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University of California
Agriculture and Natural Resources
Making a Difference for California

UCCE

Field Crop Notes
Kings &Tulare Counties

Vol. 10, Issue 2, August 2013

Dry Bean Meeting

Tuesday, August 27, 2013
UC Kearney Research and Extension Center
9240 S. Riverbend Ave., Parlier, CA

7:30 am **Registration**

7:50 **Depart for field**

In the field
Developing New Varieties for Insect and Disease Resistance, *Dr. Phil Roberts and Dr. Bao Lam Huynh, University of California, Riverside*

Evaluating Insecticides for Lygus Bug Management, *Carol Frate, UCCE Farm Advisor, Tulare County*

Subsurface Drip Irrigation Trial for Blackeye Production, *Dr. Larry Schwankl, UCCE Irrigation Specialist*

Screening Bean Varieties and Breeding Lines for Root Knot Nematode Resistance, *Dr. Phil Roberts, Dept. of Nematology, UCR*

Break

Indoor
Update on Blackeye Market, *Gary Luckett, Manager, Cal-Bean & Grain Warehouse*

Using Marker-Based Techniques for Developing New Blackeye Varieties, *Dr. Phil Roberts and Dr. Bao Lam Huynh, University of California, Riverside*

Past, Present, and Future Dry Bean Weed Control, *Kurt Hembree, Weed Management Farm Advisor, Fresno County*

11:45 **Adjourn**

PCA Hours Requested – 1.5 (Other)
CCA Credit Approved – 2 Hours (1.5 IPM, .5 Crop Mgt.)

Directions to the UC KAREC are available at http://cefresno.ucdavis.edu//files/118418.pdf

Field Crop Notes – August 1, 2013 – Published Quarterly
Kings County, 680 N. Campus Drive, Ste. A, Hanford, Ca 93230 • Phone (559) 852-2730 • Fax (559) 582-5166
Web Site: http://cekings.ucdavis.edu
U.S. Department of Agriculture, University of California, and Kings County Cooperating

Alfalfa and Forage Meeting

Thursday, September 5, 2013
UC Kearney Research and Extension Center
9240 S. Riverbend Ave., Parlier, CA

7:30 am **Registration**

7:50 **Depart for field**

In the field

Alfalfa Variety Selection as a Tool for Managing Pests and Diseases, *Dr. Shannon Mueller, UCCE Agronomy Farm Advisor, Fresno County*

Alfalfa – Grains Rotation Study: Getting the Most from Nitrogen Fixation, *Dr. Dan Putnam, UC Davis Agronomy Extension Specialist*

Demonstration of Co-existence of RR and Conventional Alfalfa Hay Fields, *Dr. Michelle Leinfelder-Miles, UCCE Farm Advisor, San Joaquin County*

Nitrogen Utilization by Corn and Sorghum, *Dr. Dan Putnam, UC Davis Agronomy Extension Specialist*

Sorghum Variety Trial, *Dr. Jeff Dahlberg, Director, Kearney Agricultural Research and Extension Center*

Irrigation Strategies for Sorghum, *Dr. Robert Hutmacher, UC Davis Agronomy Extension Specialist*

Break

Indoor

Ag Crime Prevention, *Sergeant Michael Chapman, Ag Task Force, Fresno Co. Sheriff's Office*

Nitrogen Needs of Wheat, Steve *Wright, UCCE Agronomy Farm Advisor, Tulare Co.*

Strategies for Managing Aphids in Alfalfa, *Dr. Pete Goodell, UC Area IPM Advisor, Kearney Agricultural Center*

Weed Management Strategies in Alfalfa With and Without Roundup, *Kurt Hembree, UCCE Weed Management Farm Advisor, Fresno Co.*

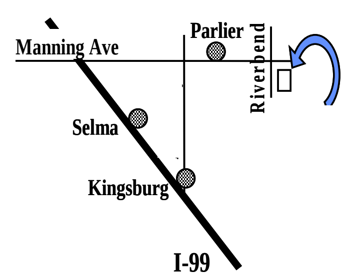
12:15 pm **Adjourn**

PCA Hours Requested:
1.5 hours (Other)
CCA Credit Approved *3.0 hours*
1.5 IPM
1.0 Nutrient Mgt.
0.5 Crop Mgt.

