

Biology, Ecology, and Management of Brown Marmorated Stink Bug in Orchard Crops, Small Fruit, Grapes, Vegetables, and Ornamentals



Funding



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

Specialty Crop Research Initiative
Grant #2011-01413-30937

Collaborating Institutions



Cornell University



UNIVERSITY OF
MARYLAND



Virginia Tech



Small Fruit Team

Principal Investigators

- Cesar Rodriguez-Saona (leader), Rutgers University
- Dean Polk, Rutgers University
- Vaughn Walton, Oregon State University
- Doug Pfeiffer, Virginia Tech University
- Bryan Butler, University of Maryland

Post-docs/Students

- Nik Wiman, Oregon State University
- Joyce Parker, Rutgers University
- Sanjay Barnet, Virginia Tech University

Characterizing damage of brown marmorated stink bug in OR and NJ blueberries

Nik Wiman, Joyce Parker, Vaughn Walton, Cesar Rodriguez-Saona, Zoe Milburn, Bryan Smith, Bernadine Strik, David Bryla, Chad Finn

Methods – Rutgers “Bag-a-bush”

Duke

Early maturing variety
(Late June - Early July)
High commercial value

Bluecrop

Mid maturing variety
(July)
High commercial value

Aurora

Late maturing variety
(Early Aug - Early Sept)
High commercial value

- OSU and NJ Research Farm, randomized block of blueberry varieties
- 10/clusters bush bagged with organza after fruit-set
 - Clusters thinned to 10 berries if needed
 - Exclude other insect damage
- 10 bushes/treatment (reps)
- Treatments: 0, 2, 5, 10/bugs per cluster
 - Field-collected bugs
- After one week of feeding, bugs moved to a new cluster
 - Dead BMSB replaced

