BMSB impact on vegetable and field crops in the Mid-Atlantic and research plans for 2011

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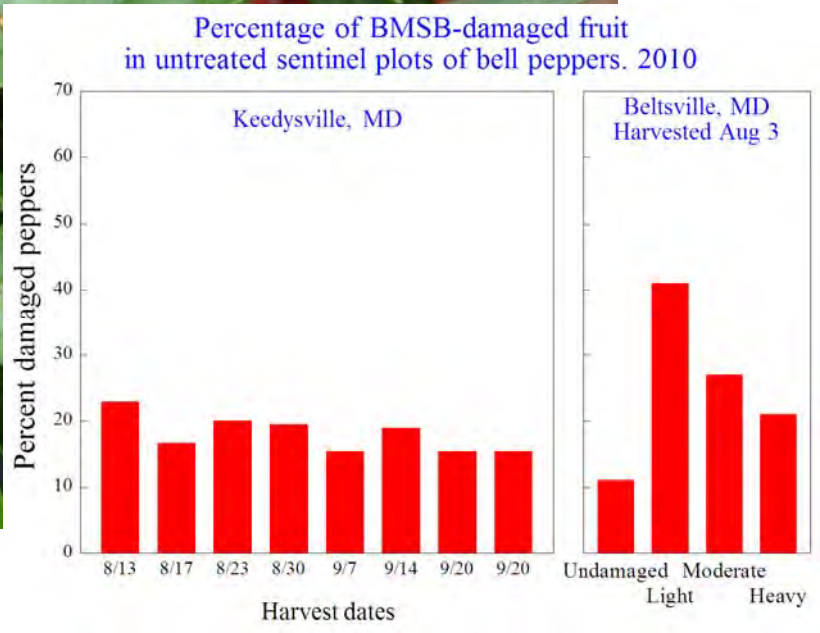
MD - Cerruti Hooks, Terry Patton, Jerry Brust, Stan Fultz, **Emily Zobel**


Percentage of BMSB-damaged fruit
in untreated sentinel plots of bell peppers. 2010
Keedysville, MD
Beltsville, MD
Harvested Aug 3
Percent damaged peppers
0
10
20
30
40
50
60
70
8/13
8/17
8/23
8/30
9/7
9/14
9/20
9/20
Harvest dates
Undamaged
Light
Moderate
Heavy

Pepper Studies (NE-IPM, IR-4, and Industry Funding)

Evaluate field efficacy of selected insecticides (NJ, DE, MD, VA)

Registered systemic and non-systemic products.

Sprays needed? Best residual activity?

Best treatment during fruiting and harvest?

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Manipulative experiments to separate effects of adult and nymphal feeding.

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Examine relative infestations and damage in replicated plots of bell, banana, hot varieties.

