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Agriculture and Natural Resources | Cooperative Extension

Drought impacts on salinity, nitrogen management

Aside from the more obvious impacts that the drought has had and will have on water availability, the lack of rainfall may have some secondary effects in terms of salinity and soil nitrogen. In terms of salinity: since we have had less rainfall than in a normal year, there has been less flushing of salts through the soil profile with the downward percolation of rain water. As a result, the starting point for salt accumulation near crop roots might be higher this year than in a typical year. In addition, with less surface water availability, folks are more likely to be pumping groundwater, which is typically higher in salts. There are a number of low-cost electric conductivity (EC) meters available to monitor water and soil salinity and several useful publications that estimate thresholds of concern for various crops (eg. <http://vric.ucdavis.edu/pdf/Irrigation/EvaluatingSalinityinIrrigationWater.pdf> and <http://anrcatalog.ucdavis.edu/pdf/8066.pdf> and <http://www.ext.colostate.edu/pubs/crops/00506.pdf>). Vegetable crops tend to be more sensitive, with onions and peppers among those showing least salt tolerance among common veg crops in this area. Among agronomic crops grown in the Sacramento Valley, beans and corn are some of the least salt tolerant. If you are pumping more groundwater than usual or irrigating from new or seldom used wells, it may be worth your while to take an EC reading of your water and compare it to the thresholds in the above publications. Also, feel free to call and discuss with me.

The same dynamic (low rainfall) that leads to greater salt accumulation higher in the soil

profile is also likely to result in higher levels of residual soil nitrate than in a normal rainfall year. If a pre-plant soil nitrate test is not part of your pre-season protocol, including it this year may be a way to reduce your nitrogen fertilizer requirements. Here is a good overview on soil nitrate testing:

http://apps.cdfa.ca.gov/frep/docs/Soil_Sampling_Nitrate.pdf. Similarly, testing the nitrate-N concentration in well water (particularly new or seldom used wells that are being brought online in response to reduced surface water availability) and accounting for the nitrogen therein may be a way to reduce your purchased N inputs. To determine the lb/acre N applied in irrigation water: multiply the ppm NO₃-N by 2.7 to get to the lb/acre N per foot of applied water (eg. 5ppm NO₃-N x 2.7lb x 2ft of water = 27lb/acre N).

In-field diagnostics to optimize nitrogen management in wheat

As mentioned in the last newsletter, I have been working on a project in wheat this season to test and calibrate several tools which give an indication of the in-season nitrogen (N) status of the crop. Prior research has shown that N applications during the vegetative growth stage tend to benefit yield while applications during the reproductive growth stages tend to increase grain protein, but usually only for crops that are high yielding. The goal of this project, which is being funded in part by the California Wheat Commission and the CDFA FREP program, is to be able to determine whether adding N at a given point in the season is likely to increase yield and/or protein content, and, if so, to indicate how much fertilizer to apply. The cost of some of the devices we are using is much lower than

equivalent technologies were as little as 5-10 years ago.



While it's still too early to say how useful these tools will be, we are seeing some promising results. For example, **Figure 1** depicts a N index of the penultimate leaf sampled at late boot/early heading in two fields at various N rates. The tool seemed to be able to differentiate between the various rates pretty effectively.

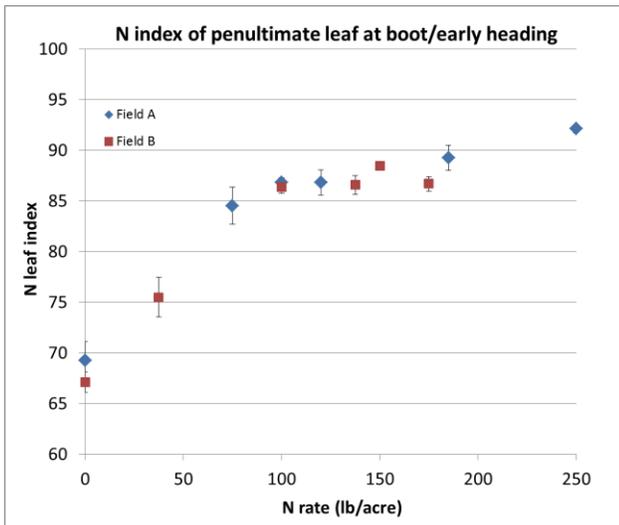


Figure 1.

I'll be presenting some of this work at the **May 7th Small Grain and Alfalfa Field Day** at the UC-Davis agronomy research fields (details

below). Heading into next season, we might be looking for more cooperators so that we can start to get an idea for how robust these tools and our calibrations are under the different growing conditions where they might be used. If this is of interest and value to you, I would encourage you to come talk to me at the field day, send me an email or give me a call.

