

**Thousand Cankers Disease vs. Shallow Bark Canker
Seasonal Activity of Walnut Twig Beetle
in the southern San Joaquin Valley**

Botryosphaeria canker diseases

Lethal Paradox Canker vs. Phytophthora

Elizabeth Fichtner, Tulare Co.

Western USA: Urban and Suburban Plantings

HISTORY

2001-present: widespread mortality of black walnut (*Juglans nigra*) in western United States

June 2008: First disease report in California—Yolo County

2009: Many reports of disease throughout California

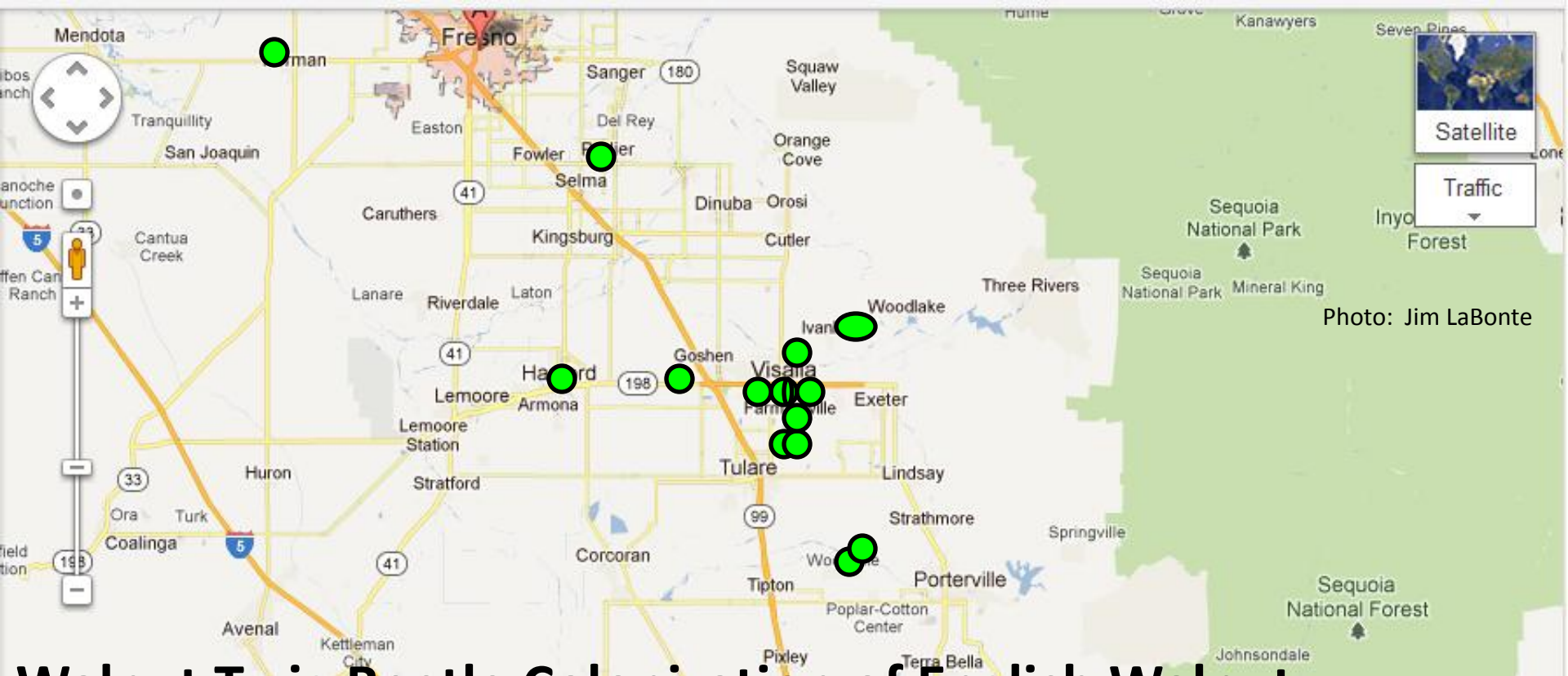


Photo: Fichtner

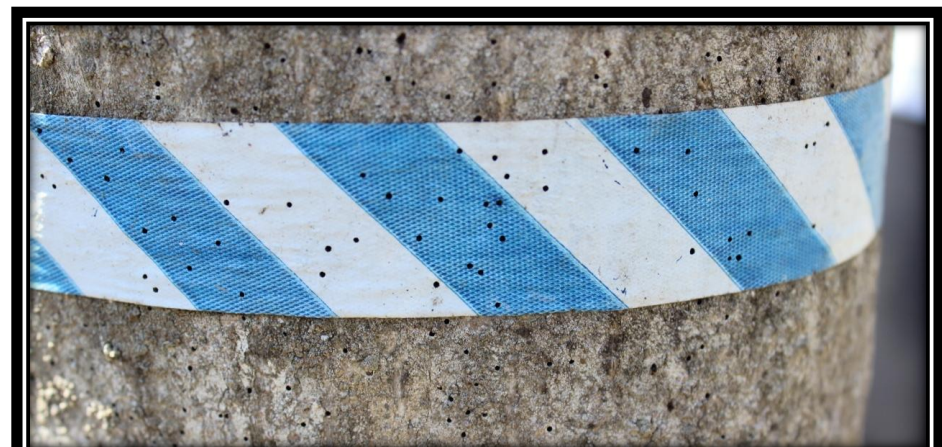
2009 Tulare County

Photo: Cranshaw
and Tisserat Pest
Alert

California Commercial Walnut Production



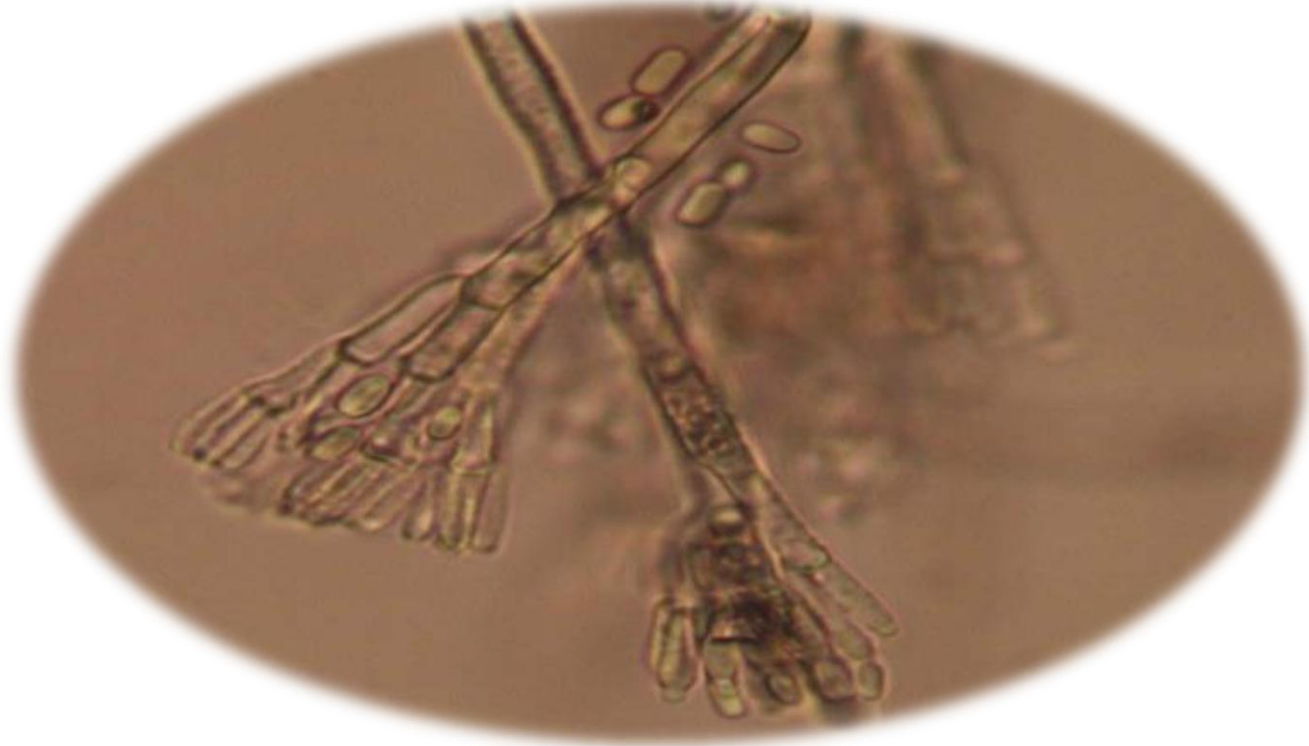
Walnut Twig Beetle Colonization of English Walnut Tulare and Fresno Counties



