

Influence of different organic additives on spawn growth of *Pleurotus ostreatus*

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ABSTRACT

An experiment was conducted to determine the effect of different organic additives (cereal and leguminous flour of rice, wheat, maize, gram, chickpea, lentil, soybean and black gram) at different concentrations (2, 4 and 6%) on spawn growth of *Pleurotus ostreatus*. Among all tested organic additives, 6% wheat flour gave the maximum mycelial run rate (MRR) and took least time to complete mycelial growth as compared to other additives. The lowest MRR was observed in control (6.96 mm day⁻¹) on 15th days, which was significantly lower than all the other treatments indicating that addition of supplements enhances the spawn growth and minimizes the days of spawn growth.

Keywords: *Pleurotus ostreatus*, spawn, mycelial run rate, cereal, legume, flour

Mushrooms are fungi that can be produced on a variety of substrates and can be consumed by people of all ages (Nongthombam *et al.*, 2021). The cultivation of oyster mushroom is now becoming popular in developing countries because of easy and cheap cultivation technology (Sud and Jandaik, 2007) and is the third most cultivated mushroom in the world after shiitake and wood ear mushroom (Singh *et al.*, 2021). One of the several species in this genus, *P. ostreatus*, is consumed worldwide because of its flavour, taste, nutritional value, and therapeutic benefits. It has a wide range of uses in both food and medicine and is a strong source of protein, vitamins, and minerals (Etich *et al.*, 2013). Fresh mushrooms contain 85-90% moisture, 3-4% protein, 4-5% carbohydrate, 0.3-0.4% lipids and 1% vitamins (B complex, C and D) & minerals (Miah *et al.*, 2017; Ahmed *et al.*, 2009). Oyster mushrooms are reported to have antibacterial, antitumor, antithrombotic, hypoglycemic, anti-inflammatory, anti-hypertensive, and other medicinal attributes (Gunde, 1999).

Mushroom cultivation begins with spawn production (Stanley and Awi-Waadu, 2010). Spawn acts as the inoculum, which leads the mushroom to grow vegetatively (Royse, 2003). Vigorous spawn growth results in increased basidiocarp production and mycelium growth of mushroom is significantly impacted by the various additives (Shah *et al.*, 2004). Different grains were also evaluated for spawn production and yield of oyster mushroom (Sud and Jandaik 2007.). Keeping in view the importance and potential of growing oyster mushrooms in both rural and urban areas of the country, the experiment was conducted with the aim to study the influence of different organic additives (cereal and leguminous flour) on spawn growth of *Pleurotus ostreatus*.

Various organic additives were used in three different concentrations i.e. 2, 4 and 6% and were mixed in wheat grain for studying the days required for spawn development and to calculate the rate at which mycelium was running per day. The data

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obtained after addition of cereal flours and the number of days needed for spawn development is presented in Table 1. In the spawn development of oyster mushroom significant variation was observed in various

cereal flours at different concentration. In cereals, 6% wheat flour took lesser time i.e.11 days followed by rice flour and wheat flour, which required 13 days for complete spawn development in glass bottles.

Table 1. Days required for complete mycelial growth and mycelial run rates of *Pleurotus ostreatus* at different concentration of cereal flour

Additives	Concentration	Spawn growth (days)	MRR(mm/day)						
			3DAI	5DAI	7DAI	9DAI	11DAI	13DAI	15DAI
Wheat flour	2 %	13	4.95	6.97	7.43	10.56	9.58	9.26	8.02
	4 %	13	6.63	7.02	7.85	10.89	9.86	9.27	8.04
	6 %	11	8.39	8.40	9.42	11.48	10.95	9.26	8.03
Rice flour	2 %	13	6.79	8.47	9.41	10.60	10.47	9.29	8.06
	4 %	13	6.82	7.05	8.33	8.96	10.05	9.27	8.04
	6 %	13	5.22	5.75	6.95	7.82	9.12	9.27	8.03
Maize flour	2 %	15	5.22	5.09	6.46	7.15	7.50	8.04	8.01
	4 %	15	6.79	7.72	7.24	8.07	8.59	8.36	8.03
	6 %	15	6.08	7.15	6.63	7.31	7.76	8.10	8.03
Control		17	3.41	4.12	5.04	5.56	5.68	6.59	6.96
CD (5%)			0.23	0.34	0.65	0.49	0.34	0.33	0.36

