

Soybean Stink Bug Update

2012 Soybean Breeders Worksh

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Stink bugs in soybean

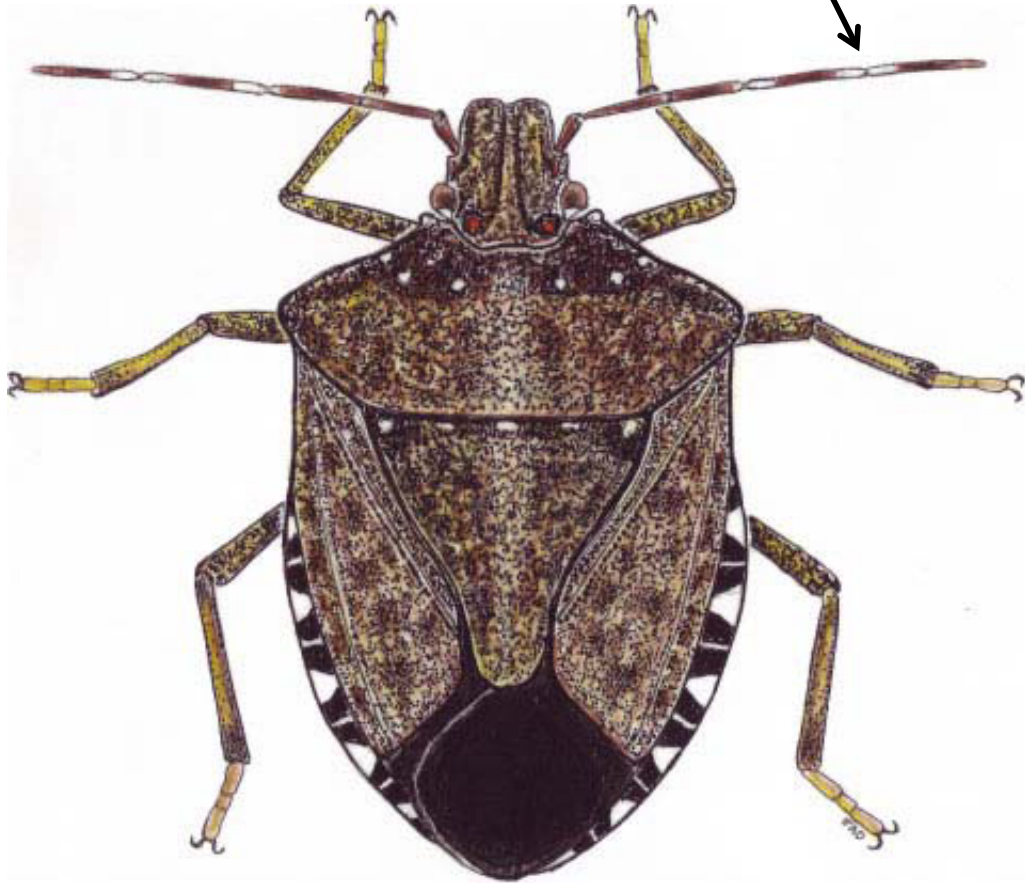


Brown marmorated stink bug (*Halyomorpha halys* Stahl)

A new pest in VA
soybeans



White bands on antennae



Soybean growth stages



R4
(full pod)



R5
**(beginning
seed)**



R6
**(full
seed)**

- Stink bugs begin to migrate in large numbers into soybean fields at the R4 (full pod) soybean development stage
- Injury to soybeans includes undeveloped (flat) pods, punctured and deformed seed



Stink bug feeding can also delay maturity, causing 'stay green' syndrome

Undamaged,
maturing



BMSB damaged, 'stay-green'



Stink bug “stay-green” injury—Orange Co., VA, 2011



Tree of Heaven

Orange Co., VA, 2011



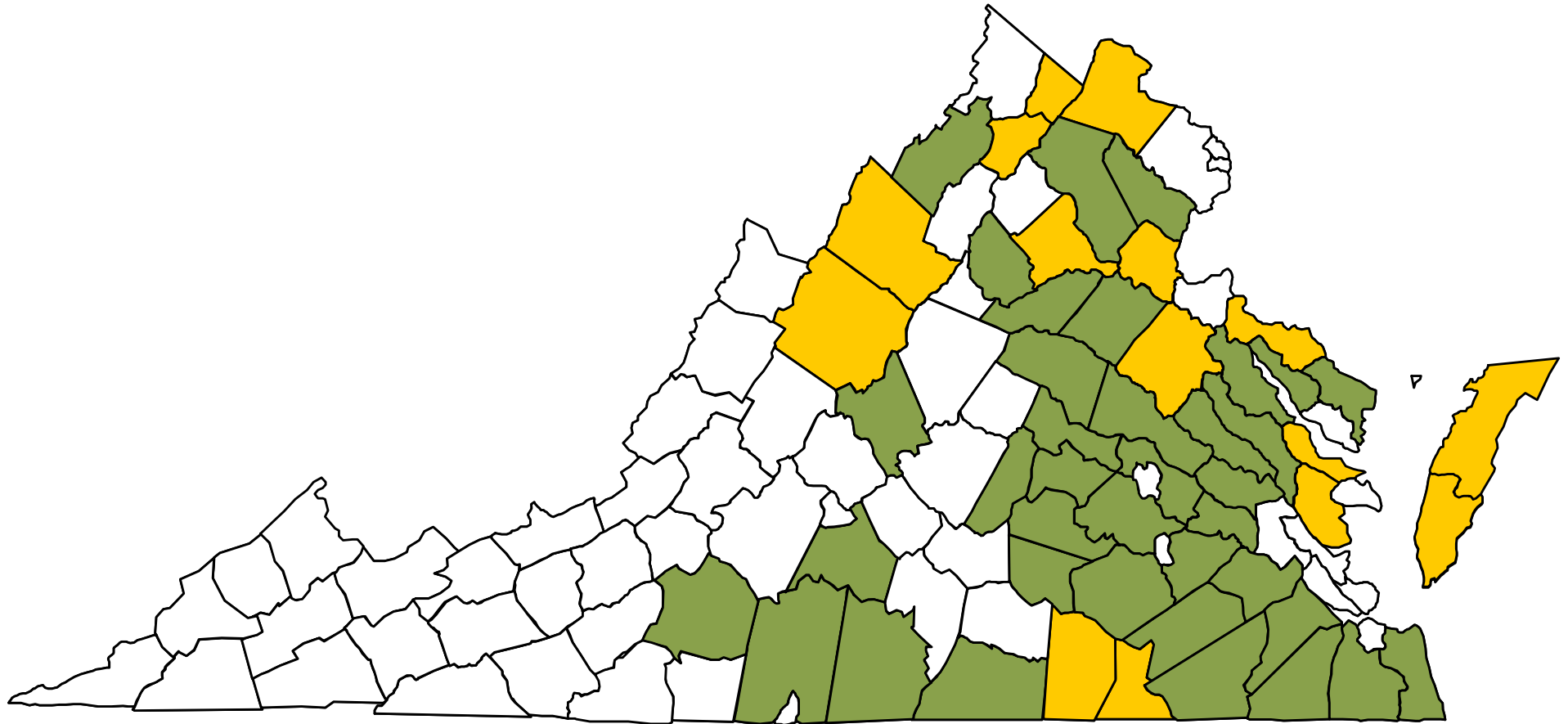
Tree of Heaven *Ailanthus altissima* (Mill.)



BMSB also colonizes and moves from corn fields



Brown marmorated stink bug (BMSB) survey: 2010 range in Virginia soybean fields



■ BMSB detected in soybean (Accomack, Augusta, Brunswick, Caroline, Clarke, Culpeper, Gloucester, Greensville, Loudoun, Middlesex, Northampton, Rockingham, Stafford, Warren, Westmoreland)

■ Soybean-producing counties



Brown Marmorated Stink Bug Update Delaware

**Joanne Whalen
Extension IPM Specialist
University of Delaware**

Delaware Soybean Survey - 2011

- Surveyed 45 Fields– weekly sweep counts from late June to Sept; looked at field perimeters versus interiors
- Objectives:
 - Identify distribution of BMSB and “native” stink bugs in DE
 - Identify fields for evaluation of perimeter treatments

Funded by the Delaware Soybean Board

Range of Brown Marmorated Stink Bug Detected in Delaware Soybean Fields

2010 Season:

- Found for the first time in commercial soybean fields
- High populations found on the Newark research farm in field corn and soybean fields
- No green edges documented

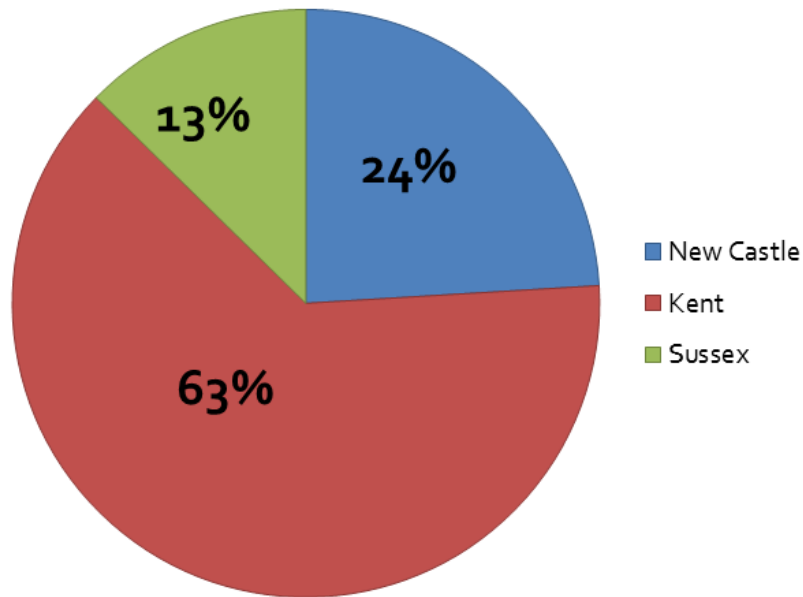
2011 Season:

- Found in all 3 counties
- Highest populations along field edges – green edges observed
 - Kent County: highest population near the Maryland border (Harrington) and in the Smyrna area
 - New Castle County – generally throughout the county
 - 1 unconfirmed detection in SE corner of Sussex County by a consultant

