



**UNIVERSITY OF CALIFORNIA**  
Agriculture and Natural Resources



National Institute of Food and Agriculture  
U.S. DEPARTMENT OF AGRICULTURE



LAND IQ



## **CLIMATE-SMART PRACTICES FOR FRUIT & NUT PRODUCTION WORKSHOP**

**Date:** Wednesday, November 29<sup>th</sup>, 2023

**Location:** International Agri-Center  
4500 South Laspina Street - Tulare, CA 93274

**With:** UC Davis, UC Merced, Land IQ, UC ANR

**Registration:** \$30

(Includes participation fee, coffee breaks, lunch meal, workshop materials,  
and access to workshop presentations)

**Online Registration Link:**

<https://na.eventscloud.com/climatesmart2023>

**EU Credits available**

### **WORKSHOP AGENDA**

- 8:30 – 9:00 am: On-site Registration
- 9:00 – 9:15 am: Welcome to participants. Overview on the Climate-Smart Projects (D. Zaccaria, UC Davis and T. Pathak, UC Merced)
- 9:15 – 9:30 am: Financial Incentives for Resource Efficiency, Conservation, and Climate Risk Mitigation (S. Weeks, CDFA-OEFI)

#### **Session 1 – Issues and Challenges in Fruit and Nut Production under Changing Climate: Moderator: D. Zaccaria**

- 9:30 – 10:00 am: Climate Change Trends and Potential Impacts on Agricultural Production (T. Pathak, UC Merced)
- 10:00 – 10:30 am: Major Challenges for Fruit and Nut Production (C. M. Culumber, UCCE Fresno County)
- 10:30 – 11:00 am: Effect of Climate Change and Variability on agricultural pests and potential risk management (Dr. Jhalendra Rijal, UCCE and Statewide IPM Program)

**11:00 – 11:15 am COFFEE BREAK**

**Session 2 – Tools and Resources for Climate-Smart Agriculture:** Moderator: T. Pathak

11:15 – 12:00 pm: The CDFA Climate-Smart Web Repository (S. Tillman, Land IQ)

12:00 – 12:30 pm: Climate Change, Changing Electricity Grid, and their Impact on California's Irrigated Agriculture (A. Aghajanzadeh, Klimate Consulting).

**12:30 – 1:15 pm LUNCH BREAK**

1:15 – 1:45 pm: CalAgroClimate Decision Support Tools for Managing Risks in Agriculture (T. Pathak, UC Merced)

**Session 3 – Case Studies on Regional Adaptation Practices:** Moderator: C. M. Culumber

1:45 – 2:15 pm: Water-related effects of Winter Cover Cropping in Nut Orchards (D. Zaccaria, UC Davis).

2:15 – 2:45 pm: Physiological effects of Winter Cover Cropping in Grapevine (R. Yu, CSU - Fresno)

**2:45 – 3:00 pm: COFFEE BREAK**

3:00 – 3:30 pm: Mitigation of Heat and Drought Risks in Grape Production (K. Kurtural, Kurtural Consulting)

3:30 – 4:00 pm: Use of weather information for addressing frost, heat, and spray drift risks (M. Battany, UCCE San Luis Obispo and Santa Barbara Counties)

4:00 – 4:30 pm: Whole orchard recycling can sequester carbon, reduce nitrogen leaching, and improve soil fertility while reducing air pollution (B. Holtz UCCE San Joaquin County)

4:30 – 5:00 pm: QUESTIONS & ANSWERS and WORKSHOP EVALUATIONS

**5:00 pm WORKSHOP ADJOURN**

**For questions, please contact:**

Maria Alvarez and PJ Kelly - UC ANR Program Support Unit.

Email: [anrprogramsupport@ucanr.edu](mailto:anrprogramsupport@ucanr.edu); Phone: (530) 750-1361.

