

Functional (bacteriocinogenic and antioxidant) properties of *Lactiplantibacillus plantarum* strains isolated from Bulgaria fermented vegetables

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Lactiplantibacillus plantarum ST01BG, ST07BG, ST10BG and ST15BG, were isolated from home-made fermented vegetables from North-West Bulgaria and differentiated by repPCR and identified by biochemical, physiological and biomolecular analysis, including partial 16S rRNA sequencing. The strains were evaluated as bacteriocin producers, and the expressed antimicrobials partially characterized. The bacteriocins were effective in inhibiting different strains of *Listeria* spp., *Enterococcus* spp. (including vancomycin resistant enterococci) and *Staphylococcus* spp. These strains can be considered as safe, based on the evaluation of hemolytic activity, production of biogenic amines, mucin degradation, antibiotic susceptibility/resistance, and gelatinase enzyme production. Moreover, the strains can be considered as potentially beneficial based on their stability and survival under simulated gastrointestinal tract conditions (stomach and duodenum), the production of diacetyl and specific levels of hydrophobicity.

Recorded levels of DPPH in the studied strains ranged between 62.53 % for *Lpb. plantarum* ST01BG and 36.96% for *Lpb. plantarum* ST10BG, indicating that antioxidant properties are strain specific. The studied strains ferric ion chelating activities with the highest recorded for *Lpb. plantarum* ST07BG (59.10%), and the lowest chelation activity for *Lp. plantarum* ST15BG (33.00%), compared to the positive control, ethylene diamine tetra-acetic acid (EDTA) (1 mg/mL) (82.27%). In our study, evaluated strains demonstrated variable hydroxyl radical scavenging activities with highest levels ranging from 94.50% for *Lpb. plantarum* ST01BG to 76.60% for *Lpb. plantarum* ST10BG, as compared to the control, ascorbic acid, with results of 98.34%. The recorded superoxide anion radical scavenging activity was higher for *Lpb. plantarum* ST15BG (51.61%) and lower for *Lpb. plantarum* ST07BG (29.53%), when control was 54.20%. *Lpb. plantarum* ST15BG (83.65%) and *Lpb. plantarum* ST10BG (39.42%) showed the highest and lowest anti-lipid peroxidation values respectively, compared to the control - 77.88%. Antioxidant properties were found to be strain specific. The beneficial attributes (antimicrobial and antioxidant) of these cultures to fermented food products may enable the reduction of chemical additives in line with consumers' demand for more natural and chemical-free food commodities. Combination between production of antimicrobial proteins (bacteriocins) and antioxidants can be considered as interesting application scenario for the



IAFP Latino 2024

Simpósio Latinoamericano
em Segurança dos Alimentos
Santos - SP - Brasil
11 a 14 Nov, 2024

selection of new starter cultures with multiple beneficial properties.

Agradecimentos: FAPESP (2023/05394-9; 2023/14944-2); University of Sao Paulo, Sao Paulo, SP, Brazil (2016.1.920.93); FCT, Portugal (UIDB/05937/2020 and UIDP/05937/2020); Grant from the president of the Russian Federation; Grant from Handong Global University, Republic of Korea.



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