BIOCONVERSION OF AGRO WASTE INTO EDIBLE PROTEIN RICH MUSHROOM BY
PLEUROTUS SAJOR CAJU (FR.) SINGER

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ABSTRACT
Pleurotus sajor caju (Fr.) Singer was cultivated on the different agricultural wastes (Substrates) singly Wheat straw, paddy straw, soybean straw, pigeon pea straw and green gram straw or combine with Wheat + soybean, Wheat + pigeon pea, wheat+ green gram (1:1) and wheat alone to determine fresh weight, number of fruiting bodies and protein content of oyster mushroom. Pleurotus sajor caju contains 20-35% of protein (dry weight basis) which is higher than any other vegetables and fruits. Agricultural waste may be utilized for commercial purpose and avoids the pollution by using it in proper way. It also helps to increases the economy of farmer as a side business to reduce the suicides of them. No land is required for cultivation of it and provides self-employment. In the present study different lignocellulosic agro wastes were used for cultivation of oyster mushroom. The highest protein percentage was found when it cultivated.

KEY WORDS: Lignocellulosic wastes, non-conventional food, Pleurotus, Protein.

INTRODUCTION
Sufficient supply of food in our country is most precious asset. Now a day with increasing population and conventional agricultural methods, we cannot cope up with food problem. In India, due to population explosion most of people living under below poverty line and are landless. The balanced diet is essential for normal growth of human beings, protein is one of them. The required demand of food materials is insufficient for human consumption. Especially a large population found protein deficiency in their diet. Pleurotus is richer in protein, vitamins, minerals, fibers, amino acids and low sugar and fat. It can be cultivated by landless worker in a small room on a different agricultural wastes which available in rural area. Along with these mushroom industries has potential for providing adequate employment opportunities to landless labors, women, and educated unemployed. Mushroom industries in India developing fast and present mushroom production is about 50,000 tons in 2004-05 of the entire mushroom (Suman and Sharma, 2005). Pleurotus has great demand in metropolitan cities. It has a one of the important non-conventional food with great demand abroad.

In India, paddy and wheat straw were used for commercial production of oyster mushroom (Jain and Vyas, 2002). Paddy straw proved to be best substrate for cultivation of oyster mushroom (Bano and Shrivastava, 1962; Bonatti and et. al, 2004). The fungi used for conversion of lingo-cellulosic materials into protein rich food by non-conventional method. Different types of cellulosic substrates were used for cultivation of oyster mushroom. Next to paddy straw, wheat straw proved to be best substrate for cultivation of Pleurotus species (Bhatti et. al, 1987; Thampi et. al., 1966; Bonatti et.al., 2004). Sorghum straw was used effectively for cultivation of oyster mushroom (Bahuahandi and Munjal, 1989). Similarly Bhandari et. al. (1991) successfully cultivates Pleurotus sajor caju on Echinochloa frumentacea (Poaceae) and Eleusine coracana (Poaceae) and grasses. Chemical study was carried out by Patrabansh and Madan (1997). In the present study the effect of different agro waste were used for cultivation of oyster mushroom singly or combined substrates. The number of fruiting bodies, fresh weight and protein content were determined.

MATERIALS AND METHODS
Source of spawn- The spawn of oyster mushroom obtained from NCL, Pune and mushroom research centre, Agriculture College, Pune, India.

Collection of different agricultural substrates- After harvesting of crops, the plant debris commonly burnt in the field causes pollution .These agricultural wastes were used in for cultivation of Pleurotus sajor caju. Wheat, paddy, soybean, pigeon pea and green gram debris were collected from different fields and brought into laboratory separately in gunny bags.

Cutting and sterilization- Wheat straw, paddy straw, soybean straw, pigeon pea straw and green gram straw were used for cultivation of oyster mushroom, followed by method proposed Bano and Shrivastava (1962) with slight changes. Dried agro wastes were chopped separately into 1-2 cm long and soaked into the water overnight, excess of water drained off. These substrates were dipped separately into the hot water at 80°C for one hour.
Spawn preparation- Wheat grains were boiled in the water bath for 20 min and mixed with 4% CaCO3 and 2% CaSO4. This inoculated with strain for mycelial growth fully covered the grains.