**List of speakers/presenters and email contacts:**

1. Daniele Zaccaria – University of California, Davis: [dzaccaria@ucdavis.edu](mailto:dzaccaria@ucdavis.edu)
2. Tapan Pathak – University of California, Merced: [tpathak@ucmerced.edu](mailto:tpathak@ucmerced.edu)
3. Scott Weeks - CDFA Office of Environment and Farming Innovation: [Scott.Weeks@cdfa.ca.gov](mailto:Scott.Weeks@cdfa.ca.gov)
4. Catherine Mae Culumber – UC Cooperative Extension, Fresno County: [cmculumber@ucanr.edu](mailto:cmculumber@ucanr.edu)
5. Jhalendra Rijal - UC Cooperative Extension, San Joaquin County: [jrijal@ucanr.edu](mailto:jrijal@ucanr.edu)
6. Stephanie Tillman – Land IQ: [stillman@landiq.com](mailto:stillman@landiq.com)
7. Arian Aghajanzadeh - Klimate Consulting: [arian@klimateconsulting.com](mailto:arian@klimateconsulting.com)
8. Runze Yu – California State University, Fresno: [crzyu@csufresno.edu](mailto:crzyu@csufresno.edu)
9. Sahap Kaan Kurtural – Viticulture Consultant: [skkurtural@kurturalconsulting.com](mailto:skkurtural@kurturalconsulting.com)
10. Mark Battany - UC Cooperative Extension, San Luis Obispo and Santa Barbara Counties: [mcbattany@ucanr.edu](mailto:mcbattany@ucanr.edu)
11. Brent Holtz - UC Cooperative Extension, San Joaquin County: [baholtz@ucanr.edu](mailto:baholtz@ucanr.edu)

**Event Description:** Join, UC Specialists Daniele Zaccaria and Tapan Pathak, UC Nut Crops Advisor Catherine Mae Culumber and other experts from University of California and Land IQ in this in-person Workshop on Climate-Smart Practices for Fruit and Nut Production on November 29, 2023, at the Tulare International Agri-Center in Tulare, CA to learn about the latest research and advances in Management of Climate Change Risks.

Topics include - Climate Change Trends and Impacts, Climate-related Challenges for Fruit and Nut Production, Effects of Winter Cover Cropping on Fruit and Nut Production, Mitigation of Heat and Drought Risks, Orchard Recycling, Financial Incentives for Resource Efficiency and Conservation.

A set of information and tools available to manage climate change risks will also be presented during the Workshop. Registration includes participation to the morning and afternoon sessions, coffee breaks, lunch meal, workshop materials, and access to the workshop presentations.

**Who should attend:** Fruit and nut growers, orchard and vineyard managers, representatives from the fruit and nut production industry, technical assistance providers, consultants and practitioners, CCAs, CPAs, natural resource managers, personnel from water conservation districts, irrigation districts' managers, extension specialists and advisors, professional researchers, University students, and representatives from state and federal agencies.

## **Salinity Management in Pistachio Workshop and Recent Pistachio Salinity Trial Results**

Wednesday, December 13<sup>th</sup>, 2023

8:00 am – 12:00 pm

Nectarine Room

Kearney Agricultural Center

9240 South Riverbend Ave., Parlier, CA 93648

Registration Fee: \$25.00

Registration is limited to 100 attendees.

Registration at: <https://na.eventscloud.com/ereg/newreg.php?eventid=778160&>.

Information: 559-737-3061, email [L.Ferguson@ucdavis.edu](mailto:L.Ferguson@ucdavis.edu)

Parking on the west side of the building: [https://kare.ucanr.edu/About\\_us/Center\\_Map/](https://kare.ucanr.edu/About_us/Center_Map/)

Course Materials Include:

USB Drive with Digital Resources and Links

Salinity Management Guide for Pistachio Growers

UCANR Agricultural Salinity and Drainage Publication #3375:

<https://anrcatalog.ucanr.edu/Details.aspx?itemNo=3375>

7:30 am	<b>Registration and Coffee</b>
8:00	<b>Welcome, Workshop Structure and Pre-Workshop Survey</b> Louise Ferguson, Statewide Specialist
8:15	<b>Effects of Salinity on Pistachio Physiology, Growth and Yield</b> Giulia Marino, Orchard Systems Specialist
9:00	<b>Irrigating Pistachios in Saline Conditions: Including Considering Soil Texture</b> <i>Giulia Marino, Orchard Systems Specialist</i>
9:30	<b>Coffee Break</b>
10:00	<b>Calculating Leaching Fractions and Requirements – Lecture and Hands-on Exercise &amp; Mitigating Salinity and Sodicity Lecture and Hands-on Exercise</b> <i>Mae Culumber, Fresno County Farm Advisor</i>
11:30	<b>Current Pistachio Salinity Research Results</b> <i>Louise Ferguson, Statewide Specialist; Mukesh Mehata, Postdoctoral Scholar; Gary Banuelos, USDA Research Scientist</i>
12:00 pm	<b>Conclusion</b> <i>Louise Ferguson, Statewide Specialist</i>

