BMSB in Western Region
California's and Utah's Increasing Concerns

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Funding

USDA United States Department of Agriculture National Institute of Food and Agriculture

Specialty Crop Research Initiative

Collaborating Institutions

ars · NC State University · PennState · OSU Oregon State · University of Maryland · University of Georgia · Washington State University · Northeastern IPM Center · Cornell University · UtahStateUniversity · Rutgers University · The Ohio State University · University of Kentucky · UC Davis · University of Minnesota · VirginiaTech · Berkeley · Michigan State University · UC Riverside

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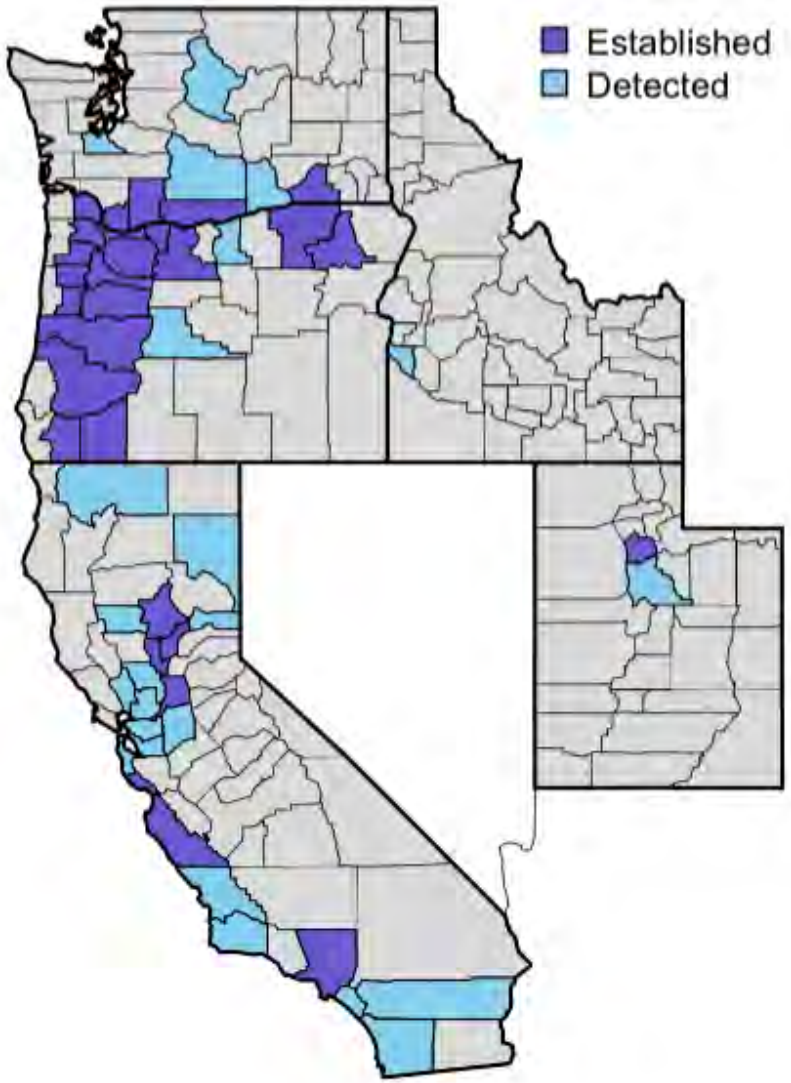
BMSB in Western Region



California:

Frank Zalom (UCD), Mark Hoddle (UCR), Jhalendra Rijal (UCCE Areawide IPM), Emily Symmes (UCCE Areawide IPM) , Chuck Ingels (UCCE Sacramento Co.), Monica Cooper (UCCE Napa Co.)

Utah:

Lori Spears (Utah State Univ.)

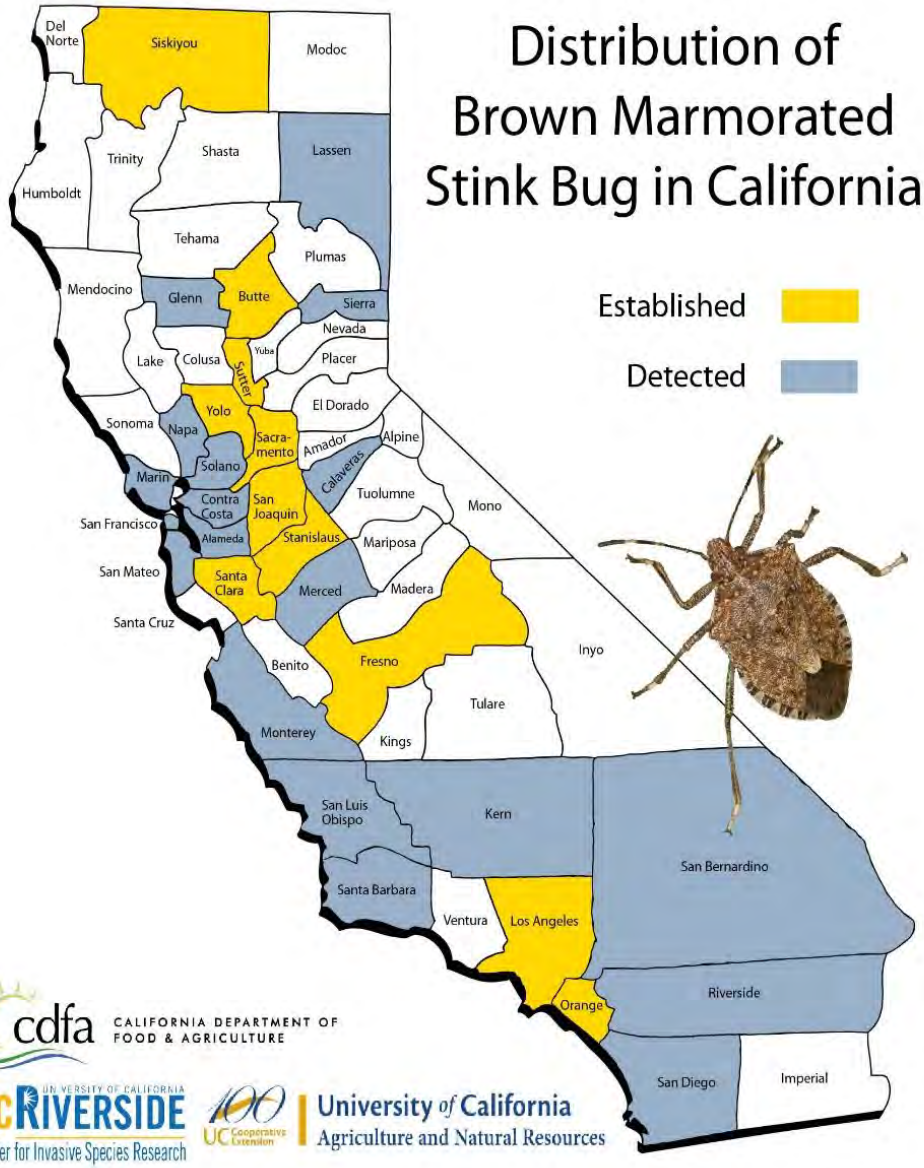
BMSB in California

>$50 billion
Top agricultural counties are in the Central Valley, other valuable crops throughout the state

