Field Notes
San Joaquin County
May 2021

University of California
Agriculture and Natural Resources

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Drought and Livestock

The 2020-2021 year has been mentioned as being worse than the drought in 1976. I can definitely agree that it is worse than 2015, which was bad. As you make the hard decisions on how you will weather this current storm, below is information on tax implications to consider from California Cattlemen's Association and information on feeding the animals that you do keep.

The postponement of capital gains for certain classes of livestock liquidated due to drought is governed by 26 U.S.C. § 1033(e), which provides that "the sale or exchange of livestock (other than poultry) held by a taxpayer for draft, breeding, or dairy purposes in excess of the number the taxpayer would sell if he followed his usual business practices shall be treated as an involuntary conversion to which this section applies if such livestock are sold or exchanged by the taxpayer solely on account of drought, flood, or other weather-related conditions."

IRS Notice 2020-74, which was issued on September 22, 2020 (and explained in plainer language at https://bit.ly/3udH9EB), provides guidance regarding the application of section 1033(e). Importantly, it lists in an Appendix (pages 4-5) the California counties which have qualifying drought designations for purposes of the postponement of capital gains taxes. San Joaquin County is on the list, and Stanislaus County will qualify as a contiguous county.

Be sure to talk to your tax accountant about your decision to sell cattle. If you or your accountant have any questions, Notice 2020-74 does include contact information for the individual who authored the notice, and he may be able to provide you with additional clarification: Lewis Saideman of the Office of Associate Chief Counsel (Income Tax & Accounting), (202) 317-7006.

Everyone knows the saying "You can't feed your way out of a drought." Luckily living in California, there are more creative options that should be cheaper than buying replacement hay to help you through this spring and summer if need be. With the diversity of agriculture in the valley, there is potential for many "by-product" feeds. Almond hulls are still a popular option, are easy to store and easy to feed. There might be some other by-products you can find locally to provide the needed roughage for ruminants and then supplement with small amounts of concentrates for the quality. Rice straw has increased palatability and nutrient availability with changes in baling methods, making it a possibility to feed cattle. Distiller's grain, brewer's grain, any type of pomace, and cull fruits and vegetables can all be options for feeding cattle.

When deciding what to feed, look at the cost based on what you are supplementing, not just the total pounds. Water weight is not cheap to ship long distances. Something might look cheaper, but when you compare "apples to apples" the more expensive feed might actually be the cheaper thing to meet your animal's requirements. When you do start to feed supplements, remember to go slowly so as not to upset the rumen microbes with fast shifts in diet. As much as you can, try to stick with one roughage, and do not change every week if possible.

Some by-products will also be more challenging to store and feed and might have a higher freight cost per pound of nutrients based on water content. Research has shown that feeding concentrate energy supplements one to three times a week had similar effect as feeding supplements daily, which might be easier on labor. Another often overlooked diet aspect during drought is Vitamin A deficiency. Vitamin A is provided by all the green forages cattle are normally grazing on at this time of the year and is stored in the liver. Now that we are adding 2-3 months of dry grass to their diet, you may want to talk to your vet to ensure adequate levels. Deficiencies can lead to abortions or affect the fetus and calves more than the cow. Vitamin A does not last long when exposed to sunlight, so an injectable might be a better option.

Once we have put this year behind us, if you have not already, consider putting together a written plan for the next drought. One will always be just around the corner. Your plan may include how hard do you cull and what factors do you use besides an open animal. Having your plan written down and agreed upon by everyone will make it easier to do.

Theresa Becchetti, Livestock and Natural Resources Advisor, Stanislaus and San Joaquin counties

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Summary of Agronomic Crops Production Survey

Last summer, I reached out to those of you on my email and blog subscriptions about an online survey that UCCE was conducting. (See https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=43148.) The purpose of the survey was to receive your input on the most important issues in agronomic crops production. We hoped to learn how UCCE could best address those issues through research and outreach. The survey was sent over email and open for responses for about a month and a half. It was sent to growers, consultants (i.e. PCAs, CCAs), and allied industry professionals statewide. In the end, we received 483 responses, of which 89 were from San Joaquin County, and 63 were from Sacramento County. San Joaquin County had the highest number of respondents among counties – followed by Fresno, Colusa, and Kern counties – so **many thanks** to those of you who were able to fill out the survey. In San Joaquin County, 19 respondents were growers, 29 were consultants, and the rest described themselves as allied industry. In Sacramento County, 10 respondents were growers, 12 were consultants, and the rest were from allied industry. Respondents received slightly different questions depending on their job category.

We asked growers to estimate, in a given year, what percentage of the land they farmed was in field crops, vegetable crops, and trees and vines. In San Joaquin County, the average response was 45 percent in field crops, 10 percent in vegetables, 39 percent in trees and vines, and 7 percent in an "other" category, like pasture or nursery crops. In Sacramento County, the responses averaged 70 percent in field crops, 4 percent in vegetables, 24 percent in trees and vines, and 2 percent in "other." Among consultants in both counties, their average time consulting was 39 percent in field crops, 8 percent in vegetables, 49 percent in trees and vines, and 4 percent in "other."

Combining the data for both counties, grower respondents indicated that of their total farmed acreage, roughly 84% is irrigated and 58% is owned versus leased. Growers identified their top acreage field crops over the last three years as alfalfa, dry beans, grain corn, silage corn, small grains forage hay, and wheat. For those crops, growers identified top production challenges and primary reasons for growing them (Table 1). Additionally, growers identified factors affecting their management decisions. Some of the issues that were identified as "always" or "often" affecting management decisions, and the percent of growers responding with that issue were as follows: crop yield (100%), profitability (96%), crop quality (92%), certainty that a management practice will work (88%), soil fertility (84%), availability of water (81%), ease of implementation (81%), and land stewardship (77%).

We also asked respondents about how they engage with UCCE and how they prefer to receive information. The percent of all respondents from the two counties who answered "very valuable" to the following services were as follows: crop diagnosis (77%), continuing education credits at meetings (72%), on-farm trials (71%), and on-farm consultations (52%). The percent of respondents engaging with UCCE *at least* 1-2 times per year were as follows: read a newsletter (95%), attended a field day (89%), read a blog (88%), called a farm advisor for a farm call (66%), engaged over social media (41%). The type of information that respondents want to receive from UCCE include on-farm trial results, cost of production information, and decision support tools, among others. In terms of how respondents prefer to receive information from UCCE, there was overwhelming interest in the following methods: websites, in-person meetings (i.e. field days, grower meetings), newsletters, and fact sheets. These methods were supported regardless of how the respondents categorized their vocation (i.e. grower, consultant, or allied industry).

