Field Notes
San Joaquin County
May 2018

University of California
Agriculture and Natural Resources

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Considerations for a Successful Sorghum Silage Crop

While wet winters have caused sorghum acreage to decrease in recent years, early projections of water deliveries indicate that sorghum planting may once again be a necessity for some in 2018. We all know that sorghum is not corn, but successfully harvesting a quality sorghum crop became more complicated in 2016 with the appearance of sugarcane aphid (SCA). Below are some management practice tips that may contribute to a higher quality feedstuff this fall.

Variety Selection. Work with your seed representative and nutritionist to select a variety best suited for your milk production needs. Consider yield potential and feed quality, as well as which animals will be consuming the forage. Brown midrib (BMR) trait varieties tend to be lower yielding and may be more susceptible to sugarcane aphid (SCA), but they can have a higher relative feed quality (RFQ). See the 2017 Sorghum Forage Report for California Dairy (http://sorghum.ucanr.edu/data/files/2017%20Forage%20Sorghum%20Silage%20Trials%20Final.pdf) for more information on variety performance. For weed management programs that include a pre-emergent herbicide, select seed that has been safened. Also consider a neonicotinoid treated seed in order to have early protection from SCA for up to 40 days.

Stand Establishment. For optimum stand establishment, plant when there is adequate soil moisture and soil temperature is 60ºF. Target a plant population of 100,000 plants/acre (usually about 10 lbs seed/acre, but seed weights vary). Don't allow water stress during plant establishment, as this phase is critical for forming deep roots that make the plant more drought resilient. Control weeds which compete for water and host diseases and pests (e.g. SCA in Johnson grass).

Fertility & water relations. Nitrogen requirements for forage sorghum are 7.9 lbs N/ton at 30% dry matter. A 20-ton crop on N deficient soil will require an application of about 150 lbs N. A high yielding, adequately irrigated forage sorghum will evapotranspire about 20" of water. The crop will utilize more stored soil water when water is withheld before or after flowering, but there is significant yield loss when moisture stress is experienced before the crop flowers, probably because there is less deep-root development inhibiting the use of deeper soil water. If water is short, try to deficit irrigate after flowering.

Sorghum is tolerant of soil salinity up to 6.8 dS/m before there is a yield loss. Corn, for comparison, will tolerate 1.8 dS/m before yield loss. However, beware of potential delays in crop maturity under salinity and drought stress which can increase the opportunity time of SCA to infest the field (i.e. more insecticide treatments would be needed to protect yield).

Sugarcane Aphid Management. Why? In 2016, when comparing the nutrient composition of SCA infested samples with non-infested samples, SCA caused significant decreases in starch and non-fibrous carbohydrates (NFC), with higher crude protein, acid detergent fiber (ADF), and ash content. Talk with your seed provider or pest control advisor (PCA) to obtain neonicotinoid treated seed. Clothianidin and imidacloprid treated seed have been shown to offer protection from SCA for up to 40 days after planting, delaying the need for foliar applications of insecticide. During the season, scout for SCA starting in July or in the early vegetative stages, whichever is first, weekly until the aphid is found, then semi-weekly until the threshold is reached. The PCA or scout should look at four corners of the field away from edges or irrigation borders, and pick the bottom green leaf and top expanded leaf of 15 plants in each corner. Average the number of aphids per leaf. When 25% of plants have 50 aphids/leaf (a cluster about the size of a pinky fingernail), pull the trigger to spray.

Flupyradifurone (Sivanto Prime) is the only product registered in CA that is shown to consistently knock down and have good residual control of SCA in sorghum in research across the US. Trials are currently underway in CA to explore the efficacy of other registered and experimental materials. Foliar coverage of the insecticide is as important as the timing of the application once the insect population threshold is reached. Thus, ground applications are preferable whenever field conditions allow. If an aerial application is required, use as much water as is affordable. Based on the experiences of growers in the SJV since 2016, it would be wise to include the cost of at

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least two over the top treatments into your production budget to evaluate potential costs for the 2018 crop year.

