Insecticidal Activity of *Illicium verum* Fruit Essential Oil Compounds and Their Related Compounds against Three Mosquito Species

Kyu-Sik Chang, Won-Ja Lee[1] and Young-Joon Ahn

School of Agricultural Biotechnology, Seoul National University

[1]Department of Medical Zoology, National Institute of Health,
Korea Center for Disease Control and Prevention

The toxicity of *Illicium verum* fruit essential oil compounds [(*E*)-anethole, α-caryophyllene, *l*-linalool, and methyl chavicol] against females of *Aedes aegypti*, *Ocherotatus togoi*, and *Culex pipiens pallens* was examined using direct contact and fumigation methods and compared with those of the widely used dichlorvos and deltamethrin as well as nine known *Illicium* fruit oil compounds [anisaldehyde, anisic acid, 1,8-cineole, (+)-limonene, (-)-limonene, (±)-limonene, α-phellandrene, α-pinene, and safrole]. Potencies varied according to compound and mosquito species. In a filter paper diffusion bioassay, (*E*)-anethole, anisaldehyde, and safrole were highly effective against all the three mosquito species on the basis of 24-h LD_{50} values. The insecticidal activity of these compounds was higher than deltamethrin but lower than dichlorvos. Moderate or weak mosquitocidal activity was observed with 1,8-cineole, (+)-limonene, (-)-limonene, (±)-limonene, α-pinene, and α-phellandrene. Anisic acid was ineffective. Structure-activity relationships indicate that hydrophobicity appears to play a crucial role in determining mosquito toxicity of the test compounds. In fumigation tests with female *Aedes aegypti*, (*E*)-anethole, anisaldehyde, 1,8-cineole, (+)-limonene, α-phellandrene, α-pinene, and safrole as well as dichlorvos were more effective in closed cups than in open ones, indicating that the effect of the compound was largely due to action in the vapor phase. Deltamethrin did not exhibit fumigant toxicity. *Illicium* fruit essential oil, particularly anethole, anisaldehyde, and safrole, merits further study as potential mosquitocides or lead compounds for the control of mosquitoes.