

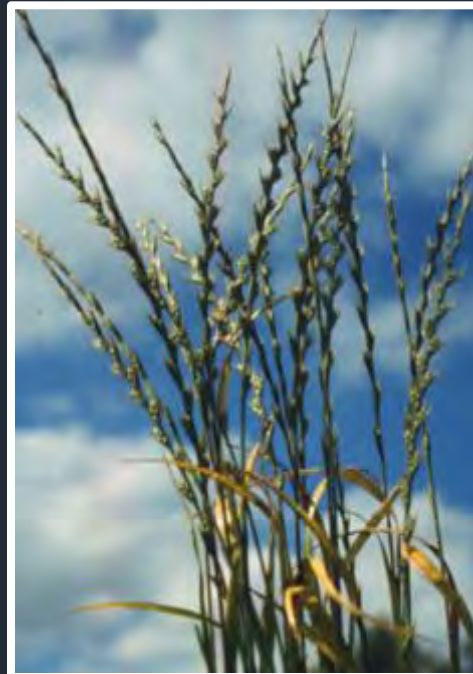
Jan. 23, 2019

Soybean Weed Control

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Tom Barber and Jason Norsworthy

2019 Arkansas Crop Management Conference



Weed Management History



“The farmer has many problems.”



The farmer has many problems. He confers with specialists on plant disease (top left); hog management (bottom left); soils (top right); and dairy management (bottom right).



Hammonds and Woods 1938. *Today's Agriculture*. 498p.

New Technologies Available

- **Enlist E3 Soybean**

- Glyphosate + Glufosinate+ 2,4-D
- Been waiting for ~3 years
- Limited varieties available

- **Enlist Duo**

- Glyphosate + 2,4-D Choline
- Limited Tankmixes

- **Enlist One**

- 2,4-D Choline
- Numerous Tankmixes
- Glufosinate (Liberty) is allowed

- Check Enlisttankmix.com
- Training Required – currently online
- Neighboring cotton very sensitive
- Stewardship is KEY

- **Liberty Link GT27 Soybean**

- Glyphosate + Glufosinate+ Isoxaflutole
- Approved for import last year
- Limited varieties available
- Alite 27 (Isoxaflutole) not yet labeled for PRE or POST
- Can use both glufosinate (Liberty) and glyphosate POST
- No training required

Enlist Recommendations

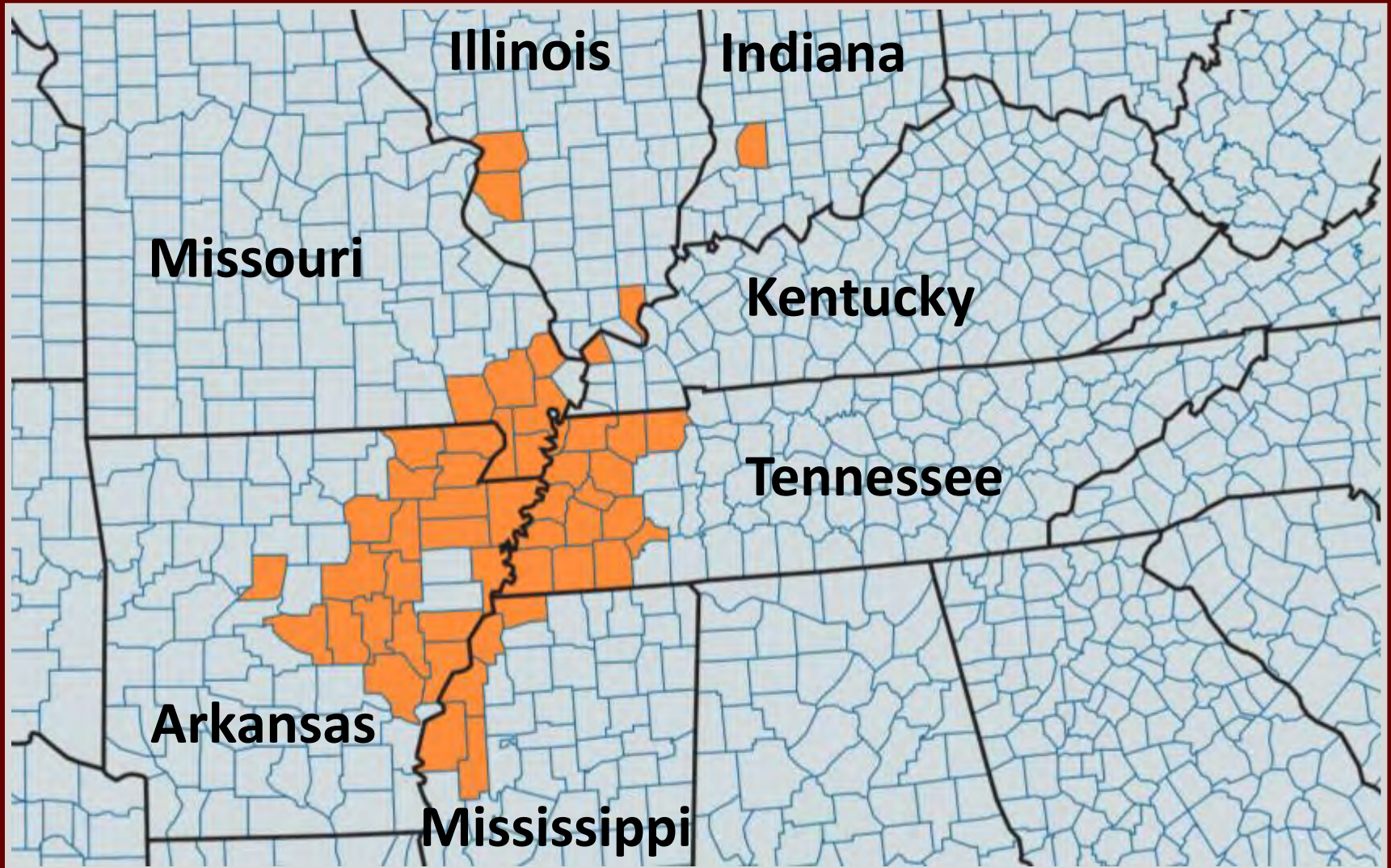
- Residuals still key regardless of technology at planting and early POST
- Check website (Enlist.com) to select residual that is allowed tankmix
- Enlist Duo, Enlist One or glufosinate should be sprayed when pigweeds are small and actively growing
- If pigweed population is heavy and/or >4in tall tankmix Enlist One and allowed glufosinate formulation
- Previous research on PPO-rs pigweed shows rate response with Enlist One. Use the full labeled rate (2pts)
- Enlist One: 6 pints total from burndown through R2
- Enlist Duo: 4.75pt/A, 14.25 pints total, burndown through R2

