

## **Antioxidant and Antimicrobial Activities of *Musaparadisiaca* L., *Citrus Microcarpa* L., and *Mangifera Indica* L. Peel Extracts**

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### **Abstract**

*The growing awareness and concern of the public for the safety and efficacy of synthetic preservatives in food and pharmaceutical preparations demand a search for effective, safer and cheaper alternatives. This study aims to utilize the peels of Musa paradisiaca, Citrus microcarpa and Mangifera indica aqueous, ethanolic and methanolic extracts as potential food and pharmaceutical preservatives through determination of their antioxidant and antimicrobial activities. All extracts, except methanolic extract of C. microcarpa, exhibited comparable activity with standard antioxidant preservative, butylated hydroxytoluene, by half maximal inhibitory concentration (IC50) measurement using the ferric reducing antioxidant power (FRAP) assay ( $p > 0.05$ ). Aqueous extract of M. paradisiaca ( $p=0.509$ , n/a, 0.347), C. microcarpa ( $p=0.916$ , 0.504, 0.773) and M. indica ( $p=n/a$ , 0.999, 0.942) revealed similar activity with the antimicrobial preservative, methylparaben, against Escherichia coli, Staphylococcus aureus and Klebsiella pneumoniae. These properties were attributed to the secondary metabolites present in the extracts such as glycosides, reducing substances, tannins, plant acids and flavones/flavonols. This study implies that these peel waste extracts may be used as an alternative and cheap source of preservatives in food and pharmaceutical industry.*

Keywords: natural preservatives, banana, calamansi, mango, antimicrobial, antioxidant

### **Introduction**

Food-borne diseases, food contamination and microbial spoilage of pharmaceuticals continue to become a global concern to both developing and industrialized countries due to changes in production practices, climate change, rise in global trade of food and the continuing microbial resistance of microorganisms (Havelon, 2010). Preservatives are added to prolong shelf life and limit the microbial growth on food and pharmaceutical products. Commonly, synthetic preservatives are used for such purpose. However, due to concerns about the safety and efficacy of these compounds (Wilson *et al.*, 2015), industries and research agencies are pressured to search for alternative sources of preservatives.

Preservatives act by inhibiting the growth of microorganisms and preventing lipid oxidation of different products, thus extending shelf life. Plant-occurring bioactive compounds and medicinal plants have long