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EXTENSION

Drone Fungicide Applications in Corn – Opportunities and Challenges

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2022 & 2023 – The Rise of Spray Drones

DJI T40 – 10.5 gallon tank, rotary atomizers, 36 ft swath…….

Hylio AG-272 – 18 gallon tank, 49 ft swath,……

Interest in Spray Drones

Spray Drone Options

DJI

HYLIO

Drone Costs: $20,000 - $40,000

Certifications: $6,000 - $10,000

Maintenance: $2,500 - $8,000

XAG

Other brands

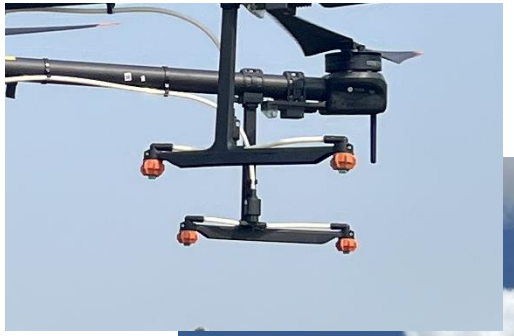
Corn Fungicide Applications with Spray Drones

- **Timeliness** – where a timely fungicide application with a ground sprayer or crop duster is not feasible
- **Field topography or conditions –** fields or parts of the fields where conditions do not allow applications with traditional equipment
- **Field size and shape** – more efficient spraying in small and irregular-shaped fields

“I get it, spray drones seem like a good technology but……..what about uniformity?”

GPA, swath width, height, coverage, drift……???

Two Most Common Spray Drone Platforms (2023)



DJI Agras T30

DJI Agras T40

Corn Fungicide Studies with Spray Drones – Tifton (2023)

Drone: DJI Agras T30 *(w/ nozzles)*

Treatments:

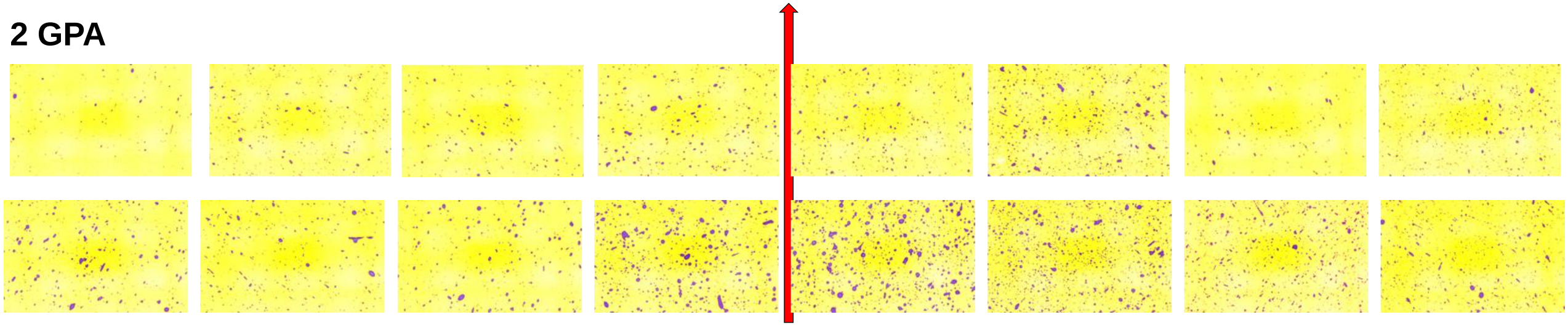
- Two spray volumes – **2** & 5 GPA
- Four heights – 5,7.5, 10 & **12.5** ft

Spray deposition assessed at different positions within the corn canopies:

- *Middle – ear leaf*
- *Top – two leaves above ear leaf*
- *Bottom – two leaves below ear leaf*

