Invasion of the True Bugs

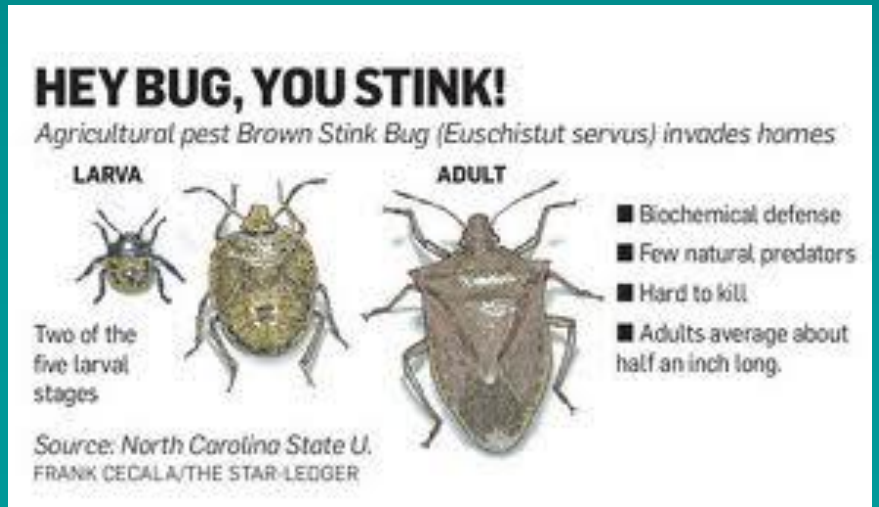
Sacramento Master Gardener Monthly Meeting

Jan. 14, 2014

Chuck Ingels

UC Cooperative Extension, Sacramento County

Brown Marmorated Stink Bug (BMSB)



Brown Marmorated Stink Bug (*Halyomorpha halys*)

Photos: Baldo Villegas

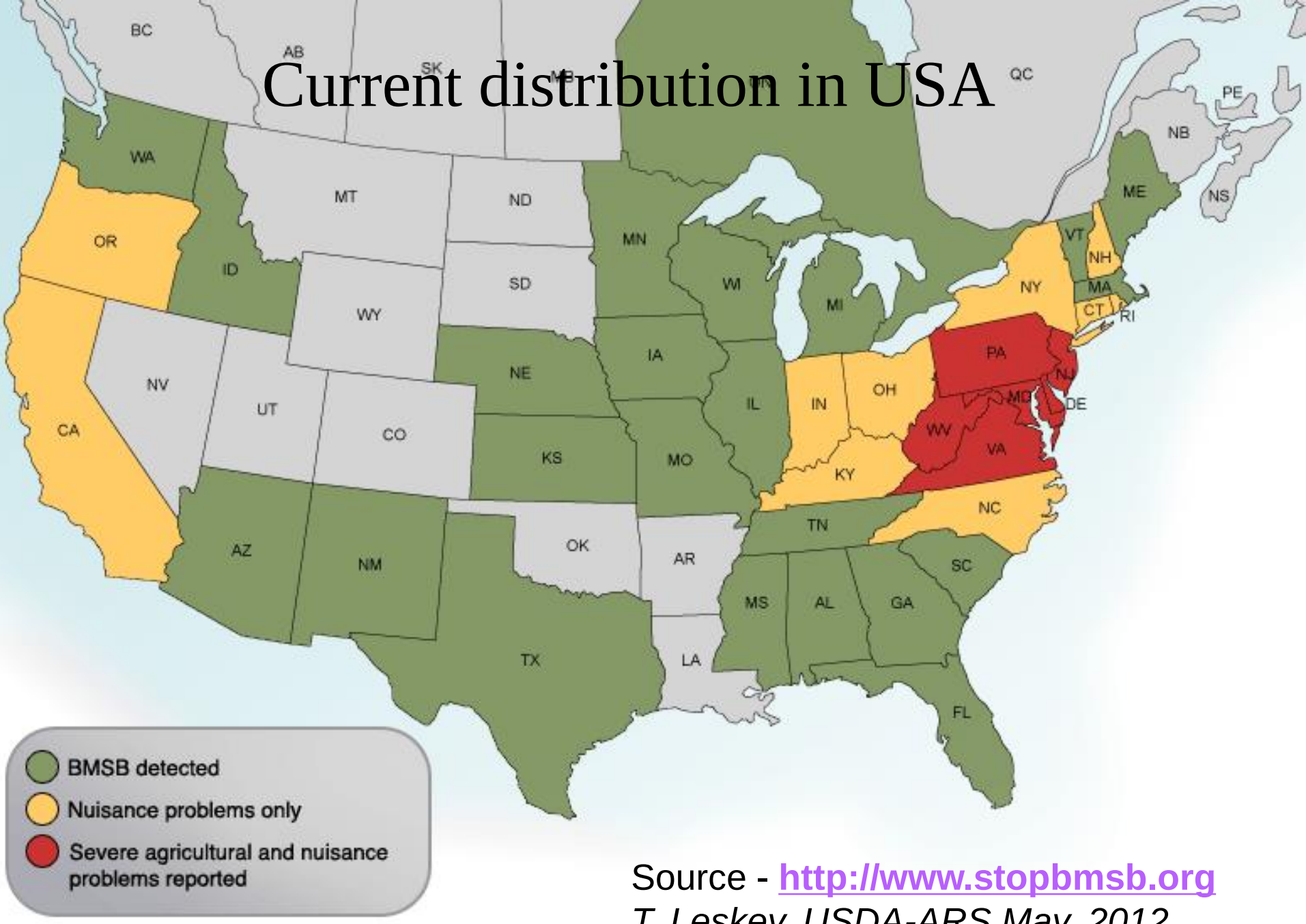
Brown Marmorated Stink Bug (*Halyomorpha halys*)