A close-up photograph of a wood sample showing several small, dark, oval-shaped holes, which are characteristic of Walnut Twig Beetle damage. A green speech bubble with a blue border points to one of these holes. The wood has a light tan color with a darker, brownish stain around the holes. The background is dark and out of focus.

Walnut Twig Beetle
(*Pityophthorus juglandis*)

Causal Agent: *Geosmithia sp.*
Species name: *G. morbida*



Vector: Walnut twig beetle

Aggressive feeder

Introduces fungus during gallery formation

Fungus sporulates in gallery

Aggregation pheromone

No other predisposition to decline observed





Thousand Cankers Disease (*Geosmithia* sp)



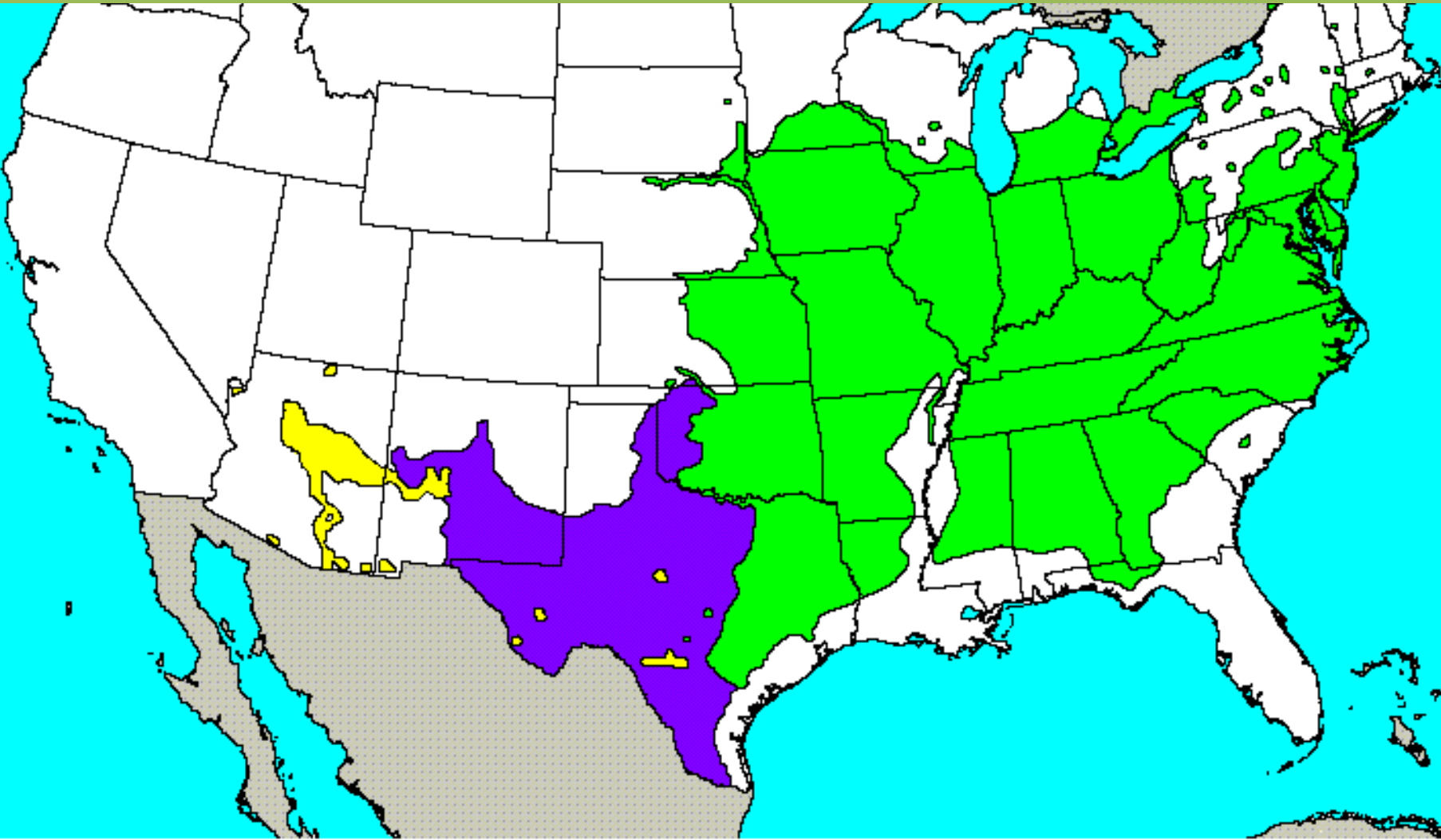
Shallow Bark Canker (*Brennaria* sp)



