EFFECT OF ADDITION OF Lactobacillus sp 031 ON GROWTH AND SPORULATION OF Aspergillus carbonarius DO162 IN SOLID FERMENTATION

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Introduction. Molds belonging to the genera Aspergillus and Penicillium, are capable to produce toxins, which have been found mainly in foods such as cereals and coffee. Yeasts and lactic acid bacteria (LAB) are potential agents of fungal growth control due to their ability to grow and survive under a large range of environmental conditions, either as a part of the natural microflora or supplemented as starter or protection cultures (1). The objective of this study was to determine the effect of the addition of a LAB on growth and sporulation of Aspergillus carbonarius on solid state cultivation.

Methods. Lactobacillus sp. 031 was isolate from coffee (2) and grown on MRS at 30°C for 12h. The cells were harvested and re-suspended at 1x10^6 and 1x10^8 cells/mL. Aspergillus carbonarius D0162 was grown in PDA for 7 days, spores were harvested in tween 80 0.01%. Solid substrate fermentation (SSF) was carried out coffee pulp (CP) impregnated with a suspension of 1X10^6 spores/mL in all the cases. A control culture was carried out with no LAB (E1); two assays were carried out adding washed cells of LAB: 1X10^6 cells (E2) and 1X10^8 cells of LAB 031 (E3). SSF was carried out at 30°C and CO₂ production was monitored automatically (3). Moisture (%), pH and spores number by g of CP were determined.

Results. In the case control assays E1 (with no LAB) spore production attained 1.2x10^8 spores/g*dry CP, in the presence of LAB the production of spores were an order of magnitude lower. In the cases, of LAB added the pH of the cultures was close to neutrality. It should be noted also, that spore production was faster in the presence of LAB in comparison with than the control. Figure 1 shows the CO₂ production rate during SSF by A. carbonarius.

CO₂ production is an indirect measurement of fungal growth. The total production of CO₂ in the control (422 mg CO₂/g dry CP) was higher than E2 (342 mg CO₂/g dry CP) and E3 (272 mg CO₂/g dry CP). It is clearly shown that the presence of LAB affect the growth of A. carbonarius. Table 1 shows also that the final moisture value of the control experiment (E1) was higher probably due the higher metabolic water produced. Growth and spore production were affected in the presence of LAB 031 in SSF. Same effect has been determined in submerged cultivation.

Table. 1. Final Moisture (%), pH and spore concentration.

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<thead>
<tr>
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<th>Moisture (%)</th>
<th>pH</th>
<th>spores/g*dry CP</th>
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</thead>
<tbody>
<tr>
<td>E1</td>
<td>73.95</td>
<td>3.69</td>
<td>1.2x10^8</td>
</tr>
<tr>
<td>E2</td>
<td>72.58</td>
<td>6.92</td>
<td>3.0x10^7</td>
</tr>
<tr>
<td>E3</td>
<td>71.27</td>
<td>6.58</td>
<td>7.9x10^7</td>
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</table>

Conclusions. It was demonstrated that the presence of the LAB 031 decreased CO₂ production and when this concentration increased there was early sporulation A. carbonarius lesser extent relative to control.

References