

Antibacterial Properties of Methanolic and Ethanolic *Citrus microcarpa* Leaf Extracts

Nur Atiqah Khairul Annuar^a, Ernie Eileen Rizlan Ross^{a*}

Structured Abstract

Background: The rise in antibacterial resistance among bacterial species has led to the search for alternative antibacterial agents from natural sources. Antibacterials are substances recognised by the capability of eliminating or disturbing the growth of bacteria. They contribute to reducing the accumulation of plaques and infectious diseases. *Citrus microcarpa*, commonly known as calamansi, is famously recognised for its small green fruit with yellow pulp. The fruits and leaves are utilised as a traditional remedy and are recognised for their bioactive content including flavonoids, alkaloids and essential oils. These compounds are known to exhibit antibacterial properties. However, the effectiveness of *C. microcarpa* leaf extracts against bacteria remains unexplored. This study provides insight into the effectiveness of the *Citrus microcarpa* leaf extract as a natural antibacterial.

Methods: The leaves of *C. microcarpa* were collected, dried, and ground into powder. The powder was macerated in methanolic and ethanolic solvents to extract the bioactive compounds. The extracts were tested for their antibacterial properties using the disc diffusion method against five selected bacterial strains at three different concentrations. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) tests were conducted to compare the potency of the two extracts.

Results: The methanolic and ethanolic *C. microcarpa* leaf extracts exhibited antibacterial properties in the disc diffusion assay against the five selected bacterial strains. The ethanolic leaf extract showed inhibition against all five bacterial strains, whereas the methanolic leaf extract inhibited only two of the five strains. The MIC values ranged from 10 to 25 mg/μL, and the MBC values were higher than the MIC values.

Conclusion: In conclusion, this study demonstrated that the leaves of *C. microcarpa* exhibit antibacterial properties. The choice of extraction solvent significantly affects the inhibitory and bactericidal activities of the extracts. These findings suggest that *C. microcarpa* leaves are a potential alternative source of natural antibacterial agents and could be explored further.

Keywords: *Citrus microcarpa*, Calamansi, Antibacterial activity, Methanolic and ethanolic extracts, Disc diffusion

*Correspondence: ernie974@uitm.edu.my

^a School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia