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Redbanded Stink Bug

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4 Goals of Integrated Pest Management

1. Reduce pest status
2. Ensure producer profits
3. Attain environmental compatibility
4. Produce sustainable solutions

“Reduce pesticide inputs through judicious use.”

IPM is about assessment and decision making

2016 Soybean Insect Losses in the Southern US

Musser, F. R.*¹, A. L. Catchot, Jr.¹, J. A. Davis², G. M. Lorenz³, T. Reed⁴, D. D. Reisig⁵, S. D. Stewart⁶ and S. Taylor⁷

For Louisiana: \$98 million lost due to insects (yield loss + cost of control)

Yield & Management Results

Total Bushels Harvested	62,500,000
Total Bushels Lost to Insects	2,692,448
Percent Yield Loss	4.13%
Yield w/o Insects	52.15
Ave. # Spray Applications	3.216
Seed Treated Acres	1,187,500
Scouted Acres	1,125,000

Stink Bug Composition

Species	% of SB
Brown	29
Brown Marmorated	0
Green	1
Redbanded	60
Redshouldered	1
Southern Green	10
Total	100

Top 3 Soybean Insect Pests (% total loss + cost)

Stink bugs	45%
Soybean looper	33%
Green cloverworm	7%

- ❖ **Common name:**
redbanded stink bug
(RBSB)

- ❖ **Scientific name:**
Piezodorus guildinii
(Westwood)

- ❖ **Most damaging species**
 - Deeper seed damage
 - Greater enzyme activity
 Salivary pectinases
 - Larger food and salivary
 canals



R5 to R8

0 stink bugs/25 sweeps

3 stink bugs/25 sweeps



Redbanded stink bug causes damage quickly at low numbers.

Implementing an Effective Stink Bug IPM Program

- **Identify**

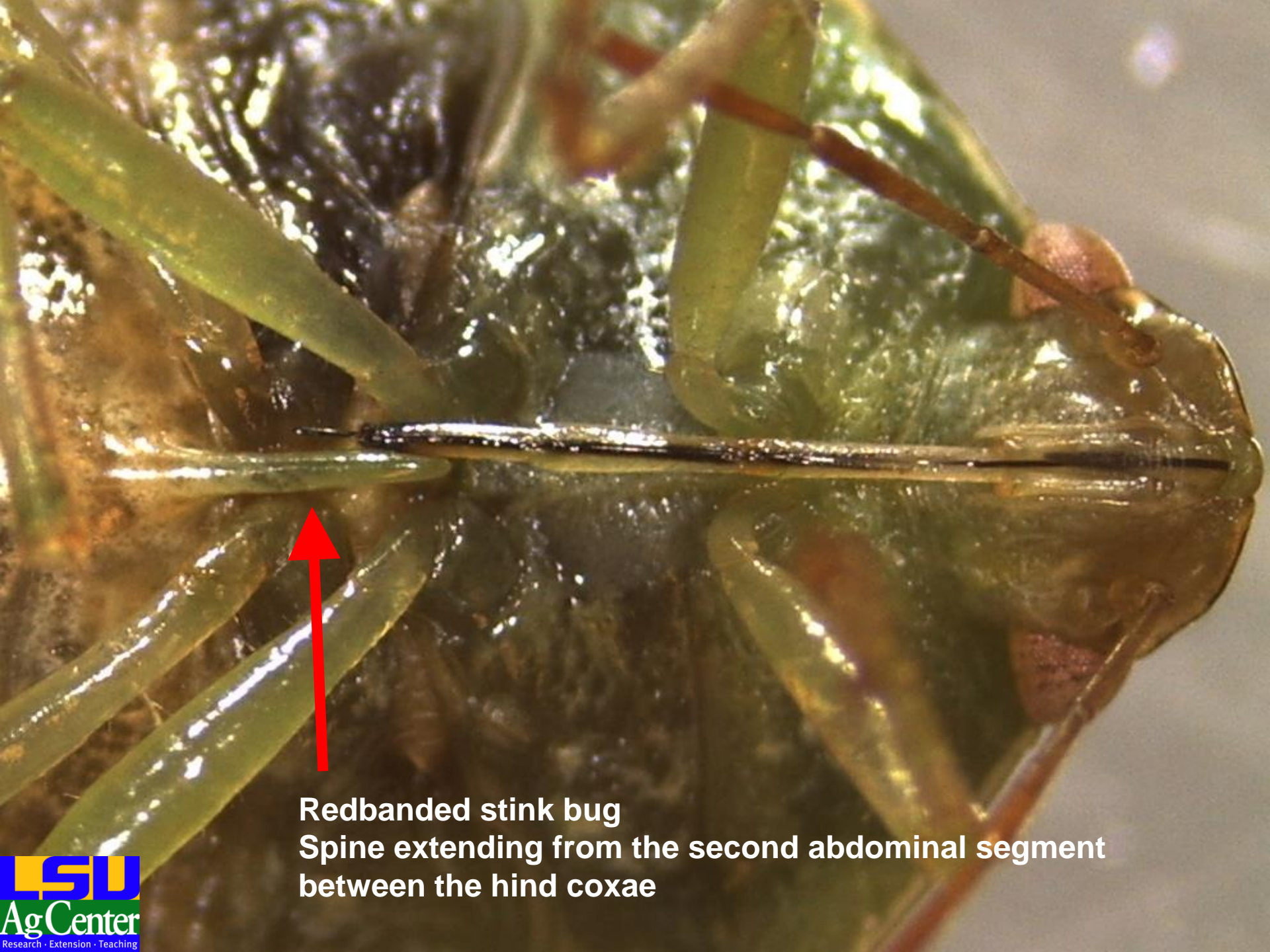
Know thine enemy



Redbanded Stink Bug



Red Shouldered Stink Bug



Redbanded stink bug
Spine extending from the second abdominal segment
between the hind coxae





Implementing an Effective Stink Bug IPM Program

- Identify
- Understand the pest biology

Understanding Redbanded Stink Bug Biology



<https://hansendairy.files.wordpress.com/2012/05/cowsinsnow1.jpg>

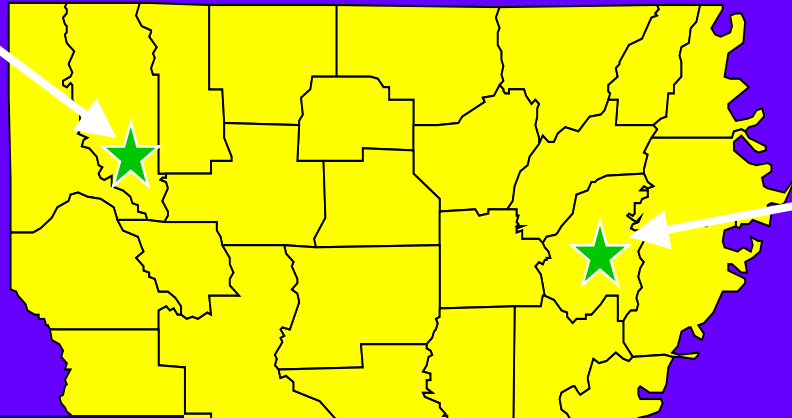
Cold Weather

Redbanded Stink Bug Status 2009 to 2016

Weekly samples from
late May – early October

Red River Sta

2009: 848
2010: 118
2011: 3
2012: 82
2013: 204
2014: 358
2015: 167
2016: 1230



Macon Ridge Sta

2009: 433
2010: 17
2011: 6
2012: 290
2013: 690
2014: 12
2015: 1095
2016: -----

Dean Lee Sta

2009: 791
2010: 311
2011: 90
2012: 648
2013: 460
2014: 29
2015: 1115
2016: 210

- ★ Cold temperatures
- ★ Drought
- ★ Flood

Rice Sta

2009: 30
2010: 22
2011: -----
2012: 103
2013: 202
2014: 211
2015: 627
2016: 65

New Iberia Sta

2009: 1338
2010: 1370
2011: 427
2012: 510
2013: 1019
2014: 475
2015: 448
2016: 487

Ben Hur Sta

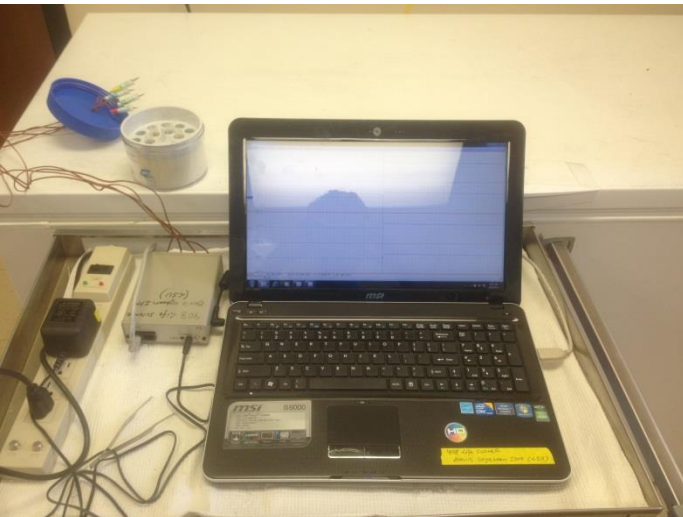
2009: 409
2010: 23
2011: 526
2012: 153
2013: 198
2014: 40
2015: 282
2016: 211

10,000 sweeps per location

Lethal Temperatures (LT) for Redbanded Stink Bug

At 20°F, $LT_{50} = 4$ hr and $LT_{90} = 7$ hr

At 32°F, redbanded stink bug had to be exposed for a week to see 95% mortality





**No. of hours at or below 20°C for
December 1, 2016 to February 14, 2017**

Ben Hur Research Station	1
Dean Lee Research Station	4
Rice Research Station	0

**At 20°F, 50% mortality = 4 hr
90% mortality = 7 hr**

Understanding Redbanded Stink Bug Biology



Overwintering Hosts: Legumes

Cover crops

Crimson clover (*Trifolium incarnatum* L.)
Cardinal red clover (*Trifolium pratense* L.)
Austrian winter pea (*Pisum sativum* L.)
Berseem clover (*Trifolium alexandrinum* L.)
Hairy vetch (*Vicia villosa* Roth)
White clover (*Trifolium repens* L.).

