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PERFORMANCE OF DIFFERENT AGRO WASTE ON GROWTH AND YIELD OF PINK OYSTER MUSHROOM (*PLEUROTUS DJAMOR*) CULTIVATION

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ABSTRACT

In the present study, the best/superior substrates for mushroom culture were assessed, along with the growth and yield performance of pink oyster mushrooms on various agro wastes. A variety of substrates, including rice husk, sugarcane bagasse, wheat straw, banana pseudostem, paddy straw, and mixed beds, were utilized to cultivate pink oyster mushrooms. The findings showed that spawn run, fruiting body pin head development features, and yield varied significantly depending on the substrate. Paddy straw resulted in a shorter spawn run (10.66 days) and pin head development (13.66 days). The paddy straw produced the greatest number of fruiting bodies (89.00), stipe length (62.33mm), cap diameter (81.33), and yield (737.33g/kg), followed by other substrates. Compared to other agricultural residues, paddy straw was shown to be the best substrate for the cultivation of pink oyster mushrooms.
Keywords **:** *Pleurotus djamor*, Substrates, Growth, Yield.

Introduction

Fungi are a class of organisms that cannot directly use sunlight to produce food, because they lack chlorophyll. Mushroom is an edible macro fungus which has fleshy fruiting bodies and cultivated in many countries by using agricultural wastes (Alexopoulos *et al*., 1996). It is a member of the phylum Basidiomycota. The majority of the mushroom's vegetative elements are long, thin filaments called mycelia, which, under the right circumstances, develop into fruit bodies called sporocarps. Man has been drawn to mushrooms from the beginning of time. The earliest known Sanskrit name for mushrooms appears to be "Ksumpa," while in modern times, the terms "Khumbi," "Chhatra," "Kukurmutta," and "Bhumi kavak" are frequently used in India to refer to mushrooms.

Pleurotus djamor is an edible fungus, a member of the Pleurotaceae family and belongs to order Agaricales. Due to its pink sporophore, huge fruit bodies, and mouth-watering flavour, it is also known as the Salman pink oyster, the pink oyster, and the roseus mushroom. The pink oyster, or *Pleurotus djamor*, is a fungus that grows extremely quickly and readily bears fruit on a variety of lignocellulosic substrates. Among the cultivated species of mushrooms, oyster mushroom (*Pleurotus* spp.) had ranked 2nd in the world (Chadha, 1994). Pegler (1977) considered *P. flabellatus* as a valid species but Corner (1981), Guzman *et al*. (1993) now considered it as a synonym of *P. djamor*. The pink oyster, or *Pleurotus djamor,* is a fungus that grows extremely quickly and fruits readily on a variety of lignocellulosic substrates. It can grow temperature range between 26 and 35ºC with relative humidity levels around 80%.

Agricultural waste which is rich in cellulose, hemicellulose and lignin can easily grow by mushroom. A simple method of breaking down the lignin cellulosic components found in agricultural wastes is mushroom culture. It can easily colonise on any type of agricultural waste, including wheat straw or paddy straw, sugar cane bagasse, rice husk, banana leaves, banana pseudo stem, groundnut shell, sawdust, maize straw, ragi straw, mixed substrates and does so in 8 to 10 days.

Materials and Methods

Experimental site

The experiments on growth and yield of pink oyster mushroom (*Pleurotus djamor*) on different agro waste were carried out in laboratory of Plant Pathology at School of Agriculture, Uttaranchal University, Dehradun.

Collection of the substrate

The substrate viz., paddy straw, banana pseudo stem, rice husk, sugarcane bagasse, wheat straw was collected from Sudhowala chowk, Dehradun.

Source of spawn

The spawn of pink oyster mushroom was obtained from the laboratory of Plant Pathology, School of Agriculture, Uttaranchal University, Dehradun.

Preparation or Chemical sterilization of substrates

According to Sameera (2007), various substrates were sterilized using chemical sterilization. A variety of well-dried substrates, including rice husk, sugarcane bagasse, wheat straw, banana pseudo stem, paddy straw, and mixed substrates, were chopped into 5–6 cm pieces. After being transferred to a big drum, the substrates were steeped for eighteen hours in a solution containing formaldehyde (500 ppm) and carbendazim (75 ppm). After draining off extra water, the mixture was spread out to dry on a fresh sheet. The substrates were utilized for bed preparation, and their moisture content was kept at an ideal level.

