Field Notes
San Joaquin County
MAY 2022

University of California
Agriculture and Natural Resources

PRACTICAL • CONNECTED • TRUSTED

Bacterial Blossom and Leaf Blast and Canker of Almond Trees

I observed a number of almond orchards this spring where the fruit and vegetative buds pushed, but the blossoms and growing shoot tips quickly blighted with bacterial blast-like symptoms (Figure 1). This was followed by blighted leaves, with a number of trees showing full bacterial canker symptoms (Figure 2, pg. 2) that I worry will not survive. Bacterial canker and blossom and bud blast are both caused by the plant pathogenic bacteria called *Pseudomondas syringae pv. syringae*. *Pseudomondas syringae* lives most of the time as an 'omnipresent epiphyte,' always present on the surface of healthy plants. It lives there happily, just waiting for certain environmental conditions (i.e. cold and wet) that allow it to enter the plant, multiply, and build to high enough populations within the tree to trigger a disease (i.e. bacterial blast or canker). Relatively little is known about blossom bacterial blast, but we do know that cold, wet weather can be important predisposing factors that can worsen the disease. We did receive a Section 18 Emergency Exemption for Kasumin 2L (the antibiotic Kasugamycin) to be used on almond trees to control bacterial blast from February 14 to April 15, 2022, but timing with a possible frost event is often difficult, and Kasumin should be sprayed before a frost event if possible, in order to enhance efficacy.

Figure 1. Bacterial blast.

The picture of 'blasted' flowers are from trees growing in sandy soils in an orchard near Ripon. During almond bloom, we had some cold temperatures, but it was mostly dry. Bacterial blast is usually more severe in the lower canopy of the tree and in the lower part of an orchard. Blast is usually more severe on earlier blooming varieties, but that may be because earlier blooming varieties tend to be in bloom when temperatures are cooler. Aldrich and Fritz seemed much less affected than Nonpareil, Independence, and Carmel. Bacterial blossom blast has been significantly reduced in trials where trees were protected against frost by running water or wind machines. Harley English, a UC Davis professor in the 1980s, conducted a series of experiments on bacterial blossom blast. Cut blossoming shoots of almond that were subjected to 24.8 °F (-4°C) for two hours were significantly more susceptible to blast than shoots that were not subjected to the two-hour frost treatment. In another experiment, cut leafing out shoots were sprayed with 'ice-nucleating' (i.e. the ability to catalyze the formation of ice) *Pseudomondas syringe* before being subjected to freezing temperatures. Other shoots were also inoculated but not chilled. Damage to leaf clusters were significantly greater in shoots that had been inoculated and chilled, confirming the interaction between ice-nucleating bacteria and freezing temperatures with bacterial blast.

Symptoms of bacterial canker can be observed in the spring and include scaffold and trunk dieback with cankers and amber-colored gum. Sometimes total tree collapse can occur. The sour-sap phase of bacterial canker may not show gum and cankers, but the inner bark can be brown, fermented, and sour smelling. Flecks and pockets of bacterial invasion in bark occur outside canker margins. Frequently, trees sucker from below the graph union because bacterial canker does not move into the rootstock.

(Continued on page 2)

Table of Contents:

Figure 2. Bacterial canker.

Trees growing in sandy soils with high ring nematode populations and low nutrient value, typically flood irrigated with district water, appear to be the most susceptible to bacterial canker. Bacterial canker control usually includes preplant fumigation for ring nematode, proper rootstock selection, proper irrigation and nutrition (especially nitrogen and perhaps calcium and iron), and post-plant nematicide treatments (less successful—Movento and VelumOne). Conversion to drip irrigation systems has, in general, reduced bacterial canker incidence. Roger Duncan, UC Farm Advisor in Stanislaus County, has shown Viking and Lovell rootstocks to be more tolerant than peach-almond hybrids (Hansen, Nickels, and Brights) and Nemaguard. Joe Connell, Emeritus Farm Advisor in Butte County, found that Marianna 2624 plum rootstock was much more susceptible to bacterial blast damage than trees on peach rootstocks. Other rootstocks with plum heritage may be more susceptible to bacterial blast and canker. I observed a number of Independence trees on Krymsk rootstock this year with bacterial canker, perhaps because of the plum heritage in Krymsk. There may also be an incompatibility issue between the Independence scion and the Krymsk rootstock that is weakening the scion and making the tree more susceptible to bacterial canker.

I have also observed bacterial canker on trees growing in heavy soils, most likely absent of nematodes. I believe these trees were stressed from saturated soils with high saline conditions. One orchard was in the Delta with leaf tissue analysis showing high sodium levels, while the other orchard received dairy lagoon water high in salts over the winter. Stress, besides nematodes, can make trees more susceptible to bacterial infection.