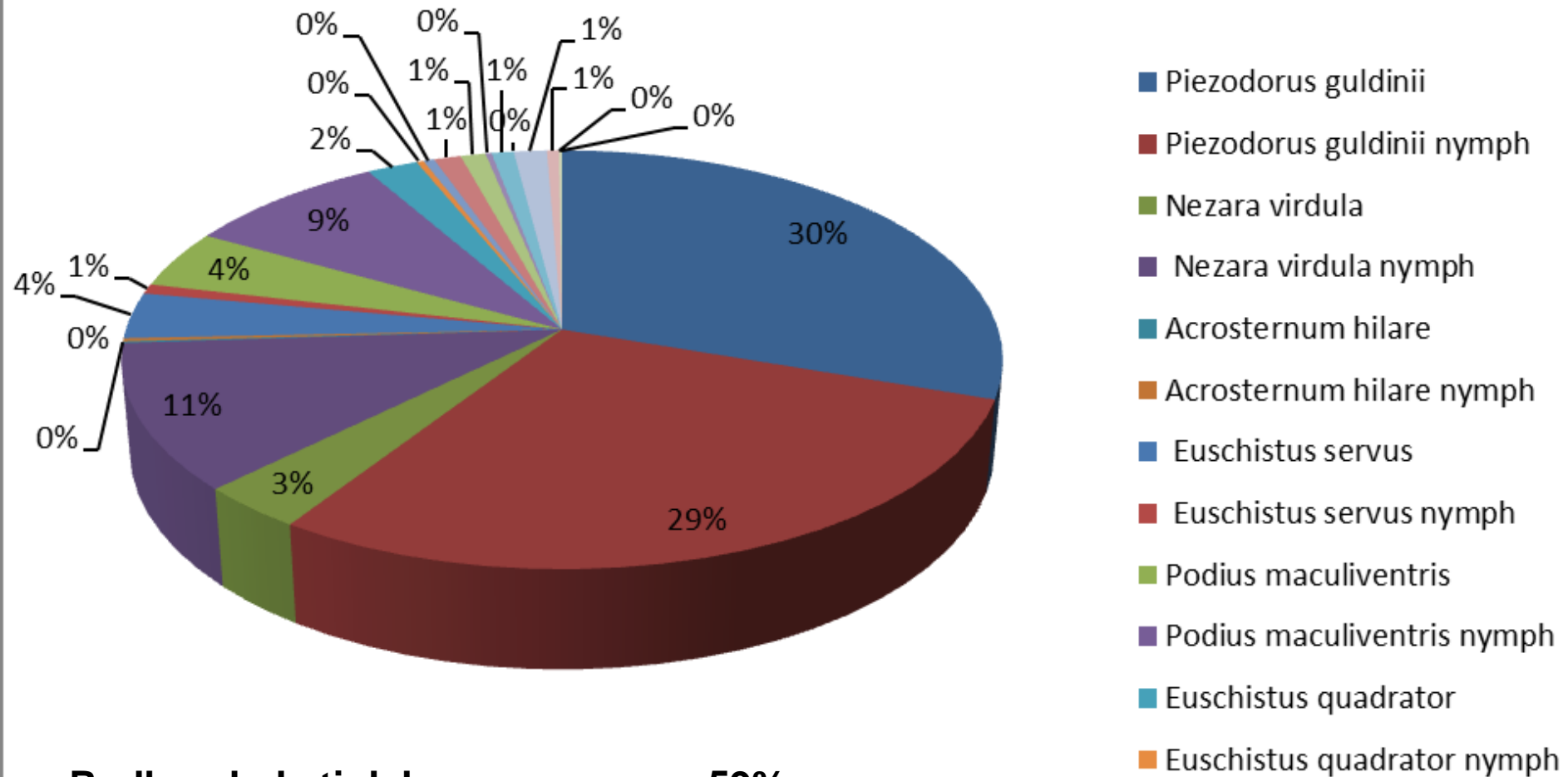
RBD with four replications per location

3 locations each year for 3 years – (2013 to 2015)

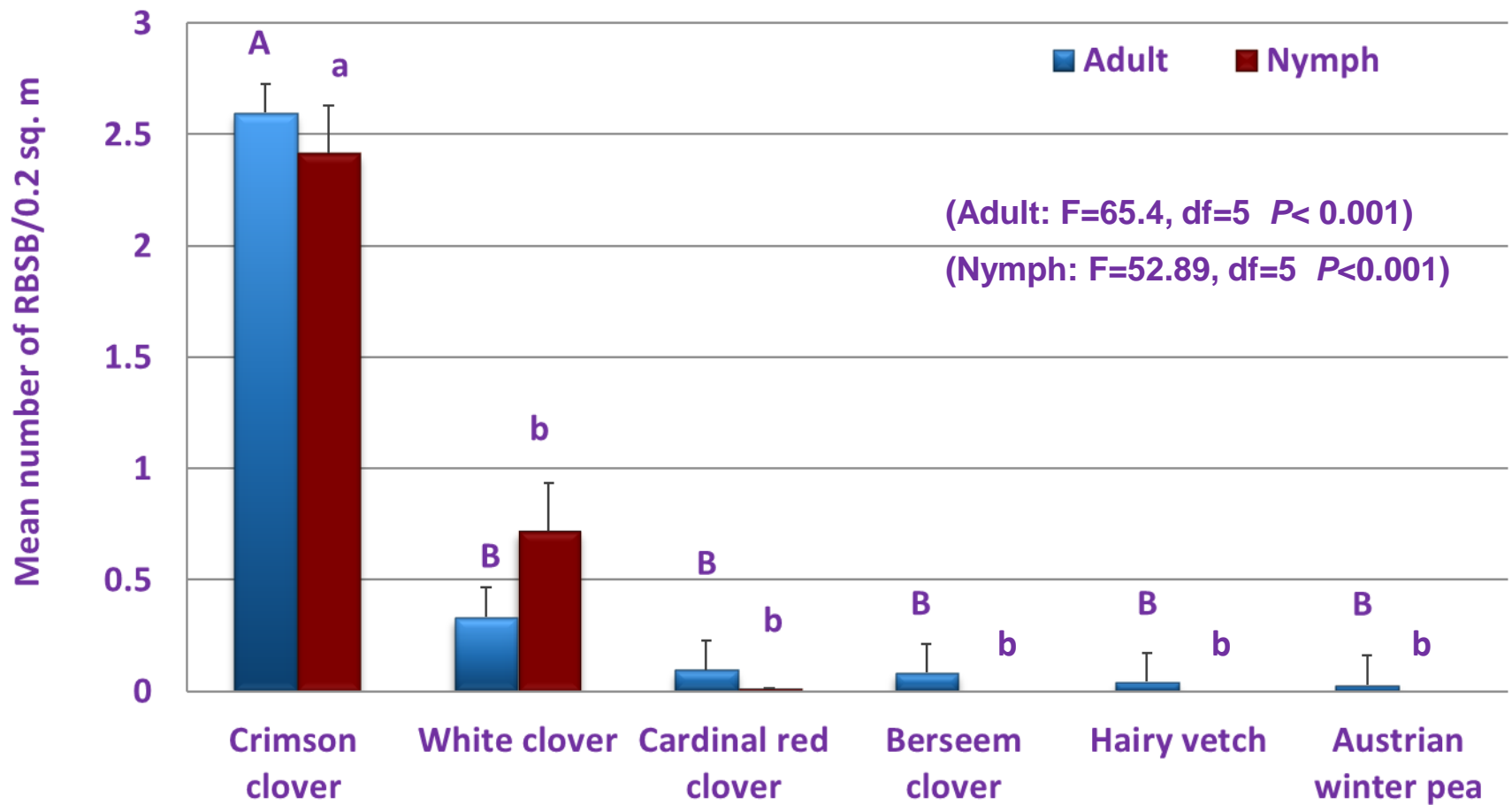
Individual plot size was 7.62 m x 3.04 m with a 3.04 m alley



Stink bug composition by adult and nymph



Redbanded stink bug	59%
Southern green stink bug	14%
Spined soldier bug	13%



Mean (\pm SE) of RBSB (adults and nymphs) collected from different host plants at New Iberia, Louisiana. Value bars with different letters within adult or nymph are significantly different ($P < 0.05$, Tukey's HSD)

Conclusions

- Cover crops can increase pest populations
- Crimson clover and white clover cover crops are a bridging host for RBSB when soybean is not present
- Based on mean nymphal production over 3 years, a single acre of crimson clover in a 12 week period can produce **570,000** RBSB
- In comparison, a single acre of soybeans produces **35,000** RBSB, 16 times less.





