Residual Efficacy of Pyrethrin-Methoprene Aerosols on Packaging Surfaces

Abstract

Previous studies have shown that aerosol applications of either 1% pyrethrin + methoprene or 3% pyrethrin + methoprene have residual activity against the red flour beetle, *Tribolium castaneum*, and the confused flour beetle, *Tribolium confusum* (Jacqueline DuVal). In this test, field trials were conducted inside a commercial flour mill whereby seven different packaging surfaces (cardboard, flour bag, muslin bag, paper bag, pallet wrap, plastic overwrap, polyethylene) were exposed to aerosol applications of 1% pyrethrin + methoprene or 3% pyrethrin + methoprene. These different surfaces were affixed inside of Petri dishes, the dishes exposed to the aerosol, and the dishes were returned to the laboratory. Bioassays were conducted two weeks for sixteen weeks by placing 10 late-stage larvae of either species on different sets of the packaging surfaces exposed to the aerosol. About 500 mg of flour was put in each dish to provide a food source for the larvae. There were 4 separate replications in time for each rate, with three subsamples for each time period.

The criterion for survival was the emergence of normal adults with no visible morphological defects. All exposed individual larvae were classified according to life stage and the specific morphological defect (arresting in a particular stage, inability to molt to the next stage, adults unable to emerge, and defective adults that died shortly after emergence). Larvae that were able to emerge as adults were considered to have "survived" on the packaging surfaces exposed to the aerosol combinations.

Few of the red flour beetle larvae survived to the adult stage at either application rate, 1% pyrethrin-methoprene or the 3% pyrethrin-methoprene, on any of the packaging surfaces. The flour food source apparently absorbed some of the residues of the aerosol from the exposed packaging surface. Survival of confused flour beetle to the adult stage depended on the specific packaging surface, but at both application rates survival increased on the individual surfaces as the residues aged. The confused flour beetle was the more tolerant of the two species to the residues from the aerosol applications, regardless of the packaging surface. Similar to previous studies, the aerosol mixtures gave complete residual control of the red flour beetle for 16 weeks, but were less effective against the confused flour beetle.