In addition to learning from you what are the challenges in agronomic crops production, we were also interested in learning how we could respond to those challenges with research and extension. Table 2 (pg. 3) illustrates how respondents (all vocations combined) prioritize agronomic crops production topics for UCCE research and extension programming. What was enlightening, albeit a bit sobering, were the responses to the open-ended question, "Do you have ideas for applied research or extension that you would like to see tested?" Example responses included how to manage limited water on alfalfa, how to improve leaf retention during alfalfa harvest, how to use liquid manure in subsurface drip irrigation systems, research on soil amendments for modifying pH

Table 1. Highest priority management challenges and primary reasons for growing the top acreage agronomic crops identified by San Joaquin and Sacramento County growers. The top challenges and top reasons are followed by the percent of growers who identified the categories.

Crop	Top management challenge	Primary reason for growing
Alfalfa	Irrigation and water management (21%), Insect pest management (21%)	Profitability (19%), Crop rotation benefits (19%), Crop is traditionally grown on the farm (19%)
Dry beans	Insect pest management (26%)	Crop rotation benefits (33%)
Grain corn	Nutrient management (21%)	Crop is traditionally grown on the farm (21%)
Silage corn	Nutrient management (20%)	Crop rotation benefits (40%)
Small grains forage hay	Weed control (23%)	Crop rotation benefits (27%)
Wheat	Irrigation and water management (22%), Weed control (22%)	Crop rotation benefits (21%), Capacity for deficit irrigation or fallowing (21%)

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Table 2. Ratings of priority for UCCE research and extension programming as percent of total respondents from San Joaquin and Sacramento counties.

Agronomic Crop Production Topic	High Priority	Medium Priority	Low Priority	No Opinion
Irrigation Management/Crop water requirements	58%	37%	3%	2%
Water Conservation and Storage	45%	39%	13%	2%
Nutrient Management (fertilizer application rates, timing, methods, etc.)	67%	29%	4%	0%
Salinity Management	38%	40%	19%	3%
Soil Health Management (ex. conservation tillage, crop rotation)	48%	34%	16%	1%
Cover Crops	31%	41%	23%	4%
Weed Control	45%	38%	13%	3%
Insect Pest Control	61%	30%	8%	1%
Disease Control	62%	28%	9%	1%
Manure Management	15%	45%	29%	11%
Compost Management	13%	42%	36%	8%
Crop Establishment	36%	37%	22%	5%
Variety Testing	47%	33%	15%	5%
Harvest/Postharvest	34%	35%	29%	3%
Emerging Crops (e.g. hemp)	22%	51%	23%	4%
Testing new products (pesticides, herbicides, biostimulants etc.)	59%	32%	8%	1%
Niche marketing of field crops	19%	39%	36%	5%
Greenhouse Gas Emissions Reduction	19%	26%	47%	8%
Organic Production	14%	38%	42%	6%

and micronutrients, salinity and leaching, how to build soil organic matter, more variety evaluations, pest management studies particularly in alfalfa and dry beans, and research on Delta rice production, among others. It is a sobering list because it illustrates the numerous and complex needs for research and outreach. We will use these results to direct our programming and to advocate for the hiring of more farm advisors to work on these topics. We recognize that a limitation in our survey method was that we targeted people who are already connected with UCCE. We will continue to work on extending our offerings to those who are not yet connected with us.

In summary, I want to thank everyone who was able to participate in this survey. Your feedback is valuable, and we will use it to shape local and statewide UCCE programming in agronomic crops. Of course, your feedback is always appreciated, regardless of whether there is a survey circulating or not! Please never hesitate to reach out to me with comments, questions, or observations from the field.

Michelle Leinfelder-Miles, Delta Farm Advisor

Vegetable Crops Update

Chemigation and fumigation trials for Fusarium wilt and *Fusarium falciforme*

In the past several years, we have been collaborating with the Swett lab (UC Davis Plant Pathology Dept.) and with chemical manufacturers to look at the efficacy of several products to reduce losses due to Fusarium wilt and *Fusarium falciforme* in processing tomatoes. We recognize that chemical control should not be considered the first line of defense against these diseases, but rather the focus should be on resistant and/or tolerant tomato varieties and avoiding infested fields when feasible. However, in situations where resistant or tolerant varieties are not an option, or when the disease tolerance is not sufficiently high, chemical control might be an option to consider. Often, multiple disease management approaches may be necessary, as one alone may not be sufficient – particularly where we are lacking resistant varieties, as is the case with *Fusarium falciforme*. In these trials, we are applying metam potassium (K-Pam) via the buried drip tape at least three weeks prior to transplanting. The fungicides were applied at planting (either via drip or drench depending on the trial) and then commonly applied again at three or five weeks after transplanting. While we followed disease incidence over the course of the season (Figure 1, pg. 5), our primary interest was in evaluating the yield outcome. This is because we know that we are not going to eliminate disease with these treatments. The goal is to delay the onset of disease, hopefully giving the plant more time to set, size and ripen fruit.

Over numerous field trials in commercial production

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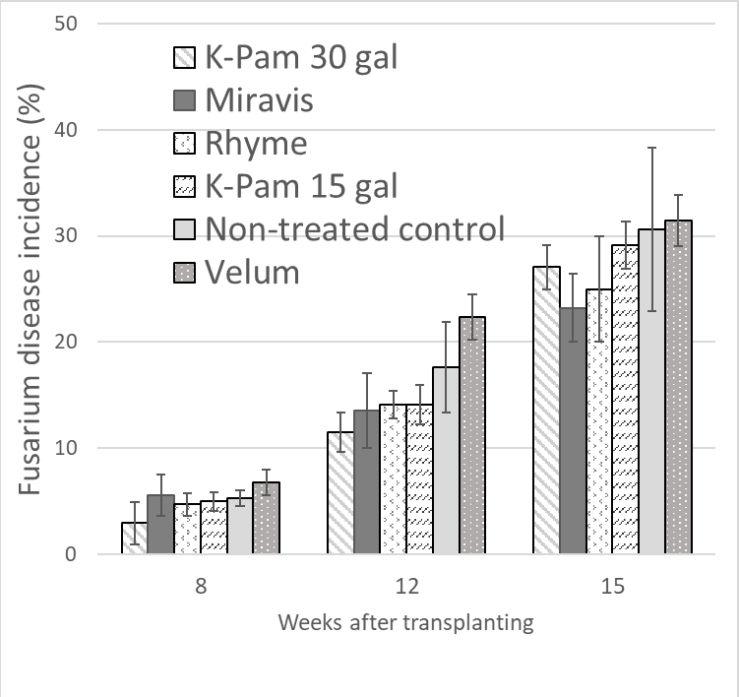

Figure 1. Fusarium disease incidence in plots treated with fumigants or fungicides. The field had both Fusarium wilt and *Fusarium falciforme*.

fields from 2017 through 2020, the average yield effect of K-Pam drip fumigation was 7.7 tons per acre. The locations had varying disease pressure as well as varying rates of K-Pam (ranging from 15 to 40 gallons per acre). In my local trials, the yield increase at two locations over two years has been 9 tons per acre (2020 trial in Figure 2).

