UC Cooperative Extension
Water Conservation, Alfalfa, Forages, Biofuels and
Other Agronomic Crops Field Day
Thursday, April 17, 2014 at the Desert Research & Extension Center (DREC)

Agenda

7:30 AM: Registration
8:00 AM: Begin Field Day

Stop I**: Sugar Beet, Oil Crops and IR-4**
8:10: Irrigation & fertilizer interactions, **Steve Kaffka (UCD)**
8:25: Oil crops, **Steve Kaffka (UCD)/Nicholas George (UCD)**
8:35: IR-4 what it is & activities, **Brent Boutwell (UCCE Imperial)**

Stop II: **Alfalfa and Irrigation Practices**
8:45: Alfalfa subsurface drip projects, **Khaled Bali (UCCE, Imperial)**, **Dan Putnam (UCD), Oli Bachie (UCCE Imperial)**
8:55: Crop rotation work with alfalfa, **Dan Putnam & Sam Wang (UC DREC)**
9:05: Deficit Irrigation possibilities, **Dan Putnam & Khaled Bali**
9:15 Current research & extension efforts in agricultural water management, **Daniele Zaccaria (UCD)**

Stop III: **Alfalfa Varieties, Sweet Corn**
9:25: Alfalfa varieties, **Dan Putnam**
9:35: Sweet corn and pickling cucumber trials in the low desert, **Sam Wang**

Stop IV: **Wheat, Sorghum, Biofuels, Cotton, Water & Irrigation, & Nematodes**
9:45: Durum wheat , **Oswaldo Chicaiza (UCD)**
9:55: Sorghum forages for California, **Jeff Dahlberg (UC KARE)**
10:05: Environmental costs of purpose-grown sorghum and energy cane as potential lignocellulosic feedstocks, **David Grantz (UC KARE)**
10:15: Simulated cotton crop damage trials, **Oli Bachie**
10:25: Automation of surface irrigation systems, **Khaled Bali, Tom Gill (US Bureau of Reclamation), Dale Lentz (US Bureau of Reclamation) & Jim Conley**
10:35: Commercial automation gate, **Allen Jackson (Rubicon Water) & Khaled Bali**
10:45**:** Irrigation water, **Dean Currie**
10:55: Demonstration of AquaMon–RSVP radio communication and web reporting systems from the SIMAS flood irrigation sensors, **Frank Stempski (Cermetek Microelectronics**)
11:05: Demonstration of cultivator & planter for minimum tillage practices, **Rick Cesena (tillage company, Ceseña Dist., Co**)
11:15: Cyst nematodes of sugar beet, **Oli Bachie**

Stop V: **Olives, Alfalfa Insect Pests**
11:25: Olive production and water use in Imperial Valley, **Khaled Bali**
11:35: Blue alfalfa aphids and control, **Eric Natwick (UCCE Imperial)**
11:45: Insects of Palo Verde, **Vonny Barlow (UCCE Riverside)**

12:00: Lunch

Speaker Biographies

Alan Jackson is an irrigation engineer at Rubicon Water, www.rubiconwater.com

Dale Lents is an Agricultural Engineer at US Bureau of Reclamation, Denver, Colorado

Daniel Putnam, PhD is an Alfalfa and forage crops systems specialist. His specialties include forage quality and utilization, alternative field crops, cellulosic energy crops and crop ecology.

Daniele Zacaria, PhD is an Assistant Cooperative Extension Specialist in the Department of Land, Air and Water Resources at UC Davis. He served as scientific officer at the International Center for Advanced Mediterranean Agronomic Studies in Italy before joining the UC Davis.

David A Grantz PhD, is a UC Plant Physiologist & CE Specialist at Kearney Agricultural Center. His research specialties include Air pollution, Ozone, Environmental Crop Physiology, and Biofuel Feedstocks.

Dean Currie is a Customer Service Coordinator at Imperial Irrigation District, Imperial, CA www.iid.com

Erick Natwick is a UC Coperative Extension Imperial County Entomology Advisor

Frank Stempski is a sales rep/engineer at Cermetek Microelectronics, http://www.cermetek.com/

Guangyao (Sam) Wang, PhD is a UC Cooperative Extension Vegetable Crops Specialist & Director at Desert Research & Extension Center. Prior to this position, Wang served as a cropping systems specialist and assistant professor at the University of Arizona in the Maricopa Agricultural Center.

Jeff Dahlberg, PhD is the director of the UC Kearney Agricultural Research and Extension Center in Parlier, California. He served as research director for the National Sorghum Producers and the United Sorghum Check off Program.

Khaled Bali, PhD is the UC Cooperative Extension Imperial County Director and Irrigation/Water Management Advisor.

Oli Bachie, PhD is a UCCE agronomy advisor for Imperial, Riverside & San Diego Counties. Prior to becoming an Agronomy advisor, he worked as an assistant research specialist for the UC Riverside Department of Nematology.

Oswaldo Chicaiza, PhD is a Staff Research Associate and wheat breeder at the Department of Plant Sciences, UC Davis, www.ucdavis.edu

Rick Cesena is the owner of a tillage company, Ceseña Dist., Co. Stockton Ca. Empresas Ceseña, Mexciali Baja CA.

Stephen Kaffka, PhD is Director of the California Biomass Collaborative and extension specialist in the Department of Plant Sciences at the University of California, Davis. He is chair of the BioEnergy Work Group for the University of California's Division of Agriculture and Natural Resources.

Thomas Gill is an Agricultural Engineer at US Bureau of Reclamation, Denver, Colorado

Vonny Barlow is a UCCE Entomology/IPM /Crop production Advisor for Riverside County

Drip Irrigation of sugarbeet in the Imperial Valley: Can drip irrigation save water and also help improve nitrogen management of sugarbeets? Will it be cost effective?

Steve Kaffka, Khaled Bali, and Oli Bachie[1]

Sugar beets are a deep rooted crop well-adapted to the Imperial Valley. They are planted in fall and harvested starting until April and until mid-July. Average yields are the highest in the world, but water use for full season beets can be high. They are susceptible to root rots in the hot weather at the end of the growing season. Drip irrigation is becoming increasingly more common in the central Valley of California, but is still uncommon in the Imperial Valley. With drought affecting the state and the entire Colorado River System, improved water use efficiency may make drip irrigation a prudent choice in the Imperial Valley. This trial investigates the performance of drip irrigation systems for sugarbeet in the IV.

Table 1. Sugarbeet water use in California (ETc). (data from diverse sources).

	Month												
Location	J	F	M	A	M	J	J	A	S	O	N	D	Total
Dates	in/m												(in/yr)
Central Valley													
4-1 to 10-20				1	3.3	8	9.6	8.3	6	3			39
2-1 to 9-15		0.3	0.8	1.6	5.3	8.9	10	8.4	3				38.1
10-1 to 6-30	1.1	1.9	3.6	5.1	6.3	6.1				2	2.5	2.4	22.3
Imperial Valley	3.2	4.3	5.3	8.4	10	8.9	(8.9)			2	2.5	2.4	47.6 (56.5)

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[1] Department of Plant Sciences, UC Davis; Imperial County Cooperative Extension; Imperial Valley Cooperative Extension.

Drip irrigation has been shown to improve water use efficiency in other crops, and also is correlated with improved yields. Tomato yields especially have improved from the use of drip irrigation. There is a range of observed efficiencies associated with irrigation systems. Drip systems avoid runoff and may reduce losses to tile drainage in the Imperial Valley. Buried drip systems will reduce losses from direct soil evaporation. Crop water use (ETc) will remain the same. Avoided losses may be 10% to 20 % if surface irrigation is inefficiently managed.

Table 2. Range of observed irrigation system efficiencies in California (Hansen, 2011)

Irrigation method	Irrigation efficiency (%)
Gravity (furrow, flood)	70-85
Sprinkle	
Hand-move, wheel-line, solid set	70-80 (low wind)
Center pivot, linear-move	80-90
Micro-irrigation	80-90

Characteristics of different Irrigation systems:

Gravity (surface) irrigation: Low capital cost, low labor cost to operate, difficult to manage efficiently, trial and error approach, Surface runoff can cause water quality problems

Sprinkler irrigation: Moderate capital cost, low to moderate labor costs to operate, easy to manage, efficiency limited by wind effects and sublimation

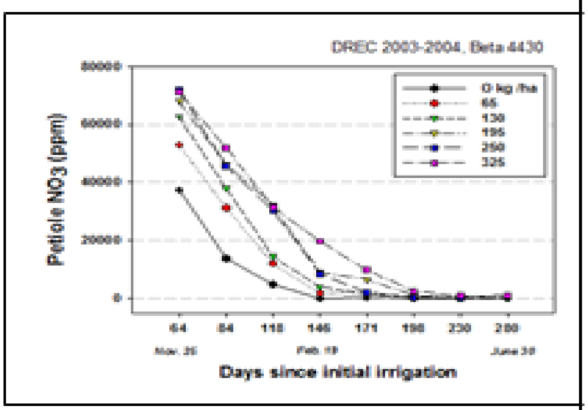
Micro-irrigation (drip): High capital costs, precise application of water throughout a field, moderate labor costs, easy to manage, but maintenance and repairs needed, highly susceptible to emitter clogging.

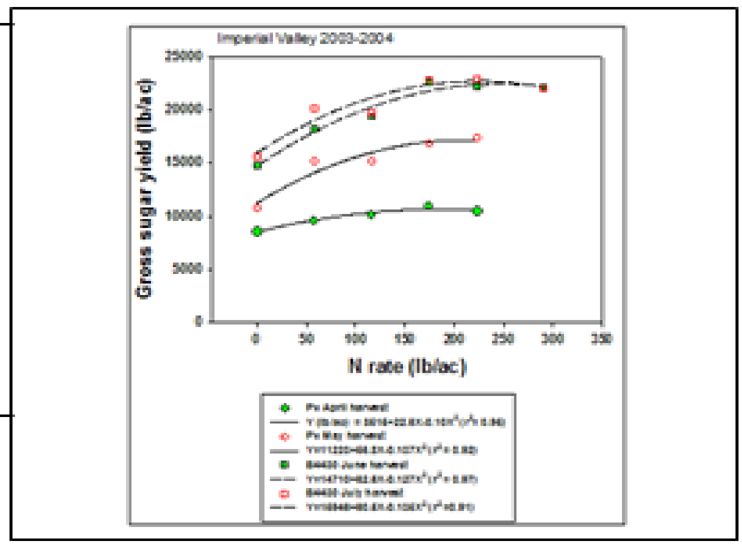
Three levels of drip irrigation are being compared to full irrigation of a set of furrow irrigated plots. Target irrigation amounts are 60%, 80% and 100 % of surface applications (full crop ETc), estimated using CIMIS.

Fig. 1. Plot layout, 2013-14 sugarbeet irrigation trial.

COLUMN	8		7		6		5		4			2		1		
																North
	Drip								Surface		GAP	Drip				
	80%		100%		60%		80%		100%			100%		60%		
ROW		25		21		17		13		9			5		1	
1	160	160	160	160	220	220	0	0	0	0		160	160	220	220	
		26		22		18		14		10			6		2	
2	0	0	0	0	100	100	220	220	100	100		100	100	0	0	
		27		23		19		15		11			7		3	
3	100	100	220	220	0	0	160	160	220	220		0	0	100	100	
		28		24		20		16		12			8		4	
4	220	220	100	100	160	160	100	100	160	160		220	220	160	160	
	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows		6 rows	6 rows	6 rows	6 rows	
	Block 8		Block 7		Block 6		Block 5		Block 4			Block 2		Block 1		

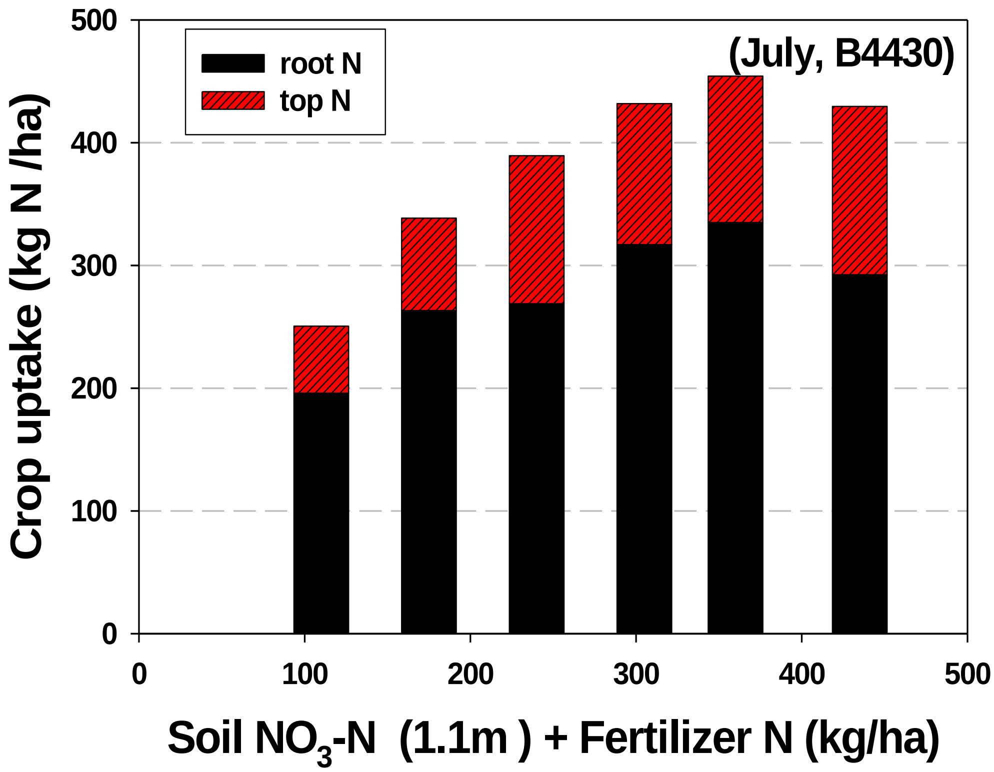
The interaction between irrigation and optimum nitrogen fertilizer is also being evaluated. The proper amount of fertilizer nitrogen depends on the estimated yield and time of harvest and the amount of residual nitrogen present in the field at planting. Proper fertilization of sugarbeet is challenging. The crop is in the field for 7 to 10 months, it is deep rooted and efficient at recovering fertilizer left behind by previous crops, and should be nitrogen deficient at harvest to ensure high sugar contents in roots and plow levels of impurities which interfere with sugar extraction at the factory. Drip irrigation systems should make in-season fertilizer application much more effective than water-run applications, and allow farmers to cut back on fertilizer early in the season and apply fertilizer as needed during the season, reducing total amounts applied.





Petiole nitrate data from earlier work at the DREC in Holtville California. Optimum N fertilizer levels applied at side dressing in this trial were approximately 220 lbs N/ac. Petiole NO3 levels became deficient approximately 10 weeks before harvest and resulted in high sugar yields, similar to the behavior observed in growers' fields that same year. Lower N rates resulted in yield losses, while higher rates were ineffective and increased impurities (not shown).

Drip irrigation may make the ***petiole testing system*** a more effective guide to in-season fertilization.



Crop nitrogen uptake from previous work in the Imperial Valley at the DREC. (Kaffka, Sugarbeet Fertilizer Management in the Imperial Valley_UC ANR- 80xx, forthcoming).

Other potential benefits of drip systems:

Root Rots are common in the Imperial Valley late in the season, especially during extremely hot weather, when the need to irrigate also can stimulate rots. Sometimes whole fields are abandoned. After harvest in July, we will continue irrigating beets in this trial until early August, to test whether or not drip irrigation reduces root rots in late season beets. If drip irrigation reduces rots, it might be preferentially used for later season crops. It may also be possible to apply systemic pesticides for later season insect control through the drip system and reduce the amounts used and losses to surface water and worker exposure.

Winter oilseeds as alternative crops for California

Nicholas George, Joy Hollingsworth, Oli Bachie & Steve Kaffka

Winter crops are advantageous for California farmers because they grow during times of lower transpiration and can make use of rainfall, however California has few economically viable cool-season crops. Canola (*Brassica napus*) and camelina (*Camelina sativa*) are oilseed crops that could diversify winter rotations. Our project, funded by UC ANR, is evaluating the potential of these species as crops for California growers.

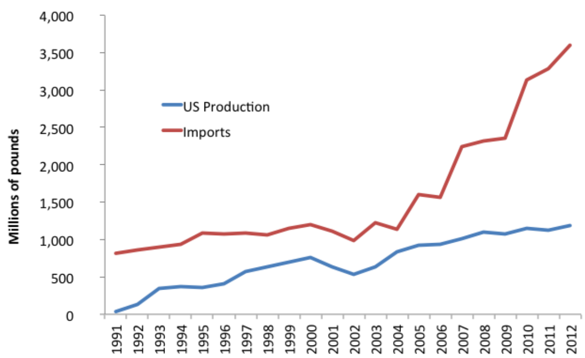
Young camelina & canola, Paso Robles.

Canola in full bloom, Davis.

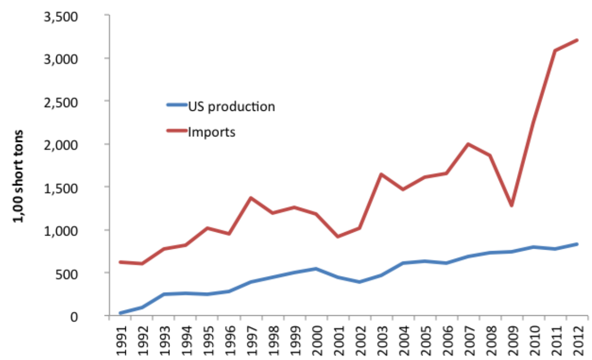
Camelina ready for harvest, Five Points.

Harvesting canola, DREC, Holtville.