Canola and camelina, winter oilseed crops

Recently, I had the chance to tour a variety trial site for canola and camelina located north of Maxwell and part of a project headed by Nicholas George, a UC ANR scientist whose specialty is the evaluation and development of new and under-utilized crops, and Steve Kafka, an extension specialist on the UC-Davis campus and the director of the California Biomass Collaborative.



The trial is one of several located across the state. The work is funded by UC ANR and is trying to determine if canola and camelina are economically viable winter crop options for California growers and which varieties of each crop might be best adapted to California conditions. Often the price of canola moves inversely relative to the price of wheat, so planting one of these winter oilseed crops may serve as a diversification option for growers looking for a fall-seeded crop other than wheat.

Canola is grown extensively in Canada, Europe and Australia, where it is used as break-crop to diversify otherwise cereal-dominated cropping systems. Canola is a multi-use crop that can be processed for food grade oil or for biodiesel, and as feeding ration for livestock

(http://www.canolacouncil.org/media/516716/canola_meal_feed_guide_english.pdf).

Camelina is not classified as an edible oil in the United States but produces oil of similar or better quality than canola. Of the two, canola has greater yield potential (in the range of 1500-2500lb/acre for canola vs 1000-1500lb/acre for camelina under California conditions) but uses more water. Canola has been trading around \$450/ton on the futures market. The market for camelina is more regionalized and tends to be roughly pegged to biodiesel prices.

Seed cost for canola is high (around \$10/lb) but being a very small seeded crop, the seeding rate is low (6-12lb/acre). The trial pictured on the previous page was planted with 8 inch spacing at around 1cm depth in November. Growth would generally be more advanced but it was adversely affected by drought conditions over the winter. The site is organic rice ground therefore no herbicides were used. On the topic of weed control, there has been concern about the potential for roundup ready varieties of canola becoming a glyphosate-resistant weed (see: <http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=7123>); however, in other regions where it has been grown for a number of decades canola has not become a problematic weed of agricultural land or natural vegetation.

For more information on recent work on canola and camelina in California see this recent report:

<http://alfalfa.ucdavis.edu/FieldDay/2013/2013%20Field%20Day%20Oilseeds%20Handout%20Davis.pdf>. Also, Nic and Steve will be present at the **May 7th Small Grain and Alfalfa Field Day** at

the UC-Davis agronomy research fields and will present some of their work on these crops at that time (a picture of this trial is below). If you are interested in experimenting with one of these crops in the Sacramento Valley, give me a call or send me an email to discuss.



Upcoming events and other announcements

The annual **Small Grain and Alfalfa Field Day** will be held **May 7th** at the Agronomy research station west of the UC-Davis campus from **8:00AM-4:30PM**. Details on the agenda and directions are included in this newsletter. As mentioned above, I'll be presenting some of my N management work in wheat. I hope to see you there!

CleanWorld (<http://www.cleanworld.com/>), is a company in the pilot phase that processes organic waste streams into energy, fertilizers and other soil amendments via anaerobic digestion. They are seeking partners in the agricultural sector who are interested in experimenting with their liquid and solid by-products. More details on the nutrient makeup and availability of these by-products is available. Please contact me if interested and/or check out their informational flyer, posted on my blog: <http://ucanr.edu/blogs/SacValleyFieldCrops/>

There will be a field day on **May 28th** from **8:00AM-1:30PM** at the **Russell Ranch Sustainable Agriculture Facility** located west of Davis on Russell Blvd. and Kinsella Ln. I'll be

presenting some of my N management work in wheat at this event as well. The schedule and registration for the event can be found here: <http://russellranch.ucdavis.edu/education-and-outreach/russell-ranch-sustainable-agriculture-field-day-2014> and directions to the facility can be found here: <http://asi.ucdavis.edu/rr/long-term-experiments/people/directions>. The event (and lunch!) is free for farmers, but you need to register in advance.

Web resources... There are a number of web links in this Newsletter. If you received this via paper mail and would like to be able to follow these links automatically, you can access the

newsletter electronically at [http://cecolusa.ucanr.edu/Field_Crops/Newsletter 805/](http://cecolusa.ucanr.edu/Field_Crops/Newsletter_805/). And, if you can't wait until the next Newsletter to find out what I'm up to, visit my blog: <http://ucanr.edu/blogs/SacValleyFieldCrops/> or <http://cecolusa.ucanr.edu/>.

Best of luck in the upcoming season, and I hope to see you soon!