Mushroom bed preparation

Before to usage, 100-gauge thick polyethene bags measuring 14" x 18" were sterilised by dipping in @ 2% formalin. The lower corners of the bags were then knotted with twine to produce a rounded bed. Multi-layered spawning at 2% of the substrate's wet weight was done during the filling of the straw. About 125gm of spawn are used in one bag filling. Thebags' mouths were carefully stitched shut after being filled 90% of the way. About 20-to-25-minute holes were made all around the filled bags with the aid of a sterilised needle. To get the desired results, 3 kg of agricultural waste was poured into each bag for individual treatment.

Result and Discussion

The efficacy of *Pleurotus djamor* growth characteristics and yield was demonstrated during the study. The substrate is one of the most crucial components of mushroom culture since it depends on the availability of nutrients to support the growth of mycelia and yield fruiting bodies. Furthermore, because the substrate in the cunny bags needs to be appropriate for the mycelium to penetrate the basal substrates as it is crucial for the mycelial development. The spawn's ability to fruit is affected by three phases of the mushroom cultivation process: spawn running, pinhead development, and fruit body formation. Results for spawn run, pinhead formation, maturation of fruit bodies and yield are shown in Table 1, 2 and 3.

Spawn running

The spawn run was first appeared on paddy straw i.e., 10.66 days, followed by wheat straw i.e., 11.66 days, wheat straw +paddy straw i.e., 12.00 days, wheat straw+ sugarcane bagasse i.e., 13.00days, sugarcane bagasse i.e., 14.66days, banana pseudo stem i.e., 14.66days and slowest was found on rice husk i.e., 16.66days respectively. In the present investigation are almost similar to the results obtained by other workers. Jegadeesh *et al.,* (2018) reported that *P. djamor var. roseus* takes about 12 to 25 days to complete spawn run and in the present study a quick spawn run time was recorded in paddy straw (10) days. In the *Pleurotus* sp. mycelium growing day was generally observed on 10-15 days (Ragunathan and Swaminathan, 2003). According to Sharma *et al.* (2002), the spongy nature of banana pseudo stem tissue can absorb more water and the result in high moisture content caused poor colonization of *P. sajor caju.*

Initiation of pin head formation

It took 13.66 days for pin head formation to form. The first pinhead formation was observed in 13.66 days in paddy straw, followed by 14.66 days in wheat straw, 15.00 days in wheat straw + paddy straw, 16.00 days in wheat straw + sugarcane bagasse, 17.66 days in sugarcane bagasse, and 18.66 days in banana pseudo stem. The pseudo stem of a banana showed poor pinhead development. Premordium initiation, or pin-head formation, was seen when mycelial growth invaded surfaces. The time required for the formation of pin-heads is comparable with other studies of (Ahmed, 1998). While (Fan *et al*., 2000) reported it to be 20–23 days. Tirky *et al.* (2017) observed the primordial initiation of *Pleurotus florida* on 17th to 26th days.

First and last harvesting of mushroom

The minimum days required for first harvest of mushroom after inoculation were recorded in paddy straw i.e., 16.66 days, followed by wheat straw, wheat straw + paddy straw i.e., 17.66 days, 18.33days. These treatments were at par with each other. wheat straw+ sugarcane bagasse and sugarcane bagasse required 19.66 days and 20.33days. whereas banana pseudostem required maximum number of days i.e.,22.66 days for

first harvest after inoculation of substrate. The minimum days required for last harvest after inoculation were recorded in *Pleurotus djamor* on paddy straw i.e., 36.66 days, followed by wheat straw and wheat straw + paddy straw i.e., 38.00 and 38.33days. wheat straw+ sugarcane bagasse and sugarcane bagasse required i.e., 39.66days and 40.66days respectively. The *Pleurotus djamor* on banana pseudo stem substrates required maximum number of days for last harvest after inoculation i.e., 43.33 days. Similar, results were reported by Krishnaveni and Saranya (2014) they noted 22.00 to 25.00 days were required for first, 28.00 to 31.00 days for second and 36.00 to 48.00 days for third harvesting after inoculation

