



# IRR◊METER

*Presented by—*  
Lanny Sowell

## **IRROMETER COMPANY**

- **Established 1951**
- **P.O. Box 2424  
8835 Philibin  
Riverside, California  
951.689.1701**
- **Tom Penning, President.**



## SCHEDULING IRRIGATION

- **WHEN AND HOW MUCH?**
- **Only way to know for sure is to measure it.**



## WHY?

- **SAVE MONEY**
- **SAVE WATER**
- **SAVE ENERGY**
- **SAVE LABOR**





## MUST KNOW

1. ROOT ZONE
2. IRRIGATION ZONE
3. SOIL ZONE



## METHODS

- **Direct Method – soil or plant-based**
- **Indirect Method – ET modeling**
- **Considerations**
- **ACCURACY**
- **COST**
- **ACTUAL VS THEORETICAL**



# SOIL WATER MEASUREMENT

- **Site Specific**
- **Measure effect of irrigation**
- **Measure effect of rainfall**
- **Measure effect of evaporative loss**
- **Measure effect of crop water use**
- **Can disclose irrigation inefficiencies**



# MEASURING SUCTION VS. PERCENT MOISTURE

- Root system reacts to  
“physical force, not percent”
- Soil variability – at site and profile
- Ease of data interpretation

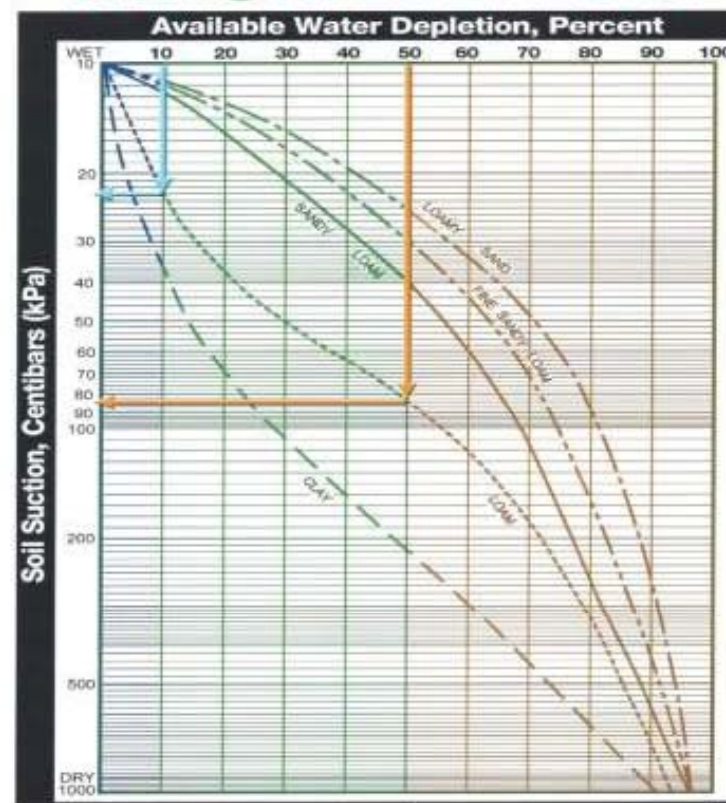




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## CONVERSION

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Graph adapted from: Agronomy No. 11 figure 30-2 Irrigation of Agricultural Lands  
American Society of Agronomy D. M. Hanson, H. B. Keiser, T. W. Edminster authors



## EVALUATION OF DATA

- Rate of change
- Effect of soil type
- Effect of irrigation method:  
low frequency vs. high frequency
- Crop sensitivity- stage of growth
- Leaching
- Continuous data



## HOW MANY SENSORS?

- One station (group) per irrigation valve.
- One station (group) per soil type.



## PLACEMENT OF SENSORS

- Top of root zone
- Middle of root zone
- Bottom of root zone
- In the irrigation zone
- Be consistent with placement



