WINFIELD™

USING ADJUVANTS TO INCREASE COVERAGE AND REDUCE OFF TARGET MOVEMENT WITH AERIAL APPLICATIONS

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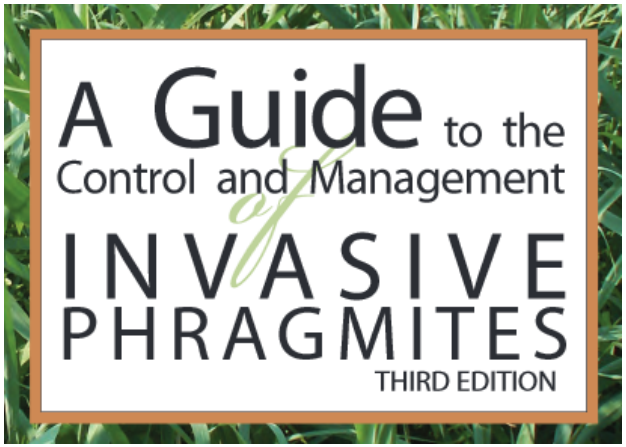
INVASIVE PLANTS AND AERIAL APPLICATIONS

Aerial application is an efficient and useful method land mangers can add to their IWM toolboxes for weed infestations involving:

- Multiple weed species,
- At landscape scale, and
- On steep and remote areas

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd497004.pdf

PHRAGMITES



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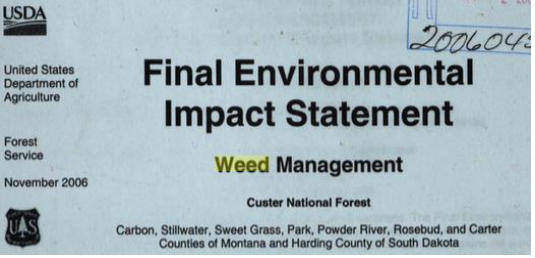
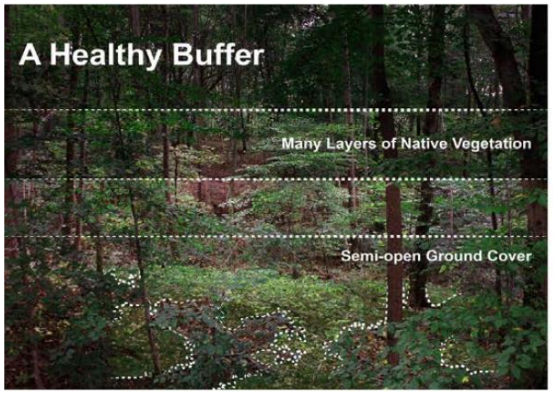
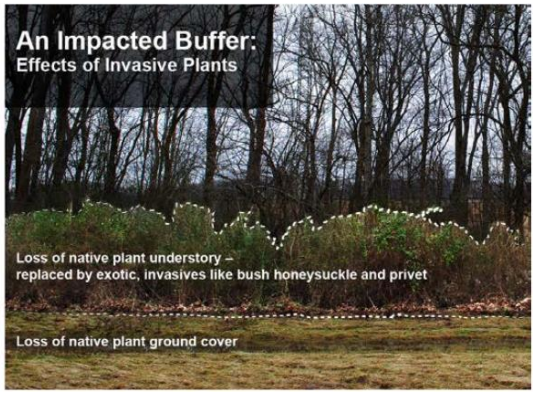
https://www.michigan.gov/documents/deq/deq-ogl-ais-guide-PhragBook-Email_212418_7.pdf



APPENDIX N
AERIAL SPRAY GUIDELINES AND DRIFT MODEL RESULTS





https://www.tn.gov/assets/entities/agriculture/attachments/UrbanRiparianBufferHandbook.pdf

Buffers and No Treatment Areas: Buffer and no treatment areas should be established around any sensitive resource you want to avoid. These areas may include live water, wet areas, other land ownerships, TES plants or occupied areasAerial treatment buffer zones may vary depending on site characteristics. Treatments may also be designed to avoid any aerial treatment near sensitive resources (see Appendix C). . The width of an aerial treatment buffer zone near sensitive resources should consider:

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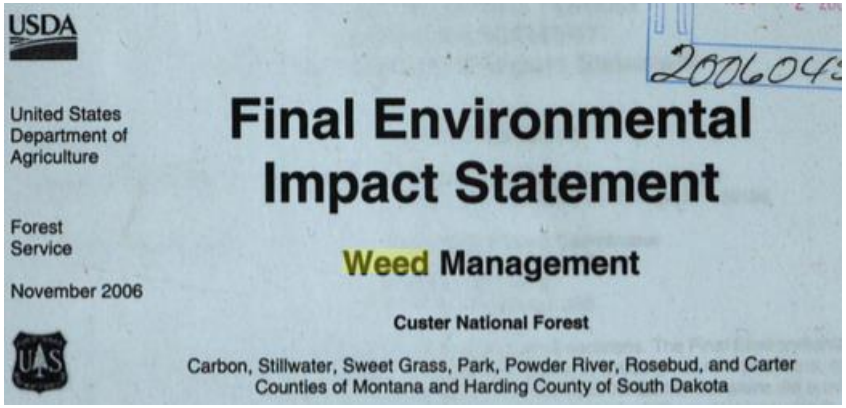
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd497004.pdf

ADJUVANTS FOR INVASIVE MGMT


USDA

United States Department of Agriculture

Forest Service

November 2006

Final Environmental Impact Statement

Weed Management

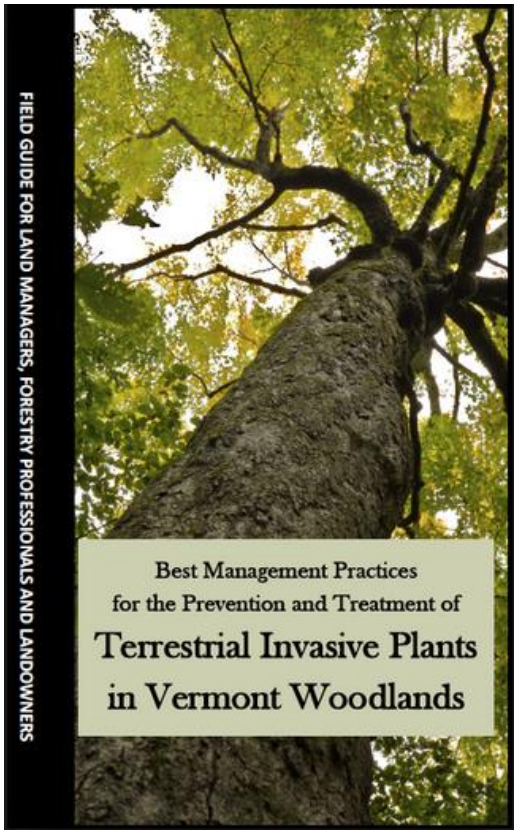
Custer National Forest

Carbon, Stillwater, Sweet Grass, Park, Powder River, Rosebud, and Carter Counties of Montana and Harding County of South Dakota