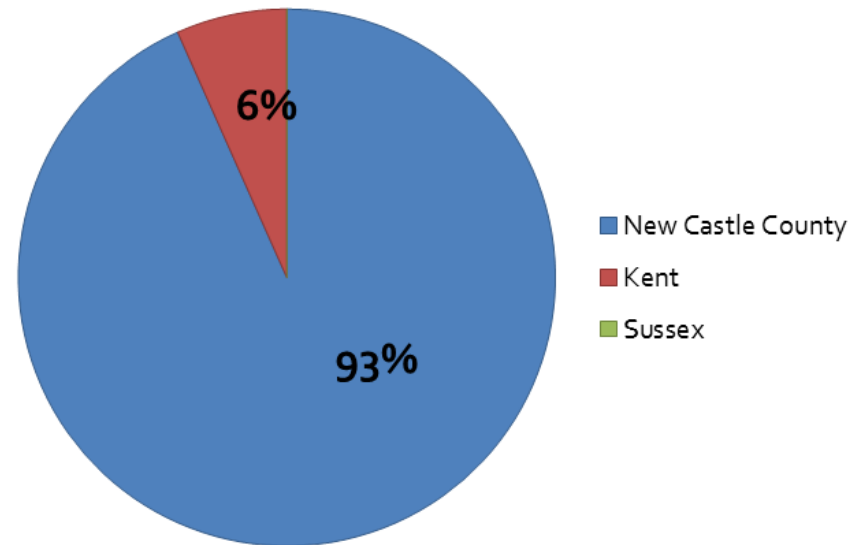


2011 Stink Bug Survey Results

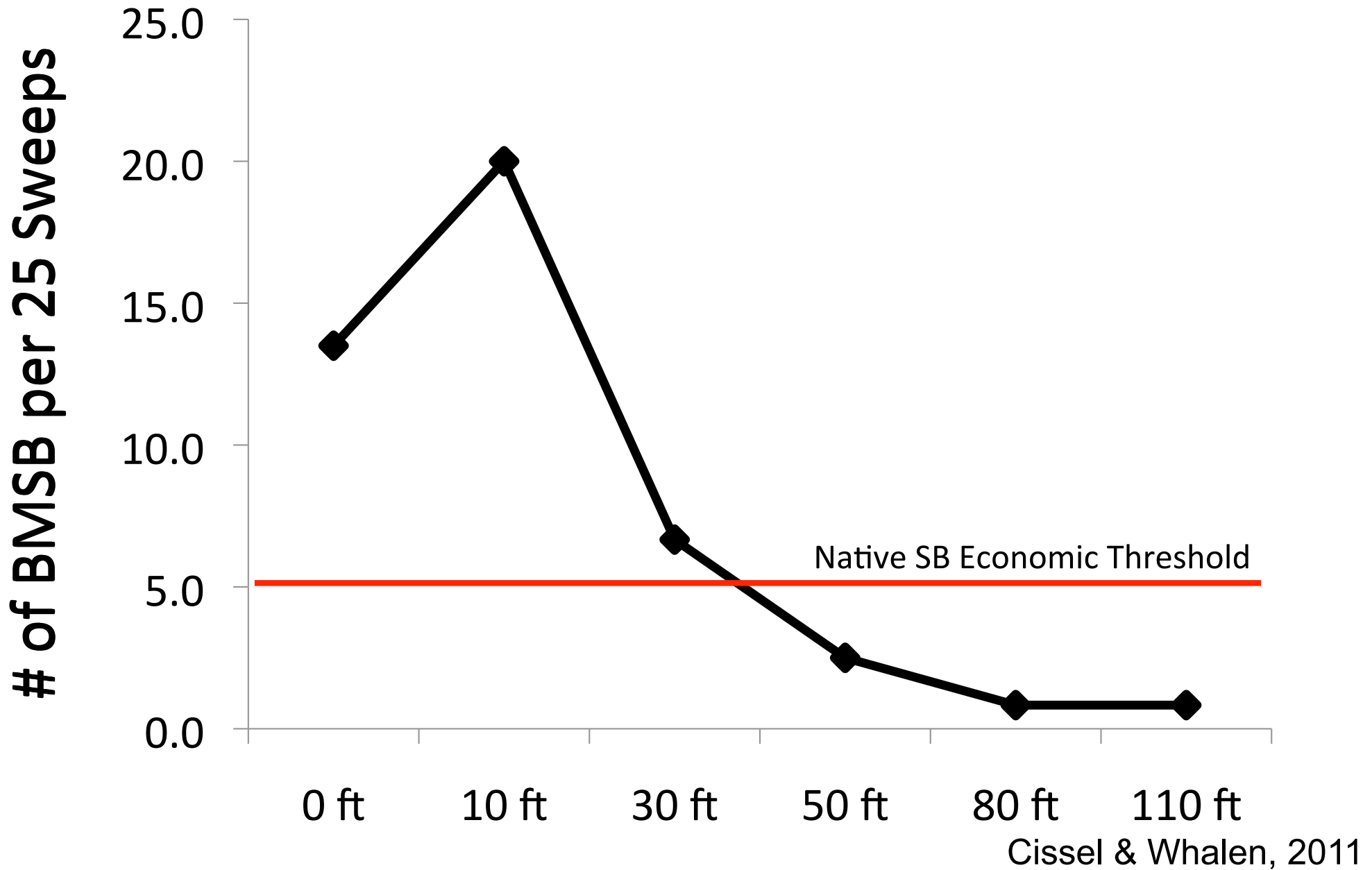
**% Fields with Green Stink Bugs
(*Acrosternum hilare*)**



