Contribution of Multiple Spray Passes to Downwind Movement of Sprays: Progress Report

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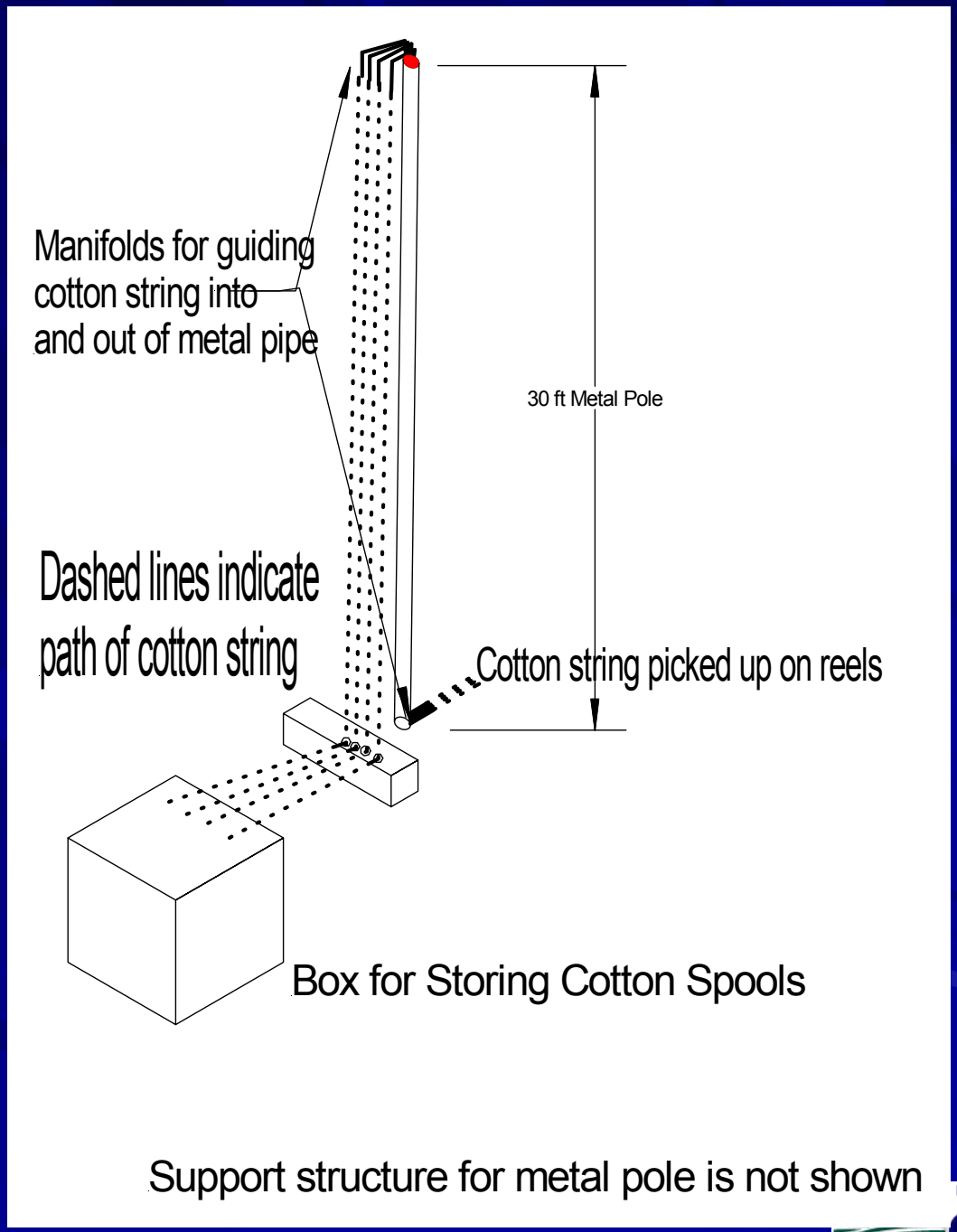
Research Objectives

- Develop a system for rapidly and accurately measuring the contribution of individual spray passes to downwind movement of sprays;
- Investigate the relationship between droplet size and canopy type as related to drift.

