

REPELLENT ACTIVITY OF ESSENTIAL OILS AGAINST COCKROACHES (DICTYOPTERA: BLATTIDAE, BLATTELLIDAE, AND BLABERIDAE) IN THAILAND

Usavadee Thavara¹, Apiwat Tawatsin¹, Payu Bhakdeenuan¹, Prapai Wongsinkongman²,
Thidarat Boonruad², Jaree Bansiddhi², Pranee Chavalittumrong², Narumon Komalamisra³,
Padet Siriyasatien⁴ and Mir S Mulla⁵

¹National Institute of Health, ²Medicinal Plant Research Institute, Department of Medical Sciences, Ministry of Public Health, Nonthaburi; ³Department of Medical Entomology, Faculty of Tropical Medicine, Mahidol University, Bangkok; ⁴Department of Parasitology, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand; ⁵Department of Entomology, University of California, Riverside, California, USA

Abstract. Seven commercial essential oils extracted from the plant species *Boesenbergia rotunda* (L.) Mansf., *Citrus hystrix* DC., *Curcuma longa* L., *Litsea cubeba* (Lour.) Pers., *Piper nigrum* L., *Psidium guajava* L. and *Zingiber officinale* Roscoe, and naphthalene as a control, were evaluated for repellent activity against the three cockroach species *Periplaneta americana* (L.), *Blattella germanica* (L.) and *Neostylopyga rhombifolia* (Stoll) under laboratory conditions. The essential oil derived from *Citrus hystrix* showed the best repellency over other candidate essential oils and naphthalene. The essential oil of *Citrus hystrix* exhibited complete repellency (100%) against *P. americana* and *B. germanica*, and also showed the highest repellency (among the essential oils tested) of about 87.5% against *N. rhombifolia* under laboratory conditions. In the field, *Citrus hystrix* essential oil formulated as a 20% active ingredient in ethanol and some additives provided satisfactory repellency of up to 86% reduction in cockroaches, mostly *P. americana* and *N. rhombifolia* with a residual effect lasting a week after treatment. *Citrus hystrix* essential oil has good potential for being used as a cockroach repellent. Further improvements in efficacy and residual activity may be realized with appropriate formulations.

Correspondence: Usavadee Thavara, National Institute of Health, Department of Medical Sciences, Ministry of Public Health, Nonthaburi 11000, Thailand.

Tel: 66 (0) 2951 0000 ext 99245; Fax: 66 (0) 2591 5449

E-mail: apiwat@dmsc.moph.go.th