



DOES ADJUVANT CHOICE REALLY MATTER?

Bryan Young

Factors Influencing Foliar Herbicides

<i>Process</i>	<i>Plant</i>	<i>Climate</i>	<i>Spray</i>
<i>Interception</i>	Canopy	Wind	Boom Height/ Nozzle
<i>Retention</i>	Leaf angle	Rain/dew	Nozzle/GPA (droplet size)
<i>Penetration</i>	Cuticle waxes	Humidity	Adjuvants
<i>Translocation</i>	Growth stage/ rate	Temperature	Concentration

Adjuvant Timeline

Interaction between pest, pesticide, adjuvant & host recognized. Multifunctional adjuvants invented — 1990s

MSOs introduced. Adjuvant recommendations increase — 1980s

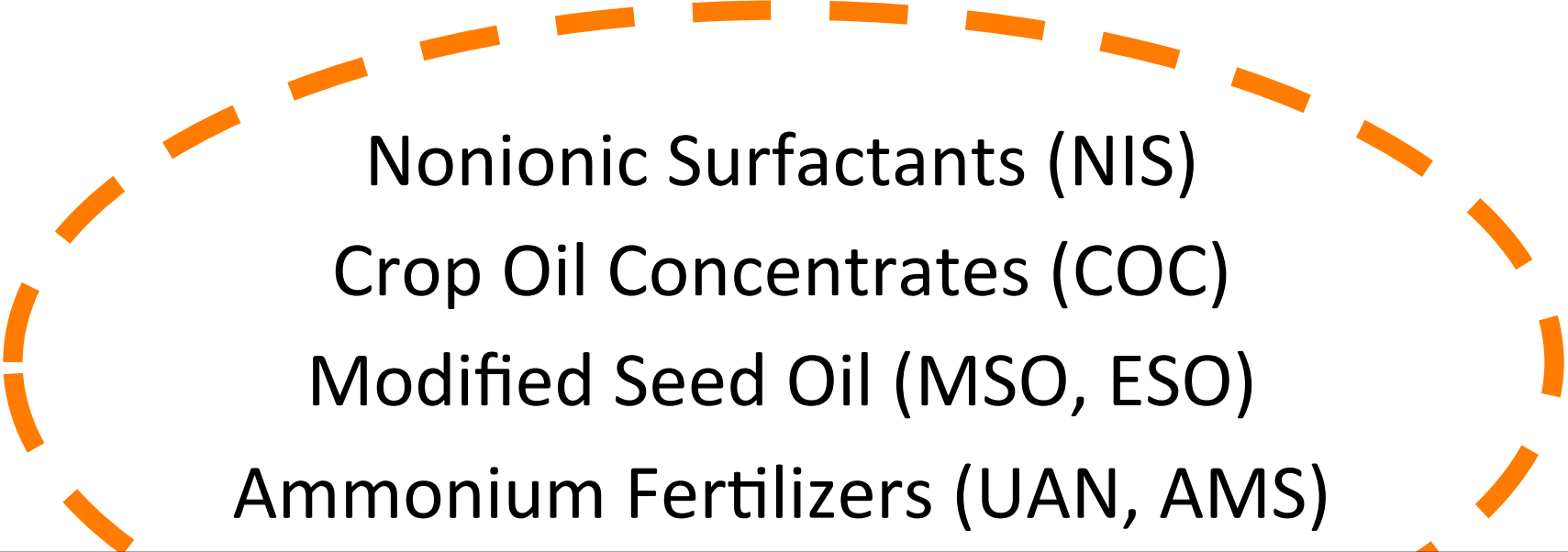
N.I.S. identified. Pesticide activators noted.
AMS increases herbicide uptake — 1940s - 1950s

1930s — Impact of surface tension & contact angle on pesticide performance studied

1900 - 1925 — Oils used to enhance performance of insecticides & fungicides

1700 - 1800 — Molasses, sugar and resins used to “stick” sulfur, copper & lime fungicides to grapes. Kerosene emulsions and soaps derived from whale oil are used to improve arsenical insecticides

Adjuvant Categories Based on Herbicide Label Recommendations



Nonionic Surfactants (NIS)
Crop Oil Concentrates (COC)
Modified Seed Oil (MSO, ESO)
Ammonium Fertilizers (UAN, AMS)