Harvest. Prior to harvest, communicate your goals with your silage team (nutritionist, harvester, etc.). The animals consuming the sorghum silage may dictate optimal chop length, stage of maturity at harvest, etc. Generally, it is recommended to harvest when the grains ripen to the milk to soft dough stage. This is typically the optimal timing for quality and yield as the plant is virtually done adding biomass and the grains might be chewable by the cow or destructible by the chopper, making the nutrients more available to the animal. Deciding by grain color or days after planting can be deceiving since not all varieties have reddening grain, and environmental or management factors can delay maturity. If moisture content is too high at this optimal harvest stage, consider windrowing to wilt the crop before chopping and ensiling.

Take-home thoughts.

Advantages of sorghum for silage include decreased seed costs, decreased fertilizer needs, and potential for water savings. Sorghum is not corn, however, and the quality of samples in 2016 showed lower levels of starch and NFC, with higher fiber content than typical corn silages. Talk with your nutritionist to best determine how to incorporate sorghum into your feeding system.

Nicholas Clark, Farm Advisor, Kings, Tulare & Fresno counties
Jennifer Heguy, Dairy Advisor, San Joaquin, Stanislaus, and Merced counties

2018 California Leopold Conservation Award® Seeks Nominees

Sand County Foundation, the California Farm Bureau Federation and Sustainable Conservation are accepting applications for the $10,000 California Leopold Conservation Award. The award publicly honors California farmers, ranchers, foresters and other private landowners who demonstrate outstanding stewardship and management of the state's natural resources.

"It is an honor to be a recipient of the Leopold Conservation Award and to be affiliated amongst the other alumni who share a passion for conservation and are committed to sustainable practices in agriculture," said Jack Thomson of C. Jeff Thomson, International, the award's 2017 recipient. "I strongly encourage those who care deeply about conservation and agriculture to apply for this award."

Given in honor of renowned conservationist Aldo Leopold, the Leopold Conservation Award inspires other landowners and provides a public forum where farmers and ranchers are recognized as conservation leaders. The California Farm Bureau Federation is proud to partner with Sand County Foundation in awarding the Leopold Conservation Award to a California farm or ranch whose land ethic has developed creative and replicable ideas concerning the stewardship of the natural resources on its land while providing a sustainable economic stimulus that feeds our nation.

Nominations must be postmarked by July 13 and mailed to California Leopold Conservation Award c/o Sustainable Conservation, 98 Battery Street, Suite 302, San Francisco, CA 94111. The award will be presented in December in San Diego, CA.

The California Leopold Conservation Award is possible thanks to generous contributions from many organizations, including Farm Credit West, American AgCredit, The Harvey L. & Maud S. Sorensen Foundation, The Nature Conservancy, and Leopold Conservation Award Alumni. For application information, please visit leopoldconservationaward.org, or contact Alex Karolyi, 415-977-0380 x317, akarolyi@suscon.org.

Announcements / Calendar of Events

UC Davis Small Grains and Alfalfa/Forages Field Day
Thursday, May 17, 2017
7:30am – 4:30pm (includes lunch)
UC Davis Agronomy Field Headquarters, 2400 Hutchison Drive, Davis, CA 95616
Contact: Michelle Leinfelder-Miles, 209-953-6100, mmleinfeldermiles@ucanr.edu

Small Grains and Soil Health Field Meeting
Tuesday, June 5, 2018
9:30am – 12:00pm
Staten Island, San Joaquin County
See attached flyer!
Contact: Michelle Leinfelder-Miles or Brenna Aegerter, 209-953-6100, mmleinfeldermiles@ucanr.edu or bjaegerter@ucanr.edu

UC Davis Weed Day
Thursday, July 12, 2018
7:30am to 4:30pm (includes lunch)
Buehler Alumni Center, UC Davis
Please see http://wric.ucdavis.edu/events/weed_day_2018.html for more information and to register.

