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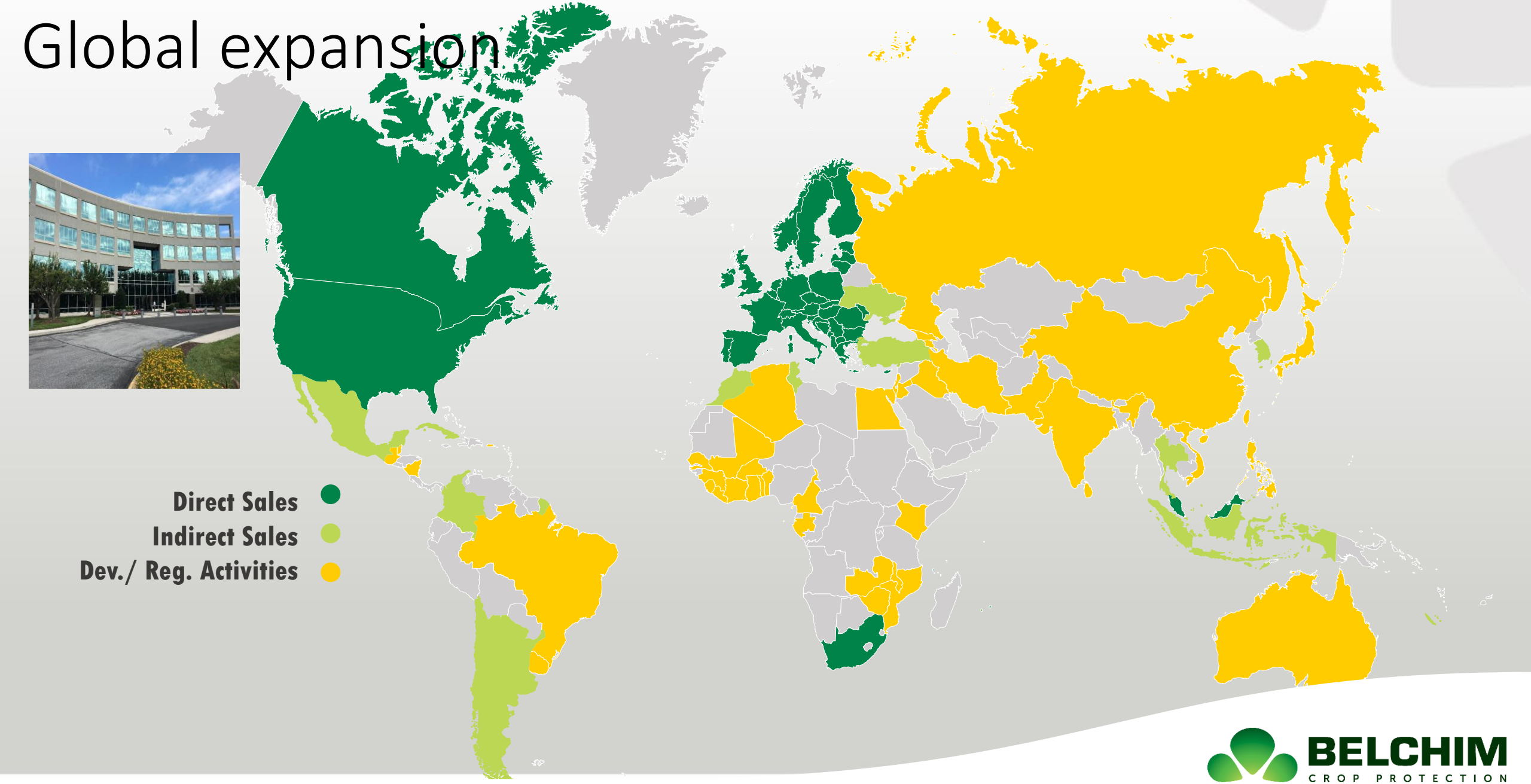
Dennis Long

Technical Service & Development Manager

Global expansion



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TENCHU® 20SG

The Next Generation of Insecticide for Rice Stink Bug Control

TENCHU® 20SG

What is it?

TENCHU 20SG is a 3rd generation neonicotinoid for rice stink bug control with the active ingredient "dinotefuran".

How does it work?

- **Quick knock down**
- **Highly systemic**
- **Anti-feeding properties at sub-lethal doses**
- **>10 day residual control**

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Dr. M.O. Way

The Benefits of Tenchu 20SG for Texas Rice Farmers

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Rice Stink Bug, *Oebalus pugnax*