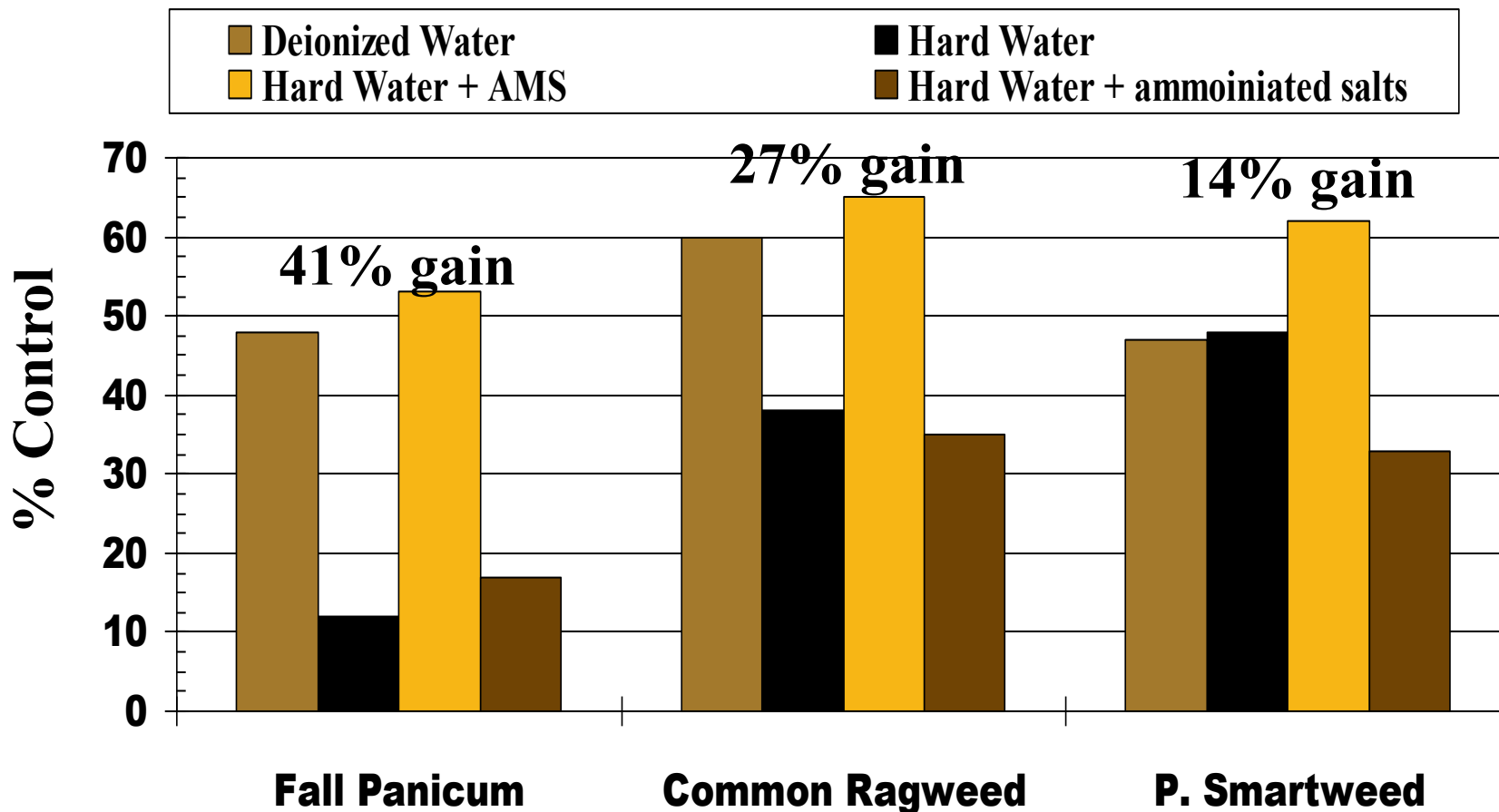
Activator Adjuvants

stant Crop Era

Economical



Impact of Hard Water on Glyphosate Activity



- Applied at 0.75 lb ae/A; Roundup UltraMax 1.6pt/A; 10 GPA; average weed height 8"; AMS = 8.5 lb/100 gal
