BMSB Update for the Western Region

Nik Wiman et al.
Oregon State University
Corvallis, OR

Western Problems Highlighted

- Massive specialty crop production
  - > potential economic impacts
  - Huge industries (CA almonds $5.8 billion, grapes $5.6 billion, tomatoes $1.2 billion, WA apples $2 billion)
- Specialty crop diversity
- Valuable export markets
- Unique environment types

BMSB SCRI Planning Grant

- Define research and Extension priorities
- Identifying how we fit into the greater scheme
- Other BMSB projects
  - Avoid duplication of effort
  - How can we make a unique contribution that serves our stakeholders
    - First, we need to identify what the priorities are

Western Environments

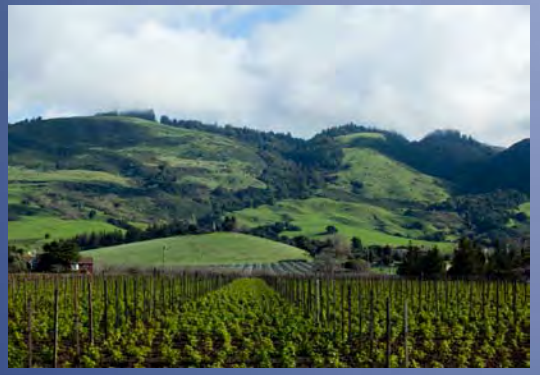
- Shrub steppe
- Mediterranean
- Coastal
- Plains

Agroecosystems within these environments

Effects on BMSB phenology and behavior*?

