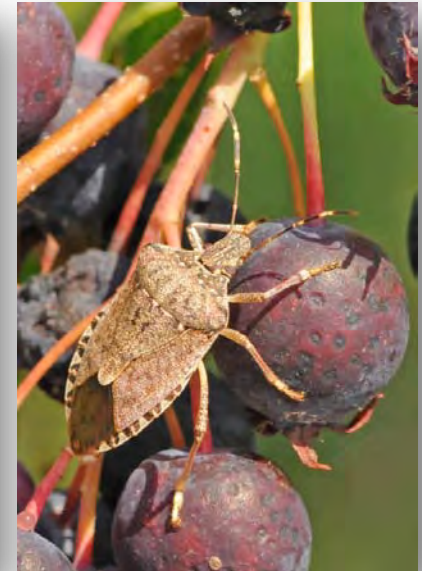
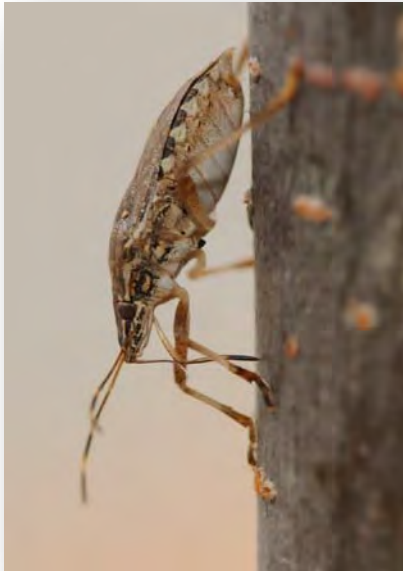


Spatial patterns of BMSB host use in nurseries: a multi-scale analysis

Holly Martinson ▪ Erik Bergmann ▪ Michael Raupp

Department of Entomology University of Maryland, College Park

hmartins@umd.edu



BMSB aggregating on trees



BMSB feeding through tree bark



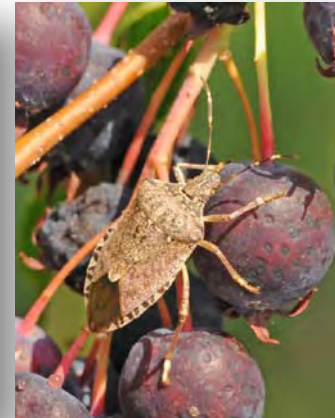
Martinson, Raupp, Shrewsbury (in press)
Annals of the Entomological Society

BMSB feeding through tree bark ... may damage trees



Possible damage

- Direct feeding
- Indirect as disease vector
- Home invasions



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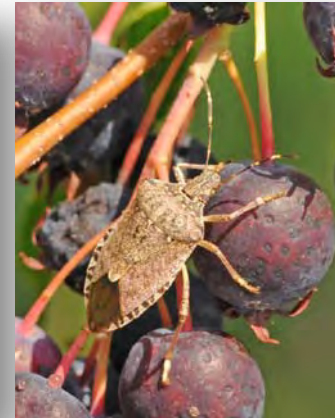
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Woody Plant Nurseries

Economically important: #2

Ag Sector in MD

2008: ~ \$2 billion green industry gross receipts



BMSB in Nurseries

Must immigrate, emigrate

High plant diversity

Large blocks of trees

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- Understand phenology in woody plant nursery
- Characterize how BMSB utilize woody plants: within-plant scale and overall host use
- Field- and nursery- scale edge effects
- Nursery-scale spatial dynamics



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Research Site

Raemelton Farm

Adamstown, MD

300+ Acres, 6 Fields

Plants in the ground 1-7 years

Heavy BMSB pressure 3 years



Photos by Steve Black

Survey Methods



1 minute visual counts for each plant part

Leaves ▪ Fruit ▪ Bark (up to 2 m)

BMSB stages

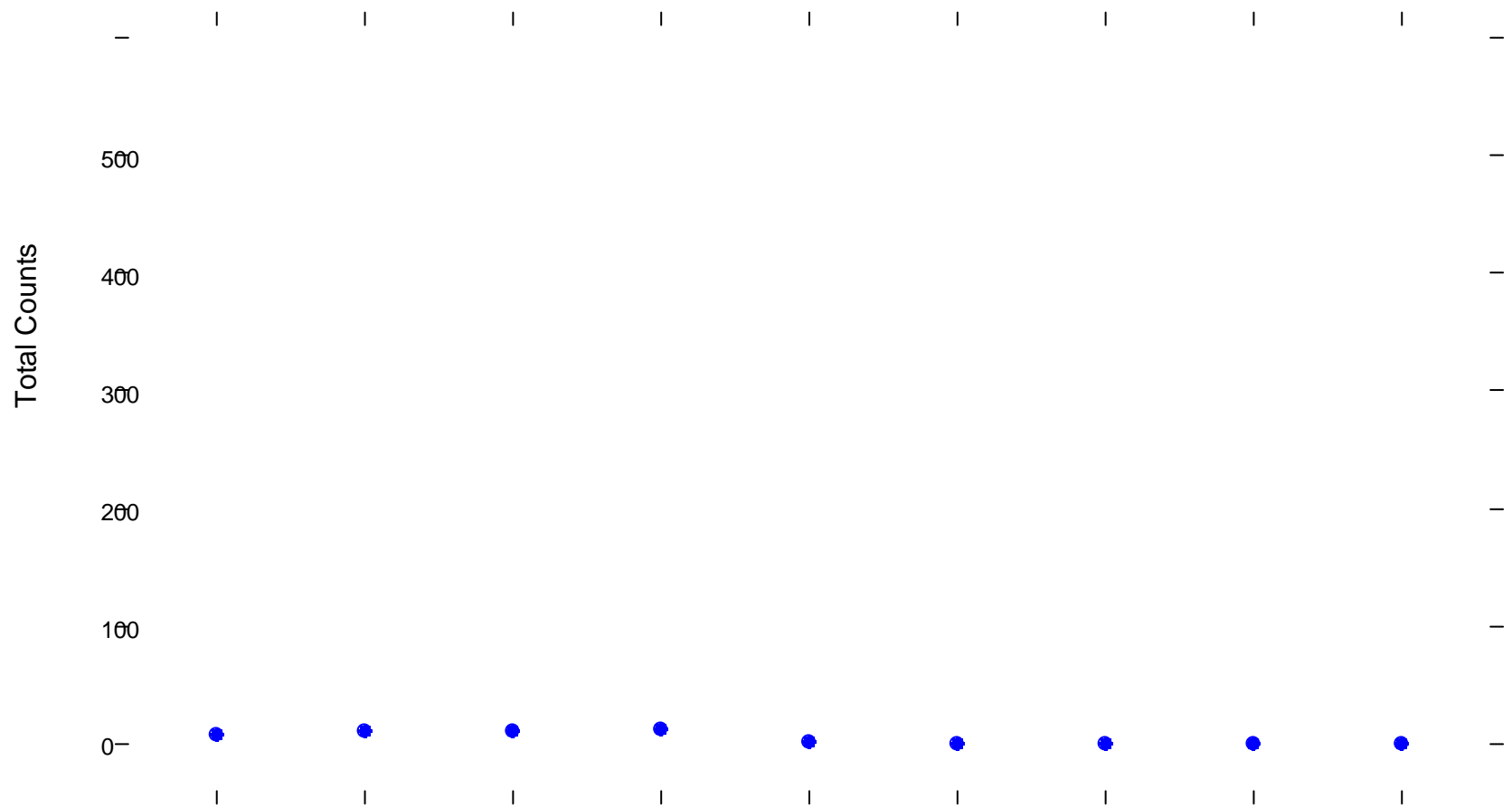
Egg clusters ▪ Early nymphs ▪
Late nymphs ▪ Adults