Directions to Kearney REC

From the North: Take State Route 99 southbound. Exit State Route 99 at the Manning Avenue exit, and go east eight miles to Riverbend Avenue. Turn right on Riverbend, and continue one-quarter mile.

From the South: Take State Route 99 northbound. Exit State Route 99 at the Manning Avenue exit, and go east eight miles to Riverbend Avenue. Turn right on Riverbend, and continue one-quarter mile.



Directions to the UC KAREC are available at http://cefresno.ucdavis.edu//files/118418.pdf

Reducing Water and Nitrogen Losses

No one wants to apply water or nitrogen to a crop and then not have it available when the crop needs it. Irrigation water that goes past the root zone is water that is paid for but that the crop can't use. Nitrogen that moves beyond the root zone is nitrogen that is paid for and/or reported as applied but that the crop can't use. Only the nitrate form of nitrogen can be carried with water past the root zone. The other forms of nitrogen, organic and ammonium (NH_4^+), will not be carried by water past the root zone until they are changed into the nitrate form – which for ammonium happens in a matter of days when soils are warm and moist.

Soil types vary in the rate at which water infiltrates and passes through the root zone. Sandy soils tend to be the soils where leaching is most likely to occur and clay soils the least likely. Within the same field, the rate of infiltration and the speed at which water passes through the root zone can vary over time and is influenced by farming operations. This is no surprise to farmers who have seen a pre-irrigation take many more hours than a later irrigation for the same crop.

In periods of short water supply and concerns about nitrate in groundwater, knowing the amount of water applied to a field at each irrigation is an important management tool. The best way to determine this is with a flow meter. A propeller meter can be used with fresh water, and can be readily installed in an existing pipe system following the manufacturer's recommendations. Knowing pump output is another technique for estimating the amount of water applied to a field but can be inaccurate as demonstrated this summer when the output of many wells declined significantly in a matter of weeks. Runoff from a field needs to be accounted for, because it is the amount of water that stays on the field that is important.

Once the amount of water applied per irrigation is determined, and knowing the soil type, we can estimate how deep the water penetrated into the soil. With a 5 inch irrigation application to a completely dry sandy loam soil, the water would move to a depth of about 3.8 feet (5" ÷ 1.3 in/ft = 3.8 ft, see Table 1). Because irrigation almost always occurs before soil is completely dry point (permanent wilting point), it is likely that the 5-inch irrigation would penetrate even deeper and could "push" water and nitrate already present in the soil deeper into the profile.

Table 1. Water holding capacity of soil

Soil Textural Class	**Water holding capacity inches water/foot of soil**
Coarse sand	0.25 – 0.75
Fine sand	0.75 – 1.00
Loamy sand	1.10 – 1.20
Sandy loam	1.25 – 1.40
Fine sandy loam	1.50 – 2.00
Silt loam	2.00 – 2.50
Silty clay loam	1.80 – 2.00
Silty clay	1.50 – 1.70
Clay	1.20 – 1.50

If significant drainage occurs in some irrigations, such as the pre-irrigation or those following cultivation, then steps can be taken to reduce the amount of water that is applied. Shorter fields, "torpedoes" or packer wheels to smooth the furrows so that water travels faster to the end of the field, or surge irrigation may be considered. For further information on these strategies, see the article, "Alternative techniques improve irrigation and nutrient management on dairies," available at http://cetulare.ucanr.edu/files/170597.pdf. If you don't have access to the internet, contact the office (559-684-3314) and we can get a hard copy for you.

If it is unavoidable to have water draining below the root zone, in some or all irrigations, then nitrogen should be managed so that when deep percolation is inevitable, there is a minimum of nitrate present in the soil to leach. If a field shows significant drainage at every irrigation, nitrogen applications should be frequent and closely matched to crop uptake. If deep percolation doesn't occur after cultivation has stopped, then larger amounts of nitrogen can be applied less frequently after lay-by.

