

The Effect of Application Volume and Deposition Aids on Droplet Spectrum and Deposition in Broccoli for Aerial Applications

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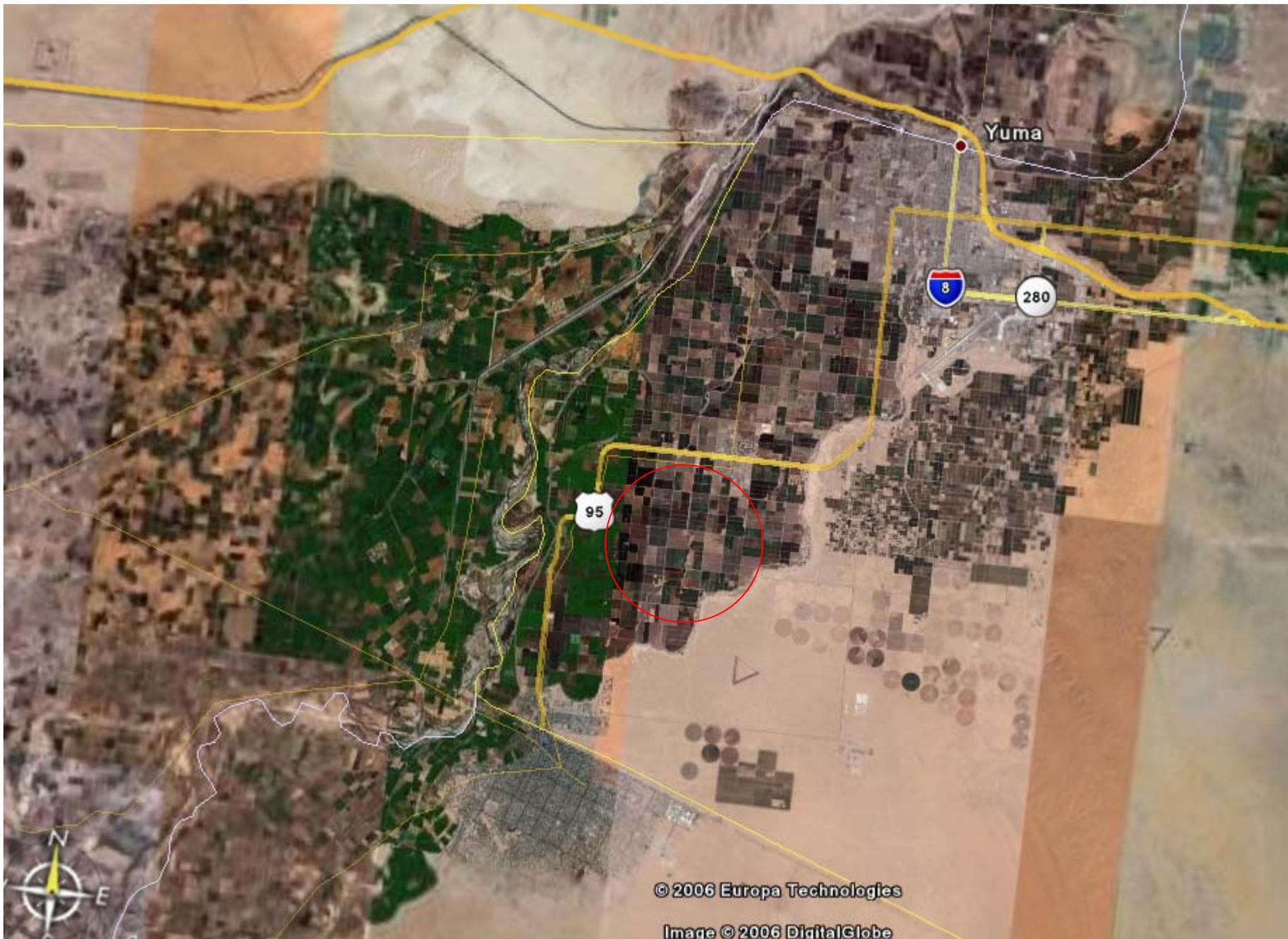


Biological and Agricultural Engineering

Paper # *AA06-009*

Objective:

The effect of application volume and deposition aids on droplet spectrum and deposition in broccoli for aerial applications.