Canola is the third most important oilseed globally, with well-established industries in Canada, Europe and Australia. It is frequently used as a break-crop to diversify otherwise cereal-dominated cropping systems. Canola has several markets that could be exploited by California growers including food grade oil, biodiesel production and livestock feed. Prices for canola seed in early April range from $450 to $500 per ton. Seed oil content varies from 38% to 45%. The cost of production will be approximately similar to wheat. Current demand for both canola oil and seed meal in the United States exceeds domestic production so there is scope to meet more of this demand using local production.



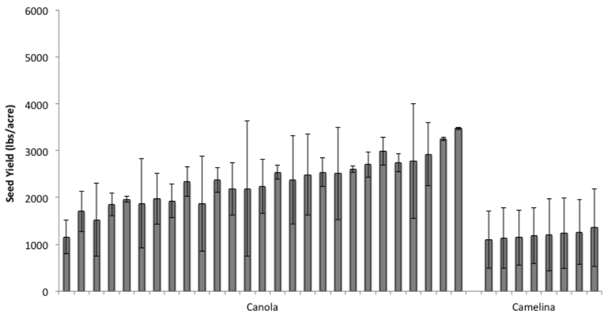
US canola oil production vs imports



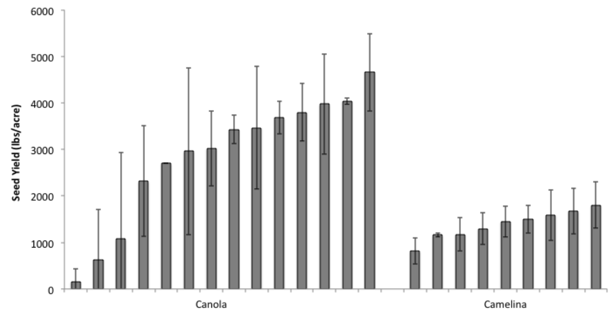
US canola seed meal production vs imports

Relative to other oilseeds, canola has received the greatest research and development effort and is generally the highest yielding, but canola can be unreliable in medium to low rainfall conditions and there are also regions of the state where canola may not be compatible with existing rotations. Camelina can be planted later and matures sooner than canola, and yields more reliably under dry and low nutrient conditions. It may be an alternative option for some growers.

In the 2013-14 season our research group planted 34 canola varieties and 9 camelina varieties at the Desert Research and Extension Center. The figure below shows the trial performance relative to the average yield achieved at four sites in the 2013-13 season. To protect intellectual property the variety names are not given. Twenty varieties of canola did poorly, producing no harvestable seed due to heavy lodging, immaturity or uneven seed ripening. Fourteen canola varieties produced harvestable seed, and a number of these performed exceptionally well, with the best canola variety producing close to 5000 lbs/acre. By way of comparison the average canola yield in North America is around 1800 lbs/acre. The camelina varieties all produced harvestable seed, with yields of between 1000 and 2000 lbs/acre, which is approximately average for camelina in the state.



Average canola & camelina yields across four sites in California 2012-2013



Average canola & camelina yields at the DREC 2013-2014

SUBSURFACE DRIP IRRIGATION (SDI) EXPERIMENTS ON ALFALFA

Dan Putnam, Khaled Bali, Aliasghar Montazar, Daniele Zaccaria, UCCE and UC Davis

Field Crops Field Day, April 17, 2014, El Centro, CA

Introduction. Irrigated alfalfa is the largest water user in California and most other western states (Table 1), thus multiple efforts to improve water use efficiency (WUE) are important for this crop. Drip irrigation is a well-known technology with important advantages in terms of distribution uniformity, irrigation scheduling, and (potentially) water savings through lower loss below the root zone and losses due to runoff. In the case of alfalfa, surface drip is impractical, but subsurface drip irrigation (SDI) could be considered. However, currently less than 1% of farms use SDI on alfalfa fields. In recent years, however, there has been increased interest in the viability of this technique. In several studies across California, we are interested in how SDI compares with check flood systems in yield and irrigation efficiency, as well as how schedules can be managed, and the general viability of the approach.

Table 1. Applied water of major California crops in a 3-year period (1998 (wet), 2000 (ave), 2001 (dry).

Crop	Applied Water (AF x 1,000)	Percent of Total Ag. Water Use
Potato	86	0.3%
Safflower	87	0.3%
Tomato (Fresh)	105	0.4%
Dry Bean	245	0.9%
Onion/Garlic	260	0.9%
Sugarbeet	284	1.0%
Curcurbits	292	1.1%
Other Field Crops (incl. sudan)	501	1.8%
Tomato (Processing)	748	2.7%
Grain	1,025	3.7%
Subtropical Tree (citrus)	1,295	4.7%
Other Truck	1,440	5.3%
Vine	1,569	5.7%
Corn (~80% silage)	*1,673*	*6.1%*
Other Decid. Tree	2,113	7.7%
Almond/Pistachio	2,113	7.7%
Cotton	2,277	8.3%
Rice	2,685	9.8%
Pasture (incl. grass hay)	*3,318*	*12.1%*
Alfalfa	*5,301*	*19.3%*
Total Crop Use	**27,417**	**100.0%**

Our Objectives:

1. To understand the yield impacts of SDI compared with surface irrigation systems.
2. To measure the differences in water use under the different systems.
3. To develop rodent management strategies for SDI
4. To document grower experiences with SDI so that others may learn

Approach: Field Experiments were established at El Centro to compare SDI with surface systems. This is designed to measure yield differences over a 3 year period. Additionally, we will be monitoring several SDI fields in California to understand how the system is working on-farm. Specific adaptations, for example spacing, depth, different irrigation schedule will be observed, and data collected. Key issues are irrigation scheduling, spacing and depth, strategies to control gophers, and economics.

What are the key known (potential) advantages of SDI in alfalfa?

- Higher yield possibilities (20-35% higher yields have been measured)
- Excellent Distribution Uniformity if spacing optimized
- More rapid application of water during irrigation (hours vs. days)
- Ability to fertigate with precise measurements of fertilizers

CHARACTERIZING THE NITROGEN BENEFITS OF ALFALFA ROTATIONS

Dan Putnam (dhputnam@ucdavis.edu), Chris DeBen, Eric Lin, UC Davis, and Sam Wang, UC Desert Research and Extension Center, El Centro, CA.

UC Desert Research and Extension Center Crops Field Day, April 17, 2014

How much Nitrogen Does Alfalfa Produce? Alfalfa produces a surprisingly high quantity of nitrogen (N) per year, the most likely range from about 400 lbs to 700 lbs N per acre in California depending upon yield and crude protein concentration of the crop (Table 1). Most of this N is removed in the crop, but some portion remains to benefit the subsequent crop. Virtually all (likely over 80-90%) of this originates from the atmosphere through biological N_2 fixation. This is valuable since alfalfa requires zero fertilizers, but it also valuable to meet the N needs of a subsequent crop in rotation. But how much "N-credit" should be given to a grain crop in rotation?

Table 1. Crop removal of Nitrogen at different alfalfa yield and protein levels. Shaded area indicates most likely range for California Central Valley locations.

	Crude Protein of Alfalfa Forage					
	16	18	20	22	24	26
	%Nitrogen in Forage					
Tonnage	2.56%	2.88%	3.20%	3.52%	3.84%	4.16%
(t/a)	Crop Removal of N					
	lbs N/acre					
1	51	58	64	70	77	83
5	256	288	320	352	384	416
6	307	346	384	422	461	499
7	358	403	448	493	538	582
8	410	461	512	563	614	666
9	461	518	576	634	691	749
10	512	576	640	704	768	832
11	563	634	704	774	845	915
12	614	691	768	845	922	998

Shaded area representas most likely outcome

Rotation Studies in California: Over the past several years, we have been conducting rotation studies with alfalfa. Our objectives were to develop an 'N credit' recommendation for N fertilizers in non-legumes rotated with alfalfa. Locations are Davis (Yolo County), Parlier (Fresno County) and Tulelake (Siskiyou County). The first data is coming off of the plots this spring, and it will continue through 2014 and 2015.

Analysis: Rotation Effects between crops are complex. Rotation is generally thought to be highly beneficial, since disease cycles are interrupted, weed infestations may differ, in addition to the nutrient benefits of a legume-non-legume rotation. In this study, we may be able to differentiate between an "N-effect' and the "non-N" effects of rotation, as per the graph shown (Figure 1). The non-N effects may be shown by some increase (or decrease) in wheat yields, even after the full N needs of the crop are met in the alfalfa-wheat rotation compared with the grains-wheat rotation. There are also possibly some negative effects, such as allelopathy from a rotated crop.

So far, observations on our field plots in Kearney and Davis show significant benefit from a alfalfa-wheat rotation compared with a grains-wheat rotation (rotation of wheat/Sudangrass/wheat). Severe yellowing was observed in the zero N plots following wheat compared with bright green plots in the alfalfa-wheat zero N plots. There was a small response to N fertilization in the alfalfa-grain rotation while a very large response in the grain-grain rotation. We'll wait for the final yields to quantify the N benefits of this rotation in 2014, and again in 2015.

Rotation Studies in Arizona: The main objective of the experiments in Maricopa, AZ was to study the effects of alfalfa and tillage on following durum wheat under different N rates. Four rates of N fertilizer (0, 30, 60, 90 lb/acre) was applied at 3-4 leaf stage of durum wheat. All plots were applied with 60 lb/acre of N at each of jointing, booting, and flowering stage. This experiment potentially shows the non-N effects of rotations since there was still a benefit to rotations at 270 lbs/a N applications.

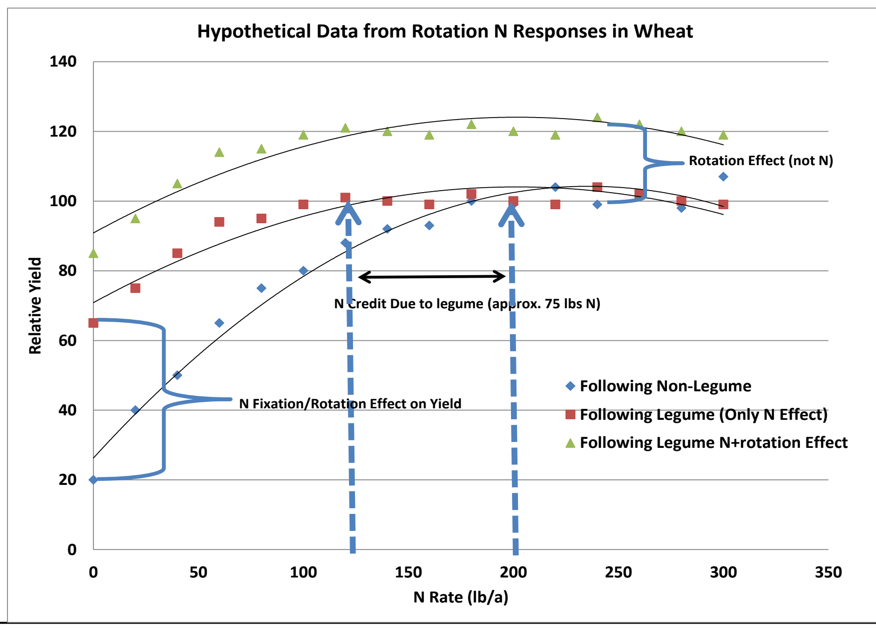


Figure 1. Hypothetical results of wheat fertilized at different rates following a non-legume (blue diamond) vs. legume crop (red squares). If rotations are beneficial, the N and rotation benefit can be seen at zero N. The difference between optimum yield without rotation vs. with rotation can be considered the N benefit, in this case 75 lbs/acre. The green triangle represents a hypothetical curve where rotation effects (beyond N) are influencing crop yield (such as soil tilth and other effects), which is often seen in rotation studies.

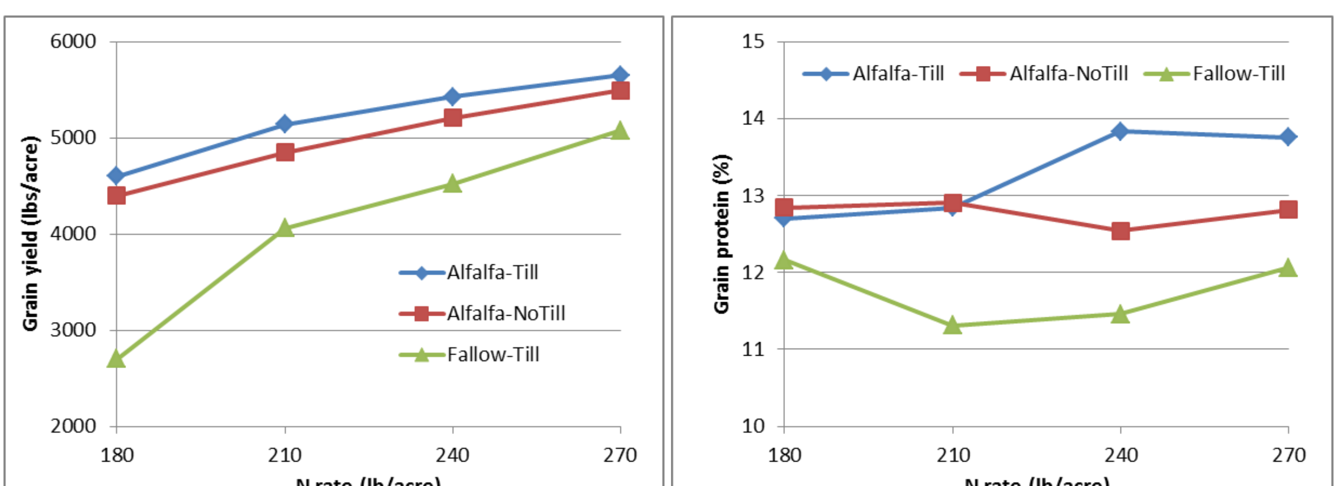


Figure 2. Tillage & N effects on durum wheat yield and grain protein at Maricopa, AZ in 2009 (Sandy loam soil)

University of California
Agriculture and Natural Resources

RESEARCH AND EXTENSION EFFORTS IN AGRICULTURAL WATER MANAGEMENT

UC Desert Research & Extension (DREC)

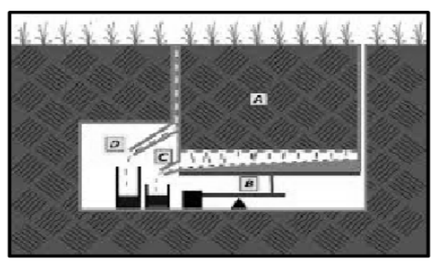
April 17th, 2014

Daniele Zaccaria
UC Cooperative Extension Specialist
Ph.: 530-219 7502   dzaccaria@ucdavis.edu

RESEARCH PROJECTS/PROPOSALS

(DWR) Measuring alfalfa water use (ETr) by weighing lysimeter

D. Zaccaria, R. Snyder, D. Putnam, K. Little

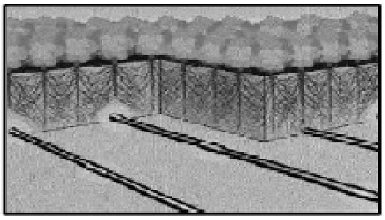


OBJECTIVES

1) Measure ET of alfalfa by weighing lysimeters, eddy covariance and surface renewal methods, under optimal agronomic conditions and typical weather conditions of the Central Valley of California.
2) Evaluate the standardized reference ASCE-EWRI equation for ET_r (Allen et al., 2005), under the climatic conditions of the Central Valley of California.
3) Determine the values of crop coefficient (K_{cr}) relative to ET_r and ET_o for the different growth stages of alfalfa.
4) Improve our knowledge of alfalfa evapotranspiration (and yield) to improve irrigation scheduling for alfalfa growers in California.

(DWR-ANR) Subsurface Drip Irrigation for Alfalfa to Improve W.U.E. and Protect Water Quality

D. Putnam, R. Baldwin, K. Bali, D. Zaccaria

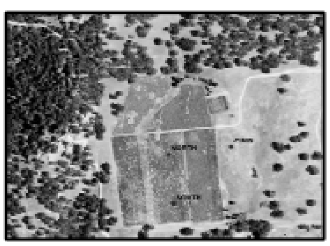


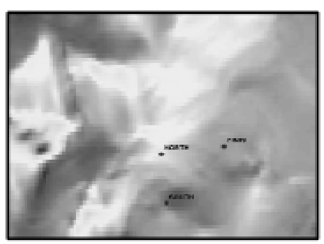
<u>Project Objectives</u>:

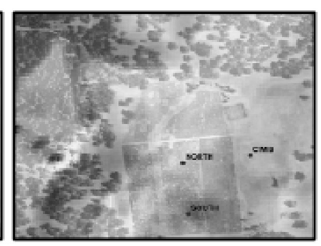
1) To develop and improve pocket gopher management strategies which would enhance the viability of SDI in alfalfa.
2) To develop a documented learning network for growers who are implementing SDI in alfalfa fields.
3) To compare SDI methods with check flood irrigation in terms of water use, yield, viability, and efficiency.

