

Thrips Control in Cotton

... and Closely Related Stuff

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THRIPS

Tobacco thrips, eastern flower thrips, western flower thrips, onion thrips, soybean thrips, etc.

- Adult and larval stages
- Leaf deformity, stunting, maturity delay, plant death, and yield loss
- Consistently among the top 3 pests in the Mid-South Cotton



Tobacco Thrips





TOBACCO THRIPS

Beltwide survey of species composition in cotton during 2009 and 2010

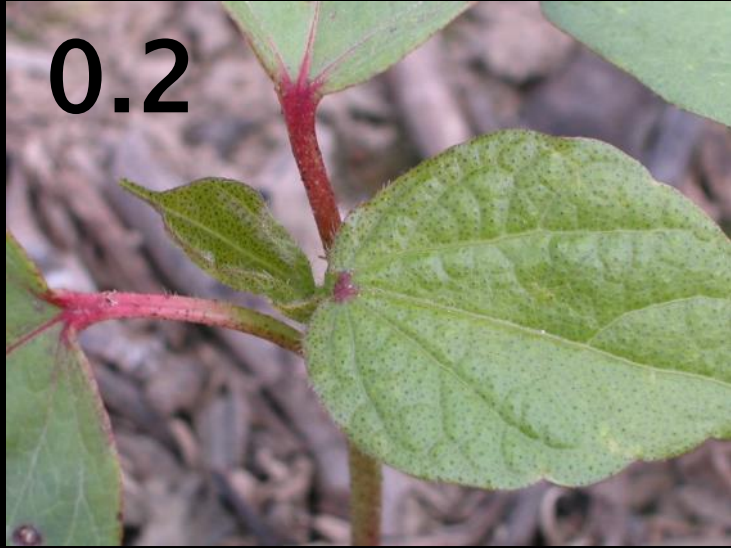
- Stewart et al. 2014 (J. Cotton Science)
- Based on adults

In the Mid South and Southeast (15 locations):

- 2009 = 81.0% tobacco thrips
- 2010 = 81.8% tobacco thrips

Over 90% in Mississippi were tobacco thrips

THRIPS INJURY



CURRENT THRIPS CONTROL OPTIONS

- Imidacloprid at 0.375 mg ai/seed*
 - Gaucho, Aeris, Acceleron IF
- Imidacloprid in-furrow (e.g., Admire Pro)
- Aldicarb (AgLogic15G at 3.5 - 5 lb/acre)
- Acephate in-furrow or seed treatment
- Recommended foliar applied insecticides
 - Acephate (Orthene), Bidrin, Dimethoate, Radiant
 - Typically not used as stand alone approach



7 Node Cotton

* Base seed treatments and rates vary by company, and some already include imidacloprid. For example, FiberMax and Stoneville varieties have a base treatment that includes imidacloprid at 0.135 mg ai/seed (36%).

SOME HISTORY

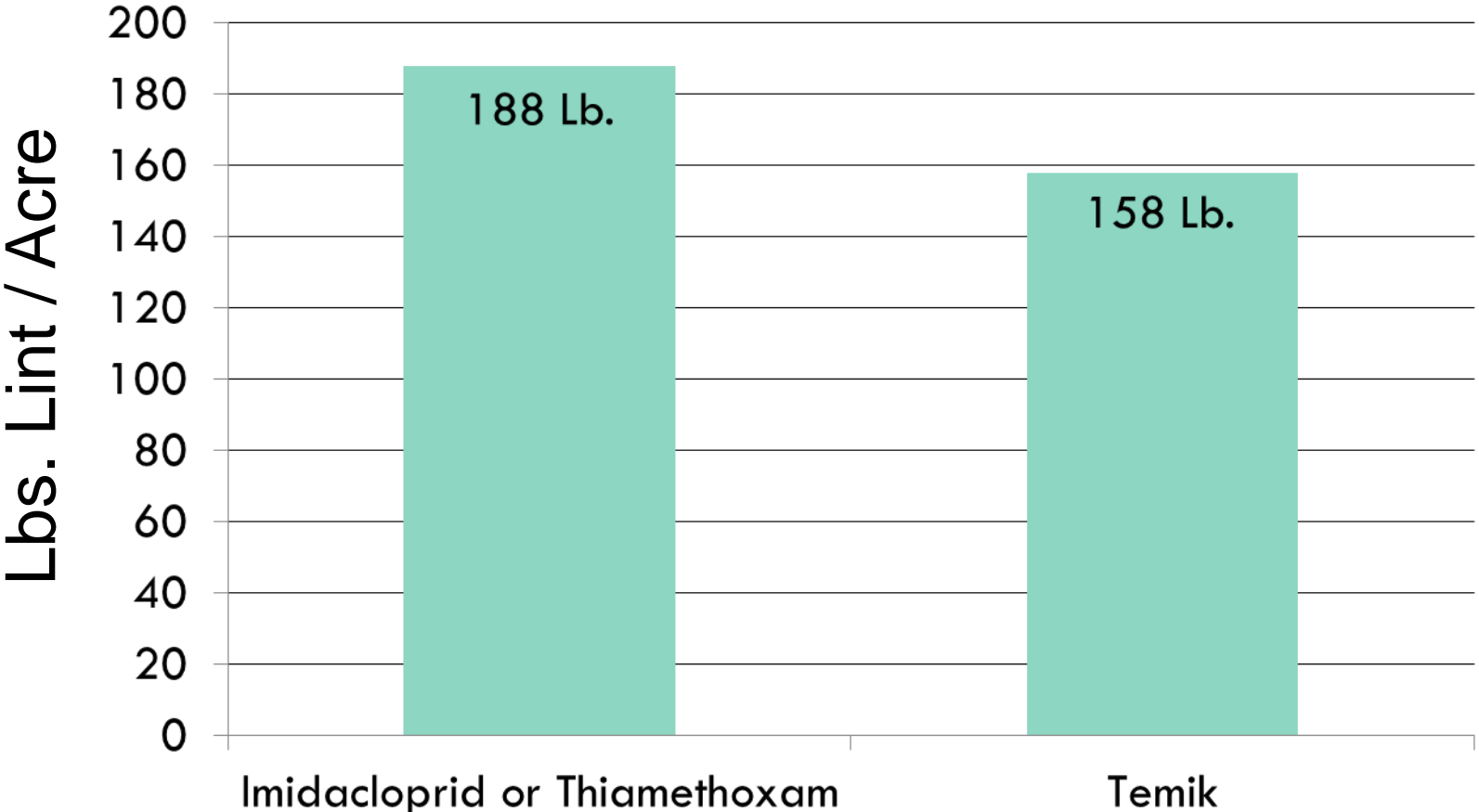
Gaucho and Cruiser insecticide seed treatments were quickly adopted in the Mid South after their introduction in 1996

- Largely replaced Temik (aldicarb)
 - Aldicarb provides a greater reduction in thrips numbers, but imidacloprid and thiamethoxam seed treatments typically provided a similar level of yield protection
- Easier and safer to use
- Nearly 100% use in cotton for many years
- Effective but not perfect
 - Resistance
 - Real or perceived effects on bees



LINT YIELD INCREASE ABOVE UNTREATED COTTON

AVERAGED OF 22 TRIALS FROM 1998-2007, TN (STEWART) AND AR (LORENZ)