- Study code 01-2A-ME70: Simulated hard water with Calcium chloride (500ppm); Evaluated 28 DAT

Performance of Commercial Water Conditioners

4 JOURNAL OF ASTM INTERNATIONAL

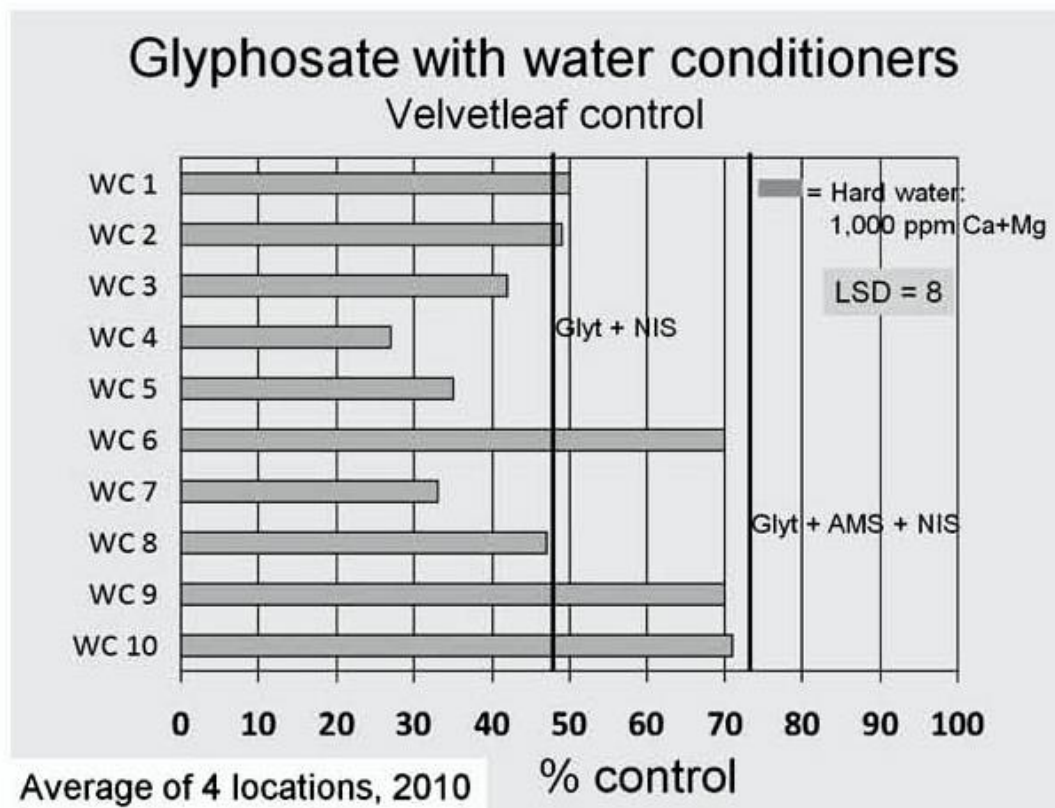
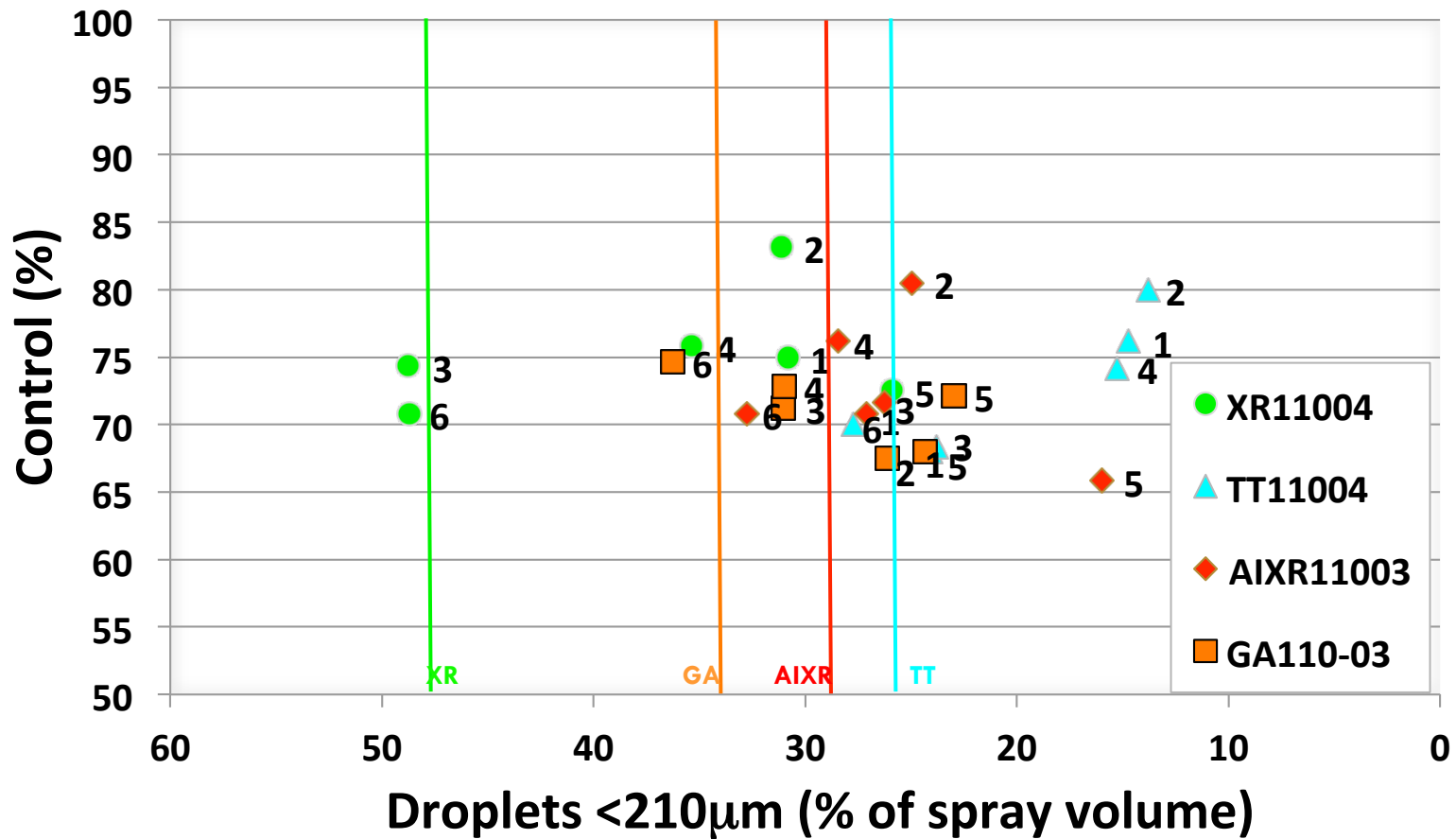