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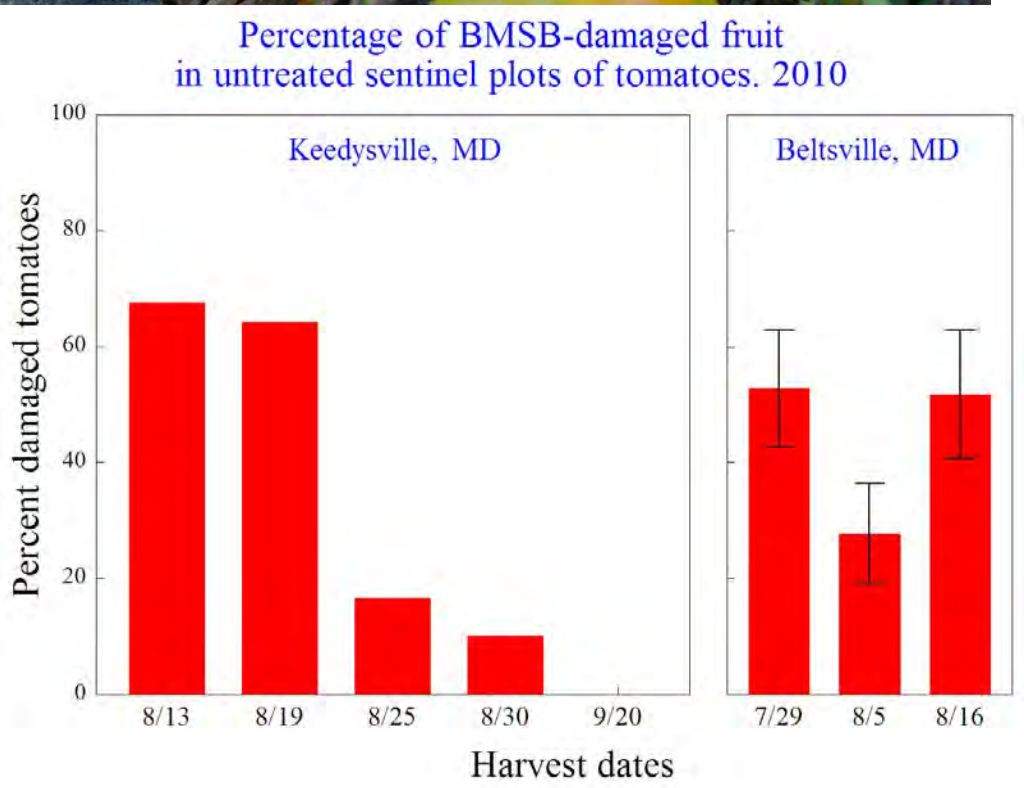
Determine parasitism levels by native egg parasitoids in peppers (MD).

Sentinel egg masses to monitor parasitism in different pepper varieties.


Percentage of BMSB-damaged fruit
in untreated sentinel plots of tomatoes. 2010
Keedysville, MD
Beltsville, MD
Percent damaged tomatoes
100
80
60
40
20
0
8/13
8/19
8/25
8/30
9/20
7/29
8/5
8/16
Harvest dates

Tomato Studies (MD, VA; Industry Funding)

Evaluate field efficacy of selected insecticides.

Foliar and systemic conventional products plus organic treatments.

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Lima Bean Studies (DE)

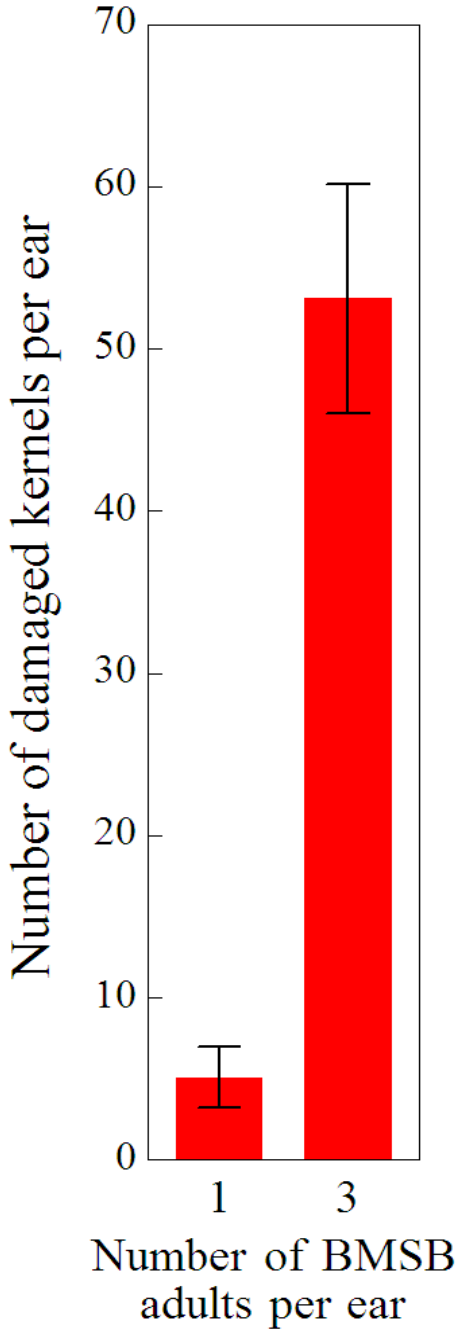
Develop monitoring methods

Compare field infestations with captures in vane traps.

