

Antibacterial Assessment of *Moringa oleifera* Leaf Extracts Fermented by Various Lactic Acid Bacteria Against *Serratia marcescens* & *Enterococcus faecalis*

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Structured Abstract

Background: The rise in mortality cause by antimicrobial resistance has become a threat to humans. Current antibiotics that are available no longer potent or effective, raising the need to find an alternative therapeutic agent. Herbal medicine such as *Moringa oleifera* are gaining attention as an alternative antimicrobial agent due to their various therapeutic phytochemicals content. Lactic acid bacteria (LAB) biofermentation is a green extraction method that offers enhanced bioavailability of the phytochemicals while offering probiotic benefits. However, there is a limited study in implementing co-culture of LAB in *M. oleifera* fermentation. Hence, this study aimed to explore whether the fermentation of *M. oleifera* using three different species of *Lactobacillus* could boost its antibacterial activity efficacy.

Methods: The *M. oleifera* leaf extracts were fermented at 37°C, 200 RPM for 48 hours using single, dual and triple combo of LAB (*Lactobacillus acidophilus*, *Lactiplantibacillus plantarum*, and *Lactobacillus casei* Shirota strains) producing a total of seven derivatives (D1-D7). The antibacterial potency of each extract was tested against *E. faecalis* and *S. marcescens* using the agar well diffusion at 500 mg/mL concentration.

Results: This result shows that the triple species derivative (D7) showed the highest antibacterial activity against *E. faecalis* compared to single and dual species fermentation inoculum derivatives. However, the use of single strain fermentation inoculum derivative was more effective against *S. marcescens*.

Conclusion: Fermentation using LAB improved the antibacterial activity of *M. oleifera* against *E. faecalis*. The enhanced antibacterial activity could be due to synergistic effects of the released bioactive compounds of *M. oleifera* and diverse bacteriocin production by each LAB strains. Nevertheless, this study show potential in using *M. oleifera* as natural antibiotic alternative

Keywords: Fermentation, *Moringa oleifera*, Antibacterial Activity

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