Liberty Link GT27 (Alite 27)

Recommendations

- Residuals still key regardless of technology at planting and early POST
- Manage like Liberty Link beans but also tolerant to Roundup
- Glyphosate plus glufosinate provides control of most problematic weeds.
- Need residuals to reduce pigweed numbers for glufosinate
- Glufosinate works best on small <5in pigweed when sprayed 2 hours after sunrise to 2 hours prior to sunset
- 65 total ounces of Liberty per season
- Emergence to bloom (R1)

PPO-Resistant Palmer amaranth 2019?



Top Herbicides Used for Palmer Pigweed Control in Soybean

- Roundup
- Flexstar
- Valor
- Authority
- Sharpen
- Liberty
- Dual
- Warrant
- Zidua
- Classic
- Sonic
- Surveil
- Blazer
- Pursuit
- Cobra
- Metribuzin
- Gramoxone
- Prowl
- Treflan
- Scepter
- 2,4-D (Enlist One, Duo)
- Dicamba (Xtendimax etc.)
- LL27, Alite 27 (HPPD)
 - Waiting for Alite 27 label

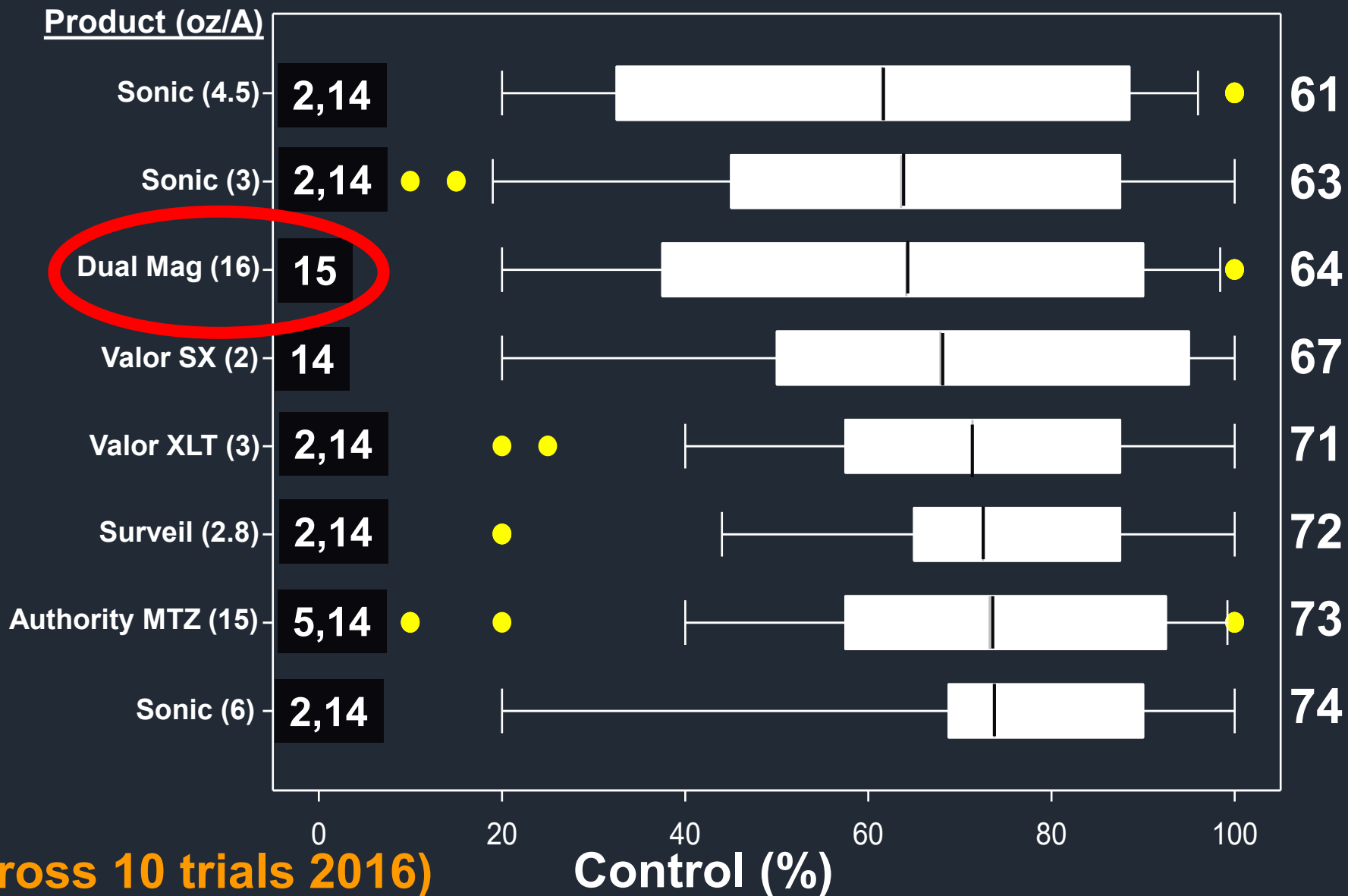


What is left for PPO-resistant Palmer Pigweed Control in Soybean

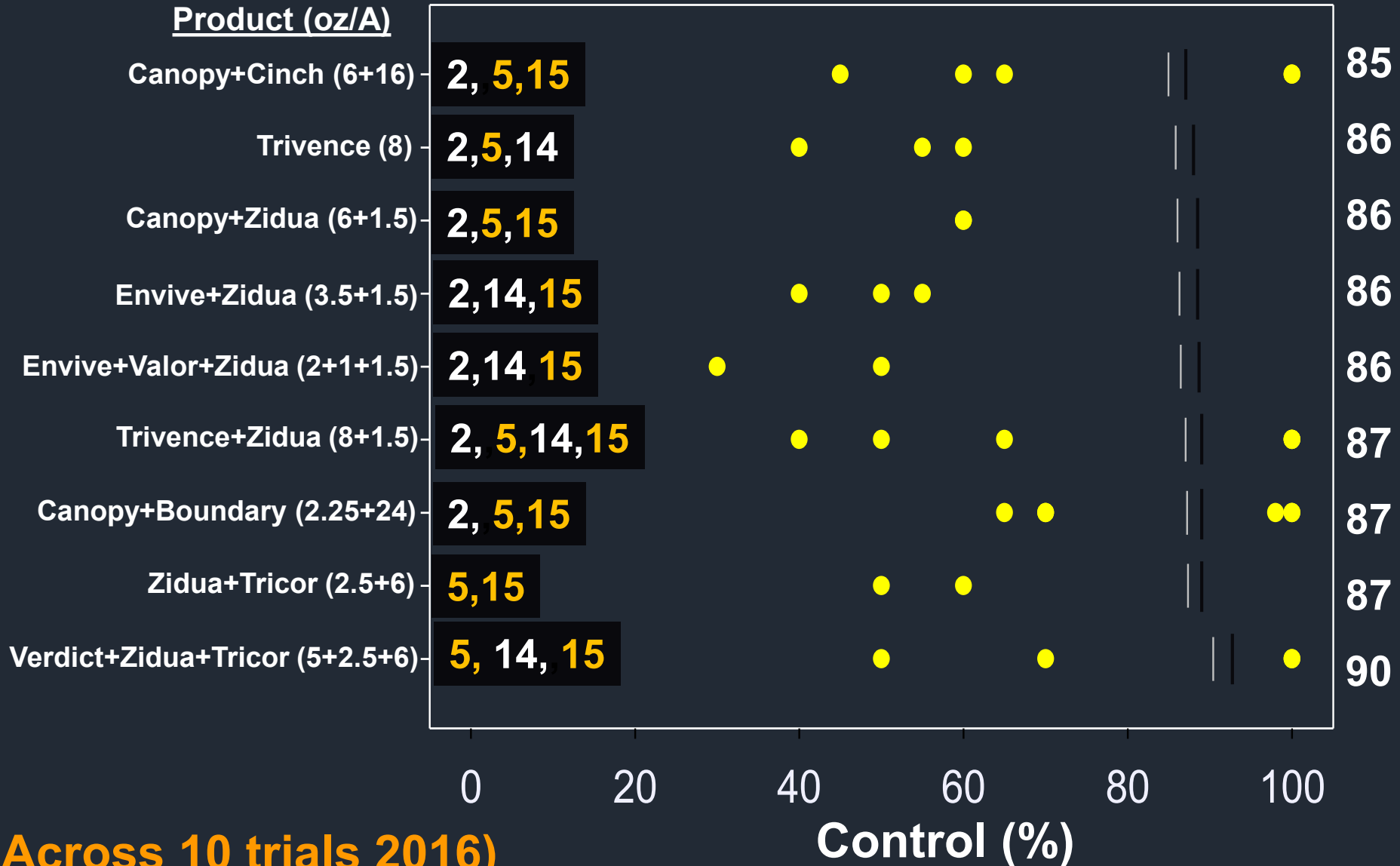
- Roundup
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PRE Programs on PPO-Resistant Palmer Amaranth (26 to 28 DAT)



PRE Programs on PPO-Resistant Palmer Amaranth (26 to 28 DAT)