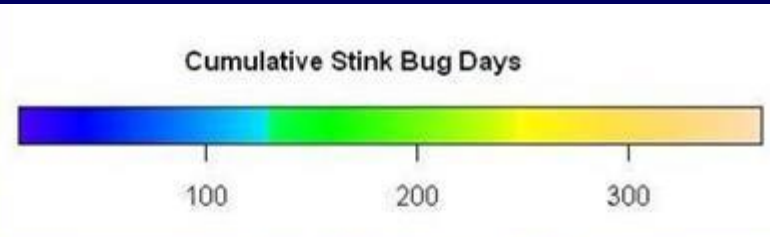
WRONG
WAY

Understanding Redbanded Stink Bug Biology

A wide-angle photograph of a large agricultural field, likely a soybean field, showing rows of green crops stretching into the distance. The field is divided into sections by dark brown soil paths. The crops are in various stages of growth, with some showing small white flowers. The sky is clear and blue.

Stink Bug Movement

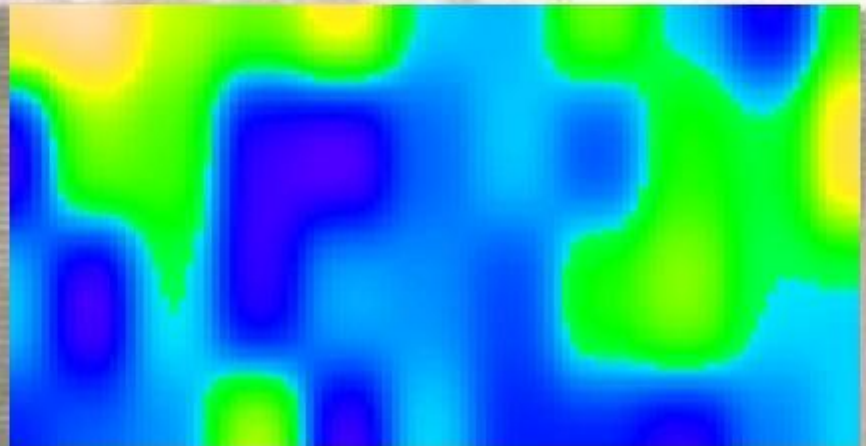
Stink bugs are clumped and colonize a field from the edge, moving inward as populations grow.



Cotton

Par Road

Corn

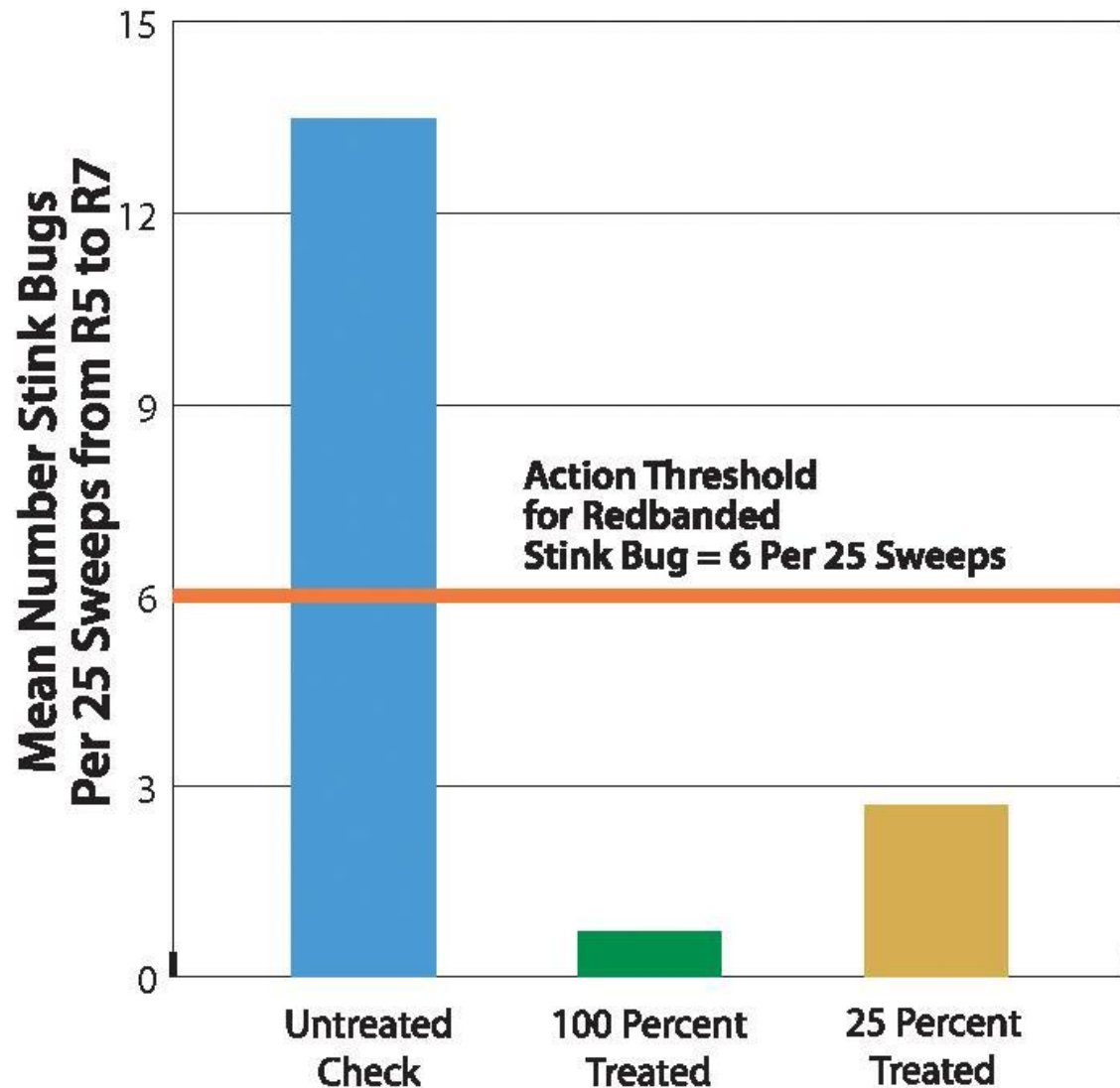


Soybean

We can take advantage of stink bug edge colonization

This concentrates stink bugs for site-specific targeted insecticide applications

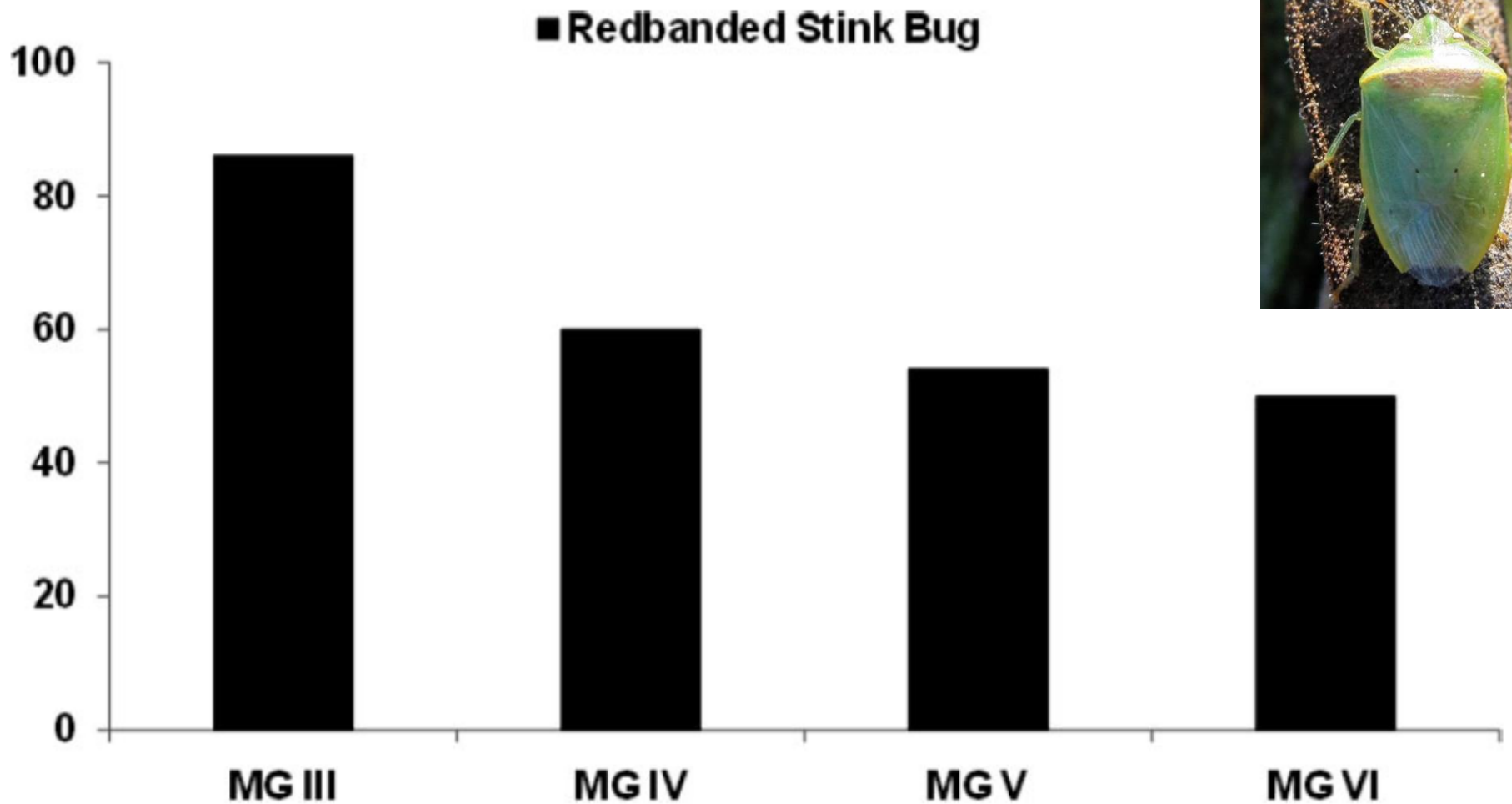
Figure 2. Perimeter insecticide applications keep stink bug numbers below the action threshold.