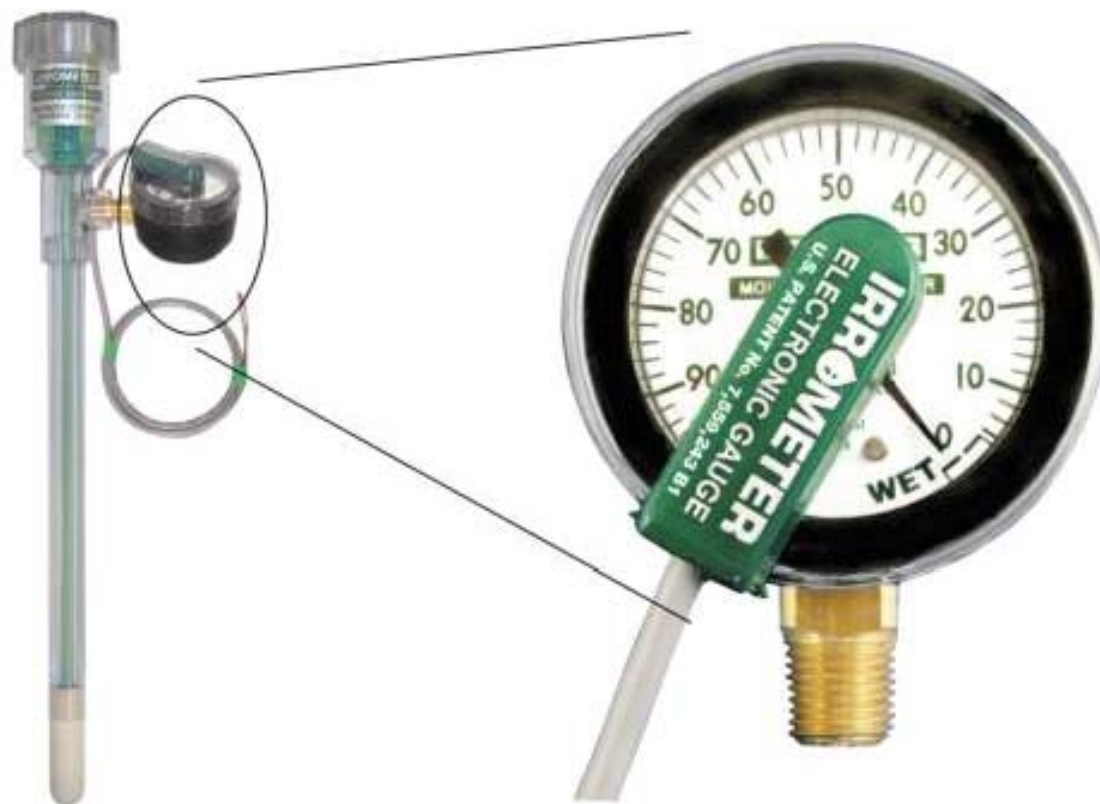


## TENSIOMETER

- Direct method
- All soil types
- Simple
- Reliable
- Manual or automatic
- MECHANICAL ROOT



## E-GAUGE



# WATERMARK



## WATERMARK

- Indirect method
- Most soil types
- Salinity buffered
- Manual or automatic
- Stable proven calibration
- Low cost





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## HANDHELD



# DATA LOGGER



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## WIRELESS





# LONG RANGE RADIO





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## E-NET



## **SUMMARY**

- **SOIL MOISTURE SCHEDULING**
- **PRODUCES BETTER CROPS**
- **PROTECTS WATER RESOURCE**
- **SUSTAINABLE PRACTICE**
- **MAKE MONEY**



**REMEMBER. . .**

**CONTACT**

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# INNOVATIONS IN SOIL MOISTURE MONITORING

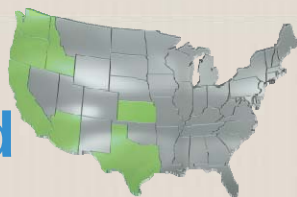
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[www.PureSense.com](http://www.PureSense.com)

*Presented by—*  
Melissa Naber  
888.882.7873

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## Company Background



- 48 full-time employees
- Serving over 225 customers
- Over 1,300 monitored sites
- 97% renewal rate
  - Now Serving California, Arizona, Oregon, Washington, Idaho, Nebraska and Texas

## Strong Roots in Agriculture

- Monitoring over 35 different crop types.
- Software developed specifically for agriculture.
- Accommodate a wide range of operation sizes.

## Diverse Team

- Development team consists of 9 team members dedicated to keeping the product at the forefront of irrigation management technology.



## **Major Crop Types**

|                      |                       |
|----------------------|-----------------------|
| <b>Almonds</b>       | <b>Oranges</b>        |
| <b>Alfalfa</b>       | <b>Peaches</b>        |
| <b>Apples</b>        | <b>Pistachios</b>     |
| <b>Avocado</b>       | <b>Pomegranates</b>   |
| <b>Blueberries</b>   | <b>Potatoes</b>       |
| <b>Canola</b>        | <b>Raspberries</b>    |
| <b>Carrots</b>       | <b>Radicchio</b>      |
| <b>Cherries</b>      | <b>Strawberries</b>   |
| <b>Corn</b>          | <b>Tomatoes</b>       |
| <b>Lemons</b>        | <b>Walnuts</b>        |
| <b>Melons</b>        | <b>Wine Grapes</b>    |
| <b>Nursery Crops</b> | <b>Wheat Soybeans</b> |
| <b>Onions</b>        |                       |



