EVALUATION OF VITAMIN, PHYTOHORMONE AND TRACE ELEMENT REQUIREMENTS OF LENTINUS CLADOPUS LÉV

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ABSTRACT

Lentinus cladopus Lév is an edible and wood decaying mushroom. It was collected from the stem of Albizia chinensis and pure culture was raised on Potato Dextrose Agar.

INTRODUCTION

Edible mushrooms are rich sources of nutraceuticals [1, 2, 3, 4]. One such edible mushroom is Lentinus cladopus Lév, which belongs to Class–Agaricomycetes, Order–Polyporales and Family–Polyporaceae [5]. It is reported growing in nature on variety of substrates including wooden logs in caespitose clusters and is characterized by membranous whitish smooth convex, depressed to subinfuliduliform pileus and cylindrical concolorous stipe [6]. In the present work, biochemical studies on L. cladopus Lév was carried out specifically to understand the role of different vitamins, growth regulators and trace elements on the vegetative growth of this mushroom.

MATERIAL AND METHODS

The fruit body of L. cladopus Lév was collected from the stem of Albizia chinensis Palampur (Himachal Pradesh) in North-West India. It was taxonomically investigated and identified [7]. Molecular sequence has been deposited in NCBI Gene Bank (accession number JQ868754). The specimen (PUN–3948) has been raised in Malt Broth liquid medium at 30±1°C for investigating the role of vitamins (Ascorbic Acid, Biotin, Nicotinic Acid, Thiamine) phytohormones (Gibberellic Acid, Indole-3-Acetic Acid, Indole-3-Butyric Acid, Kinetin) and trace elements (Iron, Boron, Manganese, Molybdenum, Zinc).

RESULTS

Thiamine at 10ppm, Indole-3-Butyric Acid at 15ppm and Iron at 1ppm were found to be supporting the maximum mycelial growth of L. cladopus Lév.

Material and Methods: The culture of L. cladopus Lév was raised in Malt Broth liquid medium at 30±1°C for investigating the role of vitamins (Ascorbic Acid, Biotin, Nicotinic Acid, Thiamine), phytohormones (Gibberellic Acid, Indole-3-Acetic Acid, Indole-3-Butyric Acid, Kinetin) and trace elements (Iron, Boron, Manganese, Molybdenum, Zinc).

Objectives: The objective of present study was to investigate the effect of biochemical sources viz. vitamins, phytohormones and trace elements on the vegetative growth of L. cladopus Lév.

Effect of growth regulators

Four growth regulators, namely Gibberellic Acid (GA), Indole-3-Acetic Acid (IAA), Indole-3-Butyric Acid (IBA) and Kinetin (K) were selected and in each case four concentrations (5ppm, 10ppm, 15ppm and 20ppm) were prepared to study the effect on the mycelial growth of L. cladopus Lév. Variable concentration of each growth regulator so prepared was amended in the basal medium. Basal medium devoid of any growth regulator and with the mixture of all four growth regulators served as checks.

Effect of trace elements

Five trace elements used at 1ppm, 2ppm and 5ppm concentration included Iron (Fe), Boron (B), Manganese (Mn), Molybdenum (Mo) and Zinc (Zn). Different salts consisting of these trace elements namely FeSO₄.7H₂O, H₂BO₃, MnSO₄.7H₂O, NH₄Mo and ZnSO₄.7H₂O were used for the experiment. Stock solution of respective trace element of each concentration was prepared and then amended into the basal medium. The mixture of all the five trace elements and the basal medium devoid of any trace elements were used as controls.

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growth was supported by Kinetin (4.08 mg/ml) in 15 ppm concentration followed by vegetative growth at 3.60 mg/ml in 20 ppm concentration. The mean dry weight of the fungus in mg/ml with ± standard deviation (SD) has been presented in table 2.

While working with variable concentrations of trace elements, mycelium was observed growing at different rates and maximum vegetative growth (7.46 mg/ml) was obtained in 1 ppm concentration of Iron followed by growth in 5 ppm Control devoid of any trace elements. The results achieved are presented in table 3.

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Mean dry weight of mycelium (mg/ml) ± standard deviation (SD) at variable concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10ppm</td>
</tr>
<tr>
<td>Ascorbic Acid (AA)</td>
<td>5.49 ± 1.55</td>
</tr>
<tr>
<td>Biotin (B)</td>
<td>2.09 ± 1.66</td>
</tr>
<tr>
<td>Nicotinic Acid (NA)</td>
<td>4.93 ± 1.04</td>
</tr>
<tr>
<td>Riboflavin (R)</td>
<td>2.05 ± 0.22</td>
</tr>
<tr>
<td>Thiamine (T)</td>
<td>6.30 ± 0.96</td>
</tr>
<tr>
<td>Mixture</td>
<td>5.69 ± 0.71</td>
</tr>
<tr>
<td>Control</td>
<td>1.77 ± 0.14</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Mushrooms require vitamins, growth regulators and trace elements in small concentration for vegetative growth. [11] and [12] documented that Thiamine stimulated the maximum mycelial growth in *L. edodes* (Berk.) Singer. [13] have found Thiamine at 20 ppm concentration to be stimulating for vegetative growth of *L. edodes* (Berk.) Singer. [14] evaluated Thiamine as the best amongst the vitamins for mycelial growth of *L. subnudus* Berk. [15] documented the importance of Ca**2+** and Mg**2+** ions in stimulating the vegetative growth. In the same vein, [17] reported that best vegetative growth of *L. squarrosulus* (Mont.) Singer was supported by Manganese which ranged from 14.95 mg/ml in 1 ppm to 15.25 mg/ml in 5 ppm concentration. According to [19] CuSO4.7H2O showed the highest biomass of *Agaricus palateosporus*. In the present study, the maximum vegetative growth of 4.17 mg/ml was recorded at 15 ppm concentration of Indole-3-Butyric Acid.

<table>
<thead>
<tr>
<th>Growth Regulator</th>
<th>Mean dry weight of mycelium (mg/ml) ± standard deviation (SD) at variable concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5ppm</td>
</tr>
<tr>
<td>Gibberellic Acid (GA)</td>
<td>2.84 ± 0.22</td>
</tr>
<tr>
<td>Indole-3-Acetic Acid (I-3-AA)</td>
<td>1.74 ± 0.36</td>
</tr>
<tr>
<td>Indole-3-Butyric Acid (I-3 BA)</td>
<td>2.23 ± 0.16</td>
</tr>
<tr>
<td>Kinetin (K)</td>
<td>3.14 ± 0.79</td>
</tr>
<tr>
<td>Mixture</td>
<td>1.95 ± 0.10</td>
</tr>
<tr>
<td>Control</td>
<td>1.66 ± 0.48</td>
</tr>
</tbody>
</table>

**CONCLUSION**

The results obtained in the present study revealed that Thiamine at 10 ppm concentration, Indole-3-Butyric Acid at 15 ppm concentration and Iron at 1 ppm concentration supported the maximum vegetative growth of *L. cladopus Lév*. The present findings have helped us to understand the biochemical requirements of *L. cladopus Lév* for enhancing the vegetative growth of this mushroom in the basidium.
ACKNOWLEDGEMENT

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