

# The dispersal capacity and host choice of BMSB nymphs

(AKA painting nymphs and watching them move)



Brett Blaauw, Doo-Hyung Lee,  
Anne Nielsen, and Tracy Leskey

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**RUTGERS**  
UNIVERSITY



# Overview

**Lee**

## 1. Dispersal capacity

- Lab-based study
- Field-based studies:
  - Direct observation on walking
  - Mark-release-recapture study



**Blaauw**

## 2. Nymphal host choice



# Dispersal Capacity

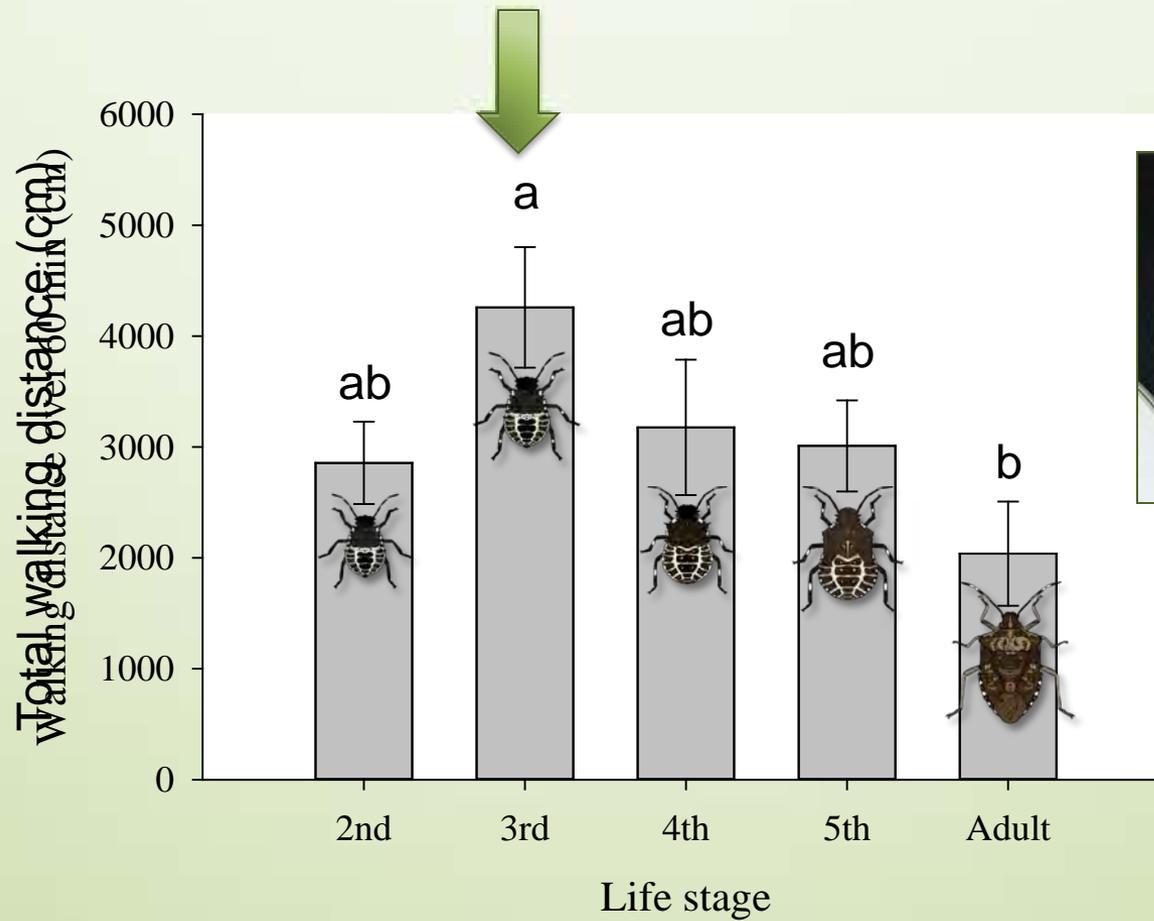


# Walking capacity test in the lab

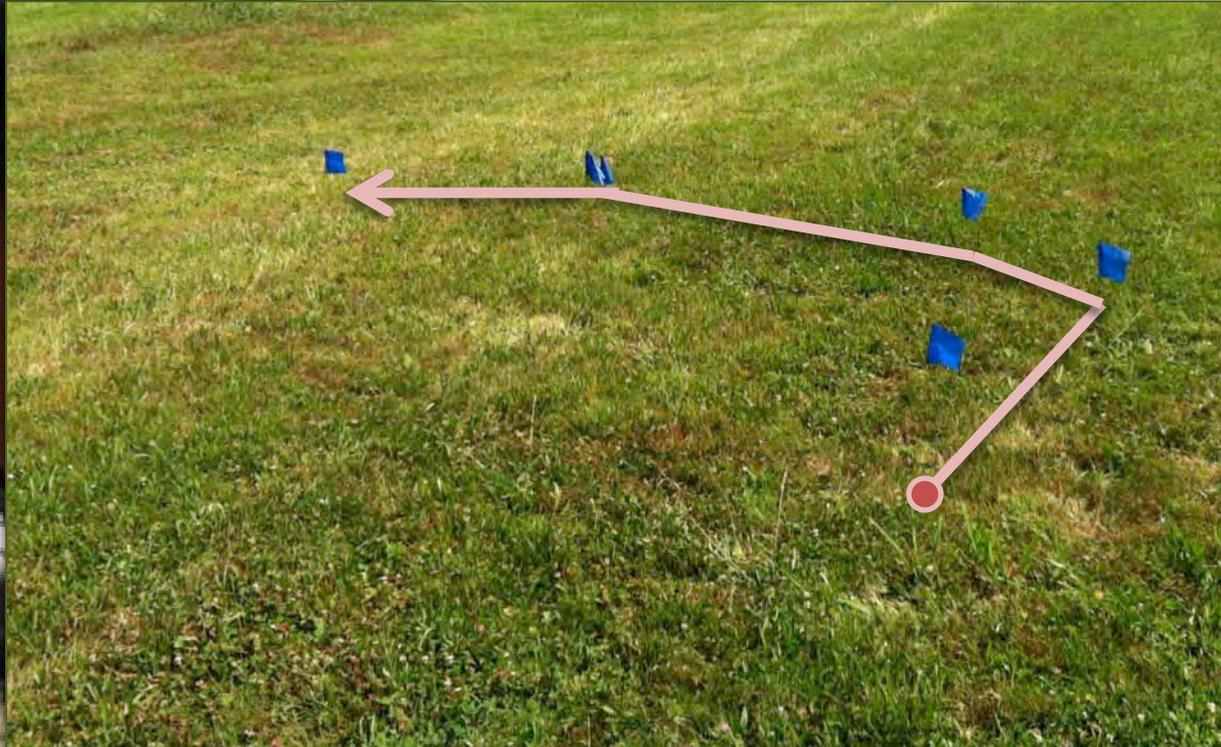
- Tested 2<sup>nd</sup> through 5<sup>th</sup> instars
- Petri-dish arena
- Video tracking system
- Observed for 1 hour



# Under lab conditions 3<sup>rd</sup> instar nymphs moved the greatest distances



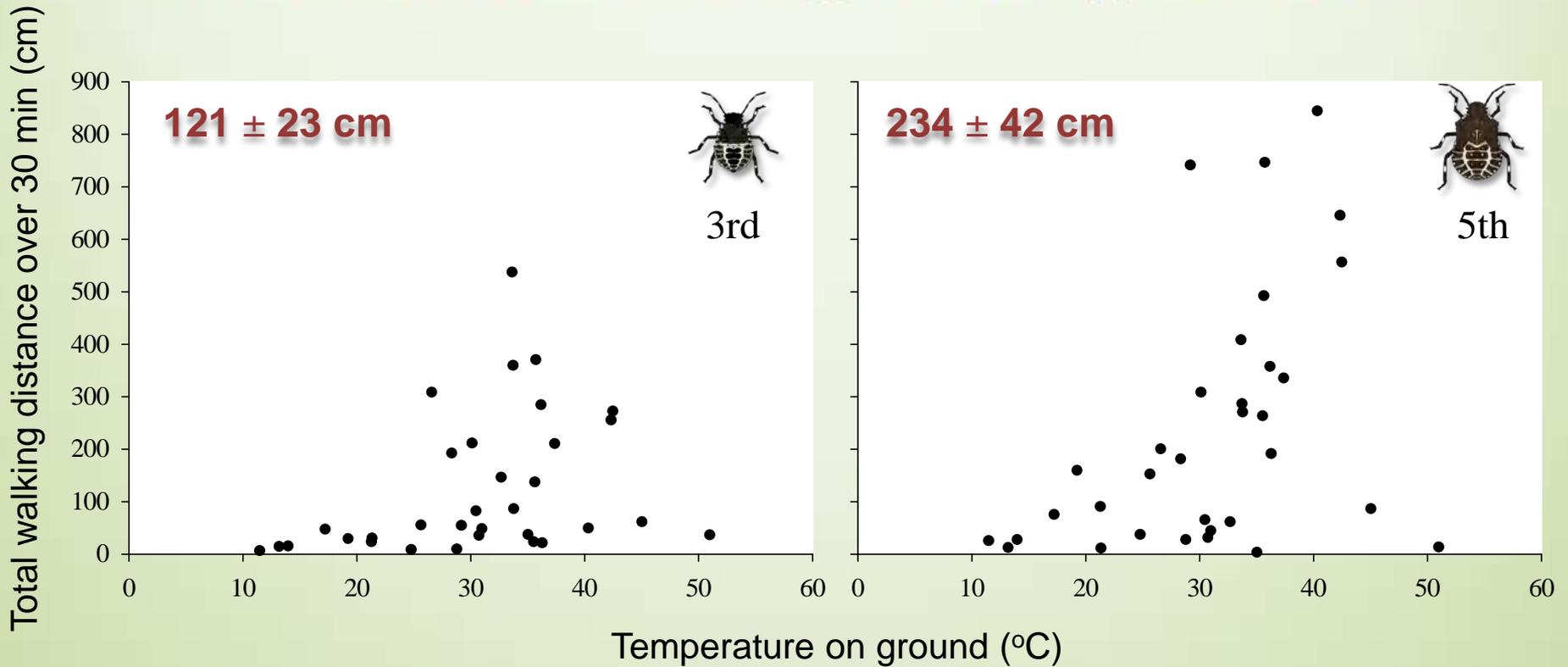
# Direct observation of nymph movement in the field