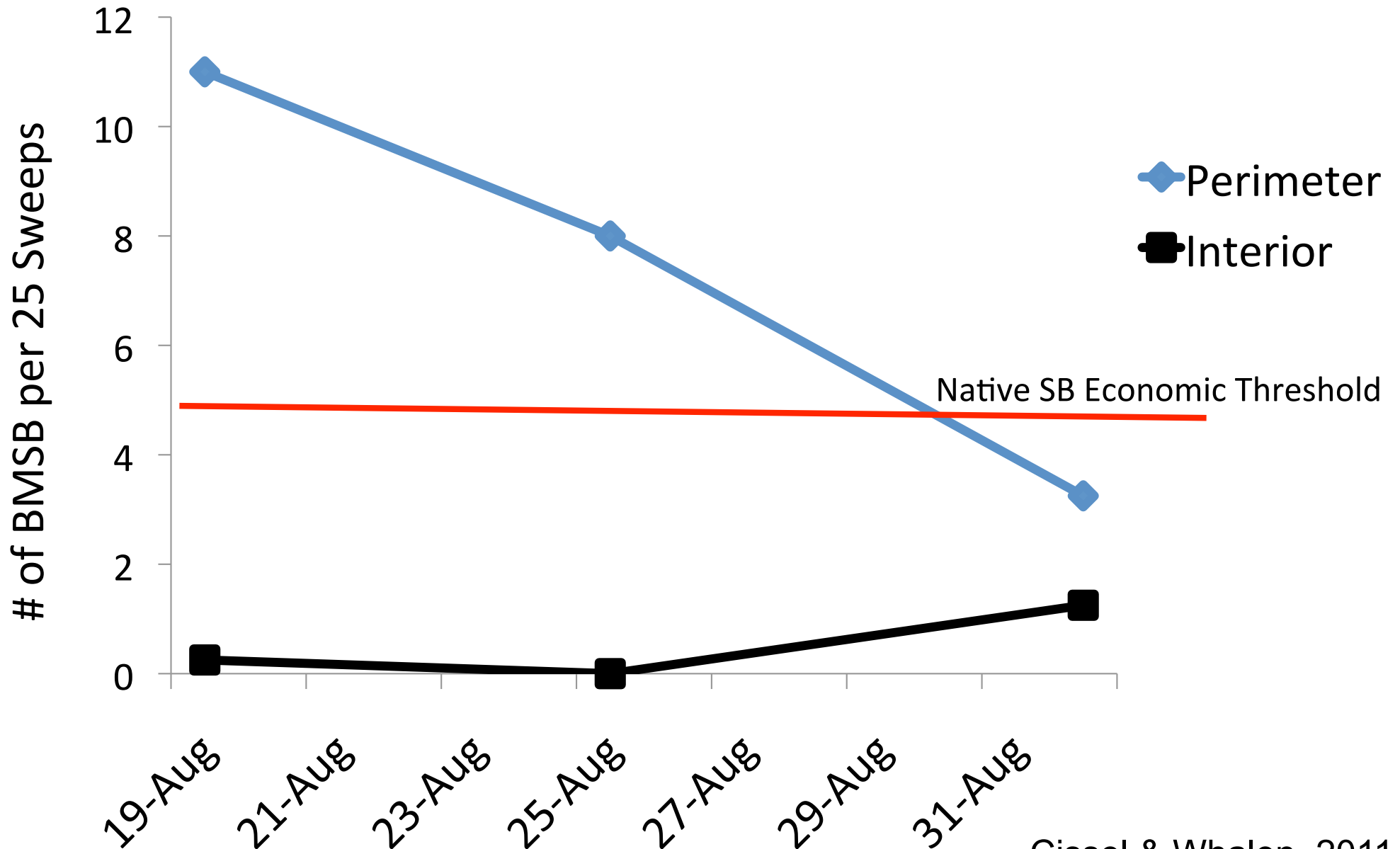
% Fields with BMSB



BMSB Soybean Field Infestation Gradient Grower # 1



BMSB Soybean Field Perimeter v/s Interior, Grower # 2



Cissel & Whalen, 2011

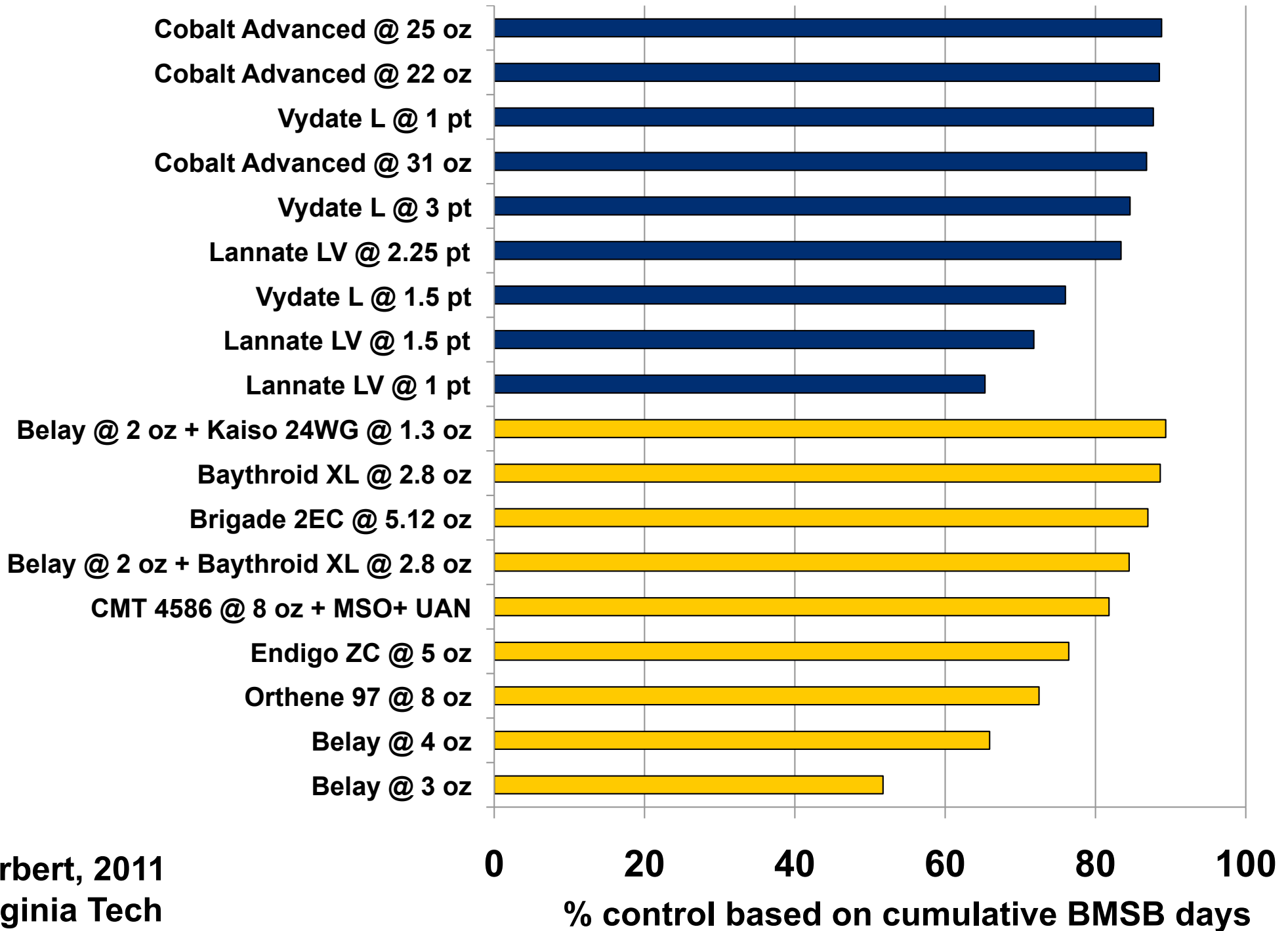
Seed Quality Information – Grower #1

Field Location	Seed Quality Evaluation			
	% Clean Seed	% Purple Stain	% Moldy Beans	% Shriveled
Perimeter	2.02	0.00	92.22	5.76
Interior	98.48	0.23	1.23	0.06

Seed Quality Information – Grower #2

Field Location	Seed Quality Evaluation			
	% Clean Seed	% Purple Stain	% Moldy Beans	% Shriveled
Perimeter	8.95	0.28	89.63	1.14
Interior	97.41	1.17	1.17	0.26

BMSB Efficacy Trials 1 and 3 in Soybean—Orange Co., VA, 2011



Effectiveness of Field Perimeter Treatments

- 12 commercial soybean fields
- Culpeper, Madison, Orange, Clarke, Stafford, Fauquier, and Augusta Cos.



BMSB edge treatments—2011

Location	Product/rate	Acres (entire field)
Culpeper et1	Lambda @ 5 oz	300
Madison et1	Acephate 97UP @ 12 oz	150
Madison et2	Acephate 97UP @ 12 oz	150
Orange et1	Acephate 97UP @ 12 oz	100
Orange et2	Acephate 97UP @ 12 oz	50
Fauquier et 01	Acephate 97UP @ 12 oz	300
Fauquier et02	Acephate 97UP @ 12 oz	220
Stafford 01	(Lannate @ 1.5 pt) Sniper @ 6.4 oz	300
Augusta et02	Sniper @ 6 oz + Warrior @ 2.5 oz	400
Madison 01	Bifenthrin @ 6 oz	300
Clarke et02	Endigo @ 4.5 oz	150
Clarke et03	Endigo @ 4.5 oz	250

BMSB edge treatments—2011

Location	Date treated	R-stage	Post-treatment sample—number per 15 sweeps									
			Date 1		Date 2		Date 3		Date 4		Date 5	
Culpeper et1	25-Aug	5	9/12	<1	9/19	<1	9/26	<1				
Madison et1	25-Aug	5	9/1	0	9/7	0	9/15	0	9/22	0	9/29	0
Madison et2	25-Aug	5	9/1	<1	9/7	<1	9/15	0	9/22	0	9/29	0
Orange et1	25-Aug	5	9/1	0	9/7	0	9/15	0	9/22	0	10/3	0
Orange et2	25-Aug	5	9/1	0	9/7	0	9/15	0	9/22	0	9/29	0
Fauquier et 01	30-Aug	4	9/12	0	9/19	0	9/26	0	10/3	0		
Fauquier et02	5-Sep	5	9/12	0	9/19	0	9/26	0				
Stafford 01	28-Sep	6	10/3	0	10/10	0						
Augusta et02	28-Sep	6	10/4	0	10/10	0						
Madison 01	28-Sep	6	10/3	0	10/10	0						
Clarke et02	28-Sep	6	10/3	0	10/10	0						
Clarke et03	28-Sep	6	10/3	0	10/10	0						