Assess extent and nature of feeding injury

Determine parasitism levels by native egg parasitoids in peppers.

Sentinel egg masses to monitor parasitism in lima beans over time.


70
60
50
40
30
20
10
0
Number of damaged kernels per ear
1
3
Number of BMSB adults per ear

Sweet Corn-BMSB Project
(MD; supported by SEW Friel Co. and Syngenta Seeds)

Assess incidence of infestations in relation to plant growth stage, planting date and field location.

- **Involve weekly sampling of 50+ fields (6,700 acres) for processing**
- **Distributed south to north on the Delmarva Peninsula**
- **Focus on a 10-day period prior to harvest**

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Describe colonization patterns and within-field spatial distribution in relation to surrounding habitats.

- **Characterize fields based on % perimeter adjacent to woodlots, other crops, or non-cropped open areas.**
- **Is it possible to identify 'high risk' fields based on surrounding habitat?**

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Develop an efficient scouting program and an effective management strategy.

- **Can targeted areas of the field be scouted?**
- **Can visits be restricted to specific growth stages?**
- **Changes in silk spray schedules and insecticides needed?**

Multiple Veg Crop Studies (MD)

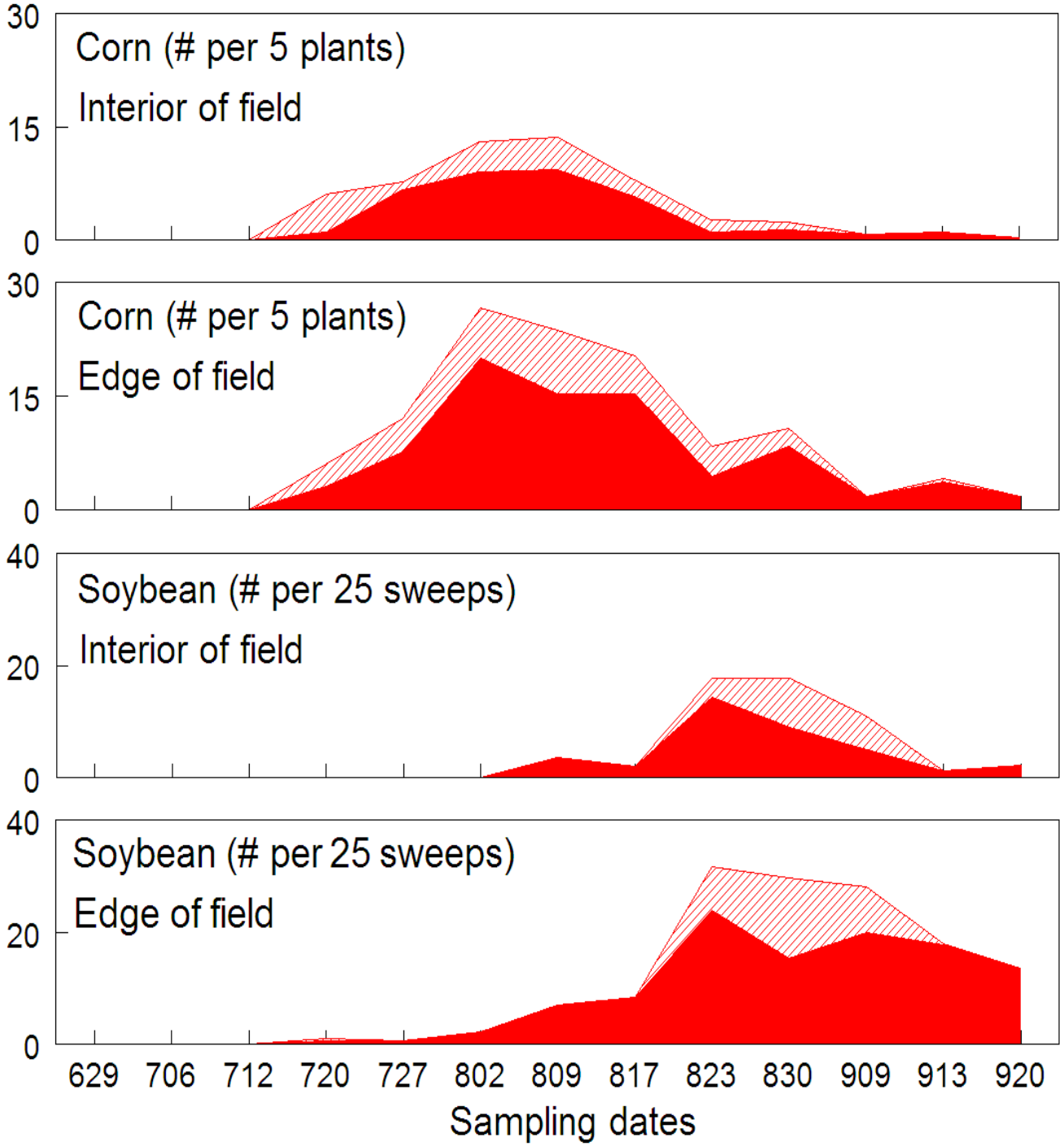
Evaluate relative susceptibility of different vegetable families as hosts for BMSB and determine the economic impacts of foliage versus fruit feeding.

