

ID 29

Evaluation of the antioxidant properties of lime waste

V. Sivasamalai* and S. Vasantharuba

Department of Agricultural Chemistry, Faculty of Agriculture, University of Jaffna, Sri Lanka.

Abstract:

Lime is a widely produced, economical fruit that is nutritious and healthy. Processing lime produces large amounts of waste, including peel, pulp, pomace, and seeds, and improper disposal can lead to environmental pollution. This study aims to investigate the antioxidant properties of different portions of lime waste as a functional ingredient, helping to valorize by-products and mitigate environmental pollution. Lime waste was obtained and separated into peel (P1), pulp (P2), and a mixture of both (P3). The samples were dried at 60 °C for 12 hours and ground into flour (particle size 150 µm). Methanolic extracts were prepared using 5 g of each waste and 50 mL of methanol, and the total phenolic content (TPC), total flavonoid content (TFC), 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS), and ferric reducing antioxidant power (FRAP) assays of the lime waste extracts were analyzed in duplicate. Overall, peels had significantly higher polyphenols (27.35 ± 0.06 mg GAE g⁻¹), while pulp (17.526 ± 0.28 mg GAE g⁻¹) and the mixture of peel and pulp (19.256 ± 0.08 mg GAE g⁻¹) had significantly lower polyphenol contents ($P < 0.05$). A similar pattern of high results was observed for the antioxidant potential of lime peel among the waste portions in TFC (0.068 ± 0.01 mg QE g⁻¹) and in the IC₅₀ values of DPPH (0.200 mg mL⁻¹), ABTS (0.069 mg mL⁻¹), and FRAP (0.154 mg mL⁻¹) assays. In conclusion, polyphenols, flavonoids, and other antioxidants are present in lime waste, with levels significantly higher in lime peel, intermediate in the mixture of both, and lowest in pulp. Hence, lime waste contains beneficial compounds, making it a functional raw material that helps valorize by-products and mitigate environmental pollution.

Keywords: Antioxidant; Environmental pollution; Lime waste; Polyphenols; Valorization

*Corresponding author: sivasamalai15@gmail.com