Thresholds and sampling

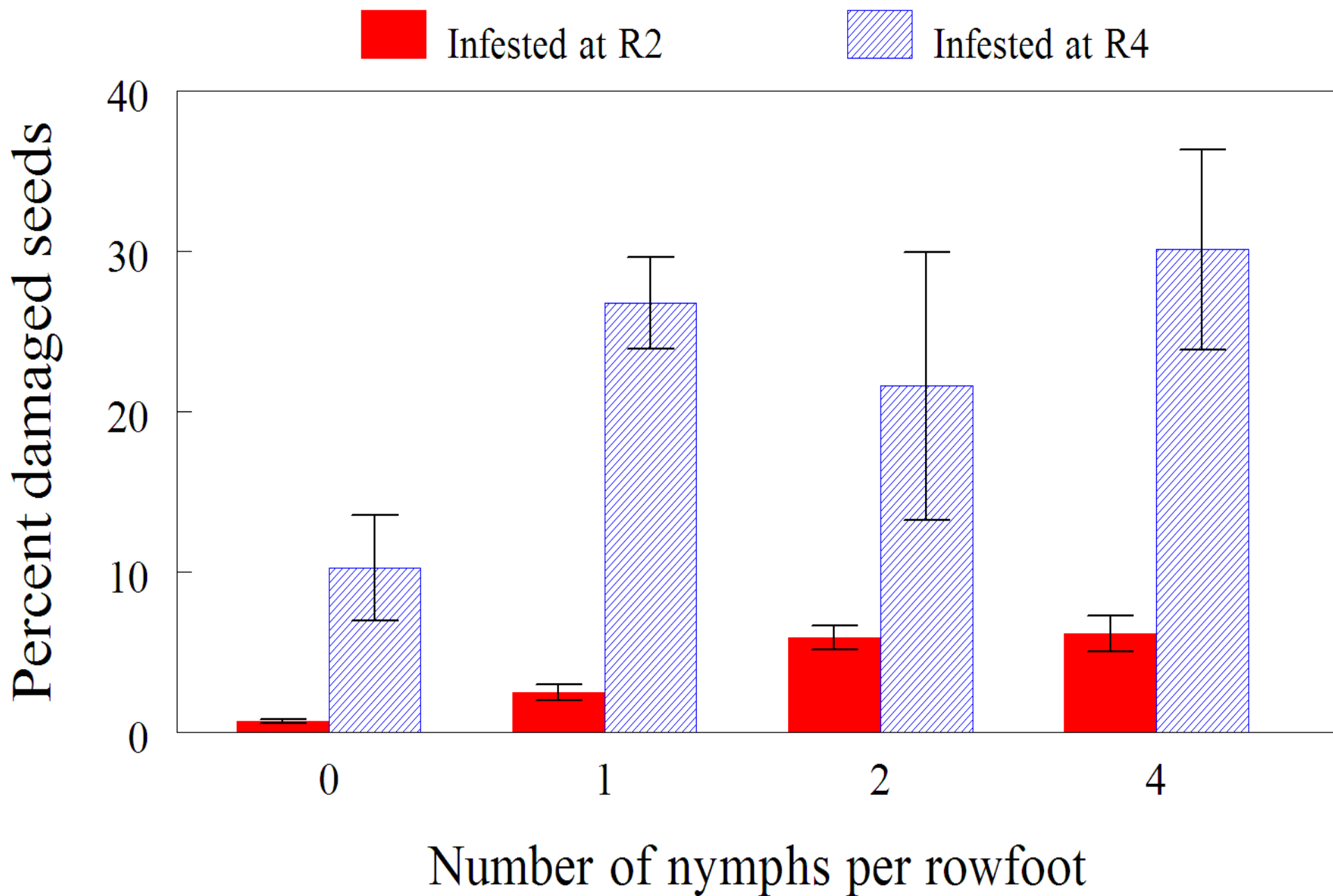
	# per row foot		# per 15 sweeps	
Row spacing	7-21" rows	Above 21"	7-21" rows	Above 21"
Stink bugs	1	1	2.4	3.6



