On and off-target spray deposition from a solid set canopy delivery system and an axial-fan airblast sprayer tested for vineyard spray applications

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Overview of the talk

- **Solid set canopy delivery system (SSCDS):** Background
- **SSCDS:** Grapevine trained in modified VSP vineyard
- **Comparison:** SSCDS Vs Airblast sprayer
- **Results and conclusions**

Background

Changing architecture

Similar practices

Background

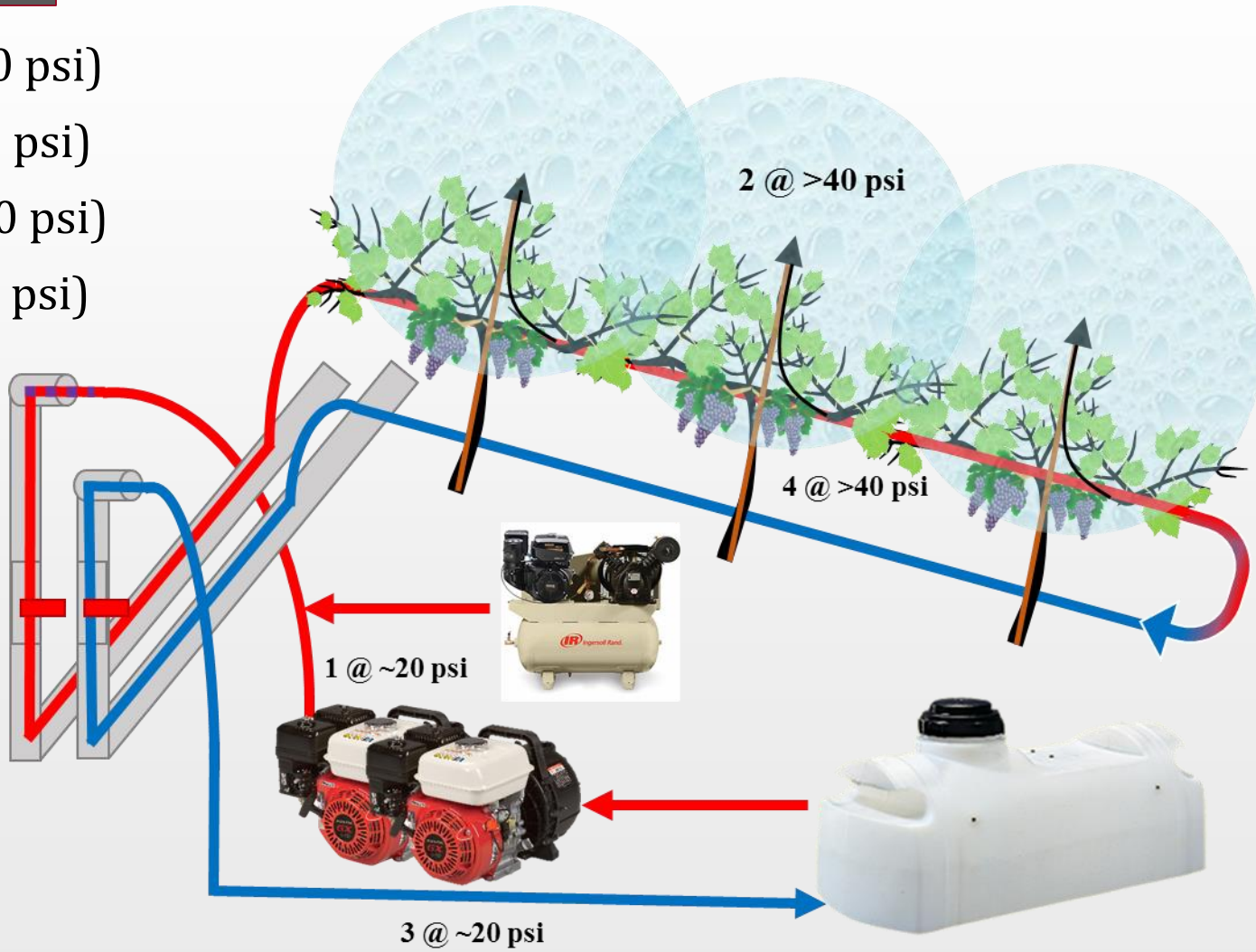
Conventional spray application

- Off-target drift
- Human exposure issues
- Dependency on ground condition
- Drive row compaction

