Field Notes
San Joaquin County
May 2023

University of California
Agriculture and Natural Resources

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Meet Our New Advisor, Moneim Mohamed

My name is Moneim Mohamed, and I am the new irrigation and soils advisor serving Stanislaus, San Joaquin, and Merced counties. I joined UCCE on February 1st, 2023, and I am very excited to serve orchard and vineyard growers, and industries in the northern San Joaquin Valley to build resilience in the face of greater weather and water availability variability. Generally, my primary focus is on agricultural irrigation. This includes irrigation scheduling, deficit irrigation, variable rate irrigation, irrigation and soils technologies, and groundwater recharge. In my role, my focus will be on identifying better soils and agricultural water management practices for enhancing soil health, improving water use efficiency and productivity, and minimizing environmental impacts in the region. This includes development, integration, and grower adoption of new irrigation scheduling and management technologies. Moreover, I will work closely with growers on improving irrigation and groundwater recharge practices to meet state regulations. I'm looking forward to collaborating with permanent crop advisors to establish multidisciplinary research and extension programs to address local needs.

Prior to joining UCCE, and over the last two years, I worked as assistant project scientist at the Kearney Agricultural Research and Extension Center in Parlier, CA. In that position, my research focused on alfalfa water use efficiency and groundwater recharge practices. Besides that, I worked in many cropping systems such as almond, olive, pistachio, and apple.

I earned a Ph.D. degree in biological and agricultural engineering from Washington State University with a focus on irrigation engineering. In my Ph.D. research, I worked to employ new methods of estimating irrigation uniformity and to formulate engineered solutions to agricultural water management challenges that help in water savings. These new methods can be used by growers to adjust their irrigation uniformity and ultimately save water. Part of my research included monitoring crop water stress in apple trees at different times.

I earned a master's degree in "land and water resources management: irrigated agriculture" from CIHEAM, Mediterranean Agronomic Institute of Bari, Italy, and a bachelor's degree in agricultural engineering from Zagazig University, Egypt.

I'm working to develop needs-based irrigation and soils extension and education programs tailored to your needs. As part of that, I'm currently meeting with growers and commodity boards, and I have put together a short survey to better understand your needs and reach out to as many of you as possible. Thank you in advance for participating in this survey, I greatly appreciate your feedback.

The survey can be found using the QR code below or at this link: https://ucdavis.co1.qualtrics.com/jfe/form/SV_a9uX8FznGcifYpg.

I'm based in Modesto and can be reached at (209) 525-6812 and amohamed@ucanr.edu

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Processing Tomato Update

Broomrape

The parasitic weed broomrape (Figure 1) continues to pose a significant threat to California tomato production. The primary control strategy is avoidance -- not planting into fields with known or suspected past problems with this state-regulated (A-rated) weed. However, you may find yourself worrying about this weed, or the risk of this weed, because it can move into fields on equipment – either your own or shared equipment such as harvest trailers. Equipment sanitation can be another important strategy to reduce risk. Canneries are applying sanitizers to harvest trailers that have been used in infested parts of the state, but you may want to consider your own efforts to prevent spread into your fields. For recommended best practices for equipment sanitation, see the link below. In addition to reducing the risk for broomrape seed spread, sanitizers are expected to reduce the risk of spreading fungal propagules, such as those causing Fusarium diseases, etc. BMPs for harvester sanitation are available here: https://bit.ly/tomatosanitationBMPs

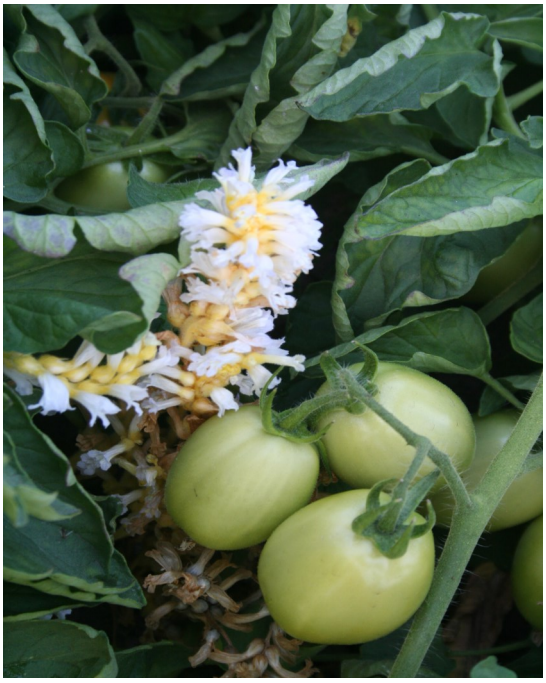

Figure 1. Broomrape in processing tomatoes.