Roger Duncan also cooperated on research that showed copper sprays may play an important role at reducing bacterial populations. Silicone-based surfactants may help deliver bactericides into previously inaccessible leaf surfaces. There is limited evidence that defoliating leaves in the fall with zinc or urea may improve bacterial canker symptoms. We wonder if freezing temperatures in the fall, before trees were completely dormant, may contribute to early bud infections because sometimes dormant buds appear to be killed even before bloom. I'm guessing that frost events and rainfall may allow the bacterium to enter the plant early and reach high enough populations to cause the canker and blast symptoms we observed this spring. Several farm advisors, including myself, are working with Dr. Florent Trouillas to better understand bud colonization in the winter by *Pseudomondas syringe*.

Brent Holtz, Farm Advisor and County Director

Want Alternative Manure Management Information?

The Alternative Manure Management Program is accepting applications for grants of up to $750,000. By now, those interested in submitting an application are well on their way with the paperwork. Detailed information is needed to complete the process. It is key to be sure you've done your homework sufficiently. You don't want to end up implementing a practice that does not fit your expectations or needs.

Take a virtual field trip and get information on alternative manure management practices. The California Dairy Quality Assurance Program has a page dedicated to alternative manure management practices. Factsheets, producer interviews, and webinars related to use of vacuums, mechanical separators and compost bedded pack barns are available to help you better understand operational aspects.

https://cdqap.org/ammp-outreach-project/

This page was produced through a project funded from the California Department of Food and Agriculture through California Climate Investments (CDFA Agreement # 19-0930-000-SO) and the California Dairy Research Foundation.

Deanne Meyer, Extension Specialist, UC Davis

Jennifer Heguy, Dairy Advisor, Stanislaus, San Joaquin and Merced counties

Denise Mullinax, California Dairy Research Foundation

Soil Health in Alfalfa Receiving Full and Deficit Irrigation

Over the last few years, I have been working on a project to characterize a suite of soil health properties in alfalfa receiving full and deficit irrigation. Soil health has been described as the ability of soil to function and is characterized by biological, chemical, and physical soil properties that are sensitive to changes in management. The idea for this project developed after the 2012-2015 drought when water shortages and regulatory curtailments meant that growers had to make tough decisions on how to apply scarce water resources. Some growers opted to cut irrigation to alfalfa since it is a deep-rooted crop that can scavenge water and nutrients from the soil profile. (See this recent blog post by UC Alfalfa and Forage Specialist Dan Putnam, and Farm Advisor Rachael Long on the resiliency of alfalfa during drought: https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=51887.) I had a hunch, however, that while alfalfa may be adapted to survive drought conditions, soil health properties might be negatively impacted because water is essential to life in the soil, facilitates nutrient movement and availability, and influences soil physical characteristics, among other things. Fortunate for me, there was a research trial at UC Davis where I could test this idea.

The UC Davis trial was initiated by Dan Putnam and Isaya Kisekka (UCD Associate Professor of Agricultural Water Management), and managed by graduate student Umair Gull. Their interest was in evaluating alfalfa yield and survival under different levels of deficit irrigation. The replicated treatments were: 1) full irrigation (100 percent of crop evapotranspiration, ETc), 2) full irrigation at the beginning of the season with a sudden cutoff toward the end of the season (60 percent ETc CT), 3) sustained deficit where each irrigation imposes restriction (60 percent ETc SD), and 4) more-severe sustained deficit (40 percent ETc SD). The treatments were applied using overhead irrigation – an 8000 series Valley 500-ft, four-span linear-move system (Figure 1). The primary soil classification at the site is a Yolo silt loam. Soil sampling occurred twice each year – in the spring before irrigation began and in the fall after the last irrigation. We conducted a comprehensive nutrient analysis, as well as testing organic matter, total carbon and nitrogen, salinity, compaction, bulk density, N mineralization, and particulate organic carbon.

I view alfalfa as a model crop for studying soil health under restricted water conditions because practices like crop rotation and tillage do not occur over the four or more years of an alfalfa stand. Therefore, those practices would not confound our results. From this experiment, we are learning how imposing varying levels of deficit at different stages of the cropping season impact soil properties, which will help us optimize deficit irrigation strategies for alfalfa. Additionally, the deficit treatments serve as a proxy for drought and could potentially demonstrate how prioritization of water uses during drought may impact soil conservation outcomes.

Data analysis is ongoing, but preliminary results suggest that soil health may not be resilient under deficit irrigation or drought, even if alfalfa is.