Don't ignore shallow bark canker symptoms
Look for beetle galleries!



Risk of Thousand Cankers Disease in Native Range of *Juglans nigra*



Arizona walnut
Juglans major

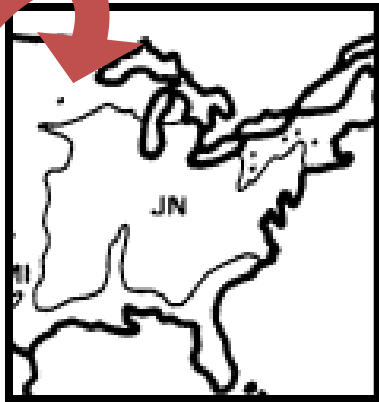
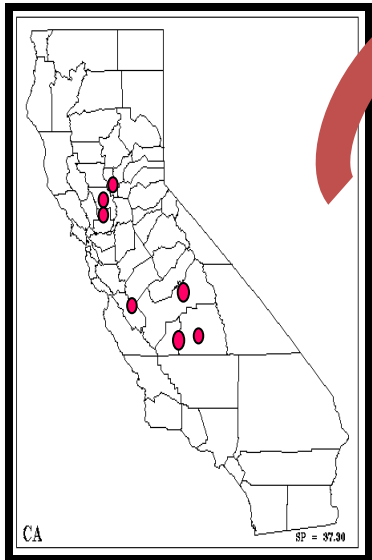
little walnut
Juglans microcarpa

black walnut
Juglans nigra

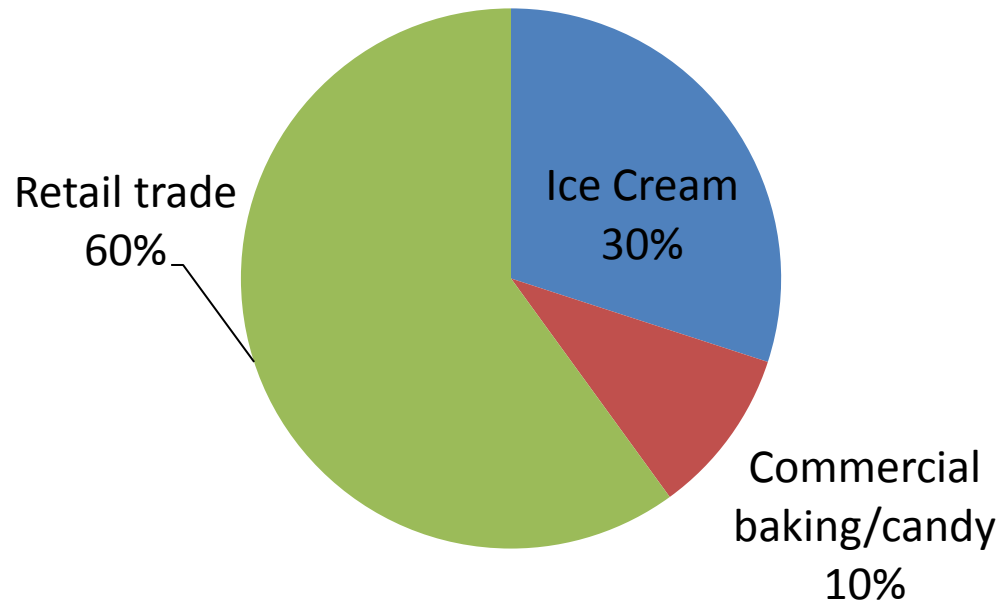


- 10,000 metric tons of black walnuts harvested annually
- High value native wood (furniture, gunstocks)
- food for wildlife; ecosystem component