This workshop is supported by California Department of Food and Agriculture grants:

#21-0001-036-SF-36: Long Term Saline Irrigation Strategies for Pistachios on *P. Integerrima* Parentage Rootstocks

**Statewide Pistachio Day 2024:**  
**Wednesday, January 17, 2024, 8 am-4:10 pm**  
**Visalia Convention Center, 303 E Acequia Ave, Visalia, CA 93291**

7:00 am	<b>Doors open for Registration and morning coffee.</b>
	<i>Session Moderator: Jorge Angeles, UCCE Tulare County Farm Advisor</i>
8:00	<b>Welcome:</b> <i>Elizabeth Fichtner, Farm Advisor, UCCE Tulare County</i> <i>Larry Micari, Tulare County Supervisor</i>
8:05	<b>Update from the California Pistachio Research Board</b> <i>Robert Klein, Manager California Pistachio Research Board</i>
8:30	<b>Economics of Pistachio Production</b> <i>Brittney Goodrich, Professor of Extension, UC Davis</i>
9:00	<b>Update on Specialty Crops Research Initiative supported pistachio research program</b> <i>Pat Brown, Professor, UC Davis</i>
9:15	<b>Boron: Function and Recent Research Results</b> <i>Louise Ferguson, Professor of Extension, UC Davis</i>
9:30	<b>Regional &amp; Future Climate Considerations for Farming Pistachios</b> <i>Katherine Jarvis-Shean, Orchard Advisor, UCCE Yolo County, UC ANR</i>
10:00	<b>Coffee Break and Visit with Sponsors</b>
	<i>Session Moderator: Tobias Oker, UCCE Kern County Farm Advisor</i>
10:30	<b>Effects of cover cropping on radiation dynamics of micro-irrigated pistachio</b> <i>Daniele Zaccaria, Professor of Extension, UC Davis</i>
11:00	<b>Initial evaluation of satellite remote-sensing estimates of pistachio water use</b> <i>Pasquale Steduto, Visiting Scientist, UC Davis</i>
11:30	<b>Mechanical Harvesting of Pistachio trees: An Update</b> <i>Reza Ehsani, Professor, UC Merced</i>
12:00 pm	<b>Luncheon</b>
	<i>Session Moderator: David Haviland, Farm Advisor, UCCE Kern Co.</i>
1:00	<b>Management of foliar pistachio diseases</b> <i>Themis Michailides, Plant Pathologist, UC Davis</i>
1:30	<b>Do plant-parasitic nematodes damage pistachios?</b> <i>Andreas Westphal, Nematologist, UC Riverside</i>
2:00	<b>Navigating increasingly complex insecticide programs for Gill's mealybug</b> <i>David Haviland, Entomology Advisor, UCCE Kern County</i>
2:30	<b>Break and visit with sponsors</b>
3:00	<b>Advances in efforts to develop sterile insect technique (SIT) for navel orangeworm and monitoring programs for leaffooted bug</b> <i>Houston Wilson, Entomologist, UC Riverside</i>
3:40	<b>Carpophilus beetle: origins and recommendations for a California response</b> <i>David Haviland and Houston Wilson</i>
4:10	<b>Pest Management Q&amp;A Session, Adjourn</b>