**Must start with a robust PRE
(2 effective MOA)**

Valor SX 2oz

**Metribuzin 6oz+
Verdict 5oz + Zidua
2.5oz**

28 days after planting

Untreated Check 1x Dimethenamid

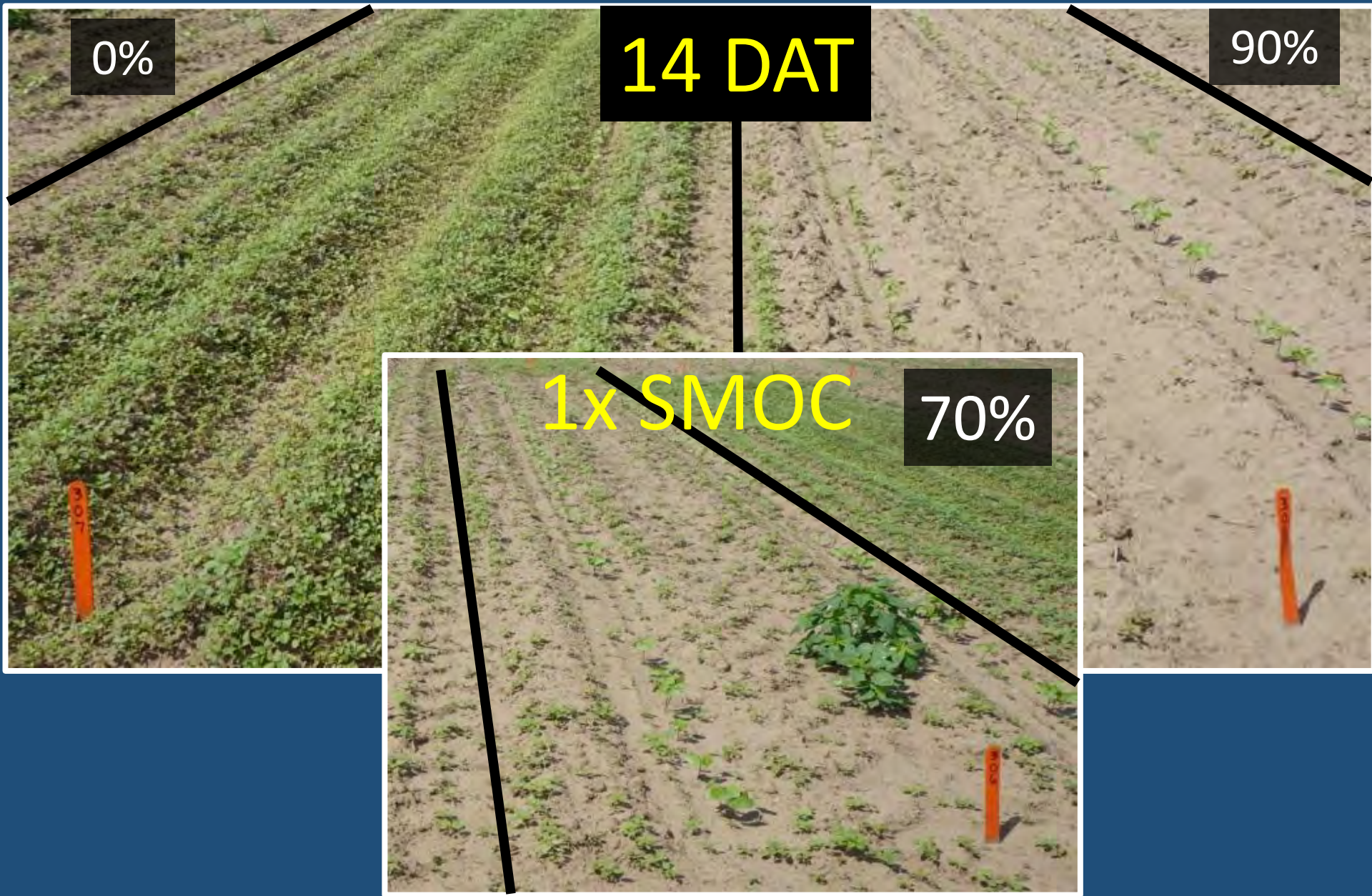
0%

14 DAT

90%

1x SMOC

70%



Crawfordsville

Drone Images

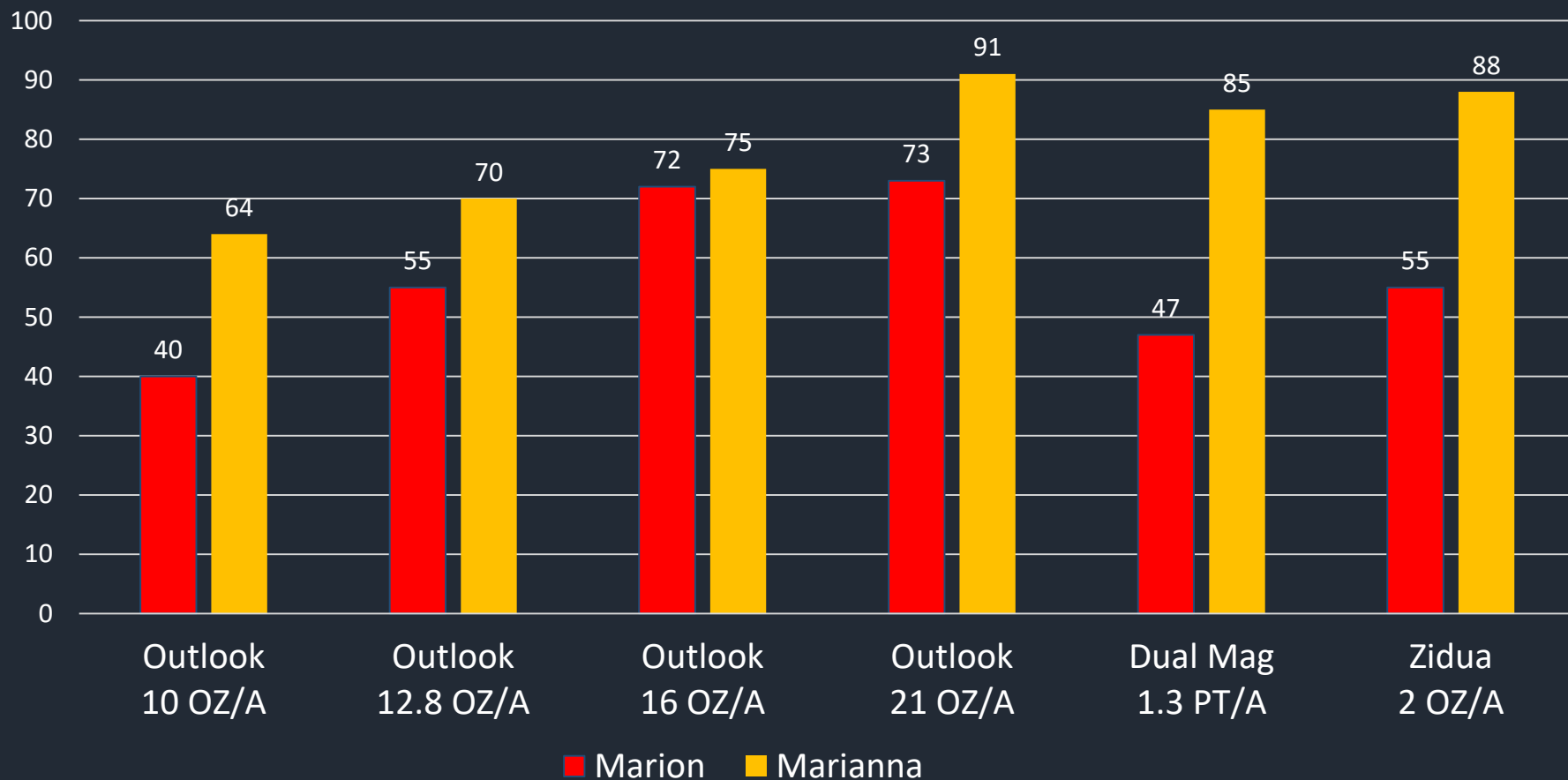
28 DAT

- Untreated
- 1/4x SMOC
- 1/2x SMOC
- 1x SMOC



Pigweed Control 28 DAT

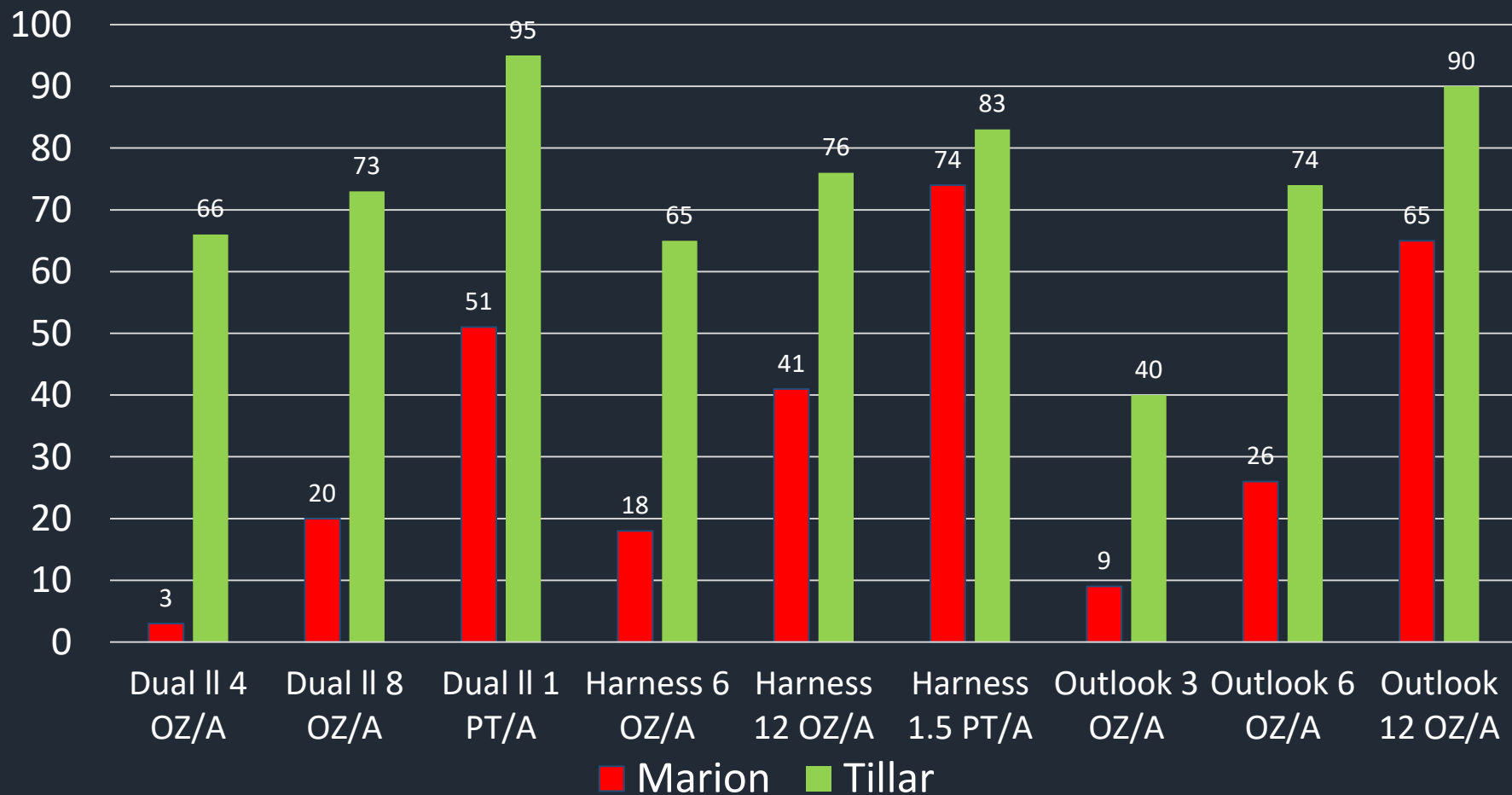
Chloroacetamides



Marion LSD- 15
Marianna LSD- 17

Pigweed Control 28 DAT

Chloroacetamides



Marion LSD- 19

Tillar LSD- 29

Palmer amaranth^a

Herbicide^b

14 DAT

28 DAT

Stand
Count

Control

Stand
Count

Control

————— % —————

————— % —————

S-metolachlor

46 B

60 B

63 B

33 B

Acetochlor

12 A

84 A

35 AB

61 A

Dimethenamid-P

21 AB

80 A

23 A

60 A

^aFor each timing, means within a column followed by the same lowercase letter are not statistically different based on Fisher's protected LSD (0.05).

^bEach herbicide tested across 0.25x, 0.5x, and 1x of labeled use rate.

^cStand counts shown as percentage of nontreated control.

Barnyardgrass

Herbicide^b

28 DAT

Stand Count

Control

———— % of Control ————

———— % ————

S-metolachlor

9 A

95 A

Acetochlor

6 A

95 A

Dimethenamid-P

1 A

98 A

^aFor each timing, means within a column followed by the same lowercase letter are not statistically different based on Fisher's LSD (0.05).

^bEach herbicide tested across 0.25x, 0.5x, and 1x of labeled use rate.

^cStand counts shown as percentage of nontreated control.

Conclusion After 3 Years Field Research on PPO-resistant Pigweed Populations

- PPO Herbicides: **Valor**, Reflex, Authority, Sharpen will provide some level of residual control **~60%**
- **Single modes of action are not effective**
 - Apply 2 effective residual herbicides at planting
 - Metribuzin plus Anthem/Zidua
- 14 days overlapping of residuals provided best level of protection: Outlook or Warrant in POST apps
- **Metabolic RS in pigweed is SCARY!**
- Increased tolerance/RS to metolachlor and maybe others with these pigweed populations.
 - Do not use Dual alone as PRE. Boundary 1 qrt/A

Numerous diversified strategies available

Long term, answer won't come from a jug!