*Different genes in the western BMSB: independent introductions

Western Environments



CA – Coastal Plains

CA – Central Valley

UT – Wasatch Front

WA – Columbia Basin

WA – Skagit Valley

OR – Willamette Valley

Western Specialty Crops





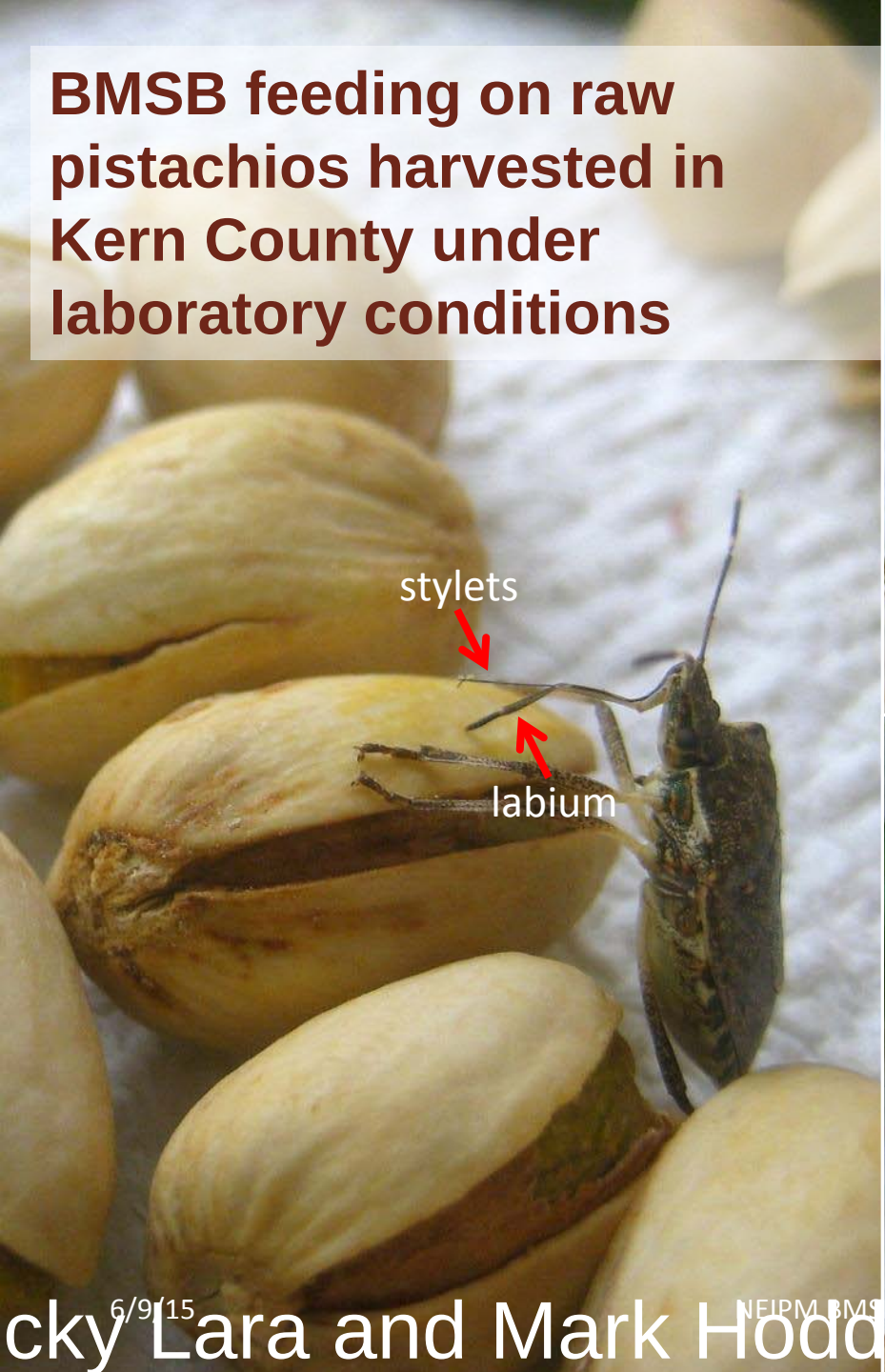


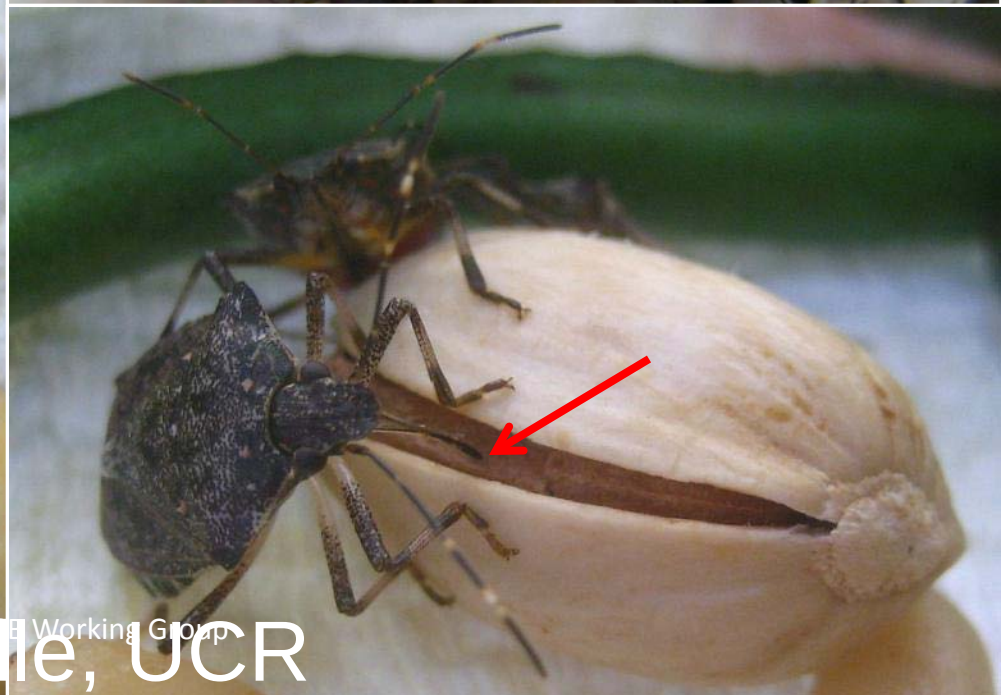
Avocados

Citrus

Ricky Lara and Mark Hoddle, UCR

BMSB feeding on raw pistachios harvested in Kern County under laboratory conditions





cky Lara and Mark Hoddle, UCR

BMSB damage to pears (left) at harvest (20 Aug). BMSB caged 4 June at pear turn-down stage. Control fruit on right.