The difference between imidacloprid and thiamethoxam was < 10 lbs

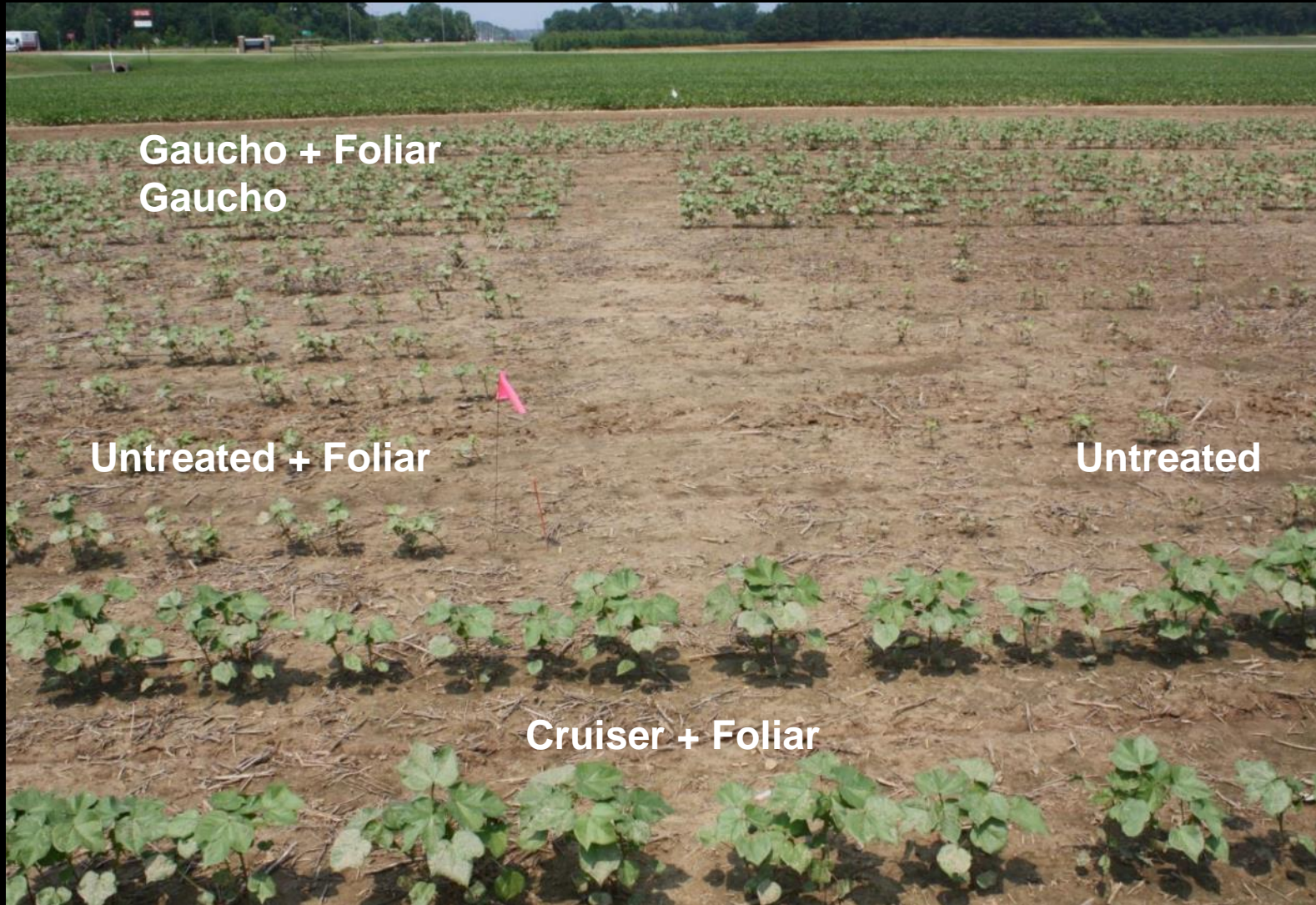
YIELD INCREASE FROM A NEONICOTINOID IST

J. NORTH, REPLICATED TRIALS FROM AR, LA, MS,
AND TN (2007-2014)

Crop	Average Increase	Number of Trials	≈ Net Value
Cotton *	107 Lb Lint/Acre	67	\$70/Acre
Corn *	11.8 Bushels/Acre	91	\$45/Acre
Soybean *	2.0 Bushels/Acre	170	\$10/Acre

* *North, et al. (2016, 2017, 2017), J. Economic Entomology*

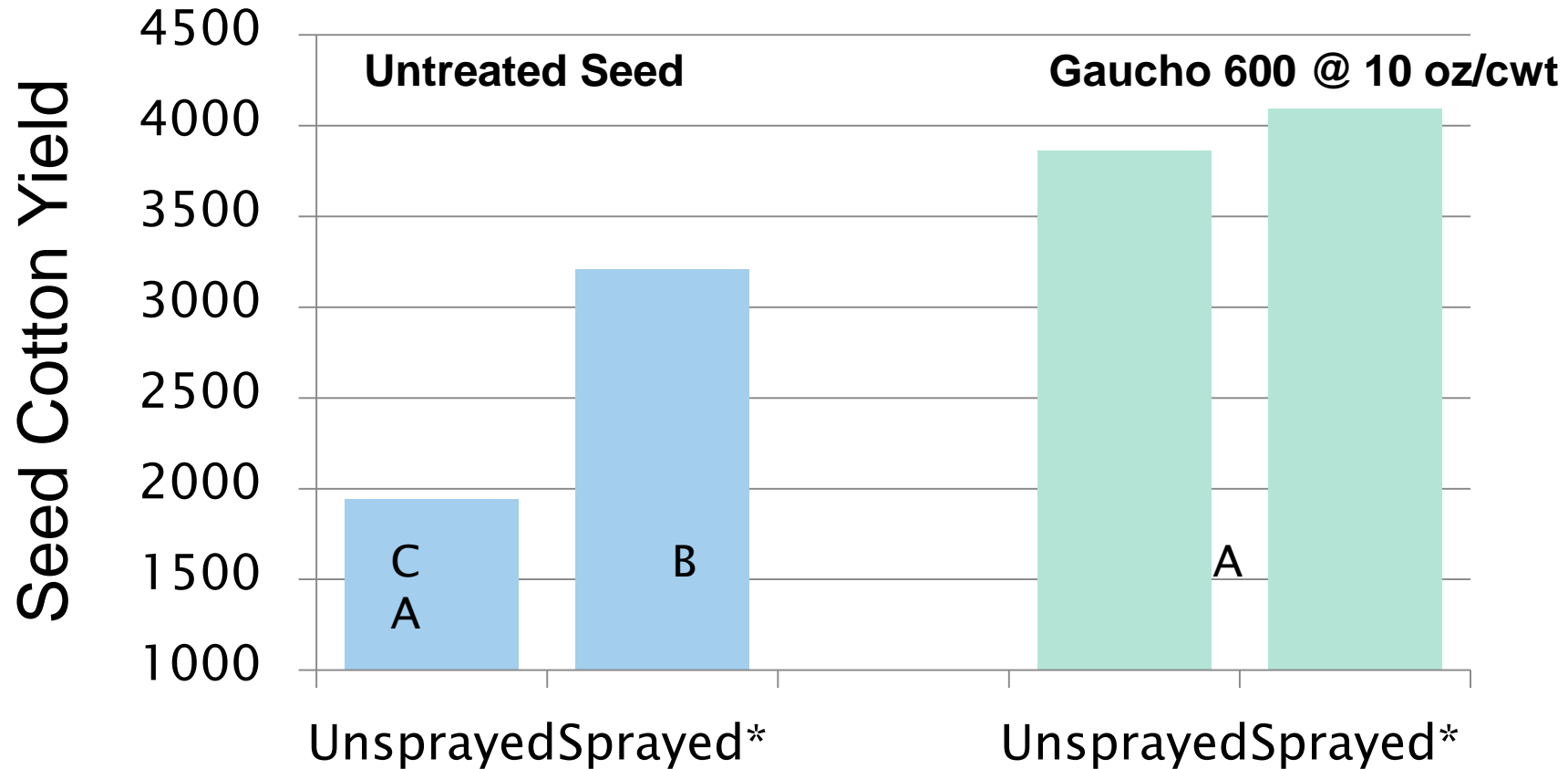
THRIPS CONTROL DEMONSTRATION (TN, 2011) AVERAGES DON'T TELL THE WHOLE STORY



Stunting,
maturity delay,
and some plant
death

Catastrophic
yield loss

THRIPS CONTROL DEMONSTRATION IN TENNESSEE, 2011



* Sprayed at second leaf with Acephate 90S (0.25 lb/a), and plots with untreated seed were sprayed again at 4th leaf

