INHIBITION OF GROWTH AND SPORULATION OF ASPERGILLUS CARBONARIUS 089 AND DO162 BY LACTIC ACID BACTERIA ISOLATED FROM COFFEE PULP

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Introduction. During the processing of coffee beans (beneficio) it could be serious pollution problems affecting the quality and safety of products by toxigenic fungi. The most common mould species causing food spoilage belong to the genera *Aspergillus*, *Penicillium* and *Trichoderma.* Already 5-10% of the world's food production is lost due to the synthesis of highly toxic metabolites produced by fungi. In order to prevent spoilage, a limited number of compounds have been approved for addition to foods as preservatives (1), weak acids are used ferquently. The aim of this work was to evaluate the inhibition of growth and sporulation of *Aspergillus carbonarius* caused by a lactic acid bacteria.

Methods. The inhibition assays were performed on Petri dishes using a modified agar method (3). A total of 24 lactic acid bacteria (LAB) were confronted with two molds, *Aspergillus carbonarius*, 089 and D0162, isolated from coffee beans in Ivory Coast. The inoculum of spores used was $1x10^4$ spores/ml, incubation was carried out for 24h, 30h and 48h at 30°C. The inhibition halo and the time of sporulation were determined. The bacteria that produced greater inhibition (031) was tested in liquid medium with a concentration of $1x10^4$ spores/ml of *A. carbonarius* D0162: spores culture with fermented supernatant cells free (E1), spores culture with fermented broth of LAB 031 (E2) and a control (T).

Results. Only 3 of the 24 strains of lactobacillu exhibited an inhibitory effect on both molds (Table 1). Figure 1 shows the inhibition halo around the LAB 031 on *A. carbonarius* D0162 at different incubation times. Liquid fermentation of *A. carbonarius* (Fig. 2) showed an abundant spore formation at 148 h of fermentation in absence of the LAB 031 or the supernatant (T1), while the growth of mycelium and spores were reduced in the presence of LAB. In the case of fungal cultivation added with LAB supernatant free of cells, it was an abundant mycelium growth and spore production was less dense than the control and more important than the assay with LAB cells.

Table 1. Inhibition halo of *A. carbonarius* strains D0162 and 089 caused by LAB at different incubation times

LAB code	Inhibition halo (mm)					
	A .carbonarius 089			*A.carbonarius* D0162		
	24h	*30h*	*48*	24h	*30h*	*48 h*
015	26	14	40	22	14	39
021	24	18	40	20	15	30
031	24	18	39	20	15	40

Micrographs taken at initial time of culture in the presence of LAB (E2, Fig. 2) shows the fungal spore surrounded by LAB.

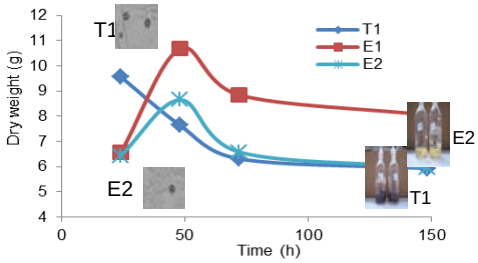

Fig.1. Evolution of biomass during cultivation of *A. carbonarius* D0162 (T1), culture added with a supernatant cells-free (E1) and added with cells of LAB 031 (E2).

Conclusions. It was demonstrated that only 3 LAB were able to inhibit both molds. The inhibition of sporulation of *A. carbonarius* D0162 was observed in liquid fermentation when LAB 031 cells was added. This inhibition could be associated to the metabolites production (like organics acids) by LAB or to the presence of the cells of LAB *per se.*

References

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