Patternator™:
A new Method of Improving Deposit Uniformity in a Crosswind

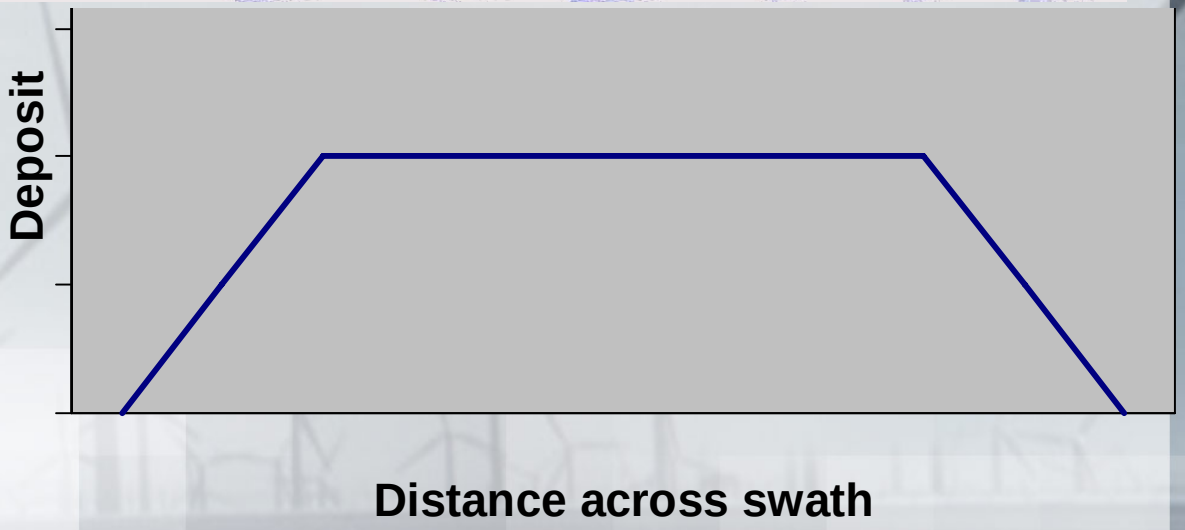
Gordon McDermit, Western Ag-Air Ltd., Ormiston, Saskatchewan, Canada
Thomas M. Wolf, Ph.D., P.Ag, Agriculture & Agri-Food Canada, Saskatoon, SK
Dennis R. Gardisser, Professor-Assoc. Dept. Head, UofA Dept of Ag-CES, Bio&Ag Eng

UofA
UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
Cooperative Extension Service

