Efficacy of Pyrethrin Aerosol in Simulated Field Applications

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Application of aerosol treatments applied to specific target areas is a tool available for managing insect infestations in food plants. When insects are exposed to an aerosol treatment, dispersion of the aerosol formulation within the target area, recovery after knockdown, and the presence of food material can all affect product efficacy and final mortality. However, there has been little field research with any of these factors regarding their effects on specific aerosol formulations, and such data would be valuable information that could be used in management programs for stored-product insects.

There are several commercial formulations of aerosols on the market today, including several that add CO_2 to synergized pyrethrins to help in the spread and dispersion of the aerosol fog. We conducted a study in an abandoned warehouse by exposing adult confused flour beetles, *Tribolium confusum* (Jacqueline DuVal), in 100 by 15 mm plastic Petri dishes containing 0 to 2,000 mg of whole-wheat flour. Ten adults were placed in each dish, and separate sets of dishes were placed in 18 different positions inside the warehouse. An aerosol application system with two dispensing nozzles was installed in the center below the roofline, and the test insects were exposed to the aerosol (a pyrethin-$C0_2$ mixture) for two hours. Upon completion of the exposure interval knockdown was assessed in all dishes, and insects in one set of dishes from each

position were transferred to new dishes. All dishes were returned to the laboratory, where knockdown and recovery were monitored for two weeks. Four separate replicates were conducted on successive weeks.

Nearly all exposed beetles were knocked down after the two-hour exposure interval, however, recovery was affected by position within the warehouse, presence of food material, and whether or not insects were transferred to new dishes. In dishes that did not contain food material, recovery averaged 0 to 20%, with the greatest recovery in those dishes that were in one end of the warehouse, away from the general pattern of aerosol dispersion. Recovery increased with the amount of food material in the Petri dishes, indicating that efficacy was decreased in the presence of food. Recovery also increased when insects were transferred to new dishes, indicating that some residue remained in the dishes from the application. Results show how variation in exposure, location, and food material at the time of exposure could affect efficacy from aerosol formulations.