Sampling System

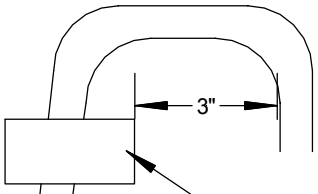
- Utilizes cotton string and WRK Analysis System;
- A manifold system was constructed that allowed the cotton strings to be suspended vertically;
- After the string was “treated,” the line was pulled into a pipe, which protected the string from receiving additional sprays.

Sampling System

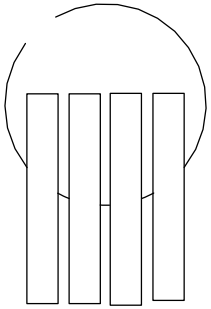


Manifolds

Side View of Top Manifold

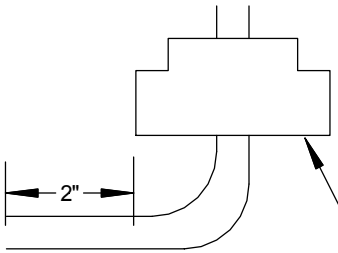


Top View of Top Manifold

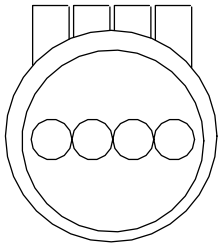


This block should fit into the top of the pipe

Side View of Bottom Manifold

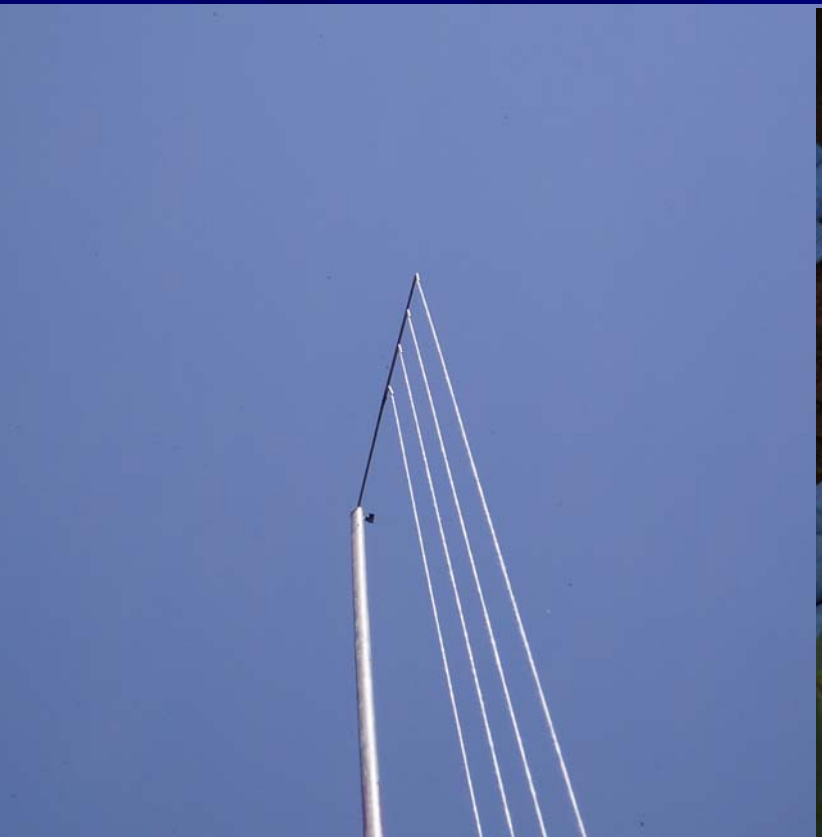


Top View of Bottom Manifold



This block should fit into the bottom of the pipe

Manifolds Used to Keep Lines Apart



Sampling Setup (Practice)

Treatments

	Treatment 1 (T1)	Treatment 2 (T2)
Nozzle Type	CP-03[a]	Disc Orifice[b]
Number of Nozzles Used	25	26
Orifice	0.125	#8 (no core)
Nozzle Orientation	0º	0º
Nozzle Deflector	30º deflector	None
Operating Pressure (kPa)	207	276
Volume Median Diameter, $D_{V0.5}$ [µm]	304	413
Volume <200µm	15.5%	8.7%