Research on broomrape management strategies is continuing at UC Davis, looking primarily at herbicide approaches. There is a new 24c SLN ("Special Local Need") label for rimsulfuron (Matrix) for applications made via subsurface drip irrigation to suppress broomrape. Rimsulfuron (Matrix) will not provide full control of broomrape but does provide some suppression. In a highly infested field, it resulted in a four-fold reduction in broomrape clusters. The SLN 24c label for Matrix is available here: https://apps.cdpr.ca.gov/sln/assets/labels/303093.pdf. Always read and follow all label instructions before making an application.

Up to three applications are made during bloom to suppress broomrape. Note that if you are doing these three subsurface drip applications, you cannot also make the usual PRE or POST applications for other weeds because of the season limit of 4 oz. Note that 24c SLN labels for other herbicides are under consideration. For more information on broomrape, see https://escholarship.org/uc/item/7b76w65x or contact me!

Beet leafhopper, vector of curly top virus

So far this season, the beet leafhoppers (BLH) that overwinter in the coast foothills are remaining in the foothills as the vegetation there has not yet dried down. This likely means that early-season risk is low for BLH to move into tomatoes and transmit curly top virus (Figure 2). However, once they do move down to the valley floor, we anticipate that they will find suitable vegetation here, as there appears to be plenty of weedy host material around to support them. What does this mean for virus risk this season? It's too soon to tell. But if BLH are delayed in moving down onto the valley floor, then at least we can expect that virus infections happening later in the season should be less economically damaging. CDFA has redesigned their website for the Beet Curly Top Virus Control Program. New additions include a beet leafhopper sighting report that you can make if you have seen either the vector or the disease (or both). The link to the sighting report is https://arcg.is/O9LyK, and the link to the user guide is https://www.cdfa.ca.gov/plant/ipc/curlytopvirus/pdfs/CTV_Survey123_LeafhopperSighting_HelpDocument_2022.pdf.

Figure 2. Curly top in processing tomatoes, San Joaquin County, 2014

As a reminder, here are some other resources to help guide your decision-making this season:

A simple nitrogen calculator for processing tomato: http://geisseler.ucdavis.edu/Tomato_N_Calculator.html

TSWV Field Risk Index and Thrips Projections: https://ucanr.edu/sites/TSWVfieldriskindex/

As always, you are welcome to contact me, and I am happy to visit fields. bjaegerter@ucanr.edu, (209) 953-6114.

Brenna Aegerter, Vegetable Crops Advisor

Monitoring Evapotranspiration in the Delta

As I write this article, a cold front is circulating over California bringing cooler-than-normal temperatures for early-May and some light precipitation. This comes after record-setting rainfall and snowpack over the winter. Despite the current water conditions, in California, we know to always consider and plan for drought.

The Delta experiences drought differently from how the rest of the state experiences drought. Rather than a physical shortage of water, the Delta is challenged by diminishing water quality – in other words, increased salinity. Reduced downstream river flows means the tidal influence from the bay comes further upstream. Other drought impacts in the Delta may include levee integrity, sediment-filled channels, and harmful algal blooms.

In 2021, in the face of continued drought, a group of Delta water users and managers came together with state agency representatives to develop a drought program for the Delta. The overall objective was to implement a variety of water conservation actions and monitor consumptive use compared to 'business-as-usual'. The program launched in early 2022 and was known as the Delta Drought Response Pilot Program (DDRPP). It was a partnership among the Sacramento-San Joaquin Delta Conservancy, the Department of Water Resources, and the Office of the Delta Watermaster. Participation in the plan was voluntary. Growers applied if they were interested in participating, and they received a grant for water-saving practices to offset expenses and/or lost revenues. Conservation actions were proposed by the water users, on at least 100 contiguous acres, and consumptive use data was gathered through an open-source modelling platform called OpenET (https://openetdata.org/). I was invited to participate in this program to advise agency personnel on Delta agricultural practices, serve as a liaison with growers, and help interpret OpenET data.

