



# Designing Stink Bug-Free Landscapes



**Paula Shrewsbury,**  
Michael Raupp, Holly Martinson,  
Dilip Venugopal, and Erik Bergmann

Department of Entomology  
University of Maryland  
pshrewsbury@umd.edu

**Brown Marmorated Stink Bug  
Working Group Meeting  
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# Components:

- **Resource use: Fruit availability and timing**
- **Spatial: Edge effects and adjacent habitat**
- **Host plant use:**
  - **Patterns**
  - **Classification or taxonomy**
  - **Host plant origin**
- **Using this information for management of BMSB and designing BMSB-free landscapes**

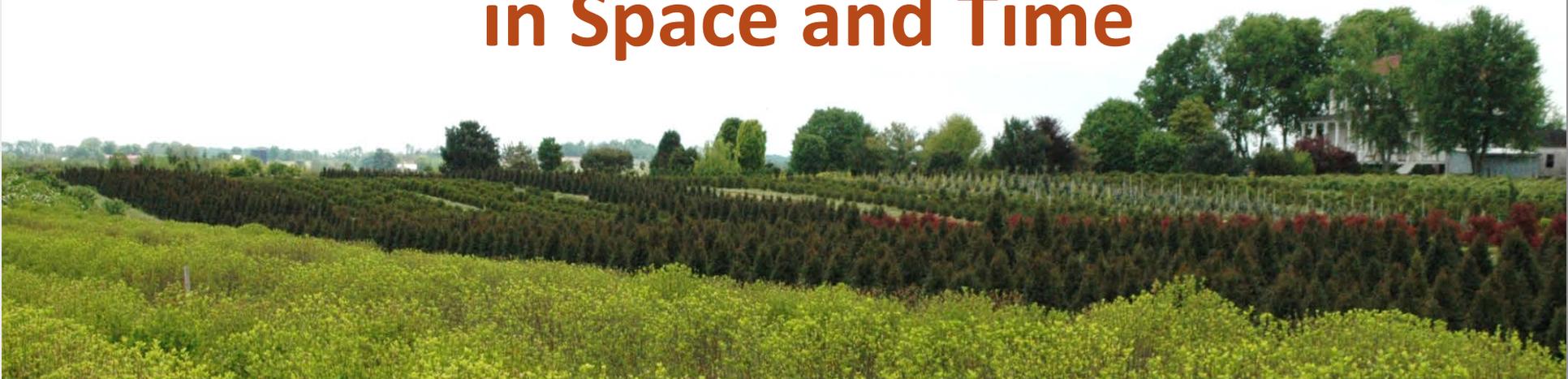
Designing landscapes:

The role of fruiting resources

# Woody Plant Production Nurseries

## Polycultures

**Heterogeneity in Resource Availability  
in Space and Time**



# Research Questions

- 1. Do BMSB utilize trees with fruits? Does that depend on fruit maturity?**
- 2. How does the timing of fruiting influence BMSB abundances?**
- 3. Does fruit removal depress BMSB abundances?**

Large-scale Observational Study



Fruit Removal Experiment



# Response Variables: BMSB Abundances in 1 Minute Counts



1 minute visual counts (0-2 m)



Leaves



Fruit/  
Flowers



Bark



Egg  
masses



Early  
instars  
(1-3)



Late  
instars  
(4-5)