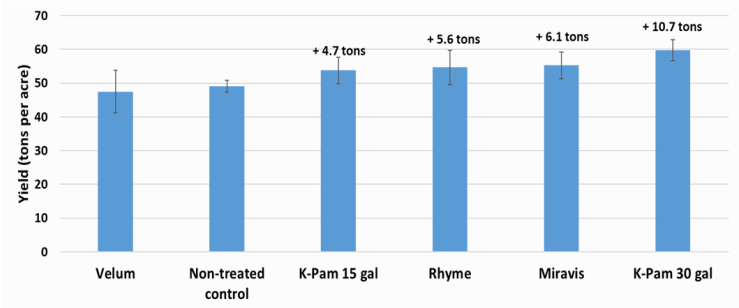

Figure 2. Impact of pre-plant drip fumigation (K-Pam) or early season fungicide chemigation on yield of processing tomato, 2020 field trial in San Joaquin County. The field had both Fusarium wilt and *Fusarium falciforme*.

If we use an average increase of 8 tons, and assume a commodity price of $80 per ton, then the economic advantage of the fumigation is $640. As the costs of fumigation are around $150 to $400 per acre (depending on rate and other factors), then we can conclude that on average, in fields with soilborne disease pressure, the costs of drip fumigation are likely to be repaid in increased yield.

Does metam kill the soil microbial community? It is a common misconception that metam fumigation kills all life in the soil. Research at other universities has shown that soil microbiological activity rebounds rather quickly, although of course there may be shifts in the makeup of the microbial community. It is important to remember that K-Pam is a restricted use pesticide that must be used with the upmost care to protect workers, neighbors and the environment. It should only be handled by properly trained personnel. Always follow the label and observe permit conditions laid out by the county agricultural commissioner.

Fusarium wilt and root knot nematode occurring together

We are very interested to hear about any tomato fields that might have both Fusarium wilt and root knot nematodes. We have a new study, funded by CTRI, which is looking at interaction between these two pests – and would be interested to see fields and take samples. Unsure if you have both? Not a problem, we can take a look anyway.

Tomato Spotted Wilt Virus – tomatoes and peppers

TSWV that has overcome the host resistance which was bred into processing and fresh market tomatoes has been causing problems further south in the Central Valley for five years now. We have not, to date, seen any problems in San Joaquin County with resistance-breaking strains. However, we would be interested in hearing about any observations of spotted wilt problems in resistant varieties (tomatoes or peppers). Note that it is normal to see a few symptomatic plants even in a resistant variety, but if you observe more than 1% of plants showing symptoms, then please let us know.

Onion bacterial diseases (bacterial blight and bulb rots)

Research continues on bacteria causing disease in onions. As part of our national survey to determine which bacteria are responsible for causing disease in onions in the different regions, we need your help. Please alert us to any onions showing signs of bacterial leaf blight or neck or bulb rot. Not sure if your onion disease problem is fungal or bacterial? Check out a video "How to Diagnose Onion Bacterial Bulb Rot" made by Christy Hoepting at Cornell University https://www.youtube.com/watch?v=FpmGHBUezVc. Still not sure? We will take samples and determine the cause.

Brenna Aegerter, Vegetable Crops Farm Advisor

Nitrogen Efficiency in Almond Production

Nitrogen (N) is the most important element we apply to our fruit trees. Almond growth and productivity depend on the availability of adequate N. Most fertilizer recommendations are based on making N available to our trees so that a shortage does not limit tree growth or productivity. Unfortunately, a report commissioned by the State Water Resources Control Board showed that many of our wells are contaminated with excess N, and that agricultural fertilizers and dairy waste are the most likely source (http://groundwaternitrate.ucdavis.edu/). Efficient N management will become increasing important in the future as we collectively try to reduce groundwater contamination while keeping our orchards productive. Nitrogen usage should be based on an individual orchard's cropping history and leaf and water analysis to determine N availability and potential sources. Dr. Patrick Brown, a

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UC Davis professor, just released Nitrogen Best Management Practices with the Almond Board of California at http://Almonds.com/. Other references include N usage in chapter 27 of the UC Almond Production Manual #3364 and the interactive "Nitrogen Fertilization Recommendation for Almond" model at http://fruitsandnuts.ucdavis.edu/index.cfm. This model can be used to calculate both the timing and rate of fertilizer applications required to maintain optimum yield. Site specific information is required in order to accurately project the N requirement for orchards.

A removal and replacement rate of 68 lb N per 1000 pounds of kernel meat yield is suggested by Dr. Brown when estimating annual N demand. Dr. Brown's research effort, near Belridge in Kern County, determined more accurately N use in almond. In the study, applications of 275 lb fertilizer N produced 3,500-4,500 pounds of Nonpareil nut meats/acre in 2009-2011. A higher rate of 350 lb N/acre/year did not produce more nuts than the 275 lb N rate. Lower rates of 125 and 200 lb N/acre/year produced good yields but significantly less than the 275 lb N/acre/year rate. Dr. Brown carefully points out that you can't expect to increase yields by increasing N application rates, but nitrogen applications should replace the N removed in the previous season's crop.

Some groundwater has elevated N levels, and you should take into consideration any N found in well water in developing your fertilization program. Several years ago the well water at my family's farm tested at 50 ppm nitrate (NO_3^-). If I applied 3-acre feet of this water per season, I would apply approximately 92 lb N per acre. This amount can be determined by multiplying mg/l or ppm of NO_3^- by 0.61 to get pounds of actual N per acre-foot of water (Figure 27.2 UC pub #3364). If the lab analysis reports N levels in nitrate-nitrogen (NO_3-N), then multiply the NO_3-N value by 2.72 to get pounds of actual N per acre-foot of water. For example, if your orchard produced 3,500 pounds of kernel meats last year, you would determine that 210 pounds of N was removed with the crop and needs to be replaced. If your irrigation water has 50 ppm NO_3^-, then you may only need to apply 118 pounds of N per acre to your orchard (210 lb orchard N minus 92 pounds found in the water).