Preparation of bed and spawning- Polythene bags of size 20x30 cm with holes were sterilized and filled with the substrate separately or combine. The 1 kg of lignocellulosic substrates samples were used for preparation of bed in combination with wheat+ soybean, wheat+ pigeon pea, wheat+ green gram in 1:1 proportion and wheat separately as a control. These substrates were transferred into pre-sterilized transparent polythene bag inoculated with 2% of spawn of oyster mushroom. These bags were 200 u in thickness, tied at the top and provide perforation. Five layers of 2% spawn were added into the combined or singly substrates.

Incubation- After inoculation bags were transferred into incubation room where 27+_ 2 °C temperature and 80-90% moisture were maintained with sufficient light and ventilation (Madan et.al, 1987). Water sprayed after regular intervals by hand sprayer. After incubation of two weeks polythene bags were cut opened carefully without disturbing the bed.

Harvesting- After incubation of 19-22 days, initiation of fruiting bodies was produced. Fruiting bodies were counted according to their size and their fresh weights were measured separately. 

RESULT AND DISCUSSION

Present study indicates that the substrate used combine in 1:1 ratio are more beneficial for cultivation of Pleurotus sajor caju. It is clear from Table No.1 that yield of Pleurotus sajor caju increased on wheat+ soybean and wheat + pigeon pea (682 and 682 gms. respectively). Development of Fruiting bodies and protein content of Pleurotus sajor caju cultivated on different agro substances shown in Figure 1.

Similar study was carried out by Rajak Shyamal et. al. (2011). Highest protein content was observed in wheat+ soybean and wheat + pigeon pea (29.45and 29.35 respectively) as compared to other substrate. These results were confirmed with the finding of Singh et. al. (2003). It is concluded from this study wheat+ soybean and wheat + pigeon pea were suitable substrate for cultivation of Pleurotus sajor caju.

Table No. 1: Development of fruiting bodies and protein content of Pleurotus sajor caju cultivated on different agro substrates.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Substrate used singly or Comb.(1:1)</th>
<th>Mycelial growth completed</th>
<th>Initiation of fruiting bodies</th>
<th>Number and size of fruiting bodies (cm)</th>
<th>Fresh weight (gm/bed)</th>
<th>Protein content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-10 cm</td>
<td>11-15 cm</td>
<td>16 and more</td>
<td>Total Number</td>
</tr>
<tr>
<td>1</td>
<td>Pigeon pea</td>
<td>17</td>
<td>21</td>
<td>17</td>
<td>12</td>
<td>06</td>
</tr>
<tr>
<td>2</td>
<td>Soybean</td>
<td>15</td>
<td>19</td>
<td>18</td>
<td>10</td>
<td>04</td>
</tr>
<tr>
<td>3</td>
<td>Green gram</td>
<td>18</td>
<td>22</td>
<td>14</td>
<td>09</td>
<td>04</td>
</tr>
<tr>
<td>4</td>
<td>Wheat</td>
<td>14</td>
<td>18</td>
<td>14</td>
<td>10</td>
<td>08</td>
</tr>
<tr>
<td>5</td>
<td>Paddy</td>
<td>15</td>
<td>19</td>
<td>16</td>
<td>11</td>
<td>07</td>
</tr>
<tr>
<td>6</td>
<td>Wheat + soybean</td>
<td>16</td>
<td>20</td>
<td>18</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Wheat + pigeon pea</td>
<td>17</td>
<td>21</td>
<td>16</td>
<td>11</td>
<td>09</td>
</tr>
<tr>
<td>8</td>
<td>Wheat + green gram</td>
<td>17</td>
<td>20</td>
<td>16</td>
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</tbody>
</table>
Figure 1. Development of Fruiting bodies and protein content of *Pleurotus sajor caju* cultivated on different agro substrates.

REFERENCES