Figure 1. UC Davis trial location with overhead irrigation system used to apply irrigation treatments.

When the trial began in Spring 2019, there were no differences in rootzone salinity among treatments, which averaged 0.41 dS/m. After two cropping seasons where deficits were imposed, the 60 percent ETc treatment with the water cut-off toward the end of the season (CT) resulted in significantly higher rootzone salinity down to the 36-inch depth (Figure 2, pg. 4). The salinity in that treatment was higher than even the 40 percent ETc treatment that had the sustained deficit (SD) throughout the entire season. In other words, it appears that the timing of the deficit is more important than the amount of deficit, and applying water throughout the season – even if the amount is severely reduced – appears to mitigate salinity build-up in the rootzone. Of note, salinity is not high enough to be problematic at this site. The overall ECe of the soil is low, and water quality is generally good at this location. I would expect, however, that in locations where soil and/or water has higher salinity to begin with, then deficit irrigation that includes a water cut-off could be problematic.

There will be a lot more information to come about this project in the near future, but the salinity information seemed timely to share given our current water year. In addition to Dan, Isaya, and Umair, I want to acknowledge Daniel Geisseler (UC Nutrient Management Specialist), Will Horwath (Professor of Soil Biogeochemistry), and graduate student Veronica Suarez Romero who have helped on soil nitrogen and carbon testing. I also want to acknowledge the South Delta Water Agency for financial support of the project.

Michelle Leinfelder-Miles, Delta Farm Advisor

(Continued on page 4)

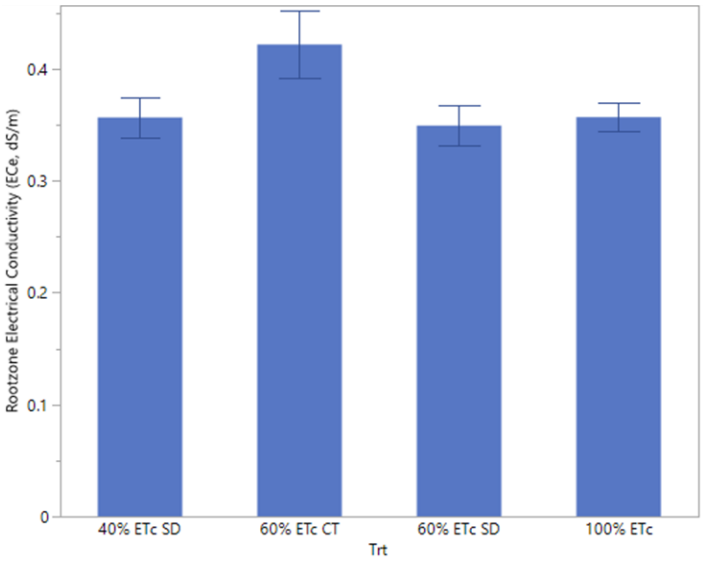

Figure 2. Rootzone salinity from the soil surface to 36-inch depth across three seasonal readings (Fall 2019, Spring 2020, Fall 2020). Of note, the statistical analysis from all three seasons, including Spring 2020, indicated that not even winter (2019-20) rainfall leaching was adequate to bring rootzone salinity down in the 60% ETc cut-off (CT) treatment.

Nitrogen Management in Walnuts

The following is a summary of a previous publication "Guide to Efficient Nitrogen Fertilizer Use in Walnut Orchards" written by Kathy Kelley Anderson, Joseph Grant, Steven A. Wienbaum, and Stuart Pettygrove.

As the growing season approaches (and fertilizer prices rise), many walnut growers are asking the question, "How much nitrogen do I need to fertilize my orchard and when?" Although walnuts, a proteinaceous crop, need more nitrogen than some stone fruit, nitrate, being negatively charged, leaches easily in the soil. Compost, organic fertilizers, urea, and ammonium containing fertilizers are all eventually converted to nitrate by soil bacteria, so regardless of form, leaching can occur at some point or another. Therefore, the right rate, time, place, and type become increasingly important as environmental concerns, regulatory restrictions, and nitrogen prices increase. The best way to manage nitrogen applications is to first estimate orchard nitrogen requirements (based on your yield estimate), then determine your nitrogen need (yield estimate minus other sources of nitrogen), determine your applied nitrogen for the season (nitrogen needs divided by application efficiency) and determine the timing of nitrogen applications based on the phenology of the crop (during the growing season, nitrogen is taken up by the tree at a relatively even rate throughout fruit development, nothing needed after harvest, nothing needed during dormancy). This is referred to as nitrogen budgeting.

