Development of a Protocol for Characterizing Sprays Generated Under Simulated Aerial Conditions

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Abstract

The purpose of this study was to demonstrate a method to characterize the spray plume generated from a fixed-wing aerial spray system, at simulated flight speeds up to 50 m/s (115 mph). Full-scale testing of a Micronair AU6600 rotary atomizer under simulated aerial application conditions was conducted in the Ambient Breeze Tunnel (ABT) using water as the test liquid. Spray droplet size and velocity distributions were measured using phase Doppler anemometry. Tests of the spray system were conducted at varying liquid flow rates (0.5, 1.0, 2.0 L/min), rotation speeds (10,000, 12,500, 15,000 rpm), and simulated flight speeds (31, 41, 51 m/s). A profile of measurements was collected extending from the center of the spray plume to the periphery, and droplet size data were used to compute a mass-balanced, integrated droplet size distribution that is more accurate for describing a spray than single point measurements. The results indicate the approach is appropriate for characterizing spray performance under aerial application conditions, and that the AU6600 does produce droplets within the desired droplet size range for mosquito vector control.

Key words: rotary atomizer, phase Doppler anemometry, spray droplet distribution, mass-balance

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