LESSONS LEARNED FROM SPRAY DRIFT RESEARCH

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Agrimetrix Research & Training, Saskatoon SK

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OMAFRA, Simcoe ON

Pesticide Drift Issues - PIRT
Kennewick WA, May 14 - 17 2019

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SPRAY BASICS | BOOM SPRAYERS | SPECIALITY SPRAYERS | MULTIMEDIA | TABLES & APPS

PESTICIDE SAFETY FOR STUDENT WORKERS

This article is based on a presentation by Dr. Melanie Filotas, who delivered it as part of the 2019 agriculture

Welcome to Sprayers 101

Search the site | Search

Our tweets

Jason Deveau
@Spray_Guy
@thewoodsey77 @thecropdoctor @FordhamHarry @SyngentaCropsUK @jwt1989 @nozzle_guy Careful - Some gambles aren't worth the risk 🤭
May 15

Jason Deveau
@Spray_Guy
@spraydriftgirl Yes. Start one.


rb
2016

Last 25 Years

- Low-Drift tips

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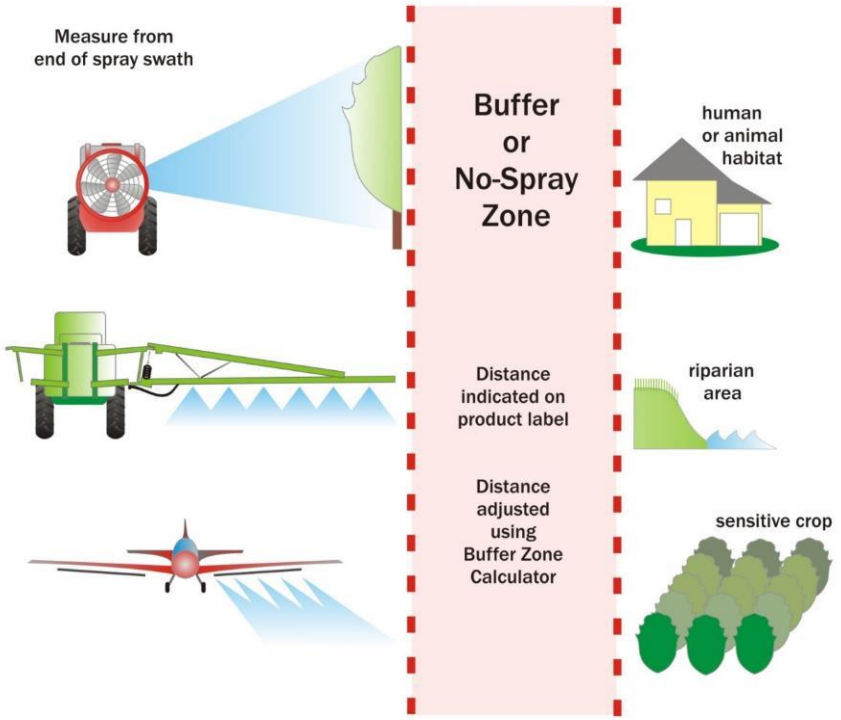
Last 25 Years

- Low-Drift tips
- Environmental awareness, Buffer Zones



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Last 25 Years

- Low-Drift tips
- Environmental awareness, Buffer Zones
- High Clearance
  - Faster
  - Higher booms
  - Heavier

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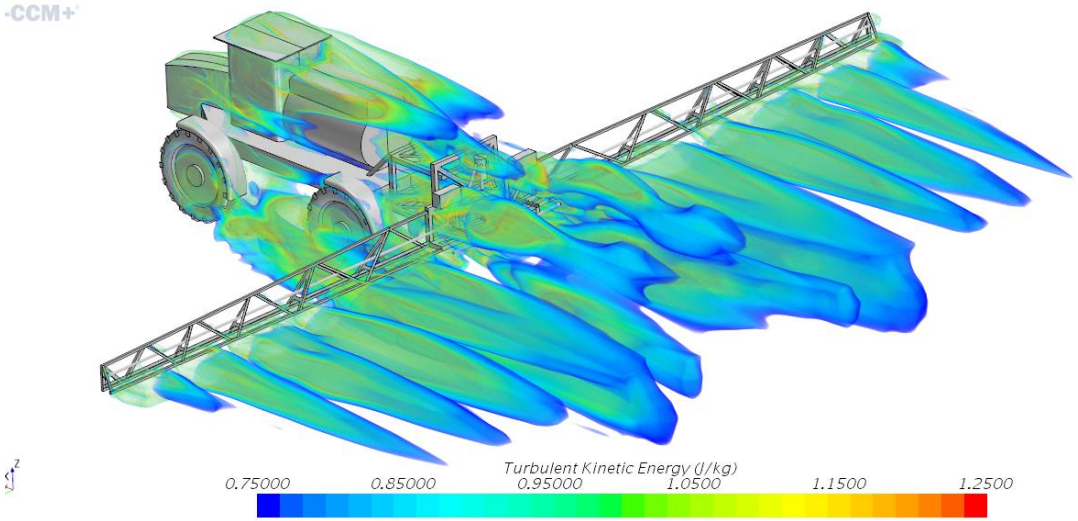

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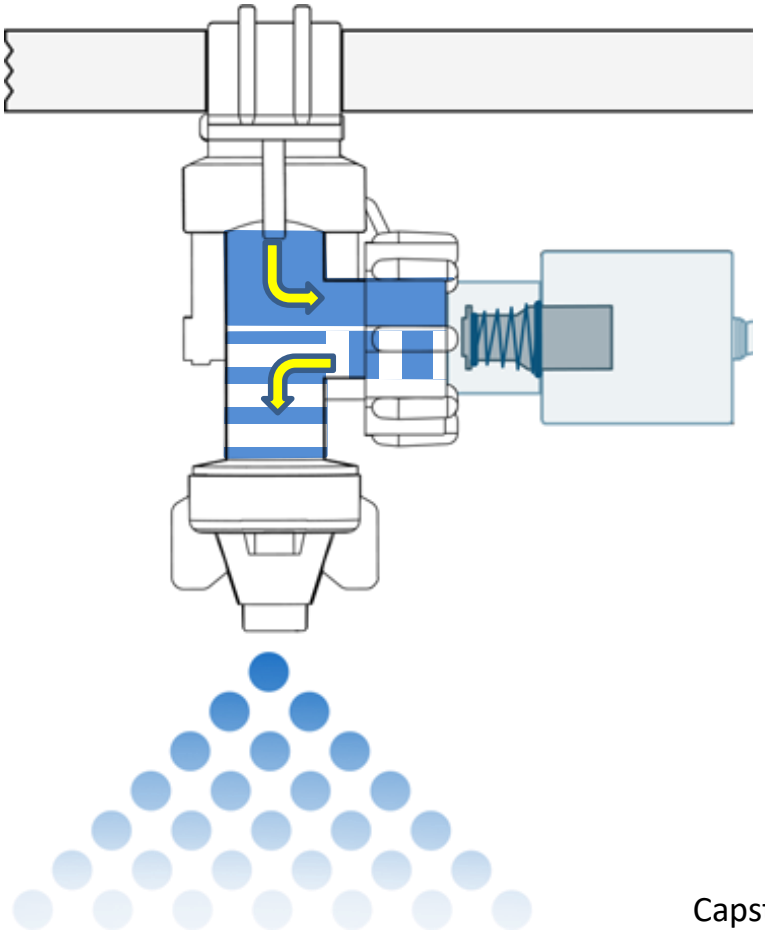
- Fungicides, Growth Regulators
- 3” Plumbing
- Pulse Width Modulation



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Last 25 Years

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- 3” Plumbing
- Pulse Width Modulation
- Social Media

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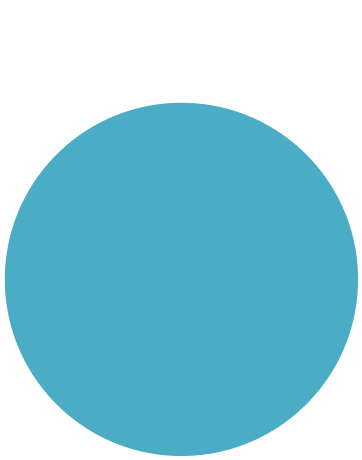
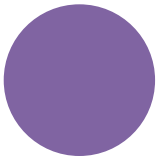



Drift remains complex

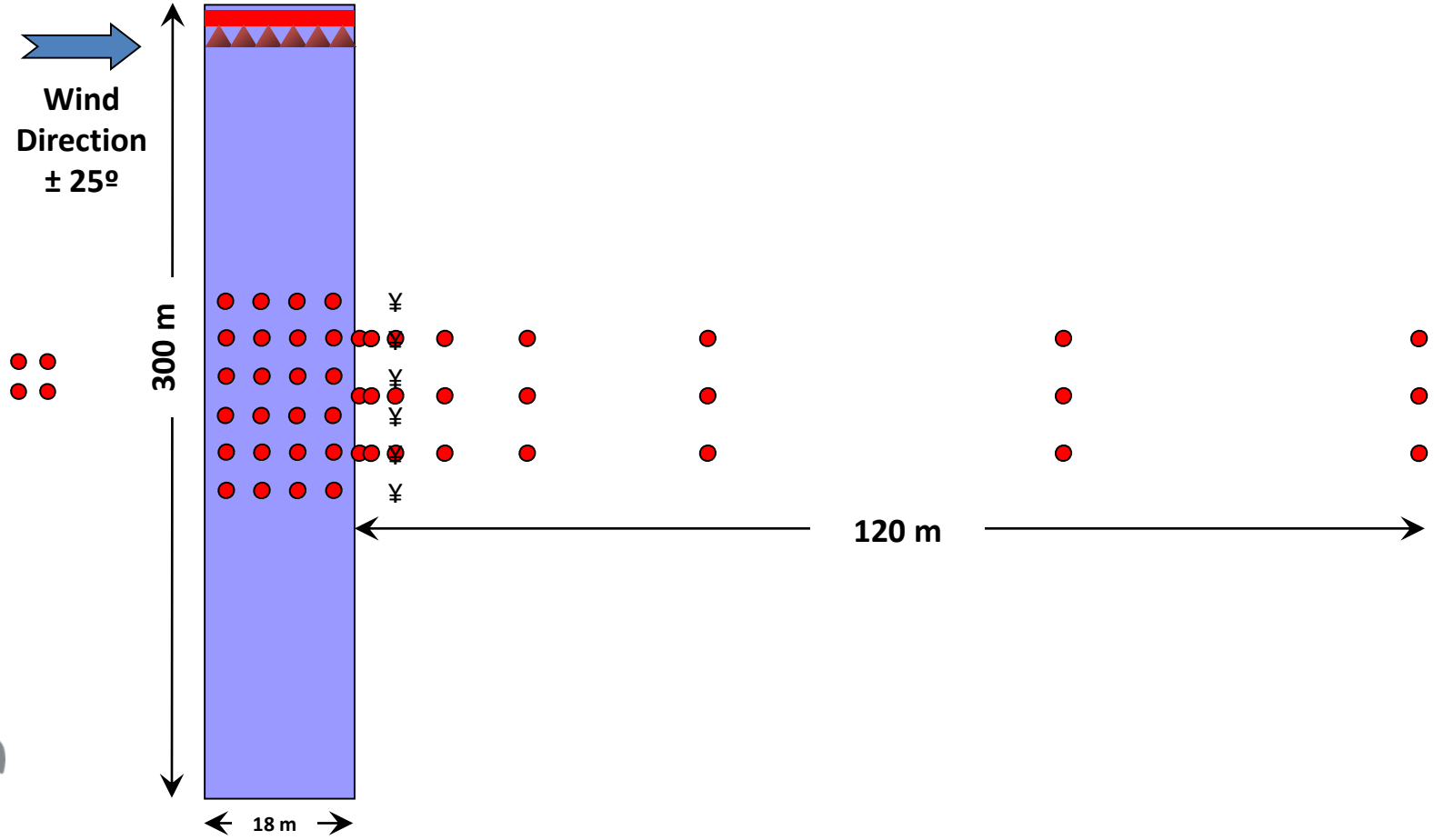
Initial Release is Intuitive

- Droplet size
- Boom height
- Wind speed
- etc.

Subsequent Behavior is Not

- Atmospheric turbulence
- Surface roughness (crop)
- Terrain
- etc.

Field Sampler Layout



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OnSwath R3 D2


Model 92
ROTOROD SAMPLER
SAMPLING TECHNOLOGIES, INC.


2011 DRIFT
DN SWATH
TRIALS 9.10.11.12

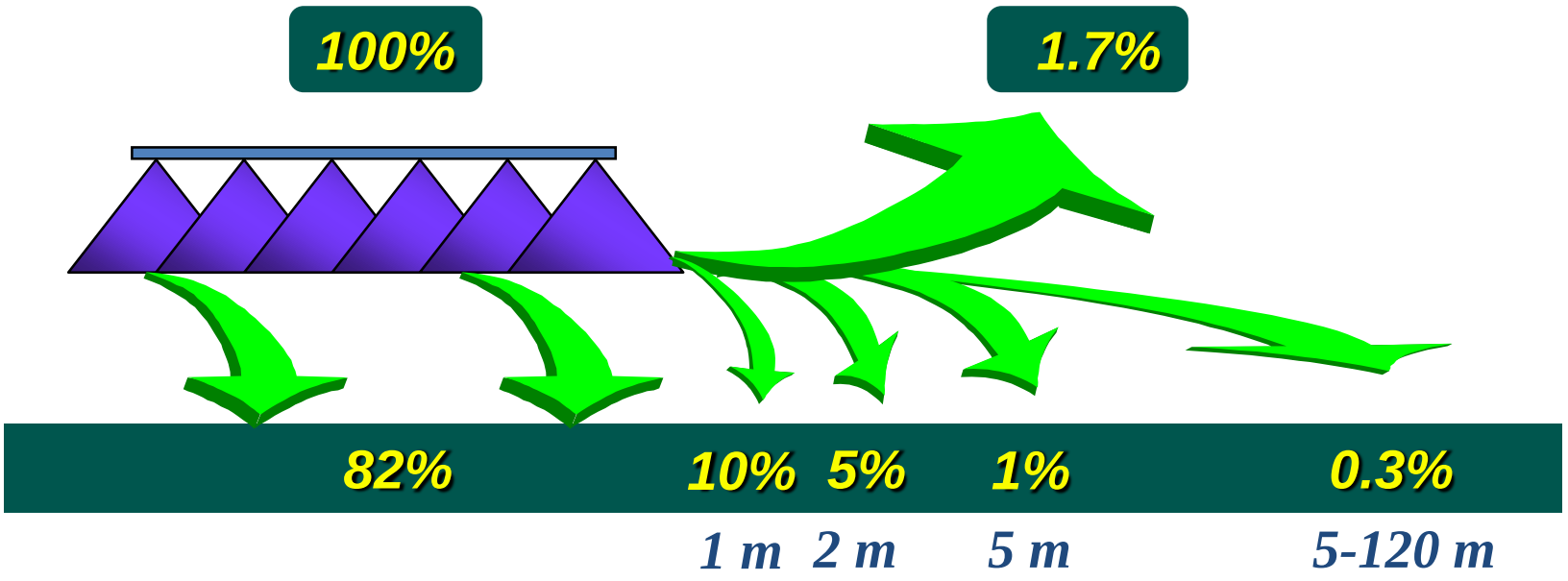

COMBO-JET


ETHANOL


40
35
30
25
20
15
10


P2-11
OffSwath
Pall R2
D1
P2-11
OffSwath
Pall R2
D120
P2-11
OffSwath
Pall R2
D80
P2-11
OffSwath
Pall R2
D40
P2-11
OffSwath
Pall R2
D20
P2-11
OffSwath
Pall R3
D120
P2-11
OffSwath
Pall R3
D80