6.1 CCA credits requested; 2.5 DPR credits requested.

## 52<sup>nd</sup> Tri County Walnut Day

Tulare County Agricultural Building  
4437 S Laspina St., Tulare, CA 93274

Thursday, February 1, 2024

7:30 am	<b>Registration and Coffee Sponsored by JCS Marketing--West Coast Nut Magazine</b>
Session Moderator: Mohammad Yaghmour, Farm Advisor, UCCE Kern County	
8:00	<b>Welcome:</b> <i>Elizabeth Fichtner, Farm Advisor, UCCE Tulare County</i>
8:05	<b>Walnut Scale and Frosted Scale Management</b> <i>Elizabeth Fichtner, Farm Advisor, UCCE Tulare County</i>
8:30	<b>Dissecting the walnut mold problem of walnut and its association with the “black nuts” in the orchard</b> <i>Themis Michailides, Professor, UC Davis</i>
9:00	<b>Weed Management in Young Walnut Orchards</b> <i>Jorge Angeles, Farm Advisor, UCCE Tulare County</i>
9:15	<b>Minimal Heading of Ivanhoe at Planting</b> <i>Elizabeth Fichtner, Farm Advisor, UCCE Tulare County</i>
9:30	<b>Update on NOW, Walnut Husk Fly, and Flatheaded Borer Pests</b> <i>Jhalendra Rijal, UC IPM Advisor, UCCE Stanislaus County</i>
10:00	<b>Coffee Break</b>
Session Moderator: Mae Culumber, Farm Advisor, UCCE Fresno County	
10:30	<b>Walnut Quality Issues</b> <i>Bruce Lampinen, Professor of Cooperative Extension, UC Davis</i>
11:00	<b>Standard Walnut Rootstocks vs. New Rootstocks - How do they Compare?</b> <i>Janine Hasey, Farm Advisor Emeritus, Sutter and Yuba Counties</i>
11:30	<b>Inputs to walnut orchards in a low-price year</b> <i>Bob Beede, Farm Advisor Emeritus, UCCE Kings County</i>
12:00 pm	<b>Luncheon Sponsored by the California Walnut Board &amp; Commission</b>
1:00	<b>Update from the California Walnut Board</b> <i>Robert Verloop, Executive Director and CEO California Walnut Board and Commission</i>
2:30	<b>Adjourn</b>

Please pre-register at: <https://surveys.ucanr.edu/survey.cfm?surveynumber=41702>

1.5 DPR & 5.1 CCA Credits Applied For

## Treatment Options for Management of Walnut Scale and Frosted Scale

*Elizabeth Fichtner, UCCE Farm Advisor, Tulare and Kings Counties, Mel Thayer, Staff Research Associate, UC Berkeley, and Robert Van Steenwyk, CE Specialist Emeritus, UC Berkeley*

Walnut scale is an important economic pest of walnuts in California. High populations of walnut scale may affect tree vigor as well as predispose trees to diseases caused by several plant pathogenic fungi and possibly flatheaded borer damage. Historic UC Pest Management Guidelines emphasize the efficacy of insecticide applications at the crawler stage of insect development (late April to mid-May); however, with the introduction of new pest management tools such as insect growth regulators (IGRs), new studies have been conducted to evaluate the efficacy of these products at earlier times during the insect lifecycle. Both walnut scale and frosted scale overwinter as immature nymphs; therefore delayed-dormant application of IGRs has the potential to inhibit maturation and subsequent reproduction of these pests.

**Table 1. Nine treatments were established in a Tulare County walnut block in 2023 to evaluate efficacy in management of walnut scale.**

Treatment	Chemical Treatment	Active Ingredient	Mode of Action	Timing
1	Centaur® WDG, 34.5 oz.	Buprofezin	Insect Growth Regulator	Delayed Dormant
2	Centaur® WDG, 34.5 oz.	Buprofezin	Insect Growth Regulator	Crawler Stage
3	Centaur® WDG, 46 oz.	Buprofezin	Insect Growth Regulator	Delayed Dormant
4	Centaur® WDG, 46 oz.	Buprofezin	Insect Growth Regulator	Crawler Stage
5	Esteem® 0.86EC, 16 fl. oz.	Pyriproxyfen	Insect Growth Regulator	Delayed Dormant
6	Esteem® 0.86EC, 16 fl. oz.	Pyriproxyfen	Insect Growth Regulator	Crawler Stage
7	Senstar®, 18 oz.	Spirotetramat Pyriproxyfen	Lipid biosynthesis inhibitor, Insect Growth Regulator	Crawler Stage
8	Assail® 30SC, 9.6 fl. oz.	Acetamiprid	Nicotinic acetylcholine receptor agonist	Crawler Stage
9	Untreated Control			

