Project Title: **Improving Crop Protection and Production Strategies for Horticultural Crops**

Principal Investigator: **Richard (Rich) C. Derksen, USDA-ARS, Application Technology Research Unit, Wooster, OH**

Project Objectives: **Develop new or enhanced delivery technologies that provide the most efficacious application of production materials, including nutrients and pest management materials.**

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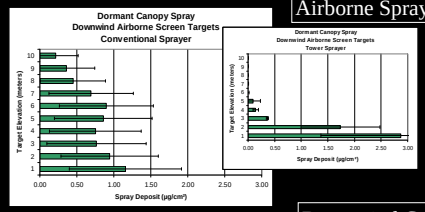
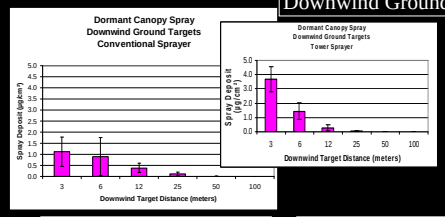
Environmental Impact of Tree Spraying

Objective: **Evaluate the effectiveness of Drift Reduction Technologies for reducing off-target spray movement as canopies mature**

Airborne Spray Movement

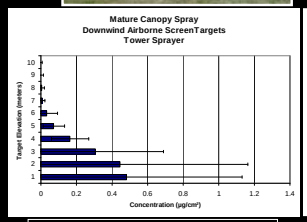


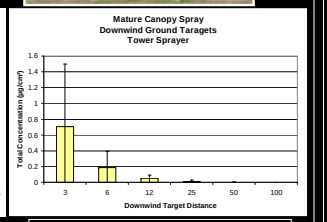
Downwind Ground Deposits



Tower Sprayer, 50 gpa

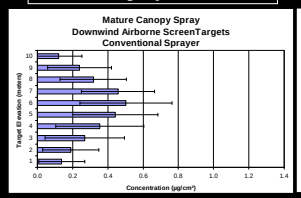
Conventional Air Blast Sprayer, 50 gpa

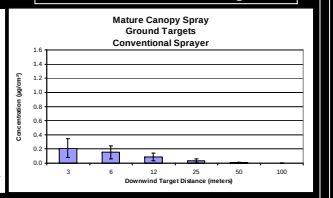




Airborne Spray Movement

Downwind Ground Deposits





Summary and Conclusions:
- **Canopy maturity significantly affects the pattern of off-target spray movement**
- **Tower spraying reduces the amount of spray moving over a tree canopy and up into the atmosphere**
- **Tower sprayers keep more material closer to the treatment area**

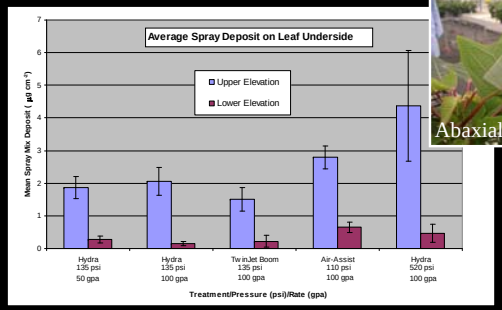
Evaluation of Handgun and Broadcast Systems for Spray Deposition in Greenhouse Poinsettia Canopies

Objective: **Determine the effectiveness of directed, handgun applications and broadcast applications to deliver spray into mature poinsettia canopies**

Handgun nozzle at 50 and 100 gpa.

Air-assist, broadcast sprayer at 100 gpa

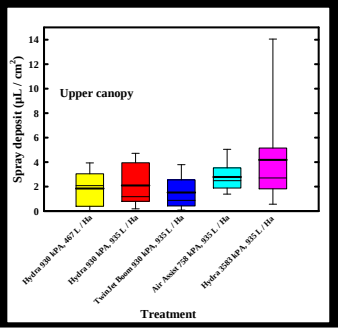
TwinJet nozzles on broadcast sprayer at 100 gpa.

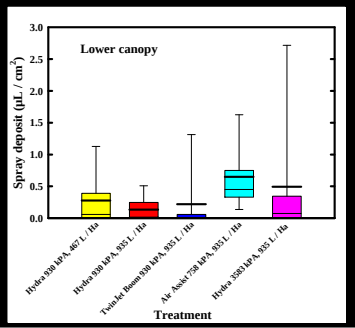


Abaxial surface target

Summary and Conclusions:
- **More variability in whitefly control and spray deposits from handgun applications than boom treatments.**
- **High variability could reduce effectiveness of pest control.**
- **Air-assistance is more effective at putting material on abaxial leaf surfaces in bottom of canopy**
- **High pressure handgun application was more effective at putting material on abaxial leaf surfaces than lower pressure applications.**
- **Top of canopy deposits were two to ten times higher than lower canopy deposits.**

Deposit variability by sprayer treatment

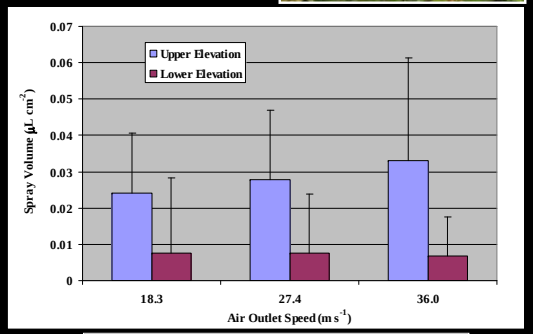




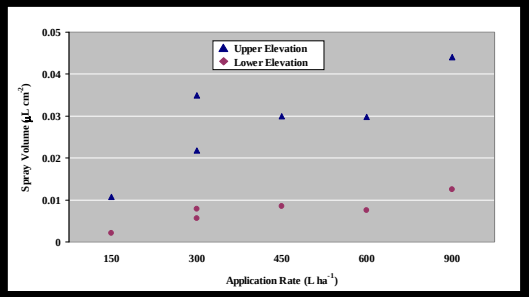
Optimizing Air-Assist Application Parameters for Improving Ornamental Canopy Penetration

Objective: **Determine how air outlet speed, nozzle flow rate and travel speed affect canopy penetration**

Air-assist, five-port nozzle mounted on automated watering boom



Abaxial leaf surface deposits by treatment air outlet speed



Abaxial leaf surface deposits by application rate across all air outlet speeds

Summary and Conclusions:
- **The highest Nozzle Flow Rate (1.17 L m^{-1}) and slowest Travel Speed (3.2 km h^{-1}) tended to produce the highest spray deposits in the upper elevation.**
- **The lowest Nozzle Flow Rate (0.39 L m^{-1}) and the highest Travel Speed (6.4 km h^{-1}) tended to produce the lowest underside leaf spray deposits.**
- **Spray deposits on the abaxial leaf surfaces increased with increasing Air Outlet Speed.**
- **Increasing turbulence in the canopy tended to increase abaxial surface deposits.**