Adults

# Study Sites: Woody Plant Nurseries



**2 commercial nurseries in Central Maryland**

**229 cultivars**

**3884 trees**

Large-scale Observational Study



**Each visited 6 times (every 2 weeks):  
Late May – early August 2013**

**Characterized available fruit  
resources**

# Methods: Availability of Fruit Resources

## Fruit Stage



No Fruits

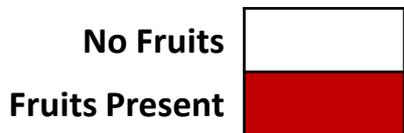


Immature Fruits



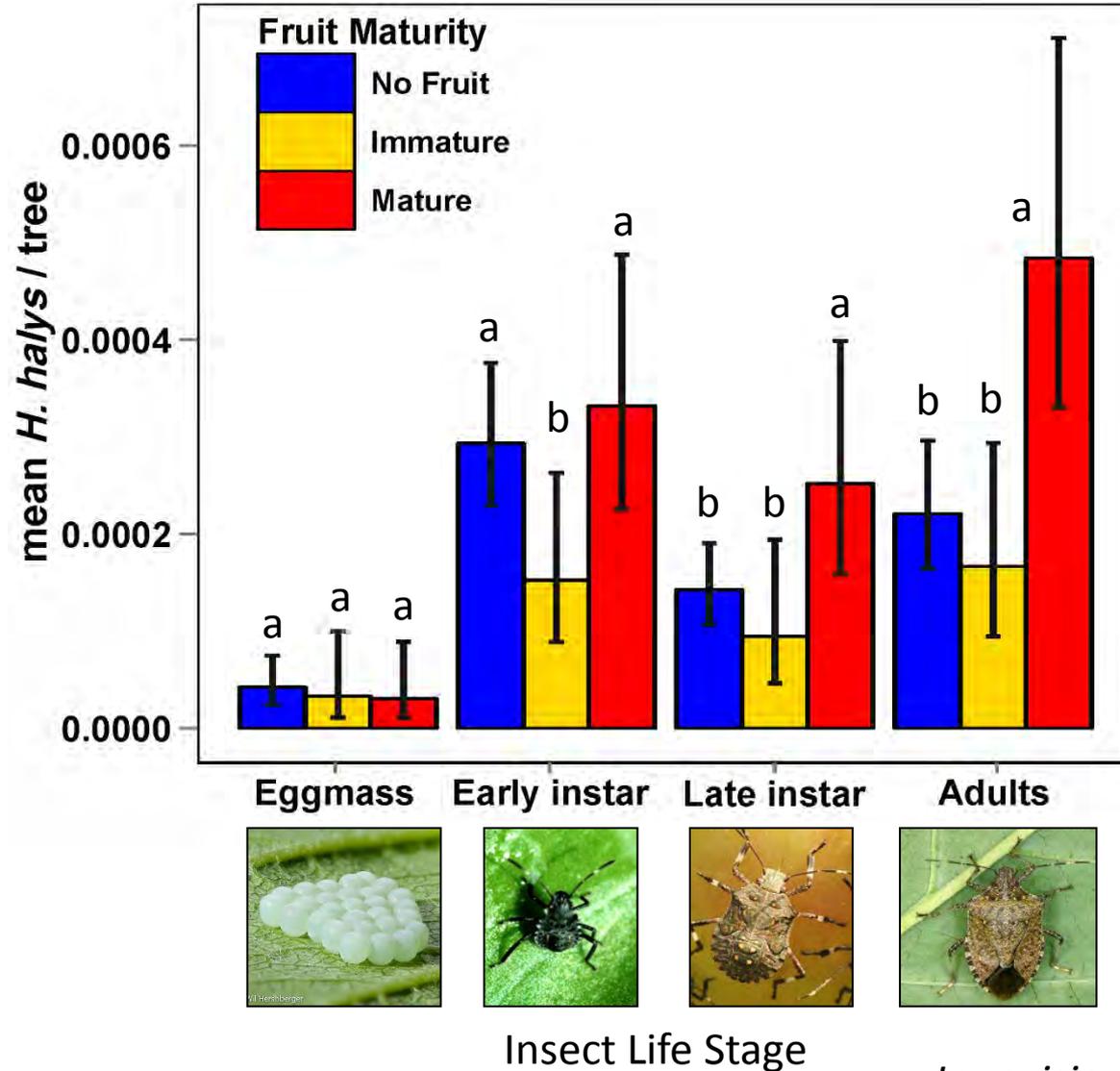
Mature Fruits

## Fruit Phenology



	Late May	Mid June	Late June	Early July	Late July	Early August
	1	2	3	4	5	6
Non-fruiting						
Early fruiting						
Midseason fruiting						
Late fruiting						
All season						

# Effect of Fruit Maturity on Abundance of BMSB



# Effect of Fruit Maturity on Distribution of BMSB on the Plant

## Location on trees



Leaves



Fruit/  
Flowers



Bark

## Insect Life Stage



Egg masses



Early instars



Late instars



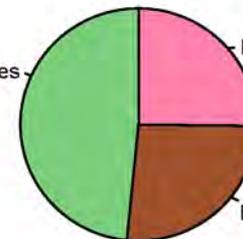
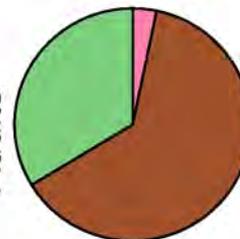
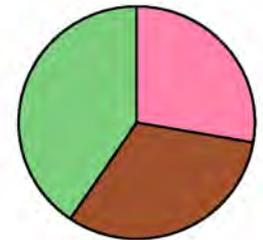
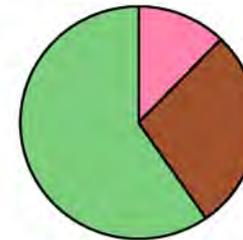
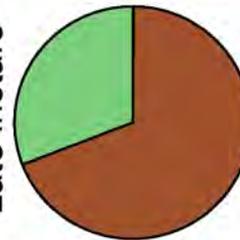
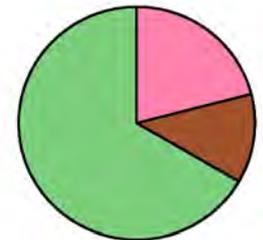
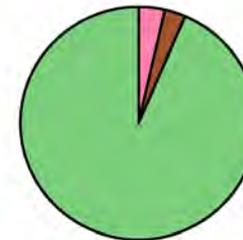
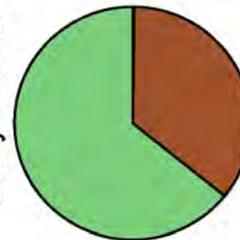
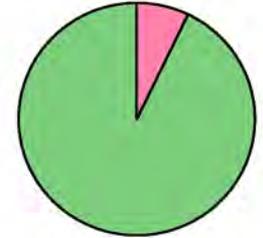
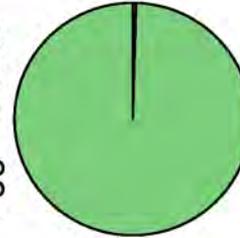
Adults