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd497004.pdf

Drift Mitigation Measures: Drift mitigation measures may include:

- Use of a drift agent
- Use of buffer areas next to sensitive resources
- On site weather monitoring
- Treatment next to sensitive areas when wind is upslope and gentle
- No treatment during inversions
- No treatment when winds in the project area are > 6 mph
- No treatment when weather forecasts predict rain in next 24 hours



http://www.vtinvasives.org/sites/default/files/tool_4_treatmentmethods_final__2_.pdf

Drift retardants

Drift retardants thicken spray solutions to create larger drops that are less likely to drift in wind, permitting more accurate applications in light wind and continued applications in slightly windier conditions.

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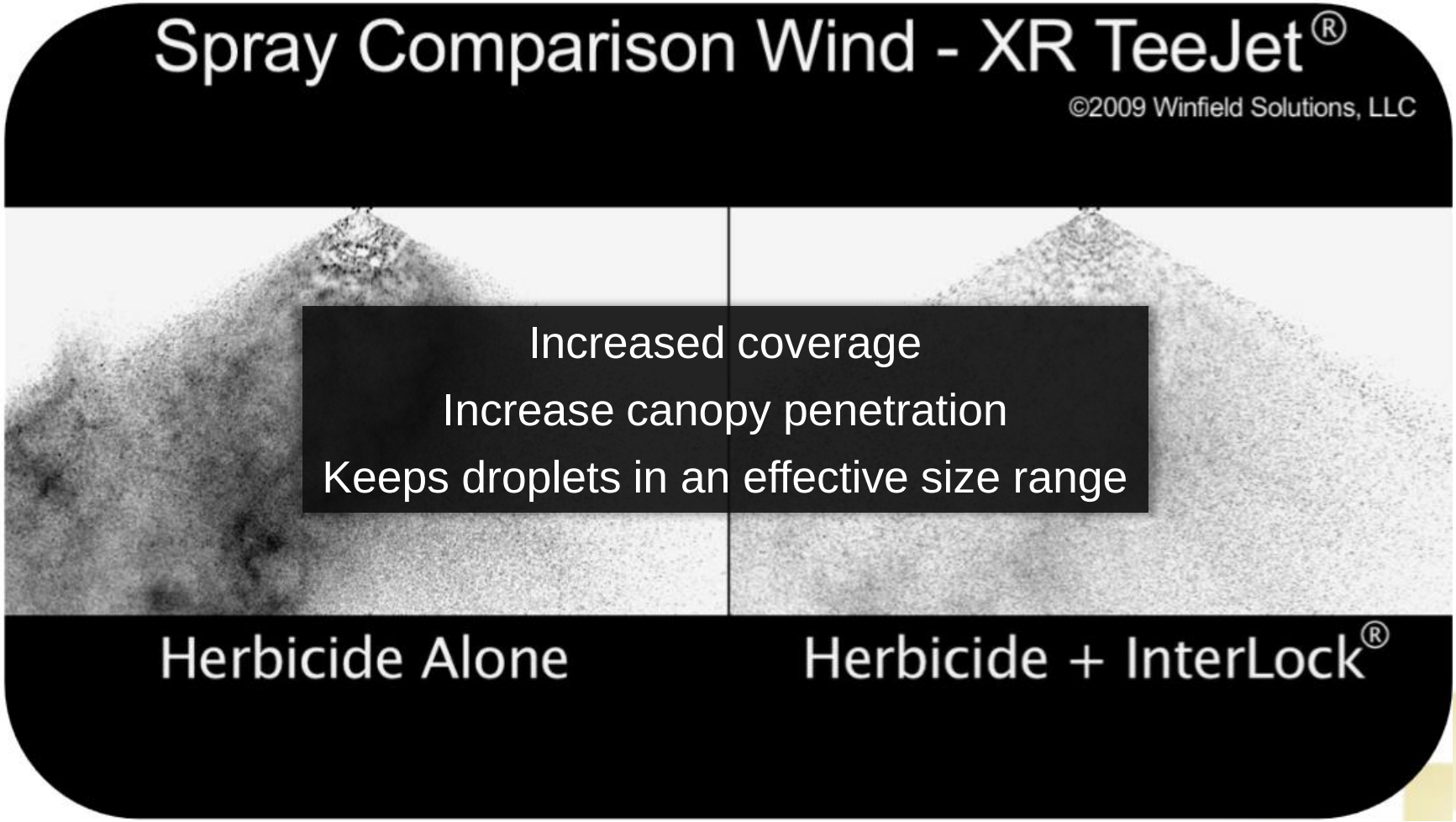
WHAT IS A DRIFT AND DEPOSITION AID ?



WHAT IS A DRIFT AND DEPOSITION AID ?

- 2 products at Winfield

InterLock®

- Flagship Drift and Deposition aid
- Can reduce fine droplets up to 50%
- 2015: growers applied InterLock® on more than 67 million acres in the US
- #2 most common applied CPP behind RoundUp

MasterLock®

- 80% InterLock + 20% proprietary Drop-Tight Technology
- Marketed towards aerial applications
- Increases spreading and sticking to the leaf surface

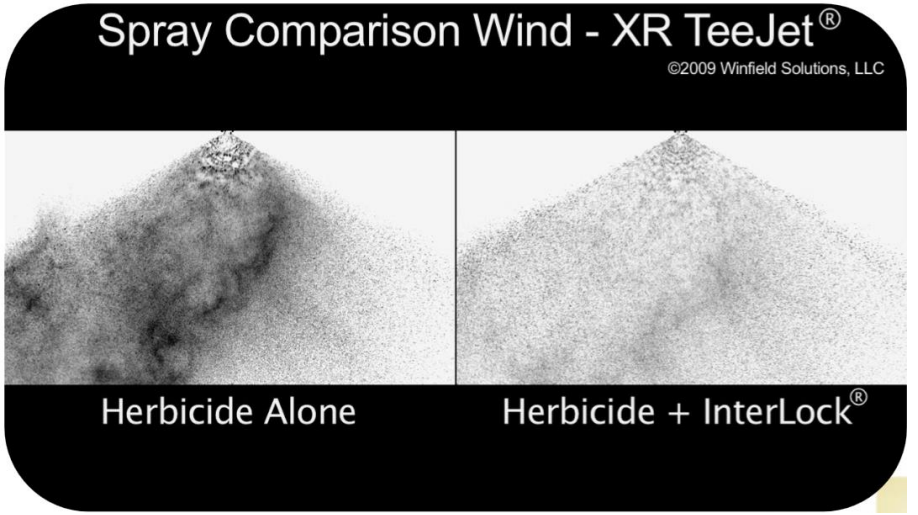


Figure 1.