Background

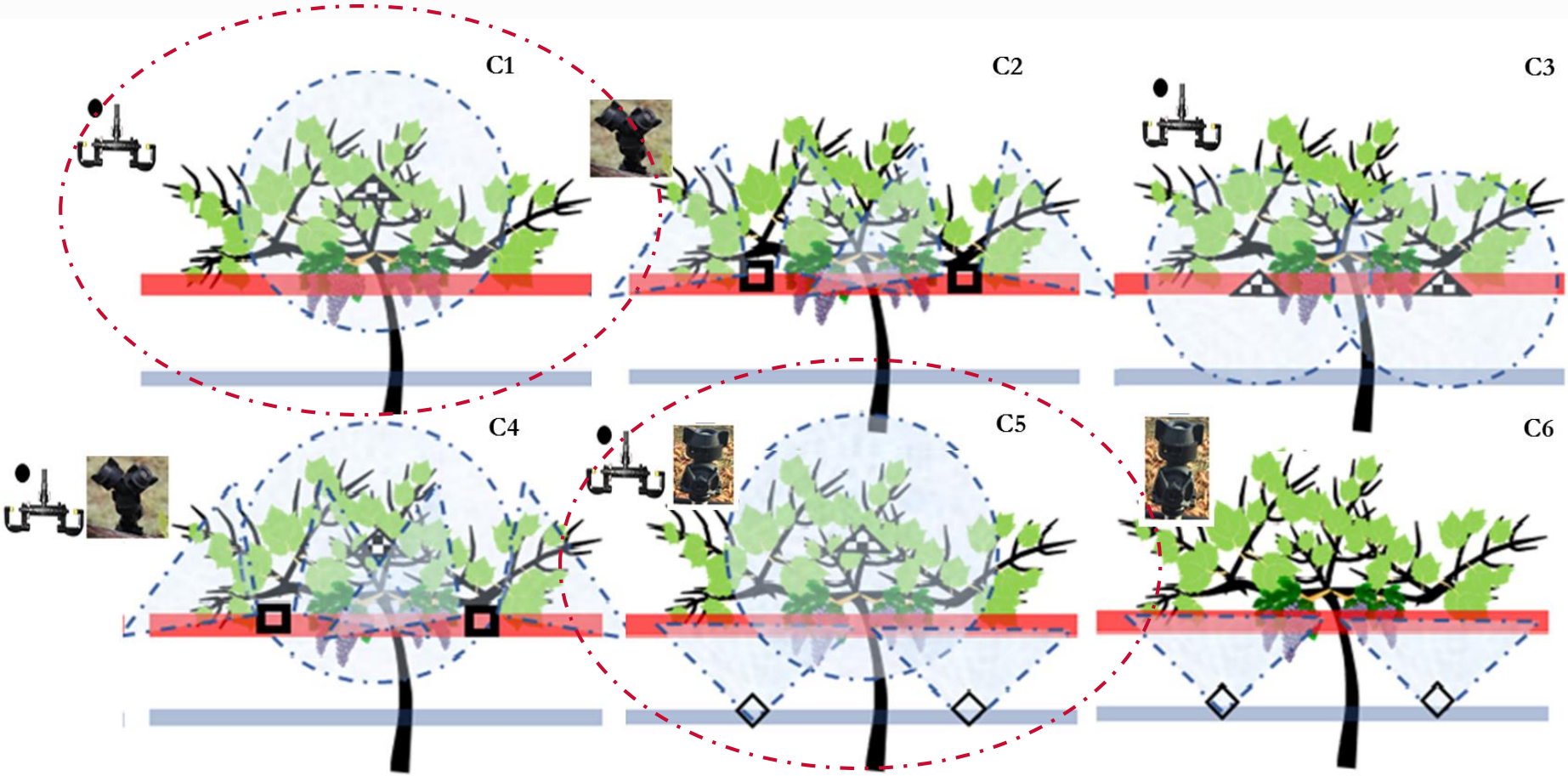
SSCDS: Concept

1. **Charging** (~20 psi)
2. **Spraying** (>40 psi)
3. **Recovery** (~20 psi)
4. **Cleaning** (>40 psi)



Background

Configurations evaluated in grapevine (Sinha et al., 2019)



Objective

Overall goal

To compare an SSCDS and an airblast sprayer for spray performance in a VSP trained vineyard.

