EFFICACY OF CONSEP'S "CHECKMATE"®,
A PHEROMONE BASED CONTROL
FOR CODLING MOTH IN WALNUT

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ABSTRACT

Pheromone mating disruption was compared with Pheromone mating disruption and insecticide, insecticide alone, and no treatment for first generation codling moth control in walnut. Pheromone placement in the orchard reduced, but didn’t eliminate, moth catch and infested nut drop. It was not clear that sufficient suppression occurred to prevent economic damage at harvest.
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Introduction

Codling moth is a major economic pest of walnut. Further, its management and control are essential to an effective seasonal integrated pest management program, that especially includes control of the serious harvest pest, navel orangeworm.

Insecticide management of codling moth has serious drawbacks and is becoming more difficult to employ. The approach is expensive; insecticides often disrupt other pests (e.g. walnut aphid, fruittree leafroller, spider mites) resulting in high total costs for this management strategy. As well, insecticide availability is decreasing and restrictions increasing for their use.

Other management strategies for codling moth would be more desirable. Within the past several years disrupting mating by flooding the orchard with the codling moth pheromone has been a technique tested. One pheromone product, "Checkmate"® has received an experimental use permit in walnut for this purpose. This report describes field efficacy of this product.

Procedure

Forty acres of nine year old Ashley walnuts, with an annual history of codling moth damage, were selected for the study. The orchard is located in Visalia, California and is growing on Foster fine sandy loam soil. The trees, spaced 28 feet apart (56 trees/ac), are vigorous averaging 25'-30' high, and are nearly canopied over.

The forty acre block was divided into two equal 20 acre segments. The Southern 20 acres, in the lee of prevailing wind, was designated for pheromone mating disruption of codling moth while the northern 20 acres was left untreated. Each twenty acres, pheromone treated and untreated, was then divided into equal 10 acre parcels. One 10 acre parcel within each 20 acres was chemically treated with Lorsban 4E at 1/2 inch nut size for first generation codling moth control. The remaining 10 acre parcel was left untreated. Thus, the following treatments encompassed the study: 1) 10 acres untreated with pheromone and untreated with insecticide (The Control); 2) 10 acres untreated with pheromone but treated with insecticide; 3) 10 acres treated with pheromone & untreated with insecticide; and 4) 10 acres treated with pheromone and treated with insecticide.

As the trees leafed out, 17 March, Consep, Checkmate® "dual release" pheromone dispensers were hung in the designated acreage. One hundred forty-six dispensers per acre, each containing 105 mg of the active ingredient, (E.E.) - 8, 10 - Dodecadien - 1-01 were placed in
the orchard; three dispensers were hung in each tree, one in the upper third, one in the lower third, and one in the middle third according to the manufacturers suggested placement within walnut trees. Dispensers were placed on the north side of each tree to minimize sun exposure.

Within each 10 acre plot, codling moth was monitored with Biolure®, "wing" type pheromone traps containing 5 mg of the same pheromone used in the dispensers. The trap dispensers emitted between .08 mg and .12 mg of the pheromone per day depending on temperature. Once an indicator trap, placed in the untreated portion of the orchard, caught a moth, the remaining traps to monitor the population were placed in the orchard in the following scheme: A trap was placed in the highest 20% of one tree in each third of each 10 ac plot, i.e. three traps/plot. In addition one trap was placed low on the edge of each plot to detect populations entering from adjoining walnuts. The traps were monitored twice per week, from 22 March through 17 June, the entire first flight of moths. Sticky bottoms were changed as needed throughout the monitoring period. The pheromone bait was not changed as the dispensing rate was adequate to last 60 days.

On 26 April, once nuts reached 1/2 inch nut size and approximately 300 day degrees into the flight, 4 pts of Lorsban 4E in 200 gallons of water were applied per acre to the two designated 10 acre plots. Treatments were applied @ 2 mph.

Within each treatment, 4 trees were selected around each high trap location (12 trees monitored per treatment) for monitoring codling moth infested nuts that drop from the trees. On 10 May the drop started. Following that date, infested dropped nuts were counted and disposed of twice per week until the drop ceased in mid June.

Although the orchard was returned to chemical treatment following first flight, each block was harvested separately and insect percentage noted.

RESULTS AND DISCUSSION

TRAP CATCHES

Pheromone treatment considerably reduced the number of moths caught in both high and low traps. Average total moths caught per high trap from 22 March to 17 June was 16.8 and 315.8 for pheromone treated and untreated respectively. A similar disparity, 3.0 & 131.0 respectively, existed for low traps, see Fig. 1. It is significant to note that moths were caught in pheromone traps within the treated area indicating some "breakthrough" of males occurred at this rate of dispenser density.

INFESTED, DROPPED NUTS

Codling moth infested nuts that drop from the trees are the best indicator of first generation damage. Infestation was observed in all treatments. An average of 29.4 infested nuts dropped from non pheromone/non insecticide treated trees. Dropped nuts from trees treated with pheromone alone were reduced almost 50% to 15.3 per tree, from that of untreated. Pheromone
plus insecticide produced 9.1 nuts per tree and insecticide alone, the least at 6.3 per tree, see Figure 2. At an estimated yield of 4,000 lbs/ac this equates to approximately 1%, .5%, .3%, .2% damage respectively. It should be noted that although no data exists, knowledgeable opinion feels 1% damage from first generation codling moth left untreated will equate to economic damage (>5%) at harvest.

PERCENT WORMS AT HARVEST

No economic damage from "worms" at harvest (Naval orangeworm and/or codling moth) was detected in any treatments. This is not unexpected as all plots were chemically treated for 2nd generation codling moth. Allowing 10 acres to remain untreated fro first generation did not result in economic loss.
Figure 1. Checkmate Pheromone Disruption for Codling Moth
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Ashley Walnut – Chan Wilcox – Visalia 1993

Average Total Moths/Trap (3/22–6/17)

6 traps hi; 2 traps lo
Figure 2. Checkmate Pheromone Disruption for Codling Moth

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Ashley Walnut - Chan Wilcox - Visalia 1993

Average Total Drops/Tree