Rice Stink Bug, *Oebalus pugnax*

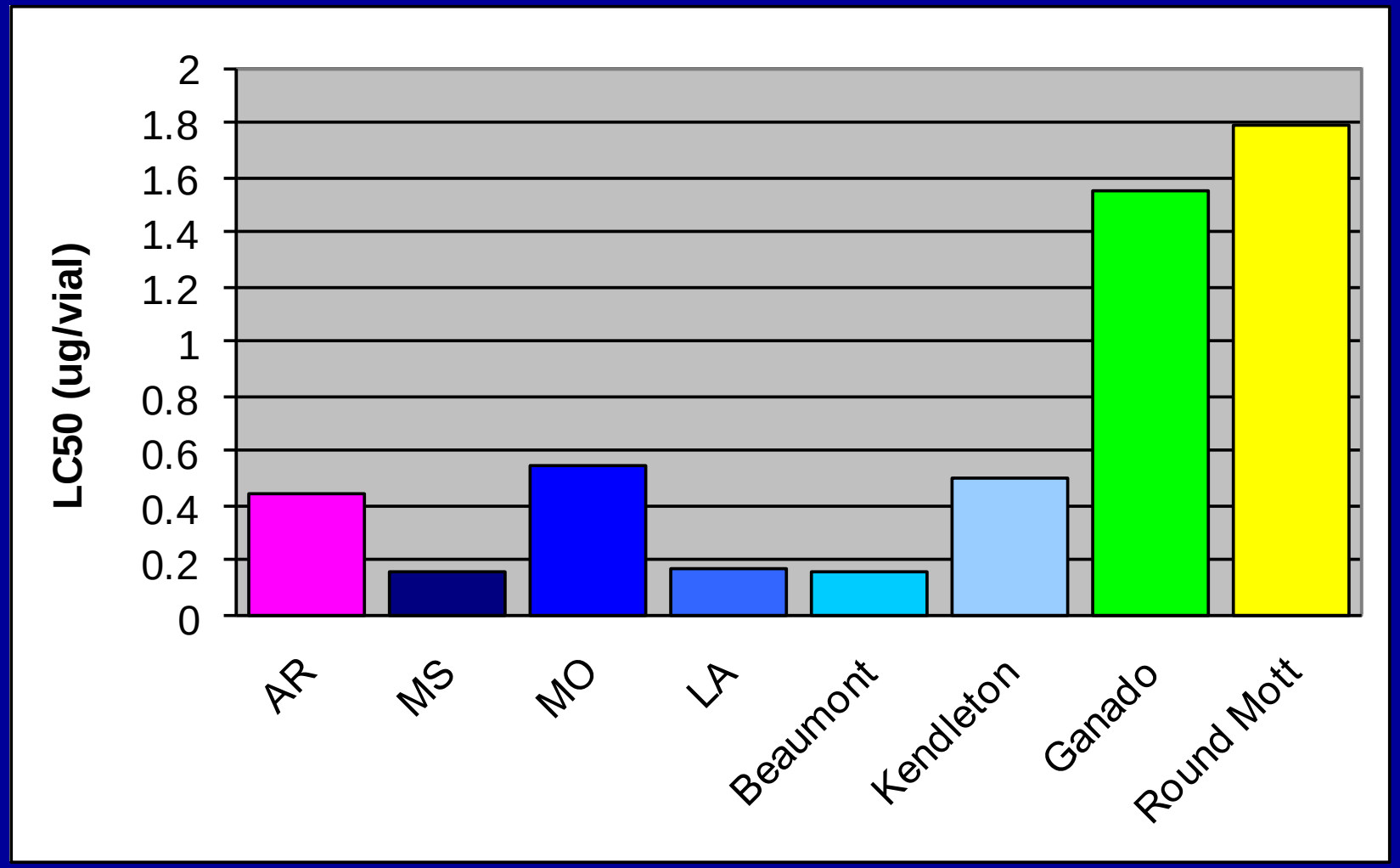
- 2013 EPA cancelled methyl parathion = go-to insecticide for rice stink bug (RSB) in TX ---Cheap and effective, but little residual (maybe 1-2 days???)
  - Farmers and aerial applicators illegally applied acephate (Orthene = systemic with long residual), but got caught = fines, warnings and possible confiscation of crop

Rice Stink Bug, *Oebalus pugnax*

- So, farmers relied on pyrethroids = lambda-cyhalothrin (Karate); zeta-cypermethrin (Mustang Max; gamma-cyhalothrin (Prolex/Declare)
  - Some applied Sevin XLR Plus but claimed too expensive
  - 3 or more pyrethroid applications per year for RSB (cheap and rapid knock-down)

Development of resistance?

LC_{50} of RSB Exposed to λ-cyhalothrin in Adult Vial Test. 2010



Development of resistance?

- Based on these data and high no. of pyrethroid applications, Crisis Exemption dinotefuran (Tenchu 20SG) approved by EPA in 2008; 2009-2012 = Sec 18 Emergency Exemptions and full federal label in 2013.
  - Data collected by Landis International (thanks to Ooe-San and Ron Landis!) and my project = 7-10 days residual

England Farms, England 8 Field (TX). 2009.

Date	Event	Average # RSB/10 sweeps
Jun 26	Before Tenchu	40.0
Jun 29	TENCHU @ 7.5 oz/A	0.0 (1 DAT)
		0.3 (4 DAT)
		1.0 (8 DAT)
		1.0 (14 DAT)
		2.0 (17 DAT)

Field size: 75 acres
Grain Yield: 53.7 bbl/A Milling Yield: 58/73
Peck: 1.7%

Contact Activity Against RSB

Mortality (%) for RSB Contact Study. Beaumont, TX. 2018.

