Irrigation Management Strategies in MS

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Sustainable Agriculture

- Economically Viable: If its not profitable, its not sustainable
- Socially Supportive: The quality of life of farmers, farm families and farm communities
- Ecologically Sound: We must preserve the resource base that sustains us all

RISER

On-Farm Evaluations: Corn

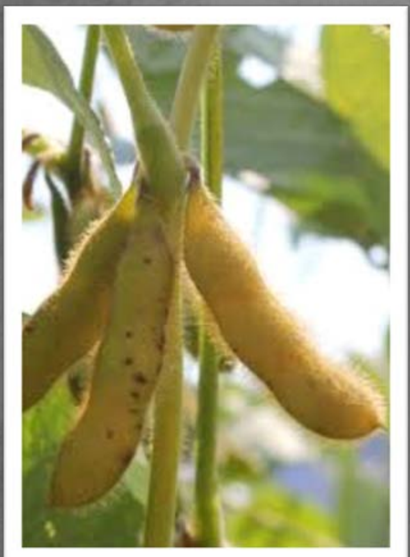
	Yield	Water Use	WUE	Profitability
	---Bu/acre---	---Acre-in---	--Bu/acre-in-	-----$-----
Producer	220	9.4	28.8	682
RISER	227	5.5	44.7	709
P-value	0.0926	0.0011	0.0100	0.0560

N = 16 farms
7% population exceeded permitted value, 18 acre-in/year
86% population applied more water than RISER
14% population applied less water than RISER

MCPB
MISSISSIPPI CORN PROMOTION BOARD

RISER

On-Farm Evaluations: Soybean



	Yield	Water Use	WUE	Return
	---Bu/acre---	---Acre-in---	--Bu/acre-in--	-----$-----
Producer	69.3	11.5	7.2	543
Riser	68.6	9.1	9.8	556
P-value	0.6703	0.0198	0.0194	0.5376

N = 20 farms Mississippi and Arkansas
7% of the population exceeded permitted value, 18 acre-in/yr
79% population applied more irrigation water than RISER
21% population applied less water than RISER

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Common Irrigation Scheduling Methods

