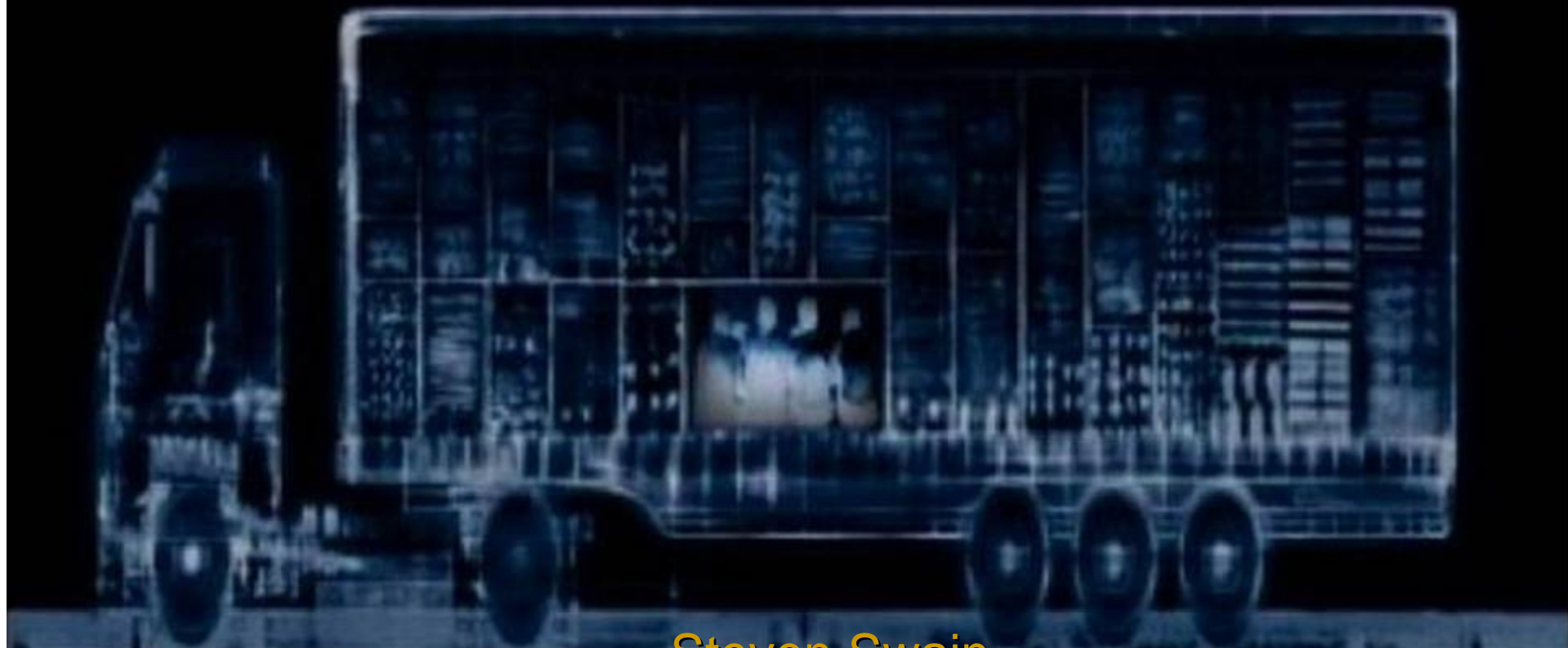


Cargo Manifest Destiny



Steven Swain

Environmental Horticulture Advisor
UCCE Marin & Sonoma Counties



Image: Hans Op de Beeck

Photo: Lonely Planet Images



We've been bringing an awful lot of stuff into California







Spotted Wing Drosophila





Spotted Wing Drosophila

- Tiny red-eyed fruit flies
- Native to Asia (Japan)
- Male pictured here
 - Wing spots
- Female no spots
 - Large saw like ovipositor



Serrated ovipositor in females



Photo: OSU

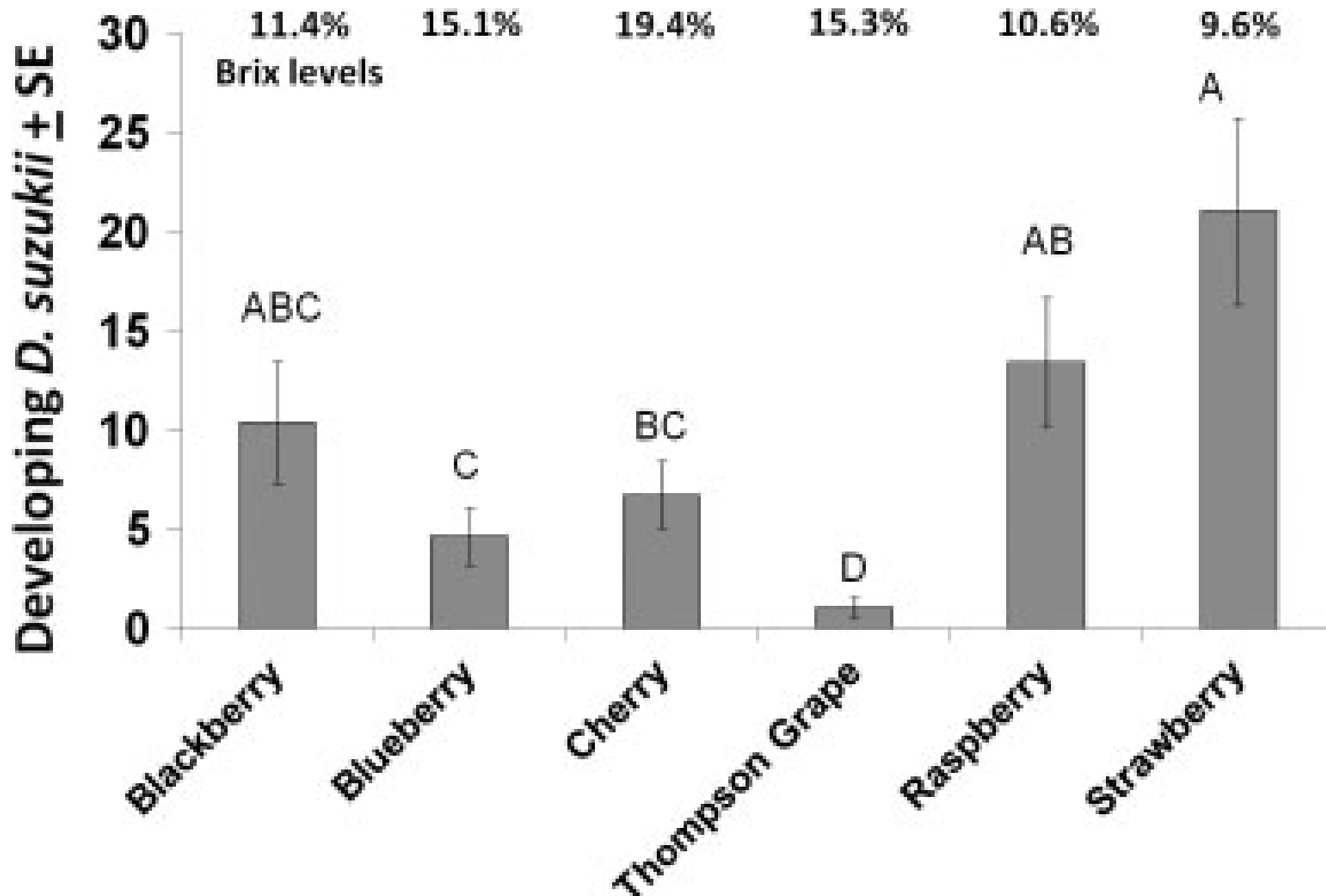


Photo: D. Bruck

Hosts

- Only ripening fruit
 - Many cane berries
 - Strawberries
 - Cherries
 - Grapes
 - Kiwi
 - Other fruits also attacked