Numbers of fruiting bodies

Paddy straw had the highest number of fruiting bodies (89.00), followed by wheat straw (78.33). There are 75.33 and 70.33 fruiting bodies in wheat straw + paddy straw and wheat straw + sugarcane bagasse, respectively. The sugarcane bagasse and banana pseudo stem had the lowest numbers of fruiting bodies, measuring 62.33 and 58.00, respectively. Similar findings were made by other researchers, such as Mondal *et al.,* (2010), who found that banana leaves took less time for oyster mushrooms to colonise, fruit, and harvest than rice straw. Previous studies by Patil (2009), Roding liana (2006), and Patil and Jadhav (1999) also revealed similar findings.

Length of stipe (mm)

The stipe length varied between 42.33 and 62.33 mm on various substrates. Paddy straw had the longest stipe length, measuring 62.33 mm, followed by wheat straw, measuring 59.66 mm. Stipe length was observed in wheat + paddy straw and Wheat straw and sugarcane bagasse i.e., 57.00 and 52.00 mm. The sugarcane bagasse and banana pseudo stem had the shortest stipe lengths, measuring 47.33 and 42.33 mm, respectively. The findings are consistent with Mondal et al. (2010), who found that rice straw produced more mushrooms overall and had greater stipe length and pileus diameter than banana leaves. Similarly, Dubey *et al. (*2019) reported that highest length of stipe found in rice straw among other substrates

Diameter of cap

Diameter of cap also varied i.e., 81.33 mm to 62.33 mm within substrates. Paddy straw had the largest cap diameter, measuring 81.33 mm, followed by wheat straw, at 77.33 mm. The cap's diameters were 73.00 mm for wheat straw + paddy straw and 70.33 mm for wheat + sugarcane bagasse. The pseudo stems of bananas and sugarcane bagasse had the lowest cap diameters, measuring 65.33 mm and 62.33 mm, respectively. The result is similar with Mondal *et al.* (2010).

Yield of different types of substrates

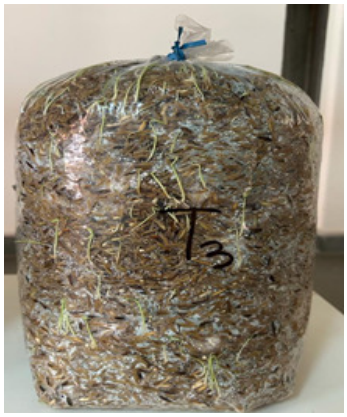
The yield of mushrooms was greatly impacted by the different substrate types. Paddy straw yielded the highest yield i.e., 737.33g/kg which was superior among all substrates. It followed by wheat straw gave second highest yield i.e., 720.66g/kg which was at par with wheat straw + paddy straw i.e., 710.00g/kg. Fourth yield wheat + sugarcane bagasse i.e., 701.00g/kg and fifth yield sugarcane bagasse i.e., 685.33g/kg. Lowest yield was obtained from banana pseudo stem i.e., 644.66g/kg. Similarly, Rajini Bisaria *et al*., (1987) cultivated oyster mushrooms using a variety of agricultural wastes, including wheat straw and paddy straw, and they found that wheat straw produced the highest yield. Dubey *et al.,* (2019) reported that maximum yield found in paddy straw and mushroom grown in the substrates composed from rice agricultural waste absorbed the available nutrient more efficiently than those composed from other agricultural wastes. Jegadeesh (2018) maximum yield (120.07%) of *P. djamor var. roseus* was recorded in paddy straw substrate. Karuppuraj *et al*. (2014) reported that the yield improvement of *P. florida* on unexplored locally available lignocellulosic materials such as paddy straw, wheat straw was used.