FIG. 2—Velvetleaf control from glyphosate plus ten WC adjuvants applied in hard water averaged over four locations.

Glyphosate



Common waterhemp
Morningglory spp.
28 DAT

Droplet Size

1. LHPG/AMS

2. HPG/AMS

3. PA/AMS

4. LPA/WC

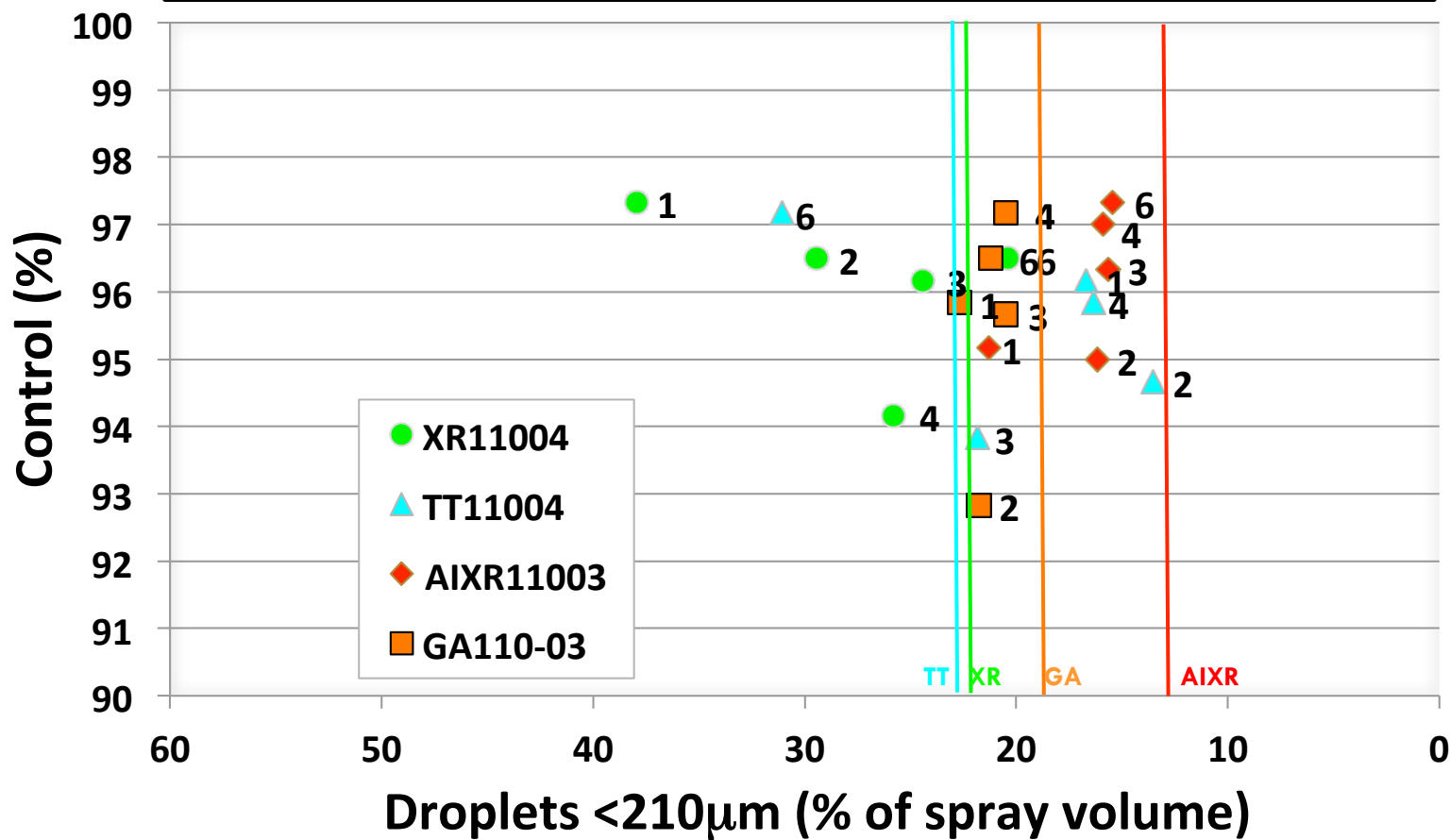
5. WC/NIS/PO

6. WC/NIS

Adjuvant System

Halex GT

Glyphosate & Mesotrione & s-metolachlor



1. LHPG/AMS

2. HPG/AMS

3. PA/AMS

4. LPA/WC

5. WC/NIS/PO

6. WC/NIS

Adjuvant System

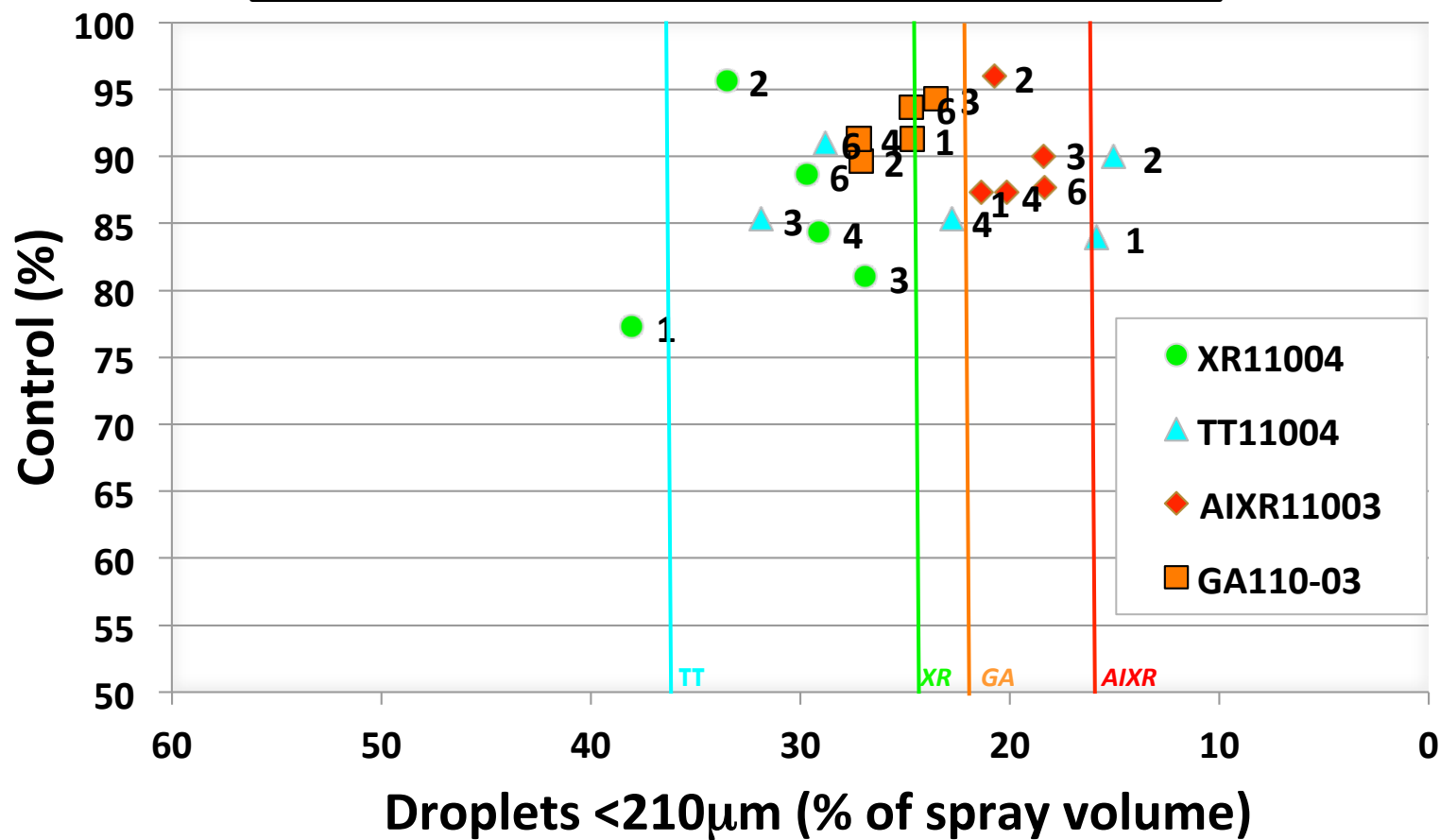
Amaranthus spp.
Morningglory spp.
28 DAT