Mature trees need more N in early spring during periods of active shoot growth, leaf activity, and photosynthesis when temperatures are between 70-80°F. Shoot growth is vital for canopy development and for the creation of fruiting positions (buds). Almond nuts and shoots use most of the season's N (80% of annual demand) between bloom and mid-June. Dr. Brown's group recommends delivering fertilizer N at four different timings and amounts throughout the season – February or March (20% of total annual N input), April (30%), June (30%) and September - October (20%). Nitrogen use efficiency has increased dramatically (75-85%) in Dr. Brown's studies where N is applied at the time of peak tree demand and uptake. I know many growers that "spoon feed" their trees with small injections of N and other liquid fertilizers into their irrigation systems. I would prefer to see you add a little bit of N with every irrigation from March to July, rather than applying large doses periodically through the season. (We prefer three small meals a day over one big one.) Fertigation delivers fertilizer to active roots. It is important that irrigation deliver only needed water because excess water could dilute or leach the N past the root zone. In orchards with flood or solid set sprinkler irrigation systems, the N should be applied down the tree rows and not broadcast down the row middles. Dormant winter applications of N should be avoided, as well as applications during hull split (July), which can aggravate hull rot and delay harvest. Deciduous almond trees absorb no N between leaf drop and leaf out.

I have seen many young trees burned by too much N, especially if liquid fertilizers like UN-32 (urea ammonium nitrate 32 %) or CAN 17 (a clear solution of calcium nitrate and ammonium nitrate) are used in single applications. These liquid fertilizers are very effective and easy to use, but it doesn't take much to burn young trees. I do not recommend using liquid fertilizers on first leaf trees. I prefer to see triple 15 (15% Nitrogen - 15% Phosphorous - 15 % Potassium) fertilizers used on first leaf trees. I like to see granular fertilizers placed at least 18 inches from the trunk. With micro-sprinkler and drip irrigation systems, liquid N fertilizers can be used very efficiently and easily by growers, but be careful. I know several farm managers who will not allow more than 10 gallons of UN-32 per acre per application on mature almond trees. UN-32 contains 3.54 pounds of actual N per gallon. If you put out 10 gallons of UN-32 per acre, you add 35.4 lb of N per acre. If you have 120 trees per acre and do the math, you come up with 4.72 ounces of actual N per tree – almost 5 ounces! I recommend not applying higher rates than this per application. I have seen N burn occur more often during hot summer temperatures when trees have elevated transpiration rates and obviously faster N uptake rates than what would have occurred at a cooler time of the year.

David Doll, The Almond Doctor, conducted a nice trial to more accurately determine the nitrogen demand for first leaf almond trees. David compared controlled release with standard fertilizers. David initially found that 20-30 pounds of N per acre delivered optimal growth. This translated to about 4 ounces of actual N per tree in the first year (ideally spread among four applications). David also found that 120-day controlled release fertilizer performed as well as conventional fertilizer applied monthly from April to September. See more details under the http://thealmonddoctor.com/.

Young almond trees don't require as much N as older trees. I like Wilbur Reil's (UC Farm Advisor Emeritus) rule of "one ounce of actual N per year of age of tree for the first five years." That rate can be applied several times per season but never more than that at any one application. Thus, a first leaf (first year in your orchard) almond tree should not receive more than one ounce of actual N per application. A five-year old almond tree should not receive more than 5 ounces of actual N per one application. If you want to apply five ounces of actual N per one-year old tree, do so in five applications and not all at once!

I have been working with many growers who are recycling first-generation almond orchards, incorporating the wood chips back into the soil, before replanting second generation almond trees. We have incorporated as much as 60-75 tons per acre of wood chips. In some of these recycled orchards, we noticed weed suppression and reduced shoot growth in second-generation trees, even after fumigating. We realized that we were not applying enough N to counter all the carbon we applied in the form of wood chips.

We hypothesized that we might be able to use less N more efficiently if we applied it earlier in the growing season or at planting time. In our 2019 whole or-

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chard recycling (WOR) trial at the Kearney Research and Extension Center, 75 tons of wood chips per acre were recycled. We applied ¼ ounce of N in the form of triple 15 at planting time, and again every two weeks with each irrigation from April through June. Then we fertigated with one ounce of actual N per tree per month from July to September with UAN32. We used button emitters, rather than drip irrigation, so that we only applied water and fertilizer at each tree site. We ended up applying 5 total ounces of N per tree or 46.6 lbs. N per acre. For the first time in our research trials, we observed a significant increase in trunk diameters from trees growing after WOR when compared to control trees growing where the previous orchard was not recycled and given the same amount of N and phosphorous their first season (Figure 1).

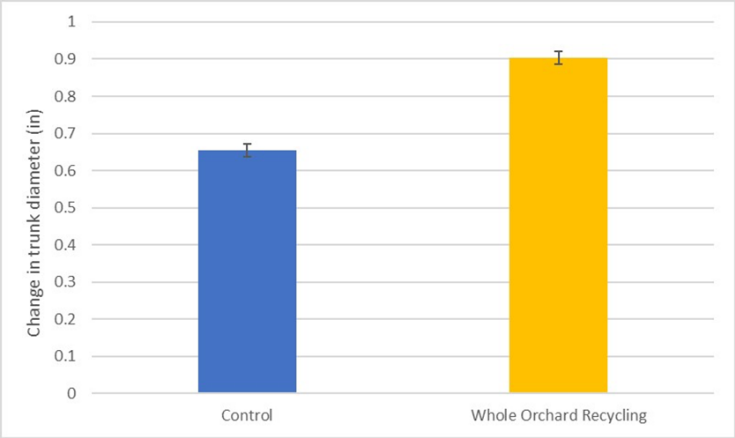

Figure 1. Change in trunk diameter of first year almond trees fertilized at planting and given the same amount of N.

We are continuing to study early N and irrigation efficiency in more detail, but at this point in our studies, we would recommend to growers that they apply 5 ounces of actual N per tree (45-50 lb. N/acre) in the first year of tree growth following WOR. Early applications, starting at planting time, are more important than applications later in the season. Remember that N applications should be spread out so that no more than one ounce of actual N is applied per tree per application in the first year of tree growth in order to prevent N burn. Another advantage of using granular fertilizer applications early in the season is that some growers have applied too much water too early in the season in order to deliver the desired amount of N and have experienced Phytophthora Root and Crown Rot infections.