Understanding Redbanded Stink Bug Biology

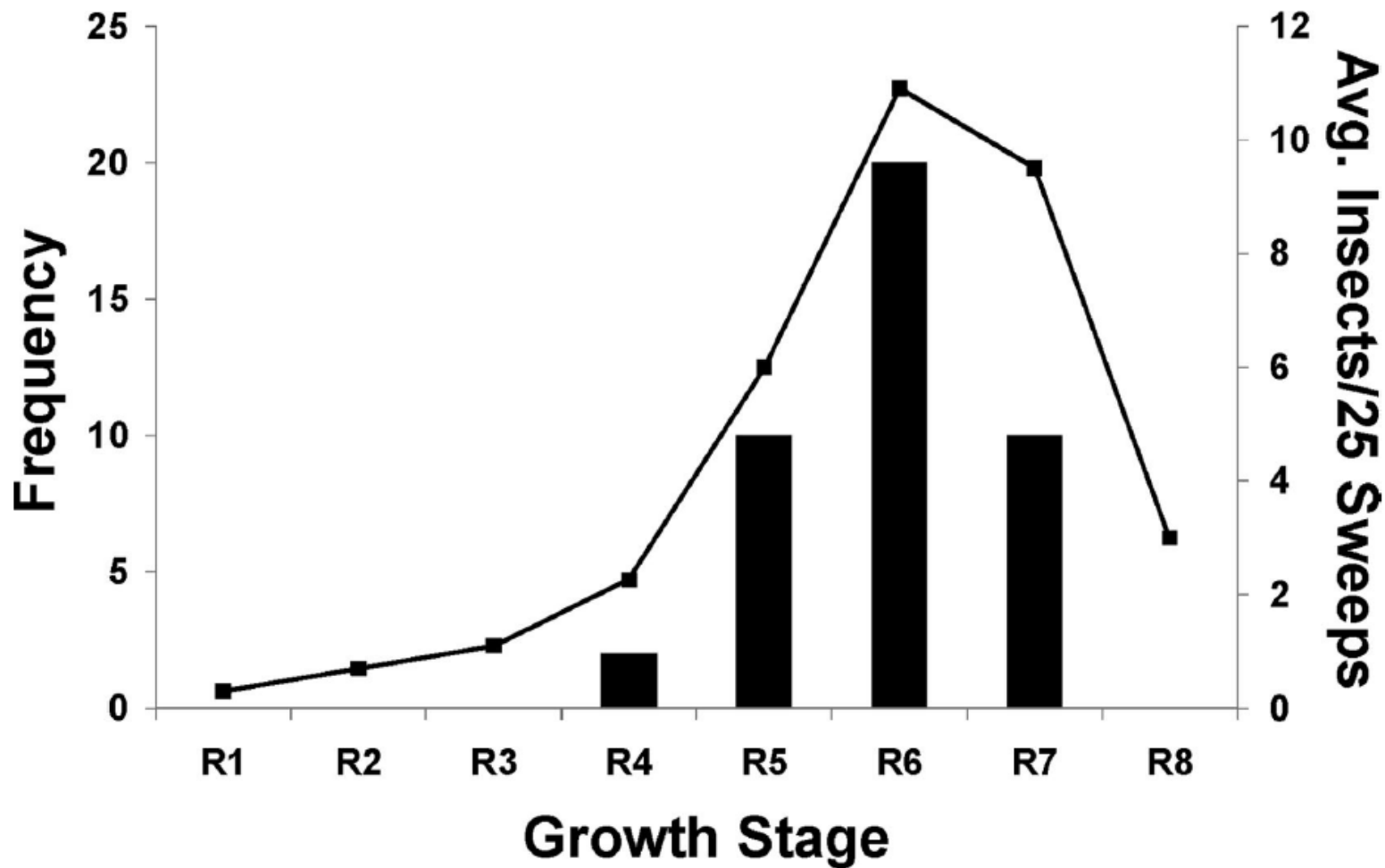


Soybeans



Which soybean fields will they be found in first?

Early maturing, early planted.



At what growth stage will redbanded stink bugs be most numerous? R6

Typically at threshold levels from R5 to R7

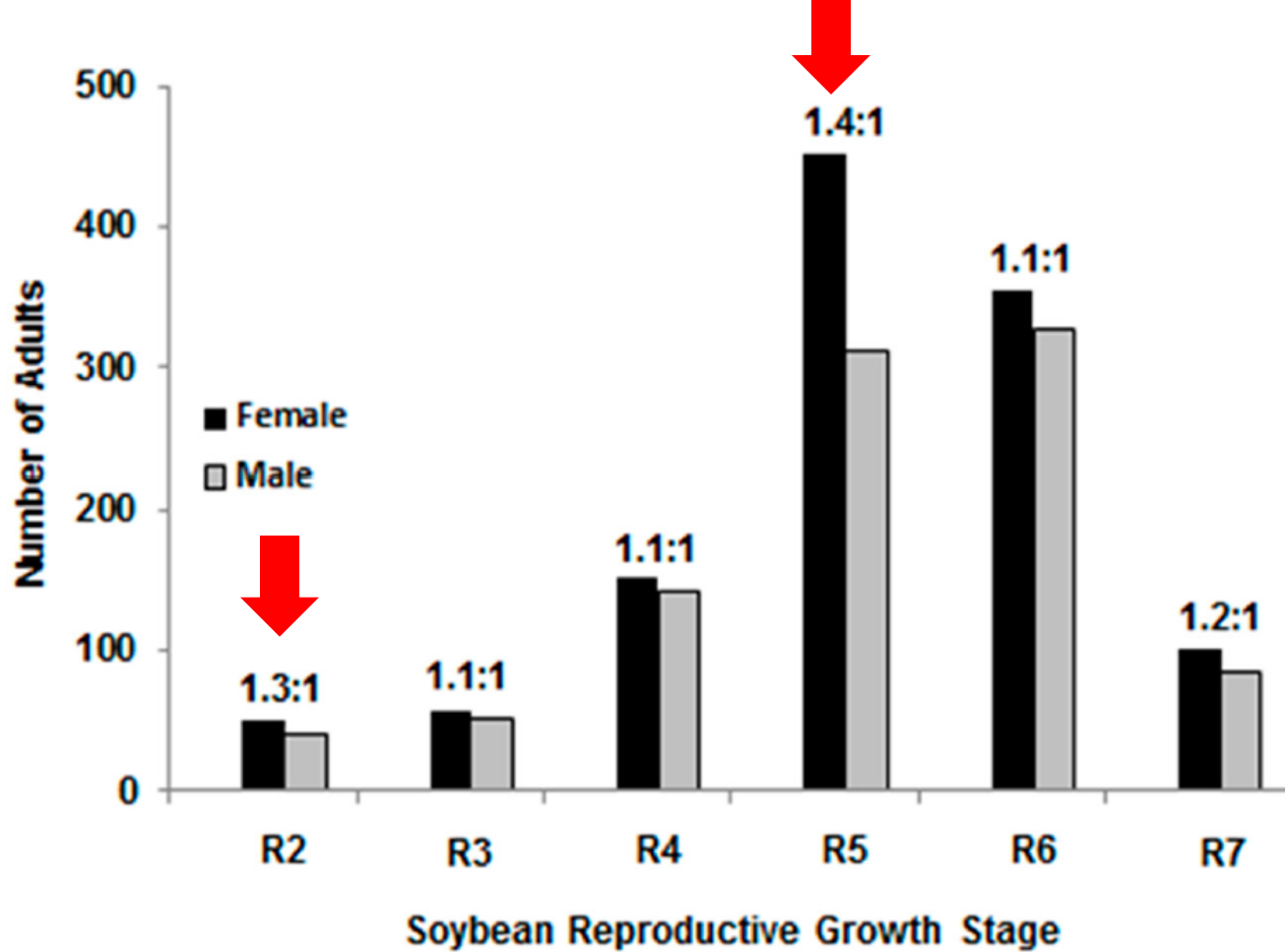


Figure 3. Redbanded stink bug sex ratio during soybean reproductive growth stages.

