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

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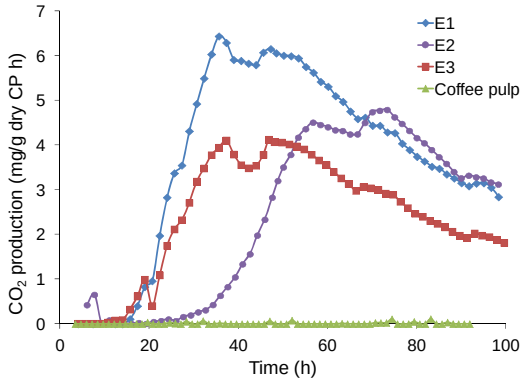
Introduction. Molds belonging to the genera *Aspergillus* and *Penicillium,* are capable to produce toxins, which have been found mainly in foods such as cereals and coffee. Yeasts and lactic acid bacteria (LAB) are potential agents of fungal growth control due to their ability to grow and survive under 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 CO_2 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 CO_2 production rate during SSF by *A. carbonarius* added with two different levels of LAB 031. CO_2 production rate attained a maximum value of 6.1 mg CO2/gCP, after 30 h of cultivation.



E1: CP + 1×10^6 spores/g CP
E2: CP + 1×10^6 spores/g CP + 1×10^6 lactic bacteria/g CP
E3: CP + 1×10^6 spores/g CP + 1×10^8 lactic bacteria/g CP

Fig. 1 CO_2 production rate during the SSF by A. carbonarius

CO_2 production is an indirect measurement of fungal growth. The total production of CO_2 in the control (422 mg CO_2/g dry CP) was higher than E2 (342 mg CO_2/g dry CP) and E3 (272 mg CO_2/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.

	Moisture (%)	pH	spores/g*dry CP
E1	73.05	3.69	$1.2x10^8$
E2	72.58	6.92	$3.0x10^7$
E3	71.27	6.58	$7.9x10^7$

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

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