

Assessment of Antifungal Activity of Lactic Acid Bacteria Strains Against Bread Spoilage Fungus *Aspergillus ochraceus*

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ABSTRACT

Lactic acid bacteria (LAB) are generally recognized as safe and can be used against fungi that contaminate various food commodities. The aim of the research was to select LAB strains with high antifungal activity for the biocontrol of *Aspergillus ochraceus*. The antifungal activity of eight strains of lactic acid bacteria has been evaluated by overlay assay method against the spoilage fungus, *Aspergillus ochraceus* isolated from white bread. The antifungal effect was assessed by co-cultivation of lactic acid bacteria strains and *Aspergillus ochraceus* in liquid media and mycelium growth inhibition was monitored for over 14 days. The LAB strains Lpl, LAB 43 and LAB 13 presented intense antifungal activity with large inhibition zones of fungal growth and sporulation, but smaller for Lpa and LAB 15 strains. Total inhibition of mycelia growth was induced by the strains LAB 43, LAB 13 and Lpa. The strains LAB 15 and LAB 35 had a moderate inhibition activity on the mycelia growth. The results of this study demonstrated the antifungal activity of several LAB strains by overlay assay and by co-cultivation method. Therefore, it was confirmed the inhibitory effect of the strains LAB 43 and LAB 13 against *Aspergillus ochraceus*. The experiment revealed that these LAB strains could be further used as biocontrol agents.

Keywords: *Aspergillus ochraceus*, antifungal activity, lactic acid bacteria, inhibition zone, co-cultivation.

INTRODUCTION

Fungal contaminants of foods are harmful for human health. Bread spoilage fungus *A.ochraceus* is potential micotoxigenic and new biocontrol agents are needed instead of chemical preservatives. A promising alternative is represented by LAB.

AIMS AND OBJECTIVES

The research aims to select LAB strains with high antifungal activity for the biocontrol of *A.ochraceus*. The objectives are to compare the antifungal activity of LAB strains against *A.ochraceus* by overlay assay method and by co-cultivation.

MATERIALS AND METHODS

The antifungal activity of 6 LAB strains obtained from dr.Medana Zamfir, Institute for Biology Bucharest have been assayed on the growth of *A.ochraceus* isolated from contaminated bread by overlay assay method (Magnusson *et al.*, 2003). Data were collected after 72 hours incubation at 25°C concerning the diameters of clear visible inhibition zones of fungal growth around the LAB strain spots. The persistence of the inhibition zones was monitored over 10 days to establish the fungistatic and fungicidal activity (Adebayo and Aderiye, 2010). Fungal spores of *A.ochraceus* were co-cultivated with 6 LAB strains on PD liquid medium and incubated at 25°C for 5 days. The

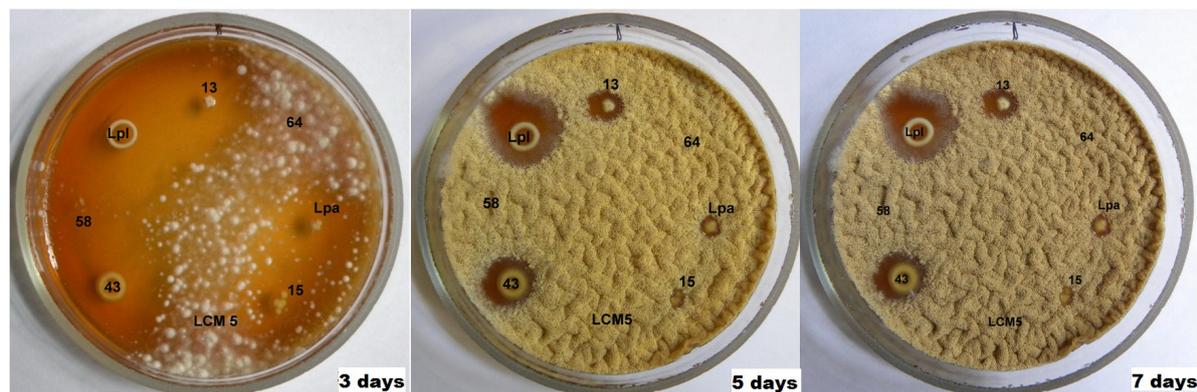


Fig. 1. Evolution of inhibitory effect of lactic acid bacteria against *Aspergillus ochraceus*

Tab. 1 The dry weight (DW) and percentage growth inhibition (PGI) of *A. ochraceus* by 6 LAB strains

	<i>A.ochraceus</i>						
		+LAB 13	+LAB 15	+LAB 35	+LAB 43	+LAB 58	+Lpa
DW(mg)	0.32a*	0.05d	0.15c	0.27b	0.07d	0.31ab	0.05d
PGI(%)	Control	84.38a	52.08c	15.63d	77.08b	3.13e	85.42a

LSD 0.05 (DW) = 0.02
LSD 0.05 (PGI) = 6.81

*The values followed by the same letter on each row are not significantly different for $p < 0.05$ (Student t test).

percent of fungal growth inhibition comparatively with control was calculated (Hamed *et al.*, 2011).

RESULTS AND DISCUSSION

The presence of large and persistent clear zones around the strains LAB 13, LAB 43, Lpl and Lpa (Fig.1) confirmed their fungicidal effect. Significant reduction of dry weight of fungal mycelia when co-cultivated with strains LAB 13 and LAB 43 or collection strain Lpa was induced as compared to pure culture of *A.ochraceus* (control).

Percent growth inhibition of fungal mycelium in liquid medium over 50% were calculated for strains LAB 13, LAB 43, LAB 15 and Lpa (Tab. 1).

The antifungal effect of strains LAB 13 and LAB 43 was confirmed in both overlay assay and co-cultivation. The results are in concordance with those reported by Adebayo and Aderiyi (2010) for LAB strains belonging to genus *Lactobacillus* assayed against *Aspergillus niger*, *Aspergillus flavus* and *Penicillium citrinum*.

CONCLUSION

The highest inhibitory effect against *A.ochraceus* was identified for the strains LAB 43 and LAB 13 in both overlay and co-cultivation assays.

The results recommend the strains LAB 43 and LAB 13 for use as biocontrol agents against *A.ochraceus* in bread.

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