Treatment	Rate (fl oz/A)	1 HAT	24 HAT
Untreated	---	0.0 C	7.5 B
Endigo ZCX	4.5	100.0 A	100.0 A
Endigo ZCX	5.0	100.0 A	100.0 A
Endigo ZCX	6.5	100.0 A	100.0 A
Tenchu 20SG	9 oz/A	97.2 A	100.0 A
Sercadis Xemium	6.8	22.5 B	92.5 A

- So, now typical scenario = Tenchu 20SG @ heading/milk + 1 pyrethroid late (but some farmers get by with 1 application of Tenchu 20SG)
- Testimonials from Crop Consultants = “Tenchu 20SG has solved my RSB problems”; “Tenchu 20SG has cut-down my RSB sampling”
- Note: RSBs caught in net following Tenchu application often dead or dying

Sweep Net with Rice Stink Bugs

RSB treatment thresholds

Average number of RSBs[1]/10 sweeps

Projected yield (lb/acre)	Heading	Milk	Soft dough	Hard dough
4500	8	10	17	47
6000	10	14	22	63
7500	13	17	28	79
9000	16	21	34	94

[1]Includes adults and older nymphs (4th and 5th instars).

Need to revise.

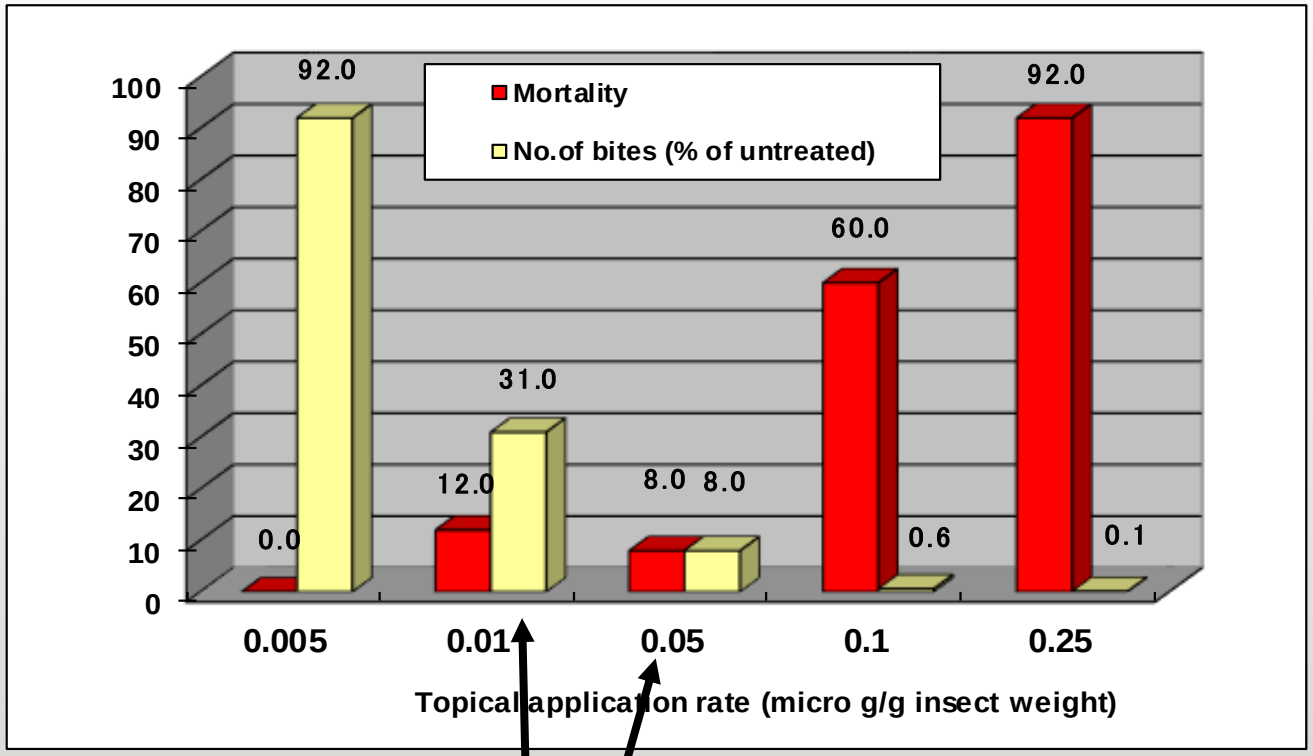
Cage Studies

Recent problem with rice delphacid

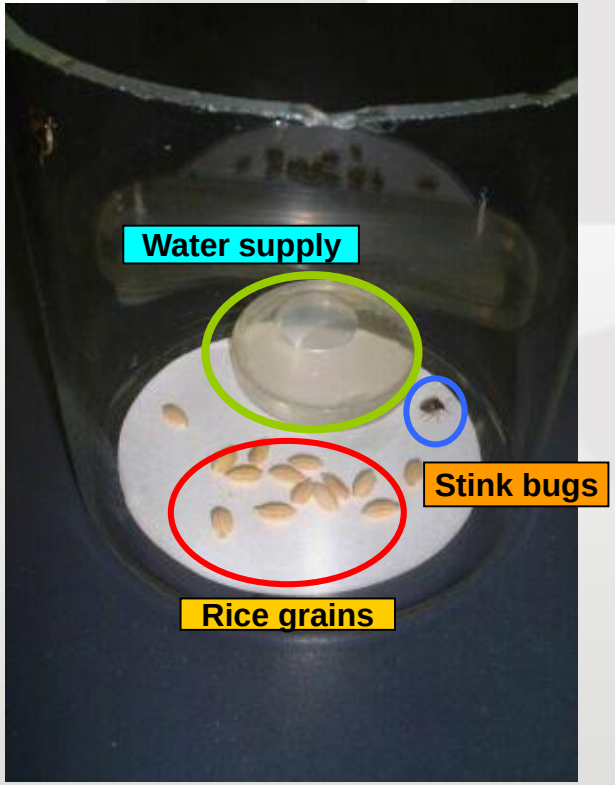
- Will Tenchu 20SG have a fit here?

Questions?

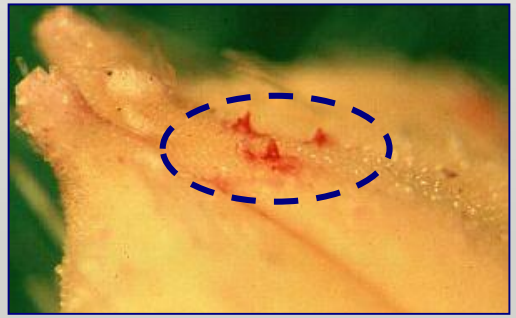
Anti-feeding Properties- Contact



Sub-lethal doses cause 70-90% feeding inhibition. Even though some stink bugs may re-infest long after the application, sub-lethal residual dinotefuran can prevent feeding