Rice Production Workshop
Tuesday, August 7, 2018
Lundberg Family Farms, 5311 Midway, Richvale, CA 95974
Save the date! More information to follow.
Contact: Michelle Leinfelder-Miles, 209-953-6100, mmleinfeldermiles@ucanr.edu

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Small Grains and Soil Health Field Meeting

June 5, 2018, 10:00am – 12:00pm
Staten Island, San Joaquin County

9:30am	Meet at Staten Island Grain Silos Caravan to field trial location
10:00am	Welcome and Meeting Overview Michelle Leinfelder-Miles and Brenna Aegerter, UCCE, San Joaquin County Dawit Zeleke, Conservation Farms and Ranches
10:15am	Small Grains Variety Testing – Statewide and Delta Trials Mark Lundy, UC Davis
10:30am	Soil Nitrate Quick Test Demonstration Mark Lundy, UC Davis
10:45am	Introduction to Cover Cropping Project (funded by CDFA Healthy Soils Program) Michelle Leinfelder-Miles and Brenna Aegerter, UCCE, San Joaquin County
11:00am	Cover Crop Trial Results Valerie Bullard, USDA-NRCS Plant Materials Center
11:15am	Demonstrations and Evidence – Why the Hype Over Soil Health Really Matters Jeff Mitchell, UC Davis
11:30am	Walk through small grains trial, participate in soil health demonstrations
12:00pm	Wrap-up and Evaluations

Applied for CCA continuing education credits.

Managing Water for Drought and Salinity

The 2012-2016 drought was one of the worst droughts in California history, not solely for the lack of precipitation, but also for its length, high temperatures, low snowpack, and water demand. It's probably safe to say that it won't be our last drought – or even our worst – as we look into the future. That said, what can we do in the California alfalfa industry to better manage for drought and the likely salinity impacts from a lack of water?

Water Management during the Growing Season: Dan Putnam wrote a blog article, "Why Alfalfa is the Best Crop to Have in a Drought" (http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=17721), which describes the water use of alfalfa compared to other crops, its adaptations to water-stressed conditions (like being deep-rooted), and ways we can adapt our management in low-water years. In particular, during the growing season, we can optimize water use and alfalfa growth during the early part of the season when yield and quality are highest, and dry down in the later part of the season. Dan's research has shown that the alfalfa will survive and resume growth when moisture conditions become favorable.

Water Management during the Winter Season: In 2013 through 2015, I cooperated with alfalfa growers in the Delta region to understand soil salinity conditions and leaching fractions in fully irrigated fields. I then modelled soil moisture and salinity conditions to understand these conditions during the winter season to help inform our management during the off-season.

Figure 1 (see page 5) shows the daily water balance (precipitation minus crop evapotranspiration, ETc) and the change in soil moisture from field capacity (i.e. soil moisture after free drainage has ceased) at seven alfalfa fields during Winter 2013-14. This figure helps us to visualize why precipitation, particularly in a drought year, is not contributing more to soil moisture for early spring growth or to leaching salts. Total rainfall was approximately 8.2 inches, and for only a few storms (shown as peaks) was there enough precipitation to exceed crop water use (ETc).

The other lines on the graph (labelled Sites 1-7) illustrate the soil moisture deficit from field capacity. Soil moisture is expressed relative to field capacity because a primary interest in this modelling was to understand how much water is available for leaching salts. Until a soil reaches field capacity, we assume the water is held in the soil and not available for leaching. For all sites, the soil was drier than field capacity in the fall after the last cutting and before the first rain event. The lines decrease (i.e. become more negative) until December 1st because crop water use exceeded precipitation, so the crop drew upon soil moisture. On December 1st, there was a rain event that was enough to exceed ETc, so the soil moisture deficit decreased, but soil moisture was still less than field capacity. This trend continued for the remainder of the winter. If there had been enough precipitation to increase soil moisture above field capacity, then water would have been available for leaching, but this did not happen in Winter 2013-14. Precipitation rarely exceeded ETc, and each alfalfa site remained at a soil moisture deficit over the entire winter. In other words, precipitation was never high enough to fill the soil profiles, exceed the soils' field capacity, and leach salts.

Figure 2 (see page 5) represents conditions for Winter 2014-15. Total rainfall was approximately 11.8 inches, and precipitation exceeded ETc more frequently than in Winter 2013-14. There was a period starting on December 11th where soil moisture exceeded field capacity (for all but Site 5), providing water for leaching. The highest peak on each site's line represents the total water available for leaching after accounting for ETc and filling the soil profile to field capacity. This peak occurred on December 20th and was 0.8, 3.3, 1.1, 1.8, 0, 1.4, and 1.2 inches, for Sites 1-7, respectively. (Site 5 was 0 inches because the soil moisture deficit remained the entire year; thus, zero water was available for leaching.) As this water was available for leaching, we assume that this water drained from the profile, and the lines drop to zero, or field capacity. Beyond December 20th, the daily water balance was never enough to exceed field capacity for any of the sites. (Note: the lines for all sites, except Site 5, overlap after December 20th.) So, no other water was available for leaching over the remainder of the winter season.