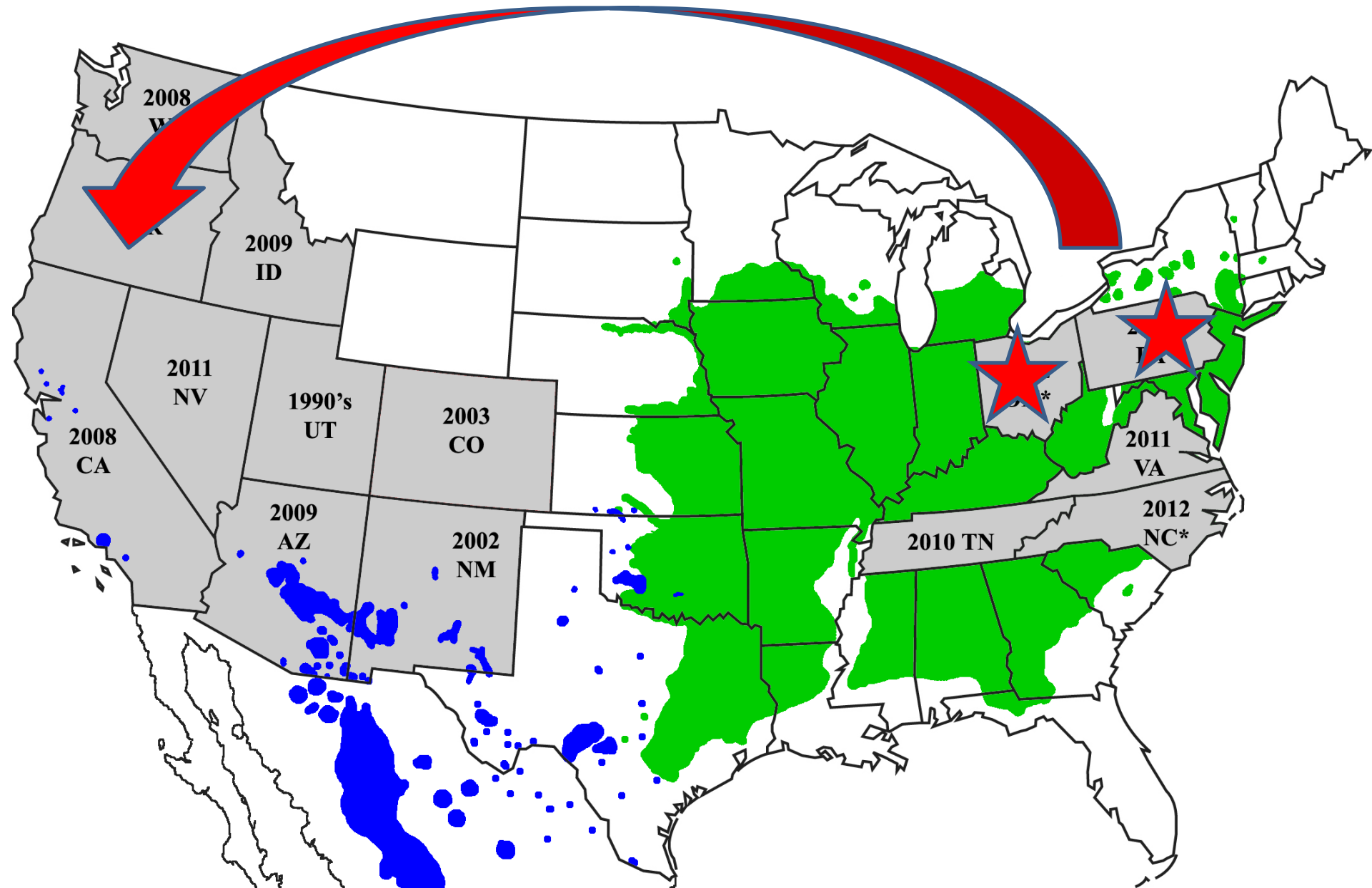
Protection of native *J. nigra*

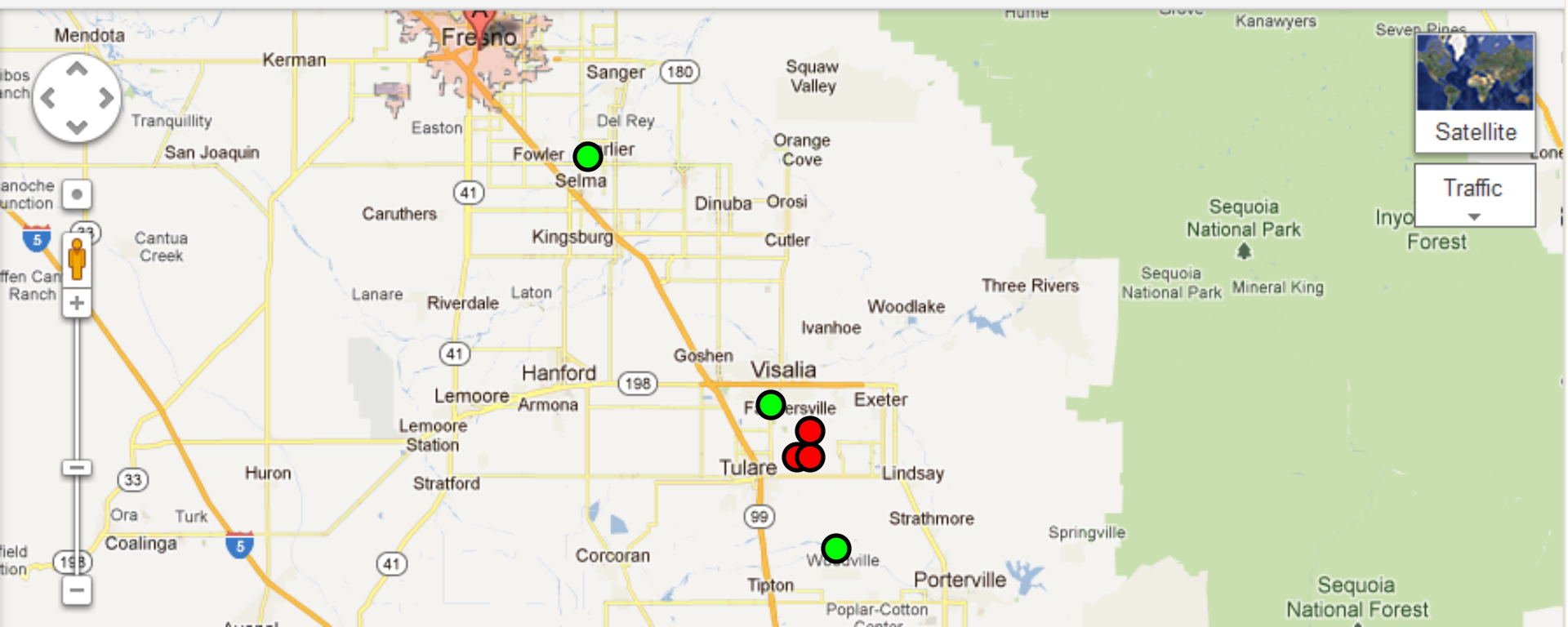


Black Walnut



Current Known Distribution of TCD in United States





2010 ●



2011 ●



2012 ●





Funnel Traps: October 2011-present

3 sites