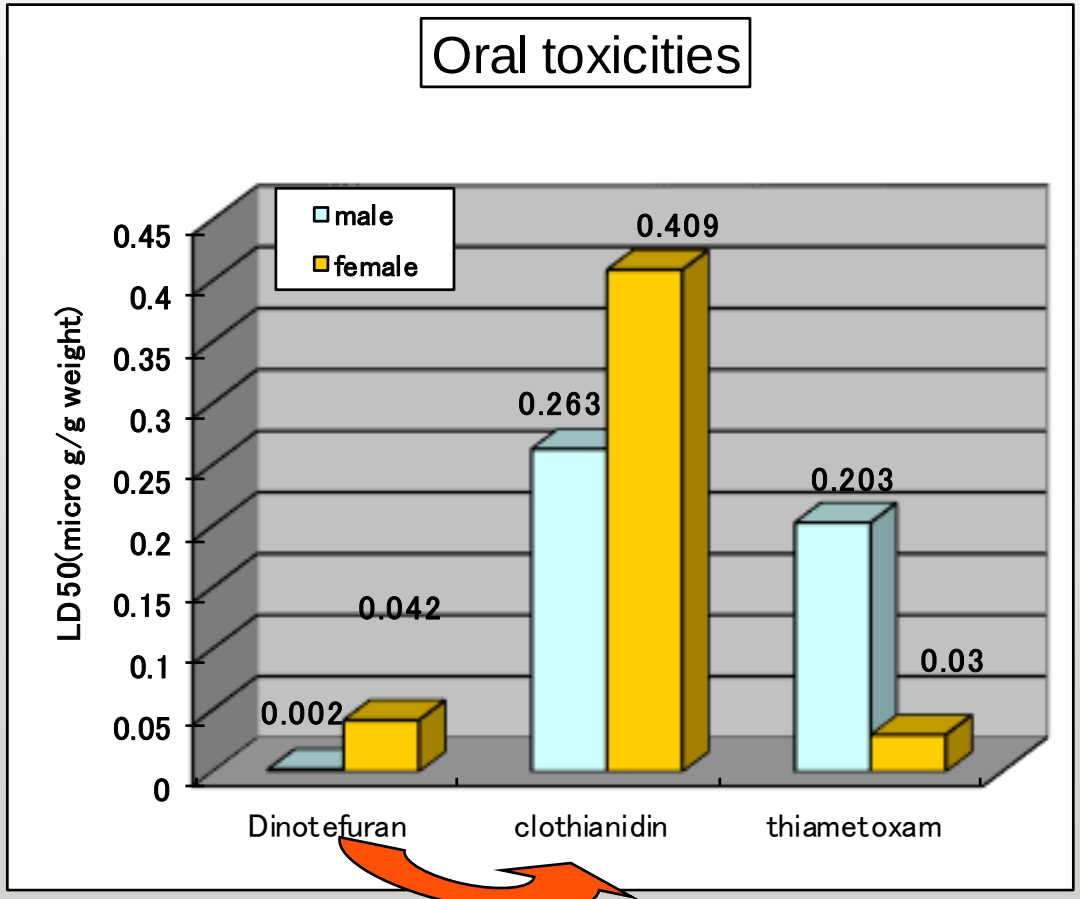
Holding arena



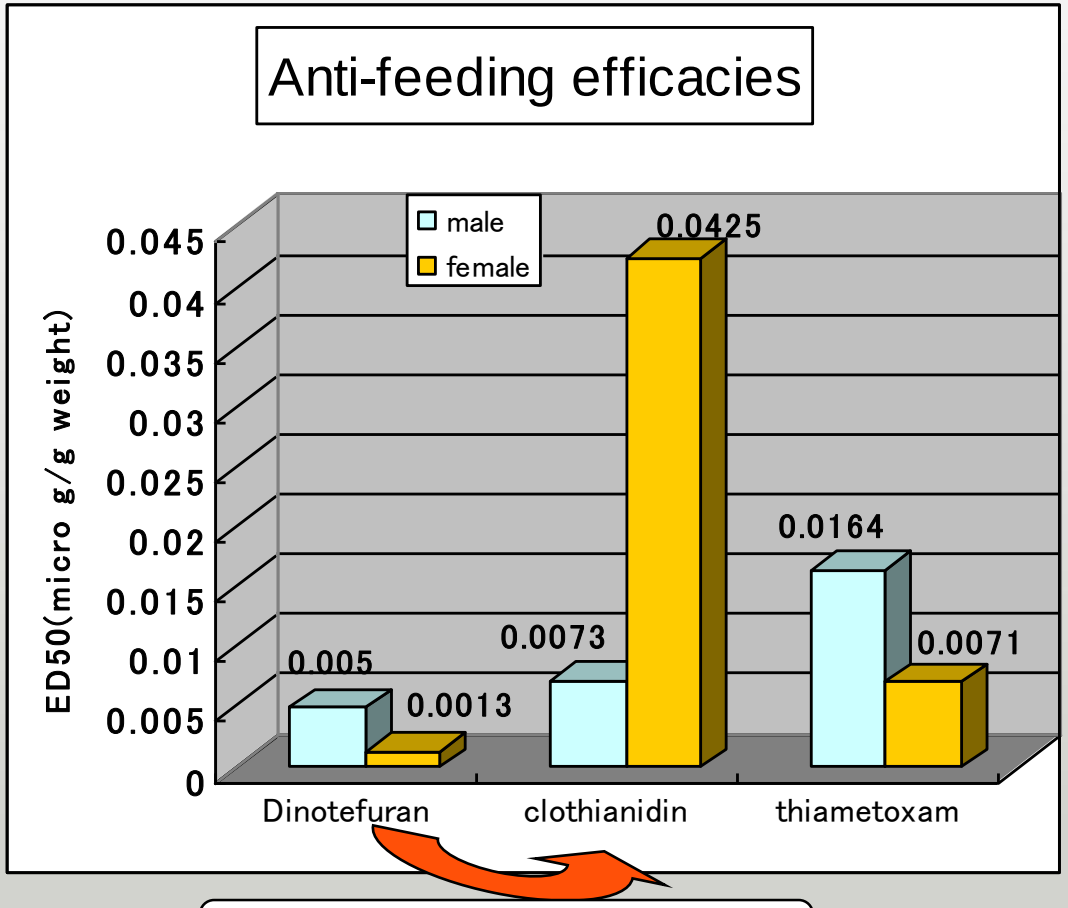
Red reagent dye identified bug bites

Mortality & Anti-feeding Properties - Oral

Comparison to other neonicotinoids



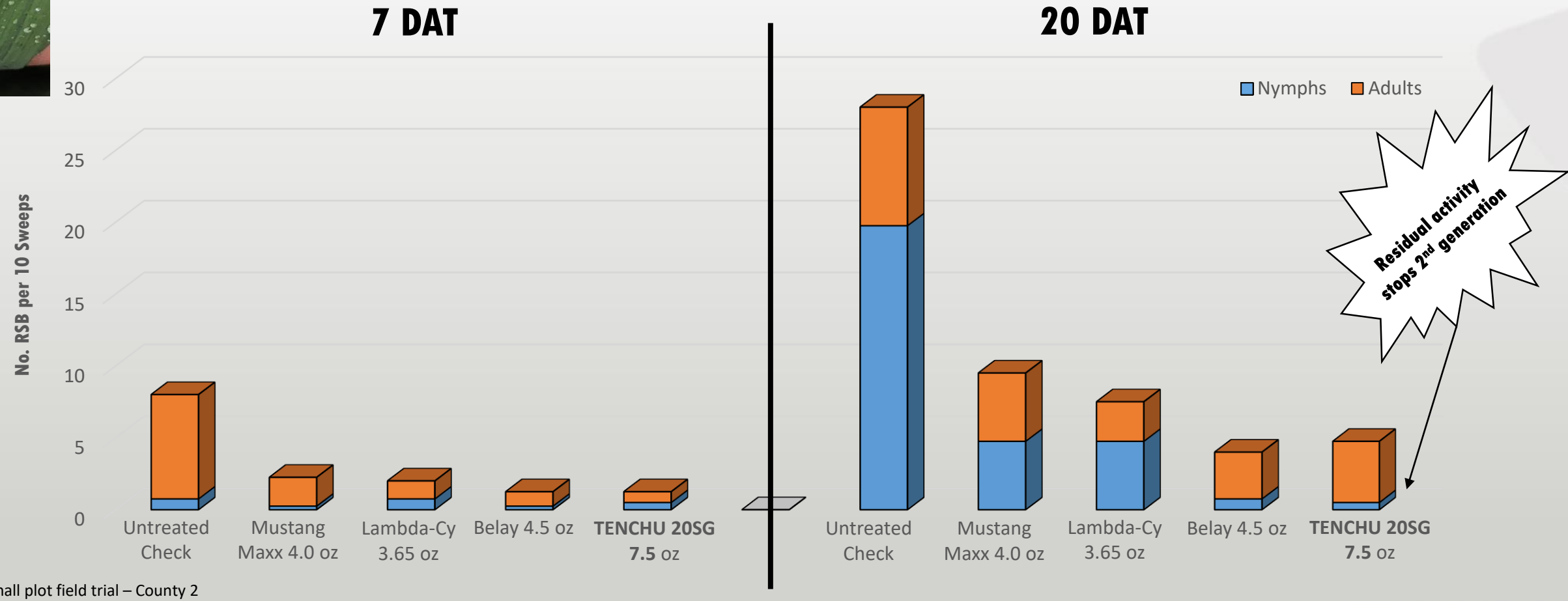
10 - 130X more active



1.5 - 33X more active

Tenchu Rice Stink Bug Control on Rice

Dr. Lorenz & Dr. Bateman, UAR – 2018



Small plot field trial – County 2

Mustang Maxx is registered trademark of FMC Corporation. Lambda-Cy is trademark of United Phosphorous Inc. Belay is a registered trademark of Valent U.S.A. LLC.

(18-149)

