Comparison of application parameters using a PWM sprayer

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Questions in this study

- What effect does
  - Duty Cycle
  - Boom Height
  - Nozzle Type
  - Tank-Mixture
  - Speed

- Have on spray coverage?

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Materials and Methods

- Two duty cycles
  - 40 and 80
- Three boom heights
  - 24, 30, and 36 inches from the ground
- All applications made at 140 L ha^{-1} (15 gal ac^{-1}) with 310 kPa (45 psi) pressure

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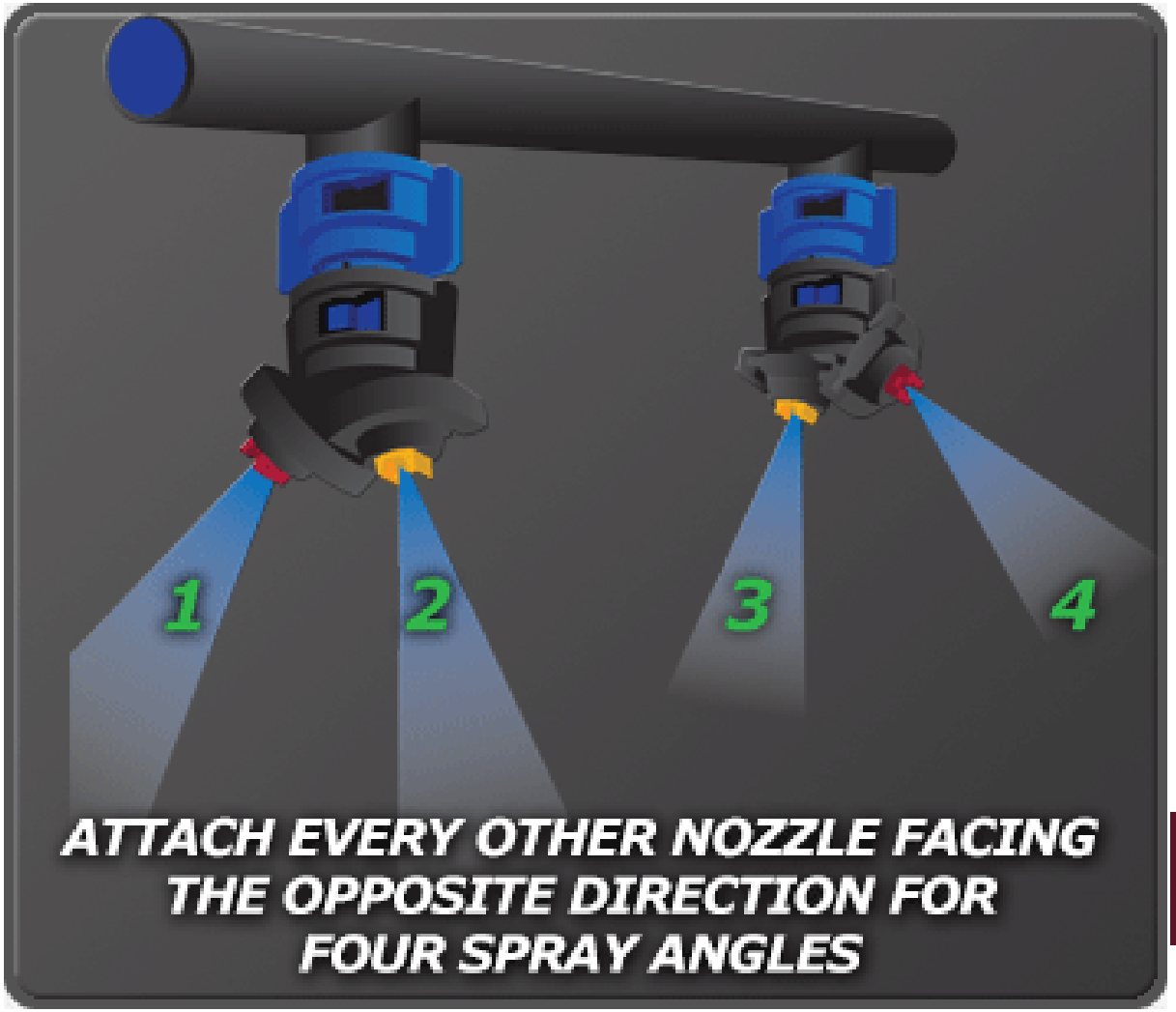
Nozzles used in the study