## Fruit Maturity

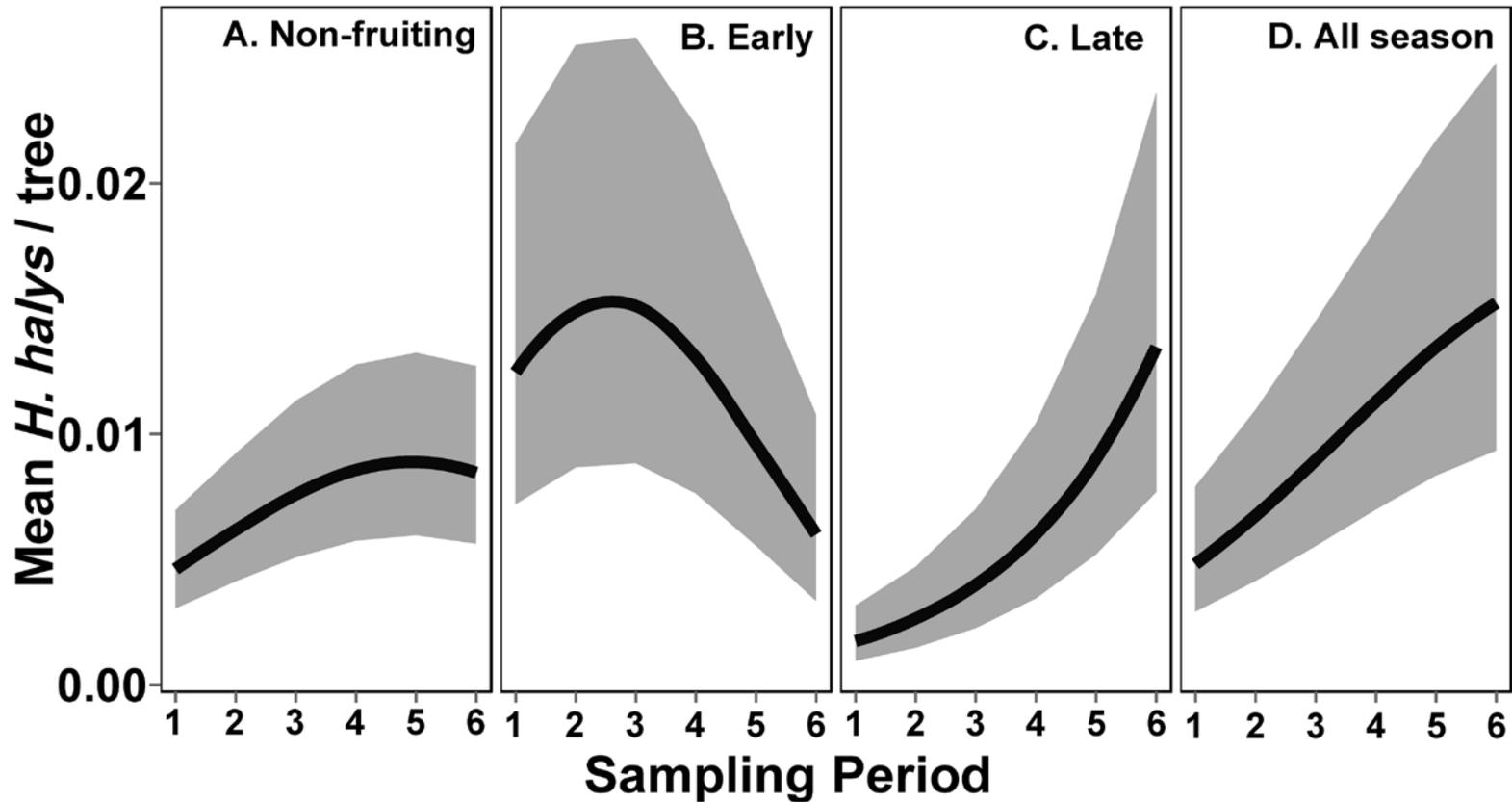
Absent

Immature

Mature



# Fruiting Phenology Influences Adult BMSB Abundance



Sampling Periods: every 2 weeks [28 May, 11 June, 24 June, 9 July, 5 Aug]

*In revision for J Pest Science*

# Question 3: Does fruit removal depress BMSB abundances?

2014: mid June – early Sept  
Weekly counts



Abundance ~ Treatment



Treatment



Fruit Present



Fruit Removed

# Methods: Fruit Removal

*Malus sargentii*  
'Select A'

*Malus* 'Don Wyman'

*Amelanchier x*  
*grandiflora* 'Autumn  
Brilliance'

*Syringa pekinensis*  
'Morton'