Damage on D'Anjou pear

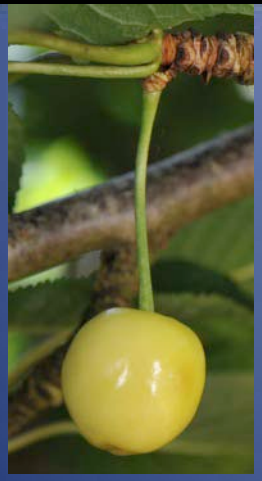
5 min after cutting

Yan Wang, OSU Mid-Columbia Ag Res and Ext

From: Peter Shearer and Yan Wang OSU-MCAREC

Bing cherry exposed to male BMSB

Straw color fruit: 4 June

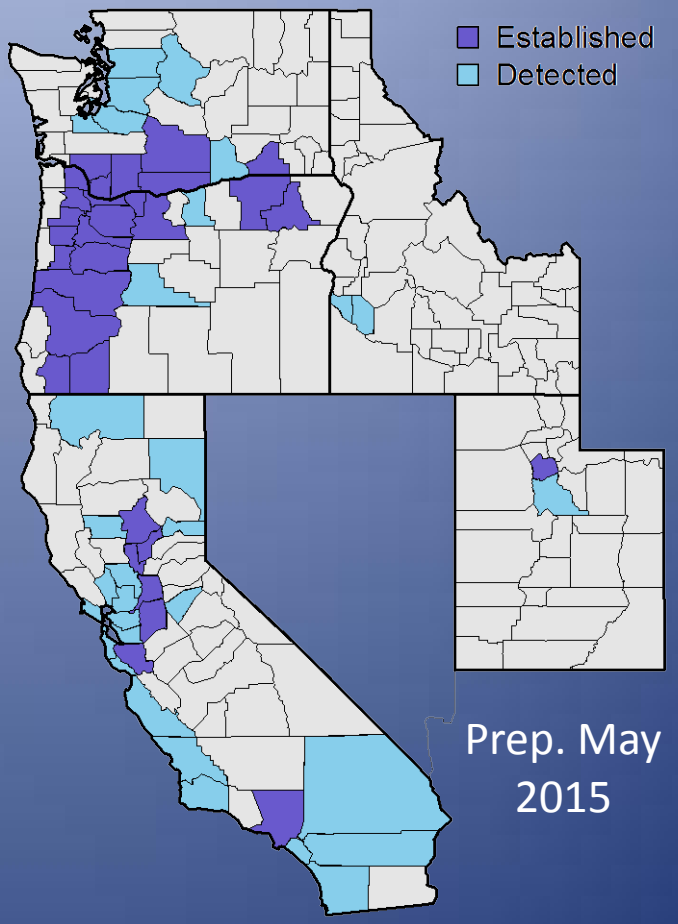


Straw color fruit: 11 June, 1 wk post introduction

Harvest: 7 July

Current Status

- California:
  - Detected: 24
  - Established: 5
- **Oregon:**
  - Detected: 2
  - Established: 17
- **Washington:**
  - Detected: 6
  - Established: 6
- **Idaho:**
  - Detected: 2
- **Utah:**
  - Detected: 1
  - Established: 1



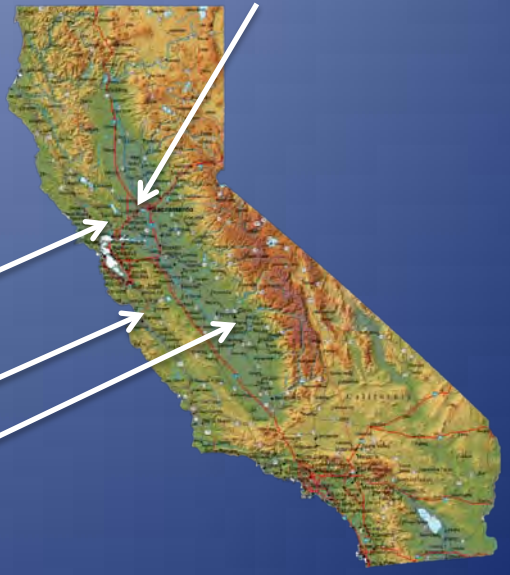
Prep. May 2015

Grower outreach

- Stakeholder focus groups/workshops
- Asses current knowledge and attitudes
- Query research and Extension priorities
- **Baseline data** - good for future projects, whatever the outcome of our project/funding situation
- Planning meeting: April 29-30, Portland OR

California Focus Groups

- Larry Godfrey [1], Frank Zalom [1], Chuck Ingels [2], Shimat Joseph [2], Lucia Varela [2], Monica Cooper [2] ([1] UC Davis, [2] UCANR)
- Prior assumptions: most growers have not experienced BMSB

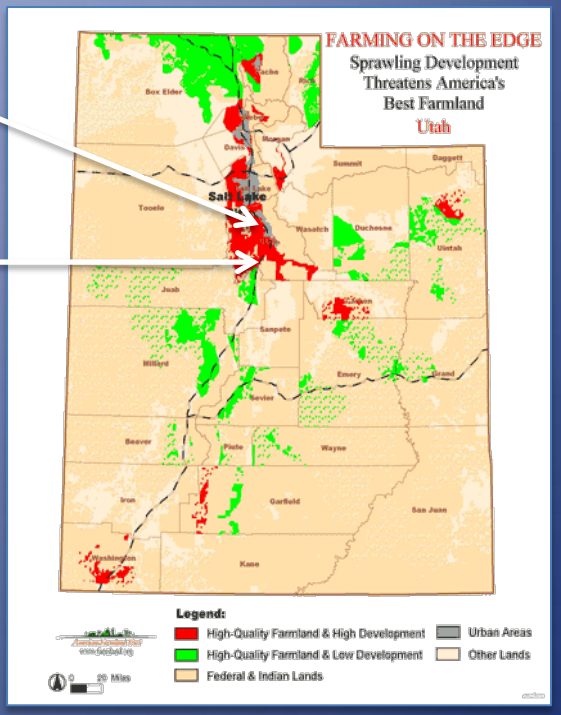


Utah Focus Groups

- Lori Spears and Diane Alston (USU)
- Prior assumptions: most growers have not experienced BMSB
- Mostly urban issue