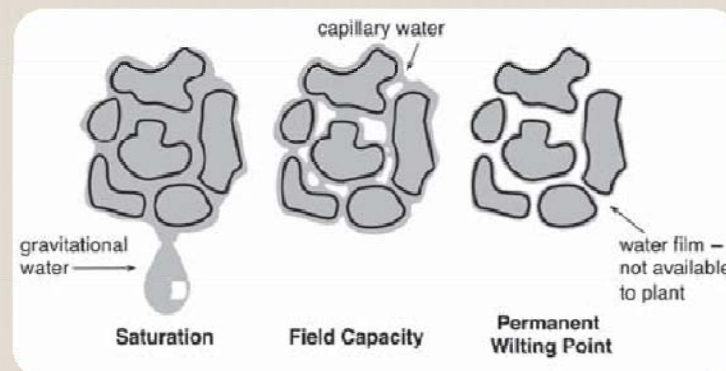


## Soil Moisture – What Is It?

**Soil Moisture** is the water in the pore spaces of a soil PLUS the water held by soil itself.

### Soil Moisture Characteristics

- **Saturation** – All of the pores are filled with water.
- **Field Capacity** – Some water is in the pores, but it no longer drains freely
- **Wilt Point** – Only water held tightly by the soil is present



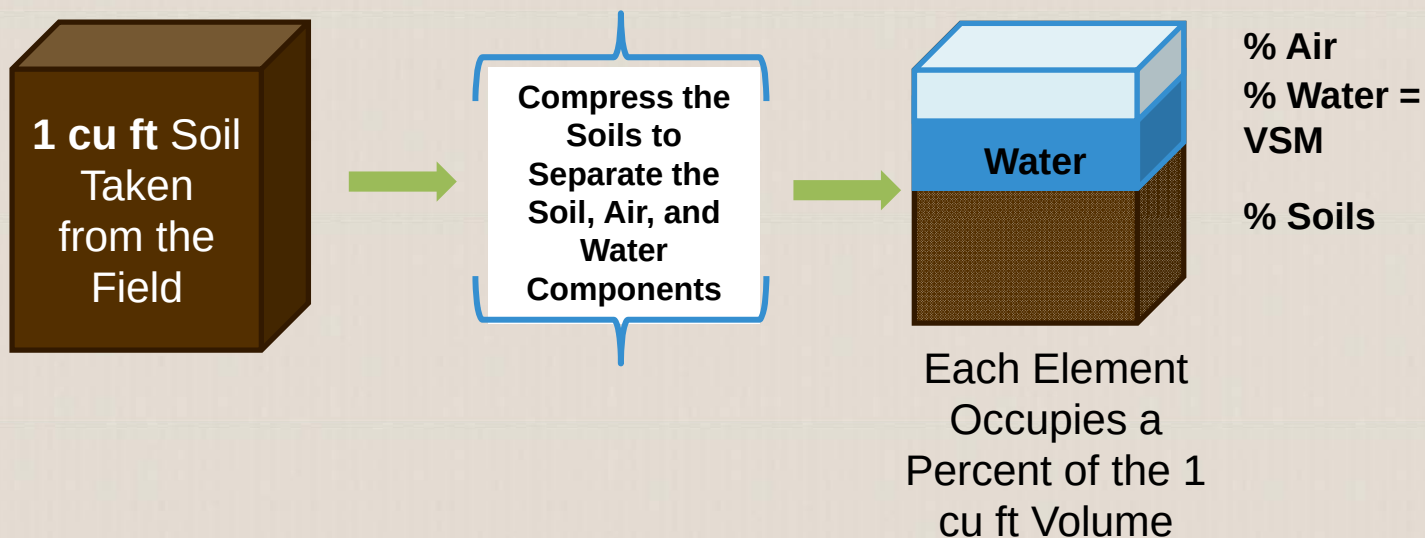
**Water Holding Capacity (WHC)** is the total amount of plant-available water when the soil is at field capacity