Feel & Appearance

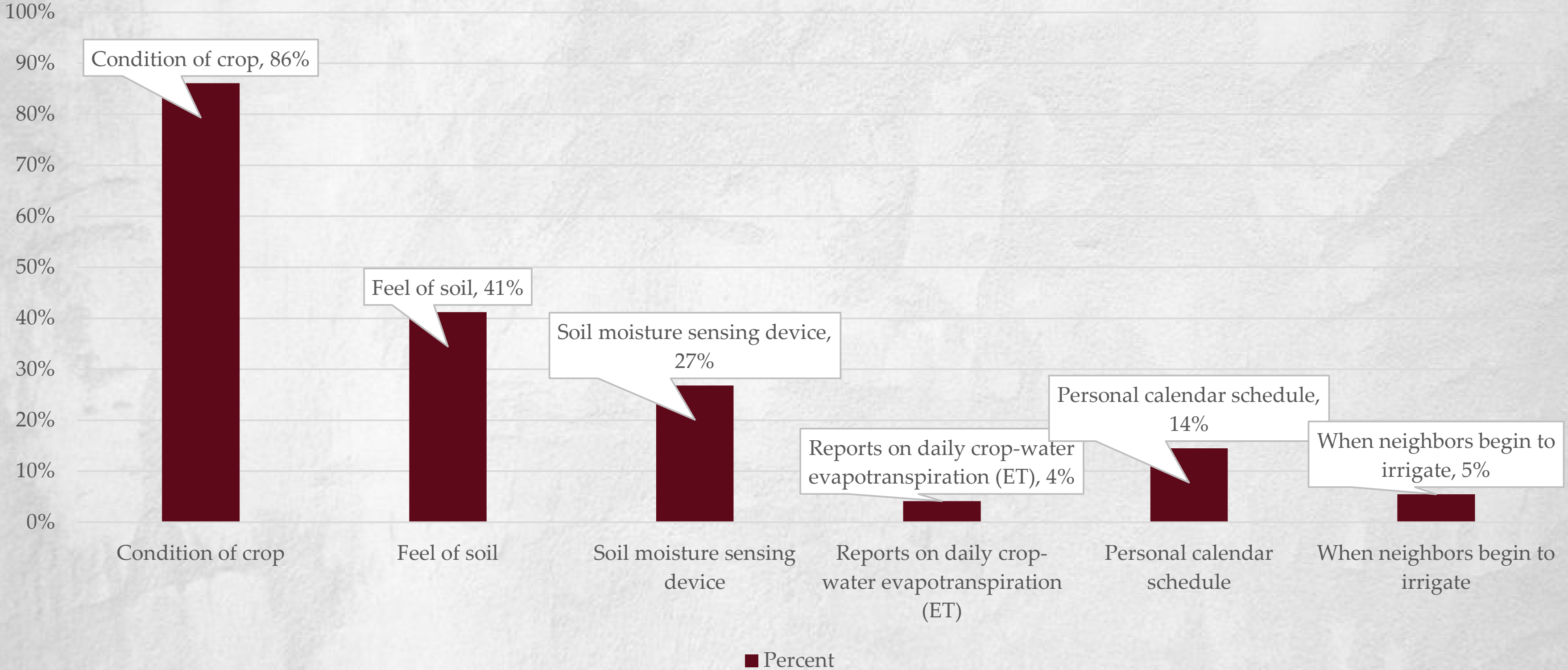
Calendar

The Neighbor

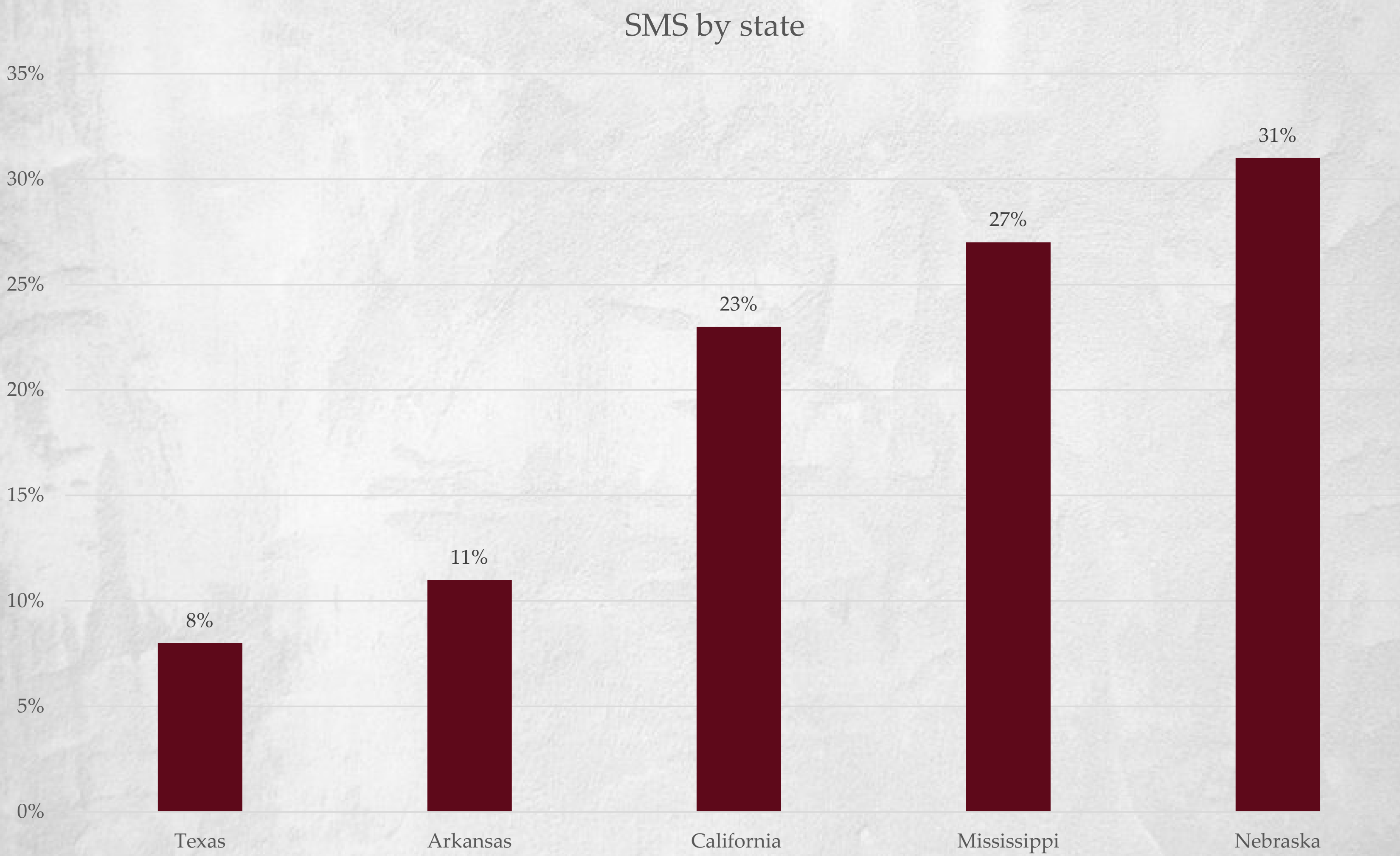
Irrigation Scheduling

- Understanding soil moisture sensors
- Interpreting soil moisture sensor data
- Making irrigation decision off of soil moisture sensors

Methods of Irrigation Scheduling in MS



National use of SMS



Common Barriers with SMS

- Interpretation of sensor data
  - Setting the correct thresholds for each crop
  - Setting triggers for your fields
  - Properly weighting sensor depths correctly
- Acquisition of data
  - Manual (infrequent)
  - Telemetry (usually high cost)

Answering questions

- When to start irrigation
- Has enough water infiltrated?
- Are we applying enough, insufficient, or excessive water?
- Is there sufficient deep soil water reserve for crop water uptake?

