Natular™ Stewardship Initiatives Over the Past Season

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Clarke - Environmental Sciences

for

Georgia Mosquito Control Association

October 21, 2009

Our journey to Natular™

1982…at a Caribbean rum still

- A vacationing scientist collected soil samples from an abandoned rum still site.
- Back at the lab, the samples showed biological activity.
- Fermentation products of the samples further demonstrated insecticidal properties

Our journey to Natular™

1986…A new organism was identified

- A new species of bacteria was found.
  - Named: *Saacharopolyspora spinosa* (“spiny sugar”)

1987…Metabolites identified

- Scientists identified the most active metabolites of *S. spinosa* - spinosyn A and spinosyn D
- Together, they comprise spinosad (spinosa + A + D = spinosad) the active ingredient in Natular™

Our journey to Natular™

1995…Spinosad classified as a Reduced Risk pesticide product

- By the U.S. EPA, due to favorable environmental and toxicological profiles.

1997…First spinosad-based products registered

1999…

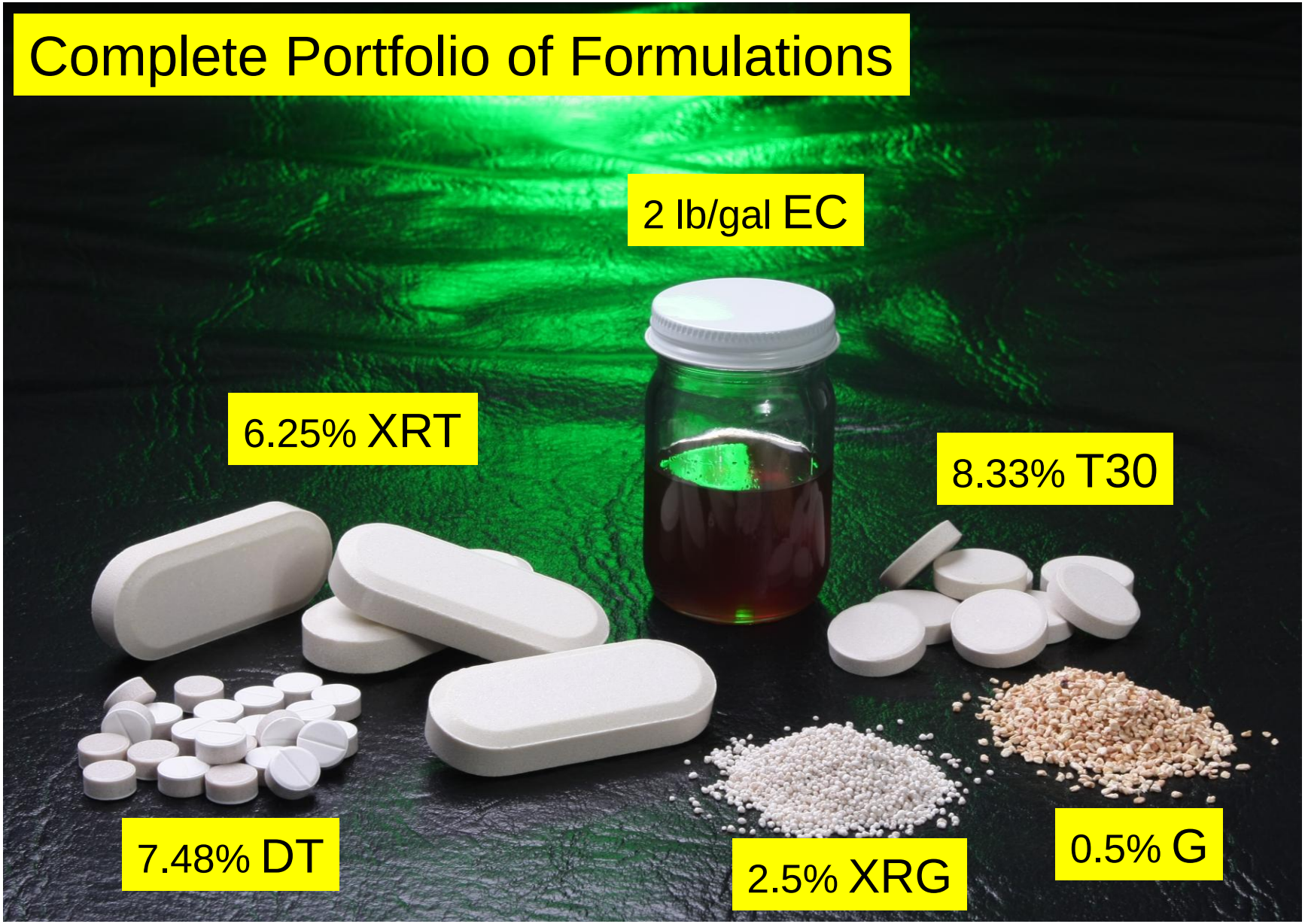
Presidential Green Chemistry Challenge Award

- Category of “Designing Safer Chemicals” based on… “…its highly selective insecticidal activity and environmentally compatible characteristics.”