- Native to East Asia (China, Japan, Korea, Taiwan)
- Serious crop pest
- Nuisance pest – overwinters inside houses
- Host list currently 170 spp., likely up to 300

Brown Marmorated Stink Bug (*Halyomorpha halys*)

- First found in Allentown, PA in 2001
- Serious fruit pest in 2010, not as bad 2011
- Has now spread to 40+ states
- Large population found in Midtown Sept. 2013
- Infestation now in Yuba City
- Additional finds in many other counties

Current distribution in USA



Source - http://www.stopbmsb.org

T. Leskey, USDA-ARS May, 2012

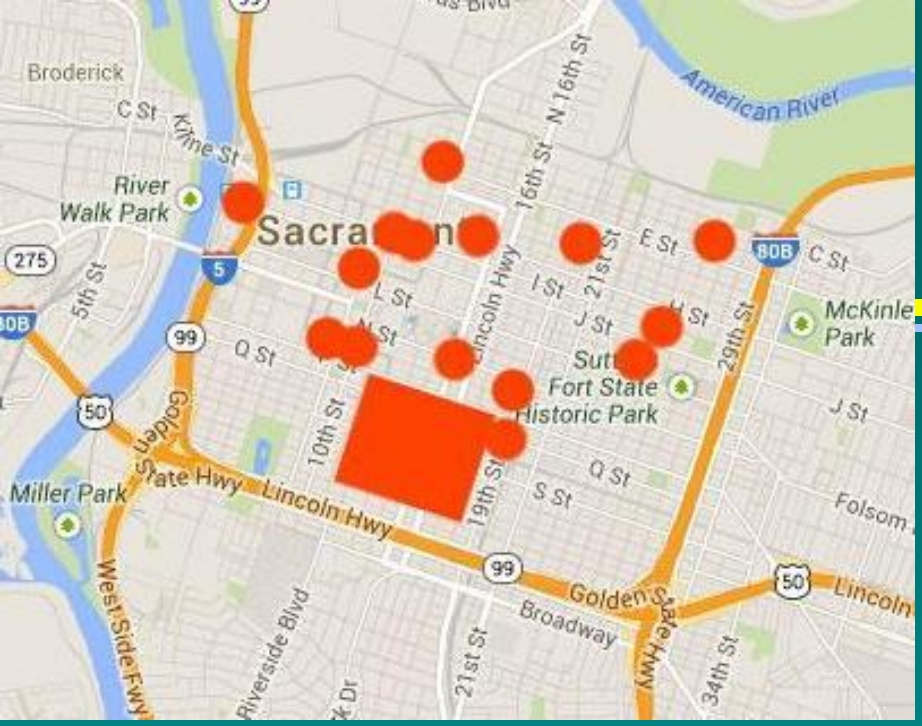
BMSB Finds in California

Alameda
Los Angeles
Riverside
Sacramento
San Diego
San Francisco
San Joaquin
Solano
Santa Clara

Also:
Butte
Monterey
Yolo
San Luis Obispo
Siskiyou
Sutter

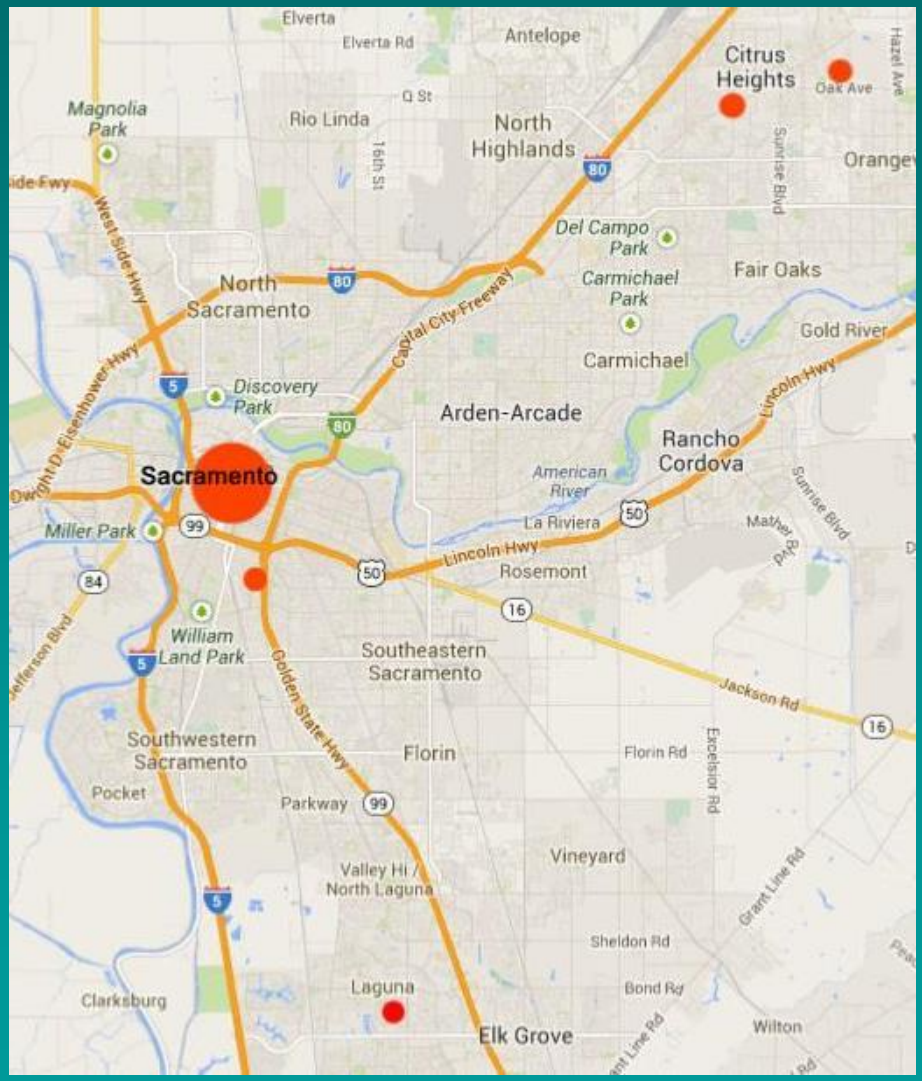
Source - CDFA Plant Health and Pest Prevention Services Database, **2010**

