

Mating Disruption/SIR

Definition of the Active Space of Pheromone Plumes from Aerosol Emitters, "Paramount Puffers"

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Design for optimizing programs using alternative pheromone dispensing technologies requires an understanding of the functional shape and length of the pheromone plume. Understanding plume dimensions may be especially important for the aerosol emitters being developed for codling moth and other lepidopterous pests. While direct or indirect measurements of pheromone concentrations have proven difficult, trap suppression has yielded rapid and more easily obtained information about the active space for various dispensing devices. However, interpretation of these data is sometimes confounded by patchy distributions of codling moth within an orchard or by low levels of resident populations. Similarly, previous research has also clearly shown that trap suppression is not always synonymous with damage suppression and as such the significance of trap suppression needs to be interpreted with caution.

To achieve a uniform distribution of codling moths within an orchard, releases of internally marked, sterilized codling moth were made on a weekly basis into orchards at a rate of 30-60K per release date. Moths were released into grids of various sizes with an upper size 880*1720 feet. A similar pattern of trapping was overlaid on the grid. As such, we assumed that moth distribution was relatively uniform over the trapping grid. In addition to increasing grid size, placement of the puffers was varied from centers of the orchard to along upwind edges.

A single aerosol emitter (Paramount Puffer) was placed within a grid and the rates of moth recapture were recorded on a daily basis from 1-6 days. Areas which had zero to low counts codling moth were assumed to have the highest levels of mating suppression and areas upwind (up to 270 feet) were assumed to represent unsuppressed counts. Similarly, as counts increased, we are currently assuming that these areas correlated with lower levels of pheromone. Obviously, this assumption will need to be tested.

Based on moth re-capture rates, the functional plume held a fairly tight core structure for upwards of 1000 feet, but that distance and breadth varied with sampling date. Complete trap suppression was observed on some dates up to 1500 feet or beyond. Lateral spread up to 200-400 feet was observed if the traps were placed within the body of the orchard where wind speeds are dramatically dampened. Alternatively, puffers placed along upwind, exposed edges failed to suppress moth recapture within the adjacent tree. Distinct edges of plumes were noted for some sample weeks which continued the length of the entire orchard. Alternatively, on some sample dates, plume structure was not easily defined and appeared more diffuse. Ultimately, definition of the functional space for an emitter combined with estimates of variability across days should allow for designing dispenser placements within an orchard.