UNIVERSITI TEKNOLOGI MARA

ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF AQUEOUS EXTRACTS OF SELECTED FRUIT PEELS AND DEVELOPMENT OF MIXED FRUIT PEEL LEATHER

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AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The discarding of fruit residues gain public's attention as they might cause serious environmental pollution. Hence, a study was conducted on four different fruit peels namely *Mangifera indica* var. Chok-Anan, *Psidium guajava* var. Kampuchea, *Citrus sinensis* var. Navel and *Malus sylvestris* var. Granny Smith. For the first phase, fresh and dried aqueous extracts were screened for their phytochemicals and toxicity level, estimating the total phenolic content and total flavonoid content as well as quantification of individual phenolic. Antioxidant activity was conducted by using Ferric Reducing Antioxidant Power, DPPH Radical Scavenging, ß-carotene Bleaching and Oxygen Radical Absorbance Capacity while antimicrobial activity was evaluated against 10 bacterial and two fungal strains. The second phase comprised of development and optimisation of mixed fruit peel leather with formulations generated by Mixture Design. The results showed that *C. sinensis* exhibited the highest pectin yield and degree of esterifIcation with 7.15% and 78.27%. All fruit peels extracts were classified as non-toxic with LC_{50} higher than 0.1 mg/ml. Fresh extracts were higher in TPC, TFC and both antioxidant and antimicrobial assays with *M. indica* peel as the strongest contributor. M. *sylvestris* and *M. indica* also showed highest in total flavonoid compound and total phenolic acids compound respectively that quantified by HPLC. A strong correlation was found between TPC with all antioxidant assays with r^2 ranged from 0.732 to 0.989. The optimised formulation of mixed fruit peel leather by using sensory scores and TPC as responses was 56.50% *P. guajava*, 33.00% *M. indica* and 10.50% *C. sinensis* peels with desirability of 98.10. The optimised formulation also showed highest in TPC and all antioxidant assays. The development of mixed fruit peel leather is recommended as an alternative way to valorise fruit by-products.

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