

PHYTOCHEMICAL AND MINERAL PROFILING OF POMEGRANATE (*Punica granatum* (L.)) LEAF WASTE: EXPLORING ITS POTENTIAL FOR HERBAL TEA FORMULATION

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Herbal tea is valued for its natural, health-boosting properties, and pomegranate leaves, rich in bioactive compounds and nutrients, make it an ideal base for herbal tea production. This study analyzed the phytochemical and mineral content, and antioxidant properties of leaves of four pomegranate cultivars: *Nayana*, *Kalpitiya hybrid*, *Nimali*, and *Daya* to develop a consumer-preferred herbal tea by blending with black tea. The antioxidant capacity was assessed by 1,1-diphenyl-2-picrylhydrazyl (DPPH) and oxygen radical absorbance capacity (ORAC) assays, while total phenolic content (TPC), and total flavonoid content (TFC) were measured by the Folin-Ciocalteu and colorimetric methods respectively. Mineral content was analyzed using inductively coupled plasma atomic emission spectrometry and the caffeine content was determined by high-performance liquid chromatography (HPLC) method. The optimal blend of pomegranate leaf and black tea was selected based on sensory evaluation among 50:50, 60:40, and 80:20 ratios. Parametric and sensory data were analyzed using ANOVA and the Friedman test in R and SPSS software, respectively. The phytochemical, antioxidant, and mineral contents of the leaves of all four tested cultivars are ideal for herbal tea. Significantly ($p < 0.05$) higher values of TPC, TFC, DPPH, and ORAC (162.12 ± 1.64 mg GAE g⁻¹, 12.94 ± 0.07 mg QE g⁻¹, 33.93 ± 0.23 mg TE g⁻¹, 194.86 ± 1.53 mg TE g⁻¹ DW) compared to black tea (106.5 ± 1.7 mg GAE g⁻¹, 11.32 ± 0.13 mg QE g⁻¹, 23.13 ± 0.1 mg TE g⁻¹, 182.28 ± 2.62 mg TE g⁻¹ DW) revealed the improved antioxidant properties and beneficial bioactive compounds in the herbal tea blend (60:40). The 60:40 pomegranate leaf:black tea blend received significantly ($p < 0.05$) high scores for all sensory attributes, indicating a strong preference among the tested blends. Lower caffeine content (0.82% (w/w)) was recorded in the 60:40 tea blend, compared to black tea (2.23% (w/w)) confirming that the pomegranate-leaf tea blend is a low-caffeine alternative, a promising option for health-conscious consumers.

Keywords: Antioxidant, Caffeine, Pomegranate cultivars, Sensory attributes, Tea blend