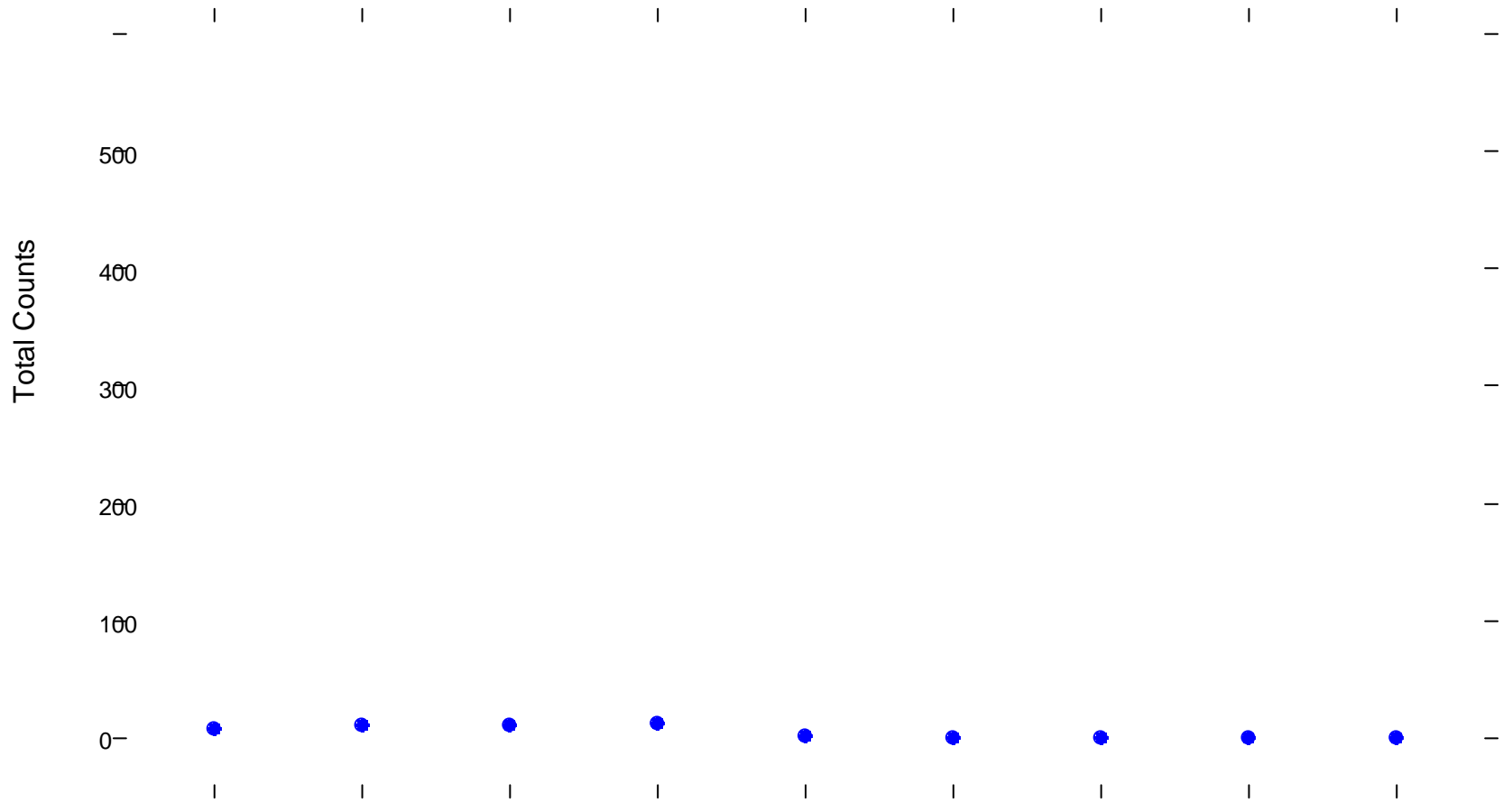
2011

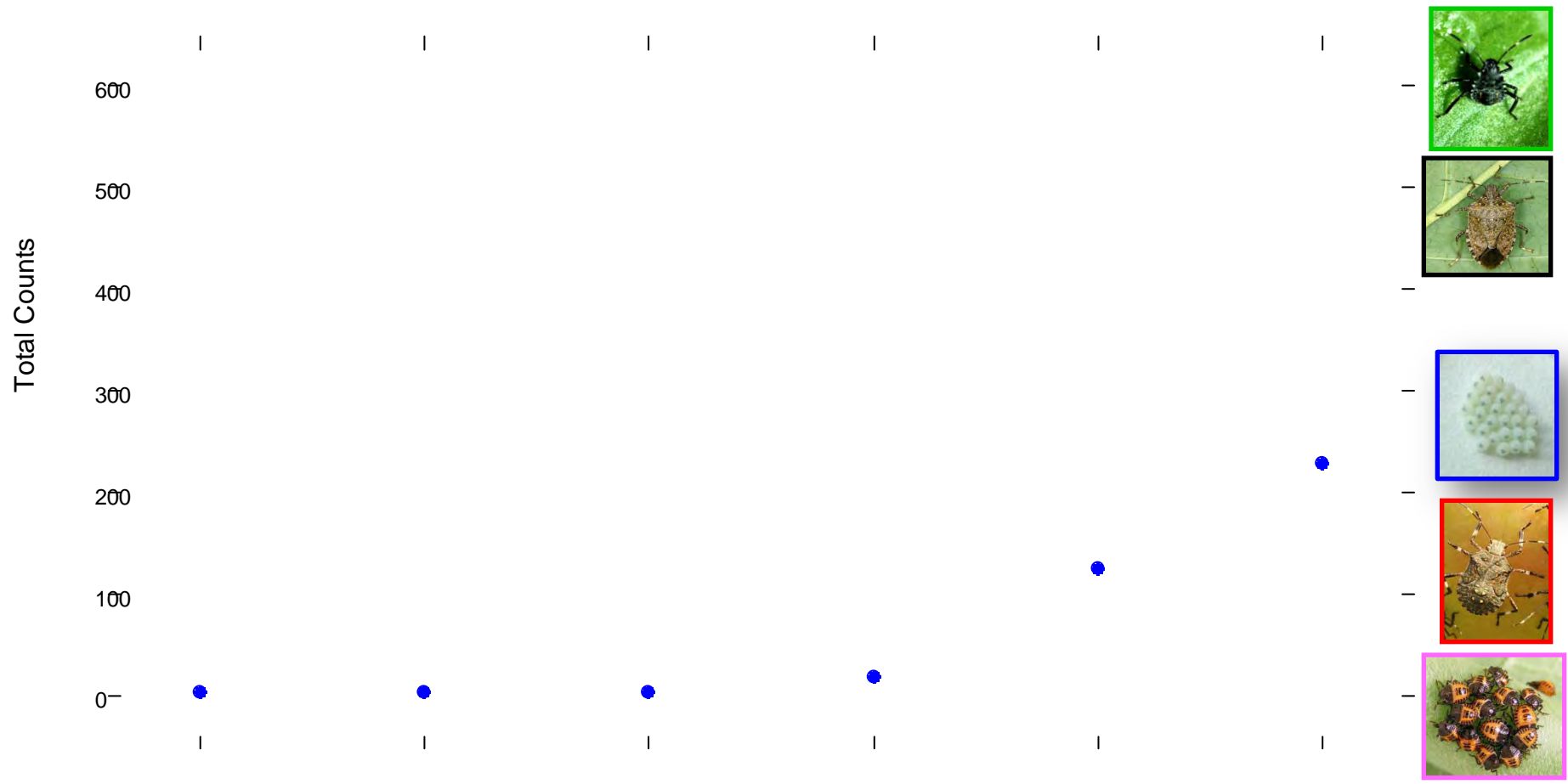
2006 individual trees
178 cultivars
7578 tree visits

