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Anti-Listeria Activity of Bacteriocin Produced by Pediococcus pentosaceus ST0408, a Potential Bio-Protective Culture

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One of the well-studied antimicrobial compounds produced by lactic acid bacteria (LAB) are bacteriocins, which are defined as polypeptides, produced via ribosomes and are typically antagonistic versus organisms that are genetically similar to the producers. Strains belonging to the species Pediococcus pentosaceus were associated to various fermented food products and have role in production of bacteriocins, metabolites involve in the food biopreservation. However, safety assessment and screening for presence of virulence and antibiotic resistance genes in LAB is an important task in the process for safety evaluation and suggestion for applications as commercial beneficial cultures. The aim of this study was to explore bacteriocinogenic and safety features of P. pentosaceus ST0408 based on biochemical, physiological antagonistic properties and presence and expression of genes related to the virulence factors, production of biogenic amines and antibiotic resistance. Bacteriocinogenic P. pentosaceus ST0408 was isolated from Bulgarian white brine cheese and identified based on its biochemical and genetic characteristics including 16S rRNA sequencing. Bacteriocin production was evaluated, including stability of antimicrobial peptide in different levels of pH (2.0–10.0), temperatures (10°C-121°C), presence of various chemicals applied in food processing processes. Activity of the expressed bacteriocin activity was tested versus numerous enterococci, lactobacilli, and listeria strains. Bacterial growth was monitored based on the changes culture turbidity (OD at 600 nm spectrophotometrically when P. pentosaceus ST0408 was cultured in MRS broth at 37°C for 24h; changes in pH were monitored; and production of bacteriocin was evaluated versus different strains of L. monocytogenes. Moreover, produced by P. pentosaceus ST0408 bacteriocins was added to exponentially growing L. monocytogenes strains and evaluated killing properties of expressed antimicrobials over 12h period. Produced by P. pentosaceus ST0408 bacteriocin was showing stable when exposed to the investigated pH levels, temperatures and chemicals used in dairy industry. Based on the results from performed biochemical and physiological test, such as hemolytic, gelatinase, proteolytic and lipolytic activity, biogenic amines and antibiotic resistance, P. pentosaceus ST0408 can be considered as safe strain. Moreover, strain ST0408 did not show evidence for presence of virulence genes, including vanA, B, C, D, E and G. P. pentosaceus ST0408 was expressing 51200 AU/mL bacteriocin activity recorded versus L. monocytogenes L211 during stationary growth phase. The addition of 6400 AU/mL of studied bacteriocin (pH 6.0) to a 3-h-old culture of L. monocytogenes L211 (OD 600nm 0.274) resulted in growth inhibition for monitored 12 h, suggesting that the mode of activity of studied bacteriocin is bactericidal. Obtained results suggest that bacteriocin producing strain P. pentosaceus ST0408, evaluated in current study can be considered safe and expressed bacteriocin can be implemented

for the control of L. monocytoses in the fermented dairy products.

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