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Cultivation of Oyster mushroom (*Pleurotus florida*) in North Chotanagpur region of Jharkhand on locally available subtract

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Abstract

Seven different locally available subtract viz. mustard straw, finger millet straw, Ground nut straw, maize cab husk, paddy straw, and Banana plant straw, were evaluated along with wheat straw as standard check for the production of Pleurotus florida during the year 2012- 13. The experiment was conducted under the optimum favorable condition at Mushroom Production Unit, Holy Cross K.V.K. Hazaribag. The data were recorded in term of time taken for total harvesting days, cost of cultivation, days of watering, yield and B:C ratio also. The ground nut straw was found to be the most suitable locally subtract for Plurostus spp. Production in terms of yield (2.116 Kg/ 5 kg Bundle) and cost of cultivation was also minimum 22 Rs/ Bundle and total harvesting day were 21 day and B:C Ratio was also maximum 1:6-5 of Banana subtract was found to be next best treatment (2.105kg/5kg Bundle) as for as the total cropping days were to 55 days comparatively maximum to all the substrate and cost of cultivate was 28 Rs/Bundle and B:C ratio was at par with ground nut used subtract (1:5.8). However other treatment was rated below the standard check (1.9 kg/5 kg bundle). In Banana in terms of day took 55 days which were maximum compare to all treatment which is raised 28-45 day in different replication. This is the maiden attempt for production of Oyster mushroom cultivation on locally available substrates in the platue zone of Jharkhand. After this result now farmer is cultivation the mushroom by using the locally available straw like as finger millet, mustard, Banana and Paddy. It is becoming the source of nutritional security and option of livelihood security.

Keywords: Oyster mushroom, North Chotanagpur region, locally available subtract

Introduction

This Mushrooms are fleshy, spore-bearing reproductive structures of fungi grown on organic substrates and for a long time, have played an important role as a human food due to its nutritional and medicinal properties (Etich, et al 2013). Mushrooms are a good source of protein, vitamins and minerals and are known to have a broad range of uses both as food and medicine. A high nutritional values of oyster mushrooms has been reported with protein (25-50%), fat (2-5%), sugars (17-47%), mycocellulose (7-38%) and minerals (potassium, phosphorus, calcium, sodium) of about 8-12% (Stanley, 2011). Edible mushrooms are also rich in vitamins such as niacin, riboflavin, vitamin D, C, B1, B5 and B6 (Syed, et al 2009). Oyster mushroom can be grown on various substrates including paddy straw, maize stalks/cobs, vegetable plant residues, bagasse etc. (Hassan, 2011). This has been reported to influence its growth, yield and composition (Iqbal, et al 2005). However, an ideal substrate should contain nitrogen (supplement) and carbohydrates for rapid mushroom growth (Khare, et al 2010). Oyster mushroom cultivation can play an important role in managing organic wastes whose disposal has become a problem. Malnutrition is a problem in developing countries and these wastes can be recycled into food and environment may be less endangered by pollution (Eswaran and Ramabadran 2000). Many of mushrooms pose a range of metabolites of intense interest to pharmaceutical e.g. antitumour, immunomodulatory, antigenotoxic, antioxidant, anti-inflammatory, hypocholesterol-aemic, antihypertensive, antiplatelet aggregating, antihypergly caemic, antimicrobial and antiviral activities antitumour, immunomodulation agents, and hypocholesterol-aemic agents and food (e.g. flavor compound) industries (Chang, 2007). Cultivated mushrooms have higher protein contents and minerals, low in fat and rich in

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vitamins B, vitamin D, vitamin K and sometimes vitamins A and C (Manzi and Aguzzi 2001). Traditionally, the cultivation of *Pleurotus sajor-caju* is performed on different composted and pasteurized agricultural residues. North Chota Nagpur region of Jharkhand falls under platue region of the state which has typical undulated land and erratic rainfall pattern 1150-1300 mm. The temperature fluctuated in the Zone from 14-40°. Since availability of wheat straws for its cultivation is problem in this region, there is a need to search for a suitable alternative substrate for its cultivation out of locally available materials in the state. Oyster mushroom is an attractive crop to cultivate in the state since long one of the most charming point, would be that it may cultivate on different agriculture waste. It enable us to acquires substrate materials at low price or even free of cost and to conserve environment by recycling wastes. Oyster mushroom is the only mushroom species which can make use of the largest variety of wastes substrates with its fast mycelia growth and its multilateral enzymes system thus can biodegrade nearly all types of available waste (Jozef P., 2004).

The aim of present investigation was to evaluate different locally available plant materials as a potential alternative substrate for oyster mushroom cultivation.