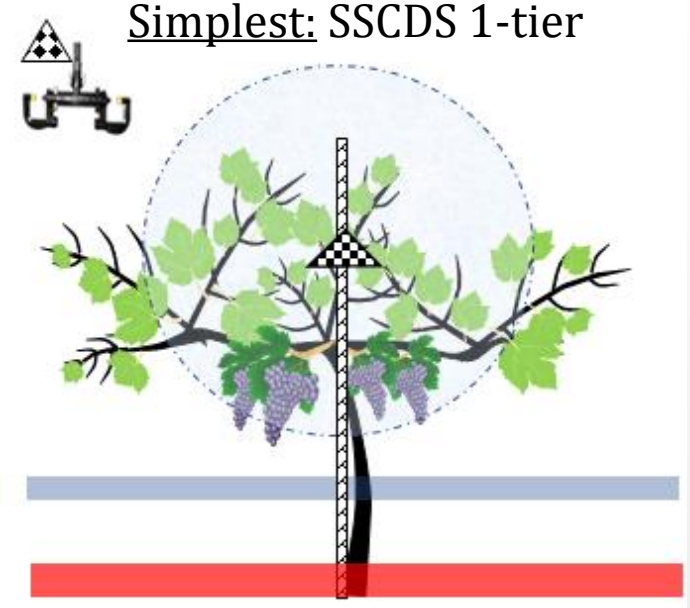
Specific objectives: To quantify

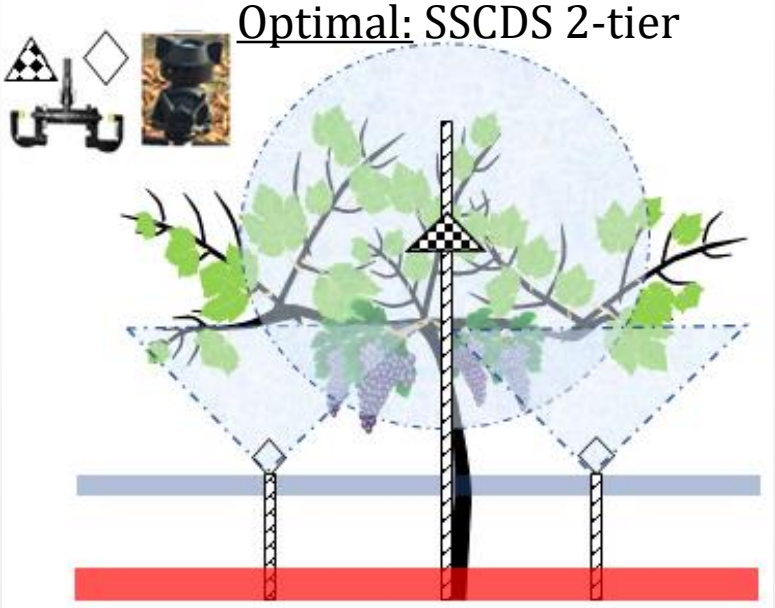
a) spray deposition and coverage on abaxial and adaxial surfaces of leaves at different canopy zones.

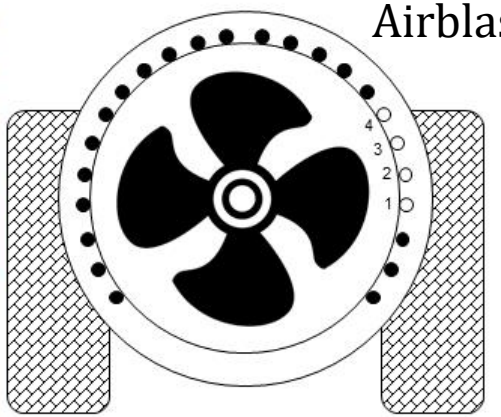
b) drift losses to air and ground at different downwind distances.

