

Brown Marmorated Stink Bug Activities in Ornamental Systems and Research Plans for 2011

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UNIVERSITY OF
MARYLAND
EXTENSION

Solutions in your community



Brown Marmorated Stink Bug: Ornamentals

- Ornamental host plants
- Patterns in ornamentals
 - Abundance, movement
 - Damage
- Research to date
- Future research plans

BMSB Ornamental Host Plants (56 genera, 80+ species)

Plant type	Common name	Genus	species
woody	glossy abelia	<i>Abelia</i>	<i>grandiflora</i>
woody	hedge maple	<i>Acer</i>	<i>campestre</i>
woody	Japanese maple	<i>Acer</i>	<i>palmatum</i>
woody	Norway maple	<i>Acer</i>	<i>platanoides</i>
woody	sycamore maple	<i>Acer</i>	<i>pseudoplatanus</i>
woody	red maple	<i>Acer</i>	<i>rubrum</i>
woody	sugar maple	<i>Acer</i>	<i>saccharum</i>
woody	maple	<i>Acer</i>	<i>spp.</i>
woody	serviceberry, shadbush	<i>Amelanchier</i>	<i>spp.</i>
woody	birch	<i>Betula</i>	<i>spp.</i>
woody	butterfly bush	<i>Buddleia</i>	<i> davidii</i>
woody	butterfly bush	<i>Buddleia</i>	<i>spp.</i>
woody	tea-oil camellia	<i>Camellia</i>	<i>oleifera</i>
woody	catalpa	<i>Catalpa</i>	<i>spp.</i>
woody	bittersweet	<i>Celastrus</i>	<i>spp.</i>
woody	hackberry	<i>Celtis</i>	<i>occidentalis</i>
woody	eastern redbud	<i>Cercis</i>	<i>canadensis</i>
woody	yellow wood	<i>Cladrastis</i>	<i>kentukea</i>
woody	gray dogwood	<i>Cornus</i>	<i>racemosa</i>
woody	redosier dogwood	<i>Cornus</i>	<i>sericea</i>
woody	Hawthorn	<i>Crataegus</i>	<i>spp.</i>
woody	Japanese cedar	<i>Cryptomeria</i>	<i>spp.</i>
woody	cypress	<i>Cupressus</i>	<i>spp.</i>
woody	Leyland cypress	<i>Cupressocyparis</i>	<i>leylandii</i>
woody	Russian olive	<i>Elaeagnus</i>	<i>angustifolia</i>
woody	winged euonymus	<i>Euonymus</i>	<i>alatus</i>
woody	Euonymus	<i>Euonymus</i>	<i>spp.</i>
woody	white ash	<i>Fraxinus</i>	<i>americana</i>
woody	ash	<i>Fraxinus</i>	<i>spp.</i>
woody	honey locust	<i>Gleditsia</i>	<i>triacanthos</i>
woody	Chinese hibiscus	<i>Hibiscus</i>	<i>rosa-sinensis</i>
woody	hibiscus	<i>Hibiscus</i>	<i>spp.</i>
woody	American holly	<i>Ilex</i>	<i>opaca</i>
woody	winterberry holly	<i>Ilex</i>	<i>verticillata</i>
woody	holly	<i>Ilex</i>	<i>spp.</i>
woody	walnut	<i>Juglans</i>	<i>nigra</i>
woody	goldenrain tree	<i>Koelreuteria</i>	<i>spp.</i>
woody	privet	<i>Ligustrum</i>	<i>spp.</i>
woody	tulip tree	<i>Liriodendron</i>	<i>tulipifera</i>
woody	honeysuckle	<i>Lonicera</i>	<i>spp.</i>