Operational Conditions of Aircraft

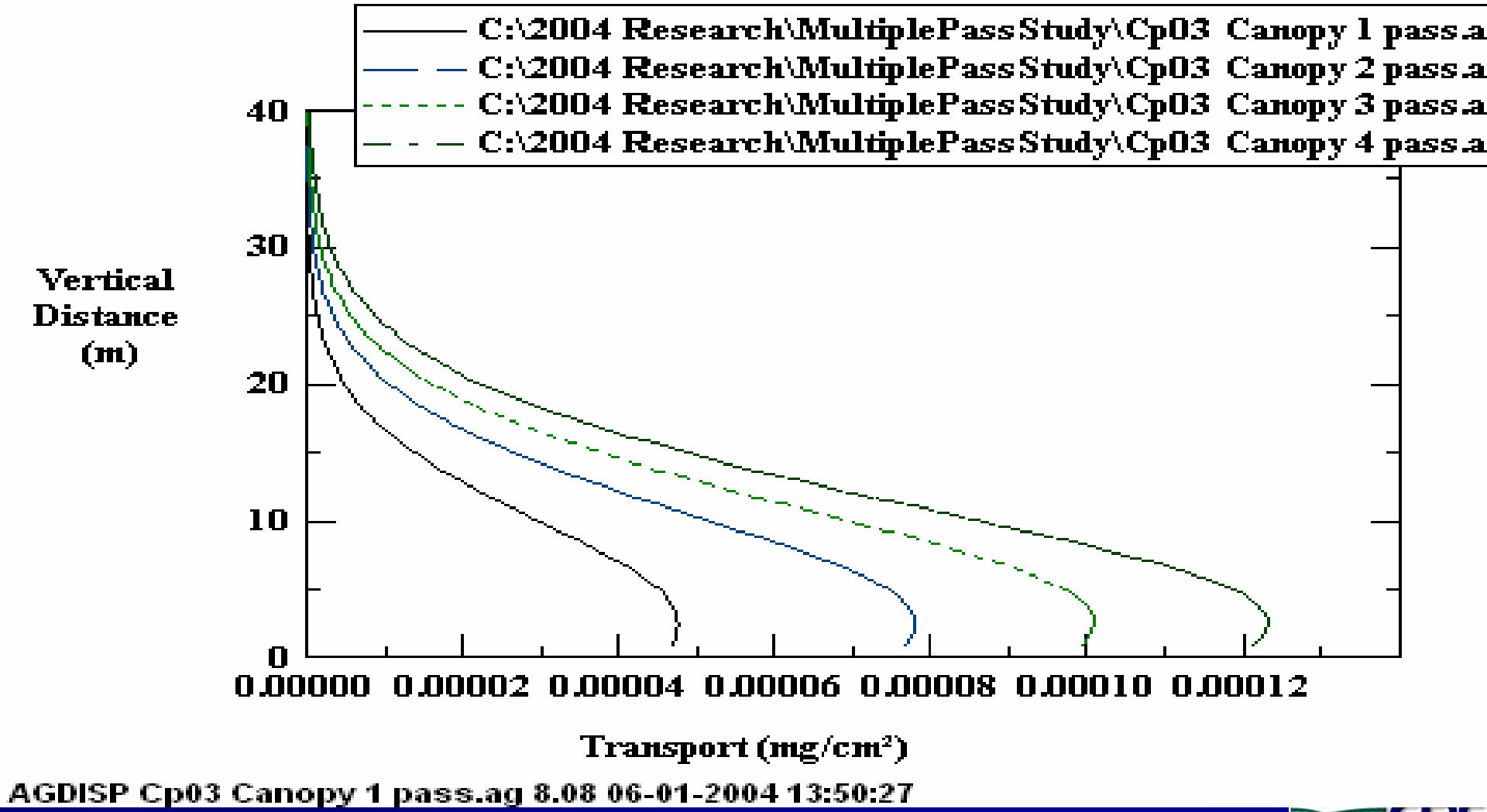
Air Tractor 402B turbine-powered aircraft;

- Speed – 209 km/hr (130 mph);
- Boom height above canopy – 1.8 m (6 ft);
- Swath width – 19.8 m (65 ft);
- Spray rate – 28.0 L/ha (3 gal/acre).