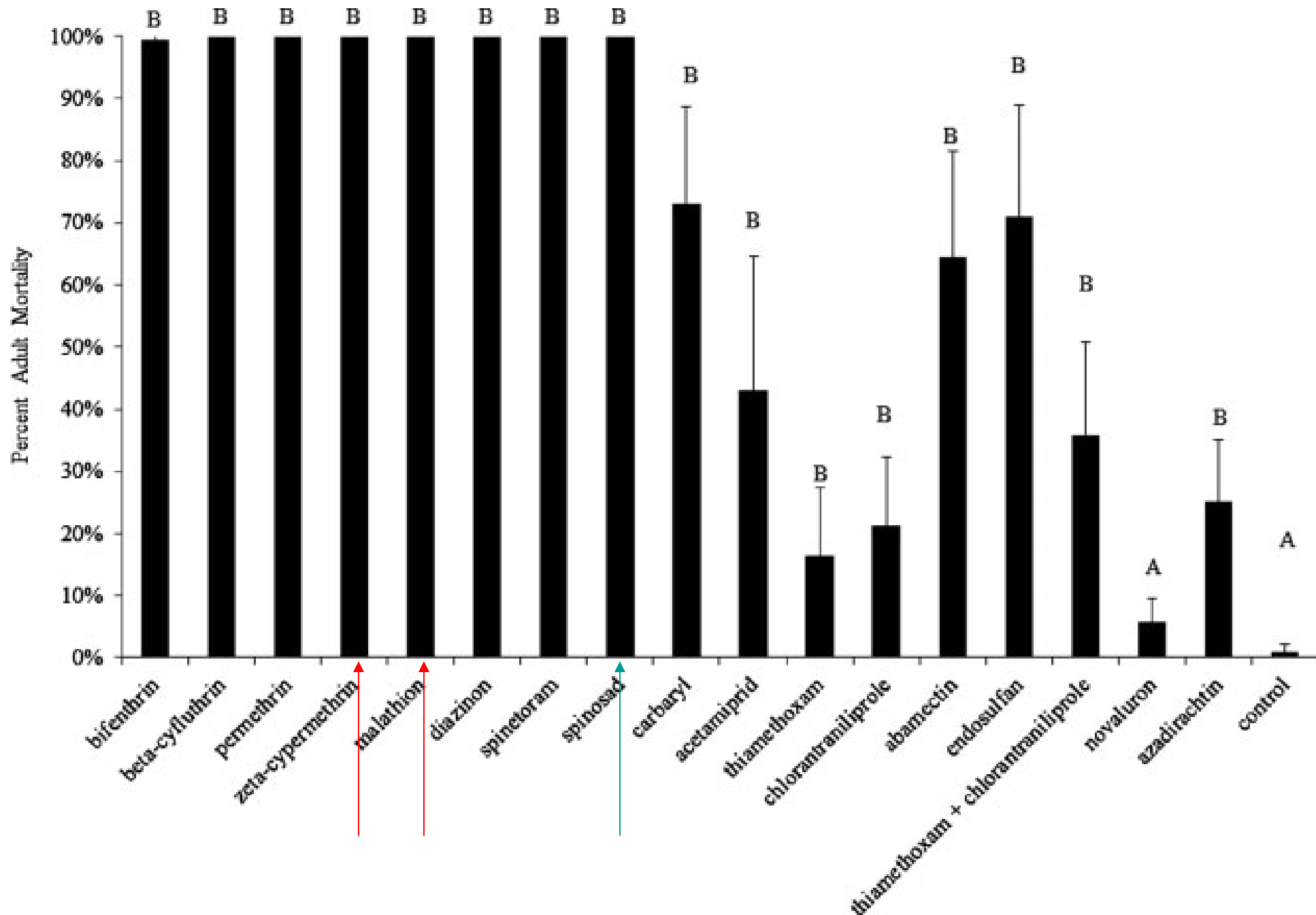
Source: Lee et al, 2011

Control

- Sanitation
 - Pick fruit promptly
 - Dispose of fallen or infested fruit
 - Bury 12 inches
 - Garbage disposal
 - Tightly tied bag
- 3-4 Traps/tree (?)
- Spinosad
 - Entrust > Pyganic
 - Resistance!
- Zeta-cypermethrin (Mustang), malathion, etc.
- Research continues



Photo: OSU



Source: Lee et al, 2011 Mustang, >14 day residual Entrust (OMRI) ~7 day residual

Trap

- Clear plastic cup
 - ¼ - 3/16 inch holes
 - Leave pour space
- Wire hanger
 - To sides of cup
- Sticky trap
 - To lid
 - red probably best – good luck!
- Apple cider vinegar
 - White wine
 - Change weekly

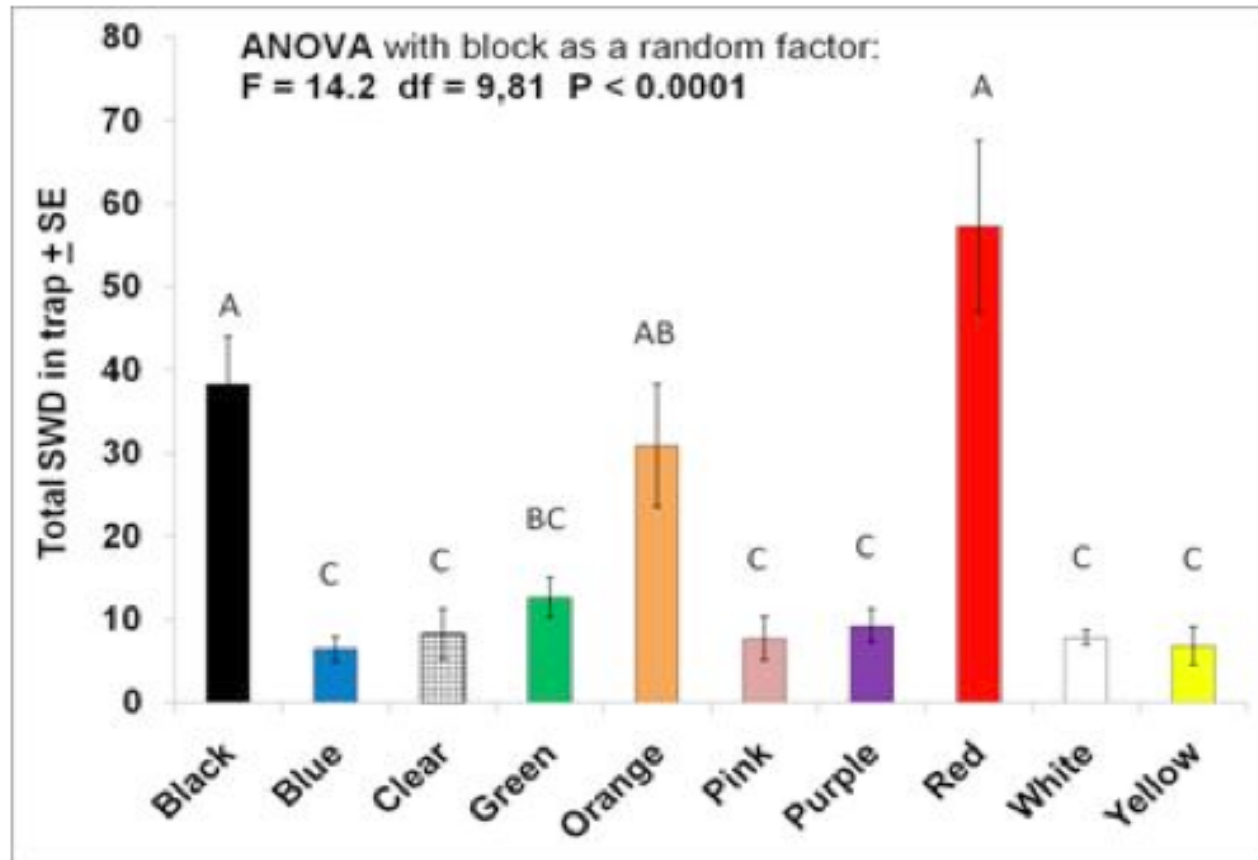


Photo: OSU

Color Preference of Spotted Wing Drosophila

Color preference: Red and black were the favorite colors of SWD, followed by orange. All the other colors, including clear and white cups, which are used in most monitoring programs, appeared similarly low.

