Title : Determination of Antioxidant Activities, Total Flavonoid and Phenolic Contents of Zingiberaceae Plants Cultivated in Northern Thailand

Author(s) : **1.** Patcharee Raedtui **Student ID :** 650510181

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Advisor(s) : **1.** Associate Professor Dr. Panchika Prangkio

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ABSTRACT

Plants in the Zingiberaceae family are widely recognized as rich sources of phenolic and flavonoid compounds that contribute substantially to antioxidant activity. This study aimed to evaluate the antioxidant activity, total phenolic and flavonoid contents, and phytochemical profiles of four medicinal species: *Boesenbergia rotunda*, *Curcuma comosa*, *Zingiber montanum*, and *Curcuma longa* with particular emphasis on the influence of sample preparation (fresh and oven-dried) and solvent type (95% ethanol and distilled water) for extraction. Antioxidant potential was assessed using DPPH, ABTS, and FRAP assays, along with determination of total phenolic and flavonoid contents. Phytochemical constituents were characterized by LC–QTOF/MS analysis. The findings revealed that extraction with 95% ethanol consistently yielded higher antioxidant activity compared with distilled water across all species. Among the samples, *C.longa* exhibited the highest antioxidant activity, followed by *Zingiber montanum*, *Boesenbergia rotunda*, *Curcuma comosa*, respectively. Oven-dried *C. longa* exhibited the highest FRAP value (83.89 ± 50.65 mg AAE/g) and the greatest total flavonoid content (5.76 ± 2.06 µg RE/g). In contrast, fresh *C. longa* demonstrated the highest total phenolic content (1.18 ± 0.24 mg GAE/g). LC-QTOF/MS profiling identified several major constituents, including dehydrocurdione and embelin. Additionally, other bioactive compounds were also detected in some species, such as naringenin in dried *B. rotunda* and 6β,7β-dihydroxykaurenoic acid in dried *C. comosa*. Collectively, these results demonstrate that both sample condition and solvent selection markedly affect phytochemical yield and antioxidant performance. This study provides fundamental support for the standardized development and potential commercialization of herbal extracts derived from Zingiberaceae species.

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