Side-by-side plantings of sweet corn, green beans, summer squash, pepper, and tomato.

Plot design duplicated at three farm locations

Measurements per unit of crop area to quantitatively compare relative host susceptibility.

Infestation levels over time compared with trapping data.



Brown Marmorated Stink Bug Relative Abundance Edge vs. Interior

Adults

Nymphs

Data from Keedysville, WMREC, 2010


G1
E-1


G1
I-1

Field cage studies – MD, DE, VA

- **Introduce green or BMSB adults or 5th instars at R2, R4 and R6 soybean growth stages**
- **Cage size= 6 ft x 6 ft (VA), 12 ft x 12 ft (MD)**
- **Stink bug densities = 0, 1, 2, or 4/row ft**
- Infestation time = 2 wk
- BMSB killed before removing cages
- Recorded number and type of pods, seed wt and quality, SB injured seeds

P-values from soybean field cages with densities of 0, 1, 2, and 4 stink bugs/row ft in Maryland, 2009

Factor	R4		R6		
	Green nymphs	BMSB nymphs	Green adults	BMSB adults	BMSB nymphs
Normal seed (%)	0.0001 (-)	0.0054 (-)	0.4248	0.0026 (-)	0.0013 (-)
Deformed seed (%)	0.0381 (+)	0.0494 (+)	0.8198	0.6657	0.8763
Diseased seed (%)	0.8413	0.0001 (-)	0.6088	0.3593	0.1046
Punctured seed (%)	0.0001 (+)	0.0001 (+)	0.2160	0.0001 (+)	0.0001 (+)
Yield (g)	0.0888	0.0384 (-)	0.8926	0.4124	0.4330
Total seed	0.2451	0.0167 (-)	0.9808	0.2823	0.4598

(+) = increasing response
(-) = decreasing response

D. Owens & A. Herbert, Virginia Tech
G. Dively, Univ. of Maryland
J. Whalen, Univ. Delaware

P-values from soybean field cages with densities of 0, 1, 2, and 4 BMSB nymphs/row ft in Virginia and Maryland, 2010

Factor	Virginia		Maryland		Combined
	R4	R6	R2	R4	R4
Normal seed (%)	0.2581	0.2770	0.0006 (-)	0.2086	0.5247
Deformed seed (%)	0.2014	0.4980	0.0031 (+)	0.3145	0.8943
Diseased seed (%)	0.5374	0.0854	0.5762	0.0292 (-)	0.5936
Punctured seed (%)	0.0755	0.4766	0.0006 (+)	0.0270 (+)	0.3257
Mature pods (%)	0.0115 (-)	0.4447	0.4519	0.1324	0.3070
Flat pods (%)	0.0048 (+)	0.1429	0.4519	0.1324	0.5164
Shed pods (%)	0.3602	0.1112	---	---	0.9477
Seed weight (g)	0.1710	0.5879	0.2411	0.0194 (-)	0.0057 (-)
Total seed	0.2853	0.3355	0.3268	0.5496	0.7334