Measuring actual water use (ETc) of vineyards with different slopes & aspects

R. Snyder, D. Zaccaria, K. Shackel, L. Wunderlich

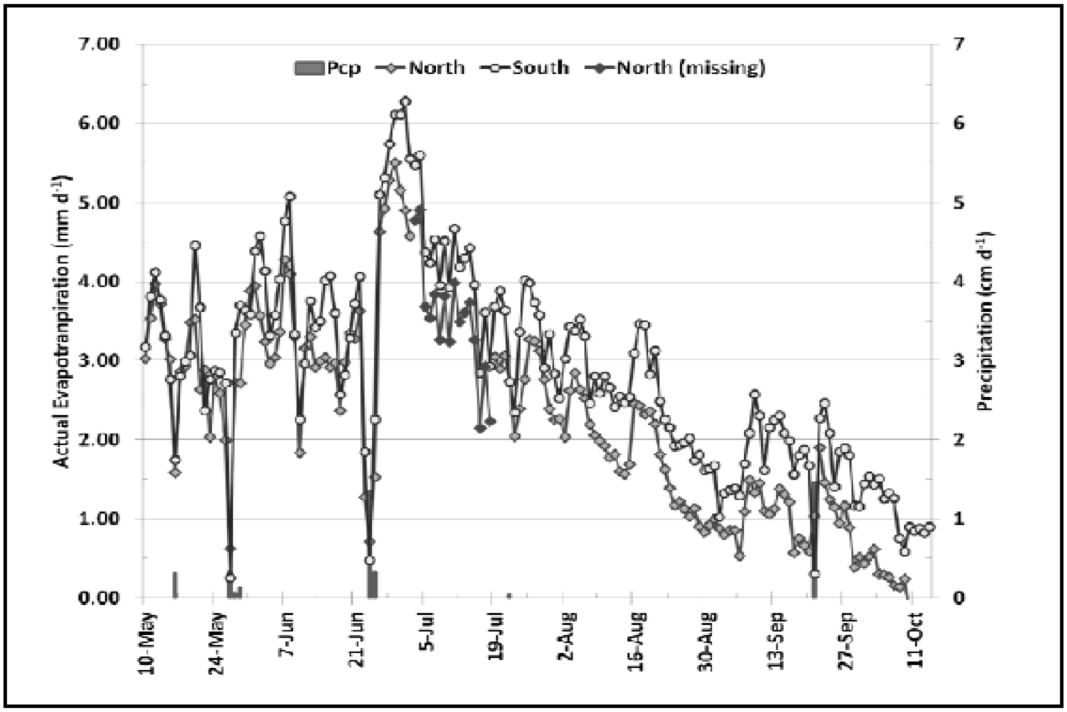




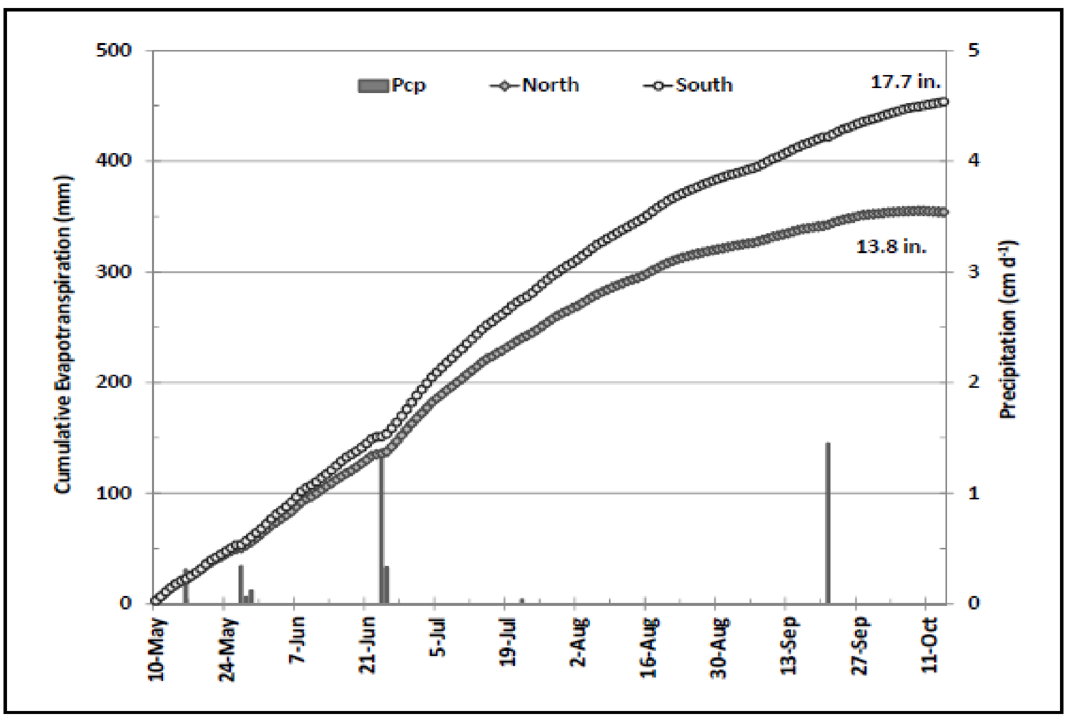


<u>Project Objectives</u>:

1) Assessing difference in water use by vineyards with north-facing and south-facing aspects, under normal water management practices, using the surface renewal method.
2) Measuring the Kc of north and south-facing vineyards in the different growing stages;
3) Correlating the vineyards water use with the cumulative solar radiation and light interception by the canopy in north and south-facing vineyards



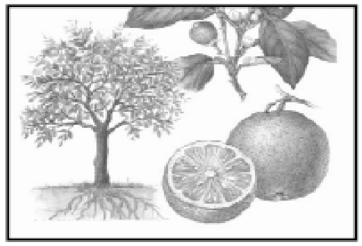
Pcp
North
South
North (missing)
Actual Evapotranpiration (mm d-1)
Precipitation (cm d-1)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
7
6
5
4
3
2
1
0
10-May
24-May
7-Jun
21-Jun
5-Jul
19-Jul
2-Aug
16-Aug
30-Aug
13-Sep
27-Sep
11-Oct



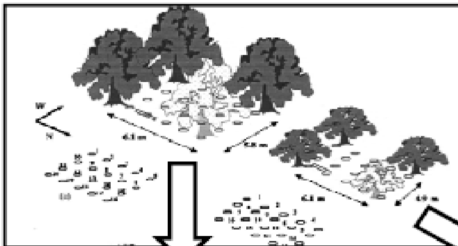
Pcp
North
South
17.7 in.
13.8 in.
Cumulative Evapotranspiration (mm)
Precipitation (cm d-1)
500
400
300
200
100
0
5
4
3
2
1
0
10-May
24-May
7-Jun
21-Jun
5-Jul
19-Jul
2-Aug
16-Aug
30-Aug
13-Sep
27-Sep
11-Oct

(DWR?) Water use in citrus orchards

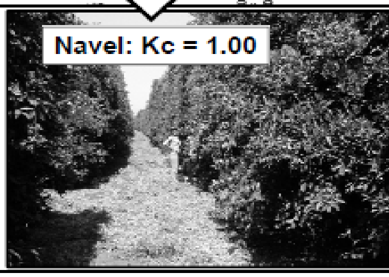
R. Snyder, N. O'Connell, B. Faber,
D. Zaccaria, B. Lampinen

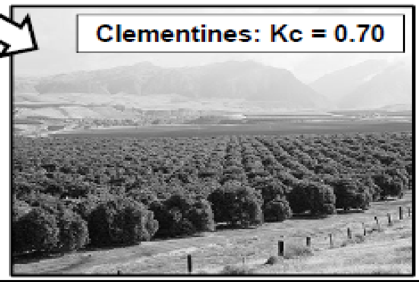


Large canopy vs. High-density



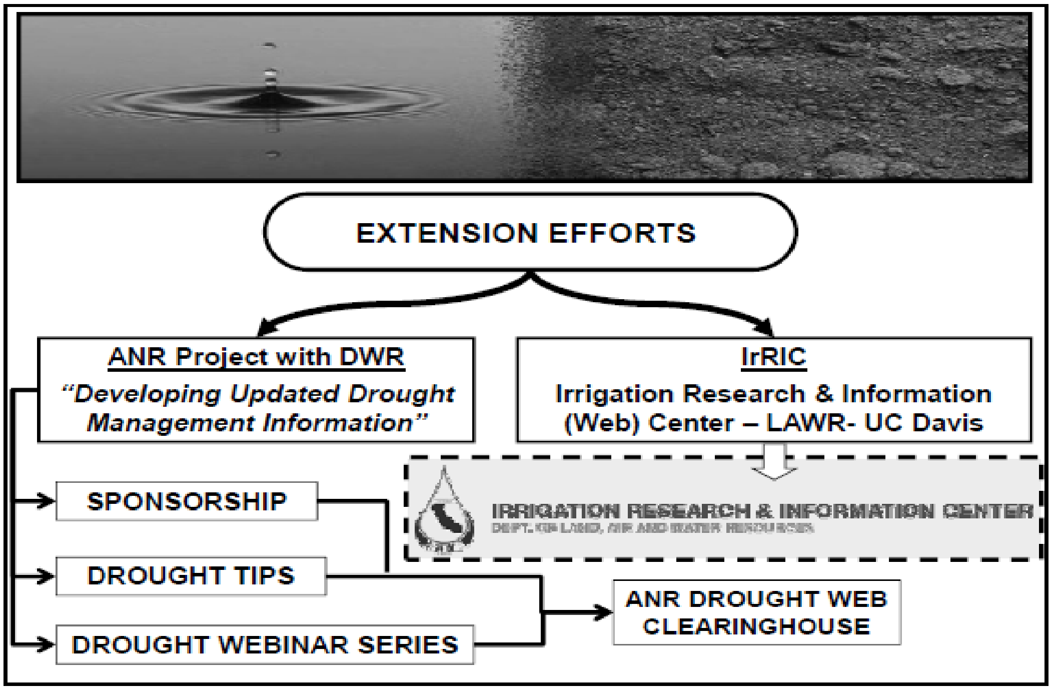
East-West vs. North-South rows





<u>Project Objectives</u>:

1) investigating relations between canopy features (tree density, canopy size, and orientation) and light interception in traditional and high-density citrus orchards with different tree rows orientations (north-south versus east-west) under frequent micro-irrigation methods;
2) characterizing the relationship between fractional canopy cover, light interception, and water use (ETc and Kc) in such orchards;
3) provide citrus growers with a simplified method to schedule irrigations by relating water use and canopy cover in different tree-rows orientations in the climate of the San Joaquin Valley;
4) evaluating irrigation systems performance, and irrigation practices with citrus growers to enhance irrigation adequacy and distribution uniformity;
5) demonstrating the benefit of efficient irrigation to citrus growers.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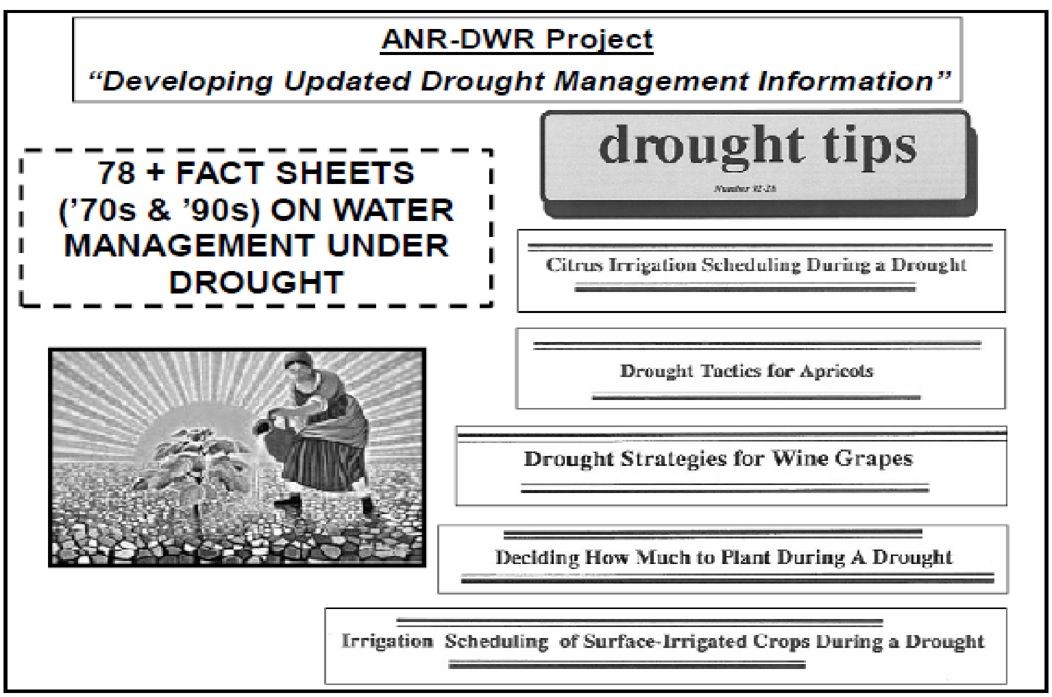
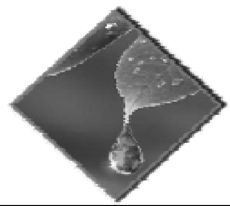
DROUGHT WEBINAR SERIES
IRRIGATION RESEARCH & INFORMATION CENTER
ANR DROUGHT WEB CLEARINGHOUSE

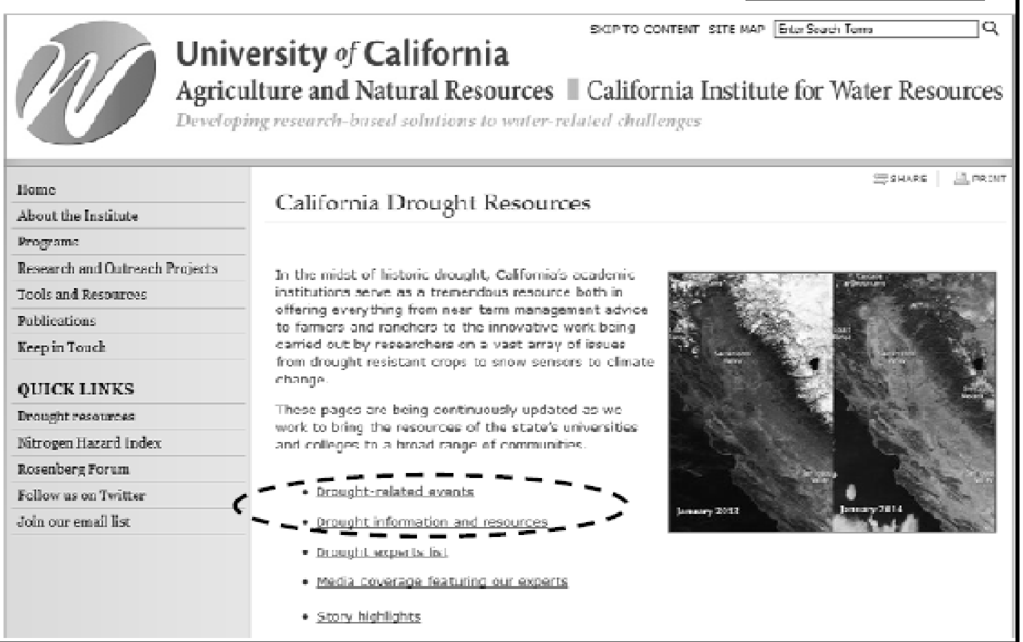

ANR-DWR Project
"Developing Updated Drought Management Information"
78 + FACT SHEETS ('70s & '90s) ON WATER MANAGEMENT UNDER DROUGHT
drought tips
Citrus Irrigation Scheduling During a Drought
Drought Tactics for Apricots
Drought Strategies for Wine Grapes
Deciding How Much to Plant During A Drought
Irrigation Scheduling of Surface-Irrigated Crops During a Drought

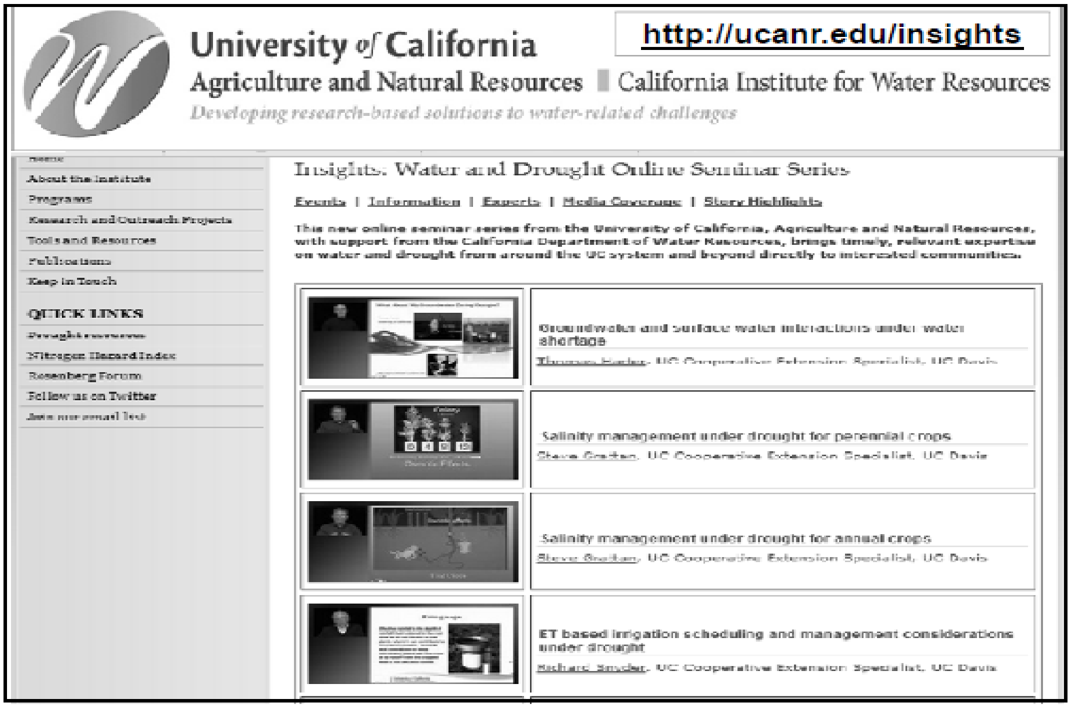
ANR–DWR Project *“Updating Drought Management Information”*

- **Rationale**: a) Drought cannot be considered as “unexpected”
  b) increase in frequency and severity in years to come
- **Objectives**: #) Updating information on drought management
  #) Making updated information available to large audience
- **Deliverables**: 1) Update drought fact sheets relevant to growers (20-30)
  2) Develop a new set of drought publications (5-10)
  3) A set of peer-reviewed 8000-series publications (5-10)
  4) A drought information clearinghouse website