Almonds ($5.8 B)
Grapes ($5.2 B)
Walnuts ($1.8 B)
Pistachios ($1.6 B)
Oranges ($950 M)
Peaches ($356 M)
Kiwifruit ($32 M)

2014 summary (CDFA)

BMSB in California



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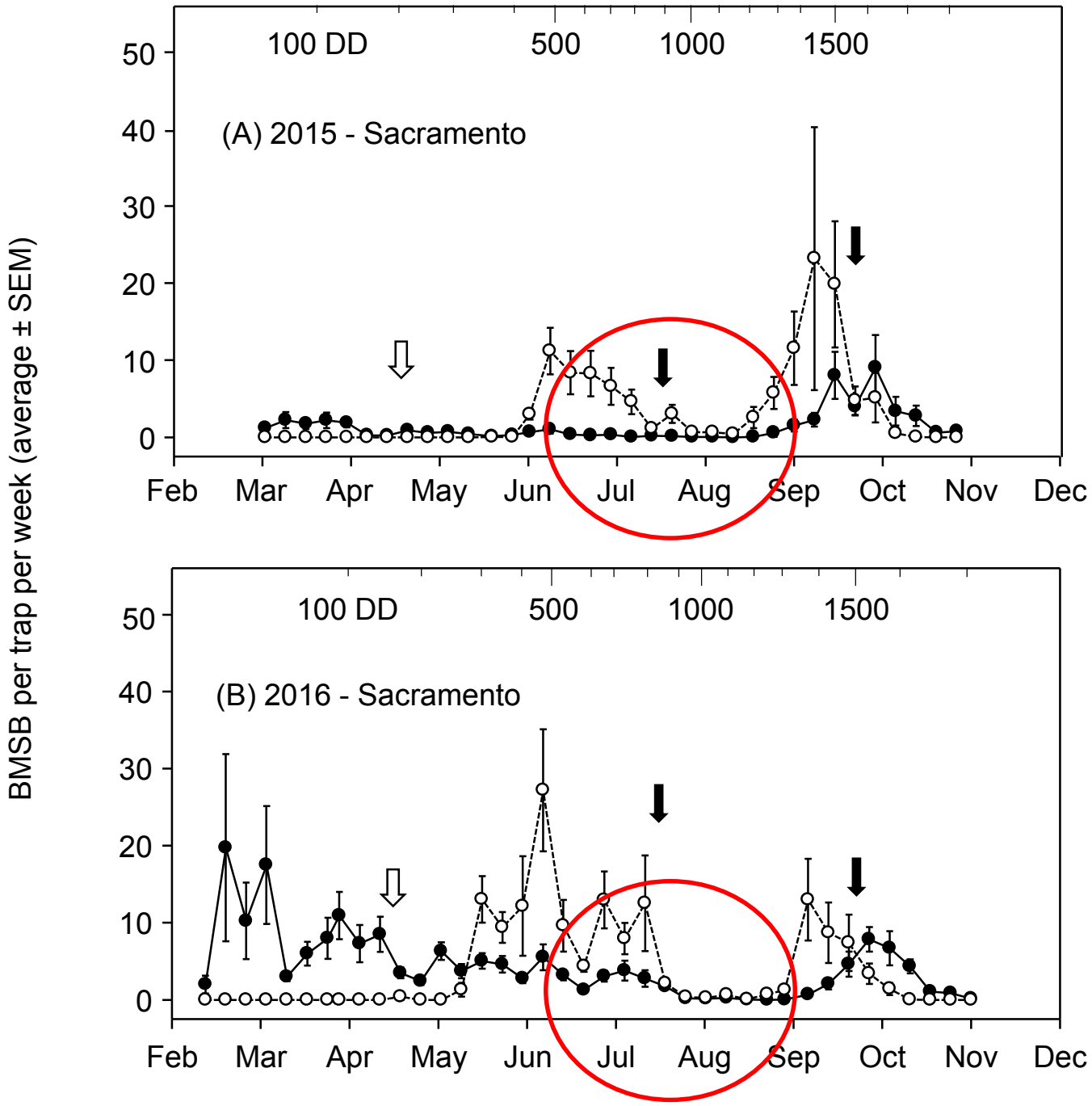
Peaches ($356 M)
Kiwifruit ($32 M)

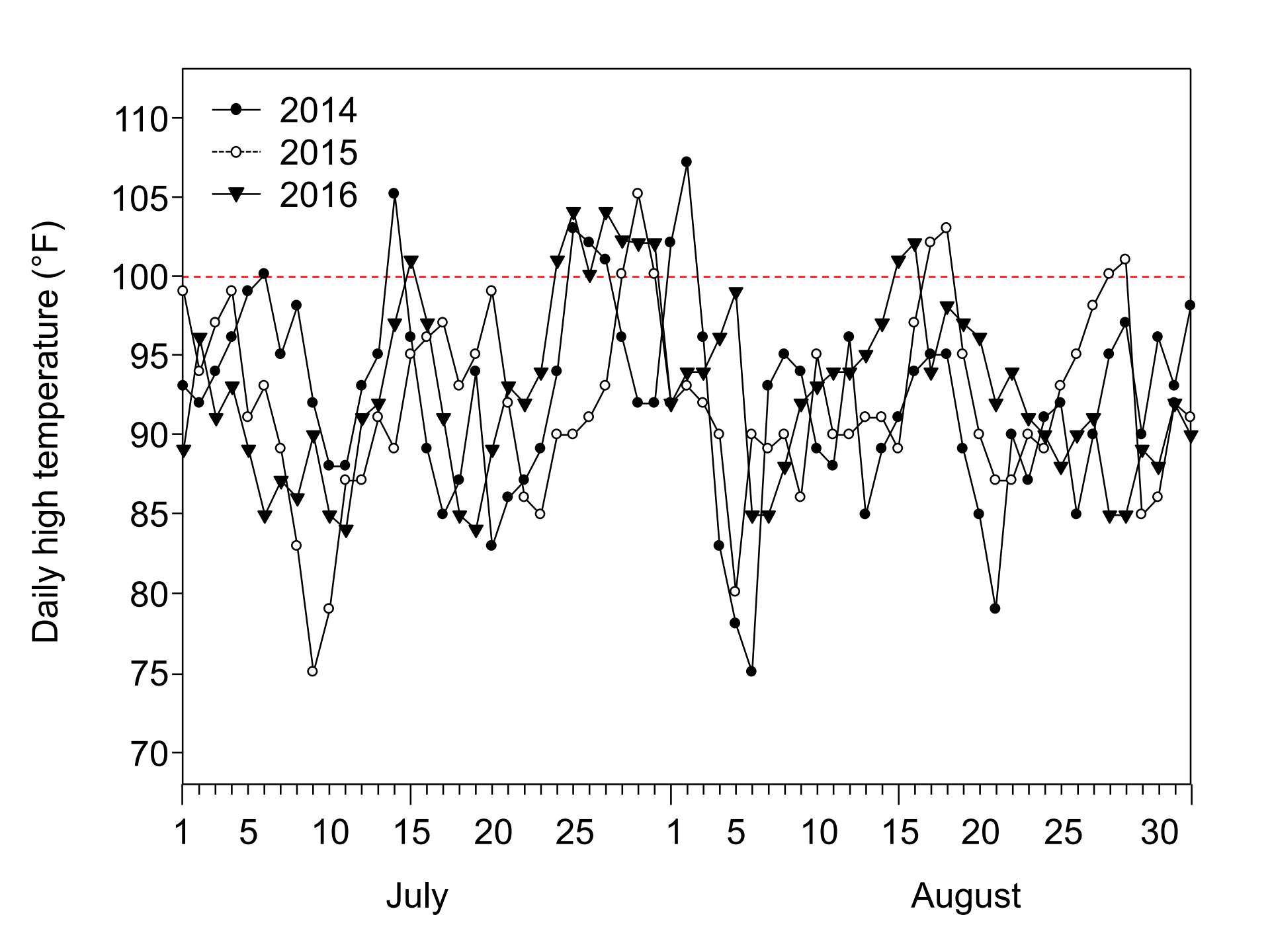
2017 summary (UCR/CDFA)

