

## Phenolic-enriched fractions from the inflorescence of *Etlingera elatior* and their antioxidant activities

Sedin Renadi,<sup>#,1,2</sup> Kimberly Delica-Balagot,<sup>1,3</sup> Vera Nurviana,<sup>2</sup> Tresna Lestari,<sup>2</sup> Clarisse Mu-Ting Fournier,<sup>1</sup> Thiagarajan Raviraj,<sup>1</sup> Olha Mykhailenko,<sup>4,5</sup> Fang-Rong Chang,<sup>1</sup> Michal Korinek<sup>\*,1</sup>

<sup>1</sup> Graduate Institute of Natural Products, College of Pharmacy, Kaohsiung Medical University, Kaohsiung 807378, Taiwan

<sup>2</sup> Faculty of Pharmacy, Bakti Tunas Husada University, Tasikmalaya 46196, Indonesia

<sup>3</sup> Department of Science and Technology–Forest Products Research and Development Institute (DOST-FPRDI), College, Laguna 4031, Philippines

<sup>4</sup> Pharmacognosy and Phytotherapy Group, UCL School of Pharmacy, London WC1E 6BT, United Kingdom

<sup>5</sup> National University of Pharmacy, Kharkiv 61002, Ukraine

\* E-mail: michalk@kmu.edu.tw

### Abstract

*Etlingera elatior* (torch ginger) is cultivated in Southeast Asia and Taiwan. The inflorescence part of this plant is widely used as food and ethnomedicine, but its phytochemical profile and antioxidant potential have not been thoroughly explored. The inflorescences obtained from West Java, Indonesia, were extracted and fractionated into eleven subfractions (EES1 to EES11), and evaluated for total phenolic content (TPC), total flavonoid content (TFC), and antioxidant activity using DPPH and CUPRAC assays. Fractions EES8 (TPC: 66.64 mg GAE/g; TFC: 392.19 mg QE/g), EES6 (TPC: 40.28 mg GAE/g; TFC: 943.51 mg QE/g), and EES7 (TPC: 51.80 mg GAE/g; TFC: 623.59 mg QE/g) exhibited the most significant antioxidant capacity. DPPH radical-scavenging activities for these fractions were 2.11, 1.61, and 1.28 mmol TEAC/g, respectively, while CUPRAC reducing capacities were 8.33, 7.45, and 6.92 mmol TEAC/g, respectively. There is a positive correlation between polyphenolic enrichment and antioxidant activity. Based on chromatographic isolation, fifteen compounds were isolated, including phenolics, fatty alcohol derivatives, and a glucopyranoside. The compounds were characterized by 1D/2D NMR and mass spectrometry. Additionally, molecular docking against inducible nitric oxide synthase (iNOS) assessed potential links between structure and bioactivity of isolated compounds from *E. elatior*. Phenolic derivative compounds formed hydrogen bonding interactions essential for antioxidant and anti-inflammatory activity. Through these findings, *E. elatior* inflorescences have been shown as a promising source of natural, phenolic-rich antioxidant compounds with potential iNOS inhibitory activity.

Keywords: *Etlingera elatior*; Phenolic compounds; Antioxidant activity; DPPH; CUPRAC; Flavonoids