(+) = increasing response
(-) = decreasing response

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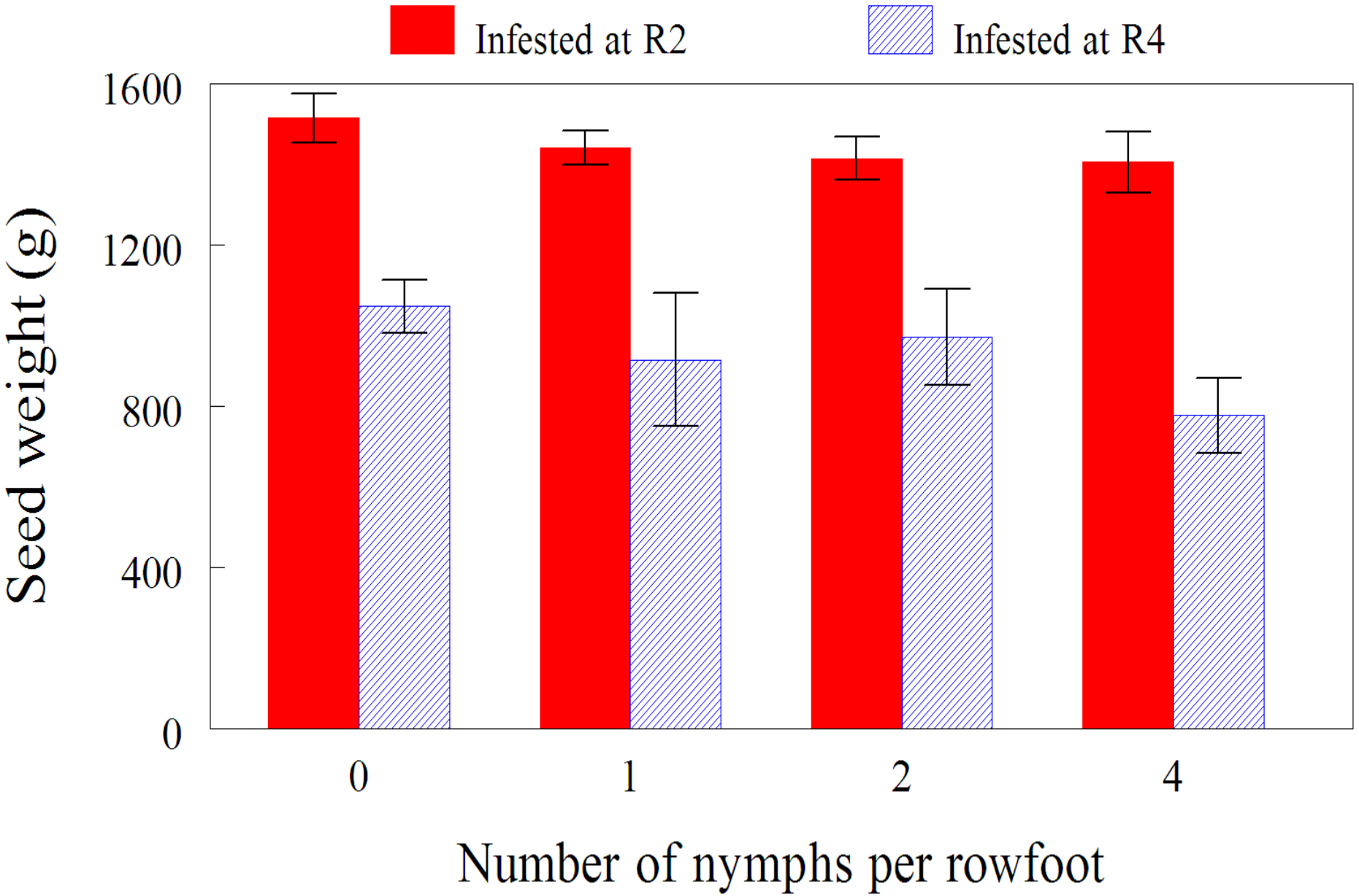