Brent Holtz, Farm Advisor and County Director

Autumn Freeze Damage in San Joaquin and Stanislaus County Walnuts: November 2020

Over the last three years, we have received several calls from walnut growers in the Sacramento and northern San Joaquin Valleys reporting widespread dieback observed in both young and mature orchards during the spring. In most cases, we suspected autumn freeze to be the major cause of those dieback symptoms. We usually try to differentiate between injury during the growing season, which is referred to as frost injury and the freeze damage that occurs in late fall or winter. The term frost injury is restricted to damage due to freezing temperatures during the growing season while the tree is not dormant, which is due to a late spring frost. This was not the case for the past three years, based on our farm calls and minimum air temperature data (°F) collected from CIMIS stations located near affected walnut orchards. Figure 1 shows the minimum air temperature data (°F) collected from the CIMIS station located in Manteca, CA for select late fall and winter months of 2018 through 2021.

In mid-November 2018, sudden minimum temperatures were low (ranging from 26.4ºF to 29.8ºF) in some locations, causing damage in young vigorous orchards as well as in mature orchards. The damage observed was not as widespread compared to what we are seeing this year, which may be due in some ways to the rains that occurred after the 9 to 10-day freeze event (Figure 2, pg. 7).

Fortunately, we went through the 2019 winter with little stress to young/mature walnut orchards, since temperatures were warm enough to protect these trees. You can notice how much wetter the weather was during the end of November and December of 2019 compared to November and December of 2020 (Figures 1 and 2, pg. 7).

This year, from mid to late April, we received several calls reporting severe dieback/not leafing out symptoms in large areas of walnut orchards in San Joaquin and Stanislaus counties. Symptoms were observed in newly planted orchards, young vigorous orchards, as well as mature orchards, including Chandler, Howard, Tulare, Serr and Solano cultivars (Figures 3 and 4, pg. 8).

Why was the freeze damage so severe in some locations/areas this year?

To face the November and early December freeze events, walnut trees must harden by developing processes of resistance to cold and frost. We believe that the acclimation to temperatures below freezing results from exposure to the gradual decline in temperatures, which allow trees to gradually lower the freezing point of their cells in order not to be damaged under the freezing effect. It is a very complex process: once the temperature slowly begins to drop, the trees synthesize enzymes that will break down the starch (large sugar molecules) – made by photosynthesis and stored in summer in the bark and the wood – in smaller soluble sugars with higher anti-freeze activity, which protect against ice formation in tree cells.

This was not the case with the significant temperature fluctuation we faced during November and early December of 2020. Starting with a first freeze event on November 9th and 10th which followed a period of temperatures ranging from 37 to 44°F during the first eight days of November – at least allowing the trees to harden off a little but not enough. Then, we noticed that the temperatures rose over the next ten days (ranging from 30 to 50°F), then relapsed again below freezing for a few hours early in the morning of the 21st and 22nd, and the last four days of the month. Temperatures continued to fluctuate during the first nine days of December (Figure 1, pg. 7).

These temperature fluctuations pose a serious threat, especially for young vigorous walnut trees during the winter. Sudden temperature drops place high amounts

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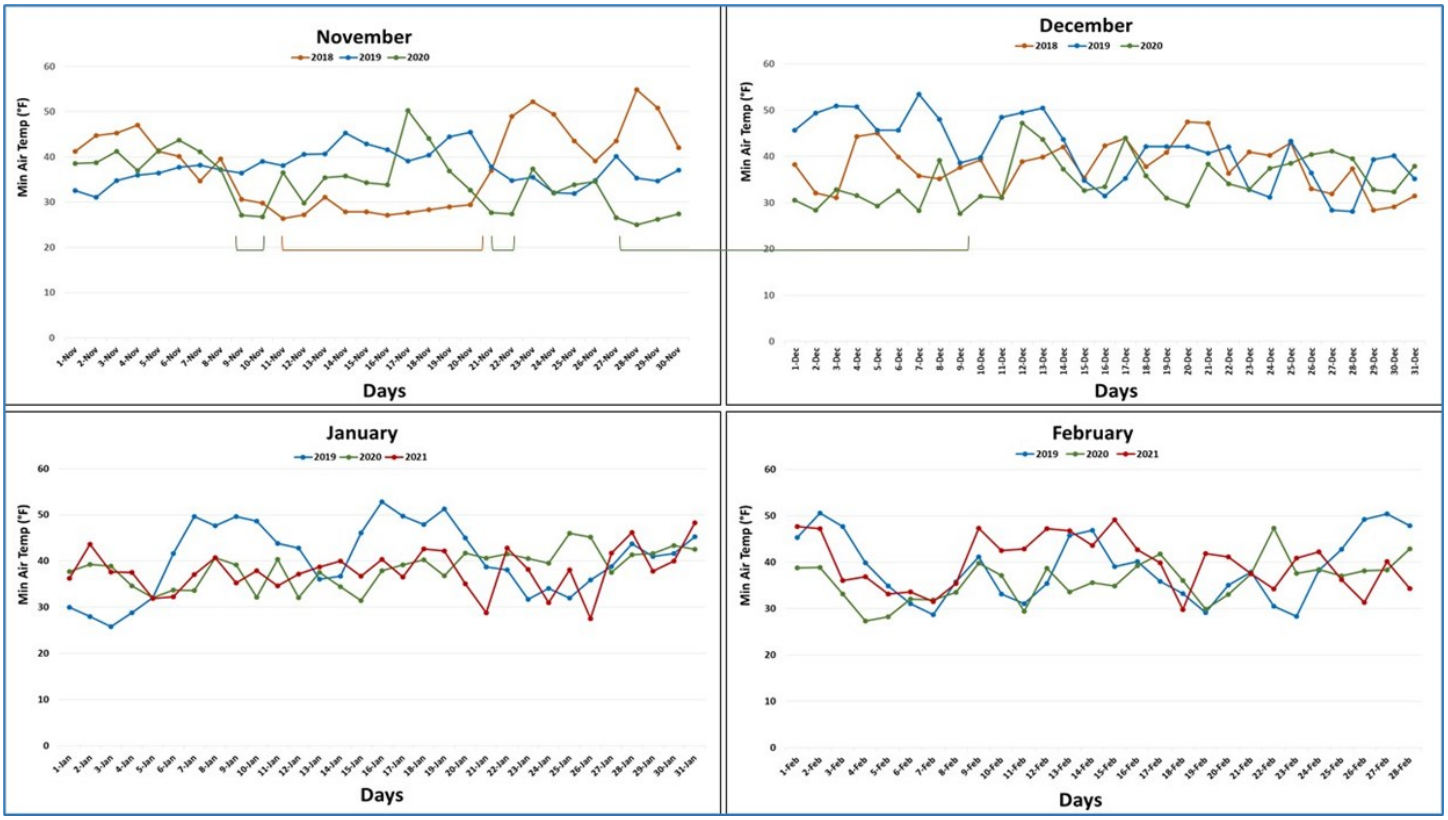

Figure 1. Minimum air temperatures data (°F) collected from the CIMIS station located in Manteca CA, for select late fall and winter months of 2018 through 2021.

