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Effect of different substrates on (sporophore) yield of oyster mushroom (*P. florida*)

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Abstract
Oyster mushroom is one of the most important edible mushrooms with medicinal value. Which commercially cultivated for food, and its world production is rapidly increasing day by day. The avocation of mushroom farming will become a very important cottage industry in the integrated rural development programme, which will lead to the economic betterment of not only small farmers but also of landless laboures and other weak sections of communities. An experiment was conducted to find out some other suitable substitutes of substrate Pigeon pea leaf powder and Black gram leaf powder were used with wheat straw. These substrates were mixed with (wheat straw) separately @ (8%, 7%, 6% and 5%) for cultivation of oyster mushroom (*P. florida)* on spawn run i.e. mycelial ramification in substrate, days for spawn run, period of cropping, pileus length, total yield, average yield and number of sporophores were recorded and data presented. The result indicated that maximum yield (957.00 g/kg of dry substrate with 95.70% B.E.) was observed in wheat straw + Pigeon pea leaf powder 8% which was statistically higher than other treatments. The highest number of fruiting bodies (143.00) was observed from wheat straw + Pigeon pea leaf powder 6% at…. Days.

Keywords: Oyster mushroom, substrates, yield, *P. florida*

Introduction
Mushroom is the excellent food item due to their flavour, nutritional content and high productivity per unit area. The mounting pressure of ever-threatening food crisis coupled with the problem of malnutrition and limited energy sources have led man to search for new and improved methods for more and better quality food. The expansion of mushroom cultivation will not only have a significant impact on food production, but also promises to be an attractive and remunerative method for accomplishing the task of disposal of wastes, hence, alleviating the environmental pollution. Mushrooms, the product of transformation of inedible waste into edible biomass, are generally being accepted as food of high quality, flavour and nutritive value. Its popularity has been increasing due to its ease of cultivation, high yield potential and high nutritional and medicinal value. Some people have been collecting mushroom from the wild for ages and cultivating them as a valuable food. Mushrooms consist of cap, gills, stalk or stipe, spores, ring, volva and mycelium (Thongnaitham, 2012) [6].
The avocation of mushroom farming will become a very important cottage industry in the integrated rural development programmes, which will lead to the economic betterment of not only small farmers but also of landless labourers and other weak sections of communities. About 385 million tonnes of agricultural wastes are available annually in India and about half of this residue remains unused. If even 1% of this crop residue is used to produce mushroom, Cultivation of oyster mushroom on different substrate with oil cakes and other additives for reduction in production cost of mushroom and utilizing agricultural waste would certain help to reduce the environmental problems particularly accumulation of filth carbon sequesters, nutrients, metal sequestration and ultimately mushroom cultivation help us to achieve bioremediation. The present works were carried out to investigate the suitable additives for increase the quality and yield of oyster mushroom. This can be used for further commercialization of oyster mushroom.

Review of Literature
Bahukhandi and Munjal, (1989) [1] evaluated different substrate like; maize straw, garden pea straw, sorghum straw, cotton waste, waste paper for cultivation of *P. sajor caju*, *P. sapidus*, *P. osterat*us and *P. florida* and found to be best substrate for *P. sajor caju* followed by *P. sapidus.* Similarly Upadhyay and Vijay (1991) evaluated performance of five different species of *Pleurotus* i.e. *P. ostreatus*, *P. florida*, *P. fossulatus*, *P. eryngii* and *P. cornucopiae* on wheat

straw. Highest yield of 94% biological efficiency was obtained with *P. florida* followed by 32% biological efficiency for *P. ostreatus* at low temperature ranging 12-16^{0}C and relative humidity 65-75%.

Baliyan, (2008) [2] reported a study wheat bran, gram husk and rice husk were found to be the superior substrate followed by other cereal and millet grain for spawn preparation. Grain spawn of *P. sajor caju* and *P. sapidus* were significantly superior in term of yield and number of sporophore than husk and spent spawn. Among the grain spawn, bajra spawn gave higher yield than wheat spawn.

Block *et al.* (1958) [3] cultivated *P. ostreatus* for the first time under laboratory conditions on saw dust medium. They used a mixture of oat meal and saw dust for cultivation and found best result of eucalyptus followed by pine saw dust.

Chang-Sung, (2000) [4] studied the effect of soaking time of paddy straw on mycelial growth of oyster mushroom. The mycelial growth was the good between 4 and 12 hours soaking treatment, showing faster growth and higher density in the lower part than the upper part. However, he could not found any significant variation among 5 strains of *Pleurotus* spp. in the effect of the various soaking time.