In 2022, there were 33 growers and approximately 8,500 acres enrolled in DDRPP, spanning north, central, south, and west Delta regions. Water-saving measures were categorized as non-irrigated crops, deficit irrigation, managed idle lands, and not double-cropping. There was an array of practices lumped into each category, but example practices were:

- Non-irrigated crops: plant non-irrigated safflower instead of irrigated corn
- Deficit irrigation: None or only one early-season irrigation to alfalfa
- Managed idle lands: Fallowing land with weed management
- Not double-cropping: Harvesting a winter cereal and not following with a summer forage

The water conservation practices were compared to business-as-usual practices to estimate water savings from the program. One comparison was between the enrolled acreage and the same acreage in the previous crop year (2021). Another comparison was between the enrolled acreage and a nearby field that was growing the same crop as what would have been grown on the enrolled acreage if not for DDRPP. For this comparison, the nearby field ideally had the same soil type, irrigation method, land manager, as well as other characteristics. Using these comparisons, the program was estimated to have achieved modest water savings in 2022, between 3,254 and 5,486 acre-feet. The category of practices that achieved the highest per-acre water savings was managed idle lands, at approximately 0.77 ac-ft/ac, followed by deficit irrigation (0.67 ac-ft/ac), not double-cropping (0.23 ac-ft/ac), and non-irrigated crops (0.20 ac-ft/ac). There was, however, high variability among the individual projects within these categories, and some categories, like managed idle lands and not double-cropping had few projects to evaluate. Also, a separate analysis suggested that projects located above sea level more reliably had water savings compared to projects below sea level, though there were project fields below sea level that realized water savings. Despite all this, the 2022 program offered valuable insights on water conservation and drought management in the Delta. These insights have informed the 2023 program, which is now underway.

In 2023, 61 projects spanning over 16,000 acres are enrolled in DDRPP. Similar to last year, OpenET estimates will be compared across practices, but additionally, we will be installing monitoring stations on the ground (Figure 1). I am collaborating with project leaders Kosana Suvočarev and Kyaw Tha Paw U from UC Davis to measure evapotranspiration and calculate water budgets over the next three years. We will set up equipment in six enrolled fields and monitor evapotranspiration, precipitation, CO_2 exchange, soil moisture, and soil salinity, among other properties. We will evaluate remotely-sensed data with data collected from the stations. If you have any questions about the research project or its objectives, please don't hesitate to contact me.

Michelle Leinfelder-Miles, Delta and Field Crops Advisor

Figure 1. Equipment like this is used to measure crop water use.

Red Leaf Viruses of Grapevine: Grapevine Red Botch and Leafroll–Associated Viruses

Grapevine Red Blotch disease was first discovered in Napa Valley, California in 2008. It was first understood to be a new disease different from Grapevine Leafroll-Associated Virus (GLRaV), which also causes similar red leaf symptoms and reductions in fruit quality and yield. The similarities between the symptoms and effects likely played a role at masking the presence of Grapevine Red Blotch Virus (GRBV) until efficient virus screening techniques for GLRaV were commonly employed. In this article, I will discuss some of the key differences between the two based on what we currently know.

Leaf Symptoms

In healthy vines, toward the end of the growing season, leaves change in color from green to yellow before dropping off. The development of red leaves in red grape varieties is an indication that something is going wrong with the vines. While leaves may turn red for reasons other than the presence of GLRaV or GRBV, such as certain nutrient deficiencies and girdling, there are some distinct differences to be aware of. GRBV leaf symptoms appear as reddish-pink blotches or patches in red grape varieties, which usually show up later in the growing season on older leaves near the bottoms of shoots and later develop on leaves progressively higher up the shoot (Figure 1).

Figure 1. GRBV red leaf symptoms first appear in older leaves in the fall. In the neighboring healthy vines on either side, older leaves begin to turn yellow as they prepare to drop at the end of the growing season.

These blotches are irregular in shape and often have a mosaic pattern. Foliar symptoms of GLRaV are visually very similar, however some subtle difference exist. With GLRaV, the margins of some leaf blades may be distorted in shape resulting in the appearance of a downward curl or “roll”, hence the name leafroll, while GRBV does not distort the leaf shape allowing leaf blades to remain flat. Another key difference is seen in leaf veins, in GRBV veins turn red as blotches first appear while GLRaV leaf veins stay green at the appearance of leaf reddening (Figure 2). In white varieties of grape, both viruses present much less obvious symptoms, as leaves do not turn red but will show subtle yellow-chlorotic, patchy patterns.

