

Evaluating the Probiotic Profile, Antioxidant Properties, and Safety of Indigenous *Lactobacillus* spp. Inhabiting Fermented Green Tender Coconut Water

Dayani Pavalakumar (Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura, Homagama, 10200, Sri Lanka

Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda, 10250, Sri Lanka)

Lanka Jeewanie Samarakoon Undugoda (Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura, Homagama, 10200, Sri Lanka)

Chathuri Jayamalie Gunathunga (Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura, Homagama, 10200, Sri Lanka

Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda, 10250, Sri Lanka)

Pathmalal Marakkale Manage (Centre for Water Quality and Algae Research, Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, 10250, Sri Lanka)

Ruwani Nilushi Nugara (Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura, Homagama, 10200, Sri Lanka)

Sagarika Kannangara (Department of Plant and Molecular Biology, Faculty of Science, University of Kelaniya, Kelaniya, 11600, Sri Lanka)

Bentotage Nalaka Samantha Lankasena (Department of Information and Communication Technology, Faculty of Technology, University of Sri Jayewardenepura, Homagama, 10200, Sri Lanka)

Chami Nilasha Kahakachchi Patabendige (Department of Science for Technology, Faculty of Technology, University of Sri Jayewardenepura, Homagama, 10200, Sri Lanka)

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Abstract

This study isolated and characterized four indigenous lactic acid bacterial strains from naturally fermented green tender coco-nut water: *Lactiplantibacillus plantarum* CWJ3, *Lacticaseibacillus casei* CWM15, *Lacticaseibacillus paracasei* CWKu14, and

Lactobacillus rhamnosus CWKu-12. Notably, among the isolates, *Lact. plantarum* CWJ3 showed exceptional acid tolerance, with the highest survival rate of 37.34% at pH 2.0 after 1 h, indicating its higher resistance against acidic gastric conditions. However, all strains exhibited robust resistance to bile salts, phenols, and NaCl, with survival rates exceeding 80% at given concentrations. Their optimal growth at 37 °C and survival at 20 °C and 45 °C underscored adaptability to diverse environmental conditions. Additionally, all strains showed sustainable survival rates in artificial saliva and simulated gastrointestinal juices, with *Lact. plantarum* CWJ3 exhibiting significantly higher survival rate (70.66%) in simulated gastric juice compared to other strains. Adherence properties were particularly noteworthy, especially in *Lact. rhamnosus* CWKu-12, which demonstrated the highest hydrophobicity, coaggregation with pathogens and autoaggregation, among the strains. The production of exopolysaccharides, particularly by *Lact. plantarum* CWJ3, enhanced their potential for gut colonization and biofilm formation. Various in vitro antioxidative assays using spectrophotometric methods revealed the significant activity of *Lact. plantarum* CWJ3, while antimicrobial testing highlighted its efficacy against selected foodborne pathogens. Safety assessments confirmed the absence of biogenic amine production, hemolytic, DNase, and gelatinase activities, as well as the ability to hydrolyse the bile salt. Furthermore, these non-dairy probiotics exhibited characteristics comparable to dairy derived probiotics, demonstrating their potential suitability in developing novel probiotic-rich foods and functional products.

Keywords Lactic acid bacteria · *Lactobacillus* · Non-dairy probiotics · Tender coconut water

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