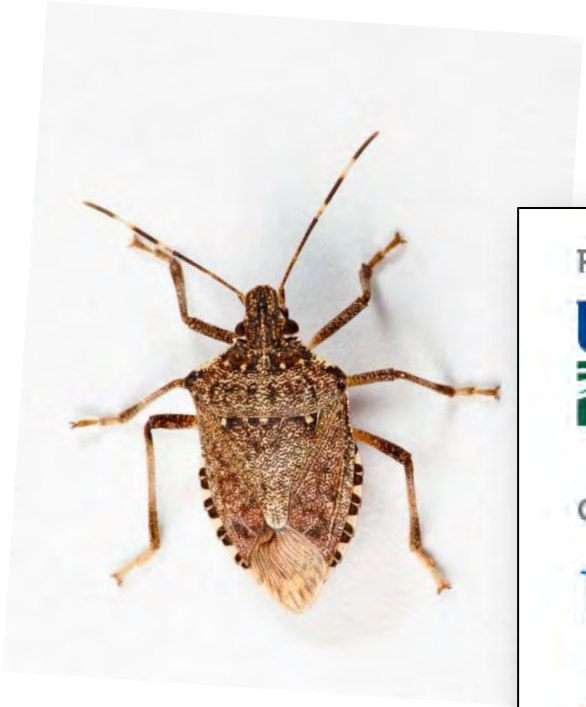
Orchard Crops Research Update



Funding

USDA United States Department of Agriculture

National Institute of Food and Agriculture

Specialty Crop Research Initiative

Grant #2011-01413-30937

Collaborating Institutions

University of Delaware

ars

Penn State

The State University of New Jersey Rutgers

Northeastern IPM Center

Washington State University

Cornell University

University of Maryland

VirginiaTech

OSU Oregon State University

NC State University

Stop BMSB.org

Objective 3.1:
Short-term mitigation of BMSB risk within specific specialty crops

- BMSB insecticide efficacy and management trials in experimental plots and commercial orchards

BMSB demonstration trial

- Final year of 3-year study
- Eight paired apple blocks in 2013
- Effectiveness against all pests
- Cost (materials, # sprays)
- Effects on secondary pests

Objective 1.3:

Determine the risk and impact of BMSB to specific specialty crops

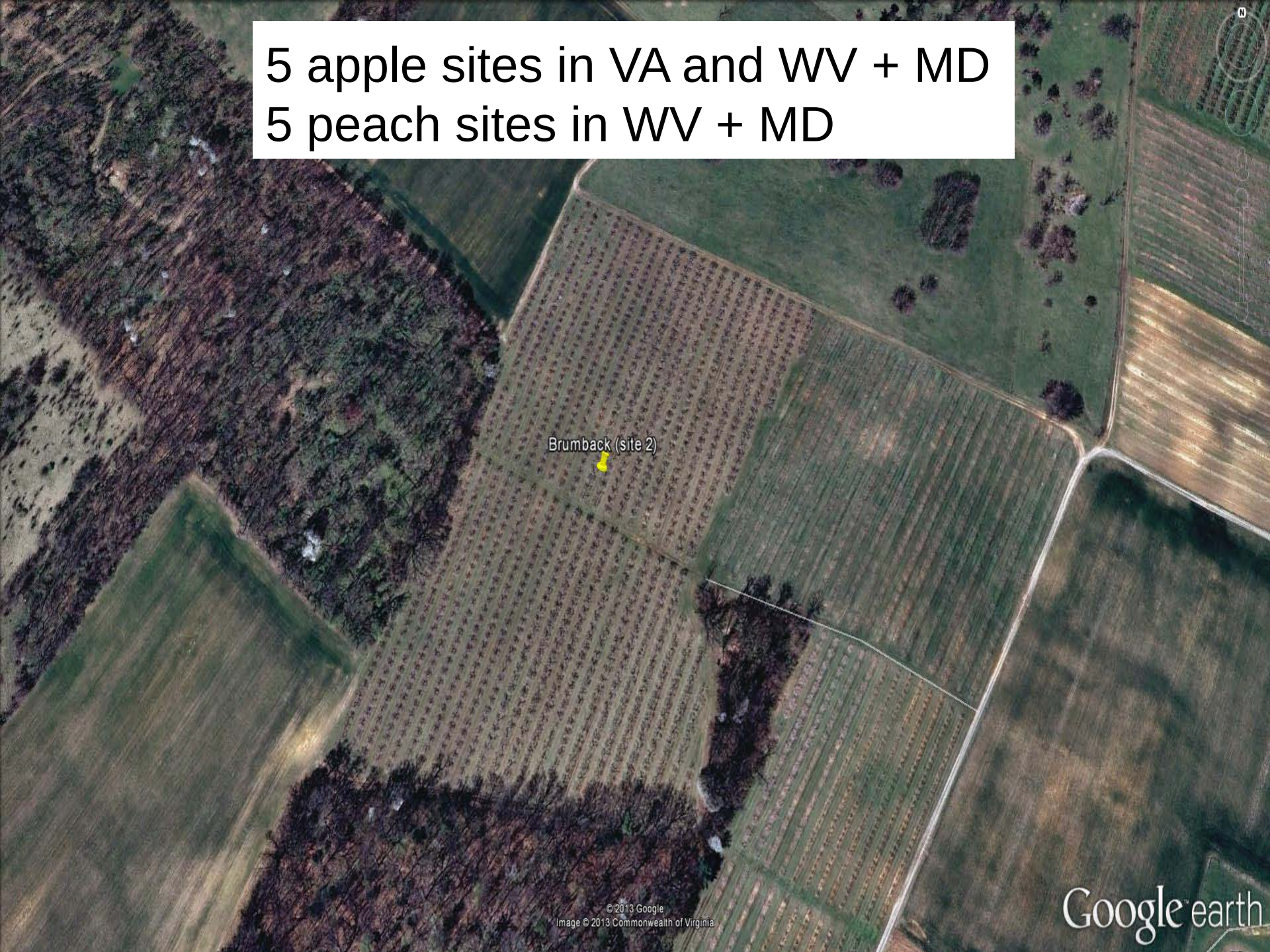
Objective 3.2:

Refine management strategies based on use of monitoring tools for BMSB to allow IPM practices to be resumed within specialty crops

Trap placement in relation to captures and injury in commercial orchard blocks

- Do different habitats bordering orchards affect captures differently through the season? How do captures in traps in the interior of orchards compare with those from traps at the borders?