Clarke's Stewardship Challenge

- Inert ingredient goals:
  - List 4 (Minimal / Reduced Risk)
  - NOP (National Organic Program – USDA)
- Reduced Risk review
- Section 3 registration
- Ultimately meet OMRI standards (Organic Material Review Institute)

Complete Portfolio of Formulations



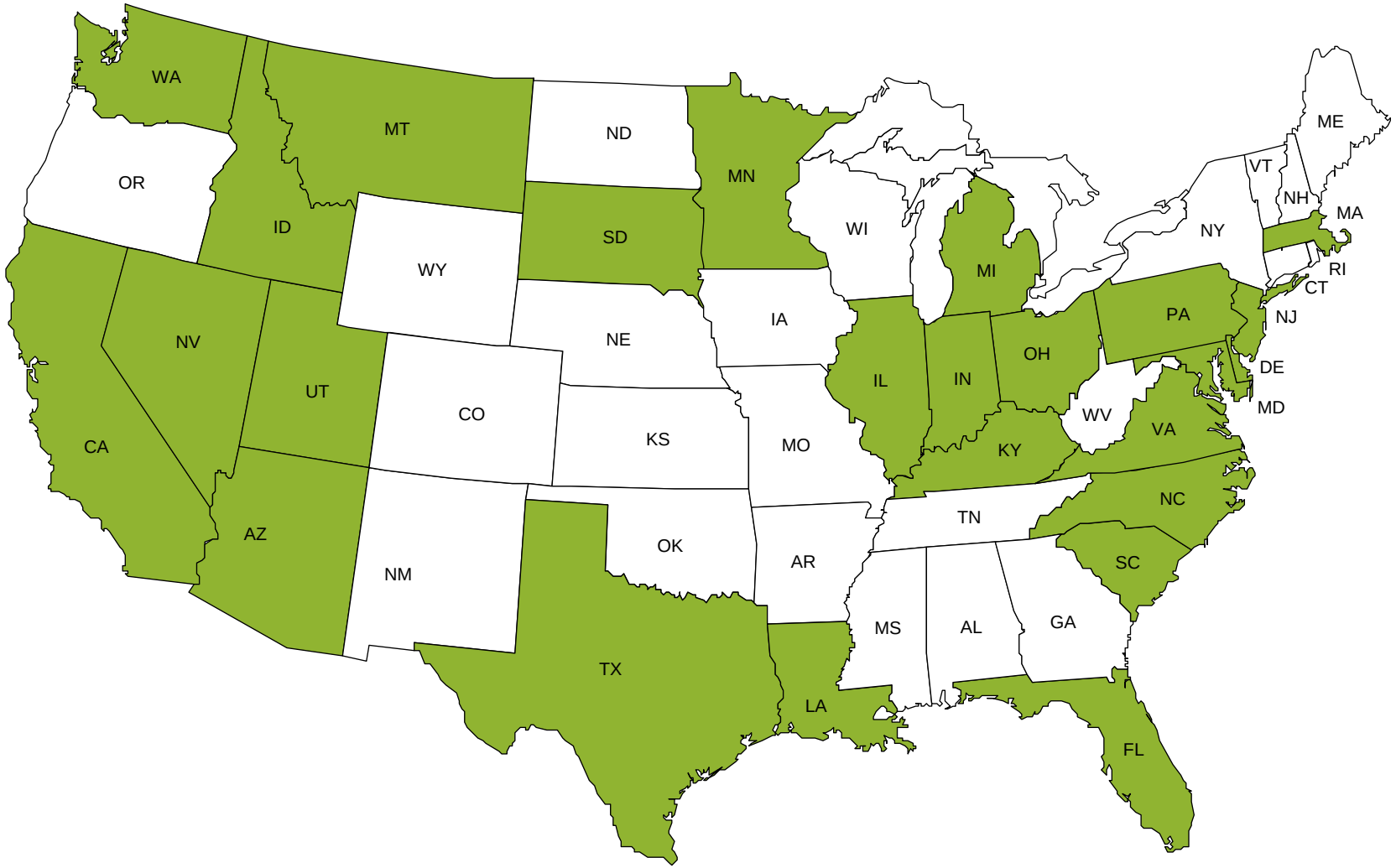
From Inception - A Unique Opportunity

Now OMRI Listed

- 2 lb/gal emulsifiable concentrate (**EC**) **In review**
- 0.5% corn cob granule (**G**) **In review**

- *2.5% extended release sand granule (**XRG**)* OMRI Listed
- *8.33% 30 day tablet (**T30**)* OMRI Listed
- *6.25% 180 day extended release tablet (**XRT**)* OMRI Listed

- 7.48% “effervescent” tablet (**DT**) international



2009 Managed Rollout

clarke®

Making communities around the world more livable, safe and comfortable.