Methods: Five color cups were randomly arranged in a 1m³ cage inside our greenhouse. During each trial run (block in the analysis) two cages with all ten colors represented were tested simultaneously (n=10 each). To only test attraction to color, soapy water rather than an attractant was used in the cups to trap flies. About 150 to 220 flies were added to each cage during a trial run, and traps were moved in position about halfway through the day, and traps were checked after 24 hours.



Source: OSU



SWD

- Backyard
 - Sanitation
 - Traps
 - Insecticides if needed
- Orchard
 - Monitor with traps
 - Rotate insecticides
 - Stay tuned

Sudden Oak Death

- Caused by *Phytophthora ramorum*
 - Fungus-like organism
- 2 Diseases
 - Foliar blight (huge host list)
 - Nursery issue
 - SOD (kills oaks, tanoaks)
 - Wildland issue
- Spread
 - Local: wind driven rain
 - Distance: people
 - Infected plants
 - Shoes & tires





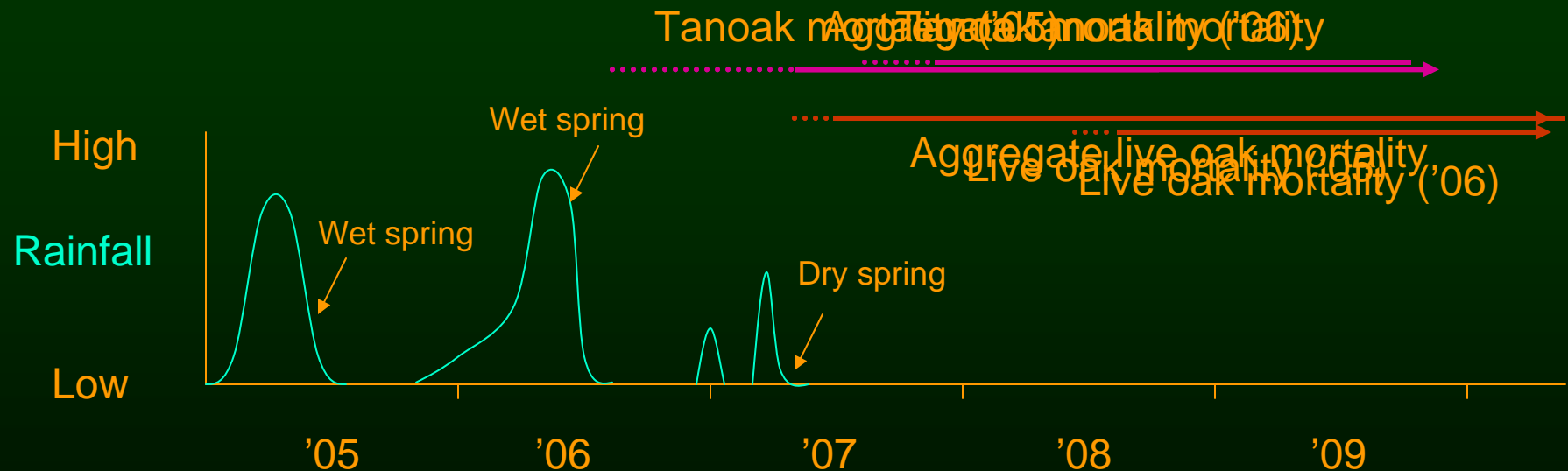
Bay Area Weather

- 2007 - 2009 fairly dry
- Summer 2010
 - Extended cold & wet
- Fall 2010
 - Early rains
- Winter 2010-11
 - Snow on mountains
- Spring/Summer 2011
 - Extended rains
- Okay, so what?
 - How does this affect us?
 - Can we anticipate it?

Oak Death Timeline

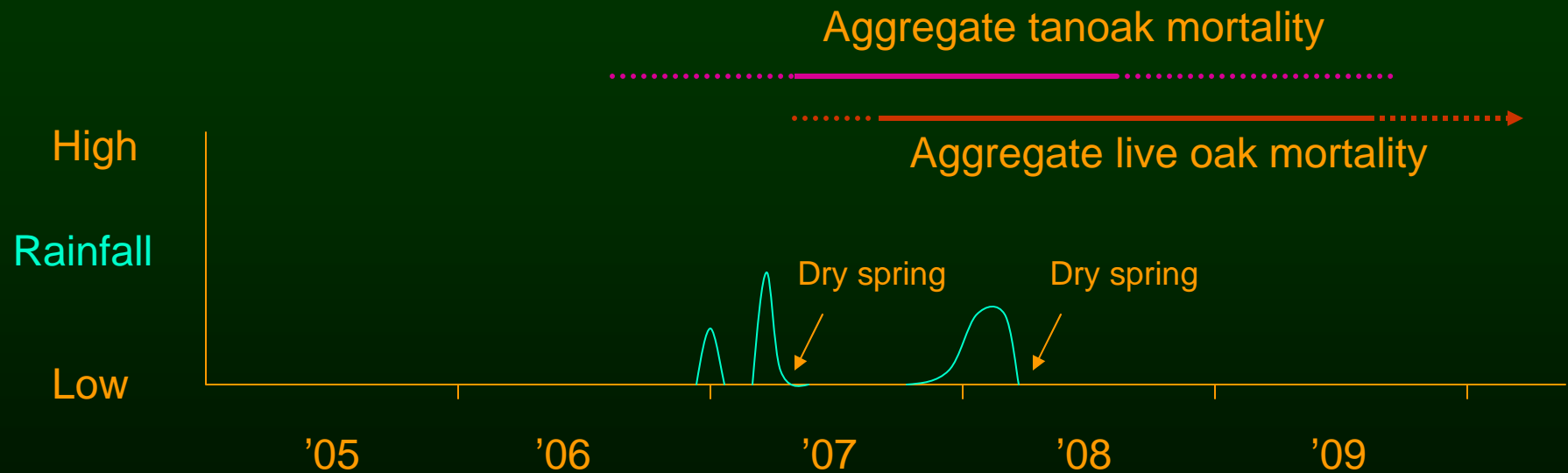
– Infection:

- Wet springs
- Tanoak mortality: 1-2 years
- Coast live oak mortality: 2-3 years
- Cryptic Infection



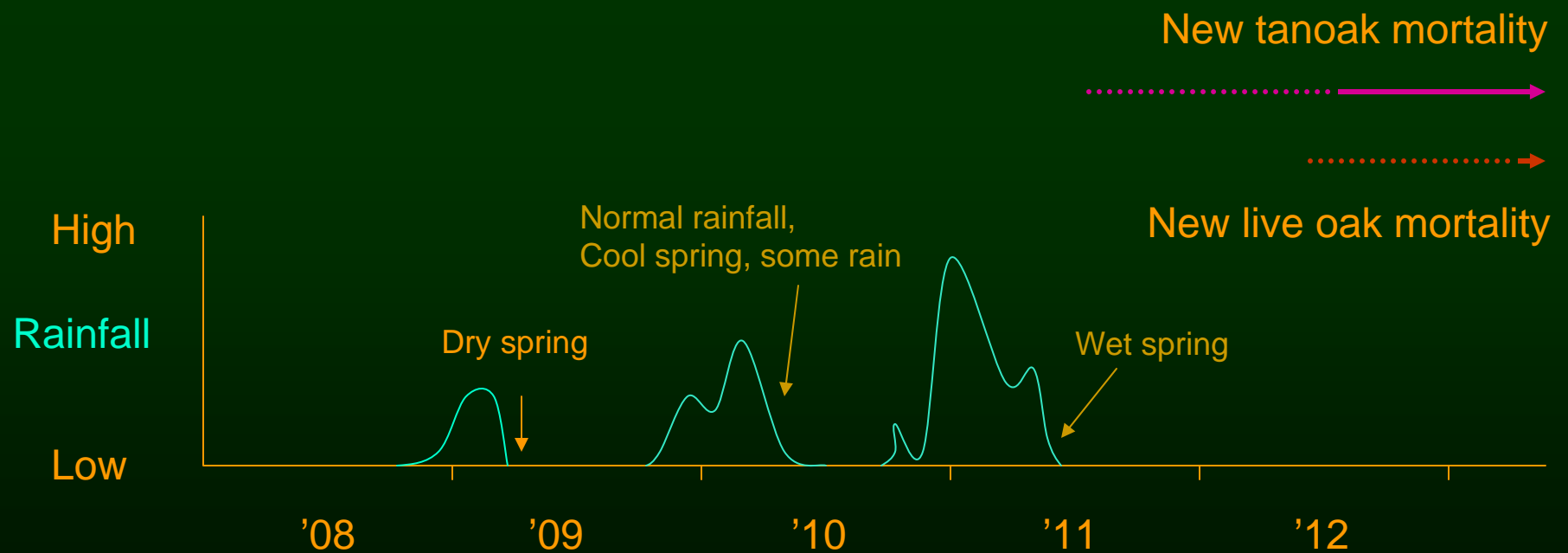
Oak Death Timeline

- Mortality rates will drop off with more dry springs
- Mortality rates increase following wet springs