Material and methods

Spray systems evaluated







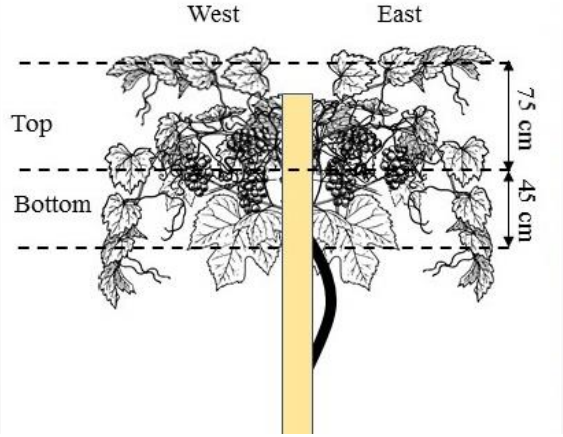
Airblast sprayer

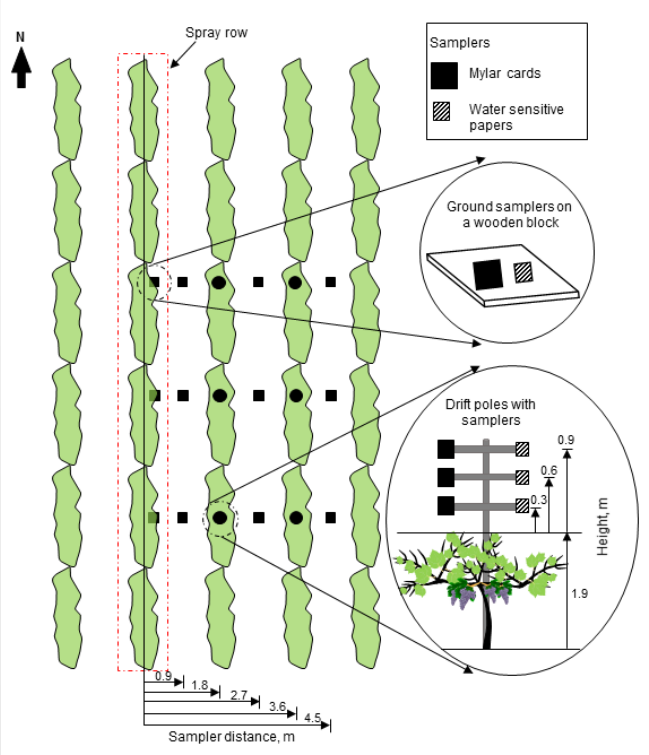
Materials and methods

Experimental details

- **Application rates:** 468 l ha^{-1} (50 GPA)

- **Data collection:**
  - *Deposition and Coverage:*
    - Six grapevines
    - Four sampling zones
    - Two sampler per zone
  - *Off-target drift:*
    - Ground: 0.9, 2.7 and 4.5 m downwind
    - Aerial: 1.8 and 2.7 m downwind





Materials and methods

Spray deposition (ng cm^{-2}) & coverage (%)

- **Spray mix:** Pyranine 10G (Keystone Inc., Chicago, IL) 500 ppm
- **Tracer concentration:** Fluorometry (***Turner Designs Trilogy Laboratory Fluorometer, Model 10 AU***, Turner Designs, San Jose, CA).
- **Coverage (%):** Image processing