Let's first discuss the right rate. Nitrogen management plans require estimating the orchard nitrogen requirement based on yield estimates. It is suggested to determine this value by averaging the previous five years (while excluding very low yielding years). Nitrogen can be present in irrigation water, therefore, testing your water source is necessary for determining your application amount for the coming season. Nitrogen in irrigation water has been demonstrated to be taken up by trees, so we can incorporate this nitrogen value into our nitrogen budget, saving money and water resources. In rare cases, these resources have been found to contain as much as the equivalent of 100 to 200 lbs. of nitrogen in 3 acre-feet of water. More often some irrigation water sources are found to contain the equivalent of 20 to 40 lbs. of nitrogen in 3 acre-feet of water. Growers can send samples to a lab to determine the amount of nitrogen present in the water. This amount can then be calculated on an acre-feet basis and subtracted from the initial estimate of nitrogen needed which is based on the five-year average yield estimate. The resulting amount of nitrogen needed for the season is then divided into how many times you plan to apply nitrogen during the season. The number of times you choose to apply nitrogen should be partly determined based on the leaching capability of the soil (sandier soil is more likely to allow nitrogen to pass through it), and the form of nitrogen used (nitrate will leach more readily than ammonium). Furthermore, walnut trees take up nitrogen steadily through the growing season so applying smaller amounts more often is better for your crop. Unfortunately, even with our best attempts, not all the nitrogen applied and/or present is taken up by the plant. Research shows approximately 70% is taken up by the plant, so we also incorporate an efficiency factor of 0.70 into our budgeting estimates. Don't worry, we will circle back to this later. In the meantime, please see Table 1 (pg. 5) for ppm nitrate present in irrigation water and how that converts to lbs. of nitrogen applied per acre in volume of applied water per acre.

So how much nitrogen is taken away from the field at harvest, and how do we determine the right rate from that? Research shows that for every ton of nuts/hulls removed per acre, approximately 29 lbs. of nitrogen is removed per acre. With an additional few pounds for limb and leaf growth, the CDFA assumes 40 lbs. of nitrogen is needed per one ton of walnuts removed per acre (for current information please see their website: (https://www.cdfa.ca.gov/is/ffldrs/frep/FertilizationGuidelines/).

We've covered quite a bit of ground here, let's run through an example. If my previous five-year yield average is three tons per acre from my orchard, I could assume I need to replenish this much nitrogen: 3 tons per acre multiplied by 40 lbs. nitrogen per ton equals 120 lbs. nitrogen per acre. Furthermore, if my water sample reflects approximately 40 lbs. of nitrogen per acre in my annual irrigation, I can remove 40 lb of nitrogen from that total, thus my application needed for the season becomes 80 lbs. of nitrogen per acre. Furthermore, I do not want to apply all that nitrogen at the same time because the trees need it throughout the fruit development process. Depending on my application method I could apply this amount of nitrogen across four to several applications until August, thereafter, walnut trees are no longer utilizing nitrogen for nut development.

(Continued on page 5)

Table 1. Amount of nitrogen applied in irrigation water as a function of nitrate-N (NO_3^-N), or nitrate (NO_3^-) concentration and the amount of irrigation water applied.

Nitrogen concentration in irrigation water		Pounds of nitrogen applied per acre in volume of applied water per acre	
ppm N as NO_3^--N	ppm NO_3^-	2 acre-feet	3 acre-feet
5	22.1	27	41
10	44.2	54	82
20	88.5	109	163
30	133	163	245

Note: Agricultural laboratories report results of water analysis as either ppm N (NO_3^-N) or ppm NO_3^-. Multiply ppm NO_3^-N in the water by 2.72 to calculate the pounds of nitrogen applied per acre foot of applied irrigation water. Multiply ppm of NO_3^- by 0.614 to obtain pounds of nitrogen. Table extracted from Guide to Efficient Nitrogen Fertilizer Use in Walnut Orchards, UCANR publication #21623.

So, if I decide to apply four times during the season, my application rate would then become 20 lbs. of nitrogen per acre. Please see Formula 1 for details:

Formula 1.

$$\frac{\left[\left(\frac{3\ tons\ of\ nuts\ per\ acre * 40\ lbs.of\ N\ per\ ton}{0.7\ efficiency\ factor}\right) - 40\ lbs.of\ N\ in\ irrigation\ water\right]}{4\ N\ applications}$$

$$= \mathbf{20\ lbs.of\ N\ per\ acre\ per\ application}$$

Right time: In general, trees can take up nitrogen when leaf out begins, but they don't need it until nut development begins to a greater extent. This is because early nitrogen needs are supplied by nitrogen remobilization in the tree. Therefore, applying nitrogen after harvest, during the winter, or even early spring, in the case of walnuts, is just a waste of money, resources, and can be an environmentally destructive action. That said, research has shown that walnuts take up nitrogen steadily during the fruit development period, therefore, "spoon-feeding" nitrogen gives you the best bang for your buck. Therefore, we suggest applying frequent small doses during the growing season. This will provide better nitrogen use efficiency. From the example above, Formula 1, applying 20 lbs. of nitrogen once a month from May to August is ok, but applying 10 lbs. of nitrogen every two weeks from May to August is better.