ANR - DROUGHT WEB CLEARINGHOUSE => ciwr.ucanr.edu

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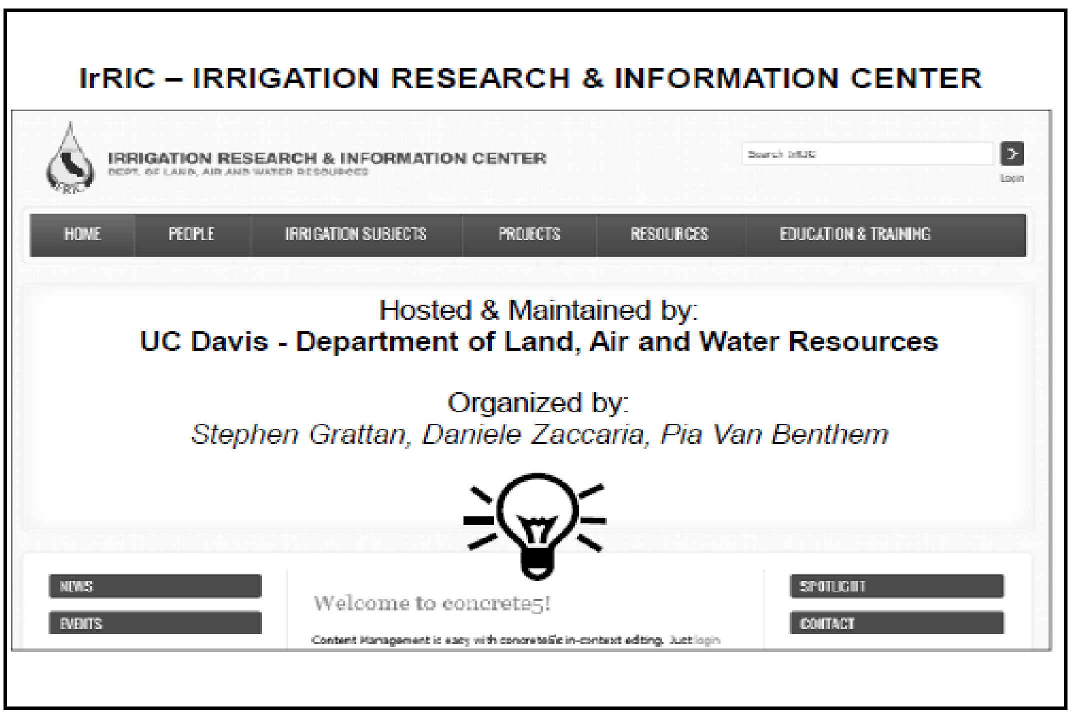
Groundwater and surface water interactions under water shortage
Salinity management under drought for perennial crops
Steve Grattan, UC Cooperative Extension Specialist, UC Davis
Salinity management under drought for annual crops
Steve Grattan, UC Cooperative Extension Specialist, UC Davis
ET based irrigation scheduling and management considerations under drought
Richard Snyder, UC Cooperative Extension Specialist, UC Davis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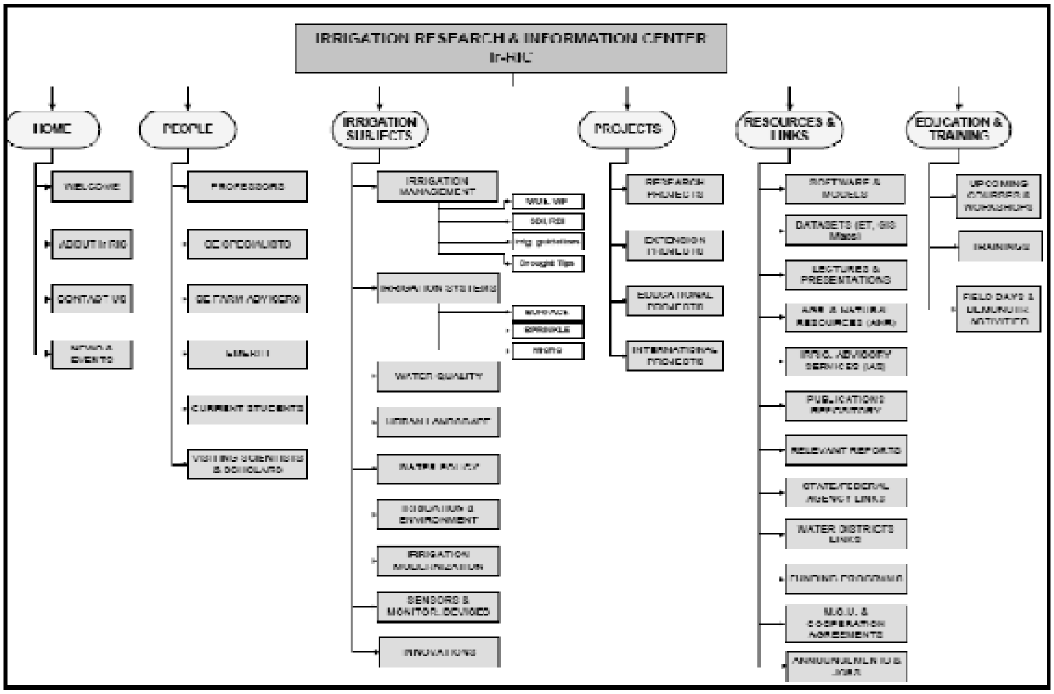
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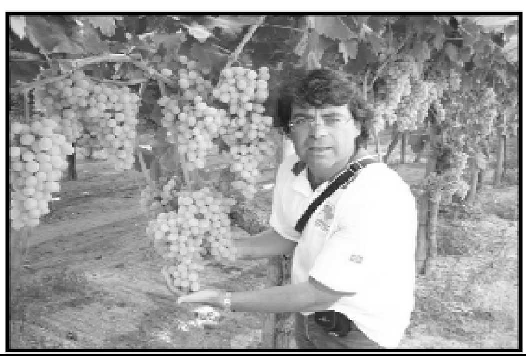
THANK YOU!!


STOP



Field Day, El Centro, April 17, 2014

UC ALFALFA VARIETY RESEARCH

Dan Putnam and Oli Bachi, UC Davis and UCCE.

Almost like getting married! Choosing a variety is a little like getting married - after all, you'll need to live with that decision for a long time. Why not take a little time to determine whether an alfalfa variety is a good one?

El Centro Trials: A University of California Variety trial was planted in 2012 on the heavy soils at the Desert Research and Extension. This is a part of the state-wide variety evaluation testing, which has 8 locations in California.

Which variety to choose? Growers often choose cultivars based upon promotion, price or habit. However, the choice of a variety can make a large long-term difference in profitability. Spending just a few minutes to carefully consider choice of variety may be beneficial, since 1) Cultivars can have a large impact upon yield, 2) Varieties can help cope with diseases or insects, and 3) Growers are 'stuck' with their choice for many years.

UC Variety Testing Program. The University of California provides an independent source of variety information that can be used to judge performance of alfalfa varieties. We have plots at Tulelake and Scott Valley (Intermountain), Davis, Modesto and Kearney and West Side (Central Valley), and El Centro (Desert).

Yields are important, but are not the only criteria for variety selection. Take a look at fall dormancy, disease resistance, and the quality characteristics, too. Research is continually underway to improve the performance of alfalfa varieties.

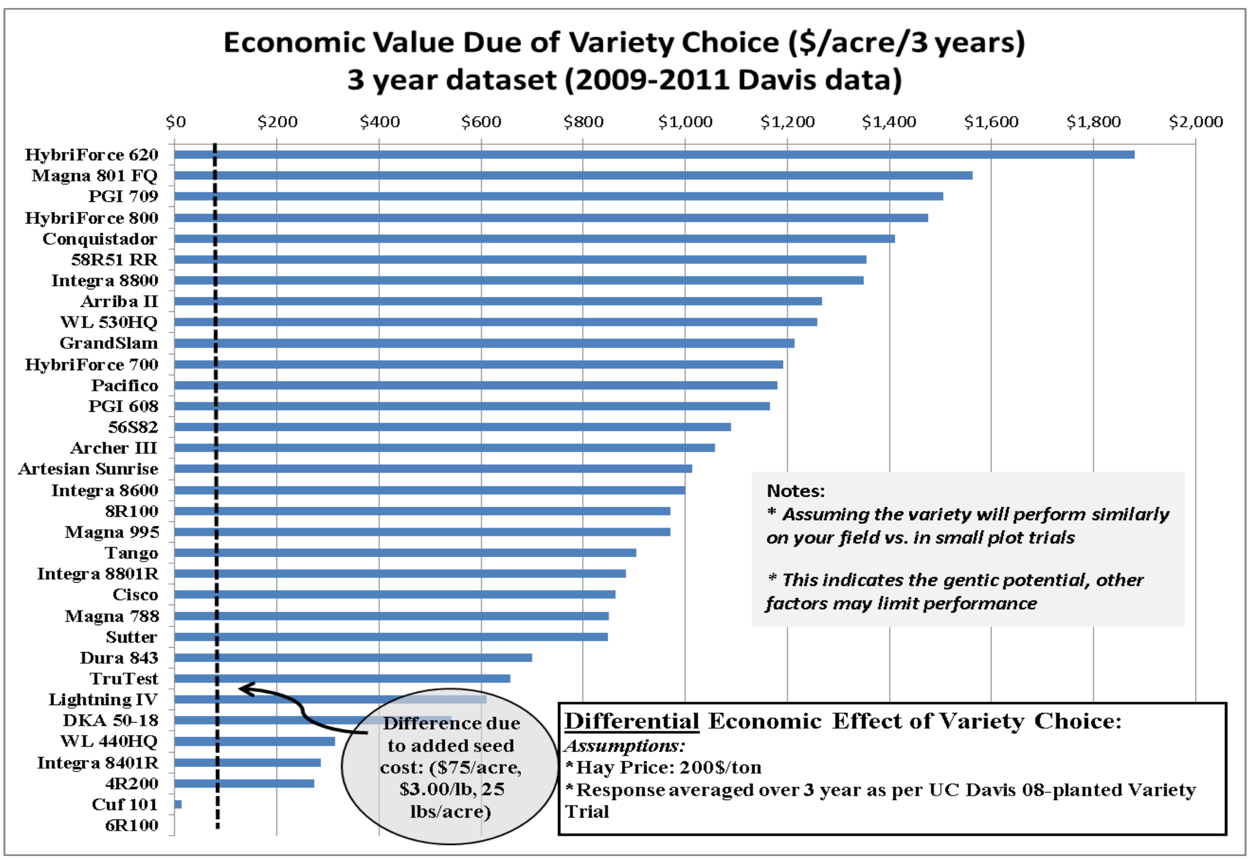
Many thanks to California Crop Improvement Association and alfalfa seed companies for funding the UC alfalfa variety work

Variety Choice – Does it pay?

See:

http://alfalfa.ucdavis.edu , for current variety information

You Bet. Although sometimes varieties don't appear to be very different, economically, they often are. Walking into a large alfalfa field, one cannot tell whether the variety is the best or not- only when they are planted side-by-side in strips or in these UC small plot trials. The choice of variety makes a sizeable difference. The maximum difference between the highest and lowest yielding varieties at Davis or Kearney has been about 3 tons/acre/year, but even among the better varieties, there are some important (but smaller) yield differences. Here, we've calculated the gross economic return (below) based only upon the differences between the varieties (e.g. a 2 ton difference is about $400/year or $1200/3 years). Even if an improved alfalfa seed were $3/lb more than a 'run-of-the-mill' variety, it would still be worth it if that variety yielded more, since only $75/acre is required for the cost of that seed (at 25 lb/a seeding rate). Growers often pay too much attention to seed price, and should instead pay more attention to how that variety performs.



Suggested minimum alfalfa cultivar pest resistance and fall dormancy ratings[1]

for alfalfa pests found in six California climate zones[2].

Zone[2]	FD	SAA	PA	BAA	PRR	BW	FW	San	Stn	RKN	VW
Intermountain	2—4	S	R	MR	R	R	HR	R	HR	R	R
Sacramento Valley	4—8	MR	HR	HR	HR	MR	HR	R	R	R	R
San Joaquin Valley	7—9	R	HR	HR	HR	MR	HR	R	HR	HR	R
Coastal	5—7	MR	HR	HR	HR	MR	HR	R	HR	HR	R
High Desert	4—7	R	R	R	R	MR	HR	MR	HR	HR	R
Low Desert	8—10	HR	HR	HR	HR	S	HR	HR	R	HR	S

[1] Pest Resistance abbreviations described below.

NOTE: These pest Resistance Ratings were originally developed by Dr. Vern Marble, Extension Agronomist, UC Davis, based upon decades of experience with alfalfa variety response in various locations in California.

[2] Zones correspond to the principle regions of alfalfa Production in California.

Resistance Abbreviations		**Percent resistance[1]**
HR	Highly Resistant	>51%
R	Resistant	31-50%
MR	Moderately Resistant	15-30%
LR	Low Resistant	6-14%
S	Susceptible	<5%

T	Tolerance	(see definition)

[1] Percent of plants in a population resistant to a given pest

Steps for Choosing Alfalfa Varieties:

1) Choose group of high yielding certified varieties from relevant trials.
2) Determine Fall Dormancy requirements and preference.
3) Determine pest resistance requirements for your area (emphasize those you expect).
4) Consider Biotech Traits (e.g. RR alfalfa)
5) Look for evidence of better persistence
6) Consider Forage quality
7) Price/availability, and of course, hats

2013 YIELDS, UC IMPERIAL VALLEY ALFALFA CULTIVAR TRIAL. TRIAL PLANTED 10/8/2012

Note: Single year data should not be used to evaluate alfalfa varieties or choose alfalfa cultivars

		Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Cut 6	Cut 7	Cut 8	Cut 9	YEAR		% of
		21-Feb	4-Apr	2-May	3-Jun	1-Jul	30-Jul	4-Sep	10-Oct	10-Dec	TOTAL		CUF 101
	FD					Dry t/a							%
Released Varieties													
AmeriStand 901TS(Opt)	9	1.5 (13)	2.3 (4)	2.0 (9)	2.7 (2)	2.5 (2)	1.7 (3)	1.3 (4)	0.9 (22)	1.1 (9)	16.0 (1)	A	106.4
Un Padre	9	1.7 (2)	2.3 (6)	2.0 (12)	2.5 (13)	2.4 (8)	1.6 (9)	1.2 (8)	1.0 (2)	1.2 (2)	15.7 (4)	A B C D	104.8
Highline	9	1.6 (9)	2.2 (12)	2.0 (19)	2.5 (11)	2.4 (5)	1.7 (4)	1.2 (11)	0.9 (13)	1.1 (16)	15.5 (5)	A B C D E	103.0
Tres Padres	9	1.7 (1)	2.3 (5)	2.1 (3)	2.5 (12)	2.2 (25)	1.4 (30)	1.1 (28)	1.0 (8)	1.1 (6)	15.3 (6)	A B C D E F	101.9
FGI 96T706	9	1.6 (10)	2.2 (27)	1.9 (25)	2.5 (15)	2.3 (12)	1.6 (5)	1.2 (16)	1.0 (5)	1.1 (18)	15.2 (8)	A B C D E F G	101.4
Catalina	9	1.4 (30)	2.2 (24)	1.9 (27)	2.4 (24)	2.5 (1)	1.7 (2)	1.2 (10)	1.0 (10)	1.0 (27)	15.2 (9)	A B C D E F G	101.4
Westar	9	1.6 (8)	2.1 (34)	2.1 (2)	2.6 (3)	2.4 (3)	1.5 (16)	1.1 (21)	0.7 (36)	1.0 (25)	15.2 (10)	A B C D E F G	101.4
Excelente HQML	9	1.5 (23)	2.3 (3)	2.0 (15)	2.5 (8)	2.3 (16)	1.5 (20)	1.2 (13)	0.8 (31)	1.2 (1)	15.2 (11)	A B C D E F G	101.4
CW 1010	9	1.4 (28)	2.2 (13)	2.0 (8)	2.5 (17)	2.4 (4)	1.6 (6)	1.1 (22)	0.9 (21)	1.1 (13)	15.2 (12)	A B C D E F G H	101.2
UC Cibola	9	1.5 (18)	2.2 (25)	2.0 (7)	2.6 (4)	2.3 (9)	1.6 (15)	1.2 (17)	0.9 (16)	1.0 (32)	15.2 (13)	A B C D E F G H	101.2
Excelente Plus	9	1.5 (21)	2.3 (2)	2.0 (18)	2.6 (5)	2.2 (24)	1.5 (24)	1.2 (15)	0.8 (29)	1.2 (2)	15.2 (14)	A B C D E F G H	101.1
Sun Quest	6	1.5 (20)	2.2 (14)	1.9 (23)	2.4 (20)	2.2 (26)	1.5 (17)	1.3 (3)	0.9 (23)	1.1 (7)	15.1 (15)	B C D E F G H	100.5
Excelente 11	9	1.5 (11)	2.3 (8)	2.0 (5)	2.5 (7)	2.2 (27)	1.5 (22)	1.1 (31)	0.8 (24)	1.1 (10)	15.0 (16)	B C D E F G H	100.1
FGI 118T816	9	1.5 (24)	2.1 (30)	1.8 (35)	2.3 (34)	2.3 (13)	1.7 (1)	1.2 (14)	1.1 (1)	1.1 (19)	15.0 (17)	B C D E F G H	100.1
WL 656HQ	6	1.4 (26)	2.1 (32)	1.9 (20)	2.6 (6)	2.2 (19)	1.6 (11)	1.2 (7)	0.8 (24)	1.1 (17)	15.0 (19)	B C D E F G H	100.0
Cuf 101	9	1.5 (25)	2.2 (29)	1.9 (21)	2.5 (9)	2.3 (15)	1.6 (14)	1.1 (23)	0.9 (11)	1.1 (20)	15.0 (20)	B C D E F G H	100.0
FGI 106T701	9	1.5 (16)	2.2 (11)	2.0 (6)	2.5 (17)	2.3 (11)	1.5 (21)	1.1 (32)	0.9 (17)	1.0 (31)	15.0 (21)	C D E F G H	99.7
CW 080046	9	1.3 (34)	2.2 (20)	2.0 (14)	2.5 (10)	2.3 (14)	1.6 (12)	1.2 (9)	0.9 (15)	1.0 (29)	15.0 (22)	C D E F G H	99.6
WL 712	10	1.6 (4)	2.3 (7)	2.0 (10)	2.5 (14)	2.2 (18)	1.4 (33)	1.1 (24)	0.8 (33)	1.1 (11)	15.0 (23)	C D E F G H	99.5
AmeriStand 901TS	9	1.5 (22)	2.2 (26)	1.9 (28)	2.4 (23)	2.4 (6)	1.6 (7)	1.1 (27)	0.9 (18)	1.0 (34)	14.9 (24)	D E F G H I	99.3
4N900	9	1.5 (12)	2.2 (28)	2.0 (16)	2.4 (25)	2.2 (20)	1.5 (18)	1.1 (29)	0.9 (18)	1.0 (22)	14.8 (26)	E F G H I	98.6
UC Impalo	9	1.5 (14)	2.2 (19)	1.9 (33)	2.3 (30)	2.2 (28)	1.5 (27)	1.2 (19)	1.0 (9)	1.1 (8)	14.8 (27)	E F G H I	98.5
Saltana	9	1.5 (19)	2.2 (22)	1.9 (31)	2.4 (22)	2.2 (29)	1.6 (10)	1.0 (33)	0.9 (20)	1.0 (35)	14.6 (29)	E F G H I J	97.4
AmeriStand 901TS(EMD)	9	1.5 (15)	2.2 (17)	1.9 (32)	2.3 (31)	2.1 (32)	1.4 (31)	1.1 (30)	0.8 (28)	1.0 (21)	14.4 (32)	H I J K	95.6
Excelente XL	9	1.3 (33)	2.1 (33)	1.9 (26)	2.4 (21)	2.0 (33)	1.3 (34)	1.1 (26)	0.8 (32)	1.0 (32)	14.1 (33)	I J K L	93.6
HybridForce-800	9	1.2 (36)	2.1 (35)	2.0 (11)	2.3 (33)	1.9 (35)	1.2 (36)	1.0 (36)	0.8 (34)	1.0 (28)	13.6 (35)	K L	90.3
La Jolla	9	1.2 (35)	2.1 (31)	1.9 (22)	2.3 (35)	1.8 (36)	1.2 (35)	1.0 (34)	0.7 (35)	1.0 (24)	13.5 (36)	L	89.6
Experimental Varieties													
DS919	9	1.6 (7)	2.4 (1)	2.1 (1)	2.7 (1)	2.4 (6)	1.6 (13)	1.2 (12)	0.8 (30)	1.1 (14)	15.9 (2)	A B	105.6
UC-412	9	1.6 (5)	2.2 (9)	2.0 (13)	2.5 (19)	2.3 (10)	1.6 (8)	1.4 (1)	1.0 (3)	1.1 (4)	15.8 (3)	A B C	105.1
UC-415	9	1.6 (3)	2.2 (16)	1.9 (30)	2.4 (26)	2.2 (22)	1.5 (19)	1.2 (5)	1.0 (4)	1.1 (5)	15.2 (7)	A B C D E F G	101.4
UC-414	9	1.6 (6)	2.2 (18)	1.9 (24)	2.4 (27)	2.3 (17)	1.5 (23)	1.2 (20)	0.9 (12)	1.1 (11)	15.0 (18)	B C D E F G H	100.1
UC-411	9	1.5 (17)	2.2 (15)	2.0 (17)	2.4 (28)	2.2 (21)	1.5 (26)	1.1 (25)	1.0 (7)	1.0 (23)	14.9 (25)	D E F G H I	99.1
UC-409	9	1.4 (27)	2.2 (21)	1.8 (34)	2.3 (31)	2.1 (30)	1.5 (25)	1.3 (2)	1.0 (6)	1.0 (26)	14.8 (28)	E F G H I J	98.3
DS1064	9	1.4 (32)	2.2 (10)	2.1 (4)	2.5 (16)	2.1 (31)	1.4 (32)	1.0 (35)	0.8 (26)	1.1 (15)	14.5 (30)	F G H I J	96.7
UC-410	9	1.4 (29)	2.2 (23)	1.9 (28)	2.3 (29)	2.2 (23)	1.4 (29)	1.2 (6)	0.8 (27)	0.9 (36)	14.4 (31)	G H I J	96.1
UC-413	9	1.4 (31)	2.0 (36)	1.8 (36)	2.3 (36)	2.0 (34)	1.4 (28)	1.2 (18)	0.9 (14)	1.0 (30)	13.9 (34)	J K L	92.6
MEAN		1.49	2.21	1.94	2.45	2.23	1.52	1.16	0.89	1.06	14.95		
CV		7.8	7.2	5.3	7.1	10.5	12.2	12.1	11.2	8.4	5.9		
LSD (0.1)		0.11	NS	0.10	0.17	0.23	0.18	0.14	0.10	0.09	0.86		

Trial planted at 25 lb/acre viable seed in Imperial clay loam soil at the UC Desert Research and Extension Center, Holtville, CA.

Entries followed by the same letter are no significantly different at the 10% probability level according to Fishers (protected) LSD.

FD = Fall Dormancy reported by seed companies.

Pickling cucumber, sweet corn, and lesquerella

Sam Wang (samwang@ucanr.edu)

UC Desert Research and Extension Center, Holtville, CA.

Pickling cucumber variety trial

Eight pickling cucumber varieties

Drip and sprinkler irrigation

Need to produce over 10 ton/acre to be economically feasible.

Sweet corn variety by N study

Establish sweet corn N uptake and N fertilizer application guidelines in the low deserts.

Four yellow sweet corn varieties: GSS1477, SC5106, XTH1778, XTH1273

N fertilizer rates: 0, 80, 160, 240, 320 lb/acre

Lesquerella

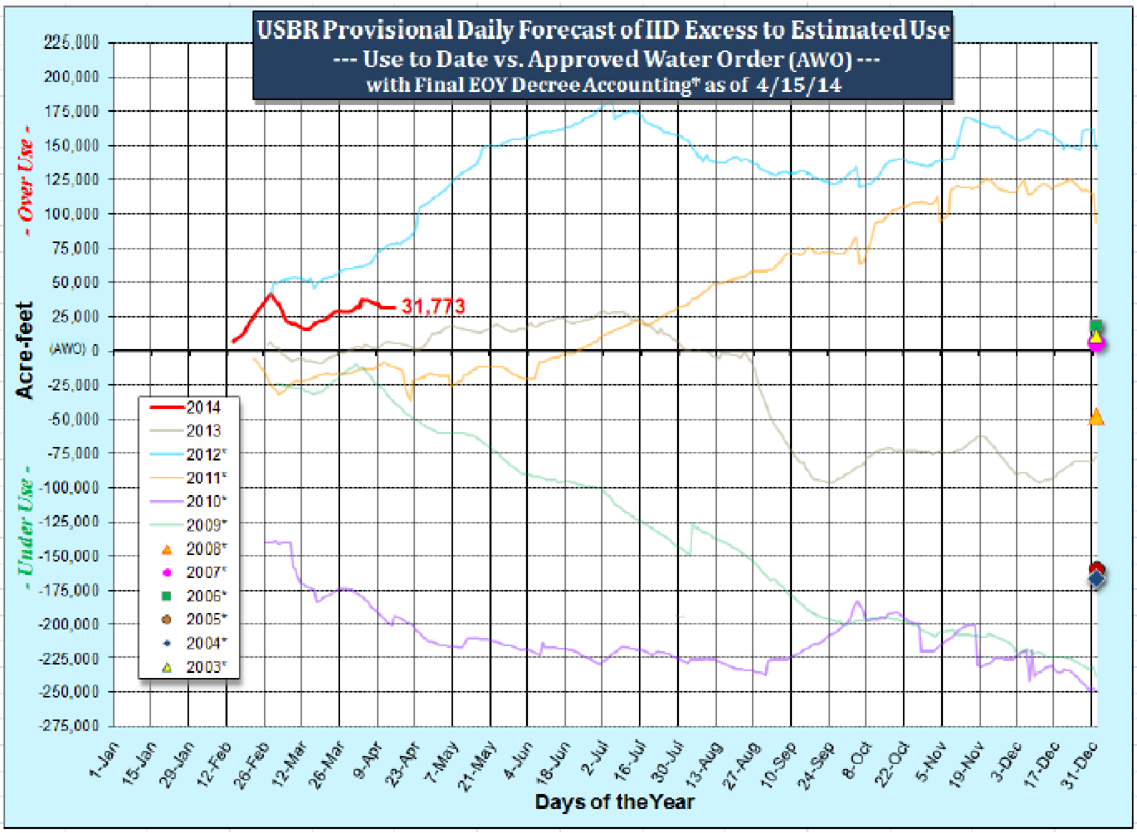
Lesquerella (Lesquerella fendleri) is a member of the mustard family and is native to the southwestern United States and northern Mexico.

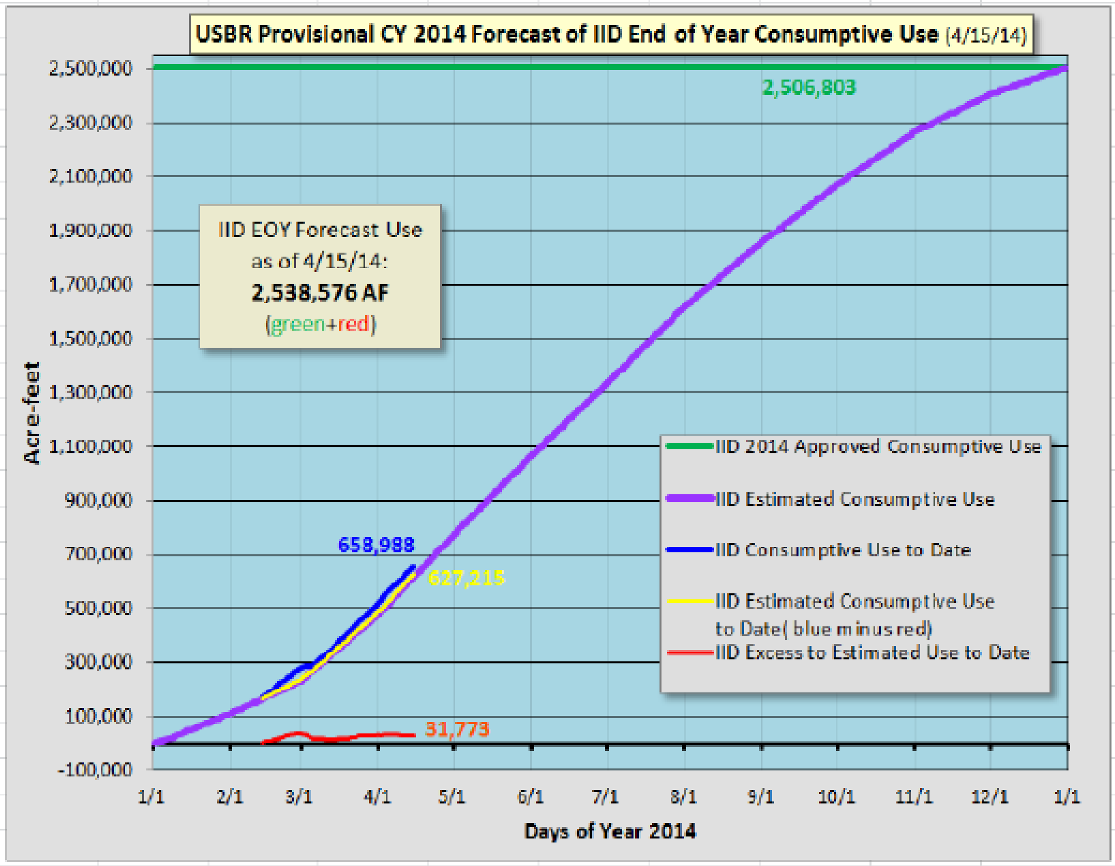
The oil in lesquerella seeds can be used as diesel additive and a number of other bioproducts such as lubricants, motor oils, plastics, inks, and adhesives.

The hydroxylated oil in lesquerella is similar to castor oil but does not contain the deadly poison ricin.

Lesquerella can be planted similar to alfalfa and harvested using regular combine.

Irrigation Water
Dean Currie





USBR Provisional CY 2014 Forecast of IID End of Year Consumptive Use (4/15/14)
2,506,803
IID EOY Forecast Use
as of 4/15/14:
2,538,576 AF
(green+red)
Acre-feet
2,500,000
2,300,000
2,100,000
1,900,000
1,700,000
1,500,000
1,300,000
1,100,000
900,000
700,000
500,000
300,000
100,000
-100,000
658,988
627,215
31,773
IID 2014 Approved Consumptive Use
IID Estimated Consumptive Use
IID Consumptive Use to Date
IID Estimated Consumptive Use
to Date(blue minus red)
IID Excess to Estimated Use to Date
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
1/1
Days of Year 2014

http://www.usbr.gov/lc/region/g4000/hourly/forecast14.pdf (page 2)

04/15/14

U.S. BUREAU OF RECLAMATION
LOWER COLORADO REGION
PROVISIONAL CY2014

CALIFORNIA WATER USERS
FORECAST OF END OF YEAR CONSUMPTIVE USE
FORECAST BASED ON USE TO DATE AND APPROVED ANNUAL WATER ORDERS
California Schedules and Approvals
Historic Use Records (Water Accounting Reports)

NOTE:
• Diversions and uses that are pending approval are noted in *red italics*.
• Water users with a consumptive use entitlement - **Excess to Estimated Use** column indicates overrun/underrun of entitlement. Dash in this column indicates water user has a diversion entitlement.
• Water user with a diversion entitlement - **Excess to Approved Diversion** column indicates overrun/underrun of entitlement. Dash in this column indicates water user has a consumptive use entitlement.

WATER USER	Use To Date CY2014	Forecast Use CY2014	Estimated Use CY2014	Excess to Estimated Use CY2014	Diversion To Date CY2014	Forecast Diversion CY2014	Approved Diversion CY2014	Excess To Approved Diversion CY2014
CALIFORNIA PUMPERS	532	1,958	1,958	---	951	3,500	3,500	0
FORT MOJAVE INDIAN RESERVATION, CA	2,395	8,505	8,996	---	4,453	15,808	16,720	-912
CITY OF NEEDLES (includes LCWSP use)	525	1,931	1,931	0	739	2,720	2,720	0
METROPOLITAN WATER DISTRICT	285,596	631,875	546,660	---	286,480	635,743	549,763	---
COLORADO RIVER INDIAN RESERVATION, CA	935	3,444	3,444	---	1,605	5,909	5,909	0
PALO VERDE IRRIGATION DISTRICT	83,452	445,998	454,108	---	224,322	996,355	994,500	1,855
YUMA PROJECT RESERVATION DIVISION	15,939	48,904	47,886	---	27,083	99,403	102,700	-3,297
YUMA PROJECT RESERVATION DIVISION - INDIAN UNIT	---	---	---	---	13,010	47,586	49,100	-1,514
YUMA PROJECT RESERVATION DIVISION - BARD UNIT	---	---	---	---	14,073	51,818	53,600	-1,782
YUMA ISLAND PUMPERS	1,351	4,974	4,974	---	2,444	9,001	9,001	0
FORT YUMA INDIAN RESERVATION - RANCH 5	147	540	675	---	266	979	1,221	-242
IMPERIAL IRRIGATION DISTRICT	658,988	2,538,576	2,506,803	31,773	669,251	2,630,050	2,607,017	---
SALTON SEA SALINITY MANAGEMENT	21,367	90,000	90,000	0	22,321	93,585	93,451	---
COACHELLA VALLEY WATER DISTRICT	88,384	353,517	352,000	**1,517**	91,439	368,271	366,370	---
OTHER LCWSP CONTRACTORS	177	650	650	---	276	1,016	1,016	0
CITY OF WINTERHAVEN	19	69	69	---	28	104	104	0
CHEMEHUEVI INDIAN RESERVATION	35	128	6,101	---	3,080	11,340	11,340	0
TOTAL CALIFORNIA	1,159,842	4,131,070			1,334,738	4,873,784	4,765,332	
FORT YUMA INDIAN RESERVATION /1	---	---	---	---	14,217	52,065	53,821	-1,756

CALIFORNIA ADJUSTED APPORTIONMENT CALCULATION	
California Basic Apportionment	4,400,000
Payback of IOPP Overrun (IID)	-154,738
Intentionally Created Surplus Water (IID)	-25,000
Creation of Extraordinary Conservation ICS (MWD)	-200,000
Total State Adjusted Apportionment	4,020,262
Excess to Total State Adjusted Apportionment	110,808

http://www.usbr.gov/lc/region/g4000/weekly.pdf

Apr 14, 2014

LOWER COLORADO WATER SUPPLY REPORT

River Operations

Bureau of Reclamation

Questions: BCOOWaterops@usbr.gov
(702)293-8373
http://www.usbr.gov/lc/region/g4000/weekly.pdf

CURRENT STORAGE	PERCENT FULL	Content 1000 ac-ft (kaf)	Elev. (Feet above mean sea level)	7-Day Release (CFS)
LAKE POWELL	39%	9,457	3574.28	8,500
* LAKE MEAD	45%	11,626	1090.77	19,100
LAKE MOHAVE	92%	1,656	641.45	18,600
LAKE HAVASU	93%	575	447.72	14,200
TOTAL SYSTEM CONTENTS ** As of 04/13/2014	47%	27,923		
SYSTEM CONTENT LAST YEAR	53%	31,564		

* Percent based on capacity of 26,120 kaf or elevation 1219.6 feet.