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Materials and Methods:

- Broccoli field in Yuma, Arizona
- March 7 and 9, 2006
- 15 treatments
- Products completely randomized
- Broccoli was post harvest stage
 - Planted on ridges, double rows, 18-24 inches tall, and dense
- Application Conditions:
 - Treatments 1-7 = 73°F and 40% RH
 - Treatments 8-15 = 48°F and 66% RH
 - Wind speed:
 - Range = 4-10 and 2-3 mph



Materials and Methods:

- AT 402B (Tri Rotor; Yuma, AZ and Lakin, KS)
 - Drop booms
 - CPTT11 nozzles with 8° deflection
 - 3 GPA (36 nozzles) CPTT11 - 15
 - 5 GPA (36 nozzles) CPTT11 - 20
 - 10 GPA (67 nozzles) CPTT11 - 30
 - 58 - 73 psi (average = 62.8)
 - 128 - 141 MPH (average = 132.5 mph, GPS measured)
- Aircraft Operation S.A.F.E. calibrated
- Application Height 10-12 feet
- Swath width = 60 feet



Materials and Methods:

- 5 deposition aids:
 - Interlock
 - Interlock + Preference
 - Interlock + Rivet
 - AG06011
 - AG06038
- Water/Prime Oil/Red dye as a check
- Spray mixes containing 50 gal
 - Prime Oil @ 3 ounces/acre
 - Tap water
 - Required amount of product or combination of products per label
- Application volumes
 - 3, 5, 10 GPA

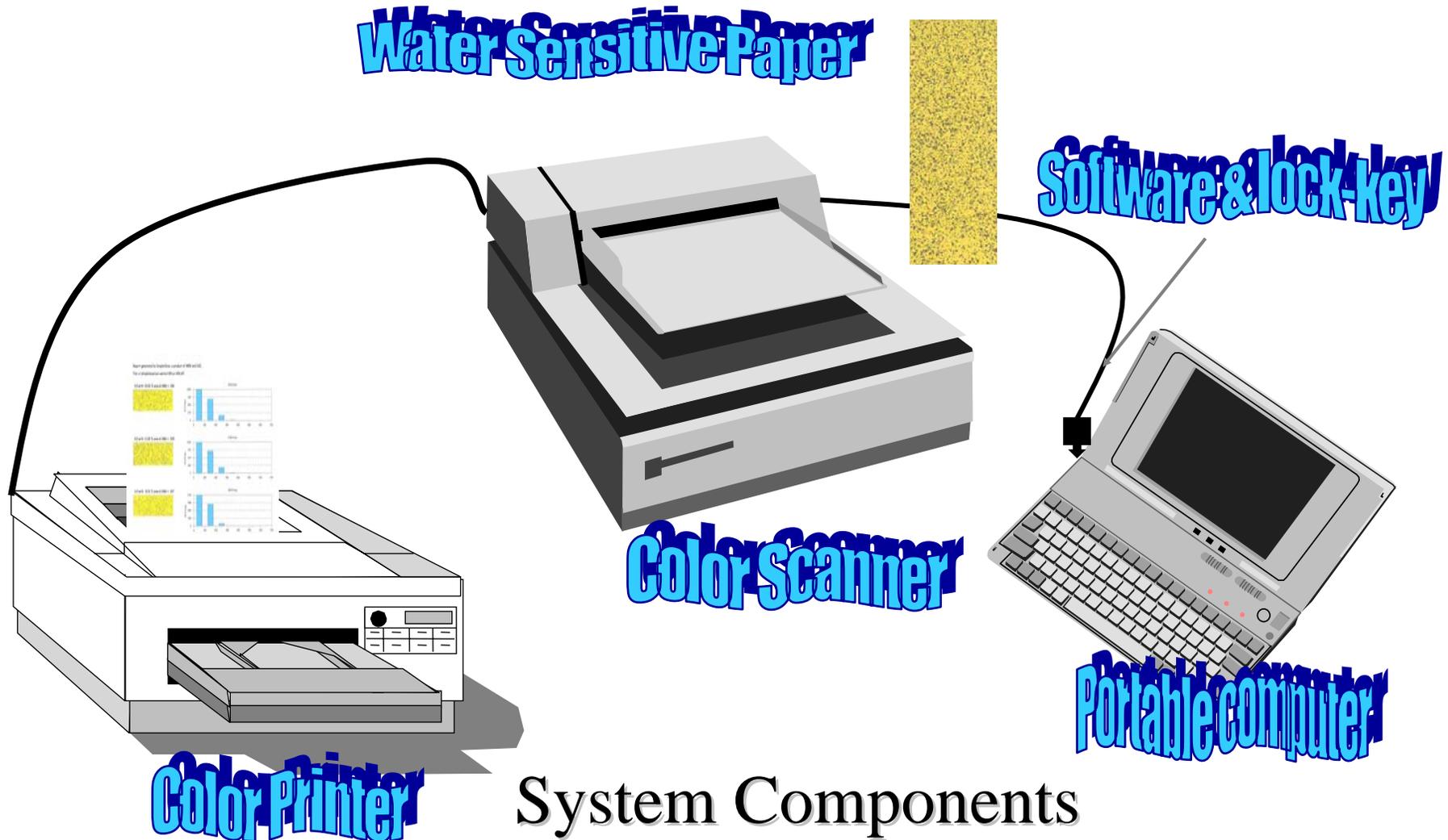


Collection Procedure for canopy:

- 1 pass
- 5 collector areas evenly spaced across the swath width
- 3 kromekote papers stapled to leaves
- placed in top, middle, and bottom of canopy = 15 papers

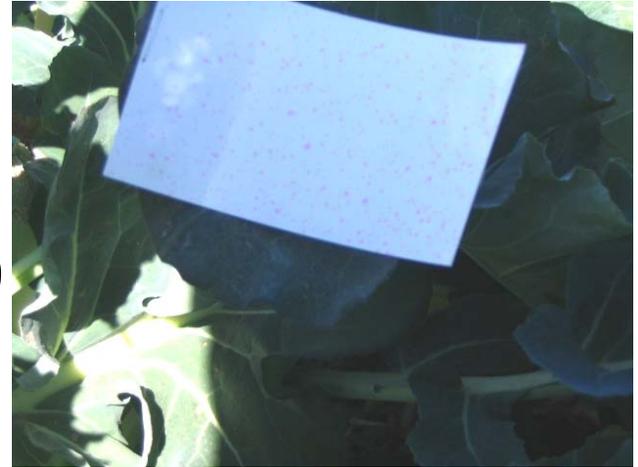


DropletScan™ used to analyze droplets:



Analysis Procedure:

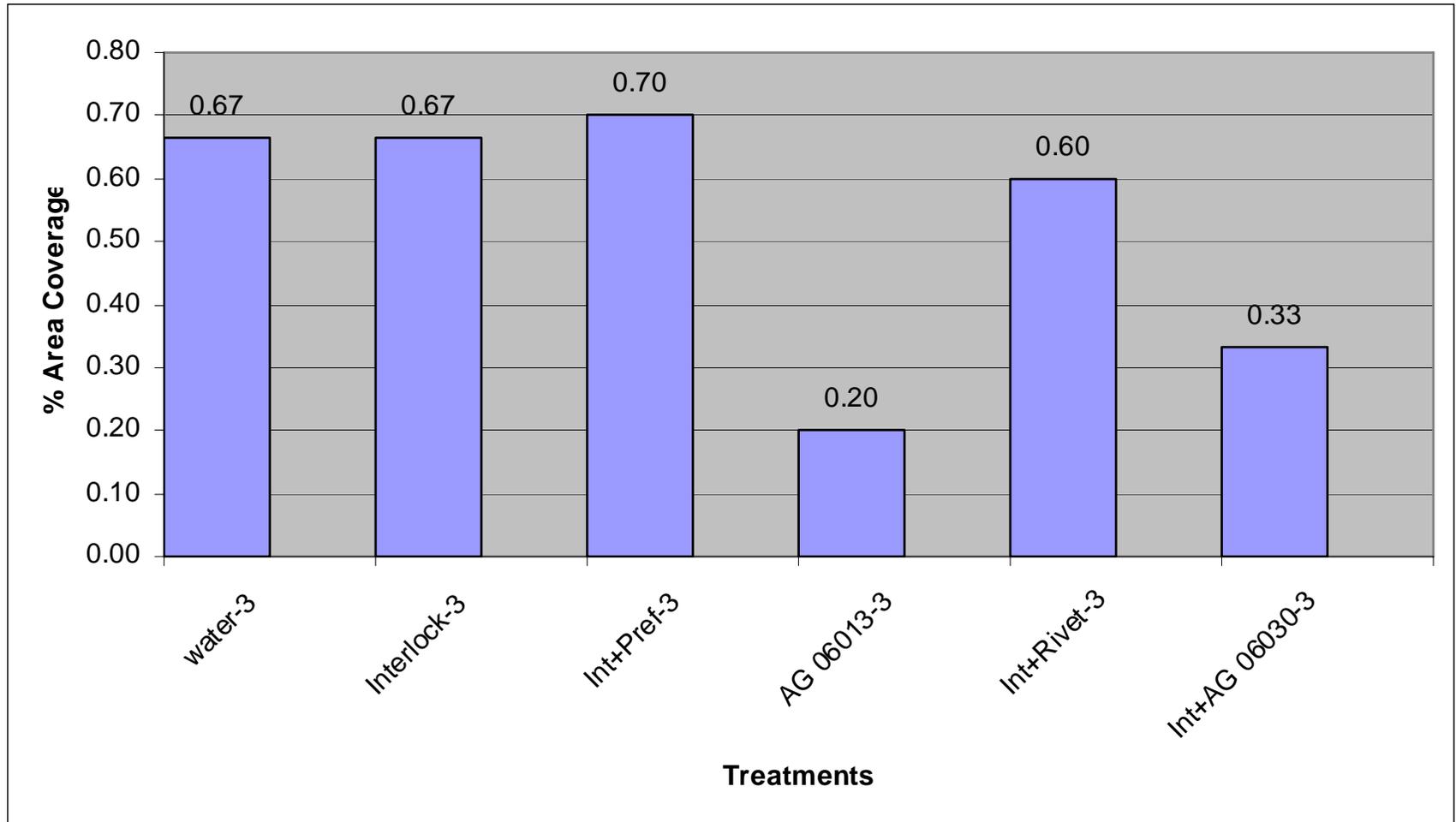
- Scanned and recorded
 - 675 canopy papers (5 x 3 x 15 x 3)
 - % Area Coverage, droplet size characteristics, and number of droplets in the bottom, middle, and top of the broccoli canopy.
- Statistical analysis with SAS
 - Proc GLM
 - LS Means compared
- Alpha = .05