Should we be targeting females?

R2 and R5

Table 2. Redbanded stink bug oviposition preference during reproductive growth stages ^a

Growth Stage	Mean % Egg Clusters \pm SE	
	MG IV	MG V
R2	10.0 \pm 9.0 ^{bc}	1.9 \pm 1.2 ^b
R3	1.0 \pm 0.6 ^c	2.8 \pm 1.3 ^b
R4	6.0 \pm 3.7 ^{bc}	5.6 \pm 3.1 ^{ab}
R5	45.0 \pm 12.0 ^a	44.0 \pm 14.4 ^a
R6	23.7 \pm 9.3 ^{ab}	41.7 \pm 16.9 ^{ab}
R7	14.3 \pm 9.0 ^b	4.0 \pm 2.0 ^{ab}

Should we be targeting egg masses and nymphs?

Where are redbanded stink bug eggs found?

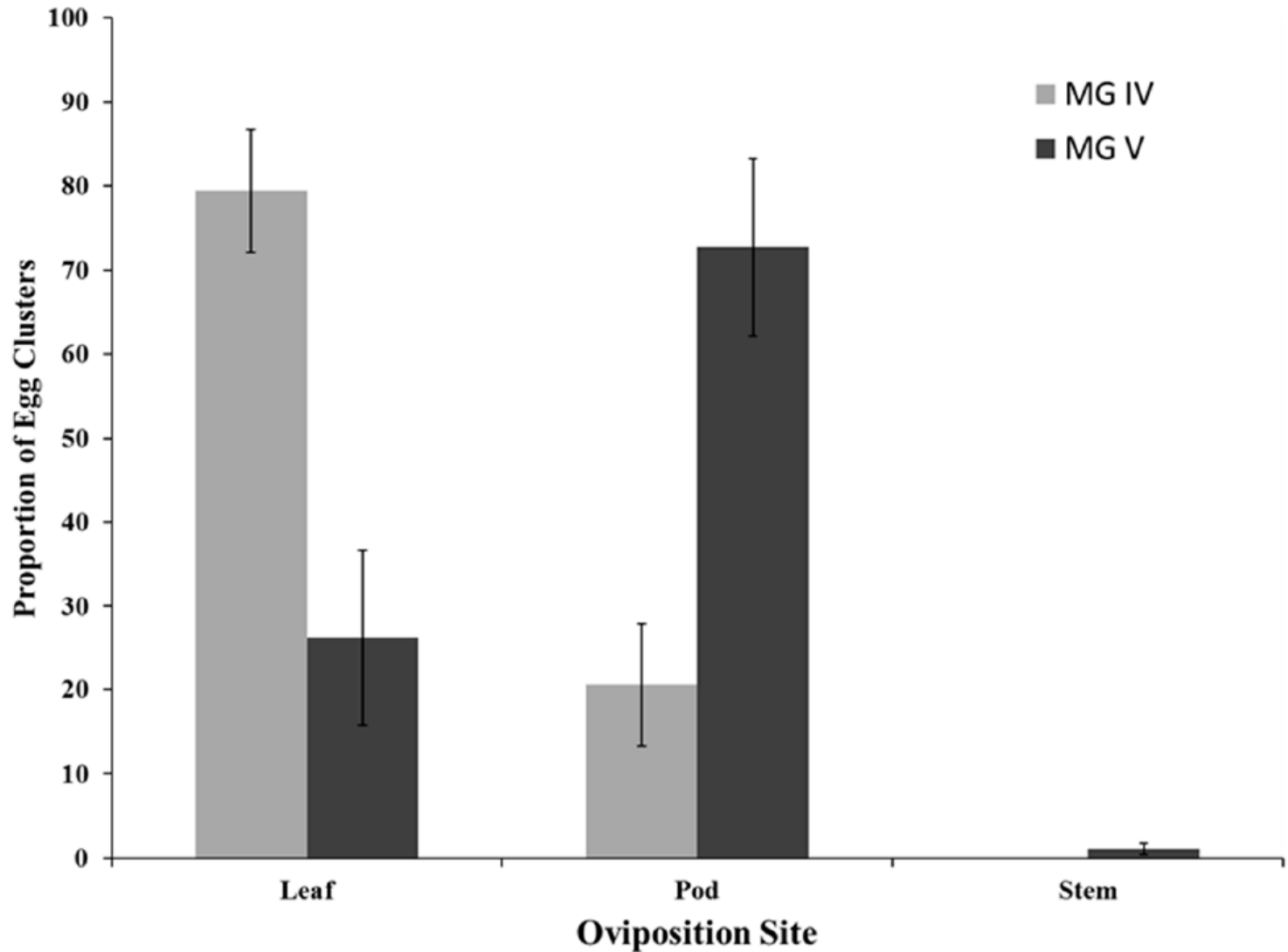


Figure 1. Frequency of redbanded stink bug egg clusters by oviposition site within MG IV and MG V soybeans.



30% of eggs found in the top 30 cm in MG IV

19% of eggs found in the top 30 cm in MG V

Where are redbanded stink bug eggs found?

70% or more found in lower two-thirds of canopy



**40% of damaged seed
found in the top 30 cm**

**Where are redbanded stink bugs
feeding?**

**60% found in lower two-thirds of
canopy**



Why should I be concerned about where they are feeding and ovipositing?

A typical sweep net is 38 cm in diameter and swept in the upper canopy.

Due to oviposition and feeding preferences for the lower canopy, sweep nets are underestimating redbanded stink bug adult and nymphal populations.



Why should I be concerned about where they are feeding and ovipositing?

Regardless of spray rate or ground speed, spray deposition is “highly variable” with most pesticide deposited in the upper canopy

(Barbosa et al. 2009)

With a high frequency of egg clusters and feeding damage found in the lower two-thirds of the plant canopy, redbanded stink bugs are exposed to less insecticide residues.

Implementing an Effective Stink Bug IPM Program

- Identify
- Understand the pest biology
- Sample

Keys to successful control of redbanded stink bug: Scout early and often!



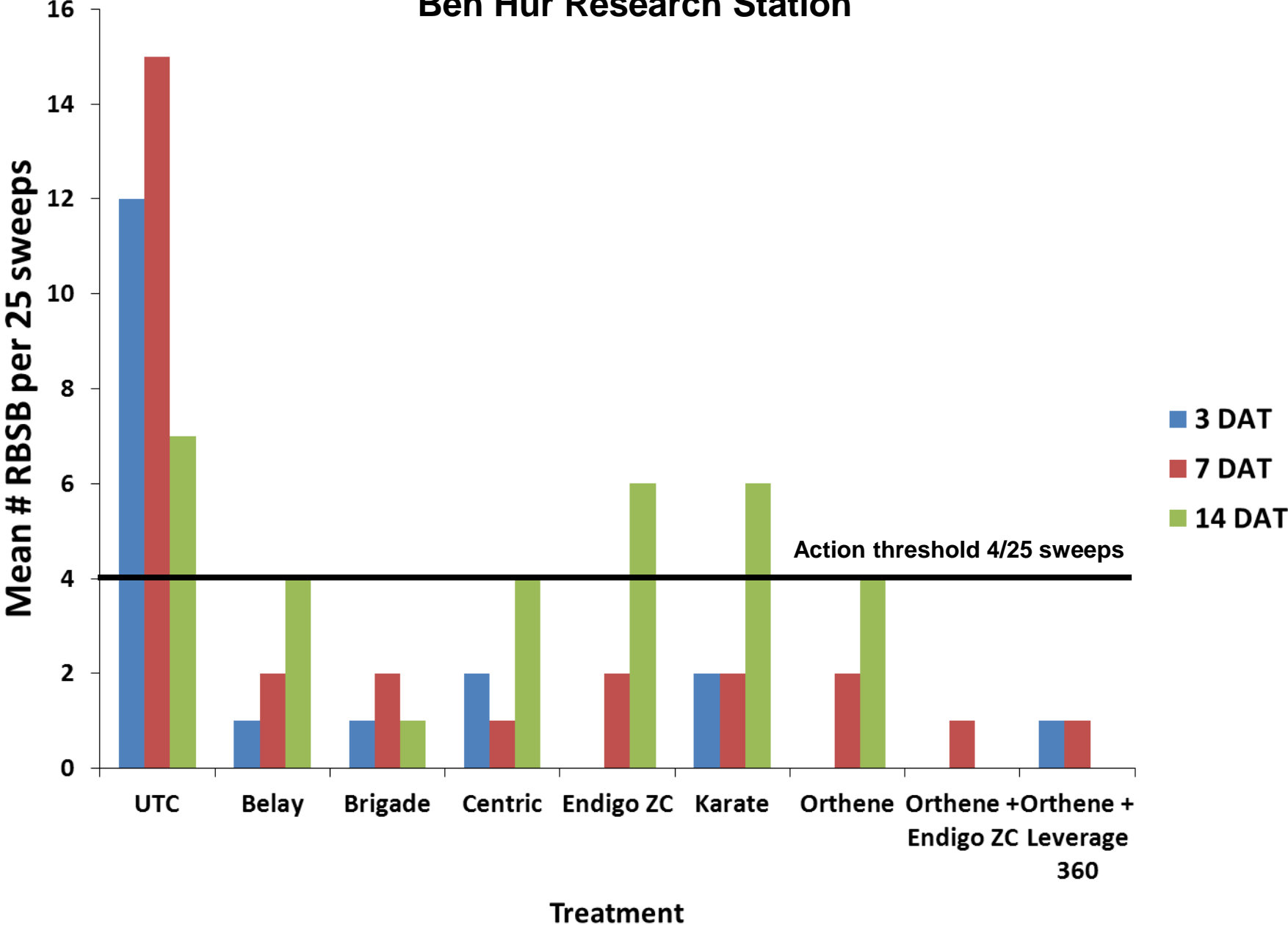
Sweep down into the canopy!