**Crabapple**

**Crabapple**

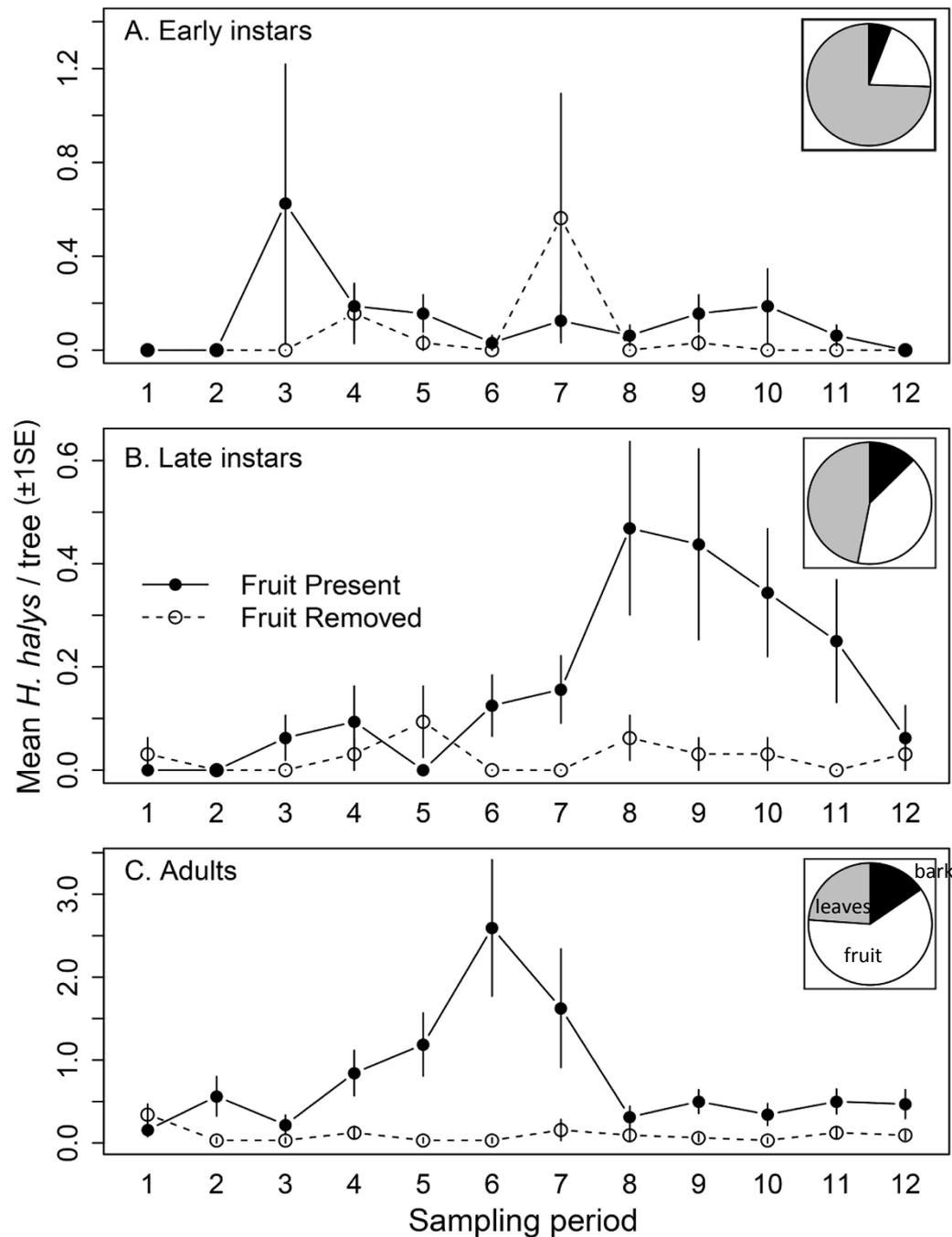
**Serviceberry**

**Lilac**

# Methods: Fruit Removal



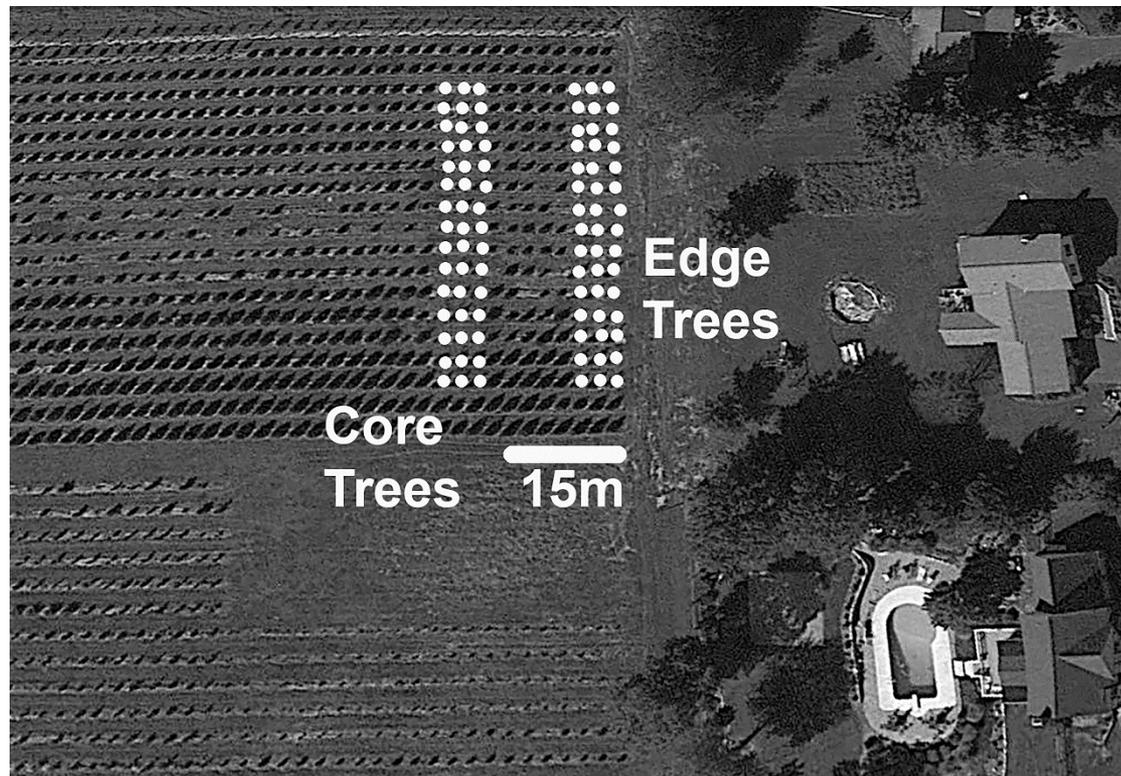
# Fruit Removal Experiment



Designing landscapes:

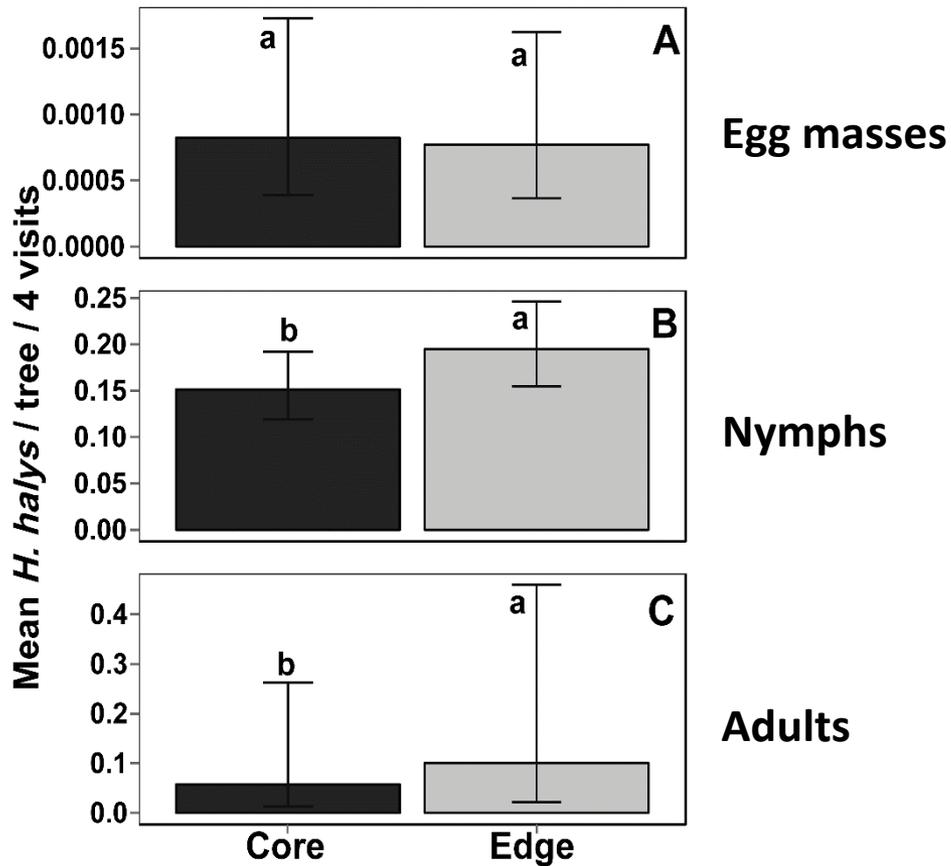
Understanding spatial  
structure in BMSB  
abundances