** TOTAL SYSTEM CONTENTS includes Upper & Lower Colorado River Reservoirs, less Lake Mead exclusive flood control space.

DELIVERY TO MEXICO - 2014 (1.50 MAF Scheduled + Preliminary Yearly Excess)[1] 1,530

OTHER SIGNIFICANT INFORMATION

UNREGULATED INFLOW INTO LAKE POWELL - APRIL FINAL FORECAST DATED 04/02/2014

	MILLION ACRE-FEET	% of Normal
FORECASTED WATER YEAR 2014	11.112	103%
FORECASTED APRIL-JULY 2014	7.850	110%
MARCH OBSERVED INFLOW	0.509	76%
APRIL INFLOW FORECAST	0.950	90%

	Upper Colorado Basin	Salt/Verde Basin
WATER YEAR 2014 PRECIP TO DATE	103% (19.5")	52% (8.9")
CURRENT BASIN SNOWPACK	111% (16.9")	NA (NA)

[1] Delivery to Mexico forecasted yearly excess calculated using year-to-date observed and projected excess.

http://www.wcc.nrcs.usda.gov/reports/SelectUpdateReport.html

Upper Colorado River Basin
SNOTEL Snow/Precipitation Update Report

Based on Mountain Data from NRCS SNOTEL Sites

Provisional data, subject to revision

Data based on the first reading of the day (typically 00:00) for Tuesday, April 15, 2014

Basin Site Name	Elev (ft)	Snow Water Equivalent Current (in)	Snow Water Equivalent Median (in)	Snow Water Equivalent Pct of Median	Water Year-to-Date Precipitation Current (in)	Water Year-to-Date Precipitation Average (in)	Water Year-to-Date Precipitation Pct of Average
UPPER GREEN RIVER BASIN							
Basin Index (%)				144			120
DUCHESNE RIVER BASIN							
Basin Index (%)				58*			70*
YAMPA/WHITE RIVER BASINS							
Basin Index (%)				128			116
PRICE-SAN RAFAEL							
Basin Index (%)				97*			90*
ESCALANTE RIVER BASINS							
Basin Index (%)				77			77
DIRTY DEVIL RIVER BASIN							
Basin Index (%)				85			87
UPPER COLORADO RIVER HEADWATERS							
Basin Index (%)				134			118
ROARING FORK RIVER BASIN							
Basin Index (%)				123			102
SOUTH EASTERN UTAH							
Basin Index (%)				9*			58*
GUNNISON RIVER BASIN							
Basin Index (%)				102			95
DOLORES/SAN MIGUEL RIVER BASINS							
Basin Index (%)				70			85*
SAN JUAN RIVER HEADWATERS							
Basin Index (%)				70			76
ANIMAS RIVER BASIN							
Basin Index (%)				69*			76*
COLORADO RIVER BASIN ABOVE LAKE POWELL (TOTAL OF ALL SNOTEL SITES)							
Basin Index (%)				111			101

-M = Missing data.

* = Analysis may not provide a valid measure of conditions.

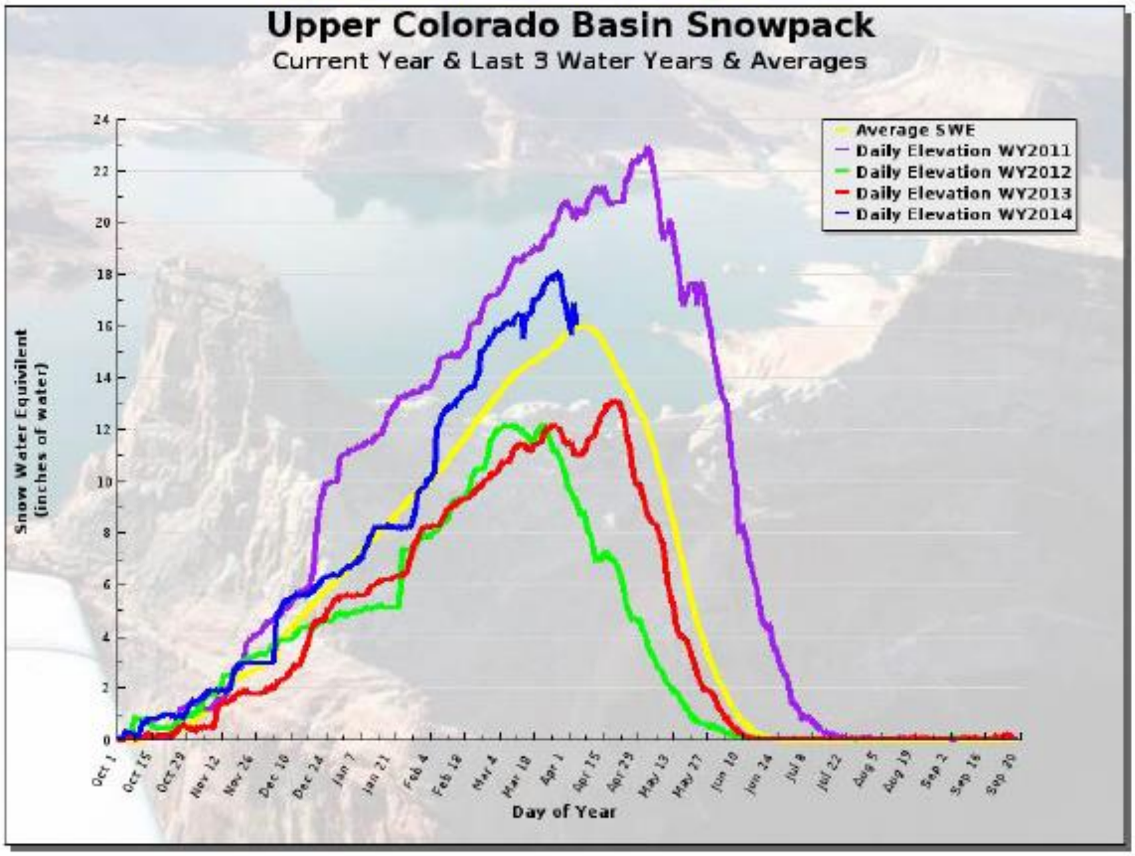
http://snowpack.water-data.com/uppercolorado/index.php

It is 02:46:06 pm MDT at Lake Powell, Utah on Tuesday, April 15th, 2014.
Today is day 197 of 365 for the Water Year 2014. We are 54% through the Water Year.

Snowpack is 110.3% of the April 15th average.

April 15th is the date of maximum snowpack and basinwide snowpack is currently 90.24% of the April 15th average

*** Link to the Latest Satellite Weather for the Southwest...**



http://www.arachnoid.com/NaturalResources/

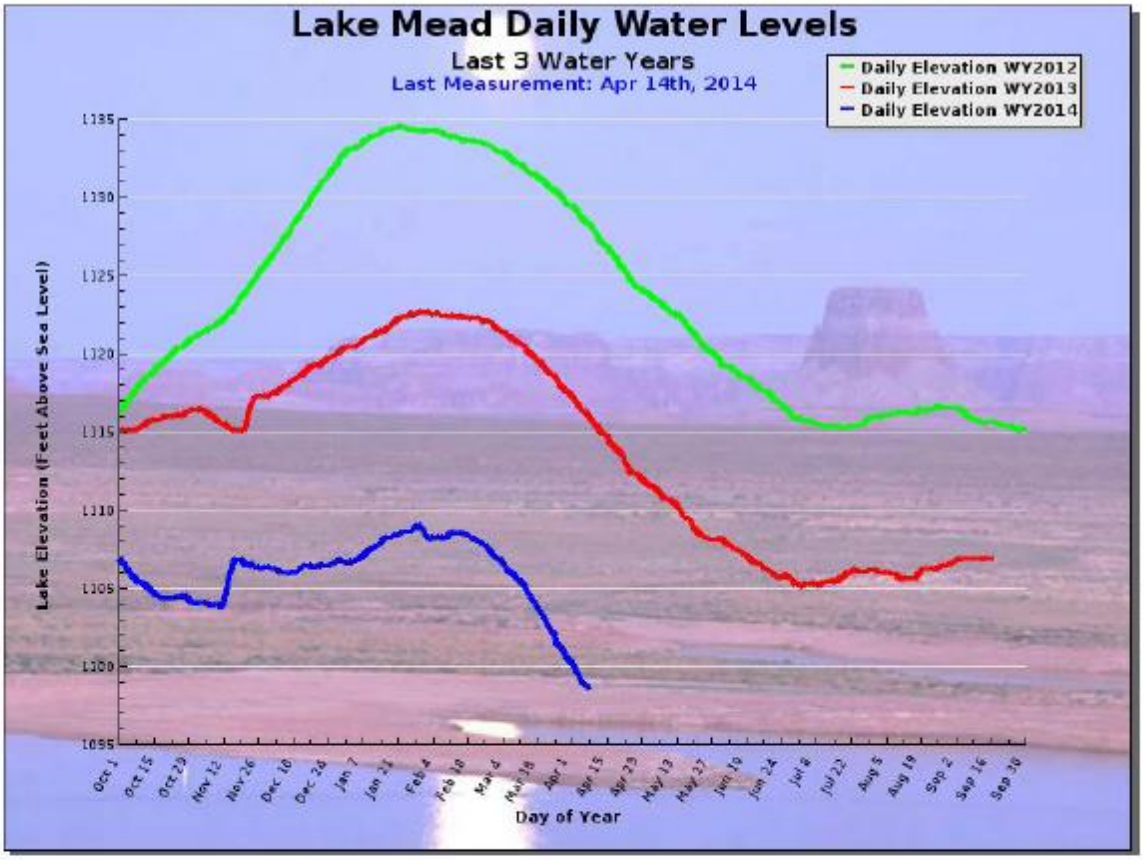
Lake Mead Water Levels — Historical and Current

Horizontal Axis: Years
Vertical Axis: Feet above Mean Sea Level

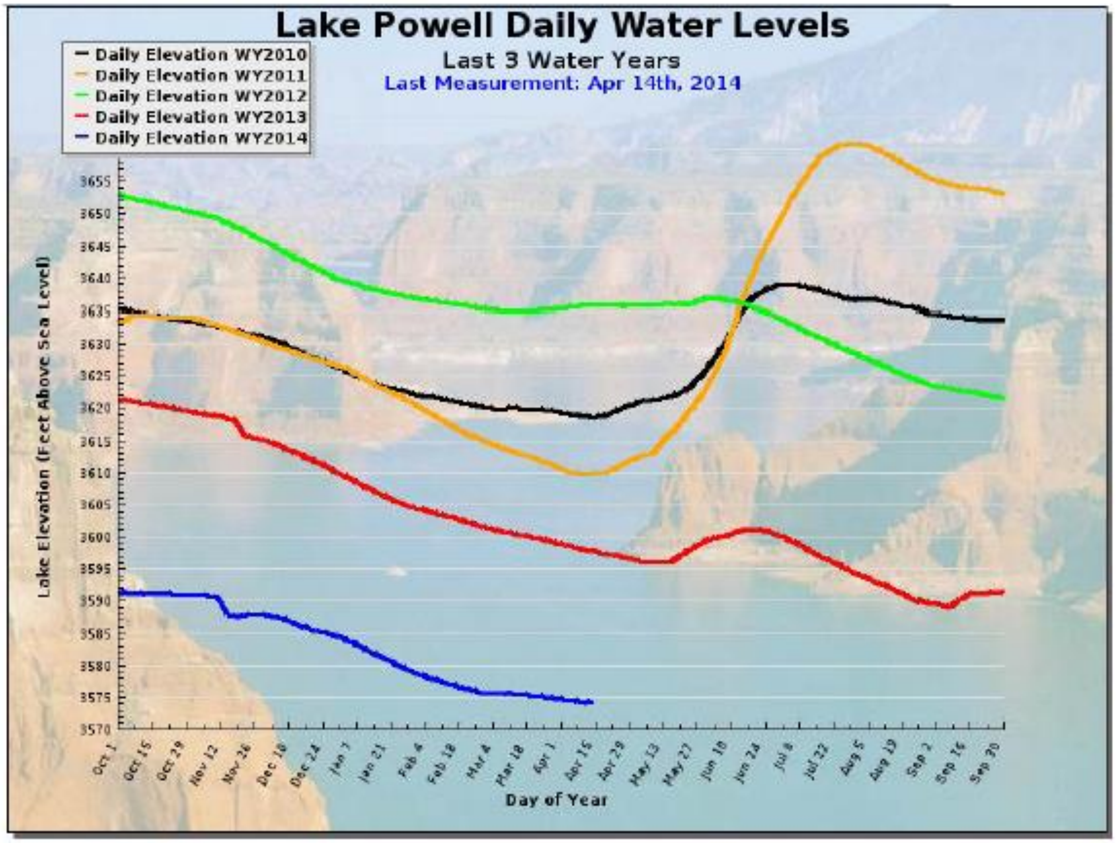
(Chart scale and labels updated January 2014)

This chart is dynamically updated. This page reads data from a government archive of water heights for Lake Mead from 1935 to the present, and draws the chart on that basis. The database, located at http://www.usbr.gov/lc/region/g4000/hourly/mead-elv.html, is updated once per month. This page's graphic updates itself in step with the data source, over time giving an easy-to-interpret picture of Lake Mead water levels.

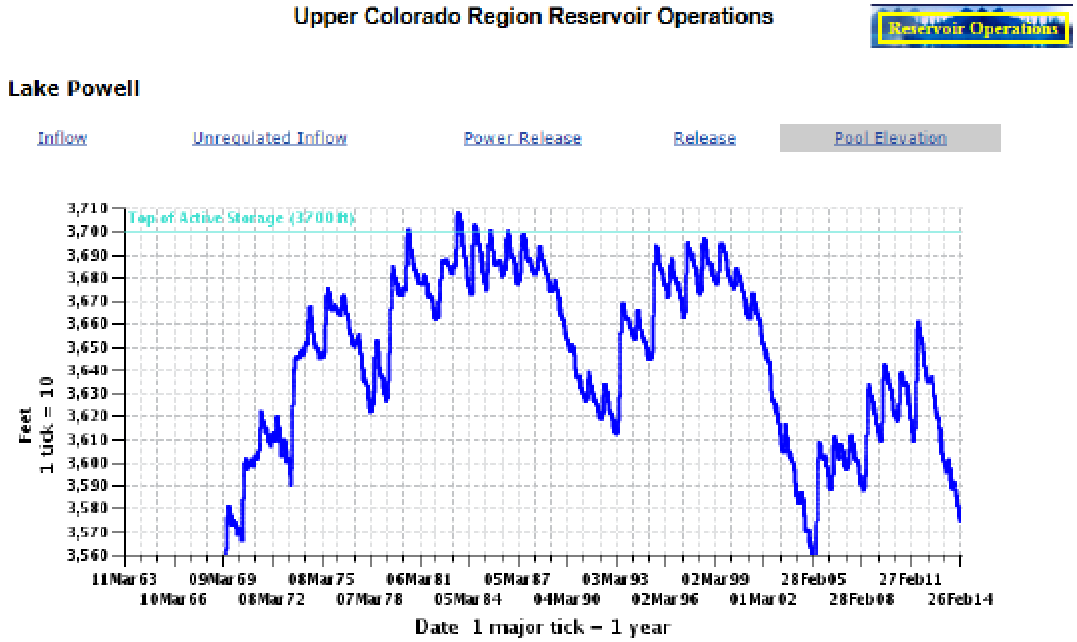
http://graphs.water-data.com/lakemead/



http://graphs.water-data.com/lakepowell/



http://www.usbr.gov/uc/crsp/GetSiteInfo



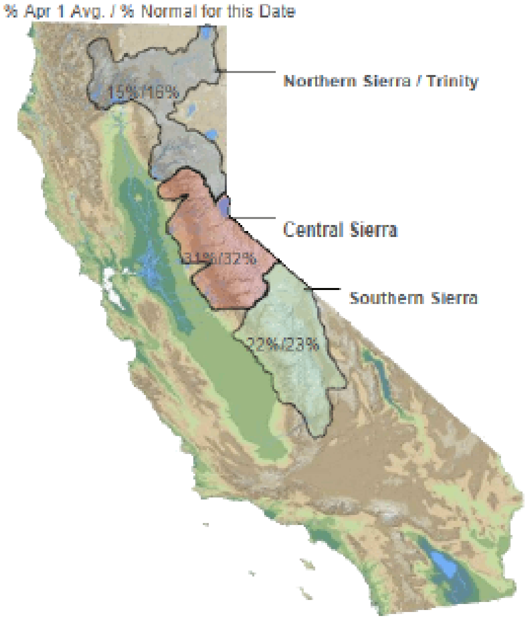
http://cdec.water.ca.gov/cdecapp/snowapp/sweq.action

Snow Water Equivalents (inches)

Provided by the California Cooperative Snow Surveys

Data For: 15-Apr-2014

% Apr 1 Avg. / % Normal for this Date



Change Date : 15-Apr-2014 Refresh Data

NORTH

Data For: 15-Apr-2014

Number of Stations Reporting	27
Average snow water equivalent	4.2"
Percent of April 1 Average	15%
Percent of normal for this date	16%

CENTRAL

Data For: 15-Apr-2014

Number of Stations Reporting	43
Average snow water equivalent	9.2"
Percent of April 1 Average	31%
Percent of normal for this date	32%