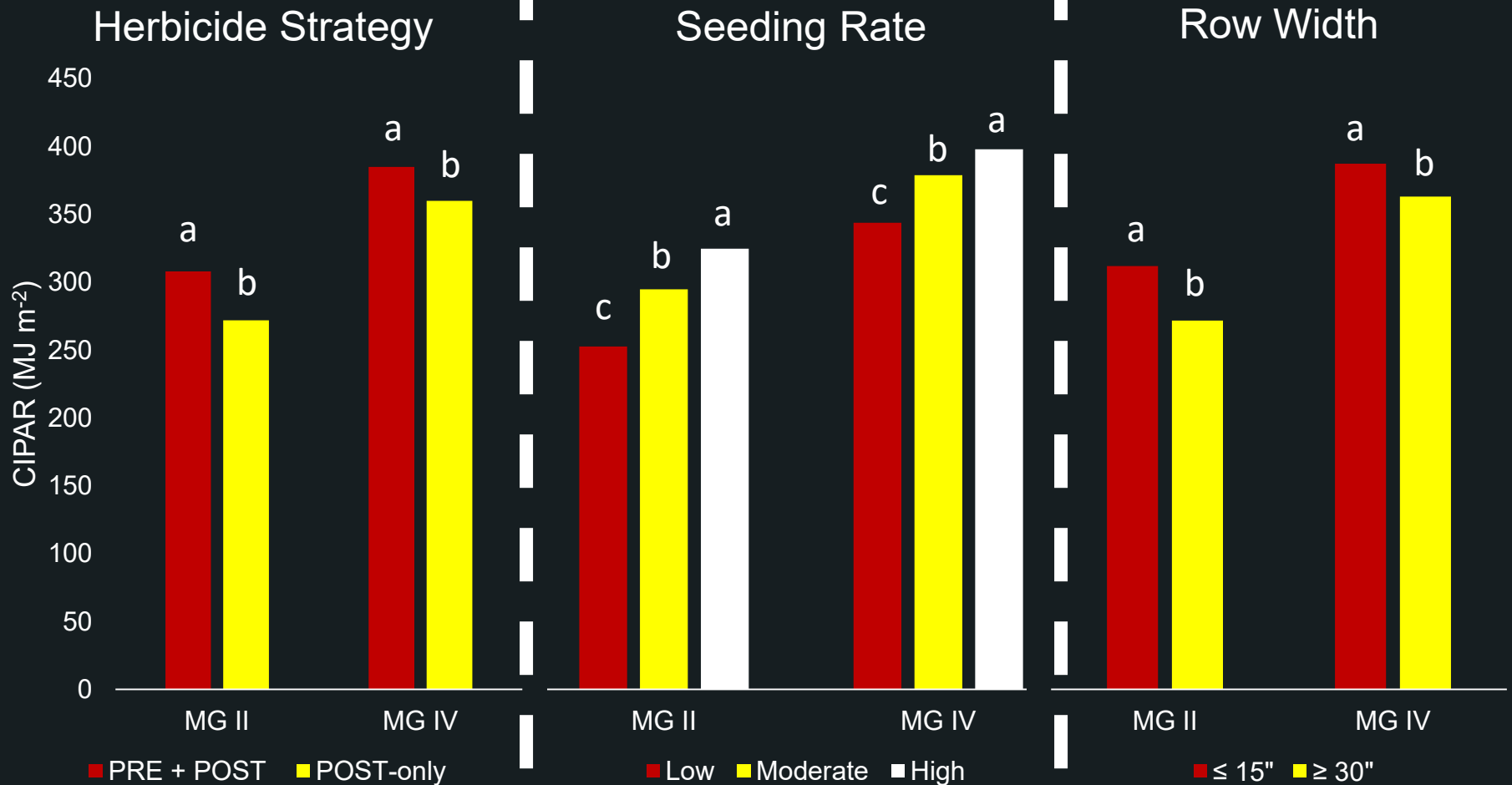
- Incorporate multiple techniques involving both non-chemical and chemical
 - Crop rotation
 - Planting dates
 - Seeding method / row spacing
 - Application technologies
 - Optimizing applications
 - Cover crops
 - Deep tillage
 - Seedbank management / **Zero Tolerance**
 - Harvest Weed Seed Control
 - Narrow windrow burning
 - Harrington Seed Destructor

Soybean CIPAR

MG II and MG IV Regions



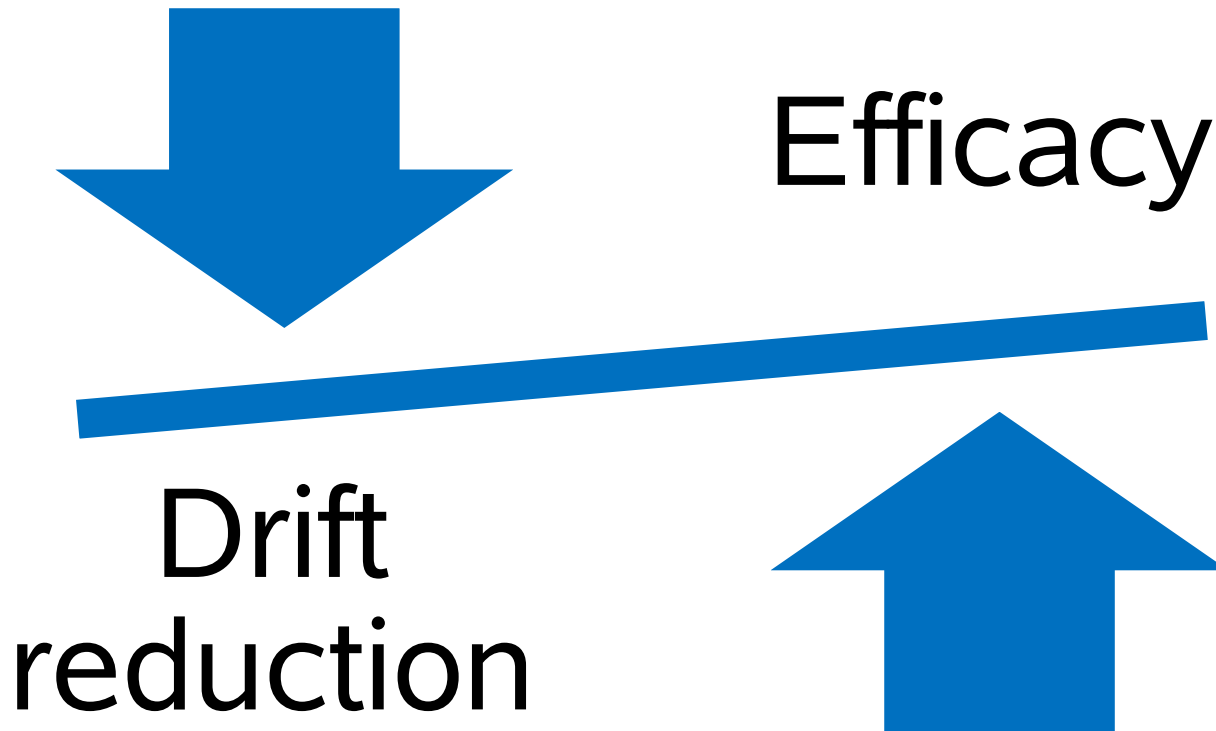
For more detailed information, please scan the QR code to the left.



