

Potential Disinfecting Activity of *Durio zibethinus* L., *Nephelium lappaceum* L., and *Annona squamosa* L. Against Known Gram-Positive Bacterial Isolates

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ABSTRACT

Fruit peels show potential as eco-friendly antimicrobials. This study tested methanol and ethanol extracts of durian (*Durio zibethinus L.*), rambutan (*Nephelium lappaceum L.*), and sugar apple (*Annona squamosa L.*) against gram-positive bacteria from gadgets. **Methanol rambutan extract (100% w/v)** had the largest inhibition zone (19.5 ± 0.9 mm), while methanol durian was least effective. Rambutan extracts had the lowest MIC (125 µg/mL) and MBC (250 µg/mL), showing strong bactericidal activity. Findings suggest methanol rambutan extract as a promising, low-cost disinfectant from fruit waste.

BACKGROUND

Mobile devices can harbor high microbial loads, raising the risk of pathogen transmission (Begum et al., 2020). This study targets bacteria based on relevance, pathogenicity, and resistance. With rising concerns over disinfectant toxicity and reduced efficacy, natural options like fruit peel extracts are gaining interest for their antimicrobial potential (Stephens et al., 2019).

MAIN OBJECTIVES

Prepare ethanol and methanol extracts of three (3) selected fruit peels: *Durio zibethinus* L., *Nephelium lappaceum* L., and *Annona squamosa* L.

Assess the disinfecting potential of each extract on the three gram-positive bacteria and compare the results through Kirby-Bauer disc diffusion susceptibility test, minimum inhibitory concentration, and minimum bactericidal concentration.

Evaluate the overall disinfecting efficacy of the fruit peel extracts and identify the most effective extract based on the susceptibility test results.

METHODOLOGY

Maceration



Filtration



Evaporation



Reconstituted with DMSO



Fruit Extract Preparation

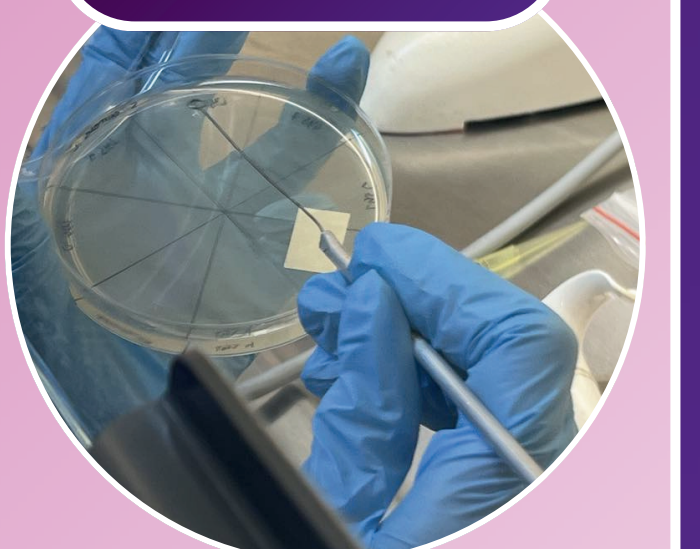
Kirby-Bauer Disc Difussion



MIC

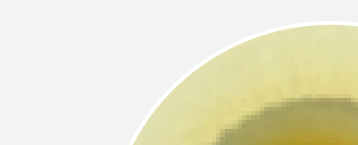
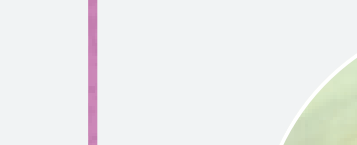


MBC



Antimicrobial Susceptibility Testing

Table 1. Kirby-Bauer Disc Diffusion Susceptibility Test (mm)

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Fruit Peel Extract	<i>Bacillus cereus</i>	<i>Bacillus subtilis</i>	<i>Staphylococcus aureus</i>
100% w/v Methanol Rambutan	19.5±0.9 	19.3±0.6 	16.3±0.6 

Methanol rambutan extract (100%) showed the largest inhibition zone (19.5 ± 0.9 mm), especially against *Bacillus cereus*. Durian extracts were the least effective. Both methanol and ethanol rambutan had the lowest MIC ($125 \mu\text{g/mL}$), while methanol sugar apple, ethanol rambutan, and methanol rambutan had the lowest MBC ($250 \mu\text{g/mL}$), indicating strong antibacterial activity at lower concentrations.

Table 2. Minimum Inhibitory Concentration ($\mu\text{g/mL}$)

Fruit Peel Extract	<i>Bacillus cereus</i>	<i>Bacillus subtilis</i>	<i>Staphylococcus aureus</i>
Ethanol Rambutan	125	125	125
Methanol Rambutan	125	125	125

Table 3. Minimum Bactericidal Concentration ($\mu\text{g/mL}$)

Fruit Peel Extract	<i>Bacillus cereus</i>
Methanol Sugar Apple	250
Ethanol Rambutan	250
Methanol Rambutan	250

RECOMMENDATIONS

Future studies should explore distilled water as an extracting solvent, include DMSO as a solvent control, and evaluate the disinfecting activity of fruit peel extracts against gram-negative pathogens. This would broaden the potential applications of these eco-friendly agents in laboratory environments.

CONCLUSION

This study evaluated the disinfecting potential of ethanol and methanol extracts from *Durio zibethinus* L., *Nephelium lappaceum* L., and *Annona squamosa* L. peels against Gram-positive bacteria. Methanolic extract of *Nephelium lappaceum* L. (rambutan) showed the strongest activity, while *Durio zibethinus* L. (durian) extracts showed little to no effects. The findings highlight rambutan peel as a promising, eco-friendly alternative for addressing antimicrobial resistance and environmental waste, emphasizing the potential of indigenous resources for public health use in educational settings.

REFERENCES:

- REFERENCES:**
- Banawas, S., Abdel-Hadi, A., Alaidarous, M., Alshehri, B., Dukhyil, A. A. B., Alsaweid, M., & Aboamer, M. (2018). Multidrug-resistant bacteria associated with cell phones of healthcare professionals in selected hospitals in Saudi Arabia. *Canadian Journal of Infectious Diseases and Medical Microbiology*, 2018, 1-7. <https://doi.org/10.1155/2018/6598918>
- Clinical and Laboratory Standards Institute. (2015). Methods for dilution antimicrobial susceptibility tests for bacteria that grow aerobically: Approved standard (10th ed.) (CLSI document M07-A10). *Clinical and Laboratory Standards Institute*
- Gerace, E., Mancuso, G., Midiri, A., Poidamani, S., Zummo, S., & Biondo, C. (2022). Recent advances in the use of molecular methods for the diagnosis of bacterial infections. *Pathogens*, 11(6), 663. <https://doi.org/10.3390/pathogens11060663>