Decrease in fine particles in the spray application with (bottom) and without (top) MasterLock® adjuvant.

STUDY OBJECTIVES

1. Examine multiple spray mixtures with and without drift and deposition adjuvants for off target spray movement

2. Use of water sensitive cards placed at different horizontal positions (e.g. upwind, treated area and downwind) to better visualize dynamic spray drift

3. Collect real-time video recordings of aerial spray application to better visualize spray deposition

EXPERIMENTAL DESIGN

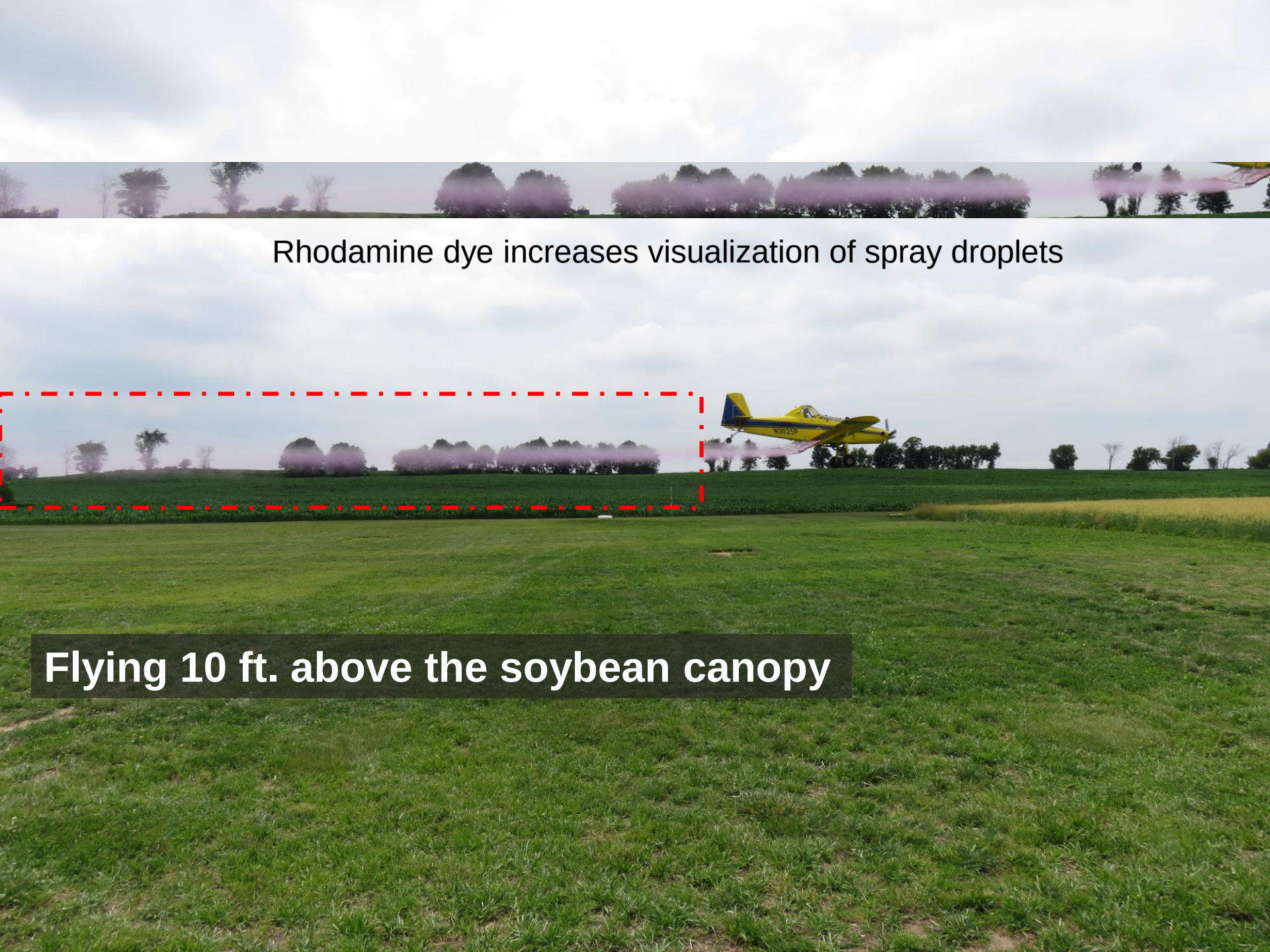
- **Location:** Chilton, WI
- **Owner & Operator:** Dean Heimmerman
- **Field:** RR soybeans on either side of a active airstrip
- **Wind direction:** From the north
- **Wind Speed:** 1.7 to 4.7 MPH

EXPERIMENTAL DESIGN

- Each treatment replicated 4x
  - One replicate = individual pass of the plane

- Treatments
  1. Water*
  2. Water* plus InterLock®
  3. Water* plus MasterLock®
  4. Water* plus Experimental adjuvants (not presented)

*Rhodamine dye added to each mixture to increase visualization


Rhodamine dye increases visualization of spray droplets
Flying 10 ft. above the soybean canopy

EXPERIMENTAL DESIGN

- **Plane:** Air Tractor® 502 A
- **Tips:** 36 40° flat fan nozzles, CP® 11 TT
- **Application volume:** 2 or 5 gpa
- **Plane speed:**150 mph
- **Application pressure:** 40 psi

15 poles placed 10 ft apart horizontally

Water Sensitive Cards 2 ft above canopy

Videos taken with a camera placed in a boom lift and operated remotely from the ground

Airplane flew over the boom lift, dropped to a application height (10 feet above the canopy) and began each application

