A Comparative Study on Microbial and Sensory Quality of Sri Lankan Green Tea Produced by Different Manufacturing Methods

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Despite its global reputation, Sri Lankan green tea faces microbiological quality concerns. This study evaluated the microbiological and sensory quality of Sri Lankan green tea produced by steaming, panning, handcrafting methods and examined compliance with Sri Lanka Tea Board standards. Green tea samples were collected from 15 operational green tea factories (n=15) during 2025, with three replicate samples obtained from each factory. Microbiological analyses followed ISO 11287:2011. Each sample was analyzed in triplicate for Total Plate Count (ISO 4833-1:2013), Yeast & Mold (ISO 21527-2:2008), Total Coliforms (ISO 4831:2006) and *Escherichia coli* (ISO 7251:2005). Sensory evaluation used a seven-point hedonic scale by seven trained tea tasters from Sri Lanka Tea Board, assessing dry leaf, liquor, and infused leaf quality. Statistical analyses were performed using IBM SPSS Statistics version 27. One-way ANOVA followed by Tukey's post hoc test was used to compare microbiological and sensory parameters among manufacturing methods at $p<0.05$. The handcrafted method recorded the lowest mean yeast and mold count (6.19×10^2 CFU/g), total plate count (3.39×10^2 CFU/g), and total coliform count (4.35×10^2 MPN/g) and the highest sensory quality ($p = 0.002$). In contrast, the panning method showed the highest microbial loads, with yeast and mold counts of 4.21×10^5 CFU/g and total plate counts of 8.15×10^5 CFU/g, while steaming had moderate levels, yeast and mold counts (1.20×10^5 CFU/g) and total plate counts (5.45×10^5 CFU/g). Although all green tea samples were free from *Escherichia coli*, a substantial proportion failed to comply with the microbiological safety limits of Sri Lanka Tea Board Circular ALMQS-02/2021; however, samples were complied with the Tea & Herbal Infusions Europe (THIE) recommended microbiological limits for *Camellia sinensis* with minor yeast and mold deviations. These findings highlight the improved sanitation and quality control, particularly in automated manufacturing systems. Overall, handcrafted green tea demonstrated superior quality compared to other manufacturing methods.

Keywords: Green Tea, Manufacturing Methods, Microbial Quality, Sensory Quality, Sri Lanka