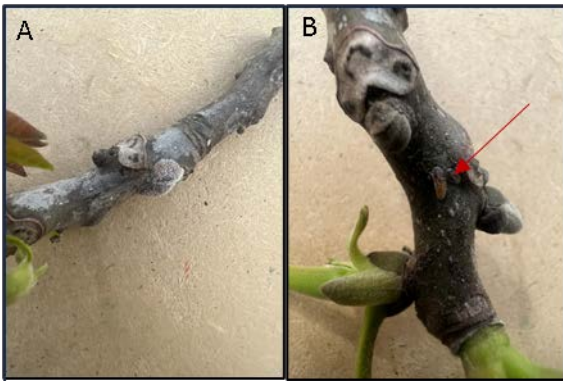


Figure 1. On April 18, 2023 frosted scale populations were observed on untreated (A) and IGR-treated (B) trees, illustrating suppression of frosted scale maturation by IGRs. Photo B is from an excised branch of a Centaur® (34.5 oz/acre)-treated tree. Red arrow indicates a frosted scale individual that had failed to mature.

In 2023, UC ANR and UC Berkeley researchers initiated a new collaborative study investigating the efficacy of four products applied at various rates and times (Table 1). Two insect growth regulator products, Esteem® (IRAC Group 7C) and Centaur® (IRAC Group 16), were included in the study, with both delayed-dormant (February 8, 2023) and crawler-stage (April 26, 2023) application timings. Centaur® was also investigated at two rates. Crawler-stage applications of Senstar (a combination of spirotetramat and pyroxifin) and Assail 20SG (a neonicotinoid) were also included in the study.

**Delayed dormant IGR applications inhibit maturation of walnut and frosted scale.** Delayed-dormant application of Centaur WD® at either 34.5 oz/acre or 46 oz/acre reduced walnut scale survival by 81% of that of untreated control treatment by April. Both Esteem and Centaur reduced populations of mature frosted scale observed in late April by over 85% of that on untreated trees (Figure 1).

**Crawler populations affected by IGRs and conventional**

**insecticides.** All treatments suppressed the rates of crawler emergence

over time in comparison to the untreated control (Figure 2); however, delayed dormant applications of both IGR treatments (Centaur® and Esteem®) resulted in the highest suppression of the first-generation curve (Figure 2). Both rates of Centaur® applied during the delayed dormant period resulted in similar suppression of crawler emergence. Crawler stage application of Centaur® at the higher rate resulted in similar levels of crawler suppression as the delayed dormant IGR treatments (Figure 2). Moderate suppression of first-generation crawlers was observed with crawler stage treatments with the low Centaur® rate, Esteem®, and Assail® 30SG (Figure 2). Crawler stage application of Senstar® suppressed first-generation crawler emergence (Figure 2) and resulted in

