

Duangsamorn Suthisut 2011: Insecticidal Activities of Essential Oils from Three Thai Plants (Zingiberaceae) and Their Major Compounds Against *Sitophilus zeamais* Motschulsky, *Tribolium castaneum* (Herbst) and Two Parasitoids. Doctor of Philosophy (Entomology), Major Field: Entomology, Department of Entomology. Thesis Advisor: Professor Angsumarn Chandrapatya, Ph.D. 131 pages.

The essential oils from rhizomes of *Alpinia conchigera*, *Zingiber zerumbet*, *Curcuma zedoaria*; their major compounds (camphene, camphor, 1,8-cineole, α -humulene, isoborneol, α -pinene, β -pinene and terpinen-4-ol) and synthetic essential oils were evaluated under laboratory conditions. In fumigation bioassay, *A. conchigera* oils were toxic to *Sitophilus zeamais*, *Tribolium castaneum* and *Trichogramma deion*. *Zingiber zerumbet* oils (LD_{50} : 26 μ L/L in air) and *C. zedoaria* oils (25 μ L/L in air) were significantly more toxic to adults of *Anisopteromalus calandrae* than *A. conchigera* oils (37 μ L/L in air). *Sitophilus zeamais* and *T. castaneum* adults were more susceptible to *A. conchigera* oils than their eggs, larvae or pupae. Synthetic essential oils were more toxic than the extracted essential oils to *S. zeamais* and *T. castaneum*. *Tribolium castaneum* was more susceptible than *S. zeamais* to the eight pure compounds. Terpinen-4-ol was highly toxic to both insects.

In contact bioassay, *S. zeamais* was more sensitive to *C. zedoaria* oils (LD_{50} : 18 μ L/L) than *Z. zerumbet* (21 μ L/L) and *A. conchigera* oils (24 μ L/L), respectively. The LD_{50} values of synthetic *A. conchigera* and synthetic *Z. zerumbet* oils were similar to those of the extracted essential oils. The synthetic *C. zedoaria* oils showed lower contact toxicity than the extracted *C. zedoaria* oils to both insects. *Sitophilus zeamais* and *T. castaneum* were sensitive to terpinen-4-ol and isoborneol. In feeding bioassay, the three extracted oils were able to decrease the consumption of flour disks, especially *Z. zerumbet* oils whereas, both insect species could feed on the flour disks treated with three synthetic essential oils. Only terpinen-4-ol deterred feeding of both insects. In repellency bioassay, *A. conchigera* oils at highest concentration repelled *S. zeamais* and *T. castaneum*. All synthetic essential oils could not repel *S. zeamais* and *T. castaneum* and only terpinen-4-ol showed repellent activity to both insect species.

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Thesis Advisor's signature

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