

Abstract

Limeberry (*Triphasia trifolia*), native to Southeast Asia, is consumed as an antioxidant-rich herbal infusion. This study aimed to (1) investigate the effects of pretreatment processes on the antioxidant, physicochemical, and sensorial properties of limeberry (*T. trifolia*) shoot tea, and to (2) determine the brewing temperature that maximizes antioxidant extraction, physicochemical properties, and the sensorial properties of limeberry (*T. trifolia*) shoot tea. Three processing treatments were conducted: Black Tea Fermentation (BTF), Green Tea Pan-frying (GTP), and Green Tea Steaming (GTS), brewed at 60°C, 80°C, and 100°C. Physicochemical properties (pH, color, °Brix, moisture loss) ($p > 0.05$), antioxidant properties (TPC via Folin-Ciocalteu, DPPH radical scavenging) ($p > 0.05$), functional groups (FTIR), and sensory evaluations (9-point hedonic scale, Optimized Descriptive Profiling) were evaluated. TPC (104.87 - 440.73 µg GAE/g) and DPPH activity (30.80 - 49.97% inhibition) varied considerably but did not differ significantly ($p > 0.05$). All samples exhibited alkaline pH (7.68-8.52) and 0 °Brix consistent with the inherently low soluble solids of unsweetened tea. FTIR indicates the presence of O-H stretching, N-H stretching, and C=C stretching. In preliminary sensory screening, BTF was the only sample to surpass the 5.5 acceptability threshold. Among BTF samples, at 60°C, the profile was the most acceptable (4.70 ± 1.95), though still below the threshold. Bitterness, astringency, and numbing sensations increased significantly with brewing temperature ($p < 0.001$). These findings suggest BTF at 60°C as the most promising formulation, but further optimization is required to ensure acceptability.

Keywords: *antioxidant activity; herbal tea; sensory profiling; tea processing; Triphasia trifolia*