2009 Stewardship Participants

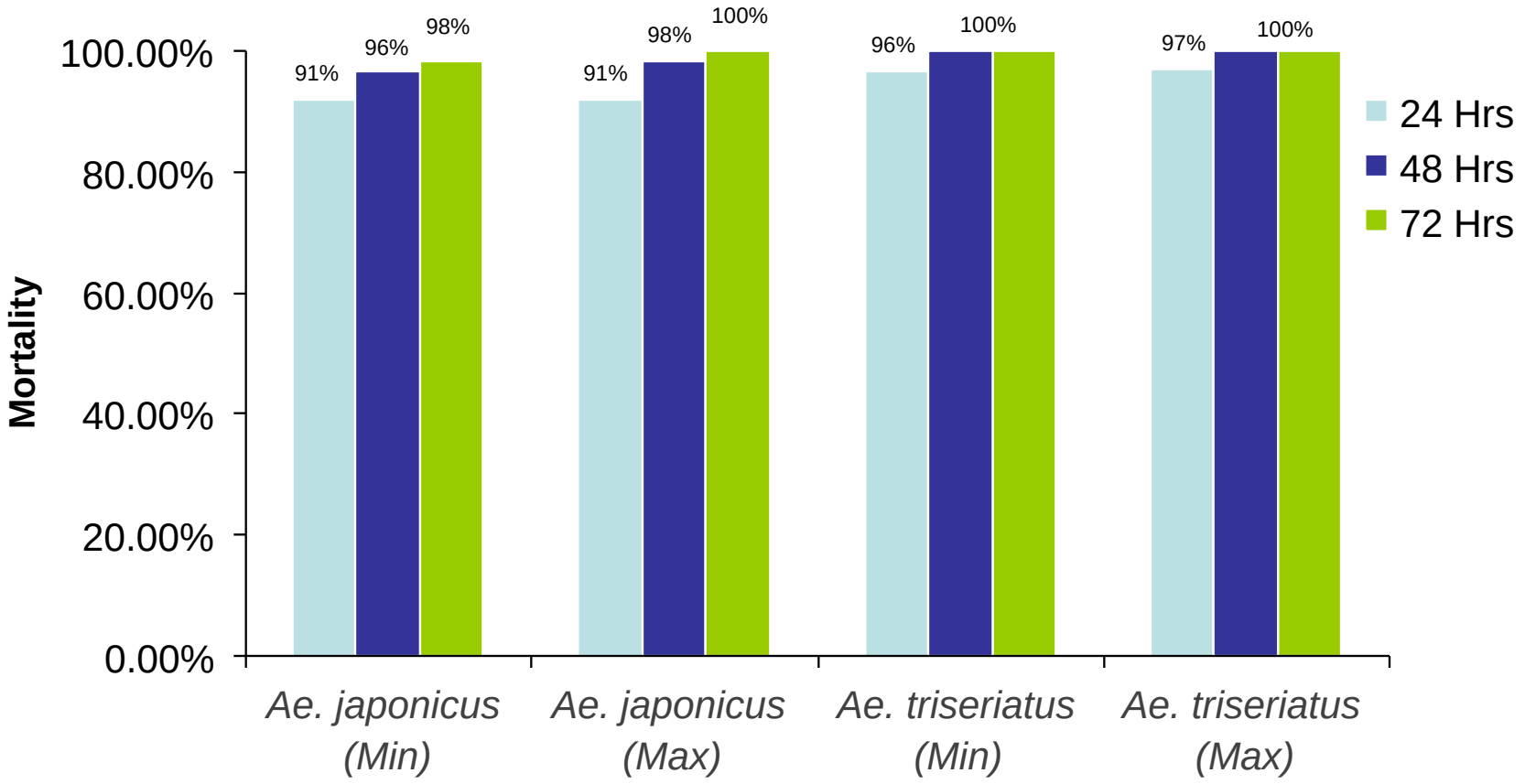
Utilized dynamic protocols, and facilitated the accumulation of operational, baseline information from coast to coast.

Our partners have helped to begin to define the interactions of a wide variety of mosquito species, in varied habitats, when challenged by a new active ingredient.

2009 Stewardship Participants

Natular Formulation	*Ae. albopictus*	*Ae. nigromaculis*	*Ae. taeniorhynchus*	*Ae. trivittatus*	*Ae. vexans*	*An. freeborni*	*An. quadrimaculatus*	*Cx. pipiens, Cx. restuans*	*Cx. tarsalis*	*Cs. inornata*	*Ae. japonicus*	*Ae. sollicitans*	*Ae. triseriatus*
EC (Min)				X			X				X	X	X
EC (Mid)							X						
EC (Max)		X		X		X	X		X	X	X	X	X
G (Min)	X			X			X				X		X
G (Mid)											X		X
G (Max)	X	X	X	X		X	X		X	X		X	
XRG (Min)	X			X			X				X		X
XRG (Mid)					X			X					
XRG (Max)	X			X			X				X		X
T30				X	X		X	X			X		X
XRT					X		X	X					