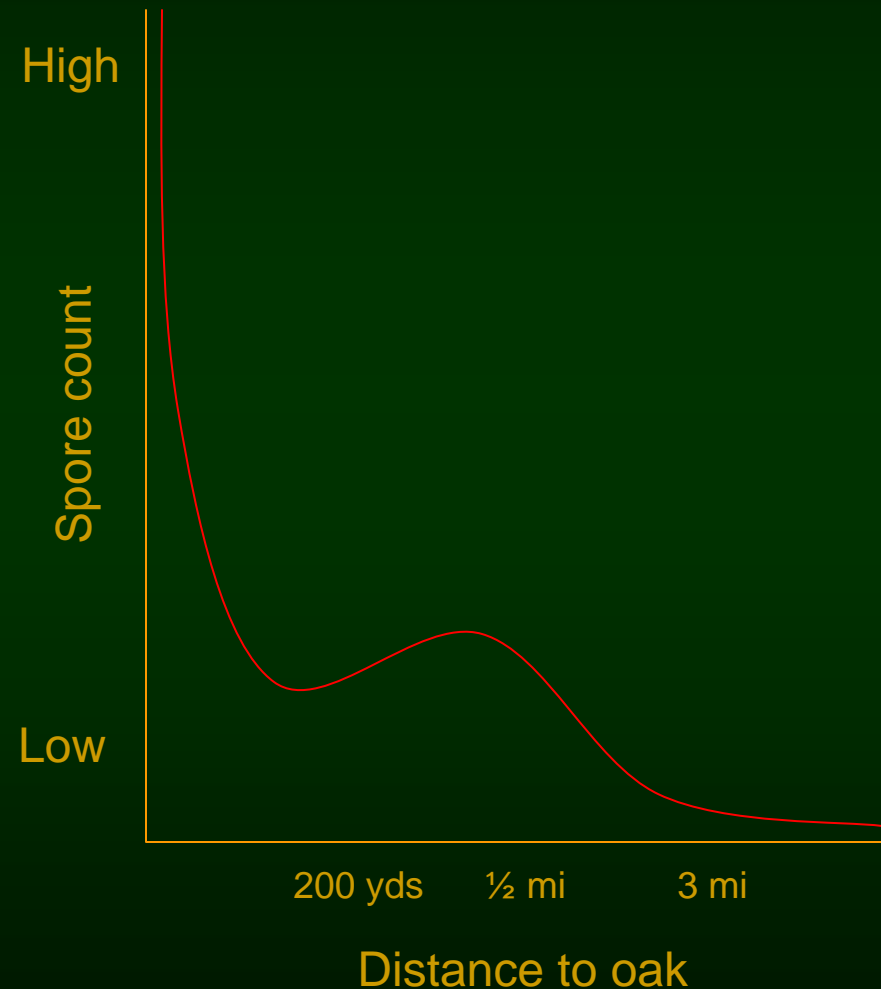
Oak Death Timeline

- Mortality rates will drop off with more dry springs
- Mortality rates increase following wet springs



Distance to spore source

- Foliar hosts near true oaks high risk
 - Some risk even at larger distances
- Not as relevant for tanoaks
 - Foliar host itself
 - Self infection



Presidio find

- No bays anywhere close
- Toyons quite close
- Genetic fingerprint matches nursery type, not wild type
 - Neighbor across street had infected landscape plants in 05 & 06
 - Rain years!
- Suggests “bay” focus might be a little myopic





Bark scribing

- Potential “new” technique being evaluated
- Early trials show some promise
- Cankers may need to be small



Lots of new seed bugs

- *Metapoplax ditimoides*
 - Native to Europe (Italy)
 - Not really a pest there
- Nuisance pest in cars & households
 - First reported in Oregon in 1998
 - In Marin County since 2008
 - Seek shelter during environmental extremes (by the hundreds)
- Vacuum & temperature treatments