Herbicide-Resistant Weed Era

Challenging, Fragile, Expensive



Glyphosate plus Clethodim



1. LHPG/AMS

2. HPG/AMS

3. PA/AMS

4. LPA/WC

5. WC/NIS/PO

6. WC/NIS

Adjuvant System

Volunteer RR corn
28 DAT

XR 11004 Glyphosate plus Clethodim

14 DAT



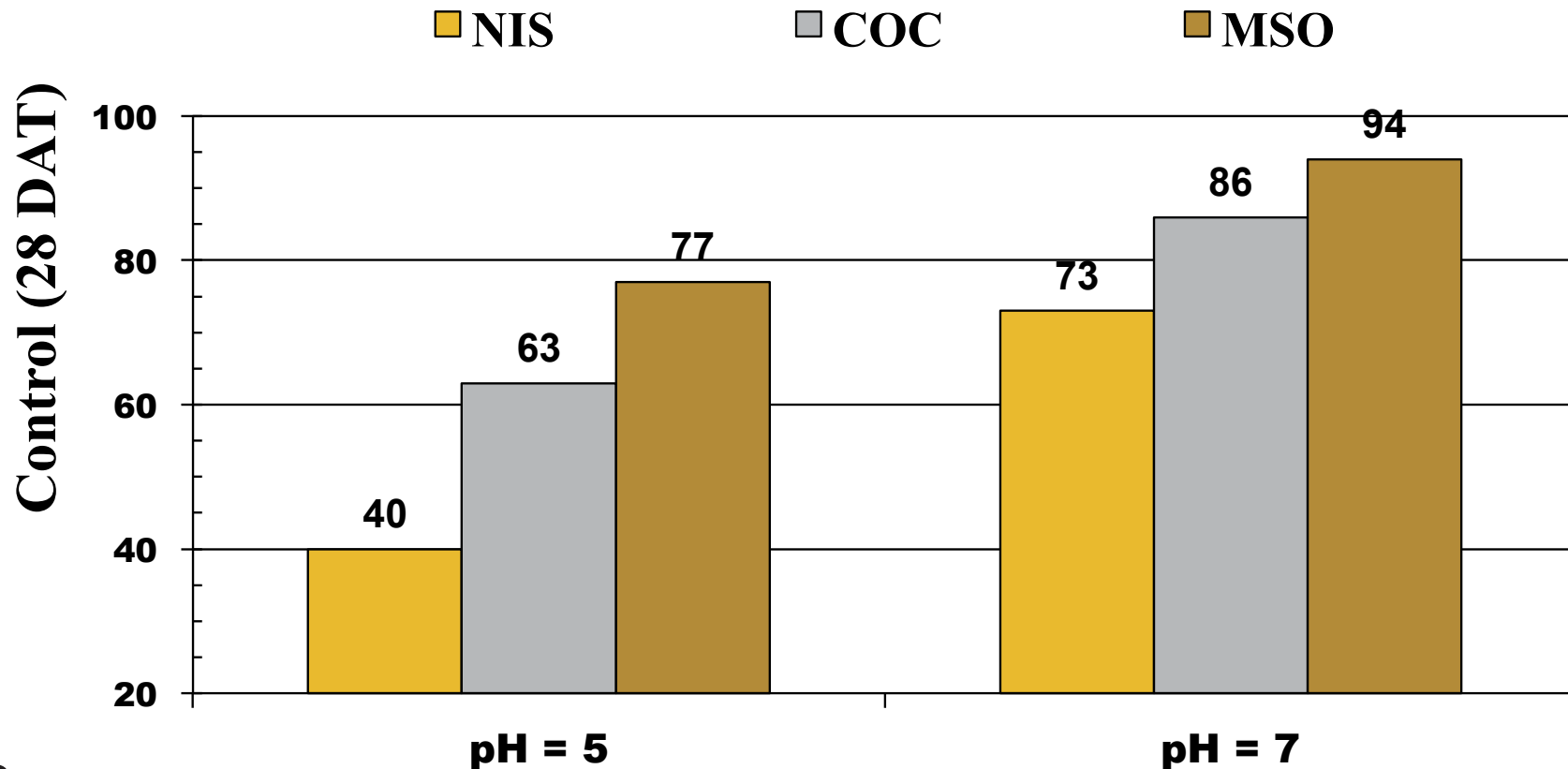
HPG/AMS



