

DEVELOPMENT OF THE PEAR ESTER KAIROMONE AS A MASS-TRAPPING STRATEGY TO CONTROL CODLING MOTH IN WALNUTS

Douglas M. Light¹, Alan L. Knight², and Bill Lingren³

¹Western Regional Research Center, USDA-ARS, 800 Buchanan Street, Albany, CA 94710, USA

²Yakima Agricultural Research Laboratory, USDA-ARS, 5230 Konnowac Pass Road, Wapato, WA 98951, USA

³Trécé, Inc., 1031-C Industrial Street, Salinas, CA 93901, USA

Because female moths lay eggs that develop into damaging larvae, monitoring or controlling female codling moth (CM), *Cydia pomonella*, adults would create an opportunity for more precise population prediction and control efficacy. We hypothesized that the preferred host of codling moth, pear, may contain kairomonal volatiles attractive to adult females. Headspace odor trapping and GC-MS analysis led to the identification of *ca.* 100 pear volatiles, followed by their screening in California walnut orchards. A single compound, ethyl (2*E*, 4*Z*)-2,4-decadienoate (Et-*E,Z*-DD), was identified as a kairomone that attracts both male and female CM adults, and both virgin and mated CM. Et-*E,Z*-DD is as attractive to male and female CM as pheromone is to male moths. Furthermore, capturing non-target insects, including beneficials, is extremely rare, suggesting that Et-*E,Z*-DD is also as species-specific as pheromone.

The unique set of attributes of Et-*E,Z*-DD in attracting CM presents multiple opportunities for development of novel IPM tools. The attraction of both female and male and virgin and mated moths allows for many monitoring advantages, including potentially more reliable treatment thresholds, more reliable treatment timing, and the ability to monitor in mating disruption orchards.

Furthermore, the Et-*E,Z*-DD kairomone presents an unique opportunity for direct moth control without insecticide, through a mass-trapping strategy. Evaluation of the Et-*E,Z*-DD kairomone as an attractant-lure versus the pheromone, codlemone, was conducted in mass-trapping trials in four replicated one acre blocks in 2001 and in ten replicated 2 – 3 acre blocks in walnuts and apples orchards currently in 2002. Blocks with pheromone-baited traps were compared with blocks of kairomone-baited traps. A large capture capacity, diamond trap (II-C trap, Trece, Inc.) was baited with lure and placed in each tree in the designated acre plots (*ca.* 64 trees/acre). Moth capture rates and efficacy, and walnut damage rates were compared for the kairomone and pheromone lure blocks. The mass-trapping blocks with kairomone-baited traps captured female moths and significantly greater numbers of male moths than the blocks with pheromone-baited traps. The occurrence and degree of orchard fruit and nut injury/damage were evaluated and compared in the mass-trapping blocks *vs.* untreated blocks by assessment of fruit/nut drop, canopy infestation, and harvest injury/damage. The development of the possible commercial monitoring and control uses for this kairomone are being fostered by a

cooperative research and development agreement and a recently approved patent jointly held by the USDA/ARS and Trécé, Inc.