## Measuring Soil Moisture

### Capacitance Probes Use Volumetric Soil Moisture

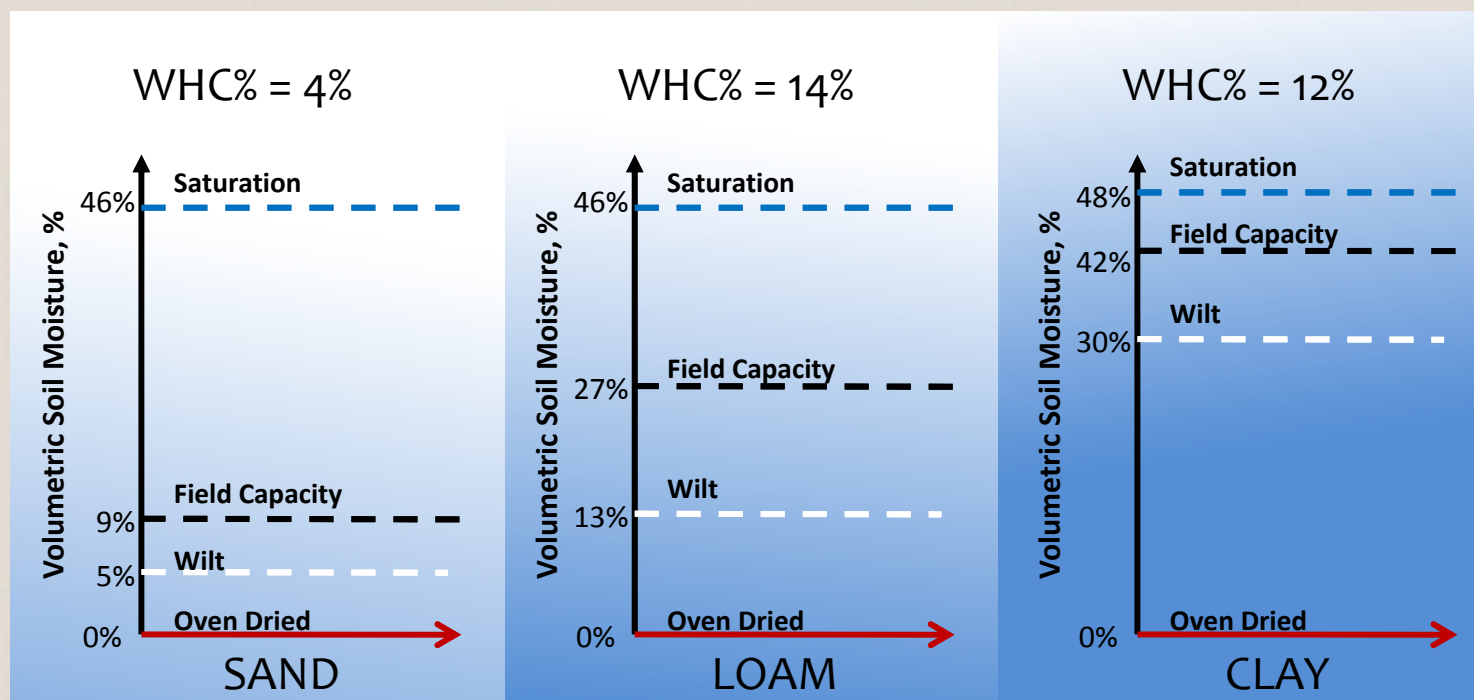


Volumetric Soil Moisture (VSM) is the total water content of soil by volume measured in percent.

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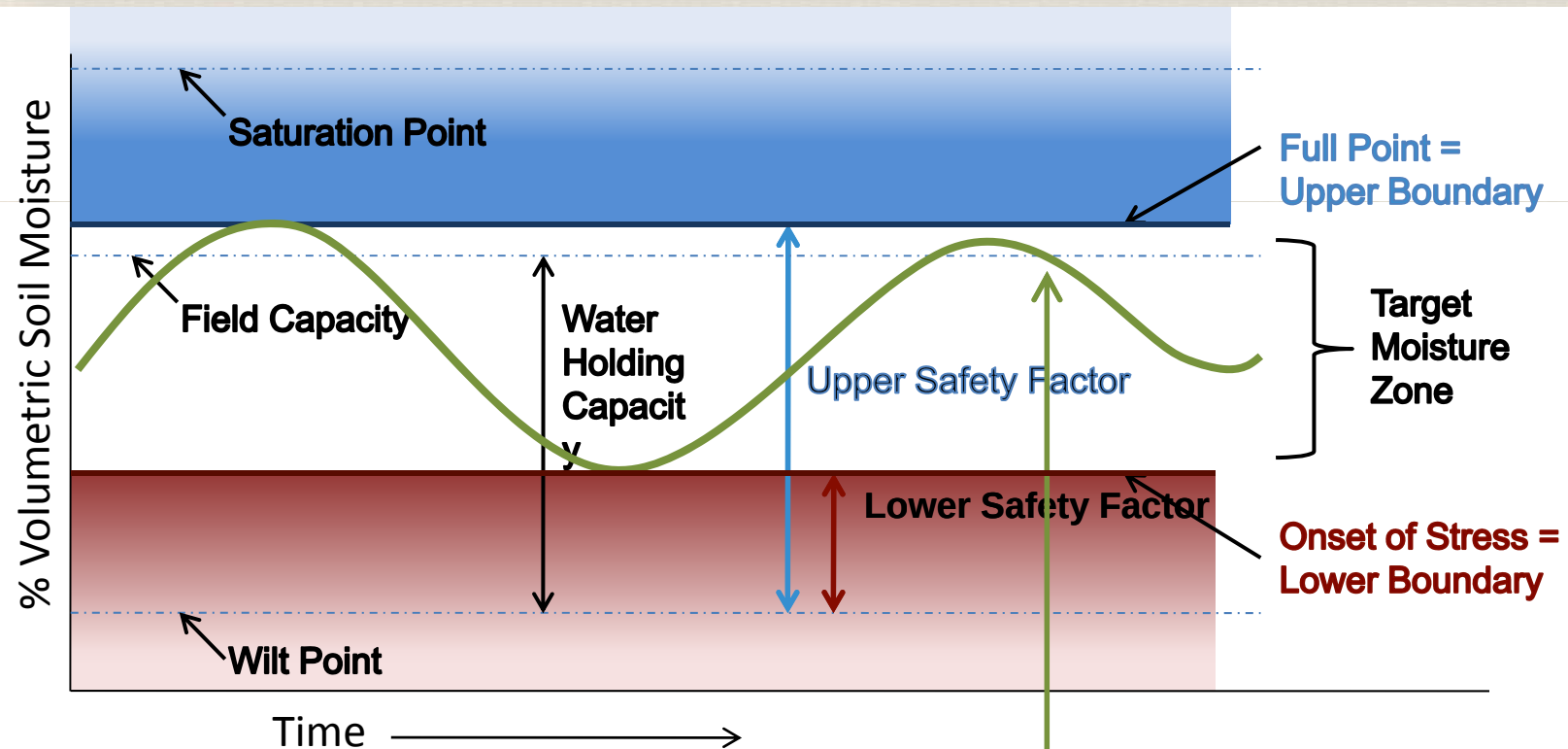
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## Both WHC and VSM Vary Widely with Soil Type