The first steps to minimize loss of water and nitrogen below the root zone are: knowing your irrigation system and how much is applied each irrigation to your fields, knowing if water infiltration changes during the season and then managing when and how much nitrogen to apply.

Will Shortening Your Field Save Water, Nutrients and Money?

Carol Frate, UCCE Tulare Co. Farm Advisor and Larry Schwank, UCCE Irrigation Specialist

Why even consider shortening fields? A problem facing many surface irrigation managers is that they would like to apply less water per irrigation but can't. There are good reasons to reduce the amount of water applied per irrigation. They include:

1. Water - becoming more efficient with irrigation water may reduce pumping costs or stretch irrigation district supplies.

2. Nitrogen - over-irrigation may result in the leaching of nitrates. If nitrate is leached past the root zone, it is not available for the crop. The result could be an under-fertilized crop with low yield or additional money spent on more nitrogen to replace what was lost. Minimizing the chances of nitrogen leaching beyond the root zone also lessens the potential for ground water contamination.

3. With sufficient savings in water and nutrients (and possibly higher yields) it may be worth the costs, direct and indirect, of shortening the field.

If a grower wants to adequately irrigate an entire field, the minimum amount of water that can be applied is the amount required to get water from the head to the tail of the field. This may mean that the upper end receives excess water and it may mean that on average, the field receives more water than is required to refill the crop's root zone. The excess water often results in deep percolation (drainage) of water and possible leaching of chemicals, such as nitrate.

One of the most effective ways to reduce the amount of water applied per irrigation is to use shorter field lengths. For example, if the field length is currently a half mile, what happens if it is reduced to a quarter mile; if the field is a 1/4 mile long, what happens if it is reduced to an 1/8 mile? There is a <u>quick</u> and <u>easy</u> way to determine how reducing the field length will impact the amount of irrigation water applied to your fields.

First, a couple of important facts:

1. Irrigation water does not "advance" down the field at a constant rate. Those who have watched an irrigation have noticed that at first water moves quickly down the field but, later in the irrigation, water advances more slowly. Often near the end of an irrigation set, the water seems to be just slowly creeping down the field. This "slow down" occurs because as more and more of the field is covered with water, there is increasingly more water soaking into the soil (infiltrating). More infiltration means there is less water available to "push" water down the field, so the rate of advance slows.

2. Water does not soak into the soil (infiltrate) at a constant rate. For most soils, the infiltration rate starts out high and then decreases the longer water is in contact with soil. Often, after a number of hours, the infiltration rate reaches a lower, relatively constant rate. This is actually a good thing. If the infiltration rate remained constantly high (some sandy soils are like this), the portions of the field that had water

sitting on them the longest could be significantly over-irrigated. A decreasing rate of infiltration mitigates this effect somewhat.

Determining the impact of reducing field length is an easy thing to do in furrow or border strip irrigated fields. The most benefit from shorter fields will be observed in fields that have been cultivated so try this for a pre-irrigation or an early irrigation after cultivation. All that is needed is a measuring tape, a marker, and a watch. Here is a step-by-step procedure and an example.

Step 1: Measure the length of the field and then place a marker at half the distance down the field.

Step 2: Keep track of these times:

(a) when the irrigation starts,

(b) when the advancing water reaches the half-way marker and

(c) when the water reaches the end of the field.

These are the only measurements needed.

Here's an example based on an actual field showing the impact of reducing a 2,000 ft. field into two 1,000 ft. fields.

Step 1: A marker was placed at 1,000 ft. down the field

Step 2: The time for water to reach the 1,000 ft. marker was 2.5 hours. The time for water to reach the 2,000 ft. marker at the end of the field was 6.3 hours.

