Evaluation of yield performance of *Pleurotus sajor-caju* on different agro-based wastes

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*Pleurotus sajor-caju* a nutrient rich mushroom was cultivated on four different substrates, viz. Paddy straw, wheat straw, Apple leaf and Chinar leaf substrates. It was observed that its yield or biological efficiency was maximum on paddy straw followed by wheat straw, apple leaves and Chinar leaves. It was also observed that *P. sajor-caju* gave the maximum yield in the first flush followed by second, third and fourth flush except in case of Chinar leaves where the yield obtained in second flush was comparatively higher than first flush.

Key words: *Pleurotus sajor-caju*, cultivation, biological efficiency, substrate.

INTRODUCTION

Food production in large quantity is a challenge but safe disposal of crop residues is a great problem. Edible fungi are natural recycler which converts lignocelluloses wastes into protein rich health food. Malnutrition is a problem in developing third world countries. The Food and Agriculture Organization have recognized mushrooms as food contributing protein nutrition to the countries depending largely on cereals. Mushrooms with their flavour, texture, nutritional value and high productivity per unit area have been identified as an excellent food source (Eswaran and Ramabadran, 2000). *Pleurotus sajor-caju* commonly known as Dhingri is an important edible mushrooms gaining popularity in recent years because of its high nutritional value and ability to grow on diverse agricultural wastes. The genus is characterized by its high protein content 30 to 40% on dry weight basis (Sharma and Madan, 1993) which is twice that of vegetable. Dhingri mushroom can help in solving the problems of malnutrition and disease. Poppe (2000) reported that there are about 200 kinds of waste in which edible mushrooms can be produced. Various agricultural wastes rich in cellulose are being used as substrates for cultivation of Dhingri mushrooms (Thomas et al., 1998). *Pleurotus* species require a temperature of 20 to 30°C both for its vegetative growth and reproductive phase in natural habitat (Chang and Miles, 2004). Since the climate of Kashmir is quite conducive for the growth of *Pleurotus* species, therefore its cultivation can be carried out on large scale easily which in turn can empower the economy of farmers. Also in Kashmir a lot of agricultural residues rich in lignocelluloses are generated every year, which can be used as base material for cultivation of mushrooms *P. sajor-caju*. The present study aimed to examine the biological efficiency or yield of *P. sajor-caju* on different agro-based wastes used for its cultivation.

MATERIALS AND METHODS

The pure mycelial culture was maintained on potato-dextrose agar (pH=7) containing 20% potato extract; 2% dextrose; 2% agar as recomended by earlier workers (Das and Mukherjee, 1996). For preparing the pure spawn wheat grains were used as a nutrient...
Table 1. Days for completion of spawn running, pinhead formation and fruiting body formation of *P. sajor-caju* on different substrates.

<table>
<thead>
<tr>
<th>Substrates</th>
<th>Spawn running</th>
<th>Pinhead formation</th>
<th>Fruitig body formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy straw</td>
<td>17-19</td>
<td>21-23</td>
<td>25-27</td>
</tr>
<tr>
<td>Wheat straw</td>
<td>22-24</td>
<td>28-30</td>
<td>32-34</td>
</tr>
<tr>
<td>Apple leaves</td>
<td>25-28</td>
<td>31-36</td>
<td>42-44</td>
</tr>
<tr>
<td>Chinar leaves</td>
<td>30-34</td>
<td>40-44</td>
<td>47-49</td>
</tr>
</tbody>
</table>

Table 2. Yield performance of fresh mushrooms.

<table>
<thead>
<tr>
<th>Substrates</th>
<th>Yield (g)/500 g dry substrate</th>
<th>Biological efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>first flush</td>
<td>second flush</td>
</tr>
<tr>
<td>Paddy straw</td>
<td>280.4±4.3</td>
<td>265.7±3.9</td>
</tr>
<tr>
<td>Wheat straw</td>
<td>225.1±2.6</td>
<td>220.4±2.9</td>
</tr>
<tr>
<td>Apple leaves</td>
<td>169.3±3.1</td>
<td>146.5±2.4</td>
</tr>
<tr>
<td>Chinar leaves</td>
<td>115.4±2.7</td>
<td>145.2±3.2</td>
</tr>
</tbody>
</table>

The values are mean of three replicates ± S.D.