End-of-Season Pigweed Growth & Reproduction

	MG IV				
Factor	Density plants m ⁻²	Height cm	Biomass g m ⁻²	Biomass g plant ⁻¹	Seed seeds m ⁻²
Row width					
≤ 15"	—	6.8 a	1.1 a	0.5 a	22 a
≥ 30"	—	11.8 a	2.1 a	0.8 b	62 b
Seeding rate (seeds ac ⁻¹)					
70,000	—	10.5 a	2.3 b	0.9 b	57 b
130,000	—	11.4 a	1.9 b	0.7 b	51 b
190,000	—	5.9 a	0.7 a	0.3 a	17 a
Herbicide strategy					
PRE + POST	—	5.3 a	0.8 a	0.4 a	17 a
POST-only	—	14.9 b	2.6 b	1.0 b	78 b
ANOVA					
RW	NS	NS	NS	0.0464	0.0409
SR	NS	NS	0.0001	0.0001	0.0426
RW*SR	NS	NS	NS	NS	NS
HS	<0.0001	0.0001	<0.0001	<0.0001	0.0005
RW*HS	NS	NS	NS	NS	NS
SR*HS	NS	NS	NS	NS	NS
RW*SR*HS	0.0203	NS	NS	NS	NS

Optimizing Applications



How far will particles go?

Droplet	Diameter (in μm)	Time to fall 10 ft	Travel distance in 3 mph wind
Fog	5	66 min	15,840 ft
Very fine	20	4.2 min	1,100 ft
Fine	100	10 sec	44 ft
Medium	240	6 sec	28 ft
Coarse	400	2 sec	8.5 ft
Fine rain	1,000	1 sec	< 5 ft