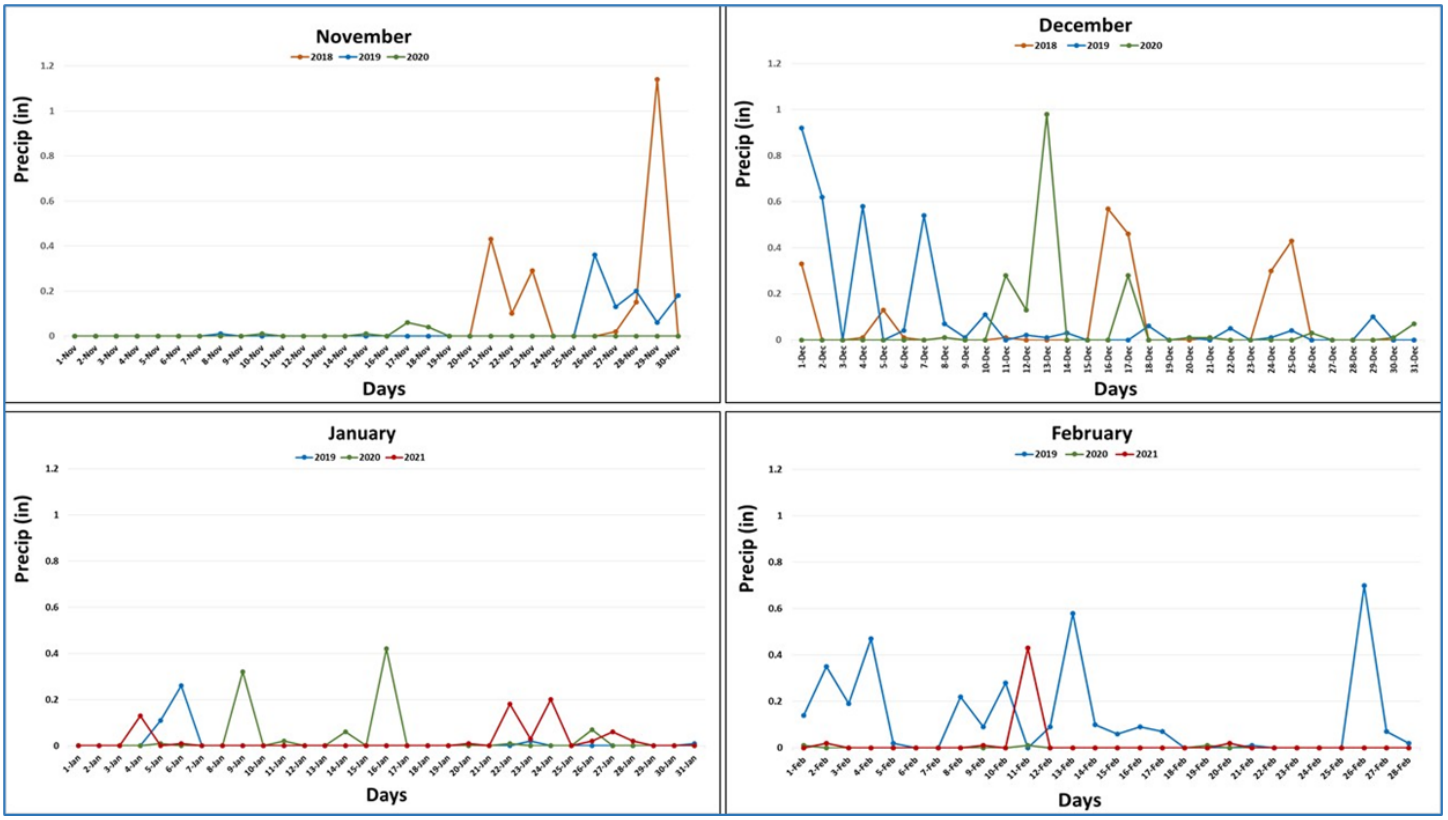

Figure 2. Precipitation data (in.) collected from the CIMIS station located in Manteca CA, for select late fall and winter months of 2018 through 2021.

Figure 3. Freeze damage in young walnut trees produces bark discoloration in the wood. Affected branches or trees dehydrate mainly from the top and show tip dieback.

of stress on trees, the effects of which are much worse when followed by mild and dry weather.

Symptoms observed

The severity of symptoms is variable across and within orchard blocks. Significant damage can be observed in young vigorous orchards. Tip dieback (Figure 3) occurs with many branches in affected trees still green or partially green and not leafing out (Figures 4, above and 5, pg. 9). Damage beneath the bark appears as brown discoloration. Based on our preliminary observation, we noticed that orchards irrigated in late October to early November showed less damage compared to those irrigated early to mid -October. More information should be gathered for the irrigation practices and other practices prior to the November-December freeze event from these severely affected orchards.

We are in the process of developing a survey in collaboration with other Farm Advisors and PCAs in counties showing severe freeze damage. It will help us identify the factors that have contributed to the freeze damage this year and how we can mitigate their future impact.

Recommended cultural operations to manage freeze damaged trees/orchards:

For young vigorous trees as well as mature trees, the damage in some tree branches/limbs looks dramatic, but the survival of these tree parts depends more on whether they are still green/alive.

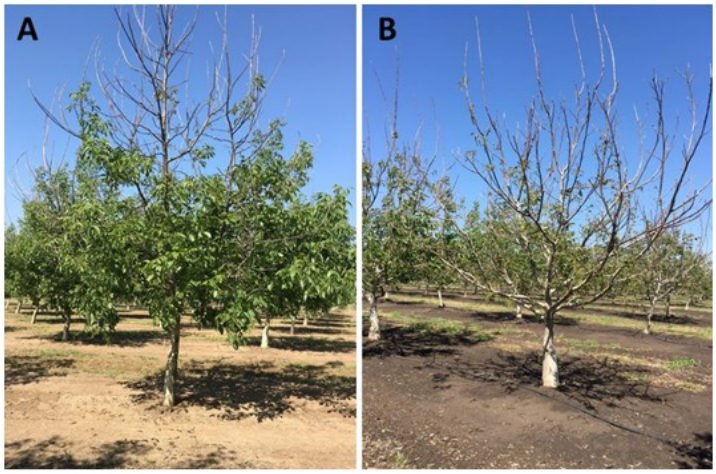

Figure 4. Freeze damaged in A. 9th leaf Solano, and B. 9th leaf Chandler.