SOUTH

Data For: 15-Apr-2014

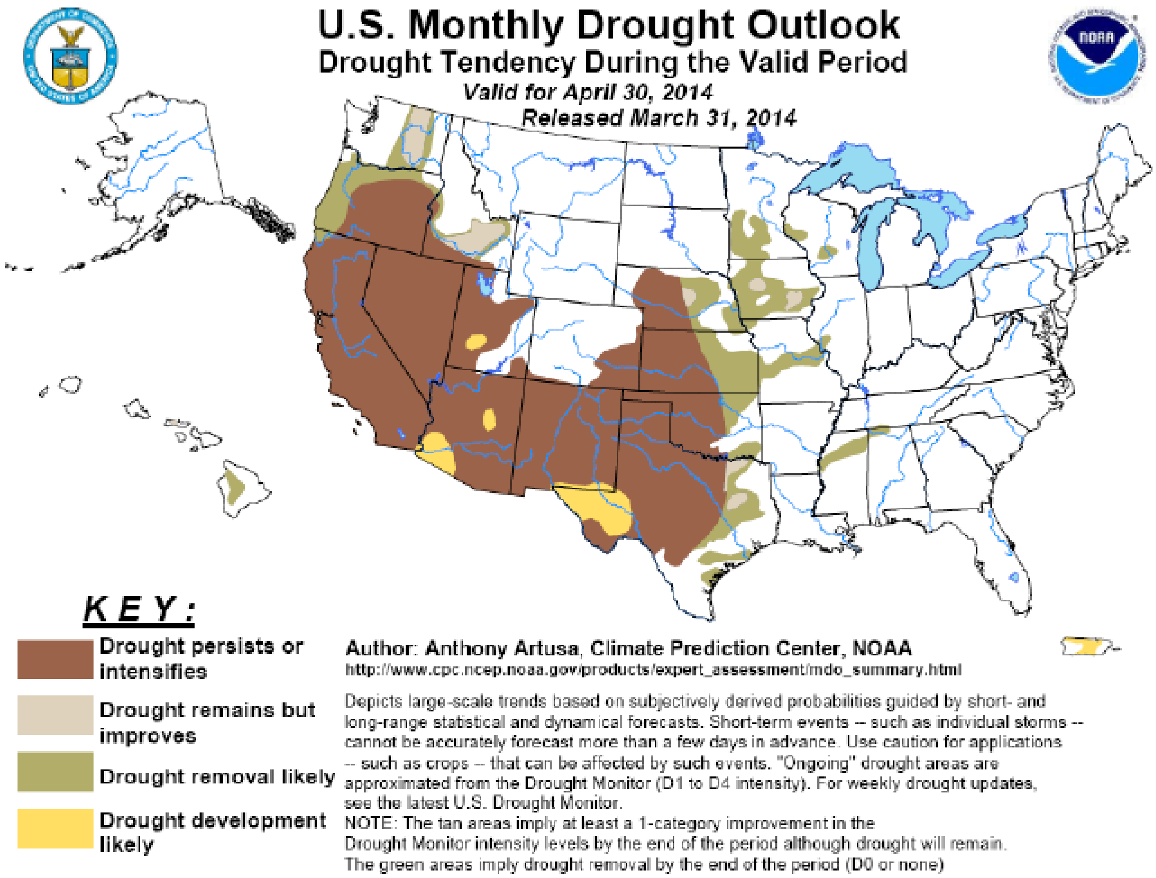
Number of Stations Reporting	30
Average snow water equivalent	5.8"
Percent of April 1 Average	22%
Percent of normal for this date	23%

STATEWIDE SUMMARY

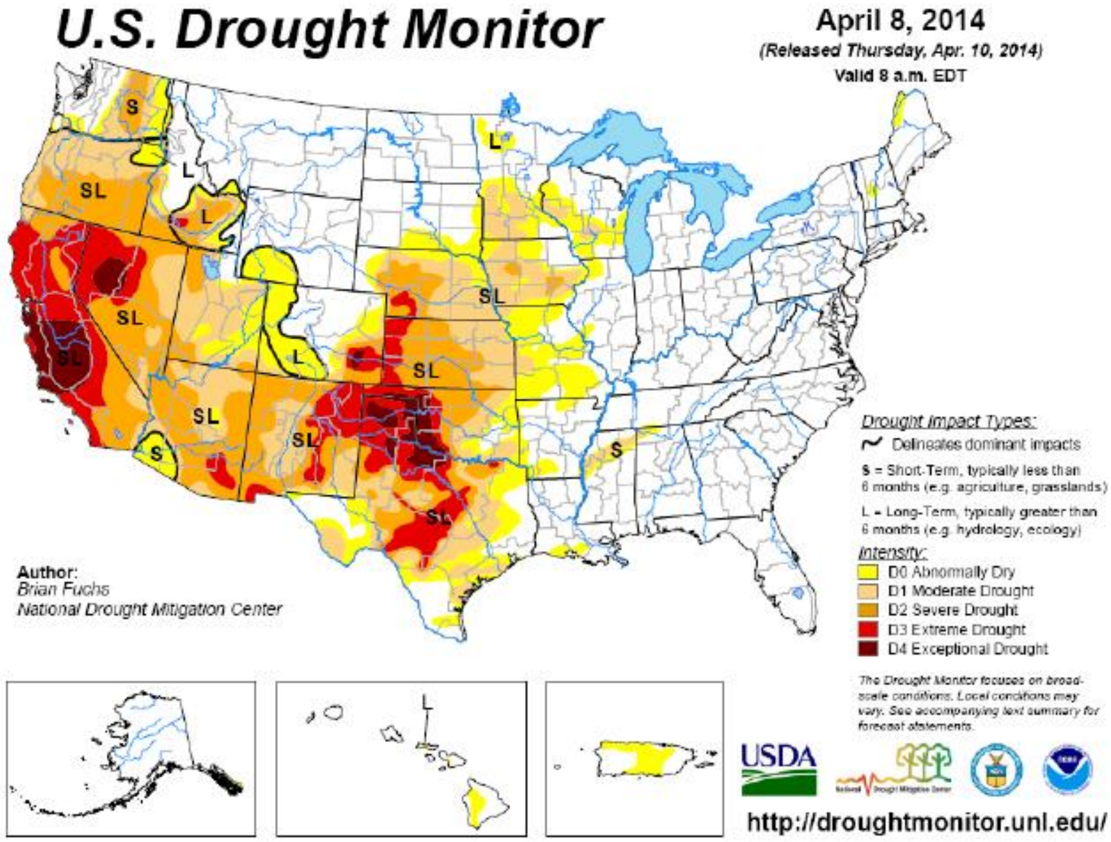
Data For: 15-Apr-2014

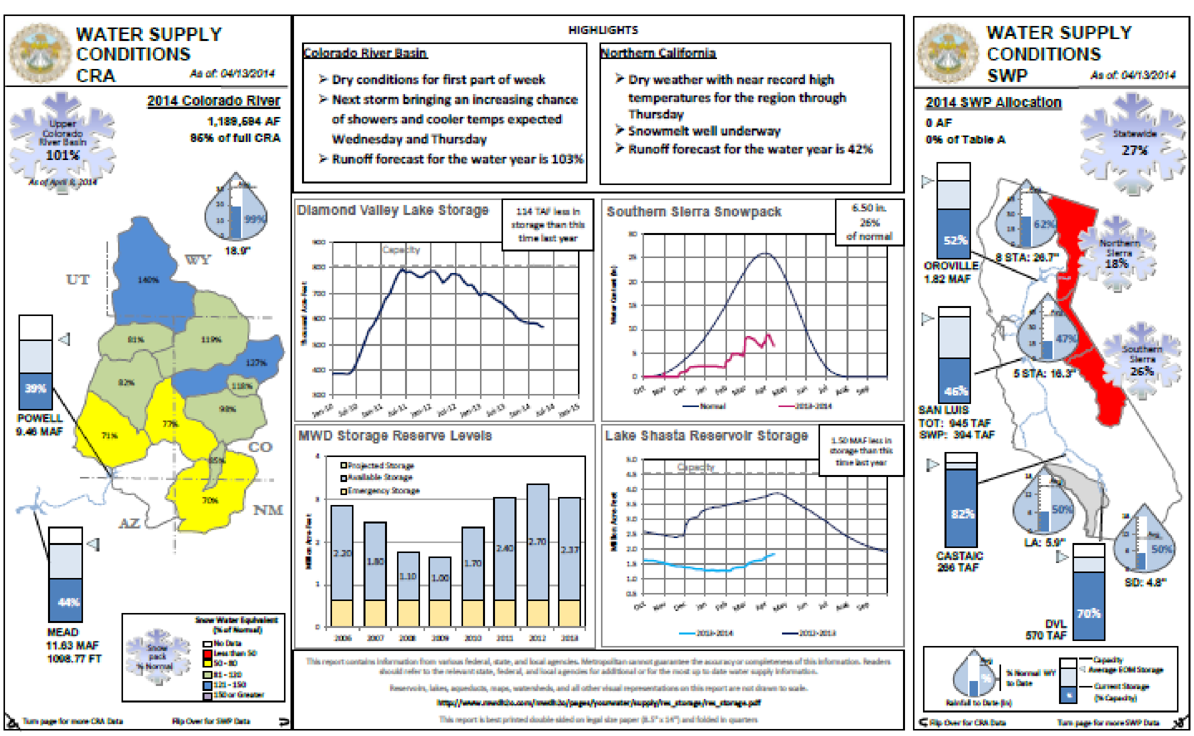
Number of Stations Reporting	100
Average snow water equivalent	6.8"
Percent of April 1 Average	24%
Percent of normal for this date	26%

http://www.cpc.ncep.noaa.gov/products/Drought/



http://droughtmonitor.unl.edu/



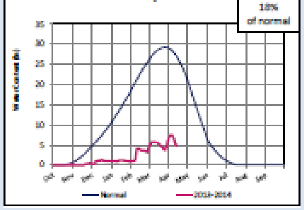


State Water Project Resources

As of: 04/13/2014

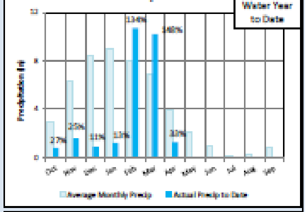
Northern Sierra Snowpack

4.80 in.
18%
of normal



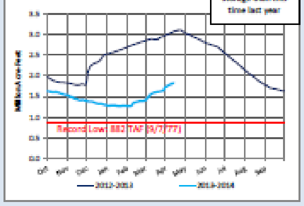
8 Station Index Precip

26.7 in.
Water Year
to Date



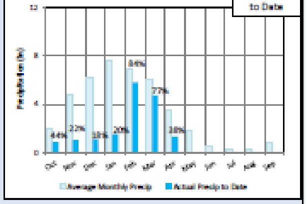
Oroville Reservoir Storage

1.25 MAF less in storage than this time last year



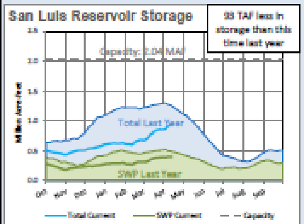
5 Station Index Precip

16.3 in.
Water Year
to Date



San Luis Reservoir Storage

93 TAF less in storage than this time last year



Other SWP Contract Supplies for 2014 (AF)

Article 14(b) (Rescheduled)	0
Transfer Supplies	0
Article 56 (Prior Cal. Years(s) CO)	223,000
Pool A/B (Purchased)	0
Multi Year Market Pool	0

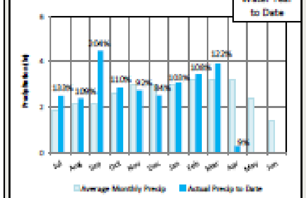
TBD - To Be Determined

Colorado River Resources

As of: 04/13/2014

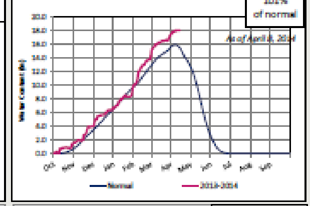
Upper Colorado Basin Precip

18.9 in.
Water Year
to Date

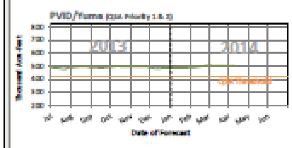


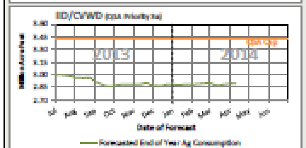
Upper Colorado Basin Snowpack

17.93 in
101%
of normal



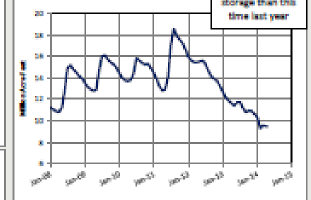
Colorado River Ag Use Forecast





Lake Powell Storage

2.08 MAF less in storage than this time last year



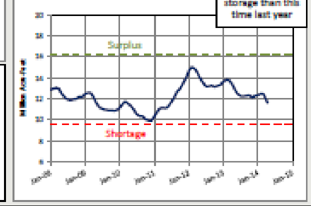
Lake Mead Outlook
Likelihood of Shortage/Surplus

	2014	2015	2016	2017	2018
Shortage	0%	0%	44%	54%	54%
Surplus	0%	0%	4%	7%	12%

Based on results from the January 2014 Colorado River Simulation System model run

Lake Mead Storage

1.61 MAF less in storage than this time last year



Demonstration of AquaMon

Frank Stempski

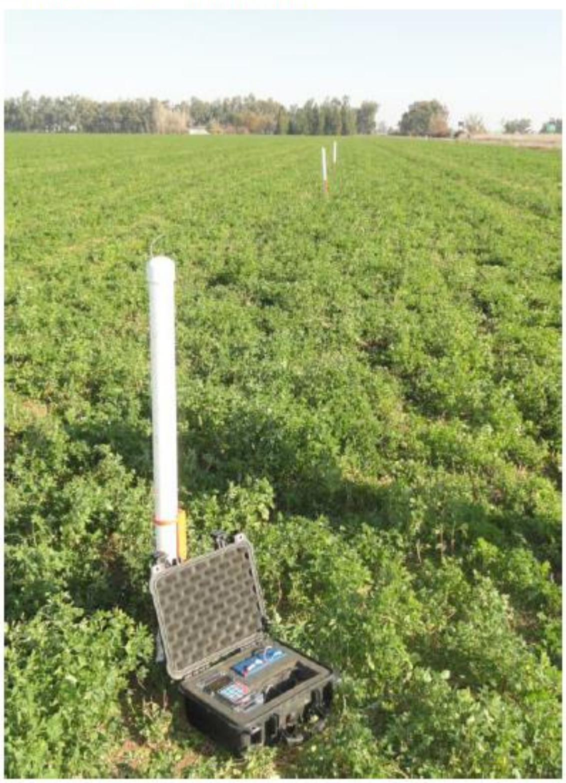
AquaMon

AquaMon® System for Surface Irrigation Monitoring and Alert System

AquaMon Surface Irrigation Monitor:

The AquaMon Surface Irrigation Monitor reduces water use, labor costs and the environmental impact of excess tail water discharge. The Surface Irrigation Monitor creates a temporary wireless sensor network to monitor water flow in the targeted field. The wireless sensor network includes a network hub and multiple wireless sensor nodes installed within 2 miles of the hub. The sensor nodes report the level of water in the field to the hub. The hub transmits the sensor data to Cermetek's RSVP web application. Workers can then monitor the water level with any browser equipped tablet, laptop, or smart phone. When the water level reaches a preset critical level, the RSVP software sends a Text or Email notification so that the water source can be shut off.

The sensors were developed by researchers at UC Davis and transferred to Cermetek through a Sustainable AgTech Innovation grant.

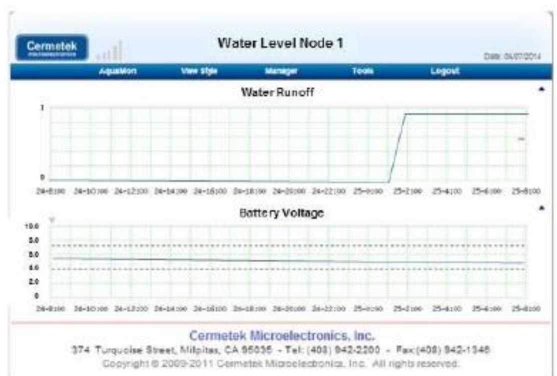


Surface Irrigation Monitor Specifications

- Hub is connected to the Internet through a GSM or CDMA Cellular connection;
- Sensor Nodes and Hub Linked by a ½ Watt, 900 MHz Radio, Wireless Range up to 2 Miles;
- The Hub can monitor up to 255 remote sensor nodes; however, a typical system will require just 3 to 4 nodes;
- Hub operates on a 12 Volt, Lead-Acid Battery power, recharge is required after each use; AC Adapters and Solar Chargers are available
- Sensor Nodes are powered by 4 AA batteries that typically last the entire irrigation season

Benefits of Surface irrigation Monitor

- Tighter control of water reduces water use and tail water discharge;
- Availability of data on a web browser reduces labor costs by eliminating unnecessary trips to the field;
- Portability allows use of one system in many fields;
- Grower defines alert notifications;

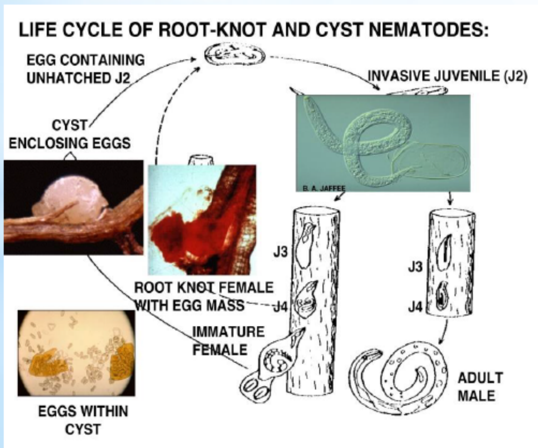


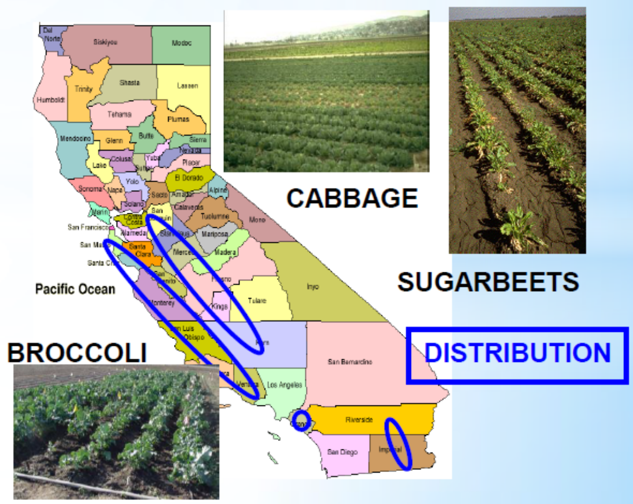
Sample RSVP Display

Cermetek Microelectronics, Inc. • 374 Turquoise Street, Milpitas, CA 95035
Web: http://www.cermetek.com • Phone: 408-942-2200 • Fax: 408-942-1346 • Email: sales@cermetek.com

Coded variety and new products for cyst nematode (*Heterodera schachtii*) resistance and management

Oli Bachie (UCCE) &
Becky Westerdahl (UCD)





For UC Cooperative Extension Field Day, Holtville, California, April 17, 2014

Background

Until suspended in April of 1990, the use of 1,3-Dichloropropene (Telone II) was a primary tool for management of nematodes in sugarbeet production in California. A study conducted by SRI International estimates that because Telone II was not available the increase in losses on sugarbeets directly due to nematodes in 1991 was 6.1 million dollars.