Figure 2. Red leaf virus caused symptoms on Cabernet Sauvignon: (Left) GRBV caused red patches with red leaf veins, (Right) GLRaV caused red patches with green veins.

Virus spread through infected material

Both viruses can be easily transmitted through propagation of infected planting material. The use of California Department of Food and Agriculture certified virus tested vines is an important initial step in excluding viruses in your vineyard. As there is currently no cure for vines once infected with GRBV or GLRaV, the use of virus-free planting materials and the removal of infected vines is the first line of defense in virus management. Scouting and monitoring vineyards for red leaf symptoms in the fall is essential for early detection. PCR testing can be used to confirm viral presence in visually identified symptomatic vines. PCR based detection is the standard for determining virus status with a high degree of accuracy. Once confirmed, infected vines should be rogued from the vineyard to prevent them from serving as a source of virus that could inflect healthy vines in the future. Ideally, newly identified infected vines should be removed before the start of the next season.

Virus spread by insect vectors

The Three-Cornered Alfalfa Hopper (*Spissistilus festinus*) is currently the only confirmed vector of red blotch virus. It is an insect that can feed on many plant species, including grapevines, and is widely distributed throughout the United States. Plants such as alfalfa and other legumes serve as the preferred hosts for three-cornered alfalfa hoppers (TCAH). As its preferred hosts become unavailable for feeding, such as when these plants dry up or are harvested, TCAH will migrate onto less preferred hosts, such as grapevine. Feeding usually occurs on the leaf petiole or around stems of young shoots forming a girdling wound (Figure 3 on page 5). TCAH is a circulative and non-propagative host, meaning the virus does not replicate within the insect but is transferred in the salivary glands. TCAH requires an extended acquisition period of about 10

days to uptake the virus while feeding on infected vines, followed by an extended inoculation access period of about 4 days of feeding on healthy vines to spread GRBV. As grapevine is not the preferred host, TCAH populations usually remain low within vineyards and are mainly driven by the presence of legumes in cover crops within a vineyard. Timely management of cover crops by tillage before TCAH reaches adulthood may help reduce the pest population and limit virus spread. Additionally removing unmanaged or free-living grapevines from the perimeter of vineyard areas is helpful as these vines can act as virus reservoirs. The work of identifying and confirming insect vectors of GRBV is ongoing and there are many other insects identified as potential vectors currently under investigation.

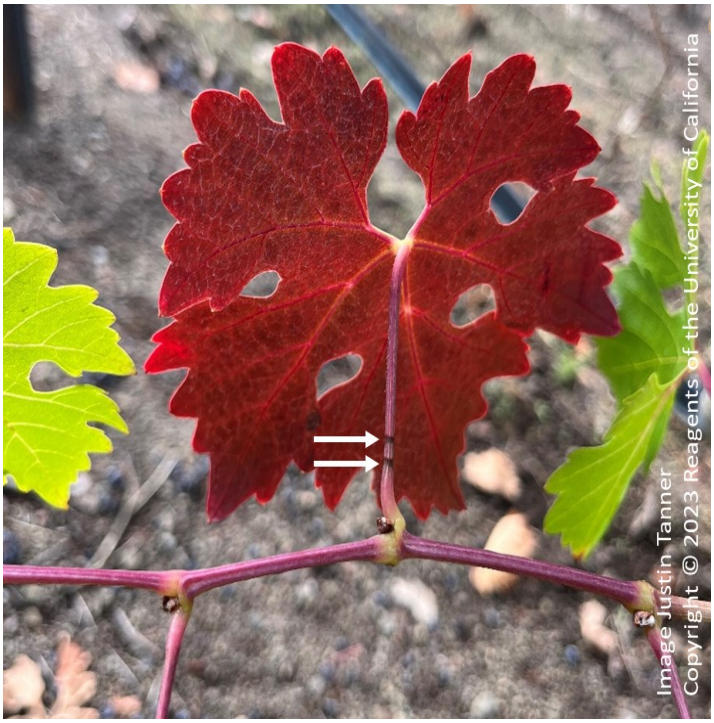

Figure 3. Signs of three-cornered alfalfa hopper feeding damage causing leaf girdling. The red color of leaf is caused by the girdling damage.