A LITTLE MORE HISTORY

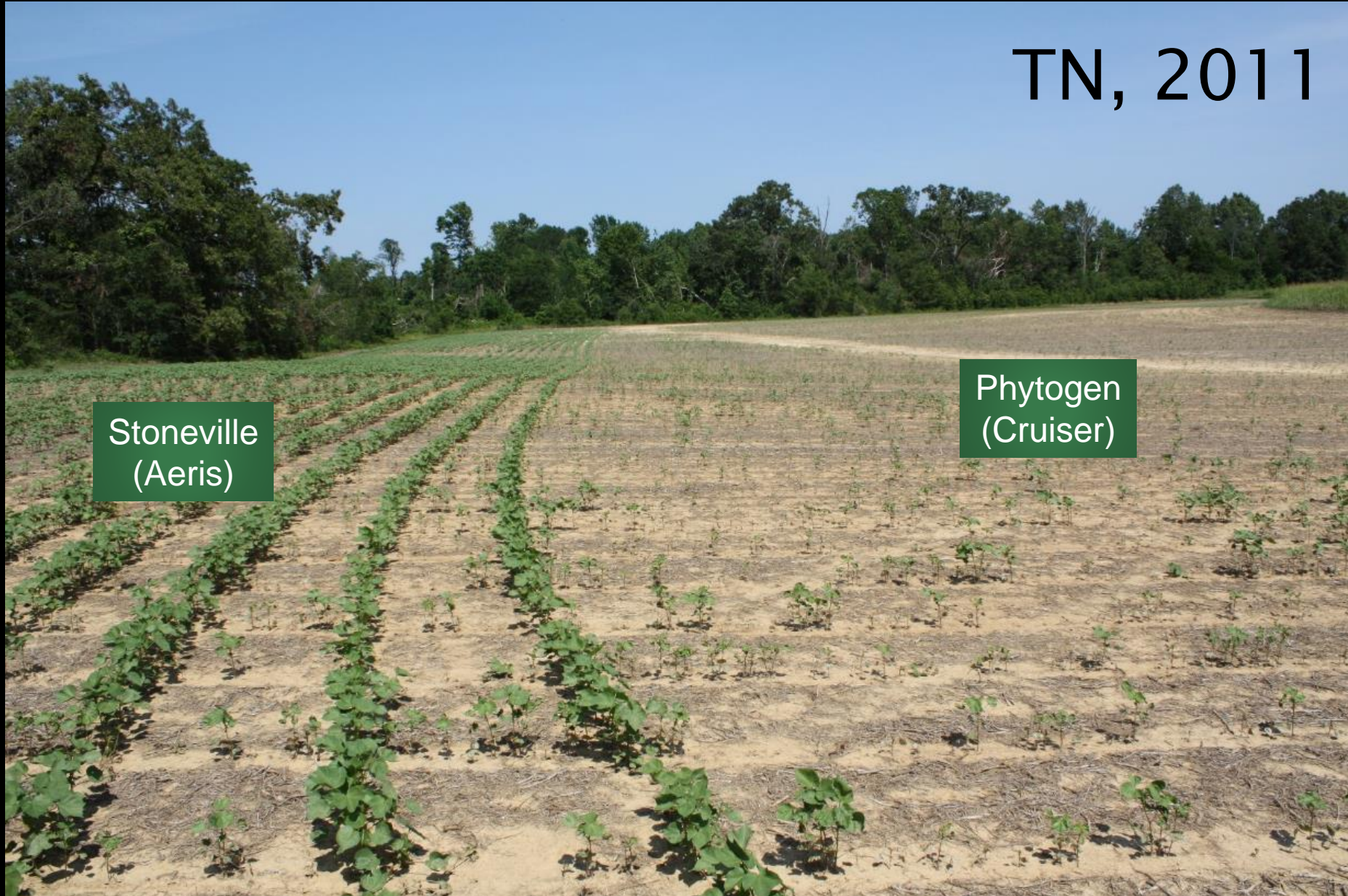
Beginning about 2011, complaints about the performance of insecticide seed treatments began to increase (and especially with Cruiser)

- Resistance of tobacco thrips to neonicotinoids was subsequently confirmed
 - Thiamethoxam is no longer marketed for use in cotton
- However, imidacloprid continues to provide adequate protection in most cases

There are other things that can, have, and will be confused with thrips injury (and may compound the impact of thrips)

RESISTANCE TO THIAMETHOXAM

TN, 2011



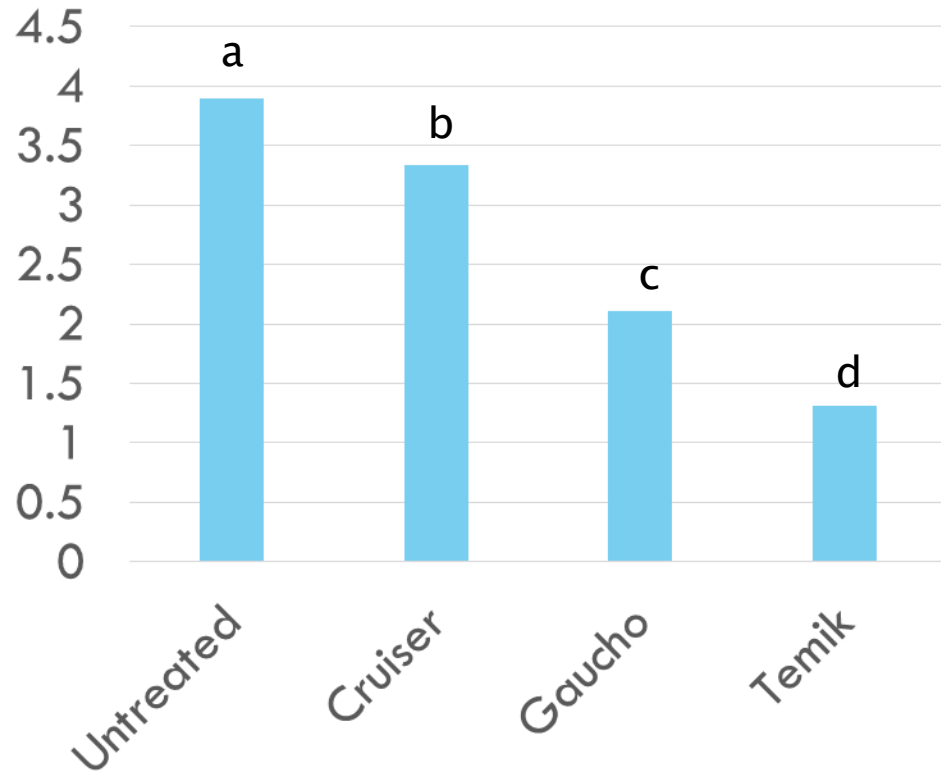
Stoneville
(Aeris)

Phytogen
(Cruiser)

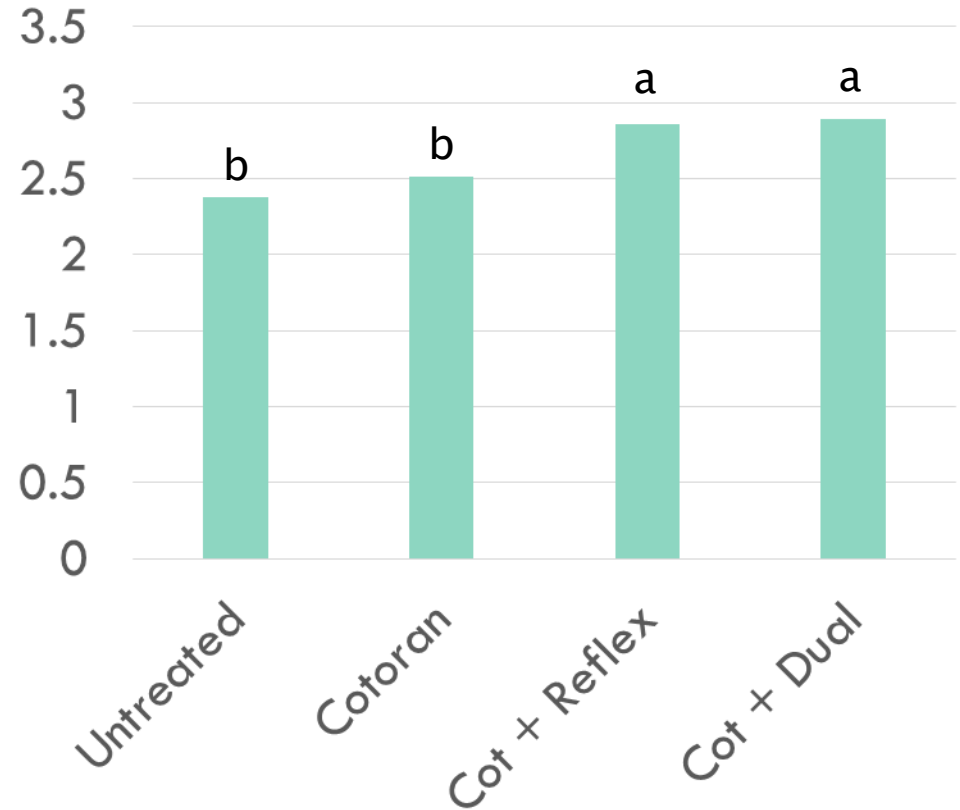
THRIPS INJURY (0 - 5), 24 DAP, 18 DAE

CORY VINEYARD, MS STUDENT, THE UNIVERSITY OF TENNESSEE, 2013-2014

Thrips Treatment ($P < 0.0001$)