Conclusions: The 2012-2016 drought provided limited ability to manage salts with winter rainfall. For seven Delta alfalfa sites, we modelled 0 inches of rainfall available for leaching in Winter 2013-14. We modelled a range of about 0 to 3 inches of rainfall available for leaching in Winter 2014-15, depending on location. As a result, root zone soil salinity decreased in Spring 2015 (data not shown). When winter rainfall is not adequate for effective leaching, however, we need to be creative in our leaching strategies. Leaching during the season may not be advisable for crop health and nutrient management reasons, but we may be able to leverage winter rainfall with irrigation by wetting the soil profile before a rain event. A soil profile that is brought to field capacity with irrigation would likely result in rain water passing through the profile and leaching salts, rather than just soaking into a dry soil. We should also consider field modifications that improve irrigation efficiency prior to planting alfalfa, like increasing on-flow rate, narrowing border checks, or shortening field length, where possible. While drip irrigation in alfalfa is still not widely employed, in those fields that have it, it might be wise to also maintain a surface irrigation system for leaching. Our options are not many, but they could provide some relief when water is scarce.

Michelle Leinfelder-Miles, Delta Farm Advisor

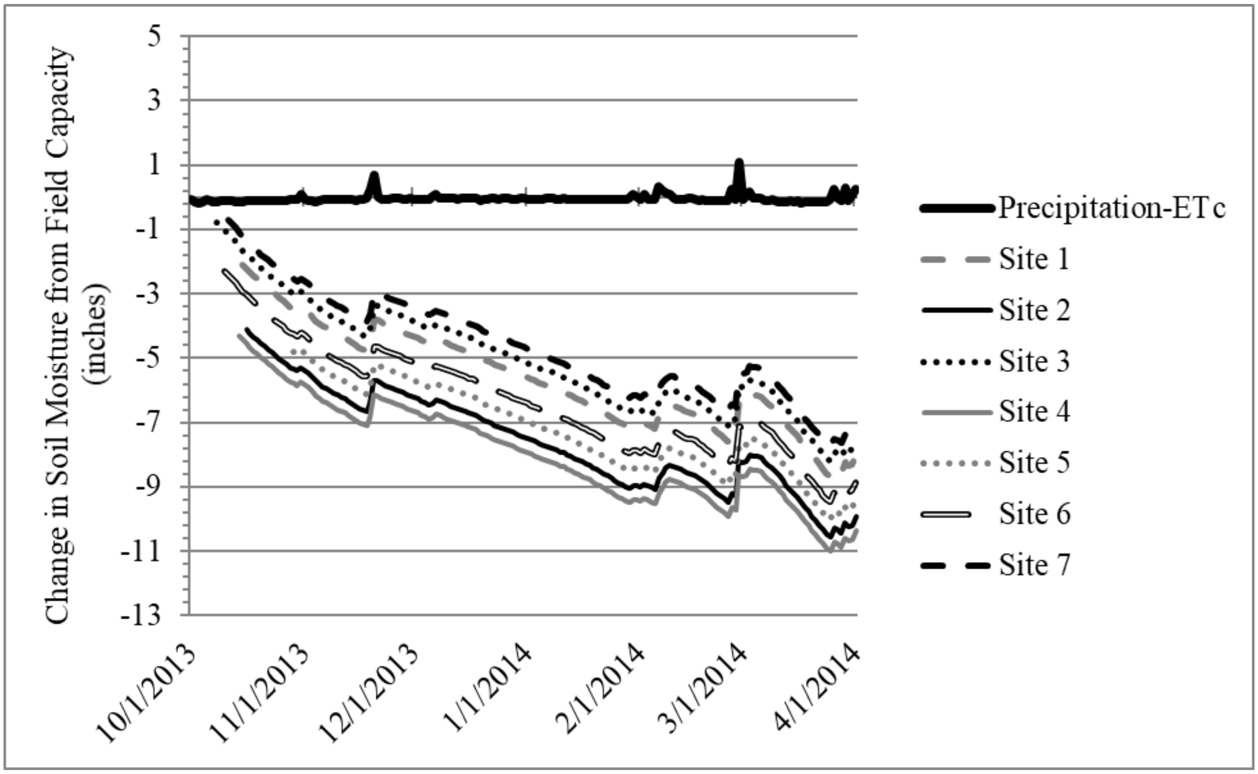

Figure 1. The daily water balance (i.e. precipitation minus ETc) and the change in soil moisture from field capacity for Winter 2013-14 at seven Delta alfalfa sites. This model shows that there was no water available for leaching. All rainfall was used by the crop or soaked up and held by the soil.

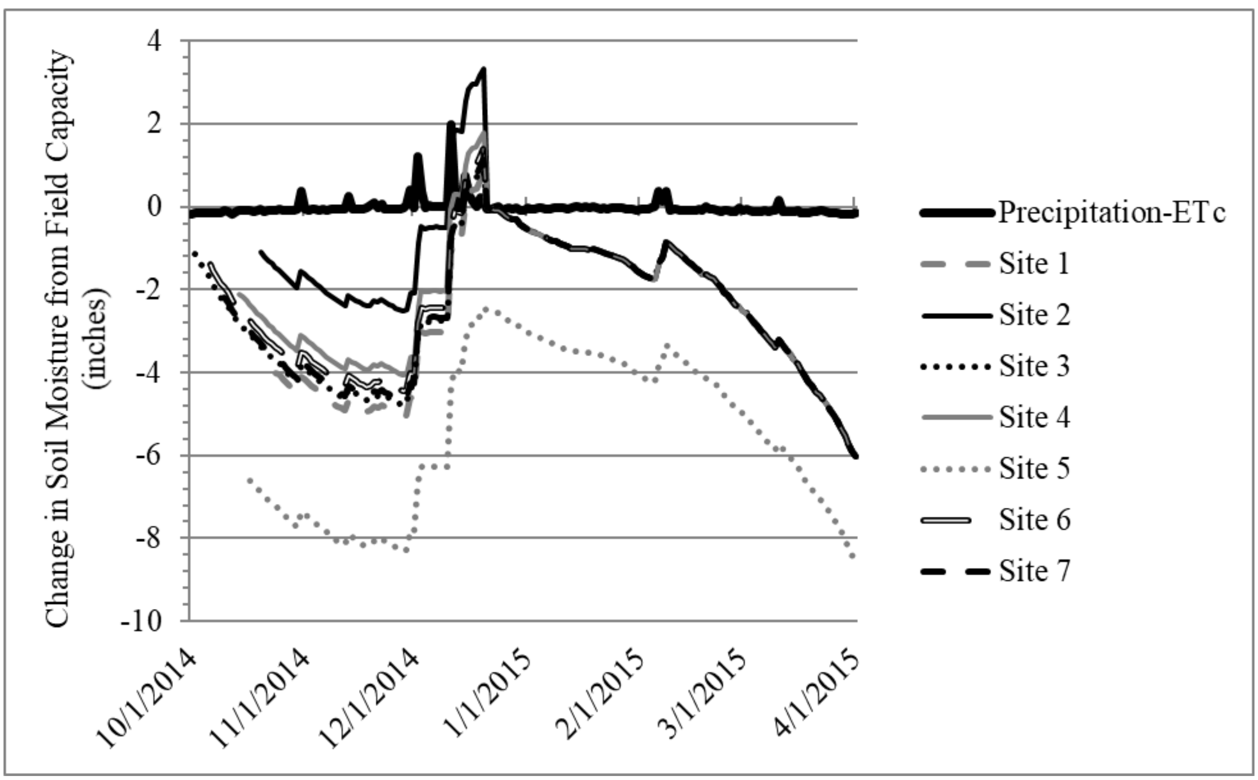

Figure 2. The daily water balance (i.e. precipitation minus ETc) and the change in soil moisture from field capacity for Winter 2014-15 at seven Delta alfalfa sites. This model shows that there was some water available for leaching in mid-December, ranging from about 0-3 inches, depending on location.