BMSB Finds in Sacramento County



Oct. 15

Jan. 1

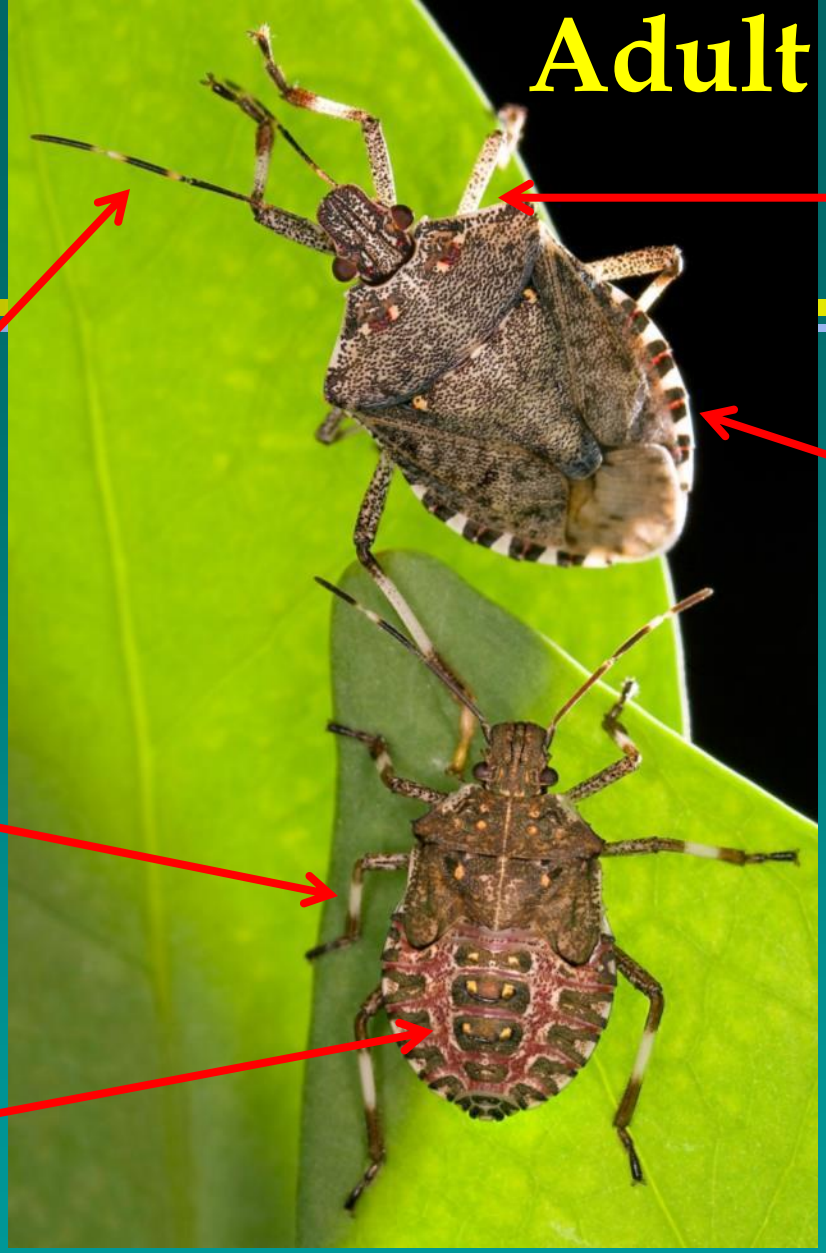


cesacramento.ucanr.edu

Midtown Sacramento

Photos: Charlie Pickett

Actual adult size
1/2 to 5/8 inch



Smooth
"shoulder" edges

Two white bands
on antennae

Banded
abdominal edge
extending
beyond wings

Banded legs

Mature nymph
(5th instar)

Rust color with
broad brown
markings

Photo: UC IPM

Eggs (20-30) & nymphs

Nymph (3rd of 5)

Adult

5 Nymphal Instars Male Female

- All stages found at same time starting late spring
- Each adult lives 6-8 months
- Female can lay ~ 250 (up to 485) eggs
- Females mate multiple times
- ~2 generations in eastern states, 4-6 in China