Developed Irrigation Instruments/Devices

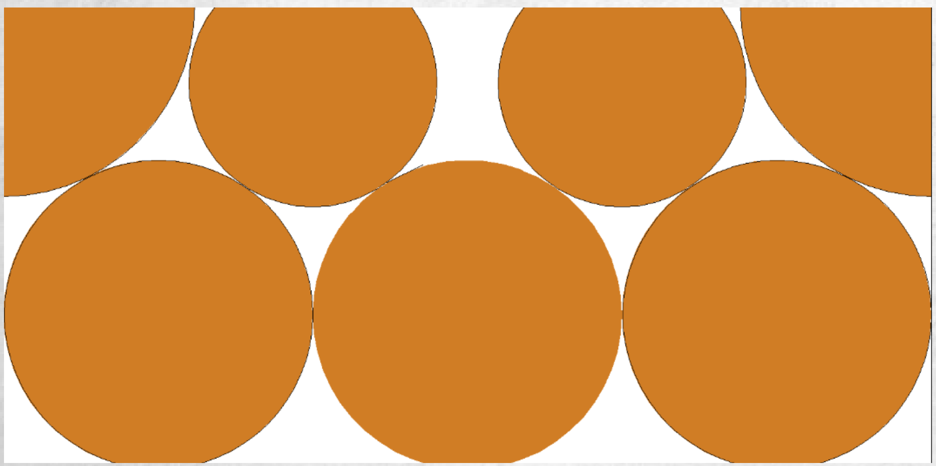
Tensiometer

Watermark Sensor

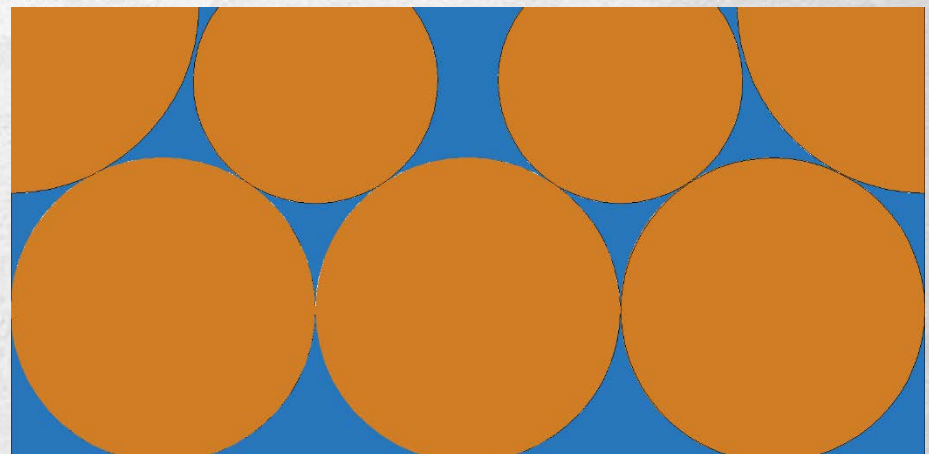
Soil Capacitance Probe

Suction/Tension in Soil

Dry Soil = High Suction



Wet Soil = Low Suction



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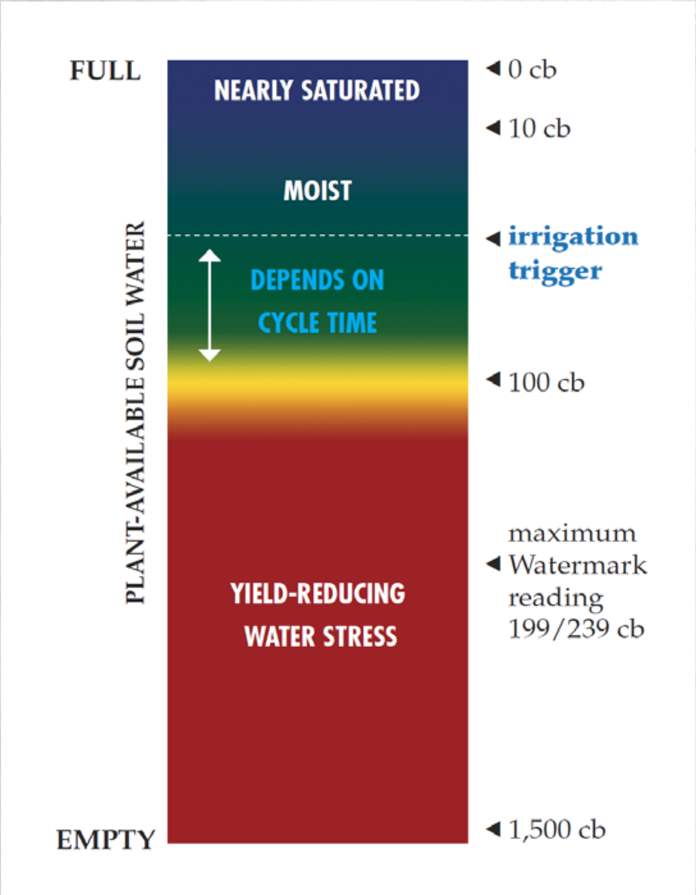
Cutaway View

