

WIPMC Project Progress Report

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Project: Title: Identification of a Sex Pheromone of *Prionus californicus*, and its Potential Use in Management of Hop

PI information: James Barbour
University of Idaho
Parma research & Extension Center
29603 U of I lane
Parma ID, 83660

Phone: 208 722-6701
Fax: 208 722-6708
Email: jbarbour@uidaho.edu.

We conducted laboratory and field studies to test the hypothesis that volatile pheromones mediate mate location in the longhorned beetle *Prionus californicus* Mots., an important pest of agricultural and ornamental plants. Males were strongly attracted to live females in laboratory ($\chi^2_{1,110} = 73.6, P < 0.001$) and field experiments (Kruskal-Wallis statistic = 13.2, $P < 0.0014$). Males also responded strongly in olfactometer assays to carcasses of freshly killed females ($\chi^2_{1,30} = 26.2, P < 0.001$) and to excised ovipositors of freshly killed females ($\chi^2_{1,23} = 19.2, P < 0.001$), but not to their excised heads, thoraces, or abdomens.

We also tested the hypothesis that contact pheromones mediate mate recognition in *P. californicus*. Males attempted to mate with live females only after contacting them with their antennae, and 80% of males showed an identical response to freshly killed females. Males did not attempt to mate with dead females that had been extracted with solvent, suggesting that mate recognition cues had been eliminated. When the solvent extract was applied to carcasses of the same dead females, however, 56% of the males again attempted to mate with them. A preliminary analysis of crude solvent extracts of adult beetles revealed that adults have at least 24 different cuticular hydrocarbons and that the sexes differ in relative proportions of some compounds that may serve as the contact pheromone.

These findings demonstrate that female *P. californicus* produce a volatile pheromone from the ovipositor that attracts males over a distance. This research also provides the first evidence that contact pheromones play an important role in mate recognition *P. californicus*. Research to identify the structure of the volatile and contact pheromones of *P. californicus* is currently underway

Key words: *Prionus californicus*, wood borer, volatile pheromone, contact pheromone, semiochemical, mate location, mating behavior

Publications resulting form this research:

Cervantes, D. E., L. M. Hanks, E. S. Lacey, and J. D. Barbour. 2006. First documentation of a volatile sex pheromone in longhorned beetles (Coleoptera:Cerambycidae) of the primitive subfamily Prioninae. *Annals of the Entomological Society of America*. In press.

Barbour, J. D., D. E. Cervantes, E. S. Lacey and L. M. Hanks. Submitted Jan. 2006. Calling behavior and a morphological trait associated with pheromone production in the primitive longhorned beetle *Prionus californicus* Motts. *Journal of Insect Behavior*.

Barbour, J. D., E. S. Lacey, J. G. Millar and L. M. Hanks. Submitted May 2006. Cuticular hydrocarbons mediate mating in the Prionine Cerambycid *Prionus californicus* Motts. *Annals of the Entomological Society of America*.

Relevant photos:

A Male *P. californicus* attempting to mate with a glass stopper treated with whole-body hexane extract of a female