Metapoplax ditimoides



Photo: Tristanba

Metapoplax ditimoides
nymph

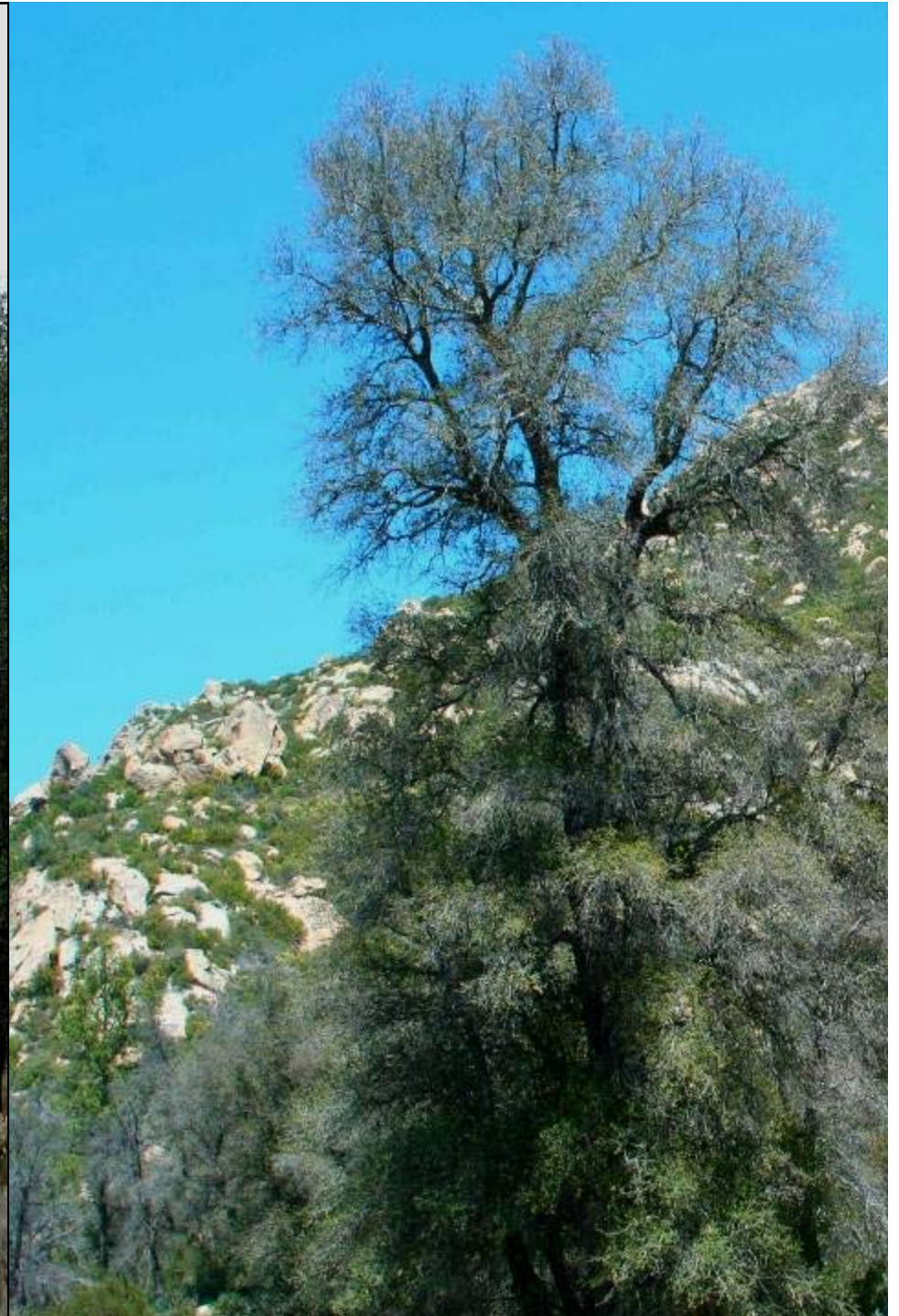


Photo: Tristanba

Photos courtesy Kim Camilli, CalFire

Gold Spotted Oak Borer

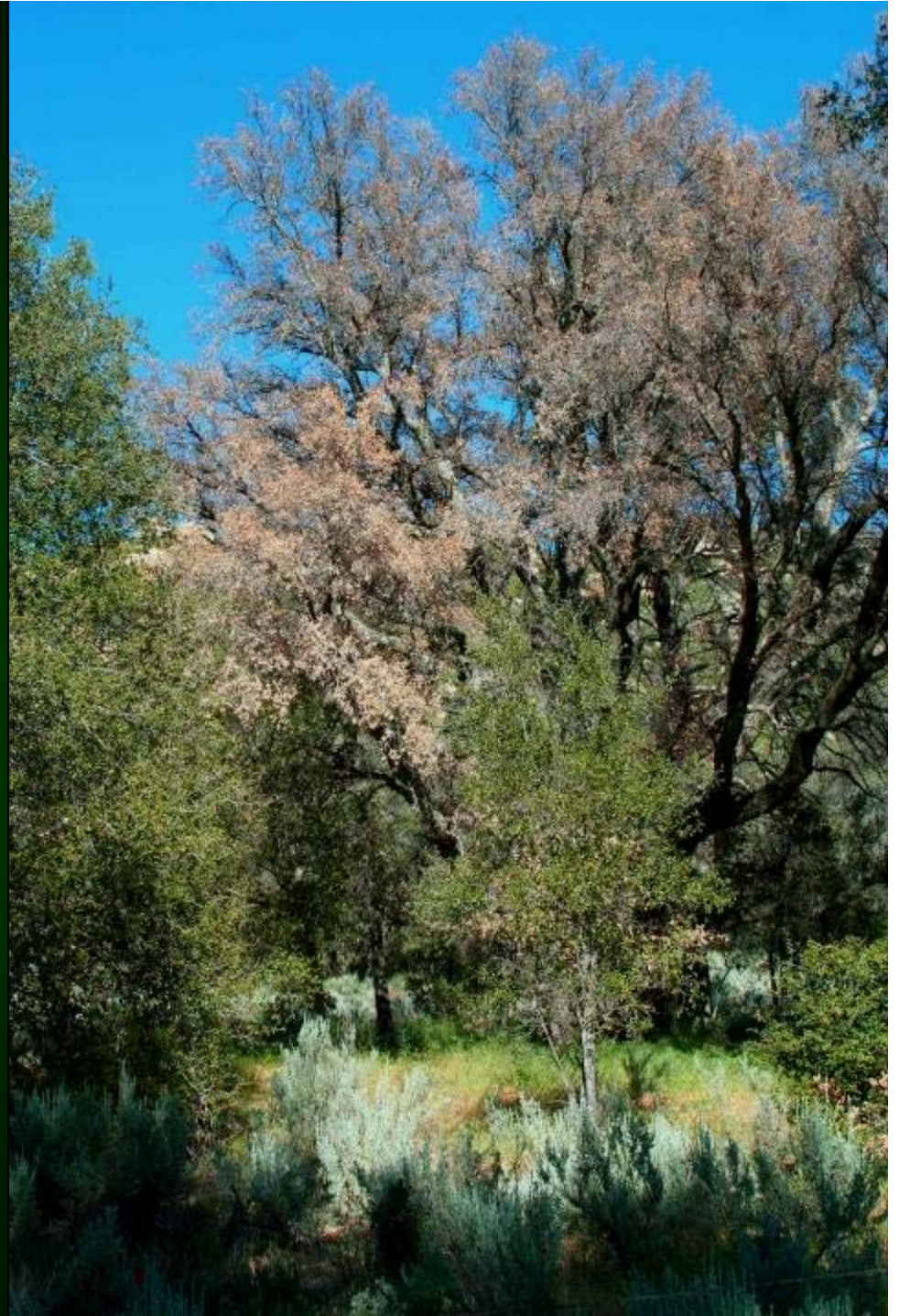
- 25,000 trees killed since 2002
- Damage spread over 5,000 sq km
- Crown symptoms of GSOB on live oak species



Gold Spotted Oak Borer

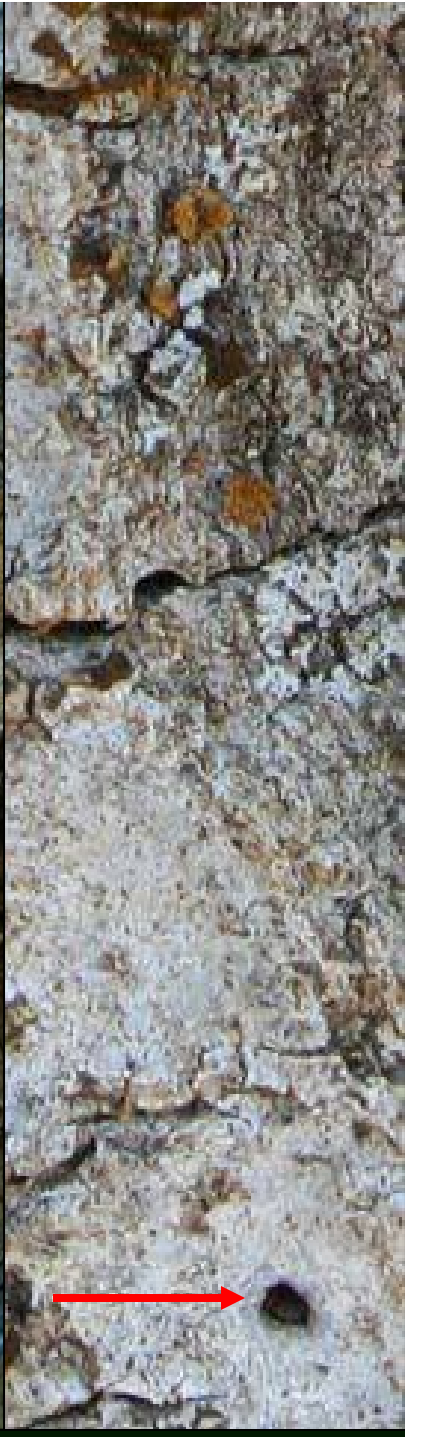
- Crown symptoms of GSOB on black oak
 - Deciduous
- Brought in from Texas / Mexico area
 - Probably on firewood
 - Not a pest there

Photos courtesy Kim Camilli, CalFire



Photos courtesy Kim Camilli, CalFire





Signs of GSOB infestation

- D-shaped exit holes
- Larval feeding galleries
 - No frass
 - Mostly in cambium