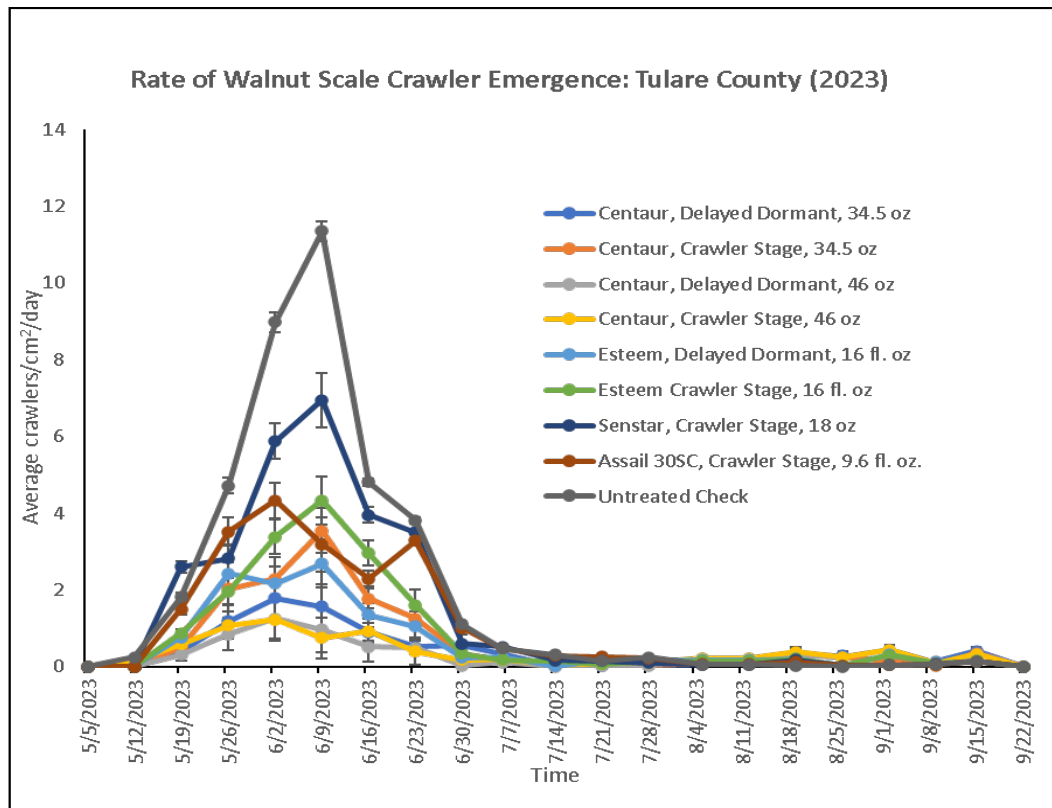


Figure 2. Crawler emergence was recorded using double sided sticky tape traps that were changed approximately weekly. Crawler emergence is recorded as the average number of crawlers from two subsample traps/cm<sup>2</sup>/day. A repeated measures ANOVA on square root transformed data was used to evaluate treatment effects (P<0.01).

modest suppression (45%) of total crawler populations across the season as compared to the untreated control (Figure 3). All IGR treatments, regardless of the rate or timing, performed similarly with regard to total crawler populations across the season (Figure 3). The range in total crawler suppression across treatments of similar statistical significance was 88.2% (Centaur, 46 oz/acre, delayed dormant) to 54% (Assail, crawler stage), illustrating the variability in crawler counts in the orchard system (Figure 3).

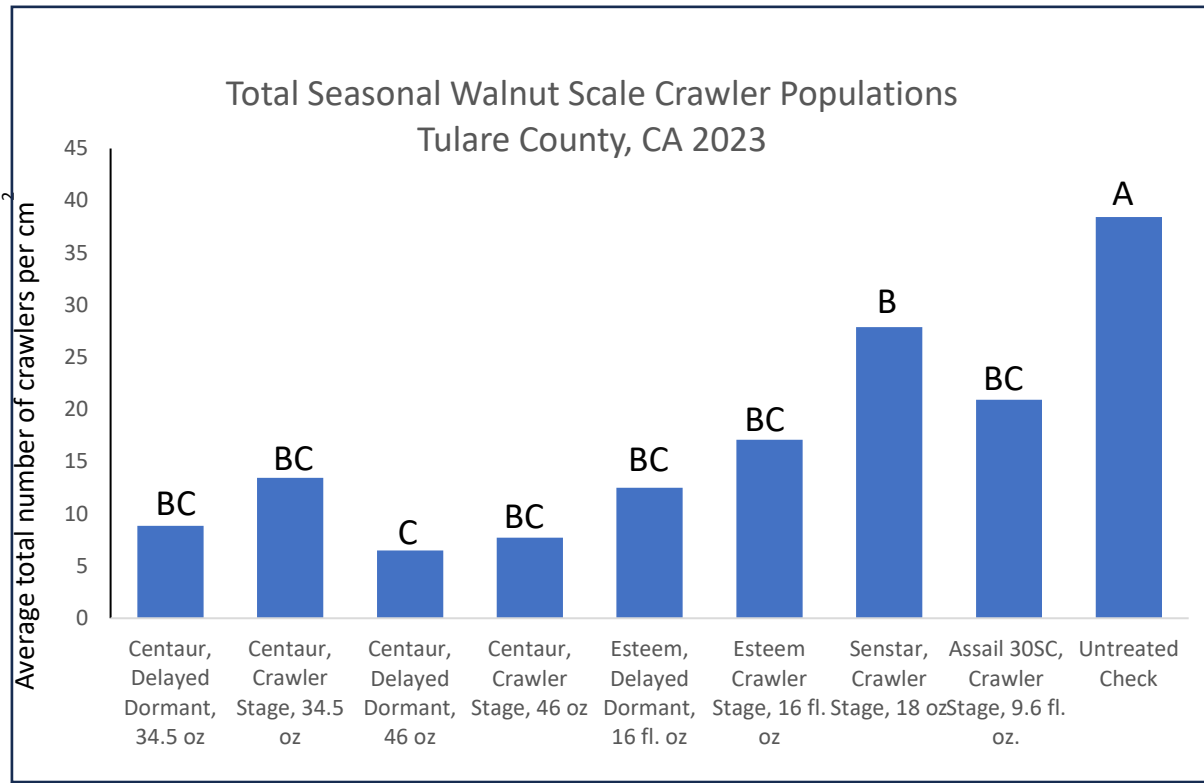


Figure 3. The average total number of crawlers emerged over the season was evaluated across treatments. P<0.01