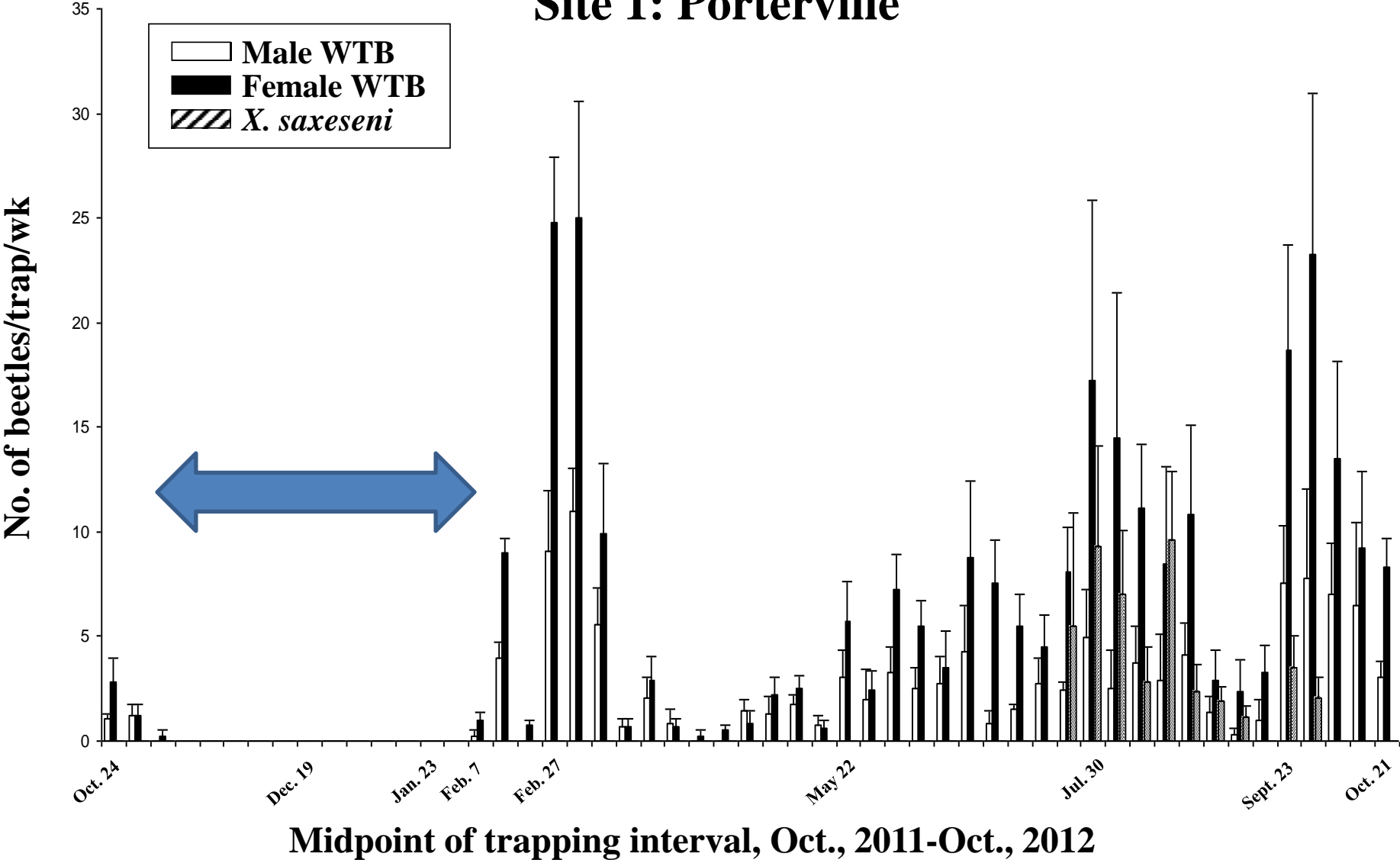
2 heights

2 locations (inside and outside)



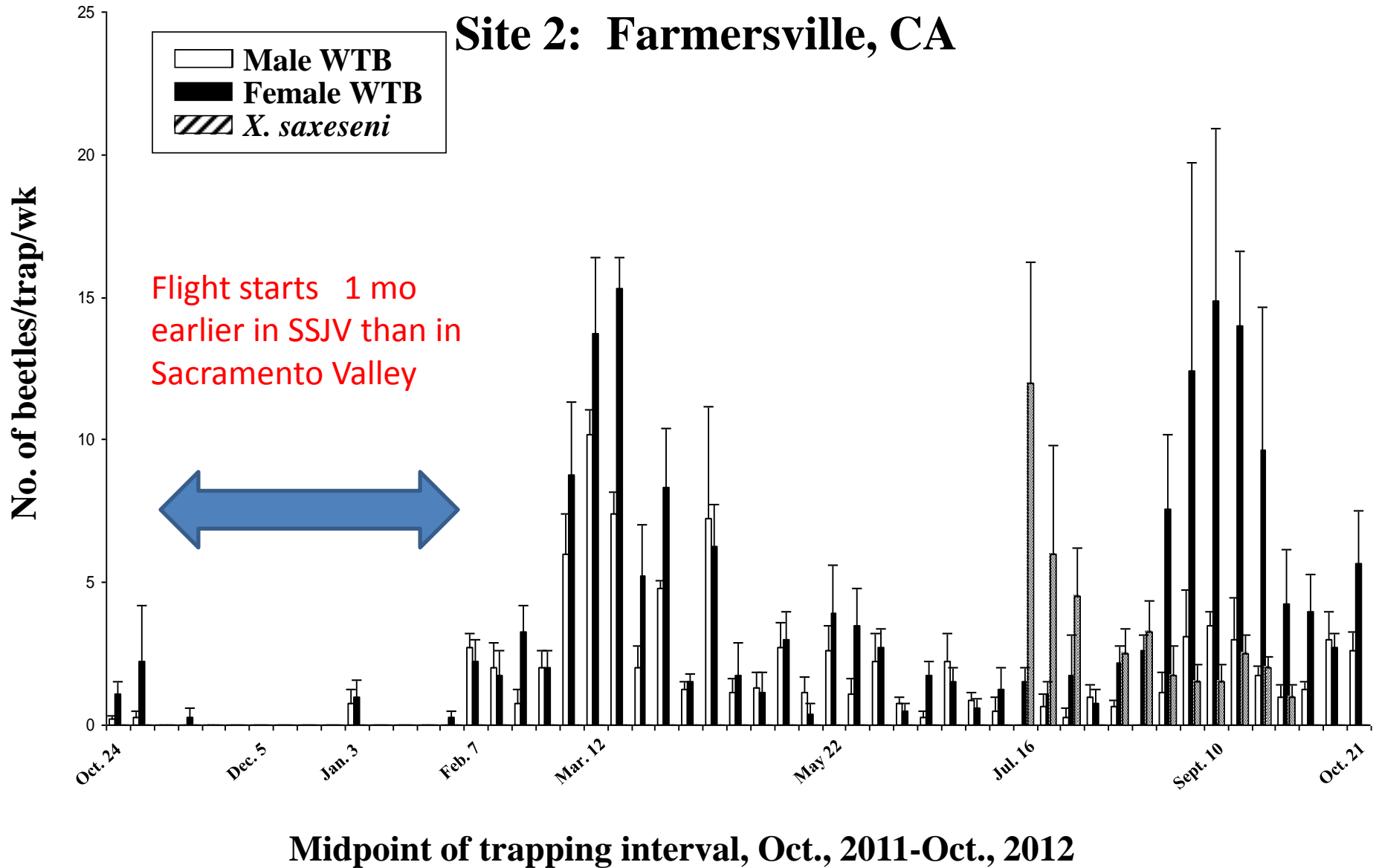
Trap catch of walnut twig beetle (WTB) and an ambrosia beetle on pheromone-baited traps (N=4), Oct. 2011-Oct. 2012, Tulare Co., CA.