New Jersey



Oregon

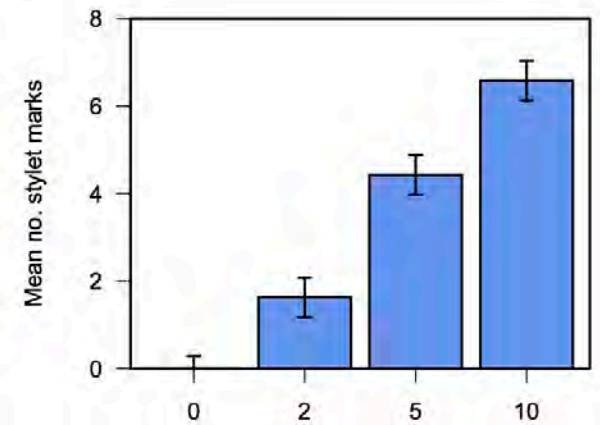
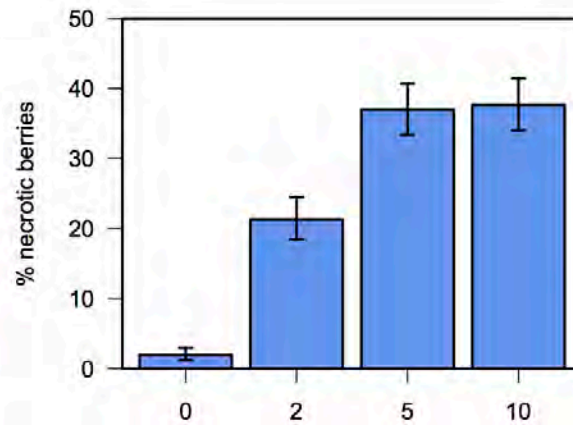
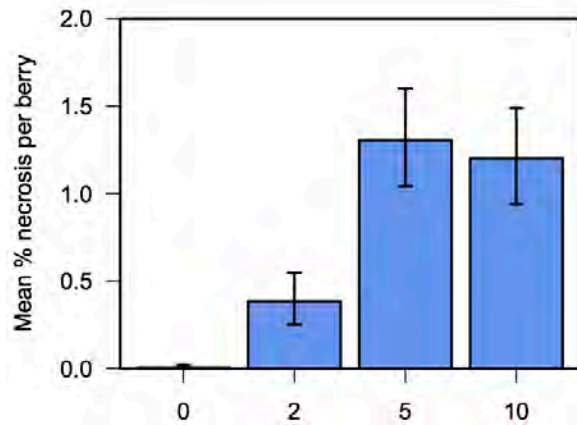
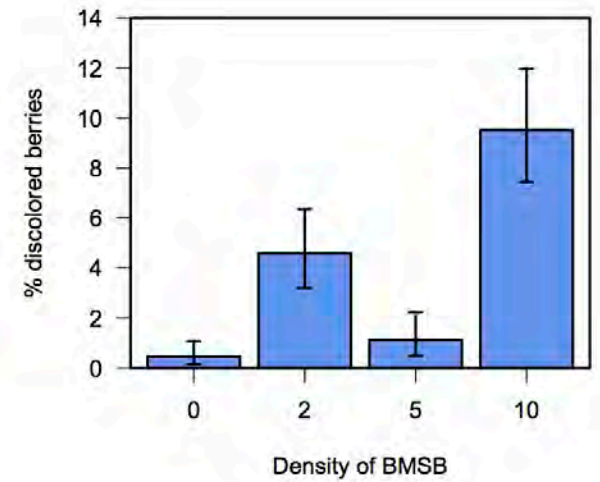
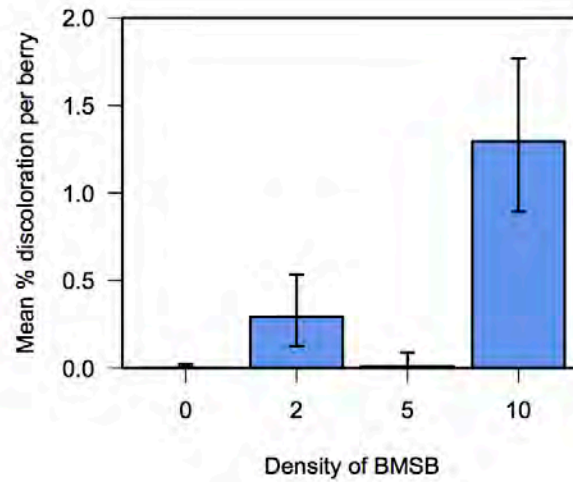
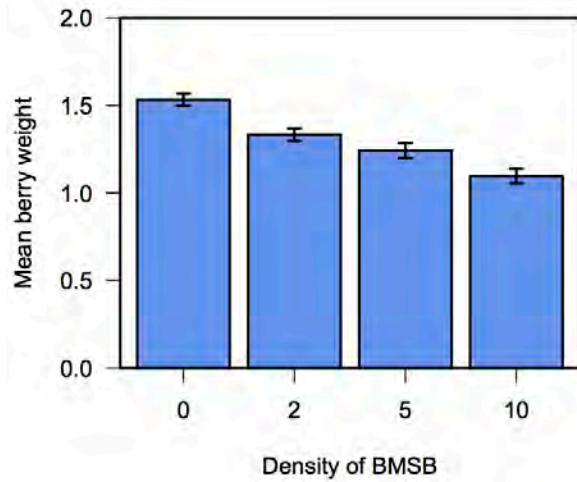


Analysis at harvest

- Acid fuchsin dyed stylet sheaths
- Each berry weighed and examined
 - Necrosis
 - Discoloration
 - Number stylet sheaths