Right place: Depending on the application form, certain measures can be taken to reduce leaching even further. If fertigating, add the nitrogen during the last half or third portion of the irrigation set. This allows water to flush and move the nitrogen into the soil and rootzone. If fertigation occurs during the first four hours of a 24-hour set, much of the applied nitrogen will be carried too far into the soil depth, wasting money, and risking environmental detriment. Knowing more about your soil and leaching capacity can help determine which forms of nitrogen you could use to reduce leaching, although all forms will convert to nitrate eventually so don't assume any form of nitrogen is "safer" than another. As a reminder, more frequent, smaller applications of nitrogen are more likely to keep the nitrogen in the rootzone where the roots can access it. One big nitrogen application in May and July reduces the available nitrogen for the crop in June and August when the crop still needs it for production (not to mention this practice increases leaching risk). Keeping nitrogen in the rootzone with more frequent applications at smaller application rates provides for a better crop in October (Cha-ching!).

As we progress into the growing season (late June/July), we should start thinking about tissue samples. This helps determine how much nitrogen is needed based on the plant status and allows for rate adjustment in the following year. We collect samples in June and July because this is when leaf nitrogen content tends to stabilize. Collect 4 terminal leaflets per tree from spur leaves that are fully expanded at approximately 6 to 8 feet above the ground around the outside of the tree.

(Continued on page 6)

To assess the entire orchard, make these collections from 29 randomly selected trees within the orchard. Submit the samples to a nutrient analysis laboratory. If leaf concentrations are below 2.3%, the trees are deficient and need additional nitrogen. If nitrogen leaf concentrations are between 2.3% and 2.7%, this orchard is adequate and needs no more nitrogen than previously assessed. If the concentrations are above 2.7%, this orchard is in excess of nitrogen, and savings can be taken advantage of by reducing or even eliminating nitrogen applications for a year or more depending on soil type (sandier soils are more prone to leaching). In other words, if your sampling numbers are above 2.7%, you can save money by not buying nitrogen when nitrogen is expensive and walnut prices are low. This is because of the stored nitrogen in the plant. If you go this route, be sure to follow your sampling next year to help determine the following year's application rates. This nitrogen savings is only good for about a year or two, and you don't want to short yourself in yield when the prices go back up. The current year's tissue samples will guide next year's nitrogen decisions and maybe save you some cash.

So, we've made it to August. By now we have a pretty good handle on our nitrogen budgeting. As a reminder, don't apply nitrogen after August, not only is this a waste of money and time since the tree is no longer using nitrogen for nut development, but this also makes trees more prone to freeze damage in the fall due to the unnecessary encouragement of new growth. September is best thought of as a slowdown month where we allow the trees to develop dormant buds and dormant tissues. Any nitrogen inputs during this time delay dormancy, furthering the risk of fall freeze damage. Take this moment to pat yourself on the back; farming is hard.

Now let's discuss the right type. Although we made it through the growing season, there is more to consider when it comes to nitrogen management in the orchard. For instance, certain forms of nitrogen and certain soils are more prone to nitrogen leaching. Ammonium is positively charged and held to clay soil particles; whereas, nitrate is negatively charged and not held in place by clay soil particles. Sandier/siltier soils are at greater risk for nitrogen leaching and nitrate-based fertilizers are more prone to leaching. That said, ammonium will convert to nitrate at some point, so using only ammonium-based fertilizers does not put you in any "safe" zone. It just slows down the process a little bit. Additionally, since water moves nitrate through the soil profile, high rainfall and heavy irrigation are also situations more prone to leaching. Therefore, as stated previously, fertigation is recommended to be done at about halfway or one-third of the way through an irrigation set as opposed to the beginning. This will keep your money spent on nitrogen in the root zone, and not below it.

Organic amendments such as manures, composts, blood meal, feather meal, and fish waste do contain nitrogen, but the amount varies drastically based on the source and batch. Furthermore, some composts and manures contain potentially detrimental levels of other salts than what they may be worth for nitrogen content. Frequent chemical analyses of the compost sources are strongly encouraged before use. Compost and manures must be incorporated into the soil soon after application to avoid loss due to volatilization.