Site 1: Porterville



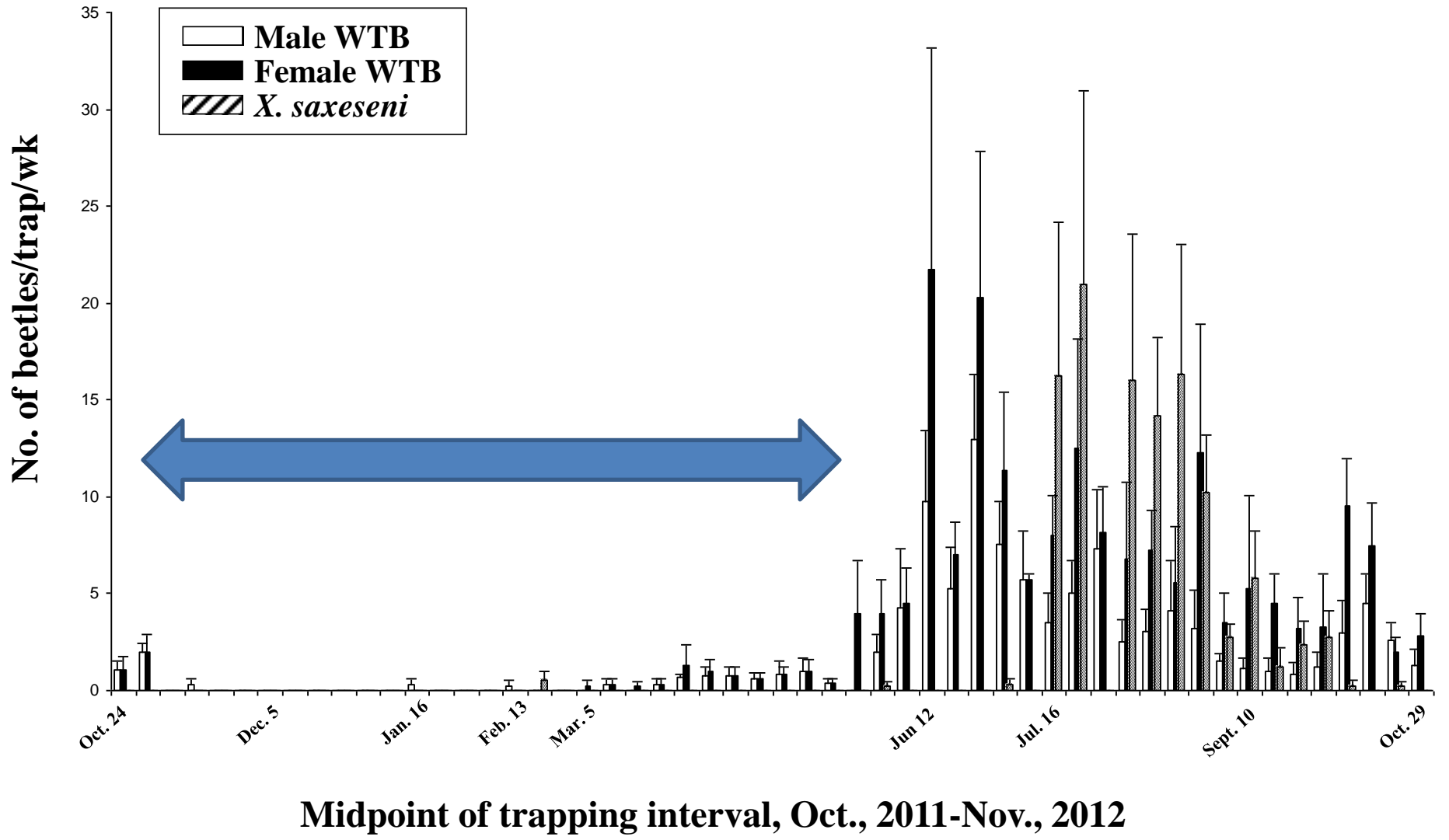
Trap catch of walnut twig beetle (WTB) and an ambrosia beetle on pheromone-baited traps ($N=4$), Oct. 2011-Oct. 2012, Tulare Co., CA

Site 2: Farmersville, CA



Trap catch of walnut twig beetle (WTB) and an ambrosia beetle on pheromone-baited traps ($N=4$), Oct. 2011-Nov. 2012, Fresno Co., CA

Site 3: Kearney Ag Center

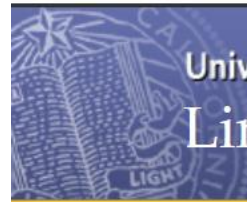




2013 Activities

- Document beetle flight activity weekly throughout growing season.
- Continue survey in TC orchards.

- Initiating new study on duration and rate of WTB (and other insects) emergence from firewood.
 - Sanitation issue
 - Risk of interstate wood movement



University of California

Lindcove Research & Extension Center

A photograph of an orchard with rows of trees and a central path covered in fallen leaves. The trees have thick, gnarled trunks and dense green foliage. The ground is sandy and shows tire tracks. A central path is lined with a pile of fallen leaves and debris.