Control initiated at 4 stink bugs per 25 sweeps or 0.3 stink bug per row ft.

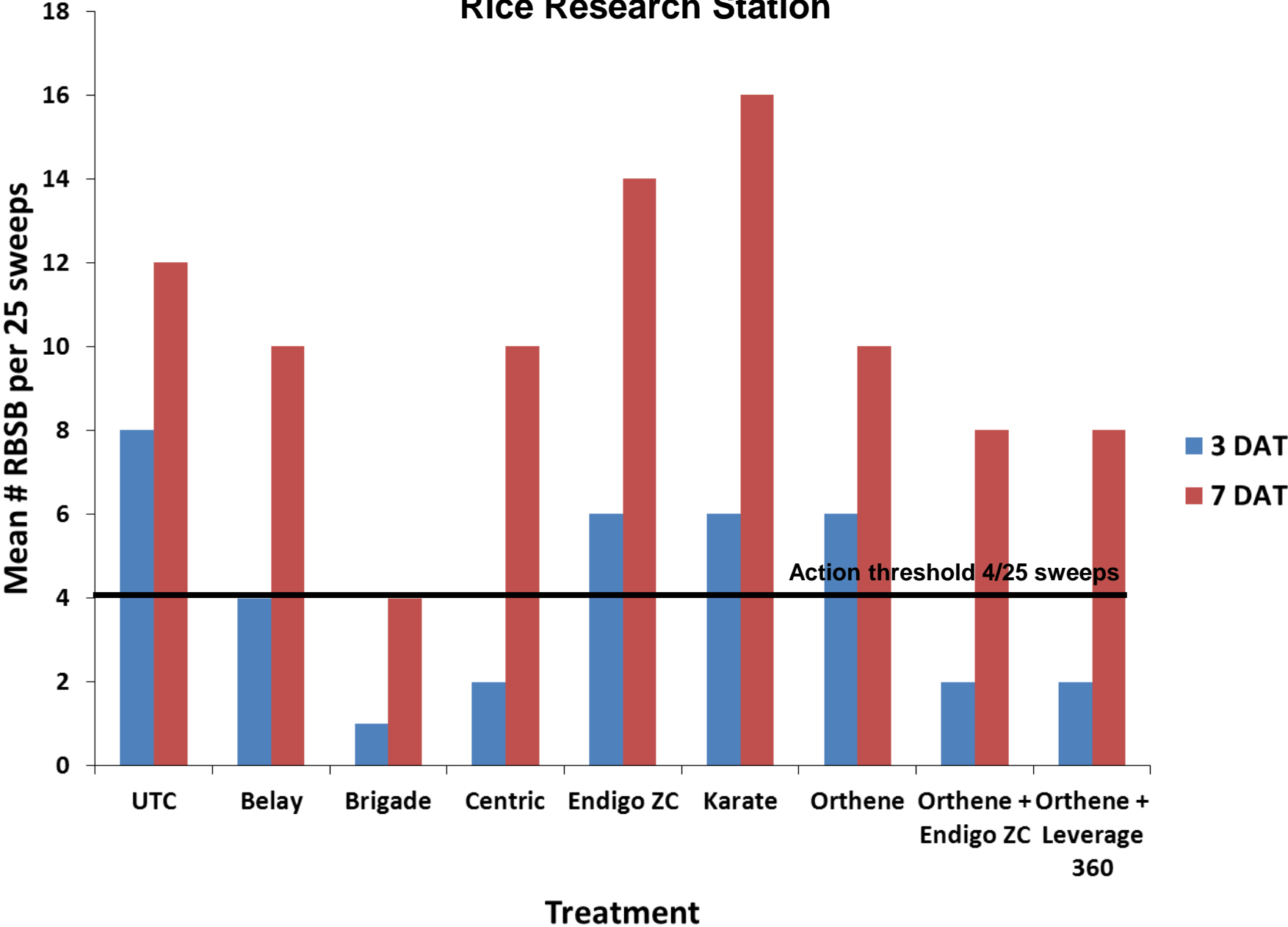
Implementing an Effective Stink Bug IPM Program

- **Identify**
- **Understand the pest biology**
- **Sample**
- **If at threshold, apply control tactic**

Ben Hur Research Station



Rice Research Station



Keys to Successful Redbanded Stink Bug Control

1. Reduce overwintering hosts



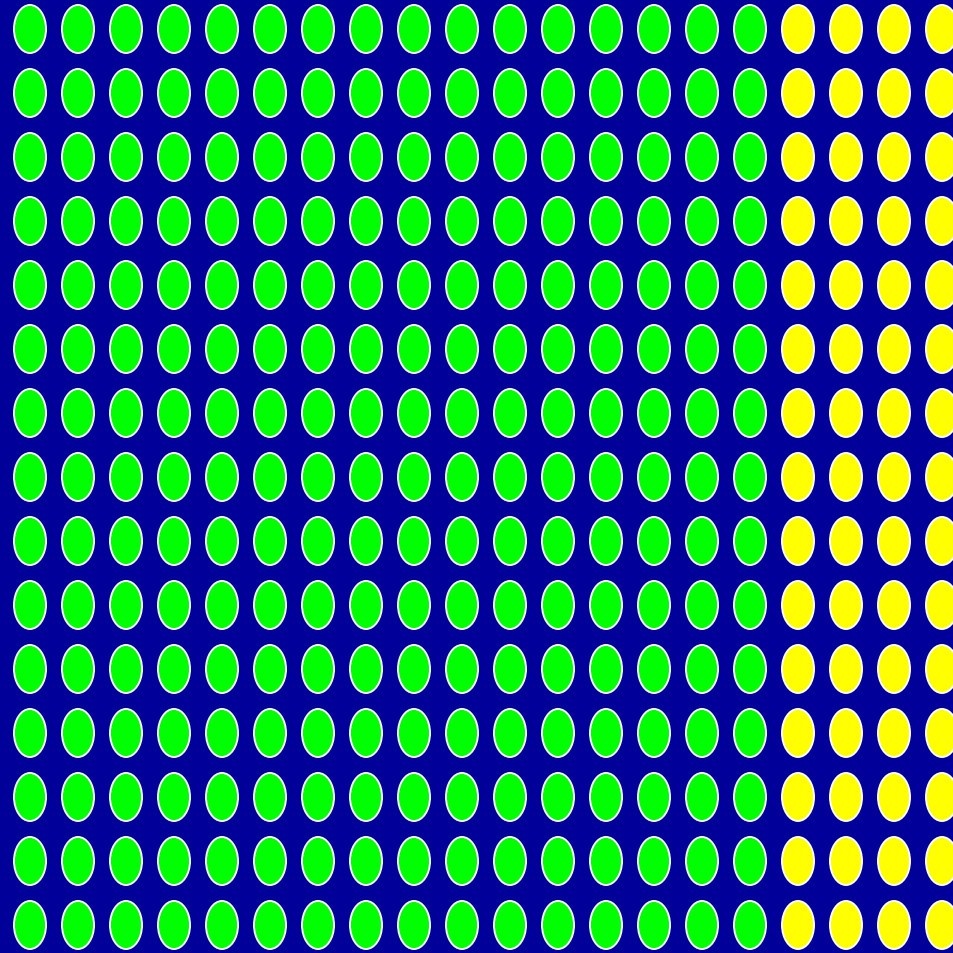
- **Don't plant crimson clover**
- **Monitor clovers**
- **If you have stink bugs, mow**
- **If you have clover cover crops, don't plant soybeans near them**
- **If you have clover cover crops, burndown as soon as possible**