Cover crops can provide quite a bit of nitrogen depending on the current nitrogen content in the soil and species selection. Vetch, clover, and other legumes can provide as much as 150 lbs. of nitrogen per acre, but these species do not fix nitrogen when adequate levels of nitrogen are present for plant growth. If these cover crops are not fixing nitrogen, they are demanding it and in turn reduce available nitrogen for the trees. Thus, careful nitrogen management is necessary when growing cover crops for nitrogen production. To estimate the amount of nitrogen available in the cover crop, collect a small area, such as a square meter (3 feet by 3 feet) of mature cover crop, and submit the sample to a laboratory for nitrogen analysis. After cutting, weigh the sample (fresh weight), place it in a plastic bag and immediately drop it off at the lab. Nitrogen budgeting assumes a 50% recovery if the cover crop is only mowed. Further information on cover crops in walnut orchards can be found in *Cover Crops for California Agriculture* (UC ANR publication 21471, 1989) and *Cover Cropping in Vineyards-A Grower's Handbook* (UC ANR Publication 3338, 1998).

Although we expect all forms of nitrogen to become nitrate (leachable) at some point, different forms of nitrogen have different levels of leaching risk and volatilization potential. Additionally, different formulations consist of different percentages of nitrogen. Please see Table 2 (pg. 7) for a quick digest of this information.

With rising prices related to nitrogen and increasing concerns related to nitrogen ground water contamination, we hope this article helps in deciphering your best nitrogen management practices. Young trees are different in their needs, if you have specific questions on young trees, please contact your local UCCE walnut advisor. For more information and guidance on nitrogen budgeting, please see the following resources: https://www.cdfa.ca.gov/is/ffldrs/frep/FertilizationGuidelines/
https://www.growingthevalleypodcast.com/cures/2020/12/31/managing-nitrogen
https://anrcatalog.ucanr.edu/Details.aspx?itemNo=21623

Kari Arnold, Orchard and Vineyard Systems Advisor, Stanislaus County

Phoebe Gordon, Orchard Crops Advisor, Madera and Merced counties,

Katherine Jarvis Shean, Orchard Systems Advisor, Sacramento, Yolo, and Solano counties

Mohamed Nouri, Orchard Systems Advisor, San Joaquin County

Janine Hasey, Tree Crop and Environmental Horticulture Advisor, Sutter-Yuba counties

(Continued on page 7)

Table 2. Components of various nitrogen (N) fertilizers and their characteristics.

Fertilizer	Formulation	Nitrogen (%)	Equivalent acidity or basicity (lb. $CaCO_3$/100 lb. N)		Leaching Risk*	Volatilization potential
			Acid	Base		
ammonium nitrate	NH_4NO_3	33.5-34.0	62	--	M	L, M***
ammonium sulfate	$(NH_4)_2SO_4$	21.0	110	--	L	L, M***
calcium-ammonium nitrate solution	$Ca(NO_3)_2 \cdot NH_4NO_3$	17.0	9	--	M	L
calcium nitrate	$Ca(NO_3)_2$	15.5	--	20	H	L
urea	$CO(NH_2)_2$	45.0-46.0	71	--	L	M
UAN-32 solution** (urea-ammonium nitrate)	$NH_4NO_3 \cdot CO(NH_2)_2$	32	57	--	M	L

Notes: *L=Low, M=Medium, H=High. These terms are relative. All ammonium forms will leach after being converted to nitrate form. This takes place in 2 to 4 weeks in most soils Nitrate leaching can be severe on sandy soils and moderate on silt loams and clays.
**UAN is often injected through low volume irrigation.
***If not incorporated or banded below the soil surface, volatilization losses can be high on soils with a pH over 7.0.
Source: California Plant Health Association 2002, Cramer et. Al., 1986 and *Guide to Efficient Nitrogen Use in California Walnut Orchards* (UC ANR Publication 21623).

UC ANR Announcements and Calendar of Events

2022 **Virtual Walnut Series** recorded videos are now available at the following link:
https://www.youtube.com/channel/UCsTjd_N5GCh6MlEPqB3jUnQ

Registration for the brand new **UC Nitrogen Management course** is now open at http://ucanr.edu/NitrogenCourse. Are you a Certified Crop Advisor (CCA) seeking Continuing Education Units and/or preparing for the new California Nitrogen Specialty Exam? Has your grower clientele asked you if you are eligible to sign off on a Nitrogen Management Plan? The UC Nitrogen course is taught online through a video series delivered by UC Researchers and Extension Specialists. Each module is eligible for CCA continuing education. The course is open to anyone interested in learning more about N management in California. The curriculum addresses all the learning objectives set forth by the American Society of Agronomy for the new California Nitrogen Management Specialty Exam. The 7-part video series starts Monday May 9th. Register at http://ucanr.edu/NitrogenCourse You may join the course at any time up until July 31st. For more information contact Sat Darshan Khalsa at sdskhalsa@ucdavis.edu or visit the FAQ page.