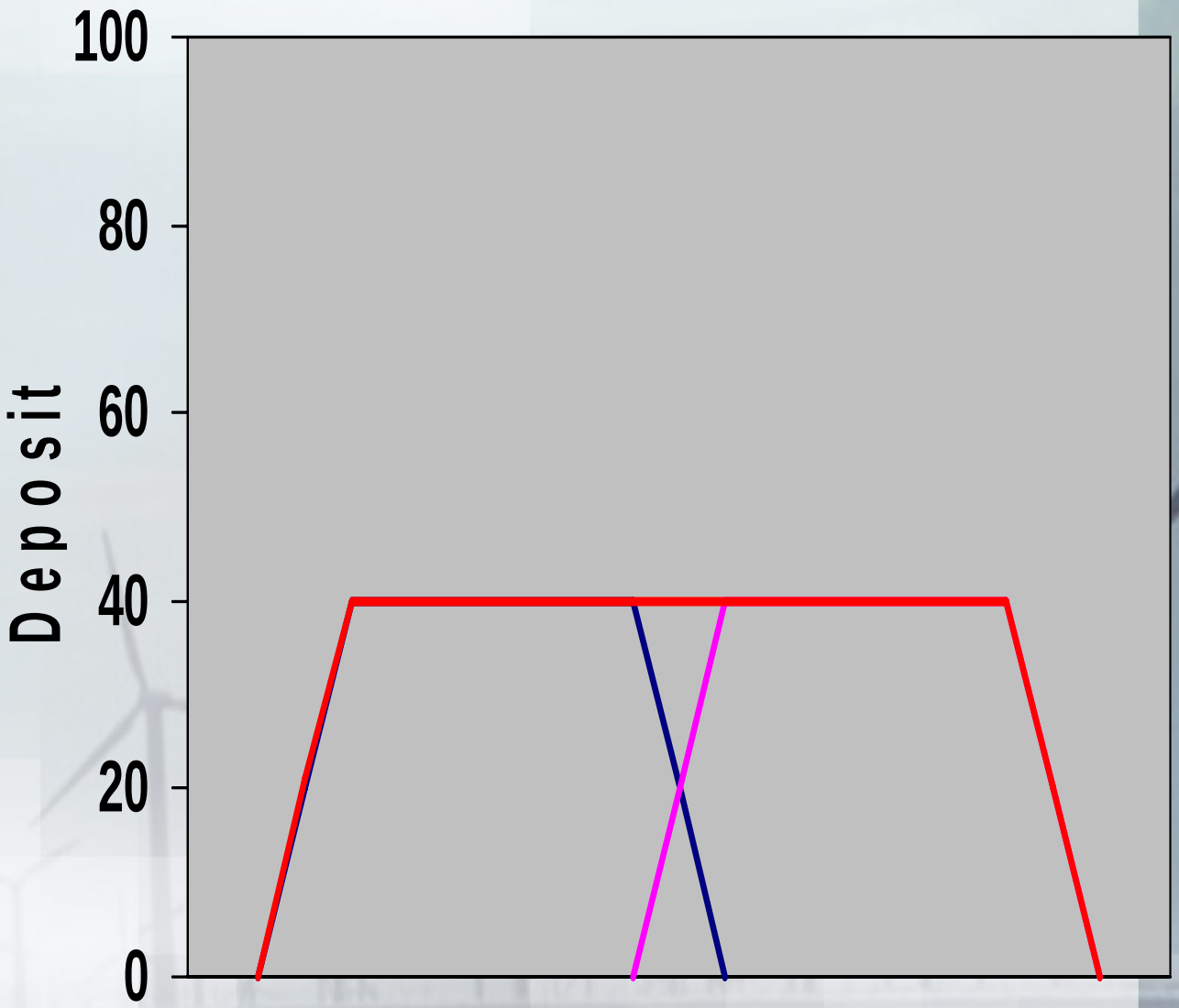
Objectives

- To show that individual boom nozzles can be automatically turned on or shut off based on cross-wind conditions
- To identify nozzle configurations that improve pattern uniformity in a cross-wind

