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DEVELOPMENT OF BALM STICK MOISTURIZER USING TAMARIND SEED EXTRACT FOR ENHANCED HYDRATION AND SKIN NOURISHMENT

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This Final Year Project Report entitled "**Development of Balm Stick Moisturizer using Tamarind Seed Extract For Enhanced Hydration and Skin Nourishment"** was submitted by Haffazira Binti Abu Osman in partial fulfilment of the Requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

DEVELOPMENT OF BALM STICK MOISTURIZER USING TAMARIND SEED EXTRACT FOR ENHANCED HYDRATION AND SKIN NOURISHMENT

The global shift toward natural and sustainable skincare presents an opportunity to explore the underutilised potential of *Tamarindus Indica L.* (tamarind) seeds, which are typically discarded as agro-industrial waste. This study aims to determine the bioactive profile of tamarind seed extract and evaluate its performance as a functional ingredient in a waterless balm stick moisturizer. Bioactive compounds were recovered using hot water extraction (HWE) for polysaccharides and ethanolic maceration for phenolics and flavonoids. The evaluation was conducted using UV-Vis spectroscopy to determine total sugar content (TSC), total phenolic content (TPC), and total flavonoid content (TFC). The combined extracts were used to develop five concentrations of balm stick moisturizer, including 0%, 3%, 5%, 7%, 9%, and 11%. All the formulated balms were assessed for pH, physical stability (texture and spreadability), and moisture retention. The best-formulated balm stick moisturizer was further assessed for antioxidant activity (DPPH Assay) and FTIR analysis. The results showed that the aqueous extraction yielded significantly higher (28.73 ± 2.11%) than the ethanolic method (7.79 ± 1.08%), with quantified bioactives of 17.48 mg GE/g (TSC), 20.80 mg GAE/g (TPC), and 51.76 mg QE/g (TFC). The 11% extract formulation was identified as the optimal variant, exhibiting a skin-compatible pH of 5.77 ± 0.02, greater moisture retention of 86.69 ± 0.87%, and strong antioxidant inhibition of 84.6 ± 1.1%. FTIR analysis confirmed the successful incorporation of hydroxyl-rich bioactive into the lipid matrix without structural disruption. Ultimately, this study demonstrates that tamarind seeds can be successfully repurposed into a high-value functional skincare product, supporting zero-waste innovation and the circular bioeconomy.

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