Some Other True Bugs

Rough stink bug

BMSB

Red shouldered stink bugs

Consperse stink bug

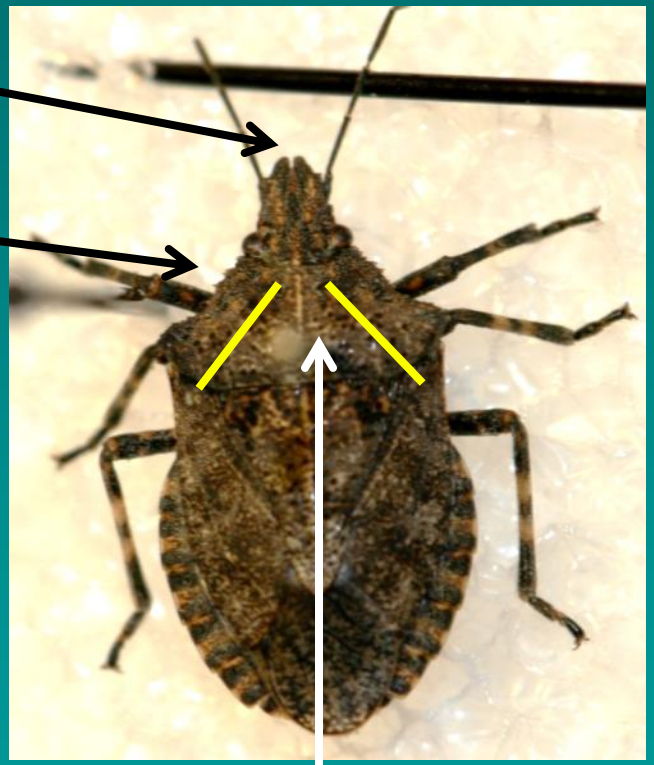
Rough Stink Bug vs. BMSB

Rough stink bug

BMSB

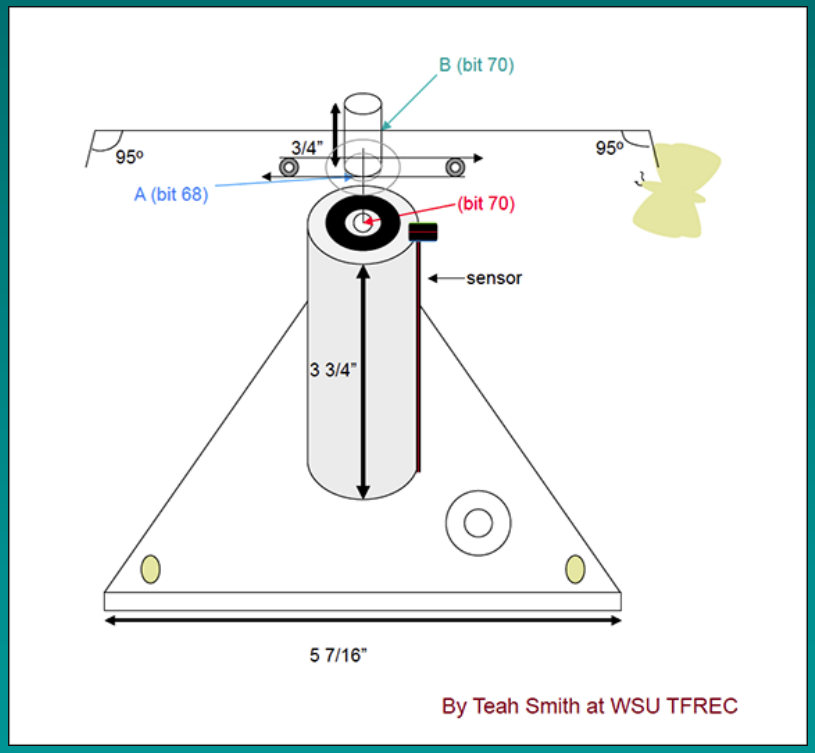
Rough Stink Bug vs. BMSB

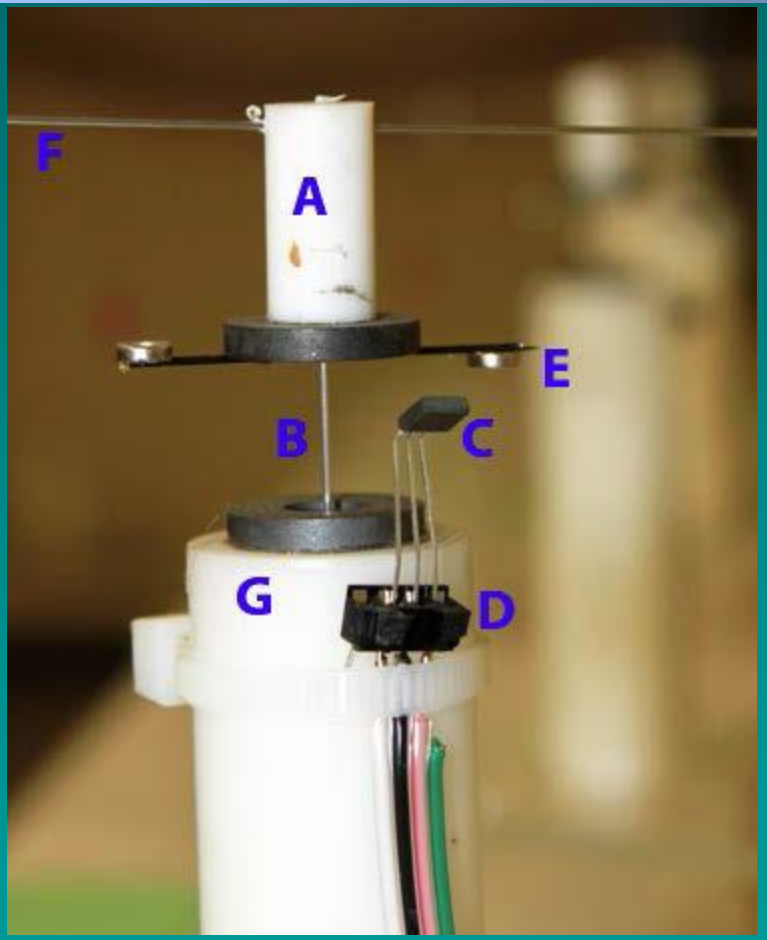
Rough stink bug



BMSB

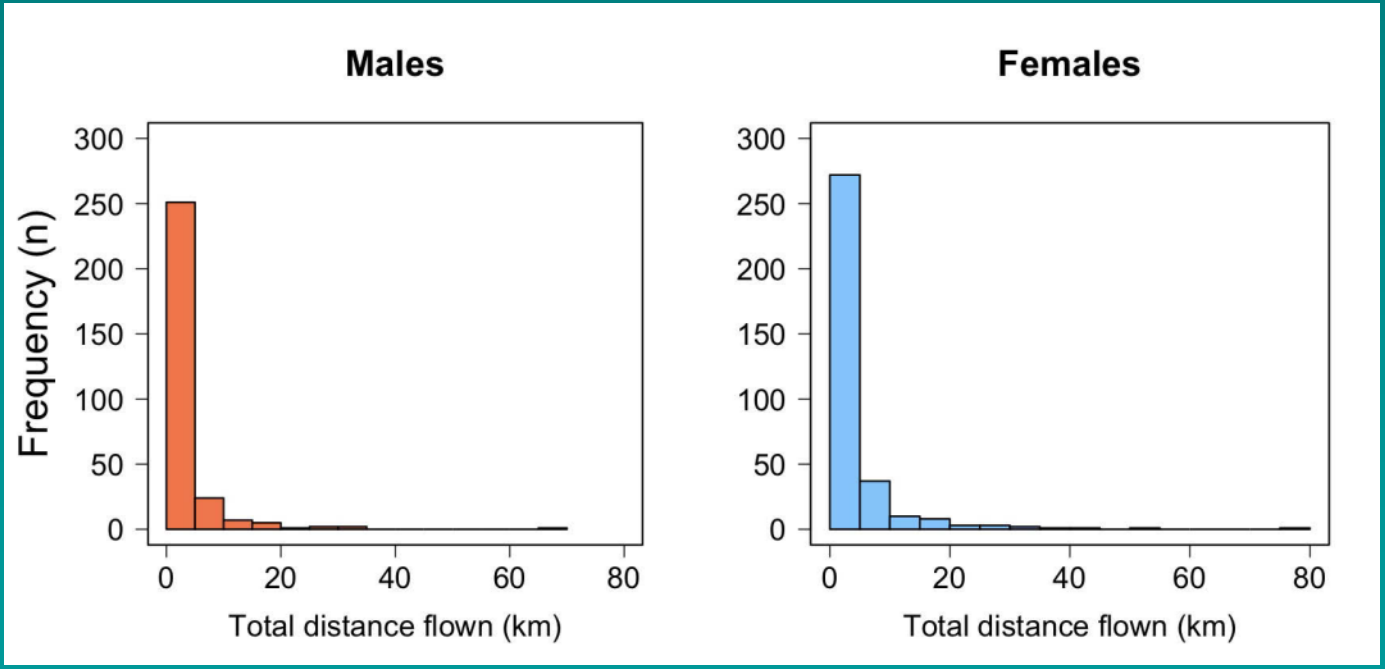
