

Evaluation of Handgun and Broadcast Systems for Spray Deposition in Greenhouse Poinsettia Canopies

Hand-held applicators are a common choice of application equipment for pest management in greenhouse structures due to ease of use and flexibility. However, few recommendations exist on best-use practices for treatment to plant benches. The objective of this study was to examine performance in different sprayers and determine which techniques yielded the highest spray retention on abaxial leaf surfaces.

A benchtop trial was conducted using a mature poinsettia canopy. Nylon screens were attached to the abaxial surface of four leaves on target plants in lower and upper canopy elevations. Five sprayer treatments were used to apply tank mixes of pesticides and fluorescent tracer (Table 1). Each treatment was replicated five times, with three plants containing unused targets being randomly placed on the benchtop for each replicate.

Table 1. Spray equipment parameters.

Treatment	Spray Liquid Pressure (kPa)	Nozzle Output (L min ⁻¹)	Application Rate (L ha ⁻¹)
Dramm Hydra (1.0)	930	1.70	467
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TwinJet boom (TJ60-11002VS)	930	5.19 ^[a]	934
Air-assist (XR11003)	758	6.51 ^[b]	934
Dramm Hydra (1.0)	3,583	3.41	934

[a] Total output from four nozzles.

[b] Total output from five nozzles.

Despite the relatively small distance between the upper and lower canopy sampling sites on the poinsettia, significant differences in abaxial surface spray deposits were noted by elevation for most treatments (Figure 1 and 2). However, no differences between treatments at either canopy level were observed. Overall, greater variability in the mean spray deposits were observed in the upper canopy elevation compared to the lower canopy elevation.

Generally, spray volume, as changed by the application speed of the handgun treatment, did not significantly affect spray deposit at either elevation. Air assistance produced the least difference in variability between deposits measured in the upper and lower elevations; however, higher operating pressure did not improve canopy penetration or spray deposits on abaxial surfaces. Ultimately, the distribution of spray with a handgun will be influenced by the skill of the operator. Further research is needed to help identify how to improve uniformity and to determine the impact of spray quality on biological efficacy.



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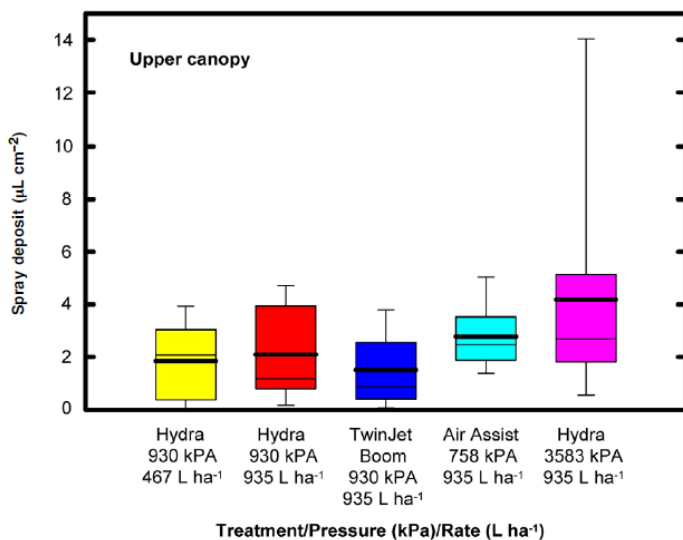


Figure 1. Box plots showing spray volume deposit on targets from the abaxial surfaces of leaves in the upper canopy from five types of sprayers. Boxes delineate 25th and 75th percentile values. The thin line inside each box represents the median, and the bold line represents the mean. The top and bottom lines around each box represent the 10th and 90th percentile values.

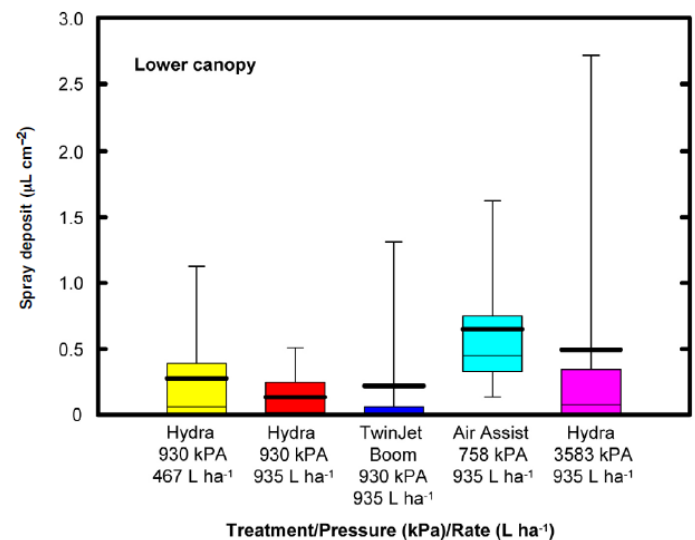


Figure 2. Box plots showing spray volume deposit on targets from the abaxial surfaces of leaves in the lower canopy from five types of sprayers. Boxes delineate 25th and 75th percentile values. The thin line inside each box represents the median, and the bold line represents the mean. The top and bottom lines around each box represent the 10th and 90th percentile values.