Natular EC
Rate: 1.1 fl oz/A (Min), 2.8 fl oz/A (Max)
Location: Kentucky



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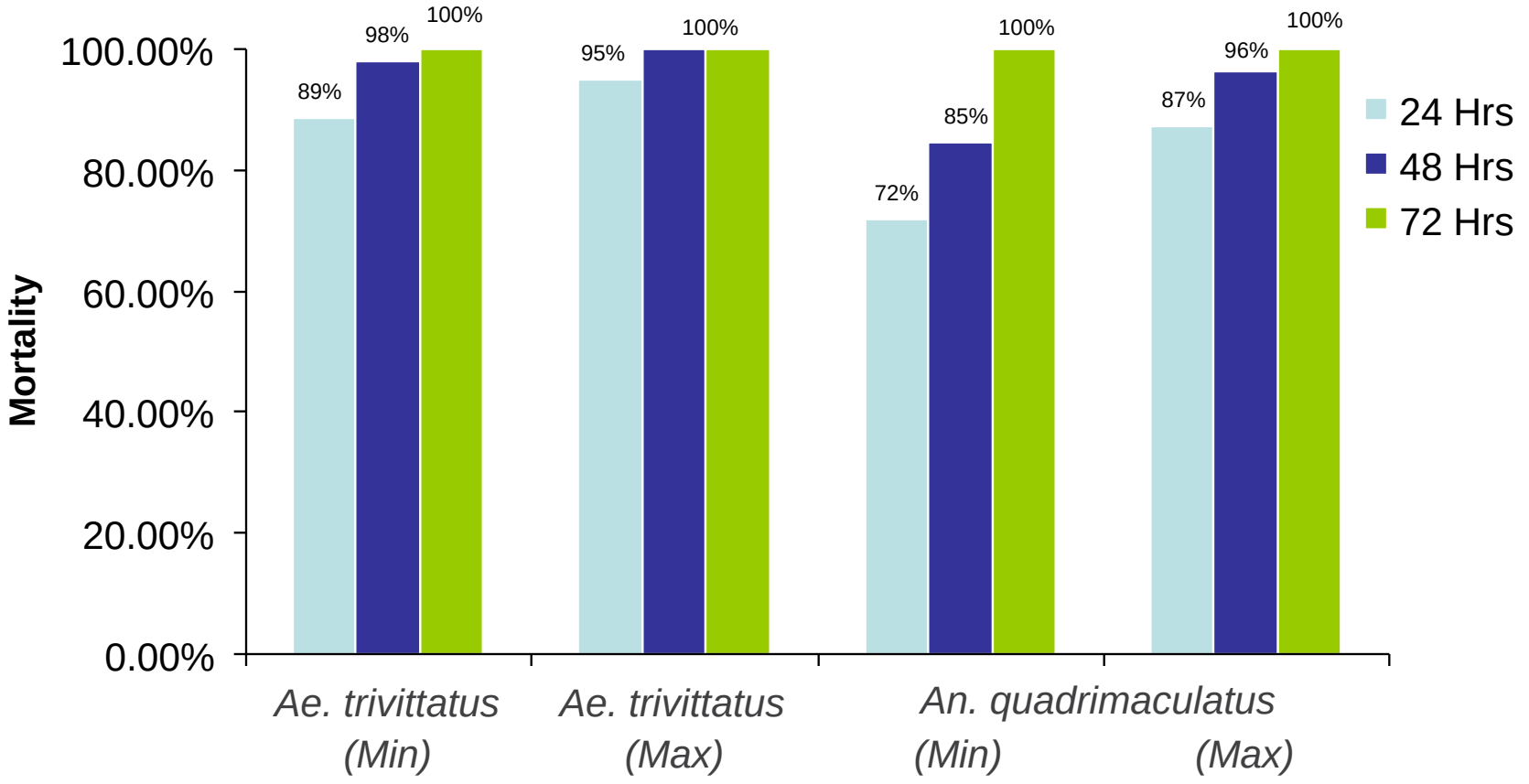
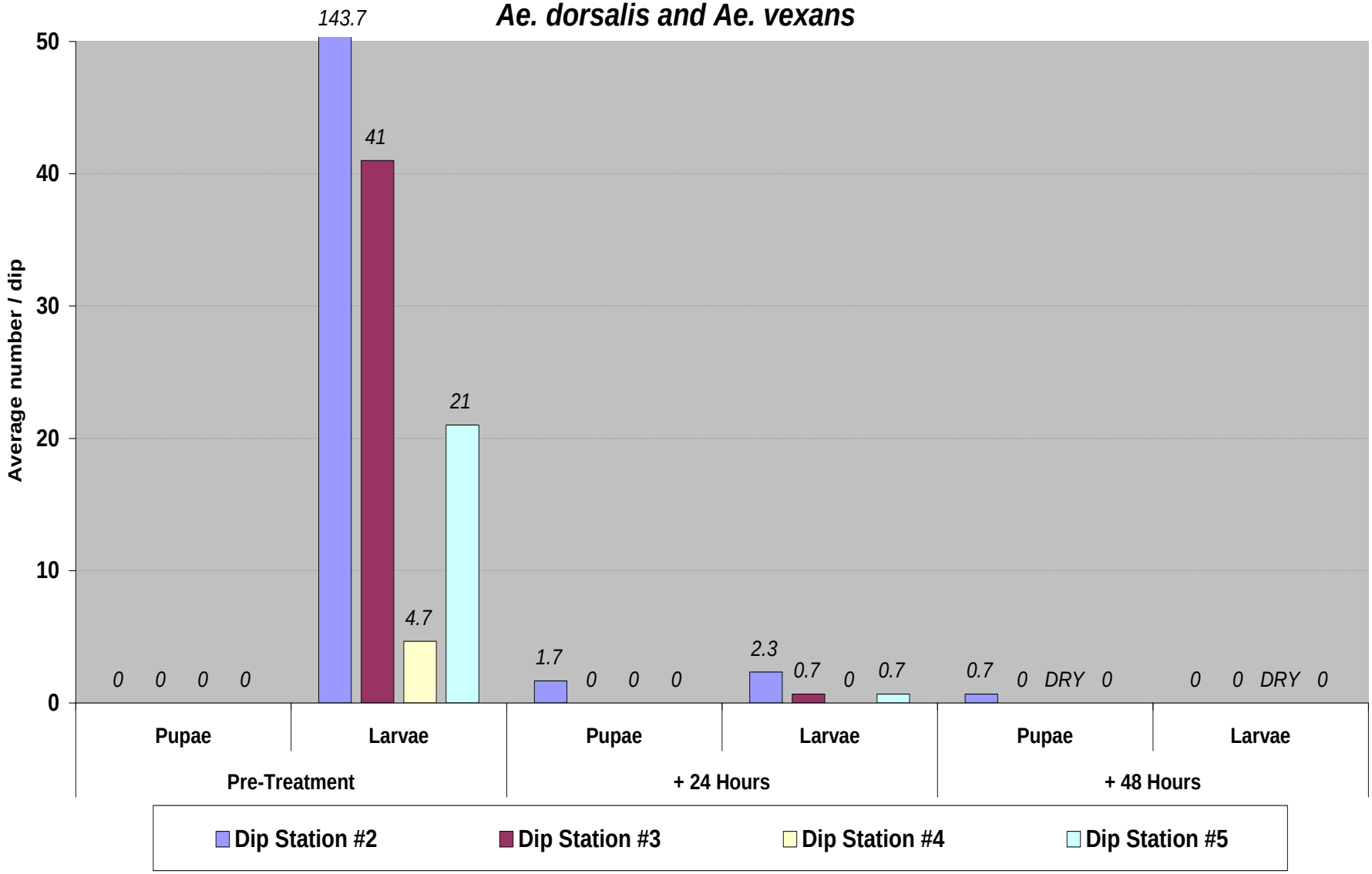