University of Arkansas, MP144 2018 pg. 96

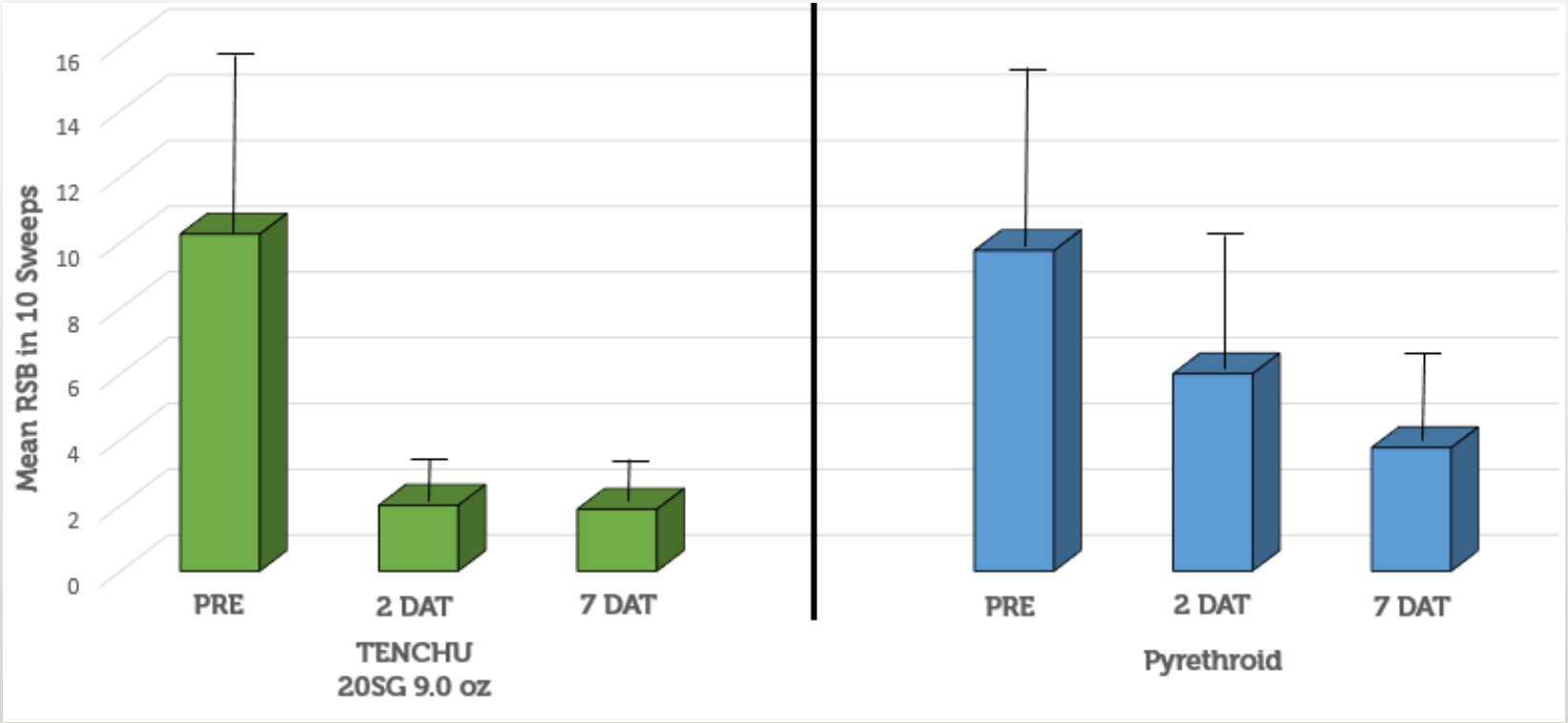
RICE INSECTICIDE PERFORMANCE RATING

Insecticide	Chemistry	Restricted Entry Interval (hours)	Restricted use (R)	Chinch Bug	Fall Armyworm	true Armyworm	Short Horned Grasshopper	Rice Stink Bug	Rice Water Weevil (adult)	Rice Water Weevil (egg)
Cruiser	NEO	12		6		2			6	7
Demacor X-100	DM	4	X	1	8	8			1	8
Nipsit Inside	NEO	12		6					6	7
Belay	NEO	12		7				7	7	
Dimilin 2L	IGR	12	X						0	7
Karate Z/Warrior	SyP	24	X	7	8	8	7	8	9	
Malathion	OP	12		1	2	5	6	8		
Mustang Maxx	SyP	12	X	7	8	8	7	8	9	
Prolex/Proaxis/Declare	SyP	24	X	7	8	8	7	7	9	
Sevin	Car	12		6	6	5	6	8		
Tenchu	NEO	12						8		

Rating Scale: 0 = no control, 10 = excellent
The performance ratings in the chart are for comparison purposes only and are not necessarily a measure of percent control.
Shaded boxes indicate products recommended for specific pests in this guide.

Tenchu Rice Stink Bug Control

Summary of 11 LSU Grower Trials Conducted in 5 LA Parishes



- **Only the Tenchu treated fields remained below action threshold.**
- **At one of the sites, a retreatment of Pyrethroid was required to keep RSB population below threshold but adjacent field treated with Tenchu remained below threshold. This trial site was not included in the summary here.**
- **Tenchu provided more consistent control.**

Blackman, et. al, LSU – 2011-2013
Each plot size was 5 acres and treatments applied by air.
Pyrethroids used were lambda-cyhalothrin & zeta-cypermethrin and were applied at commercial rates.