Plant type	Common name	Genus	species
woody	Star magnolia	<i>Magnolia</i>	<i>stellata</i>
woody	crab apple	<i>Malus</i>	<i>spp.</i>
woody	mimosa	<i>Mimosa</i>	<i>spp.</i>
woody	mulberry	<i>Morus</i>	<i>spp.</i>
woody	princess tree	<i>Paulownia</i>	<i>tortomosa</i>
woody	Paulownia	<i>Paulownia</i>	<i>spp.</i>
woody	sycamore	<i>Platanus</i>	<i>occidentalis</i>
woody	black cherry	<i>Prunus</i>	<i>serotina</i>
woody	Yoshino cherry	<i>Prunus</i>	<i>x. yedoensis</i>
woody	Ornamental fruit trees	<i>Prunus</i>	<i>spp.</i>
woody	firethorn	<i>Pyracantha</i>	<i>coccinea</i>
woody	firethorn	<i>Pyracantha</i>	<i>spp.</i>
woody	Bradford pear	<i>Pyrus</i>	<i>calleryana</i>
woody	oak	<i>Quercus</i>	<i>spp.</i>
woody	buckthorn	<i>Rhamnus</i>	<i>spp.</i>
woody	sumac	<i>Rhus</i>	<i>spp.</i>
woody	rugosa rose	<i>Rosa</i>	<i>rugosa</i>
woody	rose	<i>Rosa</i>	<i>spp.</i>
woody	Willow	<i>Salix</i>	<i>spp.</i>
woody	mountainash	<i>Sorbus</i>	<i>spp.</i>
woody	Spirea	<i>Spirea</i>	<i>spp.</i>
woody	Stewardia	<i>Stewardia</i>	<i>pseudocamellia</i>
woody	Japanese tree lilac	<i>Syringa</i>	<i>reticulata</i>
woody	lilac	<i>Syringa</i>	<i>spp.</i>
woody	linden	<i>Tilia</i>	<i>americana</i>
woody	basswood	<i>Tilia</i>	<i>spp.</i>
woody	elm	<i>Ulmus</i>	<i>spp.</i>
woody	blackhaw viburnum	<i>Viburnum</i>	<i>prunifolium</i>
woody	tea viburnum	<i>Viburnum</i>	<i>setigerum</i>
woody	viburnum	<i>Viburnum</i>	<i>spp.</i>
woody	zelkova	<i>Zelkova</i>	<i>serrata</i>
herbaceous/annual	cock's comb	<i>Celosia</i>	<i>argentea</i>
herbaceous/annual	chrysanthemum	<i>Chrysanthemum</i>	<i>spp.</i>
herbaceous/annual	spider flower	<i>Cleome</i>	<i>spp.</i>
herbaceous/annual	dahlia	<i>Dahlia</i>	<i>spp.</i>
herbaceous/annual	sunflower	<i>Helianthus</i>	<i>annuus</i>
herbaceous/annual	sunflower	<i>Helianthus</i>	<i>spp.</i>
herbaceous/annual	impatiens	<i>Impatiens</i>	<i>spp.</i>
herbaceous/annual	tiger lily	<i>Lilium</i>	<i>spp.</i>
herbaceous/annual	zinnia	<i>Zinnia</i>	<i>spp.</i>

BMSB - a new pest of woody plants



**Serviceberry
(Amelanchier sp.)**

Feeding only hosts

Feeding and reproducing hosts

Varietal differences

Temporal differences



BMSB - a new pest of woody plants



Damage:

- Wounding / wet spots
- Discoloration to foliage
- Tree stress ?
- Plant death reported (herbaceous)
- Disease transmission, secondary infections



BMSB - a new pest of woody plants



Movement onto Nursery Crops - Early Fall 2010

•Feeding on trunks
of trees

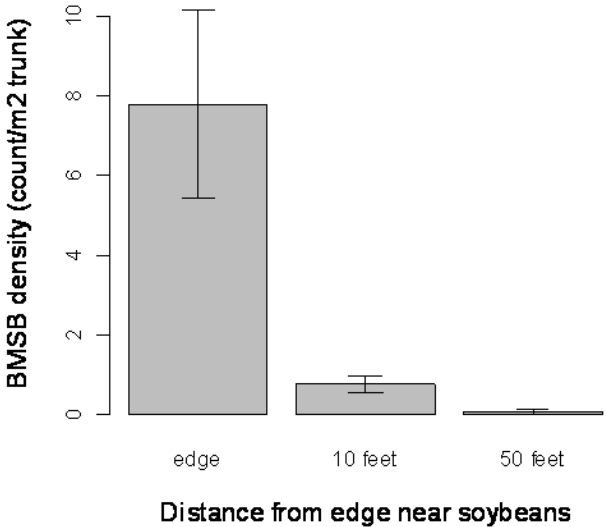


•Response to senescence
or harvest of crops?