For GLRaV several species of mealybugs (family Pseudococcidae) and scale insects (family Coccoidea) have been shown to be competent vectors. However, the most important vector is the vine mealybug (*Planococcus ficus*), an invasive species first detected in California in the mid-1990s which can have up to seven generations in a single growing season. The vine mealybug requires a period of as little as 15 minutes of feeding on an infected vine to acquire Leafroll. Because of the efficiency of virus uptake by the vine mealybug and the rapid nature of its reproductive strategy, in areas where vine mealybug is present, GLRaV has the potential for rapid spread. The most effective management strategy for vine mealybugs involves an integrated approach which includes the use of pheromone mating distruption, biological, cultural, and chemical control methods, as well as managing ants which protect mealybugs from their natural enemies. In scouting for vine mealybug, following ants up a vine will usually lead you right to them (Figure 4). The parasitoid wasp *Anagryus pseudococci* and other beneficial species have been shown to successfully reduce vine mealybug infestations to manageable levels. A detailed guide to this approach is available at https://ipm.ucanr.edu/agriculture/grape/vine-mealybug/.

In summary, both Red Blotch and Leafroll viruses can cause significant impacts to fruit quality and yield. Both viruses will cause symptoms of red leaves in red grape cultivars, however slight differences between these symptoms can be visually identified and useful in distinguishing between the two. Once symptomatic vines are identified, PCR testing can confirm virus status. While both viruses can be vectored through the propagation of infected material, there are great differences in the efficiency of virus spread by insect vectors. For GRBV, the TCAH requires an unusually long acquisition time of about 10 days of feeding on infected vines before it can spread the virus, compared to the alarmingly quick uptake of GLRaV by the vine mealybug in around 15 minutes. Other potential insect vectors of red blotch have been identified and are currently under investigation. Additionally, the TCAH usually doesn't reach high populations within vineyards, as the grapevine is not its preferred host plant. The vine mealybug, on the other hand, due to its prolific reproductive strategy has the potential to reach very high numbers if left untreated in the vineyard. Once infected with GRBV or GLRaV, there is no cure, and removal of the vine is the only sure way to prevent future spread to neighboring vines. Monitoring for GRBV symptomatic grapevines and removing them from the vineyard quickly may be the best approach to limiting the spread of Red Blotch at the moment. With research ongoing and without a clear understanding of how the virus can rapidly spread, reducing inoculum sources is a proven, preventative strategy.

Justin Tanner, Viticulture Farm Advisor

Figure 4. Vine mealybug on the trunk of a grapevine surrounded by ants.

UC ANR Announcements and Calendar Events

UC Davis Small Grains and Alfalfa/Forages Field Day
Thursday, May 11, 2023
7:30am – 3:30pm, lunch provided
Department of Plant Sciences Field Facility, 2400 Hutchison Drive, UC Davis
See attached flyer for program and registration.
Contact: Michelle Leinfelder-Miles, mmleinfeldermiles@ucanr.edu

Soil Health and Sustainability Field Day – Whole Almond Orchard Recycling
Thursday, May 18, 2023
7:45am – 12:00pm, lunch provided
3978 Orchard Road, Gustine
See attached flyer for program and registration.
Contact: Brent Holtz, baholtz@ucanr.edu

Save the Date! Weed Day 2023
Wednesday, June 21, 2023
UC Davis

Announcement from our Partner

The USDA National Agricultural Statistics Service (NASS) is entering the final phase of data collection. **Don't miss your opportunity to be represented in Ag Census Data.** Time is running out to respond to the 2022 Census of Agriculture! Thank you to the producers who have already completed the ag census. If you have not responded, there is still time. **By federal law, the ag census questionnaire needs to be completed by everyone who received it, including landowners who lease land to producers, those involved in conservation programs, even those who may have received the ag census and did not farm in 2022.**

As of April 25, NASS has received more than 1.47 million completed census forms from producers across the nation. That's nearly a 53% return rate and growing. NASS will continue to collect census questionnaires through the spring to ensure the best possible representation in the data. Strong response means strong data; these data will inform decisions that will help shape the future of American agriculture for the next five or six years. By not responding, you risk being unrepresented and therefore underserved in farm programs and funding, crop insurance rates, rural development, disaster assistance, and more. Return your ag census by mail or fill it out online at agcounts.usda.gov. Learn more at nass.usda.gov/AgCensus and respond today. The USDA plans to release the ag census data in early 2024.