Ideal Deposition Pattern

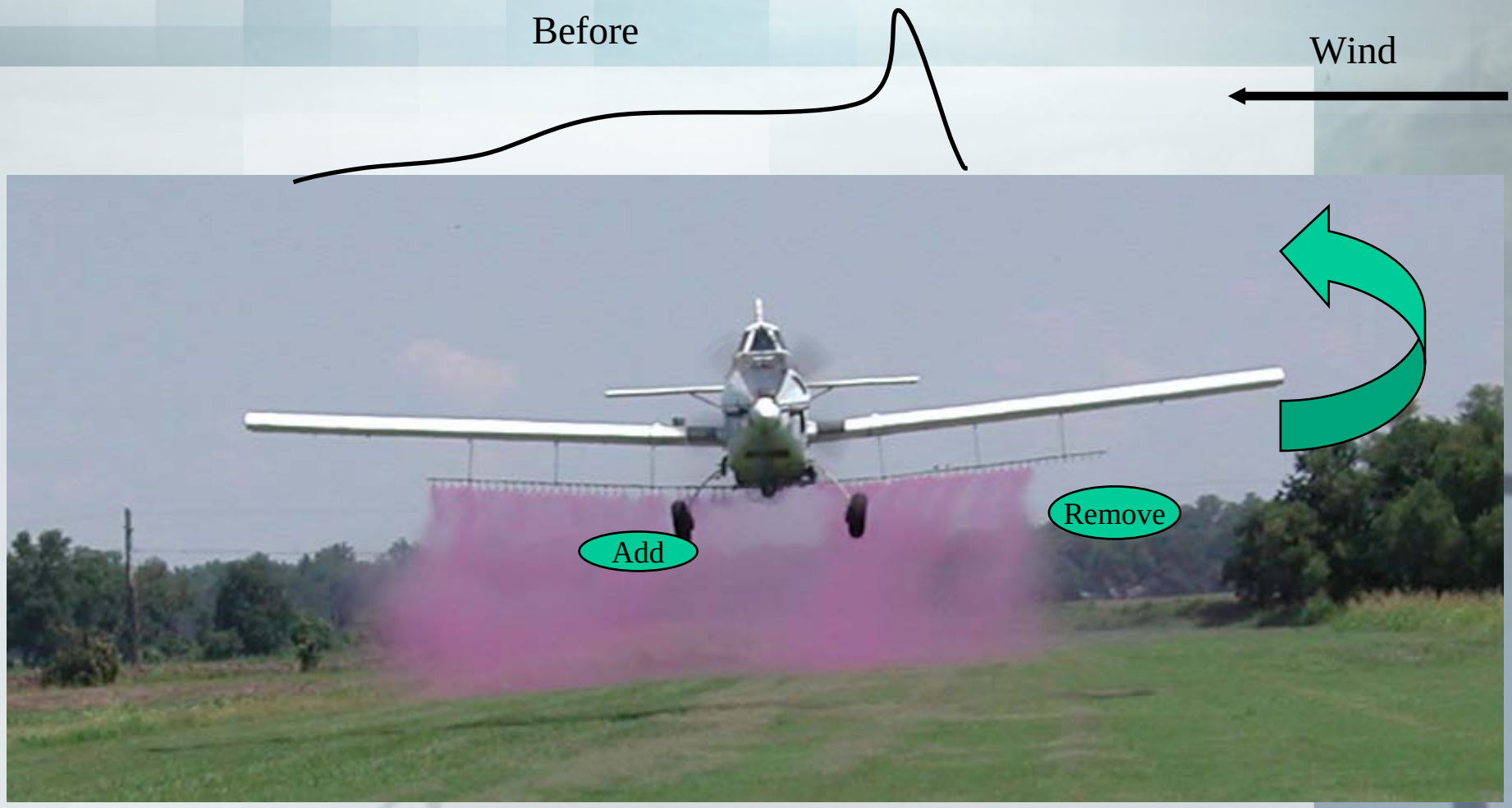


Adjacent Swaths

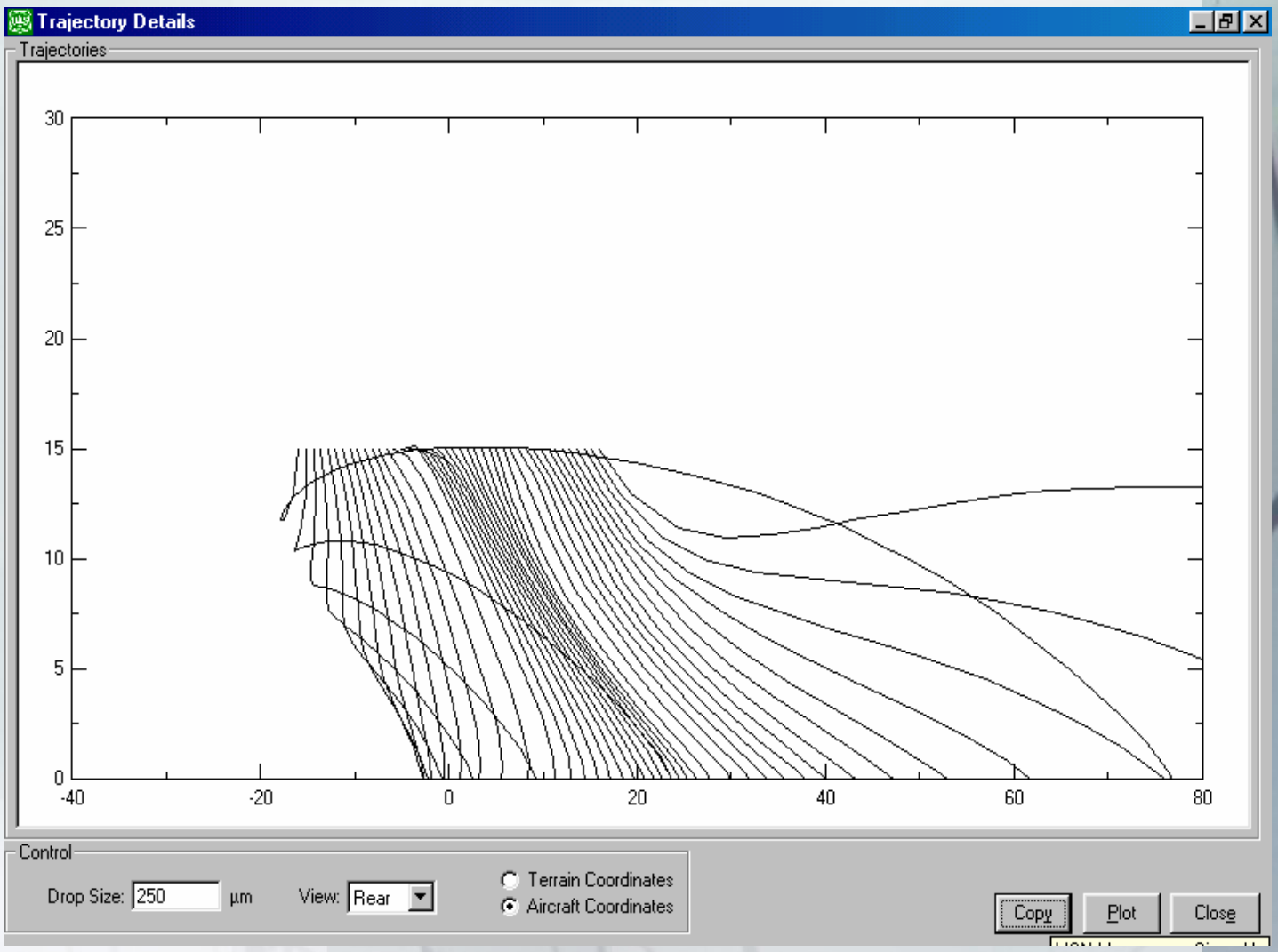


Crosswinds

Not Unique to Aircraft


Before
Wind
Remove
Add
After