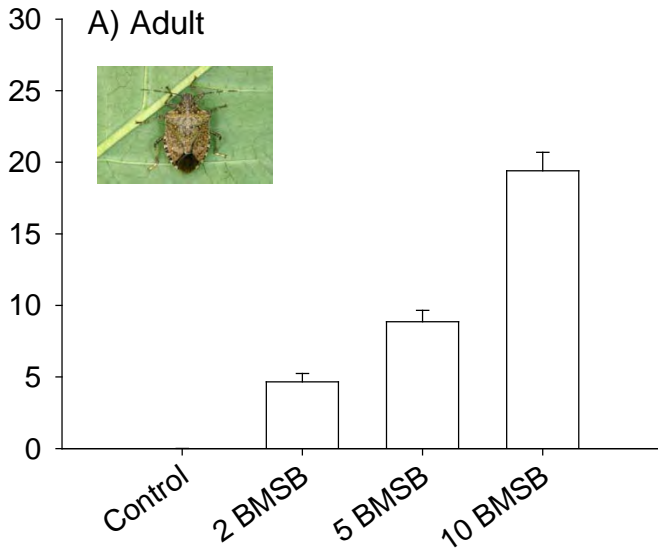


Significant damage effects on Duke

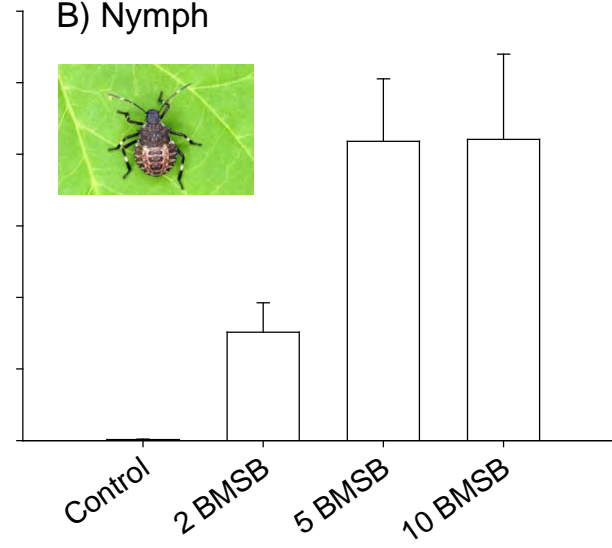


Mean number of stylet marks/treatment

A) Adult

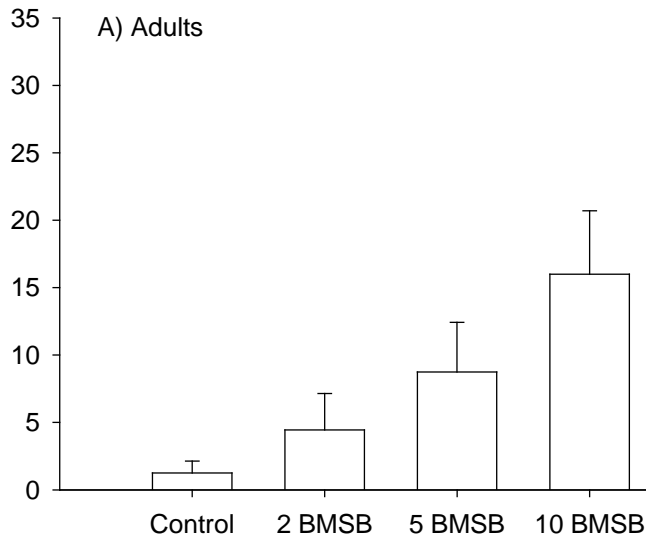


B) Nymph