1. BPDF 11004
2. BPDF 11006
3. MR 11004
4. MR 11006
5. SoftDrop SD 11004
6. SD 11006

Not recommended for PWM Sprayers

7. TADF 11004
8. TADF 11006

Asymmetric Nozzles



Courtesy of Greenleaf Technologies

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Materials and Methods Cont.

Common names	Trade Names	Rates	Adjuvant Addition and Rate
Water + dye	Brilliant Blue Dye	1 g L^{-1}	None
Glufosinate + glyphosate + dye	Interline Cornerstone Plus	1 qt ac^{-1} 33 fl oz ac^{-1}	Ammonium sulfate 2% v/v
Glufosinate + clethodim + dye	Interline Select Max	1 qt ac^{-1} 16 fl oz ac^{-1}	Crop oil concentrate (Agridex) 1 % v/v

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Materials and Methods Cont.

- Applications were made at the Black Belt Experiment Station, Brooksville, MS on August 4th, 2020
- Applications were made over photo-paper (Kromekote) and cards were analyzed using Image J for droplet coverage, droplets per cm^2 and average stain size

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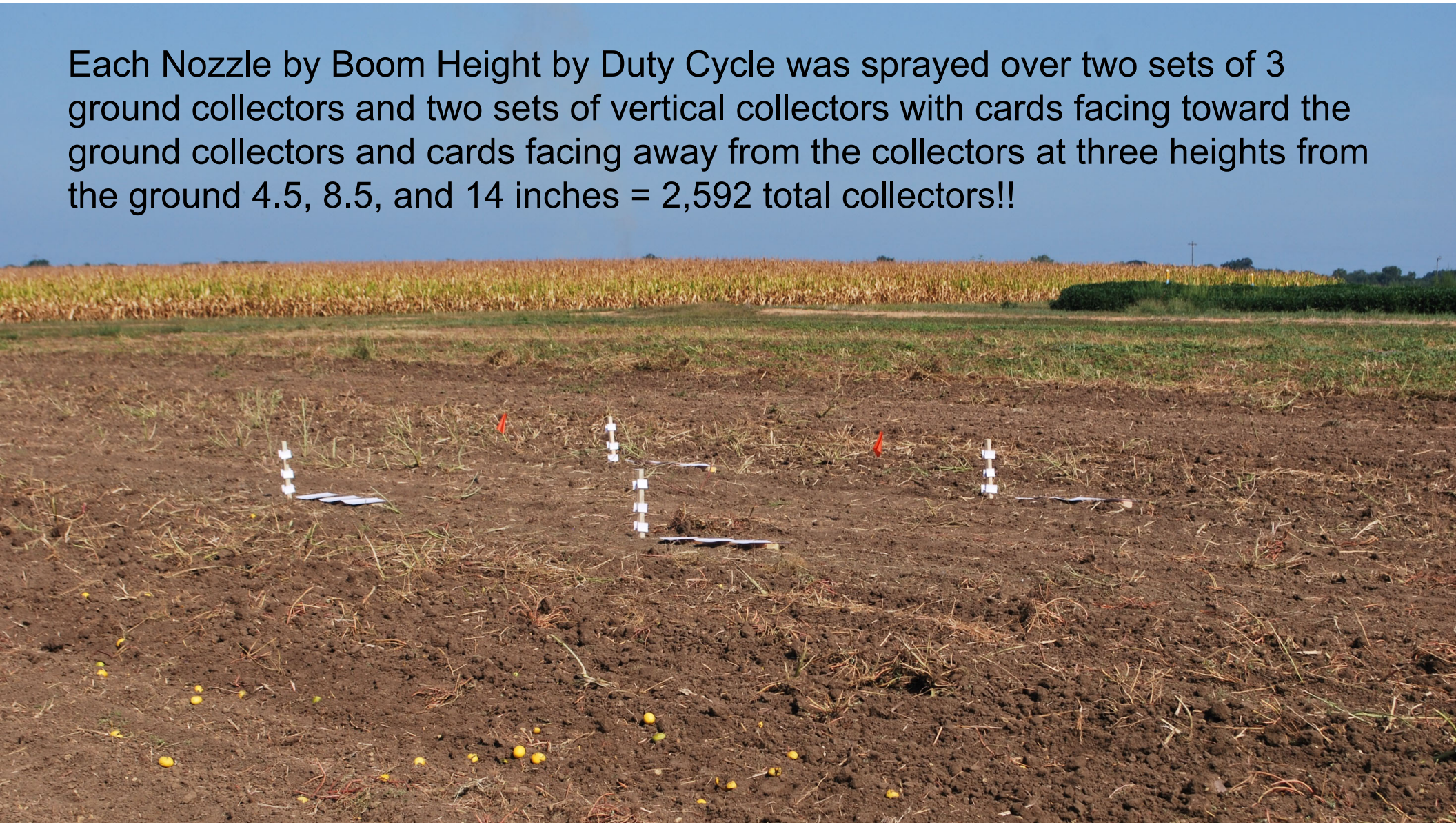
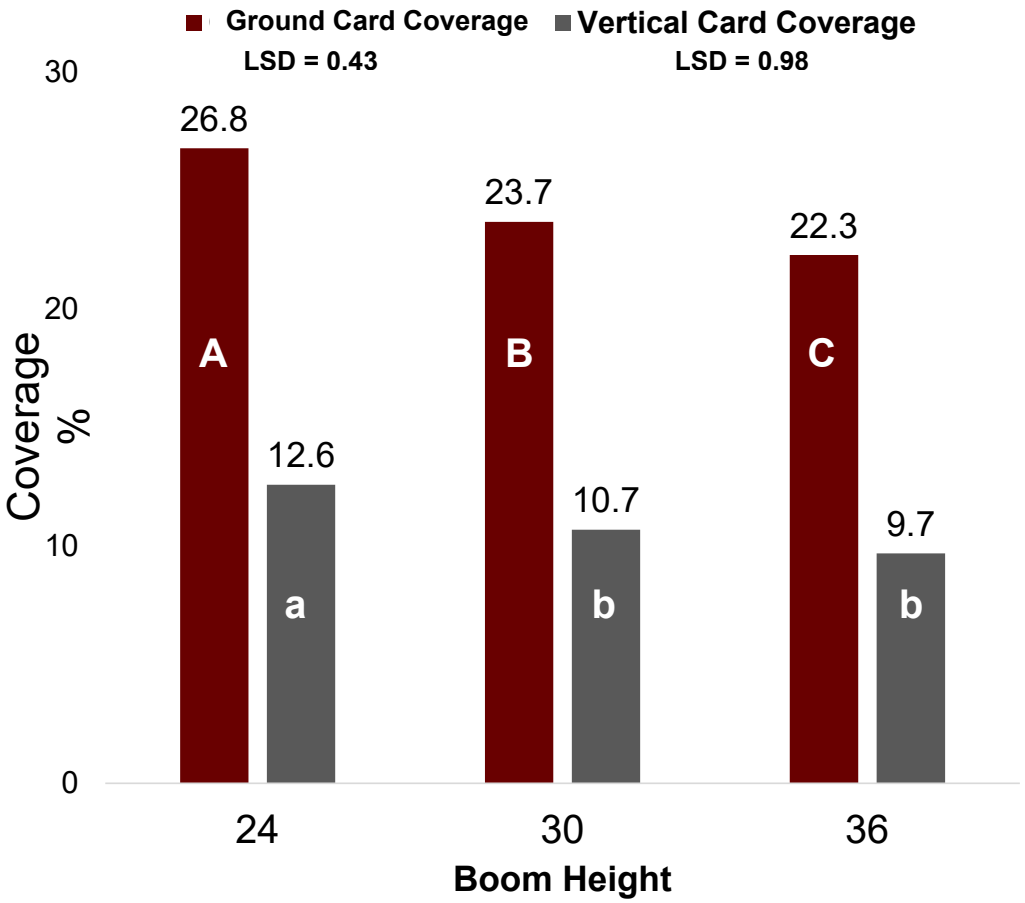
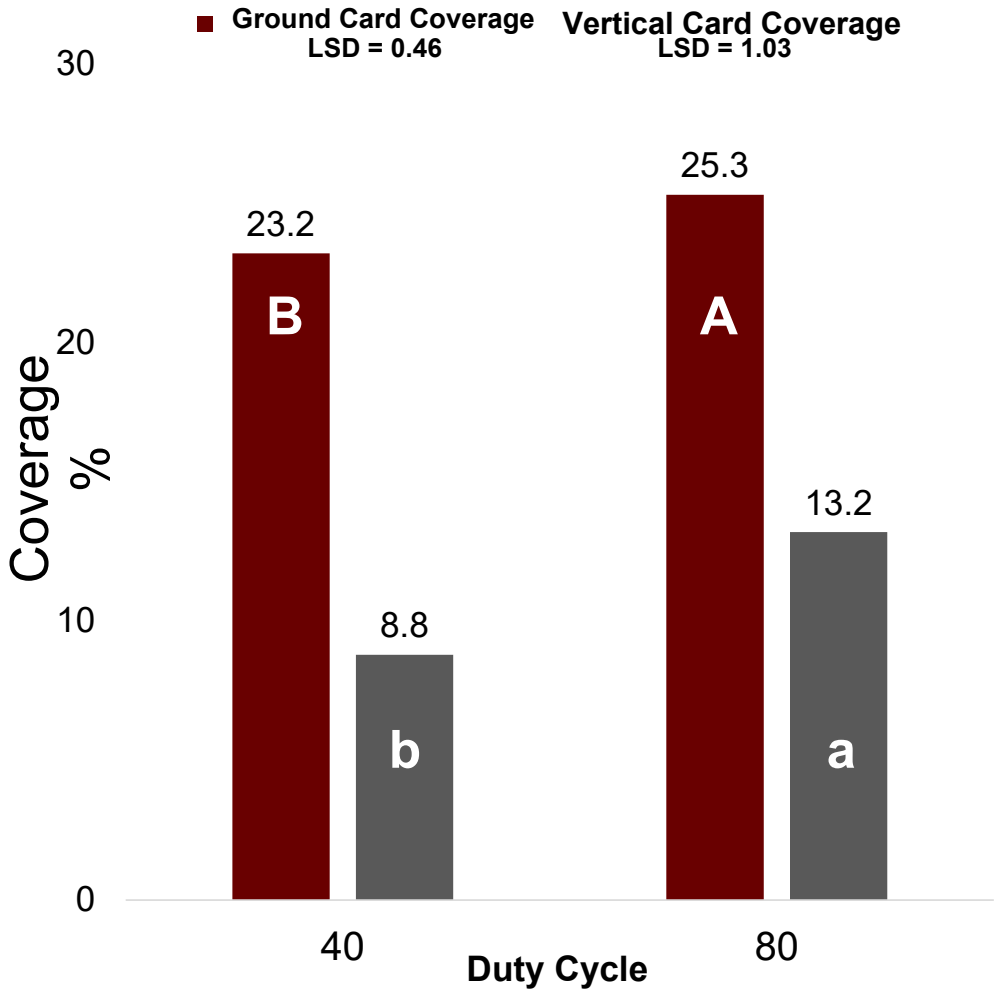
Each Nozzle by Boom Height by Duty Cycle was sprayed over two sets of 3 ground collectors and two sets of vertical collectors with cards facing toward the ground collectors and cards facing away from the collectors at three heights from the ground 4.5, 8.5, and 14 inches = 2,592 total collectors!!