Drift Spray Accountancy



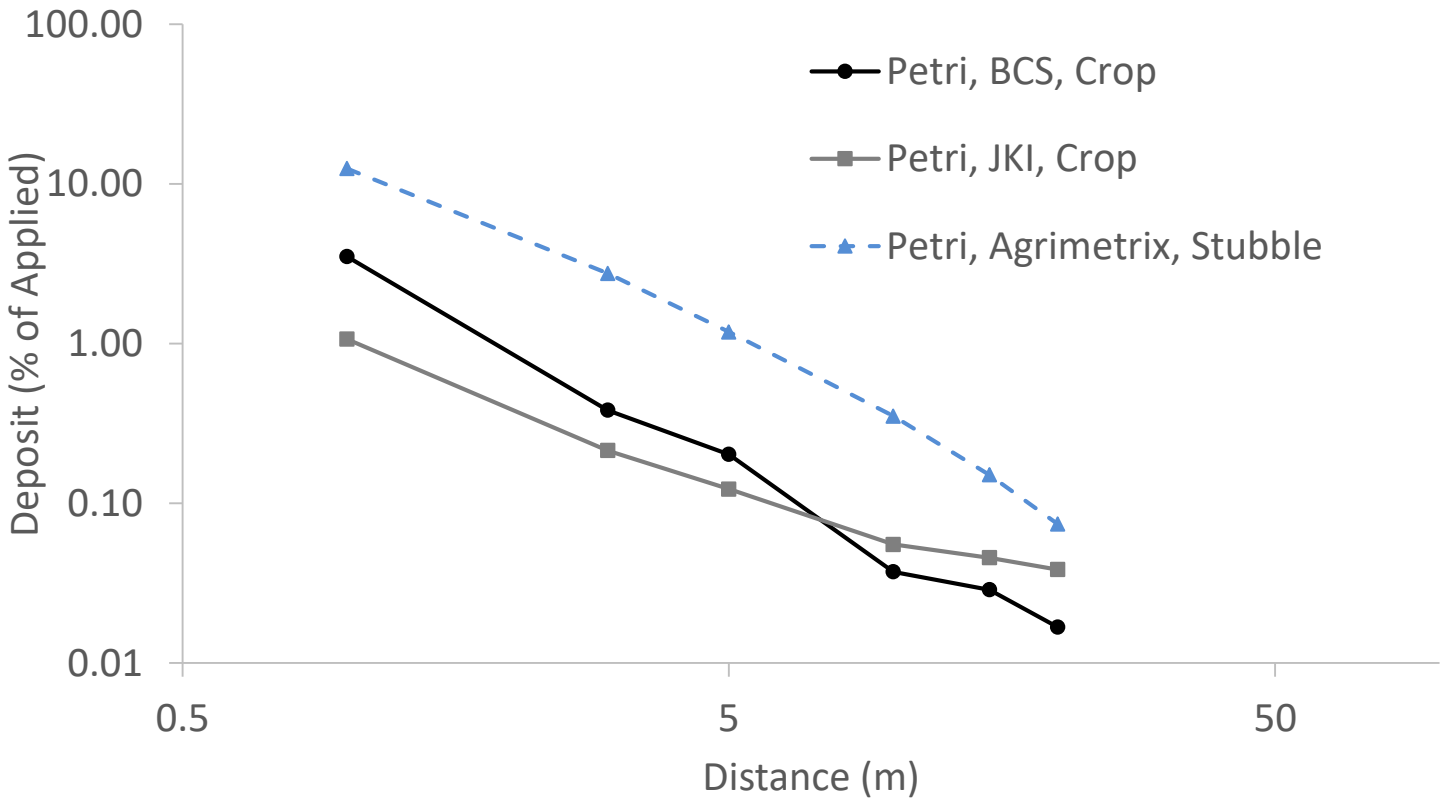

R. Lussier, Agricore United


Source: Michael Wipf

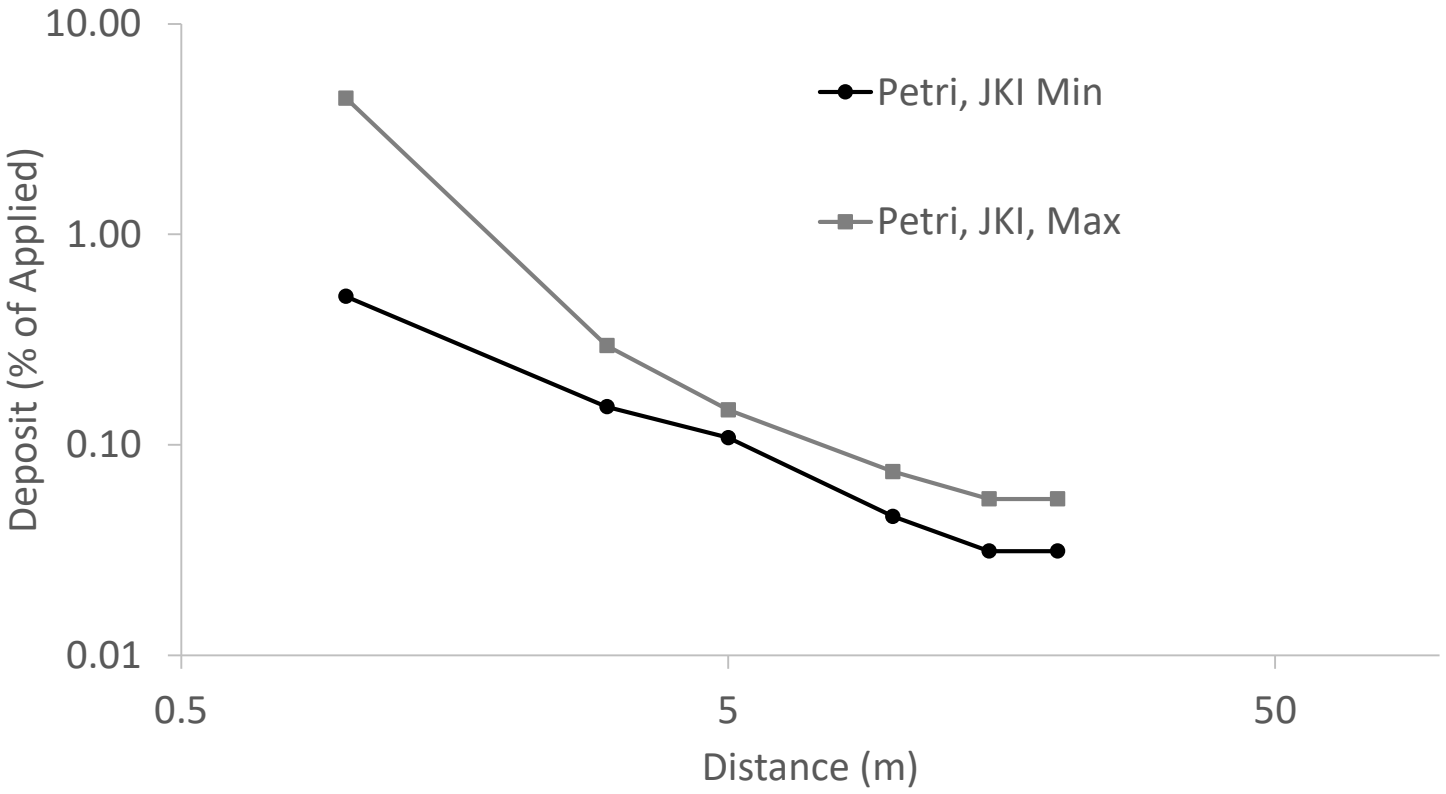

Source: Ron Tone

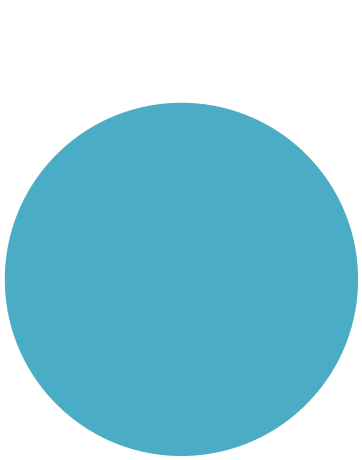
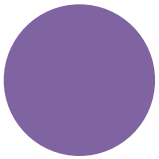
Drift research results depend primarily on the research group

Three Research Groups, Same Methods



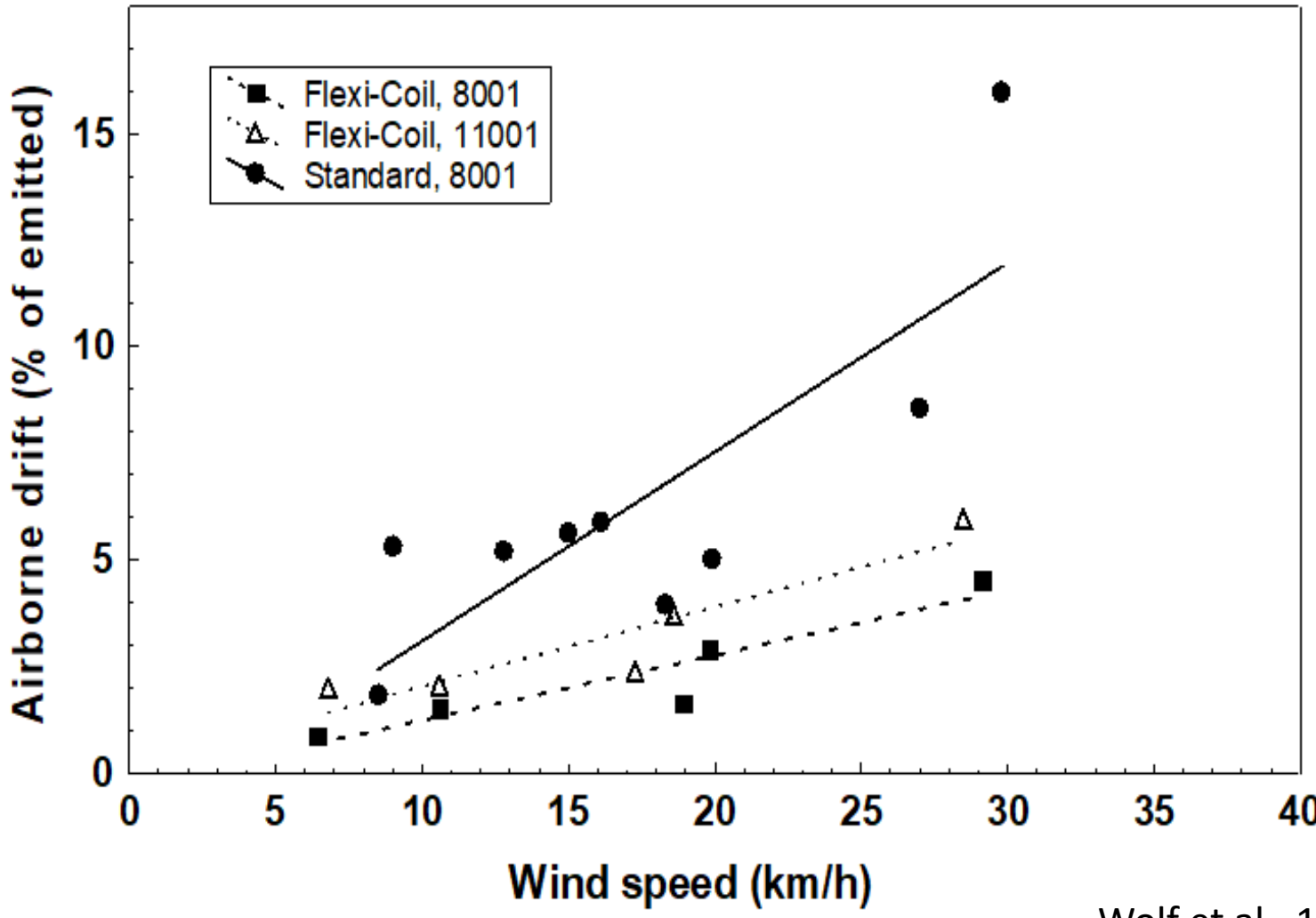
Variability



Shrouds reduce, but do not eliminate drift

Shrouds and Shields



Wolf et al., 1993

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FOR SALE


2296207
FLEXI-C


4 SALE
7313850
flexi-coil


FOR SALE

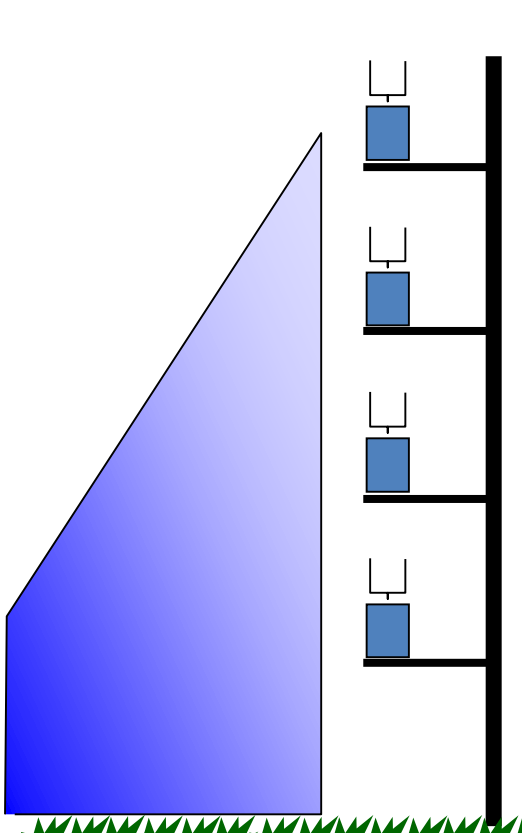
Low drift nozzles are the new shrouds

DRT benefits depend on what you measure

XR8003 (conventional)

2.9%
of applied dose

2.5%
of applied dose



5.7 x

0.43%
of applied dose

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AI110025 (low-drift)