2012

3350 individual trees
191 cultivars
17,280 tree visits





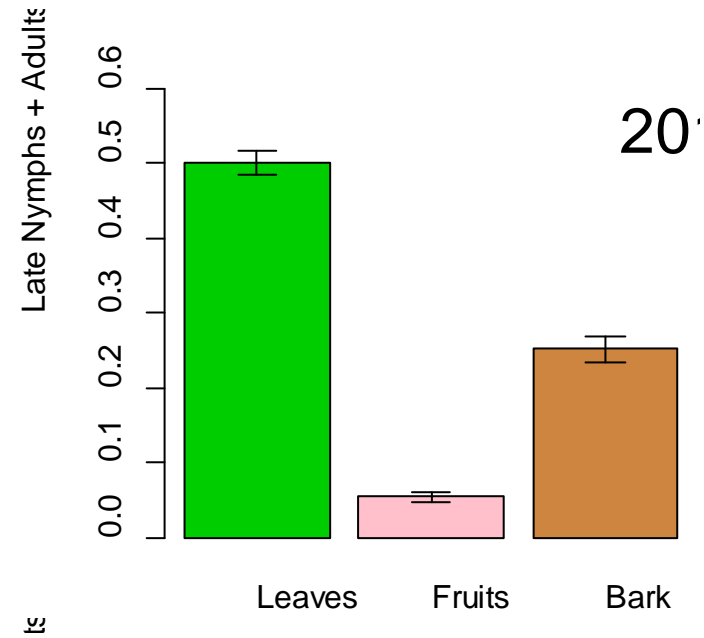


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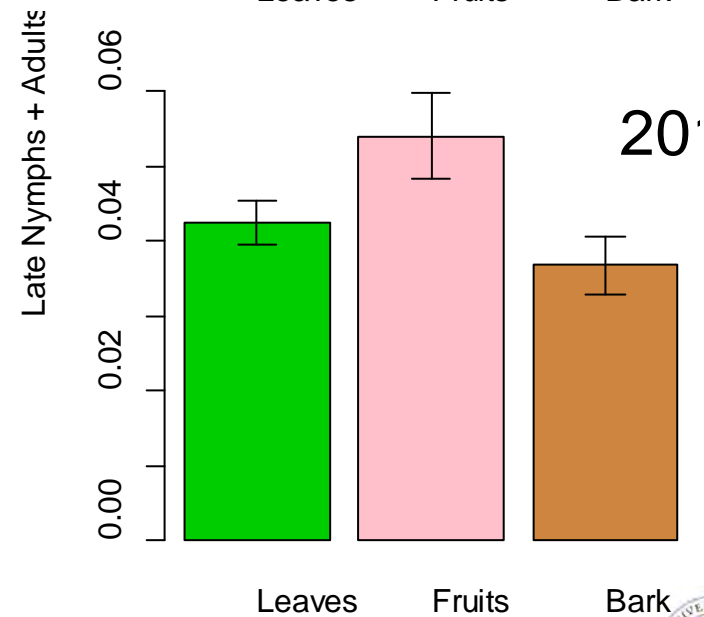
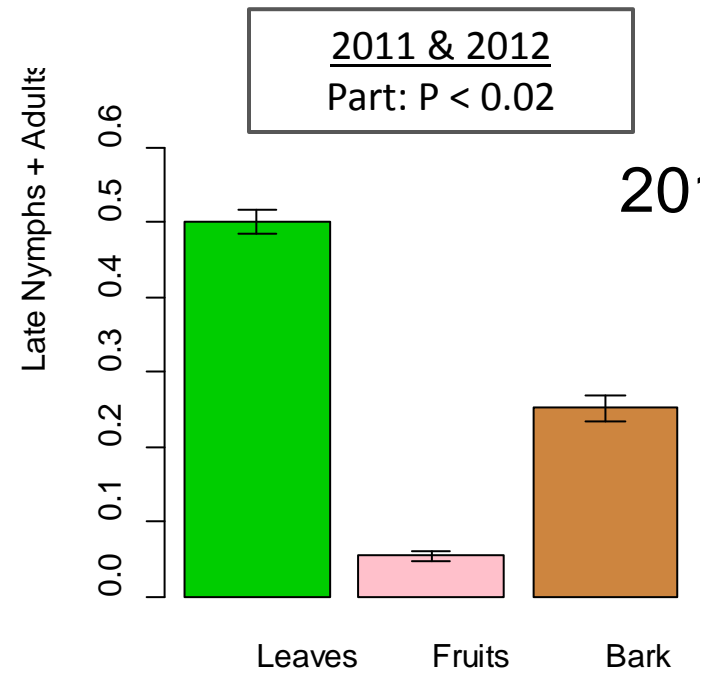
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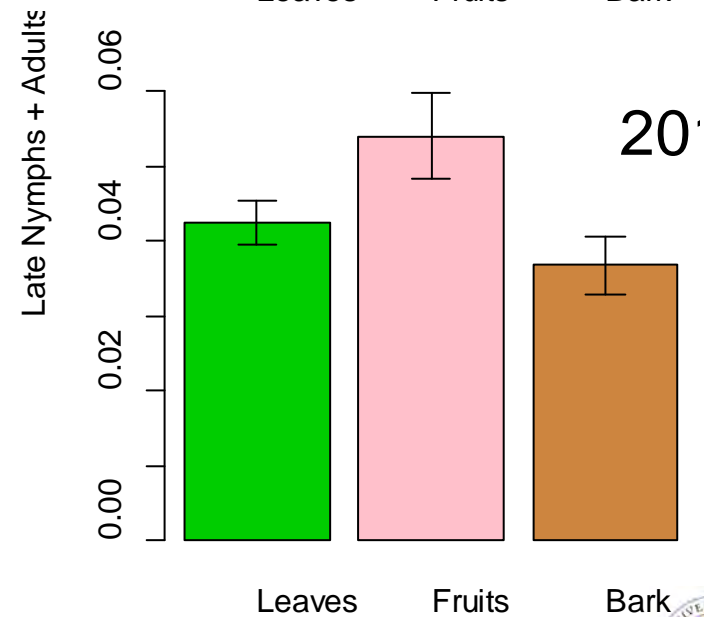
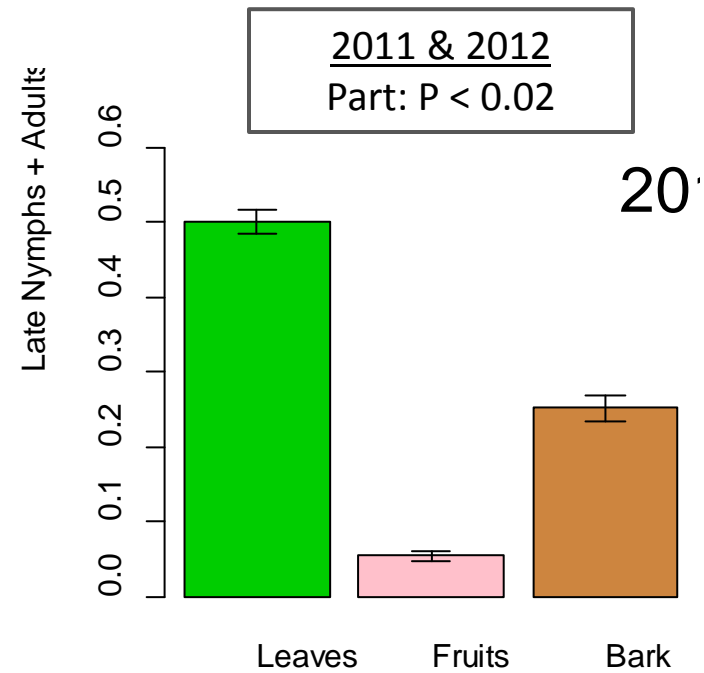
BMSB distribution within plants

