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Field response of Colorado potato beetle to enantiomeric blends of CPB I aggregation pheromone

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ABSTRACT

Colorado potato beetle, *Leptinotarsa decemlineata*, is attracted to (S)-3,7-dimethyl-2-oxo-oct-6-ene-1,3-diol [(S)-CPB I], a male-produced aggregation pheromone. Pitfall trap studies were conducted to assess the relative attraction of *L. decemlineata* adults to synthetic mixtures of the (S)- and (R)-enantiomers of the pheromone. Of the following blends that were tested: 97%(S):3%(R), 87%(S):13%(R), 73%(S):27%(R), and 50%(S):50%(R) (racemic blend), only the blend containing 97% of the (S)-enantiomer was attractive in one of the experiments. Our results demonstrate that the behavioral response of the beetle to pheromone-baited pitfall traps is unsubstantial in general, and that enantiomeric blends containing 13% or more of the opposite (R) enantiomer disrupt response to the pheromone. Any future research as well as integrated pest management strategies that incorporate CPB I as an aggregation pheromone should utilize blends containing more than 87% optical purity of the (S)-enantiomer of the pheromone.

KEYWORDS

Leptinotarsa decemlineata; Chemical Ecology; Lures; Traps; Behavior

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References

- [1] Hare, J.D. (1990) Ecology and management of the Colorado potato beetle. *Annual Review of Entomology*, 35, 81-100. doi: 10.1146/annurev.en.35.010190.000501
- [2] Casagrande, R.A. (1987) The Colorado potato beetle: 125 years of mismanagement. *Bulletin of the Entomological Society of America*, 33, 142-150.
- [3] Alyokhin, A., Baker, M., Mota-Sanchez, D., Dively, G. and Grafius, E. (2008) Colorado potato beetle resistance to insecticides. *American Journal of Potato Research*, 85, 395-413. doi:10.1007/s12230-008-9052-0
- [4] Botha, J., Hardie, D. and Power, G. (2001) Colorado potato beetle *Leptinotarsa decemlineata*: Exotic threat to Western Australia. The Gov. Western Austr. Agriculture Factsheet Online. <http://www.agric.wa.gov.au/content/pw/ins/pp/hort/fs00901.pdf>
- [5] Zhang, H., Li, X., Wang, C.J. and Qiu, L.H. (2007) Advances in the researches on control and insecticide resistance in *Leptinotarsa decemlineata*. *Chinese Bulletin of Entomology*, 44, 496-500.
- [6] Dickens, J.C., Oliver, J.E, Hollister, B., Davis, J.C. and Klun, J.A. (2002) Breaking a paradigm: male-produced aggregation pheromone for the Colorado potato beetle. *Journal of Experimental Biology*, 205, 1925-1933.
- [7] Hammock, J.A., Vinyard, B. and Dickens, J.C. (2007) Response to host plant odors and aggregation pheromone by larvae of the Colorado potato beetle on a servosphere. *Arthropod-Plant Interactions*, 1, 27-35. doi: 10.1007/s11829-007-9005-4

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- [8] Kuhar, T.P., Mori, K. and Dickens, J.C. (2006) Potential of a synthetic aggregation pheromone for integrated pest management of Colorado potato beetle, *Leptinotarsa decemlineata* (Say). *Agricultural and Forest Entomology*, 8, 77-81. doi:10.1111/j.1461-9555.2006.00286.x
- [9] Mori, K. and Tashiro, T. (2004) Useful reactions in modern pheromone synthesis. *Current Organic Synthesis*, 1, 11-29. doi:10.2174/1570179043485466
- [10] Babu, B.N. and Chauhan, K.R. (2009) Enantioselective synthesis of (S)-3,7-dimethyl-2-oxo-6-octene-1,3-diol: A Colorado potato beetle pheromone. *Tetrahedron Letters*, 50, 66-67. doi:10.1016/j.tetlet.2008.10.092
- [11] Klun, J.A., Chapman, O.L., Mattes, K.C., Wojtkowski, P.W., Beroza, M. and Sonnet, P.E. (1973) Insect sex pheromones: Minor amounts of opposite geometrical isomer critical to attraction. *Science*, 181, 661-663. doi:10.1126/science.181.4100.661
- [12] Doolittle, R.E., Tumlinson, J.H., Proveaux, A.T. and Heath, R.R. (1979) Synthesis of the sex pheromone of the Japanese beetle. *Journal of Chemical Ecology*, 6, 1573- 1581.
- [13] Borden, J.H. (1985) Aggregation pheromones. In: Kerkut, G.A. and Gilbert, L.I. Ed., *Comprehensive Insect Physiology, Biochemistry, and Pharmacology*, Pergamon Press, Oxford, 8, 257-258.
- [14] Glover, T.J., Tang, X.H. and Roelofs, W.L. (1987) Sex pheromone blend discrimination by male moths form E and Z strains of European corn borer. *Journal of Chemical Ecology*, 13, 143-151. doi:10.1007/BF01020358
- [15] Snow, J.W., Schwarz, M. and Klun, A.J. (1987) The attraction of the grape root borer, *Vitacea polistiformis* (Harris) (Lepidoptera: Sesiidae) to (E,Z)-2,13 octadecadienyl acetate and the effects of related isomers on attraction. *Journal of Entomological Science*, 22, 371-374.
- [16] DuRant, J.A., Fescemyer, H.W., Mason, C.E. and Udayagiri, S. (1995) Effectiveness of four blends of European corn borer (Lepidoptera: Pyralidae) sex pheromone isomers at three locations in South Carolina. *Journal of Agricultural Entomology*, 12, 241-253.
- [17] Bartels, D.W., Hutchison, W.D. and Udayagiri, S. (1997) Pheromone trap monitoring of Z-strain European corn borer (Lepidoptera:Pyralidae): Optimum pheromone blend, comparison of blacklight