Thesis Title	Effect of High Pressure Processing on Chemical Compositions, Antioxidants and Anti-inflammatory Properties of "Phulae" Pineapple Puree
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ABSTRACT

Pineapple (*Ananas comosus* L.) is a widely consumed tropical fruit valued for its nutritional, functional and antioxidants properties. The *"Phulae"* pineapple cultivar, a specialty fruit from Chiang Rai, Thailand, small size and crisp texture, along with high levels of vitamin C and bromelain. Pineapple puree retains these key bioactive compounds and serves as a convenient form for processing, storage, and incorporation into functional foods and beverages. However, conventional heat treatment (CHT) often degrades these compounds, creating a need for alternative preservation methods. High pressure processing (HPP) offers a non-thermal approach that can maintain nutritional quality, antioxidant capacity, and sensory attributes of fruit-based products. To address this issue, this study compared HPP (HPP; 400 and 600 MPa, 10 min, 25 °C) with CHT at 80 °C for 10 min in preserving the quality of *"Phulae"* pineapple puree, using the puree without any treatment as a control.

This research was to investigate the effects on the quality, antioxidant activity, anti-inflammatory activities and volatile profile of *"Phulae"* pineapple puree. In-depth investigations were carried out to assess antioxidant activities (DPPH, FRAP, ABTS, and ORAC tests), anti-inflammatory activities (bromelain, NO, and HA), volatile component profiles, and bioactive substances (such vitamin C and total phenolic content or TPC). The results showed that HPP effectively preserved total soluble solids or TSS (13.5 °Brix) and color (L^* 46.6–48.0; b^* 21.3–22.0), with only slight deviations from the untreated sample (L^* 49.4; b^* 24.1). Vitamin C was significantly higher in HPP samples (216.9 mg/kg) compared to CHT (167.0 mg/kg). HPP at 400 MPa yielding the highest TPC (73.8 g GAE/kg), DPPH (2.3 mmol TE/kg), and FRAP (4.7 mmol Fe (II)/kg), while ABTS activity peaked at 600 MPa (4.6 g TE/kg FW). Bromelain activity was better maintained under HPP, with bromelain ranging from 3441.7–3733.3 CDU/L, HA inhibition 78.8–79.9%, and NO inhibition 47.0 mmol TE/kg FW, whereas CHT markedly reduced these values to 2025 CDU/L, 77.1%, and 27.4 mmol TE/kg FW, respectively ($P < 0.05$). Correlation analysis indicated that phenolic compounds and bromelain activity were key contributors to the puree's antioxidant and anti-inflammatory functions, while HPP effectively preserved these bioactive components and color integrity compared to heat treatment. Volatile compound analysis identified esters and terpenes as the dominant aroma contributors, and PCA revealed that PC1 and PC2 accounted for 60.4% and 25.3% of the variance, respectively, with HPP-treated samples clustering closely with the untreated control. In conclusion, HPP proved to be a promising non-thermal technology for preserving the nutritional (vitamin C, phenolics), functional (antioxidant capacity, anti-inflammatory activities), and sensory (color, aroma) qualities of *"Phulae"* pineapple puree, offering clear advantages over CHT.

Keywords: High Pressure Processing, *"Phulae"* Pineapple Puree, Physicochemical Properties, Antioxidant, Volatile Compounds