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Effect of subtract amount and self-position on yield oyster Mushroom (*P. Sajor Caju)*

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Abstract
Experiments were conducted at Department of Plant Pathology, T.D.P.G. College, Jaunpur Uttar Pradesh, in the two consecutive year 2010-2011 and 2011-12.Edible mushroom *Pleurotus sajor caju (Fr.)*' to evaluate the varying amount of substrate for the production of *P. sajor caju*. The experiments were laid out in completely Randomized design. In order to study the effect of different quantity of wheat straw on the yield of *P. sajor caju*, an experiment was conducted with six replications and five treatments viz. 0.75 kg, 1.00 kg, 1.25 kg, 1.50 kg, and 2.0 kg dry wheat straw as substrate. The substrate preparation was done by using technique described earlier in cultivation techniques. Out of these different quantities of substrate used, the 2.0 kg dry substrate gave the maximum yield. This was followed by the yield obtained from 1.50kg, 1.0 kg and 0.750 kg dry substrate. The result also revealed that the biological efficiency of 1.25 kg and 1.0 kg substrate were found superior during 2011 and 2012 respectively in comparison to other treatments. It may be attributed due to increase in growing surface area.

Keywords: Biological efficiency, substrate, wheat straw and treatments

Introduction
Oyster mushroom (*Pleurotus sajor caju*) is an edible mushroom that belongs to the family Pleurotaceae (Randive DS *et al*. 1949) [11]. The term mushroom applies mostly to those fungi that have stem (stipe), cap (pileus), hymenium (lamellae) and spores on the underside of the cap (Masarirambi MT *et al*. 2011) [6]. Oyster mushroom can be grown at temperature ranging from 20 to 300 c and relative humidity 55%-70%. It can also be cultivated in summer months by providing the extra humidity required for its growth in hilly areas above 900 (masl), the best growing season is during March/April to September/October and in the lower regions from September/October to March/April. P. sajor caju are rich source of proteins, carbohydrates, minerals & vitamins. Mushroom contains digestible proteins (10%-40%), carbohydrates (3%-21%), dietary fiber (3%-35%), on dry weight basis which is higher than those of vegetables and fruits and is of superior quality (Mallavadhani UV *et al*. 2006) [5]. High potassium to sodium ratio contain in Pleurotus species helps to cure patients suffering from hypertension & heart diseases. Mushroom as an excellent food source to alleviate malnutrition in developing countries due to their flavor, texture, nutritional value and high productivity per unit area (Eswaran A and Ramabadran R. 2000) [1]. The different species of Pleurotus normally grow within a temperature range from 15-25 ^{o}C and on various agricultural waste materials as substrate. Although Pleurotus is leading mushroom in country most of the production relies on P. sajor-kaju and is only confined in winter season. Still there is very negligible supply of oyster mushroom in summer season although the demand is increasing day by day. So, P. florida; a species of oyster mushroom growing easily in warmer condition may be the best alternative for the year round supply of Oyster mushroom supporting summer season. P. florida gives the highest yield at 30 ^{o}C and is preferred for summer season cultivation (Uddin *et al*., 2010) [13]. Oyster mushroom production using various sources of agricultural wastes has received a renewed interest of researchers (Jeznabadi *et al*. 2016; Mohamed *et al*. 2012) [3, 8]. Furthermore, the appropriate preparation of the substrate is crucial for the production of maximized yield of Pleurotus mushrooms (Choi *et al*. 2009; Obodai and Johnson 2002; Soliman 2011) [10, 9, 12]. Pleurotus mushroom species, unlike button mushroom (Agaricus bisporus), are primary decomposers (Mohamed *et al*. 2014) [8].

They can break down and absorb the components of substrate materials that have not been degraded. Therefore, cultivation of Pleurotus mushrooms is considered to be a simple, low cost, and environmentally friendly technology for the utilization of rural and agro industrial residues in the developing countries (Kirbag and Akyu ¨z 2008; Mohamed *et al*. 2011; Zhang, *et al*. 2014) [4, 8, 14].

Fig 1: Cultivation of *P. Sajor caju*

Fig 2: Growth stage of *P. Sajor caju*

Fig 3: Growth stage of *P. Sajor caju*

Fig 4: Mushroom Production

Material and Methods

Experiments were conducted at Department of Plant Pathology, T.D.P.G. College, Jaunpur in the two consecutive year 2010-2011 and 2011-12.Edible mushroom *Pleurotus* sajor caju (Fr.)' Singer to evaluate the varying amount of substrate for the production of *P*. sajor caju. The experiments