2023 UC Davis Small Grains and Alfalfa/Forages Field Day
May 11th, 7:30 a.m. – 3:30 p.m.

Supported by the California Crop Improvement Association (CCIA)

Department of Plant Sciences Field Facility, UC Davis
(2400 Hutchison Dr, Davis CA 38.5390, -121.7800)
CE Credits (TBD)
REGISTER HERE (no charge for event)

7:30 **Sign-in** (*refreshments available*)
7:55 **Welcome and Introductions** (CCIA Directors Katy Soden and Timothy Blank)
8:00 **Travel** on Wagons to Field

Alfalfa/Forage/Biofuel Field Tour

8:10 **Alfalfa Breeding Efforts at UC Davis—***Charlie Brummer*
8:20 **Choosing Varieties for Pest Resistance—***Dan Putnam, UC Davis*
8:30 **IPM and Importance of Management of Insect Resistance in Alfalfa—***Ian Grettenberger, UC Davis*
8:40 **Test your Weed IQ – Identification of weeds—***Brad Hanson, UC Davis*
8:55 **Use of Compost to improve soils in alfalfa—***Michelle Leinfelder-Miles UCANR and UC Davis*
9:05 **Sorghum Projects for Forage and Biofuels—***Jackie Atim, Kearney Research Center and UC Merced*
9:15 **Improving agronomic and grain quality traits in sorghum, under well-watered and drought conditions—** *Christine Diepenbrock, UC Davis*
9:35 **Flood or Drought?** Alfalfa Strategies for coping with California's Future—*Dan Putnam UC Davis*
9:45 **Teff as an Alternative Summer Forage Crop—***Dan Putnam, UC Davis*
9:50 **Overhead Irrigation Technologies for Improved efficiency—***Isaya Kisekka, UC Davis*

Small Grains Field Tour Agenda

10:05 **Updates from UC Davis small grains breeding program** *Jorge Dubcovsky (UC Davis)*
10:20 **Effects of genotype and environment on productivity and quality in Californian malting barley** *Maany Ramanan, Taylor Nelsen, Mark Lundy, Christine Diepenbrock, Glen Fox (UC Davis/UCCE)*
10:30 **California Grain Foundation and research on food use of triticale** *George Fohner (CA Grain Foundation)*
10:40 **Small grain research update from Tulelake** *Rob Wilson and Darrin Culp (UC Intermountain REC)*
10:55 **Evaluating digestate and hydrolysate as alternative N sources in small grains** *Valentina Roel and Cameron Pittelkow (UC Davis)*
11:05 **Biosolids as a N fertilizer source in California small grains** *Konrad Mathesius, Daniel Geisseler, Makina Savidge, Mark Lundy, Taylor Nelsen, Neil Andersen (UC Davis/UCCE)*
11:15 **Helping farms in the Central Coast get nitrogen scavenging credits for cereal cover crops** *Eric Brennan (USDA-ARS, Salinas) and Richard Smith (UCCE)*
11:25 **DIY in-field plant tissue tests to determine N sufficiency in wheat** *Karla Estrada (UC Davis)*
11:30 **Updates on small grain research and production in the Central Valley** *Mark Lundy (UC Davis/UCCE)*
11:45 **Tour small grain variety trials**
11:55 **Depart for complementary lunch**

12:10 - 1:10 **CCIA Sponsored LUNCH**

12:30 **Welcome and Acknowledgements**
CCIA Directors Katy Soden and Timothy Blank
California Wheat Commissioner Chairman Bill Cruickshank
1:20 **Depart for afternoon small grain breeding field day**

Afternoon Program

1:40 **Modern Tools of plant breeding.** *Joshua Hegarty*
2:00 **Wheat program update.** *Joshua Hegarty / Jorge Dubcovsky*
2:15 **Triticale program update.** *Joshua Hegarty*
2:30 **Forage barley program organic trailing.** *Allison Krill*
3:00 **Malting barley and oat program updates.** *Alicia del Blanco*

Free time to visit research plots and talk with breeders.

Almond Digest

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Soil Health and Sustainability Field Day
Whole Almond Orchard Recycling

May 18, 2023 / 7:45 am - 12:00 noon
3978 Orchard Road, Gustine, CA 95322

8:25 am **Welcome**
- Zach Fowler, Fowler Brothers Farming

8:30 am **Orchard recycling and the effect on tree growth, yield, and fertility**
- Dr. Brent A. Holtz, UC Cooperative Extension, San Joaquin County

8:45 am **Considerations towards irrigation and fertigation after whole orchard recycling**
- Cameron Zuber, UC Cooperative Extension, Merced County

9:00 am **2025 Almond Orchard Goals and Whole Orchard Recycling**
- Dr. Josette Lewis, Chief Scientific Officer, Almond Board of California

9:10 am **Incentives for orchard recycling and incorporation**
- Dania Haj and Oscar Hernandez, San Joaquin Valley Air Pollution Control District

9:20 am **Benefits of preplant fumigation and integration with orchard recycling**
- Shawn Fields, Tri-Cal Inc.

