



Home Invasion by the Brown Marmorated Stink Bug

BEN CHAMBERS

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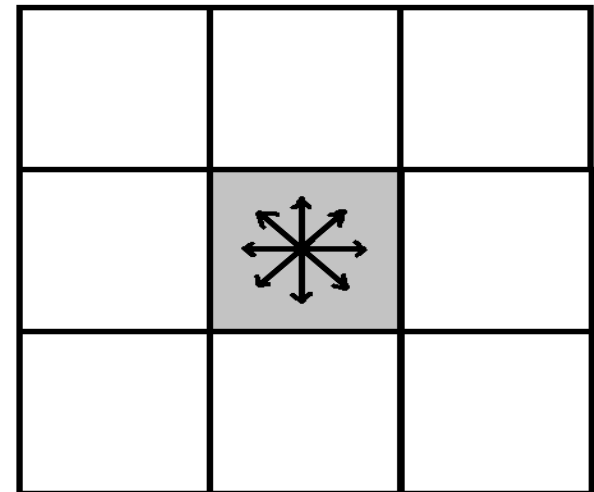
Efforts to Understand Home Invasion

- ▶ Movement direction on building exteriors
- ▶ Minimum gap size navigable
- ▶ Effects of piles of dead left from previous years
- ▶ Attic access and site selection




BMSB Movement on Building Exteriors


- ▶ Through September and October, BMSB movement on building exteriors was recorded
- ▶ One data point taken per insect, repeat observations limited by time or by specimen collection
- ▶ Data taken from 12 buildings, but largely from one single-story house



Summed Movement Directions

- ▶ 269 measurements
- ▶ 66% with upward component

39	104	35
26		34
10	15	6

14%	39%	13%
10%		13%
4%	6%	2%

Minimum Gap Sizes Navigable

- ▶ BMSB groups were placed in boxes with apertures in the lids
- ▶ Boxes were laser-cut from 1/8 in hardboard
- ▶ Apertures were either slits or holes
 - ▶ Single slits 152 mm (6 in) by 5mm, 4mm, or 3mm in center
 - ▶ Four holes near corners, 10mm, 9mm, 8mm, or 7mm diameter
- ▶ Boxes were heated to encourage movement out of the boxes into net cages
- ▶ Bugs were given 5 hours to exit



Minimum Gap Sizes Navigable

- ▶ Each box contained 30 male and 30 female BMSB collected during overwintering site selection behavior
- ▶ Each aperture type and size received 2 trials, for n=120 bugs per treatment
- ▶ Bug pronotum width and height measured with digital caliper
- ▶ Height measurements were taken at the point where bugs lost the ability to move their legs



Gap Size Test Subjects

	Male	Female
Number of Individuals	465	465
Pronotum Average Width (mm)	7.47	8.33
Pronotum Maximum Width (mm)	8.25	9.43
Pronotum Minimum Width (mm)	6.00	7.04
Height Average (mm)	3.50	4.04
Height Maximum (mm)	4.00	4.60
Height Minimum (mm)	2.41	2.99

Gap Size Results

- ▶ Slit Gaps
 - ▶ Height predicts escape
 - ▶ No escapes from 3mm gap boxes
 - ▶ Only the “runts” were small enough to exit 3mm gaps, but did not
- ▶ Round Hole Gaps
 - ▶ Pronotum width predicts escape
 - ▶ While 10% of males in 7mm trial had pronotum less than 7mm wide, only one escaped in the allotted time



Aggregation with Dead BMSB

- ▶ Builds upon Toyama et al. (2006) aggregation study
 - ▶ Overwintering bugs tend to aggregate if they touch with antennae
- ▶ Dead BMSB placed in corner of box
- ▶ Live diapausing BMSB are placed in the box with dead BMSB, and allowed to settle
- ▶ Location distribution analyzed



Toyama, M., F. Ihara, and K. Yaginuma, 2006. Formation of Aggregations in Adults of the Brown Marmorated Stink Bug, *Halyomorpha Halys* (Stål) (Heteroptera: Pentatomidae). *Applied Entomology and Zoology* 41:309.

Choice of Refuges Containing Dead BMSB

- ▶ BMSB individuals are released into choice box with two refuges
- ▶ Refuges may be empty, or contain aggregations of diapausing BMSB or BMSB that died in diapause



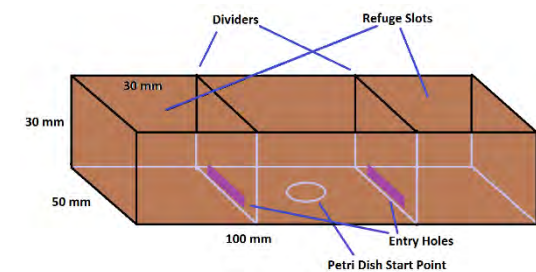
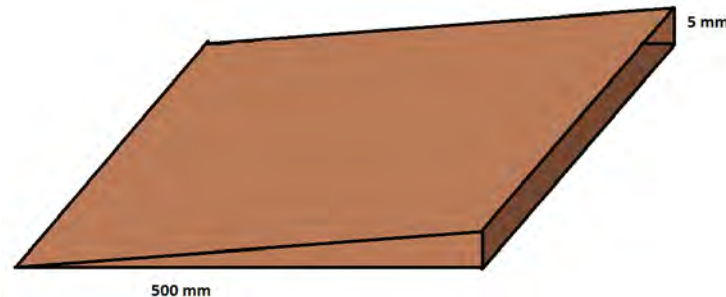
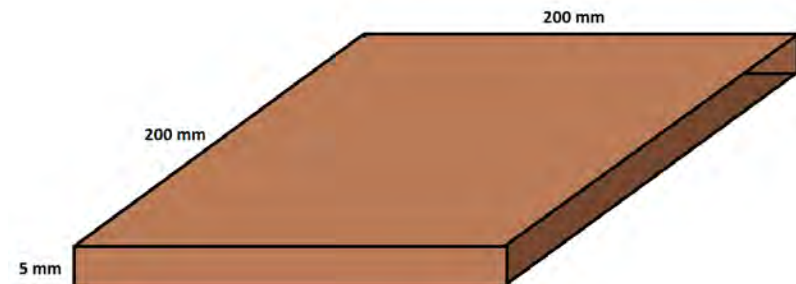
Attic Inspections

- ▶ Identify and characterize locations where BMSB entering diapause are likely to settle within attics
- ▶ Check attics for all possible points of ingress
- ▶ Evaluate presence of live and dead BMSB in and around openings
- ▶ Evaluate presence of live and dead BMSB in other “cozy” attic features
 - ▶ Insulation
 - ▶ Storage clutter
 - ▶ Building materials



Other Plans

- ▶ Preferred elevation of refuge entry relative to ground
- ▶ Preferred degree of tightness in refuge
- ▶ Preferred depth in refuge
- ▶ Effects of night-time exterior lighting on overwintering site selection
- ▶ Timing of entry and exit



Questions?