BMSB in California – Urban Areas

In California, early BMSB finds were in urban areas (Los Angeles, San Jose, and Sacramento), and found in gardens and on landscape trees (e.g., tree of heaven).



Ingels and Daane 2018, JEE

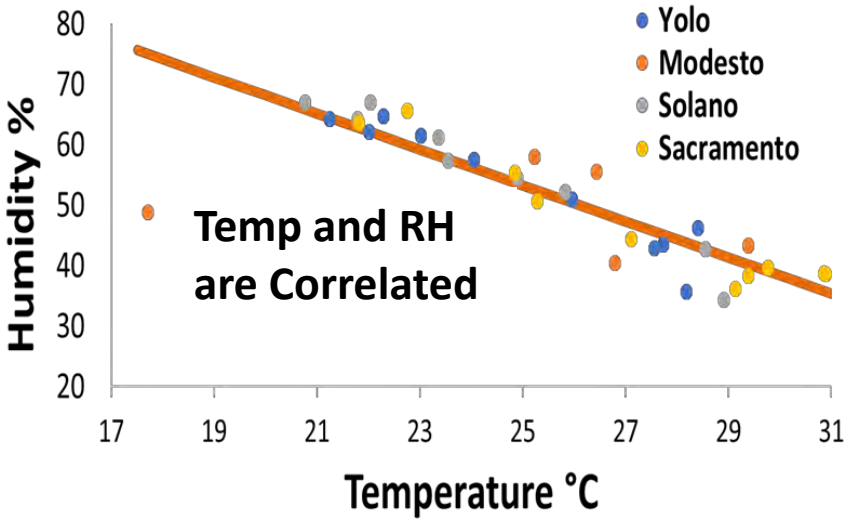

2014
2015
2016
Daily high temperature (°F)
110
105
100
95
90
85
80
75
70
1
5
10
15
20
25
1
5
10
15
20
25
30
July
August