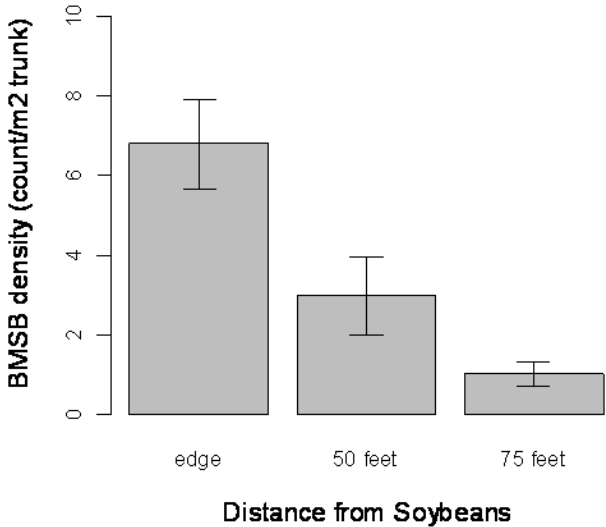
•Fattening up for winter?

BMSB densities with respect to crop edges at Ruppert Nursery

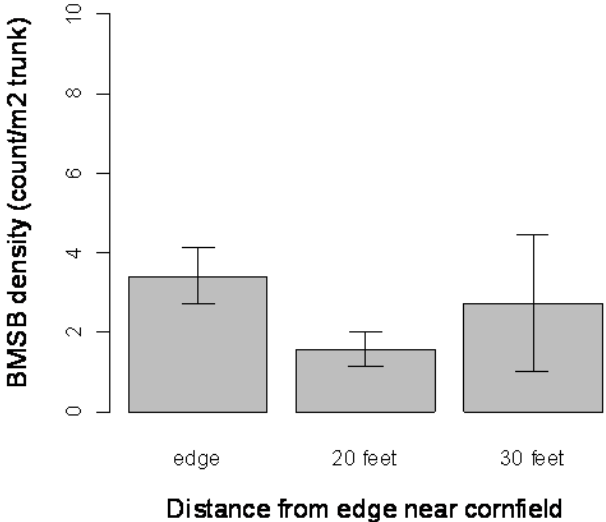
Ruppert: BMSB on maple (Red Sunset)



Ruppert: BMSB on sycamore (London Plane)



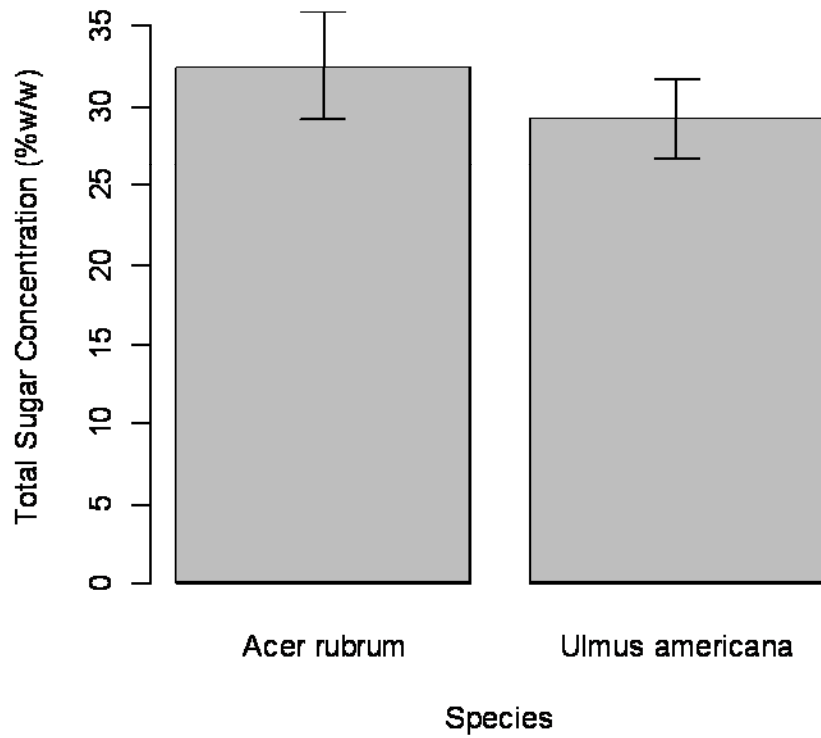
Ruppert: BMSB on maple (October Glory)



