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| <b>Thesis Title</b> | Pectin from Coffee Pulp: Extraction, Characterization, and Bioactivities |
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## ABSTRACT

Coffee pulp, a significant by-product of coffee processing in Thailand, represents a promising source of value-added compounds. This study investigates the physicochemical characteristics and bioactive properties, specifically the prebiotic and anticancer potential, of pectin derived from coffee pulp (CP). Pectin was isolated using a double extraction method and subsequently modified enzymatically (SFD). Comprehensive characterization involved thermogravimetric analysis (TGA) for purity, Fourier-transform infrared spectroscopy (FTIR) for the degree of esterification (%DE), gel permeation chromatography (GPC) for molecular weight, and high-performance anion-exchange chromatography (HPAEC-PAD) for sugar composition and structure. Bioactivity assessments included the DPPH assay for antioxidant potential, *in vitro* growth studies with *Pediococcus* sp. (PE), *Lactococcus lactis* (LL), and *Lactobacillus acidophilus* (LA) to determine Prebiotic Index and Activity Scores, and the CCK-8 assay for cytotoxicity against SW480 colon cancer and CCD 841 CoN normal colon cells, with apoptosis confirmed via Annexin V-FITC/PI staining. Results were benchmarked against commercial prebiotics (inulin), pectins (HMP, L20, L40), and 5-Fluorouracil (5-FU).

The extraction yielded 7.99% low methoxy pectin (LMP) with 4.76% DE, 68.05% purity, a weight-average molecular weight ( $M_w$ ) of 68.6 KDa, and a linear structure (CP). Enzymatic modification yielded SFD, which retained LMP characteristics (0.00% DE) but exhibited increased branching and a significantly