Table 1: Days required to complete spawn run and pin head formation of Pink Oyster Mushroom

Substrate	Spawn run	Pinhead
Paddy straw	10.66	13.66
Banana pseudo stem	15.66	18.66
Rice husk	16.66	00.00
Sugarcane bagasse	14.66	17.66
Wheat straw + sugarcane bagasse	13.00	16.00
Wheat straw + paddy straw	12.00	15.00
Wheat straw	11.66	14.66
CD @ 5%	1.576	1.529
CV	6.676	6.387


Paddy Straw


Banana pseudo stem


Rice husk


Sugarcane bagasse


Wheat straw + sugarcane bagasse


Wheat straw + Paddy straw


Wheat straw


Harvest

Fig. 1: Performance of different agro waste on growth and yield of Pink Oyster Mushroom.

Table 2: Days required for first and last harvesting of mushroom after inoculation

Substrate	First harvesting	Last harvesting
Paddy straw	16.66	36.66
Banana pseudo stem	22.66	43.33
Rice husk	0.0	0.0
Sugarcane bagasse	20.33	40.66
Wheat straw+ sugarcane bagasse	19.66	39.66
Wheat straw + paddy straw	18.33	38.33
Wheat straw	17.66	38.00
CD @ 5%	1.324	1.268
CV	4.588	2.141

Table 3: Effects of different substrates on maturation of fruiting bodies and yield of mushroom.

Substrates	No. of fruiting bodies	Length of stipe (mm)	Diameter of cap (mm)	Yield (g/kg dry substrate)
Paddy straw	89.00	62.33	81.33	737.33
Banana pseudo stem	58.00	42.33	62.33	644.66
Rice husk	0.00	0.00	0.00	0.00
Sugarcane bagasse	62.33	47.33	65.33	685.33
Wheat straw + sugarcane bagasse	70.33	52.00	70.33	701.00
Wheat straw + Paddy straw	75.33	57.00	73.00	710.00
Wheat straw	78.33	59.66	77.33	720.66
CD @ 5%	3.935	2.911	3.288	3.990
CV	3.629	3.628	3.058	0.380

Conclusion

As a result, paddy straw was ideal for *Pleurotus djamor* growth since it produced the best yield and required the least amount of time for spawn run, pinhead formation, and fruiting body maturation. This study shown that, in contrast to other substrates, the pink oyster mushroom, *Pleurotus djamor,* grew effectively in paddy straw. For the maximum yield, it is recommended that mushroom producers cultivate pink oyster mushrooms using paddy straw. One of the most environmentally responsible ways to combat the pollution and malnutrition caused by agricultural waste is to grow mushrooms upon.

References

Ahmed, S. (1998). Development of mushroom varieties suitable for rural level in Bangladesh. *Report presented in BARC Annual Review Programme*. 72–73

Alexopoulos, C.J. Mims, C.W. and Blackwell, M.M. (1996). Introductory Mycology, *fourth ed. John Wiley & Sons, Inc*., USA.

Chadha, K.L. (1994). Infrastructure for mushroom research in India. *Souvenir, National symposium on mushroom, NCMRT, Solan*, 22-34

Corner E.J.H. (1981). The agaric genera *Lentinus*, *Panus*, and *Pleurotus* with particular reference to Malaysian species. *Beihefte Nova Hedwigia*, **69**, 1-169.

Dubey, D., Dhakal, B., Dhami, K., Sapkota, P., Rana, M., Poudel, N. S. and Aryal, L. (2019). Comparative study on effect of different substrates on yield performance. *Global Journal of Biology, Agriculture &Health sciences*. **8**,1

Fan, L. Pandey, A. Mohan, R. and Soccol, C.R. (2000). Use of various coffee industry residues for the cultivation of *Pleurotus ostreatus* in solid state fermentation. *Acta Biotechnology.* **20**, 41–52.