Nitrogen Efficiency in Almond Production

Nitrogen is the most important element we can apply to our tree fruit crops. Almond growth and productivity depend on the availability and uptake of nitrogen. Most fertilizer recommendations are based on making nitrogen available to our trees so that a nitrogen shortage does not limit tree growth or productivity. Unfortunately, there are groundwater wells contaminated with excess nitrogen, which is attributed to agriculture (http://groundwaternitrate.ucdavis.edu/). Efficient nitrogen management will become increasingly important in the future as we collectively try to reduce groundwater contamination while keeping our orchards productive. Nitrogen usage should be based on individual orchard's cropping history (previous yields) and leaf, soil, and water analyses to determine nitrogen availability and potential sources. See the nitrogen usage chapter 27 in our UC Almond Production Manual #3364 (Figure 27.1) and the interactive "Nitrogen Fertilization Recommendation for Almond" model by Dr. Patrick Brown, UC Davis, 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 nitrogen requirement for orchards.

A removal and replacement rate of 60 lbs N per 1000 lbs nut meat yield is suggested by Dr. Brown when estimating annual N demand from a crop load. Dr. Brown is currently leading a research effort, near Belridge in Kern County, to determine more accurately efficient nitrogen use in productive almond orchards (http://ucanr.org/sites/scri/). In this study, applications of 275 lbs fertilizer N produced 3500-4500 lbs of Nonpareil nut meats/acre in 2009-2011. A higher rate of 350 lbs N/acre/year did not produce more than the 275 lb N rate. Lower rates of 125 and 200 lbs 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 nitrogen application rates; nitrogen applications should replace the N removed in last season's crop.

Some groundwater has elevated nitrogen levels, and you should take into consideration any nitrogen found in well water when 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 water per season with this water, I would apply approximately 92 lbs N per acre. This figure can be determined by multiplying mg/l or ppm of nitrate by 0.61 to get pounds of actual nitrogen per acre-foot of water (Figure 27.2 UC pub #3364). If the lab analysis reports nitrogen levels in nitrate-nitrogen (NO_3-N), then multiply the value by 2.72 to get pounds of actual nitrogen 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 nitrogen was removed with the crop and needs to be replaced. But if your irrigation water has 50 ppm nitrate, then you may only need to apply 118 pounds of nitrogen per acre to your orchard (210 lbs nitrogen minus 92 pounds found in the 3 acre feet of water).

Mature trees need more nitrogen 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 nitrogen (80% of annual demand) between bloom and mid-June. Dr. Brown's group recommends delivering fertilizer N at four different timings and amounts through 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 nitrogen is applied at the time of peak tree demand and uptake.

I know many growers that "spoon feed" their trees with small injections of nitrogen and other liquid fertilizers into their irrigation systems. I would prefer to see you add a little bit of nitrogen with every irrigation from March to July, rather than applying large doses periodically through the season. (After all, 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 nitrogen applied passed the root zone. In orchards with flood or solid set sprinkler irrigation systems, the nitrogen should be applied down the tree rows and not broadcasted down the row middles. Dormant winter applications of nitrogen should be avoided as well as applications during hull split (July), which can aggravate hull rot and delay harvest! Deciduous almond trees absorb no nitrogen between leaf drop and leaf out.

I have seen many young trees burned by too much nitrogen, especially if liquid fertilizers like UAN-32 or CAN 17 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 15-15-15 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 nitrogen fertilizers can be used very efficiently and easily by growers. But be careful because I know several farm managers that will not allow more than 10 gallons of UAN-32 per acre per application on mature almond trees. UAN-32 contains 3.54 pounds of actual nitrogen per gallon, and if you put out 10 gallons of UAN-32 per acre you added 35.4 lbs of nitrogen per acre. If you have 120 trees per acre and do the math you come up with 4.72 ounces of actual nitrogen per tree–almost 5 ounces! I recommend not applying higher rates than this per application. I have seen nitrogen burn occur more often during hot summer temperatures when trees have elevated transpiration rates and obviously faster nitrogen uptake rates than what would have occurred at a cooler time of the year.