## Target Moisture Zone

*Making More Accurate Irrigation Decisions*



Moisture Trend Line

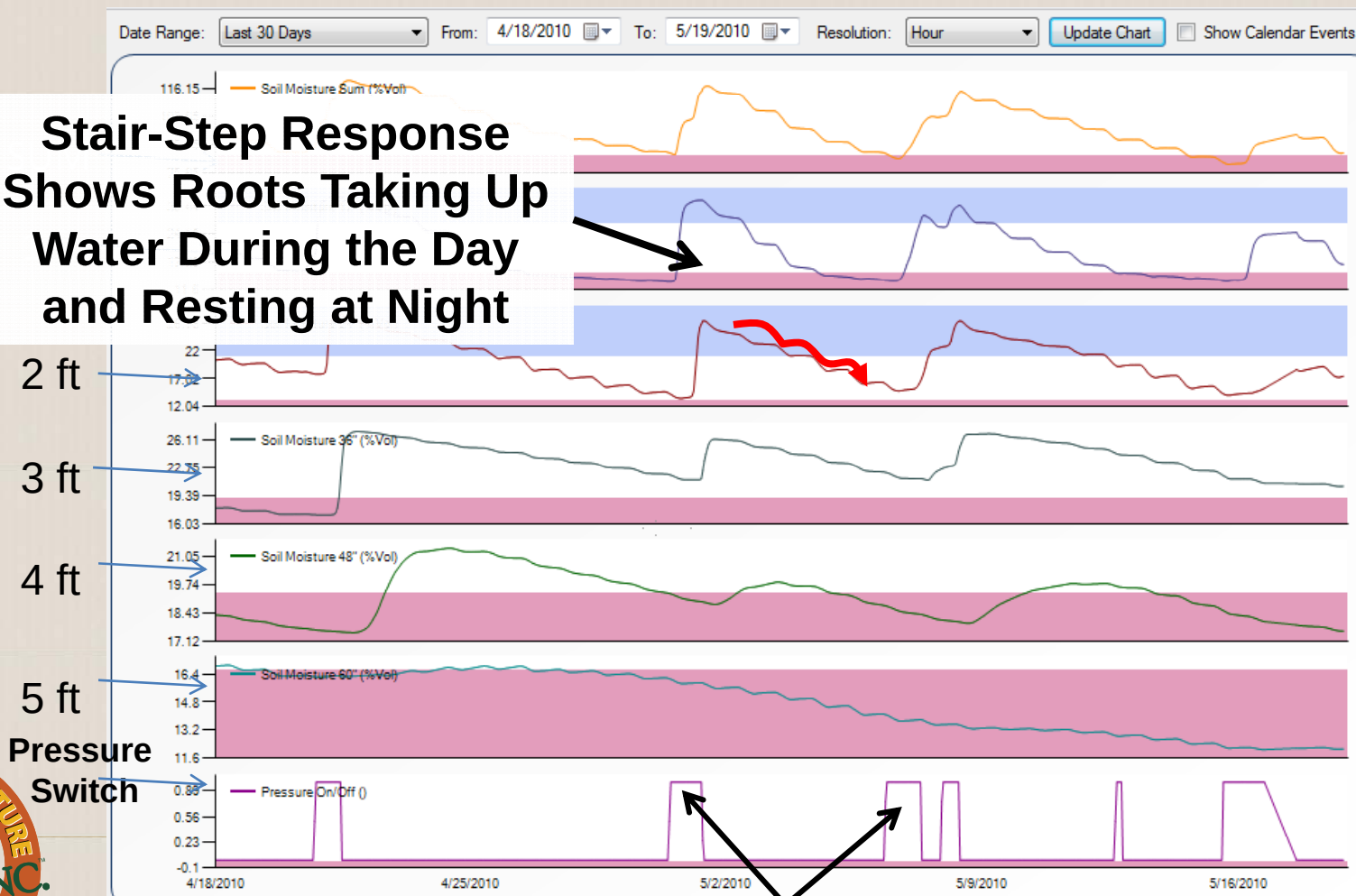
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## Soil Moisture Response Trends: Root Activity

**Stair-Step Response Shows Roots Taking Up Water During the Day and Resting at Night**



*Irrigation Events*

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## How does it all work?