Results


Natular™ G
Montana Site 2
7 lbs / acre
Ae. dorsalis and Ae. vexans
Average number / dip
50
40
30
20
10
0
143.7
41
4.7
21
1.7
2.3
0.7
0.7
0.7
0 0 0 0 0 0 0 0 0 0 0 DRY 0 0 0 DRY 0
Pupae
Larvae
Pupae
Larvae
Pupae
Larvae
Pre-Treatment
+ 24 Hours
+ 48 Hours
Dip Station #2
Dip Station #3
Dip Station #4
Dip Station #5

Monroe Co., FL

0.5% Granule @ 9 lbs/A

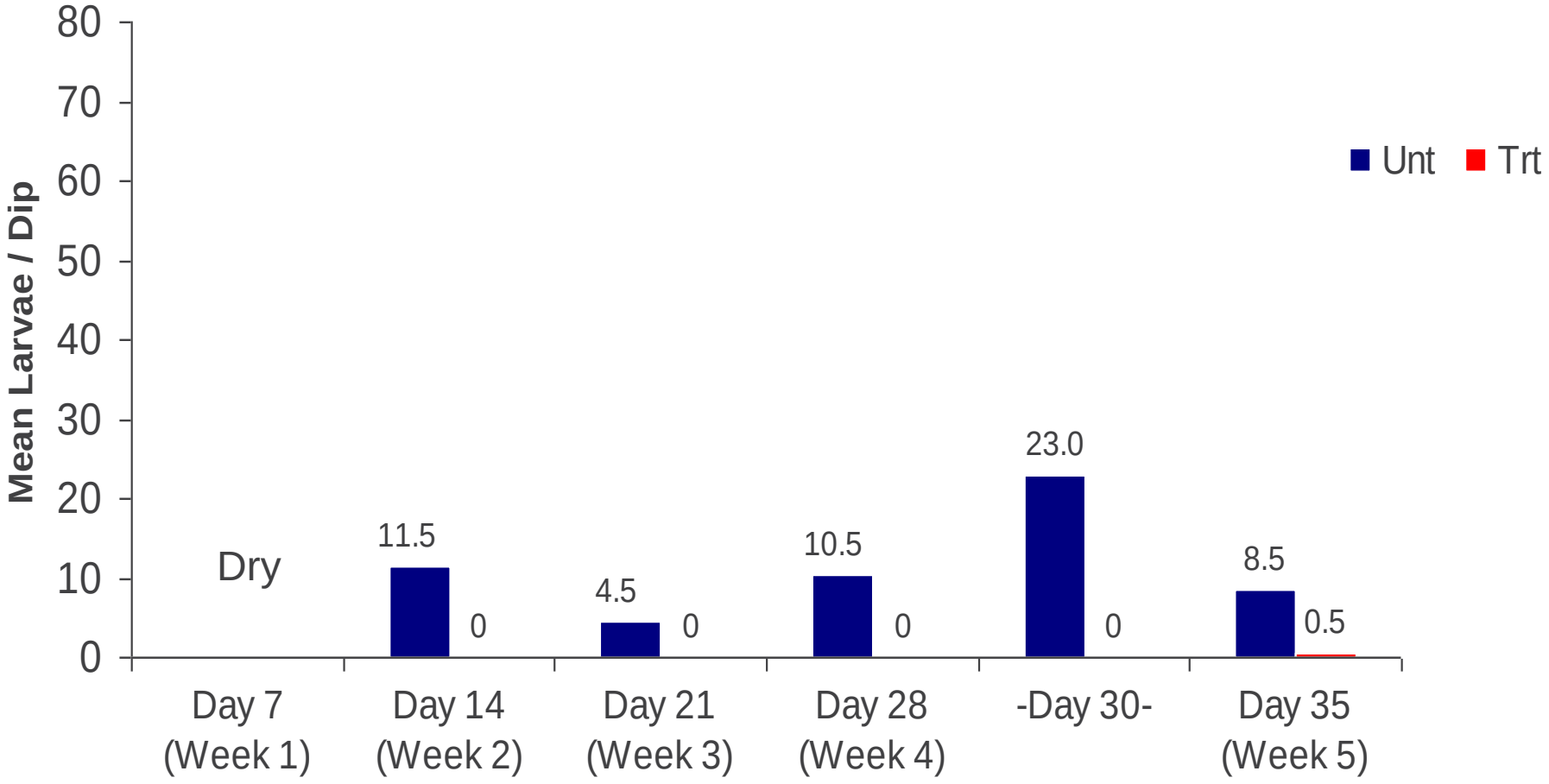
		% control based on pretreatment density		
		24h	48h	72h
Aedes nigromaculis	pasture	82	97	93
	untreated	+40	+144	+593
Aedes taeniorhynchus	rain pool	98	99	
	untreated	+23	+20	
Culex tarsalis	wetland	96	97	97
	untreated	43	+10	+71