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Upwind

Treated area

Downwind

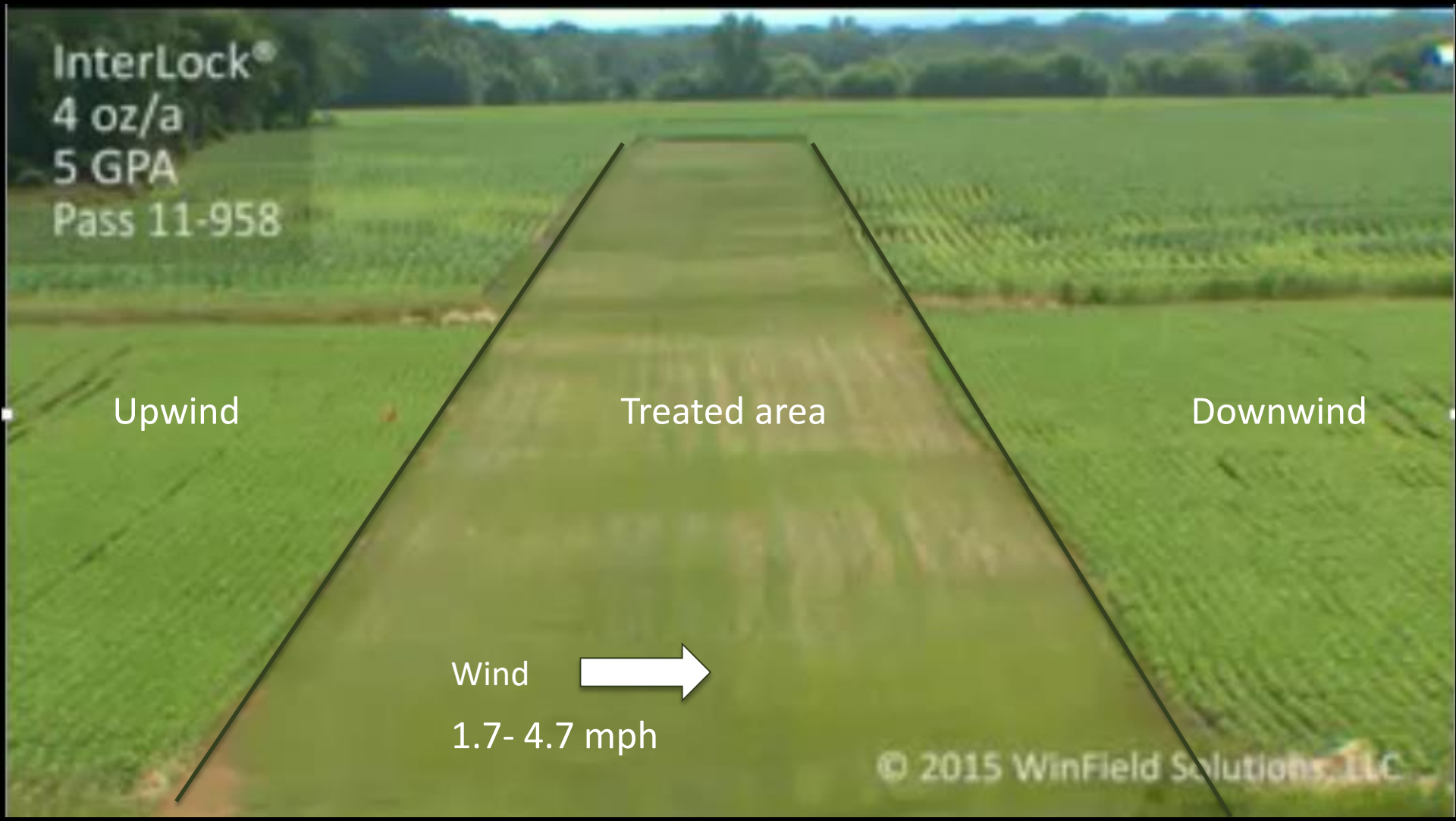
N

Wind

1.7- 4.7 mph

Boom lift / video recording

- 15 poles placed 10 ft apart horizontally
- Water Sensitive Cards 2 ft above canopy
- Plane flying 10 ft above the soybean canopy
- Poles 10 ft apart (*not to scale)