0.67%
of applied dose

0.5%
of applied dose

2.1 x

0.21%
of applied dose

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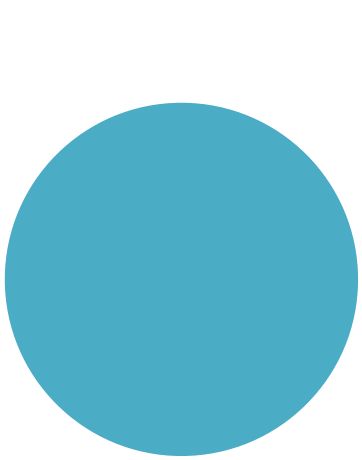
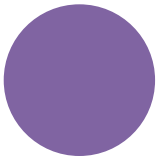
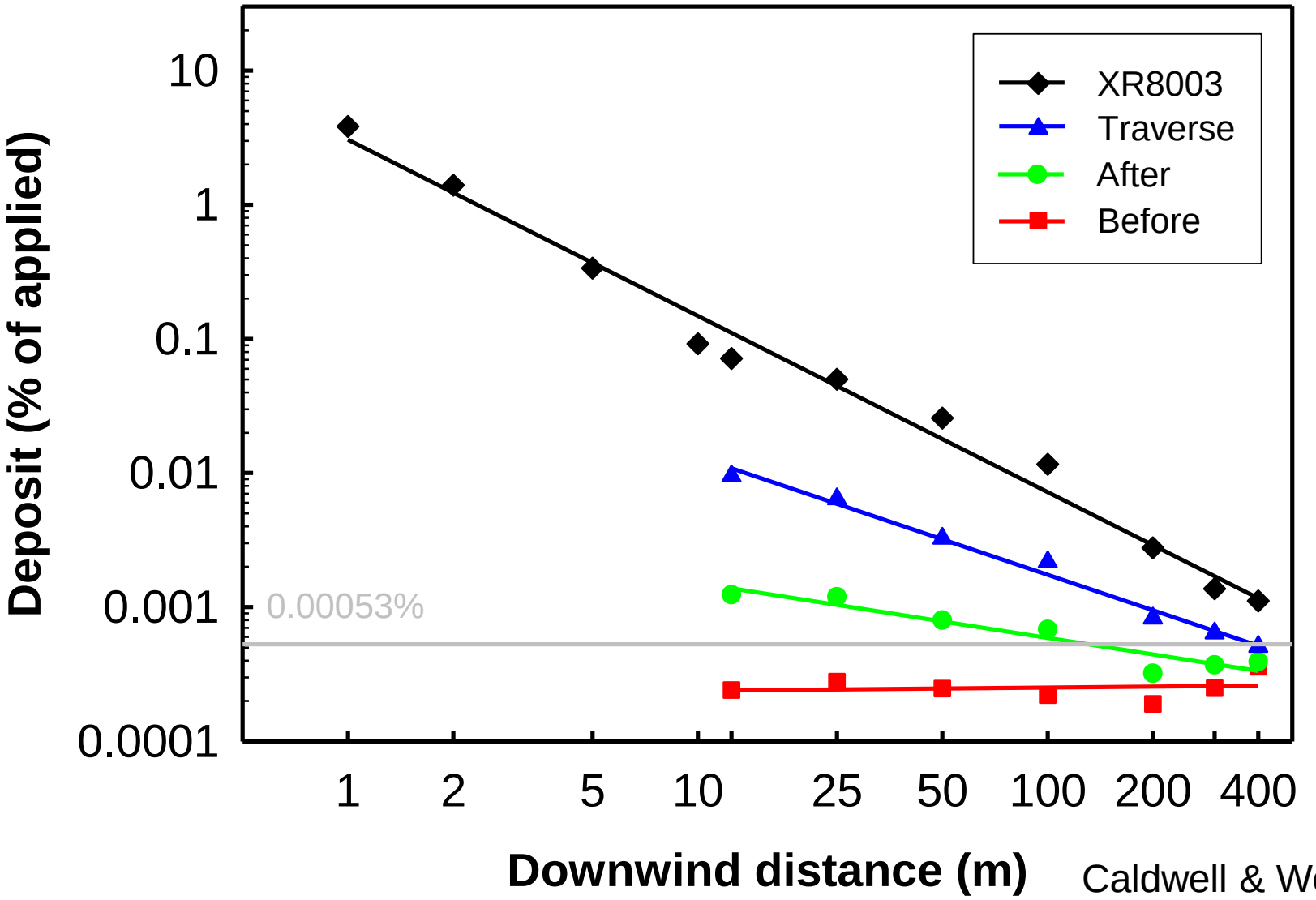
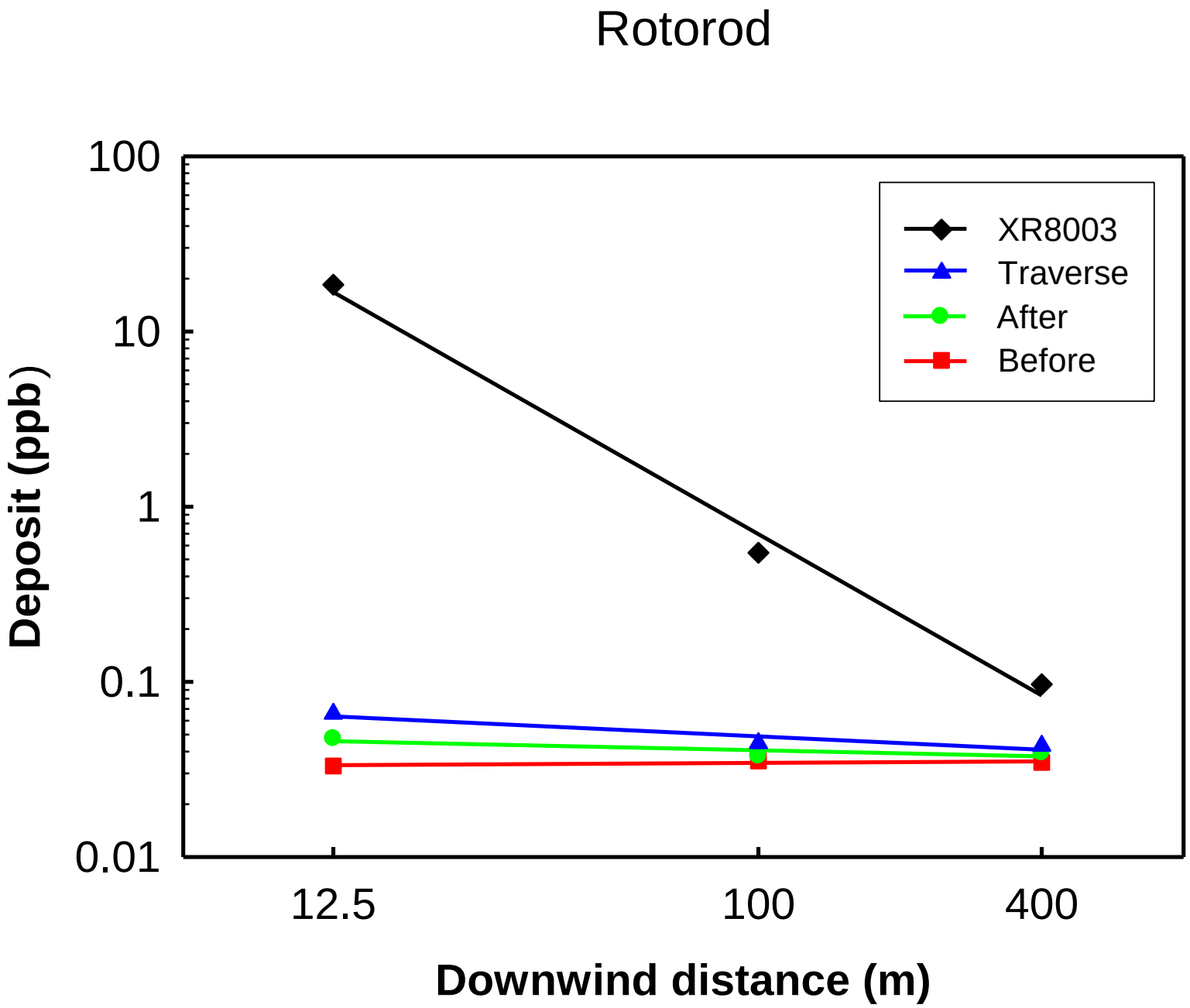



There is no safe (intermediate) distance

Petri Plate

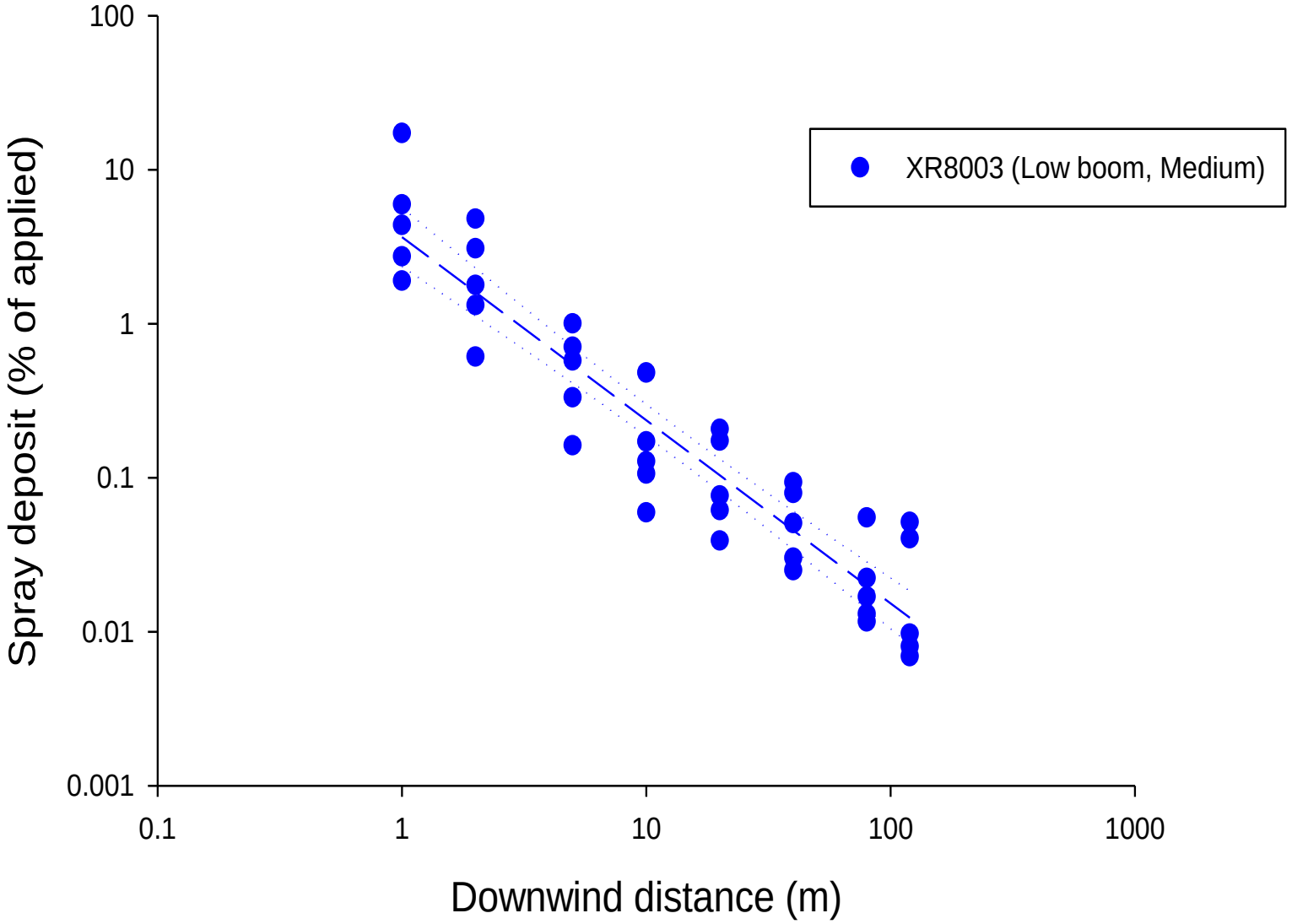


Caldwell & Wolf, 2006

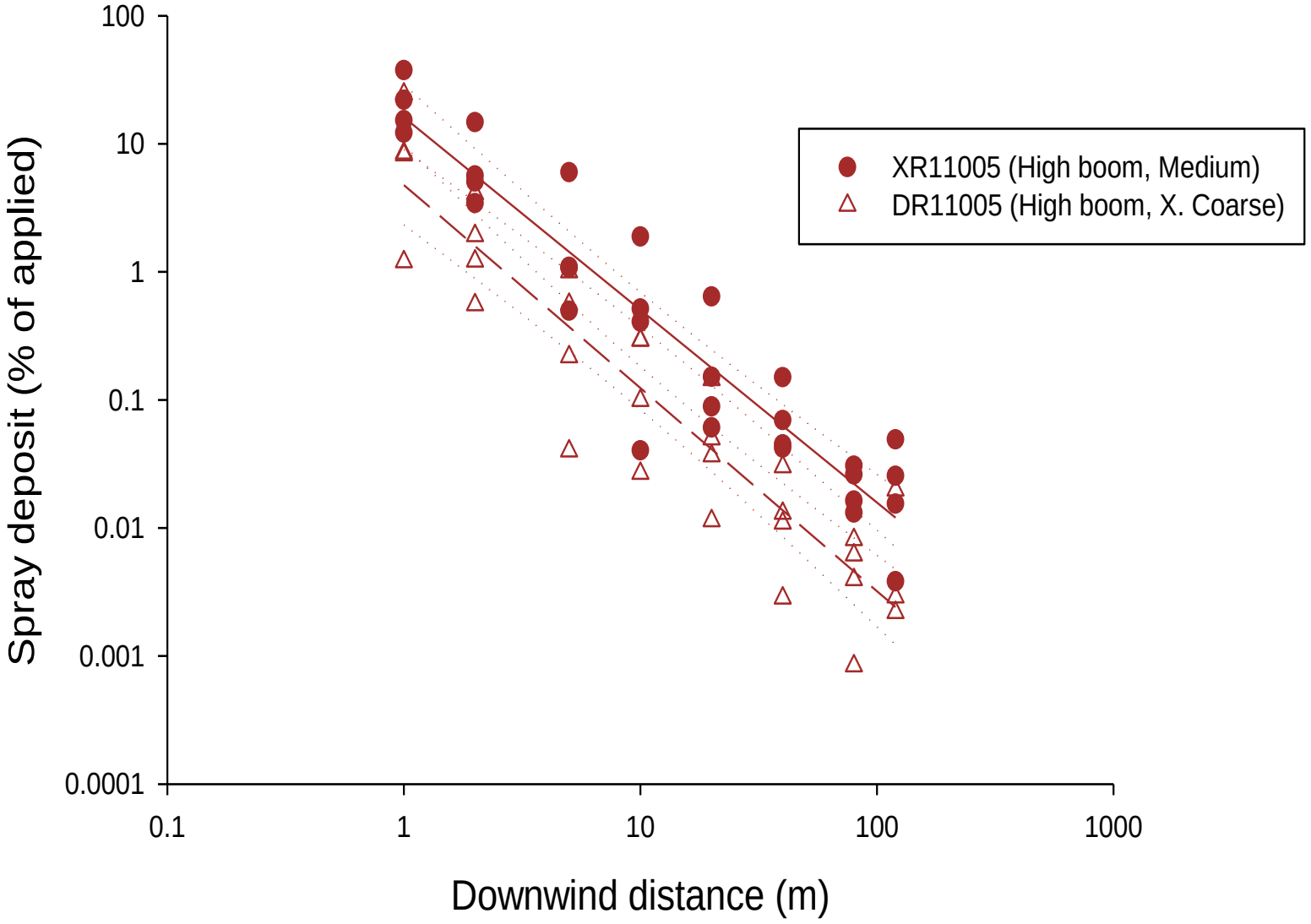

Rotorod
100
10
1
0.1
0.01
Deposit (ppb)
12.5
100
400
Downwind distance (m)
XR8003
Traverse
After
Before