Natular™ XRG

Retention Ponds / *Ae. vexans – Cx. pipiens*

Rate: 10 lb/A (<Mid)

Location: Illinois



Natular™ XRG
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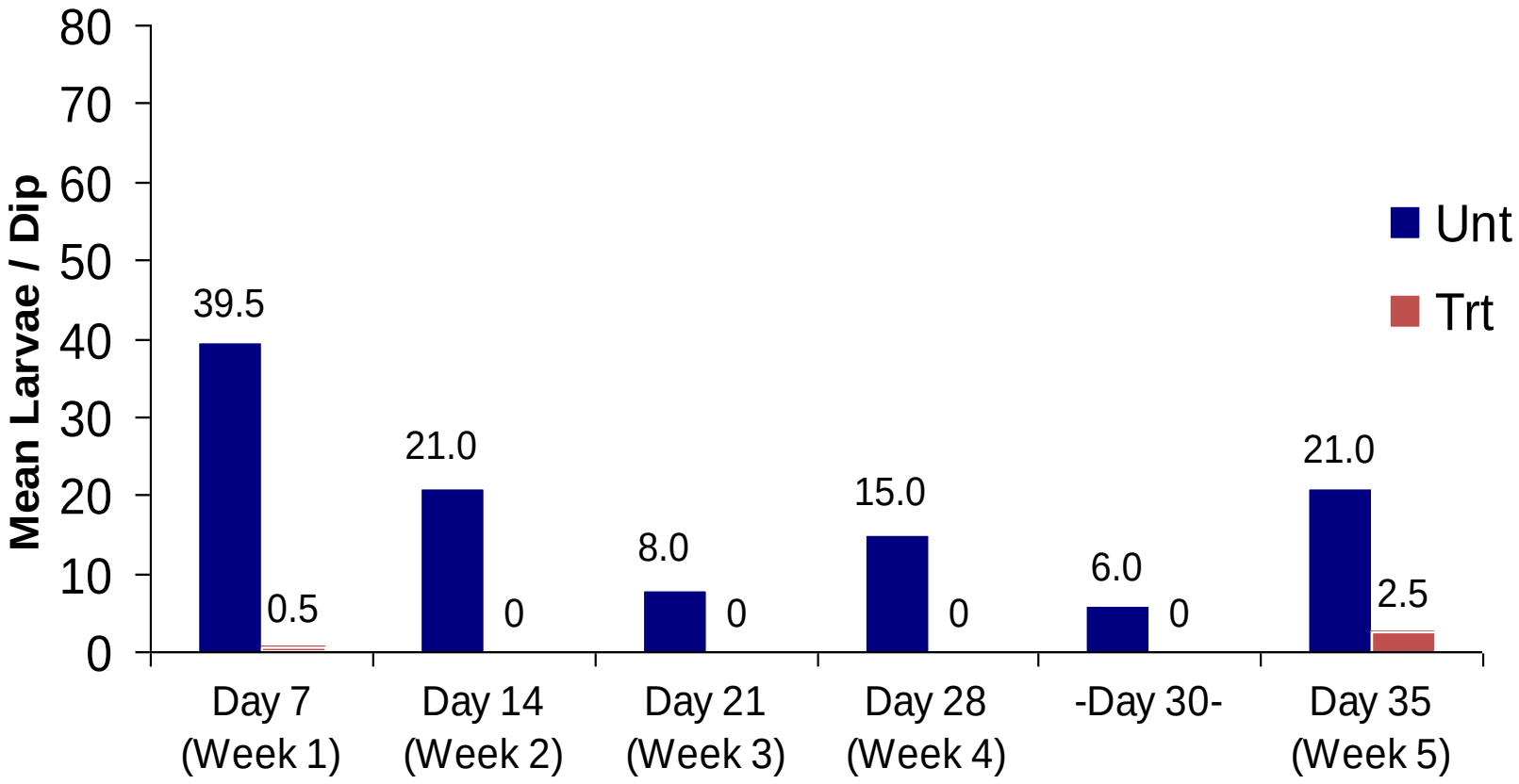


