Spray Deposition and Drift From Two "Medium" Nozzles

Clint Hoffmann and Buddy Kirk
USDA-ARS-APMRU
Aerial Application Technology Group
College Station, TX

Objective

- To evaluate the downwind movement of spray from two nozzles that produce MEDIUM droplet spectra

Background

- Labels:

- "apply in spray droplet size of 200-300 µm" Tracer (spinosad), 2002 (**Medium**)

- "apply as a **Coarse** spray. (430-530µm)" Grazon P+D, 2002

- ASAE Standard S572: Droplet spectra puts in six classes (VF – VC)

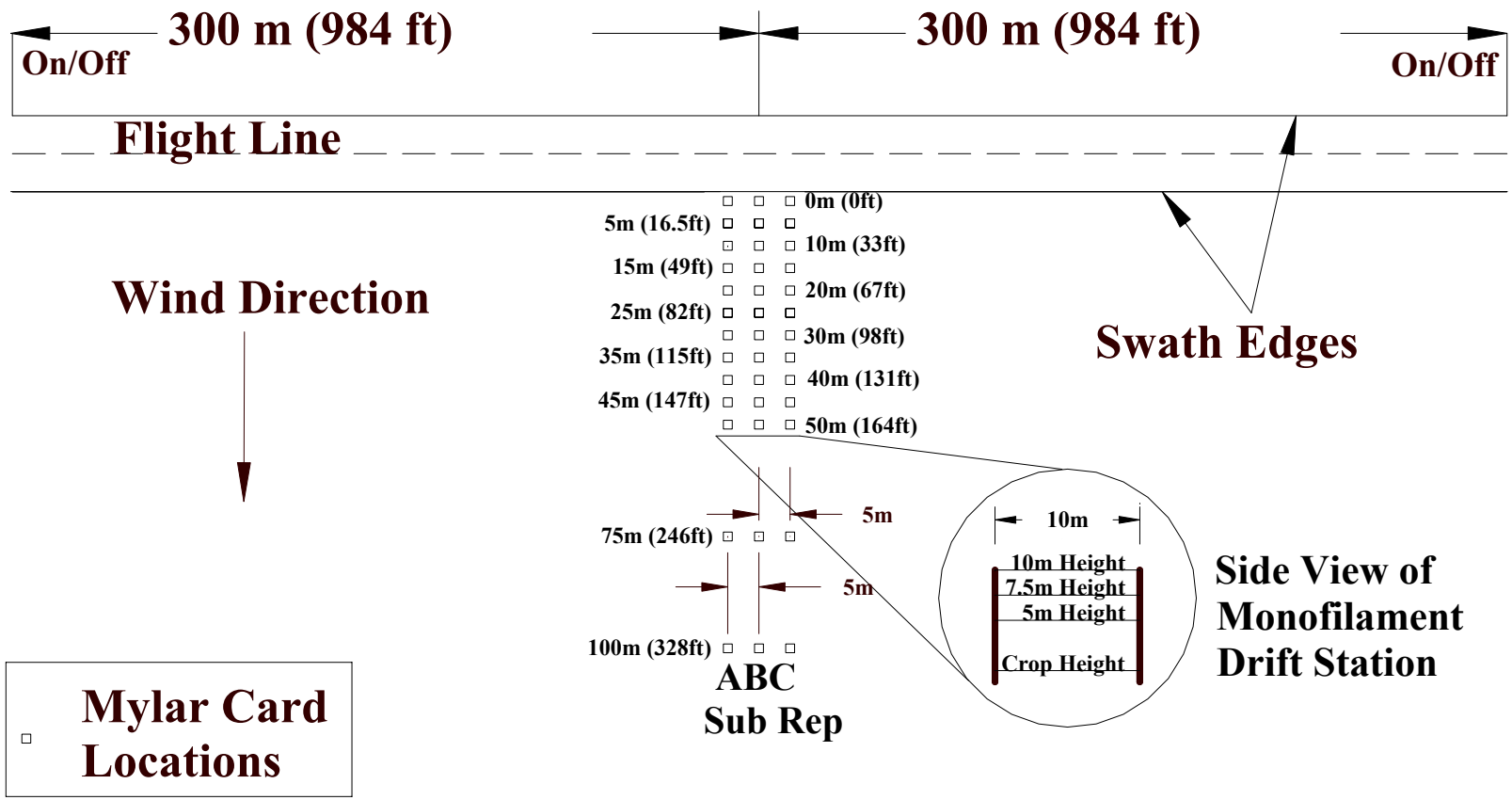
Two MEDIUM Nozzles

	T1	T2
Nozzle	CP-03	Disc Orifice
Orifice	0.125	#8 (no core)
Deflector	30º	None
Pressure (psi)	30	40
VMD (µm)	304	413
V < 200µm	**15.5%**	**8.7%**

Testing Protocol

- Two tests were conducted over crop canopies and two tests were conducted over a runway;
- Aircraft made two passes that were perpendicular to the wind;
- Four replications of each treatment at each testing date.

Test Layout


300 m (984 ft)
On/Off
300 m (984 ft)
On/Off
Flight Line
Wind Direction
Swath Edges
0m (0ft)
5m (16.5ft)
10m (33ft)
15m (49ft)
20m (67ft)
25m (82ft)
30m (98ft)
35m (115ft)
40m (131ft)
45m (147ft)
50m (164ft)
5m
75m (246ft)
5m
100m (328ft)
ABC
Sub Rep
10m
10m Height
7.5m Height
5m Height
Crop Height
Side View of
Monofilament
Drift Station
Mylar Card
Locations

Spraying During the Tests

Sampling

- Mylar cards were placed horizontally at 0-131 ft downwind from the swath edge over a runway or at crop height;
- At 131 ft, two poles were erected with monofilament (fishing) line suspended at 33, 23.5, 16.5, and 3 ft. These lines sampled the airborne spray.