Deposited drift measurements are very variable

Low Boom, Medium SQ



Medium vs X. Coarse



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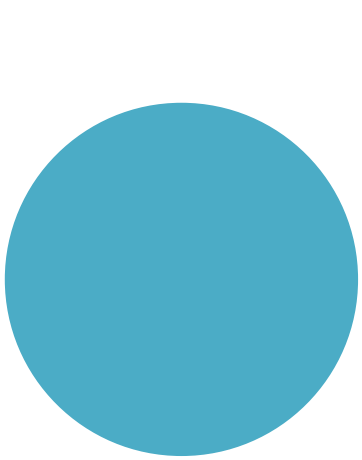
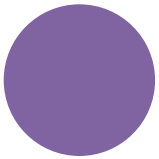
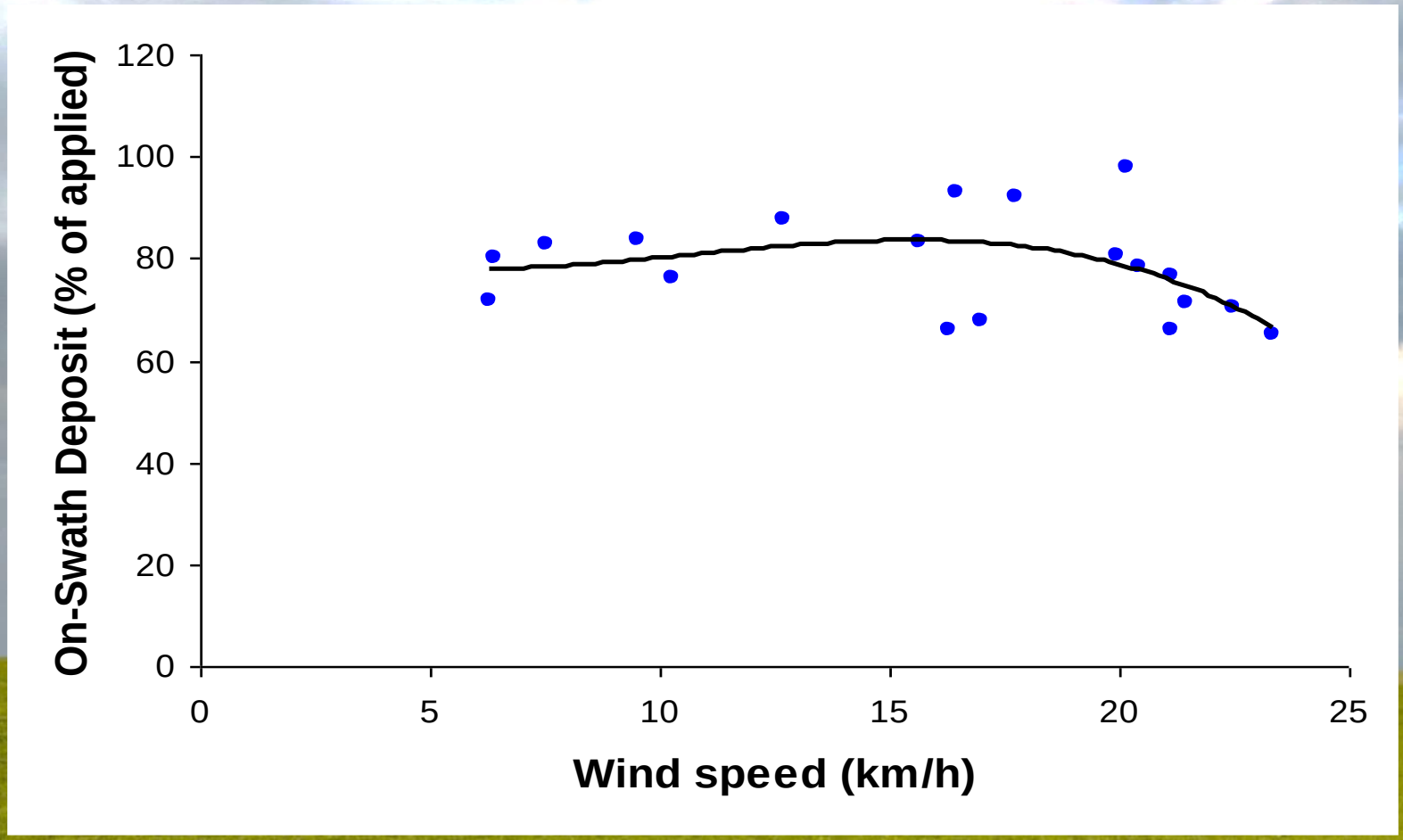
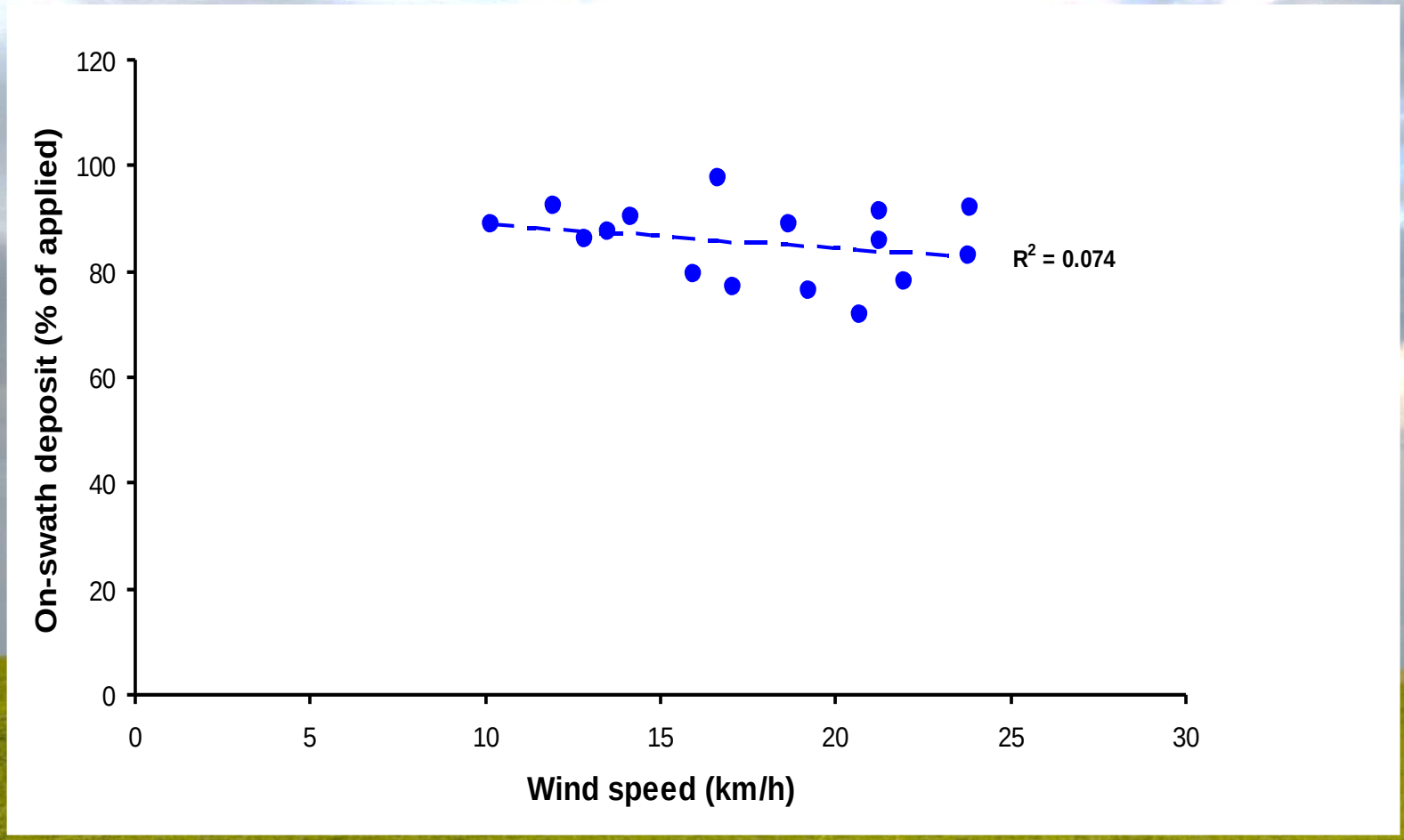



The cost of drift is paid at its destination

On-Swath Deposit (2011)



On-Swath Deposit (2000)



Very Coarse sprays work

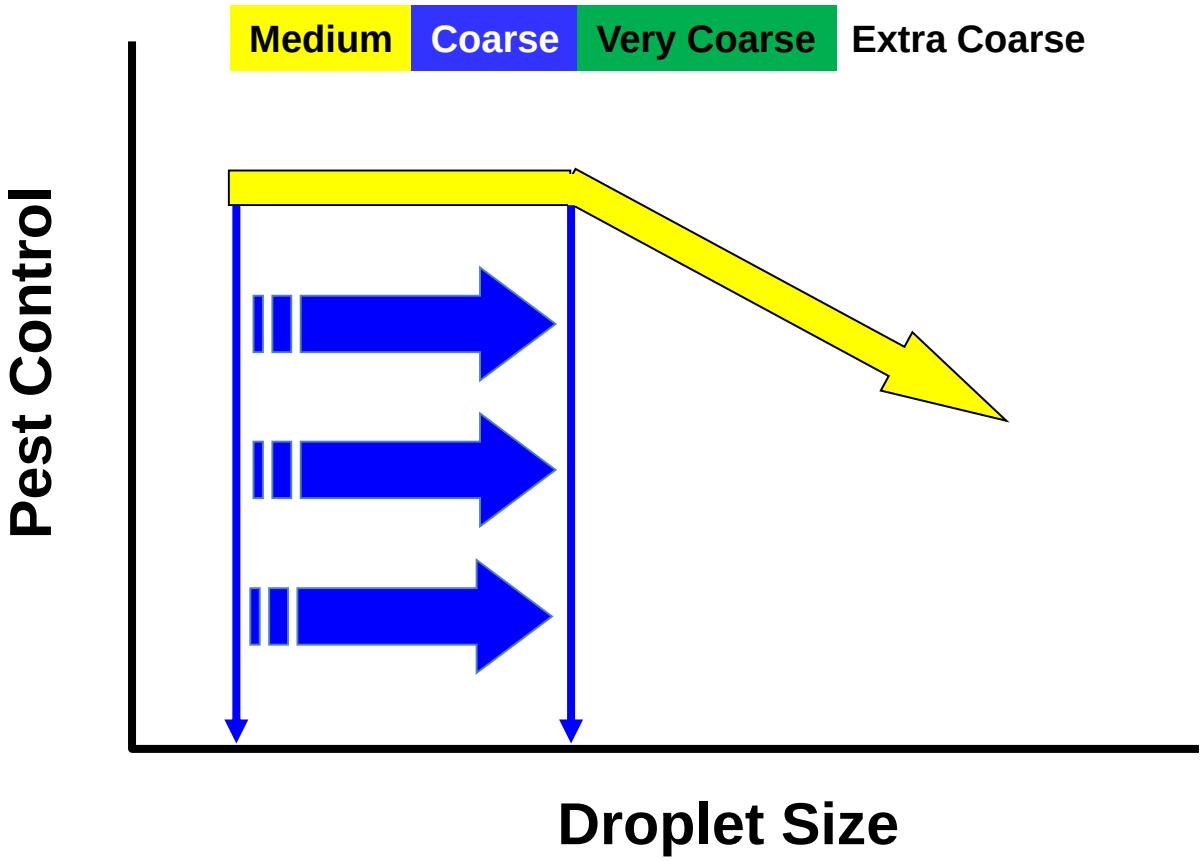

wild oats


green foxtail


barnyard grass


quack grass

Grassy Targets



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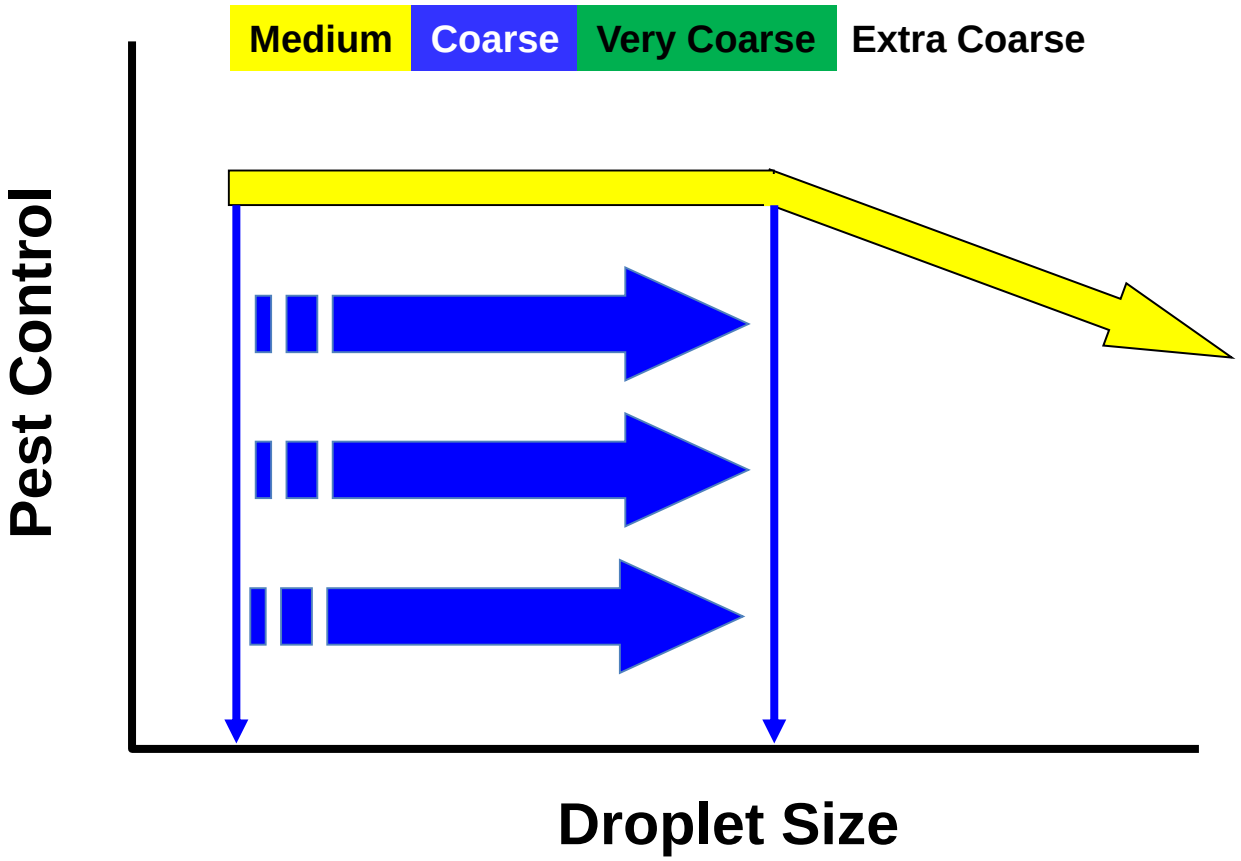
wild buckwheat