- Is the incidence of injury at points during the season related to captures and/or adjacent habitat?


5 apple sites in VA and WV + MD
5 peach sites in WV + MD
Brumback (site 2)
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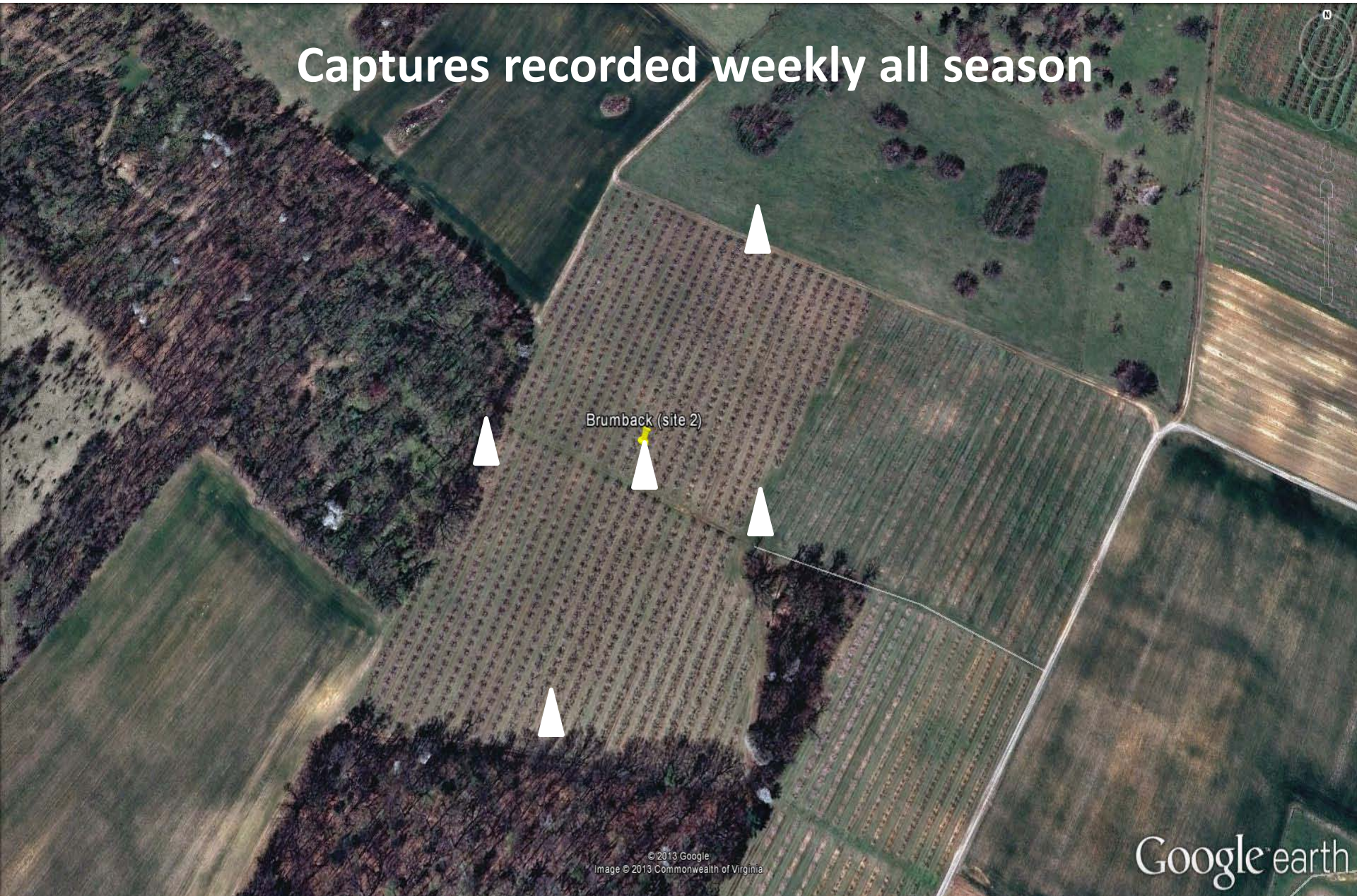
Google earth

Traps at four sides and center of each block

Traps at four sides and center of each block



Evaluate fruit from neighboring trees every 2 wk

Evaluate fruit from transects monthly

Captures in relation to injury in unsprayed apple blocks

- Blocks at AHS-AREC and USDA AFRS
- Pheromone-baited traps along border row adjacent to woods monitored weekly
- Fruit injury assessments at weekly intervals

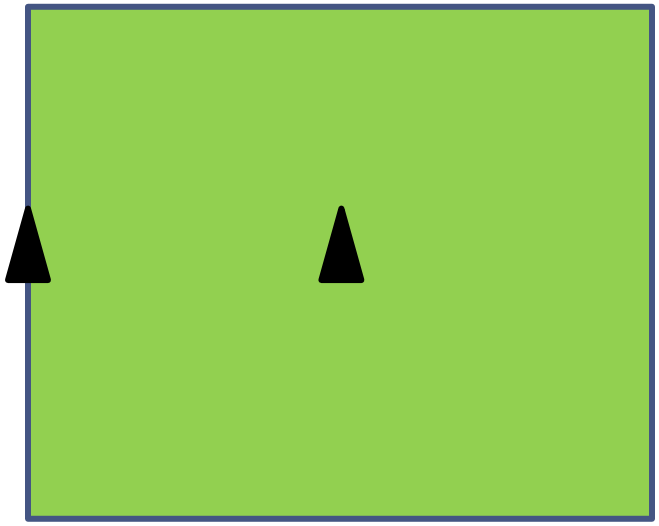
Development of Trap-Based Treatment Thresholds for Apple

- 15 apple blocks at AFRS

- Each block monitored with two traps baited with pheromone + MDT; one at border and one at center. Traps checked weekly.