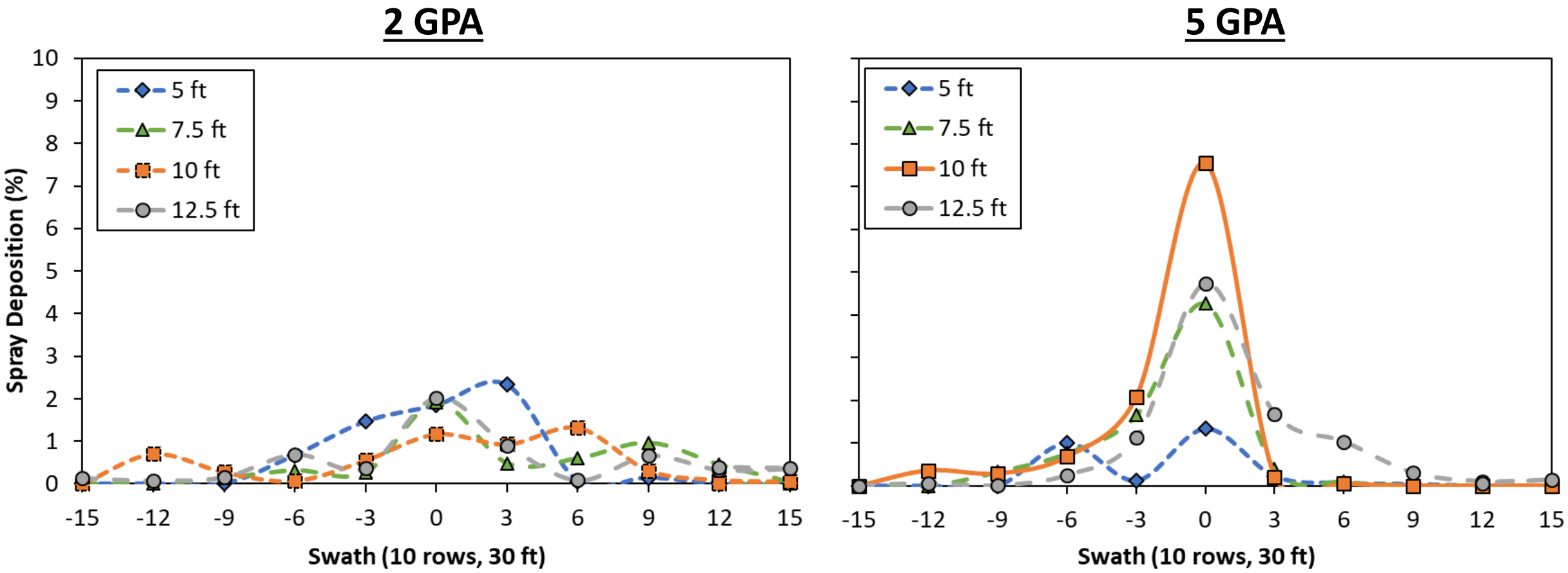
Spray Drone Coverage

Top Canopy Position

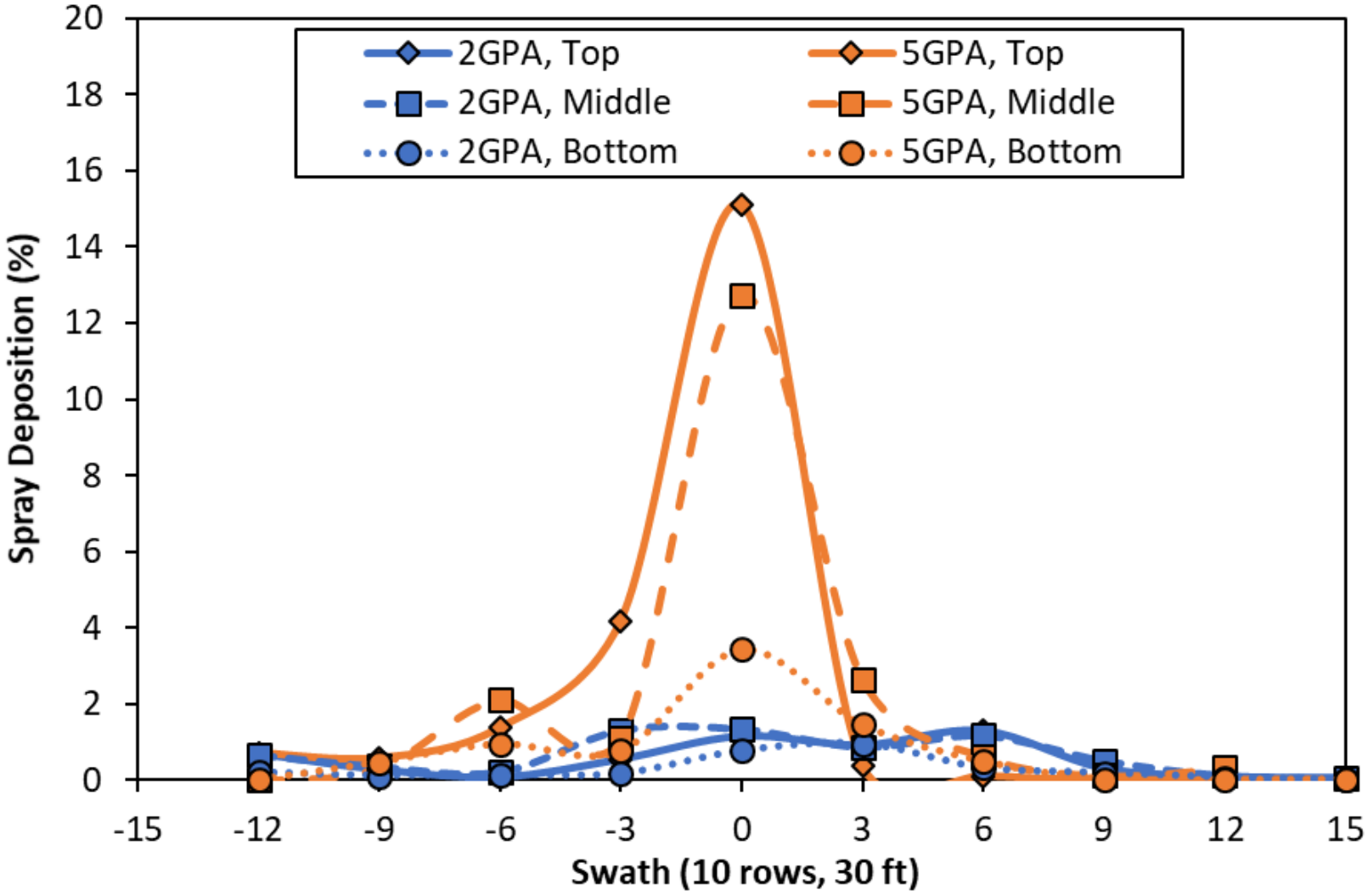


Spray Swath

Effect of Height on Deposition within Corn Canopy



Spray Deposition at different Positions within Canopy

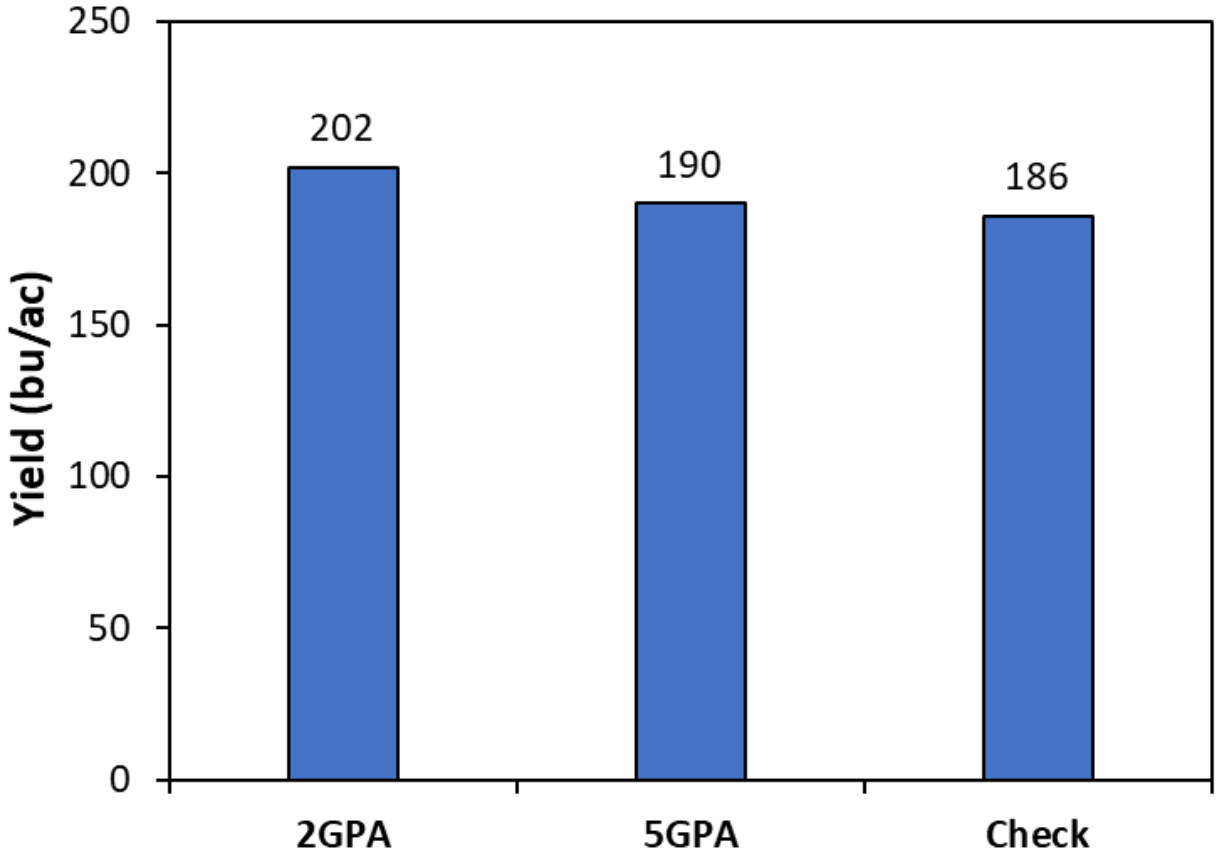


Efficacy of Drone Fungicide Applications

Fungicides were applied with spray drone at 2 and 5 GPA at 10 ft height in large plots (8 rows x 100 ft)

Disease ratings (Tar Spot, Northern Corn Leaf Blight and Southern Corn Rust) at Tifton Site

Treatment	TS (%)	NLB (%)	SCR (%)
2 GPA	0.0685	1.97 b	0.0351 b
5 GPA	0.0000	0.03 b	0.0067 b
Control	0.0074	6.70 a	0.4345 a



Corn Fungicide Studies with Spray Drones - Moultrie (2023)