Keys to Successful Redbanded Stink Bug Control

1. Reduce overwintering hosts
2. Don't be afraid to take a chance on trap crops

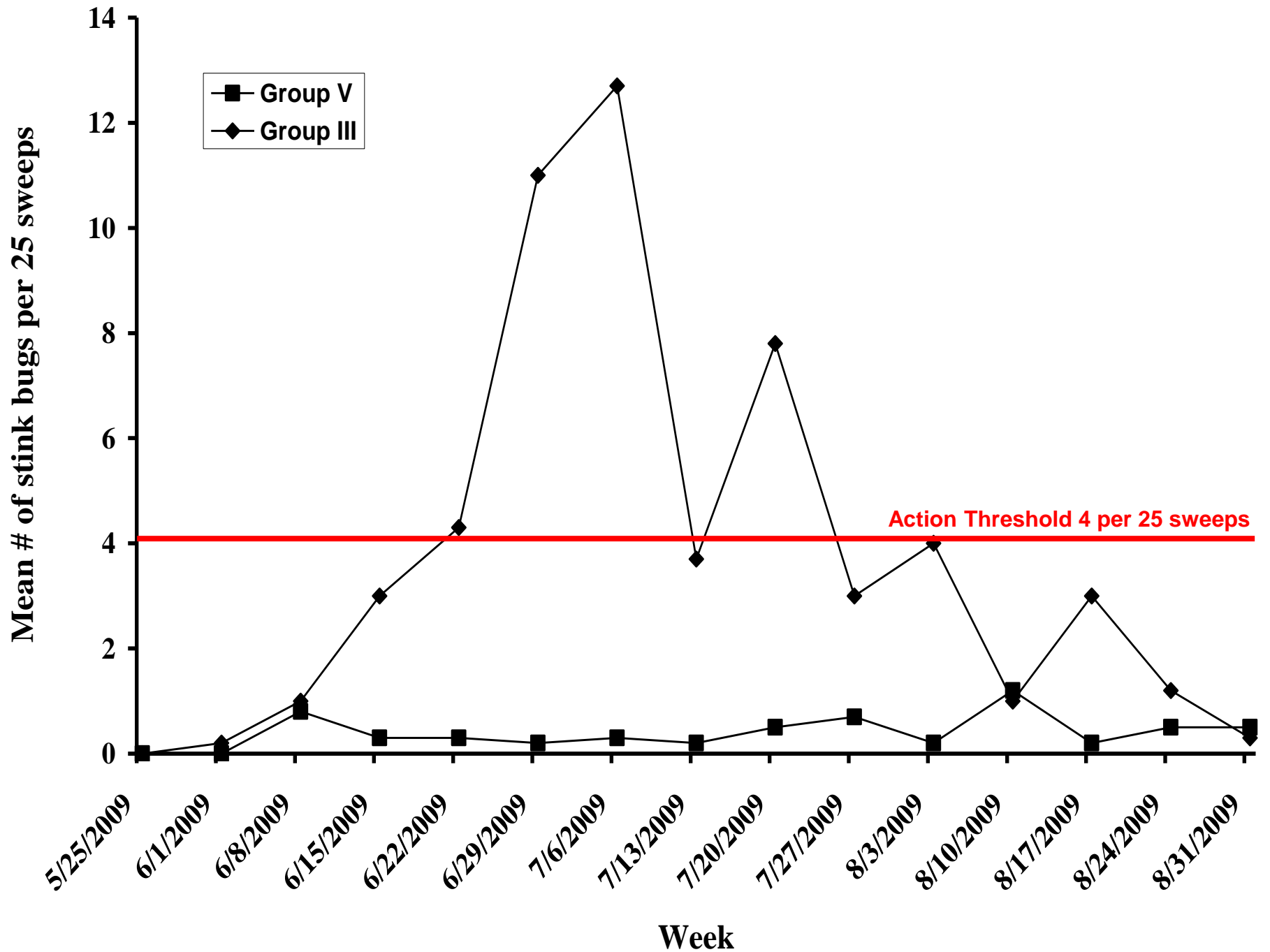


Trap Crop



 MGV

 Trap Crop (MG III)



Keys to Successful Redbanded Stink Bug Control

1. Reduce overwintering hosts
2. Don't be afraid to take a chance on trap crops
3. Plant stink bug tolerant varieties

Keys to successful control of redbanded stink bug:

Plant resistant varieties

No varieties are currently available that provide immunity from stink bugs.

In general, MG IV soybeans will have more damage than MG V as pod initiation and seed set starts earlier. This results in longer exposure to stink bugs over time, resulting in greater opportunities for stink bug injury.

Three high yielding varieties have proven to be highly tolerant of stink bugs (10% or less seed damage) if left untreated.

Highly tolerant

Armor 55R22

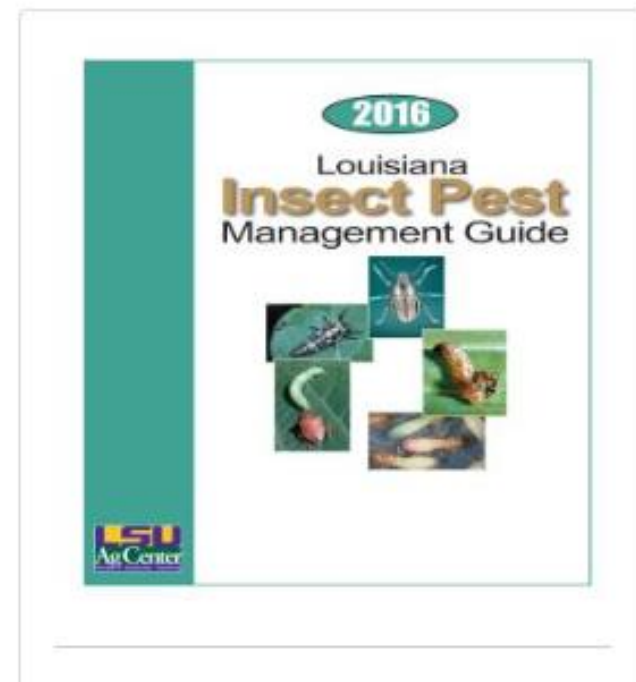
Terral REV 56R63

Terral REV 57R21

Keys to Successful Redbanded Stink Bug Control

1. Reduce overwintering hosts
2. Don't be afraid to take a chance on trap crops
3. Plant stink bug tolerant varieties
4. Rotate insecticide chemistries

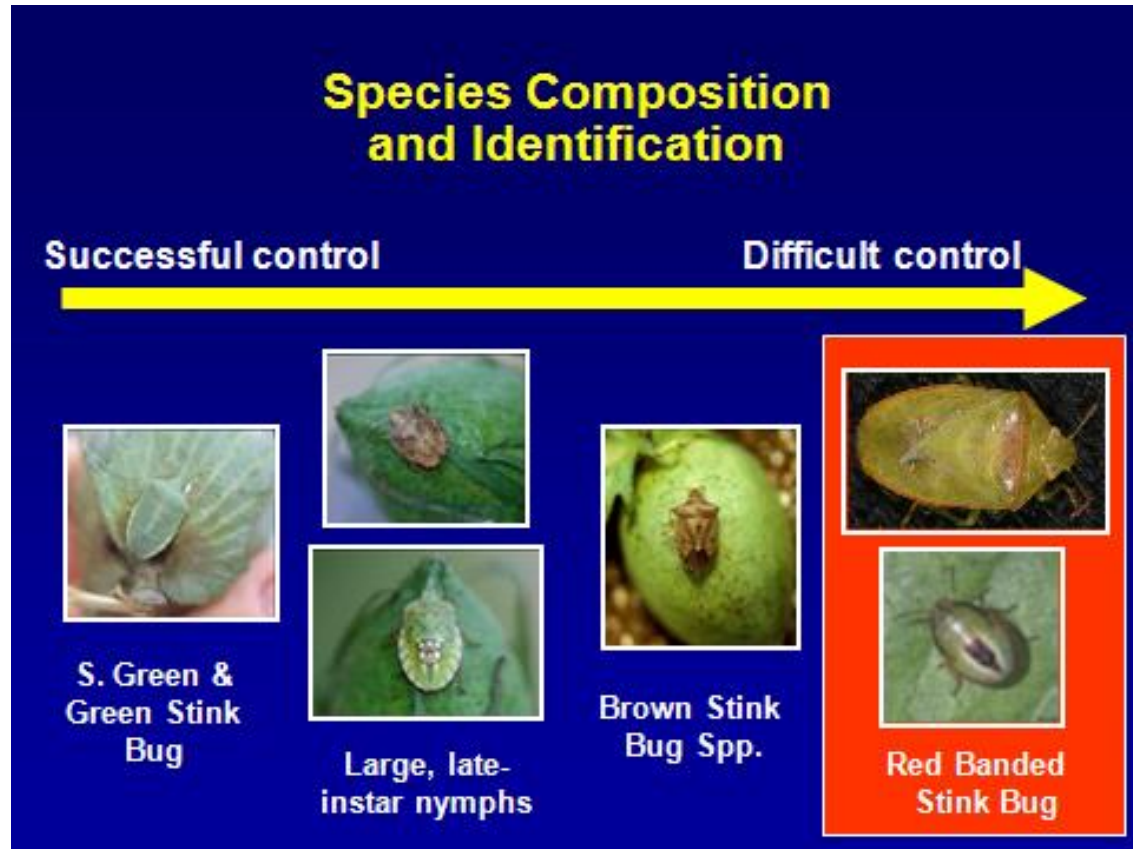
Insect	Insecticide	Amount of Concentrate per Acre	Pounds Active Ingredient per Acre	Acres Treated per Gallon or Pound	When to Treat (Economic threshold)
Redbanded stinkbug ⁴	Orthene (Acephate)	12-16 oz	0.75-1.0	1.3-1	16 bugs in 100 sweeps. Caution: 8 oz of acephate applied alone has provided unsatisfactory control of redbanded stink bugs.
	Endigo ZC	4.0-4.5 oz	premix	32-28.4	
	Brigade (2)	6.4 oz	0.1	20	
	Hero (1.24)	10.3 oz	0.1	12.4	
	Leverage 360	2.8 oz	premix	45.7	
	Belay (2.13)	4.0 oz	0.067	32	