Source: *Herbicide Spray Drift*, NDSU Extension



XR11003VS

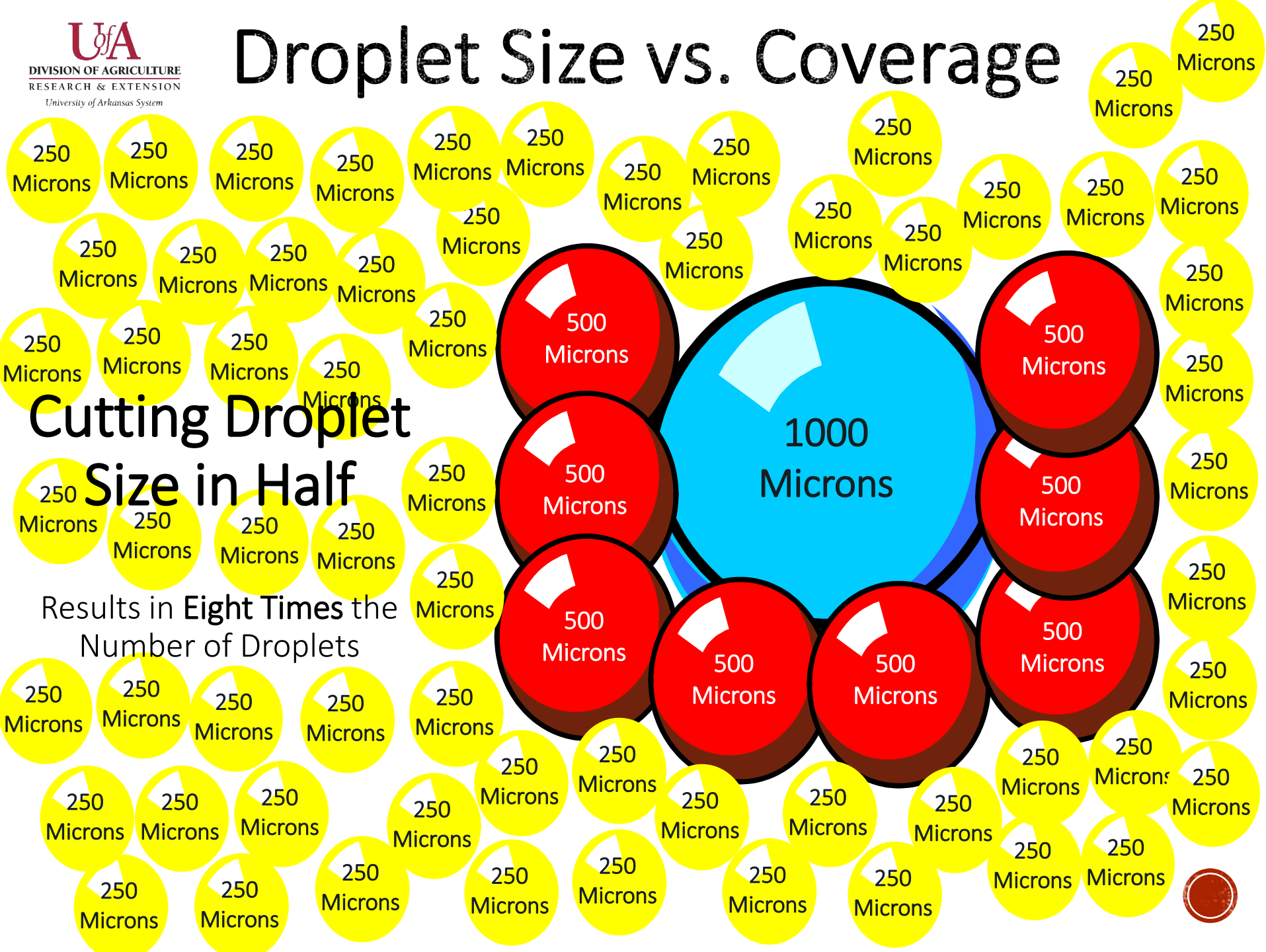
40PSI

TT11004

40PSI



Droplet Size vs. Coverage



Carrier Volume Effect on Weed Control

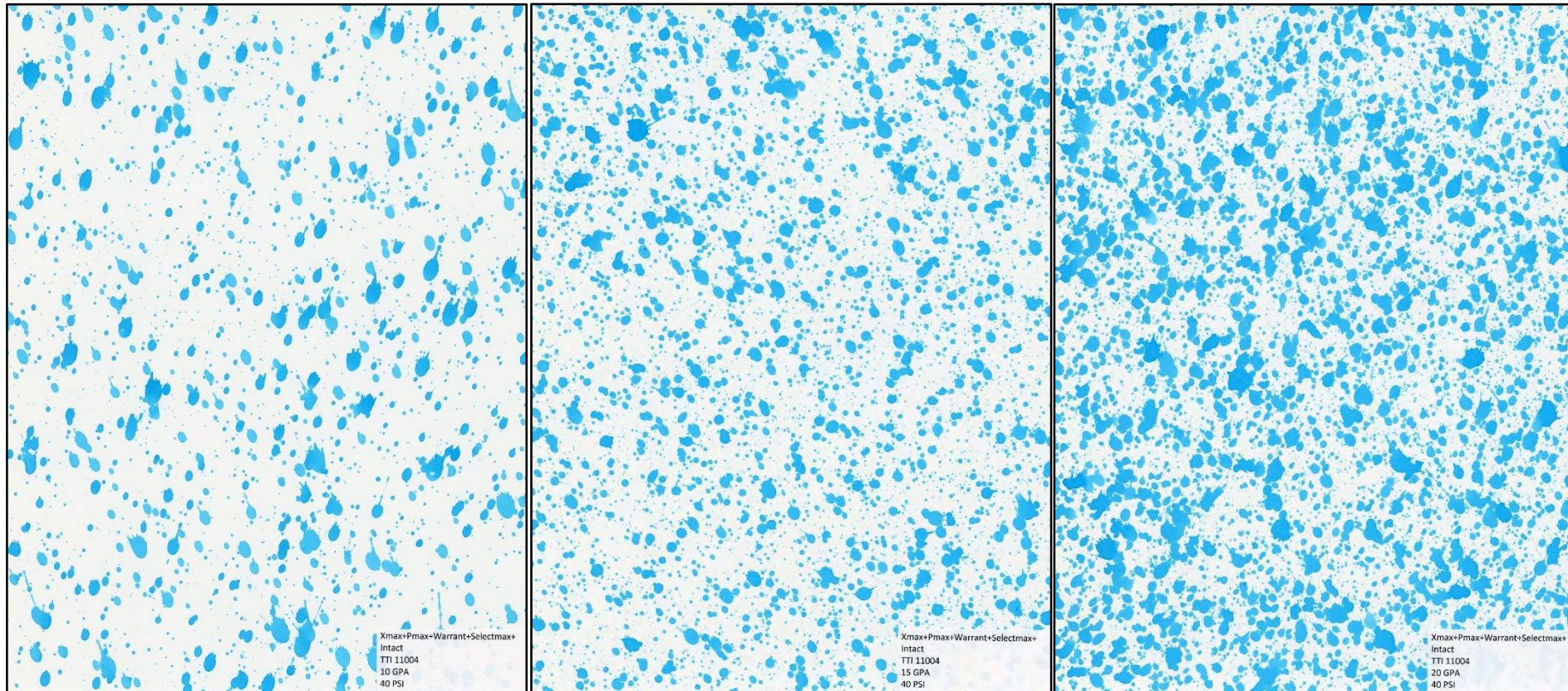


Liberty

Carrier Volume Effect on Weed Control



TTI11004 @ 40 PSI



10 GPA
 12 MPH

15 GPA
 8 MPH

20 GPA
 6 MPH

Droplet Size Effect on Weed Control

Liberty®

5 GPA

14 DAA



Droplet Size Effect on Weed Control

Dicamba

5 GPA

14 DAA



Summary & Implications

Spray droplet size impacts weed control!

- There appears to be a critical droplet size after which control is lost (for both contact and systemic herbicides)...
- ...We must find **alternative methods for particle drift mitigation** other than increasing droplet size.
- Increasing spray volume can help increase coverage and buffer the effect of increasing droplet size.



For additional information regarding optimum droplet sizes for weed control across other herbicide solutions please scan the above QR code.

Think outside of the box!



- Spread of resistance
- Additions to the soil seedbank

**Which field had the
glyphosate-resistant pigweed?**



Integrated Harrington Seed Destructor

Our IHSD at Newport on JD 9760 STS



Moisture can be a problem



2019 Thoughts

- Spray early (PRE), use multiple MOA's, RESIDUALS!
 - Provides POST application flexibility
 - Reduces resistance selection pressure
 - Gives the crop a competitive advantage
- Prepare for herbicide resistance even if not there (yet)
- Use diverse strategies
 - New trait/herbicide technologies
 - Cultural practices
 - Optimize applications
 - System approach

Do the little things, they add up!

Questions?



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