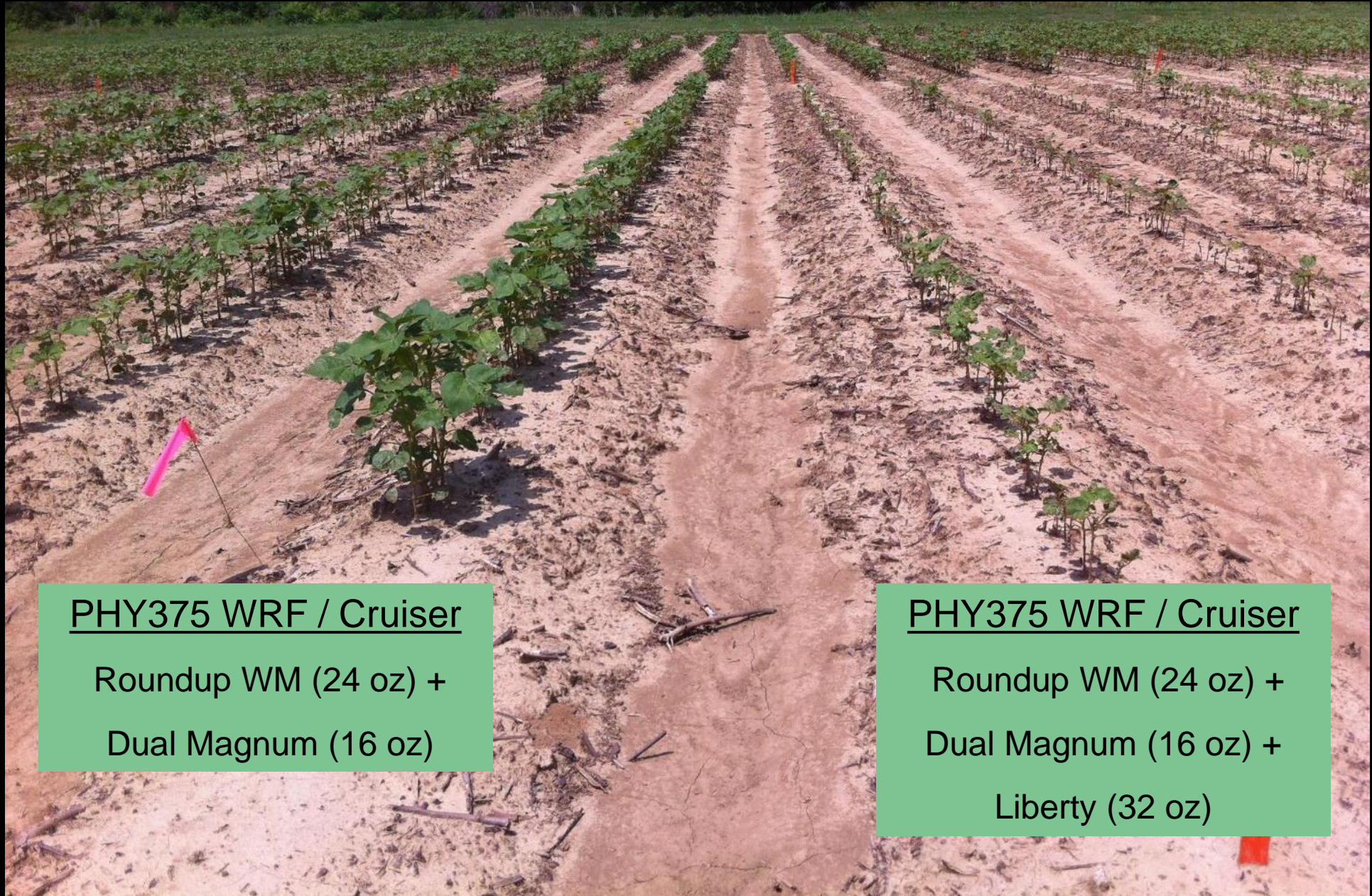


Pre-emerge Herbicide ($P < 0.01$)



$P(I \times H \text{ Interaction}) = 0.6366$

STRESS ON STRESS (DOUBLE WHAMMY)



PHY375 WRF / Cruiser

Roundup WM (24 oz) +

Dual Magnum (16 oz)

PHY375 WRF / Cruiser

Roundup WM (24 oz) +

Dual Magnum (16 oz) +

Liberty (32 oz)



**COTTON
LEAFROLL
DWARF VIRUS ...**

**CAUSING
THRIPS- OR
HERBICIDE-LIKE
INJURY**



Still, imidacloprid seed treatments are working OK (e.g., 2018)



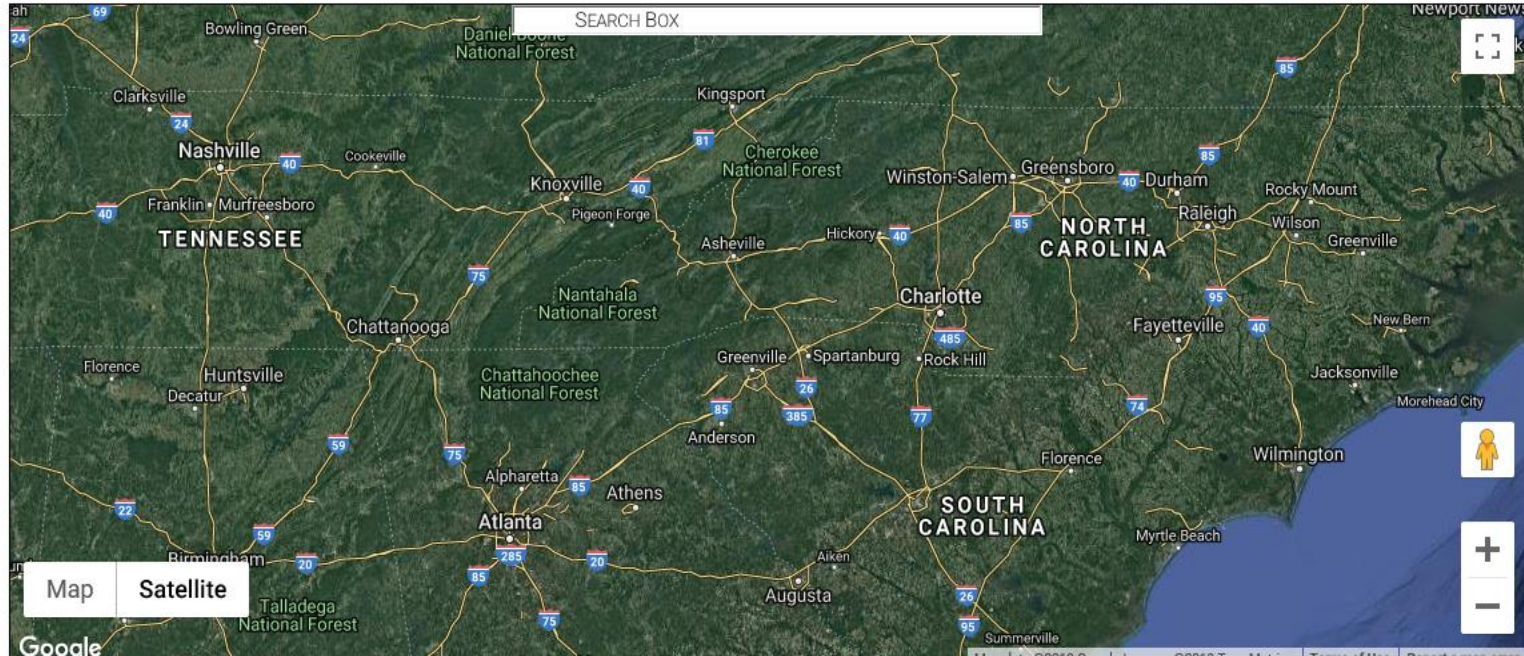
THRIPS INFESTATION PREDICTOR FOR COTTON

<http://climate.ncsu.edu/CottonTIP>

About Home Acknowledgements

Plant Date:
Run models for 1 dates 5 days before and after planting date.