Young almond trees don't require as much nitrogen as older trees. I like Wilbur Reil's (UC Farm Advisor Emeritus) rule of "one ounce of actual nitrogen 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

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any one application. Thus, a first leaf almond tree should not receive more than one ounce of actual nitrogen per any application. A five year old almond tree should not receive more than 5 ounces of actual nitrogen per one single application. If you must put out five ounces of actual nitrogen per one-year old tree, do so in five applications and not all at once! David Doll, UC Farm Advisor in Merced County, 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 nitrogen per acre delivered optimal growth—this translated to about 4 ounces of actual nitrogen 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/.

I have been working with many growers who are recycling their first-generation almond orchards, incorporating the wood chips, and planting back second generation almond trees. We have had some orchards that incorporated as much as 64 tons per acre of wood chips. This was the case with Louie Tallerico's orchard in Manteca. In orchards where high rates of wood chips were applied, we have noticed reduced growth in the second-generation trees, even after fumigating. We realized that we were not applying enough nitrogen to counter the nitrogen that was tied up with all the carbon from the wood chips. There is so much carbon in the soil that the carbon to nitrogen ratio may be out of balance. In second generation orchards, following whole orchard recycling, I suspect we should double David's recommendation of 4-5 ounces of actual nitrogen per tree. That would give us about 40-60 pounds of nitrogen per acre in the first year of the second-generation orchard after recycling. I currently have a nitrogen rate trial established with another grower after whole orchard recycling, where we will apply from 20-100 pounds per acre of nitrogen to optimize our recommendation. Of course, this rate will vary depending on the amount of carbon that was added during recycling. I have included a picture of a tree that received 0.80 ounces of nitrogen in March and another of a tree that did not receive any nitrogen (Figures 1a, 1b). Both trees are from an orchard that was recycled last year. Remember not to add more than one ounce of actual nitrogen per first leaf tree at any one time, but you can add multiple ounces over the course of the season.

Brent Holtz, Almond Advisor and County Director

Figure 1a.

Figure 1b.

Figure 1. After whole orchard recycling a) Good growth of first-year almond tree, and b) reduced growth of first-year almond tree, likely due to limited nitrogen.

Nitrogen Management in Tomatoes

For the last couple years, I have been collaborating with the research group of Daniel Geisseler at UCD. Geisseler is a nutrient management specialist with Cooperative Extension and has been working on nitrogen management in tomatoes and other crops. His group is also working on adapting the existing software tool CropManage so that it would give site-specific nutrient and irrigation recommendations for processing tomato fields. The software was originally designed for coastal growers and crops. We are expecting to have the software available for use by tomato growers this season – please let me know if you are interested in this software and we can work with you to get it working for your fields.

The research aims to better understand:

- The rate of uptake of N in processing tomatoes – how many pounds does tomato uptake at various stages of growth? How much do they really need, and how much is "luxury" uptake?
- The mineralization rate from soil organic matter – how much credit should be given for nitrogen which might become available during the growing season from mineralization of soil organic matter?
- The amount of soil residual N (what is in the soil before you start fertilizing) – how much of that is available to current season's tomato crop when grown with buried drip irrigation?

Most of the N uptake by tomato occurs between early fruit set and the early red fruit stage. Uptake peaks at about 7 to 10 weeks after transplanting, with a maximum rate of about 5 pounds per acre per day. The bulk of the uptake is before day 80 (Figure 1). Total uptake over the course of the season is about 250 pounds. (This assumes a yield of 55 tons per acre.) However, not all of that N must come from current season fertilization. We need to consider how much residual N might be left from the previous crop, as well as the potential for mineralization from soil organic matter during the course of the season. In some cases, nitrate may be present in irrigation water and can also contribute towards crop needs.

After harvest, the vines contain about 100 pounds of N per acre. Much of that should be available for the following crop, but soil testing will reassure you that it is still there and available. Soil tests can be done to determine the amount of soil nitrate present in the rooting zone. This should be done either before transplanting or before the first N application. Consider sampling and testing separately in the top foot as well as the second foot. We know that there can be significant variation across the field, so do enough sub-samples that the composite sample will be representative of the field. We don't have good information on whether all this nitrate is truly available to the crop, particularly because with buried drip irrigation, the soil surface and the shoulders of the bed are dry and not colonized by roots. Therefore, we may want to adjust a little the available nitrate. What we are using currently is the assumption that in the top foot, 50% of the nitrate is available to the crop, while in the second foot, 90% is available. Most soil test results are provided as ppm nitrate. To convert to pounds N per acre, multiply your ppm test result by 3.5.

