

Antifungal effect of organic acids from lactic bacteria on *Penicillium nordicum*

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ABSTRACT

Lactic acid bacteria (LAB) have been gaining attention for the antifungal properties of some strains. The control of fungal growth is especially important since moulds are responsible for significant spoilage of food and feed. Additionally, they are able to produce toxic compounds known as mycotoxins that cause serious health hazards. Some LAB strains have the ability to inhibit fungal growth and also the production of mycotoxins. In this work, cell free supernatants (CFS) of *Lactobacillus plantarum* UM55 and *Lactobacillus buchneri* UTAD104 were tested for the inhibition of *Penicillium nordicum* growth and ochratoxin A (OTA) production. Fungal growth was inhibited in only 18 and 11% by CFS of *L. plantarum* and *L. buchneri*, respectively. However, the production of OTA was reduced approx. in 70% by both strains. In order to determine the nature of compounds responsible for this activity, CFS were subjected to heat, proteases and neutralization of pH. It was observed that CFS retained its inhibitory properties after being autoclaved and treated with proteases. However, when submitted to pH neutralization, CFS lost its activity. Some organic acids produced by these LAB strains were also tested for their inhibitory capacity. Calculation of inhibitory concentrations shown that butyric and propionic acids were the most effective in inhibiting *P. nordicum* growth and OTA production, followed by indole lactic acid (ILA), phenyllactic acid (PLA), acetic acid, hydroxyphenyllactic acid (OH-PLA) and lactic acid. CFS were analysed by HPLC-PDA for the quantification of those organic acids. For *L. plantarum* UM55 main differences were found in the levels of lactic acid, PLA, OH-PLA, and ILA. For *L. buchneri* UTAD104, levels of acetic, lactic and PLA were higher than in the control experiment. In conclusion, ability of LAB to inhibit mycotoxigenic fungi depends of strain capability to produce certain organic acids, and those acids may differ from strain to strain.

Keywords: Lactic acid bacteria, Penicillium nordicum, ochratoxin A, organic acids