Metropolitan MCD, MN

Natular XRG tests in small ground sites (10 lb/acre rate) against *Aedes vexans* in 2009

Group	6/10/2009 Pre-Treat Dip Count			6/12/2009 48-hr Post Dip Count			% Control
	Mean	SE	n	Mean	SE	n	
Control	19.7	8.51	8	32.7	12.99	8	
Natular XRG	25.4	8.34	3	0.0	0.00	3	100%

Metropolitan MCD, MN

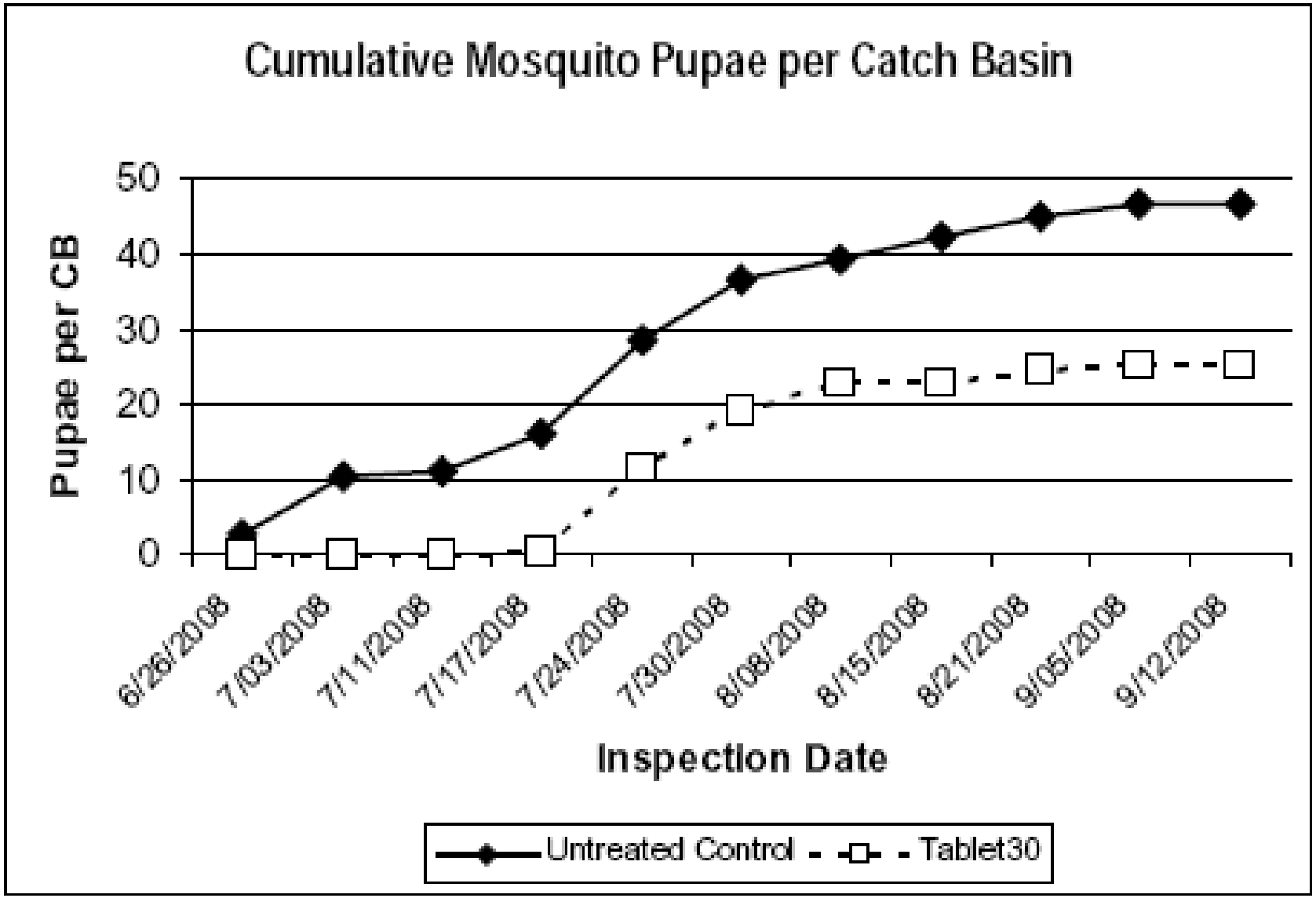
Tests of Natular XRT in Culverts (10 lb/acre rate) to control WNV vectors (mainly *Culex restuans*) in 2009

	Control					Natular XRG					
		cumulative data					cumulative data				
Inspection Dates	(n)	mean dipcount	SE dipcount	median dipcount		(n)	mean dipcount	SE dipcount	median dipcount	% Control	Weeks after treatment
					1st trt						
6/24	6	5.90	1.42	5.20	6/17	6	0.00	0.00	0.00	100.0%	1
7/1	6	18.95	4.67	20.40		6	0.20	0.14	0.00	98.9%	2
7/8	6	35.60	9.69	34.90		6	1.58	0.96	0.15	95.6%	3
7/15	6	65.55	28.83	43.75		6	3.83	2.53	0.85	94.2%	4
7/22	6	71.62	32.04	45.10		6	5.80	3.35	1.05	91.9%	5