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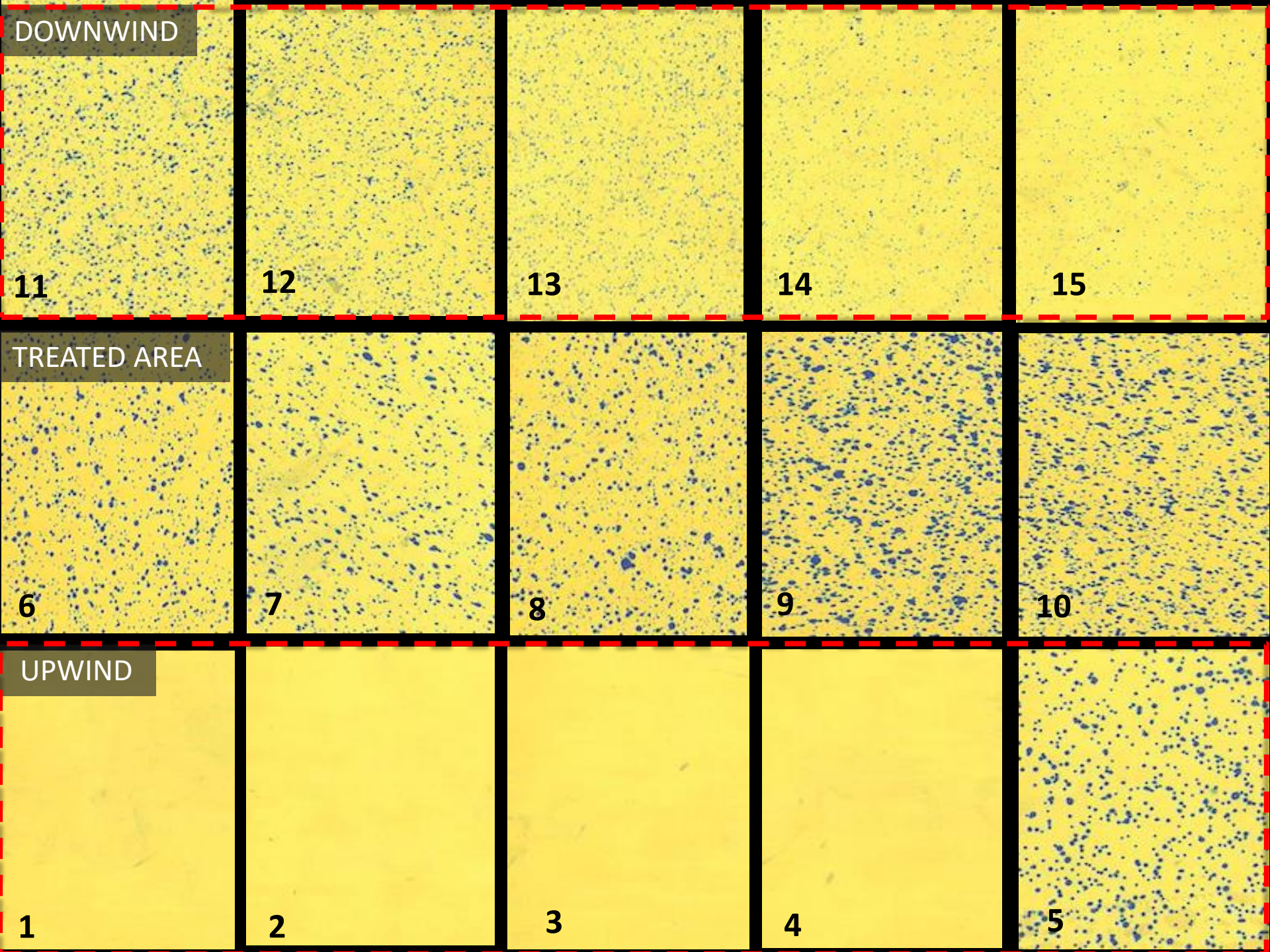
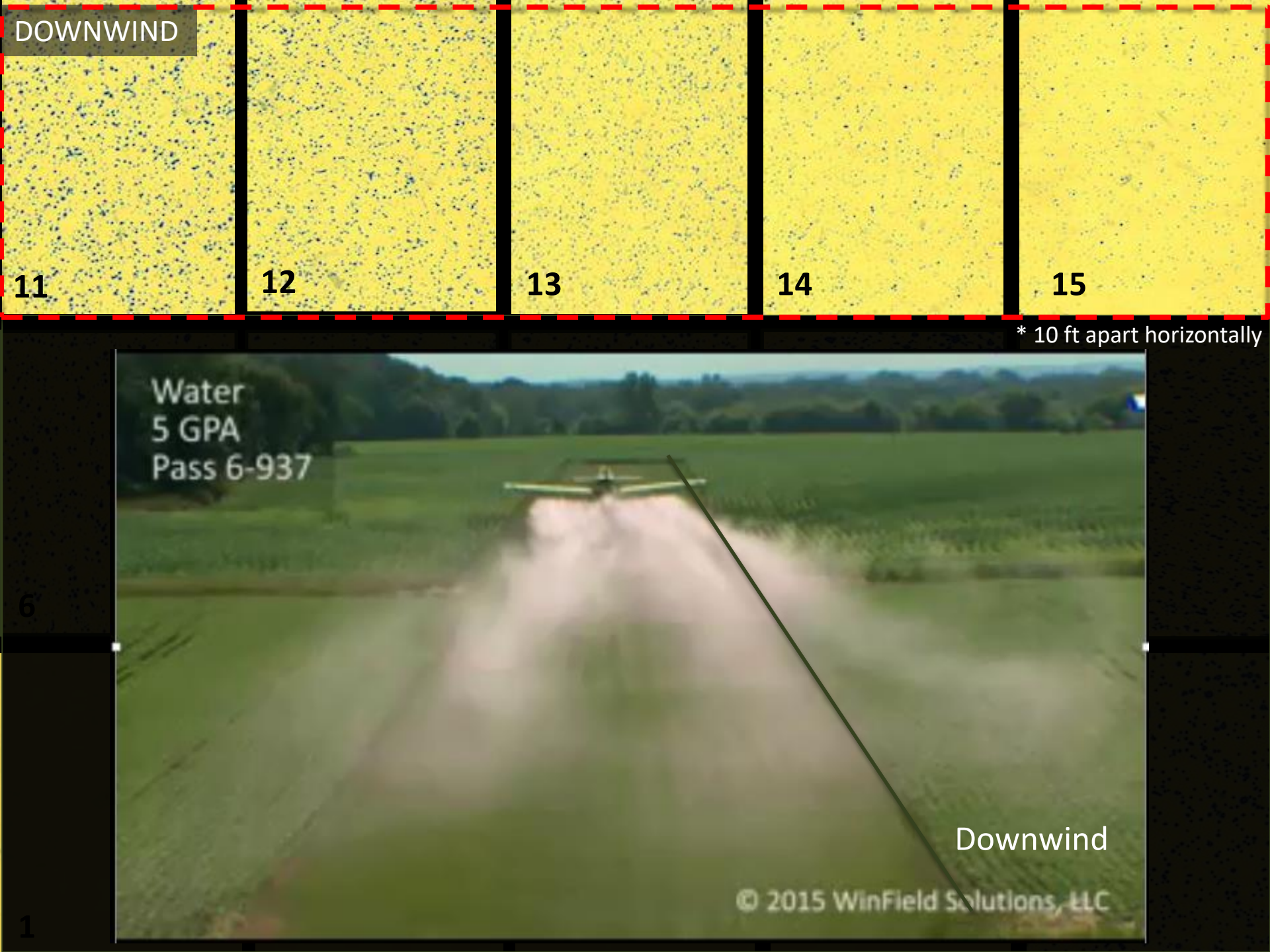
UNTREATED CONTROL (WATER ALONE)