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Louisiana Insect Pest Management Guide 2018 pg. 35

Rice stink bug	Karate Z[3]	Lambda-cyhalothrin	0.025 - 0.04 lbs A.I./acre (1.6 - 2.56 fl oz/acre)	21 days	Scout in the morning for best results. Treat when there are 30 stink bugs per 100 sweeps during first 2 weeks of heading. Treat when there are 100 stink bugs per 100 sweeps until 2 weeks before harvest.
	Mustang Maxx[4]	Zeta-cypermethrin	0.020 - 0.025 lbs A.I./acre (3.2 - 4.0 fl oz/acre)	14 days	
	Prolex/Proaxis[5]	Gamma-cyhalothrin	0.0125-0.02 lbs A.I./acre (1.28 - 2.05 fl oz/acre)	21 days	
	Declare[6]	Gamma-cyhalothrin	0.0125 - 0.02 lbs A.I./acre (1.28 - 2.05 fl oz/acre)	21 days	
	Fastac EC[7]	Alpha-cypermethrin	0.020 - 0.025 lbs A.I./acre (3.2- 3.8 fl oz/acre)	14 days	
Rice stink bug (cont.)	Sevin 80S[11]	Carbaryl	1.25 - 1⅞ lbs/acre	14 days	
	Sevin 4F[11]	Carbaryl	1.0 - 1.5 quarts/acre	14 days	
	Tenchu 20SG[12]	Dinotefuran	0.094 - 0.131 lbs A.I./acre (7.5 – 10.5 ounce/acre)	7 days	
	Malathion 57% EC[13]	Malathion	1.0 to 1.5 Pt/A	7 days	

Texas Rice Production Guidelines 2014 pg. 75

Table 18m. Insecticides for rice stink bug control.

Active ingredient/product	Rate per acre: Active ingredient	Rate per acre: Product
carbaryl Various labeled products containing carbaryl	1.0–1.5 lb	Depends on product
dinotefuran Tenchu® 20SG	0.094-0.131	7.5-10.5 oz
gamma-cyhalothrin DECLARE®	0.0125–0.02 lb	1.28–2.05 fl oz
lambda-cyhalothrin Karate® Z	0.025–0.04 lb	1.6–2.56 fl oz
methyl parathion	0.25–0.5 lb	1/2 – 1 pt (for 4 lb/gal product)
zeta-cypermethrin Mustang MAX™	0.0165–0.025 lb	2.64–4.0 fl oz