- When captures in either trap reached a treatment threshold, block treated with BMSB material (ARM), then again after 7-d. Threshold was then reset.

- Twice-monthly fruit samples



Treatment Regimes

Sprays Triggered at:
1) 1 Adult / Trap
2) 10 Adults / Trap
3) 20 Adults / Trap

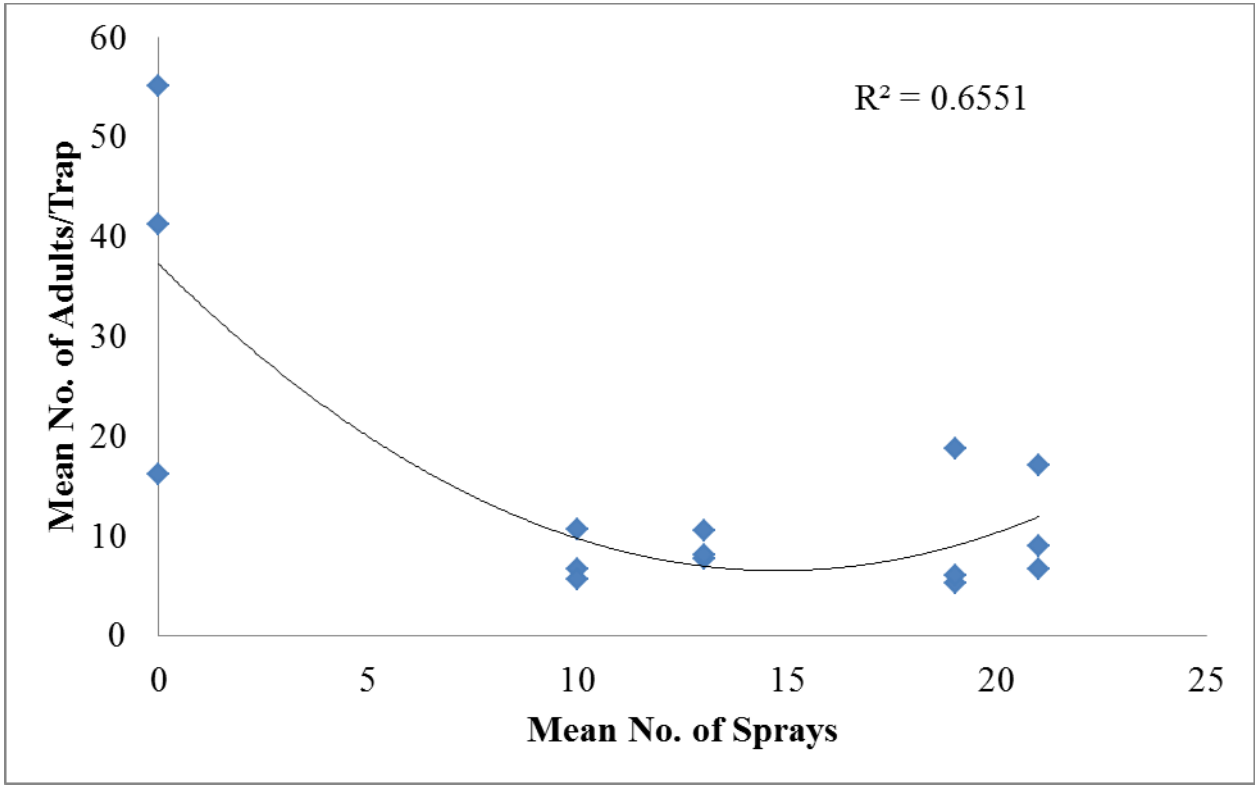
4) Treated Every 7 d

5) No Spray (Control)