An example N budget for processing tomato (see Table 1)

- We expect crop uptake to be about 250 pounds N. (This varies with yield.)
- Assume 90% use efficiency for nitrogen. (We have to apply a little extra to account for the fact that the distribution and uptake is not uniform.)
- On average, tomatoes take up about 70 pounds of non-fertilizer N. However, this number could be higher if there is more residual N available. It's better to test your soil than to guess on this one.
- In this case, soil nitrate tests indicate that there is 48 pounds of N available. (This is after the corrections to soil test results which I discuss above.)
- The irrigation water contains no nitrate in this case.
- N mineralization during the season may be 30 to 50 pounds during the growing season, but this could be higher depending on agronomic practices and soil types. We are learning more about N mineralization from different soils and should soon have guidelines for this estimate.

Brenna Aegerter, Vegetable Crops Farm Advisor

Table 1. Example of a N budget for processing tomatoes.

N sinks and sources		**lbs N/acre**
	N uptake	250 lbs/acre
	N efficiency	90%
N requirement		278
	N in irrigation water	0 ppm
	Residual soil nitrate	48 lbs/acre
	N mineralization during season (guesstimate)	30 lbs/acre
N credits totaled		78
Fertilizer application rate		200

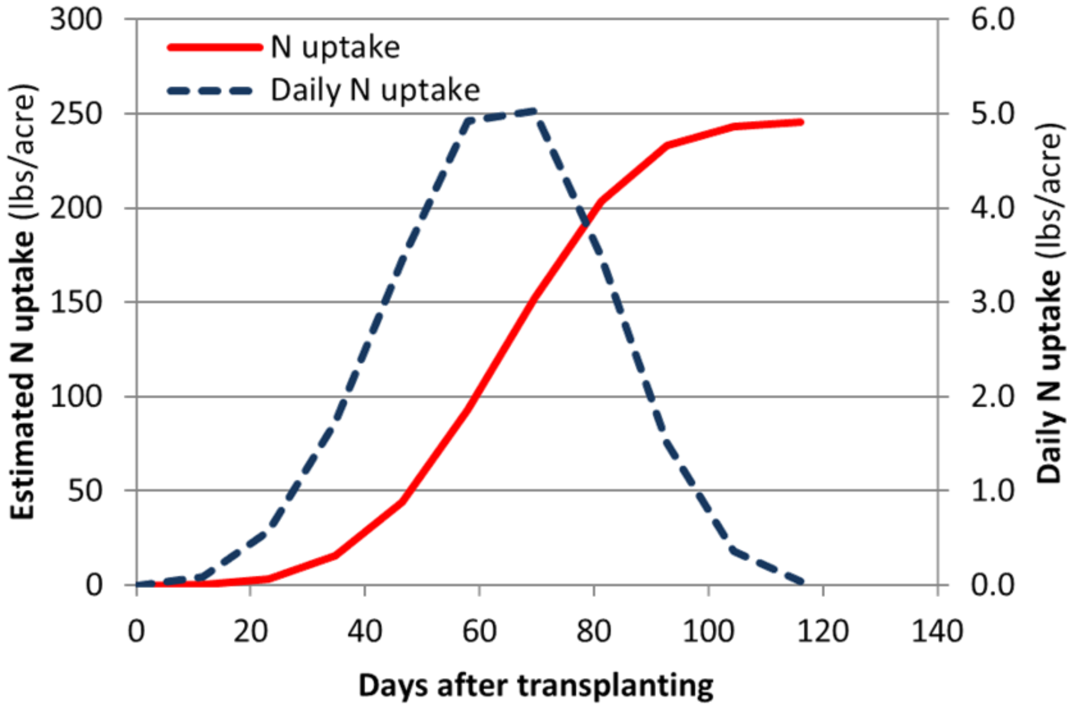

Figure 1. Expected N uptake in a processing tomato crop. From Daniel Geisseler, Nutrient Management Specialist, Cooperative Extension, UC Davis.

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