Drone: DJI Agras T40 *(rotary atomizers)*

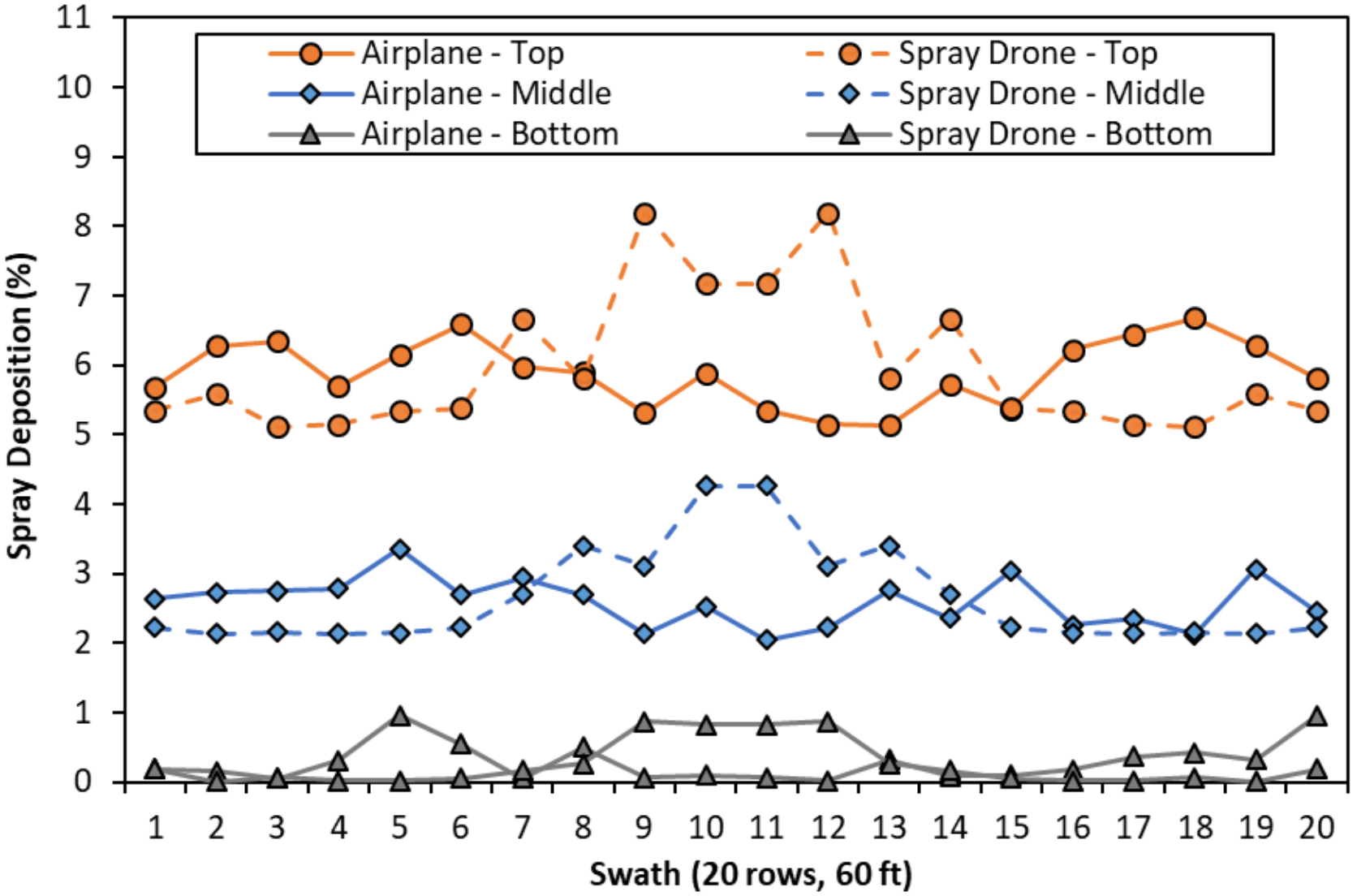
Treatments: *(Fungicides, ~800 ft. plots)*

- Airplane – **2 GPA**
- Spray Drone – **2 GPA**

Spray deposition assessed at different positions within the corn canopies:

- *Middle – ear leaf*
- *Top – two leaves above ear leaf*
- *Bottom – two leaves below ear leaf*

Spray Deposition within the Corn Canopies
(Airplane vs Drone)