Irrigation Triggers

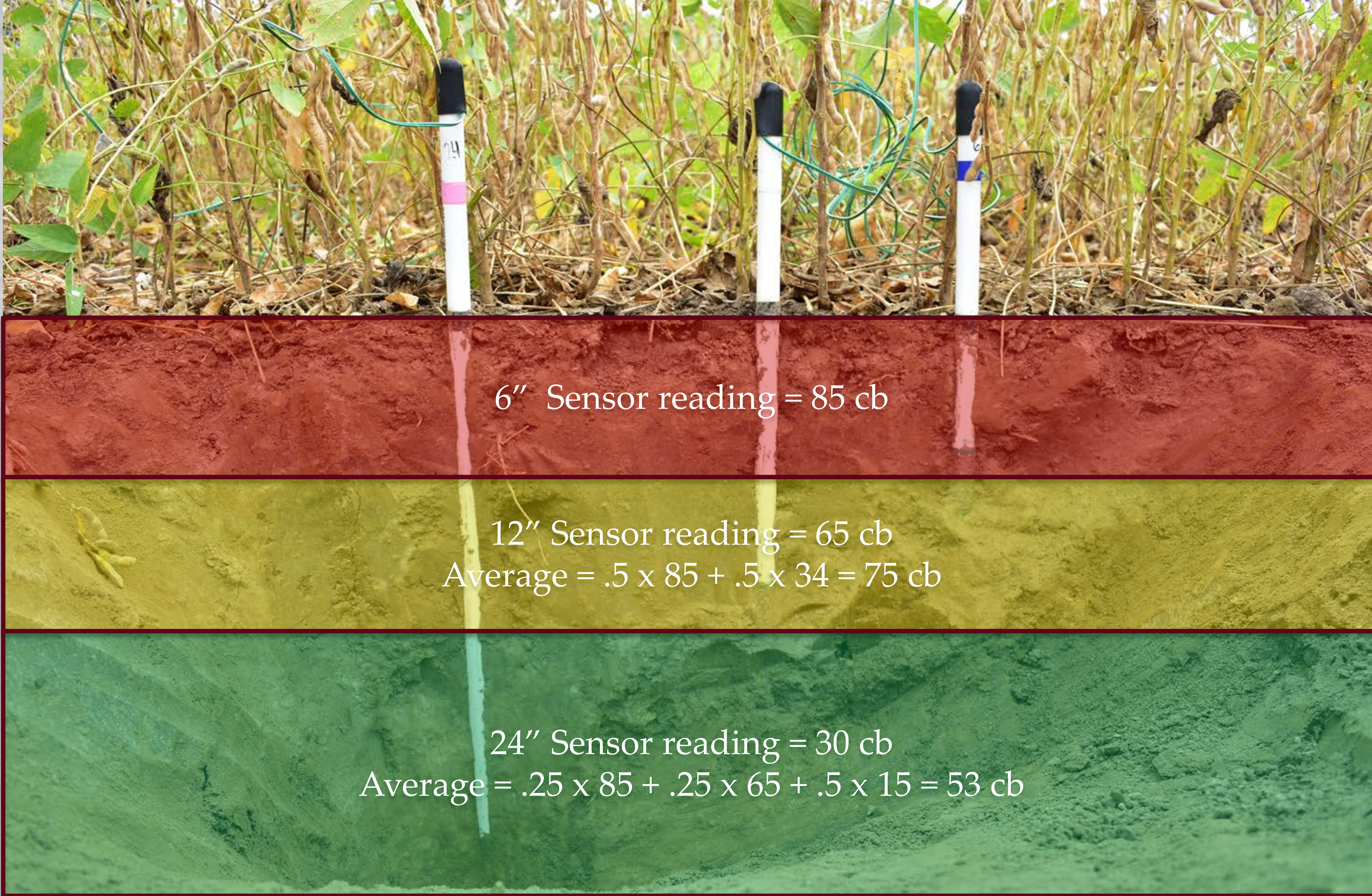


Depends on cycle time

How to find your trigger

Sensor depth	Date A (two sensors)	Date B (three sensors)	Date C (four sensors)
6"	0.5 × 62 cb = **31 cb**	0.25 × 104 cb = **26 cb**	0.17 × 72 cb = **12 cb**
12"	0.5 × 52 cb = **26 cb**	0.25 × 108 cb = **27 cb**	0.17 × 60 cb = **10 cb**
24"		0.50 × 54 cb = **27 cb**	0.33 × 51 cb = **17 cb**
36"			0.33 × 30 cb = **10 cb**
Weighted average	31 cb + 26 cb = **57 cb**	26 cb + 27 cb + 27 cb = **80 cb**	12 cb + 10 cb + 17 cb + 10 cb = **49 cb**