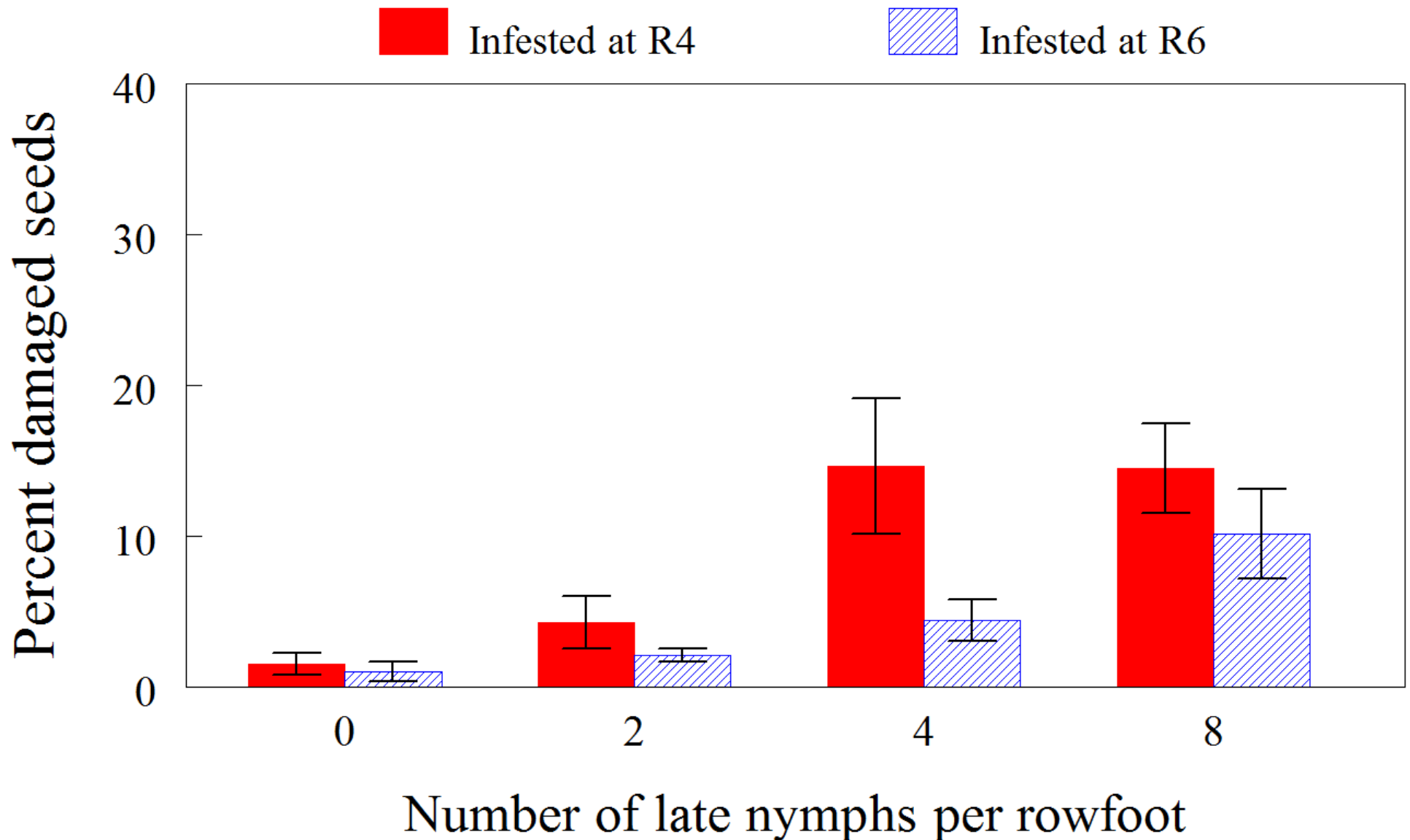
Field Cage Studies: VA, MD and DE

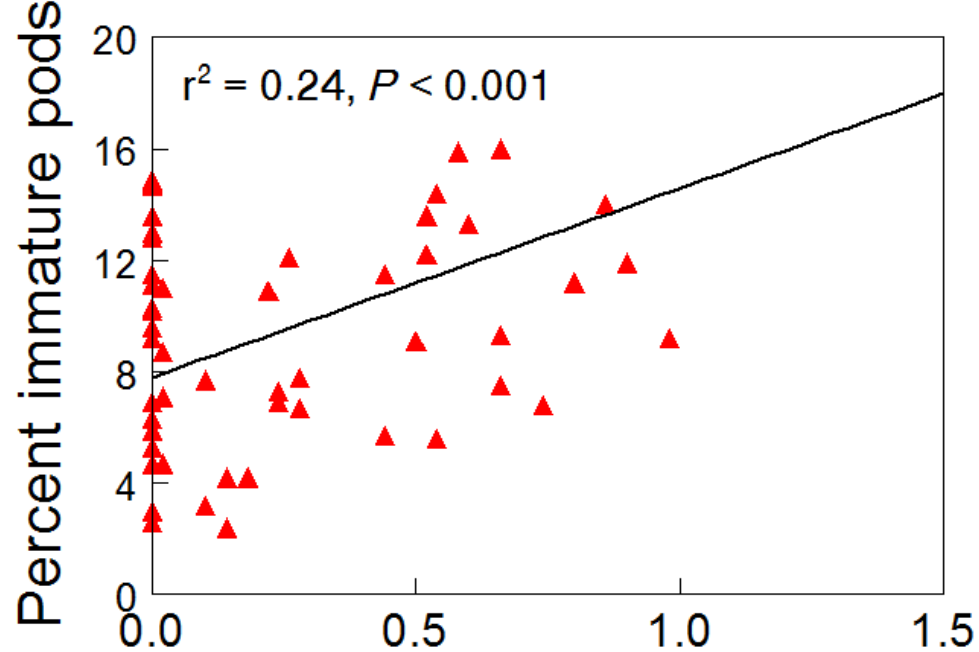
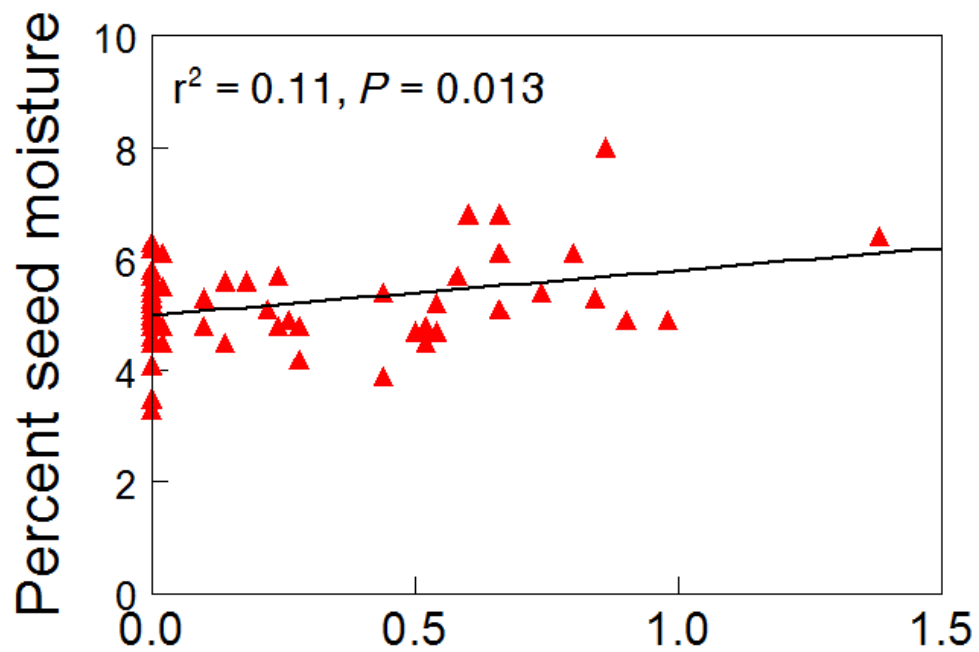
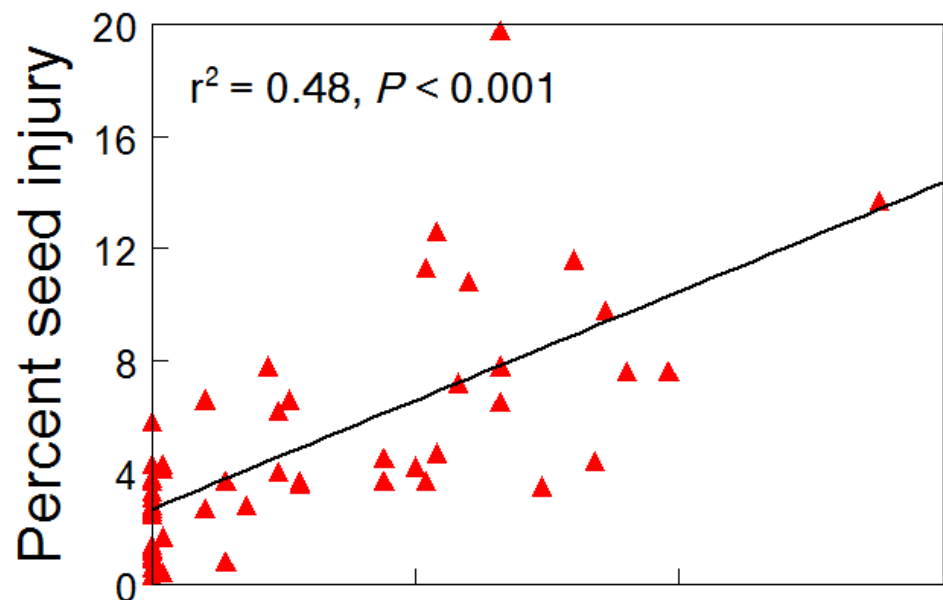
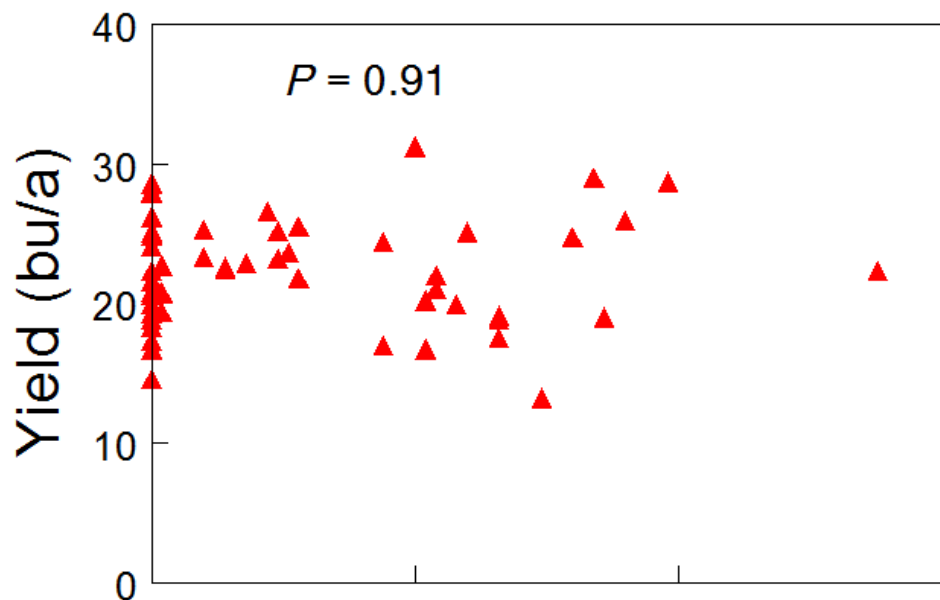