West Jordan Feb 18

Spanish Fork Jan 23



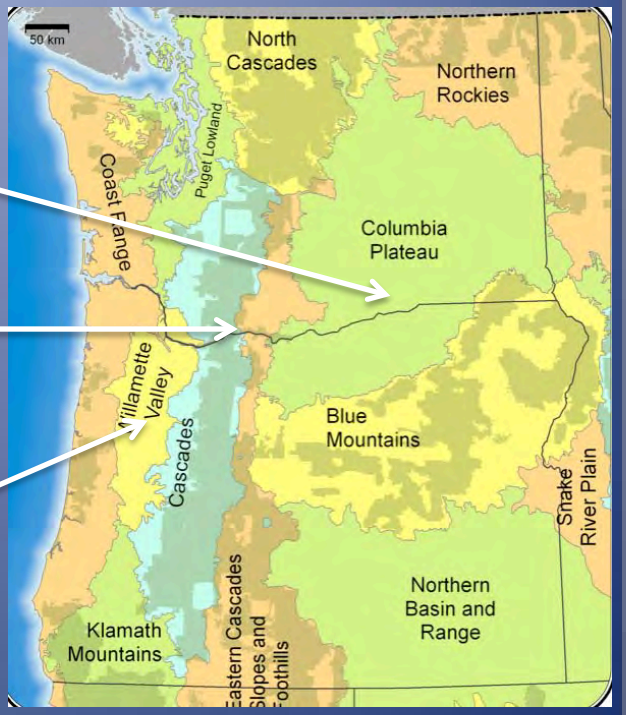
A very dry urban environment …

OR/WA Focus Groups

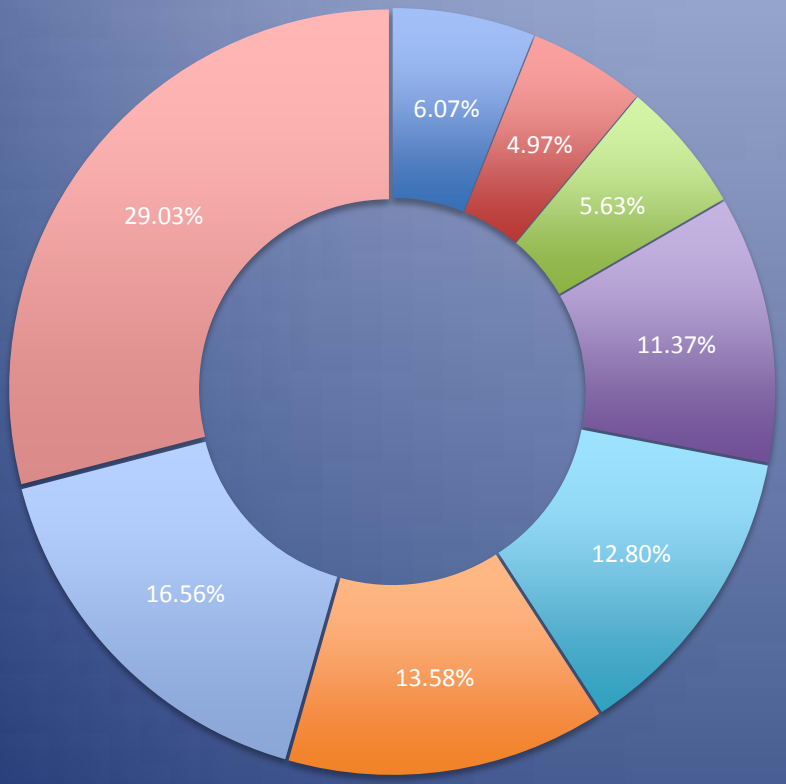
- Gwen-Alyn Hoheisel[1], Todd Murray[1], Steve Castagnoli[2], Peter Shearer[2], Nik Wiman[2] ([1]WSU, [2]OSU)
- Prior assumptions: many have experienced BMSB
- Urban issue is severe, increasing agricultural