- Do NOT prune out damaged limbs now. Buds may be slow to break or may fail to completely break, and adventitious buds may emerge from under the bark. Prune out the dead wood that did not revive at the time of pre- or post-harvest. Formed new shoots can be trained to replace the damaged wood.
- To help prevent further damage from sunburn, exposed larger limbs/branches (southwest facing area) can be painted with tree paint or white latex paint diluted 1:1 with water.
- Orchards/blocks severely affected by the freeze will have lower overall growth with an expected yield reduction, which will reduce nitrogen (N) requirements. Much of the N demand comes from the crop, and hence N must be reduced. Make fertilizer decisions based on current soil reports and leaf analysis.
- Less leaf surface area results in reduced water loss (less transpiration). Monitor your orchard carefully, and schedule irrigation using a pressure chamber and/or soil moisture measuring devices through the season. By using the pressure chamber, you directly measure the level of water stress your trees are experiencing because it measures the plant and not the soil. Start your irrigation when pressure chamber readings are 2 to 3 bars below baseline.

Newly planted trees showing dieback symptoms due to freeze damage are more vulnerable than older trees. The lack of foliage will provide a prime target for Flathead Borer and more sunburn damage.

- With enough healthy shoots left on the tree, cutting below the damaged tissue would help the tree rejuvenate and should not be an issue at this point (Figure 6, pg. 9).
- If there are not enough leaves, damaged tissue that was not painted with a white-wash (December/January) after the freeze events should be painted now to protect against further sunburn damage and/or borer.

Continued on page 9

How to prepare and protect trees from future freeze damage?

There are additional steps you can take to prepare for freeze events.

- Trees should enter the fall months as healthy as possible, but growth should be reduced. Cutting back some irrigation in September and no N applications after August could help slow down growth and may help the trees harden off before a sudden freeze event comes along.
- For young trees, stop irrigating in September to set the terminal bud on the trunk to harden the trees. Then resume irrigation to avoid tree stress.
- A dry fall could make freeze damage worse. If there is not enough rain by the end of harvest, irrigate walnut orchards so the soil is moist in November.
- To keep orchards slightly warmer, it is advisable to run the irrigation system a few days before an expected freeze event to ensure the soil surface is moist and help the soil store a little more heat in advance during sunny days. This will also ensure trees are hydrated enough before the freeze occurs. Moist soil absorbs more solar radiation than dry soil and will re-emit heat overnight.

Mohamed T. Nouri, UCCE Orchard Systems Advisor, San Joaquin County
Kari Arnold, UCCE Orchard and Vineyard Systems Advisor, Stanislaus County

Figure 5. Freeze damaged in 9th leaf Solano. Severity of symptoms is variable across and within orchard blocks (damage beneath the bark appears as brown discoloration).

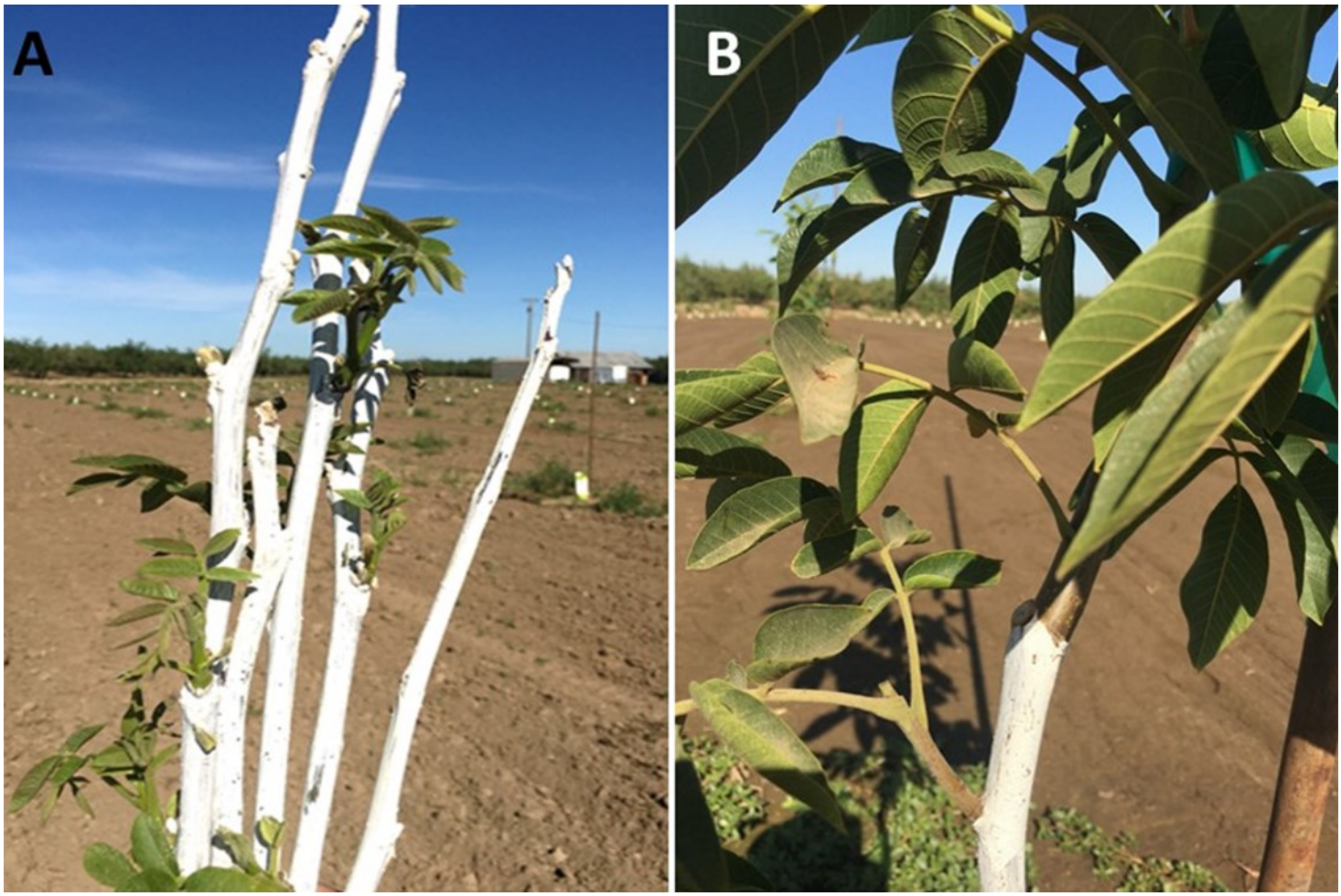

Figure 6. Freeze damage in 2nd leaf Chandler A. Pruned below the damaged tissue on April 30, 2020, and B. Picture taken on July 30, 2020 showing tree recovery.

