

Evaluation of Regional Variations in the Quality Characteristics of Bottled Palmyrah Toddy in Sri Lanka

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Palmyrah (*Borassus flabellifer* L.) toddy is a traditional fermented beverage made from sap collected from male or female inflorescences. The demand for toddy is increasing locally and internationally due to its organic nature and unique sensory properties. However, limited information is available on the regional variations in the physicochemical and microbial characteristics of bottled palmyrah toddy produced in Sri Lanka. Therefore, this study evaluated the physicochemical and microbial properties of bottled palmyrah toddy collected from seventeen production centers of the Palmyrah Development Cooperative Societies across different regions of Sri Lanka to assess product quality and consistency. Physicochemical parameters, including total soluble solids, total solids, turbidity, alcohol content, acidity, original extract, total ash, sulphated ash, sugars (glucose, fructose, and sucrose), mineral composition (Na, K, Ca, Mg, and P), and total phenolic content, and microbial properties, including Total Plate Count (TPC) and Yeast and Mold Count (YMC), were analyzed according to Sri Lankan

Standard methods. Data were analyzed using one-way ANOVA to determine significant regional differences (Inland, Coastal Near-Inland and Coastal). Results revealed significant regional differences ($p < 0.05$) in total solids, total soluble solids, and total phenolic content, while other parameters showed no significant regional differences. Inland toddy samples showed higher sugar content (2.67 ± 0.93 g/100 mL), and a milky appearance, whereas coastal toddy samples exhibited higher alcohol content ($4.20 \pm 0.55\%$ v/v) and acidity (0.54 ± 0.08 g/100 mL), indicating stronger fermentation. Samples obtained from coastal near-inland regions exhibited moderate characteristics, sharing features of both inland and coastal toddy. Sulphated ash values ranged from 0.23 to 0.53%, suggesting the absence of adulteration in all bottled toddy samples. Microbial analysis revealed TPC values of <1 CFU/mL and YMC values ranging from <10 to 90 CFU/mL, indicating acceptable microbial quality. The findings demonstrate distinct regional profiles of bottled palmyrah toddy, highlighting the influence of geographical conditions and processing practices on product quality. Future research should focus on characterizing sensory attributes, establishing standardized quality parameters, and developing Standard Operating Procedures to ensure consistent product quality.

Keywords: Fermentation, Palmyrah bottled toddy, Physicochemical Properties, Quality, Regional variation

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