Materials and methods

Monitoring pressure

Pressure transducers: Omega Engineering

Monitoring weather parameters

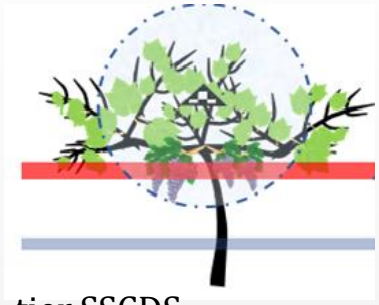
WSU AgWeatherNet

ATMOS-41: Meter Group Inc.,

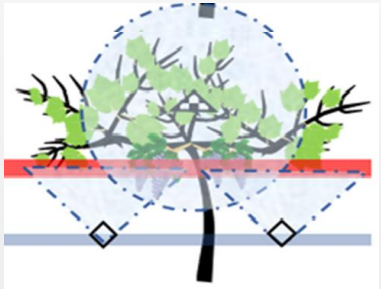
Results

Spray deposition

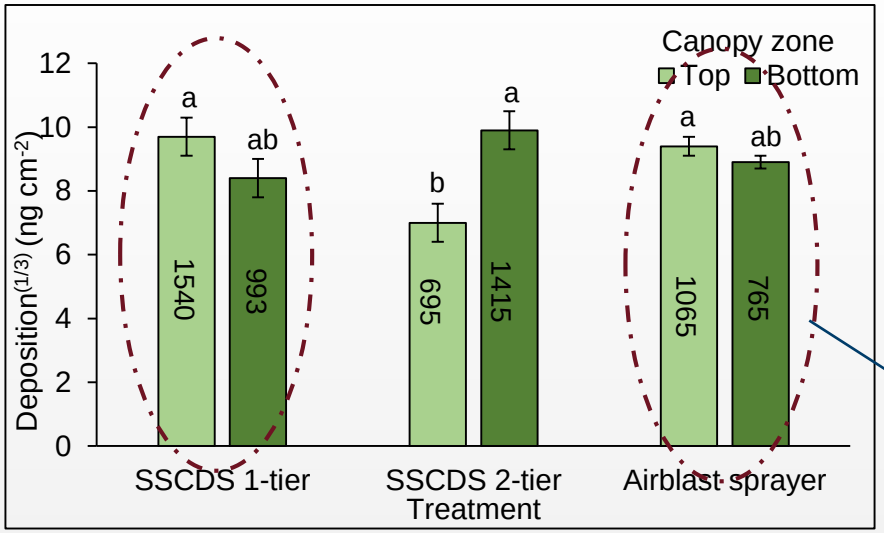
1-tier SSCDS

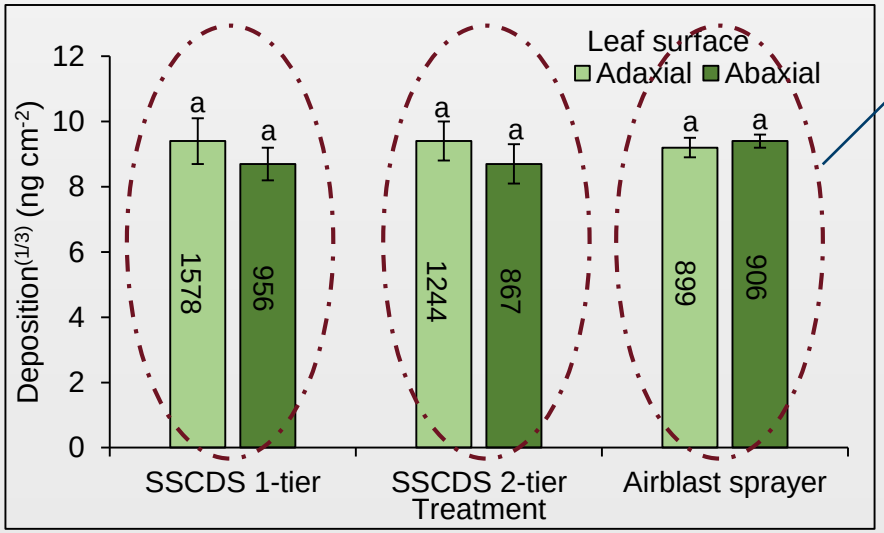


2-tier SSCDS



Airblast sprayer





Similar spray deposition in different zones

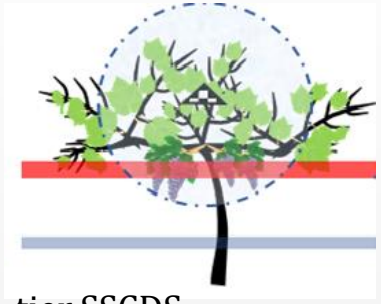