Announcements / Calendar of Events

UC Davis Small Grains and Alfalfa/ Forages (Virtual) Field Day

Wednesday, May 12, 2021
1:00pm – 4:30pm
See attached flyer for agenda and log-in information.
Contact: Michelle Leinfelder-Miles, 209-953-6100, mmleinfeldermiles@ucanr.edu

Weed Management for Small Acreages

Tuesday, May 25, 2021
6:00pm – 7:30pm
Register at http://ucanr.edu/weed-webinar

Virtual Range Camp for high school kids

June 21-25, 2021
For more information, visit https://ucanr.edu/sites/rangecamp/.

Irrigation scientists are seeking your help

A survey has been designed about surface (a.k.a. gravity or flood) irrigated croplands, including those under furrows, borders, or basins. Surface irrigation plays an important role in supplying food, feed, and fiber demands in the US, but has received much less attention in recent decades compared to sprinkler and drip irrigation methods. Information from this survey will be used to guide researchers, extension specialists, and county agents and advisors at land-grant universities in designing and developing their future educational and outreach projects to better serve farmers with managing surface irrigation systems.

This survey does *NOT* ask or record any private or personal identifier information. *NO* individual response will be shared. All responses will remain anonymous. Summaries of responses will be shared through extension events and outreach venues, such as university field days, workshops, social media, crop schools, and various other events in the near future. The survey is 21 questions in length and will take an estimated 15 minutes to complete. You may choose to discontinue participation at any time. The survey will close at the end of May, so please consider submitting by then.

Thank you for your assistance. Here is the link to the online version of the survey: https://okstate.az1.qualtrics.com/jfe/form/SV_bKkAylDYCzXqKWN

Are you interested in learning more about Nitrogen Management?

Are you a Certified Crop Advisor 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?

Registration for the brand new UC Nitrogen Management course is now open at

http://ucanr.edu/NitrogenCourse

The UC Nitrogen Course is taught online through a video series delivered by UC Researchers and Extension Specialists. Each module is eligible for Certified Crop Advisor (CCA) continuing education units (CEUs).

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 (ASA) for the new California Nitrogen Management Specialty Exam.

The 7-part video series starts Monday May 10th.

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 (https://ucanr.edu/sites/NitrogenCourse/FAQ/)

University of California Small Grains - Alfalfa/Forages Virtual Field Day

Sponsored by California Crop Improvement Association (CCIA)
University of California, Davis (UCD), and UC Agriculture and Natural Resources (ANR)

Wednesday, May 12, 2021, 1 PM – 4:30PM
Join the meeting on ZOOM at this link. PASSWORD: Alfalfa
(https://ucanr.zoom.us/j/91985979366?pwd=OUFrNnNRWXNNYTRmTTVya2lSSWlNZz09#success)

CEUs available: PCA (1.25 pending); CCA (2.5 pending).
Pre-registration for the meeting is required to receive CEUs. No charge to attend.
REGISTER HERE (or https://ucanr.edu/survey/survey.cfm?surveynumber=33716)

1:00 Welcome and opening remarks: John Palmer Executive Director, CCIA

1:05-2:45 UC small grain breeding, variety evaluations, agronomic research and extension

1:05 Update from the California Wheat Commission: Claudia Carter, Executive Director California Wheat Commission
1:10 UC Wheat Breeding Update: *Jorge Dubcovsky and Oswaldo Chicaiza, UC Davis*
1:18 UC Malting Barley & Oat Breeding Update: *Alicia del Blanco, UC Davis*
1:24 Breeding Triticales for Bread and Forage: *Josh Hegarty, UC Davis*
1:30 Evaluating Small Grain Varieties for Grain Yield, Grain Quality, Stress Stability, Pest Resistance, and Biomass Productivity Potential: *Mark Lundy, UC Davis/UCCE*
1:45 Interactive Web Tools for California Small Grain Management: Soil nitrate quick test; California weather; Nitrogen Fertilizer Management Tool; Seeding rate calculator: *Taylor Nelsen and Mark Lundy, UC Davis/UCCE*
2:00 Case Study: Using N-rich Reference Zones to Guide N Fertilizer Management for Irrigated Triticale in the San Joaquin Valley: *Nicholas Clark, UCCE*
2:20 Above and Belowground Productivity of Perennial Wheatgrass (Kernza) Compared to Tilled and No-till Annual Wheat: *Kalyn Diederich, UC Davis*
2:30 Evaluating Biosolid Fertilizers in Sacramento Valley Small Grain Crops: *Konrad Mathesius, UC Cooperative Extension*

2:45 – 4:30 UC Alfalfa & Forage Virtual Field Day

2:45 Weed Control During Stand Establishment: *Sarah Light, UCCE Advisor, Sutter/Yuba Counties*
2:57 Update on Weed Control Field Studies in the Intermountain Area: *Tom Getts, UCCE Advisor, Shasta County*
3:09 Importance of Resistance Management in Alfalfa: *Ian Grettenberger, Madi Hendrick, UC Davis*
3:21 Use of Drones for Insect Management: *Rachael Long, UCCE Advisor, Yolo/Solano/Sacramento*
3:33 Updated on Blue Alfalfa Aphid and Control in California: *Michael Rethwisch, UCCE Advisor, Riverside County*
3:45 Choosing Alfalfa Varieties for Insect, Nematode, and Disease Resistance and high yield: *Dan Putnam, UC Davis*
3:57 Viable Strategies for Production of Alfalfa in a Drought Year using LESA and MDI on Overhead Sprinklers: *Umair Gull, UC Davis Graduate Student*
4:09 Soil Health under Full and Deficit Irrigation Conditions: *Michelle Leinfelder-Miles, UCCE Advisor, San Joaquin and Delta Region*
4:21 Sugarcane Aphid Control in Forage Sorghum: *Nick Clark, UCCE Advisor, Kern/Fresno Counties*
4:33 Adjourn

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