Canada thistle


shepherd's purse


volunteer canola

Broadleaf Targets



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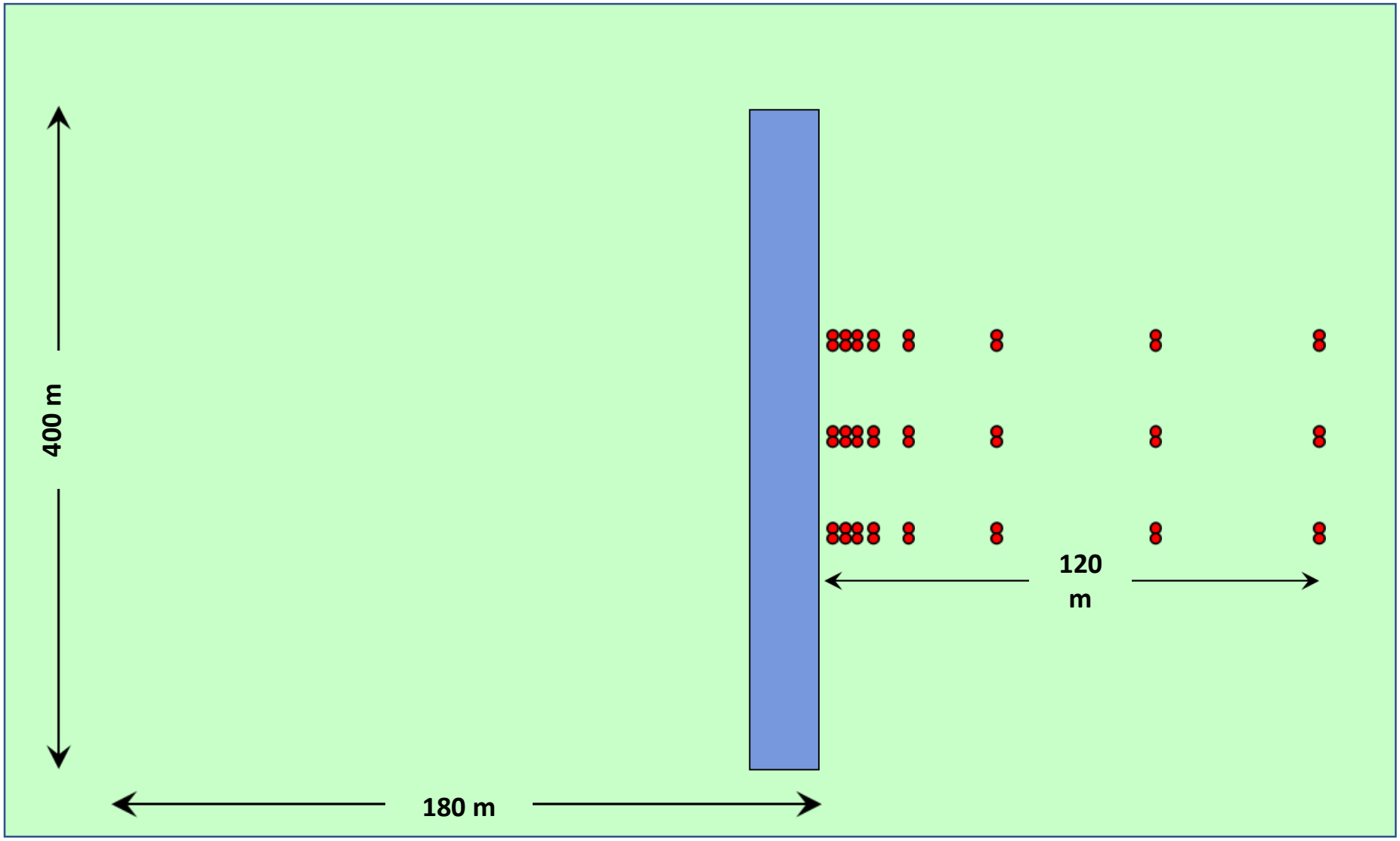
The drift from multiple spray passes is additive

Field Sampler Layout



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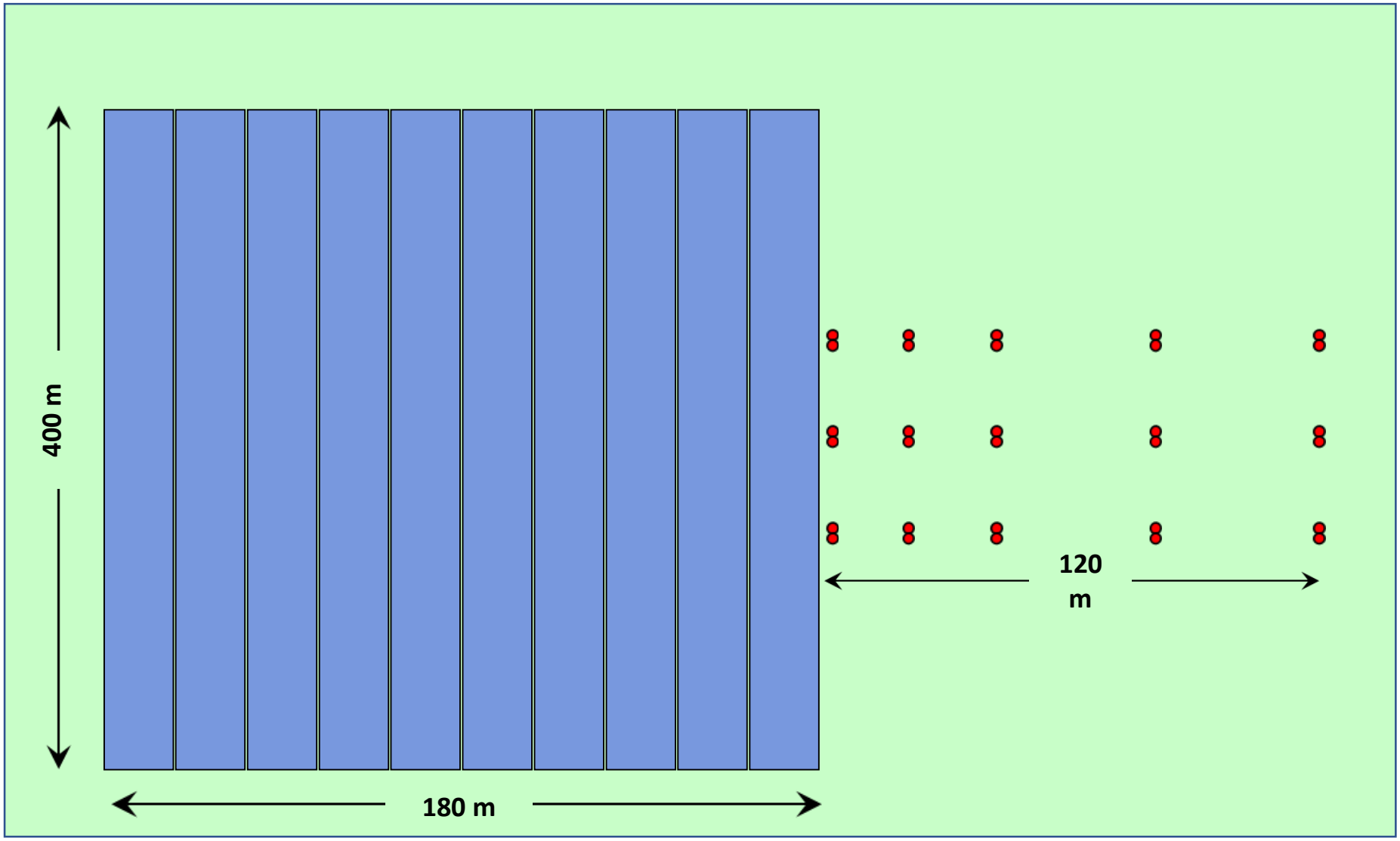
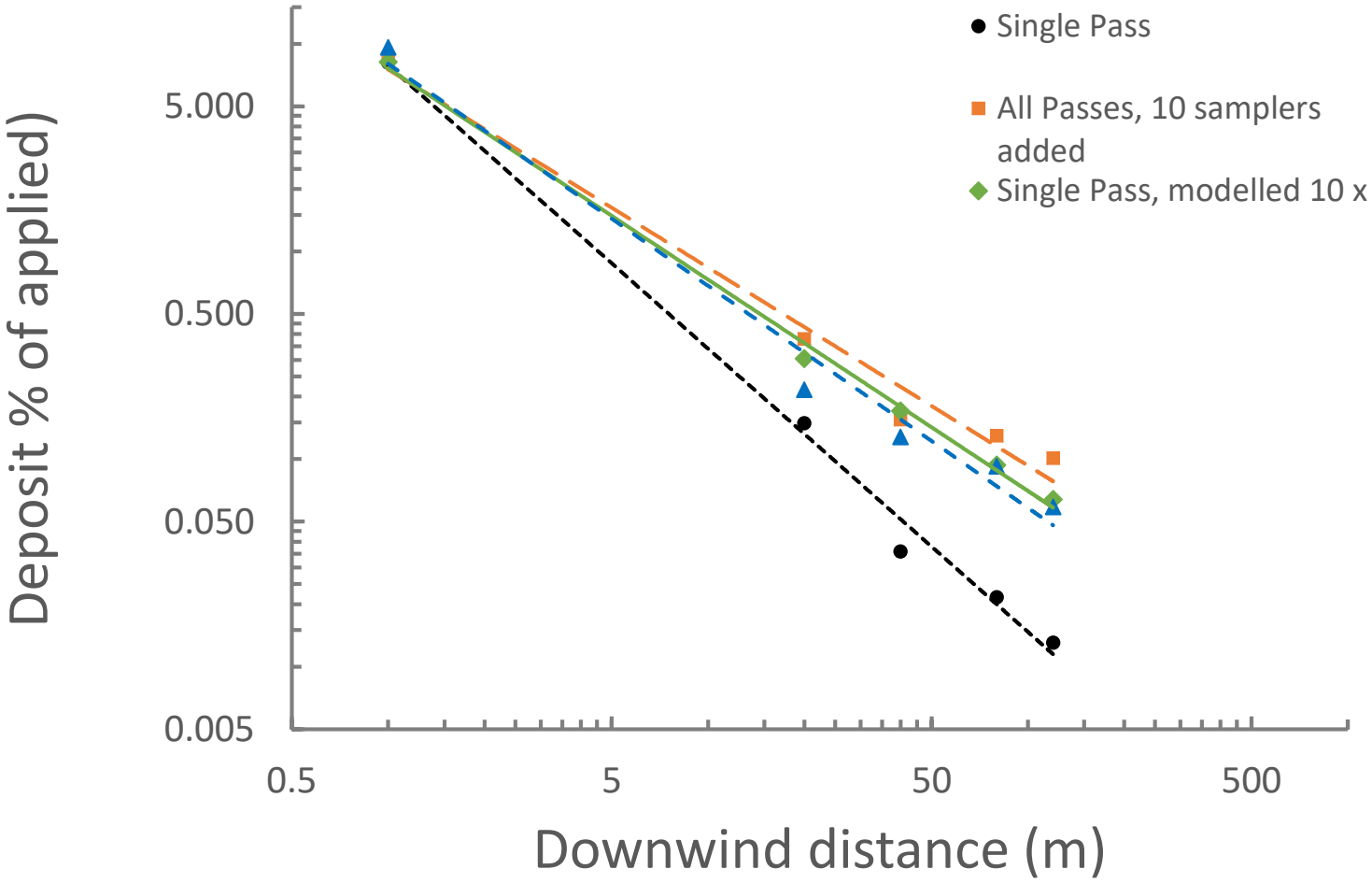
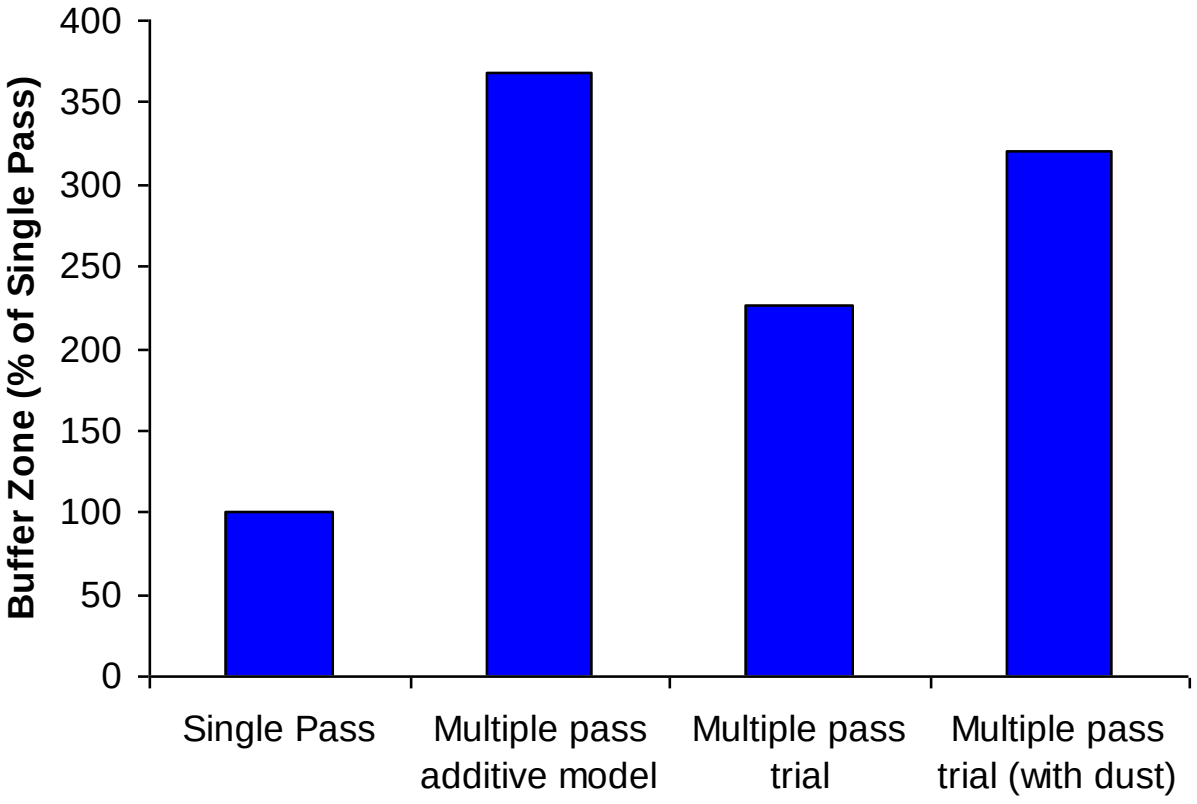