Synanthedon

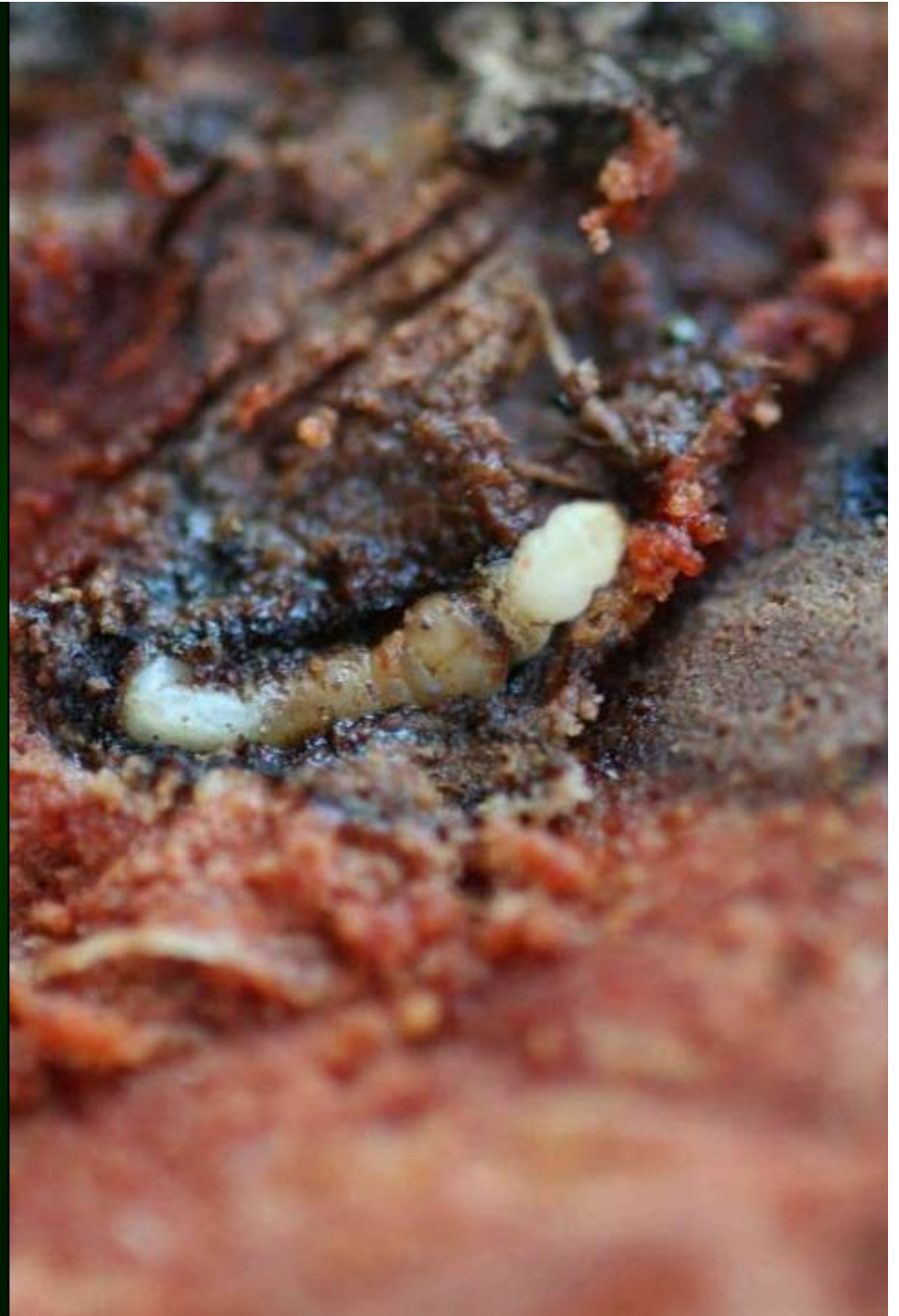
- Sycamore borer rarely to cambium
 - Round exit holes
 - Frass like coffee grounds
 - Usually dry
 - Sometimes bleeds like Phytophthora



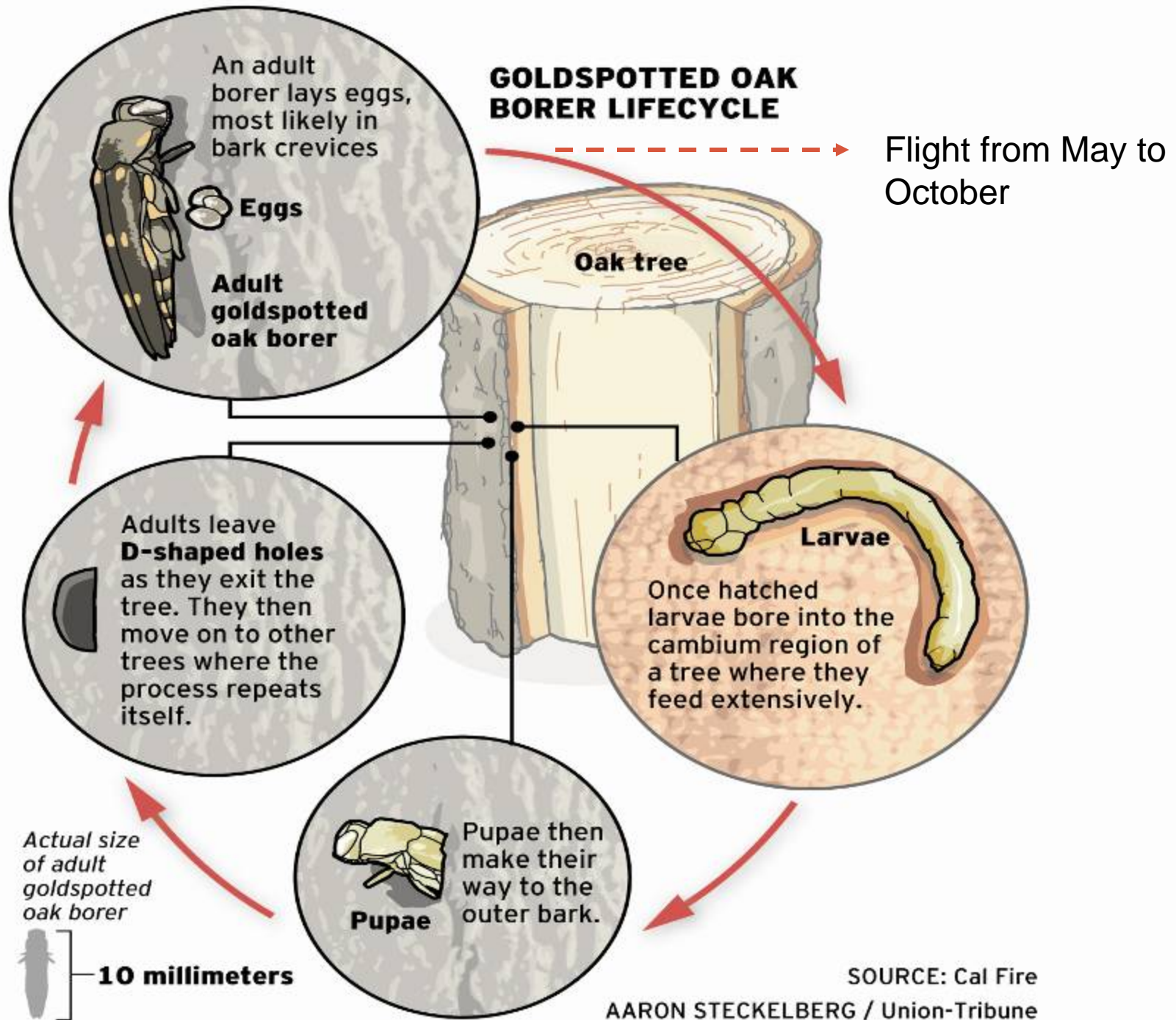


Larvae

- ~18mm long
- Slender
- Narrow head
- 2 pincher-like projections at tail



GOLDSPOTTED OAK BORER LIFECYCLE



Adults

- 10mm long
- Bullet shaped
- 3 pair of gold spots along back





Photo: CSIR

Firewood

- Harbors GSOB for up to one year

Cultural controls

- Don't move firewood
- Chip or remove bark from wood
 - Don't store untreated wood near oaks
 - Clear tarping with UV plastic *doesn't* kill larvae
 - No data yet on tree health aids (mulching)





Photo: Andy Morrison

Prevention

- Systemic insecticides
 - Neonicotinoids
 - Prophylactic on healthy trees
 - Once a year
 - Not a guarantee
 - Commercial strength
 - Trunk injection > more product in tree
 - Soil injection: at root crown