Marked nymph position every 5 minutes

- Marked 3<sup>rd</sup> and 5<sup>th</sup> instars
- 30 min for each individual
- Varying temperature throughout day

# Under field conditions 5<sup>th</sup> instar nymphs moved further at higher temperatures



# Mark-release-recapture study

## 5m



Marked 4<sup>th</sup> and 5<sup>th</sup> instar



Mark-release-recapture study  
20m

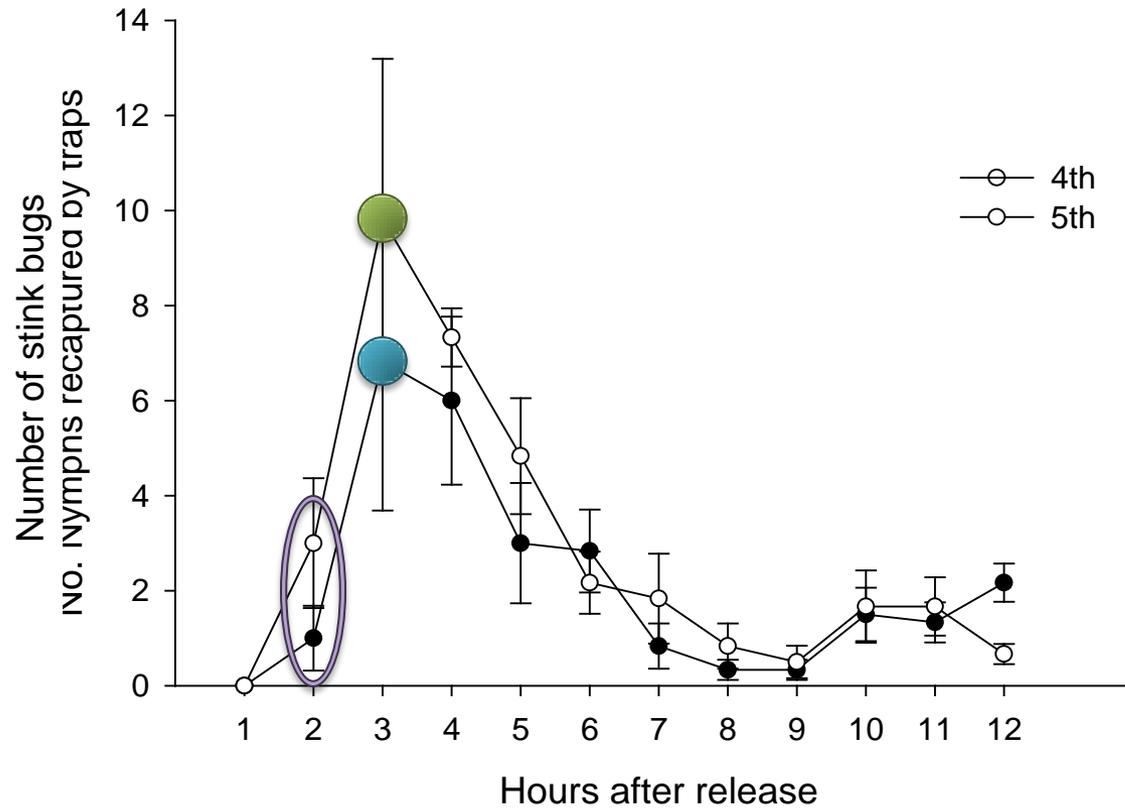


# Recapture rates

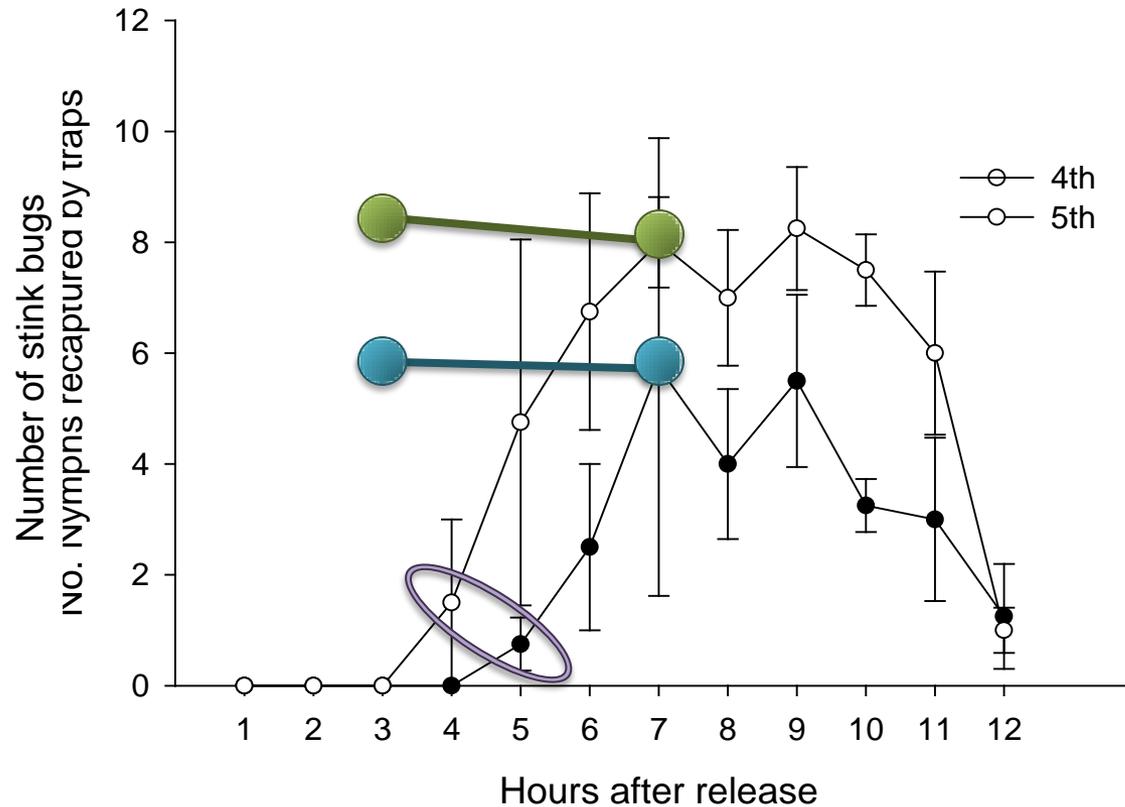


Distance to trap	Trial date	Life stage	
		4th instar	5th instar
5 m	July 23	<b>40%</b>	<b>57%</b>
	July 30	<b>69%</b>	<b>82%</b>
	Total	<b>54%</b>	<b>69%</b>
20 m	August 7	<b>19%</b>	<b>41%</b>
	August 14	<b>34%</b>	<b>62%</b>
	Total	<b>27%</b>	<b>51%</b>

# At 5m peak recapture after 3 hours



# At 20m peak recapture after 7 hours



# Nymphal host choice



# Field set up

- Four host plants: bell pepper, Swiss chard, soybean, and sweet corn
- Experimental plots:
  - 3 m x 3 m plantings
  - 4, 1 m<sup>2</sup> subplots
  - Planted to one of the four host plant
  - Fifth host plant positioned in the center as a release point.
  - Arranged in a random Latin square
  - Four replications



# Mark-release-recapture

- Marked with oil-based paint pens
  - 10 - 20 nymphs
  - Nymph instars corresponding to field
- Placed on one of the center host plants
- Plants with the nymphs were placed in the center of each of the 16 plots
- Plots were monitored 1, 3, and 5 days after each release
- Releases of marked nymphs were made six times

