

FORMULATION OF STANDARDIZED HERBAL TEA FROM WHOLE FLOWERS, STAMENS AND IMMATURE FRUITS OF BAEI (*Aegle marmelos* (L.) Corrêa)

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Bael *Aegle marmelos* (L.) Correa, belonging to the family Rutaceae, is an underutilized fruit crop despite its significant therapeutic properties and untapped potential for the global herbal tea market. This study evaluated the feasibility of formulating herbal tea from different parts of Bael; whole flowers, stamens, and immature fruits and found the best element of Bael for herbal tea preparation by examining inherent phytochemical and antioxidant properties, mineral contents, and organoleptic qualities. Herbal tea was prepared by crushing and oven-drying the raw materials, which were then sieved and packed into tea bags. An aqueous extraction was subjected to phytochemical analysis and sensory evaluation. Total phenol and flavonoid contents were measured using the Folin-Ciocalteu and modified aluminum chloride (AlCl₃) methods, respectively. Antioxidant activity was assessed using the DPPH free radical scavenging assay and ORAC assay, while mineral content was analyzed by ICP-MS. Sensory evaluation was conducted by thirty-one untrained panelists using a 7-point Hedonic scale. All non-parametric data was analyzed by using the Friedman test, and parametric data was statistically analyzed using a one-way ANOVA test at a significant level of 95%. Results indicated that herbal tea made from immature fruit had significantly ($p < 0.05$) high amount of phenolic (206.63 ± 1.58 mg GAE g⁻¹) and flavonoid contents (12.90 ± 0.12 mg QE g⁻¹) compared to herbal tea with whole flower and stamen. The highest level of antioxidant activities (67.22 ± 2.4 µg mL⁻¹) was in whole flower tea. No significant differences ($p > 0.05$) were observed in the ORAC assay among three tea types. Comparatively higher mineral content was recorded in stamen tea. Sensory evaluation revealed that herbal tea made from immature fruit had the best organoleptic qualities, while stamen was the least suitable for herbal tea preparation. In conclusion, herbal tea made from immature Bael fruit demonstrated strong market potential, due to its high phytochemical content, antioxidant properties, and favorable sensory qualities. The formulated immature Bael fruit tea outperformed the Bael tea currently available in local markets.

Keywords: Antioxidant activity, Flavonoids, Organoleptic qualities, Phenolic contents