

Effect of Mango Peel Fortification in Yoghurt on Probiotic Growth and Evaluation of Its Antimicrobial Potential

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Structured Abstract

Background: Mango peel, a major by-product of the fruit processing industry, is often discarded as agro-industrial waste despite being rich in bioactive compounds such as polyphenols, flavonoids, dietary fibers, and essential nutrients. These compounds are known for their health-promoting effects, including antioxidant and antimicrobial activities. This study investigated the potential of mango peel powder (MPP) as a functional fortifying agent in yoghurt to enhance probiotic viability and provide antimicrobial benefits. Probiotics, particularly *Lactobacillus bulgaricus*, are beneficial bacteria that support gut health and immune function and inhibit pathogenic microbes. The fortification of yoghurt with MPP was intended to assess its effects on probiotic growth and antibacterial efficacy.

Methods: Yoghurt samples were prepared with or without MPP, then fermented and freeze-dried. The probiotic growth was monitored through viable colony-forming unit (CFU) counts on MRS agar, titratable acidity, and total soluble solids (°Brix). *L. bulgaricus* was isolated and confirmed via Gram staining, catalase, and oxidase tests. Furthermore, the cell-free supernatant (CFS) and cell lysate (CL) of MPP-grown *L. bulgaricus* were evaluated for antimicrobial activity against selected Gram-positive and Gram-negative pathogens using the disc diffusion method. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were determined through broth dilution assays.

Results: Results indicated that MPP-fortified yoghurt exhibited improved probiotic growth (8.53 log CFU/mL) compared to the control (8.43 log CFU/mL), enhanced titratable acidity (11.2), and reduced °Brix value (17.86%), implying active bacterial fermentation. The isolated *L. bulgaricus* showed typical lactic acid bacteria traits (Gram-positive, catalase- and oxidase-negative). Both CFS and CL exhibited antibacterial activity, with inhibition zones observed against all tested pathogens. MIC and MBC values ranged from 25–50 µg/mL for Gram-positive and 12.5–100 µg/mL for Gram-negative strains, demonstrating effective antimicrobial potential.

Conclusion: : In conclusion, mango peel powder is a promising, sustainable ingredient for enhancing the quality and functionality of probiotic yoghurt. Its incorporation not only supports the viability of beneficial bacteria but also imparts antimicrobial properties, adding value to food waste and contributing to the development of healthier food. The valorisation of mango peel as a natural functional additive not only improves food quality but also offers a sustainable approach to food waste management.

Keywords: Mango peel powder, probiotics, yoghurt, *Lactobacillus bulgaricus*, antimicrobial activity

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