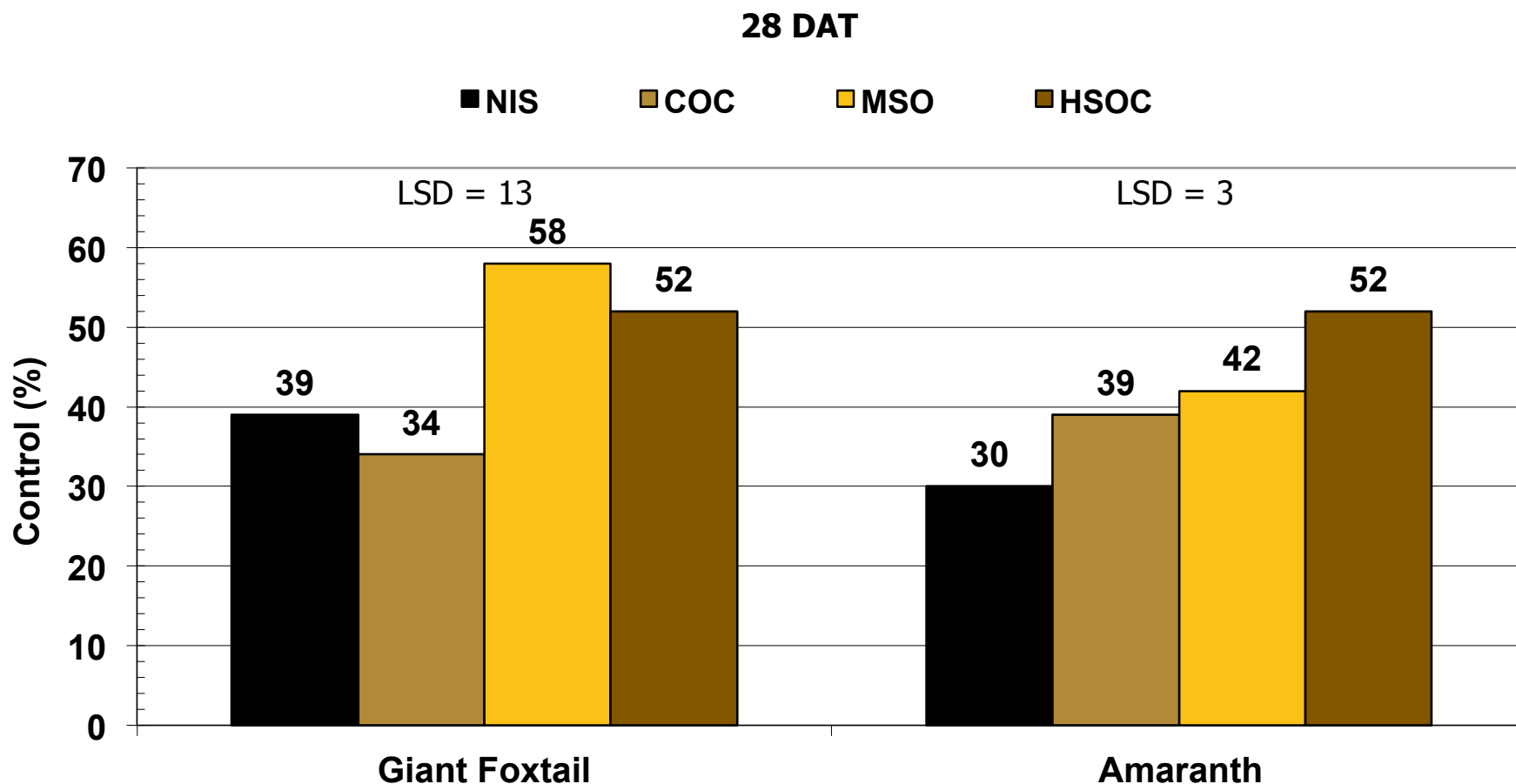
LHPG/AMS

Spray pH and Adjuvant Influence on Sharpen + Glyphosate

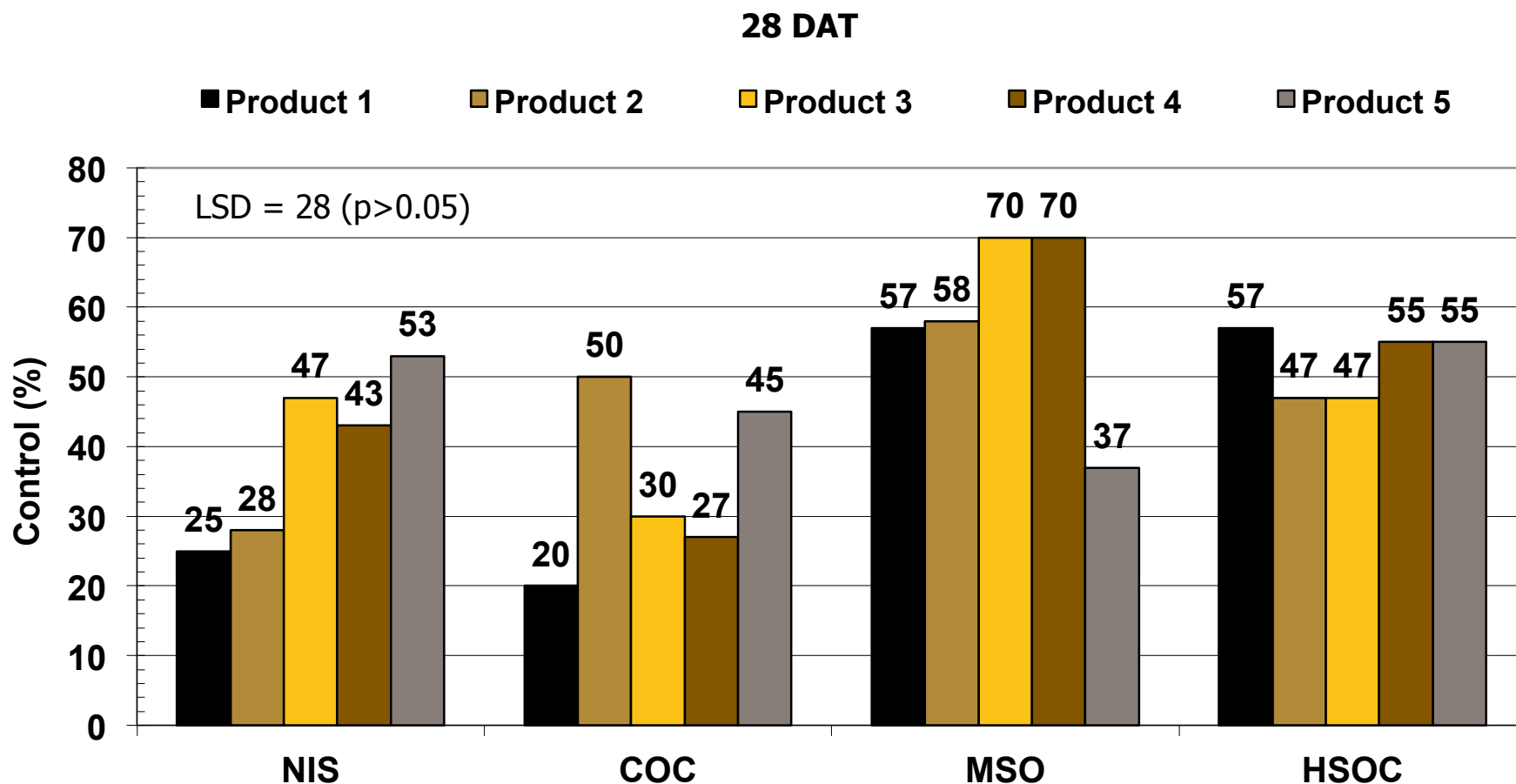
Glyphosate-Resistant Marestail



Influence of Adjuvant on Laudis Efficacy



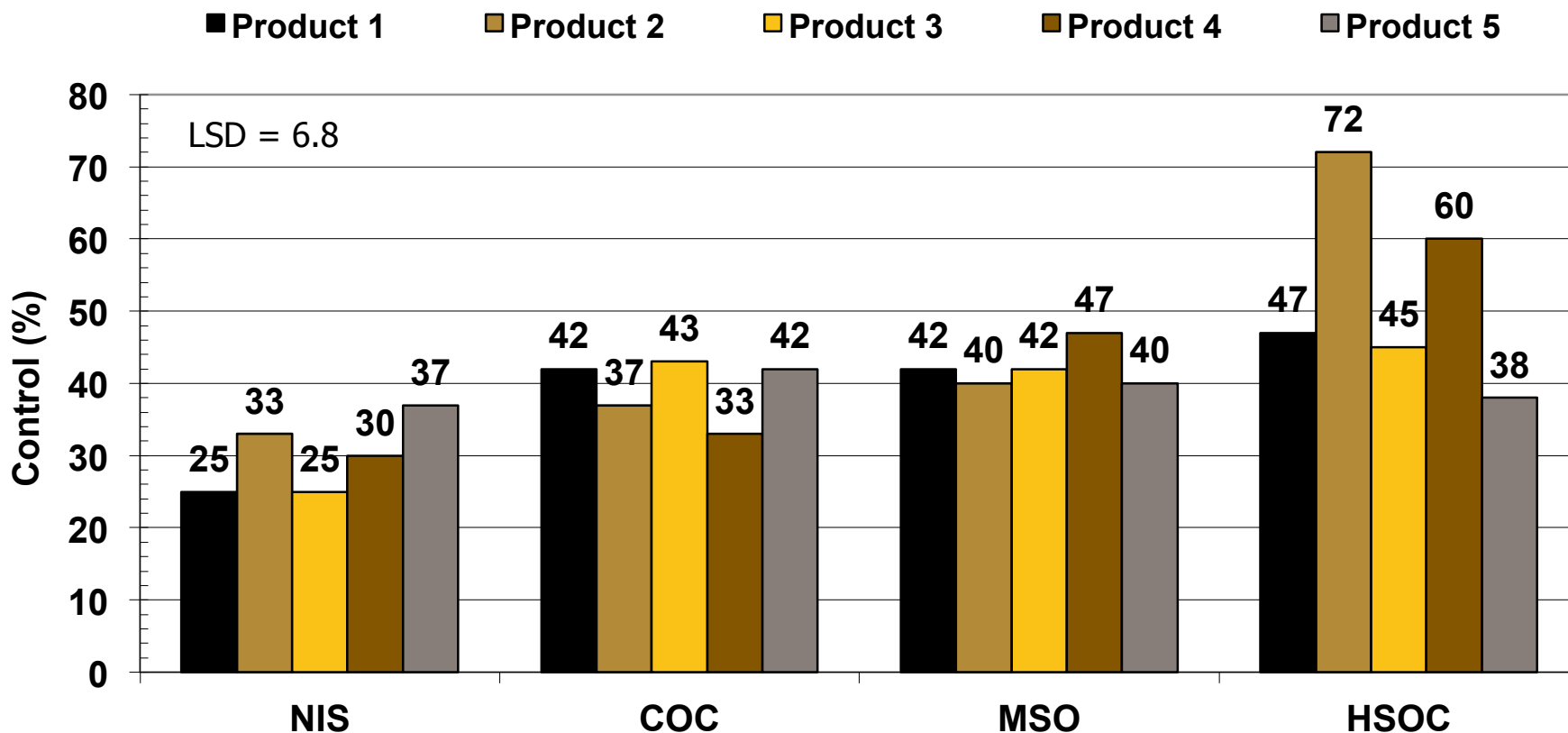
Influence of Adjuvant on Laudis Efficacy