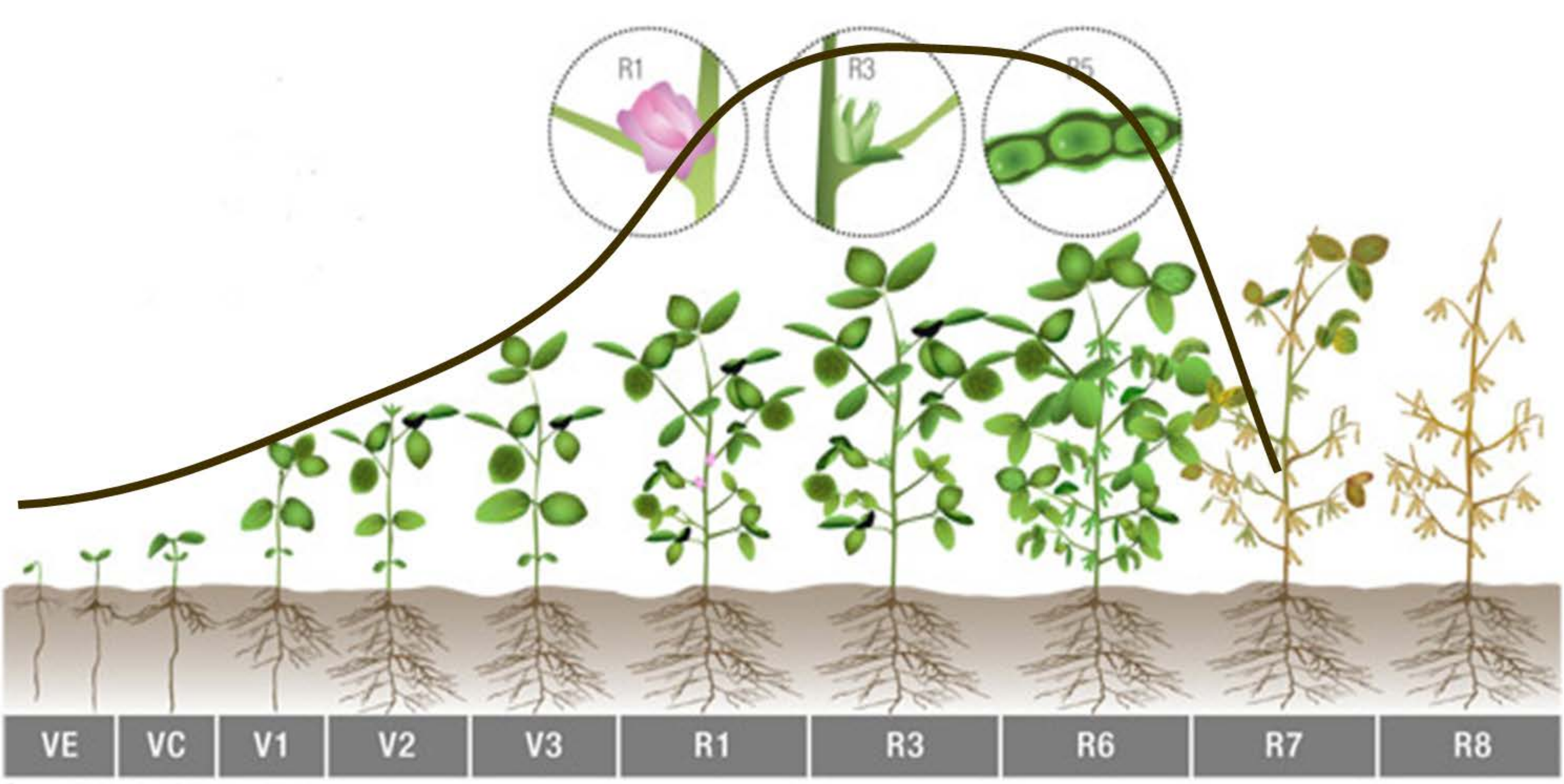

24


6″ Sensor reading = 85 cb
12″ Sensor reading = 65 cb
Average = .5 x 85 + .5 x 34 = 75 cb
24″ Sensor reading = 30 cb
Average = .25 x 85 + .25 x 65 + .5 x 15 = 53 cb

How to use the data?

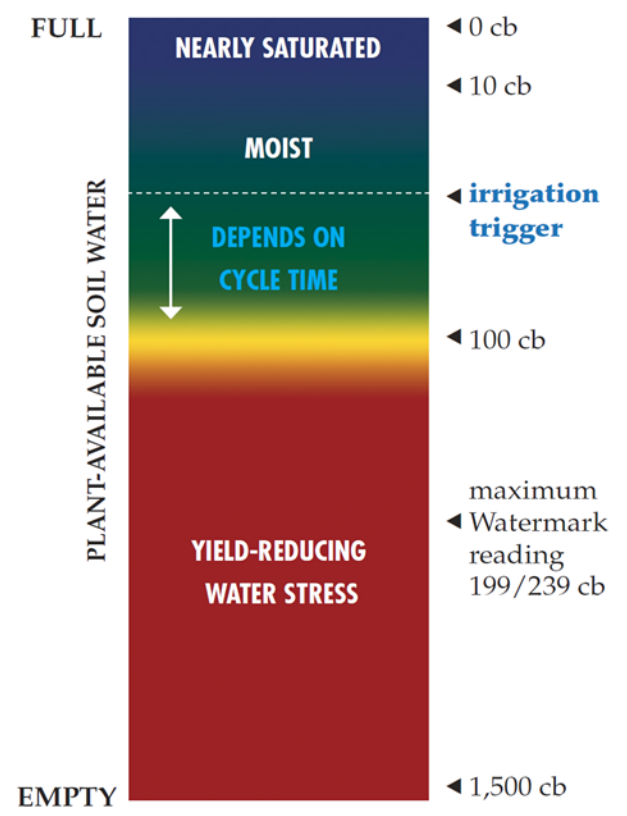
- Determine irrigation trigger levels
- Schedule Irrigation
- Monitor responses to irrigation and rainfall