Impact of temperature and humidity on BMSB in the Central Valley

Joanna Fisher, Frank Zalom, Jhalendra Rijal, Chuck Ingels

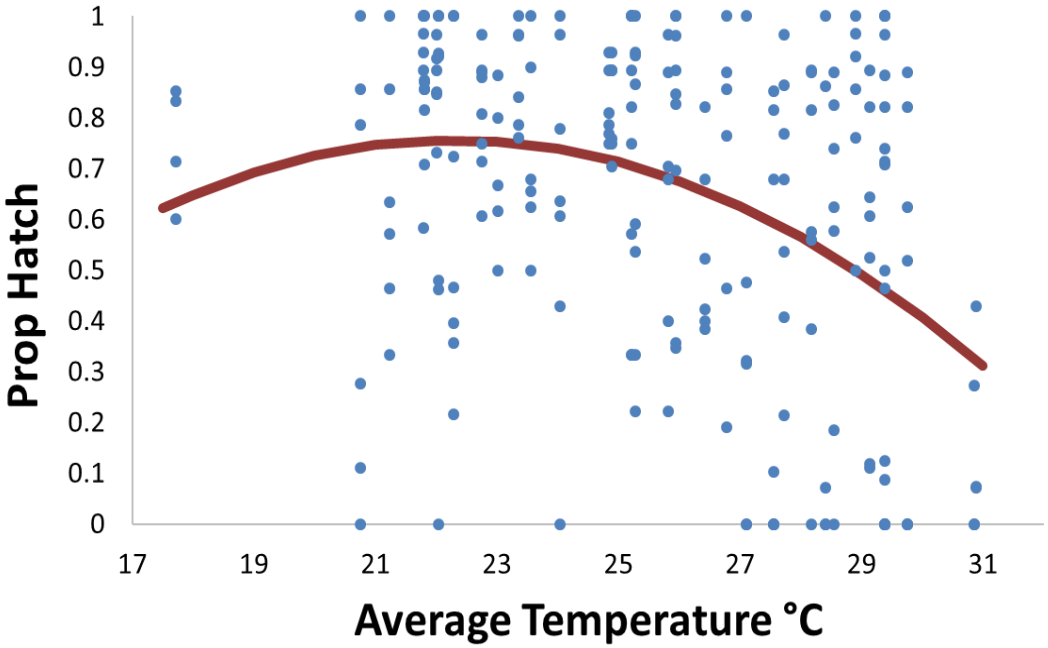
1) Summer 2017 Field Study

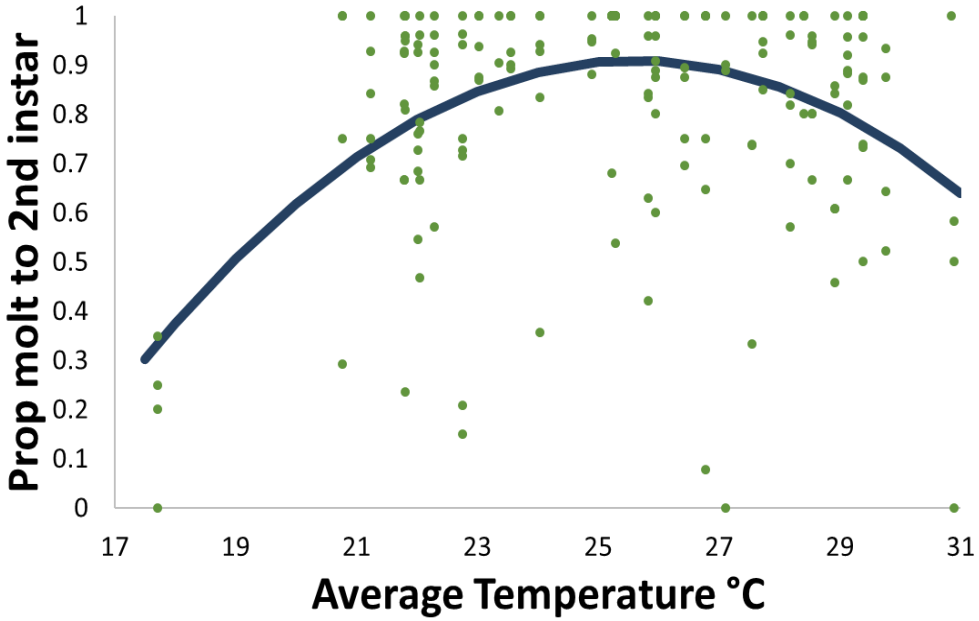
- Established colony and obtained regulatory permits
- At 4 sites, placed eggs in trees for 48 hr., then returned to lab
- Reared exposed eggs to 2nd instar, measured mortality



2) On-going research (2017-18)

- Lab studies to separate effects of temperature and humidity
- Field studies of BMSB egg and adult survival in different locations in California





Impact of Temperature and Humidity on BMSB

Hatch rate (Figure 1) and survival to the 2nd instar (Figure 2) decline with high temp (low RH) or low temp (high RH)

Overall finding: High temps in the Central Valley decrease BMSB egg hatch and nymph survival

BMSB in California – Agriculture

In 2016 BMSB finds in orchards were reported, and in 2017 crop damage in peaches and almonds were found.

BMSB in California – Agriculture

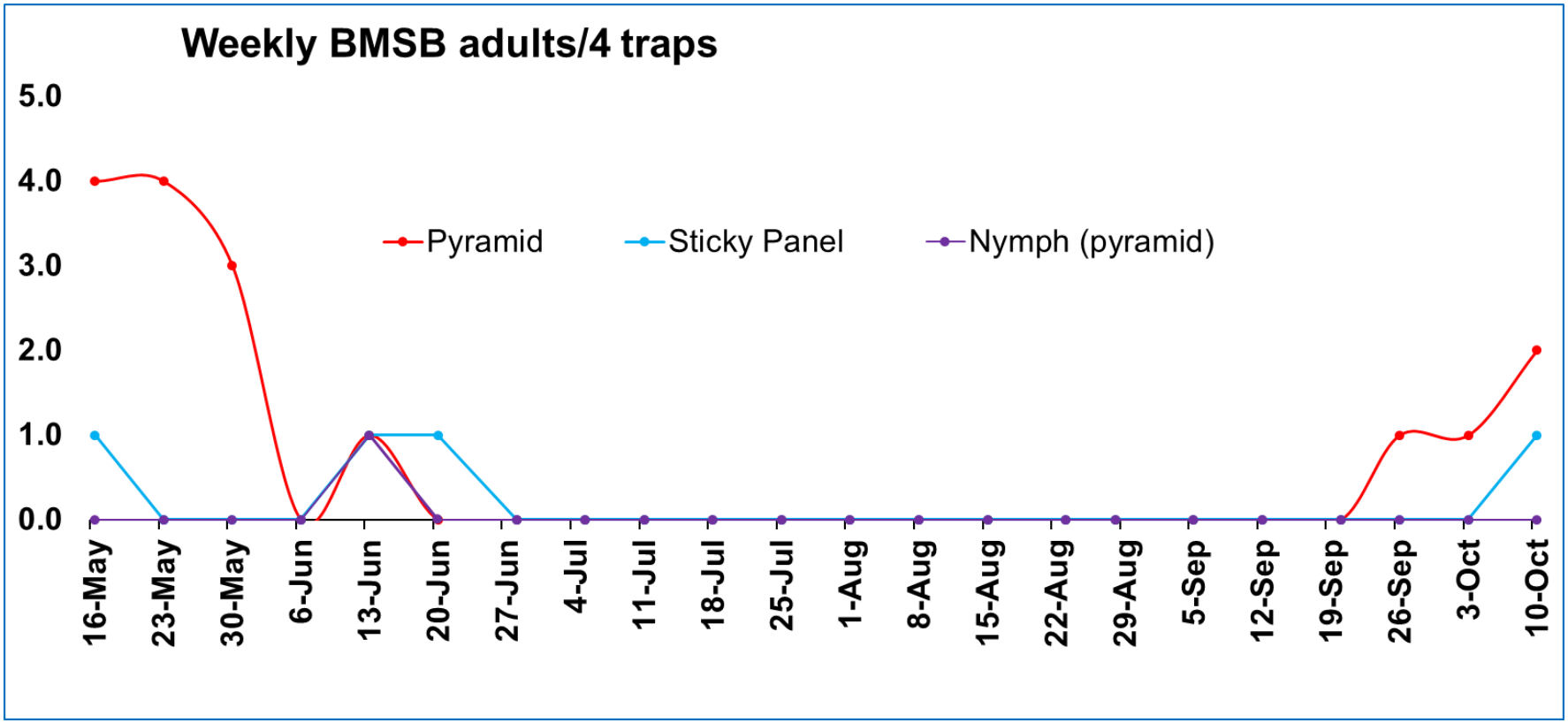
Ongoing studies:

Jhalendra Rijal, Frank Zalom

BSMB damage to almonds

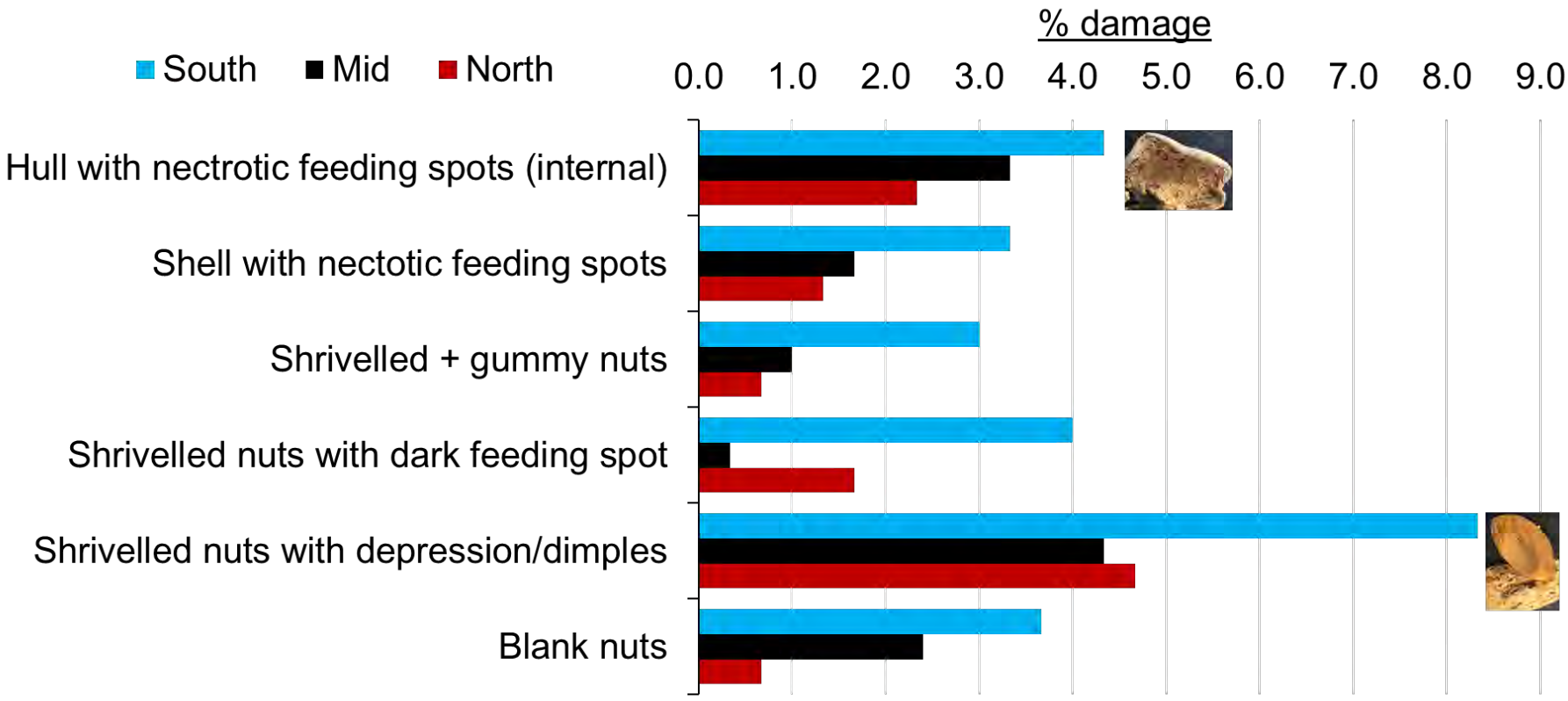
BMSB in California – Agriculture

Almond – BMSB adult trap counts (var. non-pareil)



BMSB in California – Agriculture

Almond - % damage at harvest (var. non-pareil)



400 nuts from each of the northern, middle, and southern portions of the orchard

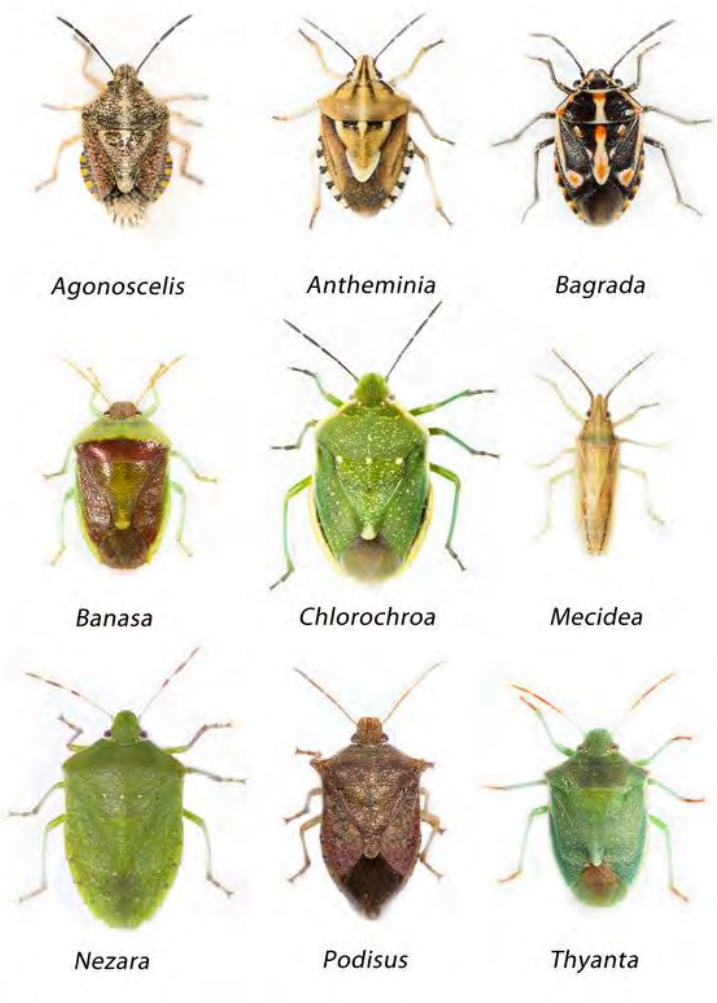
BMSB in California – Agriculture

Napa – collected 0 (2015), 1 (2016) and 47 (2017)

BMSB Parasitoid Studies in California

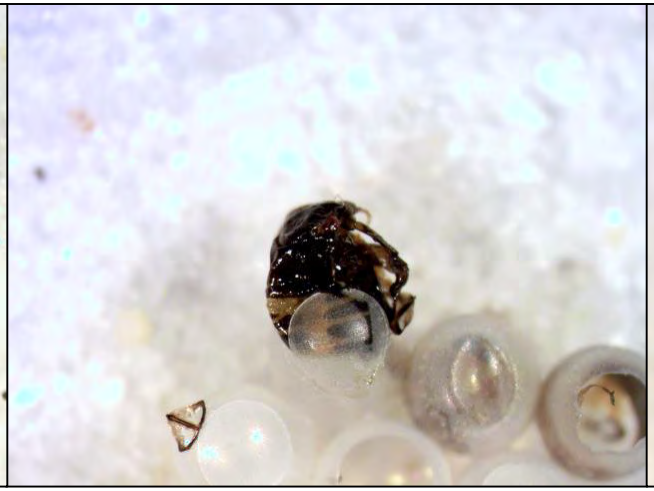
Mark Hoddle & Jesus (Ricky) Lara

- Complement national efforts being led by Kim Hoelmer (USDA) and other lab teams
- Non-target stink bugs, including exotic and native species
- Expose *T. japonicus* to different stink bugs and categorize encounters