Botryosphaeria canker diseases

Elizabeth Fichtner, Tulare Co.



Botryosphaeria blight and cankers!

- 3 Heavily diseased sites-Tulare Co.
- Numerous sites with low levels of disease (non-economic threat)



T. Michaelides

T. Michaelides

Botryosphaeria fruit, leaf, and shoot blight

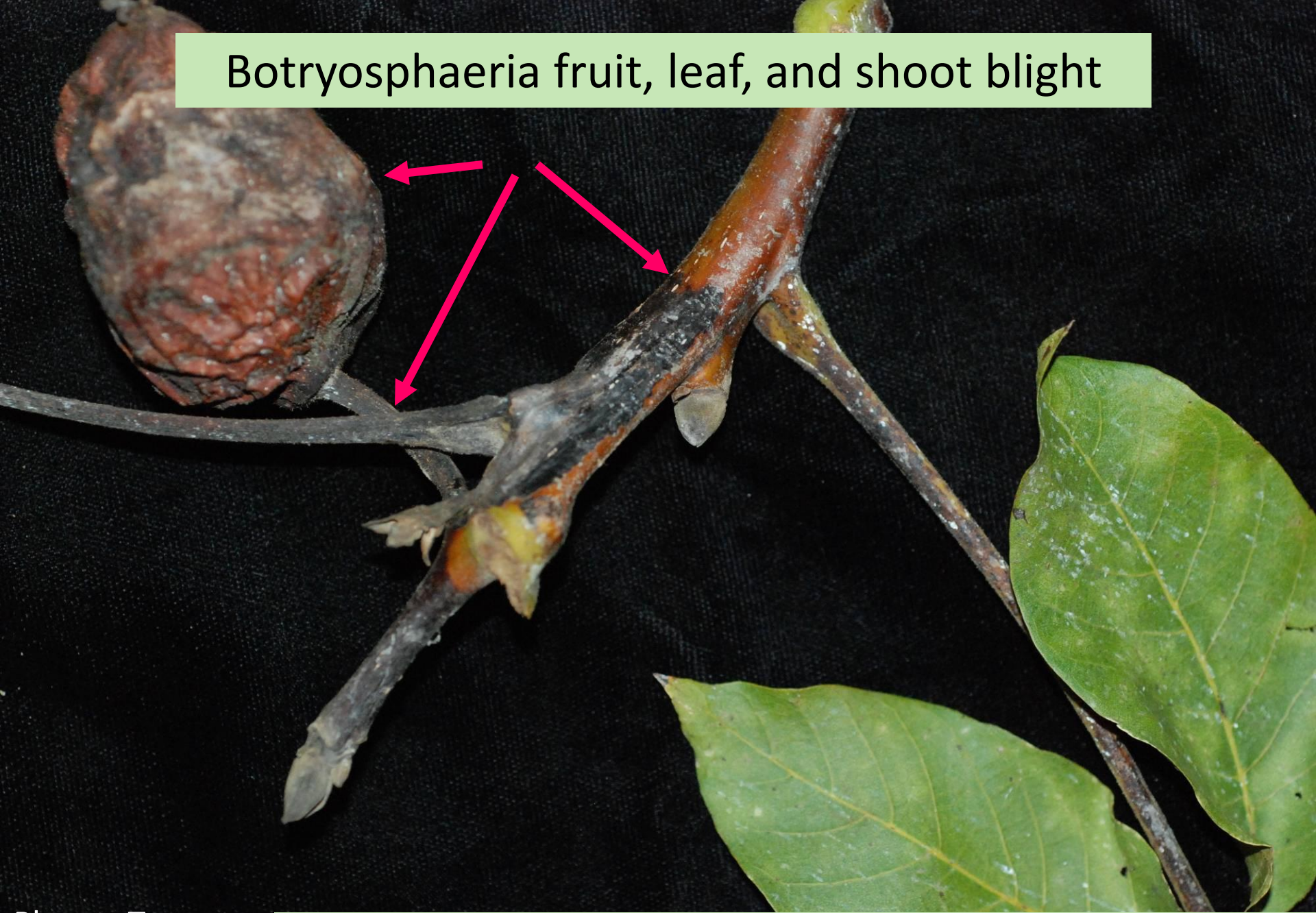


Photo: T.
Michaelides

Kills bud wood and limits following year's growth

Predisposition to infection by Botryosphaeriaceae



Wounds: graft/bud union;
pruning.

Sunburn



'Generally' low risk of fungicide resistance

Sexual reproduction favors variability in populations.

Disease associated with spring rains

- More prevalent in Sacramento Valley than SSJV.

Fungicides Labeled for Walnut

- Pristine[®]
- Quash[®]
- Luna Sensation[®]
- Inspire Super[®]

Spray Timing (based on pistachio):

- Before rain event

Calendar schedule:

At bloom and 2-3 more X at monthly intervals.

Fungicide efficacy tables

Pistachio as a model

**EFFICACY AND TIMING OF FUNGICIDES,
BACTERICIDES, AND BIOLOGICALS**
for
**DECIDUOUS TREE FRUIT, NUT,
STRAWBERRY, AND VINE CROPS**
2011