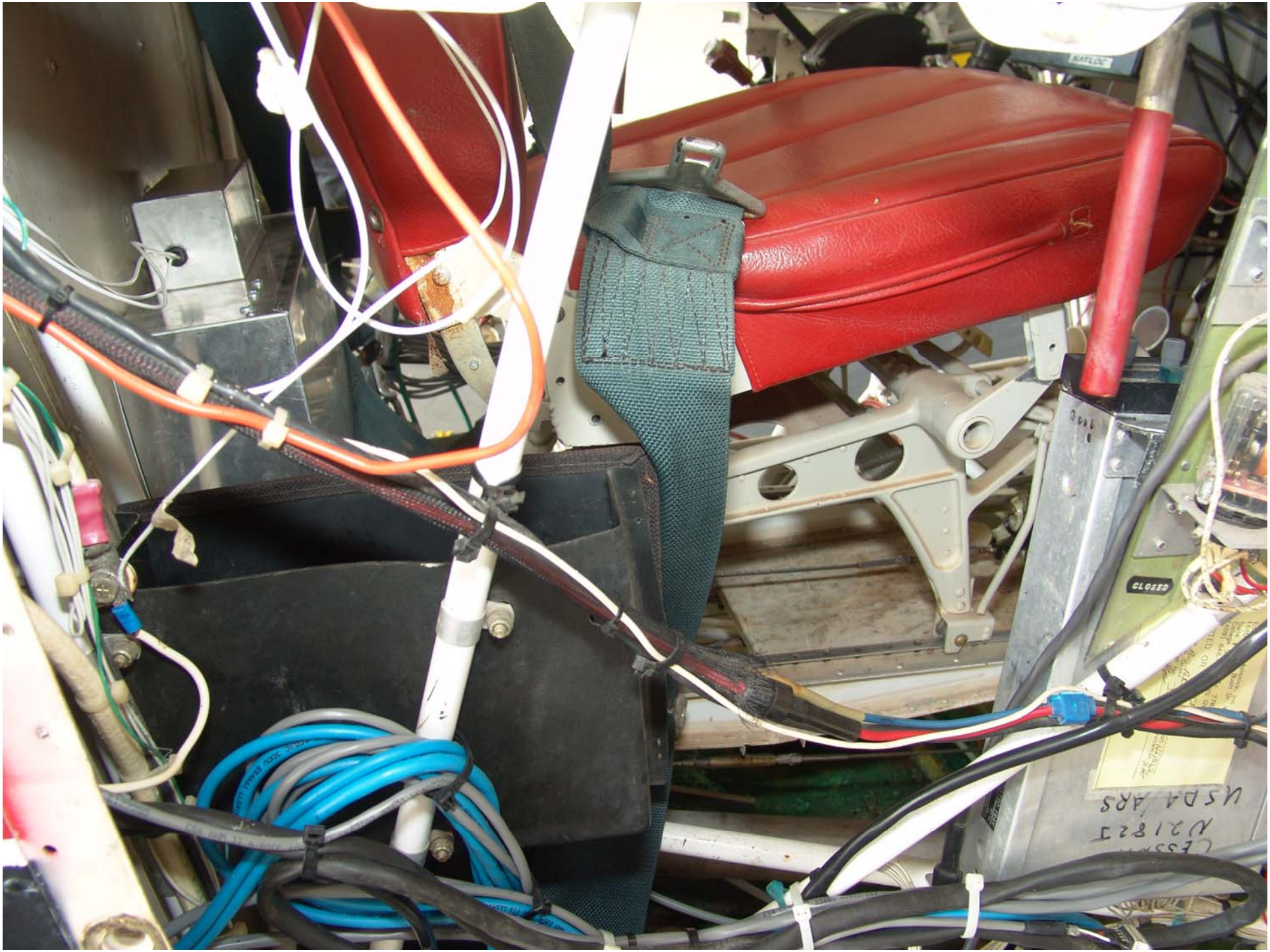
250 micron


Trajectory Details
Trajectories
30
25
20
15
10
5
0
-40
-20
0
20
40
60
80
Control
Drop Size: 250 µm
View: Rear
Terrain Coordinates
Aircraft Coordinates
Copy
Plot
Close