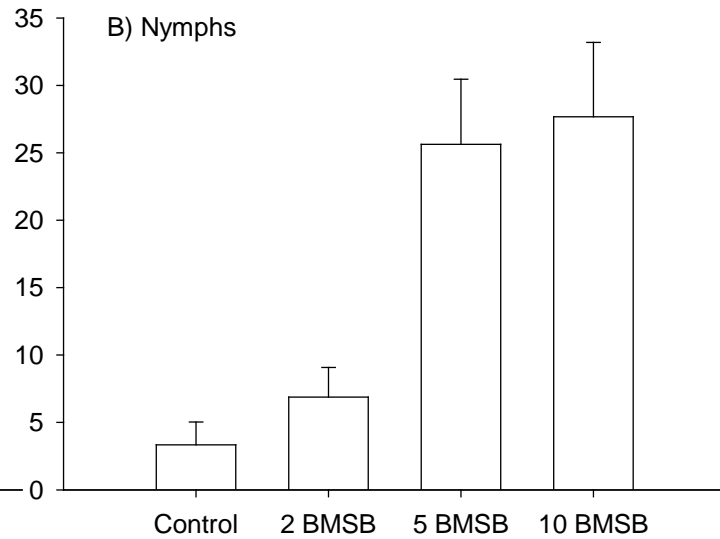


Mean % necrosis/treatment

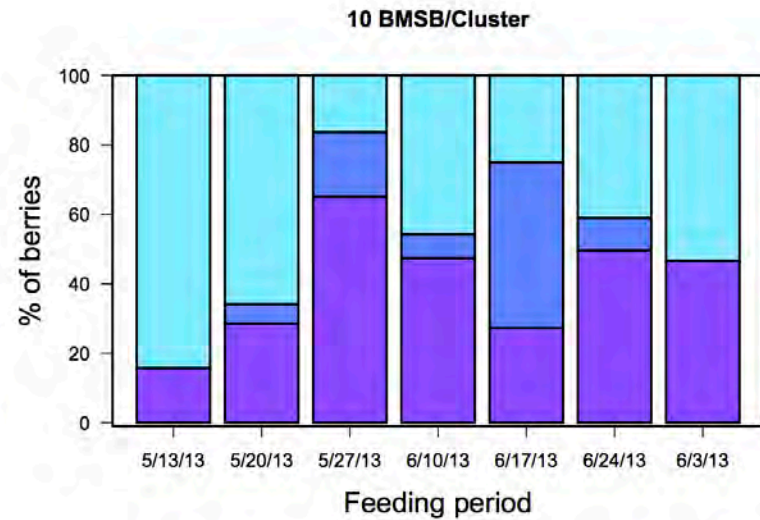
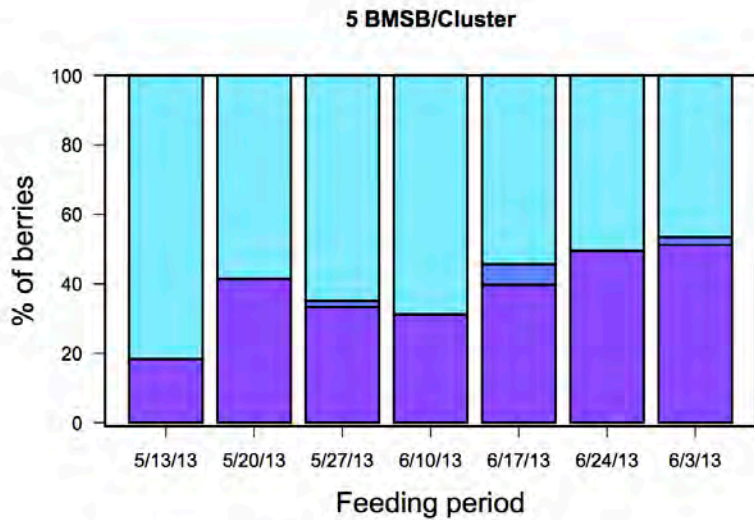
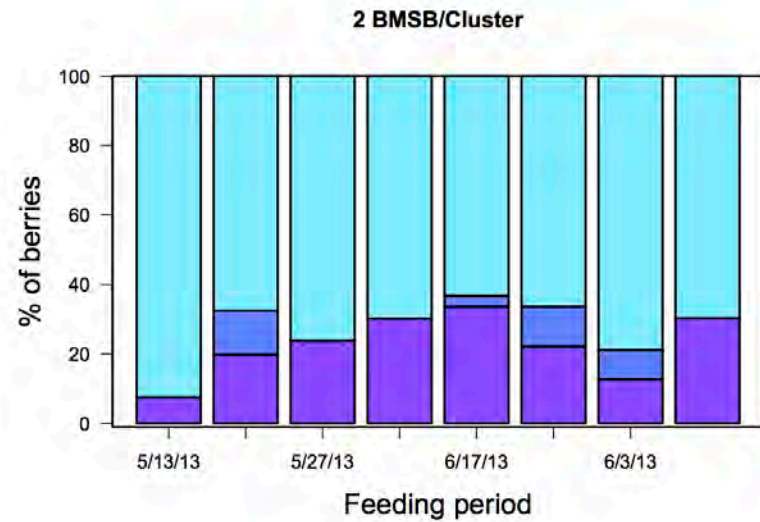
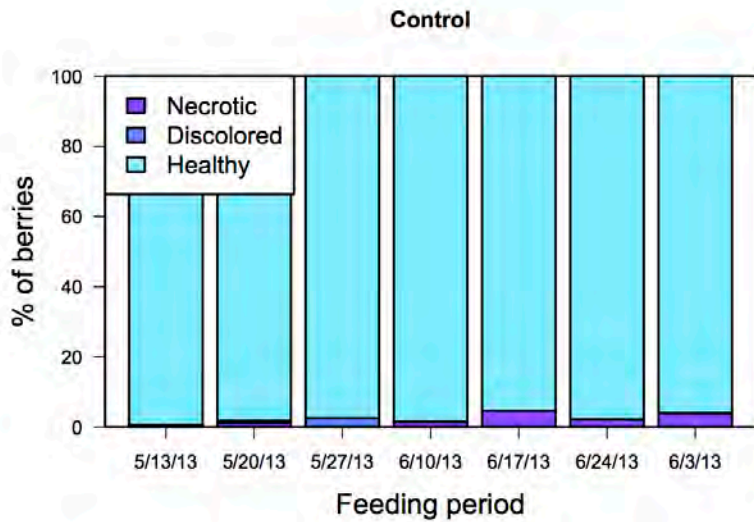
A) Adults



