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Comparative Antibacterial Activities of Tender and Mature Leaves of *Manilkara Zapota* against Gram-Positive and Gram-Negative Bacteria

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The methanolic extracts from tender and mature leaves of *Manilkara zapota* were analysed through GC-MS to identify the bioactive compounds, and the compounds peaking in abundance were chosen to analyze their antibacterial properties. Bioactive compounds identified by GC-MS were docked against *Staphylococcus aureus* (Gram- positive) Surface Protein G and *Salmonella typhimurium* (Gram-negative) Chaperone Protein SicA using Argus Lab (dry lab analysis). The antibacterial properties of these compounds were further validated using agar disc diffusion assays (wet lab analysis). Both dry and wet lab results confirmed that tender and mature leaves exhibited similar antibacterial activity against *S. aureus*. However, tender leaves showed significantly enhanced inhibition activity against *S. typhimurium* than mature leaves. Notably, *M. zapota* leaves were more effective against Gram-negative bacteria, contrary to the general belief that they have their higher antibiotic resistance. The findings suggest that the neutralization of SicA, a key component of the Type III secretion system in *S. typhimurium*, may explain this phenomenon. These findings highlight the potential of *M. zapota* as a novel antibacterial agent against Gram-negative bacteria through possible intervention in their infection machinery.

Keywords: *Manilkara zapota*, Antibacterial activity, Gram-negative bacteria, Methanolic extract, Type III secretion system

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