Top

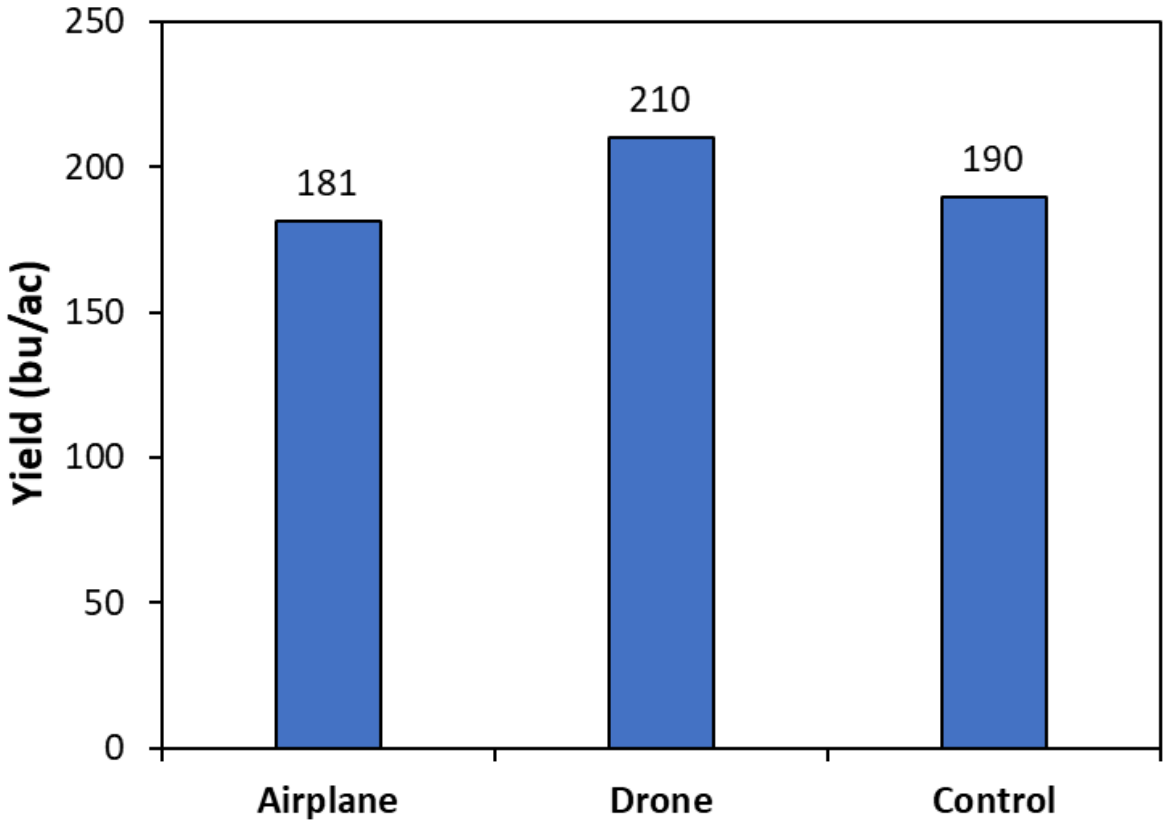
Middle

Bottom

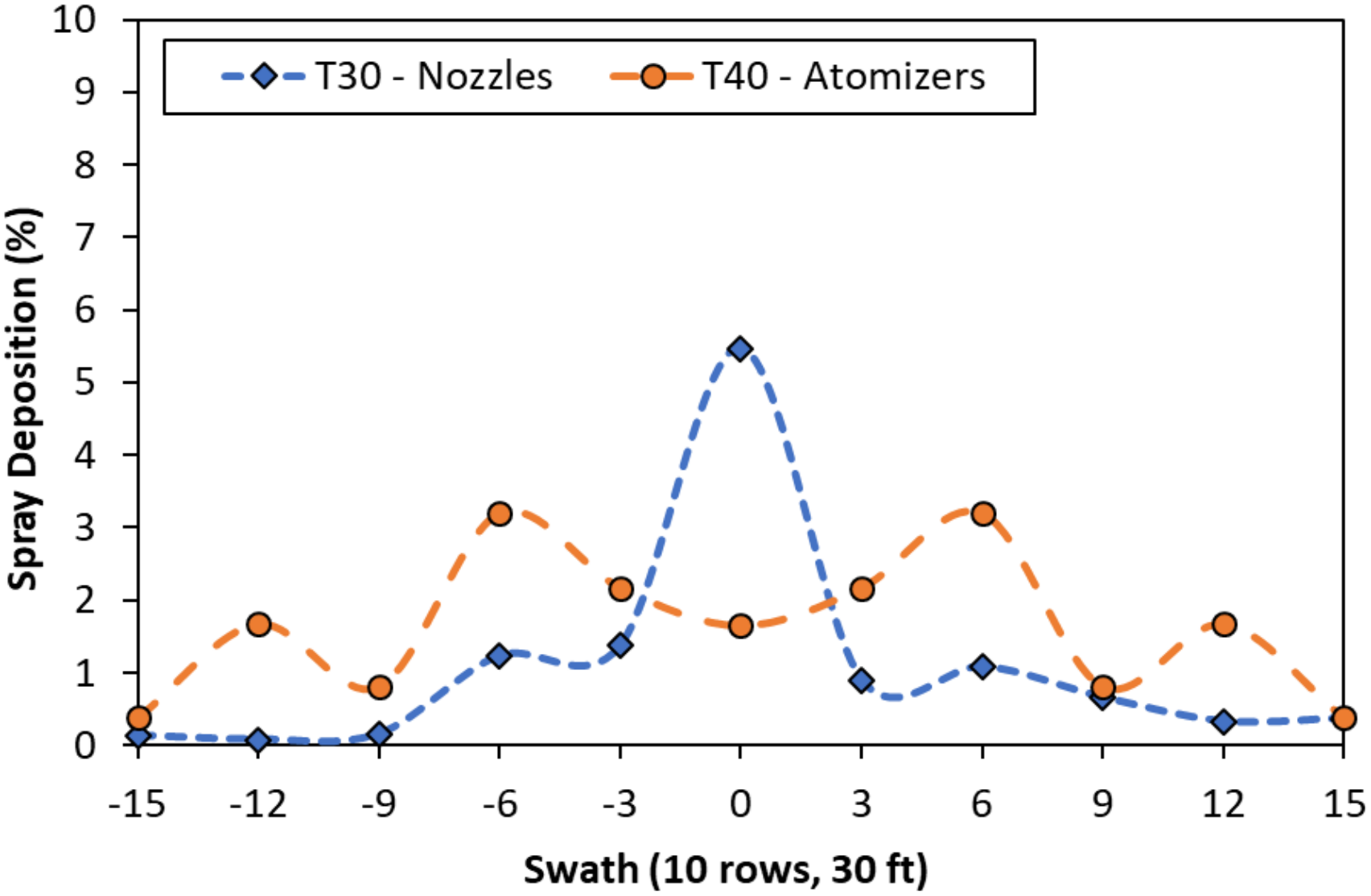
Efficacy of Drone Fungicide Applications
(Airplane vs Drone)

Disease ratings (Tar Spot, Northern Corn Leaf Blight and Southern Corn Rust) at Expo Site

Treatment	TS (%)	NLB (%)	SCR (%)
Airplane	0.0021	0.07	0.0047
Drone	0.0012	0.03	0.0031
Control	0.0023	0.21	0.0045



