Improving Herbicide Effectiveness and Minimizing Impacts.

UMISC and NAISMA Conference
Rochester, MN
October 16, 2018
Background

- WFU Over 25 years of lab and field testing experience in agriculture spray adjuvants
- More than 60 products
- Over 1 Billion Acres treated
- Many U.S. Patents and International Patents
  - Patent strategy allows us to reveal ingredients in our adjuvants
Background

- Improved Performance.
- Improved Efficacy, Use, Convenience.
- Improved stability, shelf life.
- Better Coverage, Deposition, Uptake.
- Reduced Off-Target losses or impacts.
Adjuvant
What is it?

*To-On-In*

get more *to*,
get more *on*,
get more *in* the target

Protects and Enables for performance and consistency
Droplet Fate

1. On-Target application: the goal is 100%!

2. Missing the target

3. Run or bounce off of leaf
   - > 600 μm

4. Drift: off-target deposition
   - 50-200 μm

5. Evaporation: very small droplets
   - < 50 μm
Combining nozzle and InterLock® technology

maximizes deposition +

minimizes drift
Droplet Size Makes a Difference
Advantages and Disadvantages of Different Droplet Sizes*

**+’s**
- Excellent coverage
- Low droplet bounce

**-’s**
- Very high air evaporation potential
- Quick drying time on leaf
- Very high drift potential
- Poor canopy penetration

**+’s**
- Very good coverage
- Low droplet bounce
- Good efficacy for contact pesticides

**-’s**
- High air evaporation
- Fast drying time on leaf
- High drift potential
- Moderate canopy penetration

**+’s**
- Good coverage
- Medium evaporation
- Low drift potential
- Good drift potential
- Favorable drying time on leaf
- Good efficacy for systemic pesticides

**-’s**
- Some droplet bounce/spatter

**+’s**
- Very low evaporation
- Very low drift potential
- Good canopy penetration
- Long drying time on leaf

**-’s**
- Low coverage
- Hi droplet bounce/spatter
- Reduced efficacy for many pesticides

*Relative comparisons. Results vary depending on environment, products included, adjuvants, canopy characteristics, and other factors.

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Spray Quality Improvement

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<th>Nozz Trt</th>
<th>VMD SPAN &lt;105</th>
<th>µm</th>
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Reduction of fines with InterLock and low-drift tips
Nozzles & InterLock can Reduce Fines

% Driftable Fines (< 105 um) 11004 Nozzles

- STD_XR03
- Hypro VP
- Tee Jet XR
- GL Spray Max
- Wilger ER
- TeeJet DG
- Wilger SR
- Hypro LD
- TeeJet AIXR
- Wilger MR
- GL Air Mix
- Hypro GA
- TeeJet AI
- GL Turbo Drop
- Wilger DR
- Hypro ULD
- TeeJet TTI

- Roundup PowerMax
- Roundup PowerMax + InterLock
Consistent droplet sizing allows InterLock® to get coverage deeper under the canopy?

Less fines

- Less spray evaporates or drifts away before landing.
- More spray volume on target.

Does not create large droplets

- Large spray droplets can miss the target, reducing the amount of pesticide on the plant.
- Large droplets can bounce or shatter on impact. Shattered or rebounding droplets can decrease spray volume on target.

Faster droplets

- Studies show that InterLock® increases spray droplet speed up to 45 – 55%*.
- There is less air time for droplet evaporation which leads to more spray volume getting to target.

* Data from Downer, Ohio State University, 2004.
Without InterLock®
Spray coverage is limited to top leaves

Native: 7804, 7805, 7806
With InterLock®
Spray coverage into the canopy
Which spray coverage provides superior control?

Without InterLock®

With InterLock®
Control

InterLock, 4 oz/a Preference, 1 pt/100g

Above

Middle

Lower ¼
InterLock®: More deposition = more control

Herbicide application with and without InterLock®

- Flax
- Amaranth spp.
- Biennial Wormwood
- Lambsquarters

Percent Control %

Herbicide* w/o InterLock®  |  Herbicide* w/InterLock®

* Touchdown HiTech 7.2 fl oz/a + Sharpen 0.5 fl oz/a + Destiny® HC 0.5 % v/v + Class Act® NG® 2.5 % v/v

Evaluated by R. Zollinger, NDSU; Mapleton, ND 2011
InterLock®: More deposition = more control

Glyphosate on Rye Grass with and without InterLock®

With InterLock®... Great Control

Without InterLock®... Re-spray?

Glyphosate on Rye Grass with and without InterLock®
Summary

- Roundup PowerMax
- Right to left wind at 15 MPH
- AI Spray Tip + 4 oz InterLock
Winfield® United Innovation Center
Controlled Environments
Controlled Environments
Controlled Environments
Controlled Environments
Wind Tunnel/Spray Analysis System
Wind Tunnel/Spray Analysis System
Wind Tunnel/Spray Analysis System
Wind Tunnel/Spray Analysis System
Spray Application
Spray Application
Spray Application
Chemistry Laboratories
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