DAI = Days after inoculation

Table 2. Days required for complete mycelial growth and mycelial run rate of *Pleurotus ostreatus* at different concentration of leguminous flour

Organic additives	Concentration	Spawn growth (days)	MRR(mm/day)						
			3DAI	5DAI	7DAI	9DAI	11DAI	13DAI	15DAI
Gram	2 %	13	6.68	7.99	9.29	8.95	8.57	9.26	8.03
	4 %	15	6.72	7.00	8.58	9.43	9.14	8.07	8.02
	6 %	15	5.00	4.40	5.43	6.45	6.60	7.55	7.37
Soybean	2 %	15	6.89	8.07	7.90	8.71	8.93	8.33	8.01
	4 %	15	4.07	6.09	5.35	5.86	6.43	7.13	7.03
	6 %	15	5.22	6.13	6.57	6.96	7.48	7.73	8.03
Black gram	2 %	15	5.12	7.79	7.18	8.06	8.41	8.07	8.02
	4 %	13	6.82	8.10	8.65	9.39	9.16	9.26	8.03
	6 %	15	5.28	5.71	6.04	6.47	6.99	7.56	7.37
Lentil	2 %	15	3.77	5.08	5.47	5.82	6.40	7.36	7.22
	4 %	15	5.11	7.11	6.08	7.25	7.51	7.74	8.02
	6 %	15	5.13	6.05	5.75	8.04	8.16	8.10	8.04
Chickpea	2 %	15	3.77	5.10	5.75	6.15	6.70	7.58	7.68
	4 %	15	5.18	7.13	7.20	7.84	8.22	8.15	8.03
	6 %	15	5.45	7.34	6.56	7.70	7.66	7.88	8.05
Control		17	3.41	4.12	5.04	5.56	5.68	6.59	6.96
CD (5%)			0.22	0.29	0.35	0.28	0.42	0.27	0.38

DAI = Days after inoculation

Treatment containing maize flour took maximum days of incubation (15 days) among all the treatments with mycelial growth rate declining after 11th day. Control (wheat grains) required maximum period (17 days) for complete mycelial growth (Table 1). The highest MRR was observed on 6% wheat flour (11.48 mm day⁻¹) while lowest MRR was observed in control (6.96 mm day⁻¹) (Table 3). It was interesting to note that MRR on wheat flour significantly varied with concentration while no significant difference could be observed in rice flour.

In case of leguminous flours as organic additive, 2% gram and 4% black gram flour required minimum time (13 days) to complete mycelial growth against 15 days in other treatments and 17 days in control. Highest MRR was observed on 2% gram flour and 4% black gram flour (9.26 mm day⁻¹) and lowest MRR was observed in control (6.96 mm day⁻¹) (Table 2). The least MRR was observed in control which indicates that addition of supplements enhances the mycelium growth in spawn.

Singh *et al.* (2017) in his studies evaluated the influence of different organic additives (pulses flour) on spawn production of oyster mushroom (*Pleurotus djamor*) and found the maximum mycelial growth (100 mm) in 2% pigeon pea flour followed by 1% black gram on the 20th day and minimum in control on the 20th days. Singh *et al.* (2021) evaluated effect of different organic additives on spawn production of *Cordyceps militaris* and reported maximum growth in maize flour. Kumar *et al.* (2019) studied the effect of different inorganic and organic additives on spawn growth of two strains (CI-17-04 and CI17-08) of milky mushroom (*Calocybe indica*) and concluded that maximum mycelial growth (90.00 mm) was found in rice powder @ 1%.

Quality of Spawn is an important concern for mushroom growers that influences mushroom yields. From the above experimental findings, it was concluded that both cereal and leguminous additives

enhanced the spawn growth rate and 6% wheat flour was the best additive among all additives evaluated for the spawn production of the oyster mushroom.

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