Mark Lundy
UCCE Agronomy Advisor
Colusa-Sutter-Yuba
530-902-7295
melundy@ucanr.edu

UC Davis Small Grains/Alfalfa Field Day

Wednesday, May 7, 2014, Davis, CA

Directions: UC Davis Agronomy Field Headquarters, Hutchison Road, Davis, CA

Take Hwy 113 near Davis to Hutchison Rd. go west. Right at first rotary, left at second rotary, about 1/3 mile further down on the left.

The purpose of this field meeting is to take a look at and discuss research trials and crop production issues in California related to forages and cereal grains. This includes variety trials, pest and disease updates, weed control, and nutrient management.

8:00 Registration (Coffee and donuts)

8:15am – Noon: Small Grains

- Welcome and Introductions
- Issues for California Wheat– *Janice Cooper, California Wheat Commission*
- New UC wheat varieties, wheat research– *Jorge Dubcovsky, UCD wheat breeder*
- Departure to field tour
- Promising UCD Lines for Future Common Wheat and Durum Wheat Variety Releases – *Oswaldo Chicaiza, and Alicia del Blanco Wheat Breeders*
- Genetic Studies for New Traits –
 - Mapping new stripe rust resistance genes *PhD student Nicolas Cobo*
 - Using barley to identify resistance genes to wheat stripe rust *PhD Student Josh Hegarty*
 - Increasing resistant starch content in the wheat grain *PhD student Brittany Howell*
 - Discovering genes for drought tolerance *Tyson Howell and Junli Zhang*
- In-field diagnostic tools for improved nitrogen management – *Mark Lundy, UCCE Colusa-Sutter-Yuba*
- Pyramiding genes for virus resistance in barley – *Lynn Gallagher and Alicia del Blanco*
- Collaborators Quality Program –*Phil Mayo*
- Statewide Germplasm Development and Evaluation – Wheat & Triticale, Durum, and Barley – *Phil Mayo, Wheat and Barley Regional Testing Program Coordinator. With participation of breeders from private breeding companies.*

12:00 Noon: Barbeque Lunch (Noon) Sponsored by California Crop Improvement

12:30 Welcome – *Dean Helene Dillard, UC Davis College of Agriculture*

12:40 Envisioning Plant Breeding for Improved Yields and Pest Management at UC Davis – *Charlie Brummer, director, the new Plant Breeding Center, UC Davis*

12:50 California Alfalfa & Forage Association—Pesticide and Industry Reports—*Spencer Halsey, CAFA, Sacramento, CA*

1:00 Field Tour:

- 1:05 Yield and Pest Management in new crops: Canola, Camelina and Castor grown for Biofuels—*Steve Kaffka, Nick George, UC Davis*
- 1:20 Studies on Switchgrass as a Potential Forage Crop—*Dan Putnam, UC Davis*
- 1:30 Aphid Outbreak in Alfalfa Hay and Results of Field Trials—*Larry Godfrey, Department of Entomology, UC Davis*
- 1:45 Diseases, Stem Nematode Issues with Alfalfa, and Chlorpyrifos use—*Rachael Long, UCCE Farm Advisor*
- 1:55 Low Lignin Trials in Alfalfa—First Year Data —*Dan Putnam, UC Davis*
- 2:10 Irrigation Studies with Alfalfa and Wrestling with Drought
- Lysimeter/ Field-based water Measurements in Alfalfa —*Daniele Zaccaria, Rick Snyder, UCD*
 - Deficit Irrigation of Alfalfa During Drought—*Steve Orloff, UCCE Siskiyou County, Yreka, CA*
 - AquaMon-CIMAS Sensors for timing Irrigations—*Frank Stempski, Cermetec, San Jose, CA*
 - Subsurface Drip Irrigation work in alfalfa—*Dennis Hannaford, Netafim Co., Fresno, CA*
- 3:00 Understanding the Nitrogen Credits when Alfalfa is rotated with Wheat—*Eric Lin, Graduate Student, UC Davis*
- 3:15 In-field diagnostic tools for improved nitrogen management—*Mark Lundy, UCCE Colusa-Sutter-Yuba*
- 3:20 Sharpen as an Alternative Weed Management Option—*Dawn Brunmeier, BASF, Stockton, CA*
- 3:35 Testing of Photosynthesis Enhancers in Alfalfa — *Chris DeBen, Dan Putnam UC Davis*
- 3:45 Alfalfa Varieties: Yield and Pest Management Implications—*Craig Giannini and Dan Putnam, UC Davis*
- 4:00 Weed Identification Contest —**win Fabulous Prizes, impress your neighbors**—*Brad Hanson, Weed Specialist, UC Davis.*
- 4:15 Return to Base

Meeting announcements and newsletters are also available at our website: <http://cecolusa.ucdavis.edu>

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University of California
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Colusa, CA 95932

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