BMSB Parasitoid Studies in California

Eclosed Nymphs

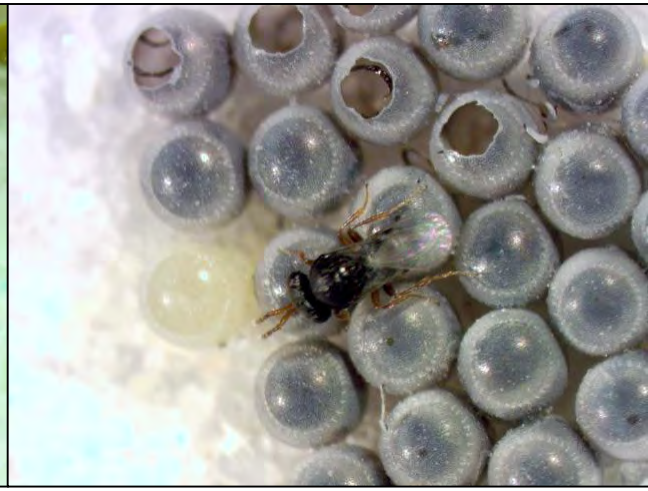


Dead nymph

Undeveloped Nymphs

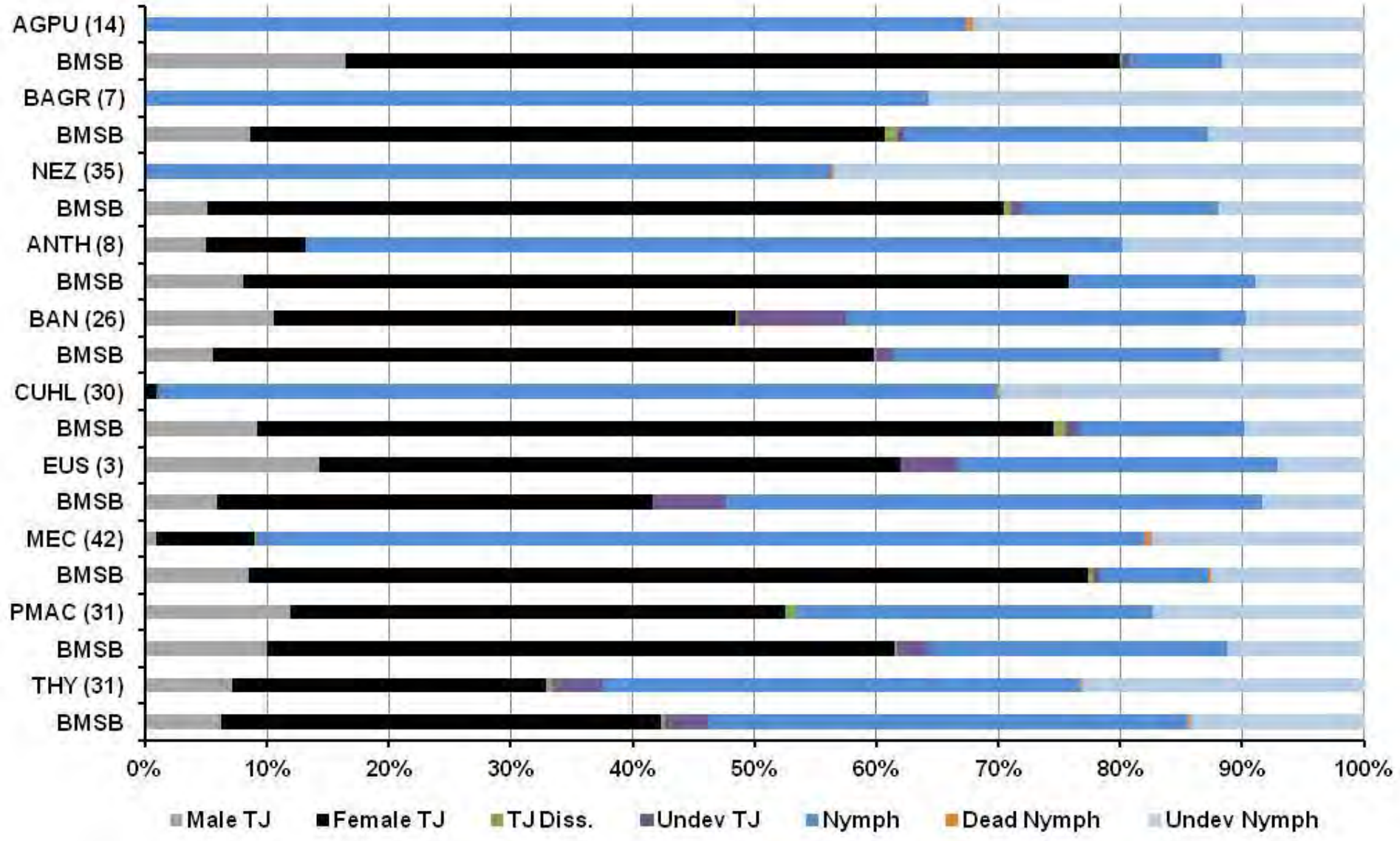
Undeveloped Parasitoids

Failed Adult Emergences



Eclosed Parasitoids

BMSB Parasitoid Studies in California



BMSB in Utah

Diane Alston, Lori Spears, Cody Holthouse*, Zach Schumm* & Cami Cannon**

Utah State University

- *Graduate students, **Vegetable IPM Associate

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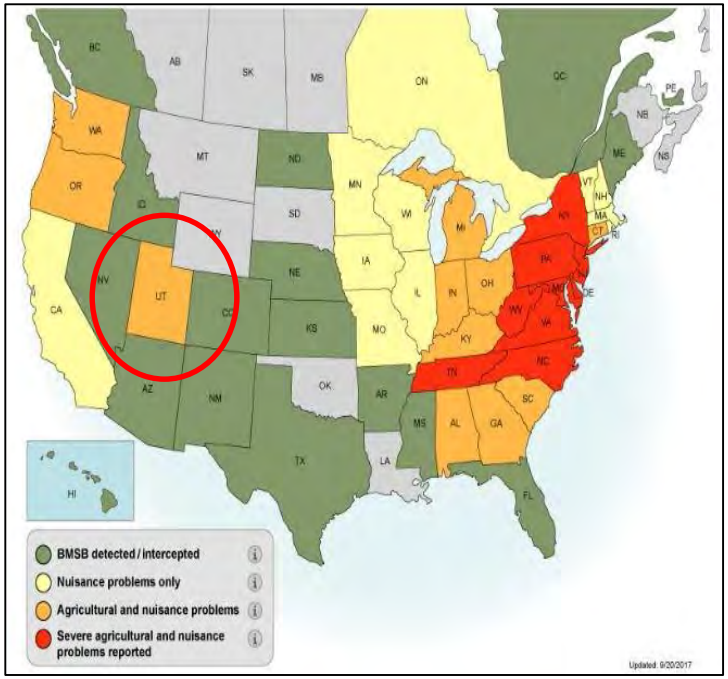
Utah BMSB Distribution by County

