Title Bioprotective *Leuconostoc* strains against *Listeria monocytogenes* in fresh fruits and vegetables

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Abstract

Ten *Leuconostoc mesenteroides* and one *Ln. citreum* strains isolated from fresh fruit and vegetables were tested for their antagonistic capacity against *Listeria monocytogenes*. Genetic differences among strains were analyzed by Random Amplified Polymorphic DNA (RAPD). All the isolates clustered together and differed from the type strain *Ln. mesenteroides* ATCC 8293 as well as from *Ln. fallax* and *Ln. citreum*. Organic acids, hydrogen peroxide and bacteriocins were detected as main inhibition mechanisms. Characterization of culture supernatants from the bacteriocinogenic strains, CM135 and CM160 revealed a high resistance of antibacterial activity to temperature and pH, and a bactericidal mode of action against *L. monocytogenes.* Produced bacteriocins belonged to the Class IIa and sequencing of genes showed complete homology with mesentericin Y105. A study of the effect of the relative dose of pathogen and LAB on control of *L. monocytogenes* in wounds of Golden Delicious apples and Iceberg lettuce leaf cuts was performed. A comparison of the dose of bioprotective strain needed for a ten fold reduction of the viable pathogen concentration (ED_{90}) revealed that strain CM160 was the most effective against *L. monocytogenes.* ED_{90} values varied from $1.3 \cdot 10^4$ to $5.0 \cdot 10^5$ cfu·g^{-1} or wound, at ranges of pathogen levels from $1.0 \cdot 10^3$ to $5.0 \cdot 10^4$ cfu·g^{-1} of lettuce or wound of apple. The efficiency of the strains was also calculated as the ratio of the ED_{90} value to the pathogen dose inoculated. The lowest ratio was found for strain CM160 at 5 to 50 cells of LAB per cell of pathogen. The strain offers potential application for prevention of the presence of *L. monocytogenes* in fresh fruit and vegetables.