

## CHAPTER 5

### CONCLUSION

Preparation of plant products performed by steam distillation and solvent maceration provided essential oils as well as ethanolic and hexane extracts, respectively, with different yields and physical characteristics. Topical application of these plant products provided effective protection against *Aedes aegypti* with varying degrees of repellency. *Ligusticum sinense* rhizome hexane extract (LHE) afforded the highest repellency, with a median complete-protection time of 6.5 (5.0-8.0) hr, which was comparable to that for DEET (6.25, 5.0-6.5 hr). Furthermore, ethanol preparations of LHE and DEET, with and without 5% vanillin added, were effective in repelling both *Ae. aegypti* and *Anopheles minimus*. In field repellent experiments, 25% LHEv and 25% DEETv demonstrated a similar strong repellency, with a complete protection (100%) against a wide range of natural mosquito populations. A qualitative GC/MS analysis of chemical composition in LHE revealed its major components, including 3-n-Butylphthalide (31.46%), 2, 5-Lutidin (21.94%), and Linoleic acid (16.41%), constituting 69.81% of all the volatile constituents. Results obtained from repellent investigations as well as physical and biological determinations suggested that LHE offered not only remarkable repellency under laboratory and field conditions, but also no skin side effect and rather stable state when kept at various conditions. Therefore, this plant product is a potential candidate for development of a new natural alternative to DEET.