California Agricultural Water Stewardship Initiative

Farm Water Toolbox:
Know your Risks, Plan for the Future

Meeting Results from a Regional Forum for the Northern San Joaquin Valley Farm Community

Merced, California
March 25, 2010

Co-hosted by the USDA East Merced Risk Management Agency, the Ecological Farming Association, and the California Agricultural Water Stewardship Initiative.

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Facilitator
Joseph McIntyre, Ag Innovations Network, Sebastopol, CA

PRESENTATIONS

State Water Supply and Policy: Implications for Valley Growers
Water Supply Outlook and the CA Water Plan – Baryohay Davidoff, CA Department of Water Resources, Sacramento, CA

2009 Water Bill and the Upcoming Bond Measure – Implications for California Agriculture – Dave Runsten, Policy Director, Community Alliance with Family Farmers and CAWSI, Davis, CA

Regional Outlook
California Partnership for the San Joaquin: Opportunities for Agriculture – Jim Tischer, Center for Irrigation Technology, California State University, Fresno, CA
Groundwater - Thomas Harter, Robert M. Hagan Chair, Water Management and Policy, Department of Land, Air, and Water Resources, University of California, Davis, CA

Research panel: Soil and Crop Management for Water Efficiency and Stewardship
Role of Soil Moisture Retention in Smart Water Management and Overview of Practices – Rex Dufour, National Center for Appropriate Technology, Davis, CA

Irrigation Management and Technology – Jim Tischer, Center for Irrigation Technology, CSU, Fresno

Management Strategies to Improve Water Productivity: Deficit Irrigation, Crop ET Assessment, and Crop Production in Saline/se Soils – Dong Wang, USDA-ARS Water Management Research, Parlier, CA

Grower Panel
Aaron Barcellos, A-Bar Ag Enterprises, Los Banos, CA

Nic Marchini, J. Marchini Farms

NRCS Funding and Technical Support for Water Management
Natural Resource Conversation Service, Merced, CA

MEETING SUMMARY

On March 25, 2010 growers, technical experts, and agricultural supporters gathered at the UC Cooperative Extension classroom in Merced to explore strategies for improved farm water management. Participants were updated on the region's water supply outlook and legislation that is likely to affect growers' access to water resources. They learned about regional issues affecting agricultural water access, including groundwater management and the irrigated lands regulatory program, as well as efforts underway – such as the San Joaquin Integrated Regional Watershed Management Plan – to provide frameworks for solutions. Participants had the opportunity to discuss among themselves, as well as with policy decision-makers, their concerns, barriers to their ability to enhance their management of water, and opportunities for policy change and support. Technical resource people helped participants connect to programs and resources to help manage water supply insecurity, and participants heard from farmers and experts about successful, practical on-farm management approaches. All presentations are available at www.agwaterstewards.org/txp/Events.

PRESENTATIONS

Water Supply Outlook and the California Water Plan

Baryohay Davidoff, California Department of Water Resources

Baryohay Davidoff offered participants a picture of anticipated water supply into the future. In the short-term, DWR is currently only able to provide 25% of contracted water this year. Numbers may be increased following the April 1 snow survey. Over a longer time horizon, urbanization in the Central Valley, combined with expectations of decreased overall supply as a result of climate change, will threaten agricultural water supply. Nine million acres of agricultural land in California use 35 million acre/ft per year. California will be adding roughly 600,000 people – 200,000 homes – per year. The conservation potential in the urban setting is almost two times the potential of agriculture.

The Department has developed a framework for action to secure a sustainable and reliable water supply for 2030. The three keystones of this effort include water use efficiency, protection of water quality, and support for environmental stewardship. Two key related initiatives include implementation of integrated regional water management planning, and improvement of statewide water management systems. Regions of California will be eligible for funding to, for example, reduce water demand (both urban and agricultural) and improve operational efficiency. Davidoff explained the funding programs that are available for water management planning and implementation, including Prop 50, Prop 13, SB13, and forthcoming funds from SBX 7 7, a bill to rebuild California's water system. Upcoming Prop 50 agricultural water use efficiency grants include $15 million for integrated water management planning. Past projects funded have included spill and tailwater recovery systems, automated canal structures, evaluation and improvement of water efficiency, and canal lining (roughly 50% went to lining). Funds through Prop 13 agricultural water use efficiency loan program will include $15 million in available funds. More information at http://www.water.ca.gov/irwm/integregio_implementation.cfm

Davidoff explained the ins and outs of CIMIS – the California Irrigation Management Information System, a network of over 130 automated/computerized systems that helps growers calculate water needs for their crops and improve irrigation scheduling. CIMIS is particularly useful in areas where the timing of water delivery is flexible. In Merced, it can take several days to order water.