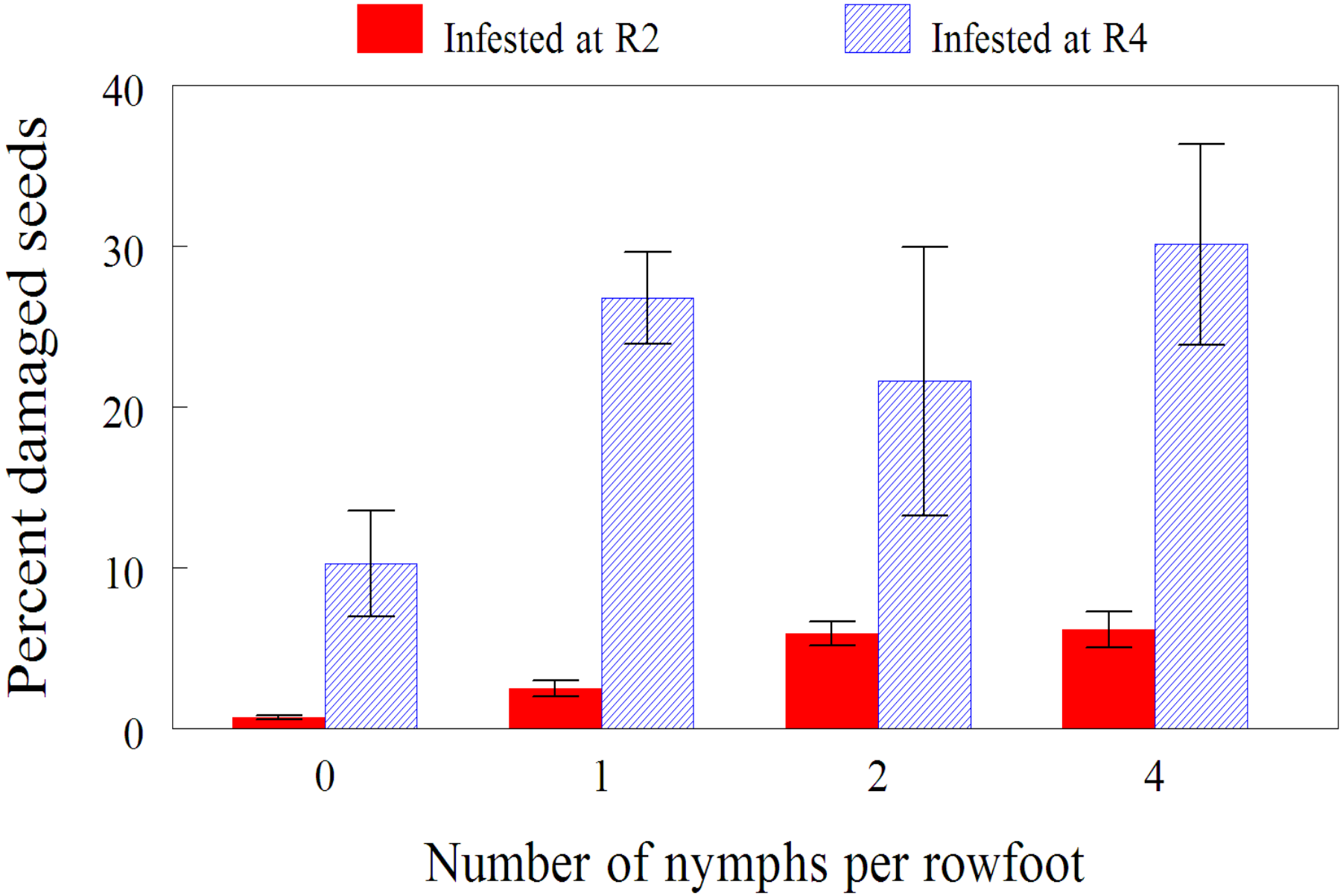
Seed weight per 20 rowfeet of double-crop soybean plants enclosed in cages infested with BMSB nymphs at the R2 and R4 growth stages. 2010.