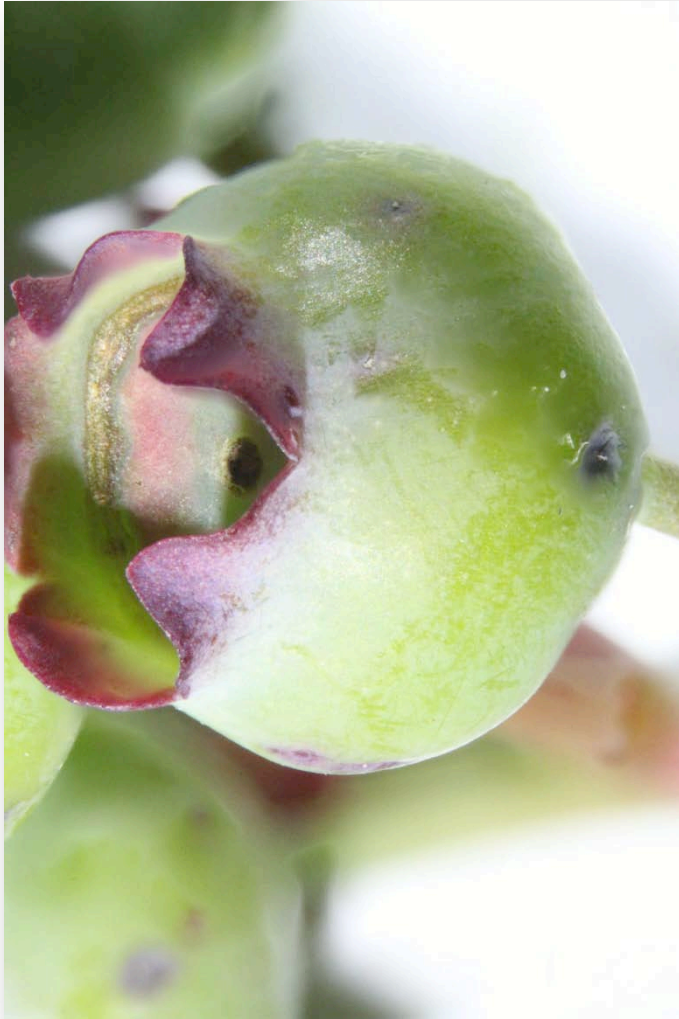
B) Nymphs



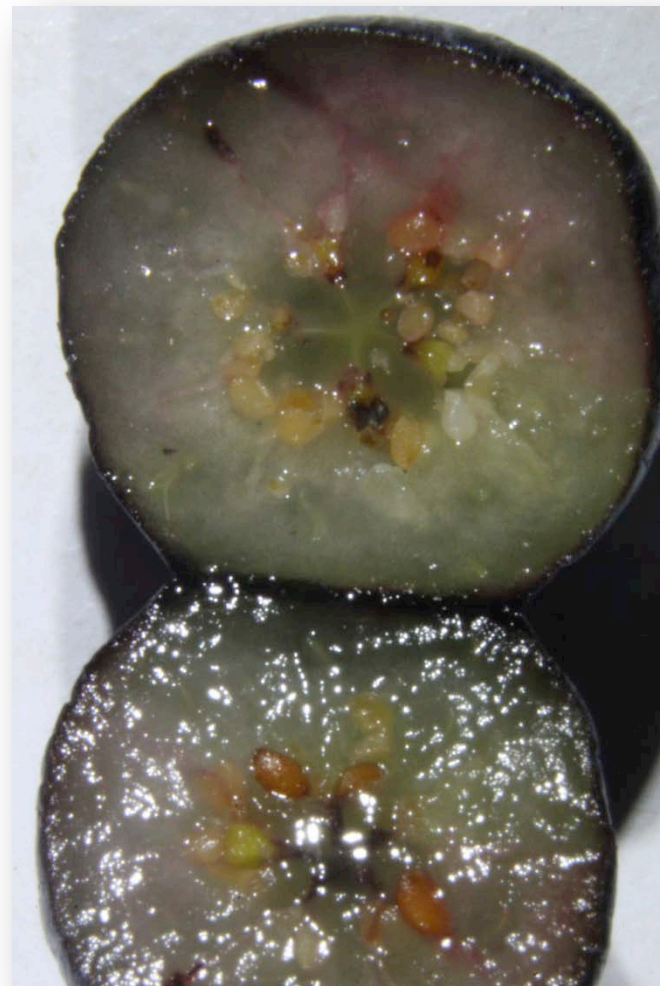
Damage Phenology



Fresh damage- Stylet sheaths and discoloration



Fresh damage – mature berries