**Summary.** Delayed dormant applications of either of the insect growth regular products, Centaur® or Esteem®, offer excellent suppression of walnut scale and frosted scale populations. Delayed dormant applications may offer similar efficacy at lower product rates due to the opportunity to achieve better coverage prior to leaf-out. Additionally, delayed dormant applications of these products may inhibit maturation of nymphs into adults, thus limiting sexual reproduction and subsequent laying of eggs.

In prior studies, the efficacy of crawler stage Assail® application became apparent the year following application. Based on this background information, the populations of adult walnut scale will be evaluated across all treatments in April 2024 to fully capture the efficacy of these products over time.

Additionally, future studies are planned to further determine the value of dormant versus delayed dormant applications of IGR treatments for management of walnut scale. The results of the current study, however, do demonstrate a need for updating the current UC IPM guidelines for management of walnut scale. To date, the UC IPM guidelines only recommend crawler stage applications of IGR products while the current study demonstrates the value of IGR applications earlier in the season.



## **‘UC Wolfskill’, a new Walnut Variety**

*Caleb Crawford, Staff Research Associate, UC ANR and Elizabeth Fichtner, UC ANR Farm Advisor*

In 2003 a new variety of walnut was bred by the UC Walnut Breeding Program. Resulting from a cross between the ‘Chandler’ and ‘Solano’, this new genotype is referred to as ‘UC Wolfskill’. With a bloom and harvest time similar to that of ‘Solano’ and a kernel quality and color similar to ‘Chandler’, ‘UC Wolfskill’ is expected to meet industry standards. A study sponsored by the California Walnut Board that spanned the period from 2012 to 2022 characterized ‘UC Wolfskill’ as having a similar leaf out, female bloom, and harvest time as ‘Solano’. Anthesis (the shedding of pollen) of ‘UC Wolfskill’ only briefly overlaps that of the female bloom; therefore, the addition of pollinator varieties such as ‘Chandler’ or ‘Tulare’ may enhance nut set by broadening the period of pollen availability.

Diamond Foods conducted a blind study to assess differences in edible yield, color, and relative value between “UC Wolfskill” and “Chandler.” This five-year study concluded that ‘UC Wolfskill’ had significantly higher edible yields than “Chandler,” as well as a higher relative value. In three of five years, ‘UC Wolfskill’ exhibited a wider range in kernel color than ‘Chandler’. The ‘UC Wolfskill’ variety is currently available to the public.

## **New Fruit and Almond Advisor, Raymond Mireles, Joins UC ANR**

Jesus Raymond Mireles serves as the Fruit and Almond Advisor for UCCE Fresno and Tulare Counties. Raymond is a Central Valley native, born and raised in Visalia, CA. He attended California State University, Fresno where he achieved his bachelor’s in plant science. Mireles attained a competitive fellowship with Bayer Crop Science, where he was given the opportunity to continue his academic career at Fresno State and obtain a master's degree in plant science. His thesis research entailed the utilization of remote sensing technologies to establish a monitoring protocol for assessing spider mite damage in almonds. Raymond has experience in the agrochemical and technological research industry as a research technician with Bayer Crop Science. He gained experience in identifying and controlling common insect pests in California cropping systems while working with Bayer Crop Science. He became versed in the establishment and operation of drone technology used to assess plant health for the Bayer Crop Science UAV Program. Raymond is excited to apply his industry and academic expertise to aid farmers in overcoming existing issues and challenges. He is assigned to cover crops such as almonds, all stone fruit (peaches, nectarines, plums, cherries and apricots), pomegranates, kiwi, blueberries and persimmons. Growers and professionals involved in fruit and almond production are encouraged to contact Raymond with any questions or suggested topics to address.