

Thesis Title	Natural Miticides for Controlling of <i>Tropilaelaps</i> sp. in <i>Apis mellifera</i> L.
Author	Kritsana Narapong
Degree	Master of Science (Biological Science)
Advisor	Khanobporn Tangtrakulwanich, Ph. D.
Co-Advisor	Kitiphong Khongphinitbunjong, Ph. D. Tharakorn Maneerat, Ph. D.

ABSTRACT

Tropilaelaps mites cause damage to *Apis mellifera* L. and lead to great economic loss in beekeeping. Many control methods, such as chemical agents, resulted in the mite resistance and accumulation of acaricidal residues in bee products. Botanical essential oils have been shown to provide an efficient alternative method to replace synthetic acaricides for the control of the mites. In this study, the efficacies of three botanical essential oils from *Curcuma longa* L., *Zingiber officinale* Roscoe and *Alpinia galanga* L. with the concentrations of 25%, 50%, and 75% were investigated to control the *Tropilaelaps* mites both under laboratory and field (apiary) conditions. Under laboratory conditions, the results demonstrated that both essential oils of *Z. officinale*, and *A. galanga* showed the same potential in controlling the mites and had higher efficacy in the increase of mite mortality than *C. longa* essential oil did at every tested concentration. The mite mortality occurred within 1-6 hours after being exposed to *Z. officinale* and *A. galanga* essential oils at every concentration. In contrast, all concentrations of *C. longa* essential oil showed significantly slower action (24-36 hours) ($P<0.05$) in causing mortality rate after the exposure compared to the previous two botanical essential oils. When observing the effect of these botanical essential oils

on the honeybees in the laboratory, the result showed that the 50% and 75 of *Z. officinale* and *A. galanga* oils had a negative effect on the bees and resulted in death within 2 days whereas 25% concentration of both botanical essential oils showed significantly lower mortality of honeybees ($P<0.05$) and the honeybees could survive for 14 to 36 days. *C. longa* essential oil at every tested concentration had a significant difference in honeybee mortality compared to the control (water) treatment ($P<0.05$).

According to the lower efficacy of *C. longa* essential oil in controlling the mites, only *Z. officinale* and *A. galanga* essential oils were tested for efficacy in the control of the mites in the apiary. The result showed that both botanical essential oils at 25%, 50%, and 75% concentrations had a significant acaricidal effect on the mites when compared to the control treatment ($P<0.05$). However, all concentrations of *A. galanga* essential oil caused significant differences in mortality rate of the mites when compared among the months ($P>0.05$). Moreover, *A. galanga* essential oil was found to increase mortality of honeybees. *Z. officinale* essential oils at all concentrations gave no significant efficacy in controlling the mites ($P>0.05$) and caused no negative effect on the honeybee population. Our results suggested that *Z. officinale* essential oil has a higher potential than *A. galanga* essential oil for controlling *Tropilaelaps* mites in apiculture.

Keywords: *Apis mellifera* L., Honeybees, *Tropilaelaps* mites, *Curcuma longa* L., *Zingiber officinale* Roscoe., *Alpinia galanga* L., Essential Oil