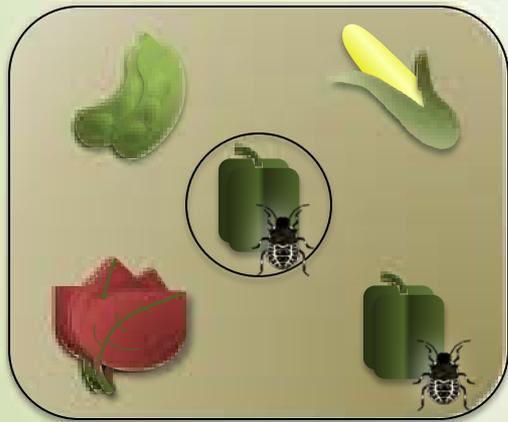


# Sampled through progressive plant phenology



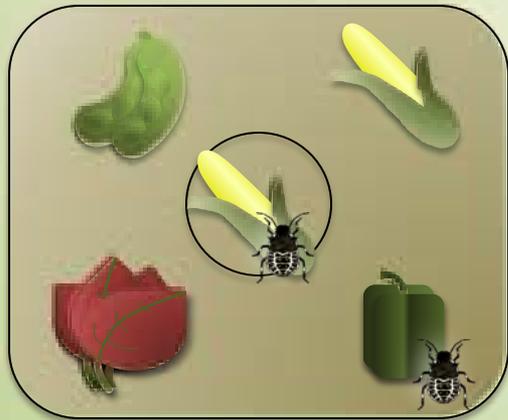
# Attraction index

**When center plant and dispersal plant are the same:**



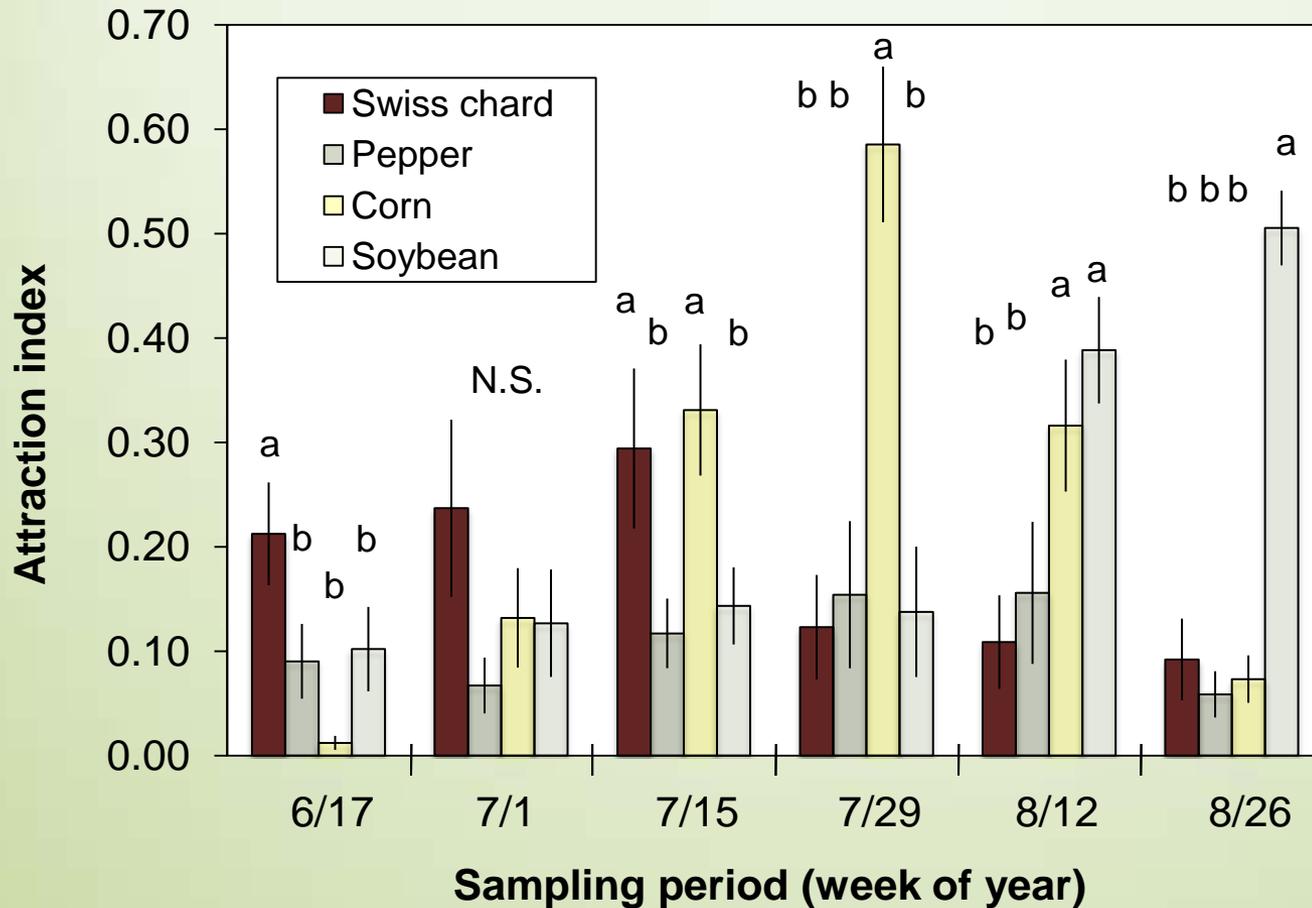
$$\text{Attraction index} = \frac{\text{nymphs center} + \text{nymphs dispersal plant}}{\text{total nymphs recovered in plot}}$$