Photo courtesy Kim Camilli, CalFire



Treatment

- Topical insecticides
 - Pyrethroids, carbaryl
 - Best for infested trees
 - Effective immediately
 - Reduces additional attacks
 - Can be combined with systemics
 - Trunk, leaves, and all branches >5in dia.
 - Must last from May to October each year
 - May require re-treatment

Laurel wilt

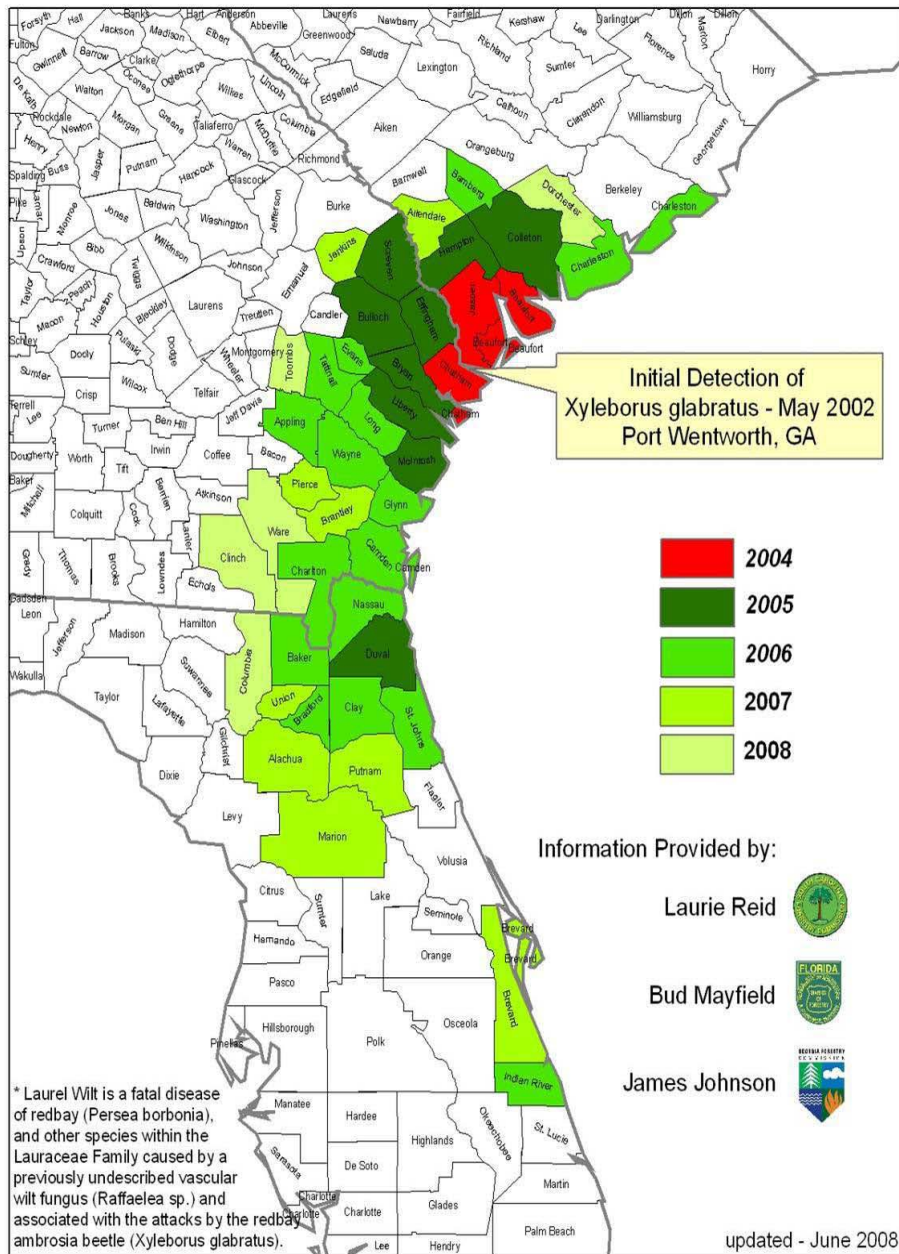
- A fungus,
 - *Raffaella lauricola*
 - Vascular wilt
 - Native to SE Asia
- Attacks laurel family
 - Persea (avocado, redbay)
 - Camphor
 - Laurel
 - Others
 - Endangered species
- Vectored by an ambrosia beetle
 - *Xyloborus glabratus*



Photo: USDA FS



Distribution of Counties with Laurel Wilt Disease* Symptoms, by Year of Initial Detection



Background

- 2002: *Xyloborus* identified on packing crates in Georgia
- 2005: Thousands of dying redbay in S.C., Ga and Fla.
 - Natural rate 17 miles/year
 - Whole trees rapidly decline, like
 - Dutch elm disease
 - Unknown *Raffaella* species proven as cause
- 2008: *Rafaella lauricola* named
 - So widespread that there's no chance for control

Photo: CSIR



Teamwork

- Galleries go deep into wood
- Ambrosia beetles “farm” the fungus
 - Ambrosia beetles get food
 - Don’t eat the tree
 - Relatively immune to tree’s defenses
 - Fungus gets custom transport



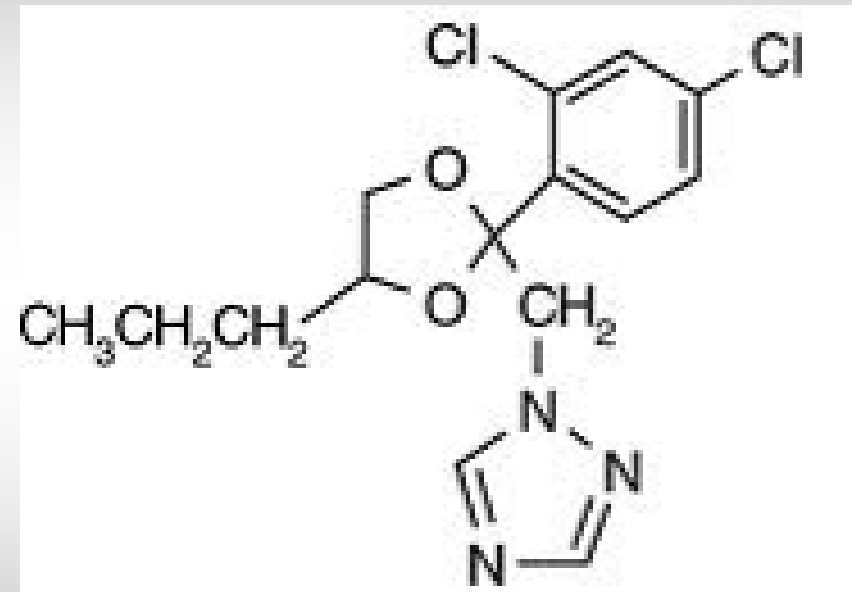


Temecula 2010

- *Raffaella canadensis* isolated from an avocado field
 - Cause of infection proven
 - Not *R. lauricola*
- If it's arrived once, it will arrive again

Treatment?

- If you suspect laurel wilt, call:
 - Ag. Commissioner
 - UCCE office
- Research
 - Propiconazole
 - Banner Maxx, ...
 - Systemic
 - Nonbearing
 - Appears effective
 - Lasts >1 year in “lab”
 - 4-6 months in field?
 - Colloidal silver
 - In the lab ...



Black canker of willow

- Fungus:
*Colletotrichum
acutatum*
 - Native to Europe?
- Host: *Salix*
 - *babylonica*
 - *alba*
 - *laevigata*?
- Suspected in Marin
- Consistent with reports
in Sonoma
- Have you seen this?