RESULTS

The analysis of yield on all the four substrates (Paddy straw, Wheat straw, Apple leaves and Chinar leaves) used for the cultivation of *P. sajor-caju* gave more or less significant results. However, the there was a quite momentous variation in the time interval needed for completion of spawn running, pinhead formation and fruiting body formation on different substrates. In all the cases the time duration for the formation of fruiting bodies was longer in case of Chinar leaf substrate (47-49 days), followed by Apple leaf substrate (42-44), Wheat straw (32-34 days) and Paddy straw substrate (25-27 days) as shown in Table 1. The trend was same for the spawn running and pinhead formation that is, more time was consumed in case of Chinar leaf substrate followed by apple leaf substrate, wheat straw and paddy straw substrate. While analyzing the total yield of *P. sajor-caju* on the above mentioned substrates the trend was opposite, where the highest yield was found on Paddy straw substrate (747.1 g/500 g dry weight), followed by Wheat straw (623.7/500 g dry weight), Apple leaf (478.1/500 g) and Chinar leaf substrate (426.8/500 g dry weight) as shown in Table 2. The biological efficiency of the mushroom was 149.4, 124.7, 95.62 and 85.3 on Paddy straw, Wheat straw, Apple leaf and Chinar leaf substrate respectively. While examining the yield achieved in each flush it was observed that *P. sajor-caju*...
Figure 1. Mature fruiting bodies of *P. sajor-caju* on a) Chinar leaf, b) Paddy straw, c) Wheat straw and d) Apple leaf substrates.

DISCUSSION

Since *P. sajor-caju* can easily grow on the by-products or lignocellulosic residues and lignin, therefore a large number of agricultural, forests, and agro-industrial by-products can be used for its cultivation. In the present study *P. sajor-caju* was cultivated under *in-vitro* conditions on different substrates, viz. Paddy straw, Wheat straw, Apple leaves and Chinar leaves. The study revealed that highest biological efficiency *P. sajor-caju* on Paddy straw, followed by Wheat straw and Chinar leaf substrates. Zhang et al. (2002) cultivated *P. sajor-caju* on rice straw and wheat straw and observed 10% higher yield in case of rice straw under the same cultivation conditions. Madan et al. (1986) cultivated *P. sajor-caju* on leaves of *Morus alba* and *Ricinus communis*. Several species of *Pleurotus* are known to be cultivated on different substrates in India (Suman and Sharma, 1990). Ragunathan et al. (1996) cultivated three species of *Pleurotus*, viz. *P. sajor-caju*, *P. platypus* and *P. citrinopileatus*, on various agro-residues such as Paddy straw, maize stover, sugarcane bagasse, coir pith and a mixture of these wastes, where the maximum yield was obtained from *P. sajor-caju* cultivated on Paddy straw. According to Chang and Miles (2004)) nutrient content of substrates affects the growth and formation of fruit bodies of *Pleurotus* species. Banik and Nandi (2004) observed that yield of *P. sajor-caju* can be increased significantly when grown on a lignocellulosic crop residue-rice straw supplemented with biogas residual slurry manure in 1:1 ratio as substrate. Khan et al. (2011) studied the impact of various sterilization methods using different substrates on the yield of *Pleurotus* sps. In Kashmir there is a lot of potential for growing mushrooms from Paddy straw as
Paddy cultivation takes place on 140,970 ha of land generating 2,459,930 tons of Paddy straw annually (Anonymous, 1999-2000). Only 5706 quintals of mushrooms were produced during 2001-2002 in Kashmir (Munshi and Ghani, 2003). Large scale cultivation of P. sajor-caju using suitable substrates can help people in rural areas improve their income. Mushroom cultivation is not just an agribusiness but also a noteworthy means for restoration, replenishment and remediation of earths overburden ecosphere, thereby benefiting all the inhabitants of the planet earth.

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REFERENCES