**When center plant and dispersal plant are different:**

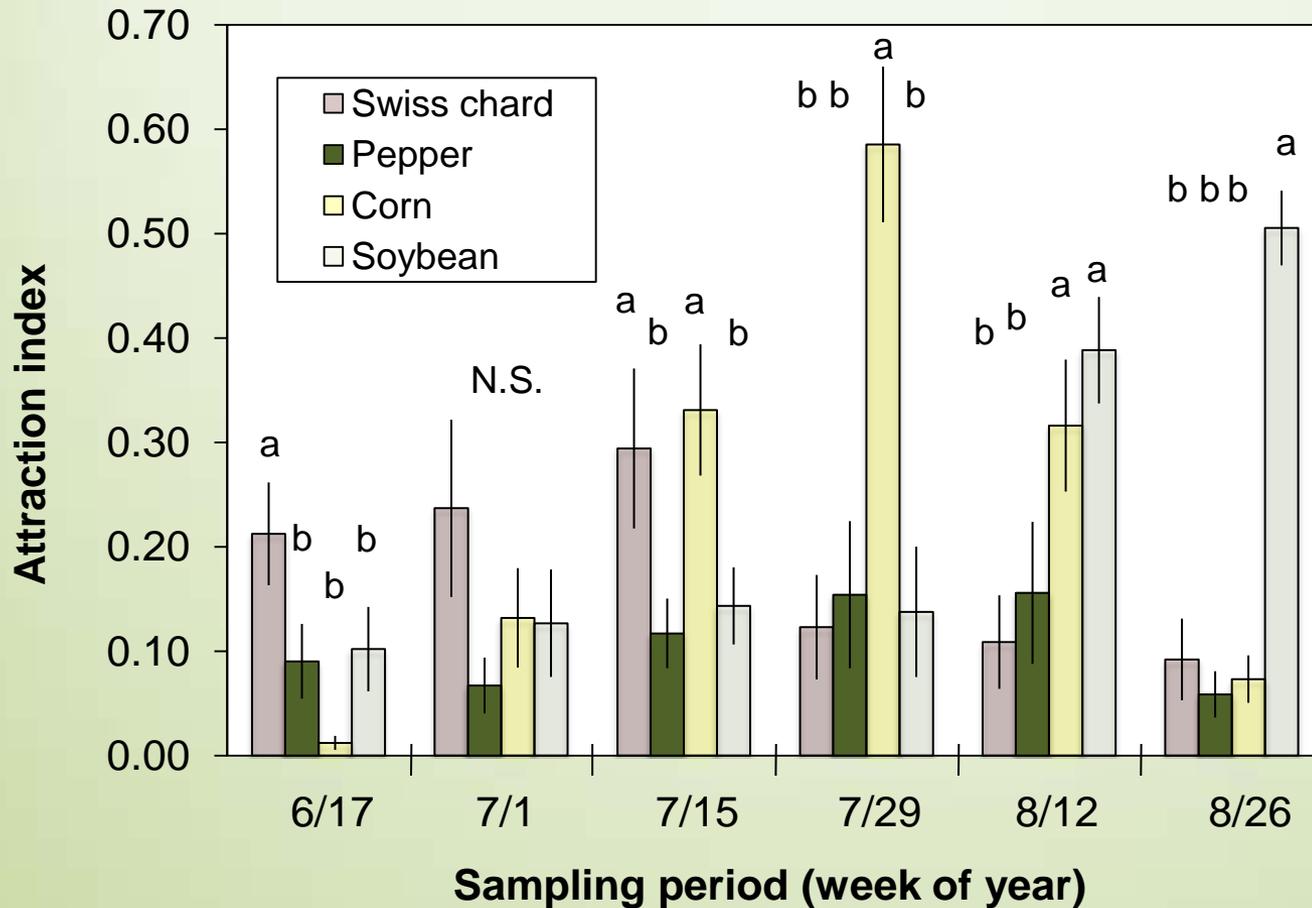


$$\text{Attraction index} = \frac{\text{nymphs dispersal