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## Hardware

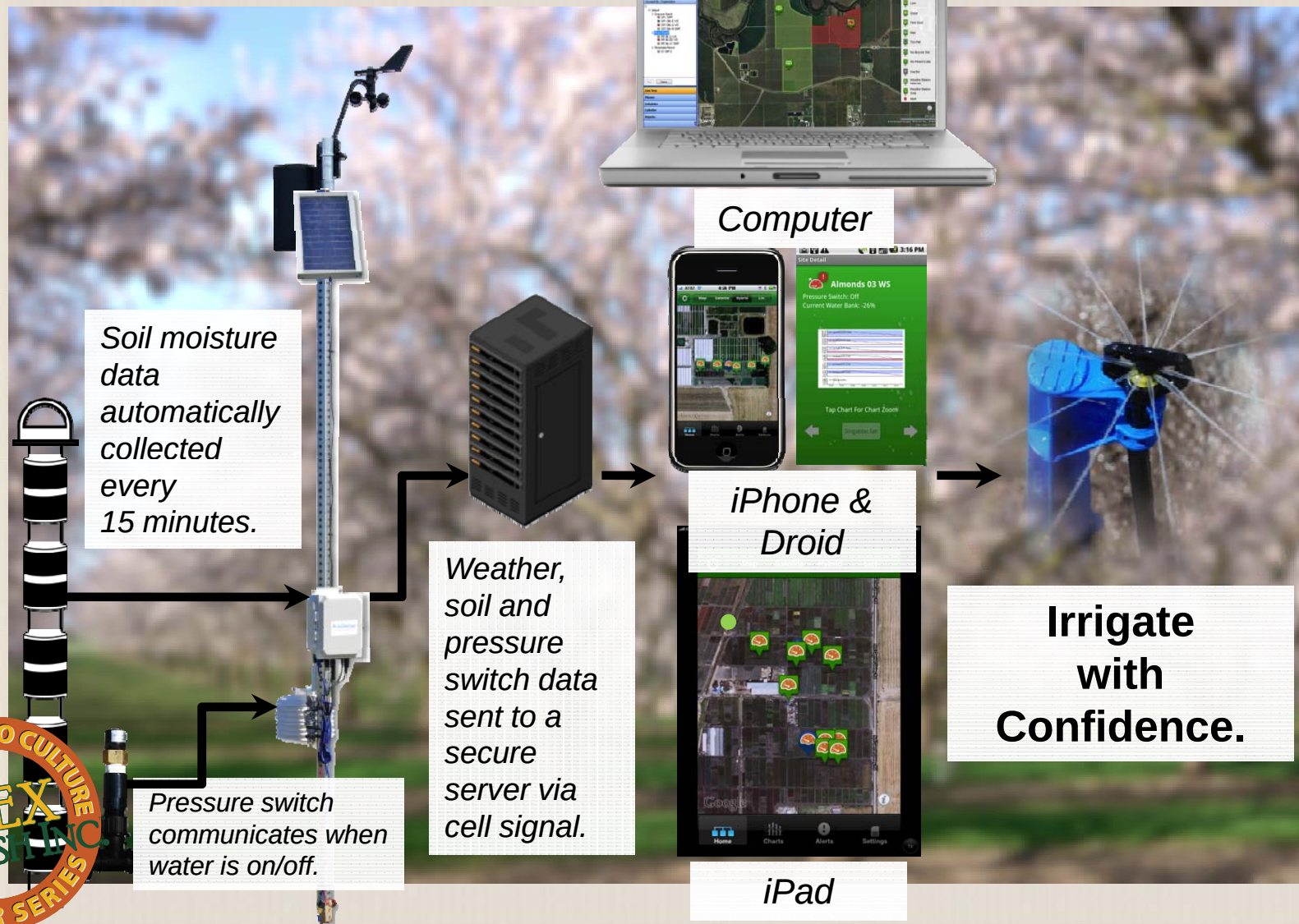
- Weather station
- Solar-powered on-board field computer
- Soil probes installed down to 5 ft.
- Pressure switch or rain bucket to capture irrigation event