Davidoff also explained the mobile irrigation lab programs that are available to growers. While some of these programs are no longer operational, others are.

Towards a Water Policy for Family Farmers in California

Dave Runsten, CAFF

Dave Runsten provided a framework for farmers to think about emerging water policy in California. He started with some background on the State Water Project and Central Valley Project, Area of Origin law, and the system of state water contractors. He outlined key components of the 2009 Water Package and implications for agriculture. SBX 7 7 will require accurate measurement of farmgate water deliveries, and will require agricultural water suppliers serving 10,000 or more irrigated acres to prepare and submit water management plans by July 31, 2012. SBX 7 6 provides for groundwater monitoring by local agencies. The water bond, SBX 7 2, which will be on the November ballot, has several implications for agriculture, including provisions for two new dams – Temperance Flat Dam on the San Joaquin River, to provide 180,000 AF of water storage capacity, and Sites Reservoir in Colusa County, an off-stream storage reservoir, sourced by pumped water from the Sacramento River.

Runsten explained some of the factors putting Northern California, Delta, and Southern Californian farmers at odds with each other. The presentation closed with some proposed elements of a family farmer water agenda, which included:

✔ Communicating to urban areas that farmers are producing food, not wasting water.

✔ Support for infill development (smart growth) in cities rather than sprawl. Smart growth requires much less water, as dense urban areas use the least water per capita. On average 40% of urban water is used outdoors, mainly for landscaping, but in hotter areas of sprawling subdivisions this can rise to 75%. The least expensive way to get more water is through urban conservation.

✔ Support for farmland preservation, particularly in areas such as east side of the San Joaquin Valley, the Delta or Sacramento Valley that have inexpensive water and senior water rights. Create a permanent agriculture. From 1984-2006, on average each year about 50,000 acres of farmland were urbanized in California, including 33,000 acres of irrigated farm land.

✔ Groundwater storage and recharge – expand spreading basins, resolve NEPA/CEQA requirements to use flood flows, build more ponds on farms

✔ Fix Delta levees

✔ Install the Two Gates project in the Delta if it will work

✔ Halt/limit the marketing of publicly subsidized agricultural irrigation water to urban real estate interests

✔ Support financing for urban water conservation

✔ Support cleaning up contaminated groundwater in Southern California

✔ Adopt water conservation measures on the farm, including high tech (drip, micro-sprinklers, tensiometers, etc.) and low tech (cover cropping, soil building, etc.) approaches

San Joaquin Valley Water Management Plan

Jim Tischer, Center for Irrigation Technology, CSU Fresno

Jim Tischer provided the audience with an overview of the San Joaquin Valley Water Management Plan "Framework". The process was launched in 2005, when a Valley Congressional Delegation convened Valley leaders to initiate a Valley Water Plan. The California Water Institute convened this effort. In June of the same year, the CA Partnership for the San Joaquin was formed and represented an unprecedented public-private partnership. The SJV Partnership Board adopted the SJV Water Management Plan Framework in October 2009. It includes all Valley-floor counties and 62 cities from SJ County to Kern County. The Integrated Regional Watershed Management Plans (IRWMPs) have generally been organized by water agencies. In this case, it is significant that land use and water management organizations joined in a common process. There are now several IRWMPs in place. More information at: www.californiawater.org

California Groundwater, Water Supply and Water Use

Thomas Harter, UC Davis

Thomas Harter began by offering a picture of a groundwater budget for a given region. Groundwater is a key element of bridging the spatial and temporal disconnects – serving as a buffer – between supply and use. In dry years, there is a heavy reliance on groundwater, which becomes more than a third of water supply in California, and more than half of supply for the San Joaquin Valley. Multi-year droughts, such as the current drought, place substantial stress on a region's water budget, and those regions more dependent on groundwater see more impact. Groundwater tables range substantially in Merced and Stanislaus Counties: west of 99, most areas have a relatively shallow water table – from 10 feet below the surface (where tile drainage is common), ranging to up to 30-40 feet depth. East of 99 and south of Merced, the groundwater table drops to 50-80 or even 100 feet or more in depth.