DOWNWIND
11
12
13
14
15
TREATED AREA
6
7
8
9
10
UPWIND
1
2
3
4
5


DOWNWIND
11
12
13
14
15
* 10 ft apart horizontally
Water
5 GPA
Pass 6-937
6
1
Downwind
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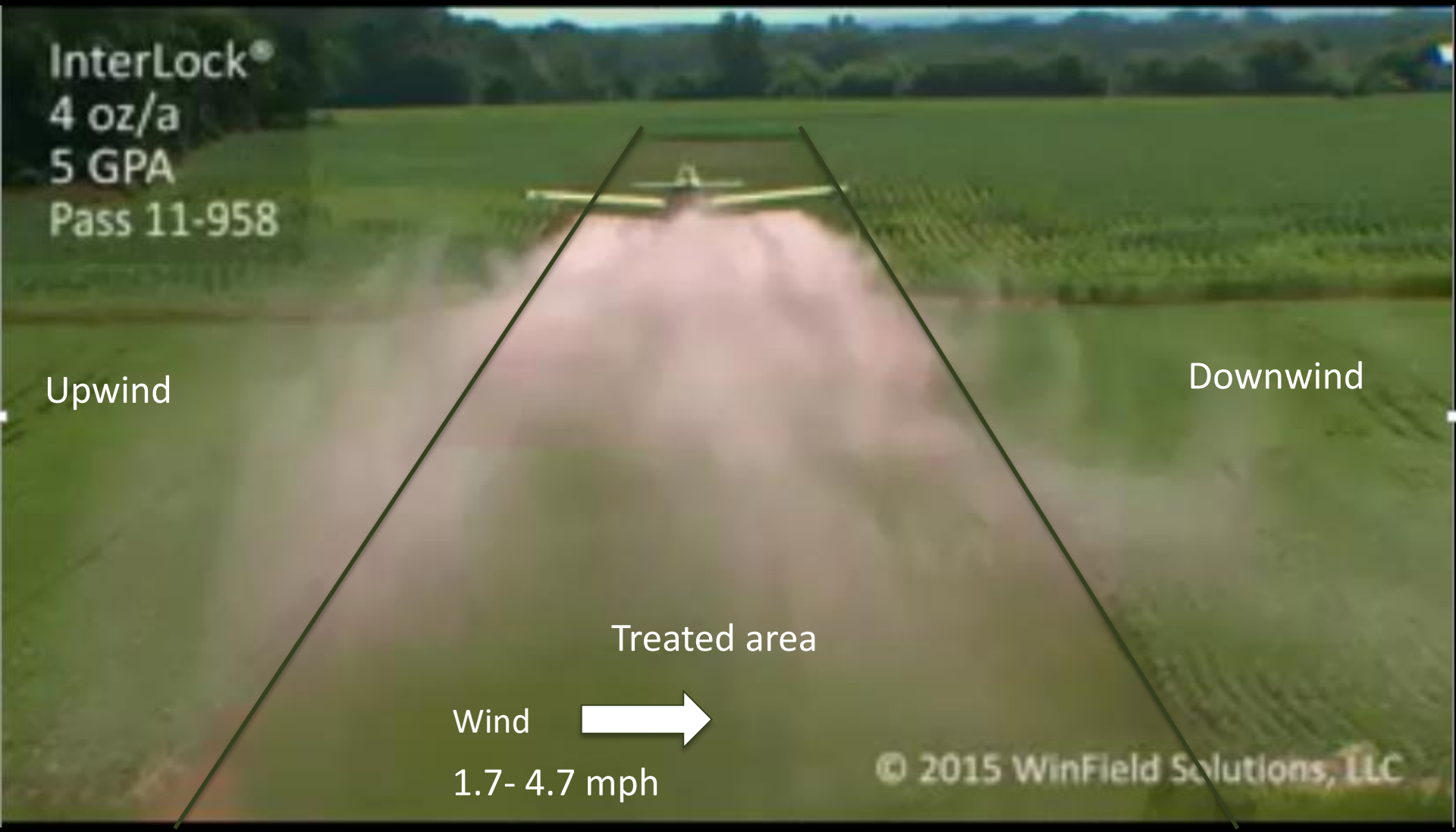
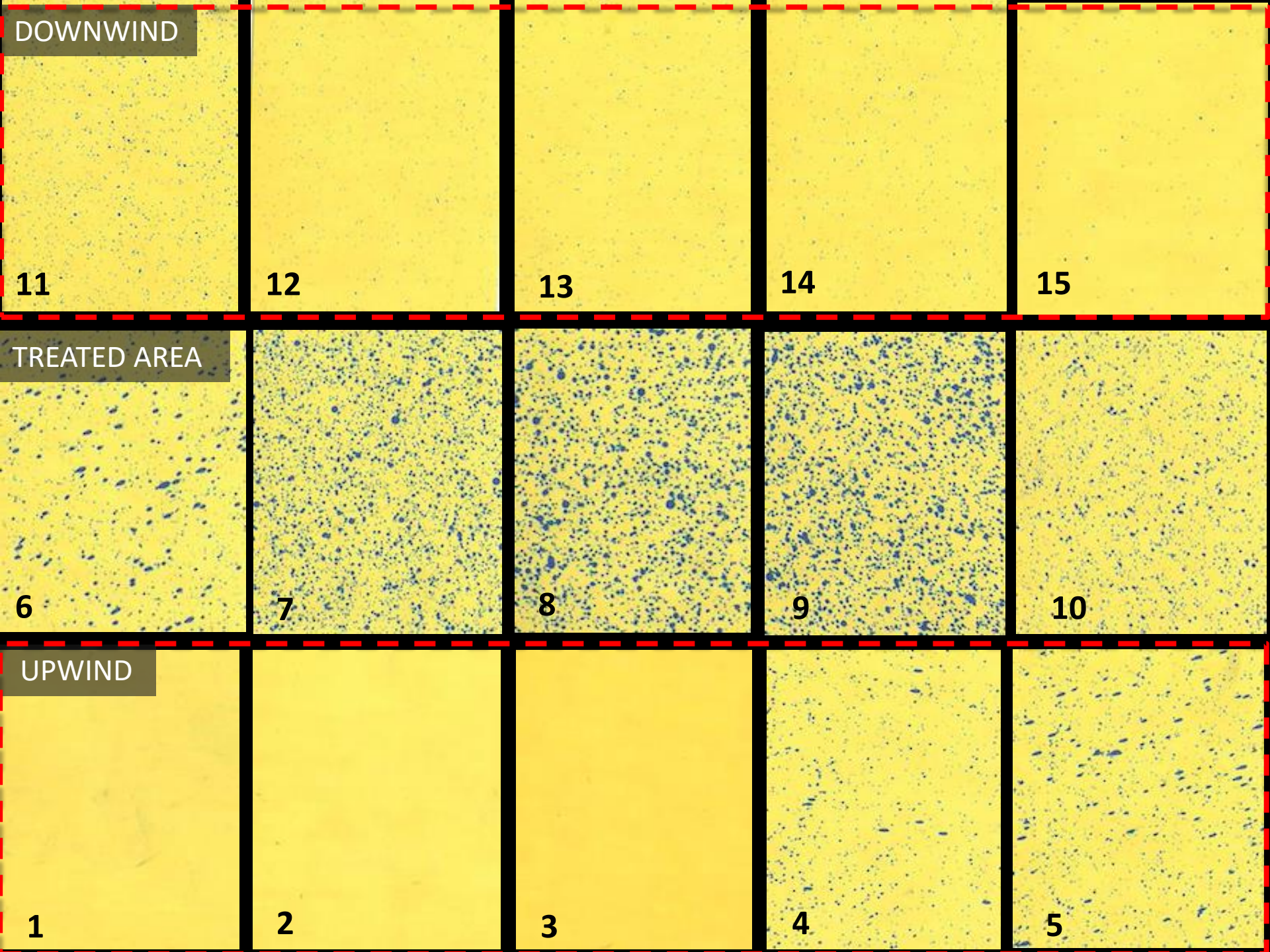
INTERLOCK® TREATMENT