Multiple Pass Trial



Relative Buffer Zones with RQ = 4000

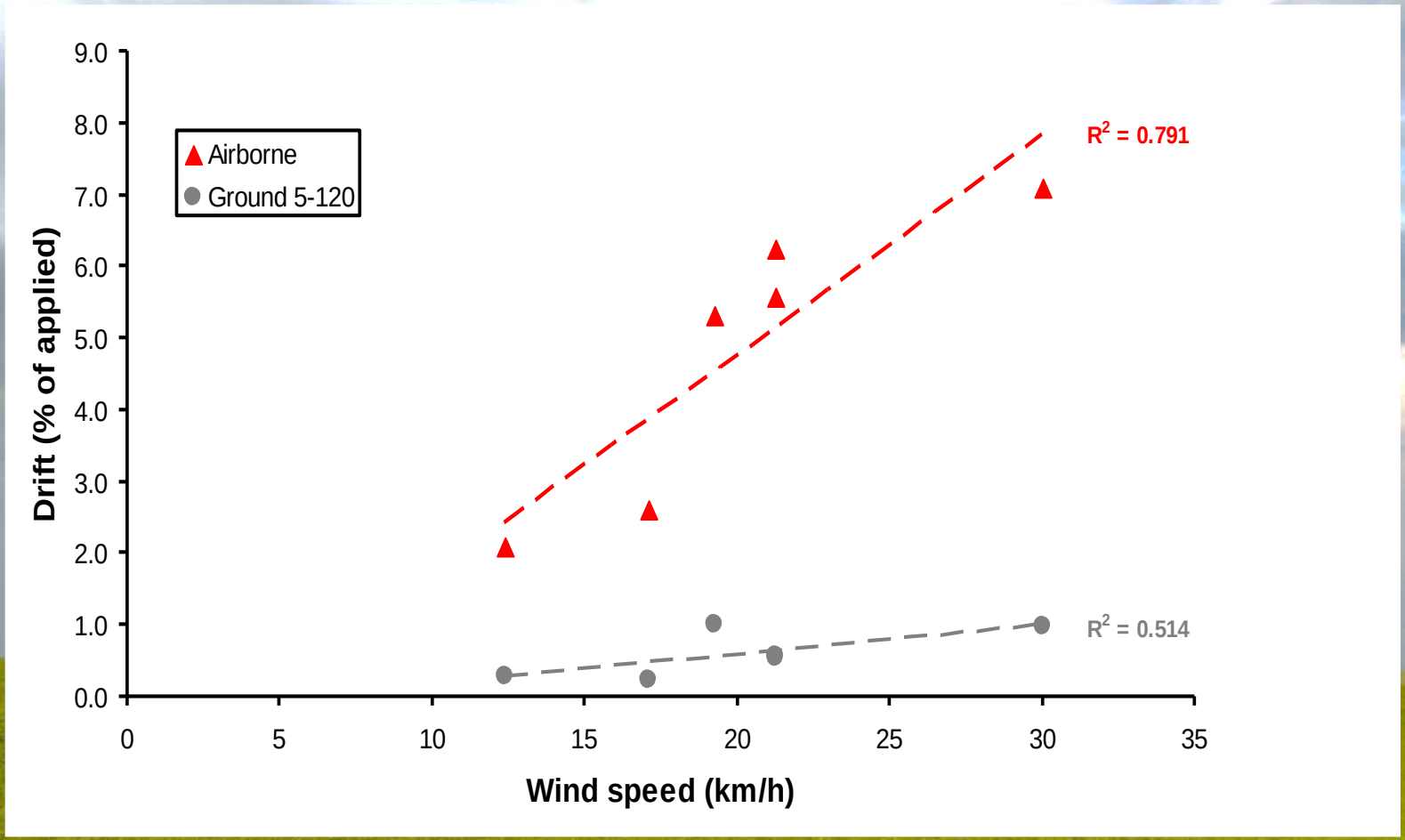


Buffer Zones and DRTs only work for non-volatile products

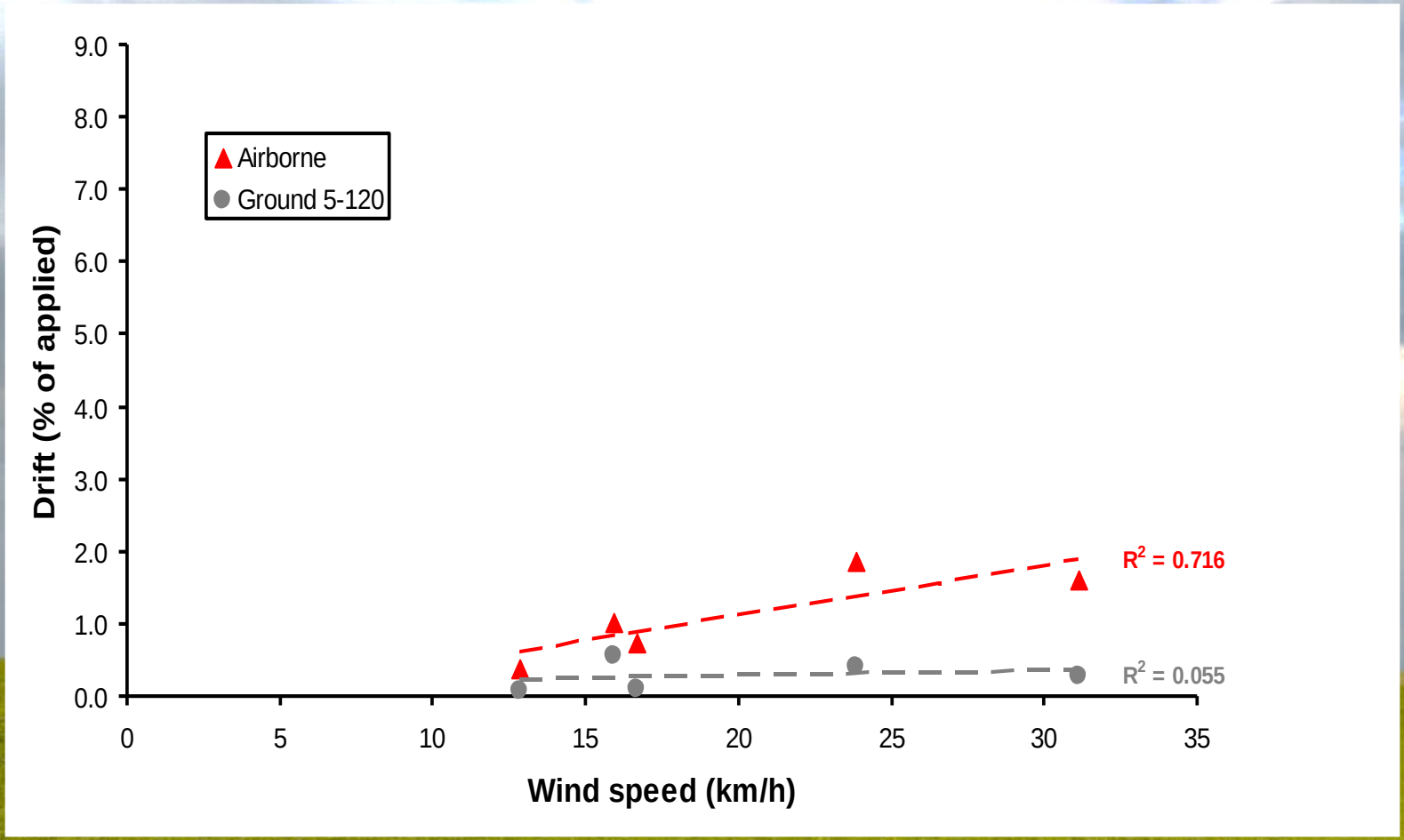
It’s better to spray in wind than (inverted) calm


Courtesy George Ramsey, DuPont

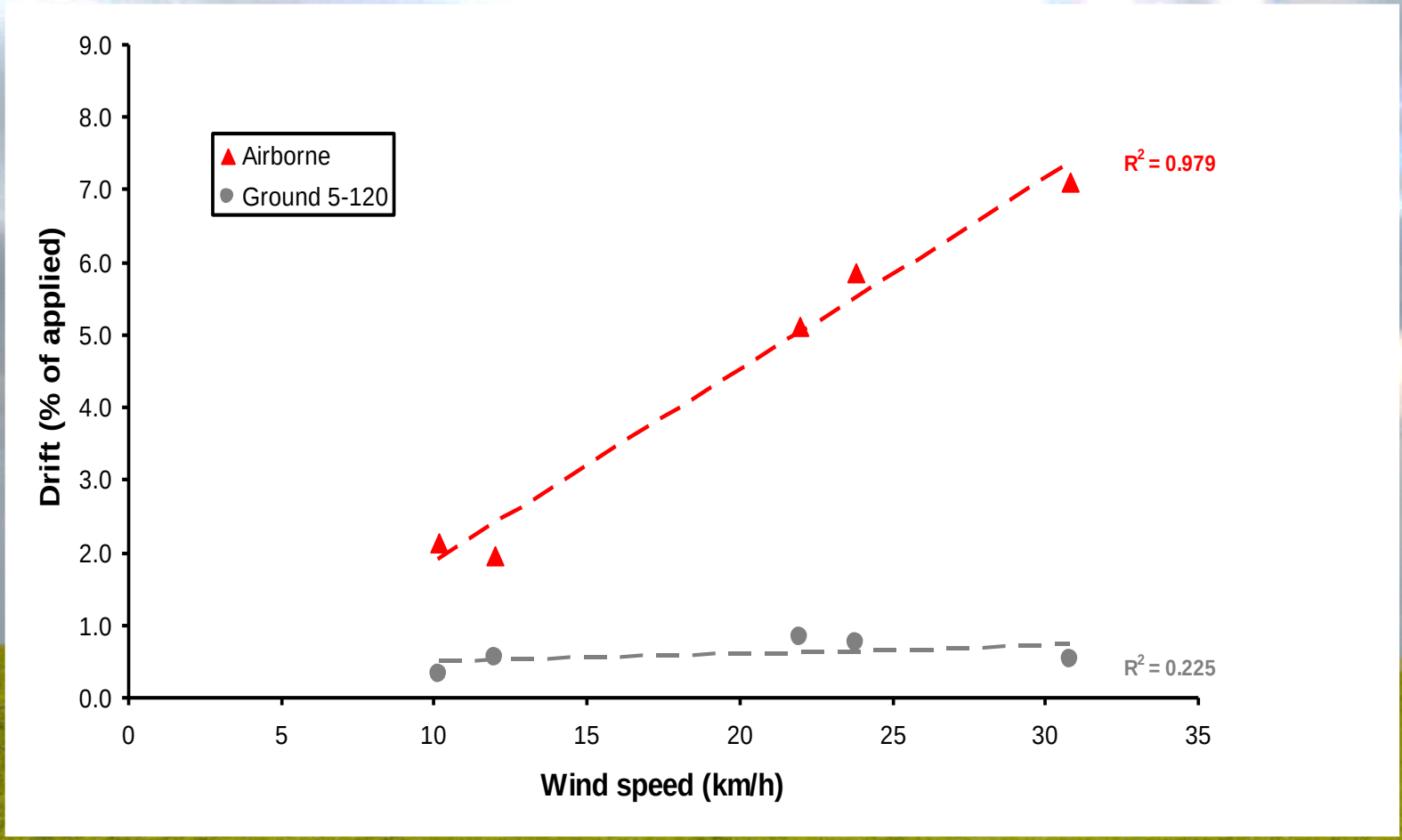
XR8003 (M), 24” boom, 8 mph



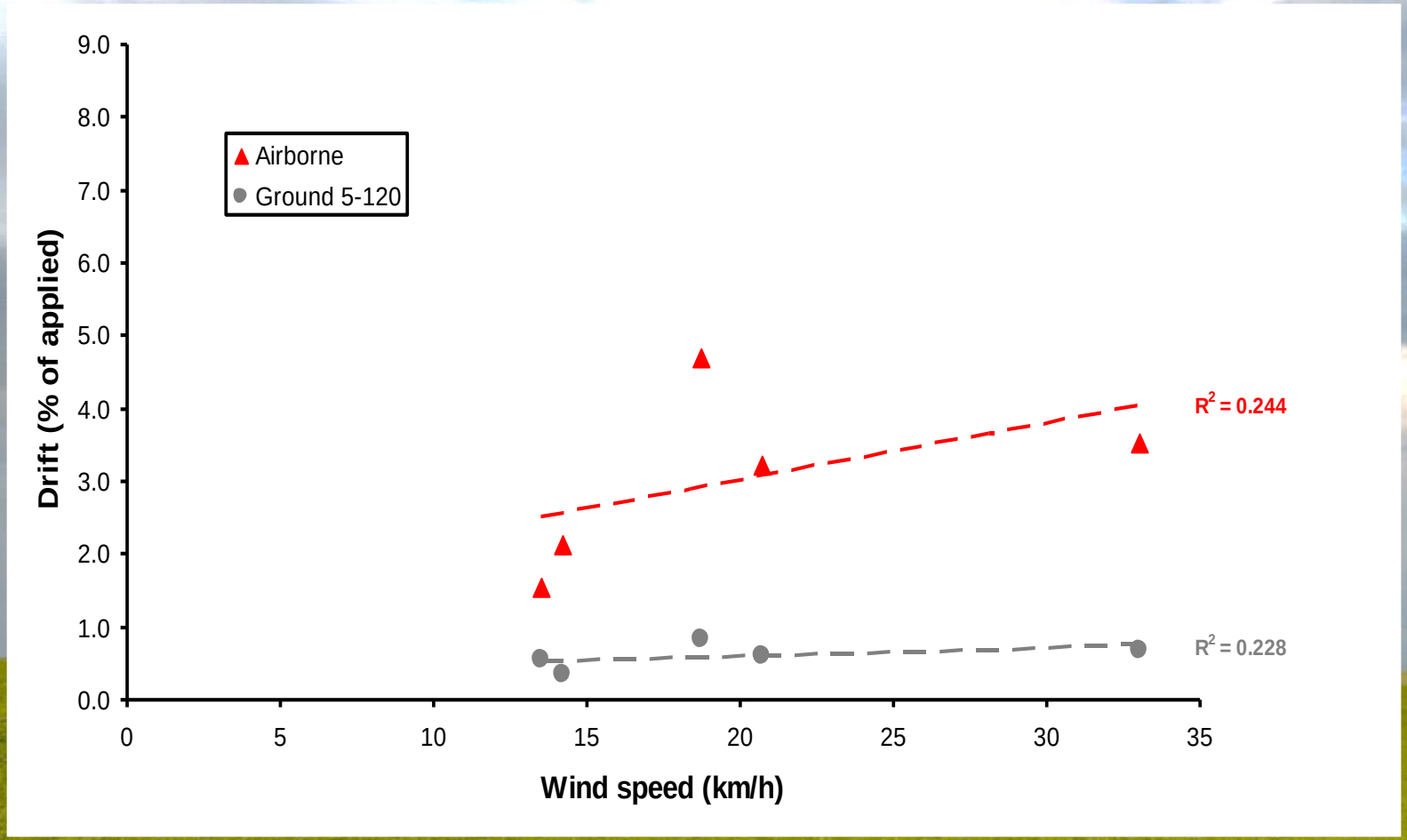
AI110025 (XC), 24” boom, 8 mph

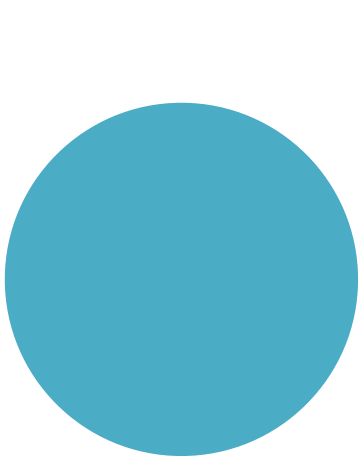
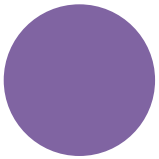