Red Palm Weevil

- *Rhynchophorus ferrugineus*
- The worst palm pest known
 - Native to Asia (India)
- Larvae live in crowns and trunks of palms
- End of August 2010 it was found in Laguna beach
- Large beetles and grubs (up to 2 inches)
- Probably introduced on nursery stock
- Can probably move 3-4 miles in a week

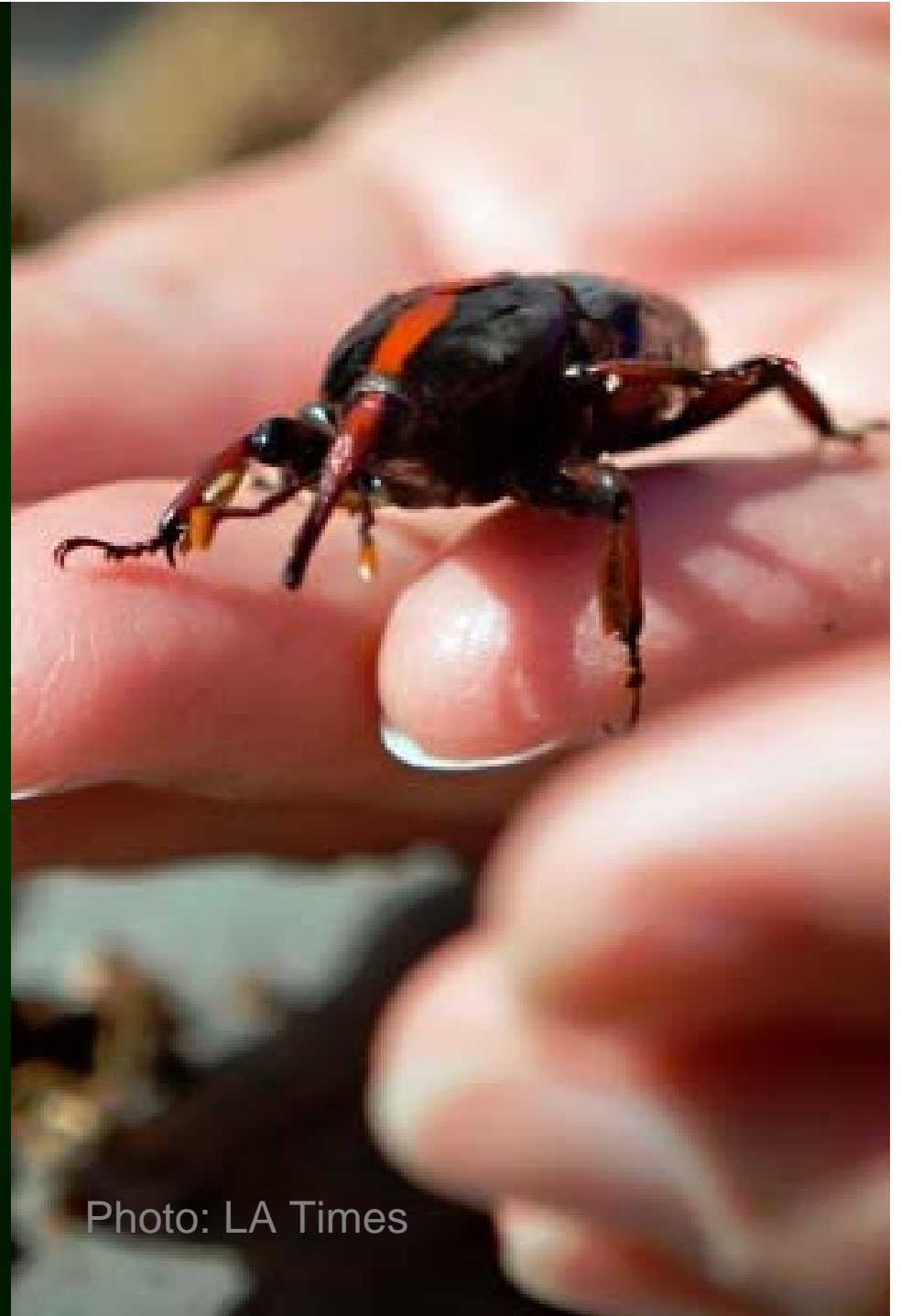


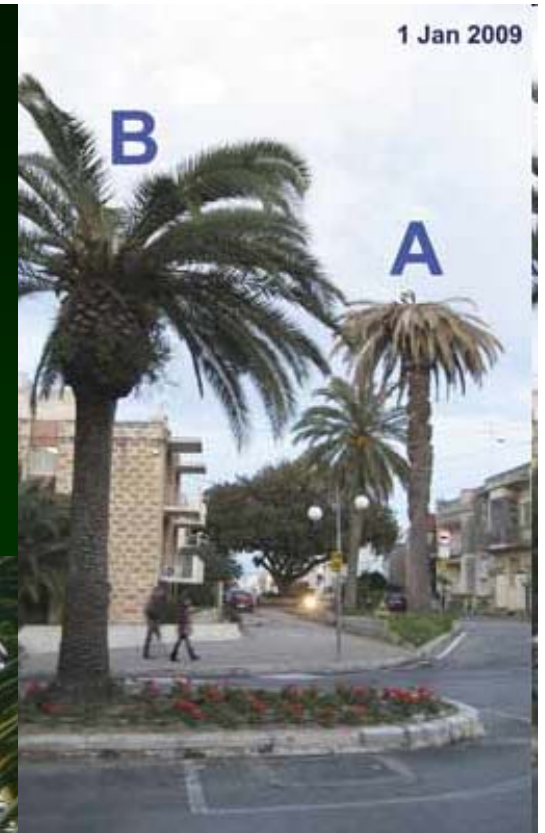
Photo: LA Times



Symptoms & Signs

- Look for accumulation of frass
- Palm fibers wrapped into cigar shaped pupal cases
- Frond dieback
- Palm generally in decline
- Chewing sounds?

- Threats:
 - Loss of ornamentals
 - Date palms in Coachella valley
 - Native palms





Control

- Bucket traps
 - Pheromones
 - Antifreeze
 - Water
- Destruction of trees

Where's IPM?

- Some new to science
 - Lifecycles and controls not known
 - Laurel wilt
- Others in new ecosystems
 - Controls not here
 - Not a pest in native lands
 - Seed bugs
 - Gold spotted oak borer
 - Sudden oak death
- Still others are just tough
 - Spotted wing drosophila
 - Red palm weevil
- Recommendations will change as we learn more



References & Acknowledgements:

- Tristanba: An English photographer, work posted on Flickr
- Oregon State Cooperative Extension <http://extension.oregonstate.edu/>
- Lee, JC; Bruck, DJ; Curry, H; Edwards, D; Haviland, DR; Van Steenwyck, RA; Yorgey, BM. (2011) The Susceptibility of Small Fruits and Cherries to the Spotted-Wing Drosophila, *Drosophila suzukii*. Society of Chemical Industry (wileyonlinelibrary.com) DOI 10.1002/ps.2225
- Bruck, DJ; Bolda, M; Tanigoshi, L; Klick, J; Kleiber, J; DeFrancesco, J; Gerdeman, B; Spitler, H. (2011) Laboratory and field comparisons of insecticides to reduce infestation of *Drosophila suzukii* in berry crops. Society of Chemical Industry (wileyonlinelibrary.com) DOI 10.1002/ps.2242
- Gold Spotted Oak Borer photos courtesy Kim Camilli, CalFire / CalPoly San Luis Obispo
- GSOB treatment recommendations by Tom Coleman, USFS, based on other buprestid beetles <http://www.fs.fed.us/r5/spf/fhp/gsob/GSOB%20Managing%20GSOB%20on%20public%20and%20tribal%20lands%20%285-10-10%29.pdf>
- Laurel wilt photos mostly from CSIR, http://cisr.ucr.edu/redbay_ambrosia_beetle_laurel_wilt.html
- Mayfield, AE; Barnard, EL; Smith, JA; Bernick, SC; Eikwort, JM; Dreaden, TJ (2008) Effect of Propiconazole on Laurel Wilt Disease Development in Redbay Trees and on the Pathogen In Vitro. Journal of Arboriculture <https://fp.auburn.edu/sfws/enebak/swfdw/Laurel%20Wilt%20ISA%20AUF%20article.pdf>



Thanks!

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