Distance	Time to Advance
1,000 ft.	2.5 hours
2,000 ft.	6.3 hours

Now here is the only tricky part. If the field length was shortened to 1,000 ft., two irrigation sets, each 2.5 hours long, would be needed to cover what would have been the long field. The first set would irrigate the top 1,000 ft. of the field and then the second set would irrigate the lower 1,000 ft. The total irrigation time for the two 1,000 ft. fields would be 5 hours (2 x 2.5 hours).

Irrigation Time (hours)	Field Length
6.3	2,000 ft. field
5	two 1,000 ft. fields

How much water could be saved? The flow rate to the field is not even needed to determine this. Subtract the 5 hours of irrigation for the two 1,000 ft. long fields from the 6.3 hours of irrigation for the 2,000 ft. field. The water savings would be 1.3 hours of irrigation - a 20% savings. This would be a 20% reduction in pumping volume or a savings of 20% of district water to be used on another field, and it would likely mean that the amount of drainage water and leaching of nitrate from the root zone would be reduced.

So why doesn't everyone use short fields? Shorter fields mean more pipelines to supply those fields, a significant cost. It can also mean additional roads and additional head and tail ditches which take land out of production. It means more irrigation sets. If a tailwater return system is used, that is an added complication. Finally, shorter fields are harder to farm. Moving equipment through shorter fields is more expensive and time consuming. Some growers have reduced the cost of shortening fields by running gated pipe across the halfway point of the field but this has its own complications such as gated pipe cost and labor to take pipe in and out of the field.

It comes down to balancing the cost and inconvenience of farming shorter fields versus water savings and improved nitrogen management which shorter fields offer. Water will have to be expensive or in short supply to justify shortening fields strictly based on water savings but, coupled with nitrogen savings and/or higher yields in addition to reduced risk to groundwater, shortening fields may be justified. The key is to do the simple exercise described above to find out the potential benefits in your specific fields. Remember to consider your soil type and farming practices. Shortening fields will most often be of most benefit in soils with a high infiltration rate and in fields after cultivation. After lay-by, when furrows are smooth, the benefits will be less. It's easy and costs nothing to determine how much water could be saved by cutting field length in half. Take the measurements and make the calculation. It's good information to have when making management decisions.

University of California, Agriculture and Natural Resources
Conservation Agriculture Cropping Systems Innovation

Conservation Tillage Dairy Bus Tours

Strip tillage has been adopted by dairy farmers on thousands of acres in the Central Valley.
Come learn about how this system can help you maintain yields, reduce water consumption, and save money.
Bus tours will share farmers' experiences in different counties on the days listed below.

Merced County
Wednesday, August 21st, 2013
9:00 a.m. to 2:00 p.m.

12:30 p.m. Lunch and Program
Bus will leave from and tour will end with lunch at:
California Ag Solutions
3451 Yeager Drive, Madera, CA 93637

Kings County
Thursday, August 22nd, 2013
9:00 a.m. to 2:00 p.m.

12:30 p.m. Lunch and Program
Bus will leave from and tour will end with lunch at:
Giacomazzi Dairy
9550 6th Avenue, Hanford, CA 93230

Additional information to follow upon RSVP. Please let us know by Wednesday, August 14th if you'll be able to join us for either or both days by responding to Ladi Asgill (lasgill@suscon.org, 209-576-7729) or Jeff Mitchell (jpmitchell@ucdavis.edu, 559-646-6565).

Strip-till equipment in action at Giacomazzi Dairy in Hanford, CA.

Field Crop Notes

August 2013

If you would like to receive Field Crop Notes by email notification, please call to add your email address at 559-684-3300 or go to http://cetulare.ucanr.edu/newletters_898819/Field_Crop_Notes_692/ and add your email address to subscribe.

Dry Bean Meeting Agenda – August 27th

Alfalfa and Forage Meeting Agenda – September 5th

Reducing Water and Nitrogen Losses

Will Shortening Your Field Save Water, Nutrients, and Money?

Conservation Tillage Dairy Bus Tours – Merced Co. August 21st, Kings Co. August 22nd

Carol Frate, Farm Advisor
UCCE Tulare County