Nozzles vs Rotary Atomizers



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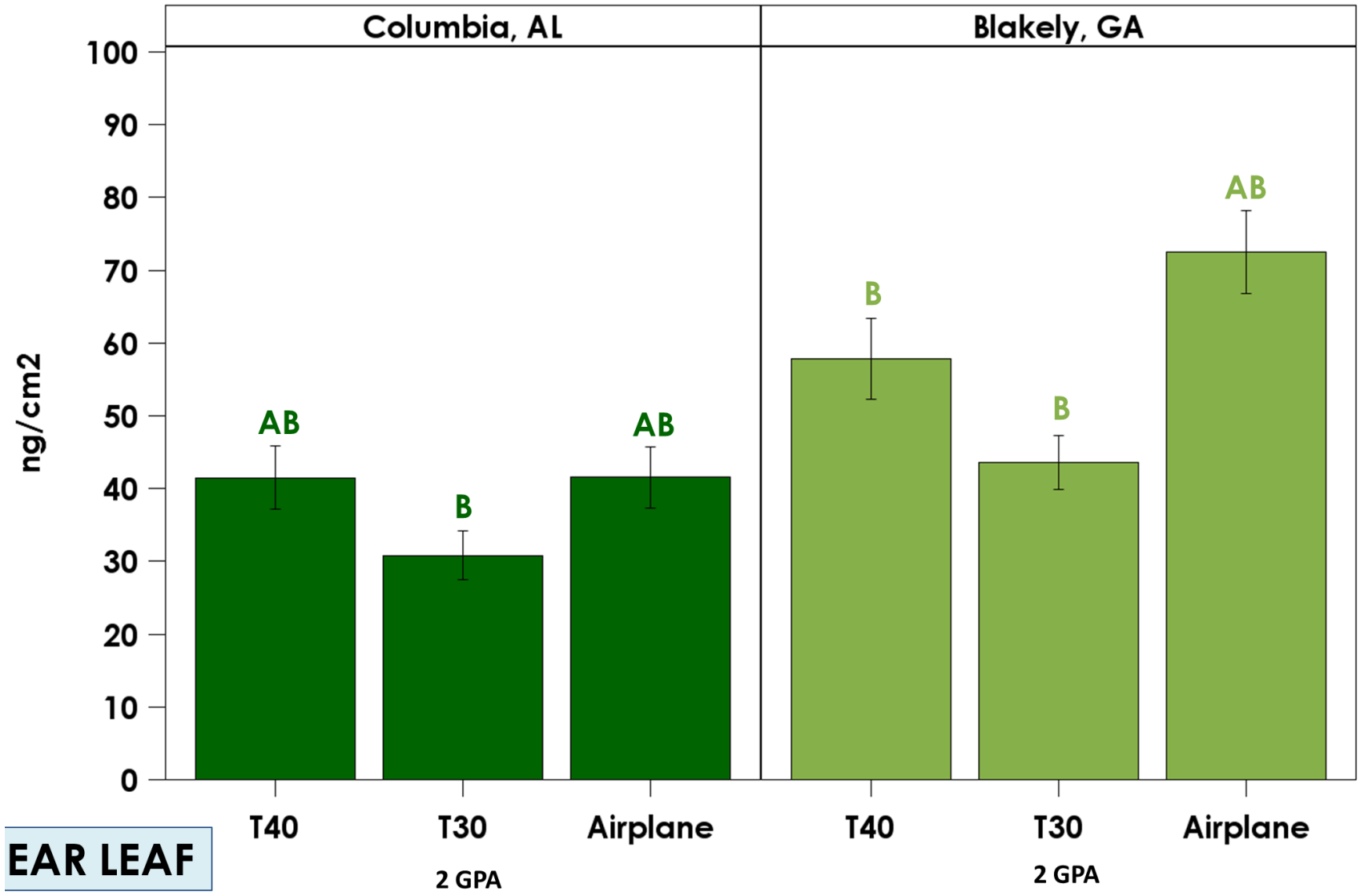
Corn Fungicide Applications – Drone and Airplane

Application type	Parameters
DJI Agras T30	2 GPA | 25 ft swath
DJI Agras T40	2 - 3 GPA | 33 ft swath
Airplane	2 GPA | 83 ft swath