were laid out in completely Randomized design. In order to study the effect of different quantity of wheat straw on the yield of *P. sajor caju*, an experiment was conducted with six replications and five treatments viz. 0.75 kg, 1.00 kg, 1.25 kg, 1.50 kg, and 2.0 kg dry wheat straw as substrate. The substrate preparation was done by using technique described earlier in cultivation techniques. The observation like average weekly maximum and minimum temperature and relative humidity during experimentation, moisture content of the substrate at the time of spawning, days taken for first harvest and total yield of mushroom of all the harvest were recorded in each treatment. Substrates preparation and bags filling: substrate for mushroom cultivation. One hundred litres of tap water was filled in a plastic drum of 200 litre capacity. A stock solution with 125 ml formaldehyde and 7 g Bavistin in water. This solution was stirred properly with a slick for its mixing. Now 10 kg dry straw abstrate was steeped completely in this chemical solution. The mouth of the container was closed with the lid and kept as such for 18 hours. After 18 hours the straw was taken out from the chemical solution and put on a wire sieve for removal of extra solution. It was then spread in thin layers over a clean coneneted floor for further removal of excess moisture. The mushroom were grown on Paddy straw in surface sterilized polythene bags measuring 60 x 45 cms in size. These surface sterilized Polythylene bags (fig 1 to 4) were taken and two small vents were made on both corners of the bottom side for leaching the excess water of the chemically treated substrate. The two layer spawning was done by using the 120 g of spawn/kg dry substrate in a bag. One third-quantity (approximate 1.3 kg wet straw) of 1 kg dry substrate of above prepared subsrate was filled in these bags and gently pushed down. The fully grown spawn was broad casted over the upper surface of the substrate. The rest of the substrate (approximate 1.4 kg wet straw) was filled in the remaining spaces of the bags and the mouth of the bags were tied with threads. The spawned bags were transferred to spawn running room and kept on a flat surface under prevailing room temperature. These bags were watched daily for spawn run. When full growth of mycelium of fungus was seen in the substrate the polythene coverings were removed. The blocks of compact substrate were transferred in the cropping room, which was earlier surface sterilized, under prevailing room temperature. Humidity of cropping room was maintained by sprinkling of top water on the walls, roof, floor and beds with the help of sprayer and automizer frequently. The data were analysed statistically to drawn the conclusion.

Results and Discussion

It is apparent from Table 1 that the results of yield and yield attributing characters of mushroom obtained from different amount of substrates were compared. The substrates used in this study showed variation in spawn run, duration of first fruiting, days to harvest, total yield and final substrate weight. Highly significant results were observed among treatments in terms of days taken for colonization duration of Pleurotus sajor-caju. Indicated that all the time of spawning the moisture content of the substrate was 71 percent and 72 percent during 2011 and 2012, respectively. Days taken for spawn run varied 20-23 days and 19-23 days. Maximum i.e. 23 days taken for spawn run was recorded on 2.0 kg dry substrate during both the years. It was followed by 1.50 kg dry subsrate (22 and 21 days) 1.25 kg and 1.0 kg dry substrate (21 and 20 days) and 0.750 kg dry substrate (20 and 19 days), respectively. Minimum days taken for spawn run (20 and 19 days) was recorded in 0.750 kg dry subsrate. As regards days taken for first harvest minimum i.e. 24 and 22 days in 2011 and 2012 respectively was recorded on 0.750 kg dry substrate. Maximum i.e. 28 and 27 days in 2011 and 2012, respectively taken for first harvest was observed on 2.0 kg dry substrate followed by 1.50 kg (27 and 23 days), 1.25 kg and 1.0 kg (25 and 22 days) and 0.750 kg dry substrate (24 and 22 days), respectively.

With a view of determine the effect of varying amount of substrate on production of *P. sajor caju*, the out of these different quantities of substrate used, the 2.0 kg dry substrate gave the maximum yield. This was followed by the yield obtained from 1.50kg dry substrate. Progressive increase in mushroom yield with treatment of substrate has also been reported Gupta and Dhar (1993) [2]. The result also revealed that the biological efficiency of 1.25 kg and 1.0 kg substrate were found superior during 2011 and 2012 respectively in comparison to other treatments. It may be attributed due to increase in growing surface area

Table 1: To determine the varying amount of substract for the production of *P. sajor caju* Weekly average max. and min. temperature and R.H. during 2011 24.0 ^{0}C – 12.4 ^{0}C and 89.0-58.10% Weekly average max. and min. temperature and R.H. during 2012 22.50 ^{0}C – 13.0 ^{0}C and 90.80-55.40%

Amount of Substrate (dry weight)	Moisture content of the substrate at spawning %		Days taken for spawn run		Days taken for first harvest		Mushroom yield (g/kg dry substrate) in 30 days		Biological efficiency %	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
0.75 kg	71	72	20	19	24	22	286.50	292.00	28.65	29.20
1.00 kg	71	72	21	20	25	22	385.00	395.00	38.50	39.50
1.25 kg	71	72	21	20	25	22	481.00	476.50	48.10	417.65
1.50 kg	71	72	22	21	27	23	575.00	562.00	57.50	56.20
2.0 kg	71	72	23	23	28	27	674.00	654.30	67.40	65.43
CD at 5%	-	-	-	-	-	-	7.51	12.30	-	-

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