Percent of seeds damaged by BMSB in double-crop soybeans enclosed in cages infested with nymphs at the R2 and R4 growth stages. 2010.



Percent of seeds damaged by BMSB in double-crop soybeans enclosed in cages infested with nymphs at the R4 and R6 growth stages. 2011.





Number of BMSB adults and nymphs per row foot

Table 1. Comparison of injury to caged soybean by stink bug species and life stages, Maryland 2009

Development stage	Factors	Species; bugs per row foot	Damaged seed %	Yield (g)
R4 Full pod	Species	Green adult	16.4	61.4 b
		Green nymph	19.2	53.0 a
		BMSB nymph	17.4	59.4 b
	Density	0	12.2 c	57.9
		1	17.0 b	61.8
		2	18.2 b	58.8
		4	23.4 a	53.2
R6 Full seed	Species	Green adult	13.4	69.2
		BMSB adult	15.1	65.2
		BMSB nymph	14.5	69.3
	Density	0	12.4 c	67.0
		1	13.1 bc	70.8
		2	15.0 ab	69.2
		4	16.9 a	64.6

Herbert, 2011
Virginia Tech

Letters indicate means within a column are significantly different, (Tukey's P=0.05).

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Table 2. BMSB injury to caged soybeans in Virginia and Maryland, 2010

Location	Factors	Bugs per row foot; plant stage	Destroyed pods %	Damaged seed %	Yield (g)
Virginia	Stink bug density	0	10.2	47.5	119.8
		1	11.3	53.2	95.9
		2	10.5	44.3	93.7
		4	14.7	56.3	83.9
	Soybean development stage	R4	14.2 a	52.6	88.1
		R6	9.2 b	48.1	108.6
Maryland	Stink bug density	0	25.1 ab	10.8 b	115.1 a
		1	23.4 b	22.9 a	99.6 ab
		2	25.1 ab	23.3 ab	116.3 ab
		4	33.3 a	28.9 a	91.1 b
	Soybean development stage	R2	14.2 b	7.2 b	122.1 a
		R4	39.3 a	35.8 a	89.0 b

(Tukey's P=0.05).

Herbert, Virginia Tech, 2011

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Soybean Cages Study

Conclusions

- **BMSB is not more damaging than green stink bug, based on the 2009 cage studies**
- Infestation beginning at R2 did not result in significant seed damage or yield loss
- Seed quality was reduced with infestations of 1 and 2 per row foot at the R4 and R6 stages, respectively

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Soybean Cages Study

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- **It took 4 stink bugs per row foot to cause yield loss, and only when feeding was initiated at R4**
- Field perimeter treatments may be used as a control strategy
 - Need additional research
- Initial insecticide efficacy trials suggest most products are working for initial knock down
- Additional work needed to determine residual activity

