Thesis Title	The Elucidation of Underlying Mechanisms Associated with Neuroprotective Effects of selected Plant-derived Function Ingredients in *Caenorhabditis elegans*
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ABSTRACT

Neurodegenerative diseases, such as Parkinson's disease (PD) are characterized by a progressive decline in nervous system function. These conditions are becoming increasingly prevalent worldwide, including in Thailand, primarily due to age-related degeneration and limited treatment options. Reducing oxidative stress is a promising approach to prevent and slow disease progression, with plant-based antioxidants showing significant potential. This study evaluated the antioxidant potential of medicinal plants approved by the Thai Food and Drug Administration (FDA), focusing on microencapsules containing a standardized extract of *Curcuma longa* L. *Caenorhabditis elegans* (*C. elegans*) was used as a model organism to investigate the neuroprotective mechanism of curcumin microencapsulated against 6-hydroxydopamine (6-OHDA)-induced dopaminergic (DA) neurodegeneration, and their applicability in the food industry was tested by incorporating them into ready-to-eat extruded snacks. The results showed that *Curcuma longa* is a locally medicinal plant that has demonstrated a strong neuroprotective effect and a good antioxidant capacity in a systematic review. It also high levels of phenolic and flavonoid compounds, exhibiting strong antioxidant activity through various mechanisms. Microencapsulation (sCL11064) preserved these properties without toxicity, as the sCL11064 did not effects on feeding behavior test, although there are still limitations in concentrations that have not yet shown positive findings, it demonstrated neuroprotective effects

against neurodegeneration in dopamine neurons induced by 6-OHDA. Additionally, functional foods made from unripe banana flour and fortified with sCL11064 represent a novel product with high consumer acceptance. These results highlight the potential of antioxidant-enriched functional foods for promoting neurological health. However, further study is required to determine its *in vivo* antioxidant efficacy, including superoxide dismutase (SOD), catalase (CAT), and malondialdehyde (MDA) levels, as well as neuroprotective testing in rodent models and clinical trials.

Keywords: *Curcuma longa* L., Microencapsulation, Antioxidant Activity, Neuroprotective Effect, Parkinson's Disease, *Caenorhabditis elegans*