Dispersal studies





Flight distance in 24 h

- Most flew < 5 km (short distance fliers)
- •A few flew up to **72 km (45 mi)**



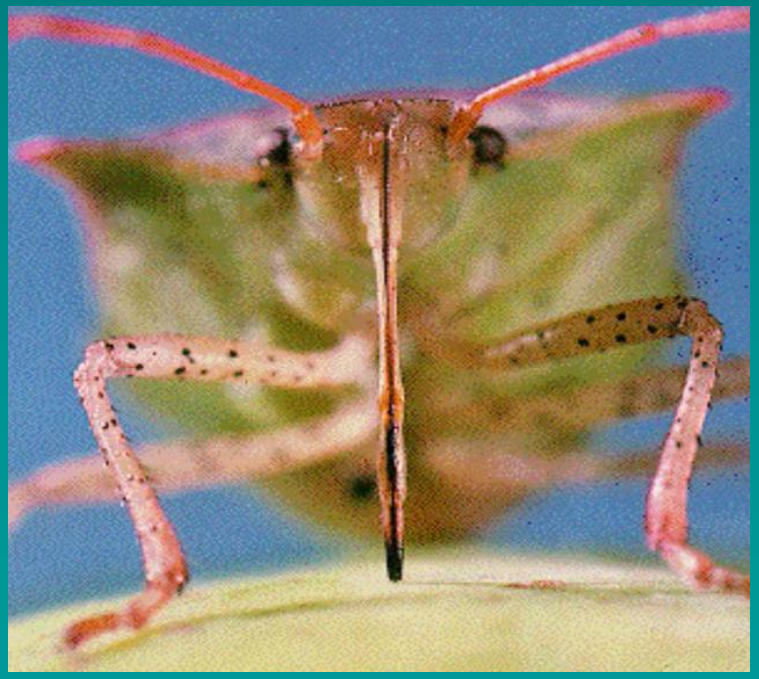
Host Plants
Crops

- Stone fruits (esp. peach), pome fruits, citrus, persimmon, fig
- Berries
- Grapes (not a major host)
- Eggplant, tomato, okra, pepper, corn, beans (esp. soy), cucurbits, sunflower