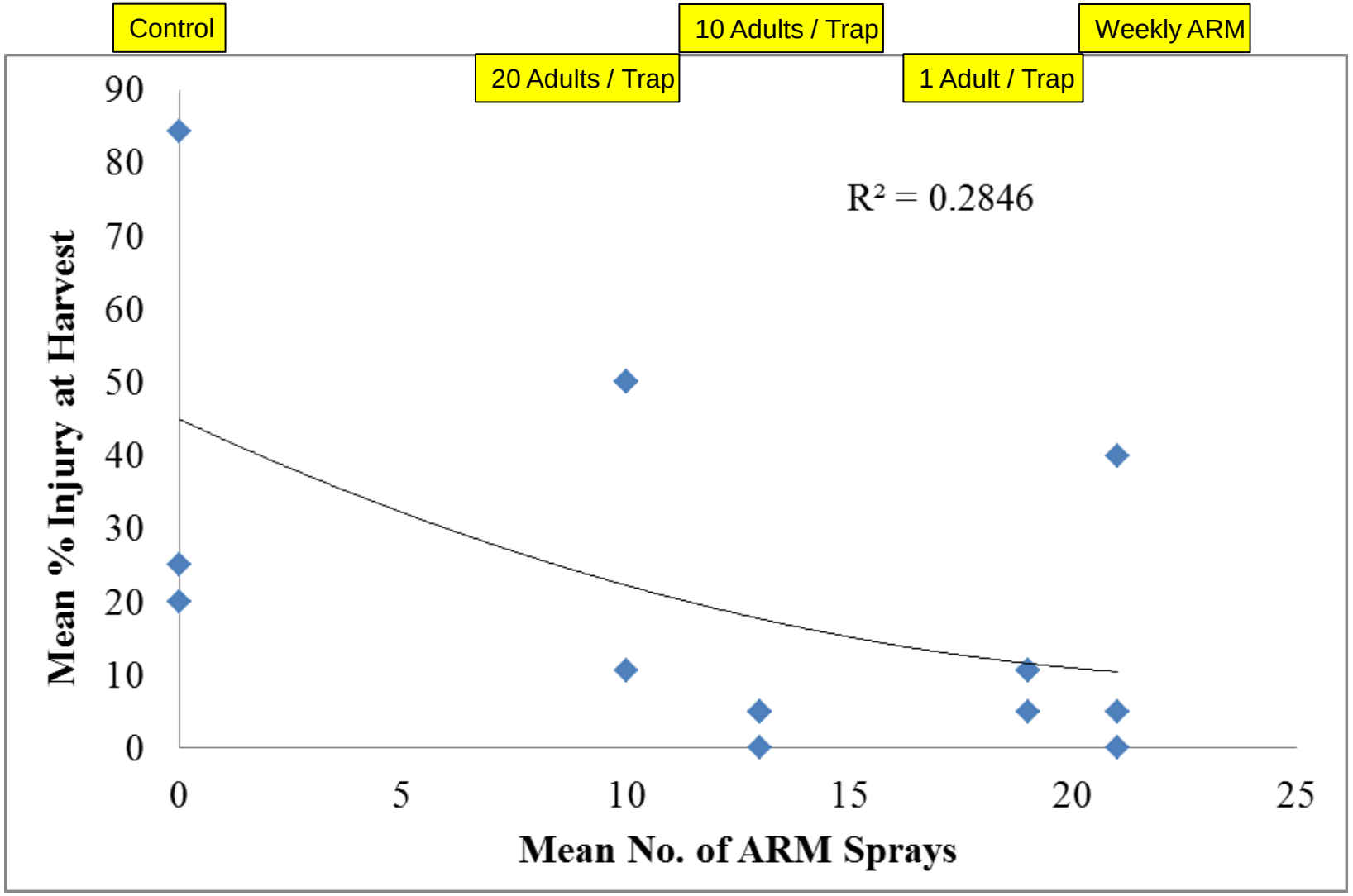
Trapping and Insecticide Treatments

Treatment Threshold	Mean No. ARM Sprays Per Block
Weekly ARM	21
1 Adult/Trap	19
10 Adults/Trap	13
20 Adults/Trap	10
Control	0

Relationship between Mean no. of Adults/Trap and Mean no. of Sprays for Whole Season:
Exterior Trap (nonlinear regression, quadratic): $R^2 = 0.655062$



% Injury at Harvest (nonlinear regression, quadratic)



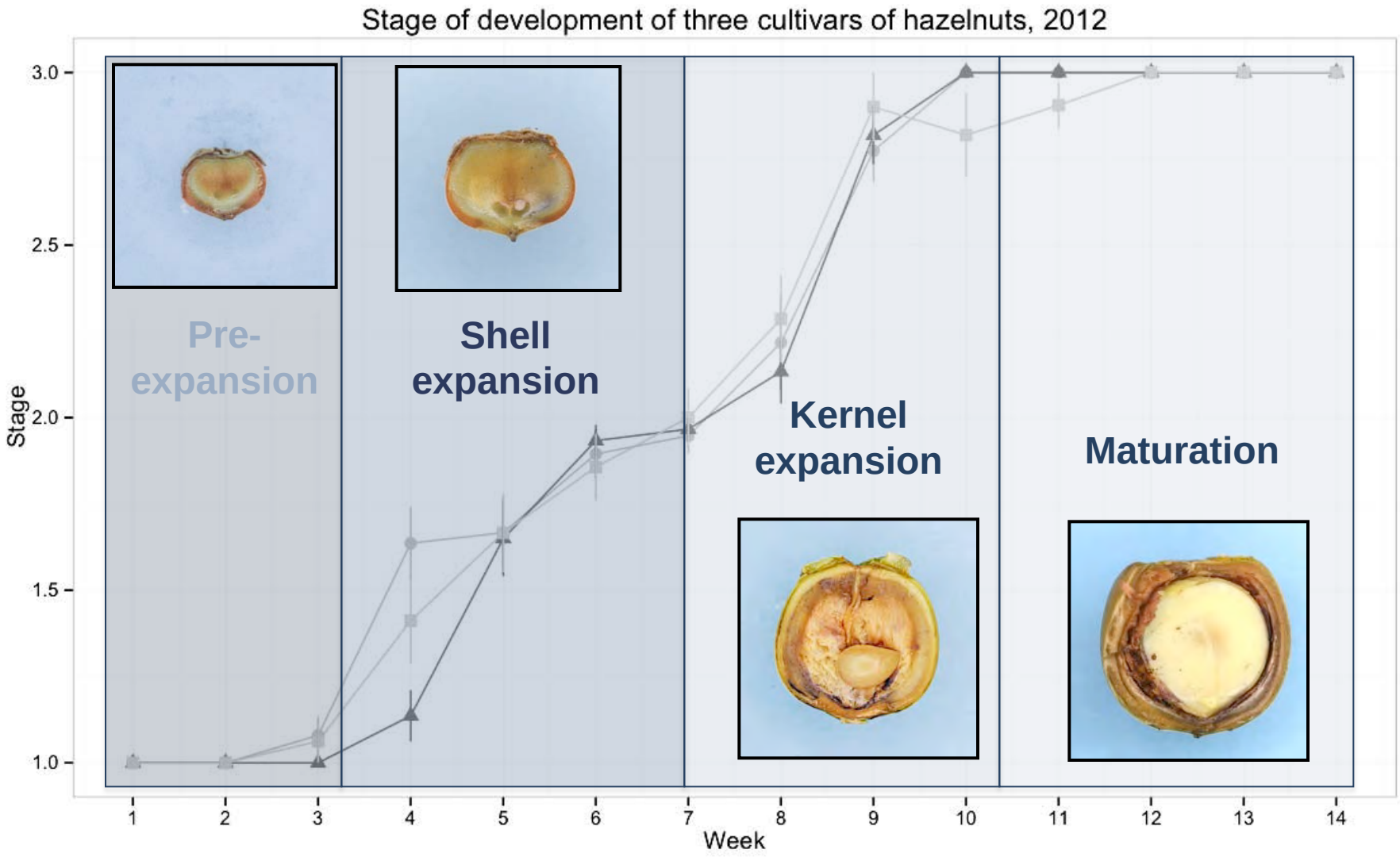
Objective 1.2:

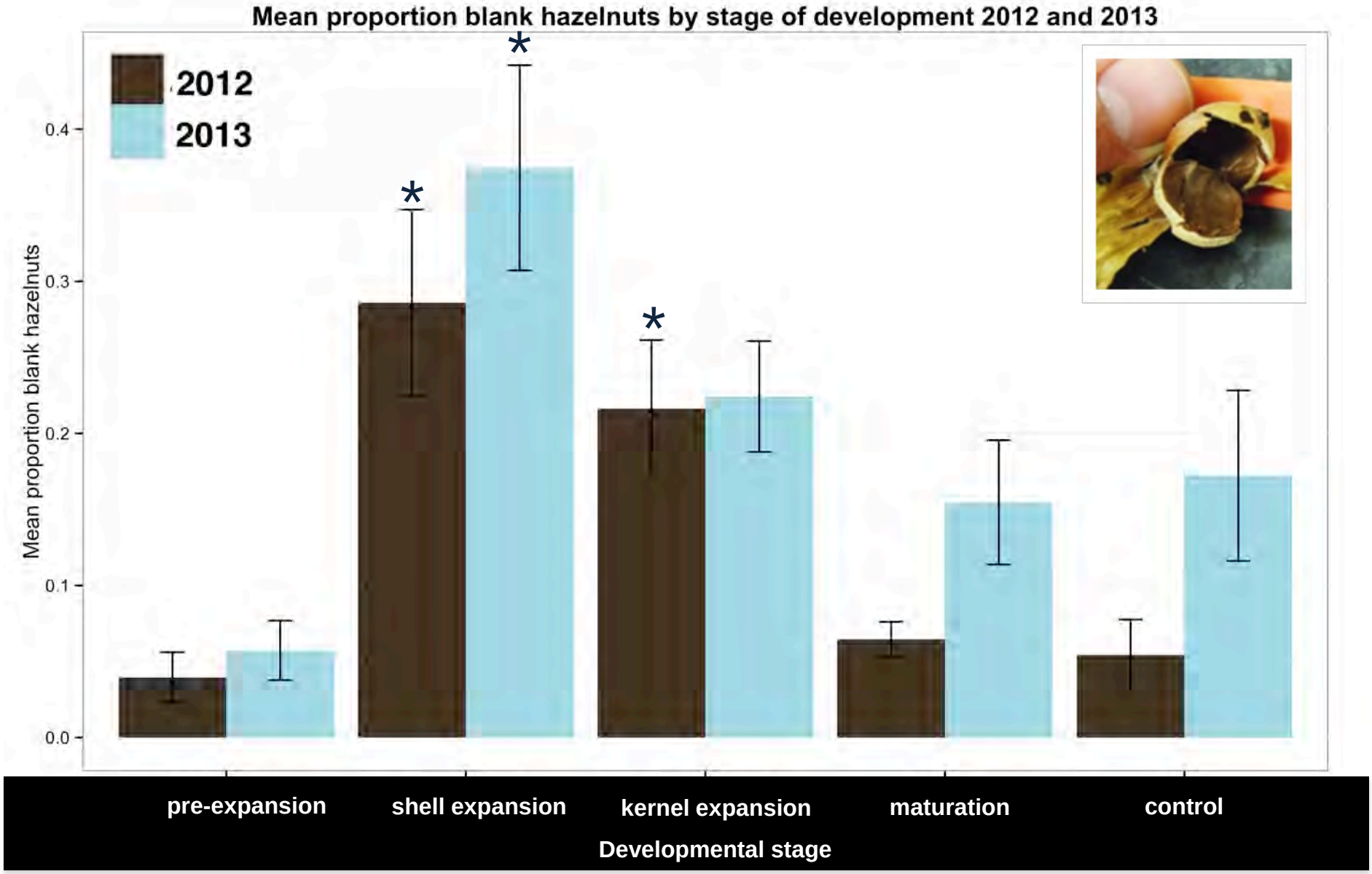
Define parameters to diagnose injury and characterize severity in specialty crops

Objective 1.3:

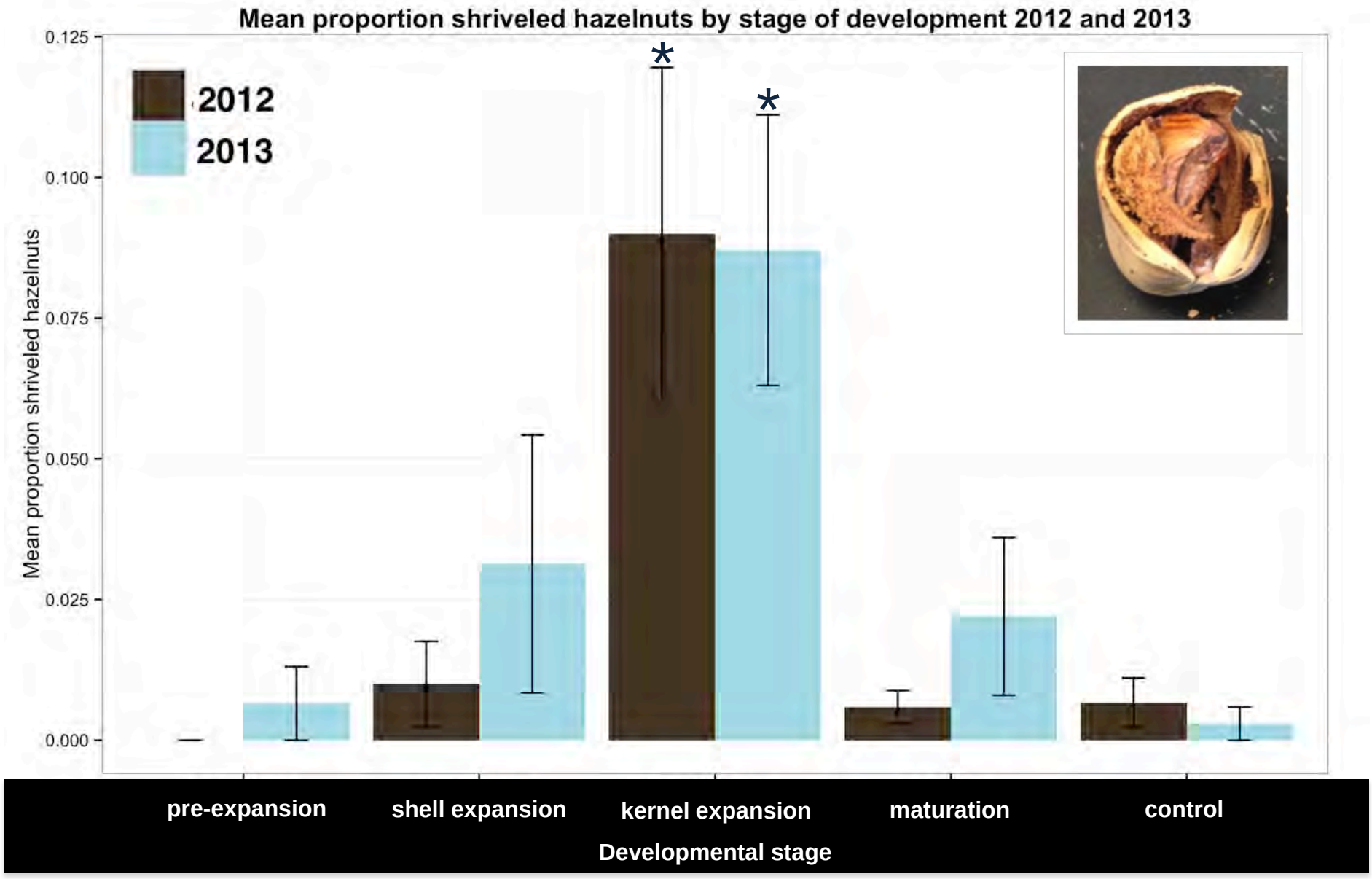
Determine the risk and impact of BMSB to specific specialty crops

Cages studies assessing BMSB feeding injury to hazelnuts in relation to nut developmental stage





*indicates a p-value < 0.005, Exact Binomial Test compared to control of same year



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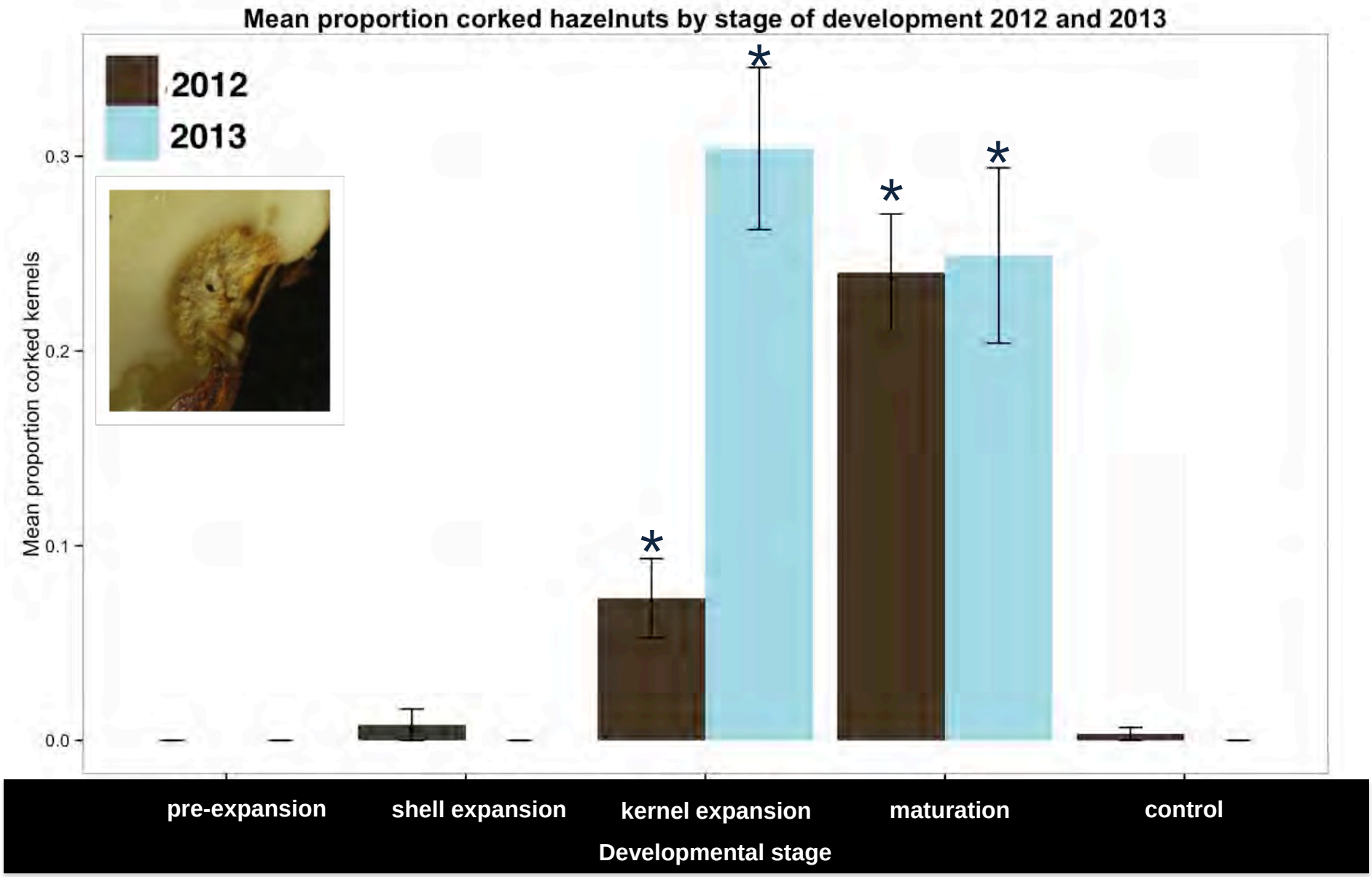