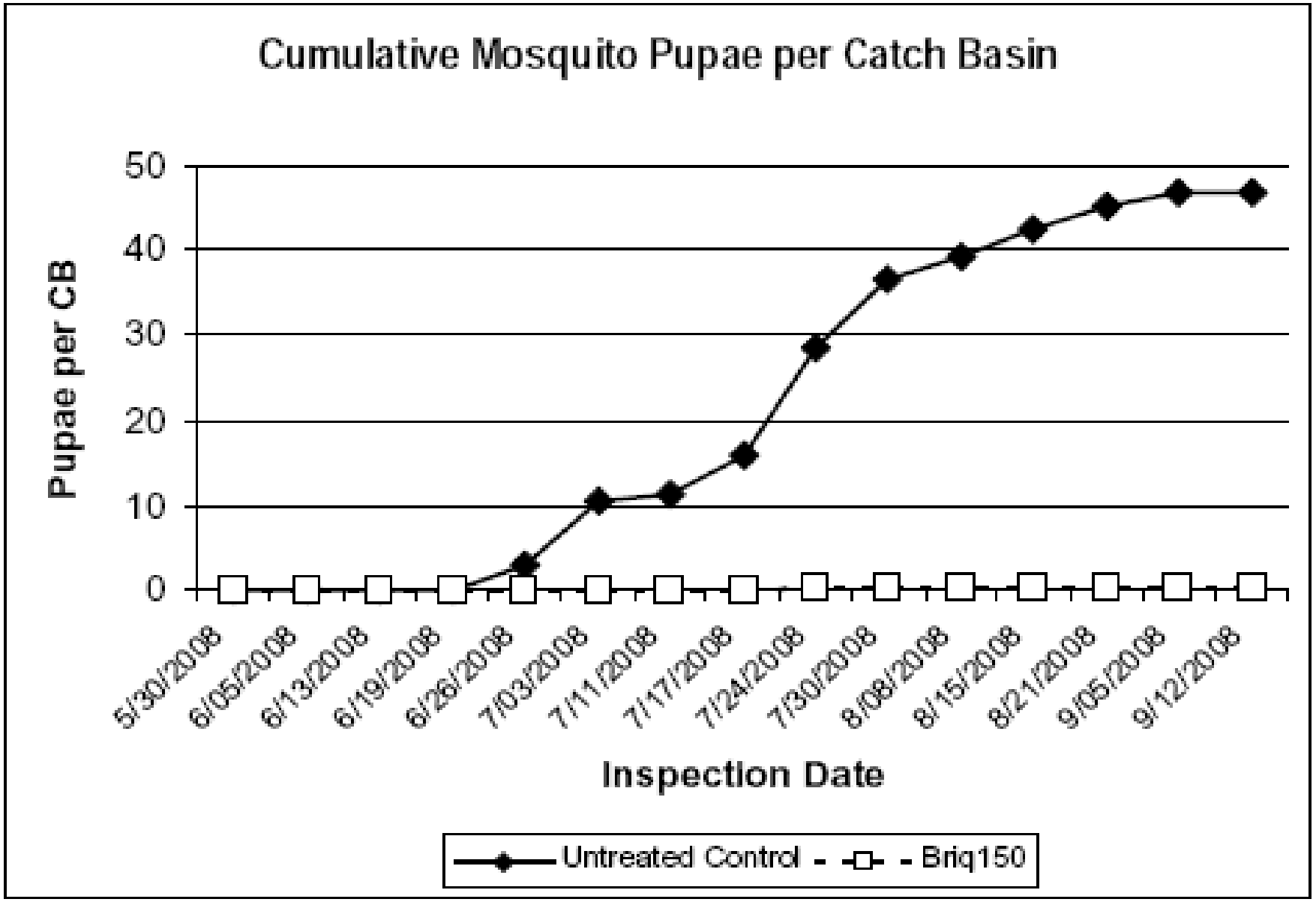
Brunswick Co., NC

Making communities around the world more livable, safe and comfortable.

Results T30


Cumulative Mosquito Pupae per Catch Basin
Pupae per CB
50
40
30
20
10
0
6/26/2008
7/03/2008
7/11/2008
7/17/2008
7/24/2008
7/30/2008
8/08/2008
8/15/2008
8/21/2008
9/05/2008
9/12/2008
Inspection Date
Untreated Control
Tablet30

Results - XRT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5/30/2008
6/05/2008
6/13/2008
6/19/2008
6/26/2008
7/03/2008
7/11/2008
7/17/2008
7/24/2008
7/30/2008
8/08/2008
8/15/2008
8/21/2008
9/05/2008
9/12/2008
Inspection Date
Untreated Control
Briq150

General Summary

- All formulations achieved results validating labeled use patterns for proposed habitats, species, and rates.
- Post-treatment efficacy of Natular™ treated water should focus on late instar larvae / pupae, and ignore early instar larvae.
- These formulations (active ingredient – spinosad) are the only products in this MOA group, and should be used in a rotational larvicide regimen.

Thank you

GO PHILS!