Airblast 2022: Spray Application and Modeling Conference (virtual)
May 16-18, 2022
8:00am – 3:00pm each day
Virtual event via Zoom. Registration is required to receive log-in information.
See the agenda here: https://ucanr.edu/sites/ASAM/Agenda/.
To register, visit: https://ucanr.edu/sites/ASAM/Registration/.

UC Davis Small Grains and Alfalfa/Forages Field Day
Tuesday, May 17, 2022
8:00am – 12:00pm, lunch provided
See attached flyer for agenda.
Contact: Michelle Leinfelder-Miles, 209-953-6100, mmleinfeldermiles@ucanr.edu

Olive Oil Irrigation Field Day
Wednesday, June 1, 2022
9:00am – 12:00pm, lunch provided
See attached flyer for agenda, map, and registration information.
Contact: Mohamed Nouri, 209-953-6100, mnouri@ucanr.edu

Airblast 2022:

Spray Application and ModelingConference

May 16 - 18, 2022

8 am-3 pm Pacific Time Each Day

Virtual via Zoom

REGISTER

Objectives/Goals: A 3-day conference covering airblast pesticide spray application practices in orchards and vineyards, decision support tools for planning and evaluating spray applications, and drift modeling support for pesticide regulatory practices. Participants will gain a holistic view to better understand ongoing partnerships between academia, industry, and the regulatory community towards better stewardship of pesticides.

This conference will focus on:

Day 1: General airblast spray application practice and equipment, and emerging technology.
Day 2: Modeling and decision support systems for improving spray deposition and efficacy.
Day 3: Pesticide drift modeling and data support for regulatory processes.

Who Should Attend: Anyone interested in or directly involved with tree and vine spray application practice, planning, supervision, advising, regulation, and/or advocacy.

Requirements: You will need a laptop/desktop computer (PC or Mac) or a mobile device and a stable internet connection in order to participate in this conference.

Continuing Education Units: 17.28 CEUs (**2.00 'Law' & 15.28 'Other'**) to be applied for from California Department of Pesticide Regulation (CDPR).

Registration: https://ucanr.edu/sites/ASAM/Registration/
Contacts for More Information
Logistics and Registration: ANR Program Support or 530-750-1361 (messages only)
Program: Peter Larbi, UCCE Specialist; Greg Douhan, UCCE Farm Advisor; or Lynn Wunderlich, UCCE Farm Advisor

University of California
Agriculture and Natural Resources

2022 UC Davis Small Grains and Alfalfa/Forages Field Day
May 17th, 8:00 a.m. – 1:00 p.m.

(with tours of Small Grains Breeding plots to follow in the afternoon)
Department of Plant Sciences Field Facility, UC Davis
(2400 Hutchison Dr, Davis CA 38.5390, -121.7800)
CCA CE Credits Offered

7:30 Sign-in (*refreshments available*)
8:00 Welcome and Introductions (John Palmer and Lauren Port, CCIA)

8:20 Alfalfa/Forage/Biofuel Field Tour
Breeding Alfalfa Varieties for Drought Tolerance and other Traits
Strategies for Coping with Drought in Alfalfa
Breeding Cool Season Grasses for Various Markets
Switchgrass & Sorghum Field Trials
Novel Applications for Biofuels
Producing Sorghum under Limited Water
Choosing Alfalfa Varieties for Pest Resistance and Yield

9:30 'Lightning Talks' on UC Forage Projects
Utilizing Pre-treatments for Weed Management for Alfalfa Stand Establishment
Options for Alfalfa Weevil and the importance of controlling resistance
Using Drones for Pest Management in Alfalfa
Technologies for Improving Water Use Efficiency with Overhead Irrigation
Using Compost on Alfalfa for Healthy Soils
Soil Quality Considerations During Drought

10:15 Small Grains Agenda
Updates from UC Davis Small Grains Breeding Program
Quantifying environment and management impacts on yield differences between resistant starch (RS) and non-RS wheat varieties
Evaluating genotype x environment x management impacts on California malting barley quality
Bread quality and ecosystem sustainability implications for triticale use in milling applications
Assessing small grain forage productivity in diverse California environments
Maximizing water productivity from winter cereal crops under water-limited conditions
Demonstrating efficient N fertilizer in CA small grains
Assessing DIY in-field plant tissue tests to determine N sufficiency in wheat
Controlling herbicide resistant Italian ryegrass in California small grains
Plot tours of small grain variety trials