2019

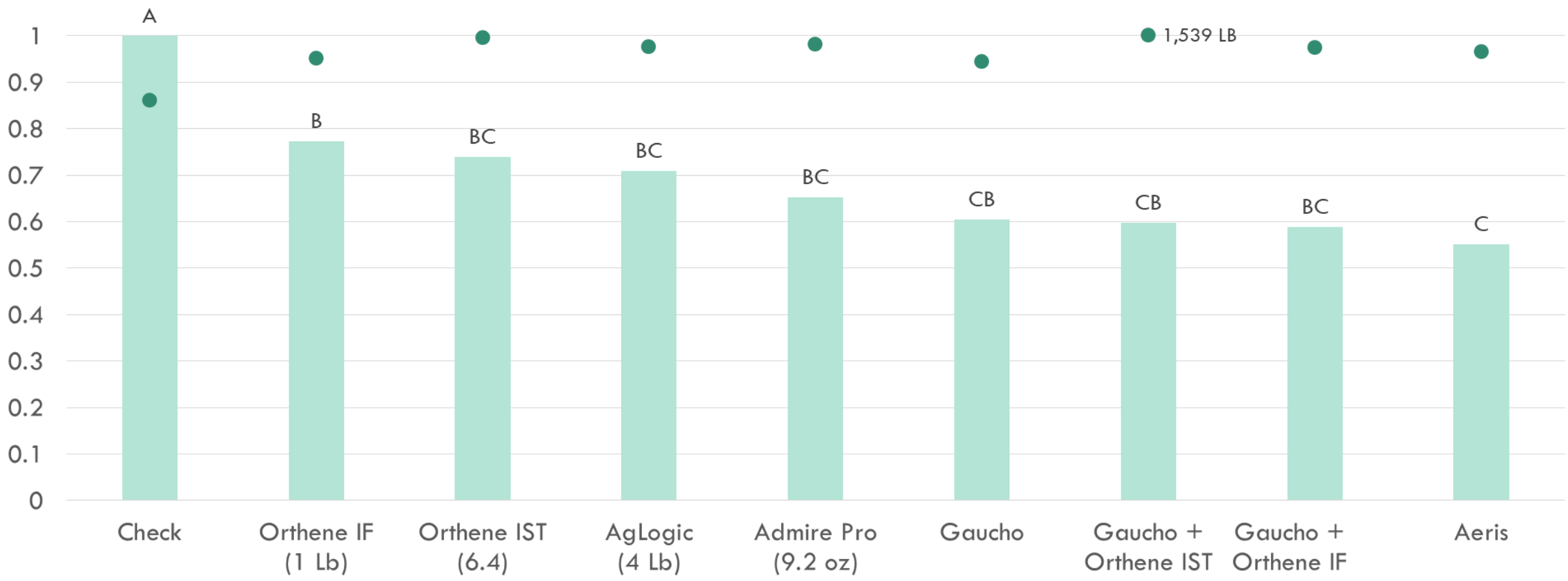


A light year for thrips

REGIONAL INSECTICIDE SEED TREATMENT TEST, 2019

■ Relative Injury (7 Locations, P = 0.0018)

● Relative Yield (6 Locations P = 0.1422)

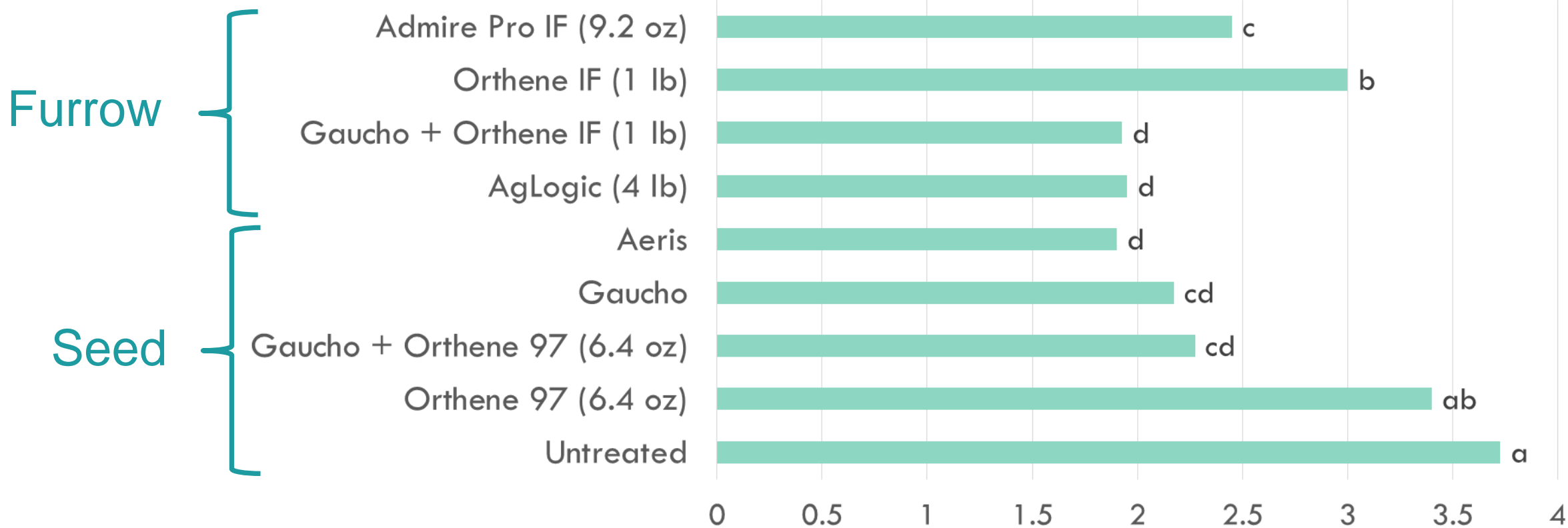


THRIPS – SEED TREATMENT & IN-FURROW



2019, JACKSON, TN

Thrips Injury (0 - 5)



FOLIAR THRIPS TESTS (TENNESSEE, 2017)

