

Abstract

Limeberry (*Triphasia trifolia*), a largely underutilized tropical fruit in the Rutaceae family, contains flavonoid glucosides including naringin, phenolic acids, and coumarins with documented antioxidant properties. Despite its bioactive potential, its intensely bitter and astringent flavor has limited commercial application. This study aimed to develop a ready-to-drink limeberry fruit tea by evaluating the effects of brewing temperature and sweetener formulations on antioxidant activity, physicochemical properties, and consumer preference. Limeberry fruits were brewed at 70°C and 90°C for 3 minutes at a 1:20 (w/v) ratio, and antioxidant activity was assessed via DPPH radical scavenging and Total Phenolic Content using the Folin–Ciocalteu method. Brewing at 90°C yielded significantly higher TPC at $1521.40 \pm 246.97 \mu\text{g GAE/g}$ ($p < 0.05$) and DPPH inhibition at $70.35 \pm 0.30\%$ ($p < 0.05$) compared to 70°C, and was thus selected as the optimal brewing condition. Six sweetener formulations (sucrose, Glucose syrup, and honey at 5°Bx and 10°Bx) were then evaluated for their effects on pH, color (CIE Lab*), and consumer acceptability by 100 untrained panelists using a 9-Point Hedonic Scale, ranking test, and Check-All-That-Apply (CATA). Honey at 10°Bx produced the most significant reduction in pH, while all sweeteners maintained stable color profiles. Sensory evaluation revealed that honey at 10°Bx achieved the highest overall liking score (7.16/9) and was most frequently ranked as the top preference, driven by superior mouthfeel, fruity aroma, and sweet aftertaste. These findings establish 90°C brewing with honey at 10°Bx as the optimal formulation for a palatable, antioxidant-rich limeberry RTD fruit tea.

Keywords: Limeberry, *Triphasia trifolia*, antioxidant activity, functional beverage, sweetener formulation, sensory evaluation