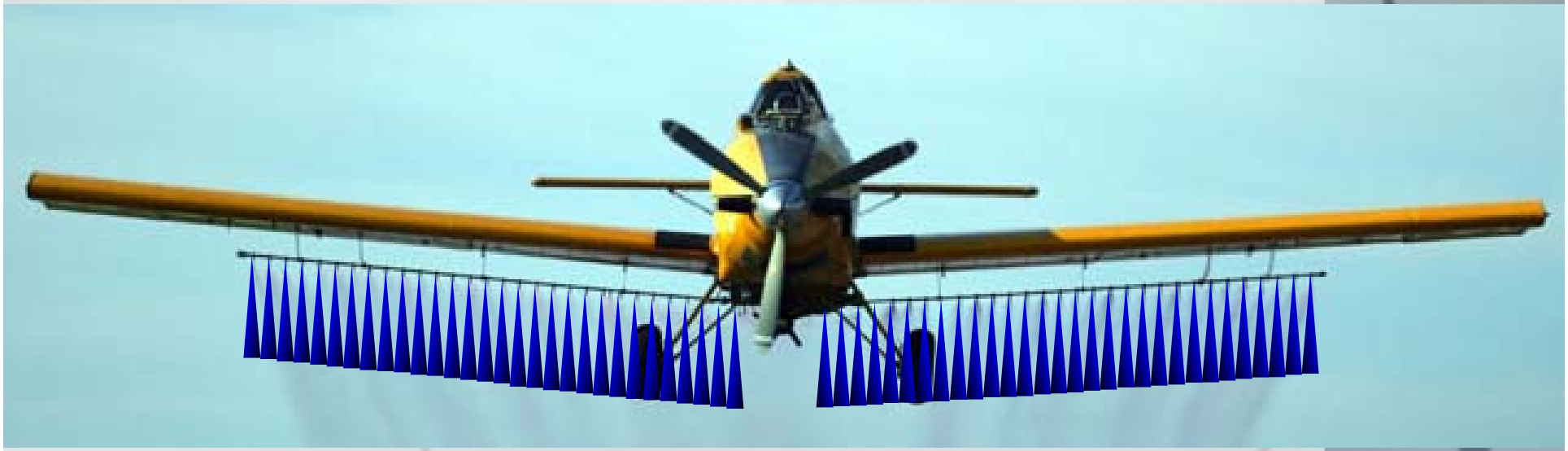
Methods

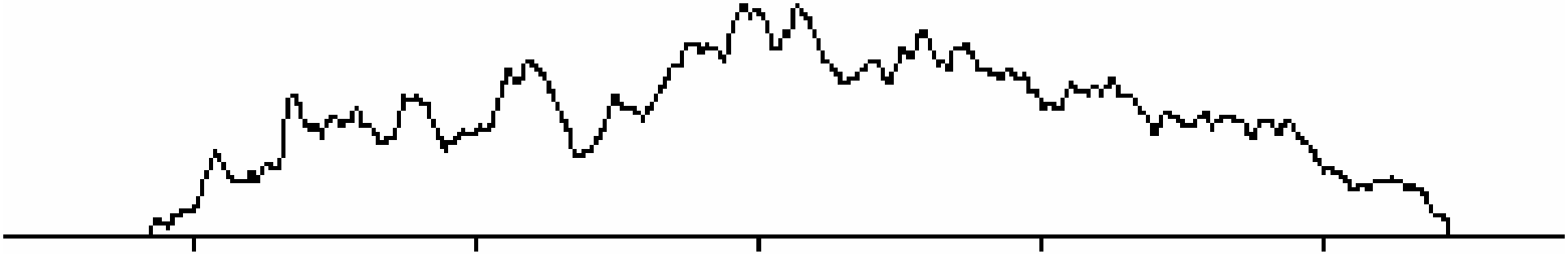
- Patternation trials conducted with card and string methods
- 7 treatments, 3 reps, right and left wing = 42 runs
- Evaluated effect on Ag Husky deposit uniformity and swath width

