

Biology/Phenology

Codling Moth Emergence from Bin Piles

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Fruit harvest bins have long been recognized as potential overwintering sites for codling moth larvae. With increased use of mating disruption for codling moth control, outside sources of infestation have become more of a concern for growers using pheromone confusion systems. Studies were designed to provide information on the source of codling moth larvae infesting bins (what proportion move from infested fruit placed in bins vs. larvae entering bins before fruit is picked) and the pattern of codling moth emergence from bin piles. The infestation experiment is in progress and includes a comparison of plastic bins. The bin pile study showed that by covering a bin pile with plastic sheeting, temperatures could be increased by 10 to 25°F compared to uncovered piles and there was a distinct gradient from lower to higher levels with increasing temperatures encountered at the higher levels. This warming effect resulted in codling moth emerging from covered bin piles 20 to 40 days earlier than uncovered bin piles.

Analysis of adult emergence patterns based on mean date of emergence indicated no significant differences between positions within levels for any of the treatments. There was a significant treatment effect ($F=97.65$, $p=.0001$), level effect ($F=63.37$, $p=.0001$), and treatment x level interaction ($F=21.63$, $p=.0002$). Due to this interaction a separate analysis was run for level effects within the clear plastic and no covering treatments which indicated significant level effects in both treatments; for the clear: $DF\ 2,4$; $F=479.8$, $p=.0001$; for no cover: $DF\ 2,4$; $F=20.8$, $p=.0077$. Analysis by treatment indicated significant differences between treatments at the mid and high levels but not at the low level (mid level: $F=55.2$, $p=.0001$; high level: $F=259$, $p=.0001$).

Further analysis by level showed the only difference in mean emergence date between the clear and black plastic treatments was at the high level (black=135, clear=122). The Tukey means separation test was used to rank order of emergence by level: for the clear plastic treatment the order of emergence was high>middle>low; for the uncovered treatment middle=high>low.

We constructed a large bin pile (10 wide x 10 high x 23 long) of 2300 bins and placed thermocouple wires at various locations to record temperature. These data are being analyzed and, combined with existing data, will yield a model predicting codling moth emergence patterns from a larger bin pile.

This information could be important in developing a technique for neutralizing codling moth infested bins, and in understanding how infested bin piles may be influencing pest management in fruit orchards both in the immediate vicinity of the bins and remote locations which receive infested bins.