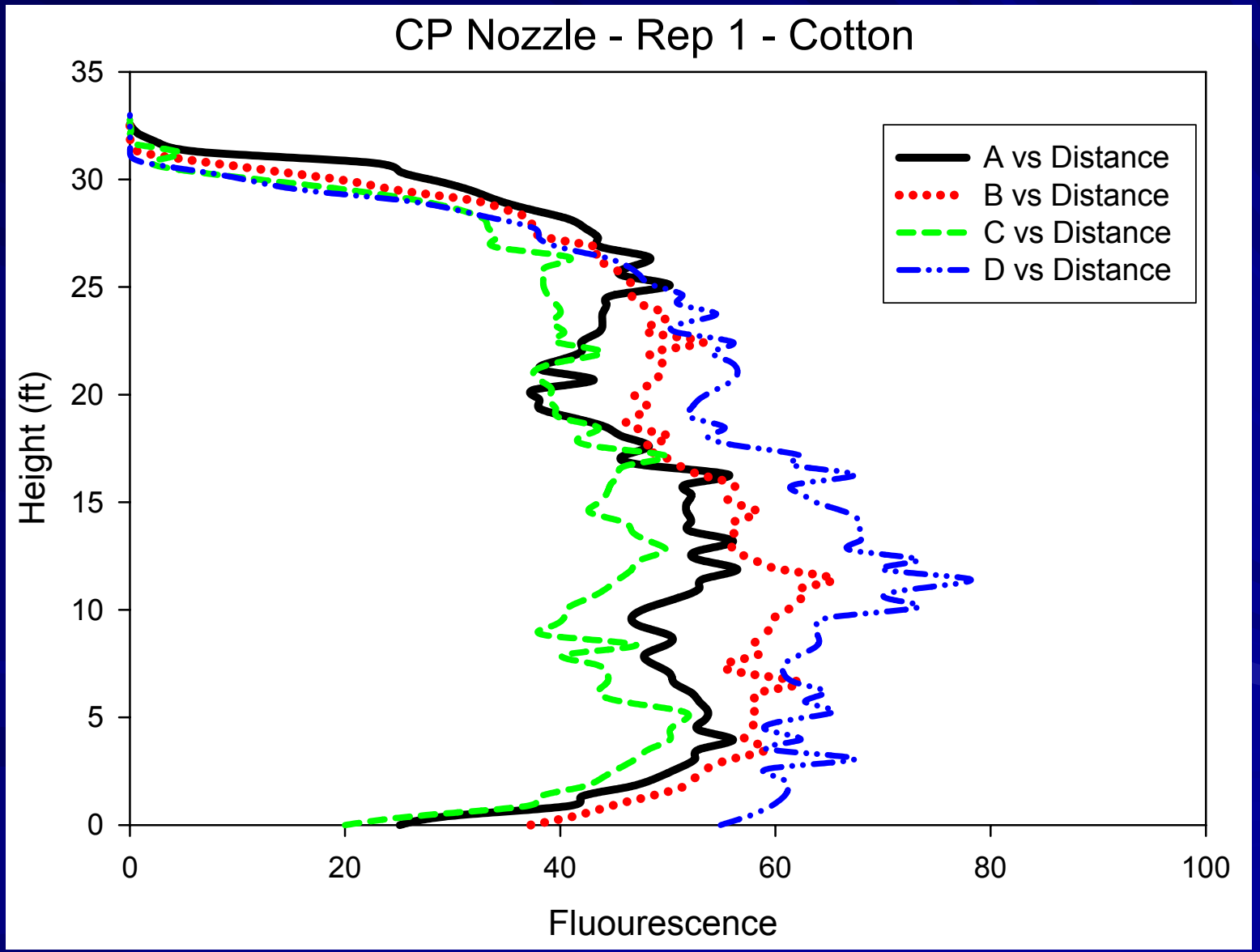
Results

- AGDISP is a predicative model very similar to AgDRIFT;
- Model results were comparable to field results;
- Field data was highly variable due to less than ideal wind conditions.

