

# WALNUT PRODUCTION RESEARCH

## Walnut Production Research Priorities & Activities

**Joe Grant**

Production Research Director

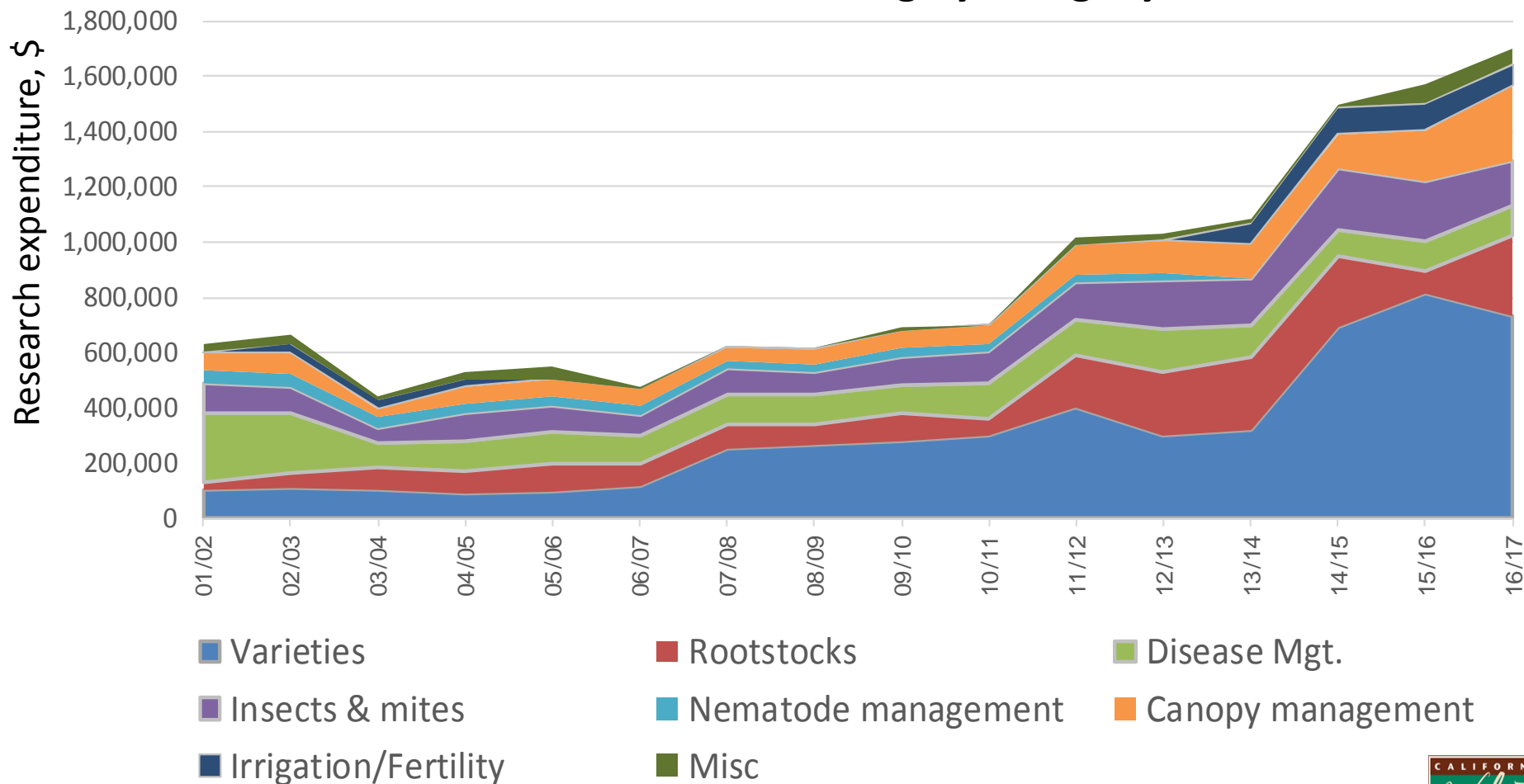
**California Walnut Board**

Tehama Walnut Day

January 20, 2017

# WALNUT PRODUCTION RESEARCH 2001-2016

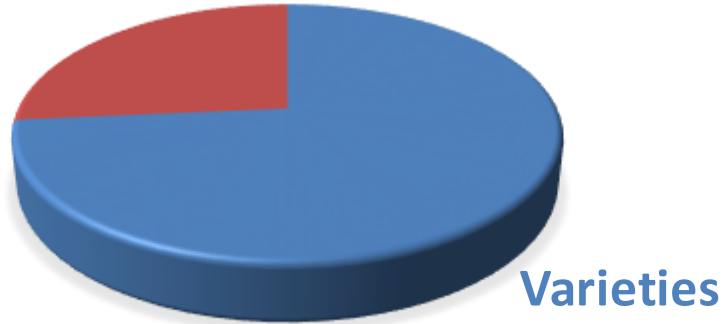
## Production research funding by category