Giant Foxtail

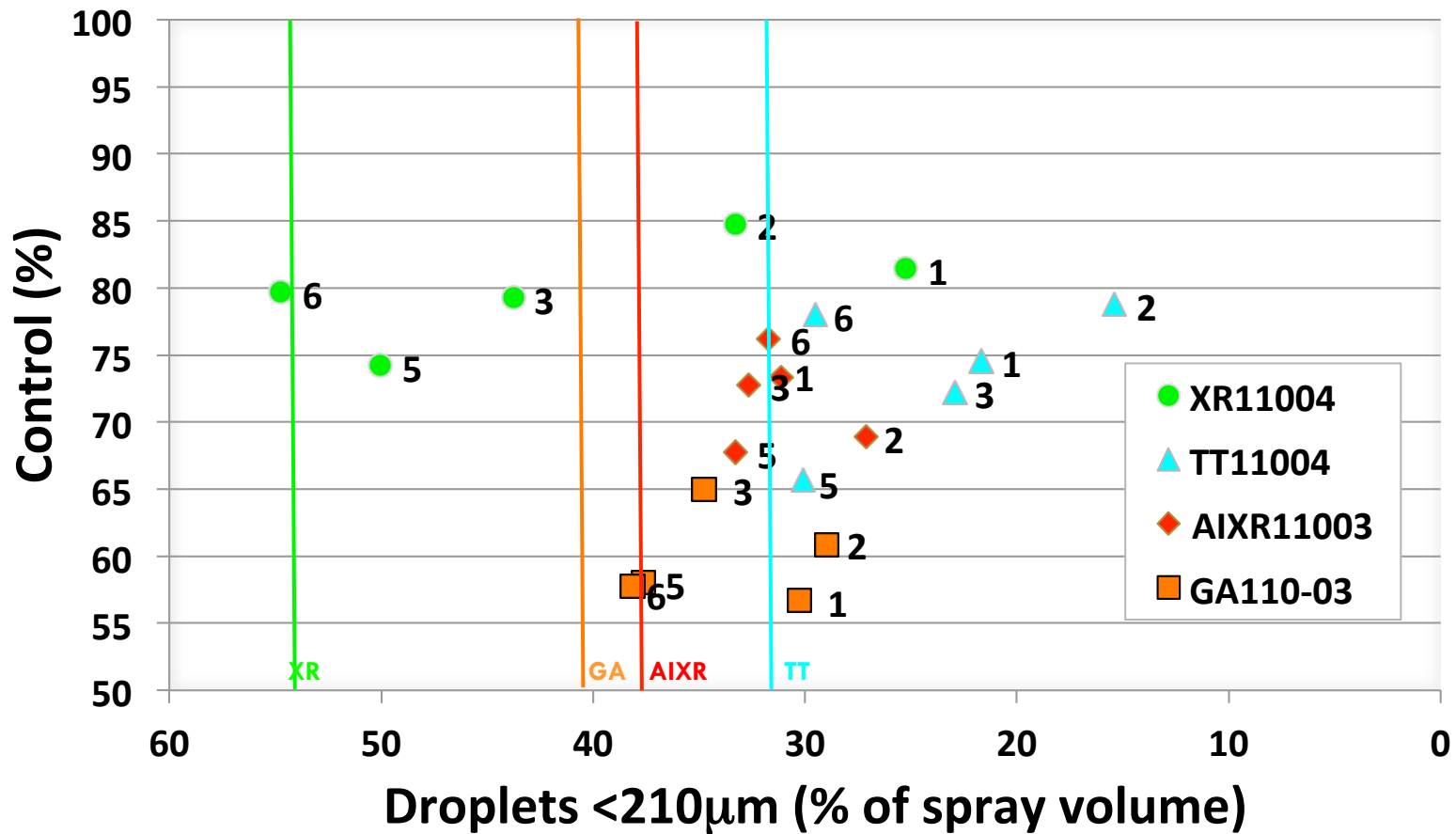
Influence of Adjuvant on Laudis Efficacy

28 DAT



Amaranth

Liberty



Velvetleaf 28 DAT
Common waterhemp
Morningglory spp.