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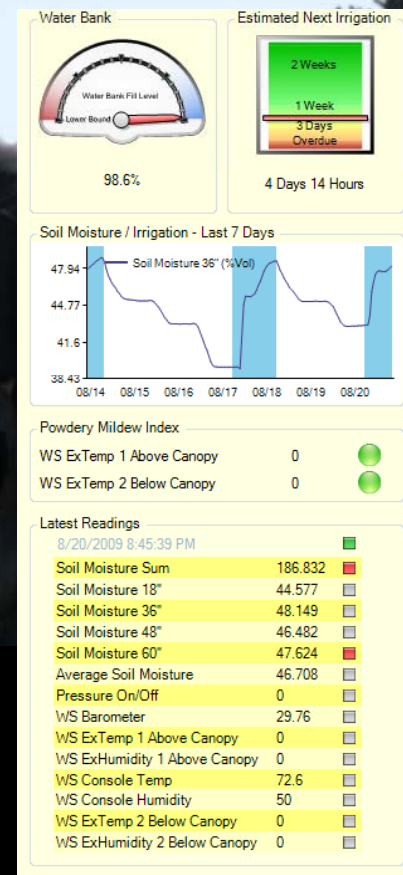
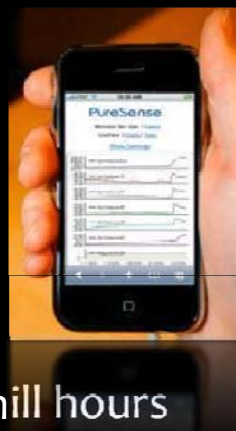
## How It Works



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## Software

- Secure, online access. Anytime, anywhere.
- Custom alerts
- Instant readings
- Easy-to-read dashboard
- Training
- Weather reporting-GGD, Heat/Chill hours



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Ease of Use

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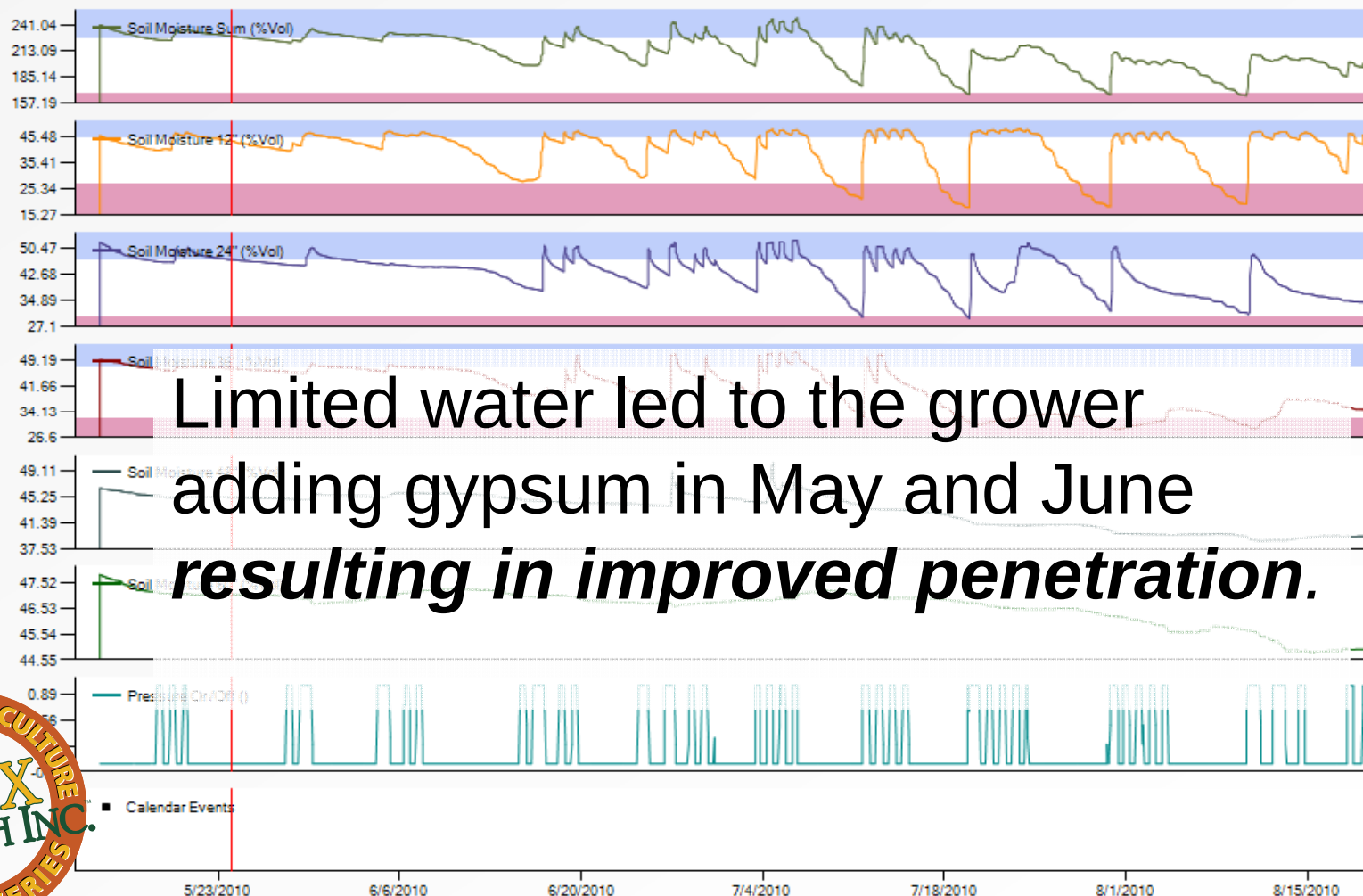