# RESEARCH FUNDING BY CATEGORY, 2002-2016

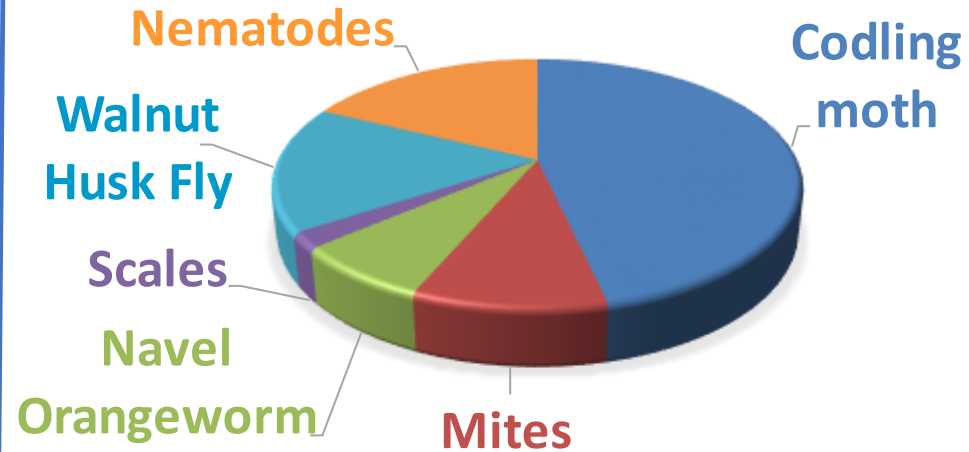
## BREEDING & GENETICS

Rootstocks



Varieties

## INSECTS & MITES



Codling moth

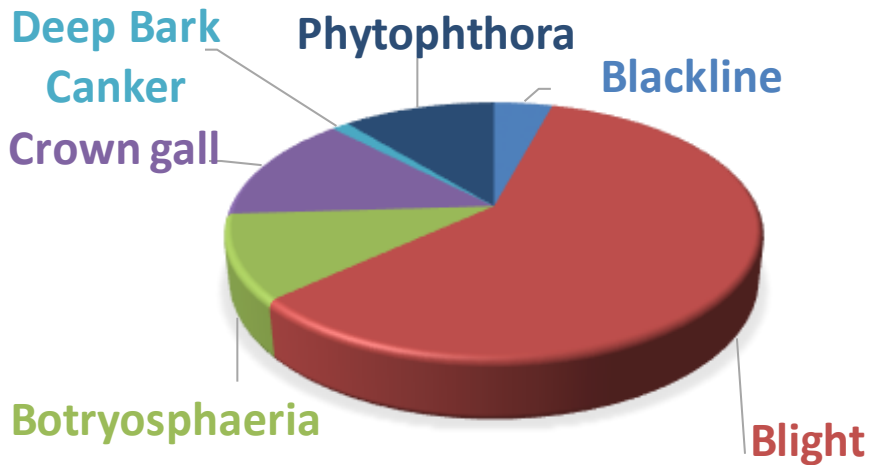
Walnut Husk Fly

Scales

Navel Orangeworm

Mites

## DISEASES & NEMATODES



Deep Bark Canker

Phytophthora

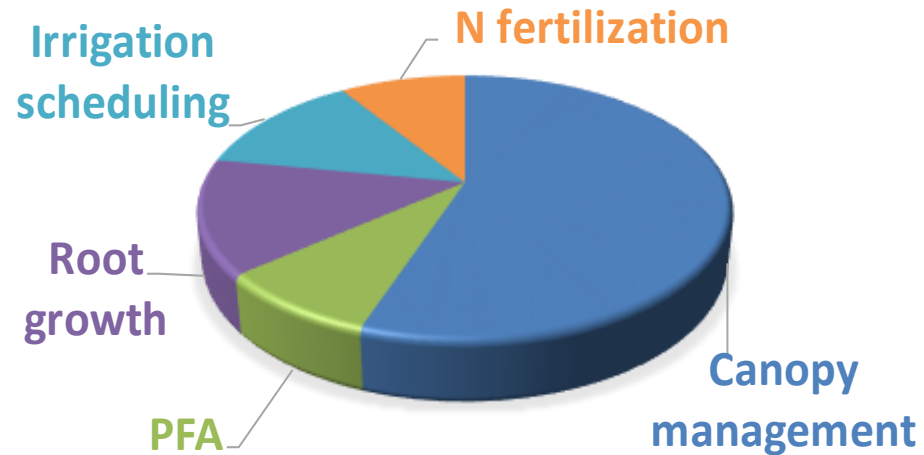
Blackline

Crown gall

Botryosphaeria

Blight

## ORCHARD MANAGEMENT



Irrigation scheduling

N fertilization

Root growth

PFA

Canopy management

# WALNUT PRODUCTION RESEARCH

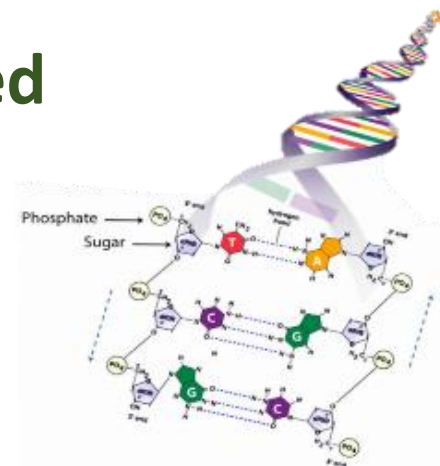
## RECENT PROGRESS

# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Using advanced genomic approaches to speed variety and rootstock development:

- Emphasis on conventional breeding, not GMOs.
- Transition to marker assisted breeding of varieties is on track toward completion (Neale).
- Developing DNA markers for light pellicle color (Dandekar)
- Continue to explore transgenic approaches where appropriate.



**DNA Markers**

# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Walnut Improvement Program

- Work supporting other researchers' efforts to identify lateral bearing gene, propagate improved rootstocks, and develop methods for improving evaluation tools for insect and disease resistance in future varieties.



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Walnut Improvement Program

#### 'Durham'

- Tulare harvest date or earlier
- Leafs few days before Chandler
- 55% kernel
- 8.4 g kernels consistent light color, plump
- Low blight
- Large, oval, smooth nuts
- Very solid shells with good seals
- Mid-season in-shell replacement for Hartley



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Walnut Improvement Program



**New UC Davis walnut breeder  
Fall 2017**



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Pest and disease resistant rootstocks (Kluepfel & others)

- Goal: Clonal Paradox rootstocks with **crown gall**, ***Phytophthora***, and **lesion nematode resistance**.
- Conventional breeding enhanced by genomic tools.
- Identified *J. microcarpa* x *J. regia* hybrids resistant to multiple pathogens.
- 600 *J. microcarpa* x *J. regia* crosses now clonally propagated & genotyped, to be evaluated for disease resistance and used to map resistance genes.
- Large-scale field trials to examine five 'elite' rootstock selections. More coming.