Mature damage - Shrivel and necrosis



Premature ripening

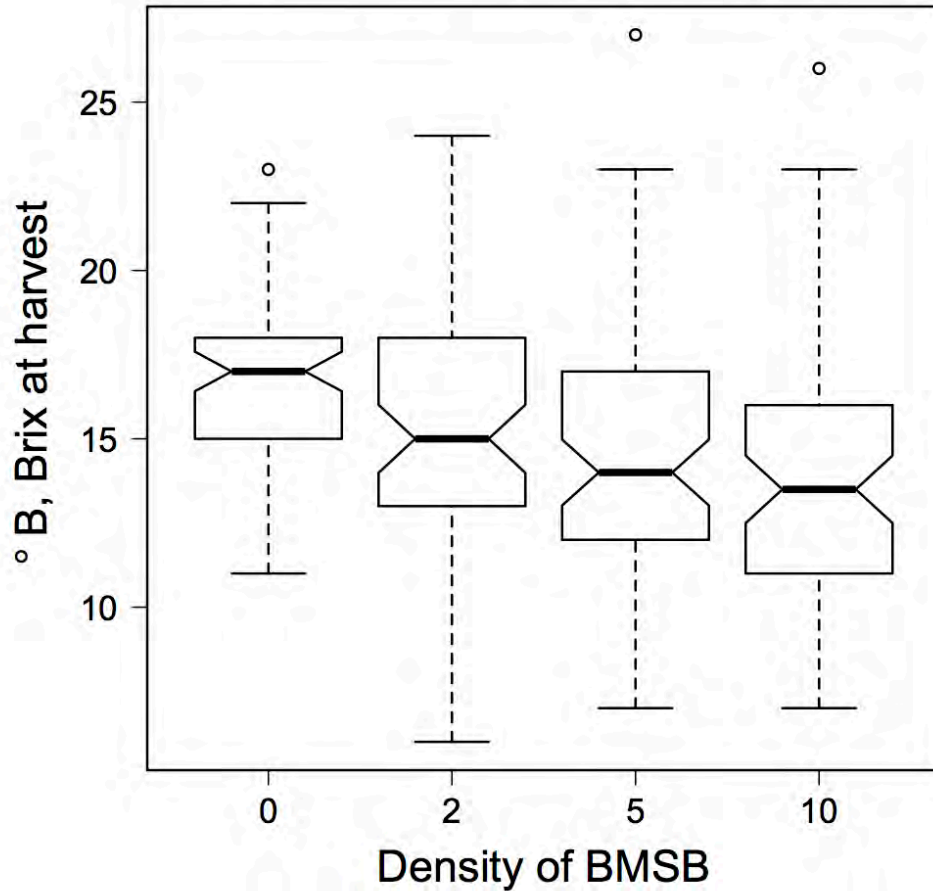
Unbagged clusters



Bagged clusters

BMSB quality effects: brix