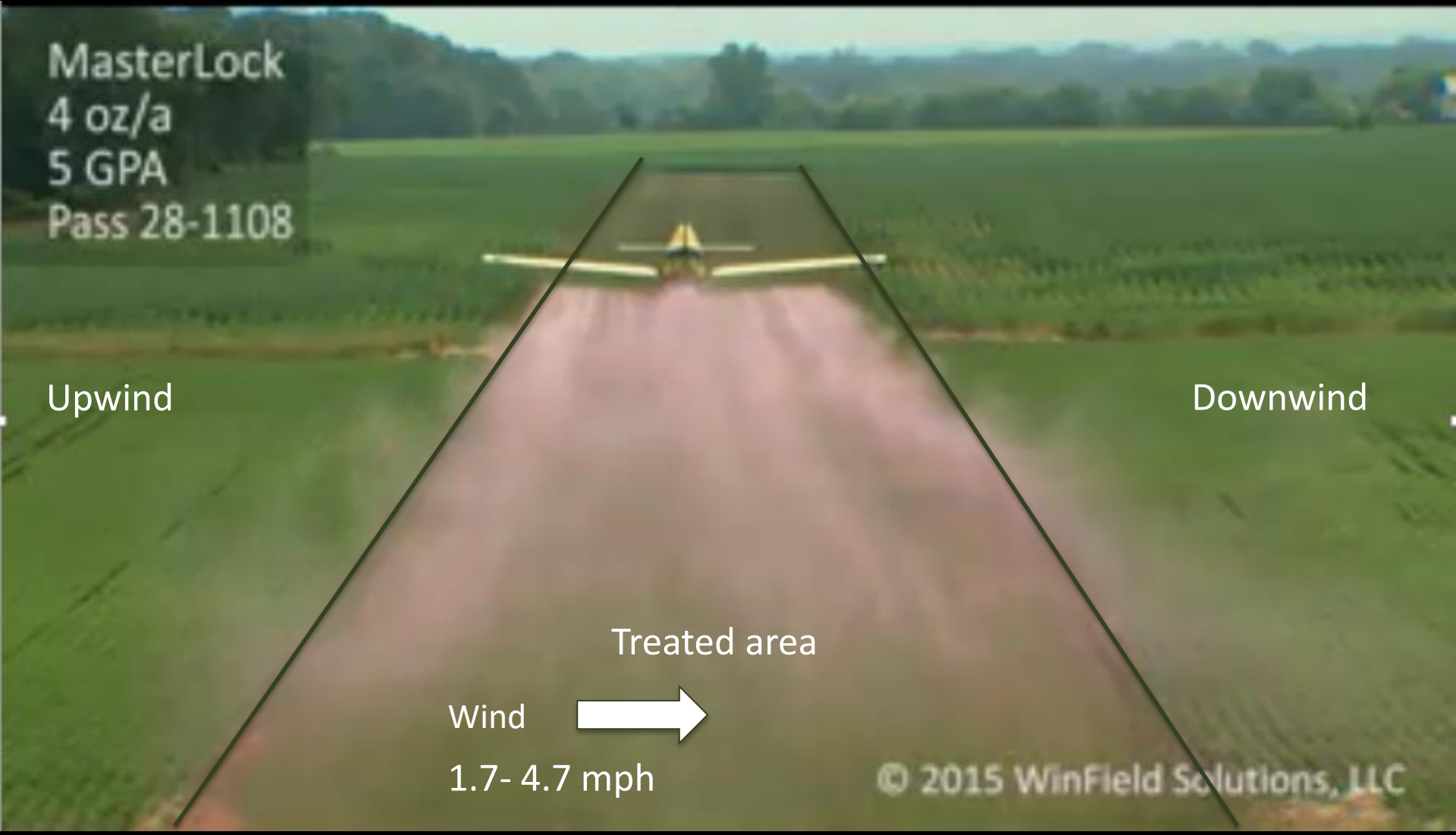

DOWNWIND
11
12
13
14
15
TREATED AREA
6
7
8
9
10
UPWIND
1
2
3
4
5

DOWNWIND

11 12 13 14 15

* 10 ft apart horizontally

MASTERLOCK®
TREATMENT



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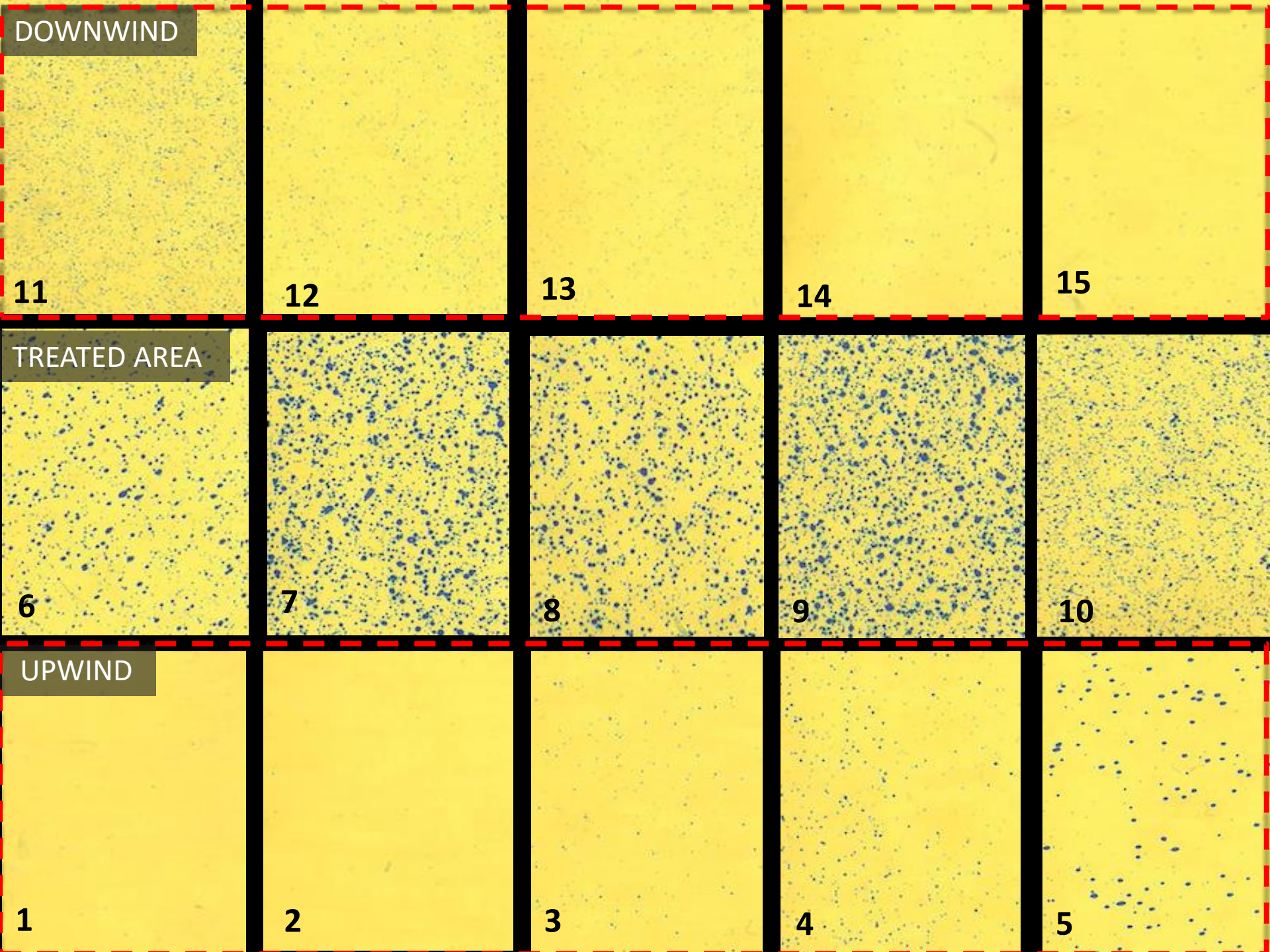
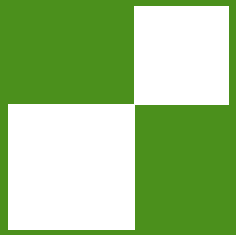