Hood River
April 1

Salem
Feb 7

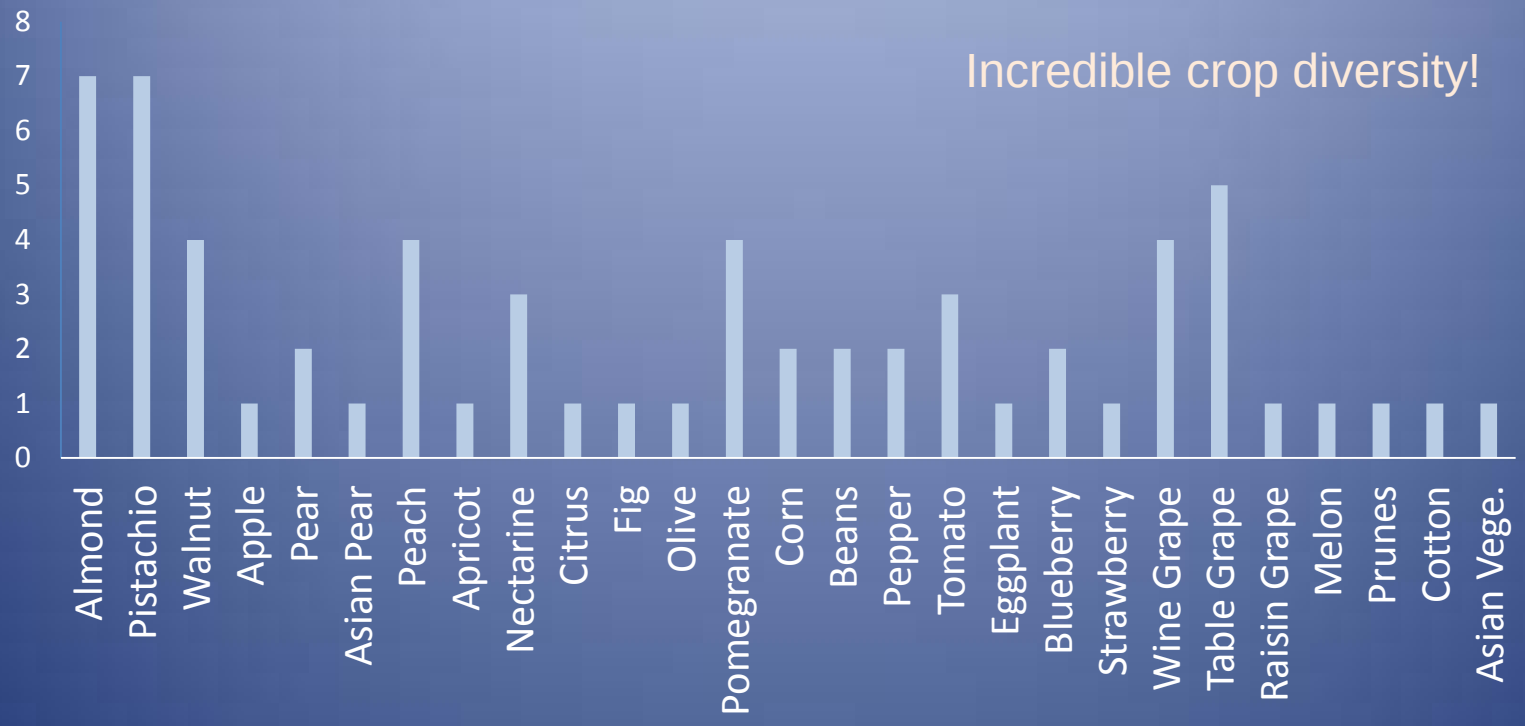


Specialty Crop Breakdown



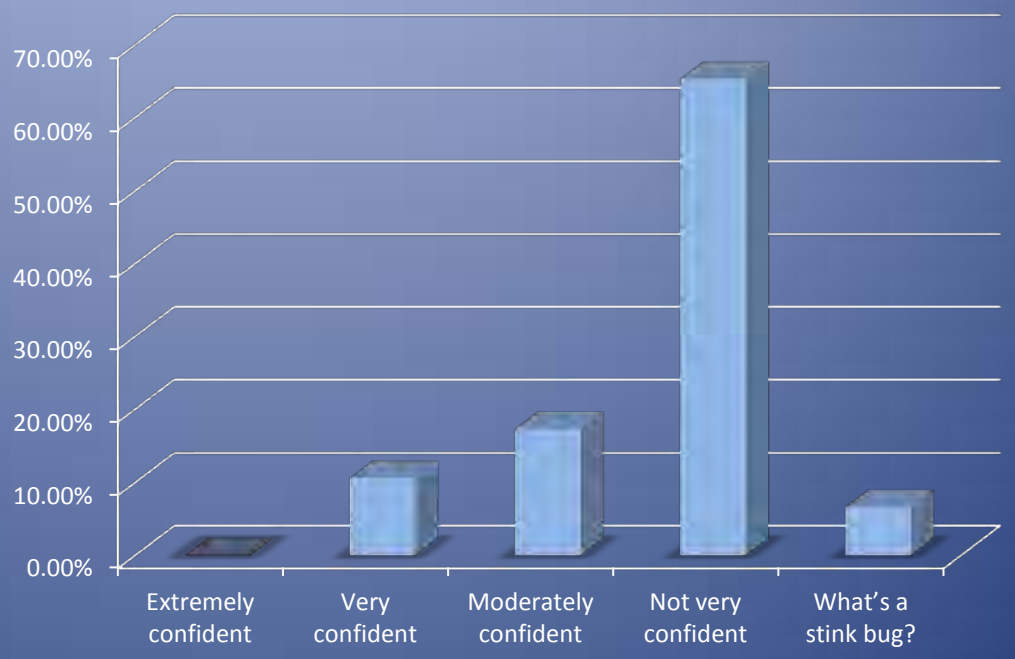
- Alt. orchard crops: avocado, citrus, date, fig, olive, pomegranate
- Table grapes
- Nut Crops: almond, pistachio, hazelnut, walnut, pecan, chestnut
- Wine grapes
- Pome fruits: apple, pear, Asian pear
- Small fruits: caneberry, blueberry, strawberry
- Stone fruits: cherry, peach, apricot, nectarine, plum
- Veg and field crops: bean, corn, cotton, eggplant, pepper, pumpkin, tomato