Methodology

An experiment was conducted at Mushroom Cultivation Unit. Holy C ross KVK. Hazaribag Jharkhand during the month of January 2012 - March 2012 under the favorable condition in house. Spawn of *Pleurotus florida* was procured from mushroom cultivation unit of Holy Cross K.V.K. Hazaribag. Seven different locally available plant materials were to collect from demonstration agriculture farm of KVK viz: mustard straw, finger millet straw, Ground nut straw, maize cab husk, paddy straw, w and Banana plant straw and wheat straw. The dried plant after harvesting were first chopped in smaller pieces size (3.5 cm), socked in water before soaking straw in water. The substrate was treated with solution containing 0.1 percent formalin and 0.05 percent corbandazim 50 wp. After socked in water up to 12 hours, remove from water and dried up to maintain the 60% moisture and then subtracted was filled in P-Polythene (18"X24"). The filled subtracted in PP-Poly bag was weight up to 5 kg in each bundle approximately. During the filled bag spawn has been used in different layer up to 150 g. As the same wheat straw used bags filled accordingly. Each treatment was replicated five times and bags were placed in house on iron shelves. After complete the spawn run on substrate the polythene bag were removed and place the bundle as such since development of fruit body in bundle and watering sufficiently for maintaining the moisture in bundle. All the standard cultural practices were maintained for proper development of fruit bodies inside the moist and humid condition house. The data was recorded in terms of total harvesting days, cost of cultivation, B: C ratio and yield up to 55 days.

Results and Discussion

A perusal of data presented in Table 1 clearly depicts that the growth of mycelia in all substrate. However the ground nut substrate maximum yield (2.116 kg/bag) having maximum no. of fruit bodies (108), significantly followed by banana substrate used bundle (2.105kg/bundle and 97 respectively). The minimum yield (0.370 kg/bundle) was recorded on maize cab husk and finger milled used substrate 0.590 kg/bundle. The control check bundle of wheat was produce (1.9 kg/bundle and 86 fruit body's)

As for as the time, total day of crop were recorded minimum by G.nut substrate used bundle (21) day as compared to wheat subtracted use bundle 28 days.

Another substrate was recorded as taken maximum time, Banana substrate used bundle recorded 55 day. The interesting observation were noted that on groundnut substrate used bundle that once the pinhead of fruit body has been formed all the production come within a weak. It produces rapidly and recorded minimum times of harvesting the crop in this respect other straw bundle were took 21 to 55 days. The B: C ratio was also higher of ground nut subtracted used bundle is 1:6.5 and from check treatment f wheat subtract was 1:3.27.

Our findings on Maize substrate are fully corroborated with Mendez et al 2005 who have reported that the grew Pleurotus ostreatus on maize straw and analyzed the mushroom fruiting bodies for three flushes for amino acid profile and nitrogen contents. They observed no significant effect of substrate for these attributes but nitrogen contents of fruiting bodies increased from 4.13 gram to 5.74 gram in 1st to 3rd flush respectively. Weed plants such as Lantana camara, Teohrosia purpurea, Cassia sophera, Ageratum conzoides, Parthenium argentatum, Sida acuta and Leonotis spp. encountered the problem of low yield on 2nd flush for these substrates but they suggested the addition of rice straw in the weed plants based substrate to overcome the problem.

Finding of this study similar with Shahid, et al 2006 who have reported that this approach can overcome the problem of low yield in later flushes to great extent. Different methods of compost preparation

Table 1: The effect of different subtract on yield, cost of cultivation and B:C ratio

Treatment/subtract use of crop	Total harvesting days	Yield/bundle in Kg	Cost of cultivation	Days of watering	B:C ratio
Wheat	28	1.9	28	33	1:3.27
Mustard	37	1.75	28	46	1:3.6
Finger millet	21	0.59	24	23	1:1.5
Groundnut	21	2.16	22	38	1:6.5
Banana	55	2.105	28	35	1:5.8
Paddy	38	1.090	28	42	1:2.29
Maize	45	0.370	22	No spray of water	1:2.1

and lime concentration has the maximum number of flushes and the highest yield (295g/1.5kg substrate) in Pleurotus sajor-caju obtained from wetting wheat straw + 2% lime concentration.

Our findings on wheat straw treatment are correlated with Dundar et al 2008 who have reported that the cultivated Pleurotus ostreatus, Pleurotus eryngii and Pleurotus sajor-caju on wheat stalk substrate. Pleurotus eryngii, Pleurotus ostreatus and Pleurotus sajor-caju took 85.27 days, 82.64 days and 67.46 days respectively. It was observed that strip opening, forming big holes, or half opening polypropylene bags result in higher yield and larger sporophores. There are many factors which affect the yield, compost preparation moisture level and temperature fluctuation cause low yield. When pH, moisture level and C/N ratio is best then maximum number of pinheads and mushrooms formed.

Bultosa et al 2011 found the highest ash content in P. sajor-caju grown on bean straw and wheat straws and the lowest content was for P. florida grown on bean straw which is similar with the finding of this study.

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