DOWNWIND
11
12
13
14
15
TREATED AREA
6
7
8
9
10
UPWIND
1
2
3
4
5

DOWNWIND

11 12 13 14 15

* 10 ft apart horizontally

RESULTS



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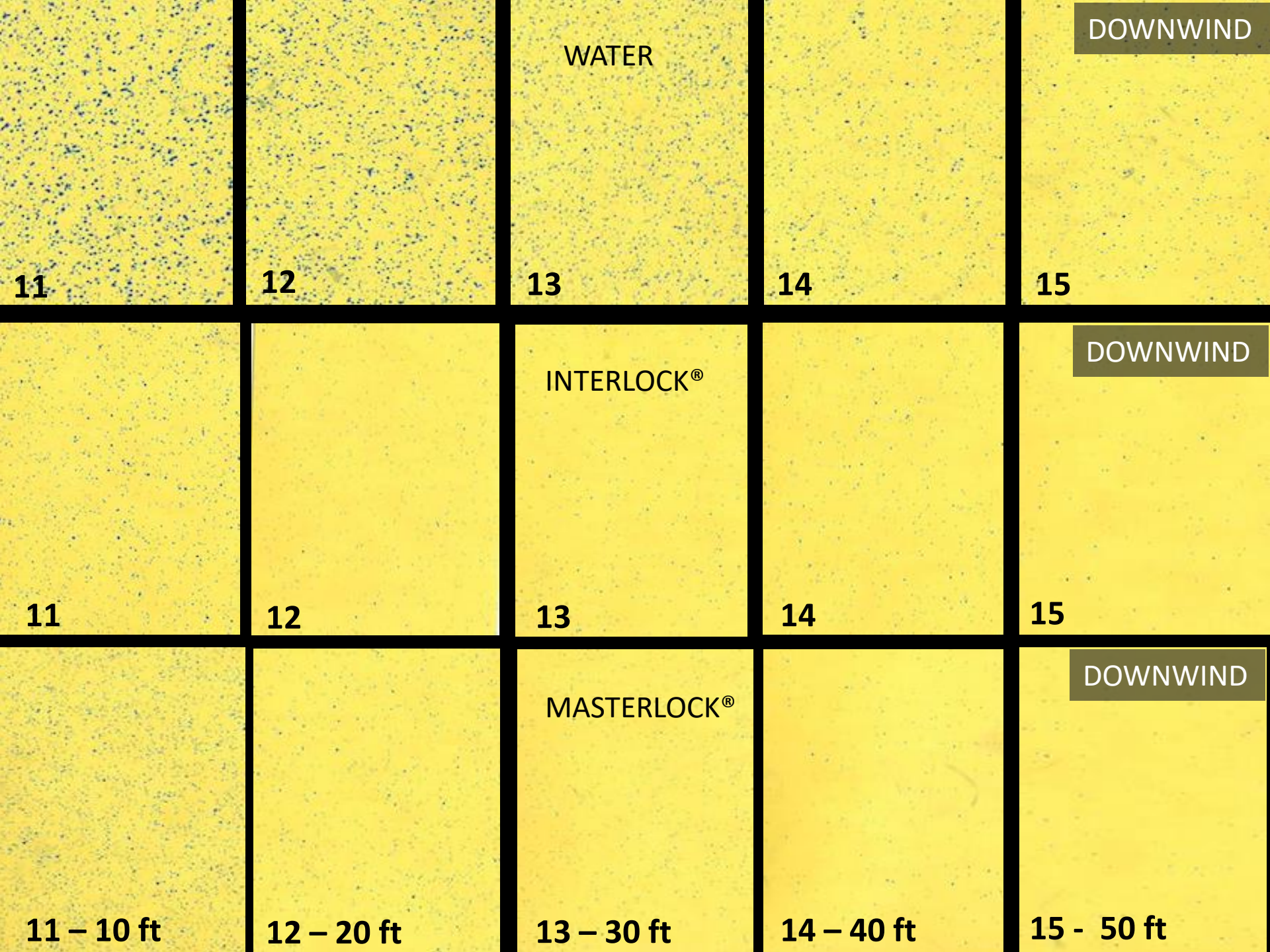
MaterLock: tight pattern, low drift observed, more spray volume directed in the treated area

Water: disrupted pattern, drift observed, spray impacted by wind more without adjuvants

Wind

1.7- 4.7 mph

InterLock: tight pattern, drift observed but not as pronounced as water alone, more spray volume directed in the treated area and more on the upwind side


WATER
DOWNWIND
11
12
13
14
15
INTERLOCK®
DOWNWIND
11
12
13
14
15
MASTERLOCK®
DOWNWIND
11 – 10 ft
12 – 20 ft
13 – 30 ft
14 – 40 ft
15 - 50 ft

RESULTS

- Addition of InterLock® and MasterLock® reduced fines in spray applications
- Spray pattern shifted less with InterLock ® and MasterLock ® with more upwind coverage, reducing off target movement and drift
- Both recordings and water sensitive cards were able to detect reduced off target movement of the applications and spray droplet deposition

WHAT THIS MEANS FOR INVASIVE MGMT. ??

- Addition of InterLock® or MasterLock® into invasive mgmt. spraying could reduce off target movement and drift

- InterLock® or MasterLock® could provide more deposition of spray droplets on targeted species
    - Increase control through effective mgmt. programs
    - Costly treatments improved with more on target spray
    - Possibly reduce need for future applications

- Visual evidence could be further used to detect and reduced off-target movement of applications, spray droplet deposition and secondary impacts to non-target species

QUESTIONS ??

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