10.25.2005 11:57

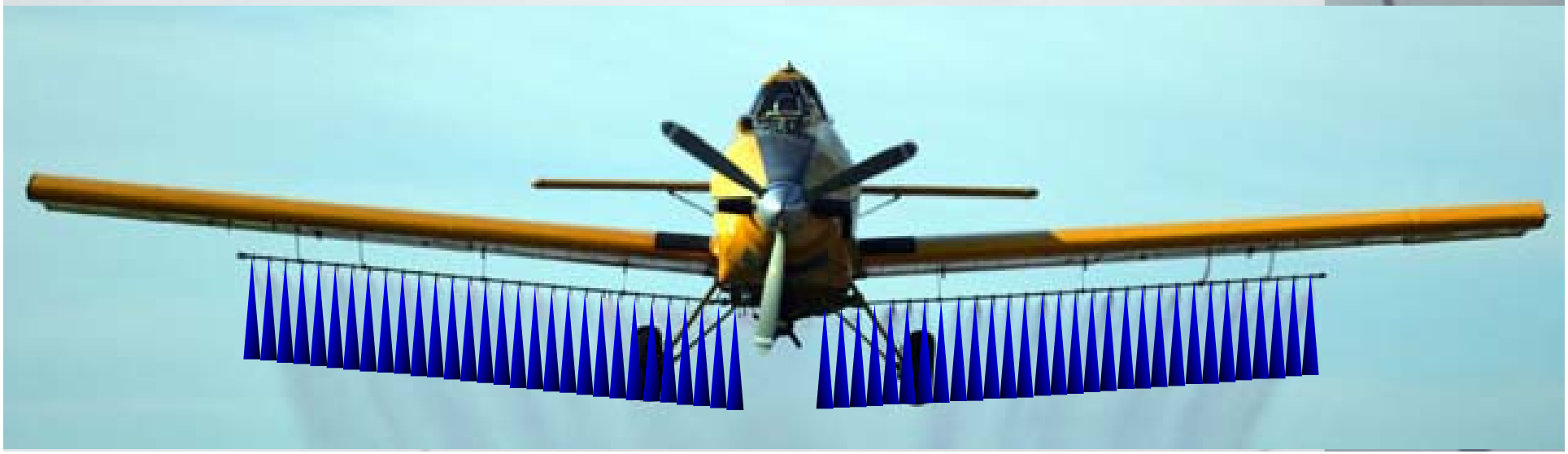

CLOSED

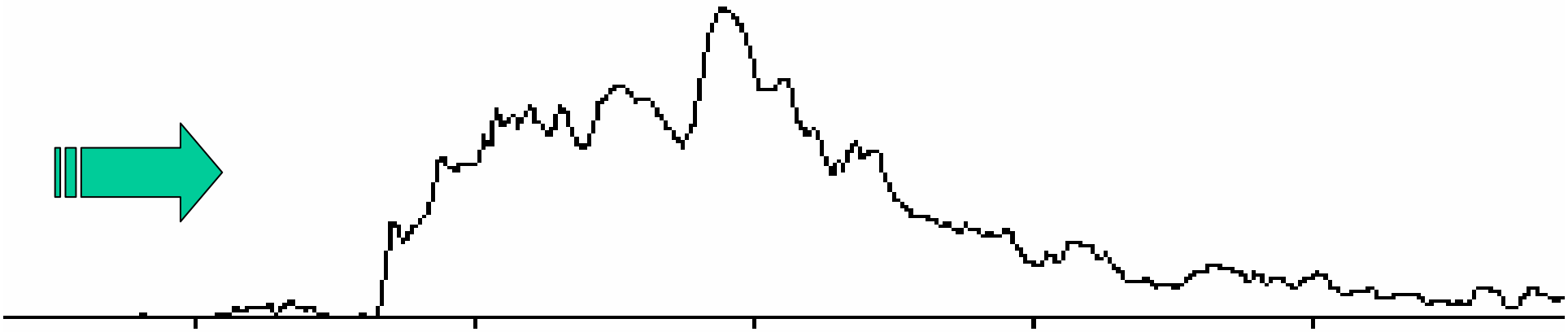
Headwind Pattern





Crosswind Pattern

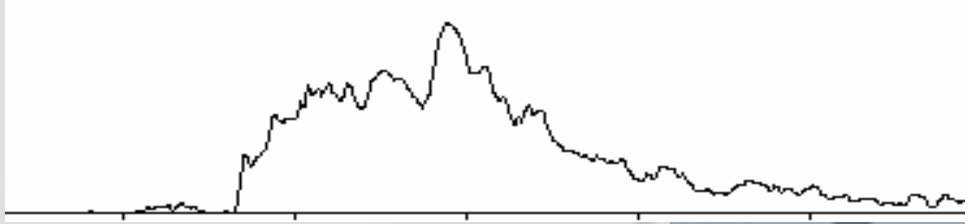




Observation

The Problem

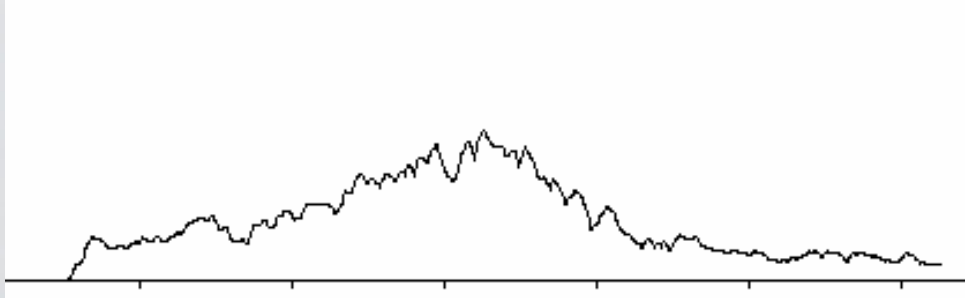
- **Spray from upwind boom "piles up" under wing, resulting in non-uniform pattern and narrow swaths**