August 31, 2010

Ants and stinging Hymenoptera attracted to feeding wounds





**Sugar concentration in sap
of *Acer rubrum* and *Ulmus
americana***

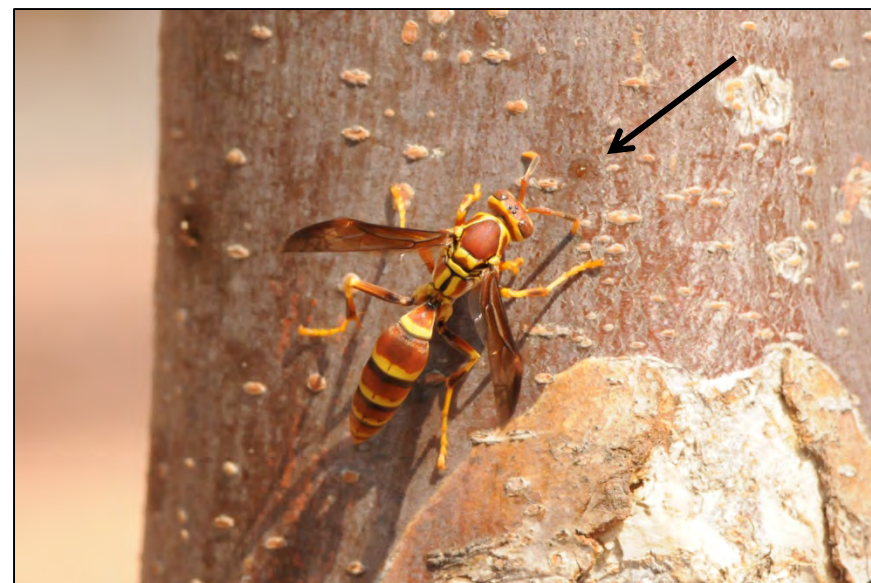
Table S1. Sugar concentrations (%w/w, mean \pm 1 SE) of different plant tissues compiled from the literature.

Resource	Sugar Concentration (\pm 1 SE)	n	References
Xylem	4.67 (\pm 2.7)	3	1, 2
Leaf Tissue	14.6 (\pm 8.43)	3	3
Phloem	19.28 (\pm 4.54)	18	4-17
Extrafloral Nectar	21.25 (\pm 5.15)	17	18, 19
Floral Nectar	23.08 (\pm 1.67)	190	19-26
Honeydew	24.05 (\pm 6.43)	14	6, 16, 19, 27
Wound Sap	42.64 (\pm 30.15)	2	19
Overall	22.56 (\pm 1.44)	247	

Sugar concentration:

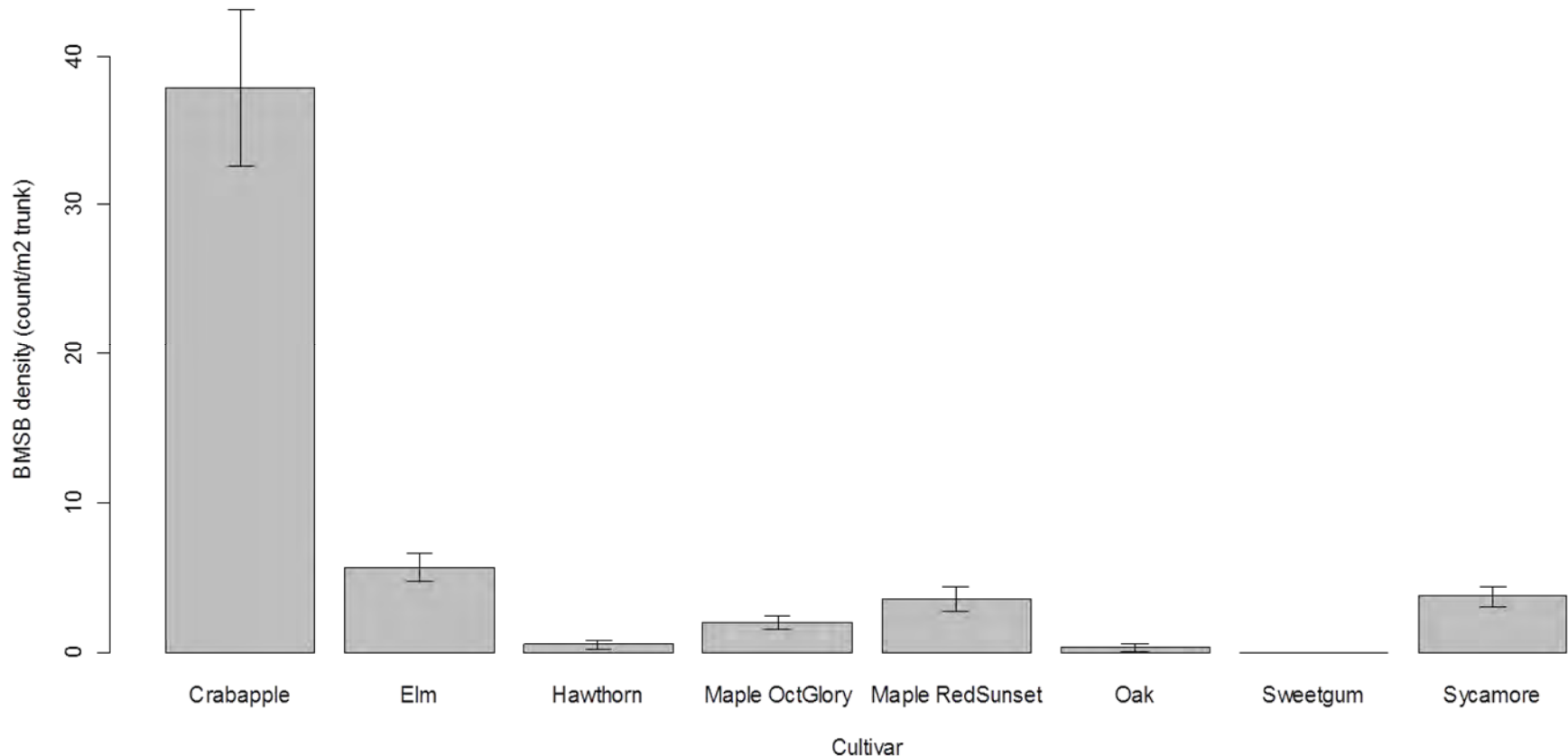
Ulmus americana - 30%

Acer rubrum - 33%



Management - resistant plants

BMSB across sites and cultivars



Develop BMSB resistant landscapes, reduce overwintering populations in structures

Future Research and Collaborations

- **Host plant use**
 - Feeding, reproduction, phenology/biology
 - Damage and thresholds
 - Greenhouse and nurseries
- **Spatial patterns**
 - Movement between overwintering habitats and crops
 - Geospatial analysis - landscape level relationships
 - Common sampling method across commodities and regions
- **Optimizing trap design (monitoring, control)**
 - Light and pheromone
- **Pesticide evaluations**

Attract and Kill Strategy

Entomopathogenic
fungi

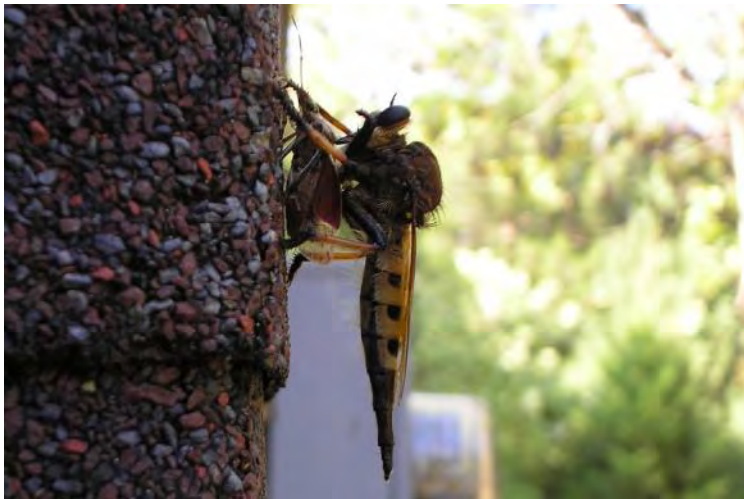


Killer Fungi



Biological Control -

- Indigenous predators and parasitoids
- Survey and conservation through habitat manipulation



Thanks for listening to a stinky story...

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others...

Ornamental plant hosts

(56 genera, 80+ species)

Woody plant hosts include: *Abelia* spp., *Acer* spp. (maple), *Buddleia* spp. (butterfly bush), *Catalpa* spp., *Celosia argentea* L. (celosia), *Cercis canadensis* (Eastern Redbud), *Cladrastis kentukea* (yellow wood), *Gleditsia triacanthos* (honey locust), *Hibiscus rosa-sinensis* L. (hibiscus), *Liriodendron tulipifera* (tulip tree), *Lonicera* spp. (honeysuckle), *Malus* spp. (crab apples), *Paulownia* spp. (princess tree), *Platanus* spp. (sycamore), *Prunus serotina* (black cherry), *Prunus x. yedoensis* (Yoshino cherry), *Quercus* spp. (oak), *Rosa rugosa*, *Syringa* spp. (lilac), *Ulmus* spp. (elm), and *Zelkova serrata* (zelkova)

Herbaceous plant hosts include: *Cleome* spp. (spider flower), *dahlia* spp., *Helianthus annuus* (sunflower), *zinnia* spp., and even some weeds such as burdock (*Articum* spp.)