Boom height effect on coverage for both ground and vertical collectors



Duty cycle effect on coverage



Results

- Boom height affected coverage on both ground and vertical collectors
  - The lower the boom height, the higher the coverage across nozzle, duty cycle, tank-mixture

- The lower duty cycle reduced coverage compared to the higher duty cycle – even at a slower driving speed

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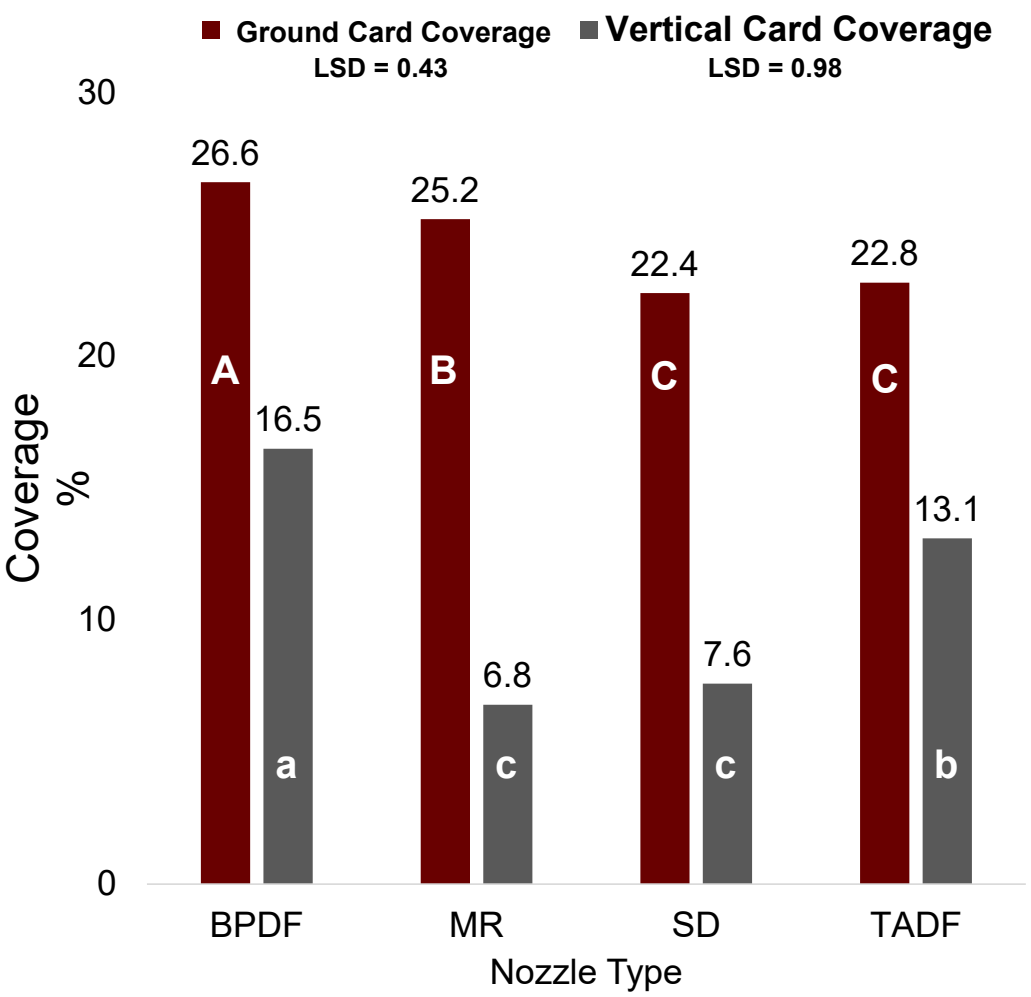
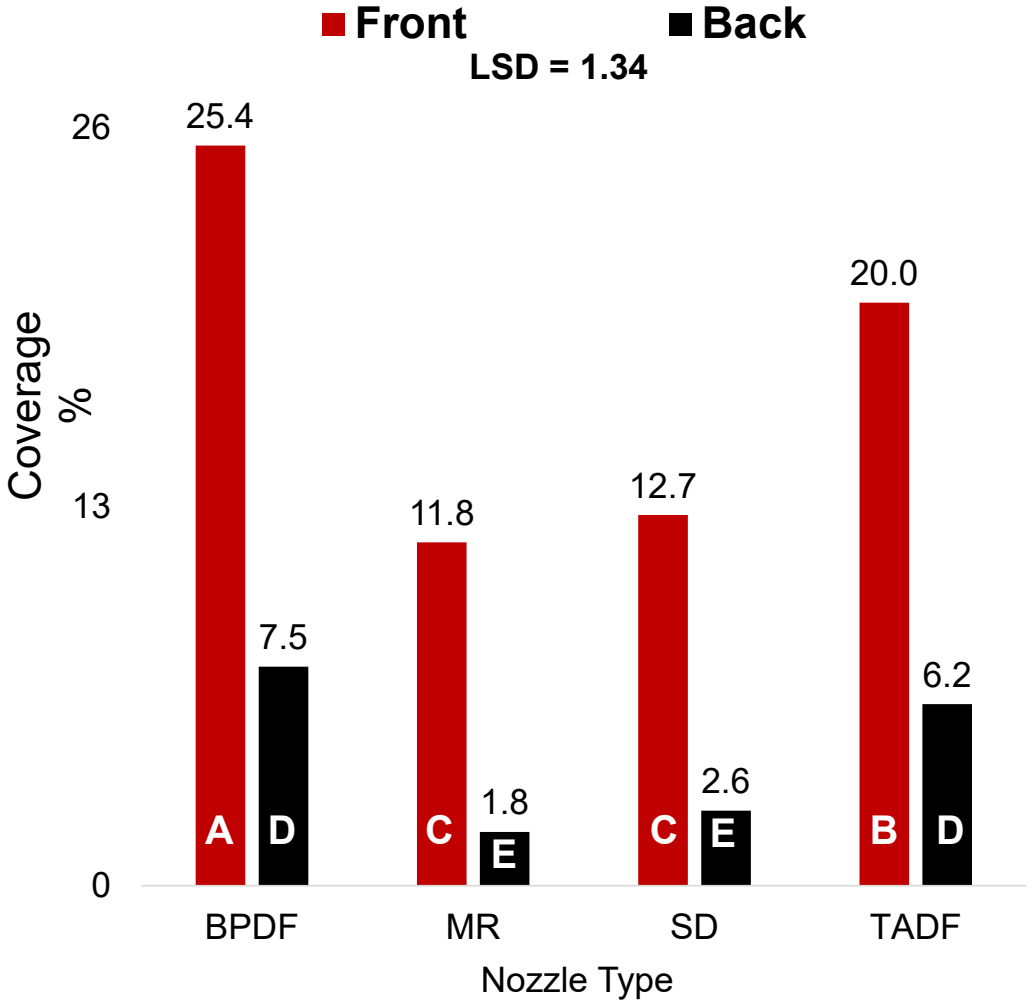
Nozzle coverage by collector type across nozzle flow rate



