Thesis Title	Effects of Ultrasound-assisted Extraction and Tannase Treatment on Physicochemical, Functional Properties, and Stability of Green Tea (*Camellia sinensis* var. *assamica*) Extract
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ABSTRACT

This thesis explores the enhancement of catechin extraction from Green Tea (*Camellia sinensis* var. *assamica*) efficiency, extract quality and catechin stability, through various methodologies, including solvent extraction, ultrasound-assisted extraction (UAE), and tannase treatment, as well as the impact of storage conditions on catechin properties. In the first, the study compared solvent extraction and UAE methods for their effects on the physicochemical properties of catechins extract. UAE demonstrated superior efficiency in catechin extraction, achieving higher yields and improved higher total polyphenol content (TPC) and antioxidant capacity of catechin extract compared to conventional solvent extraction. UAE on condition tea : 50% ethanol v/v (1 : 20) at 20min showed the highest extract yield 22.99 ± 0.08%, catechin content 33.75 ± 0.15 (g/100 g db), TPC 64.02 ± 0.16 (g/100 g db) and antioxidant capacity. The second investigated the effects of tannase in modifying the physicochemical and functional properties of catechin extract. Tannase treatment significantly impacted the TPC and antioxidant capacity of catechins. Although tannase

treatment reduced content of catechins, and it provided greater stability during storage by minimizing degradation. This stabilization effect was more pronounced at lower temperatures. In the final, the stability of catechins was assessed under different storage conditions, specifically at freezer (-20°C) and incubator (30°C). Untreated catechin samples showed considerable degradation in TPC, antioxidant activity, and individual catechin content over an 8-week period, with more severe declines at incubator. Tannase-treated samples, however, exhibited better stability, with slower declines in catechin content and antioxidant activity. Overall, the results demonstrated that ultrasound-assisted extraction (UAE) is a highly effective technique for obtaining catechin-rich extracts with superior antioxidant properties compared to traditional solvent extraction methods. Furthermore, tannase treatment proved to be a promising strategy for improving the long-term stability of catechins, despite its initial reduction in catechin content. This stability enhancement is especially critical for applications where maintaining antioxidant activity over extended storage periods is essential. The research also highlighted the significant impact of storage conditions on catechin degradation. Lower temperatures, such as those in freezer storage (-20°C), were shown to significantly mitigate the loss of catechin content, total polyphenols, and antioxidant capacity compared to higher storage temperatures (30°C). These findings provide valuable insights for the development and preservation of catechin-rich products, emphasizing the importance of employing advanced extraction techniques and stabilizing agents to maintain the quality and efficacy of catechins.

Keywords: Catechins, Ultrasound-associated Extract (UAE), Tannase