9:30 am **Amendments that enhance woodchip breakdown and microbial diversity**
- Duncan Smith, Fusion 360

9:40 am **Available composts for use in agriculture**
- Greg Pryor, Recology Organics

10:00 am **Break**

10:10 am **Observations on wood chip incorporation**
- Zach Fowler, Fowler Brothers Farming and Ag Soilworks
- Randal Tomich, Soil Stars, Ag Soilworks
- John Rasic, Soil Scientist

11:10 am **Equipment Demonstration**
- Fowler Brothers Farming, Ag Soilworks

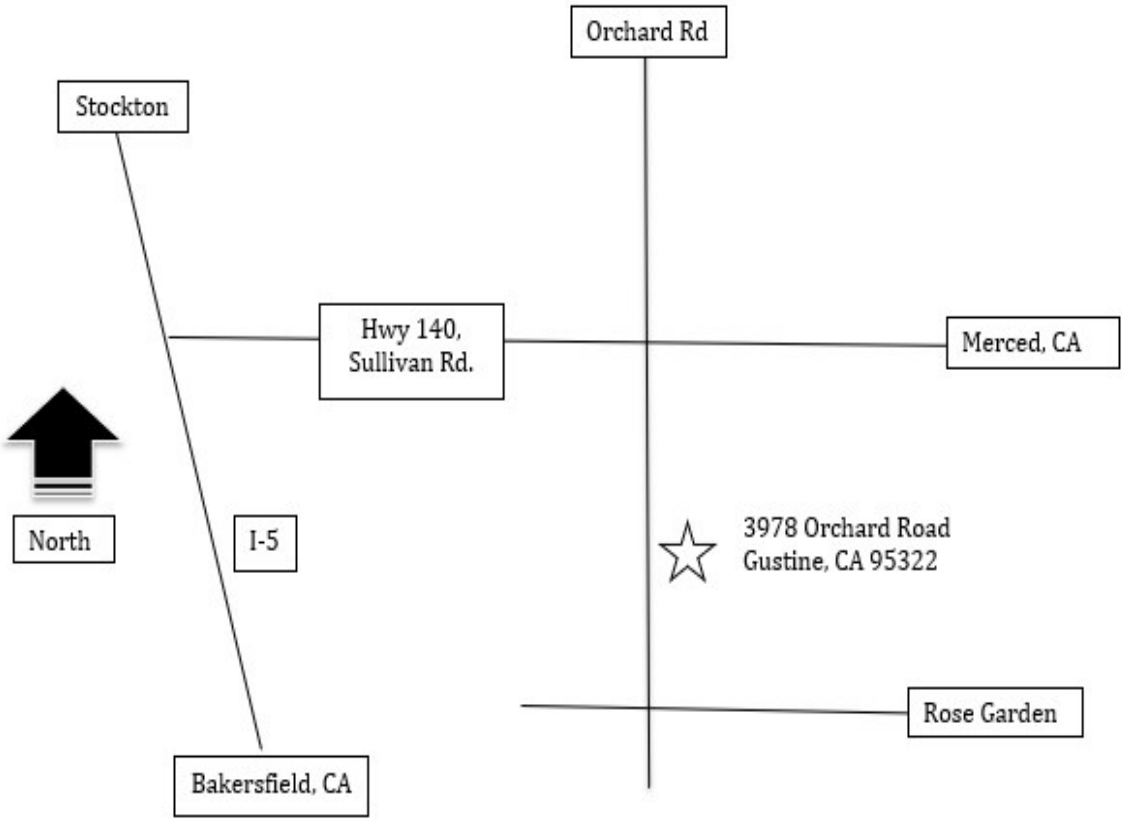
12:00 pm **Lunch / closing remarks**

RSVP by May 11th, 2023- Zach Fowler, email: Office@fowlerbrosinc.com

Breakfast: Donuts and Coffee / Lunch: sandwiches provided by Wolfsen's Meat and Sausage

Field Day brought to you by:

Thank you to all our sponsors!



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