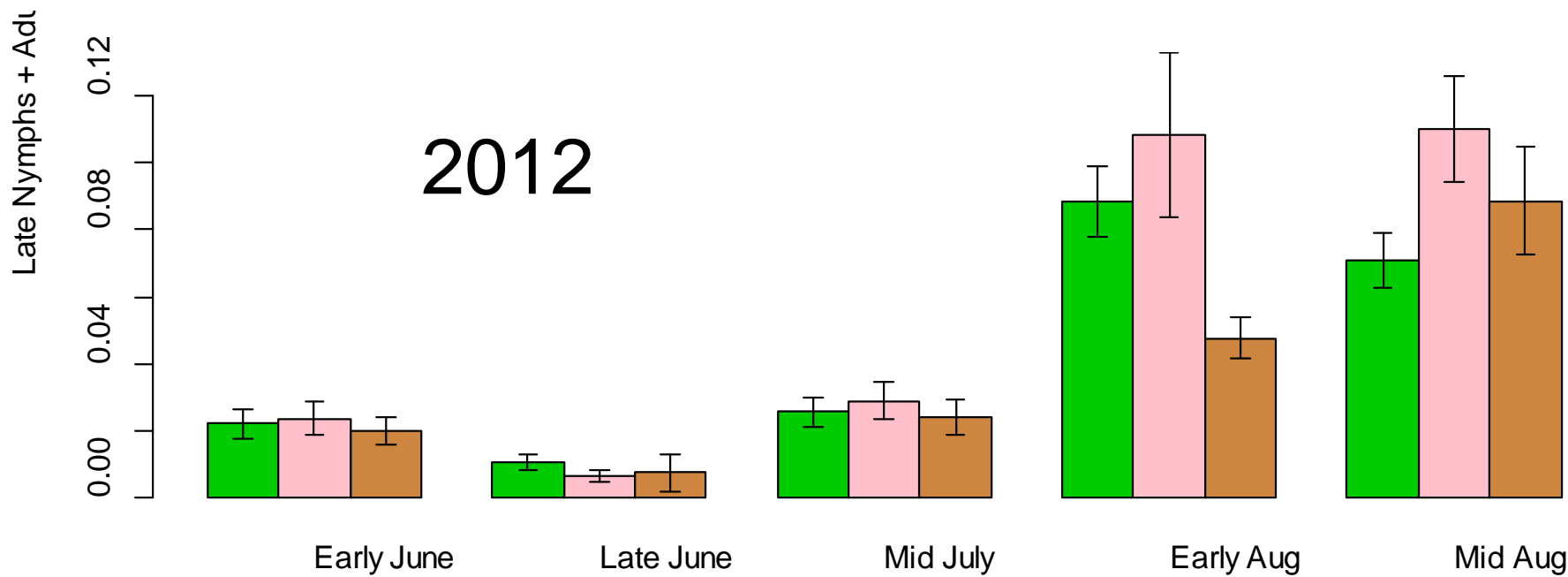
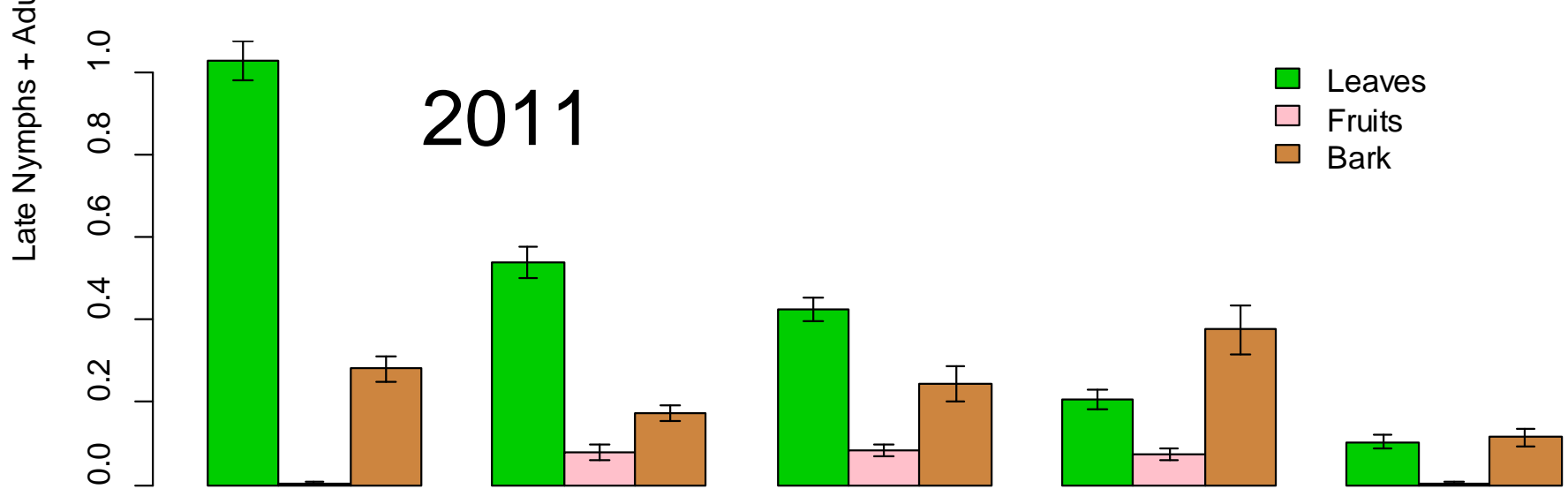