12:00 CCIA Sponsored LUNCH and Program

1:30-3:30 Small Grains Breeding Program Field Day. Departure from Agronomy Head Quarter after BBQ in personal cars to

https://www.google.com/maps/place/38%C2%B032'02.3%22N+121%C2%B047'53.1%22W/@38.5325894,-121.797092,932m/data=!3m1!1e3!4m6!3m5!1s0x8085286321001fd5:0x4c7bb3cf8dc3caea!7e2!8m2!3d38.533983!4d-121.7980754

Afternoon Program includes wheat varieties, triticales for forage and human food, branched spikes, development of low allergenicity wheat, barley for feed and forage, organic wheat breeding program, malting barleys with reduced Glycosidic Nitrile, malting barley varieties, oat varieties, and free time to visit research plots and talk with breeders.

UC CE UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources UC Cooperative Extension

2101 E. Earhart Ave., Suite 200
Stockton, CA 95206-3949

Olive Oil Irrigation Field Day

A short, topical meeting sponsored
by the University of California Cooperative Extension and
the Olive Oil Commission of California (OOCC)
Wednesday, June 1st, 2022. 9:00 a.m. - 12:00 p.m.

Field Location Hosted by Marchini Farms:
4005 South Roberts Road, Stockton, CA 95206-9660
Follow signs on dirt road at S Roberts Rd, ¾ of a mile south of Hwy 4
(Refer to map on page 11)

Register at: https://ucanr.co1.qualtrics.com/jfe/form/SV_4OwQ3bbhoXeK5XU
Contact: mnouri@ucanr.edu

Limited space. Register early.

A field day to observe the ongoing irrigation trial. The event will include:

An outline of the overall research objectives and quick sketch of trial design.
A tour of the research plots and explanation of treatments and monitoring tools, etc.
A summary of observations and results to date.
An Irrigation District perspective and projections for water availability.
Recommendations for the upcoming irrigation year based on preliminary data.
Learn how to use a pressure chamber to implement plant-based irrigation management in olive. Tasting of olive oils.

9:00 am Program Begins with Welcome and Introductions
Mohamed Nouri, UCCE Orchard Systems Advisor, San Joaquin County
Coffee and Donuts provided by OOCC. Thank you!

UC Davis Olive Center Program Update
Javier Fernandez Salvador, Director, UC Davis Olive Center

Navigating the Drought & Farm Water Situation in San Joaquin County
Scot Moody, General Manager, Stockton East Water District

Water Management Strategies for Hedgerow Olive Orchards in California
Giulia Marino, Cooperative Extension Specialist in Orchard Systems, University of California Davis

Irrigation: A Key Tool to Improve Olive Oil Quality
Filipa Grilo, Technical and Research Field Director for Corto Olive

Demonstrating the Use of a Pressure Chamber in Olive
Emily Santos, UC Davis Research Assistant Specialist

Olive Oil Tasting

12:00 pm Adjourn

Lunch provided by OOCC. Thank you!

(Continued on page 11)

June 1, 2022
Olive Oil Irrigation Field Day Location Map

4005 South Roberts Road, Stockton, CA 95206-9660

Mohamed Nouri

Mohamed Nouri, Farm Advisor
UCCE San Joaquin County

It is the policy of the University of California (UC) and the UC Division of Agriculture & Natural Resources not to engage in discrimination against or harassment of any person in any of its programs or activities (Complete nondiscrimination policy statement can be found at http://ucanr.edu/sites/anrstaff/files/215244.pdf). Inquiries regarding ANR's nondiscrimination policies may be directed to UCANR, Affirmative Action Compliance & Title IX Officer, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1343

The University of California working in cooperation with San Joaquin County and the USDA.

UC CE

University of California
Agriculture and Natural Resources

Cooperative Extension
San Joaquin County

2101 E. Earhart Ave., Suite 200
Stockton, CA 95206-3949

Notes from the Field

May 2022

It is the policy of the University of California (UC) and the UC Division of Agriculture & Natural Resources not to engage in discrimination against or harassment of any person in any of its programs or activities. (Complete nondiscrimination policy statement can be found at http://ucanr.edu/sites/anrstaff/files/215244.pdf.) Inquiries regarding ANR's nondiscrimination policies may be directed to John I. Sims, Affirmative Action Compliance Officer/Title IX Officer, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1397.

The University of California working in cooperation with San Joaquin County and the USDA.