Guzman G., Montoya L., Salmones D. and Bandala V. M. (1993). Studies of the genus *Pleurotus* (Basidiomycotina), II. *P. djamor* in Mexico and in other Latin-American Countries, taxonomic confusions, distribution and semi-industrial culture. *Cryptologia Botany,* **3**, 213-220

Jegadeesh, R., Lakshmanan, H., Kab-Yeul, J., Sabaratnam, V. and Raaman, N. (2018). Cultivation of Pink Oyster mushroom *Pleurotus djamor var. roseus* on various agro-residues by low-cost technique. *Journal of Mycopathologica.* **56**(3), 213-220

Karuppuraj, V., Chandra S. S. and Perumal, K. (2014). Yield improvement of *Pleurotus florida* fruiting bodies from locally available unexplored lignocellulosic substrates. *International Journal of Current Microbiology and Applied Sciences.*, **3**(10), 985-990.

Krishnaveni, M and Saranya, R. (2014). Cultivation of *Pleurotus florida* and *Calocybe indica* using Various Agrowaste. *Research Journal Pharmacy and Technology*. **7**(3),307-309.

Kumar, S., Singh, G., Mohit and Kannaujia, J.P. (2019). *In-vitro* evaluation of mycelial growth of *Pleurotus sapidus* against different botanicals, *Journal of Pharmacognosy and Phytochemistry*, **8**(1), 655-657.

Kumar, S., Singh, G., Singh, R., Kumar, P. and Bhatt, S.S. (2022). Assessment of Grain Extract Media on Mycelial Growth of *Pleurotus* spp. (*P. sapidus* and *P. flabellatus*). *Asian Journal of Environment & Ecology*, **17**(1), 10-16. DOI, 10.9734/AJEE/2022/v17i130279.

Kumar, S., Singh, G., Singh, R., Mishra, P., Sachan, S.K. and Sengar, R.S. (2020). Effect of different cereals flour additives on sporophores production of Oyster mushroom (*Pleurotus sapidus* and *Pleurotus flabellatus*). *Inter. J. of Chem. Studies*, **8**(1), 698-701.

Mondal, S.R., Rehana, M.J., Noman, M.S. and Adhikary, S.K. (2010). Comparative study on growth and yield performance of oyster mushroom (*Pleurotus florida*) on different substrates. *Journal of Bangladesh Agricultural University*; **8**, 213-220.

Patil, B.D., Jadhav, S.W. and Kakade, D.S. (1999). The studies in cultivation of *Pleurotus sajor-caju* on different substrates. *Journal of Maharashtra Agriculture University*. 14 (2), 156-158.

Patil, S.S. (2012). Cultivation of *Pleurotus sajor-caju* on different agro-wastes. *Science Research Reporter*. **2**(3), 225-228.

Patra, A.K. and Pani, B.K. (1995). Yield response of different species of oyster mushroom (*Pleurotus spp*.) to paddy straw. *Current Agriculture Research* **8**, 11-14.

Pegler, D.N. (1977). The classification of the genus *Lentinus* Fr. (Basidiomycota). *Kavaka,* **3**, 11-20.

Ragunathan, R. and Swaminathan, K. (2003). Nutritional status of *Pleurotus* spp. grows on various agrowastes. *Food Chemistry*, **80**, 371-375.

Rajini, B., Madan, M. and Bisaria, V.S. (1987). Biological efficiency and nutritive value of *Pleurotus sajor-caju*

cultivated on different agro wastes. *Biological wastes*, **19**, 239-255.

Salam, S., Kumar, S., Prasad, R., Bhatt, S.S. and Brohma, S. (2021). Effect of Botanical Regime on Mycelial Growth in Pink Oyster Mushroom (*Pleurotus djamor* Rumph.). *J. of the Andaman Sci. Association*, **26**(1),24-27.

Sameera, P. (2007). Disease of milky mushroom (*Calocybe indica* P&C) and their management. *M.Sc. Ag. Thesis*, Kerala Agricultural University, Thrissur, 118p.

Sharma, S.G., Chaudhaury, C., Dayaram and Jha, M.N. (2002). Compositional and enzymatic changes in banana pseudo stem residue during solid state substrate fermentation with *P. sajor-caju*. *Mushroom Researchers*. **11**(2), 89-91

Suresh, N., Ambika, J., Noorjahan, A. and Kalaiselvam, M. (2017). Pink oyster mushroom (*Pleurotus djamor*) and its efficacy against Human pathogen. *International Journal of Science Inventions Today*. **6**(6), 749-757.