TT11005 (VC), 30” boom, 14 mph



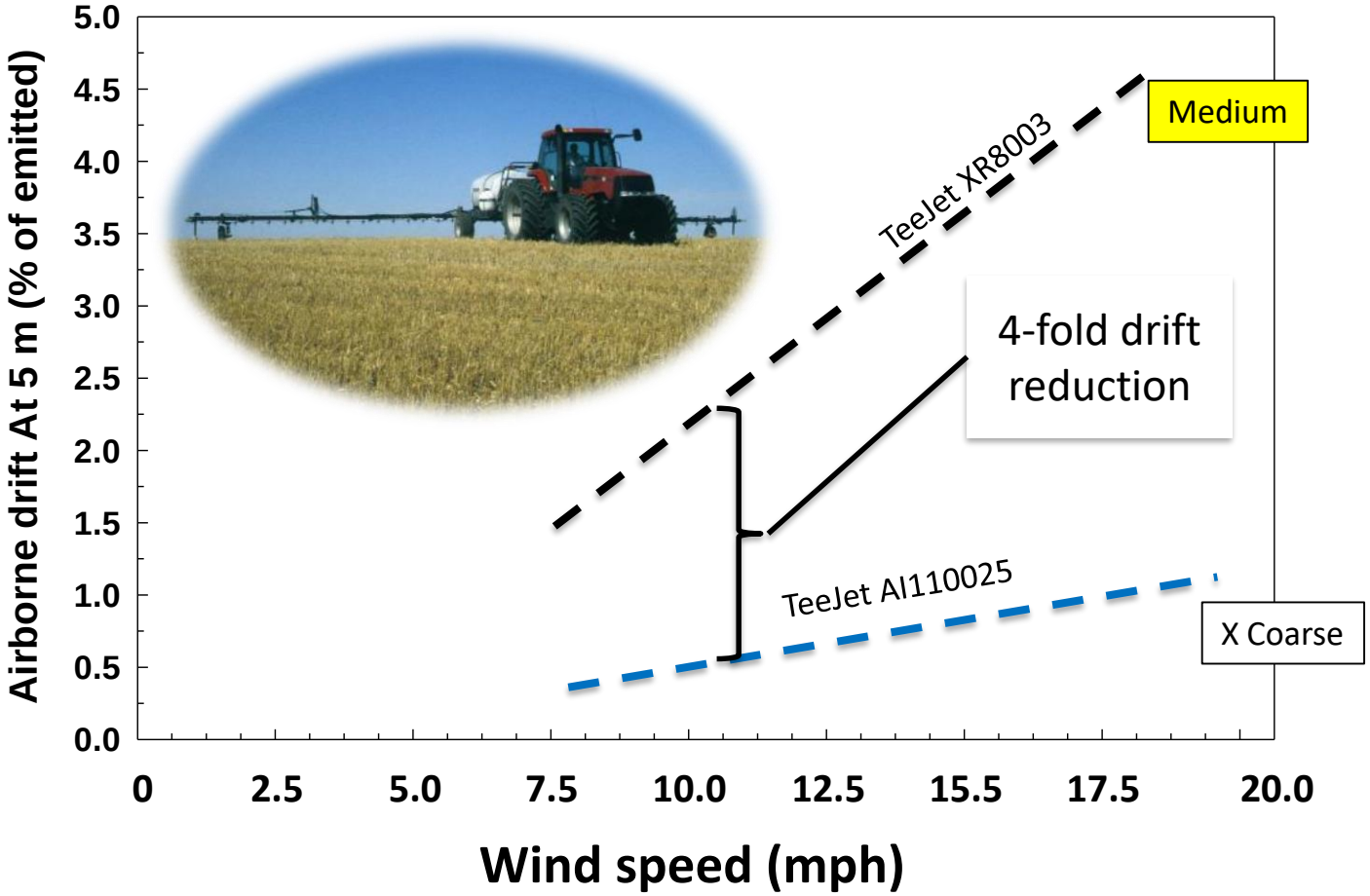
AI11004 (VC), 30” boom, 14 mph



We can only respond to, not control, technological developments

20” Boom height, 8 mph



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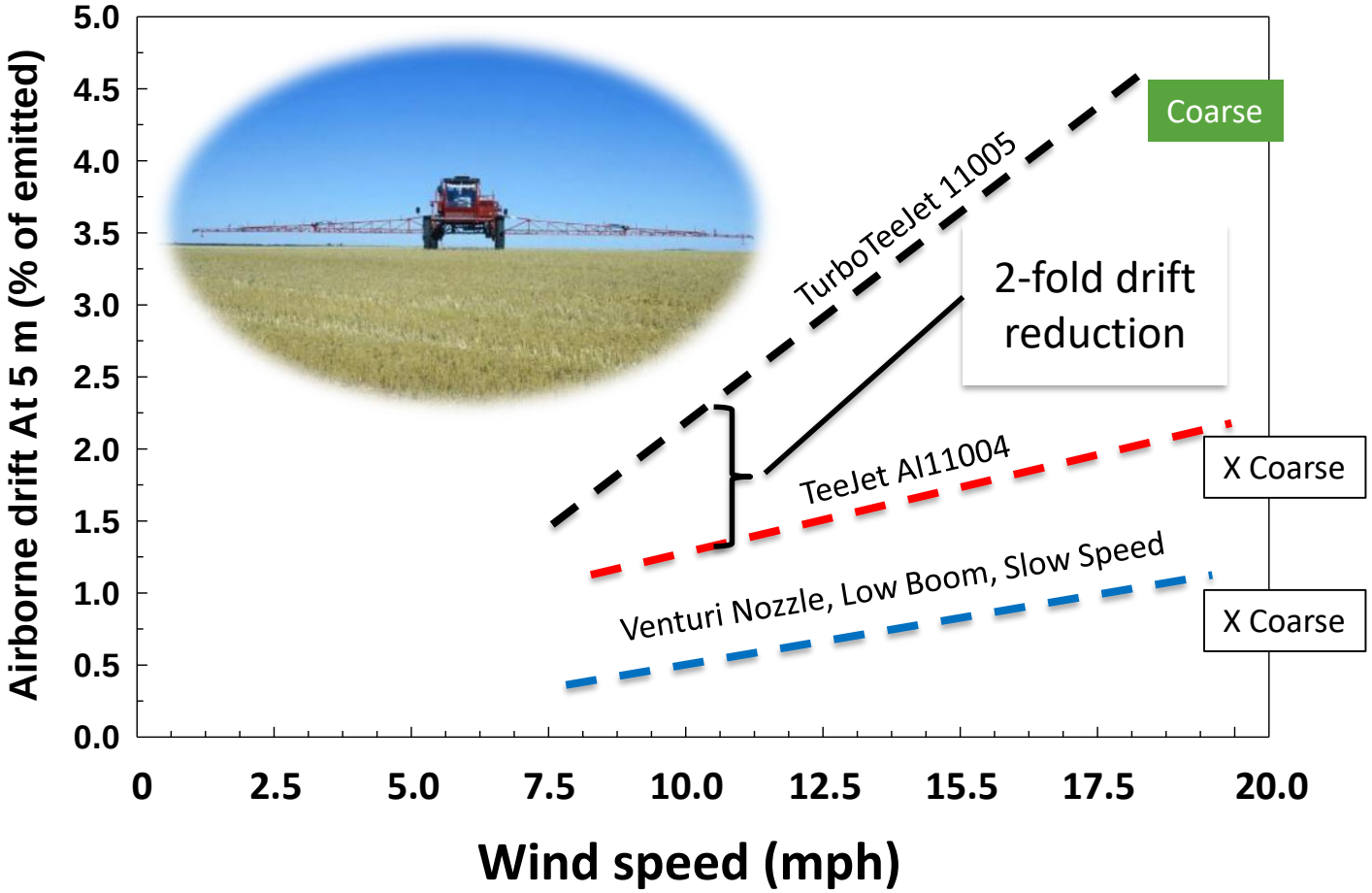
30” Boom height, 14 mph



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We need to recover the cost of BMPs for our clients

Adam Spelhaug
@PFSagronomyguy

Follow

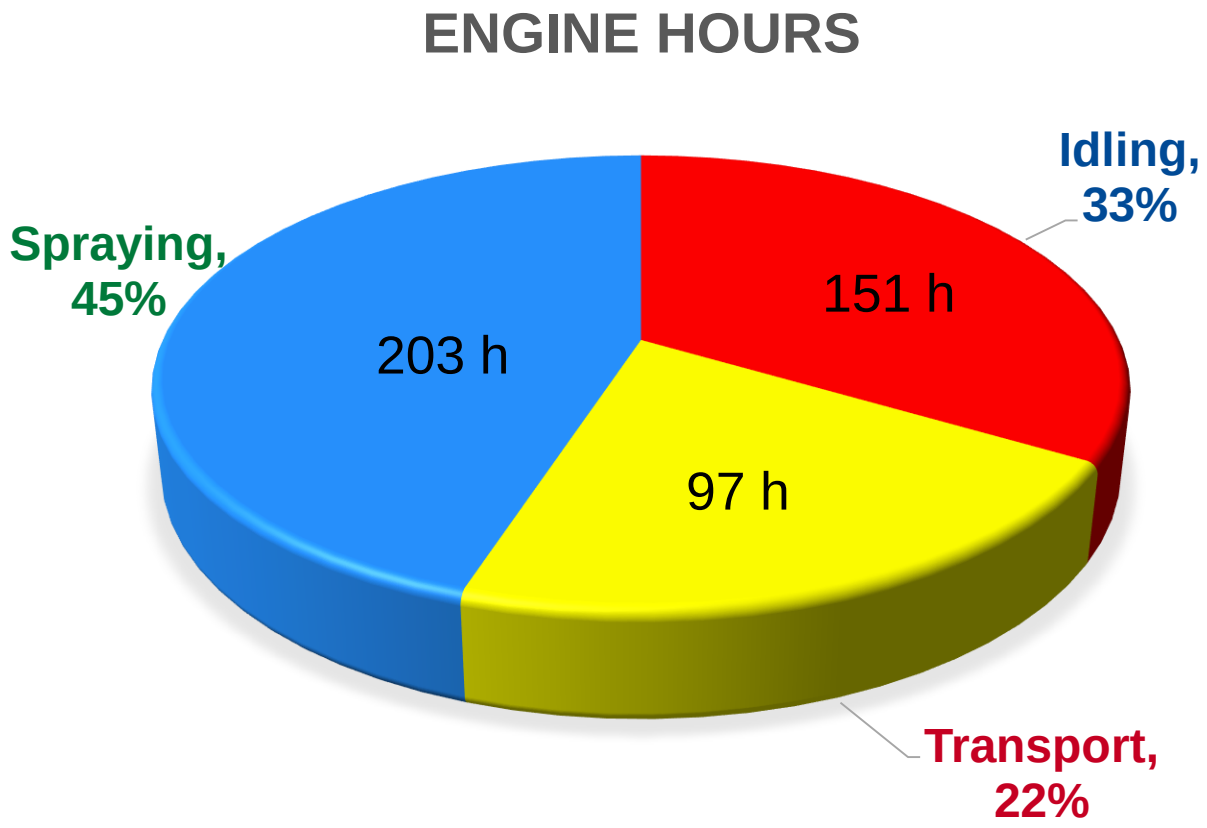
Ran some more #Dicamba application hours for the month of JUNE per the new NoDak recs