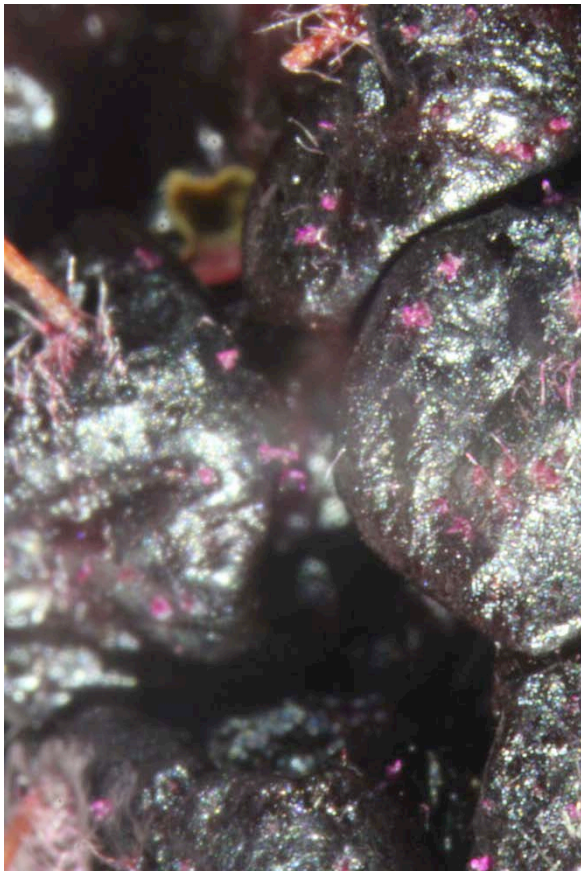
BMSB Adults on Duke Blueberries 2013



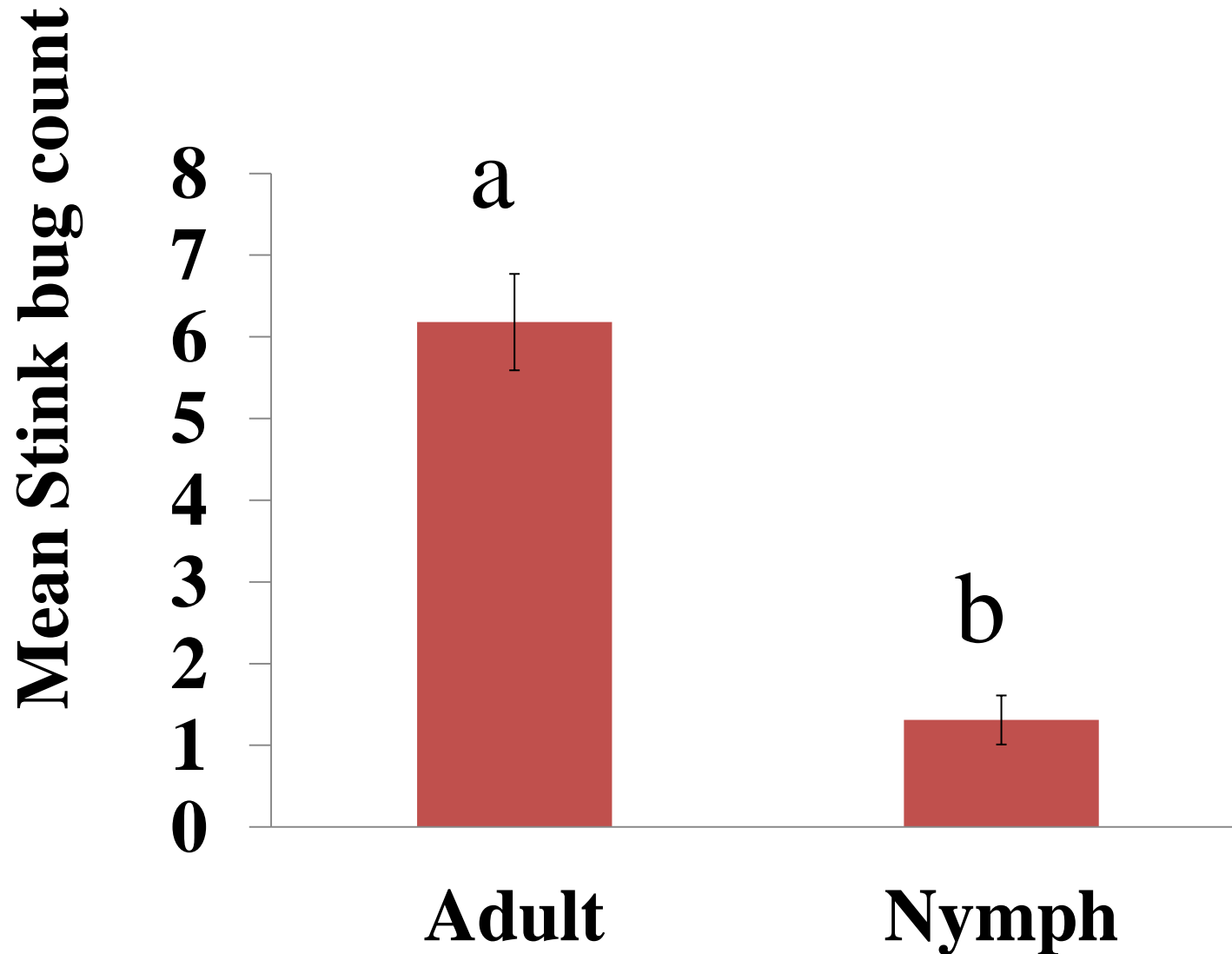
All densities of BMSB resulted in significantly lower brix @ harvest