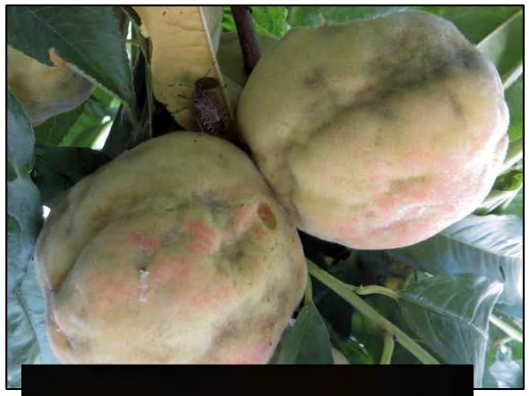
6 counties: Cache (USU, Logan – detection only), Box Elder, Weber, Davis, Salt Lake, Utah

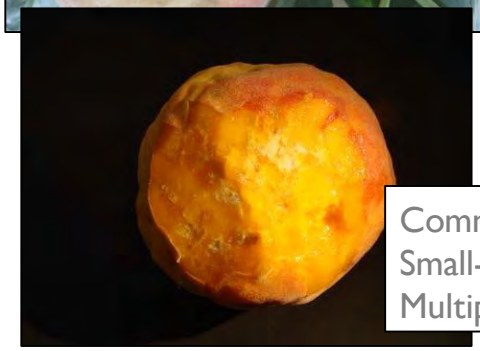


CROP DAMAGE (1ST CONFIRMATION)

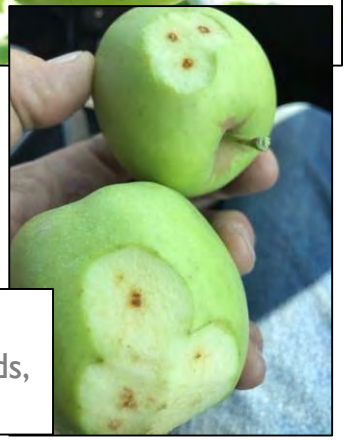
2017: First detection of agricultural economic damage

Peach





Apple



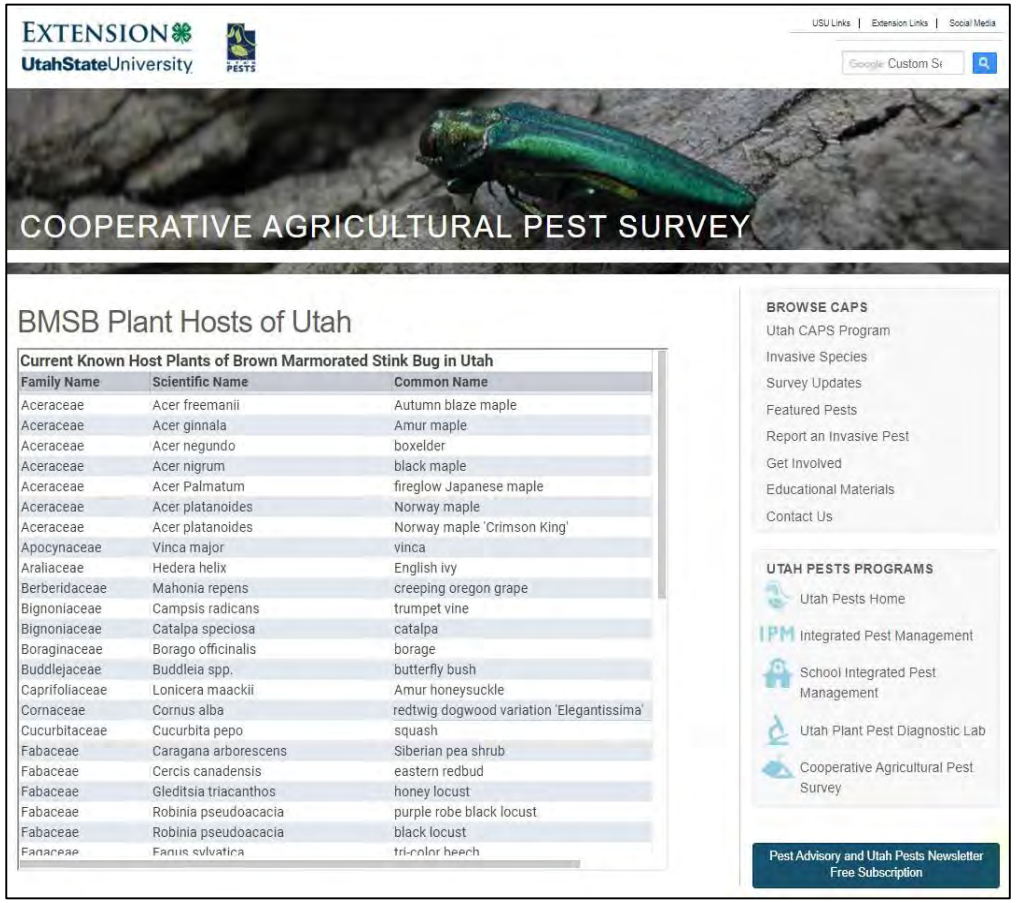
Commercial & Small-scale Orchards, Multiple Counties

Popcorn

Squash

Community Garden, Salt Lake City

BMSB in Utah: Host Plant Use



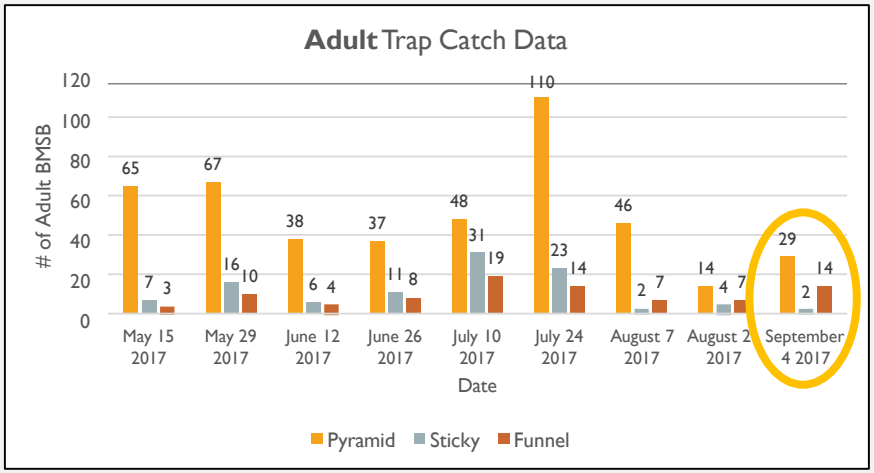
https://utahpests.usu.edu/caps/bmsb-host-plants