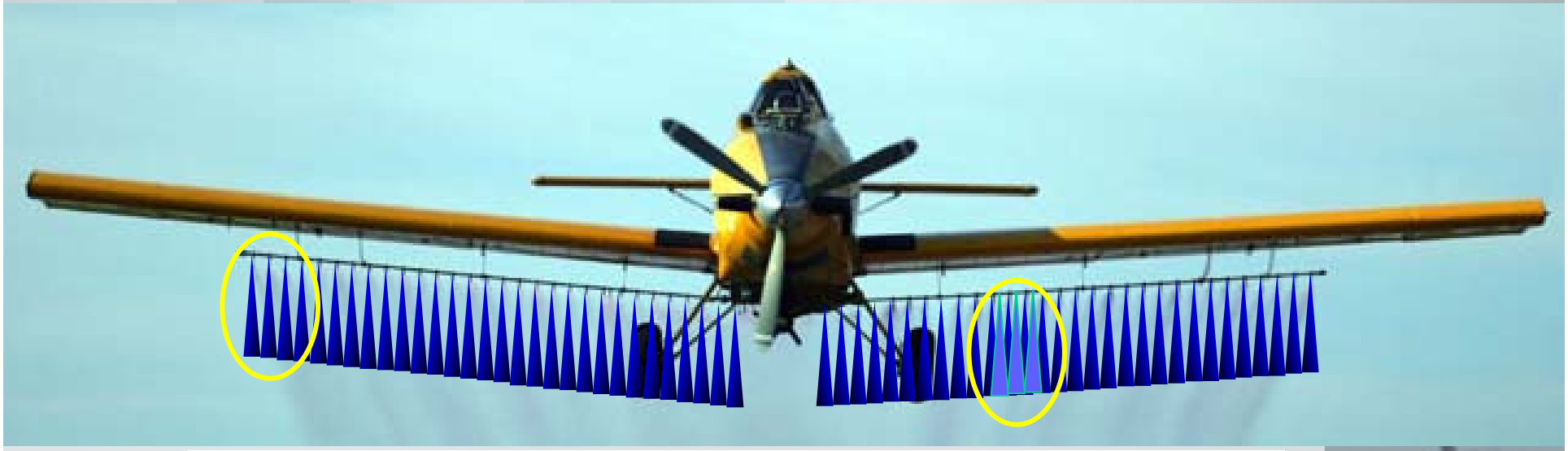


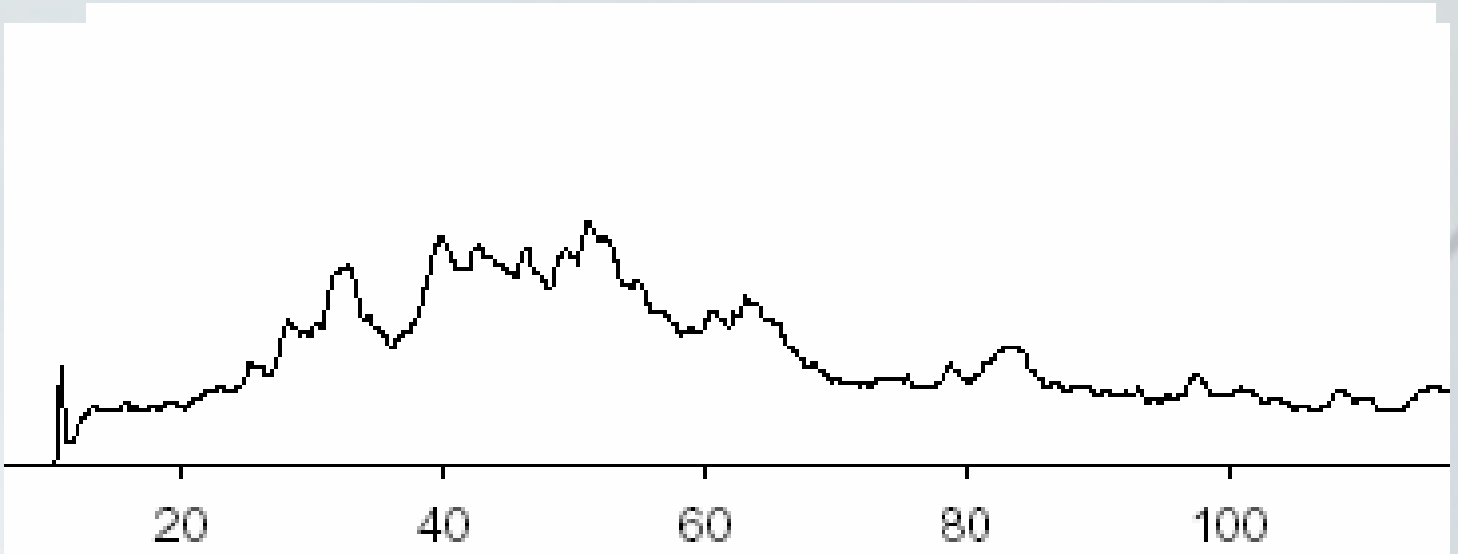
Observation

The Solution

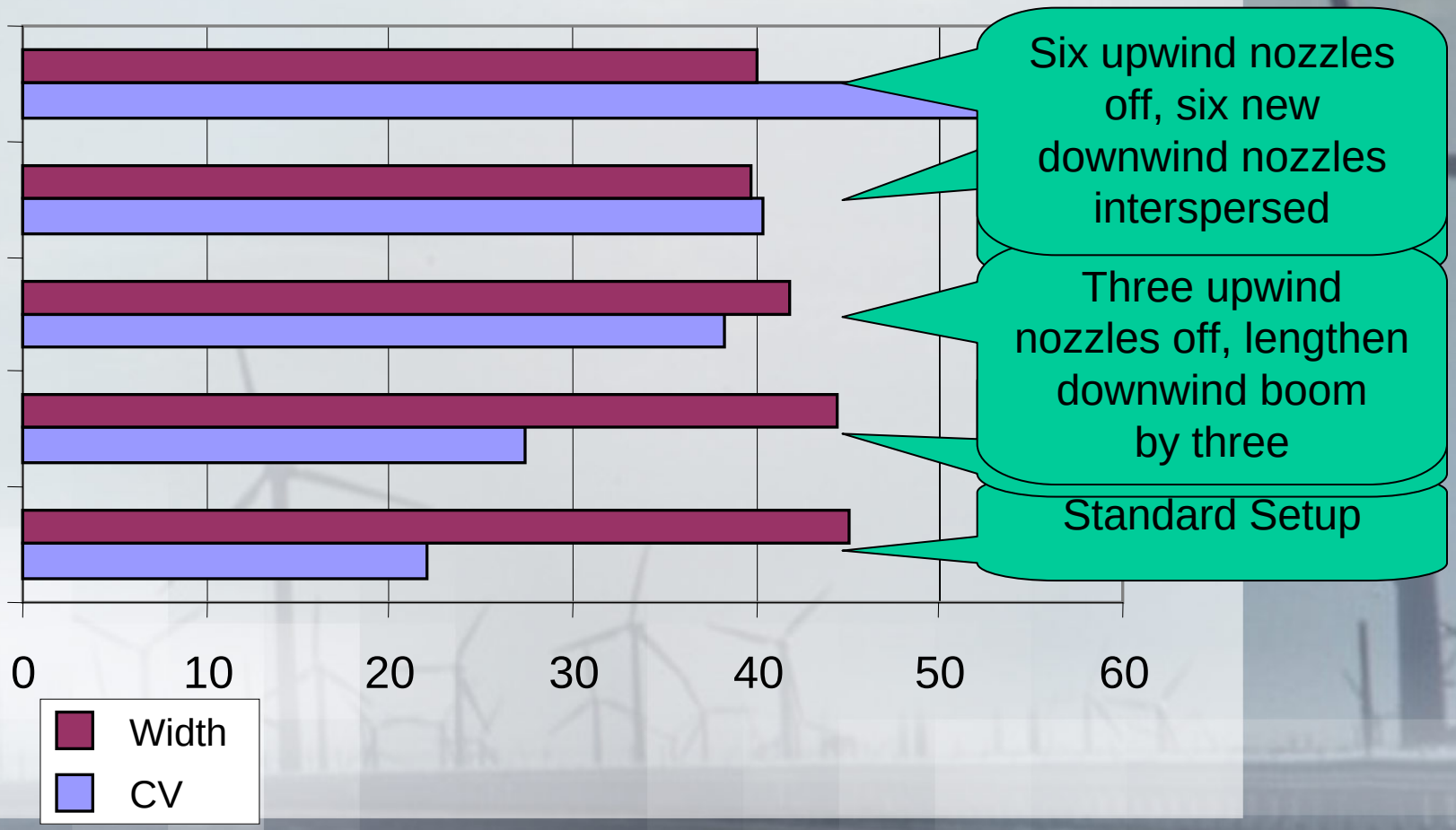
- **Reduce output of upwind boom, increase output on downwind boom**