Dr. Harter reflected on water management options available in agriculture. Improvements in irrigation efficiency result in reduced applied water and water quality impacts, but does not affect consumptive use by plants. Deficit irrigation, on the other hand, does result in less water being consumed by plants. Land fallowing also clearly results in reductions across the board.

Dr. Harter noted that water quality regulations represent a growing obstacle for water rights. TMDL requirements in the Clean Water Act regulate sediment, temperature, and nutrients in runoff. The Porter-Cologne Act regulates surface water and groundwater discharge. The Ag Waiver program is currently focused on regulating surface water, but there is discussion underway about expanding regulation to groundwater discharges as well. A nitrate and salinity basin plan amendment is being developed by the regional water quality control board, and dairy nutrient management plans are in the works. The main objective of these activities is to maintain groundwater quality at a level where we can continue to use it as a resource, one we will need to manage water in dealing with climate variability and drought into the future.

Summary of Main Points from Group Discussions and Break Out Groups

Questions for Discussion:

What is it that we can do to create a farm-friendly water policy in California?

What do we want to say to policy makers about how they manage environmental policy that is more consistent with what is going on?

✔ There is a disconnect between urban and agricultural interests. Growers often don't feel heard by policy-makers and the public and want to do a better job of making those connections.

✔ As a result agriculture is shouldering the brunt of the regulations. We need to help non-farmers understand agriculture, need to sharpen our points, and improve agriculture's image. Bring journalists together for an educational forum, get the facts out. Everyone must shoulder the responsibility.

✔ Counter productive policies are sometimes imposed on farmers when it comes to balancing surface water and ground water use. Regulators can have their own narrow viewpoints that are counteractive. We need policies that are based on sound science and a fair broker that comes from within agriculture.

✔ We need to move forward with compensation of farmers who provide environmental services.

✔ With the shift away from flood irrigation we are losing groundwater recharge. We need higher irrigation efficiency, but also need to consider losses to groundwater when we increase irrigation efficiency. Need to avoid subsidence. Focus on recharge in wet years.

✔ The more N-intensive a cropping system is, the more important it is to manage irrigation efficiently to avoid losing N and pesticides to ground water. (It's more difficult to avoid leaching in a row crop system putting 700 lbs of nitrogen into the soil than a vineyard putting in only 50 lbs).

✔ Proper management of irrigation is often more important that the equipment or technology. In some cases well-managed furrow irrigation can be as good as pressurized drip or another more advanced system that is poorly managed and has low performance.

✔ Public subsidies should have public benefits and shouldn't be sold at a profit.

✔ Tie food security to national security and strengthen local and regional food systems. The cost of growing food in Mexico or Chile is much lower as farm workers are paid less and there are fewer regulations.

✔ We need better regional land use planning. Take advantage of regional input rather than relying on the federal government. Build a system with local intelligence that works at the local level.

RESEARCH PANEL: Soil and Crop Management for Water Efficiency and Stewardship

Organic Matter(s): Neglected Component of Soil Function and Soil Moisture Retention

Rex Dufour, National Center for Appropriate Technology

Rex Dufour presented the benefits of healthy soils for sound water management. He began by pointing out the research of Kansas soil microbiologist Charles Rice, who showed that since crops were first planted on the plains, we have lost roughly half of the soil organic matter. Estimates for California are similar – land management practices can degrade topsoil without replacing the organic matter. The benefits of adequate soil organic matter (SOM) include:

✔ SOM increases soil function: absorption of rainfall/irrigation and store soil moisture.

✔ SOM can hold 30x its weight in water. 1% OM in the top 3 inches of soil can hold 1.4 inches of water, the same amount an entire foot of sandy loam soil with no OM can hold.

✔ SOM acts as a reservoir for nitrogen.

✔ SOM helps provide P through mycorrhizal-mediated interactions.

✔ SOM increases cation exchange capacity (CEC).

✔ SOM provides other micronutrients through an effective soil food web.

Dufour presented an approach that places soil health at the core of sound water management and farming. Higher organic matter and soil health cause more rainfall to penetrate, and decreases crusting and runoff, which in turn maintains topsoil in place as well as key nutrients and aerobic soil conditions.

Dufour argued that investing in soils reduces regulatory risk. Growers are being regulated for nitrates, polyphosphorus and pesticides. Healthy soil life and soil food web (including fungal hyphae, bacteria, plant roots, micro aggregates), a good organic matrix, and high cation exchange capacity, all of which are associated with a good level of organic matter in the soil, reduce runoff of amendments. Mycorrhyzae can bring in more water, and make the soil more resilient to drought stress, because more 'critters' are helping at root zone level. In drought years, organic soils shine.