plant}}{\text{total nymphs recovered in plot}}$$

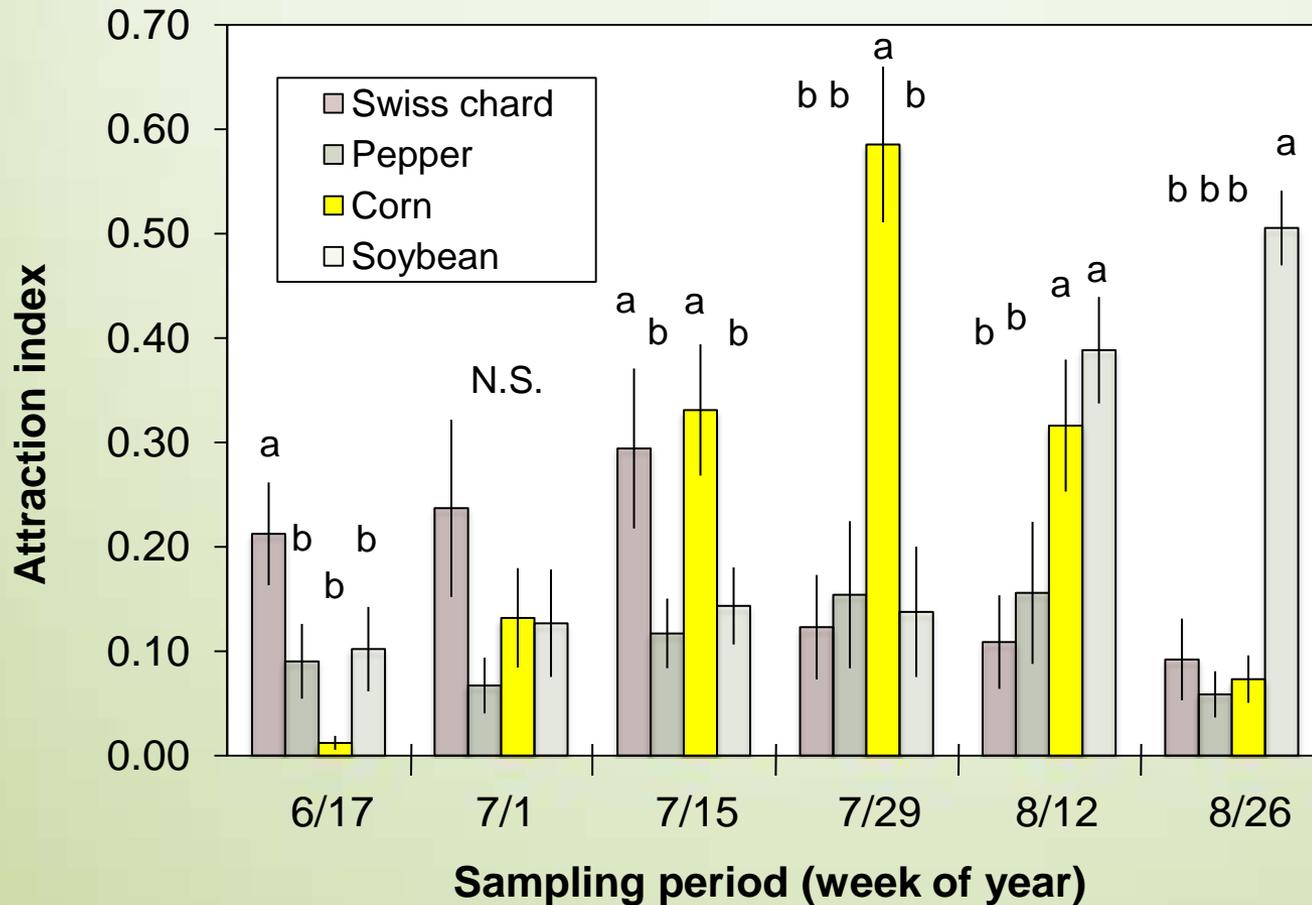
# Host plant attraction changes throughout the season: Swiss chard