Picking Up Samples

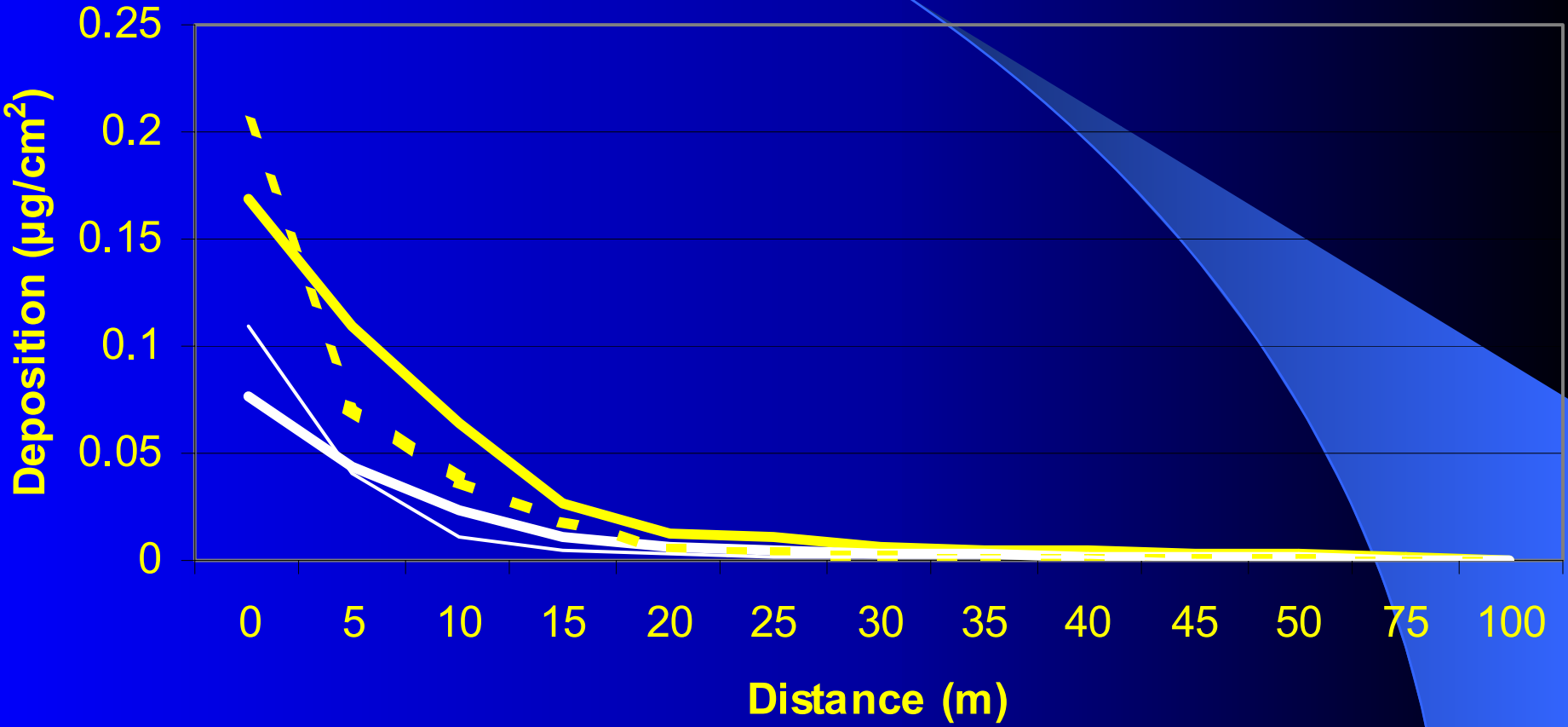
Vertical Towers

Statistical Analyses

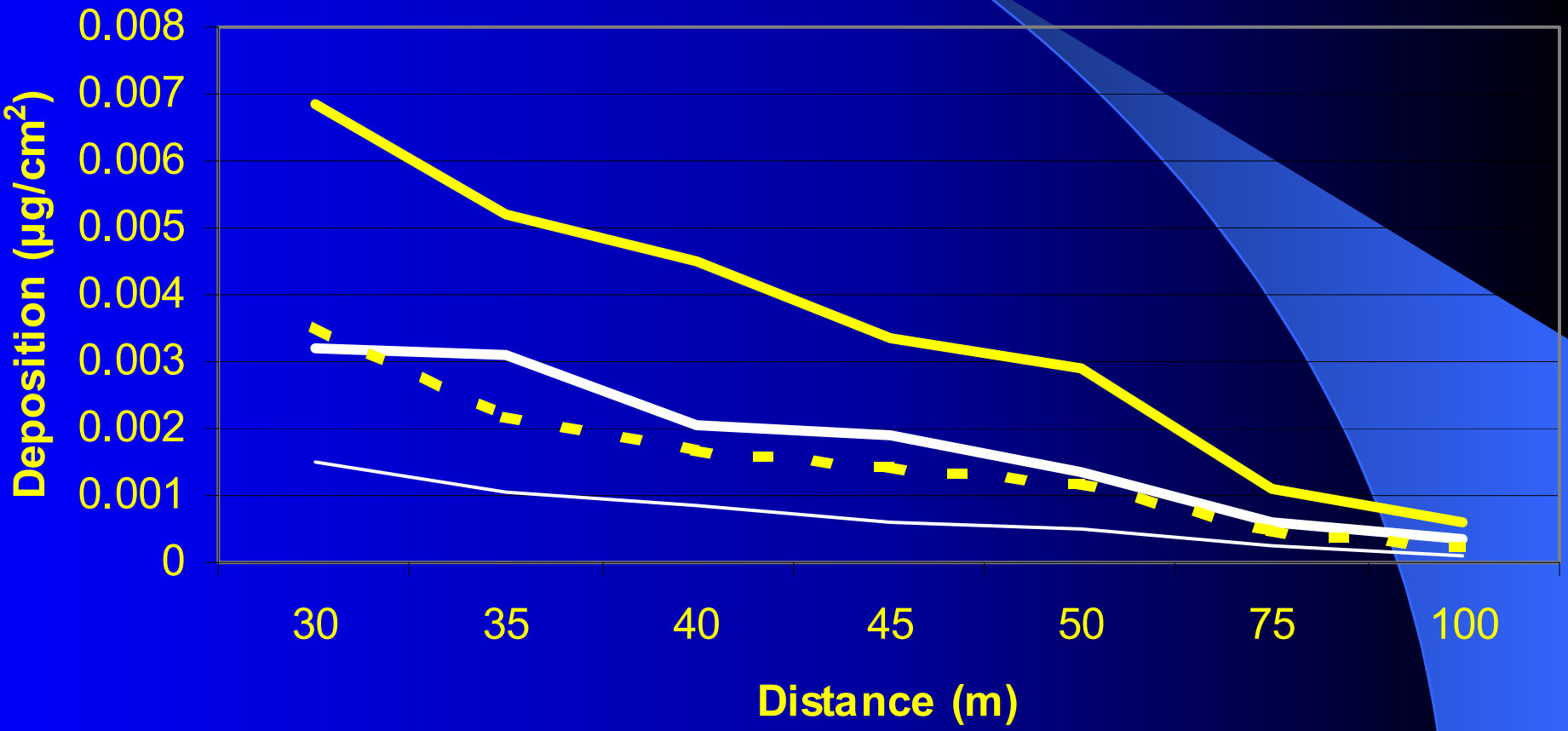
- Repeated measures with both fixed (distance) and random (reps) effects using PROC MIXED;
- Data adjusted for variation in wind speed between tests (covariate component)
- Vertical samples were separated using LSD.