Beneficial practices covered in Dufour's presentation included:

✔ Compost, cover crops, green manures

✔ Minimum tillage, no-till

✔ Mulch and wood chips

✔ Alley cropping in perennial crops

✔ No-till in combination with cover crops and good crop rotations

✔ Solar fertilizers – adds SOM and solar N as opposed to oil-based N

✔ Reducing tractor passes

Dufour concluded by pointing out that NRCS can cost share on any of these practices, including composting (mulch). Growers in the room shared their own successes with these practices. One grower eliminated the need for chemical fertilizer by incorporating vetch cover crops. Another had success using animals (pigs) to turn the soil.

Irrigation Management and Technology

Jim Tischer, Center for Irrigation Technology, CSU Fresno

Jim Tischer offered a technical description of key irrigation management solutions for optimal efficiency. He covered pump efficiency, flow meters, and system maintenance. He also described the Ag Pump Efficiency Program, about which more information is available at the CIT website. The CIT website also supplies growers with additional information on irrigation consultants who can support growers in enhancing agricultural water use efficiency.

Water Management Strategies to Improve Productivity and Protect Water Quality

Dong Wang, USDA-ARS Water Management Research, Parlier, CA

Dong discussed his research on the use of post harvest deficit irrigation of peaches in the southern San Joaquin Valley. Deficit irrigation means supplying less water to the plants than total evapotranspiration. Trials were conducted using furrow irrigation and subsurface drip. Evapotranspiration and soil water content were measured. Results indicate that deficit irrigation can be utilized for peaches after harvest to save water without causing yield losses the following season.

A second project is using satellite remote sensing to evaluate near real-time water use of vegetable and perennial crops. The goal of that project is to develop a decision support system to support practical irrigation scheduling based on climatic information for more accurate irrigation water applications that will meet crop water requirements. Initial results indicate that satellite measurements can be used to accurately predict canopy cover of different crops. This is a critical step in moving towards providing growers with near real-time crop coefficient values used to calculate water needs for different crops throughout the season.

GROWER PANEL

Aaron Barcellos, A-Bar Ag Enterprises

Aaron Barcellos grows a range of crops including tomatoes, alfalfa, cotton, melons, wheat, and pomegranates. The farm started at 900 acres and has grown to 5,900 acres. Irrigation was shifted from flood to drip on 50% of productive acres (3,000 acres). 10% of the operation is under sprinkler, and 40% is flood irrigated. The farm operates in 5 irrigation districts: CCID, Firebaugh Canal, Pacheco, Panoche, San Luis, and 3 Drainage Districts, making water management more complex.

Barcellos noted that the earlier operation was not sustainable; water was the principal challenge. The rapid growth of the farm made this even more challenging, as did the poor-drainage heavy clay, clay loam soils, high water table, sub-surface drainage, low value crops, and average yields. In the late 1990s, the farm operators initiated a substantial plan for change, operating under the following guiding principles: remain sustainable "profitable", welcome innovation, explore new ideas, maximize water efficiency, increase yields, control input costs, increase operational efficiency – GPS, diversify crops. Barcellos noted that the shift to drip irrigation is the #1 management solution that has led to the farm's sustainability. Barcellos plans to continue improving water management on the farm, and will be looking toward GPS, more site-specific farming, and other improvements.

Barcellos elaborated on the drip technology he put in place. A-Bar received EQIP funding to help put in several of their drip irrigation systems, and completed a farm conservation plan with the local NRCS office. SRF loans were also helpful. The system is highly automated and achieves higher than 90% delivery uniformity. Guidelines developed by Dr. Charles Burt at Cal Poly were helpful in getting fertigation in place. Barcellos explained the detailed features of his system.

Barcellos' tips for tomato irrigation: Start with a budget based on Etc and KC; know your application rates; develop weekly irrigation scheduling; track applied water/fertilizer vs. weekly scheduling; use surge irrigation; encourage root development to shoulders of bed; verify irrigation by ground-truthing and irrigation sensors; adapt according to plant response; "build the factory"; keep the plant "happy."

