



EFFECT OF DEHYDRATION PROCESS OPTIMIZATION ON PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF GUYABANO (*ANNONA MURICATA* L.) LEAF TEA

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Abstract

Guyabano (*Annona muricata* L.) leaves are used in herbal infusions, but dehydration conditions can alter phenolic retention, radical-scavenging activity, and sensory quality. This study evaluated the effects of forced-air dehydration temperature and time on guyabano leaf tea using an I-optimal response surface design over 55-75 degrees C and 2-6 h. Independent processing batches were analyzed for proximate composition, total phenolic content (TPC), and DPPH radical-scavenging activity, while selected high-temperature formulations were evaluated for sensory acceptability and microbiological quality. Formulation significantly affected all testable proximate and bioactive responses ($p < 0.05$). GT12 showed the highest observed TPC (119.39 ± 2.52 mg GAE/100 g dried sample), whereas GT04 and GT11 showed the highest DPPH inhibition group, with GT12 showing moderate DPPH activity ($56.61 \pm 1.21\%$). The TPC RSM model showed strong fit and predictive performance ($R^2 = 0.977$; predicted $R^2 = 0.856$), while the DPPH model was statistically significant but less predictive ($R^2 = 0.788$; predicted $R^2 = 0.325$). Multi-response desirability identified 75 degrees C for 6 h as the model-predicted optimum, with predicted TPC of 125.99 mg GAE/100 g dried sample and DPPH inhibition of 61.39%. Sensory testing of GT10-GT12 showed acceptable hedonic scores, with GT12 numerically highest in overall acceptability. The selected formulations tested for microbiological quality met the referenced criteria. The optimum represents a model-predicted condition requiring independent confirmation.