Rice Stink Bug Product Label Comparison

	SIGNAL WORD	RESTRICTED USE PESTICIDE	PPE PROTECTIVE EYEWEAR	REI Hrs	BUFFER ZONE TO AQUATIC BODIES	DAYS TO RELEASE FLOOD WATER	PHI DAYS	RESTRICTIONS
Lambda-Cy	WARNING	YES	YES	24	150 feet	7	21	-Do not apply if rain is expected within 24 hrs.
Mustang Maxx	WARNING	YES	YES	12	150 feet	7	14	
Belay	CAUTION	NO	NO	12	Avoid Drift	14	?	-Do not apply after 3rd tillering has initiated. -Not to be used on rice crops near fish farm, shrimp, pond operations
Tenchu 20SG	CAUTION	NO	NO	12	Avoid Drift	0	7	-Not for fields used for fish or crustacea production. -Maximum 2 applications per year

Mustang Maxx is registered trademark of FMC Corporation.
Lambda-Cy is trademark of United Phosphorous Inc
Belay is a registered trademark of Valent U.S.A. LLC.
Tenchu is a registered trademark of Mitsui Chemicals Agro, LLC

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SUMMARY

TENCHU® 20SG

- Quick knock down
- Highly systemic:
    - Provides aerial applicator efficiency by 3GPA water for Tenchu vs 5GPA necessary for pyrethroid coverage.
    - 5 GPA load in plane necessary for pyrethroids results in 100 ac treated. 3 GPA TENCHU is 167 ac treated – 67% more acres treated to save time & money
- >10 day residual control; fewer applications necessary
- Anti-feeding properties even at sub-lethal doses leads to less pecky rice
- More consistent control
- No buffer zones or restrictions for release of flood water

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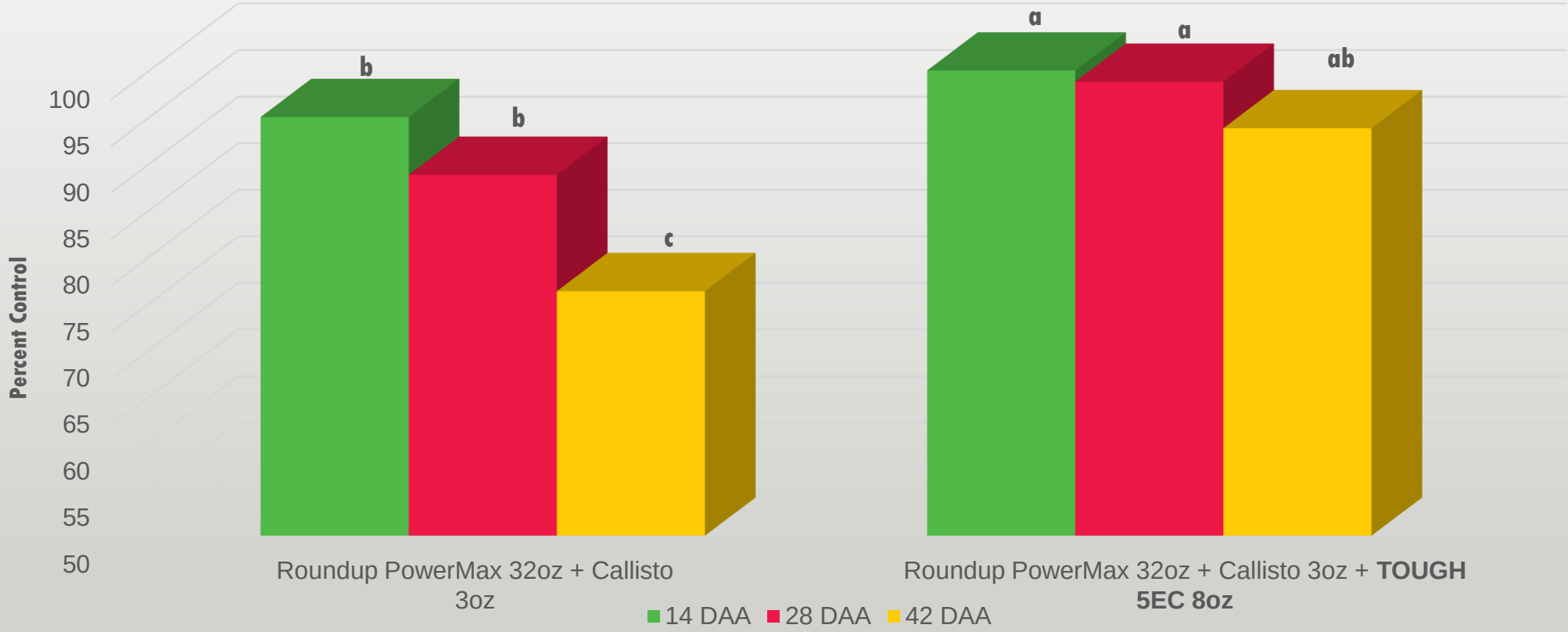
TOUGH 5EC Efficacy in Corn

Dr. Scott, University of Arkansas – Newport, 2018

Palmer Amaranth



Dual II Magnum 1.33pt PRE. AMS added to all foliar treatments
Treatments applied to V-2/V-4 corn (6" tall); 15 GPA, 25 psi
P. Amaranth 5-leaf, avg. 4" tall with 30/ft2
(18-115)

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Dr. M.O. Way

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