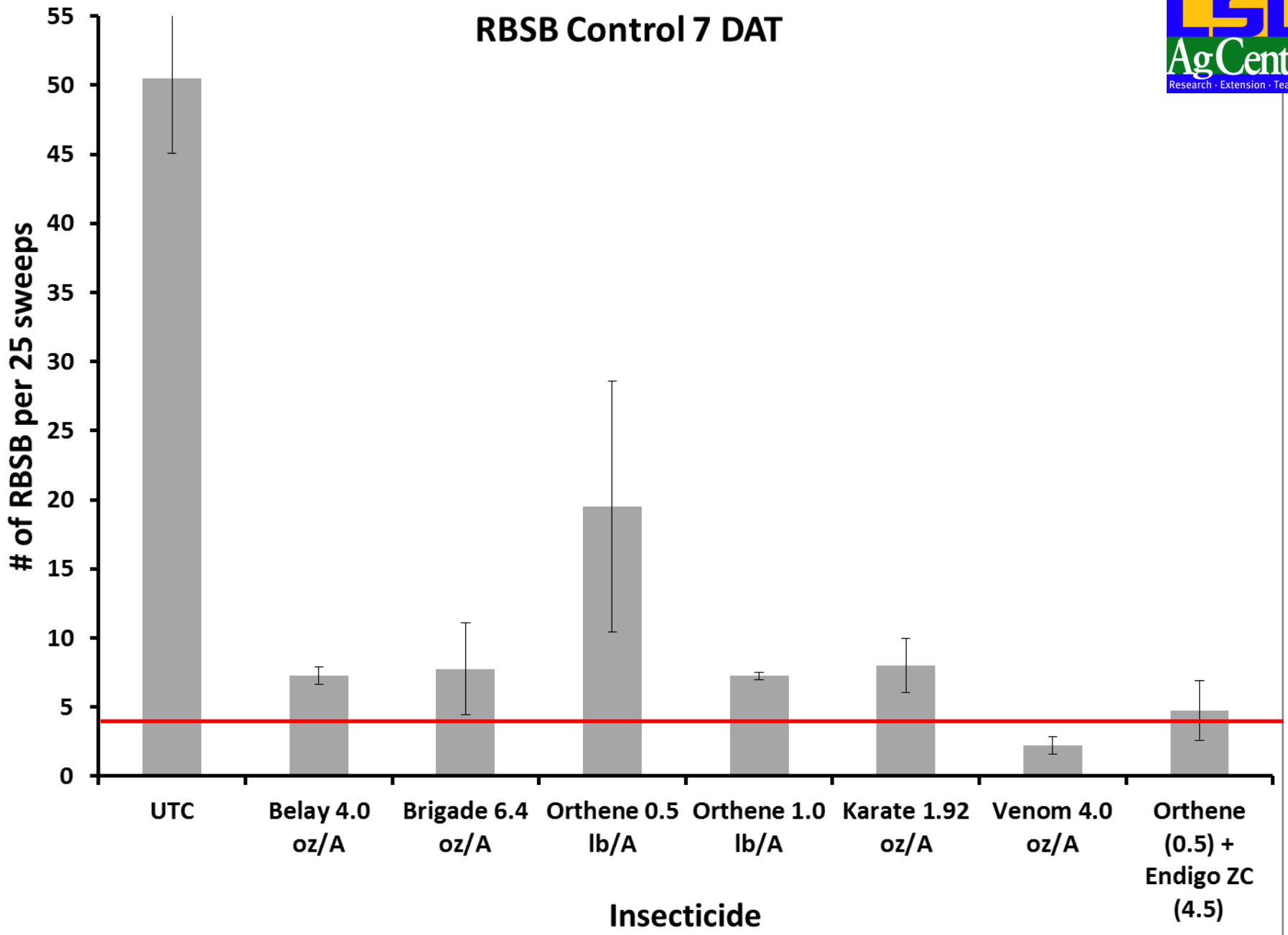
Keys to successful control of redbanded stink bug:

Rotate insecticide chemistries

- Redbanded stink bugs are difficult to control
 - Tolerant to all insecticides
 - Multiple insecticide applications needed
 - Resistant populations exist



RBSB Control 7 DAT

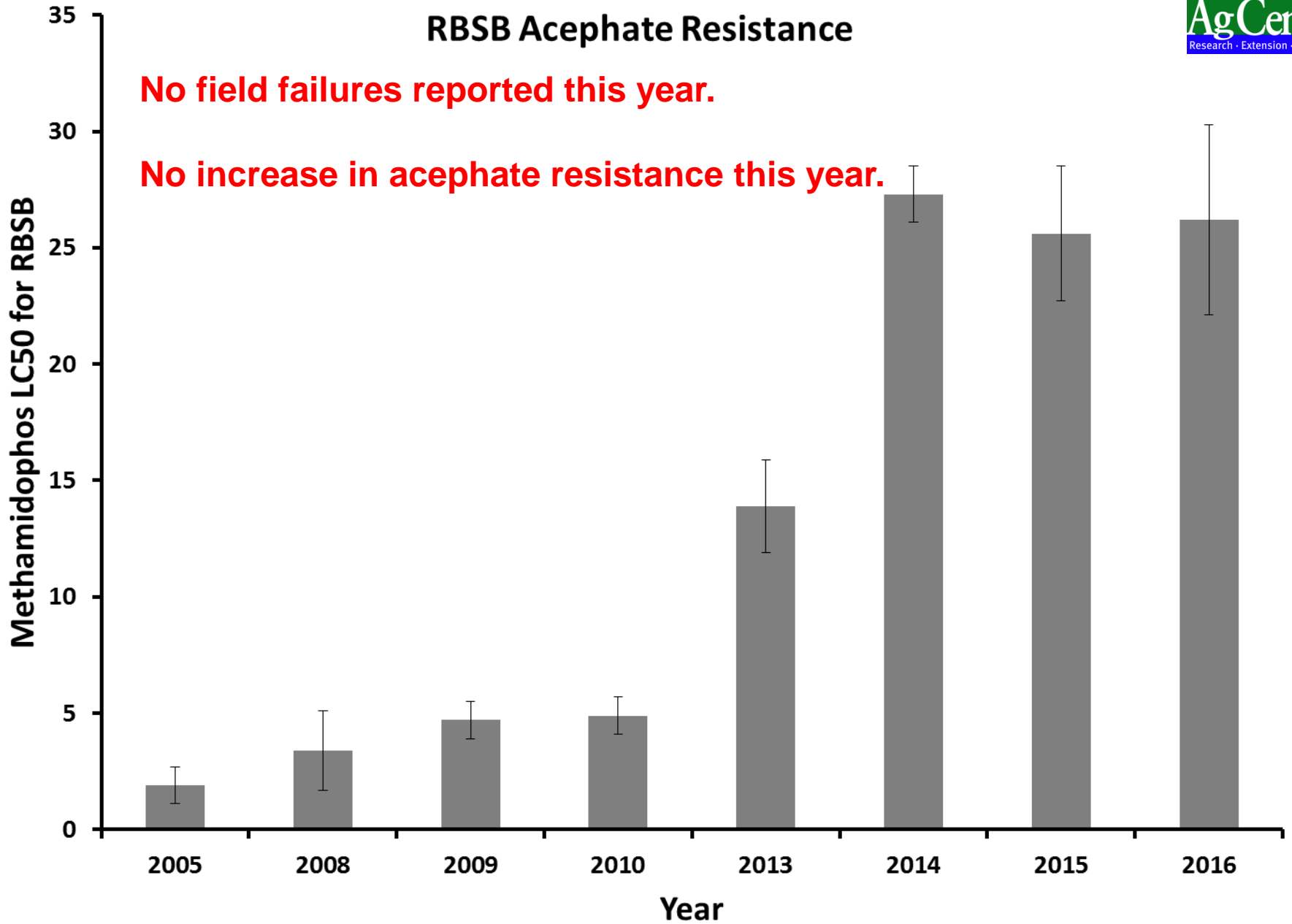


2016 Stink Bug Foliar Efficacy Trial

RBSB Acephate Resistance

No field failures reported this year.

No increase in acephate resistance this year.



Keys to Successful Redbanded Stink Bug Control

1. Reduce overwintering hosts
2. Don't be afraid to take a chance on trap crops
3. Plant stink bug tolerant varieties
4. Rotate insecticide chemistries
5. Continue to scout until harvest

Soybeans are still susceptible to stink bug damage after harvest aids are applied (yield loss as much as 10 bu/A)

Stink bugs should be controlled prior to or at harvest aid application if at action thresholds

Reduces chance of stink bugs moving to adjacent fields

Reduces overwintering populations



4 Goals of Integrated Pest Management

1. Reduce pest status
2. Ensure producer profits
3. Attain environmental compatibility
4. Produce sustainable solutions

“Reduce pesticide inputs through judicious use.”

IPM is about assessment and decision making

Questions?

Thank you

ACKNOWLEDGEMENTS:

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