

Utilisation of rice straw and husk

for oyster mushroom cultivation

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Mushroom cultivation offers a solution for recycling agro-waste as carbon pools into good quality protein, which is otherwise burnt in the field. Utilisation of rice straw and husk for oyster mushroom cultivation has been investigated to evaluate the best alternative substrate (rice straw, rice husk, banana leaves, sawdust and maize dry leaves) that supports the growth of mushrooms and produces the maximum yield. Data related to the time taken for complete spawn running, pinhead initiation, days to maturity of the fruiting bodies and total mushroom yield was recorded and analysed. A total of six treatments replicated six times were taken under the completely randomised design. Maximum yield was produced in rice straw + maize dry leaves and minimum in rice + sawdust. Thus, it has been seen that rice straw and maize dry leaves in combination proved to be best substrate for the cultivation of oyster mushrooms.

Keywords: Growth, Lignocellulosic substrates, Oyster mushroom, Yield

MUSHROOMS are achloro-phyllous, spore-bearing fruiting bodies of the fungi. They require certain substrates to cater to their needs for growth and multiplication, as they are unable to synthesize their own food through photosynthesis. Substrate acts as the source of a food supplying

medium on which spores of the fungus flourish on their own. This process utilizes all the degradable plant waste and turns it into edible mushrooms while enhancing the yield, biological efficiency and nutritional composition of the edible fungi. Mushroom cultivation offers an added advantage to recycling

agro-waste as carbon pools into good quality protein, much of which is otherwise burnt in the field. *Pleurotus* spp. is popular and widely cultivated throughout the world mostly in Asia, America and Europe because of its simple, low-cost production technology and high biological efficiency (BE).

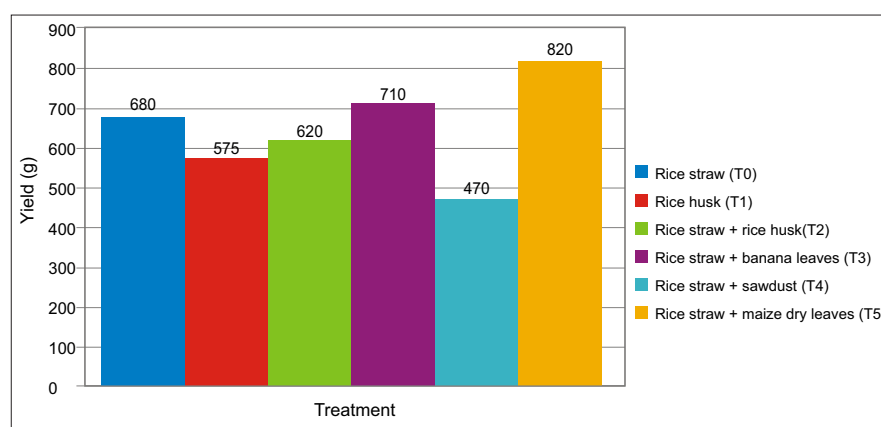


Spawning, bagging and production of oyster mushroom on different substrates

Moreover, the interest in oyster mushrooms is increasing largely due to its taste, nutritional content and medicinal properties. Oyster mushroom appears as a good source of several vitamins (thiamine, riboflavin, niacin, ascorbic acid and minerals (sodium, potassium, calcium, iron, etc). *Pleurotus* spp. has been reported to have anti-cancer, anti-microbial, anti-hypertensive, anti-hyperlipidemic and anti-allergic properties. Out of the 10,000 known species of mushrooms, 2000 are safe for humans and about 300 of them have medicinal properties. Agricultural wastes are rich in lignin-cellulosic components which are difficult to breakdown but that can effectively be done through mushroom cultivation. Oyster mushrooms are very nutritious products that can be generated from lignocellulosic waste materials. The bioconversion of agricultural wastes into a value-added product is a good means of their use. The property of edible mushroom fungi to convert complex organic compounds into simpler ones may be used to transform useless agricultural waste into valuable products. In this regard, a study was carried out at Mushroom Crop Room, Krishi Vigyan Kendra, Banka, Bihar Agricultural University Sabour, Bhagalpur during the period from September 2020–March 2021. Rice straw, rice husk, banana leaves, sawdust and maize dry leaves were collected from local areas of the Banka district. The mushroom crop room was cleaned with plain water; whitewash and complete sterilisation was done with 0.2% formaldehyde to complete the fumigation of the crop room. Plastic drums were filled with hundred litres of water and a solution comprising Bavistin (20 g), calcium carbonate (2 g) and formalin (120 ml) was prepared. The plastic drum was filled with substrates and left for 18 hours. After sterilization, the excess water was drained out and 60% moisture content in the substrate was used for bagging. The spawn was thoroughly broadcasted (80 g/kg) on substrates. Six treatments of 2 kg wet substrates were used, which were equally divided into six

Table 1. Efficacy of different substrates for *Pleurotus* spp. on spawn run (days), pinhead formation (days), fruiting body (days) and yield (g)

Treatment	Spawn run (days)	Pinhead (days)	Fruiting body (days)	Yield (g)
Rice straw (T0)	21	24	28	680
Rice husk (T1)	25	28	31	575
Rice straw + Rice husk (T2)	22	26	29	620
Rice straw + banana leaves (T3)	20	23	27	710
Rice straw + sawdust (T4)	26	29	32	470
Rice straw + maize dry leaves (T5)	19	22	26	820



Yield of first flushes on different substrates for oyster mushroom

bags, each representing a replication. The temperature of the crop room was maintained at 25–26°C and relative humidity at about 70–80% for cultivation.

The harvested fruiting bodies were weighed and data were recorded treatment wise for complete spawn run (days), pinhead formation (days), fruiting bodies formation (days) and yield (g). The minimum spawn running days were recorded in rice straw + maize dry leaves. Prior studies have found that the presence of the right proportion of alpha-cellulose, hemicellulose and lignin is responsible for a higher mycelium running rate. The minimum time taken for stimulation of primordial initiation was recorded in rice straw + maize dry leaves. The minimum days taken from the primordial stage to the harvesting stage were recorded in rice straw + maize dry leaves. The maximum yield was recorded in the treatment rice straw + maize dry leaves (820 g/2 kg) and the minimum yield was recorded in wheat + sawdust (470 g/2 kg) of the wet weight of the substrate (Table 1). Thus, it was concluded

that for cultivating *Pleurotus* spp. i.e. Oyster mushrooms, rice straw alongwith dry leaves of maize could be used for maximum yield.

SUMMARY

A study was carried out to evaluate the best alternative substrate among rice straw, rice husk, banana leaves, sawdust and maize dry leaves for supporting the growth of main crop mushroom and help produce the maximum yield. From the study, it was concluded that maize dry leaves enhanced the production of oyster mushrooms. Rice straw in combination with maize dry leaves required less time in spawn run, pinhead formation, fruiting bodies formation and yield production of the oyster mushroom. Thus, it can be used for oyster mushroom cultivation. To validate such findings more similar trials should be carried out in the future.

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