

Drones for Spraying Mayhaws, The Future or a Fad?

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The Weather Affects During Peak Spraying Window



Not what we want our orchards to look like!

Frequently rain impacts the ability to properly spray orchards. For Arkansas, Louisiana, Alabama, Mississippi, and Georgia some of the rainiest months occur during the most important time for flowering and fruiting.

This is where drones may have a place in the orchard. By flying over the orchard, we can potential still spray while reducing the risks of damaging the orchard floor.

	State						
Month	AR	LA	Tx	MS	AL	GA	FL
February	3.61	4.66	1.67	4.96	5.18	4.49	3.17
March	4.93*	5.32*	1.85	6.30**	6.65**	5.28**	4.13
April	4.82	4.89	2.14	5.61	4.77	3.62	2.84
May	5.20*	5.46*	3.52	5.39	4.69	3.58	3.92

* Represents top three highest precipitation months. ** Represents the month with the highest total precipitation in inches.

Materials and Location

Location

- El Dorado, Arkansas.
- Richland Creek Farm & Market
- Average Canopy Diameter was 13ft
- Average Tree Height was 11ft
- 20ft between Trees
- 25ft between Rows

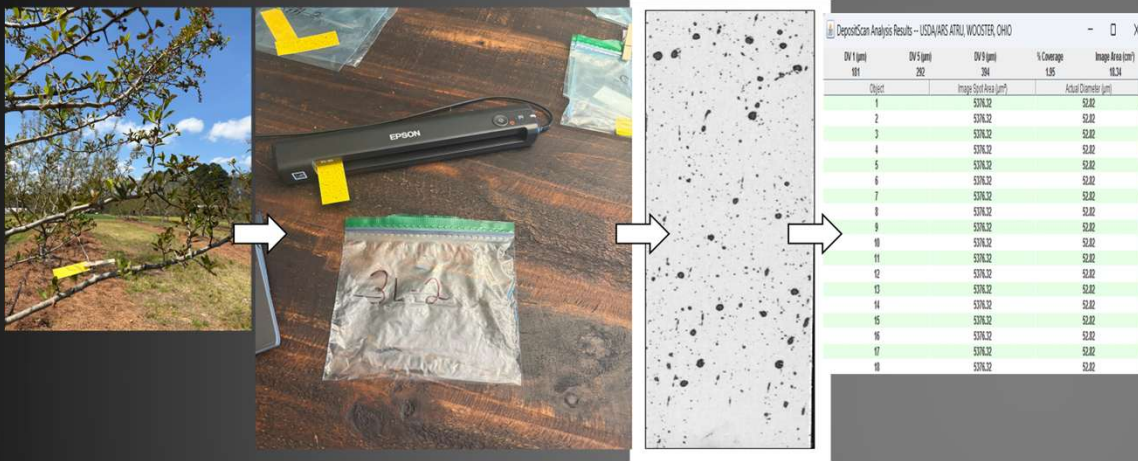


Materials

- DJI AGRAS MG-1P Sprayer Drone
- Water Sensitive Paper
- EPSON ES-50 Business card Scanner
- Water

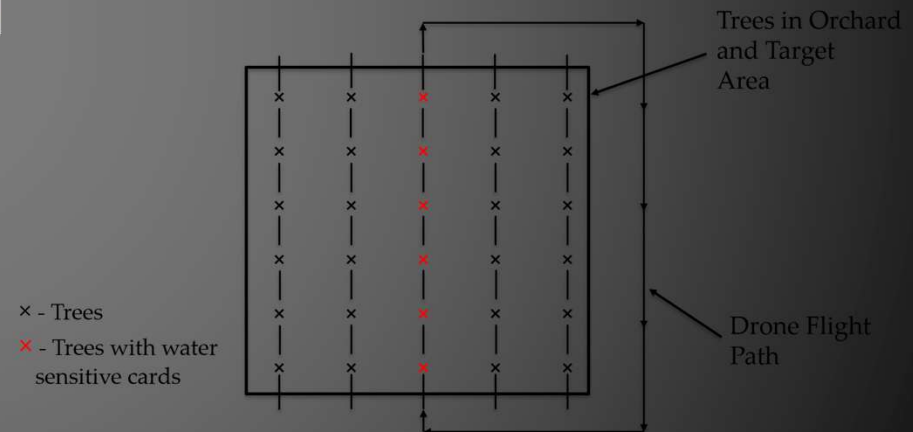


Methods



Water-sensitive cards were clipped to the top, middle, and bottom levels of the selected tree's canopy. Water-sensitive cards were analyzed using a computer, software (DepositScan, Version 2.0, and a scanner (Epson ES-50). Rstudio and Microsoft Excel was used for the statistical analysis and data visualization

The study consisted of a subset of 6 trees, that were 11ft tall, 13ft canopy diameter, and 20ft between trees. A DJI AGRAS MG-1P sprayer drone was utilized for application at a height of 6 ft above canopy height. Three application rates (2, 5, and 10 GPA) were applied at late flowering/early leaf set.



