Fate of Pre-emergence Herbicide Applications Sprayed Through Containerized Hydrangea Canopies

Pre-emergent herbicide applications are used to prevent establishment of weed seeds. In potted shrubs, the application may be made over the top of an existing shrub canopy, which represents a challenge due to the filtering effect of the canopy and the additional distance created between the soil surface and nozzle. The objective of this work was to determine the effect spray quality, spray volume, and air delivery had on delivery of sprays to the substrate surface through a potted hydrangea (*H. paniculata* 'DVPpinky') canopy.

Petri dishes and water sensitive paper were placed on the substrate surface of potted hydrangeas to collect spray material falling through the canopy (Figures A and B). Different sizes of TeeJet flat fan extended range (XR) and air induction (AI) nozzles were selected to provide 187 and 374 liters·ha^{-1} (20 and 40 gal·A^{-1}) application rates with medium (XR) and very coarse (AI) droplet spectrums. A five-port, air-assist delivery device was used to make applications at a speed of 4.0 km·h^{-1} (2.5 mph). No irrigation was applied either before or after treatment applications.

Foliage sampled from the top of the hydrangea canopy had 8–10 times higher spray deposits than foliage from the middle elevation and the targets on the substrate surface Table 1). Approximately 50–60% of the spray material was accounted for on the foliage. On average, only about 5% and 10% of the spray actually reached the intended target (substrate surface) across all treatments at both application rates. The air-assist sprayer was the least effective method of applying the pre-emergent herbicide treatment to substrate surface although it produced the highest deposits in the canopy. The high volume treatment made with larger droplet sizes produced the highest spray deposits under the canopy (Table 2). Larger droplet sizes and higher spray volumes will help ensure better delivery through the canopy. These findings suggest producers should check the coverage produced by pre-emergent herbicide applications using commercially available water sensitive paper and adjust spray volume and droplet size to increase penetration through the canopy to ensure more effective applications.

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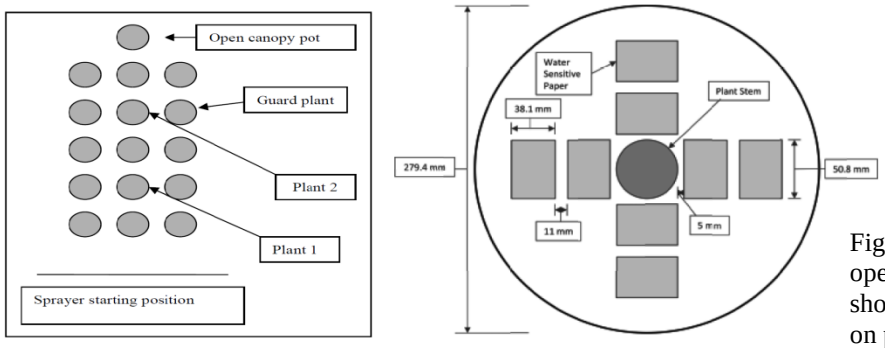

Figures A and B. A shows target plants and open canopy pot in experimental layout. B shows position of water sensitive paper targets on potting substrates surface.

Table 1. Fluorescent dye deposits on canopy foliage and potting substrate surface, with or without a hydrangea shrub canopy obstructing the spray.

Nozzle tip	Spray quality	Application rate (liters·ha^{-1})	Within canopy		Substrate below canopy	Substrate without canopy
			Upper	Middle		
			µg·cm^{-2}			
XR8002	Medium	187	1.65	0.16	0.29ab[z]	3.84ab
XR8004	Medium	374	1.70	0.08	0.13cd	3.66b
AI110015	Very coarse	187	1.62	0.16	0.19bc	3.94a
AI11003	Very coarse	374	1.53	0.17	0.31a	3.78ab
Air-Assist, XR8001	Medium	187	2.36	0.15	0.05d	3.11c

Table 2. Effect of droplet type and spray volume on spray solution deposition on substrate surface beneath the canopy of hydrangea.

Nozzle tip	Spray quality	Application rate (liters·ha^{-1})	Coverage (%)	Spot density (drops·cm^{-2})
XR8002	Medium	187	5.3	38.2
XR8004	Medium	374	5.7	41.0
AI110015	Very coarse	187	3.1	16.6
AI11003	Very coarse	374	10.0	32.1
Air-Assist, XR8001	Medium	187	1.7	24.2
LSD[z]			1.9	6.4

[z]Value for Fisher's least significant difference test.

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