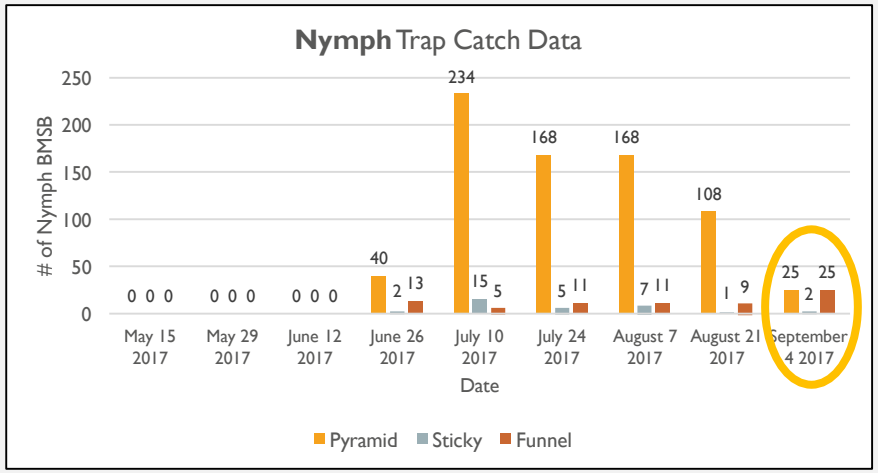
Residential surveys in
4 counties (northern UT)
49 plant species and
20 plant families.

Most common:

Aceraceae (maple, boxelder), Bignoniaceae (catalpa, trumpet vine) Fabaceae (Siberian pea shrub, locust) Oleaceae (privet, lilac), Rosaceae (apple, cherry, plum, peach)

BMSB in Utah: Phenology / Voltinism



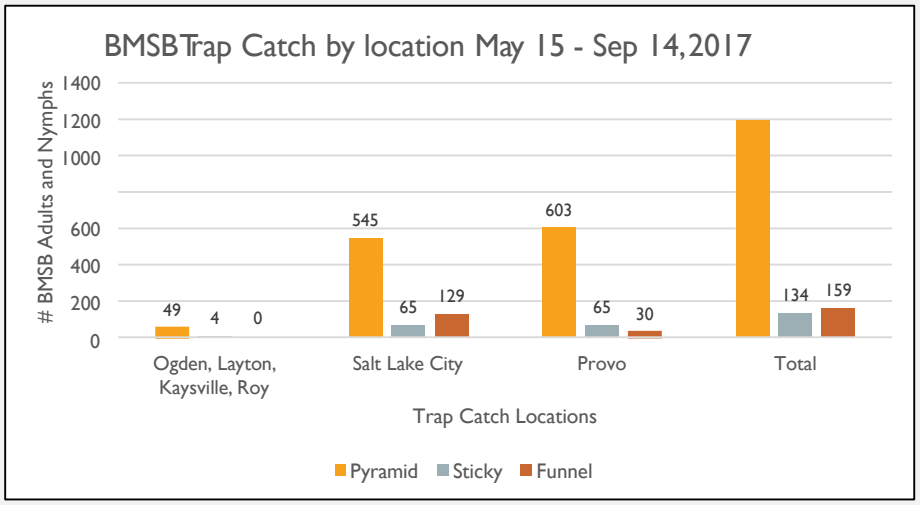


Partial 2nd generation?

High numbers of late-instar nymphs in the fall in catalpa trees

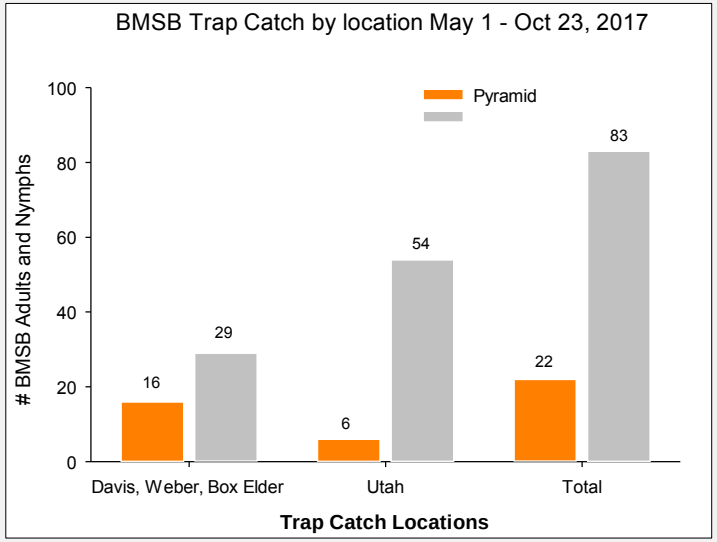
BMSB in Utah: Trap Efficiency

Residential Ornamental Sites



Pyramid >> Dual Funnel,Dual Sticky Panel (adults & nymphs)

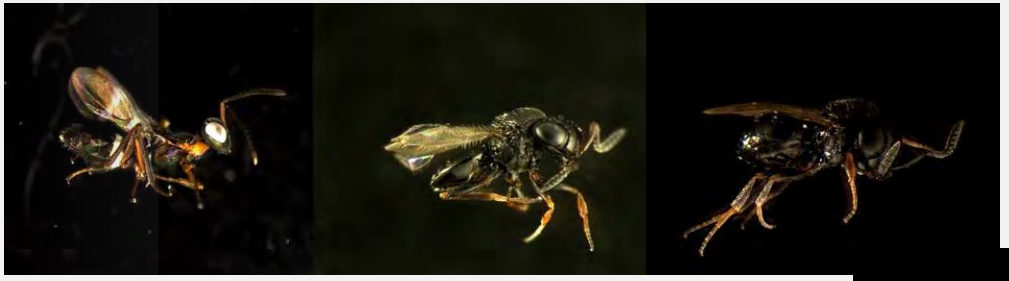
Commercial Orchard Sites



Dual Sticky Panel >> Pyramid (few nymphs)

BMSB in Utah: Egg Parasitism

- **118 BMSB egg masses deployed (lab-reared) & monitored (wild)**
  - Residential & agricultural landscapes (June-September)
  - Catalpa, boxelder, Russian olive, apple, peach elderberry & corn
- **8 egg masses parasitized (6.8%)**



Anastatus mirabilis *Trissolcus sp.* *T. euschisti*

Killed BMSB eggs, developed & emerged

Killed BMSB eggs, but no emergence

T. utahensis *Telenomus sp.* *Psix tunetanus*

BMSB in Utah: Next Generation Training / Outreach

- 2 graduate & 5 undergraduate students
- 3 extension publications (invasive fruit pest guide, updated BMSB, first detector guide)
- 1 newsletter article (Utah Pests News)
- 4 conference presentations
- 5 public talks
- 1 grower field day (Utah Tree Fruit Field Day)
- 2 extension agent in-service workshops
- 9 farmers' market displays (booths with hand-outs & interactive displays)
- 1 radio broadcast (Utah Public Radio)
- 3 USU Extension website additions/updates

Farmers' Market


The End