

## GC–MS Characterization and Insecticidal Activity of Five Herbal Plants and Their Fermented Mixtures Against *Plutella xylostella*

Supaporn Sangsrichan<sup>1,2</sup>, Amorntep Sukkhad<sup>1</sup> and Uthumporn Kankaew<sup>1\*</sup>

<sup>1</sup>Department of Chemistry, Faculty of Science, Maejo University, Chiang Mai, Thailand

<sup>2</sup>Applied Chemistry Program, Faculty of Science, Maejo University, Chiang Mai, Thailand

\*<sup>1</sup>[uthumporn@mju.ac.th](mailto:uthumporn@mju.ac.th)

### Abstract

Botanical pesticides derived from plant secondary metabolites represent a natural and biodegradable alternative. In this study, essential oils from five herbal plants (*Annona squamosa* L., *Azadirachta indica* A., *Eupatorium odoratum* L., *Tinospora crispa* L., and *Alpinia galanga* L.) were extracted by steam distillation and analyzed using gas chromatography–mass spectrometry (GC–MS) to identify their chemical constituents and evaluate their insecticidal potential. Although some of these plants have been previously used as insecticides in organic cultivation, the combined use of these herbal plants has not yet been reported. The insecticidal efficacy (mortality effect) of each plant extract was tested against the diamondback moth (*Plutella xylostella* L.) under laboratory conditions. Mixtures of the five herbal plants were prepared by fermentation in 50% ethanol (Recipe I) and by fermentation in water with Super LDD 7 microbial activator (Recipe II). These formulations were evaluated for insecticidal activity in both laboratory and field experiments. Among the individual plant extracts, *Alpinia galanga* L. exhibited the highest insecticidal efficacy. However, the mixed herbal formulations demonstrated the greatest overall insecticidal effect. In field trials, both Recipe I and Recipe II significantly reduced insect damage compared to the control treatment.

**Keyword:** Insecticide, diamondback moth, GC-MS and herbal plants.