Specialty crop production: Sacramento area (Chuck Ingels)



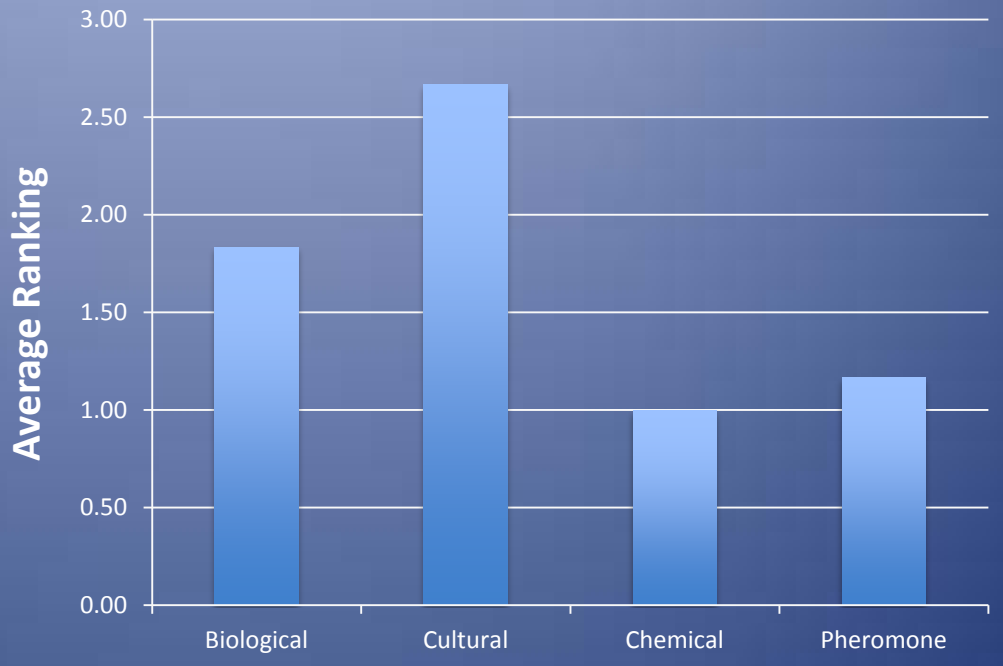
From Napa CA (Monica Cooper, UCANR)

- How confident are you that you could identify BMSB?



Research Priorities

- What research priorities are most important?



Portland Planning Meeting

- Tracy Leskey and Kim Hoelmer
- Researchers and Extension personnel from campuses, research stations and offices across the region
- Some stakeholder representatives
- Presented the focus group results and voted on priorities

Research Priorities

1. Determining at risk crops in the west
2. Landscape risk factors
3. Biocontrol
4. Monitoring
5. Chemical
6. Applied ecology
7. Pheromone management
8. Develop management thresholds
9. Overwintering mitigation
10. Resistance management
11. Early season biology
12. Post harvest mitigation
13. Cultural management
14. Damage characterization
15. Host plant use

Extension Priorities

1. Develop an alert system for growers
2. Develop management strategies based on existing knowledge
3. Incorporate new knowledge into management strategies
4. Stakeholder surveys to document changes in pest status and management over time
5. Identification skills and damage diagnosis
6. Generate mass media to sustain interest
7. On-farm demonstrations
8. Treatment guidelines for urban areas
9. Extending economic impact information

Conclusions

- BMSB is on the rise in the western US
- If it is as bad as in the mid-Atlantic, there will be massive economic effects
- Unique industries
- Large export markets
- Huge geographic area and lower researcher/Extension personnel to grower ratios
  - There is a lot to be concerned about !!

Acknowledgements

- USDA-NIFA-SCRI #2014-51181-22514
- Meeting participants and group members, approx. 35 people

Brown Marmorated Stink Bug (BMSB): Monitoring & Biological Control Research Progress in Southern California



Ricky Lara, Mark Hoddle, Charlie Pickett

April 29, 2015

NEIPM BMSB Working Group

Stink Bug parasites Reported in N. CA

TABLE 1. Survey of parasites of stink bugs in Northern California, 1987-89*

Parasite	Stink bug					
	N. viridula	*E. con - spersus*	*T. palli- dovirens*	*C. uhleri*	*C. ligata*	*M. histri- onica*
Hymenoptera:						
Encyrtidae						
Ooencyrtus californicus	+	+	+	+	+	+
Ooencyrtus johnsoni	+	+	+	+	+	+
Scelionidae						
Trissolcus basalis †	+	+	+	-	-	-
Trissolcus utahensis	+	+	+	+	+	+
Trissolcus euschisti	+	+	+	+	+	+
Gryon obesum	+	+	+	-	-	-
Telenomus podisi	-	+	+	-	-	-
Psix tunetanus	-	+	-	+	-	-
Diptera:						
Tachinidae						
Gymnoclytia occidentalis	-	+	+	-	-	-
Gymnosoma filiola	-	-	+	+	-	-
Cylindromyia fumipennis	-	+	-	-	-	-

*Sentinel eggs only. A plus sign (+) indicates that at least one egg mass was parasitized by the indicated parasite. A minus sign (-) indicates that no association was observed.
†Not recorded in surveys until following release in September of 1987.