Material and Methods

An experiment was conducted in Mushroom Laboratory of Department, Plant of Pathology Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, U.P. Culture of the *Pleurotus florida* were further purified by single hyphal tip method. For this purpose, the cultures were grown in sterilized petri plates on potato dextrose agar (PDA) medium for 8 days. Single branched hyphae from the periphery of the growing colony were marked under low power (10x) of compound microscope and transferred to PDA slants for maintenance. These culture tubes were incubated at 24±1^{0}C for about a week and again sub cultured on PDA medium and then stored in a refrigerator at 5^{0}C ±1^{0}C for further use *in vitro*.

$$\text{Biological efficiency} = \frac{\text{Fresh weight of fruit body}}{\text{Dry weight of substrate}} \text{X } 100$$

Results and Discussion

The result indicated that maximum yield (957.00 g/kg of dry substrate with 95.70% B.E.) was observed in wheat straw + Pigeon pea leaf powder 8% which was statistically higher than all other treatments followed by wheat straw + Pigeon pea leaf powder 7% (722.00 gm/kg of dry substrate with 72.20% B.E.). The minimum yield was observed in control i.e. only wheat straw (410.00 gm/kg of dry substrate with 41.00 % B.E.) followed by wheat straw + Black gram leaf powder 8% (696.00 gm/kg of dry substrate with 69.60 % B.E.), which are significantly higher than control (wheat straw alone) control significantly lower than all other treatments. The highest number of fruiting bodies (143.00) was observed from wheat straw + Pigeon pea leaf powder 6% which was statistically higher than all other treatments. The minimum number of fruiting body (70.00) was observed from wheat straw + Black gram leaf powder 8% which was statistically at per with wheat straw + oat flour and wheat straw + Pigeon pea leaf powder 5%.

The minimum days for spawn run (18.00) observed at wheat straw + Pigeon pea leaf powder 8% which was statistically similar to all other treatment except control which are significantly higher other treatments. The maximum days (26.00) for spawn run were observed in control. The minimum days for cropping period (71.00) was observed at wheat straw + Pigeon pea leaf powder 5% and maximum (73.00) days for cropping period were recorded in wheat straw + Black gram leaf powder 8%.Which was statistically lower than all other leaf powder. The minimum pileus length (10.33) were observed in wheat straw + Black gram leaf powder 5% and maximum (14.23) in wheat straw + Pigeon pea leaf powder 8%. The minimum average weight of fruiting bodies (29.33) in wheat straw + Pigeon pea leaf powder 5% and maximum (62.00) wheat straw + Pigeon pea leaf powder 8%.

Similar Dehariya and Vyas, (2015) found on substrates conventional [Soybean straw (SS), Wheat straw (WS) and Paddy straw (PS)] and non-conventional [Domestic wastes (DW), Fruit waste (FW) and Used Tea leaves (UTL)]. Locally available grains of wheat (*Triticum aestivum*), sorghum (*Sorghum vulgare*), jowar were used for spawn production. The experiments were setup as a randomized design with three replicates. Results revealed that wheat grain spawn produced better results in comparison to spawn grown on the maize and sorghum for spawn running, pinhead formation, fruit body formation and increased yield. The quickest spawn running of 17 days, early pinhead formation 21 days, greater yield of 934.4g/Kg with 93.4% BE was recorded with WS as a conventional substrate. Among the non-conventional substrate DW was found to be best.

Table 1: Effect of different substrates on yield of oyster mushroom (*P. florida*)

S. N.	Substrates	DFSR	DFCP	NOFB	Pileus length (in cm)	Yield (g/kg) Dry Substrate)	Average Weight /FB	Biological yield (%)
1	Wheat straw + Pigeon pea leaf powder@ 8%	18.00	70.67	80.00	14.23	957.00	62.00	95.70
2	Wheat straw + Pigeon pea leaf powder@ 7%	20.00	71.00	88.00	12.33	772.00	43.33	77.20
3	Wheat straw + Pigeon pea leaf powder@ 6%	18.00	71.33	143.00	12.67	608.00	45.00	60.80
4	Wheat straw + Pigeon pea leaf powder@ 5%	20.33	71.00	126.00	10.67	542.00	29.33	54.20
5	Wheat straw + Black gram leaf powder@ 8%	18.00	73.00	70.00	13.67	696.00	41.67	69.60
6	Wheat straw + Black gram leaf powder@ 7%	18.67	69.00	139.33	11.33	655.00	50.00	65.50
7	Wheat straw + Black gram leaf powder@ 6%	18.33	70.00	75.67	12.33	572.00	32.33	57.20
8	Wheat straw + Black gram leaf powder@ 5%	20.00	71.33	77.33	10.33	490.00	32.00	49.00
9	Control(wheat straw)	26.00	76.00	59.00	9.33	410.00	26.00	41.00
	CD at 5%	1.911	2.44	2.25	2.31	24.01	3.84	-
	SE	0.63	0.81	0,75	0.77	8.82	1.01	

Average of three replications

DFSR= Days for spawn run, DFCP= Days for cropping period, NOFB= Number of fruiting body.

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