10.78 on 3 and 249 DF, p -value: 1.101e-06

Blackberry Damage



Pentatomids in Virginia Raspberries



Pentatomids in Virginia Raspberries

Year	Shannon-Weaver diversity (H')	Shannon's equitability (E_H)
• 2008	1.336	0.580
• 2009	1.350	0.649
• 2011	1.180	0.660
• 2012	1.522	0.849
• 2013	1.503	0.772

Pentatomids in Virginia Raspberries

Stink bug species	2008	2009	2011	2012	2013
Brown marmorated stink bug	0.000	0.000	0.046	0.034	0.186
Brown stink bug	0.242	0.323	0.103	0.073	0.069
Twice stabbed stink bug	0.030	0.208	0.030	0.085	0.040
Dusky stink bug	0.440	0.007	0.003	0.014	0.020
Green stink bug	0.020	0.004	0.007	0.050	0.035
Harlequin bug	0.000	0.000	0.007	0.009	0.020
Spined soldier bug	0.000	0.000	0.010	0.000	0.000
One spotted stink bug	0.027	0.000	0.000	0.000	0.000
Red shoulded stink bug	0.017	0.000	0.000	0.000	0.000
Juniper stink bug	0.003	0.000	0.000	0.000	0.000
<i>Thyanata calceata</i>	0.003	0.000	0.000	0.000	0.000
<i>Coenus delius</i>	0.003	0.000	0.000	0.000	0.000
<i>Basana calva</i>	0.000	0.003	0.000	0.000	0.000
<i>Dendrocoris humeralis</i>	0.000	0.003	0.000	0.000	0.000
Rough stink bug	0.000	0.003	0.000	0.000	0.007
<i>Hymenarcys nervosa</i>	0.000	0.003	0.000	0.000	0.000











09.05.2012

Summary

- BMSB feeds and (reproduces) in blueberries, raspberries, and blackberries. No damage by BMSB has been observed in cranberries.
- BMSB populations in New Jersey blueberry farms remained low.
- BMSB populations increased considerably in Oregon in north Willamette blueberry and caneberry farms.
- Control measures have not been implemented.
- Contamination risks are a great concern to growers.
- In sensory analysis, subjects were able to detect BMSB contaminated blackberries.
- Droppings produced by stink bugs as they are feeding can add an unpleasant taste.

Summary (cont.)

- In studies on blackberries at OSU, BMSB stylet feeding tubes were observed primarily on individual drupelets, also observed feeding between drupelets.
- BMSB feeding tended to cause an increase in necrotic berries.
- In studies on blueberries at OSU and Rutgers, feeding tended to induce early ripening. Feeding caused increases in discoloration and necrosis, as well as significant decreases in brix at harvest.
- Even low rates of feeding (2 BMSB/cluster/week) caused unacceptable high levels of damage to blueberries.