Vertical card coverage from nozzle by orientation

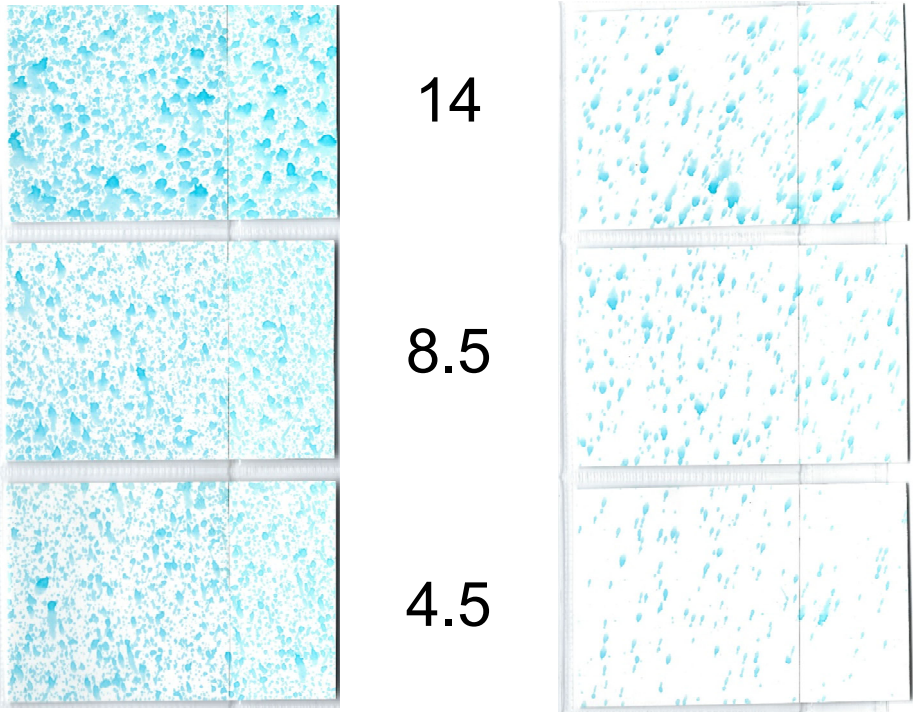


Dual fan nozzle vs. single fan nozzle

BDPF

Front

Back



14

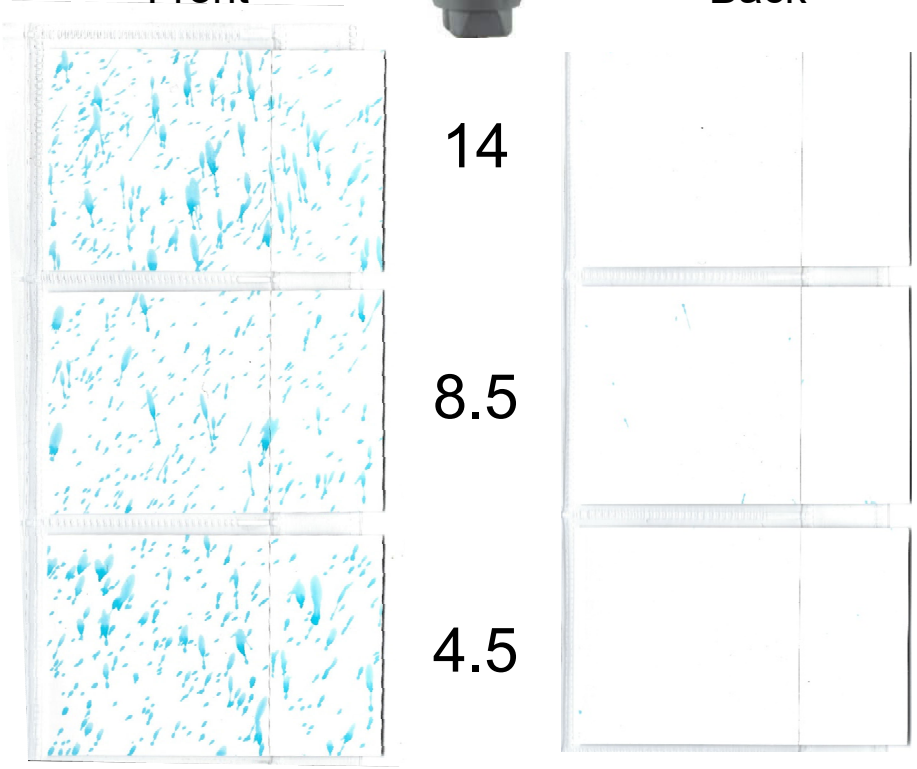
8.5

4.5

MR

Front

Back



14

8.5

4.5

Preliminary discussion

- A lot of data left to sift through, but some key take-aways:
  - Lower boom height ↑ coverage ↓ chance for drift
  - Dual fan nozzles provide more buffer on coverage
  - TADF – though not recommended for PWM sprayers, did not perform badly in this study
  - If using PWM system, apply as to stay in the > 50% duty cycle regions

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