TEST 1

TEST 2

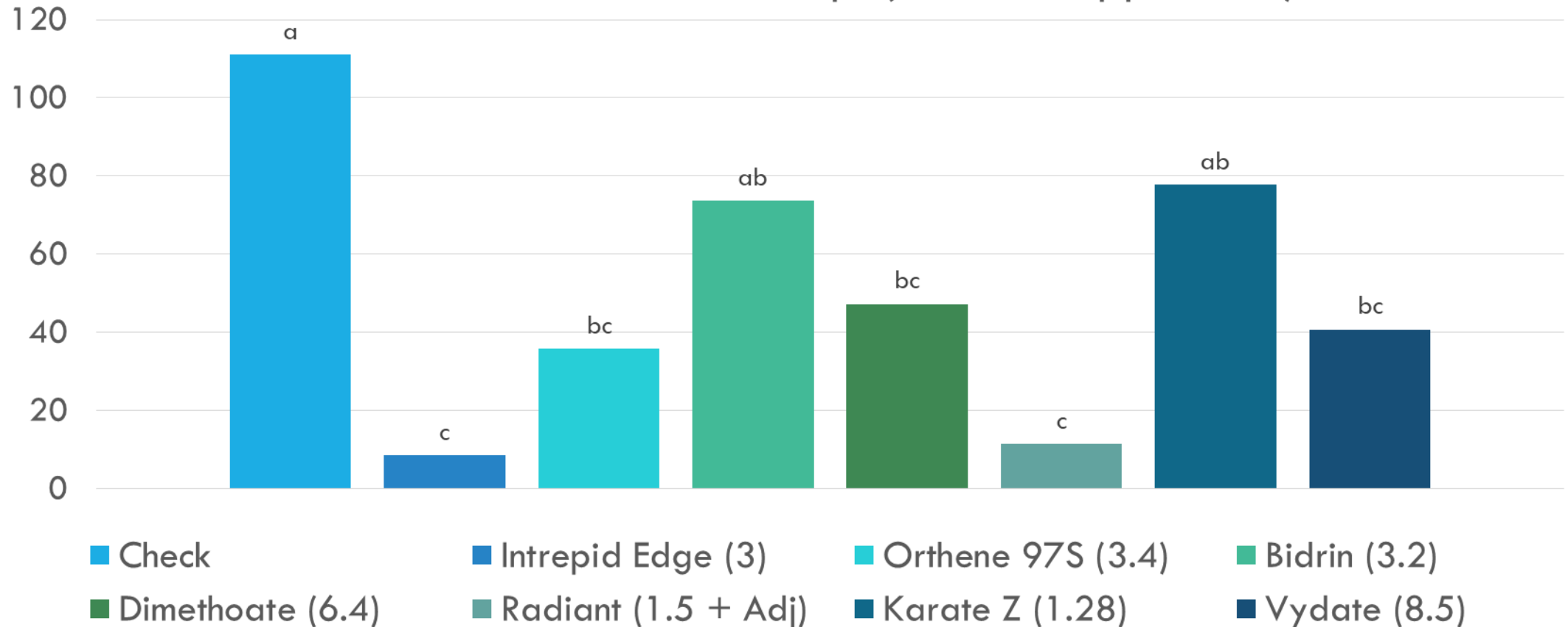
Treatment (oz/acre)	No. Thrips (3 DAT)	No. Thrips (7 DAT)	Treatment (oz/acre)	No. Thrips (2 DAT)	No. Thrips (5 DAT)
Check	11.3 ab	18.5 a	Check	94.5 a	31.3 a
Radiant (1.5)	5.8 b	6.8 a	Radiant (1.5)	22.3 c	6.3 c
Intrepid Edge (3)	9.0 ab	10.0 a	Intrepid Edge (3)	21.8 c	6.5 c
Acephate 90S (3.2)	15.3 a	16.0 a	Acephate 90S (3.2)	52.5 b	20.8 b

REGIONAL FOLIAR THRIPS TRIAL, 2019

JEFF GORE, MISSISSIPPI STATE UNIVERSITY



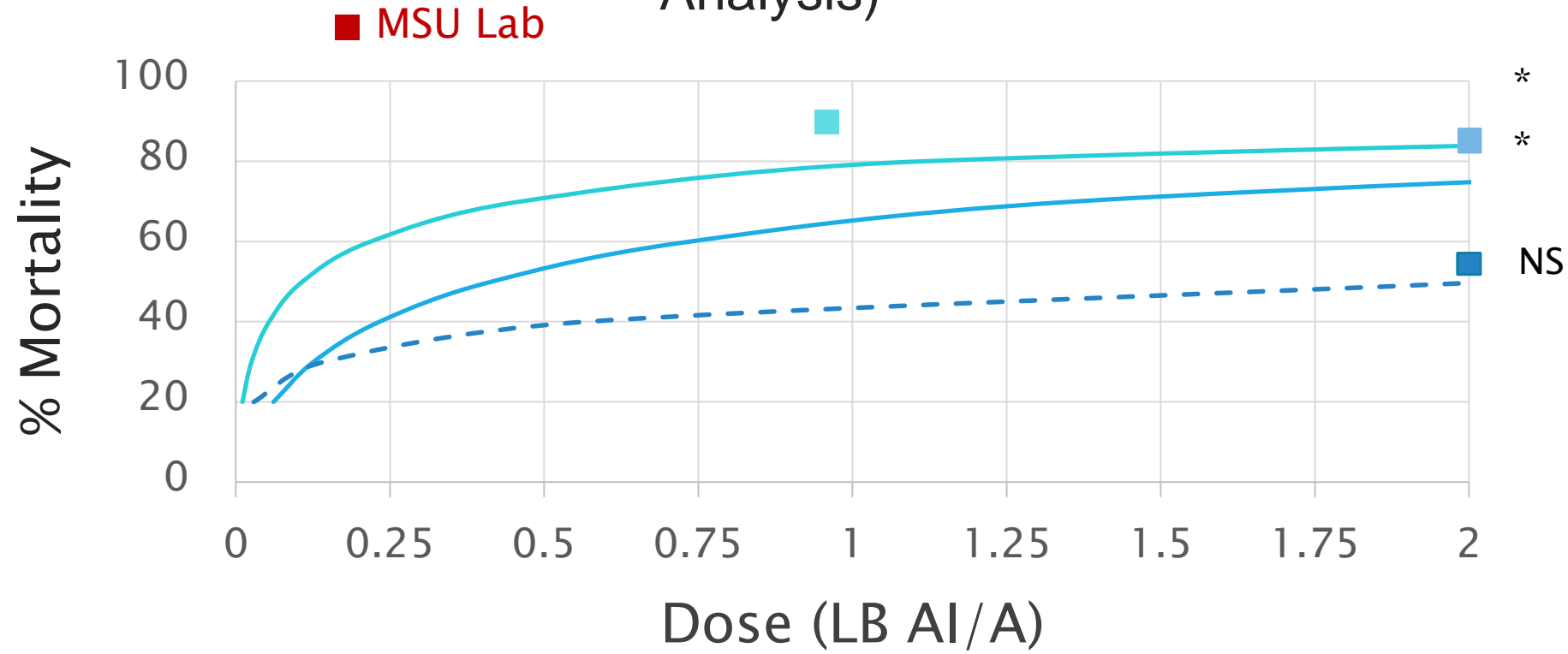
Number of Immature Thrips (after 1st application)



THRIPS ACEPHATE RESISTANCE BIOASSAYS

DOSE RESPONSE OF THREE POPULATIONS IN TENNESSEE, 2019

Acephate (Expected Mortality from Probit
Analysis)

