ONLINE ISSN : 1349-0923
PRINT ISSN : 1348-589X

Journal of Pesticide Science
Vol. 33 (2008) , No. 2 pp.152-158

[PDF (99K)] [References]

7,11,13-Hexadecatrienal identified from female moths of the citrus leafminer as a new sex pheromone component: synthesis and field evaluation in Vietnam and Japan

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(Received: November 12, 2007)
(Accepted for publication: January 24, 2008)

Abstract:
(7*Z*,11*Z*)-7,11-Hexadecadienal (Z7,Z11-16:Ald), which has been identified from female moths of the citrus leafminer (*Phyllocnistis citrella*, Lepidoptera: Gracillariidae), strongly attracts conspecific males in Japan. Recently, in addition to the dienyl aldehyde, a trienyl derivative, (7*Z*,11*Z*,13*E*)-7,11,13-hexadecatrienal (Z7,Z11,E13-16:Ald), was found as another sex pheromone component of females collected in Brazil and California. Thus, we synthesized Z7,Z11,E13-16:Ald and its isomer (Z7,E11,E13-16:Ald) to evaluate their effects on males inhabiting Asia. Starting from 1,7-heptanediol, two corresponding alcohols with trienyl structures were prepared by two applications of the Wittig-coupling reaction and then oxidized to yield objective aldehydes after separation by HPLC with an ODS column. In a citrus orchard in Can-Tho City, Vietnam, *P. citrella* males could not be caught by a lure baited only with Z7,Z11-16:Ald, but were successfully attracted with a 1 : 3 mixture of Z7,Z11-16:Ald and Z7,Z11,E13-16:Ald. On the other hand, in citrus orchards in Ogasawara (Bonin) Islands and Ehime Prefecture, Japan, neither trienals showed a synergistic effect on male capture by the dienal. Far from being reinforced, the attraction

activity of the dienal was diminished by mixing in Z7,Z11,E13-16:Ald. These results indicated that the sex pheromone of the Vietnamese strain is similar to that of Brazilian and Californian strains, but the Japanese strain has established a different communication system from those of the foreign strains.

Keywords:
Phyllocnistis citrella, lepidopteran sex pheromone, male attraction, field test, synthesis of trienyl aldehyde, chemical ecology

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doi:10.1584/jpestics.G07-40
JOI JST.JSTAGE/jpestics/G07-40