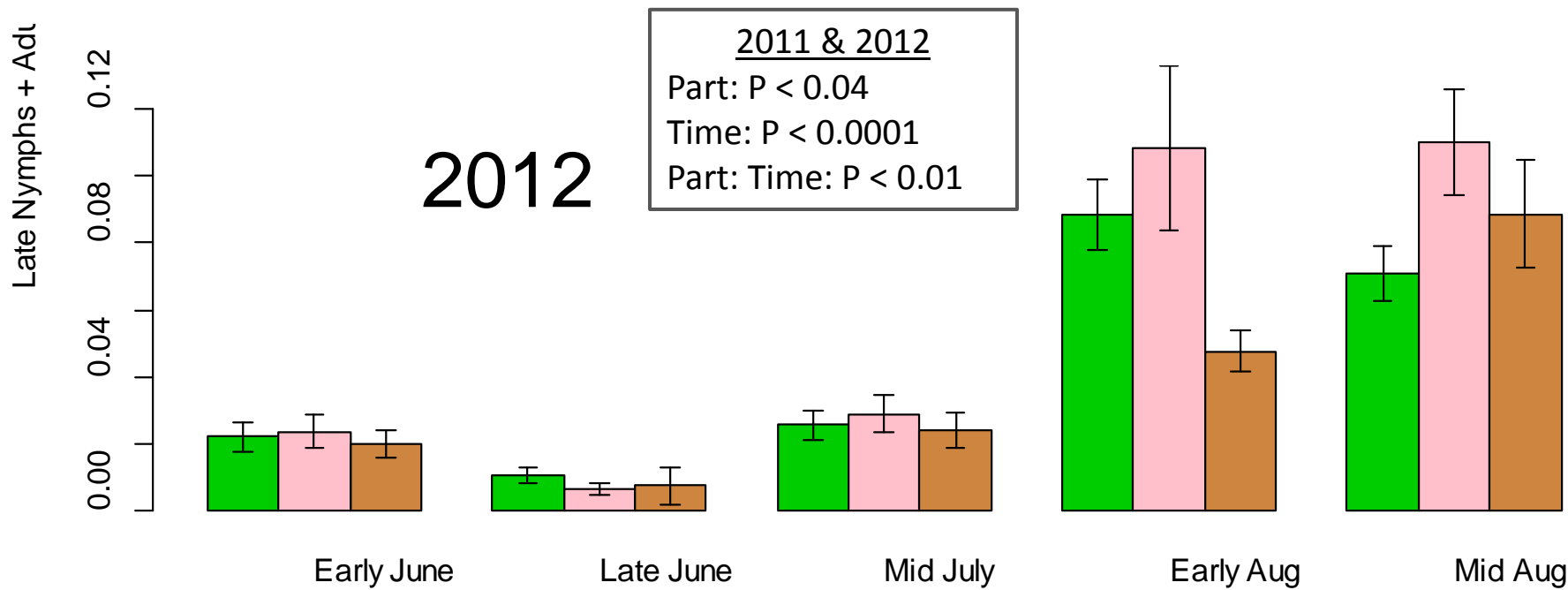
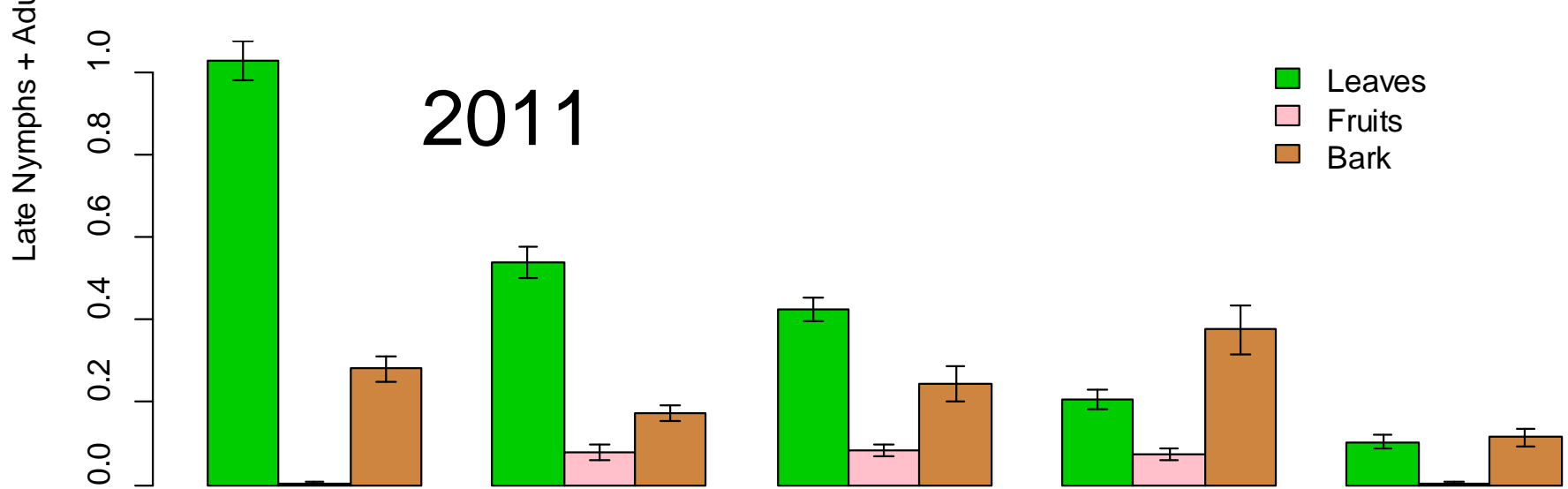
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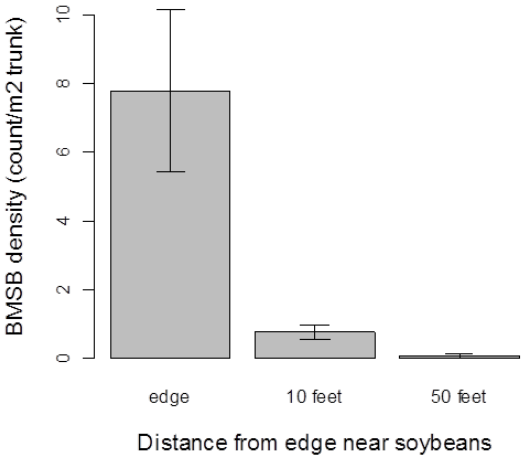
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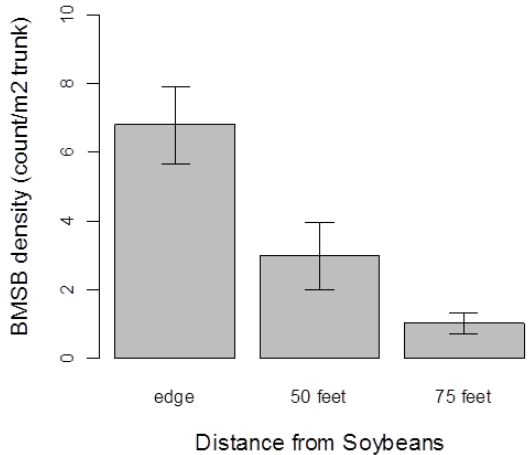
2010 Pilot Study



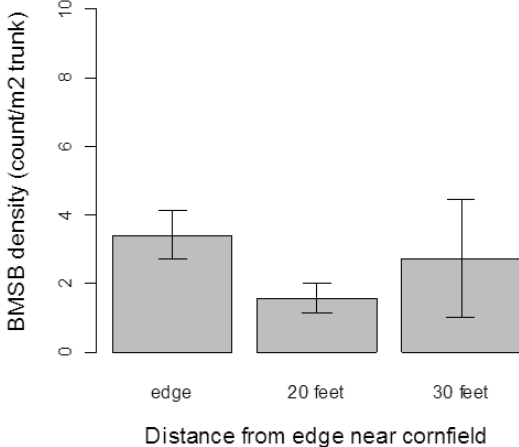
Ruppert: BMSB on maple (Red Sunset)



Ruppert: BMSB on sycamore (London Plane)

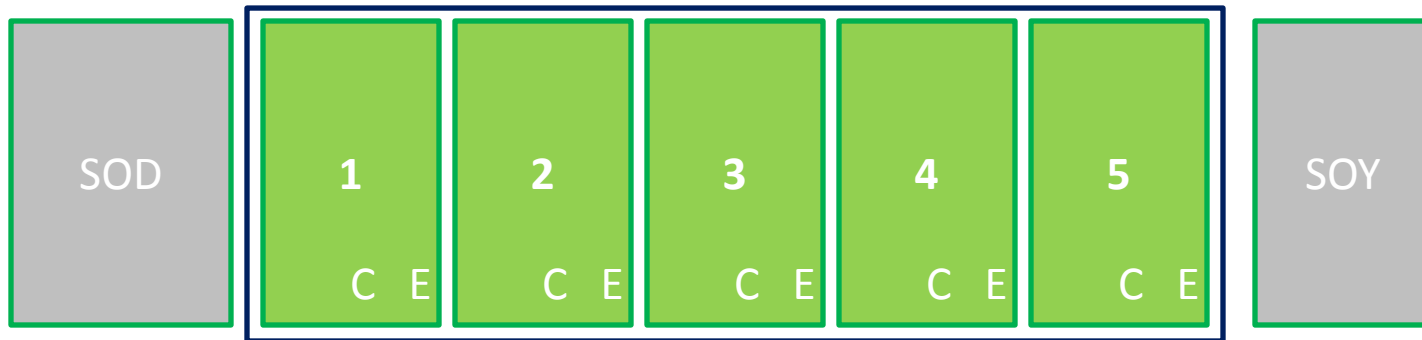


Ruppert: BMSB on maple (October Glory)



2011 Spatial Patterns

Edge effects?