Host Plants
Selected Ornamentals

- Catalpa
- Chinese pistache
- Elm
- Maple
- Holly
- Mulberry
- Princess tree (*Paulownia*)
- Pyracantha
- Redbud
- Rose
- Southern magnolia
- Tree-of-heaven

Stink Bug Feeding



BMSB Damage

BMSB Damage
Sweet Corn a High-Preference Crop

Up to 100% of ears with injury, Beltsville MA 2011

BMSB Damage

Beans

Adult Aggregation

- In cooler months, adults overwinter by aggregating in houses, underneath the eaves, or in leaf litter
- Similar to box elder bug and the Asian ladybird beetle
- Annoys residents, especially due to their offensive odor when disturbed and spotting by defecation

BMSB
An Arboreal Species

UNIVERSITY OF MARYLAND EXTENSION
Solutions in your community

Aggregation Behavior

Photos: G. Hamilton

Aggregation Season, Pennsylvania

Photos:
Tracy Leskey

Aggregation Behavior

Photos:
Tracy Leskey

Overwintering behavior

Monitoring BMSB

- Attractant-baited traps, sweep nets, beating trays, blacklight traps
- Foliage counts
  - » They crawl to the back side of leaf and hide
- Currently no effective way to predict when treatments should be applied

Pheromones

- Two lures used together:

1. Aggregation pheromone lure attracts males, females and nymphs
   - » Patented by USDA-ARS
2. Also synergist lure (MDT)

Phermone Trap

Traps & Lures (AgBio, Inc.)

Lures: Aggregation (USDA): $4.25
Harlequin bug (sex pher.): $5.00
(both last 30 days)

Vaportape (kill bugs in trap)

Phermone Trap

Dead-Inn Traps (AgBio, Inc.)

Grower
48” tall, $30

Professional
24” tall, $20

Homeowner
16” tall, $17

Phermone Traps

Rocket Trap (Rescue)

Traps Attract BMSB to Gardens

- 2013 Univ. of Maryland study
- Many gardens; trap placed 1 m away
- More BMSB on plants near traps, but not necessarily more damage
- Gardens with a trap had more BMSB and damage than those without a trap
- “Trap spillover” effect
- Mass trapping likely not a means of control

Predators

Not well studied


Photo: K. Bernhard

<u>of eggs:</u>

ants, earwings, lacewings


Photo: K. Bernhard


Photo: R. Fertig

<u>of nymphs & adults:</u>

assassin bugs, predatory stink bugs, spiders, birds (starlings, jays, chickens)

Insect Parasites

- Prospects may be good since it's an exotic insect
- Foreign exploration done by USDA
- Egg parasitoids - *Trissolcus* spp.
- Expected release in Calif. in 2016

Parasitoid Testing

USDA – Delaware
Calif. – UC Riverside
(2016 release)

BMSB rearing cages

Parasitoid
colonies
in quarantine

Photos: K. Tatman, C. Dieckhoff, K. Hoelmer

Leaffooted Bugs

Leaffooted Bugs

Leptoglossus spp.

L. clypealis – Yellow zigzag line
Clypeus extension from head

L. phyllopus

L. opposites

Leaffooted Bugs
Leptoglossus spp.

- Insect order Hemiptera, family Coreidae
  - Coreids like stink bugs & squash bugs
- Many similarities with BMSB:
  - Overwinter as adults in homes, sheltered areas
  - Exude foul-smelling liquid when disturbed
  - Emerge in spring for feeding and mating
  - Five nymphal stages
  - Multiple generations per year (3?)
  - Largest numbers in late summer and fall
  - Populations may fluctuate from year to year

Leaffooted Bugs

Leptoglossus spp.

- Garden pest of tomatoes and pomegranates
- Farms: Almonds, pistachios, and pomegranates
- Major garden pest in eastern, southeastern U.S.
- Major garden pest in Fresno, central Sierra, and Sacramento (since 2012)

Photo: Kathy Garvey

Leaffooted Bugs

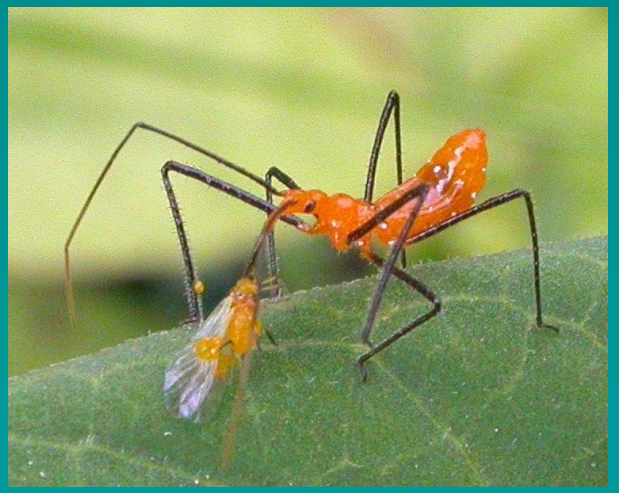
Eggs in Rows

Leaffooted Bug vs. Assassin Bug

Young Nymphs

Leaffooted bug

Assassin bug



Leaffooted Bugs
On Tomatoes

Photo: Luke Shenoy

Photo: Moon Shine Photog.

Photo: Ruth Ostroff

Leaffooted Bugs
Damage

Photo: Virginia Coop. Ext.

Photo: Marsha Prillwitz

Photo: Matt Quist

Leaffooted Bug vs. Assassin Bug

On Palm and Joshua Tree, Palm Springs

Photo: JoAnne Marshall

Photo: Barbara Harris

Leaffooted Bugs

Leptoglossus spp.

