7/27/2011

California Department of Water Resources
Agricultural Stakeholders Committee

Re: Quantifying the efficiency of agricultural water use.

Dear committee members,

There are as many scientific methods and opinions of quantifying the efficiency of agricultural water use as there are soil types. That is to say there are many of them and quantifying them correctly is somewhat subjective. Our position is not to argue what parameters define efficiency, but to suggest a scientifically proven method of optimizing irrigation scheduling, reducing water waste, maximizing plant yield, and better manage nutrient application in agricultural applications. We are recommending that the DWR include soil moisture monitoring as a very important element in the technology matrix of improving agricultural irrigation efficiency.

The committee may be aware that this week the State Water Resources Control Board held an "Agricultural Water Use Efficiency Workshop" in Sacramento. Several experts presented including the Secretary of California Department of Food and Agriculture, Karen Ross. A common thread with Secretary Ross and several other speakers was the desire to improve data collection abilities and specifically mentioned soil moisture monitoring technology as one method of improving irrigation performance. Dr. Charles Burt of Cal Poly SLO also spoke at the conference and suggested that while drip irrigation can be more efficient, it must be carefully monitored and managed.

To further support the need for improving irrigation scheduling efficiency with technology we refer you to the recent report titled The Reasonable Use Doctrine & Agricultural Water Use Efficiency by Delta Watermaster Craig Wilson. In it he states *"It is important to "follow the water" to determine what the true water savings are"*. We believe that soil moisture monitoring is a very effective method of "following the water" all the way to the crop's root zone where it provides the most beneficial use. He also suggests using financial incentives to improve irrigation scheduling methods.

In fact soil moisture monitoring may be the missing link in the irrigation scheduling equation. For example, California growers have access to ET (evapotranspiration) data from several sources (CIMIS, NOOA, etc.) or may even have their own weather station on site. Our state has an extensive network of university researchers, county extension offices, crop consultants, and other experts who provide a wealth of valuable information regarding plant physiology, crop coefficients, soil sciences, nutrient management, etc. Irrigation equipment providers can supply performance metrics such as application rate, spacing, flow monitoring etc.

However, while all of this information is important it does not take into account the many variable conditions that are site specific to the grower's location such as micro climates,

soil variances, changes in topography, crop density planting, etc. Monitoring soil moisture status is a very effective method of measuring how much water actually makes it to the root zone. Any thing else is only an estimate of what's happening above the soil surface.

Another consideration of using soil moisture measurement equipment is the value it provides in determining irrigation distribution uniformity. The catch-can test commonly used on turf does not work for many agricultural applications. Crop canopies and irrigation methods such as flood or sub-surface drip irrigation present a challenge to this type of auditing process. The migration of water within the soil profile can have a profound impact on crop performance, but can't be measured with surface measurement methods. Soil moisture sensors work well for this agricultural application and can be temporarily deployed in a field to determine the net impact irrigation has on the soil profile. The sensors can then be re-used for other audits.

The scientific and research communities have used various methods of soil moisture measurement for years and much data is available to the public. Many research papers and reports are available that are specific to crop type as well as irrigation methods and regimes. This information is readily available to growers who can use it to assist them in making smart scheduling decisions in their own fields.

Another potential benefit is the accountability tool it provides to the grower for water management. For example, the NRCS often cost shares on soil moisture monitoring equipment with growers if they agree to automatically log soil moisture readings. The data is primarily used as an irrigation management tool; however the NRCS reserves the option to verify the information via collection of historical data or access to the data via the internet. This seems like an effective use of public money to enhance water conservation and encourage good stewardship of the environment.

IRROMETER is one of several manufacturers on the market offering soil moisture measuring, monitoring, and sampling products. Many irrigation dealers throughout the state offer a multitude of brands, sensor technologies, automatic data logging equipment, and remote access telemetry options. Sensor costs range from $33 to several thousand dollars each. Data can be read manually, automatically collected and viewed on a computer, or it can be shared with others via the internet.

We hope the DWR sees the value of completing the irrigation technology loop with soil moisture monitoring equipment. It just makes it easier to follow the water all the way to the root zone!

If you have any questions please contact Brian Lennon or Tom Penning at the IRROMETER Company.

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