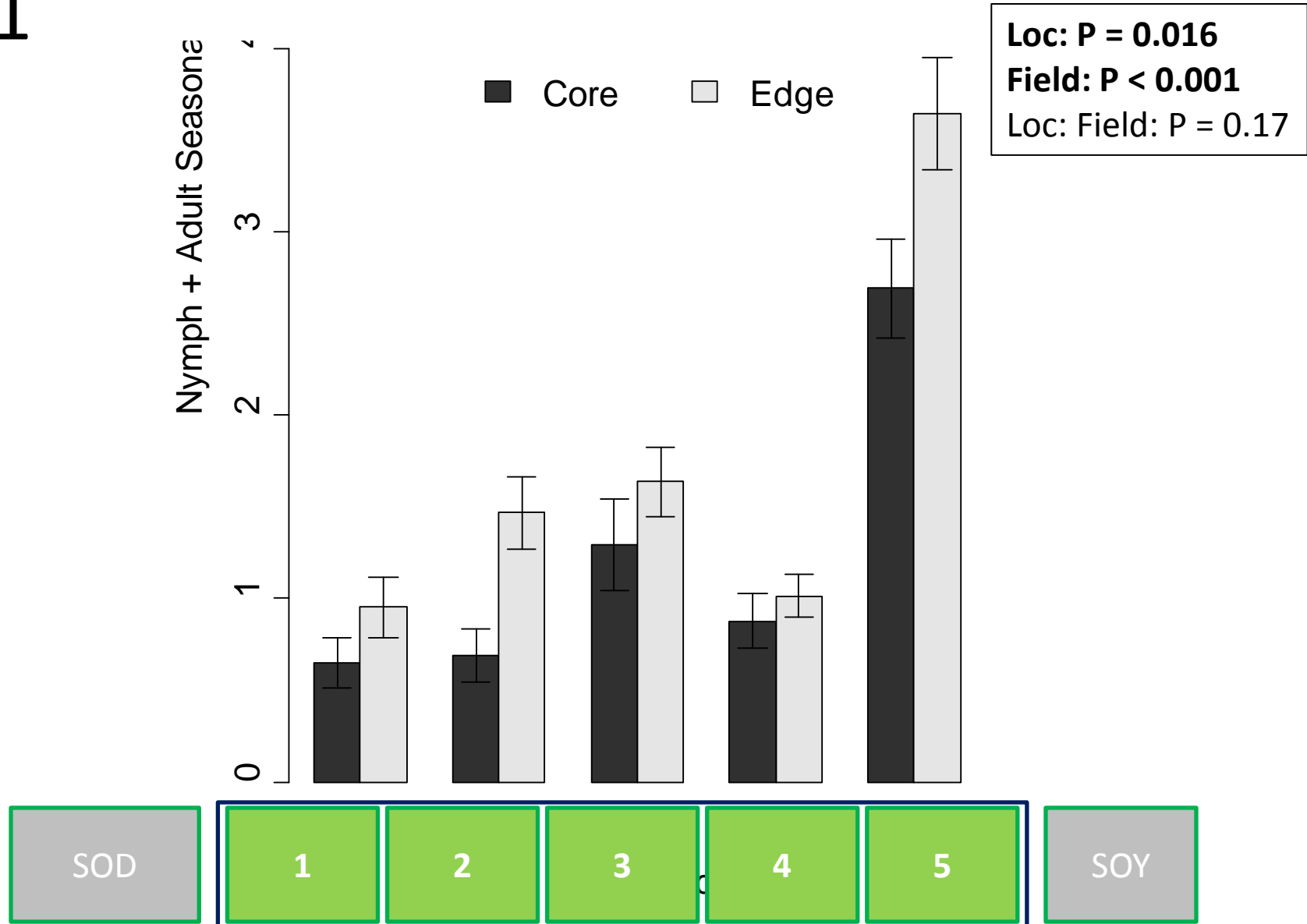


Edge Tree (E): 1-3 positions from field edge
Core Tree (C): 9-15 positions from field edge

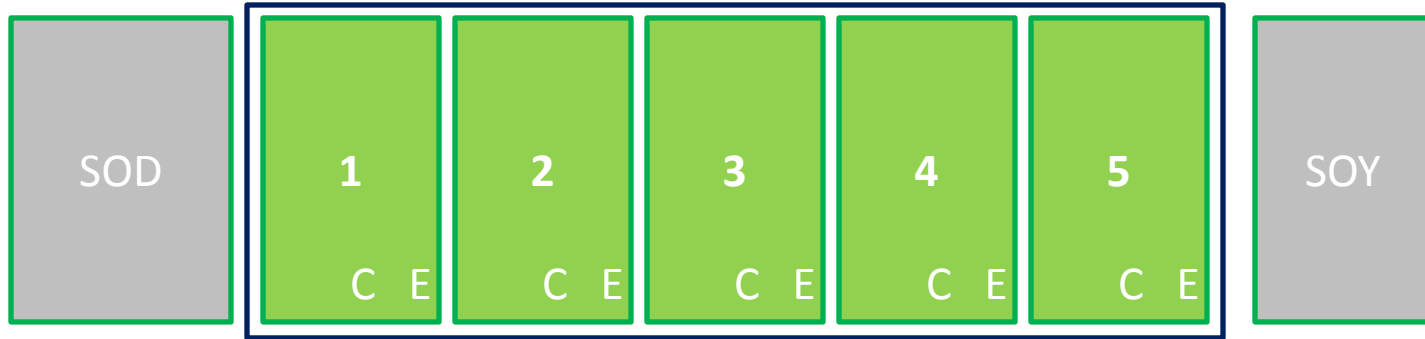
Hypotheses:

- Fields will differ in densities due to adjacent habitat type (field effect).
- BMSB counts will be higher on edge trees (position effect).
- The strength of the edge effect will vary with field (interaction).

2011

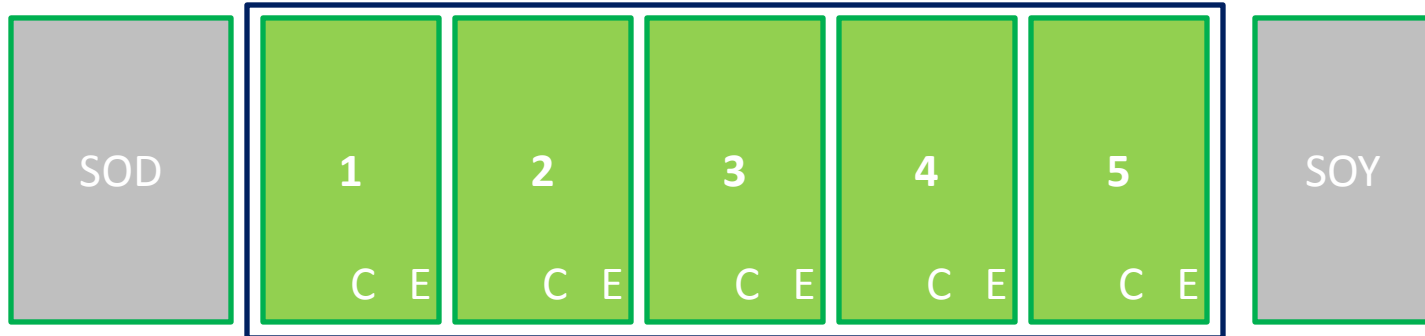


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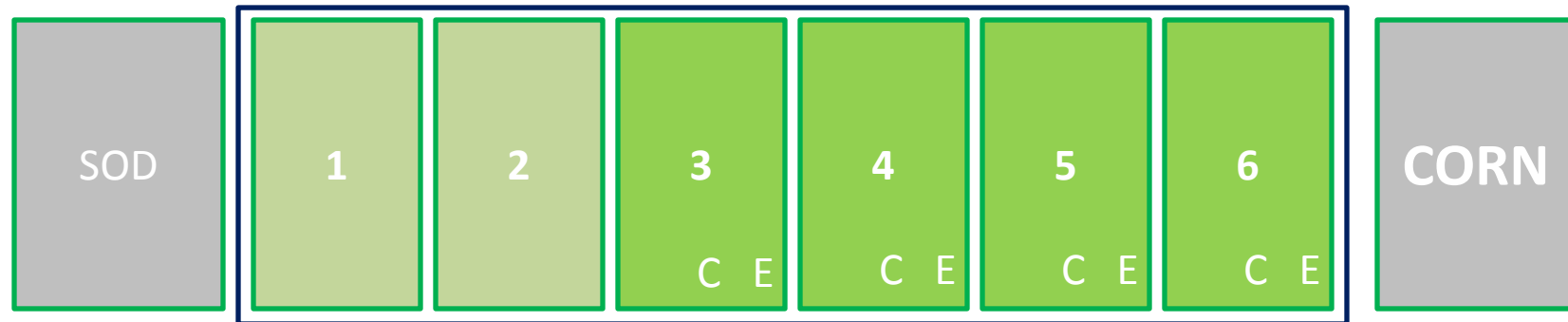