ALMOND
APPLE/PEAR
APRICOT
CHERRY
GRAPE
KIWIFRUIT

PEACH/NECTARINE
PISTACHIO
PLUM
PRUNE
STRAWBERRY
WALNUT



Paradox Canker vs. Phytophthora

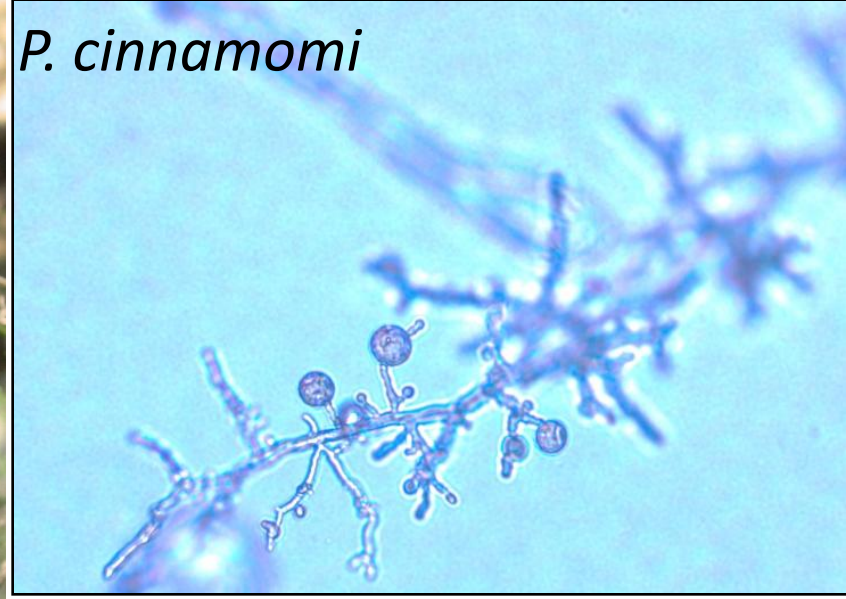
Photo: G. Browne



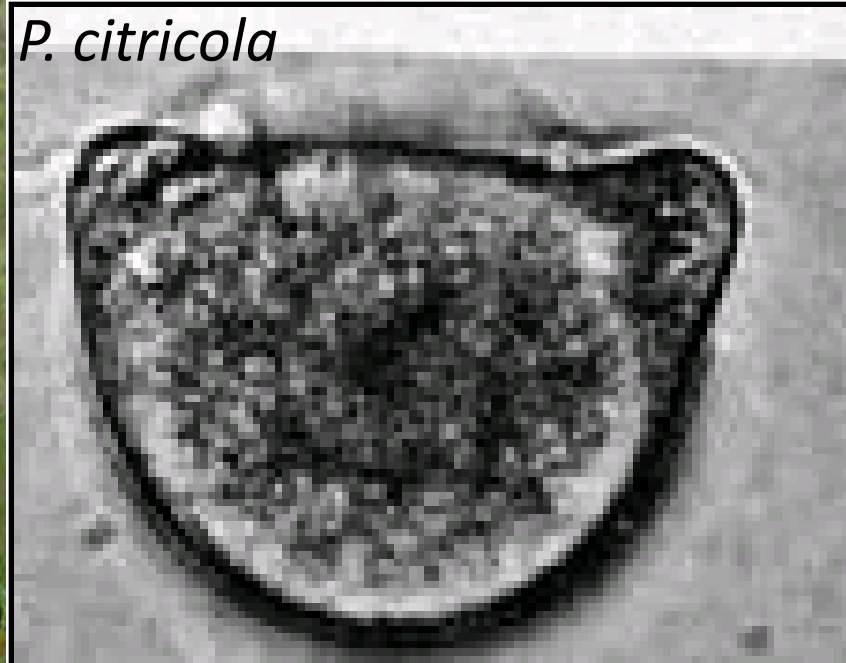
- Pointed margins
- Single color

'Phytophthora' cankers

P. cinnamomi



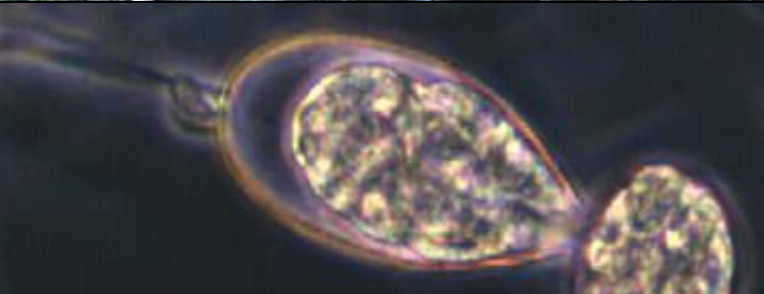
P. citricola





Several water-based components to epidemiology

1. Endemic in surface waters-natural and aquaduct/canal systems.
2. The process of soil wetting releases zoospores from sporangia.



Water management = Disease Management

REVIEW ARTICLE

Phosphite (phosphorous acid): Fungicide, fertilizer or bio-stimulator?

Hoang Thi Bich THAO¹ and Takeo YAMAKAWA²

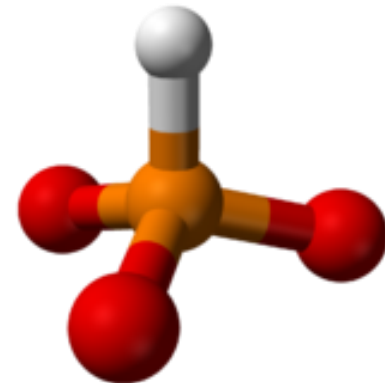
¹*Plant Nutrition Laboratory, Division of Bioresource and Bioenvironmental Sciences and* ²*Plant Nutrition Laboratory, Department of Plant Resources, Faculty of Agriculture, Kyushu University, Fukuoka 812-8581, Japan*

‘Phosphite’ or ‘Phosphonate’

Salt of Phosphorous acid

Not Phosphate----Not a fertilizer

Does not provide P nutrition



PHOSPHITE:

DOES NOT STIMULATE GROWTH OF HEALTHY PLANTS

- May be deleterious to ‘**phosphate**’-deficient plants!
- Positive plant growth responses to ‘**phosphite**’ attributable to suppression of diseases caused by *Phytophthora*.
 - A) Fungicidal effect
 - B) Stimulation of plant defense response

If planning to use Phosphite:

- 1) Make sure you have positive diagnosis of *Phytophthora*.
- 2) Make sure you have P-sufficient plant status.





ACKNOWLEDGEMENTS

Thousand Cankers Disease

- Steve Seybold (USFS)
- Rick Bostock (UC Davis)
- Katie Wilson and Walter Martinez (UCCE-Tulare County)
- Grower/Cooperators

Botryosphaeria

- Themis Michaelides (UC Davis) and Laboratory

Lethal Paradox Canker vs. Phytophthora

- Greg Browne (USDA)
- Ravi Bhat (UC Davis)
- TC Growers

High Incidence of Navel Orangeworm

- Hot August and September; sunburn and stress prevalent
- Some growers reporting over 24% “worm damage”

NOW larvae



NOW pupae