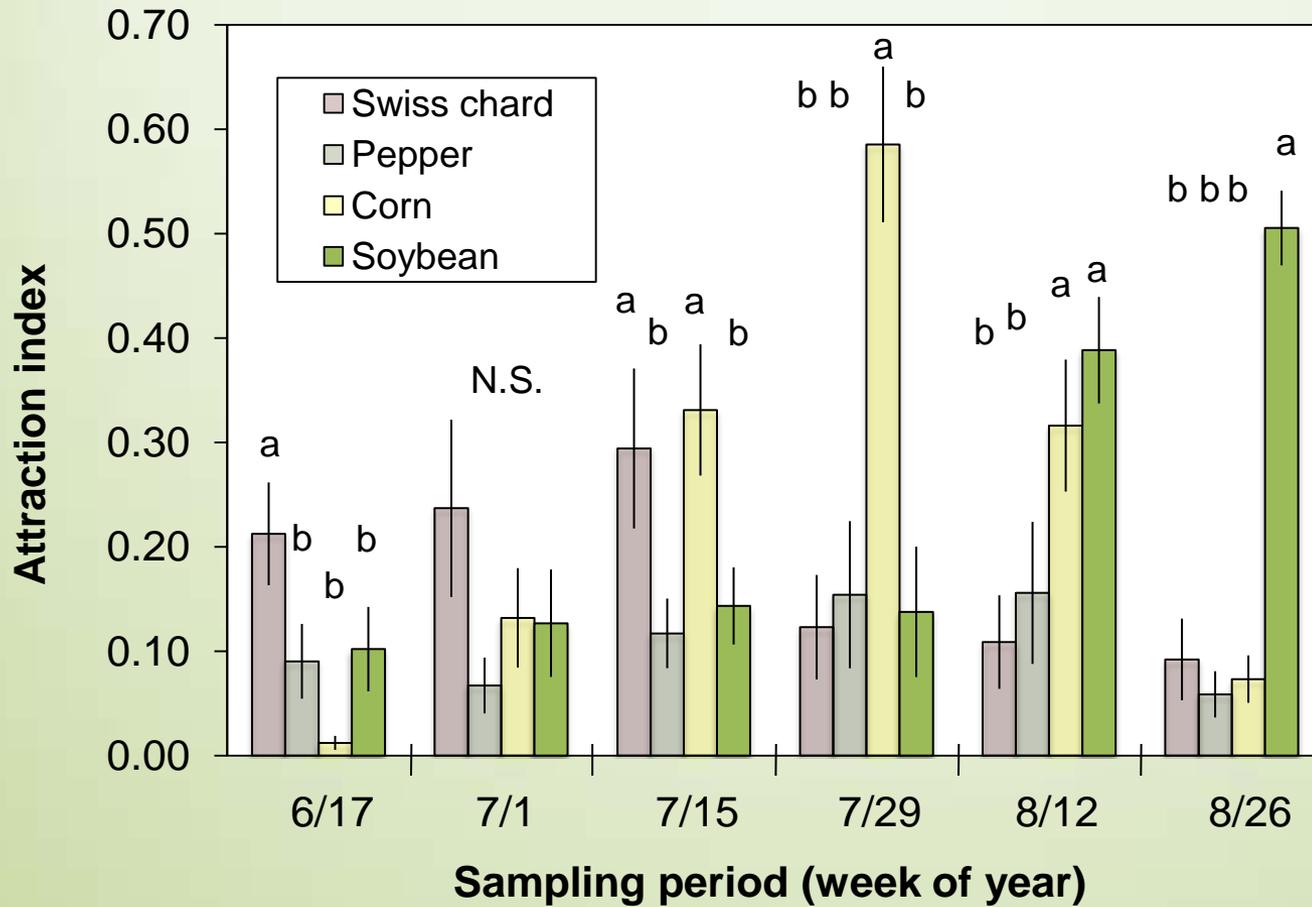
# Host plant attraction changes throughout the season: Pepper never preferred