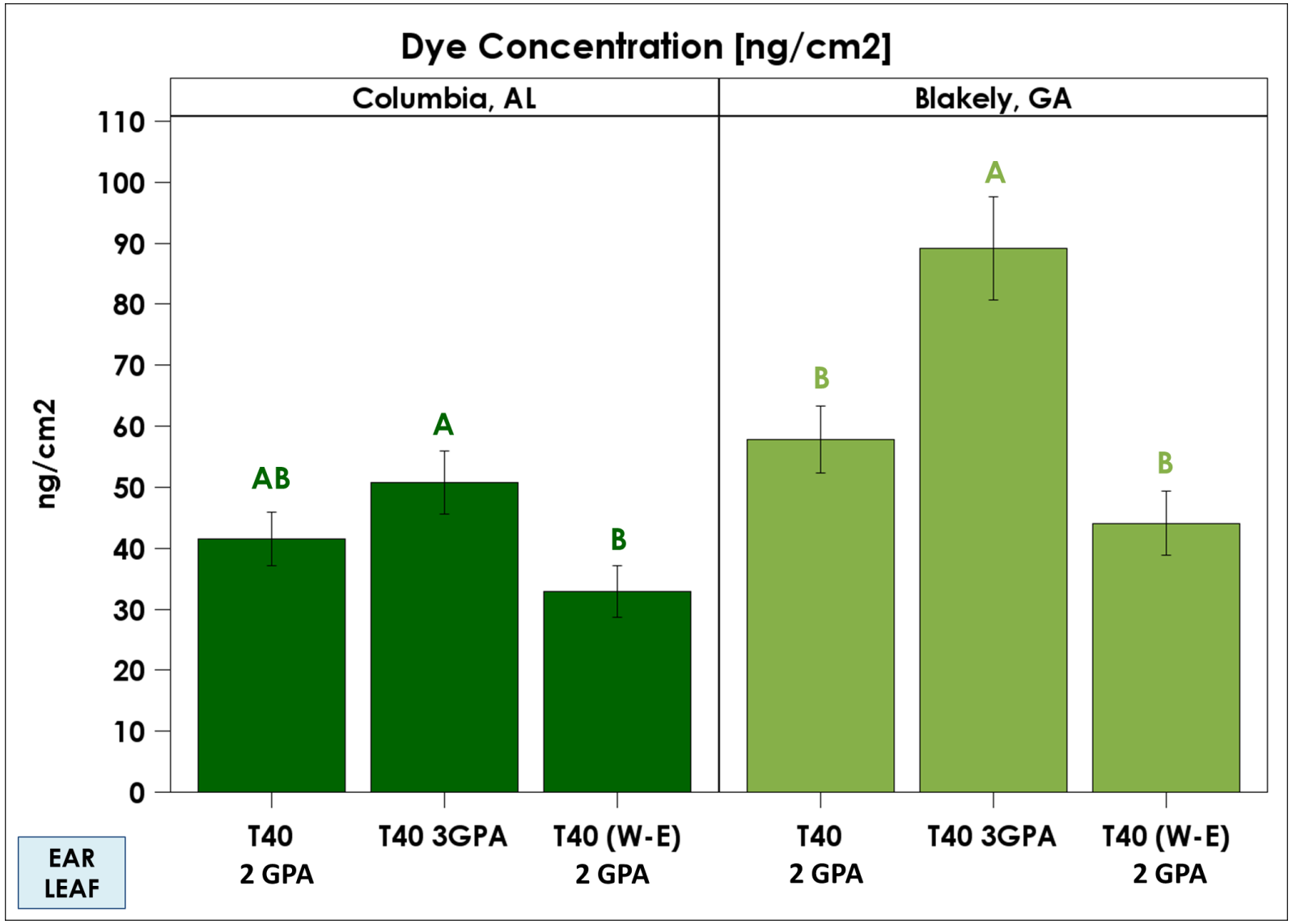
*All spray applications had Rhodamine WT dye
*Flight height was 10 ft for all treatments

*Dr. Steve Li, Livia Pereira, Thiago Caputti
Auburn University

Spray Deposition Comparison – T30, T40 and Airplane

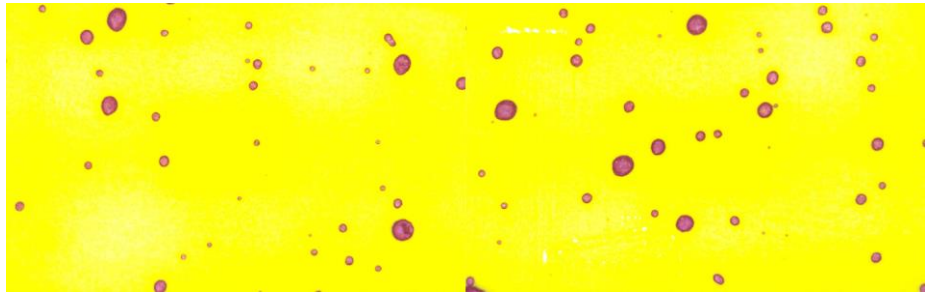


Spray Deposition Comparison – T40 (2 vs 3 GPA)