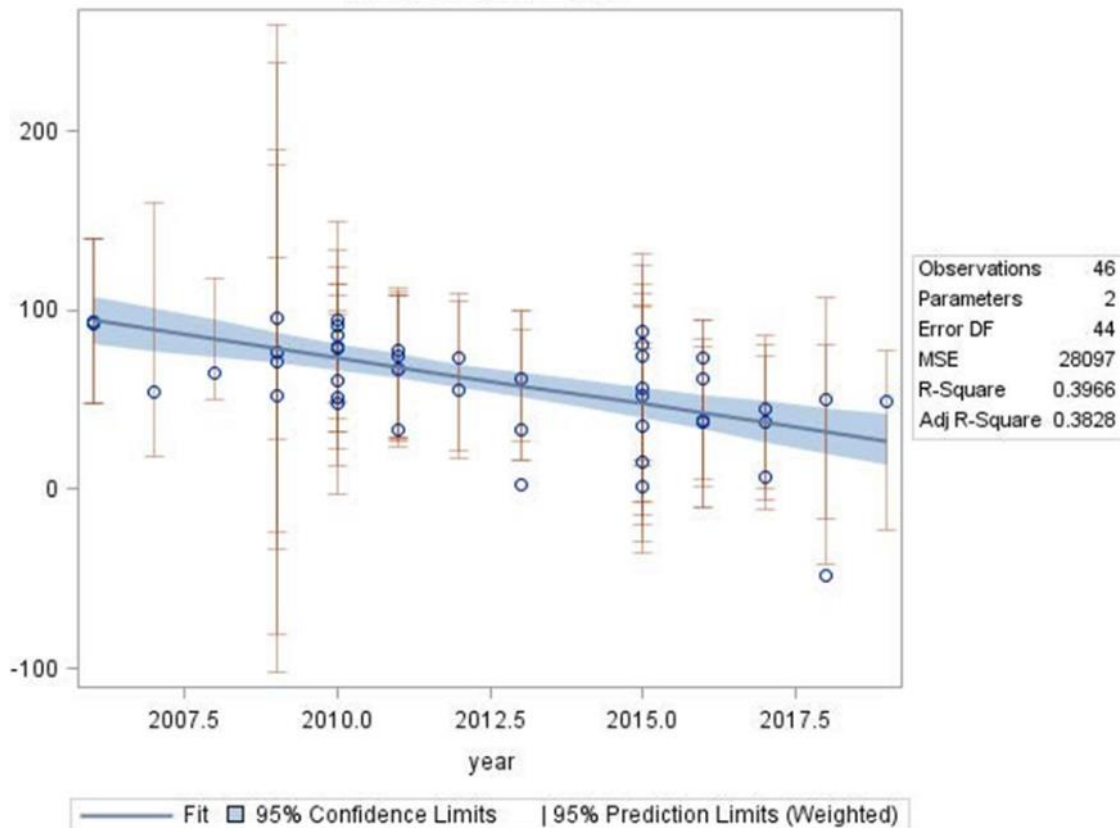


— Jackson — Milan - - Milan Selected

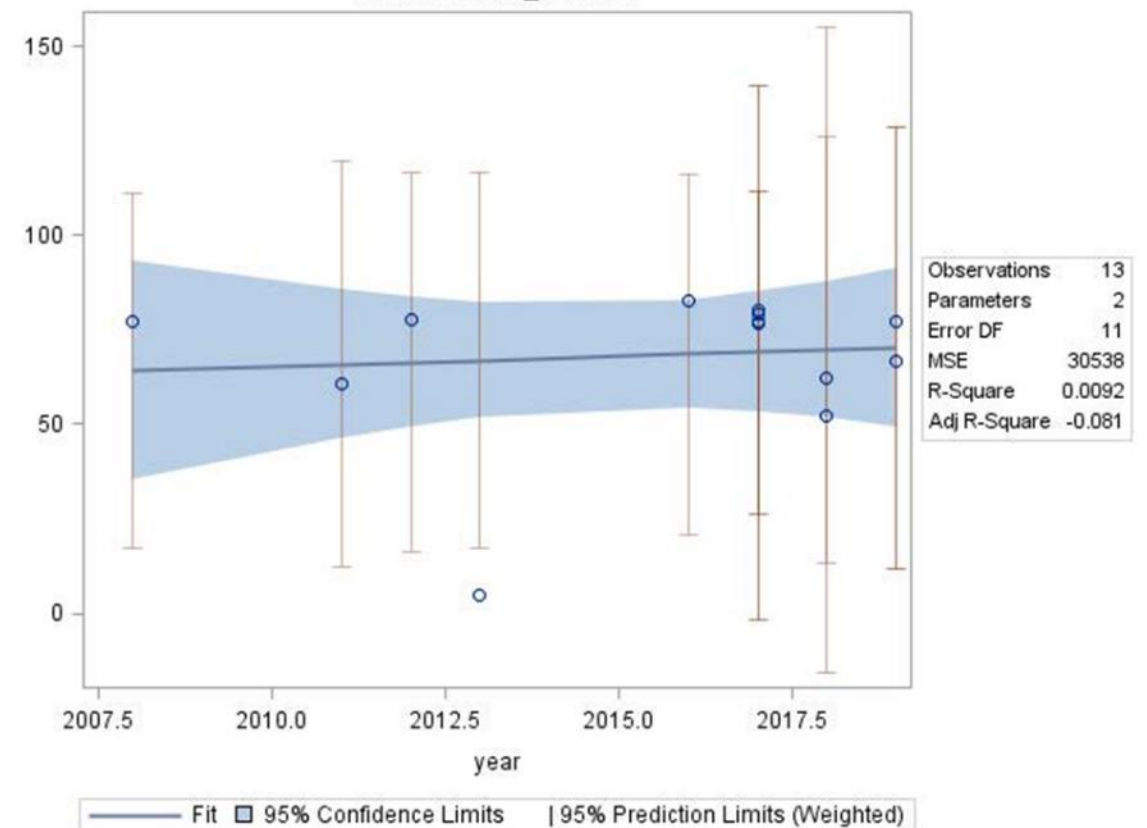
* Significant fit to probit model

THRIPS - PERFORMANCE OF FOLIAR APPLICATIONS OF ACEPHATE AND SPINETORAM (RADIANT OR INTREPID EDGE) IN TENNESSEE 2005 - 2019

% Control With Acephate (0.18-0.24 Lb/A)

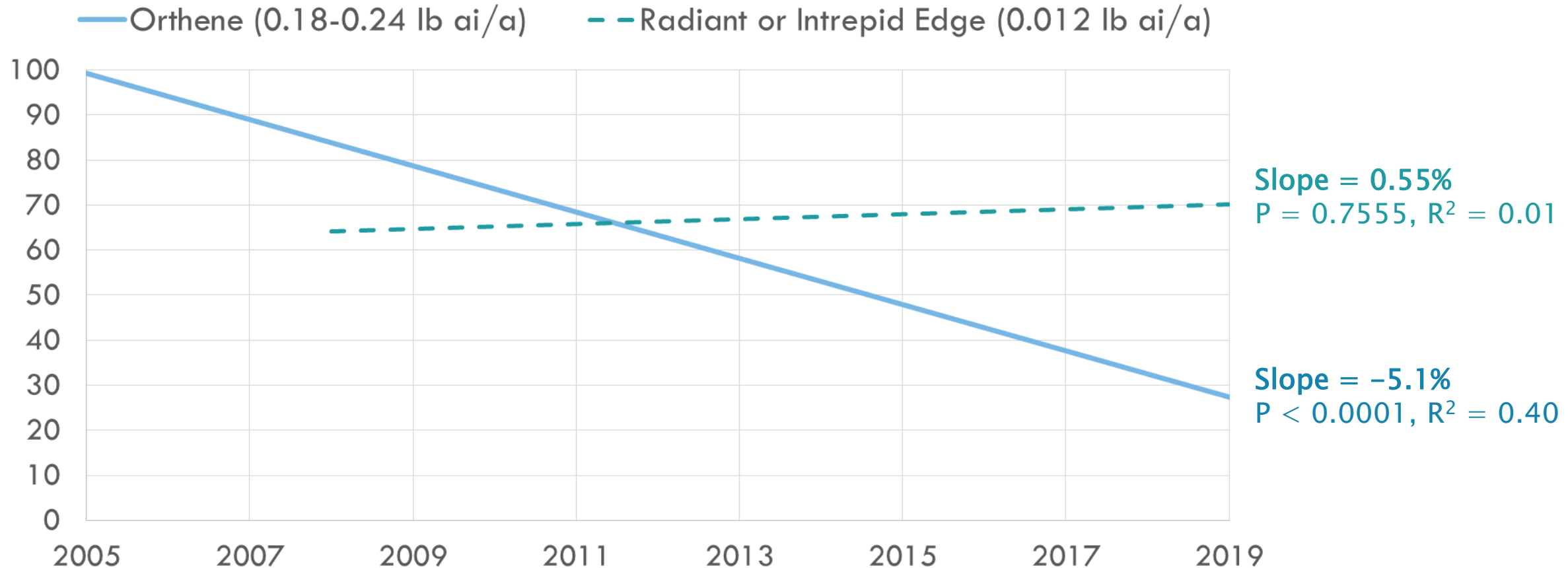


% Control With Spinetoram (0.012 Lb/A)