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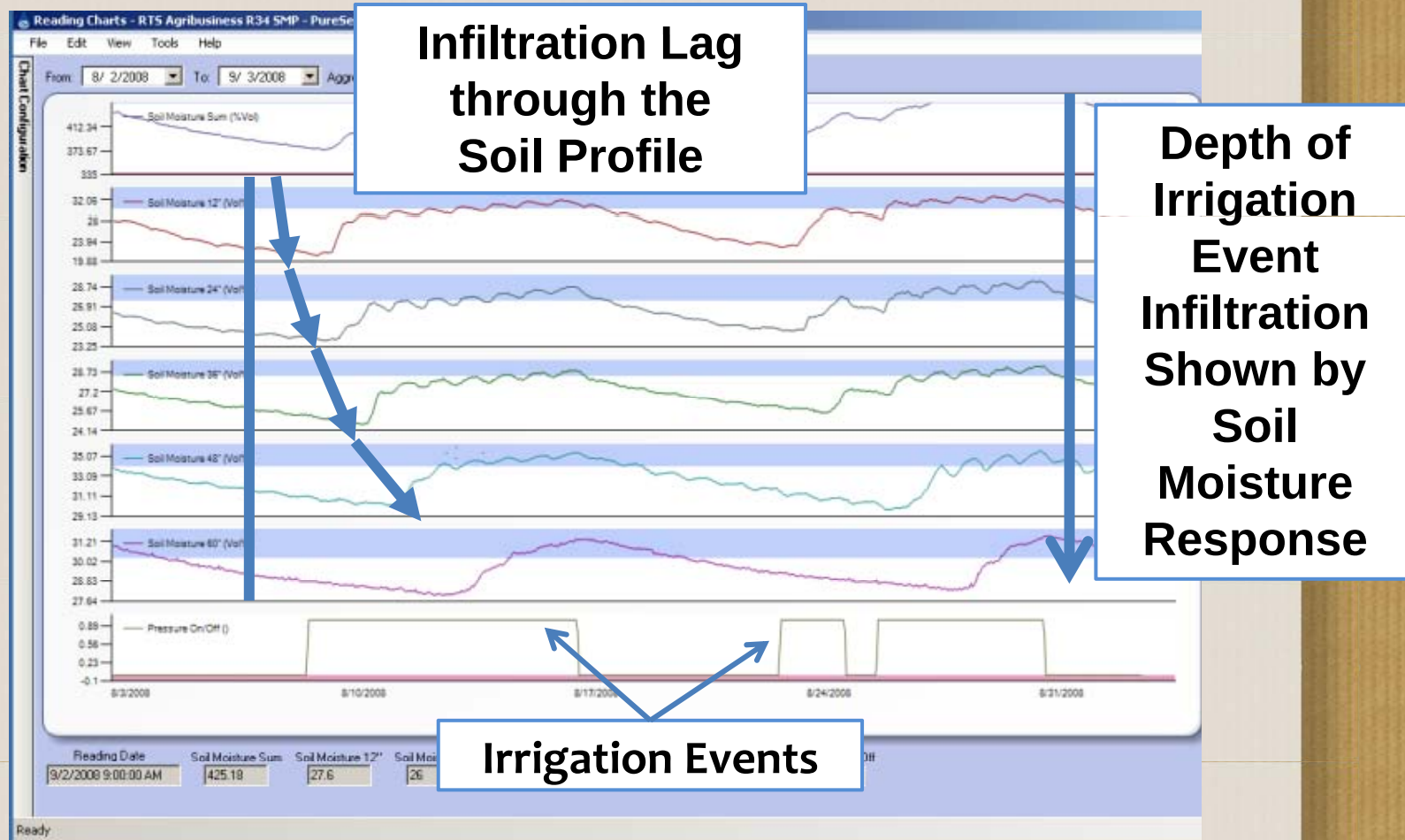
## Soil Moisture Response Trends: Root Activity

Date Range: Custom From: 5/12/2010 To: 8/20/2010 Resolution: Hour Update Chart Show Calendar Events



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## Soil Moisture Response Trends: Irrigation Infiltration



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## ...More than just hardware

- Support teams committed to solving your individual challenges.
- Dedicated team of developers, constantly innovating technology - with feedback from growers like *you*.
- Local teams to install and train you *in person*.
- Easy-to-use software helps you make intelligent irrigation decisions.



**Contact us: 888.882.7873**

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