Nic Marchini, J. Marchini Farms, Le Grand, CA

Nic discussed transitioning to drip in tomatoes on his family farm. This allowed them to be very specific and efficient with water delivery. Using measurements of ET and a crop coefficient they are able to determine when to water and for how long, saving 30 to 40% of previous water use. This was a big investment and a big cultural change for the farm requiring completely different management, The change also helped reduce nitrate in the soil at harvest extending shelf life of the product. Nic said that for both tomato and radicchio, watering too close to harvest causes the product to break down sooner. They also switched to drip on 20% of their almonds reducing water use and saving in pumping costs. The Marchinis' grow a lot of cover crops, and use plastic mulch to hold in moisture and save water. Weed control costs $150 - $200/acre up front but saves money down the line.

RESOURCES

California Agricultural Water Stewardship Initiative (CAWSI)
Agricultural Water Stewardship Online Resource Center
www.agwaterstewards.org/txp/Resource_Center

California Association of Resource Conservation Districts
Directory of California RCDs
http://carcd.org/directory.php

California Irrigation Management Information System (CIMIS):
http://wwwcimis.water.ca.gov/cimis/welcome.jsp

Center for Irrigation Technology
http://cit.cati.csufresno.edu/

East Merced Resource Conservation District (EMRCD)
A Resource Conservation District (RCD) acts as an independent local liaison between the federal government and landowners, working closely with the USDA Natural Resources Conservation Service (NRCS) on agriculture and conservation.
Phone: 209.722-4119 x3
E-mail: info@emrcd.org

Mobile Irrigation Labs:

East Stanislaus RCD
3800 Cornucopia Way Suite E
Modesto, CA 95358
Phone: (209) 491-9320 x121
Fax: (209) 491-9331

West Stanislaus RCD
PO Box 193
Patterson, CA 95363-0193
Phone: (209) 892-3026
Fax: (209) 892-5136
lisa.alamo@ca.nacdnet.net

National Center for Appropriate Technology, Alternative Technology Transfer to Rural Areas
Resources on water quality, conservation, drought and irrigation: http://attra.ncat.org/water_quality.html The publications and other resources in this area address water use, soil moisture management, water quality, and water conservation. Topics range from created wetlands to choosing water-use-efficient crops to water quality in organic production to irrigation management. This section addresses the close relationship between agricultural production, soil moisture, crop and livestock water use, and water resources.

RESOURCES (continued)

Natural Resources Conservation Service
Resources for Farmers and Ranchers
http://www.nrcs.usda.gov/partners/for_farmers.html
Farmers, Ranchers, and other conservation-minded agricultural producers, rely on NRCS for assistance through conservation programs and technical information to help them protect the natural resources on their land. Your local USDA Service Center can help you plan and install the best conservation practices for your land.

Environmental Quality Incentives Program (EQIP)
http://www.nrcs.usda.gov/programs/eqip/

Agricultural Water Enhancement Program (AWEP)
http://www.ca.nrcs.usda.gov/programs/awep.html

San Joaquin Valley Water Plan
http:// www.californiawater.org

UC Cooperative Extension Drought Management Resources
http://ucmanagedrought.ucdavis.edu/index.cfm

PARTICIPANTS

Jim Tischer, Center for Irrigation Technology
Rex DuFour, NCAT
Cindy Lashbrook , Riverdance Farms
Jasmine Roohani, EcoFarm
Teresa Doughton, USDA Risk Management AGency
Gordon Craig
Gene Edrington, Edrington Ranch
Chris Storm
Rich Gemperle
Ray Latimer, Latimer Farms
Ian Parkinson
Nelson Siefkin
Jesse Fouch
Hannah Fouch
Greg Coleman, E & J Gallo Winery
Charles Cox
Ramsey Cox
Magali Veillon
Marcy Coburn, EcoFarm
Kristin Rosenow, EcoFarm
Katy Mamen , Ag Innovations Network
Joseph McIntyre, Ag Innovations Network
Baryohay Davidoff, Dept. of Water Resources
David Runsten, CAFF
Thomas Harter, UC Davis
Dong Wang, USDA-ARS
Aaron Barcellos, A-Bar Ag Enterprises
Matt Angell, Western Ag & Turf
Jesse Roseman, Tuolumne River Trust
Ann Clark
Keith Larsen
Robert Bliss, East Merced RCD
Cathy Weber, East Merced RCD
Candice Chow, Environmental Defense
Nic Marchini, J. Marchini Farms
Reggie Knox, EcoFarm, CA FarmLink
Maggi Aaronson, EcoFarm
Lila McIver, Great Valley Center
Jim Schieferle
Ed Azhderian
Duane Marson, Bettencourt & Marson Dairy, Hilmar