- Natural enemies
  - Native egg parasite
  - Predators: Birds, spiders, and assassin bugs

Management for BMSB and Leaffooted Bugs

Management for Homes
Mechanical Exclusion

- Find openings where BMSBs gain access
- Seal cracks around windows, doors, screens, utility pipes, window A/Cs, vents, siding with silicone caulk or foam sealant
- Repair or replace damaged screens
- Install or replace weather stripping
- Use tight-fitting sweeps or thresholds
- Prevent entry into attics by putting screening inside gable vents

Management for Homes
Manage Lights

- Fly around outdoor lights
- Turn of unnecessary lights
- Entrances – light outside, dark inside
- Relocate exterior lights away from entrance and away from open bedroom windows
  - » Very distracting noises when they fly around the lights

Management for Homes
Indoor Traps (Attract & Kill)

- Light and scent to attract
- Stickem or water to kill
- May not be very effective
  - » Likely best in fall and spring

Strube's Stink Bug Trap

Management for Homes
Exclusion Trap (Delaware)

- Homemade cardboard trap (www.trapbug.com)
- Attach to top of screen, window open, fan blowing out
- Empty daily to bi-weekly

Management for Homes
Physical Removal

- Collect in soapy water or bag in freezer 2 days
- Vacuum – Nylon stocking inside tube, secure end over tube with rubber band

Management for Homes
Insecticides

- Expensive, pose health and environmental risks, and may not produce good results
- Broken down by sunlight so residual effect will decline, may not work beyond several days
- From Univ. of Maryland Extension publication:

  "Is spraying a harmless, nuisance pest worth the expense and trouble, and exposure of people and pets to toxic chemicals?"

Management for Homes
Insecticides (Univ. of Maryland)

- Aerosol-type foggers are not recommended
  - » Will not kill all bugs or prevent re-entry
- Spraying into cracks and crevices will not prevent them from entering living areas and is not a viable or recommended treatment
- Not advisable to use an insecticide inside after the insects have gained access to the wall voids or attic areas

Management for Homes
Insecticides

- Insecticides being used by pest control companies in Sacramento (informal survey)
  - » Pyrethrin (org.), fipronil, bifenthrin, cyfluthrin, cholrafenapyr
- Some are exterior, some interior, some both
- Many companies not sure what to use

Management in Gardens
Clean Up Overwintering Sites, Weeds

- Adults overwinter in wood piles, under tree bark, in buildings, and in pomegranate culls
- Remove or inspect overwintering sites
- May migrate from weedy areas – eliminate weeds
- May hide in organic mulch – remove if necessary
- These things may not help in high population years – strong flyers

Management in Gardens
Row Covers

- Must be applied early before bugs arrive
- May exclude pollinators and beneficial insects
  - Tomatoes self-pollinating, but whiteflies or aphids may build up if beneficials excluded

Management in Gardens
Physical Removal

- Examine plants daily to biweekly
- Search in AM – Adults fly when warm
- Adults & nymphs hide when approached
- Destroy egg masses
- Pick or brush off into soapy water
- Hand-held vacuum dedicated to bugs

Management in Gardens
Trap Cropping

- Probably not an effective means of control

Management in Gardens
Insecticides

- Most gardeners don't spray insecticides
- New, highly mobile pests – difficult to avoid
- Insecticides as last resort
  - Temporary only, must be reapplied regularly – new bugs reinvade, residues don't last long
  - Frequent use of broad-spectrum insecticides (org. too) kills beneficials that kill other pests

Management in Gardens
Insecticides

- Monitor for egg masses starting early season
- Pyrethroid insecticides containing permethrin
  - Very toxic to bees and beneficial insects
- Insecticidal soap, neem oil or pyrethrin somewhat effective on young nymphs only
- Kaolin clay (Surround®)
  - May reduce feeding damage
  - Heavy use can harm beneficials
- Observe days-to-harvest period

Problems Related to Chemical Control

- Lack of efficacy in field
- Moribundity – Drop & recover
- Movement into & out of gardens
- Buildup of secondary pests
  - » Mites, leafhoppers, etc.