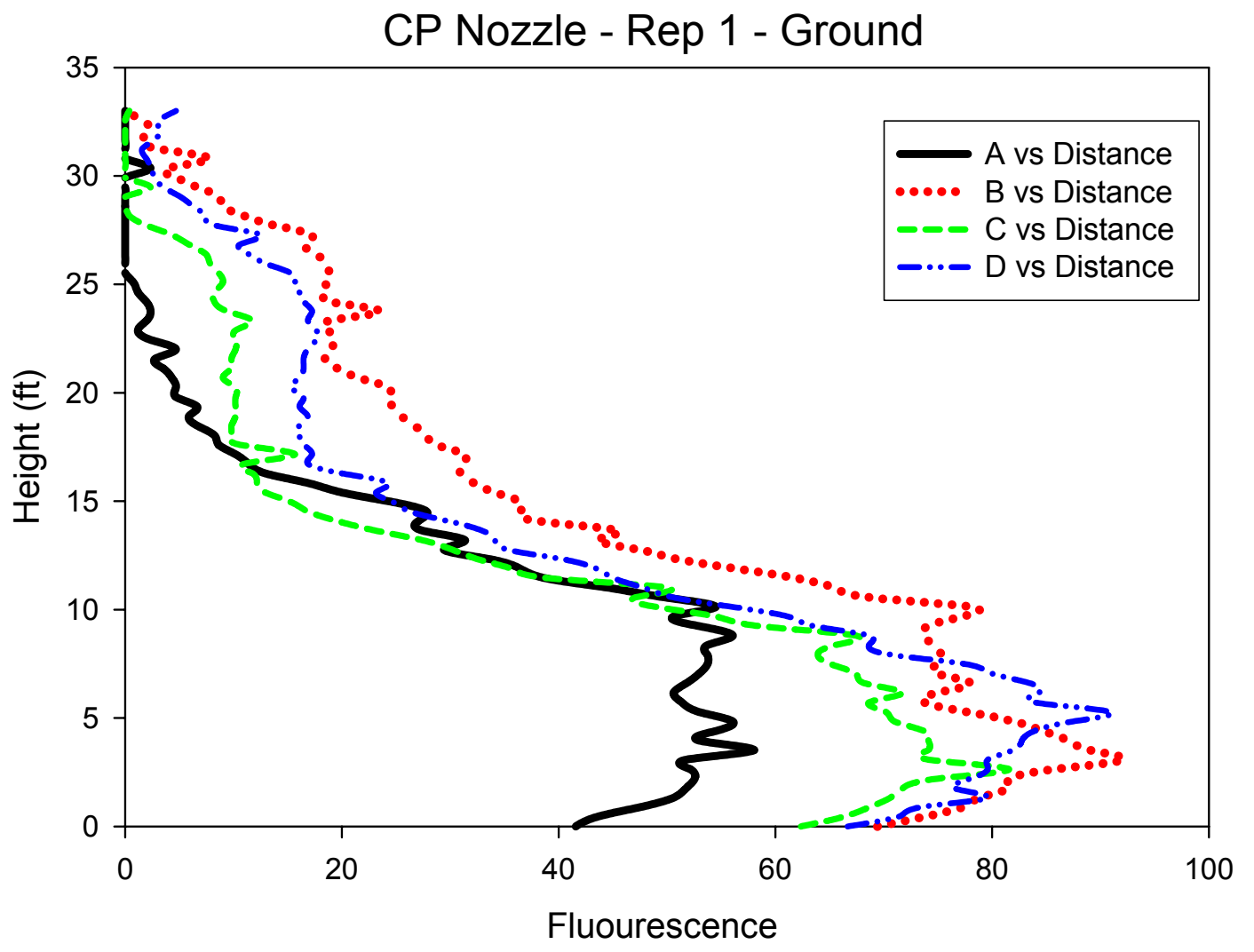
AGDISP Predictions



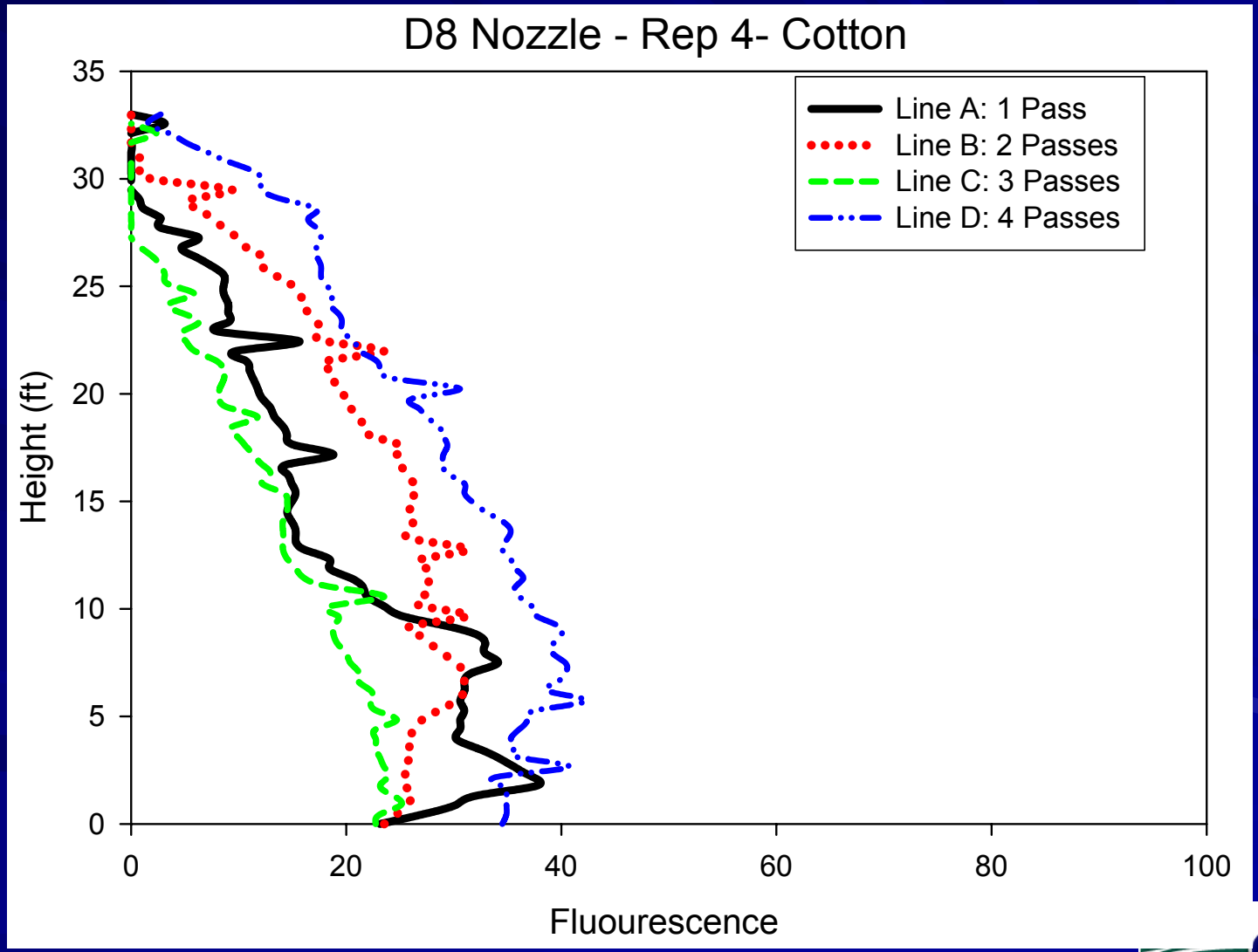
CP Nozzle over Cotton



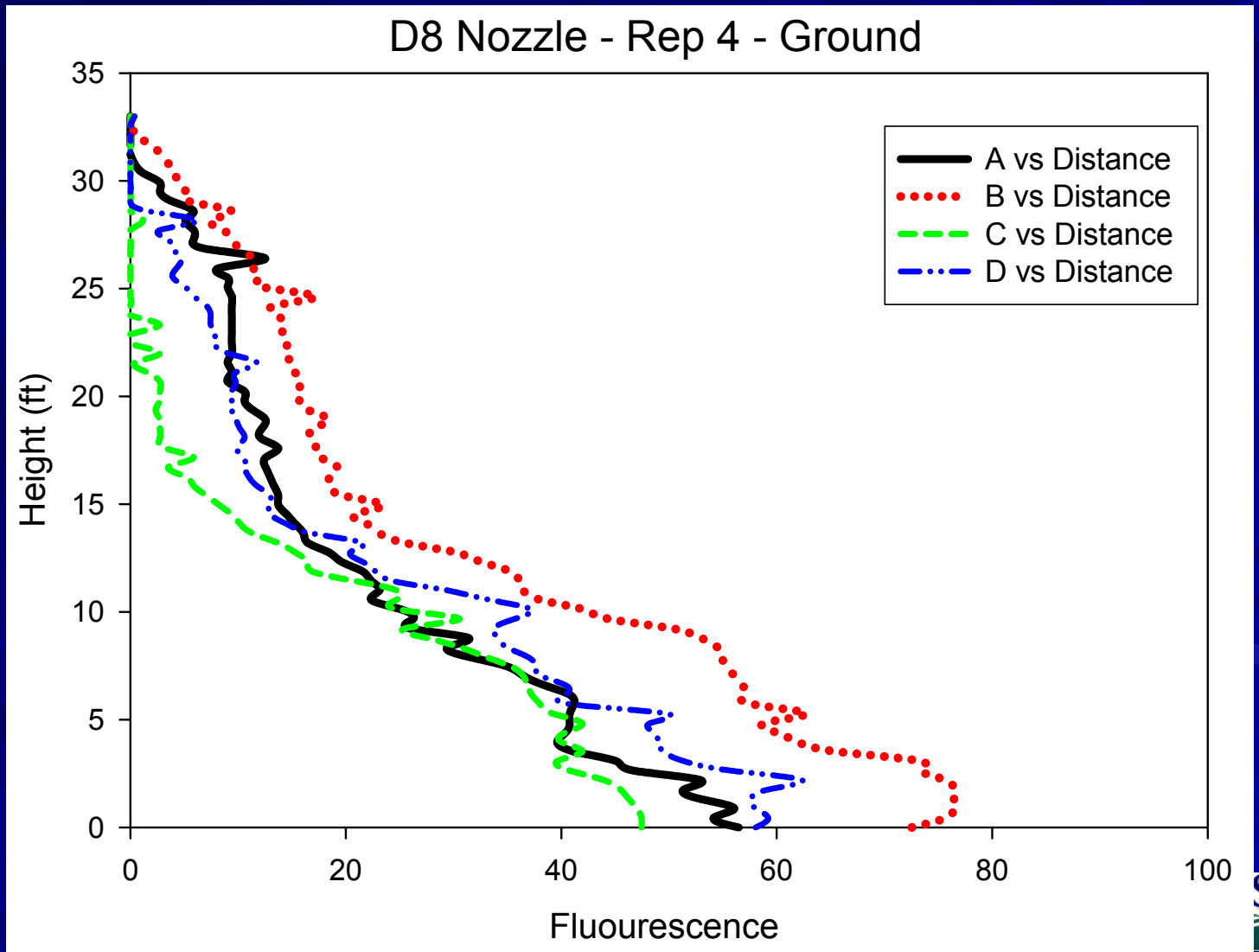
CP Nozzle over Bare Ground



D8 Nozzle over Cotton



D8 Nozzle over Bare Ground



Conclusion

- Results were highly variable and did not lend themselves to many definitive conclusions;
- Generally, applications made over cotton had less downwind movement of the spray;
- Larger droplets resulted in less drift;
- Sampling system did allow rapid sampling of individual spray passes.

Future Aerial Application Related Studies

- Effects of solution and air temperature on spray atomization;
- Influence of different adjuvants of droplet velocity and size;
- Simultaneous evaluation of droplet size measurement equipment (PMS, LaVision, and Malvern)

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