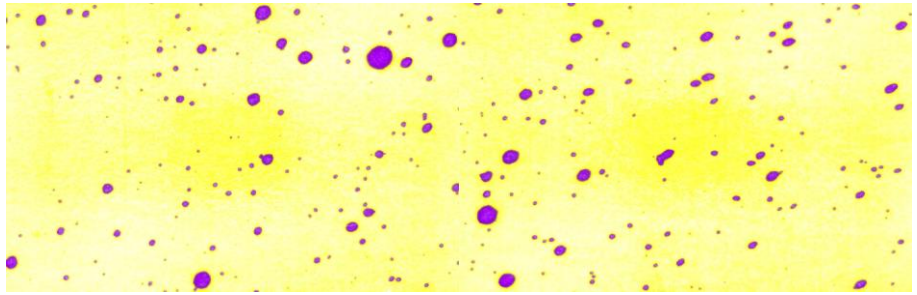


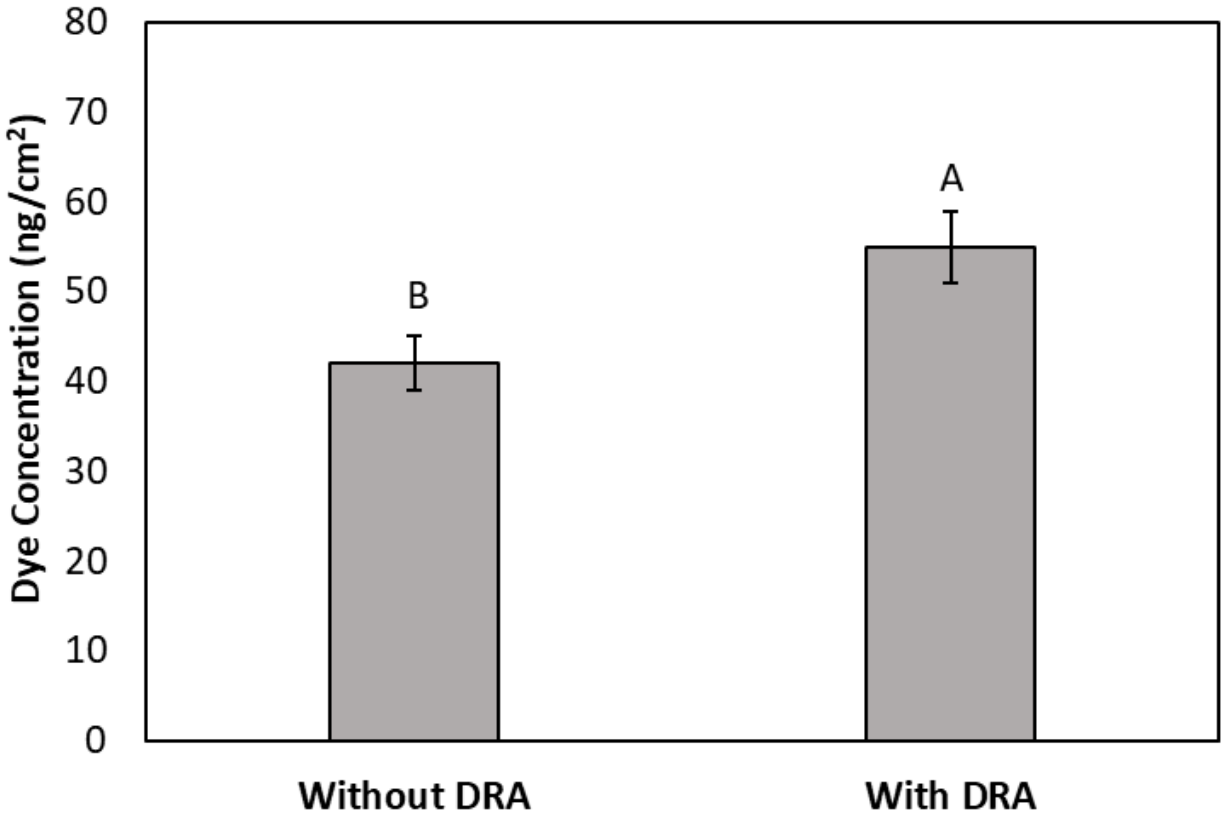
Fungicide Application Comparison
(Spray drone – DRA vs No DRA)

T40 NO DRA



T40 Exp. DRA





Challenges and Limitations

Rules & Regulations: Spray drones >55 lbs, Part 107 and 137, fly one drone only,……

Federal Aviation Administration

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- Getting Started
- Recreational Flyers & Community-Based Organizations
- Certificated Remote Pilots including Commercial Operators
- Public Safety and Government

Dispensing Chemicals and Agricultural Products (Part 137) with UAS

The regulation for operating drones to dispense or spray substances (including disinfectants) is 14 CFR Part 137, Agricultural Aircraft Operations.

Not all substances fall under this regulation, so you should first check to see if your proposed operation meets the FAA's criteria for part 137. If the substance you plan to dispense does meet this criteria (part 137.3), refer to Certification Process for Agricultural Aircraft Operators for guidance on the requirements you must meet before dispensing it.

Spray Drone Calibration

Verifying and adjusting rate (GPM/GPA)?

Swath Testing for effective swath

Short Battery Life and Refills

5 – 10 min.
4-5 batteries

Portable Charging/ refill station

Fast Changing Technology and Regulations

54-inch blades, 2 or 4 nozzle options,……

Revytek™

Fungicide

†**For disease control and plant health in beans and peas, corn, cotton, grasses, grass grown for seed, non-grass forages, oilseeds, peanut, rapeseed (canola), soybean, sugar beet, and sugarcane**

†See **Detailed Use Directions** for detailed crop listings.

Active Ingredients*:

mefentrifluconazole: 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazole-1-yl)propan-2-ol	11.61%
pyraclostrobin: (carbamic acid, [2-[[[1-(4-chlorophenyl)-1*H*-pyrazol-3-yl]oxy]methyl]phenyl]methoxy-, methyl ester)	15.49%
fluxapyroxad: 1*H*-Pyrazole-4-carboxamide, 3-(difluoromethyl)-1-methyl-N-(3',4',5'-trifluoro[1,1'-biphenyl]-2-yl)-	7.74%
Other Ingredients:	65.16%
Total:	100.00%

Aerial Application

- **For aerial application in New York State, DO NOT apply within 100 feet of aquatic habitats (such as, but not limited to lakes, reservoirs, rivers, streams, marshes, ponds, estuaries, and commercial fish ponds.**
- **Minimum spray volume per acre:** 2 gallons of spray solution per acre
- **DO NOT** apply in spray solutions less than 50% water by volume. Reduced spray volumes used in aerial application may result in physical incompatibility, reduced disease control, or crop injury particularly when mixed with other products.

Spray Drone – it's another tool in the toolbox

Need to consider – proper calibration (swath testing), application parameters, drift management, regulations, etc.

Thanks!

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