Bagrada Bug

Bagrada Bug

Bagrada hilaris

Common names: bagrada bug, painted bug, painted stink bug, African stink bug

Bagrada Bug

Bagrada hilaris

Female Male

Relative Size

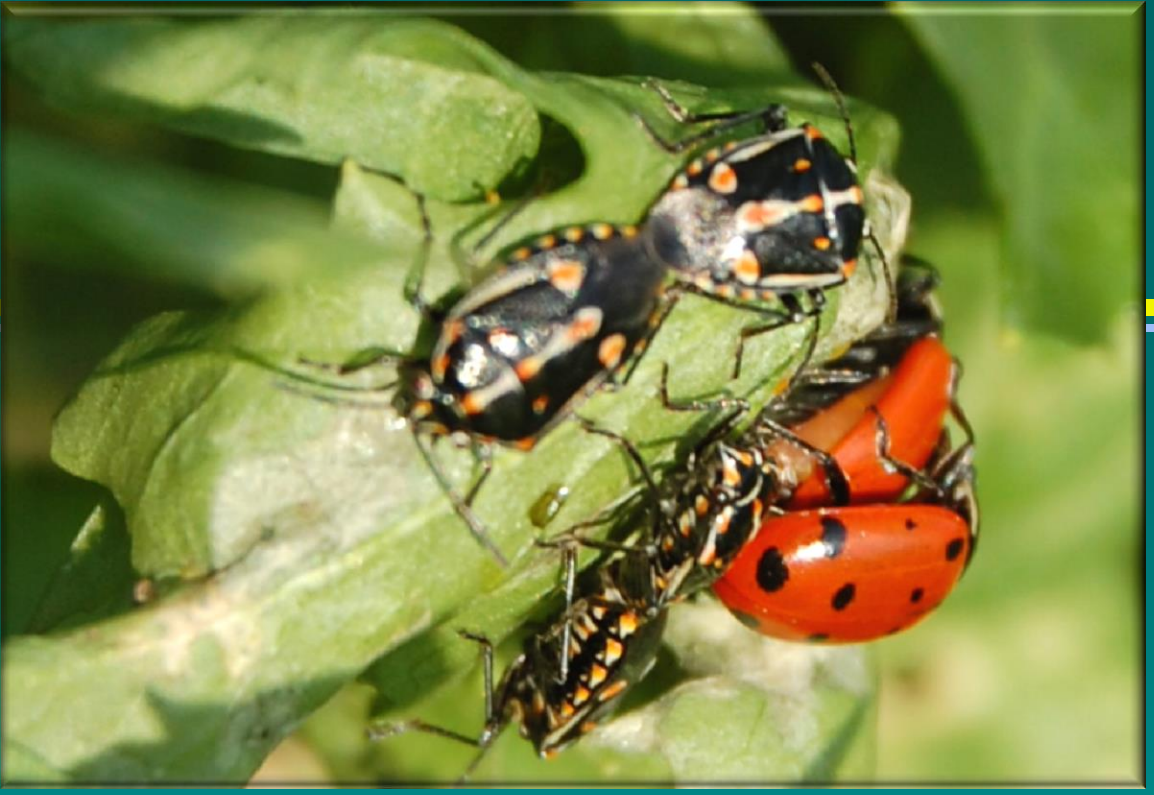


Photo courtesy of: What's That Bug?

Size comparison of Bagrada bugs and Convergent Lady Beetles
¼” or 6-8 mm

Bagrada Bug Spread

Bagrada bug distribution in CA as of November 2013

First found in LA county in 2008

Distribution in Africa

Bagrada Bug Spreads


Photo by Delbert Crawford

Bagrada Bug
Aggregation

Aggregation on mustard

Photo: John Palumbo

Aggregation on pepper

Photo by Brendan Kreute

Bagrada Bug
Host Plants (UC IPM)

- Mustard family
- Vegetables: Broccoli, cabbage, cauliflower, collards, kale, radish, rutabaga
- Ornamentals: Sweet alyssum, candytuft
- Weeds: London rocket, shepherd's-purse, wild mustard
- Also may feed on strawberries, melons, nightshades, okra, green beans, grains

Bagrada Bug Damage

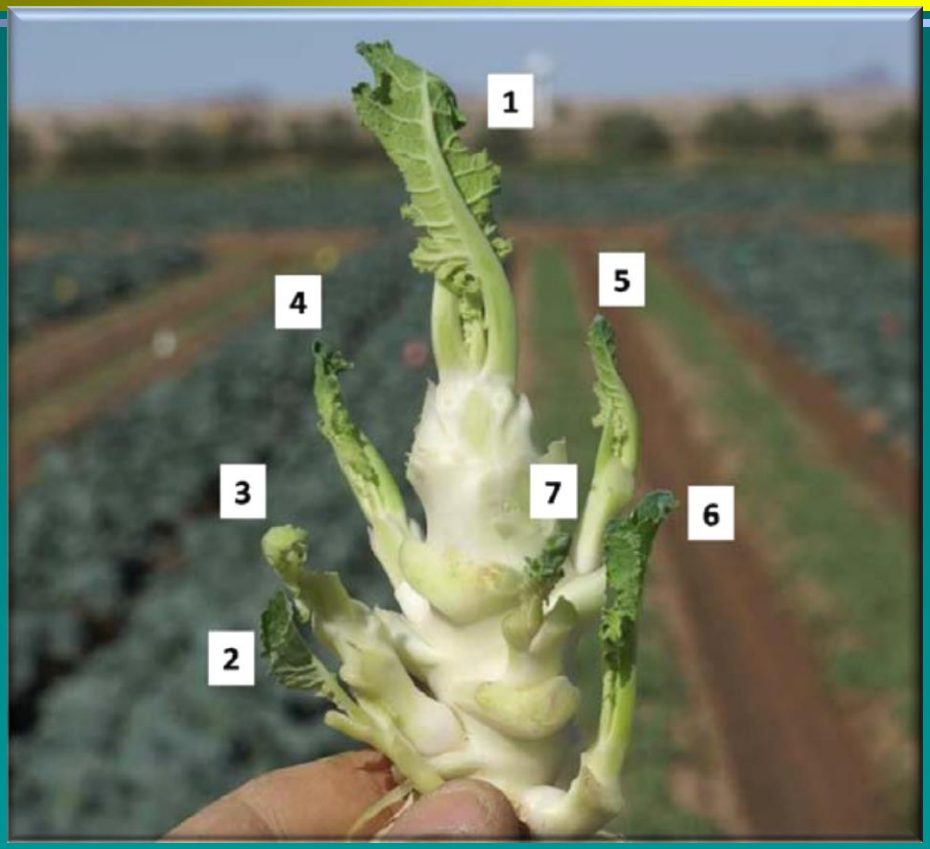


Photo: John Palumbo, Univ. of Arizona

Broccoli

Fig

Photo: Judi V. Cugat

Photo: Joselito Villero

Cauliflower

Questions?

Important Web Sites

www.StopBMSB.org

www.ucipm.ucdavis.edu

cesacramento.ucanr.edu