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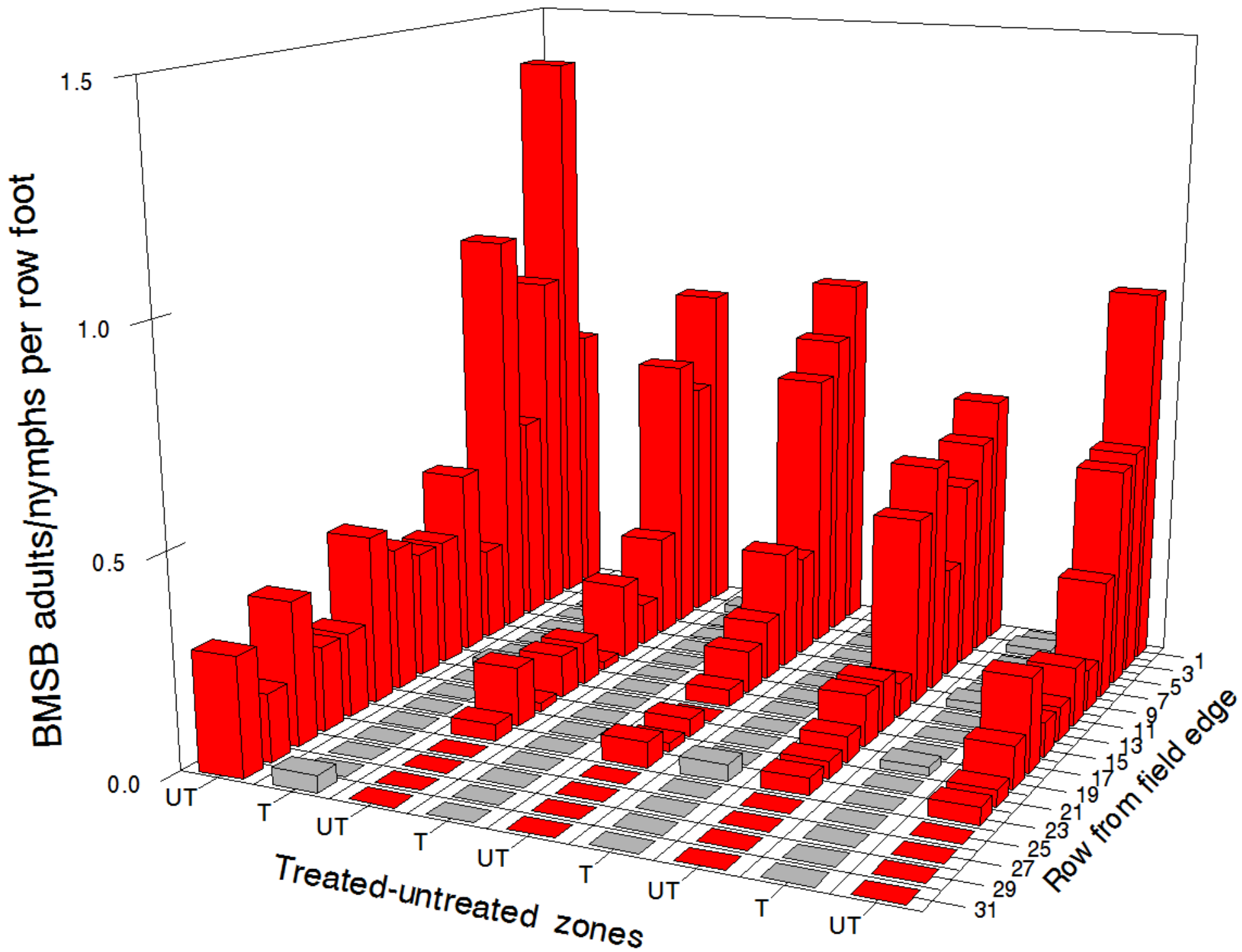
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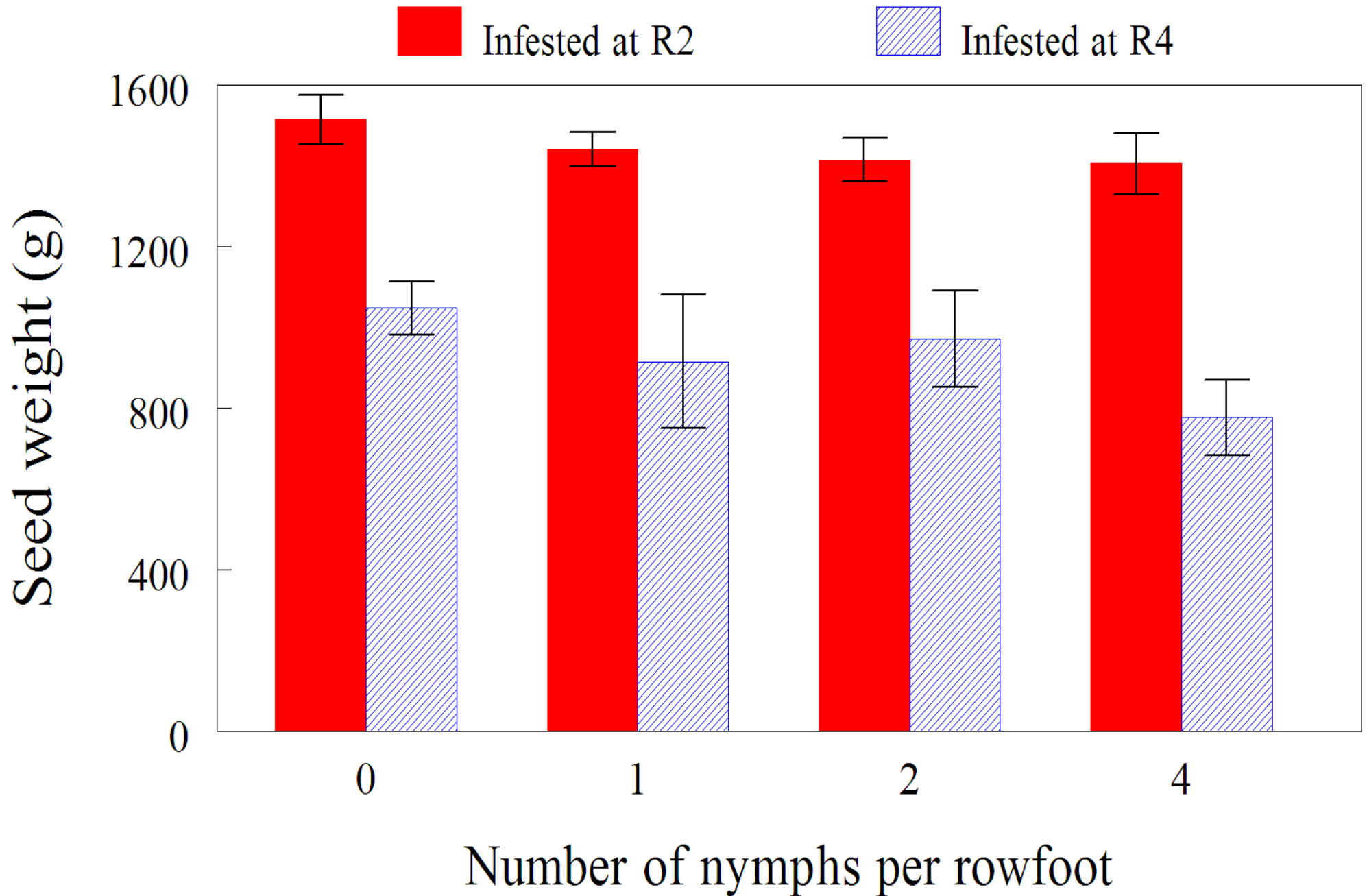
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Questions?





Seed weight per 20 rowfeet of double-crop soybean plants enclosed in cages infested with BMSB nymphs at the R2 and R4 growth stages. 2010.



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