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






Soybean Studies (MD, VA, DE; Funding by State Soybean Boards)

Examine spatiotemporal infestation patterns in different soybean landscapes.

- **Are infestations associated with woodlots, other crops, or non-cropped open areas?**
- **How far do infestations extend into fields?**

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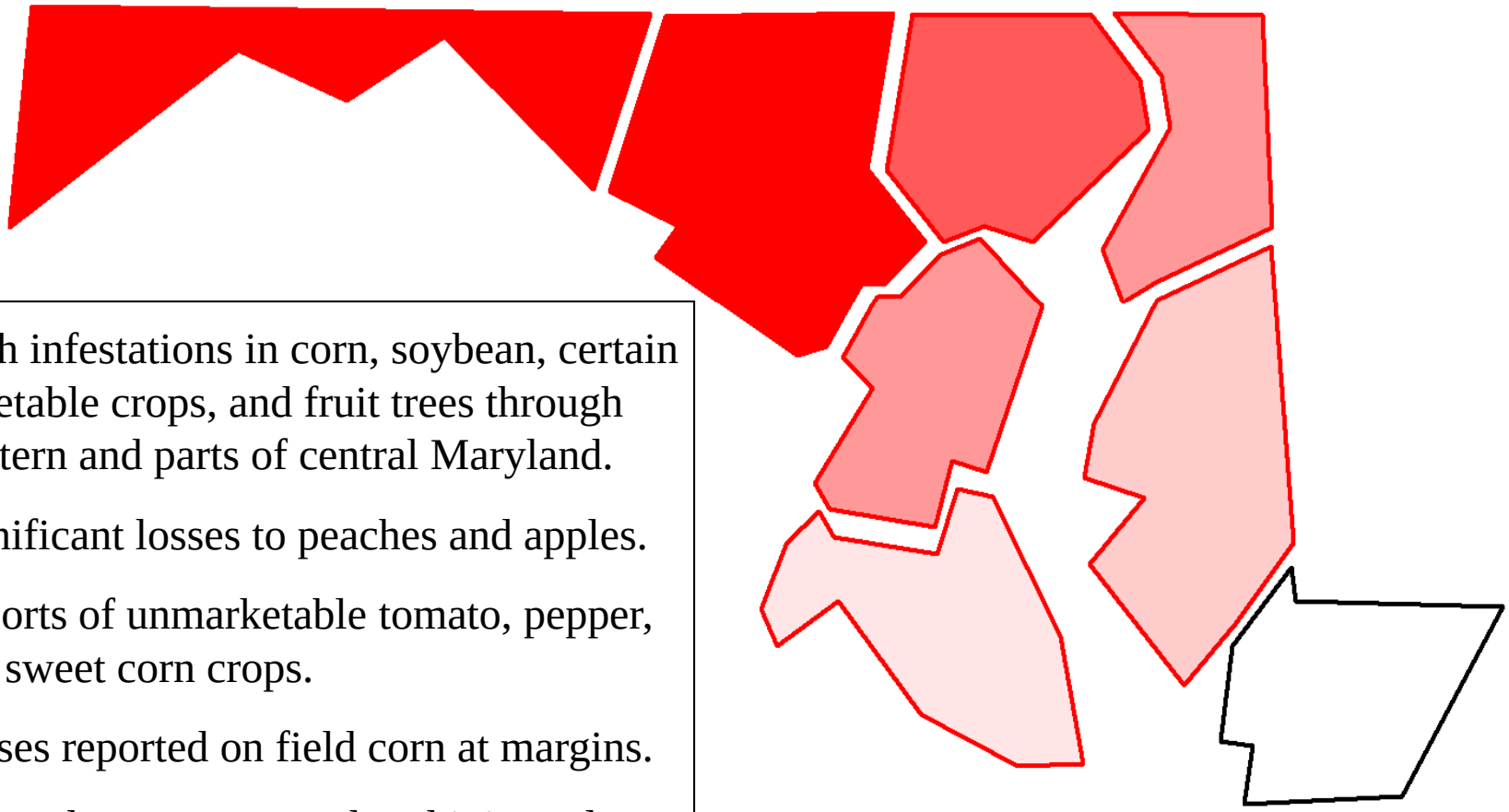
Continue surveys to determine the distribution of infestations in soybean fields.