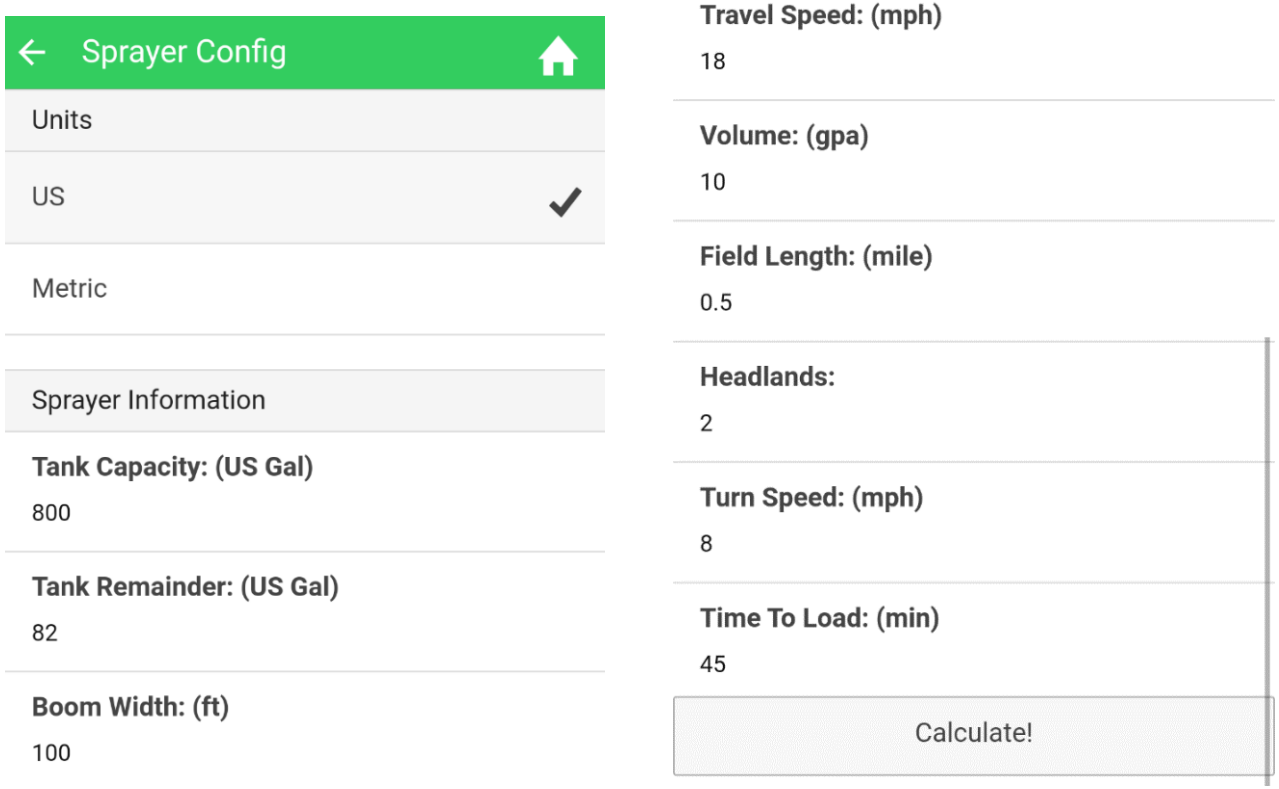
3-9.99mph wind, under 85F, 7AM-9PM

Wishek- 12hrs
Berthold- 18hrs
Cooperstown- 19hrs
Carrington- 21hrs
Stephen, MN- 26hrs
Oakes- 32hrs
Prosper- 36hrs
Wahpeton- 36hrs
Campbell, MN- 40hrs

7:27 AM - 30 Nov 2017

8 Sprayer Average (450 engine hours/yr average)




Sprayer Config
Units
US
Metric
Sprayer Information
Tank Capacity: (US Gal)
800
Tank Remainder: (US Gal)
82
Boom Width: (ft)
100
Travel Speed: (mph)
18
Volume: (gpa)
10
Field Length: (mile)
0.5
Headlands:
2
Turn Speed: (mph)
8
Time To Load: (min)
45
Calculate!

Baseline

Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	18	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	45	min

30 min loading tank

60 min cleaning tank

Clean every 4 tanks
= 15 minutes per tank

TOTAL = 45 min/tank

Baseline

Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	18	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	45	min

OUTPUTS	
Gross Productivity	218 ac/h
Productivity with turns	161 ac/h
Net Productivity	**60 ac/h**
Driving time lost to turns	26 %
Spraying lost to loading	63 %
Productivity lost	73 %
% of Baseline	**100 %**

…& Slow

Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	14	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	45	min

OUTPUTS	
Gross Productivity	170 ac/h
Productivity with turns	133 ac/h
Net Productivity	**56 ac/h**
Driving time lost to turns	22 %
Spraying lost to loading	58 %
Productivity lost	67 %
% of Baseline	**93 %**


DELARO
DELARO
DELARO


Centurion
Centurion
Centurion
Centurion
Centurion
Centurion
Centurion

…& fast fill

Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	14	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	25	min

10 min loading tank

60 min cleaning tank

Clean every 4 tanks
= 15 minutes per tank

TOTAL = 25 min/tank

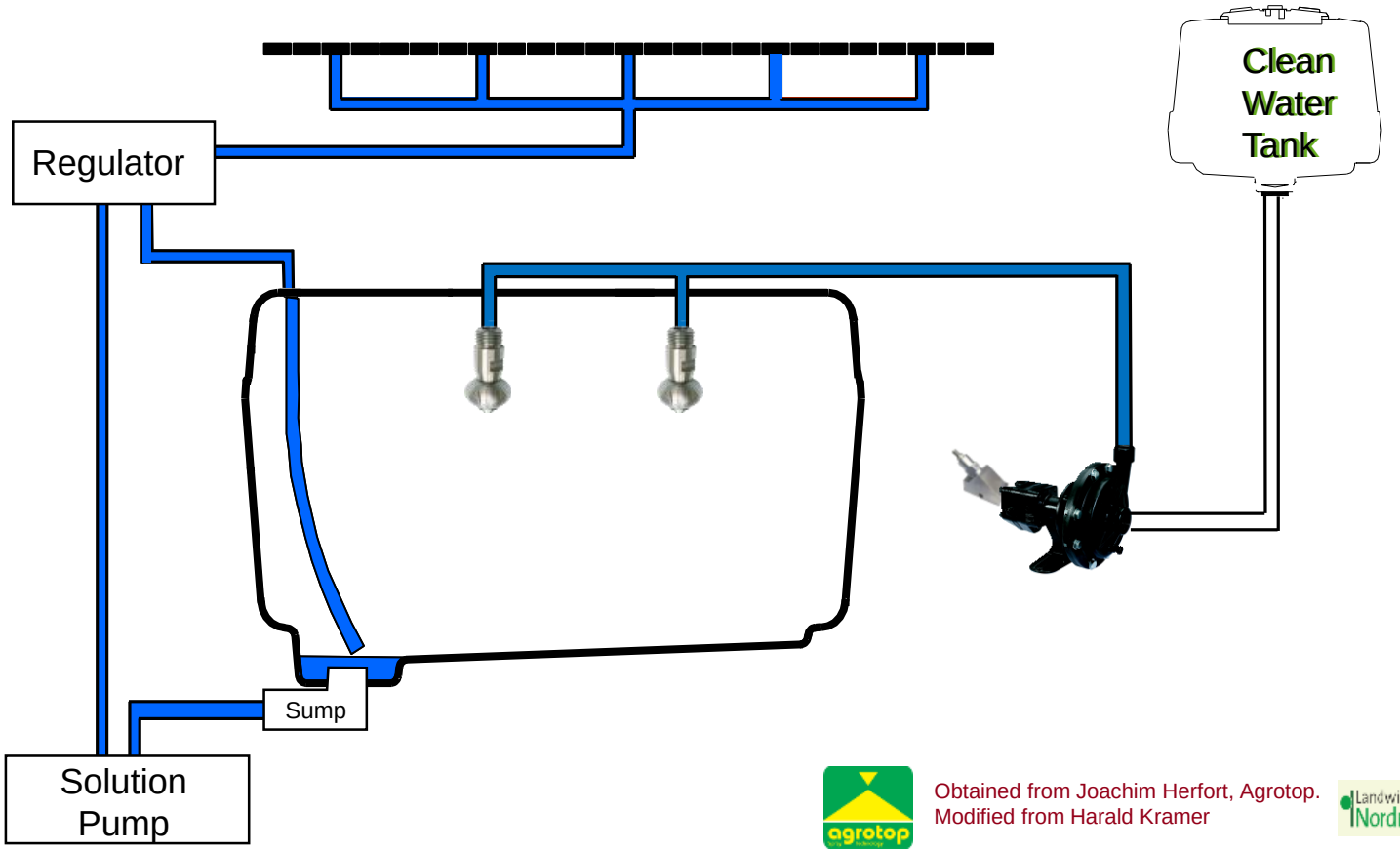
…& fast fill

Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	14	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	25	min

OUTPUTS	
Gross Productivity	170 ac/h
Productivity with turns	133 ac/h
Net Productivity	**75 ac/h**
Driving time lost to turns	22 %
Spraying lost to loading	44 %
Productivity lost	56 %
% of Baseline	**125 %**


Source: Hardi Sprayers

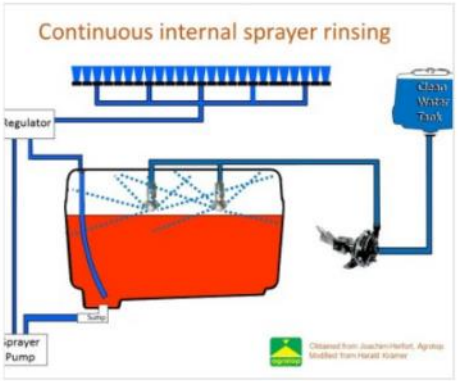
Continuous internal sprayer rinsing



Obtained from Joachim Herfort, Agrotop.
Modified from Harald Kramer


AMT
AMT

Search Results for: continuous



Continuous Rinsing

Nozzle_Guy Boom Sprayers, Cleaning & Maintenance, Cleaning & Maintenance, Speciality Sprayers

We've recently been talking about how to save time while cleaning a sprayer. Although it's very important to be thorough while cleaning, and to take the necessary time to do the job properly, there is always an opportunity to fine tune and spend less ...*Read More*

Continuous Rinsing should be considered in North America

Spray_Guy Boom Sprayers, Cleaning & Maintenance, Cleaning & Maintenance, Speciality Sprayers

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MAIN TANK GAL
0
FRESH WATER
0 Gallons
Density
0.99
Panasonic
JOHN DEERE
Manual Target Pressure (psi)
90
0.0
gal/ac
0 (gal)
0
psi
0.0
mi/h
0
100%
L3
L2
L1
C
R1
R2
R3
0 (m)
0
n/min
0
gal
Go to Menu | Greenstar to complete the GreenStar license agreement
1
Park Brake
1/2

…& fast fill and fast clean

Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	14	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	17.5	min

10 min loading tank

30 min cleaning tank

Clean every 4 tanks
= 7.5 minutes per tank

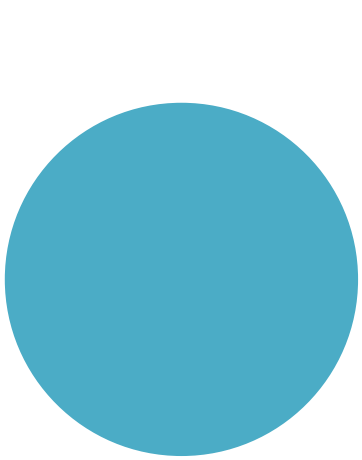
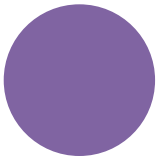
TOTAL = 17.5 min/tank

...& fast fill and fast clean

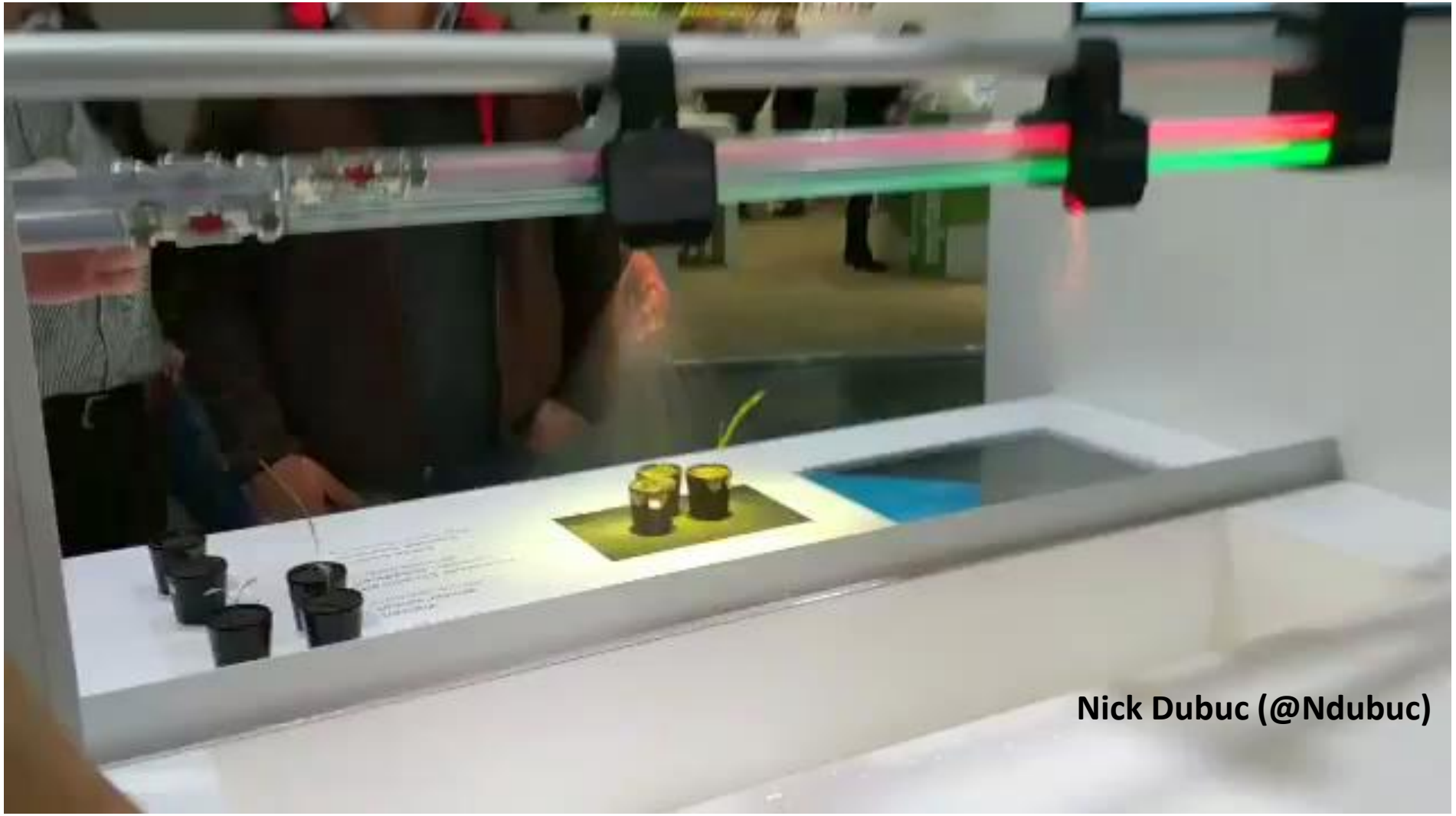
Variable	Baseline	Units
Tank Capacity:	800	gal
Tank Remainder:	82	gal
Boom width:	100	ft
Travel Speed:	14	mph
Volume:	10	gpa
Field length:	0.5	mile
Headlands:	2	
Turn speed:	8	mph
Time to load & clean:	17.5	min

OUTPUTS	
Gross Productivity	170 ac/h
Productivity with turns	133 ac/h
Net Productivity	**86 ac/h**
Driving time lost to turns	22 %
Spraying lost to loading	35 %
Productivity lost	49 %
% of Baseline	**144 %**


WESTEEL

Sensing Technology will buy us some time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