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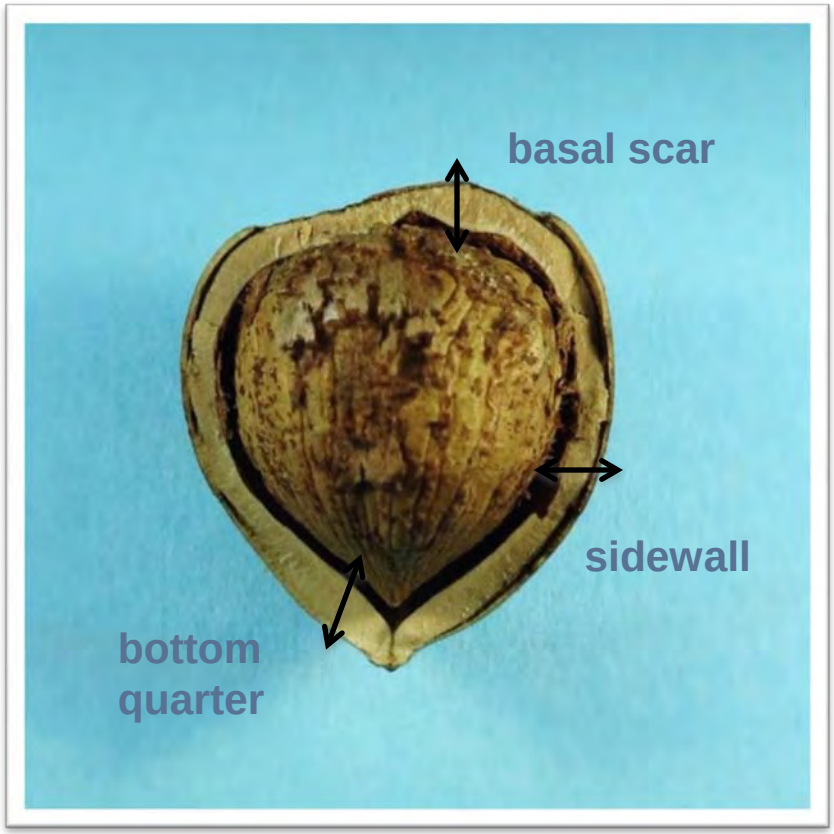
- Filbertworm and weevil infestation was reduced in cultivars with thicker shells (Chambers et al. 2011, Jones et al. 1992)

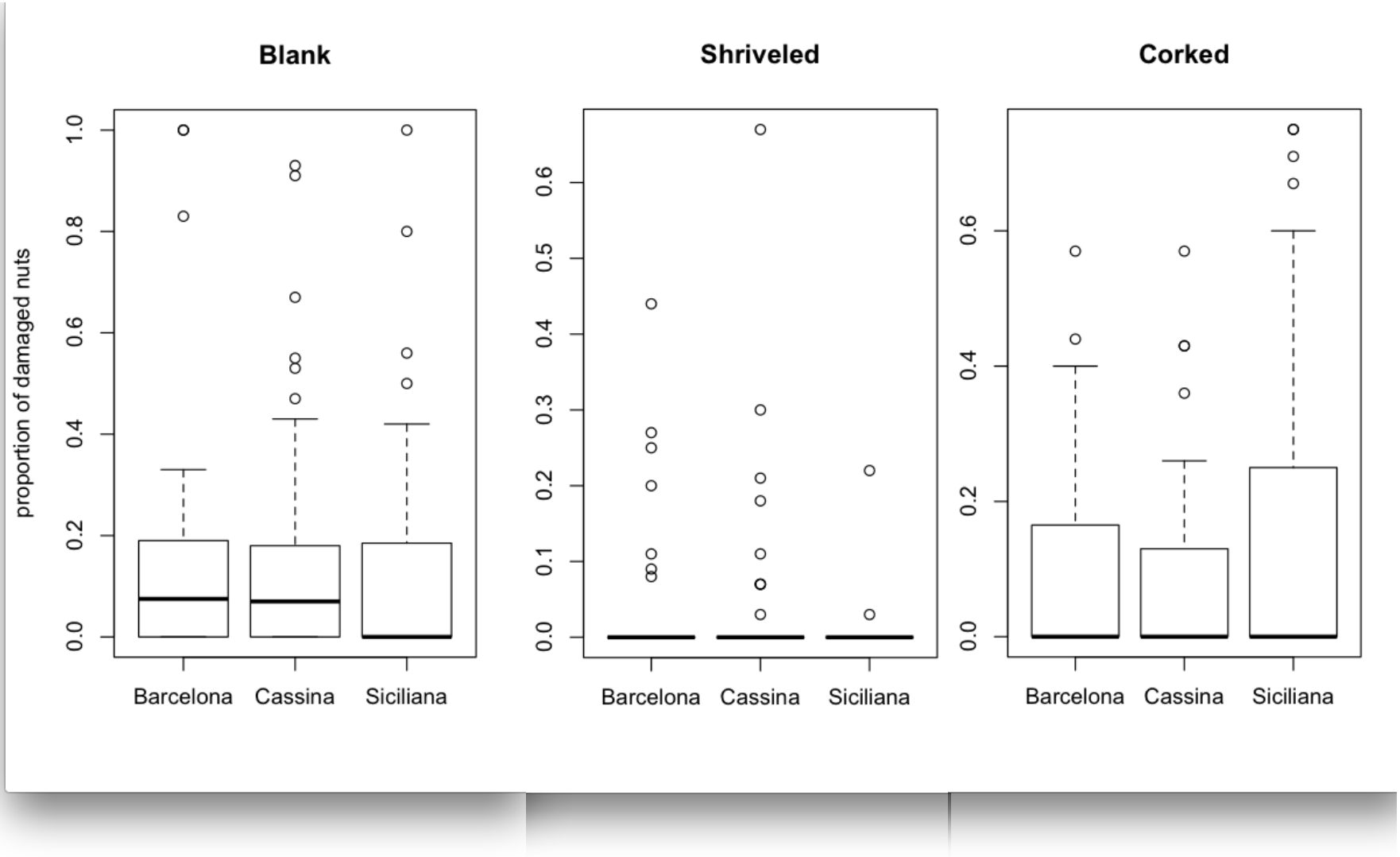
- 3 Cultivars to represent three thicknesses:
  - **Thick:** Siciliana
  - **Medium**: Barcelona
  - **Thin**: Casina (Closca Molla replaced Casina: Casina in 2013)