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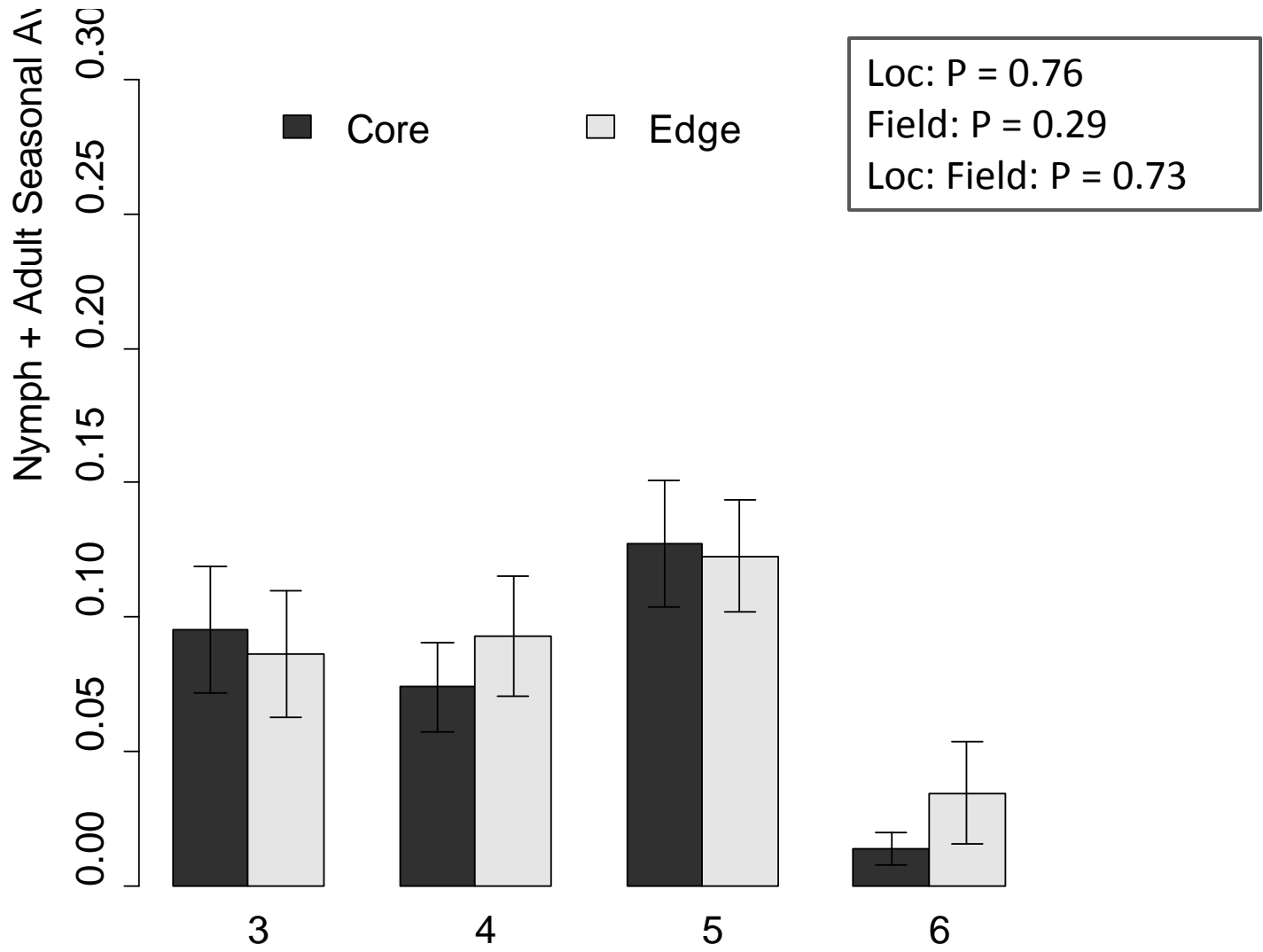


2012



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2012



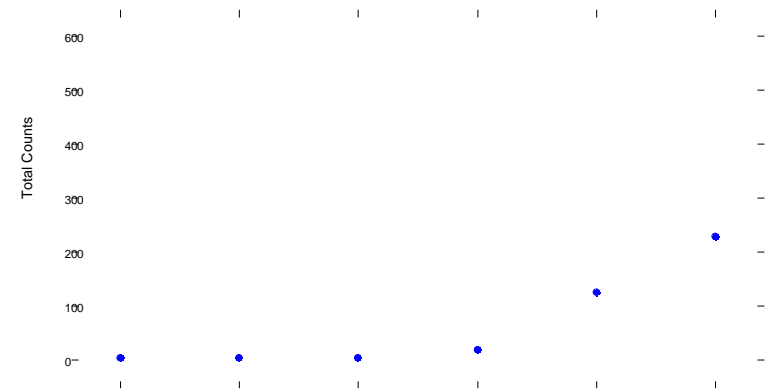
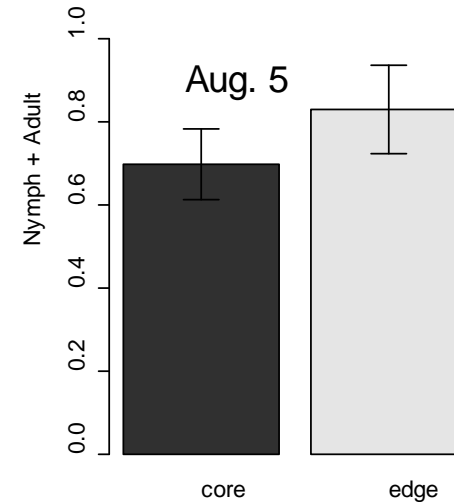
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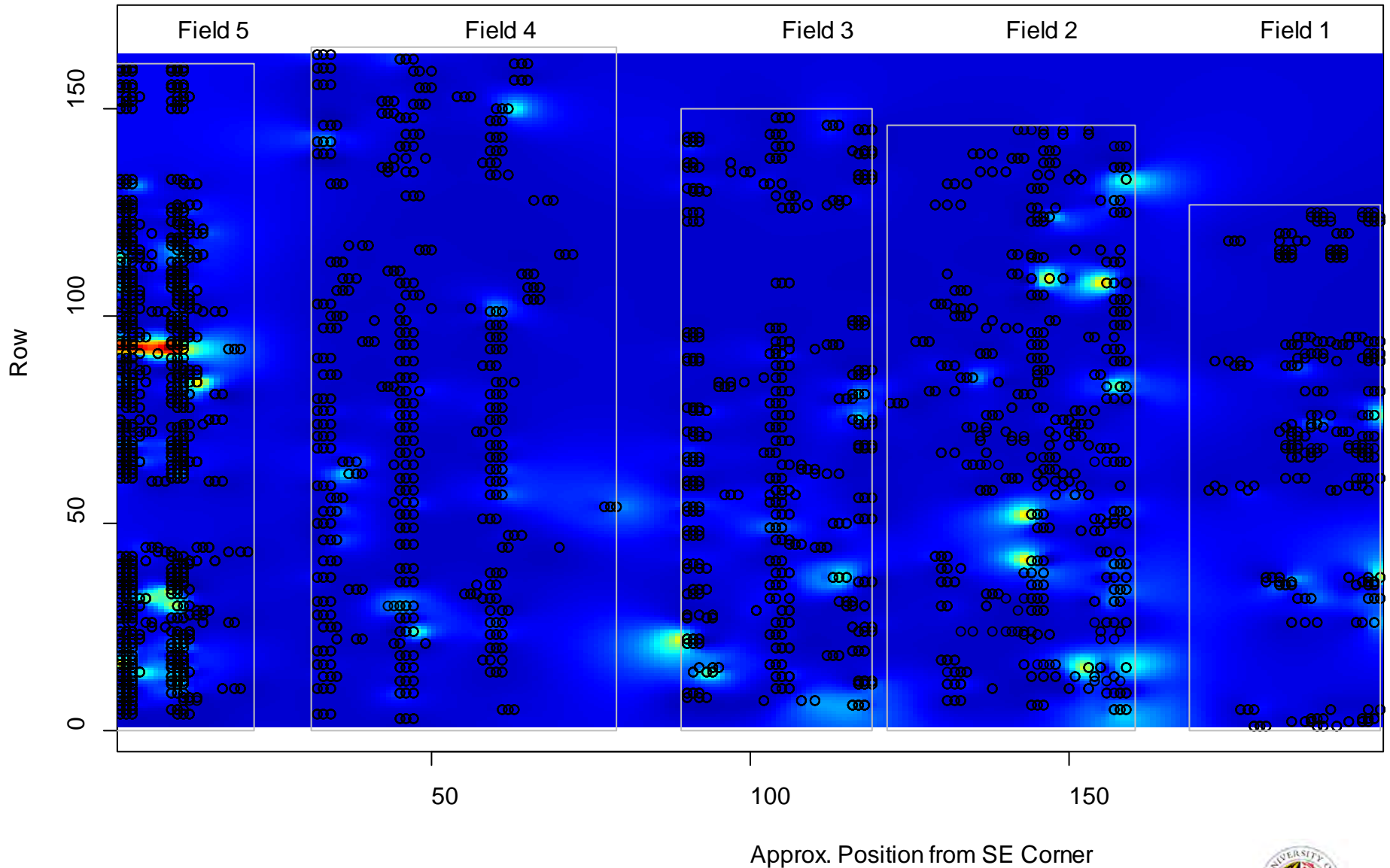


