

ASSESSMENT OF THE EFFICACY AND BROOD TOXICITY OF STINGLESS BEE PROPOLIS AND *MORINGA OLEIFERA* EXTRACTS AGAINST *TROPILAEALAPS MERCEDESAE*

Guntima Suwannapong¹, Sanchai Naree², Rujira Ponkit¹, Preeyaporn Phonguttha¹, Alexis L. Beaurepaire³, James D. Ellis⁴

¹Department of Biology, Faculty of Science, Burapha University, Chon Buri, Thailand

²Pharmacology and Biopharmaceutical Department, Faculty of Pharmaceutical Sciences, Burapha University, Chon Buri, Thailand

³Institute of Bee Health, Vetsuisse Faculty, University of Bern, Bern, Switzerland; Bee research center, Agroscope, Switzerland, Bern, Switzerland

⁴Entomology and Nematology Department, University of Florida, Gainesville, United States

Abstract

Tropilaelaps spp. are ectoparasite mites native to the Asian giant honey bee, *Apis dorsata*, and have now spread to three *Apis* species in Thailand, including the managed honey bee, *A. mellifera*, where they cause severe colony losses. Many bioactive natural extracts are increasingly being explored as alternative control agents against *Tropilaelaps mercedesae* with low toxicity to honey bees. We evaluated the effects of ethanolic extracts of Thai herb, *Moringa oleifera* leaves, and propolis from the stingless bee, *Tetragonula pagdeni*, on the survival rates of *T. mercedesae* and *A. mellifera* pupae under laboratory conditions. White-eyed pupae were individually placed into 24-well plates, followed by the addition of one *T. mercedesae* per well. Each well was then covered with wax foundation. A volume of 2 µl of *M. oleifera* and propolis extracts at concentrations of 100%, 75%, 50%, 25%, and 12.5% was applied onto the wax surface. Formic acid and ethanol at the same concentration as the extract served as positive and solvent controls, respectively, while distilled water was used as a negative control. Mortality of both *T. mercedesae* and pupae was recorded over seven days. Ethanolic propolis and *M. oleifera* extracts at higher concentrations (50–100%) resulted in approximately 50% mite mortality, while having minimal effects on honey bee pupal mortality (16.67%). The positive control (12.5% formic acid) caused complete mite mortality within one day, as well as resulting in high honey bee pupal mortality (50%). The negative control (distilled water) did not affect both mites and honey bee pupae. These findings suggest that ethanolic propolis and *M. oleifera* extracts might have potential as safer alternatives for *T. mercedesae* control with lower toxicity to honey bee brood.