THRIPS - PERFORMANCE OF FOLIAR APPLICATIONS OF ACEPHATE AND SPINETORAM IN TENNESSEE

% Control of Thrips Over Time

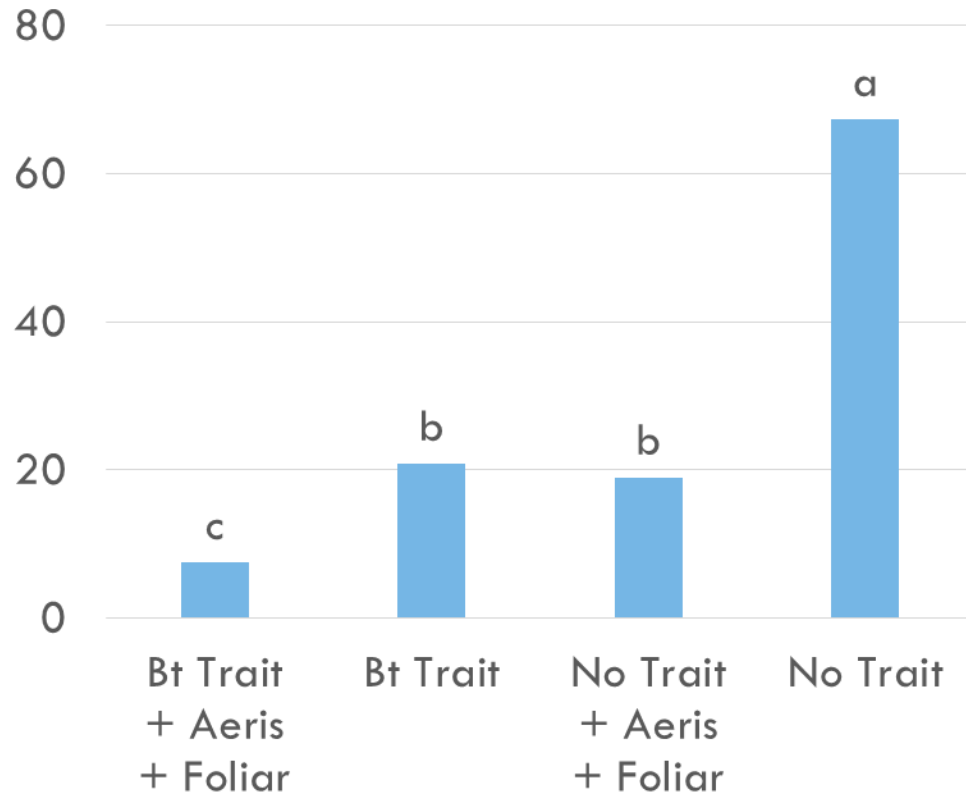


IS OUR FUTURE THE BT THRIPS/LYGUS TRAIT?

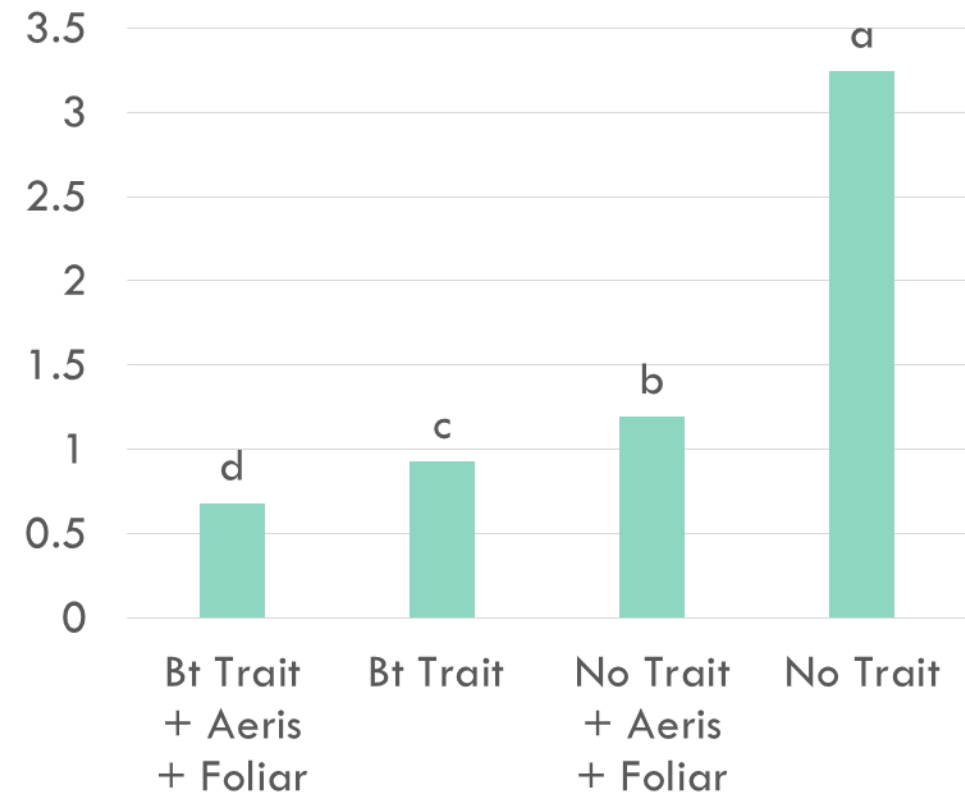
SCOTT GRAHAM, PHD STUDENT, UNIVERSITY OF TENNESSEE



THRIPS PER 5 PLANTS (3-LEAF)



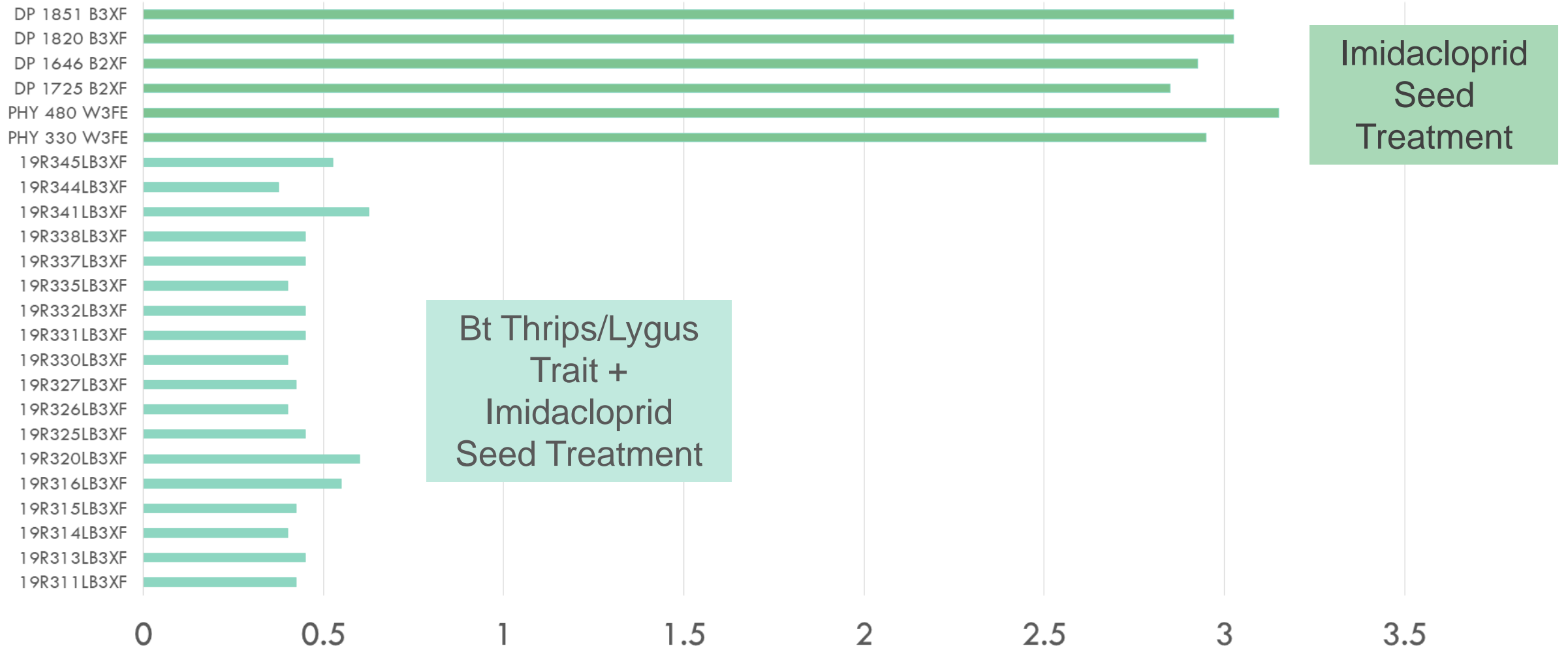
THRIPS INJURY (3-LEAF)



Averaged over 2 years and 2 locations

BT LYGUS/THRIPS VARIETY TRIAL (2019, JACKSON, TN)

Thrips Injury (0-5 Scale)



BT THRIPS / LYGUS TRAIT



Non-Bt Cotton



Bt Thrips Trait

MY SUGGESTIONS FOR COTTON IN 2020

Use AgLogic (3.5 – 5 Lb/Acre)

- Particularly in areas with reniform or root knot nematode

Or an imidacloprid-based seed treatment

- Consider add-on components like thiodicarb (Aeris), Avermectin, or Acephate
 - How much acephate will help will vary across the region

If using a seed treatment, use the thrips forecast model to judge the need for a foliar insecticide application

- If needed, make this application during the 1- 2 leaf stage
- More than one application is rarely justified (even when you think it is)

QUESTIONS

Thanks to my support staff, graduate students, colleagues,
Cotton Incorporated and our industry partners for their
support of this research