Better uniformity

Similar spray deposition on either sides of leaf

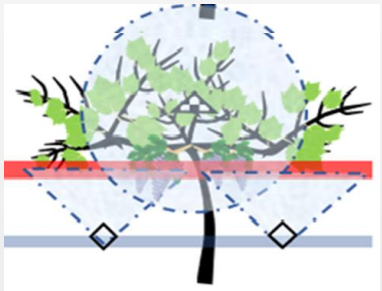
Results

Spray coverage

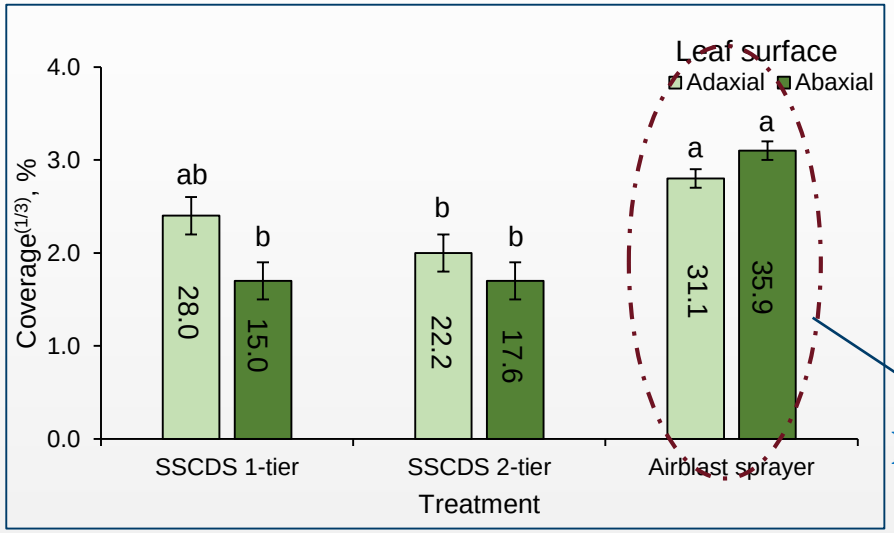
1-tier SSCDS

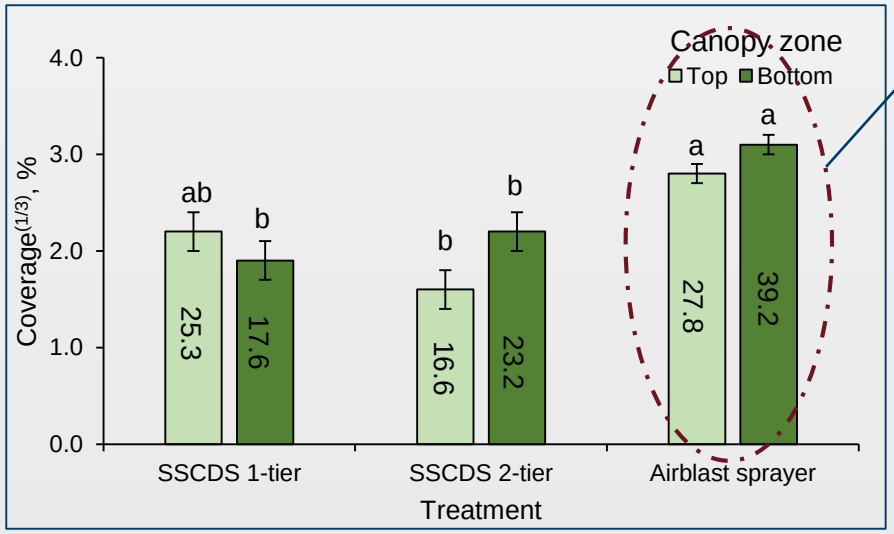


2-tier SSCDS



Airblast sprayer



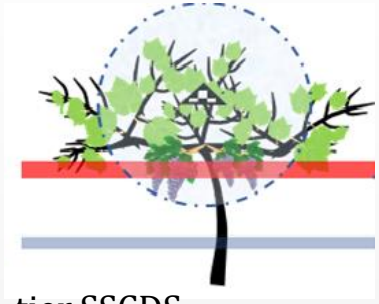


Lower deposition, higher coverage

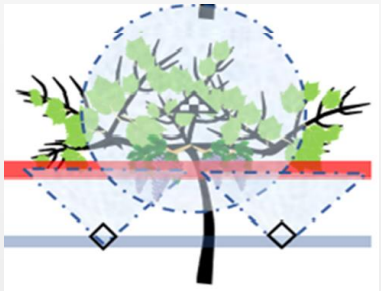
Results

Off-target deposition

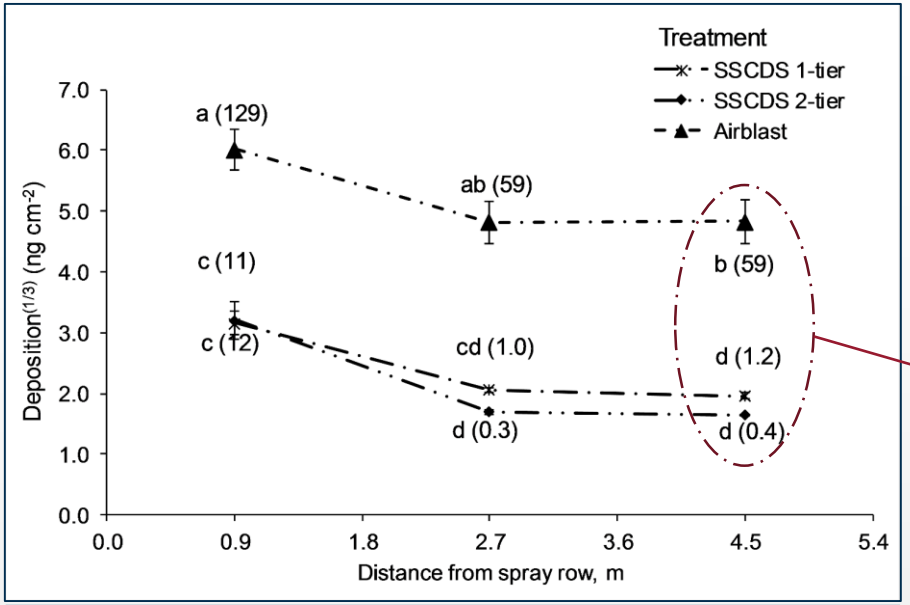
1-tier SSCDS