2010 Range of Brown Marmorated Stinkbug Detected in Soybean Fields



High infestations in corn, soybean, certain vegetable crops, and fruit trees through western and parts of central Maryland.

Significant losses to peaches and apples.

Reports of unmarketable tomato, pepper, and sweet corn crops.

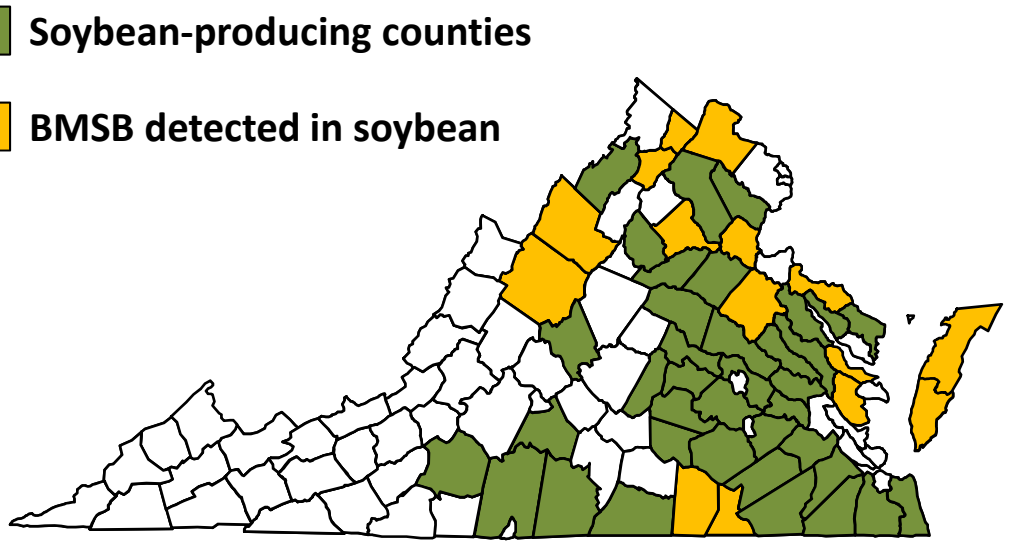
Losses reported on field corn at margins.

Delayed senescence and pod injury along margins of soybean fields

*Intensity of red in regions depict the severity of field infestations

Survey of BMSB in Virginia, 2010

- Surveyed 52 soybean fields in 30 counties
- Dates: 2 Aug.-1 Oct.
- First found on R1-stage soybean on 3 Aug. (Culpeper County)



- Detected in Accomack, Augusta, Brunswick, Caroline, Clarke, Culpeper, Gloucester, Greensville, Loudoun, Middlesex, Northampton, Rockingham, Stafford, Warren, and Westmoreland, for a total of 15 counties
- When present, the mean number of brown marmorated stink bugs per 15 sweeps ranged from 1-12
- Weekly reports posted on Virginia Ag Pest Advisory

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Field cage experiments

In-field paired treated and untreated plots along invasion gradients.

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Evaluate the efficacy of registered and new candidate insecticides.

Evaluate effectiveness of perimeter treatments to prevent spread of infestations into fields.

Field Corn Studies (MD, DE; Funding by MD Grain Producers Utilization Board)

Examine spatiotemporal infestation patterns in different plant-corn landscapes.

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Determine effects of nymphal and adult feeding on kernel fill and damage and mycotoxin levels.

Ears bagged with varying stink bug densities at different stages of ear development.
Similar studies with bagged sweet corn ears.

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