Nursery-scale spatial dynamics

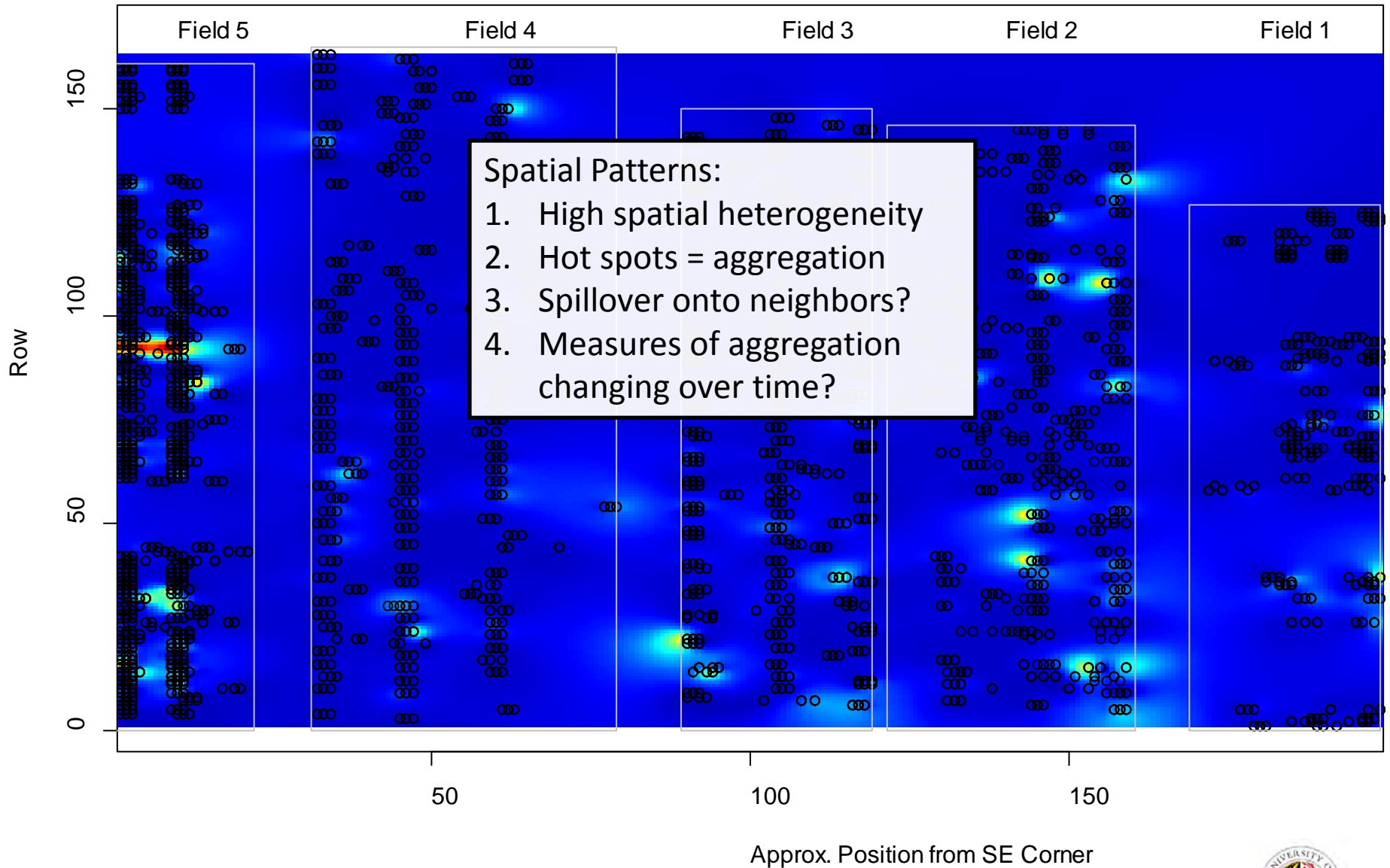
- Edge effects
- Phenology
- But really, there are changes in numbers of BMSB in space and time



2011 July 19



2011 July 19



BMSB host use in nurseries

BMSB feeds on a wide range of woody plants

Asymmetric host use

Most cultivars used (2011: 84%; 2012: 66%)

Leaves, fruits, and bark utilized over time

Contrasting patterns of phenology in 2011 & 2012.

Hypotheses:

Abiotic factors: heat, precipitation

Natural enemy cycles

Resource availability within fields and in adjacent habitats

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soy adjacent – strong
corn adjacent – weak

High degree of spatial aggregation. Hypotheses:

Host availability and host phenology

BMSB movement within and between habitats

Aggregation behavior and pheromones

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Acknowledgements

Field Crew

Caroline Brodo

Ashley Jones

Chris Riley

Ryan Wallace

Dylan Reisinger

Sean Harris

Field Access

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Ruppert Nurseries

Advice

Shrewsbury and

Raupp Labs

Photo Credits

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Galen Dively, UMD

Tracey Leskey, USDA ARS

Mike Raupp, UMD

Ryan Wallace, UMD



Illustration by
John Davidson
UMD Entomology



United States
Department of
Agriculture

National Institute
of Food
and Agriculture



Questions?

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