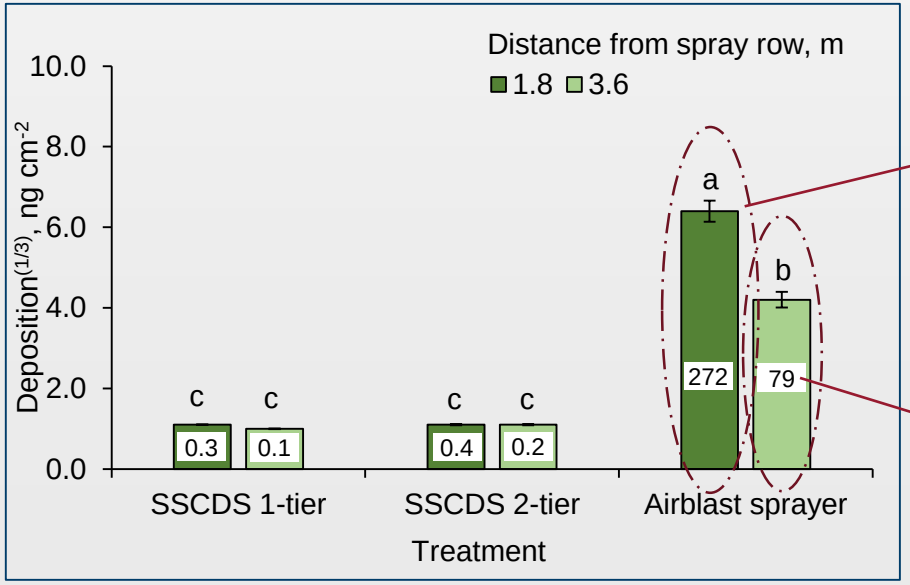
2-tier SSCDS



Airblast sprayer



Airblast: 50 times more ground drift



Airblast: 680 times more aerial drift at 1.8 m

Airblast: 395 times more aerial drift at 3.6 m

Conclusions

- **Spray deposition**
  - Similar in the studied systems
  - SSCDS had higher canopy deposits
- **Spray coverage**
  - Higher for airblast sprayer possibly due to the air-assist
- **Spray drift**
  - Significantly higher for airblast sprayer (both ground and aerial)

