Soil Moisture Management with Watermark Sensors

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Introduction

Grant Funding Obtained Through the EPA Targeted Watershed Program

Irrigation Efficiency

Real time ET—Crop Water Use

Water Quality

Soil Moisture Monitoring
On Farm Soil Moisture Monitoring

- 20 Participation Farms
  - 2 field locations/farm
  - 3 sensors at each location, 1’, 2’, & 4’

- Installed 5 data loggers

- Hopefully, we’ll answer the question, “Is it time to irrigate?”
Equipment

Irrometer Company
951-689-1701 Phone
951-689-3706 Fax
P.O Box 2424 Riverside, CA 92516
sales@irrometer.com
techsupport@irrometer.com

Watermark Soil Moisture Sensors, Meters and Data Loggers.
Installation

- Soak sensors over night
  - If time permits, conduct wetting and drying periods
- Determine root zone of crop install sensors accordingly
- Make hole at least 7/8” in Diameter
- Critical to have good soil to sensor contact
Placement in the Field

- Accessibility
- Install in representative areas
- Avoid extremes
  - i.e. Flood
    - $\frac{2}{3}$ way down run (usually the lowest water penetration)
- Pivot
  - Every 10-15 acres
Twice each week
More often, the prettier graph
For management purposes, prior to irrigation and after irrigation
Meters read resistance
  - Resistance is converted to Centibars
  - Measures the force/area required to remove water from the soil
Soil Water Holding Capacity

Field Capacity, Available Water and Permanent Wilting Point

Field Capacity

Available Water

Wilting Point

Unavailable Water

Recommended Values at Which to Irrigate Forage Crops

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Moisture Reading (centibars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand*</td>
<td>40-50</td>
</tr>
<tr>
<td>Sandy Loam</td>
<td>50-70</td>
</tr>
<tr>
<td>Loam</td>
<td>60-90</td>
</tr>
<tr>
<td>Clay Loam or Clay</td>
<td>90-120</td>
</tr>
</tbody>
</table>

*Caution: Soil moisture sensors may not respond quickly enough to indicate the rapid decline of soil moisture in very sandy soils.
Over Irrigation

Soil is dry enough to apply irrigation.

Harvest
Over Irrigation

Soil is dry enough to apply irrigation.
Over Irrigation

Soil is dry enough to apply irrigation.

Irrigation Applied

Soil Moisture Sensor Depth

1 feet
2 feet
4 feet
Pretty Good Scheduling

Soil is dry enough to apply irrigation.

Irrigation Applied

Harvest

Irrigation Applied
Under Irrigation

Soil is dry enough to apply irrigation.

Irrigation Applied
What in the “Sam Heck” is going on here?

Soil moisture sensor depth chart showing:
- Wet soil levels
- Dry soil levels

Notations:
- Harvest
- Soil is dry enough to apply irrigation

Legend:
- 1 feet
- 2 feet
- 4 feet

Altafla Field
938812-B
Soil Moisture Summary

- 13% Under irrigated
- 16% Well timed irrigation
- 71% Over Irrigation

Recommendations:

- The degree of over irrigation is not yet understood
- Take into account environmental and economic factors before changing scheduling
Potential Impacts

Change
irrigation management

Improve
conservation

Reduce
pollution

Irrigation Efficiency
Soil Moisture
Crop Water Use
Questions???