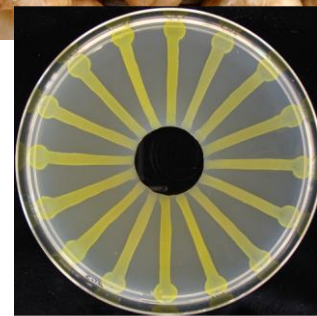


# WALNUT PRODUCTION RESEARCH

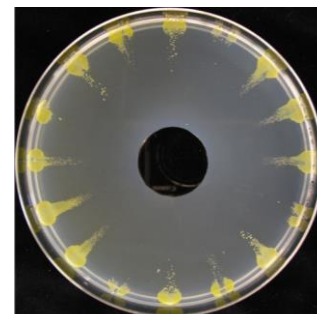
## RECENT RESEARCH PROGRESS

### Plant Pathology – Walnut Blight (Adaskaveg)

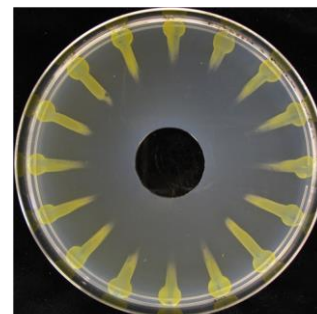
- Copper and copper-mancozeb effectiveness continuing to decline.
- **New active ingredients** for improving copper activity: similar to or better than mancozeb.
- **Oxytetracycline** submitted to IR-4 and accepted for registration as an “A” priority.
- **Kasugamycin** pending full registration by EPA and CDPR.
- Biologicals and additives identified to provide **tools for organic growers**.



H2O Control



Copper 50 ppm + ATD



Copper 50 ppm + Mancozeb

# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Plant Pathology – Bot and Phomopsis Cankers (Michailides)

- Better understanding of seasonal inoculum dynamics and infection timing.
- Role of pruning wounds in disease development
- Continued work on fungicide efficacy and spray timing.



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Plant Pathology – Thousand Cankers Disease (Seybold)

- Impact of walnut twig beetle on tree health, production, and management.



Walnut Twig Beetle,  
*Pityophthorus juglandis*



*Geosmithia morbida*



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Orchard Management (Lampinen, Zwieniecki, Volder, Doll, Pope)

- Continued refinement of non-pruning and minimal pruning techniques.
- Impact of early season water management on nut drop, kernel quality, and mold.
- Seasonal root growth dynamics.
- Role of tree carbohydrates in root growth, bud-break, flowering, and nut development.
- How rootstock choice and row and tree spacing affect orchard performance and profitability.
- Nitrogen fertilizer demand and early season leaf sampling.



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Insects and Mites

- Walnut husk fly baits and control. (Van Steenwyk)
- WHF degree day model and seasonal development. (Mills)
- Improved lures for monitoring navel orangeworm. (Burks, Rijal, Symmes)
- Understanding biocontrol of spider mites and why it often fails in walnuts. (Mills)



# WALNUT PRODUCTION RESEARCH

## RECENT RESEARCH PROGRESS

### Weed Management (Hanson)

- Evaluate herbicide performance for walnut orchard weed management.
- Glyphosate-resistant weeds, particularly junglerice and other summer grasses.
- Improving control of field bindweed.
- Herbicide injury symptoms:  
Troubleshoot and diagnose orchard crop injury and problems.



# WALNUT PRODUCTION RESEARCH

## “RESEARCH CAPACITY”

- Farm Advisors active as research leaders & collaborators.
- Recent new Advisors in Kern, Madera, and Fresno Counties.
- New recruitments coming in Butte and Stanislaus.
- CWB supported recently proposed for Farm Advisor positions in San Joaquin, Tehama, and Sutter/Yuba, Tree Nut Specialist in Parlier, and other campus positions.