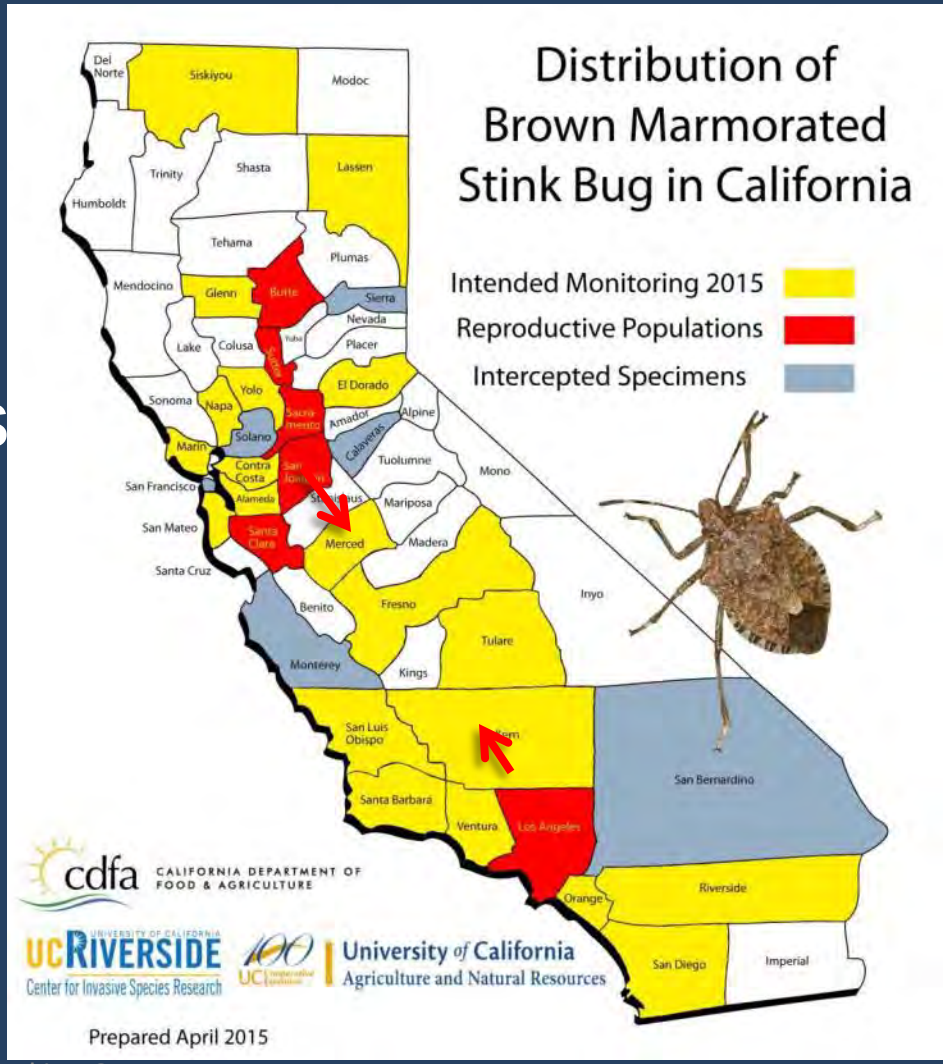
Hoffman et al. 1991

Potential of *Trissolcus basalis*?