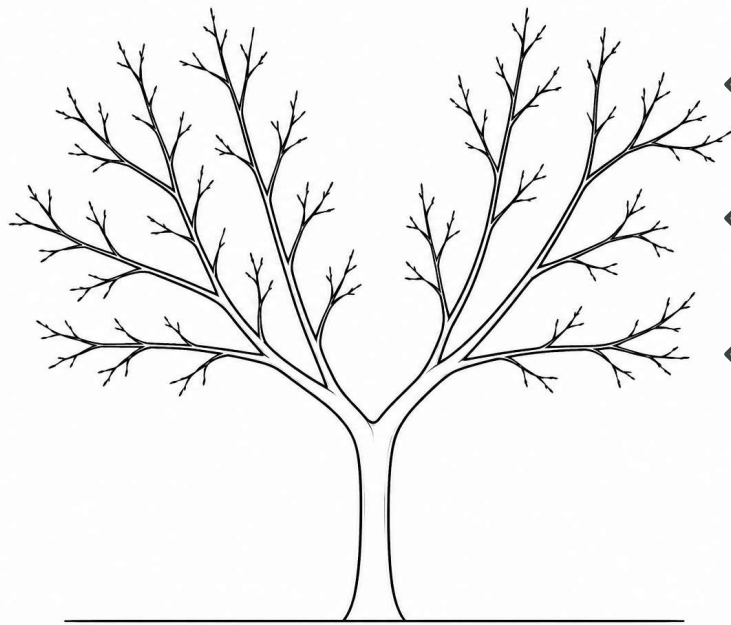
The flight pattern of the drone in an orchard

2 Gallons Per Acre

Overall Mean Coverage: 5.04%
Overall Mean Droplets/cm²: 47.8

Syngenta Recommendations

Number of droplets per cm ²	Type of Spray
20 - 30	Insecticides
50 - 70	Fungicides



Upper Canopy

- Coverage: 6.06%
- Droplets: 57

Middle Canopy

- Coverage: 5.23%
- Droplets: 49

Lower Canopy

- Coverage: 3.82%
- Droplets: 36

Although the overall mean number of droplets is above the recommended for insecticides, the coverage is too low for 2 gallons per acre to be considered viable.

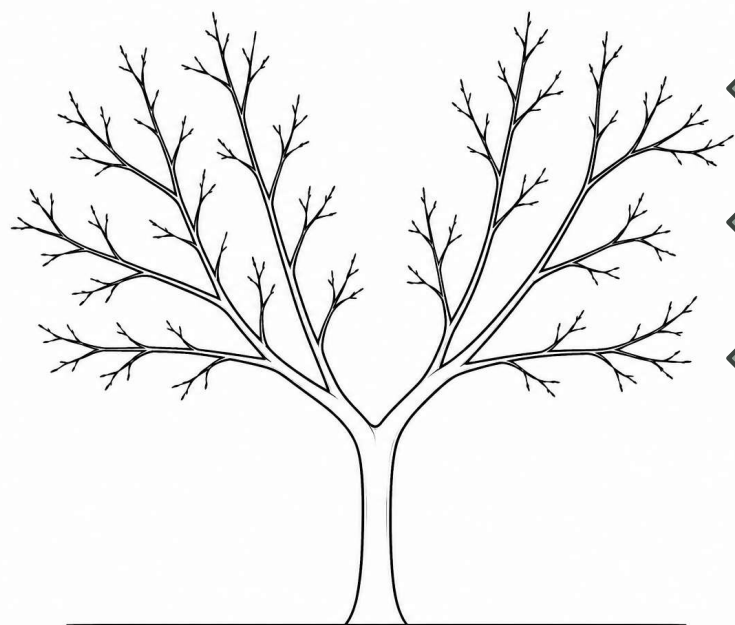
5 Gallons Per Acre

Overall Mean Coverage: 10.57%

Overall Mean Droplets/cm²: 66.2

Syngenta Recommendations

Number of droplets per cm ²	Type of Spray
20 - 30	Insecticides
50 - 70	Fungicides