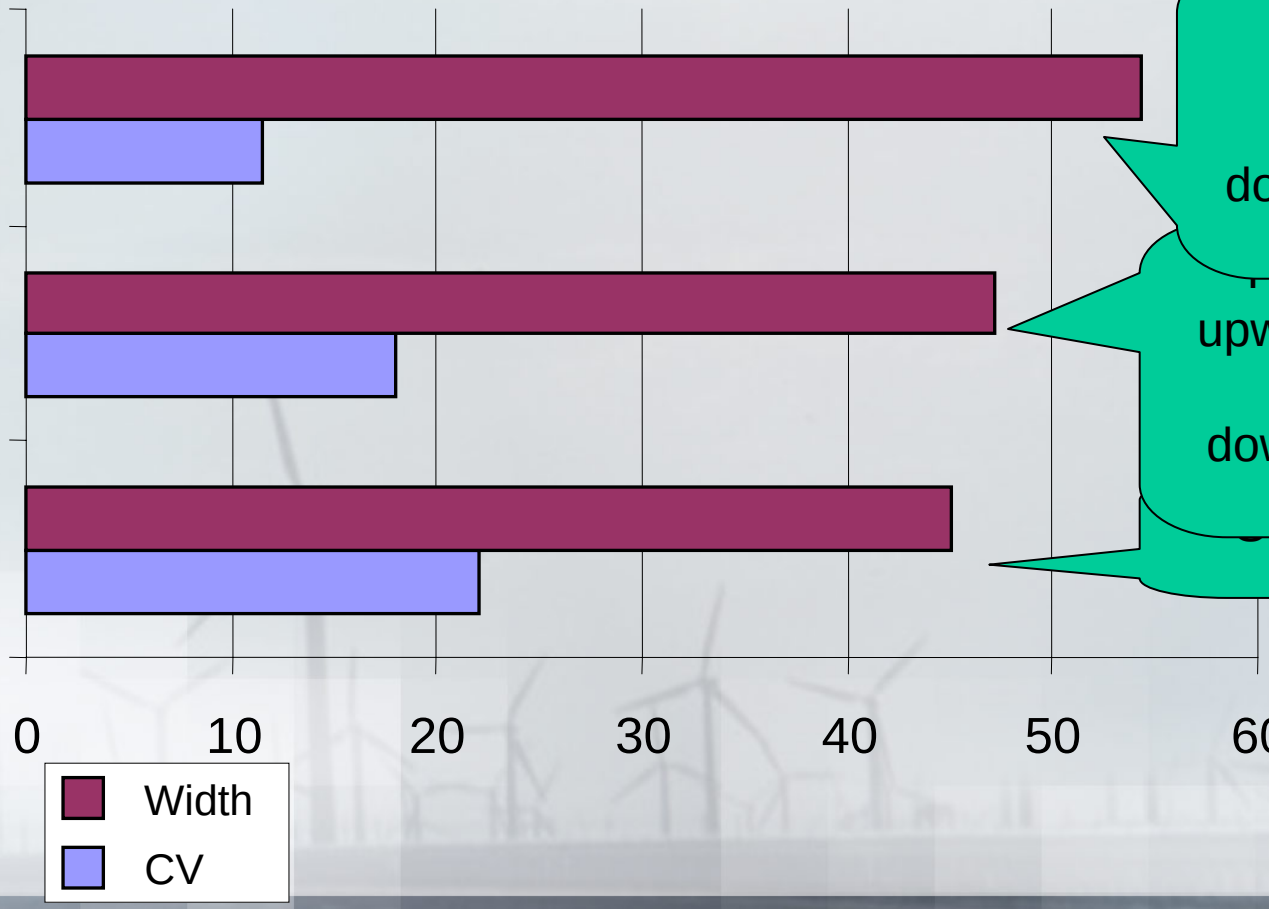



20
40
60
80
100

Same or Worse



Better



Three upwind nozzles off, three new downwind nozzles interspersed

Three alternate upwind nozzles off, three new downwind nozzles interspersed

Standard Setup

Conclusions

- **Installed hardware allowed boom configuration to change automatically as plane turned.**
- **When upwind nozzles were turned off and new downwind nozzles were interspersed, crosswind patterns improved significantly.**
- **When downwind nozzles were not added or were added at the end of the boom, patterns were not improved.**

Conclusions

- **Better patterns**
- **Less drift potential**
- **Additional details at the booth**

Acknowledgments

- Dr. Dan Martin and crew at USDA-ARS Aerial Application Research Unit, College Station, for carrying out trials
- Tom Wolf, Ph.D., P.Ag, Agriculture & Agri-Food Canada, Saskatoon, for experimental design and data analysis