SSCDS may be a viable alternative to conventional airblast sprayers for spraying in a VSP vineyard (Similar deposition and reduced drift)

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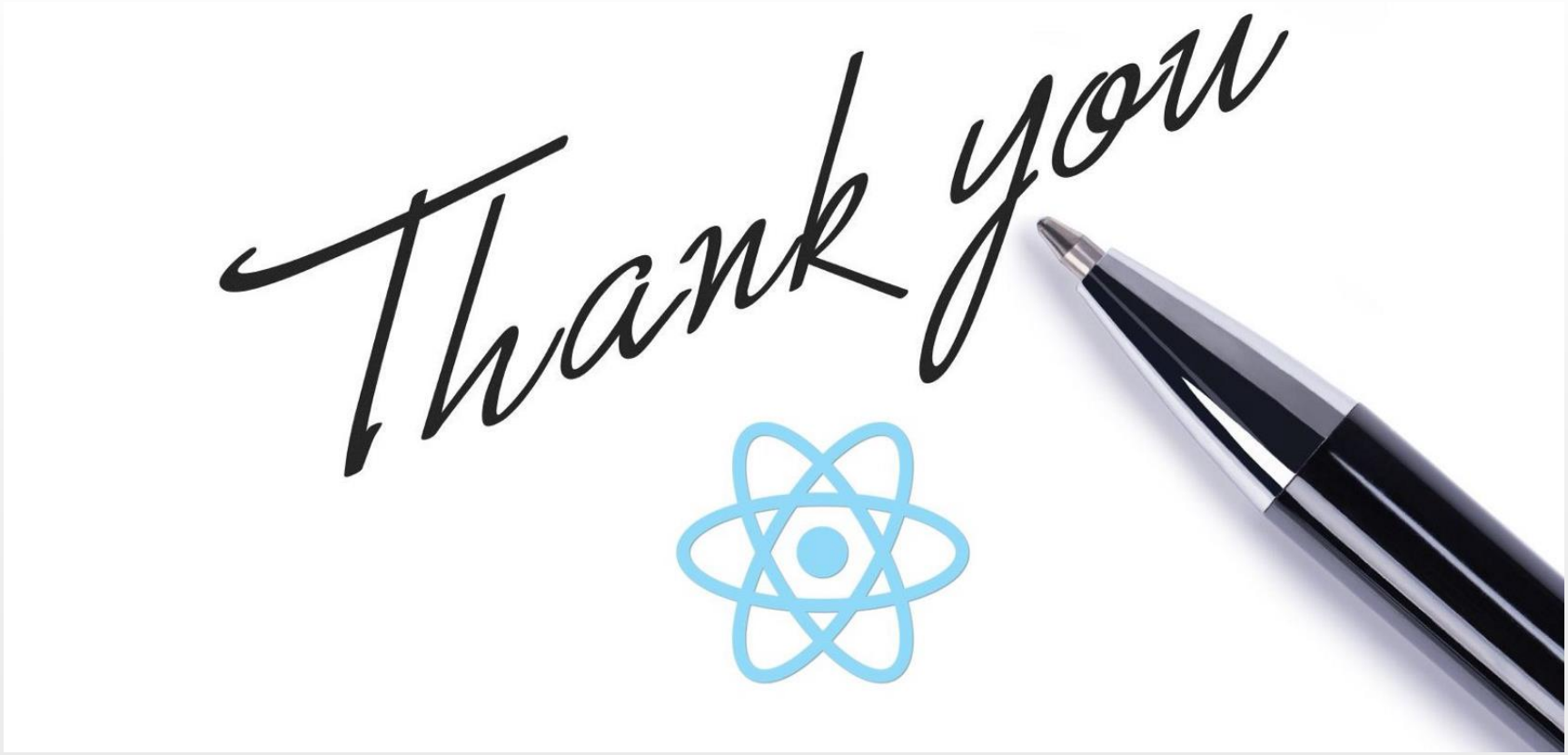
Thank you