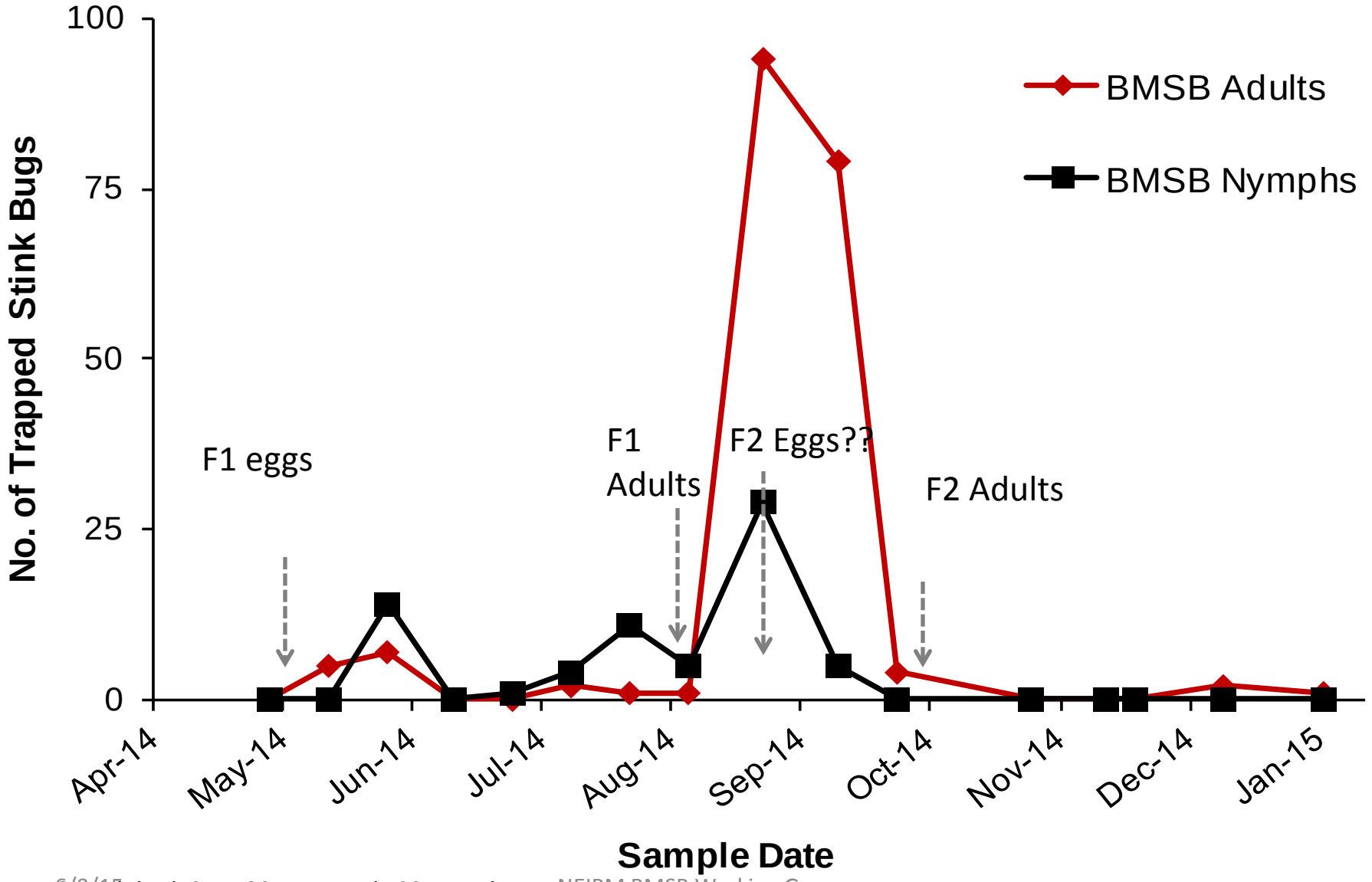
76% of BMSB nymphs have successfully hatched from 24hr old fresh egg masses exposed to *T. basalis* (N= 13 replicates, 366 eggs) and only 10 parasitoid females

BMSB Monitoring in CA

- Maintain traps (~80)
- Urban/Ag areas that include grapes, pistachios, avocados, citrus and other ag crops
- Collaboration with UCCE Extension, CDFA
- Facilitate BMSB detection
- Long-term IPM efforts also need attention



2014 BMSB (LA County)



BMSB Adults (197 = 80F + 117M), 69 nymphs

Interesting Finds in BMSB Traps

Bagrada Bug
(Invasive Stink Bug)

***Euclytia flava* (N=8)**
(Stink Bug Parasitoid)

***Astata* (N=21)**
(Stink Bug Predator)

Tachinids recovered from some traps baited with BMSB pheromone.

In lab the lab these insects have laid eggs on BMSB adults

2015 *T. japonicus* non-target evaluation

Chris Hedstrom, Barry Bai, and Helmuth Rogg, Oregon Dept. of Ag.

- Continue non-target tests, focusing on completing partial data sets of non-target stink bugs
  - Collaboration with USDA Forest Service on Koa bug, *Coleotichus blackburniae* (Hemiptera: Scutelleridae)

    - some successful parasitism observed on *C. blackburniae*

    (no-choice, 7 of 16 clusters parasitized, 17% mean, range 0-89%, female bias)

- Host finding ability experiments,
  - Cage studies with plants considering parasitism rate of single female wasp on *H. halys* and non-target host eggs in specified periods (larger arena than vial tests)

- Non-target evaluation of *T. cultratus*
  - Focus on non-target species parasitized by *T. japonicus*

Flickr: Cyanea_GW

Koa bug eggs parasitized by *T. japonicus*

C. Hedstrom