Telone II is currently available for use on sugarbeets but on a limited basis and at a higher cost. Because of the lack of available nematicides, there has been a continuing need to develop and test new products, and new sugarbeet varieties with nematode resistance.

Objectives of the trial

- Evaluate new varieties and new products for management of sugarbeet cyst nematode (SBCN) for adaptation to the Imperial Valley conditions.

Previous findings (2012-2013) from DREC field study.

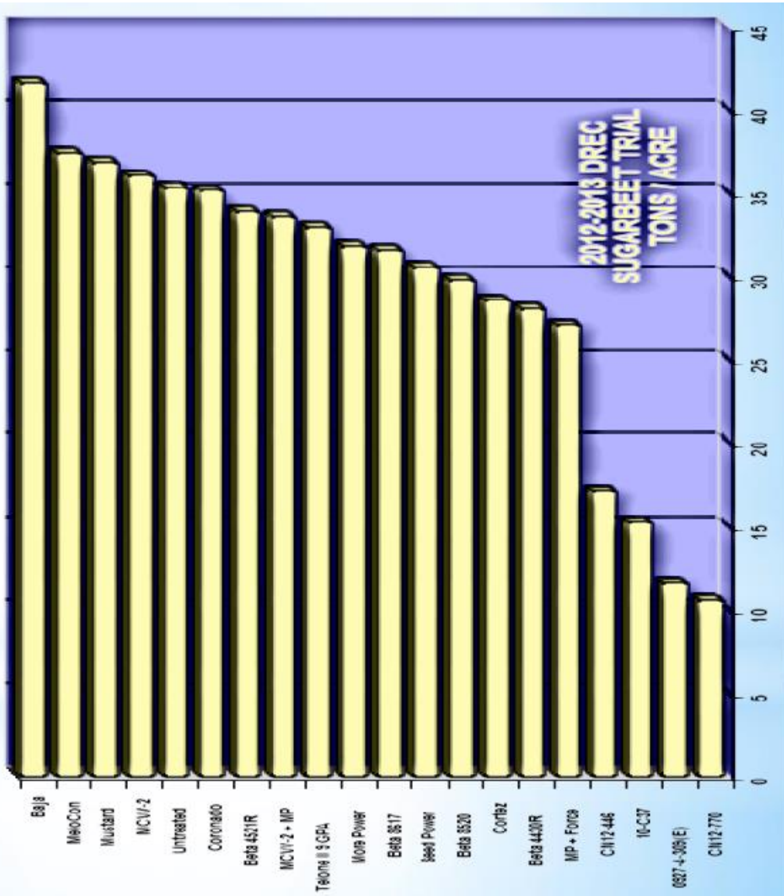
20 treatments replicated 6 times.

- ✓ The Telone II treatment,
- ✓ untreated control (pheonix), and
- ✓ seven new product treatments planted to Phoenix.
    - MeloCon, (2) mustard seed meal, (3) MCW-2, (4) More Power, (5) More Power plus Force, (6) Seed Power, & (7) MCW-2 plus More Power.
- ✓ Eleven new varieties.
    - The Holly varieties were (Cortez, Baja, & Coronado)
    - The Beta varieties were (4430, 4521, 8617, and 8520.
    - The USDA varieties are (resistant lines; CN12-446, CN12-770, and susceptible lines; C37 and 7927-4-309)

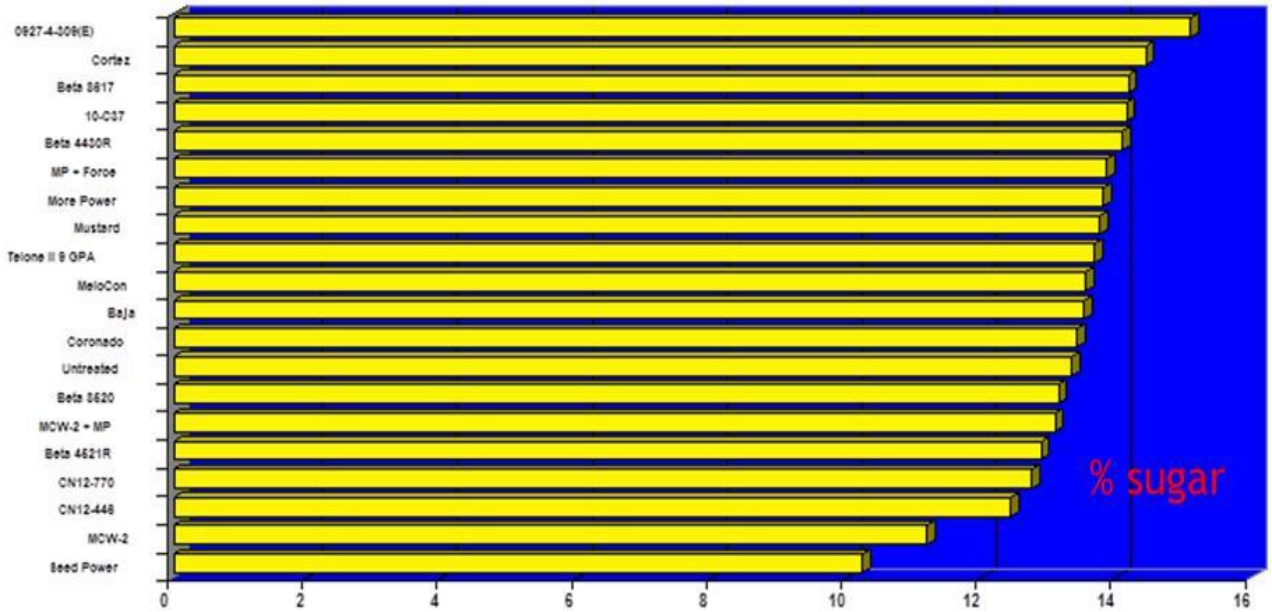
Previous trials (2012 – 2013)

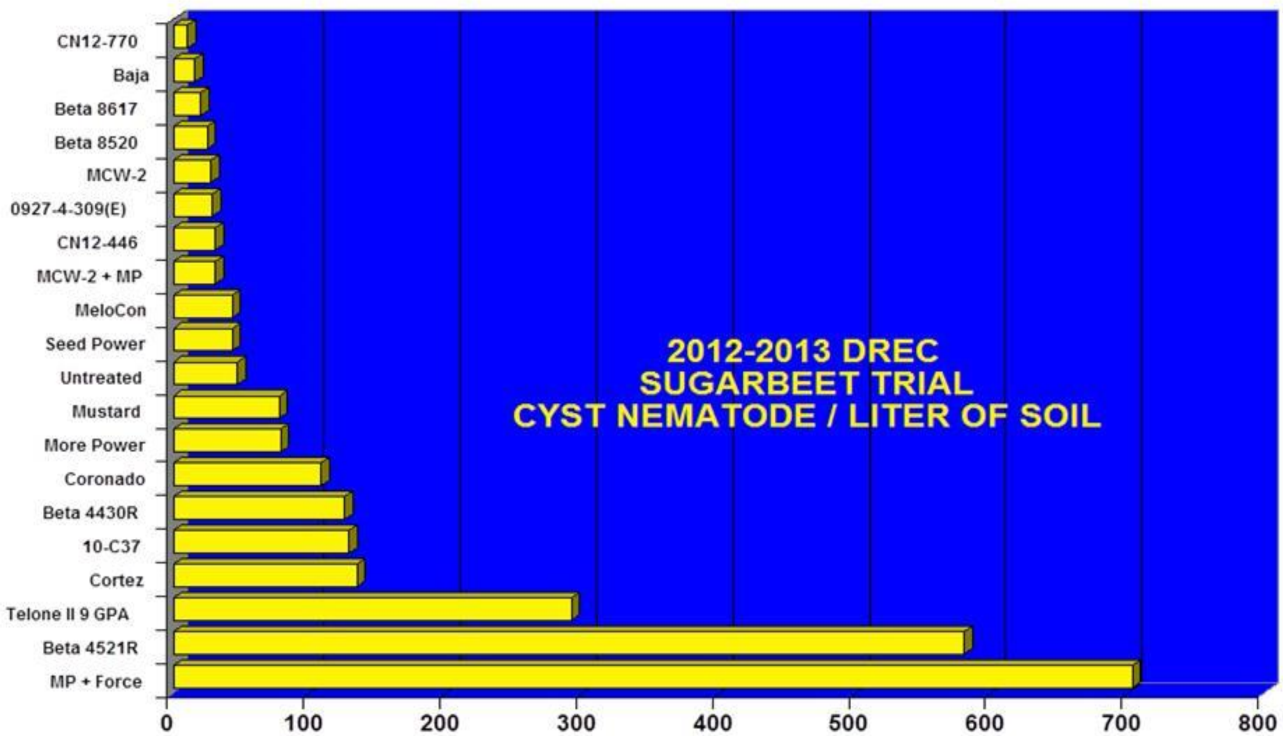
20 Treatments x 6 Replicates

- ✓ Untreated Control/Phoenix
- ✓ Telone II
- ✓ 7 New Product Treatments
- ✓ 11 Varieties



- ✓ Planted Oct 2012
- ✓ Harvested April 11, 2013


0927-4-309(E)
Cortez
Beta 8617
10-C37
Beta 4430R
MP + Force
More Power
Mustard
Telone II 9 GPA
MeloCon
Baja
Coronado
Untreated
Beta 8520
MCW-2 + MP
Beta 4521R
CN12-770
CN12-446
MCW-2
Seed Power
% sugar
0
2
4
6
8
10
12
14
16


2012-2013 DREC
SUGARBEET TRIAL
CYST NEMATODE / LITER OF SOIL
CN12-770
Baja
Beta 8617
Beta 8520
MCW-2
0927-4-309(E)
CN12-446
MCW-2 + MP
MeloCon
Seed Power
Untreated
Mustard
More Power
Coronado
Beta 4430R
10-C37
Cortez
Telone II 9 GPA
Beta 4521R
MP + Force
0
100
200
300
400
500
600
700
800

Trials being conducted (2013 – 2014)

21 Treatments x 6 Replicates

- ✓ Untreated Control/Phoenix
- ✓ Telone II standard treatment
- ✓ 10 New Product Treatments
- ✓ 9 Varieties

- ✓ Telone II applied Sept 25, 2013
- ✓ Planted Oct 15, 2013
- ✓ Treated & watered October 16, 2013

NEW PRODUCTS:

- ✓ MCW-2 (Nimitz) liquid*
- ✓ MCW-2 (Nimitz) granules
- ✓ Stimulate
- ✓ More Power
- ✓ Root Power
- ✓ LM 0624
- ✓ GWN 10221
- ✓ Neem
- ✓ Transformer

HOLLY:

- ✓ Phoenix*
- ✓ Cortez*
- ✓ Baja*
- ✓ Coronado*
- ✓ SV2013
- ✓ SV2015

BETA:

- ✓ Beta 4430R*
- ✓ Beta 4521R*
- ✓ Beta 8617*
- ✓ Beta 8520*

* Indicates third year in trial

Results pending

UNIVERSITY *of* CALIFORNIA

Cooperative Extension

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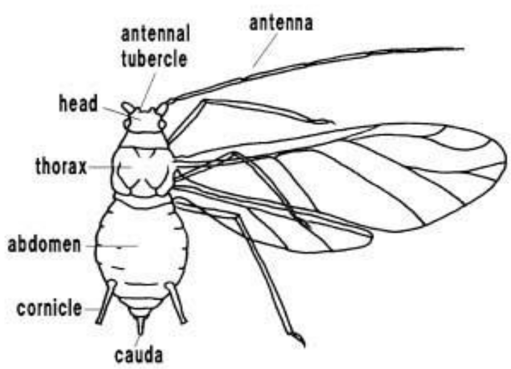
Aphid Key

Note: This key includes only the aphid species that are most commonly found in alfalfa in California's San Joaquin Valley. Adapted from "Identification: Key to Aphids Commonly Found in San Joaquin Valley Alfalfa and Cotton" by Charles G. Summers [3]

Aphids attacking California alfalfa and cotton may be difficult to identify. The alfalfa aphids, **pea aphid** *(Acyrthosiphon pisum* (Harris)) and **blue alfalfa aphid** *(A. kondoi* Shinji), are similar in appearance. Recently, the **cowpea aphid**, *Aphis craccivora* Koch, has become a pest of alfalfa and has been found colonizing cotton in California's San Joaquin Valley. The **cowpea aphid** on cotton is easily confused with **cotton aphid**, *A. gossypii* Glover, at certain times of the year.

Since economic thresholds have been developed for individual species, proper aphid management requires accurate identification.

Use this key to identify an aphid. While aphids appear to be very simple insects, they are really very complex, both in their biology and their morphology. As with other insects, external morphological features are used to identify individuals to the species level.



This drawing of a typical aphid shows a number of morphological features important in identification.

1. Look at an aphid through a 10x hand lens to see the important characters that distinguish the aphids included in this key.
2. On each page of the key, follow the arrow that best matches the character of the aphid you're trying to identify.

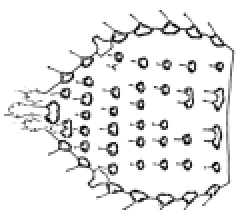
Begin Key

Follow the description that best describes the aphid.

Body is pale green, pink, or white	**Body is black, olive green, or yellow**

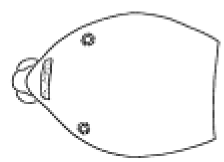
Go to page 5

Does the dorsal abdomen have rows of spots?



Six to eight rows of spots on dorsal abdomen

Based on the key characteristics, the aphid is likely to be

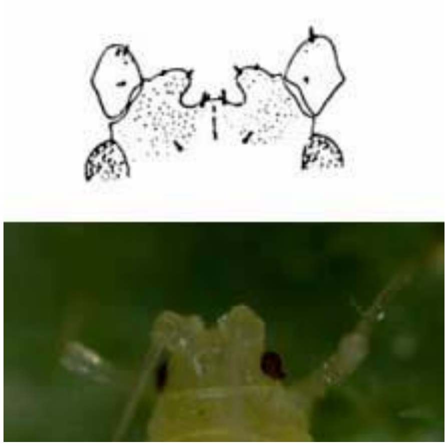


Dorsal abdomen is without spots

Go to page 3

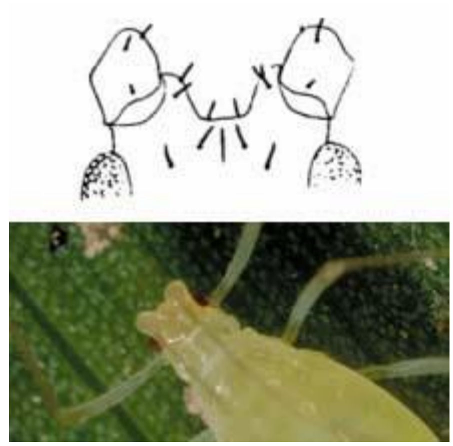
Spotted alfalfa aphid *(Therioaphis maculata)*

From page 2 "dorsal abdomen is without spots"



Antennal tubercles are converging

Based on the key characteristics, the aphid is likely to be

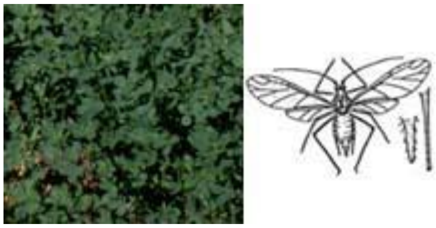


Antennal tubercles are diverging

Go to page 4

Green peach aphid *(Myzus persicae)*

From page 3 "antennal tubercles are diverging"



Aphid found in alfalfa; legs, antennae, cornicles, and cauda are long

Aphid found in cotton; legs, antennae, cornicles, and cauda are long

X

From "found in alfalfa"

Body is pink	**Body is green**

Based on the key characteristics, the aphid is likely to be

Go to page 6a

Pea aphid *(Acrythosiphon pisum)*

From page 2 "body is black, olive green, or yellow"

Body is black (shiny or dull)

Body is pale yellow, yellowish green, or olive green

Go to page 6b

From "body is black (shiny or dull)"

Cauda is bushy with many hairs, and cornicles and cauda are of equal length

Cauda is not bushy, has few hairs, and cornicles are longer than cauda

Go to page 6c

Based on the key characteristics, the aphid is likely to be

Bean aphid *(Aphis fabae)*

6a **From page 4 "body is green"**

Antennae are uniformly brown

Go to page 7a

Antennae have dark bands between light segments

Go to page 7b

6b. Based on the key characteristics, the aphid is likely to be

Cotton (or melon) aphid *(Aphis gossypii)*

6c. Based on the key characteristics, the aphid is likely to be

Cowpea aphid *(Aphis craccivora)*

7a. Based on the key characteristics, the aphid is likely to be
Blue alfalfa aphid *(Acyrthosiphon kondoi)*

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7b. Based on the key characteristics, the aphid is likely to be
Pea aphid *(Acrythosiphon pisum)*

Note: A pink-colored biotype of the pea aphid occurs in France, on the east coast and in several western states of the U.S. including California. It is infrequently encountered in the field. Biologically, it behaves identically to the green form found in California, including its response to resistant cultivars.

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[3] Summers, C. G. 2001. Key to common alfalfa and cotton aphids in California. UC Plant Protection Quarterly 11(3):8-10.