Insecticidal and Fumigant Activities of *Foeniculum vulgare* Fruit-derived Constituents Against Three Coleopteran Stored-Product Insects

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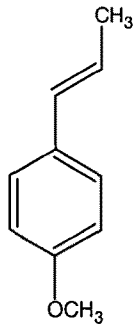
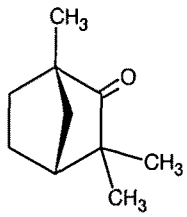
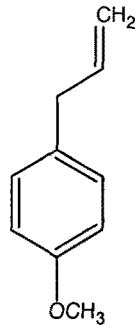
The insecticidal activities of *Foeniculum vulgare* (Gaertner) fruit-derived materials against adults of *Sitophilus oryzae* (L.), *Callosobruchus chinensis* (L.), and *Lasioderma serricorne* (F.) were examined using direct contact application and fumigation methods. The biologically active constituents of the *Foeniculum* fruits were characterized as the phenylpropenes (*E*)-anethole and estragole, and the monoterpene fenchone by spectroscopic analysis. In a test with the filter paper diffusion method, estragole showed 91.0% mortality, at 4.0 mg/paper, against *S. oryzae* adults within 1 day after treatment (DAT), whereas fenchone and (*E*)-anethole gave over 90% mortality at 2 and 4 DAT, respectively. At 2.0 mg/paper, insecticidal activity at 4 DAT was more pronounced in estragole (87.0% mortality), compared to (*E*)-anethole (77.0%) and fenchone (62.0%). For *C. chinensis* adults, all test compounds revealed potent and moderate insecticidal activities at 0.50 and 0.25 mg/paper, respectively. For *L. serricorne* adults, at 2.5 mg/paper, (*E*)-anethole gave 100% mortality at 1 DAT, whereas 90.0 and 60.0% mortality at 4 DAT was achieved in estragole and fenchone, respectively. In a fumigation test, the *Foeniculum* fruit-derived compounds were much more effective against adults of *S. oryzae*, *C. chinensis*, and *L. serricorne* in closed cups than in open ones, indicating that the insecticidal activity of test compounds was largely attributable to fumigant action. As a naturally occurring insect-control agent, the *F. vulgare* fruit-derived materials described could be useful for managing field population of *S. oryzae*, *C. chinensis*, and *L. serricorne*.



(*E*)-anethole



fenchone



estragole