# Spatially structured sampling

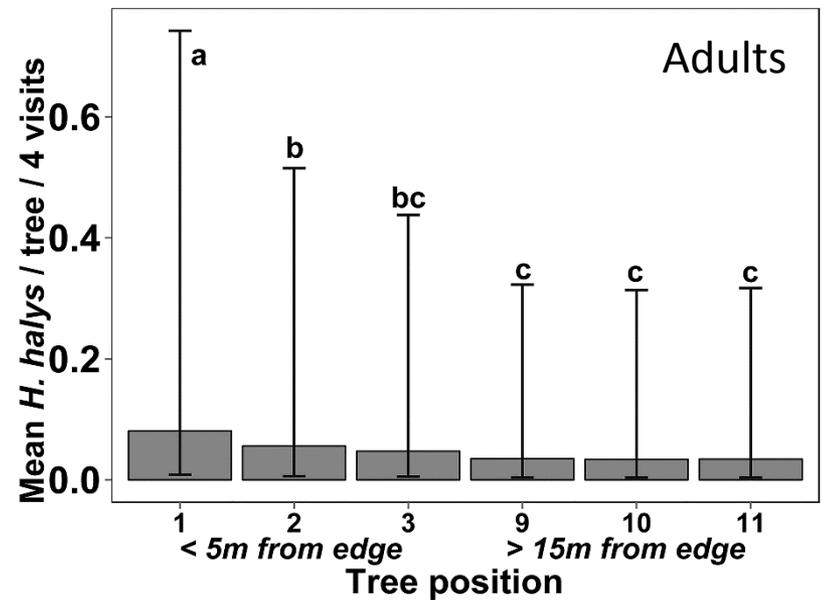


# Edge Effects in Nurseries

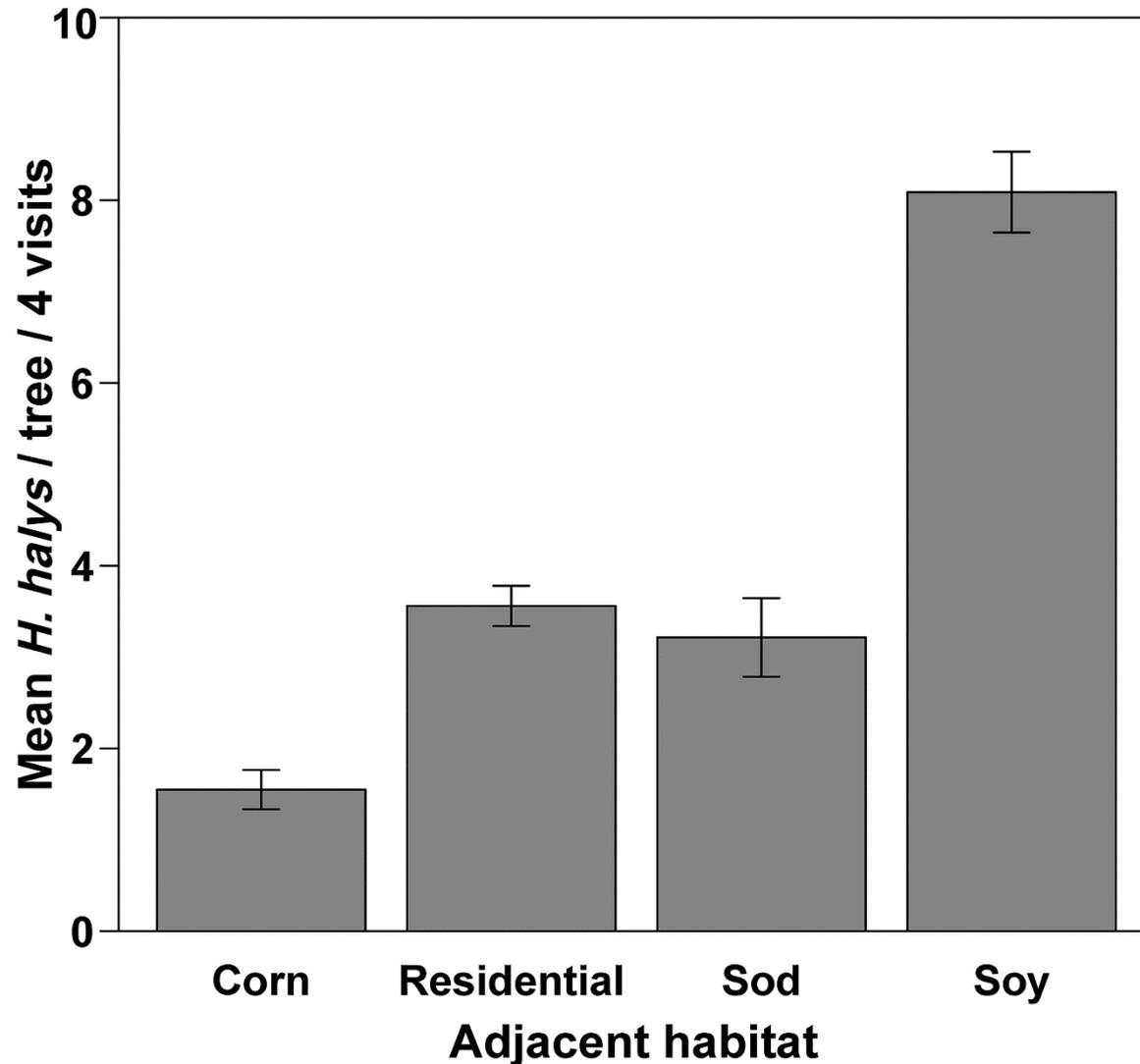
Core vs. edge samples:



Attenuation of edge effects:



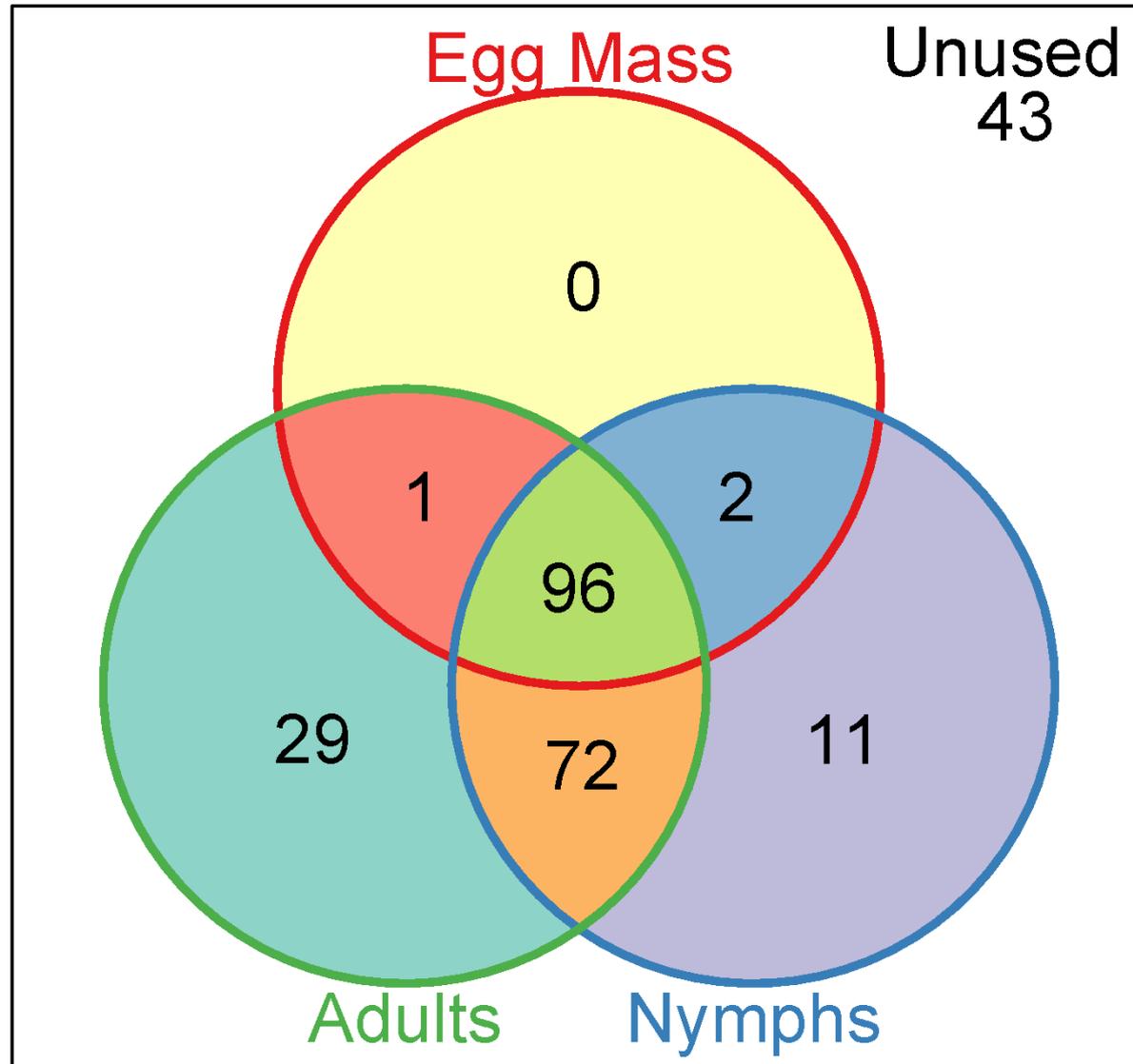
# BMSB abundance may depend on landscape context



Designing landscapes:

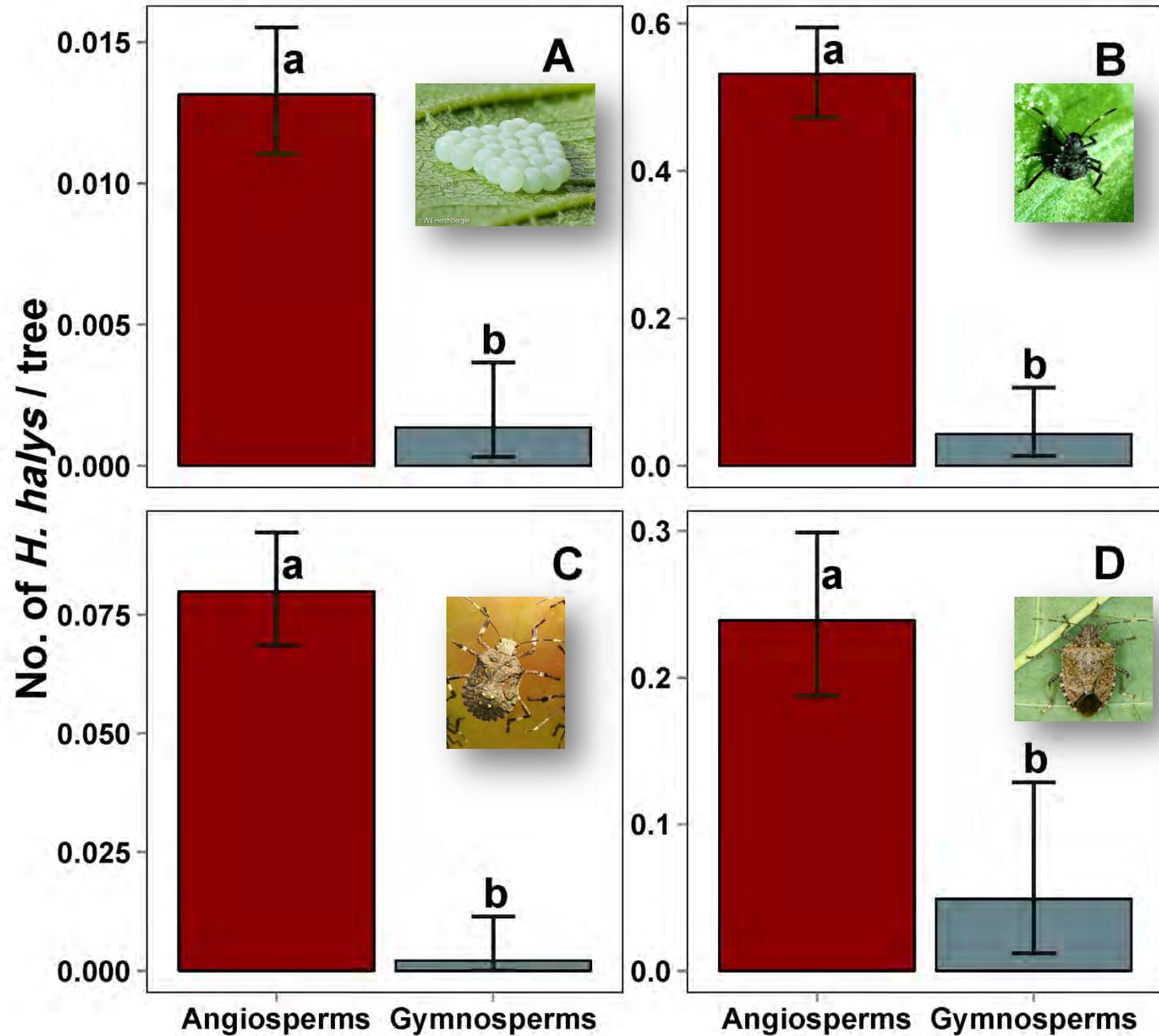
Understanding patterns of  
host use

# Pattern of Host Use Among Life Stages

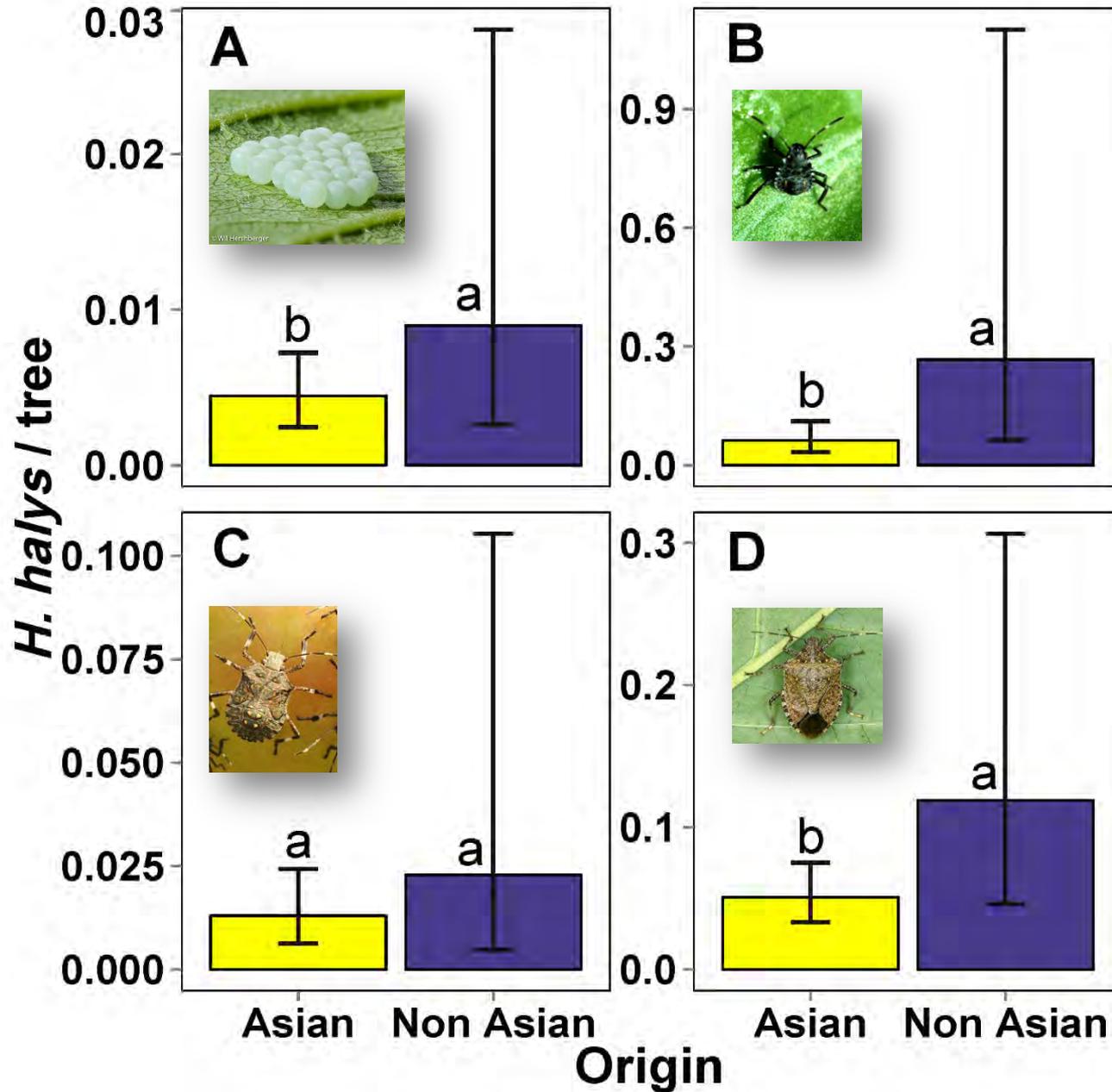


**211 (of 254)  
cultivars  
used (83%)**

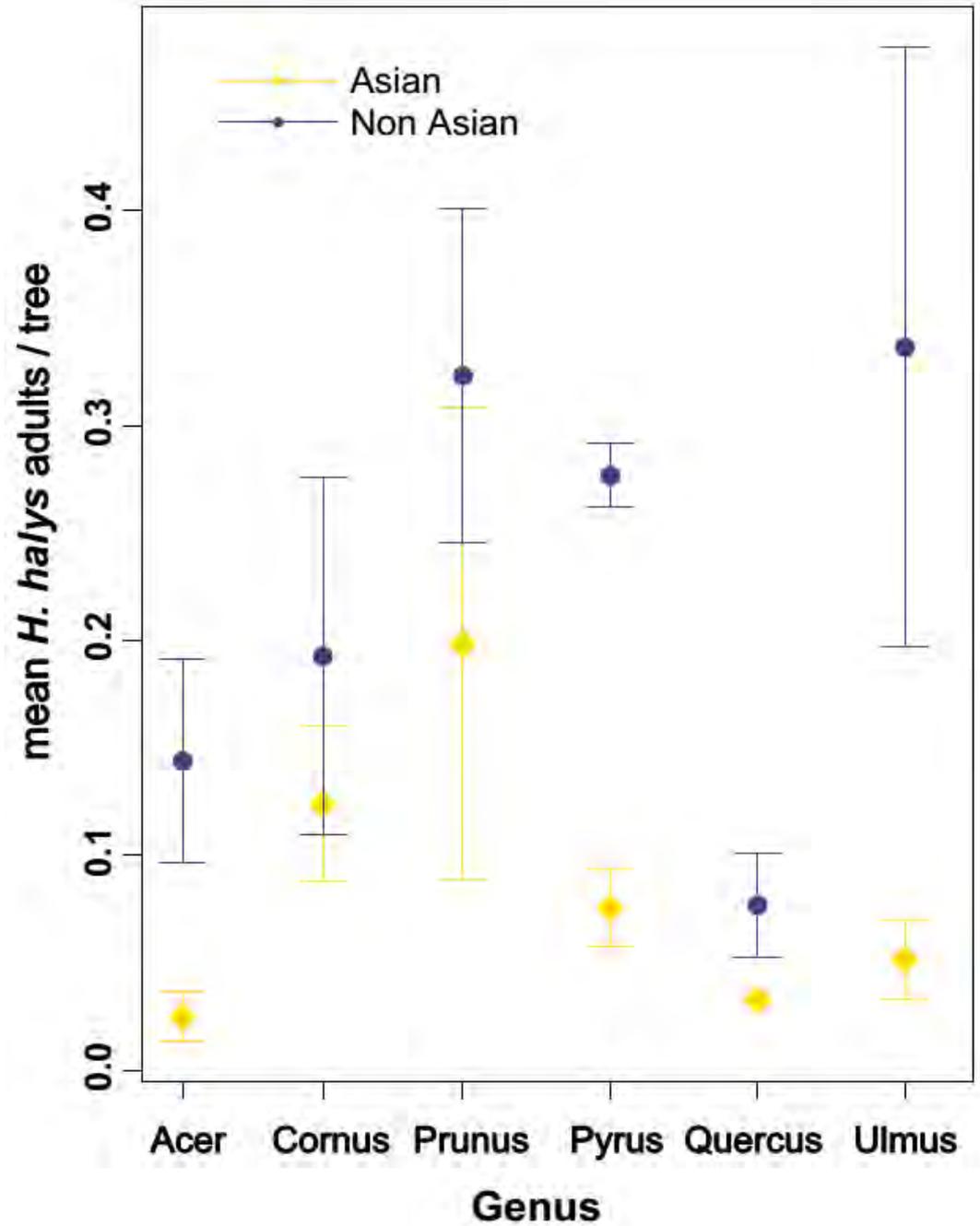
# Effect of Taxonomy on BMSB



# Effect of Plant Origin on BMSB



# Host Plant Origin by Genus



- **Goal**

- **Design stink bug-free landscapes**
- **Reduce the number of stink bugs in residential landscapes**
- **Reduce the numbers that move into homes in the fall (hopefully)**

# Designing stink bug-free landscapes

- **Resources:**
  - **Plant non-fruiting trees**
  - **Plant fruiting trees with phenological mismatch**
    - **those that flower and fruit in the early season**

# Designing stink bug-free landscapes

- **Spatial and temporal:**
  - **For growers: Scout the edges and if intervention is necessary focus applications on borders**
  - **More problematic in agricultural landscapes dominated by soybeans**
  - **BMSB populations tend to increase as the season progresses**

# Designing stink bug-free landscapes

- **Host use:**
  - **BMSB fed on most of the available cultivars (83%)**
  - **Plant hosts not used**
    - **Angiosperms and non-Asian cultivars are favored.**
    - **Gymnosperms and plants of Asian origin will be less utilized (?)**
  - **Within genera plant less-favored cultivars**
    - **common genera (i.e. Acers that are non-favored)**

# Management

- **In nurseries, scout at edges and adjacent to soybeans**
- **In newly colonized areas (nascent populations), scout plants with fruits, especially monitor mature fruits, in landscapes and wood edges**

# Future Studies

- **Damage assessments:**
  - Direct damage to bark, fruit, and leaves
  - Indirect damage via disease transmission
- **Relative abundance of cultivars in the landscape:**
  - BMSB may utilize cultivars proportional to their abundance
  - Test for importance of other factors (ex. host origin) while accounting for host abundance
- **Conservation of natural enemies**
  - Identify flowering plants that attract natural enemies of BMSB



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