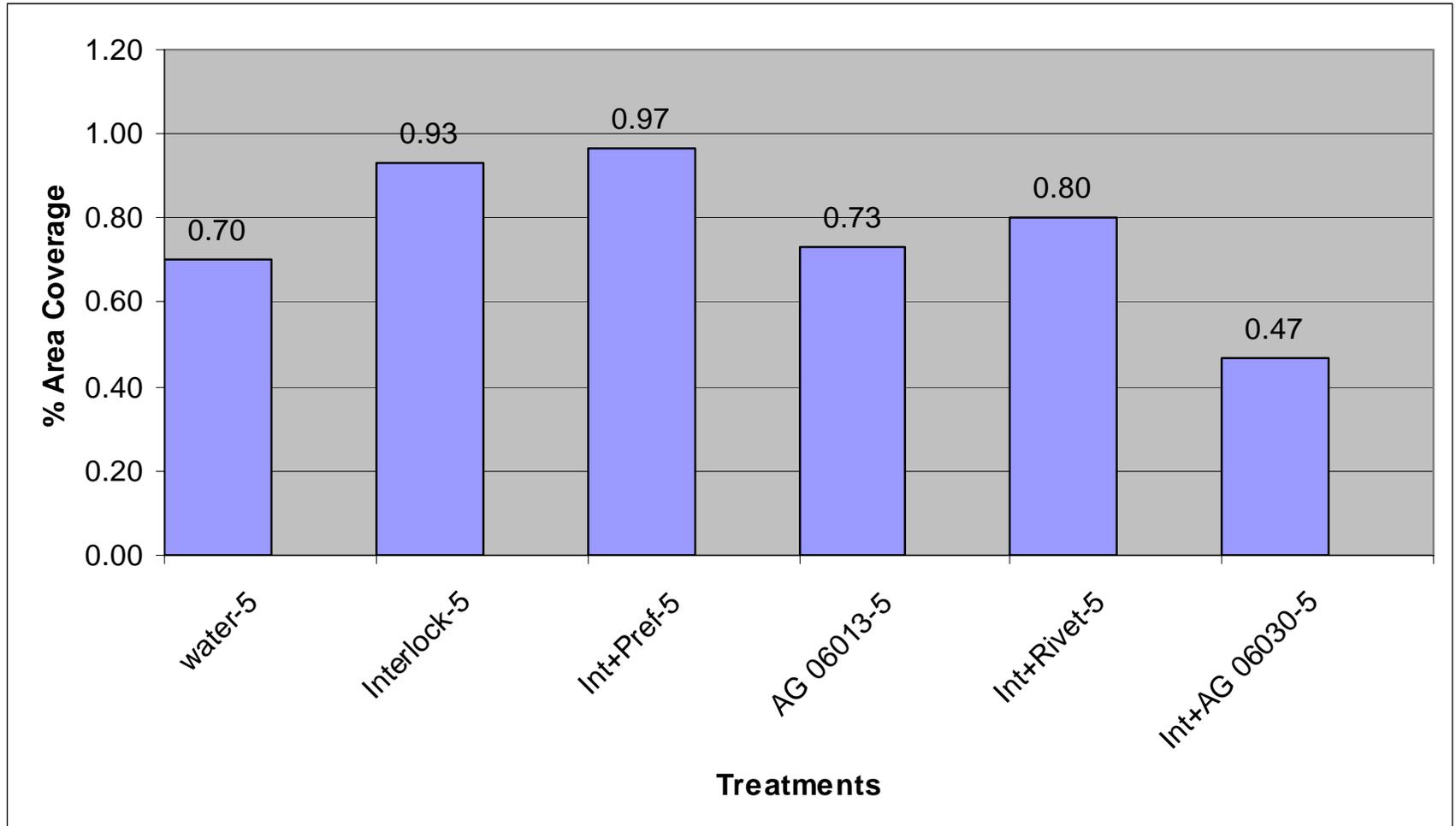
Results and Discussion:

- Comparison of locations in canopy
- Comparison of application volume
- Comparison of products vs. water
 - Percent area coverage
 - Number of droplets per square centimeter
 - Volume median diameter in lower canopy

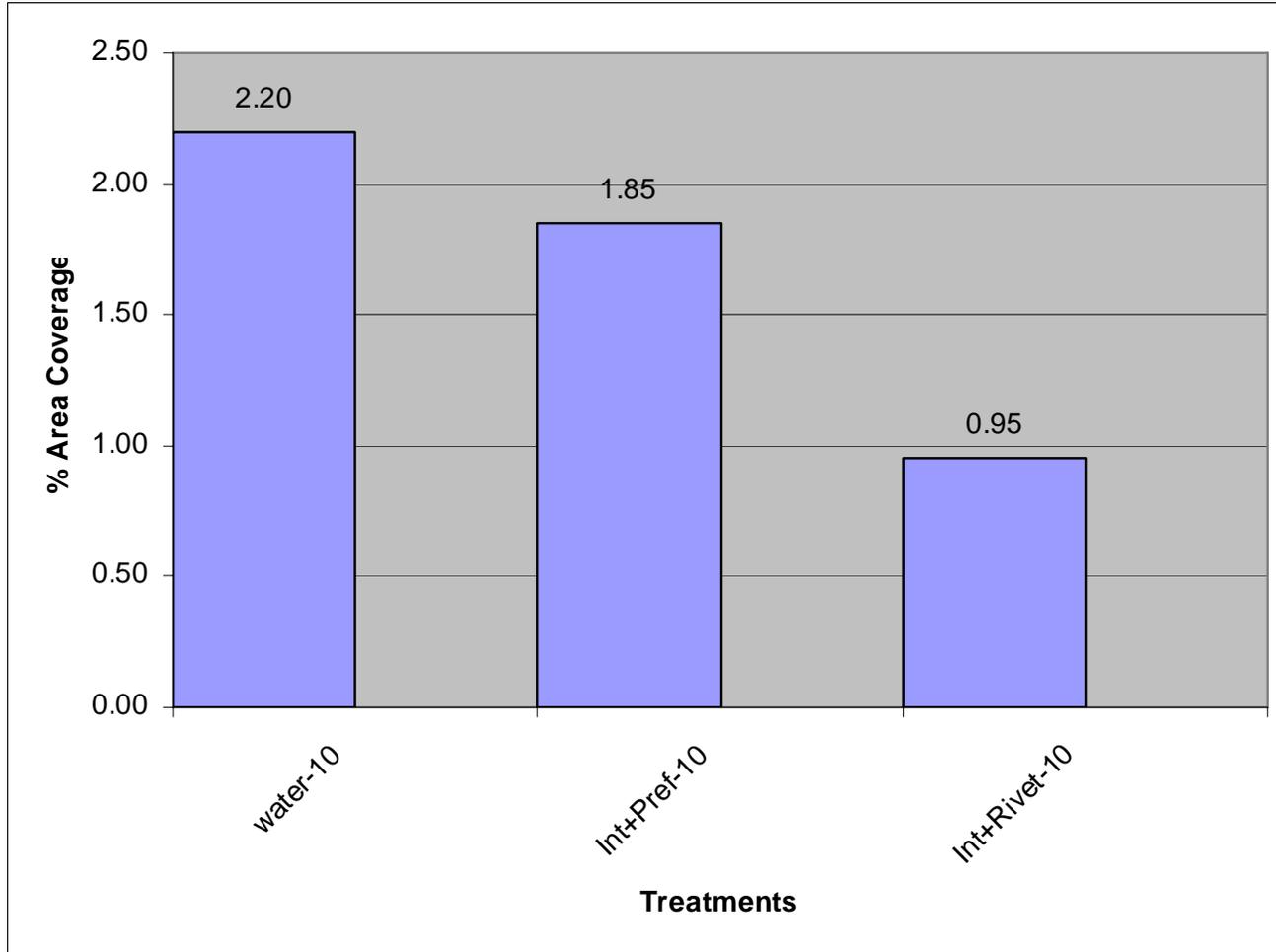
Coverage in Bottom of Canopy - 3 GPA:



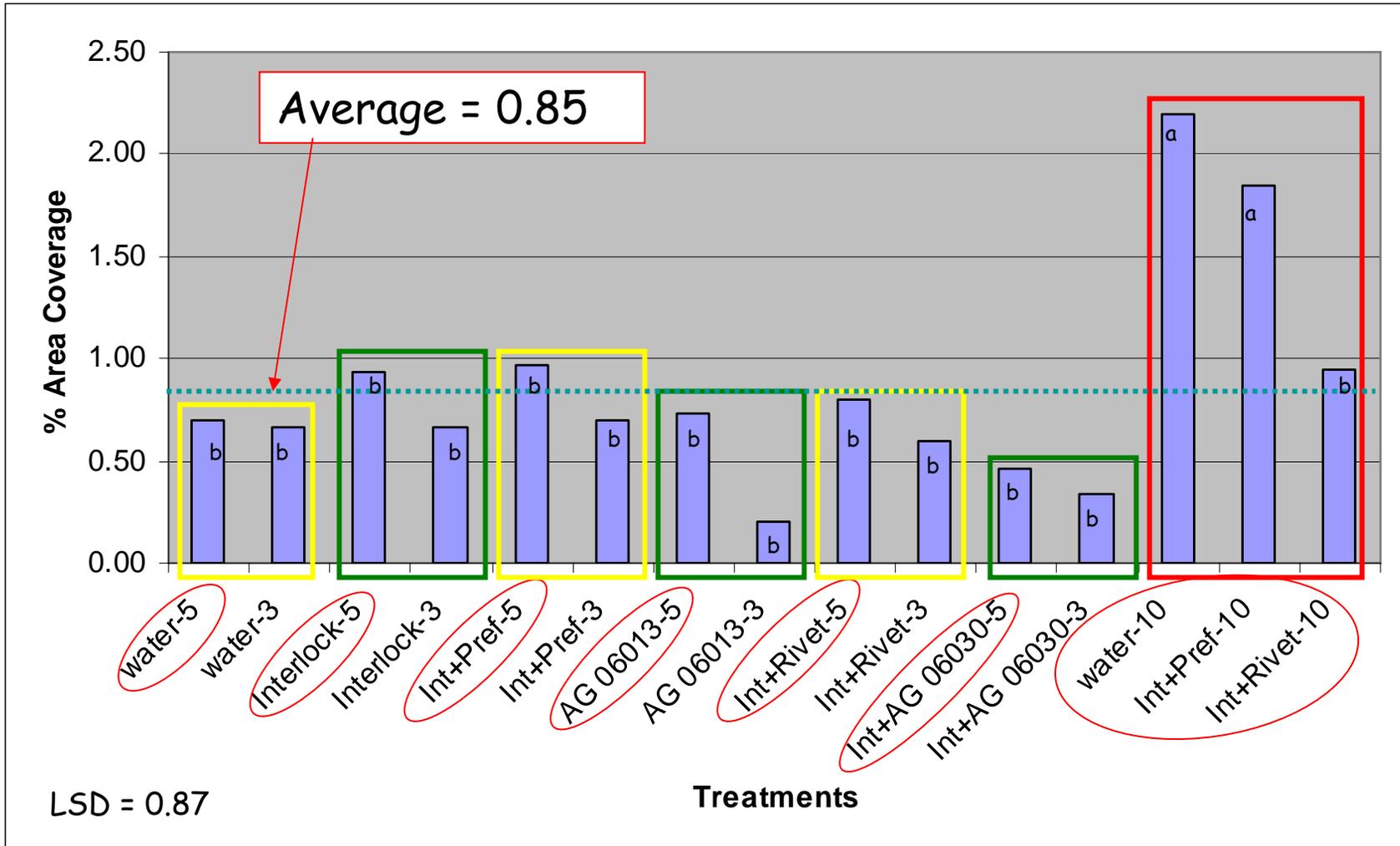
Coverage in Bottom of Canopy - 5 GPA:



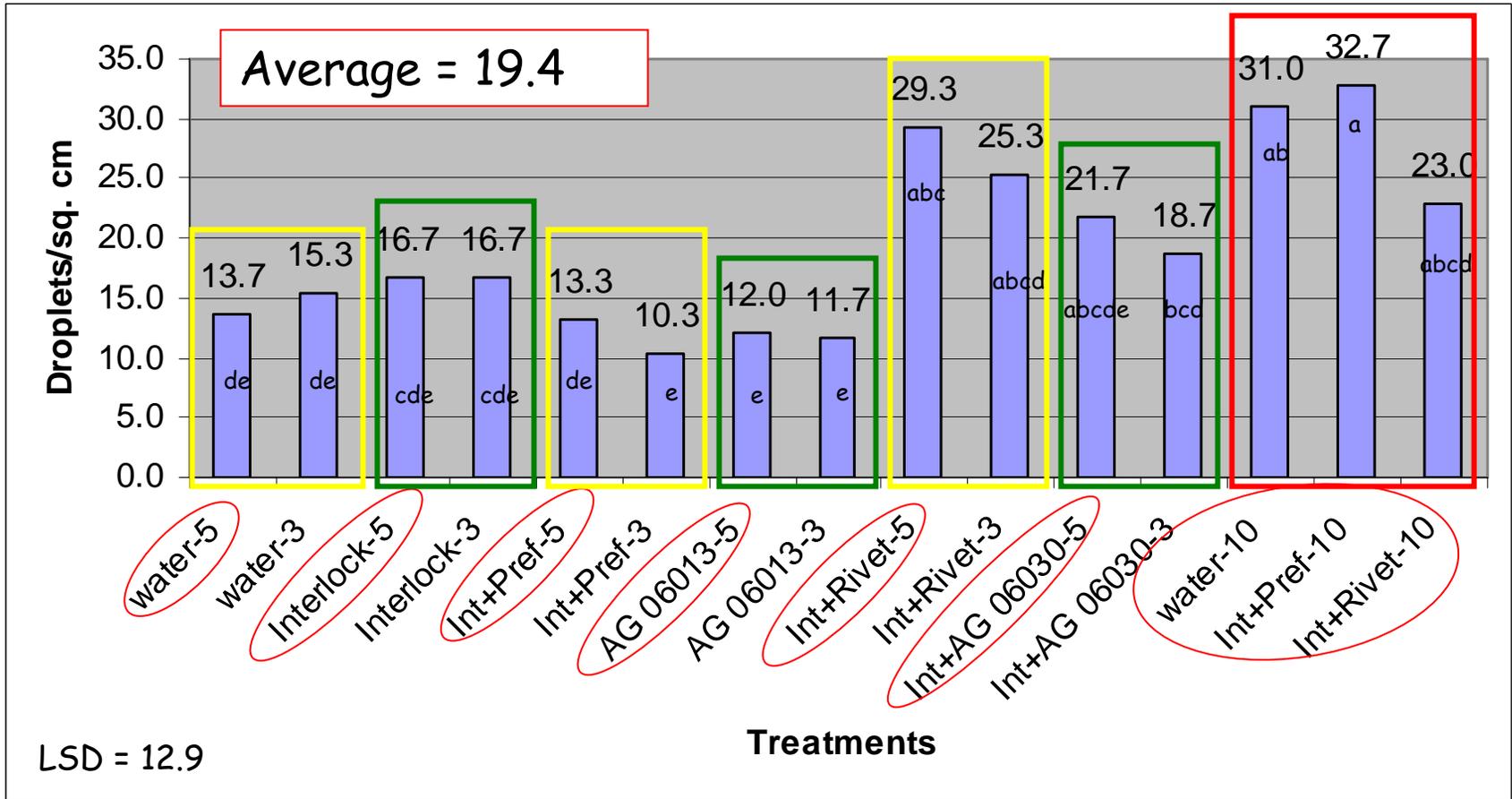
Coverage in Bottom of Canopy - 10 GPA:



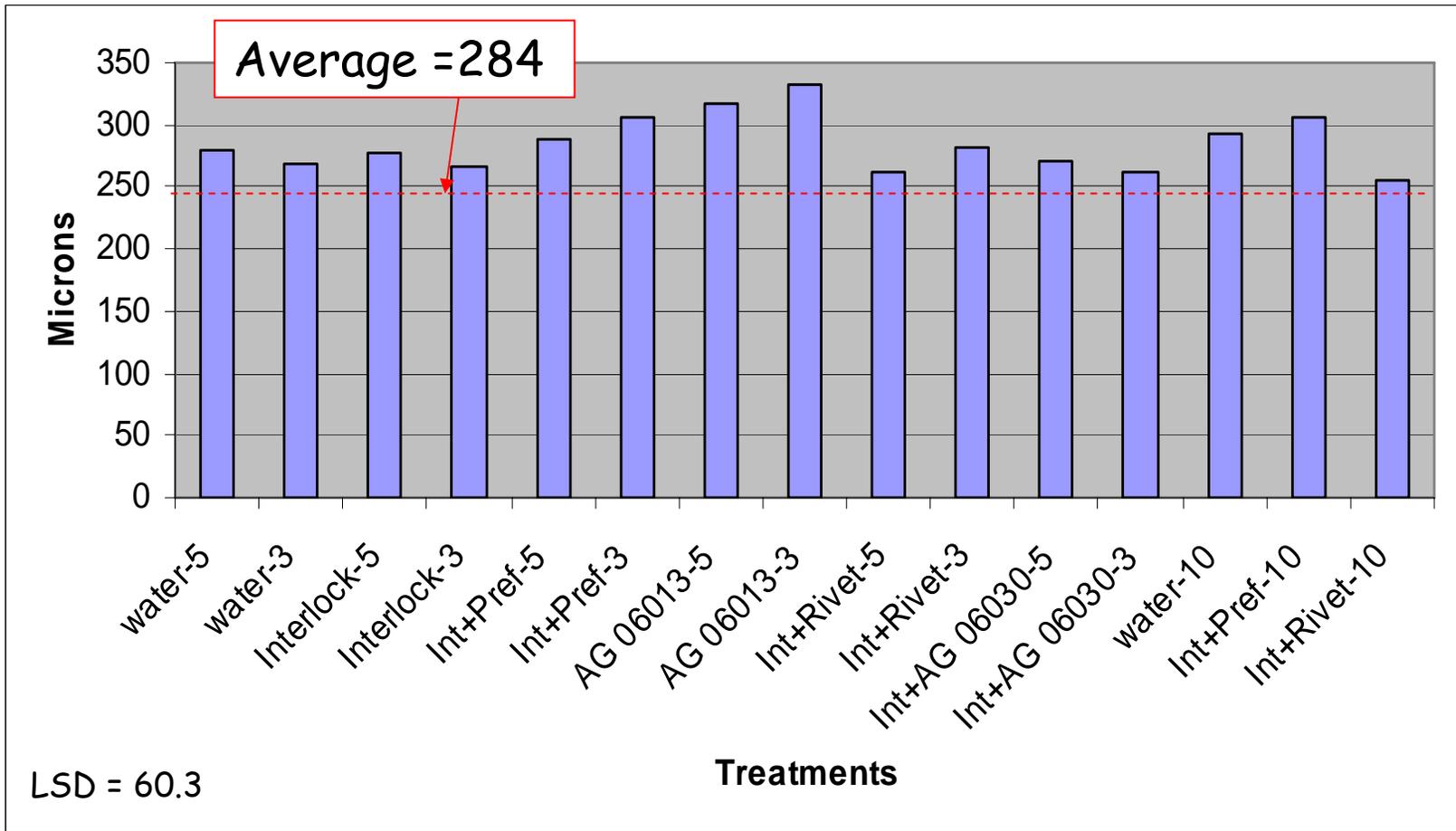
Percent Area Coverage Bottom Collectors



Droplets/Sq. cm - Bottom Collectors



VMD - Bottom of Canopy



Summary of findings:

- The 10 GPA treatments of water only and the combination of Preference/Interlock provided significantly better coverage in the lower canopy.
- There were no other significant differences measured among all other volumes and products.
- For the 5 GPA treatments, the Interlock and the Interlock/Preference combination provided the best coverage.
- Increased volume per acre improved coverage.

Summary of findings cont.:

- Deposition aids only slightly increased canopy penetration except with the 10 GPA treatments where water alone was best.
- Higher application volumes increased the number of droplets measured in the lower canopy.
- The combinations of Interlock/Rivet and Interlock/Experimental AG06030 at both 5 and 3 GPA improved the droplet count.
- Interlock/Preference at 10 GPA had the most droplets in the lower canopy.

Acknowledgements:

- Agriliance
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- Jim DeKoster - Pilot
- Armando - Mix Master



Thank you!