

DETERMINATION OF ANTIOXIDANT ACTIVITY OF SRI LANKAN GREEN TEA BY THERMAL REGULATION

S.M.B.D. Sudusooriya and D.R. Uduwela *

Department of Chemistry, Faculty of Science, University of Peradeniya, Sri Lanka
**dimanthi.uduwela@sci.pdn.ac.lk*

Green tea, derived from leaves of *Camellia sinensis*, is well known for potential health benefits attributed to its antioxidant properties. Recent research on Assam green tea of India suggests that roasting leaves at 270 °C for four minutes would be ideal to preserve a maximum of antioxidants. There are two steps involving thermal treatment in green tea production. Locally, fixation is carried out in the range of (50 - 85) °C and final drying is carried out at 100 °C. Although studies have been published regarding the effect of roasting temperature on antioxidant activity, none are related to that of Sri Lankan green tea. The aim of this study was to investigate whether antioxidants could be preserved better by roasting and drying leaves at temperatures different from the typical range used in local industries. The experimental procedure involved roasting leaves at seven different temperatures in the range of 50-150 °C for 10 min and measuring the antioxidant activity using established bioassays; 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) assays. Total phenolic content (TPC) and total flavonoid content (TFC) were separately quantified using the Folin Ciocalteu method [pyrogallol equivalent (PE)] and AlCl₃ colorimetric method [quercetin equivalent (QE)] respectively. The UV absorbance data provided insights about the compounds that could be susceptible to $\nu\lambda_{\max}$ value of epigallocatechin gallate pursuant to literature. There was a 40% decrease in area between UV spectra of samples processed at 50 °C and 100 °C, clearly suggesting the degradation. The highest antioxidant activity was observed in samples processed at 50 °C in both fixation and final drying. Overall, the findings underscore fixation at 50 °C (DPPH: IC₅₀ = 12.23 ppm; FRAP: 184.68 µg Fe²⁺/mg; TPC: 464.43 µg PE/mg; and TFC: 575.15 µg QE/mg) and drying at 50 °C (DPPH: IC₅₀ = 15.36 ppm; FRAP: 193.48 µg Fe²⁺/mg; TPC: 536.74 µg PE/mg; and TFC: 235.15 µg QE/mg) would retain a maximum of antioxidants. However, final drying is industrially carried out at 100 °C (DPPH: IC₅₀ = 35.15 ppm, FRAP: 112.28 µg Fe²⁺/mg, TPC: 427.28 µg PE/mg and TFC:159.15 µg QE/mg) which decreases the amount of antioxidants compared to drying at 50 °C. The results of the study could be further optimized by considering roasting time, production yield, moisture content and sensory evaluation before recommending 50 °C (IC₅₀ = 15.36 ppm) for the final drying.

Keywords: Antioxidant activity, Sri Lankan green tea, Temperature regulation, Thermal degradation