# Exploring potential of Lactiplantibacillus plantarum ST0414 as a potential bio-protective culture for control of Listeria monocytogenes

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Lactic acid bacteria are known for their production of antimicrobial compounds, including bacteriocins, defined as ribosomal synthesized polypeptides or polypeptide complexes usually antagonistic to genetically closely related organisms. In this context *Lactiplantibacillus plantarum* bacteriocins are one of the well-studied antimicrobials, crucial in controlling *Listeria monocytogenes*, a significant foodborne pathogen (Choi et al., 2023). Plantaricins exhibit strong inhibitory effects against *L. monocytogenes* by disrupting its cell membrane, leading to cell death (Arena et al., 2016). This makes them highly effective in enhancing food safety and extending shelf life without relying on synthetic preservatives (Choi et al., 2023). Additionally, *Lpb. plantarum* bacteriocins are natural and safe for human consumption, aligning with the growing consumer demand for natural food additives (Camargo et al., 2018). *Lpb. plantarum* is a well-studied bacteriocinogenic species known for producing diverse bacteriocins, able to inhibit the growth of foodborne pathogens and spoilage bacteria, enhancing food safety and extending shelf life. *Lpb. plantarum* is widely used in fermented foods, such as dairy and meat products, due to its ability to produce bacteriocins and can play beneficial role in enhancing food safety. Representatives from this species also contributes to the sensory qualities of foods and has probiotic properties, promoting gut health. Its application in food preservation and health benefits makes it a valuable microorganism in the food industry. Their application in food preservation helps prevent listeriosis outbreaks, ensuring public health protection. Moreover, the use of these bacteriocins supports sustainable practices by reducing the need for chemical preservatives, thus promoting eco-friendly food production (Arena et al., 2016). Overall, *Lpb. plantarum* bacteriocins play a vital role in both food safety and sustainability.

*Lpb. plantarum* ST0414 was isolated from Bulgarian white brine cheese produced by medium scale producer and identified based on its biochemical and genetic characteristics including 16S rRNA sequencing. Produced by *Lpb. plantarum* ST0414 bacteriocin was stable when exposed to the pH levels between 2.0 and 10.0, temperatures between 10$^{o}$C and 121$^{o}$C and chemicals used in dairy industry. Based on performed biochemical and physiological test, hemolytic, gelatinase, proteolytic and lipolytic activity, biogenic amines, and antibiotic resistance, *Lpb. plantarum* ST0414 can be considered as safe strain. Moreover, the studied strain did not show presence of virulence genes, including *van*A, B, C, D, E and G and genes associated with biogenic amines production. When *Listeria monocytogenes* L211 was used a sensitive strain, activity of expressed by *Lpb. plantarum* ST0414 of 51200 AU/ml was recorded during stationary growth phase. The addition of 1600 AU/ml bacteriocin produced by *Lpb. plantarum* ST0414 (pH 6.0) to a 3-h-old culture of *L. monocytogenes* L211 (OD $_{600nm}$ 0.293) resulted in growth inhibition for 12 h, suggesting that the mode of activity of studied bacteriocin is bactericidal. In accordance with obtained results, we can suggest that bacteriocin-producing strain of *Lpb. plantarum* ST0414 can be considered safe and can be used for the control of *L. monocytoses* in the fermented dairy products.

***References***

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