X_1 +1.32 X_2 +(-12.82) X_3 +90.74 X_4 ,Y=-709.24 +19.59 X_1 +(-4.77) X_2 +3.32 X_3 +178.10 X_4 was best fitted with R^2 value 0.87,0.82, and 0.67 at first, second and third harvest respectively. The correlation coefficient between total yield and the yield obtained at first and second harvest was found significant. The multiple regression Y= .018+1.001X_1 +0.9998 X_2 +1.0001 X_3 model was best fitted with R^2 value 1.000. In this model all the independent variables explained wide variation in their contribution to sporophore production/bed at all the stages of harvest. However, the multiple regression models at the third harvest were found in significant (R^2 value 0.67).

All together in this model the independent variables(days of spawn run and harvest, number of sporophore/bed and its diameter separately explain their contribution in yield at first harvest 1.92,0.78,93.84 and 3.44 percent at second harvest contribution was 0.15,0.12,12.50 and 87.21 percent ,at third harvest these variables contributed in yield 32.61,5.28,0.97 and 61.12 percent respectively. The yield obtained at first, second and third harvest explains their contribution in yield 66.39, 23.94 and 9.14 percent respectively. Overall the regression equation explains the highest contribution of no. of sporophore/bed (93.84%) at first harvest where at second and third harvest diameter of fruits contributed highest 87.21 and 61.12 percent respectively. The highest contribution in total yield was obtained by the yield obtained at first harvest (66.911 %).

Table 1

Effect of different agricultural wastes on the Yield parameters and Yield of *Pleurotus Sajor caju* at first and second harvest

	Ist HARVEST						2nd HARVEST				
	Days of spawn run	**Days of Ist harvest**	**No. of fruits/bed**	**Diameter of fruit (cm)**	**Fresh yield of fruit (g/bed)**	**Dry wt. of fruit (g/bed)**	**Days of second harvest**	**No. of fruits/ bed**	**Diameter of fruit (cm)**	**Fresh yield of fruit (g/bed)**	**Dry wt. of fruit /bed (g/bed)**
T_1	21.33	27.33	48.81	8.13	907.10	80.39	32	32.41	6.20	410.13	34.77
T_2	27.33	48.81	8.13	907.10	883.13	74.02	28	36.66	6.51	480.10	43.30
T_3	24.00	58.61	8.16	883.13	767.16	67.51	31.67	30.03	3.84	290.10	26.47
T_4	27.00	45.90	7.07	767.16	627.13	57.27	28.67	32.66	4.25	310.31	25.32
T_5	24.33	41.94	6.87	627.13	580.18	52.12	37.33	28.21	4.47	440.42	38.36
T_6	29.00	41.56	7.73	580.18	907.10	50.11	34.33	26.98	3.70	320.52	28.02
T_7	27.00	41.46	6.61	553.23	883.13	47.79	35.33	25.50	3.12	240.36	20.93
T_8	21.33	26.67	37.86	6.01	767.16	50.75	32.67	32.21	3.06	200.42	18.25
T_9	20.67	25.00	39.55	7.17	627.13	51.78	30.33	31.91	4.20	300.13	23.37
T_{10}	22.33	28.00	39.97	6.92	580.18	44.12	36.00	32.23	3.73	250.42	20.45
T_{11}	24.00	27.00	31.87	6.59	450.31	40.40	34.33	28.69	3.93	370.39	31.02
T_{12}	20.67	27.67	39.60	7.17	533.17	47.27	34.0	31.24	5.23	430.16	38.45
CD (P=0.05)	NS	NS	0.95	0.19	124.59	0.91	2.54	1.09	0.32	142.23	1.48

Table 2

Effect of different agricultural waste on the Yield parameters and Yield of *Pleurotus Sajor caju* at third harvest.

	3[rd] HARVEST						
	Days of harvest	No. of fruits/ bed	Diameter of fruits (cm)	Fresh yield of fruits/bed (g/bed)	Dry wt. of fruits /bed (g/bed)	Total yield (g/bed)	B.E. %
T_1	37.00	22.58	4.06	310.26	27.11	1627.40	81.39
T_2	35.33	26.09	4.64	370.37	31.68	1733.60	86.62
T_3	39.33	21.25	3.78	240.28	21.05	9297.54	62.98
T_4	32.33	23.02	3.85	270.14	24.08	1207.58	60.59
T_5	40.00	20.66	4.21	380.49	32.48	1401.09	70.09
T_6	37.67	21.56	4.15	330.62	28.33	1204.37	58.64
T_7	35.00	22.20	4.14	340.28	28.59	1117.98	55.71
T_8	35.00	24.55	3.90	270.32	23.13	988.20	49.25
T_9	34.66	23.88	4.31	410.41	35.16	1293.86	54.85
T_{10}	40.00	24.83	3.86	350.39	28.49	1138.3	61.51
T_{11}	39.67	21.58	3.94	340.41	28.90	1161.11	58.22
T_{12}	33.33	24.08	4.16	410.14	35.31	1373.47	67.09
CD (P=0.05)	4.89	0.99	0.12	97.09	1.29	26.02	12.84

Table 3

Correlation coefficient between yield of Pleurotus *Sajorcaju* and independent variables at first harvest.

Y_1 (Yield g./bed)	X_1 (days of spawn run)	X_2 (Days of first harvest)	X_3 (No. of sporophore/ bed)	X_4 (Diameter of sporophore cm)
1.00	-0.3719	-0.2771	0.9092**	0.7685**
	1.00	0.7090**	-0.5206	-0.0383
		1.00	-0.3439	-0.0062
			1.00	0.7424**
				1.00

Table 4

Correlation coefficient between yield of *Pleurotus Sajorcaju* and independent variables at second harvest

Y_1 (Yield gm./bed)	X_1 (days of spawn run)	X_2 (Days of harvest)	X_3 (No. of sporophore/bed)	X_4 (Diameter of sporophore cm.)
1.00	0.357	-0.1386	0.2936	0.8316**
	1.00	0.6737 *	-0.3393	-0.1654
		1.00	-0.7127 **	-0.4561
			1.00	0.6742 *
				1.00

Table 5

Correlation coefficient between yield *Pleurotus Sajorcaju* and independent variables at third harvest

Y_1 (Yield gm./bed)	X_1 (days of spawn run)	X_2 (Days of harvest)	X_3 (No. of sporophore/bed)	X_4 (Diameter of sporophore cm.)
1.00	0.1071	-0.0708	0.2469	0.7050
	1.00 1.00	0.7060	-0.4400	-0.3344
		1.00	-0.4630	-0.2514
			1.00	0.3661
				1.00

Table 6

Correlation coefficient between total yield of *Pleurotus Sajorcaju* and yields obtained at different harvesting stages

Y_1 (Total Yield g./bed)	X_1 (Yield at first harvest)	X_2 (Yield at second harvest)	X_3 (Yield at hird harvest)
1.00	0.8243	0.8494	0.3067
	1.00	0.4524	-0.2133
		1.00	0.4799
			1.00

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