Results

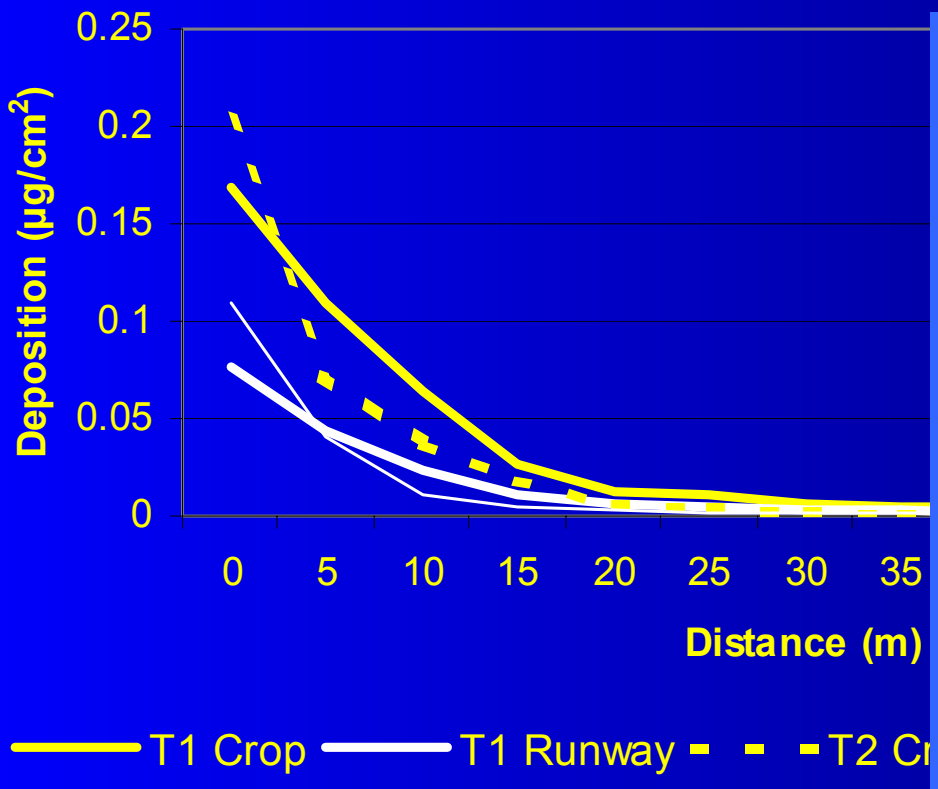
Mylar Card Samples



Mylar Samples

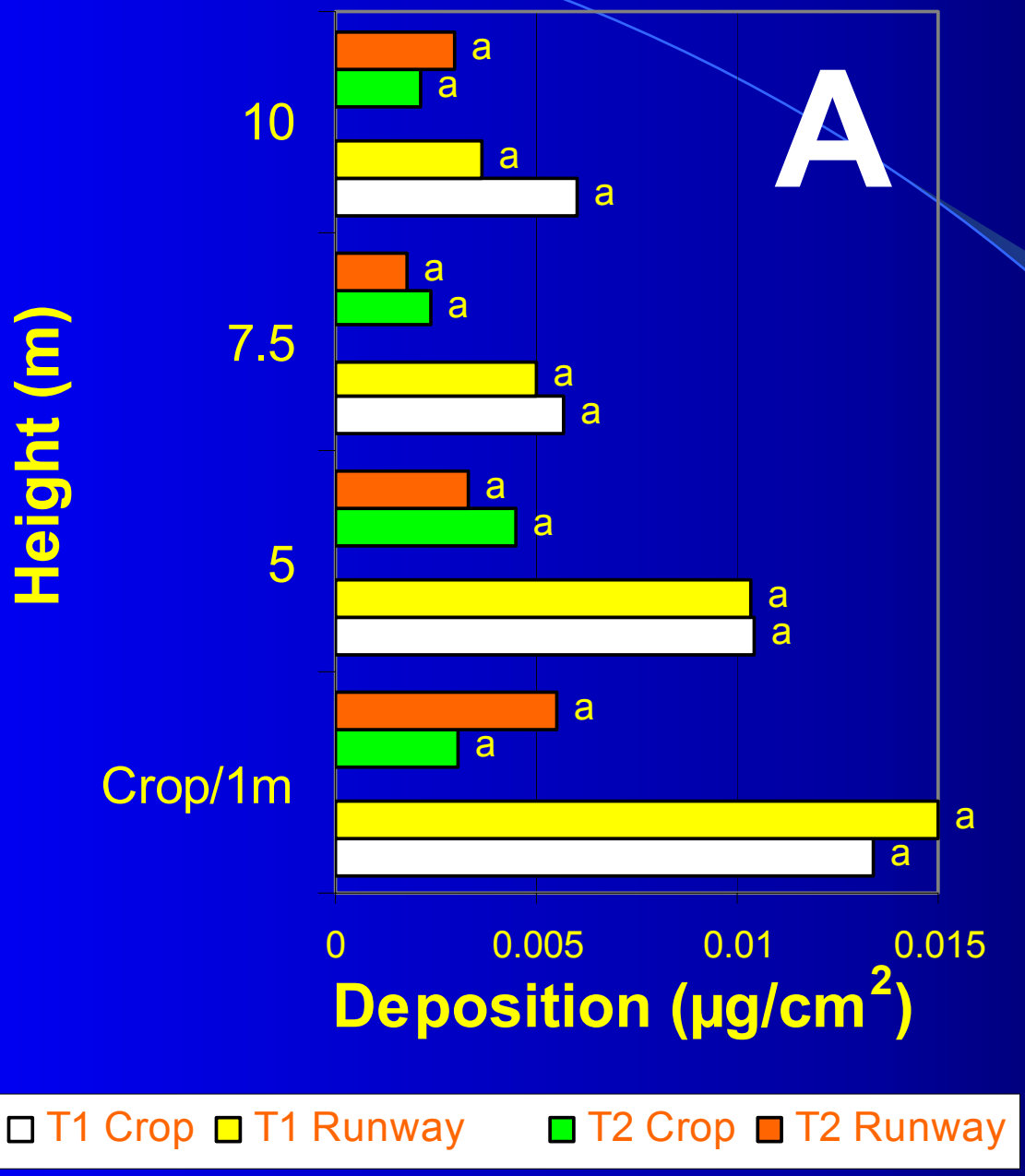


Mylar Cards

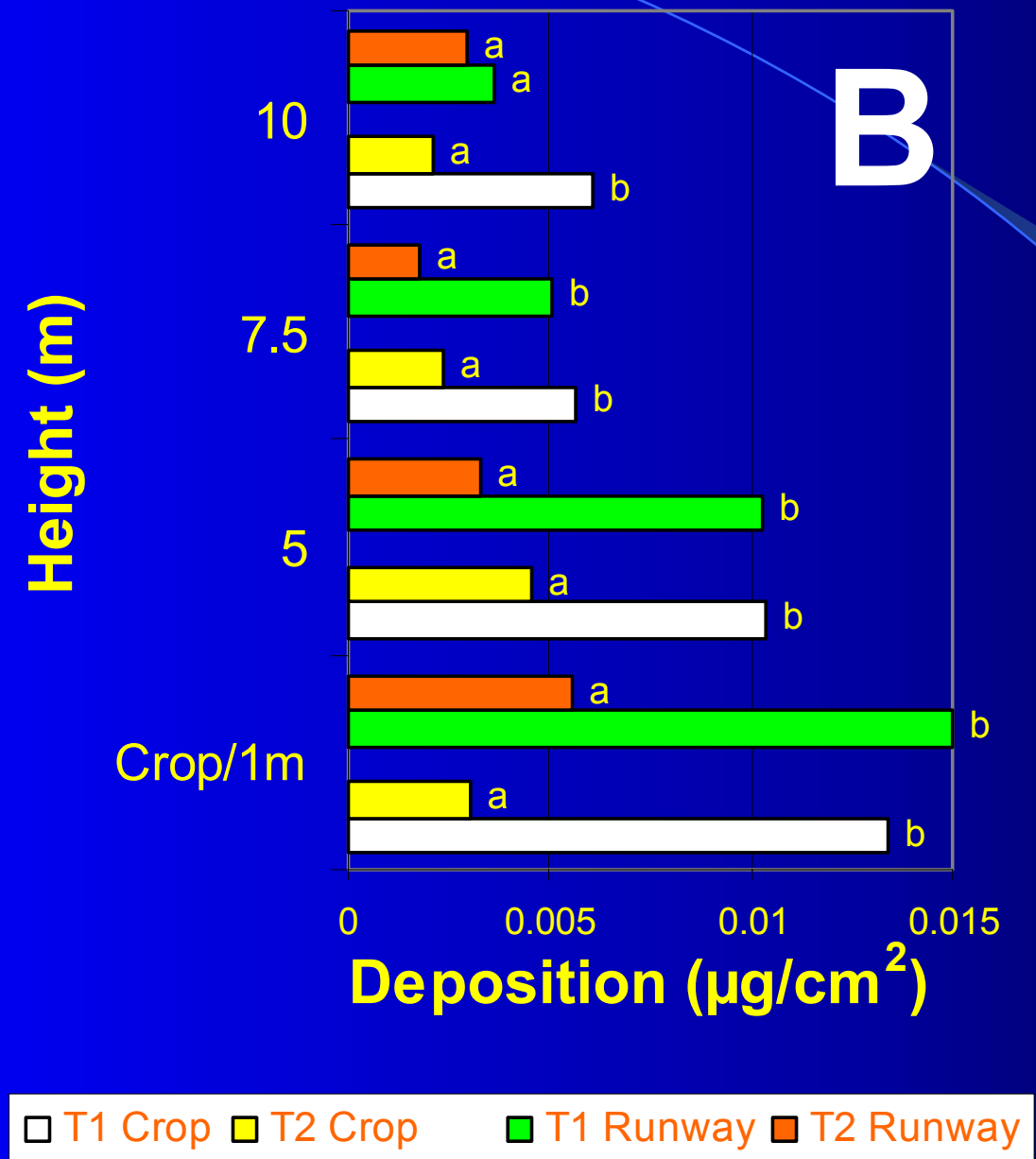


- Significant differences between T1 and T2 in both runway and crop tests
- T2 had lower deposition than T1 at all distances past 0 ft.
- T1 generated 3X as much drift at 133 ft as T2

Vertical Samples by TRT



Vertical Samples by LOC



Conclusions

- Two MEDIUM nozzles produced very different deposition and drift patterns;
- At 133 ft, T1 produced 3X as much deposit as T2;
- T1 generated significantly higher airborne drift than T2.

Take Home Message

The professional judgment and experience of the aerial applicator is the best defense against off-target movement of sprays