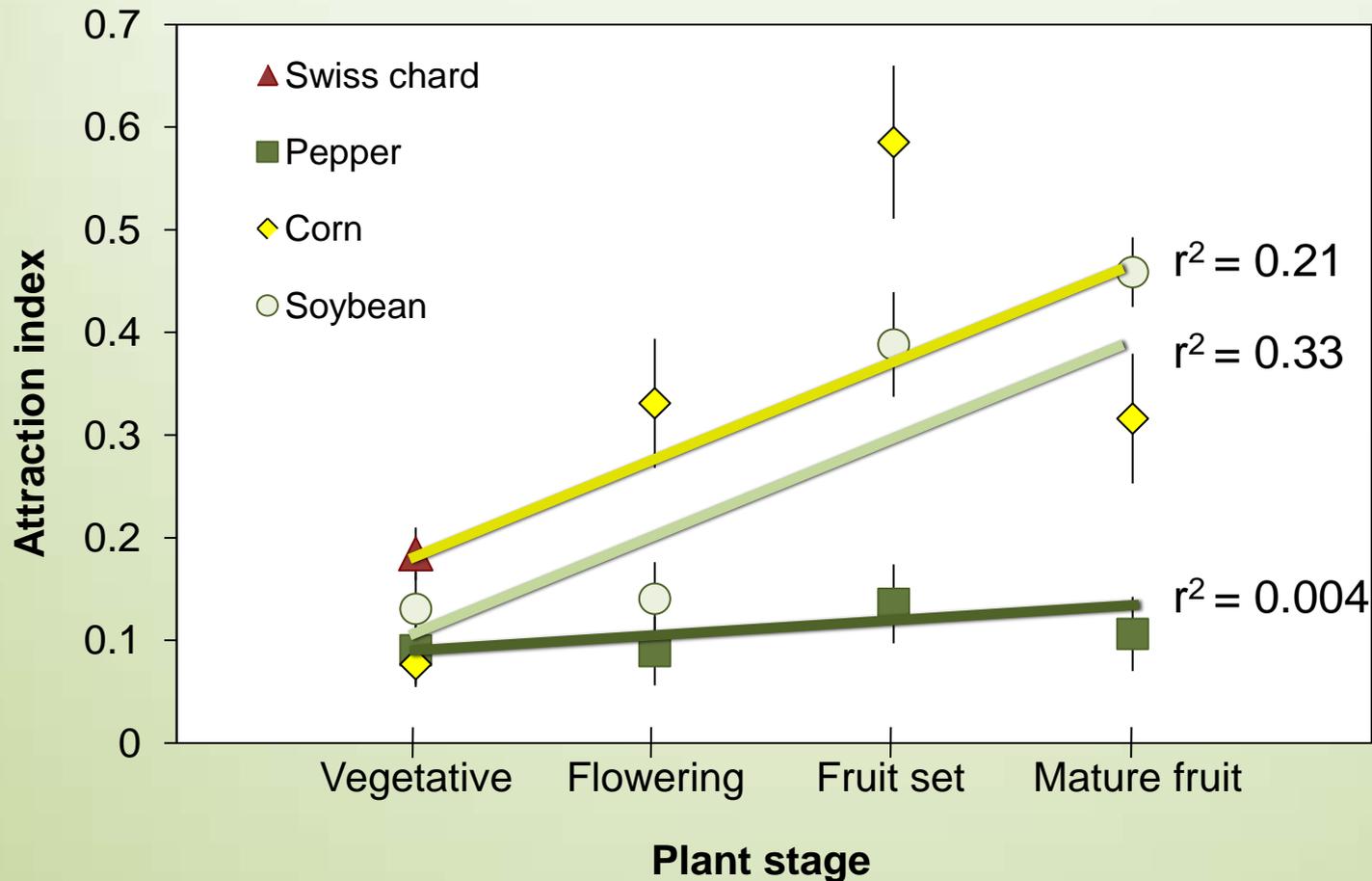
# Host plant attraction changes throughout the season: Corn



# Host plant attraction changes throughout the season: Soybean



# Host attractiveness may be dependent on plant phenology





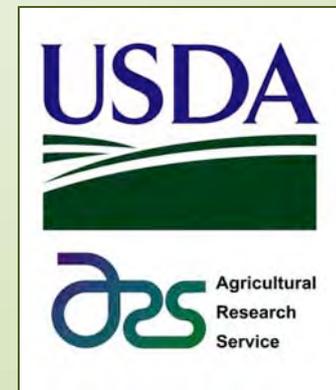
# Summary

- BMSB nymphs have strong walking capacity.
- Their capacity is affected by temperature with greater distances observed more frequently at  $>25^{\circ}\text{C}$ .
- BMSB nymphs show strong response to the olfactory attractant and traverse large distances to reach source.
- BMSB nymphs are also highly capable of dispersing from a central host plant to find a new host.
- Host attractiveness changes depending on host species and plant phenology.



# Acknowledgements

- The Nielsen Fruit Entomology Lab
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- SCRI
- OREI



# QUESTIONS?