Upper Canopy

- Coverage: 20.95%
- Droplets: 143

Middle Canopy

- Coverage: 9.93%
- Droplets: 44

Lower Canopy

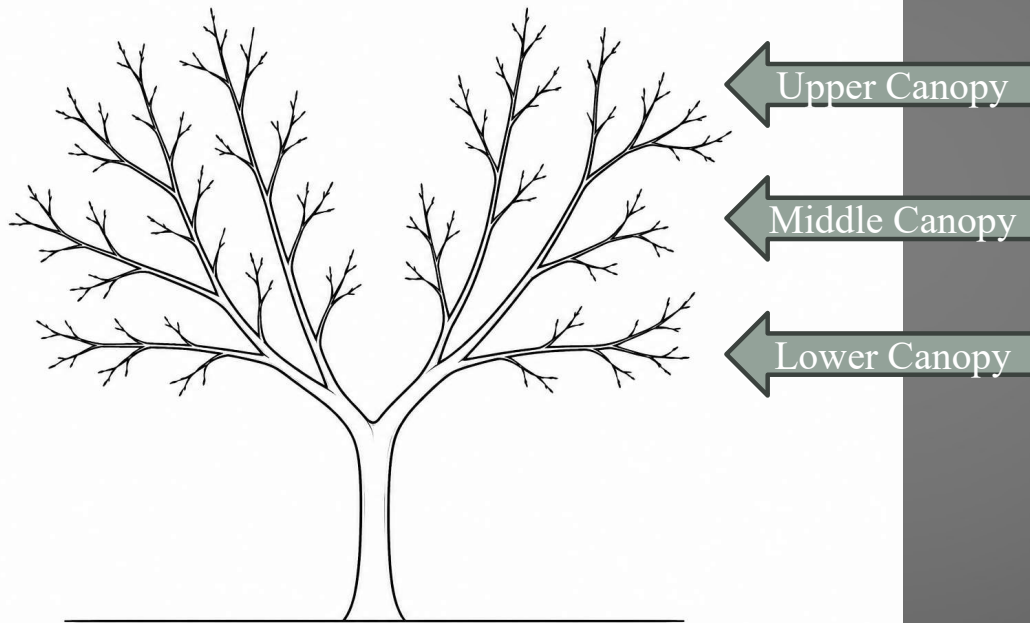
- Coverage: 2.46%
- Droplets: 18

5 gallons per acre starts to look to be applicable as a potential rate for spraying with drones. Overall mean droplets were 66.2, which is within the range for fungicides. But when we investigate the different canopy levels, we see that lower canopy is below the recommended. Coverage is also below the 15% we would like to see.

Note- Common minimum application rate required for Insecticides.

10 Gallons Per Acre

Overall Mean Coverage: 11.77%
Overall Mean Droplets/cm²: 93.9



- Coverage: 15.71%
- Droplets: 113
- Coverage: 14.43%
- Droplets: 114
- Coverage: 7.41%
- Droplets: 53

Syngenta Recommendations

Number of droplets per cm ²	Type of Spray
20 - 30	Insecticides
50 - 70	Fungicides

10 Gallons per acre gives the best results of the three-application rates. Systemic chemicals, such as many fungicides labeled for use in mayhaws are likely useable as the plants intake and internal movement can compensate for the lower canopy's low coverage rate. The lower canopy coverage does raise concerns over the effectiveness of contact action chemical, such as many insecticides.

Note- Common minimum application rate required for Fungicides.

Conclusions

- At 47.8 droplets/cm², 5.04% overall coverage (2 GPA), and 66.2 droplets/cm², 10.57% overall coverage (5 GPA) deposition does not support effective use of systemic or contact-action products at the late flowering/early leafing stage of growth.
- At 93.9 droplet/cm² and 11.77% overall coverage (10 GPA), deposition supports effective use of systemic products across the canopy at the late flowering/early leafing stage of growth. Coverage for contact-action products is lower but adequate in the upper and middle canopy but comparatively weaker in the lower canopy (7.41%, 53 droplets/cm²), warranting further research into factors influencing deposition.

Thank you!

Special Thank you to Ken and Rhonda Rudder of Richland Creek Farm & Market for providing access to the orchard and their generous support and cooperation throughout this study.