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Limos Lactobacillus Fermentum from Buffalo Milk Is Suitable for Potential Biotechnological Process Development

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Abstract : Probiotics are living microorganisms that give beneficial effects while consumed. Lactic acid bacteria and bifidobacteria are among the most representative strains assessed as probiotics and exploited as food supplements. Numerous studies demonstrated their potential as a therapeutic candidate for a variety of diseases (restoring gut flora, lowering cholesterol, immune response-enhancing, anti-inflammation and anti-oxidation activities). These beneficial actions are also due to biomolecules produced by probiotics, such as exopolysaccharides (EPSs), that demonstrate plenty of beneficial properties such as antimicrobial, antitumor, anti-biofilm, antiviral and immunomodulatory activities. Limosilactobacillus fermentum is a widely studied member of probiotics; however, few data are available on the development of fermentation and downstream processes for the production of viable biomasses for potential industrial applications. However, few data are available on the development of fermentation processes for the large-scale production of probiotics biomass for industrial applications and for purification processes of EPSs at an industrial scale. For this purpose, L. fermentum strain was isolated from buffalo milk and used as a test example for biotechnological process development. The strain was able to produce up to 109 CFU/mL on a (glucose-based) semi-defined medium deprived of animal-derived raw materials up to the pilot scale (150 L), demonstrating improved results compared to commonly used, although industrially not suitable, media-rich of casein and beef extract. Biomass concentration via microfiltration on hollow fibers, and subsequent spray-drying allowed to recover of about 5.7 × 1010CFU/gpowder of viable cells, indicating strain resistance to harsh processing conditions. Overall, these data demonstrate the possibility of obtaining and maintaining adequate levels of viable L. fermentum cells by using a simple approach that is potentially suitable for industrial development. A downstream EPS purification protocol based on ultrafiltration, precipitation and activated charcoal treatments showed a purity of the recovered polysaccharides of about 70-80%.

Keywords : probiotics, fermentation, exopolysaccharides (EPSs), purification
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