Mating Disruption/SIR

AREA OF INFLUENCE OF AEROSOL EMITTERS: IMMEDIATE AND RESIDUAL EFFECTS

Frances Cave, Matt Singleton, and Stephen Welter
University of California, Dept. of Environmental Science, Policy, and Management, Berkeley, CA 94720

Keywords: Codling moth, Cydia pomonella, walnuts, pears, mating disruption, pheromones

Aerosol emitters of codling moth (puffers, microsprayers, MISTRs) have now been used on large acreage in N. California for control of codling moth. However, our understanding of the area that a puffer can influence has proven difficult to estimate. Starting in 1999, a means to indirect image the area of influence of a puffer was developed using a grid of traps and released sterile codling moths. This approach was again used in 2000 in pears and walnuts to determine the relative shape and size of the area of influence of a single puffer, which is assumed at this point to be synonymous with the pheromone plume. Trap suppression is used as an indicator of influence rather than direct fruit damage, given that the release of sterile moths also influences rates of damage.

A series of grids were established of different size and shapes within orchards. At each grid point, a trap baited with lures containing 1 mg of codlemone was hung and monitored roughly every 1-2 days depending on the trial. Near each trap, a release of 800 sterilized codling moths (ca. 400 males and 400 females) was made. Sterilized moths that have been sterilized can be distinguished from wild moths due to an interior pink dye. Moths were recaptured and examined for the internal dye. The assumption of the trial is that in areas where there are either sufficient levels of pheromone or where sufficient levels have passed recently over the area will show trap suppression. Areas that do not have sufficient levels of pheromone would be expected to have higher trap counts. The aerosol emitters were allowed to emit every 15 minutes at 15 mg ai per puff for either 12 or 24 hours per day. Traps baited with 1 mg lures of codlement were placed at ca. 6-8 feet in the lower portions of the canopy.

Results similar to 1999 in pears were also observed in walnuts. The pheromone plume appears to influence at least 1500 feet downwind and several hundred feet in either direction laterally, as shown in a representative figure (Fig. 1). The plumes had less clear boundaries in 2000 than in 1999, but both the walnut and pear orchards were more open than the more closed canopies of pear orchards used in 1999. The presence of the wide roadway appeared to suggest a disruptive influence on the plume integrity.

One of the more interesting results was the residual effect of the pheromone plumes. Twenty-four hours after the puffer was turned off, the same levels of trap suppression

were observed in the same areas that were suppressed previously. By 48 hours, the length of the residual plumes had retracted much closer to the source puffers. By 72 hours, only the area immediately surrounding the puffer appeared to have any residual activity. However, additional studies looking at moth dispersal and behavior in different locations in the plume structure will need to be studied.