1. LHPG/AMS	2. HPG/AMS	3. PA/AMS	4. LPA/WC	5. WC/NIS/PO	6. WC/NIS
Adjuvant System					

**Liberty 29oz/A
15 GPA**

XR 11004



AMS 3lb/A

**AMS
Replacement**

**AMS +
DCA (PA)**

**AMS +
DCA (HPG)**

**AMS +
DCA (NVA)**

**AMS
Replacement
+
DCA (PA)**

AI 11004



***Liberty
Good Application***

**Palmer Amaranth Control
40% difference due to
application method**



***Liberty
Poor Application***

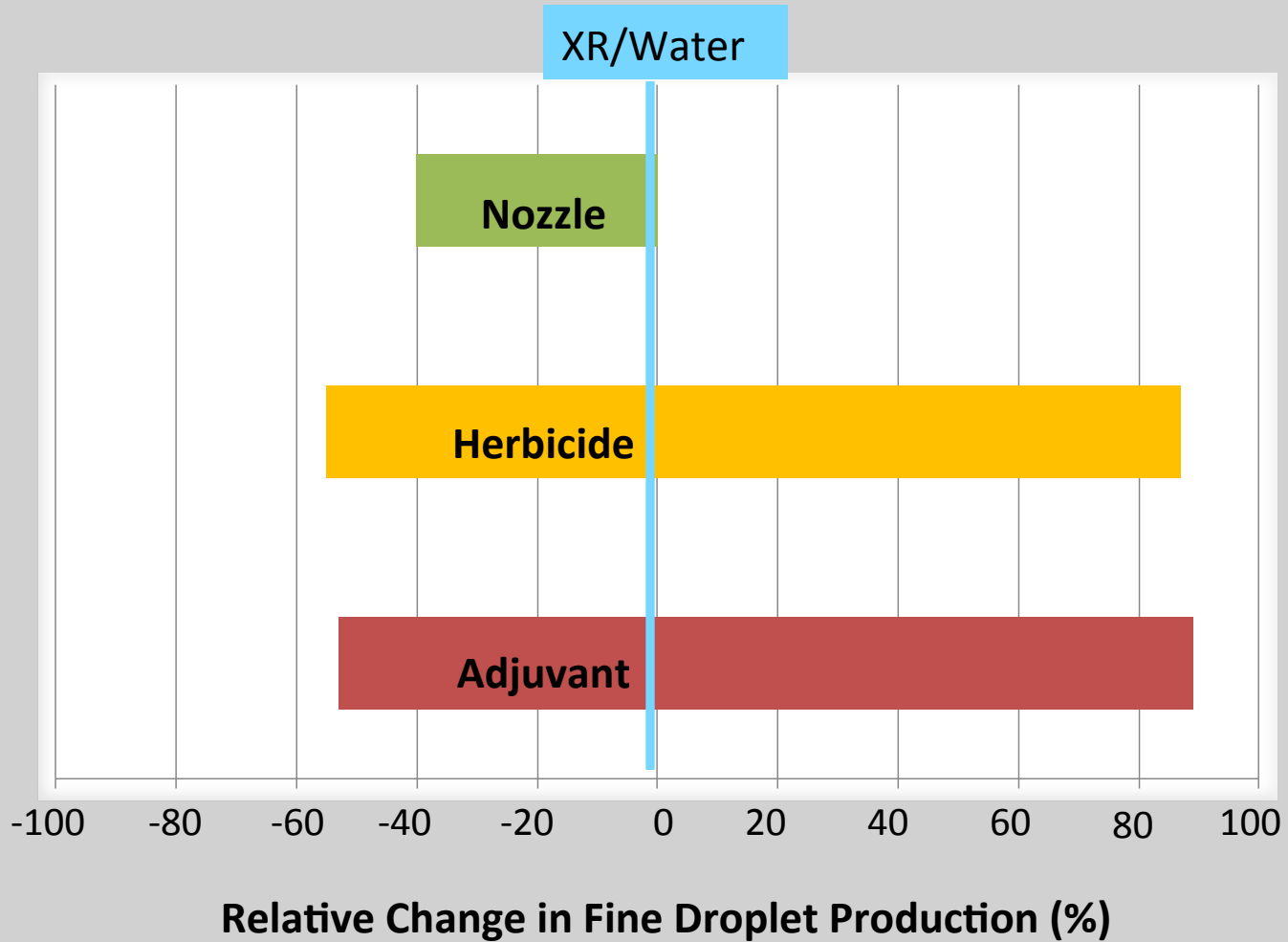
Liberty Label:

"Minimum 15 GPA"

"Medium droplets (250-350 microns)"

No mention of AMS in LL soybeans.

Impact of Variables on Fine Droplet Production



Spray Drift Reduction Technology



Desired Change

No reduction



Standard
technology, no
DRT

25% reduction



Good DRT

50% reduction



Better DRT

Another Ammonium Sulfate Replacement Adjuvant

Rich Zollinger	North Dakota State University
Kirk Howatt	North Dakota State University
Bryan Young	Purdue University
Mark Bernards	Western Illinois University

Dicamba volatility

Transgenic Seed Trait: Dicamba resistant soybean

Herbicide: dicamba-dma salt (dimethyl amine)

dicamba-dga salt (diglycol amine)

dicamba-bapma salt

(bis(3-aminopropyl)methylamine)

Dicamba volatility potential (estimate):

- dicamba-dimethyl amine = 3%
- dicamba-diglycol amine = 0.3%
- dicamba-bapma = 0.03%
- dicamba-bapma + AMS = ~0.3 to 3%

Adjuvant Product Selection

- ❑ Adhere to the pesticide label!

- ❑ Exhaustive number of commercial adjuvants
 - ▣ Focus on known quality adjuvants with high percent active ingredients
 - ▣ Reputable manufacturer
 - ▣ Demand research data....NOT testimonials!
 - ▣ Look for consistency of performance
 - Any product can appear to work a few times

Adjuvant Product Selection

- ❑ HSOC products may prove to be versatile products.
 - ▣ Not supported by any current herbicide label.

- ❑ Be skeptical of “universal” products.
 - ▣ Products that can be used in any situation.
 - ▣ Possible indicator that the product isn’t optimized for any specific use.

Soybean Oil Surfactant



SOS

SOS is
made from
soybeans grown
in America by
American
Farmers

YOUR COMPLETE SPRAY ADDITIVE

- Reduces Oxidation and Photodecomposition
- Excellent Spreader/Sticker
- Superb Wetting Agent
- Keeps Chemicals on Target

- No Need for AMS
- Reduces BURN
- Reduces DRIFT

**FREE buffering
agent for ALL SOS
paid for by May 10, 2006**

- Highest Quality Emulsifier Available
- Rainfast in 20 minutes
- SOS is completely biodegradable
- Improved Penetration

IN ILLINOIS

Windmill Farm Products

Westfield

217-967-5633

IN INDIANA

**Paxton Enterprises
Fortville**

317-727-1813

**Tri-State Ag
Jasper**

812-482-7081

**Carbo-Tech America
812-769-2773**

IN OHIO

Joe Brodman

Carey

419-396-3011

804914

Summary

- ❑ Adjuvants allow for more consistent pesticide activity and should be viewed as a safety net for performance.
 - ▣ Adjuvants optimize pesticide efficacy
- ❑ In general, adjuvants don't create value....they retain the value of the pesticide.



WEED OUT RESISTANCE

- Know Your Weeds
- Know Weed Growth
- Know Weed Seed Characteristics
- Know Herbicide Resistance

IN THE FIELD

- Rotate Crops
- Use Multiple Herbicide Sites of Action
- Incorporate Tillage Practices

SPRAY ATTENTION

- Know Herbicide Site of Action and Properties
- Manage Drift
- Know Environmental Conditions
- Know Your Neighbors

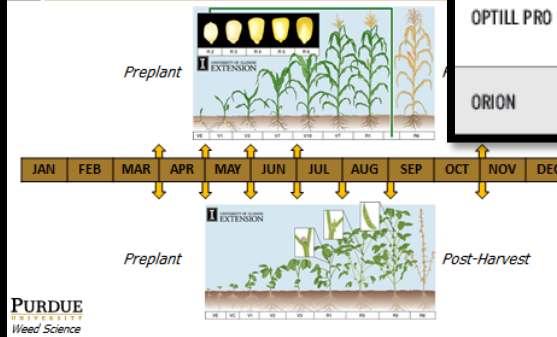
THE BOTTOM LINE

- Manage Risk
- Know Cost-Benefits of Practices
- Know the Cost of Poor Weed Control

Weed Seed Management



Critical Times for Weed Management



saflufenacil	Sharpen	14
imazethapyr	Pursuit	2
dimethenamid-P	Outlook	15
florasulam	-----	2
MCPA	MCPA	4



Supported by



Adjuvants and the Power of the Spray Droplet



Improving the Performance of Pesticide Applications

the impact of **WATER QUALITY** *on* **PESTICIDE PERFORMANCE**



COMPENDIUM OF HERBICIDE ADJUVANTS

(www herbicide-adjuvants.com)

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Questions?