- Measured at basar scar, side walls and bottom quarter

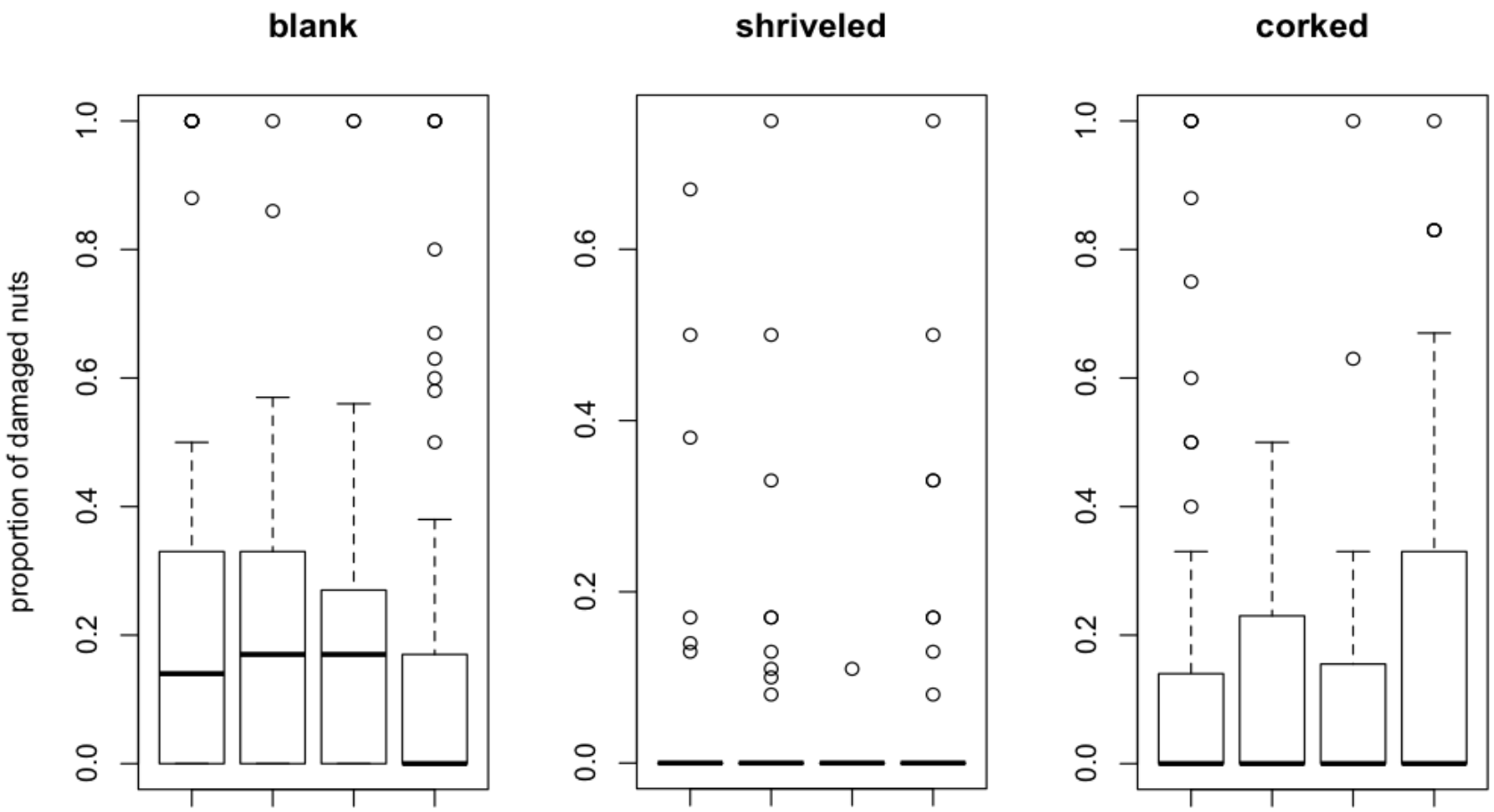
- Percentage of damaged nuts compared between cultivars



Damage by cultivar, field trial 2012



Damage by cultivar, field trial 2013



Results

Damage

- All stages of hazelnuts tested were susceptible to feeding damage

- Damage appears to be very similar to that of other tree nuts by other members of Pentatomidae, corking damage similar to hazelnuts fed on by pentatomids in Turkey and Italy

- Early season feeding during shell expansion resulted in blank nuts, feeding during kernel formation and maturation results in shriveled kernels or corking damage in both seasons tested.

Shell Thickness

- Hazelnut cultivars chosen varied in mean shell thickness, though less evident for medium (Barc.) and thick (Sici.) cultivars in 2013

- Feeding almost always occurred on side wall in lab trial

- No evidence of a relationship between hazelnut shell thickness and resulting feeding damage in field trials or lab trial

- Feeding sheath on outside of nut not always indicative of feeding event or nut damage