Crop Water Needs



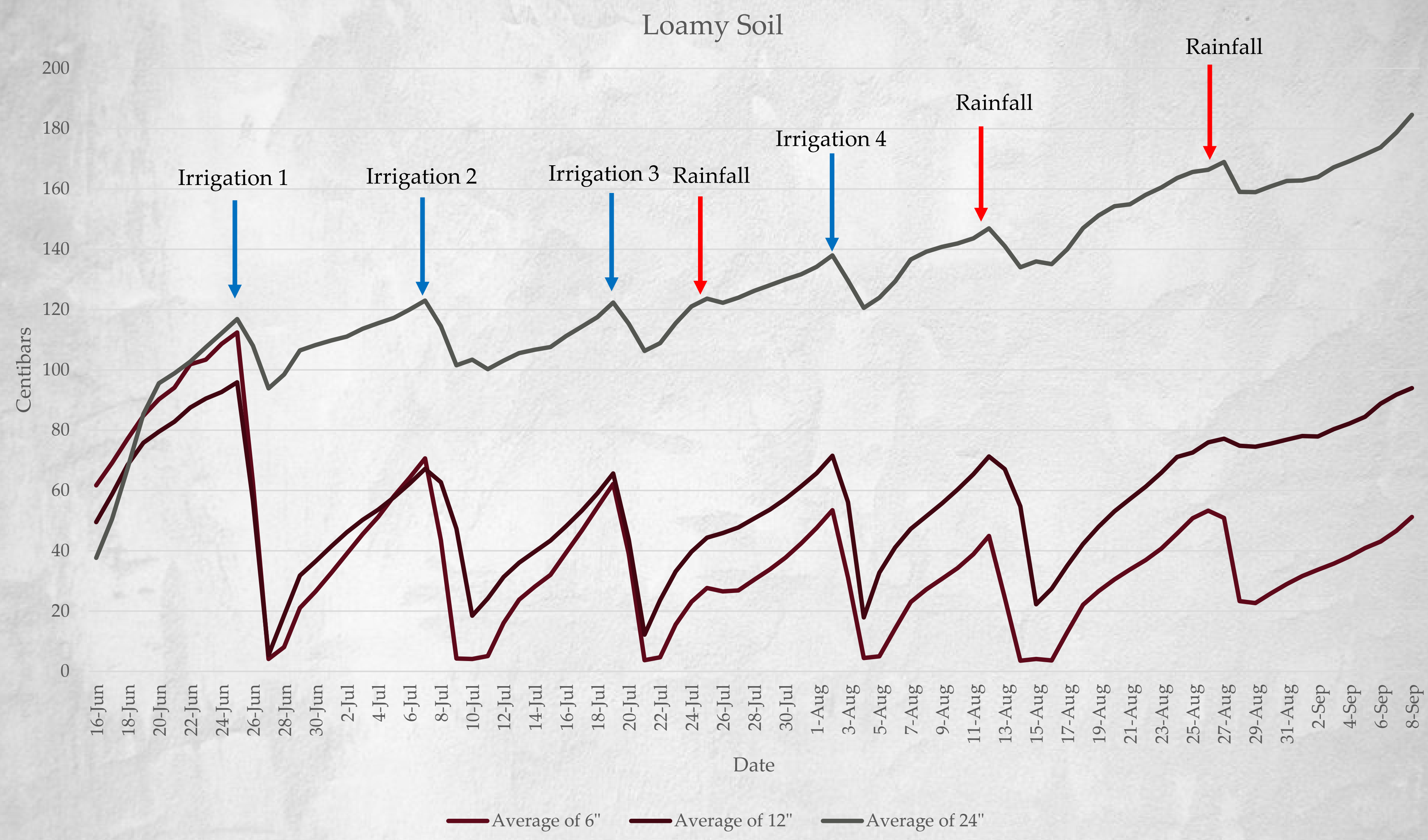
Irrigation Guide for Soybeans

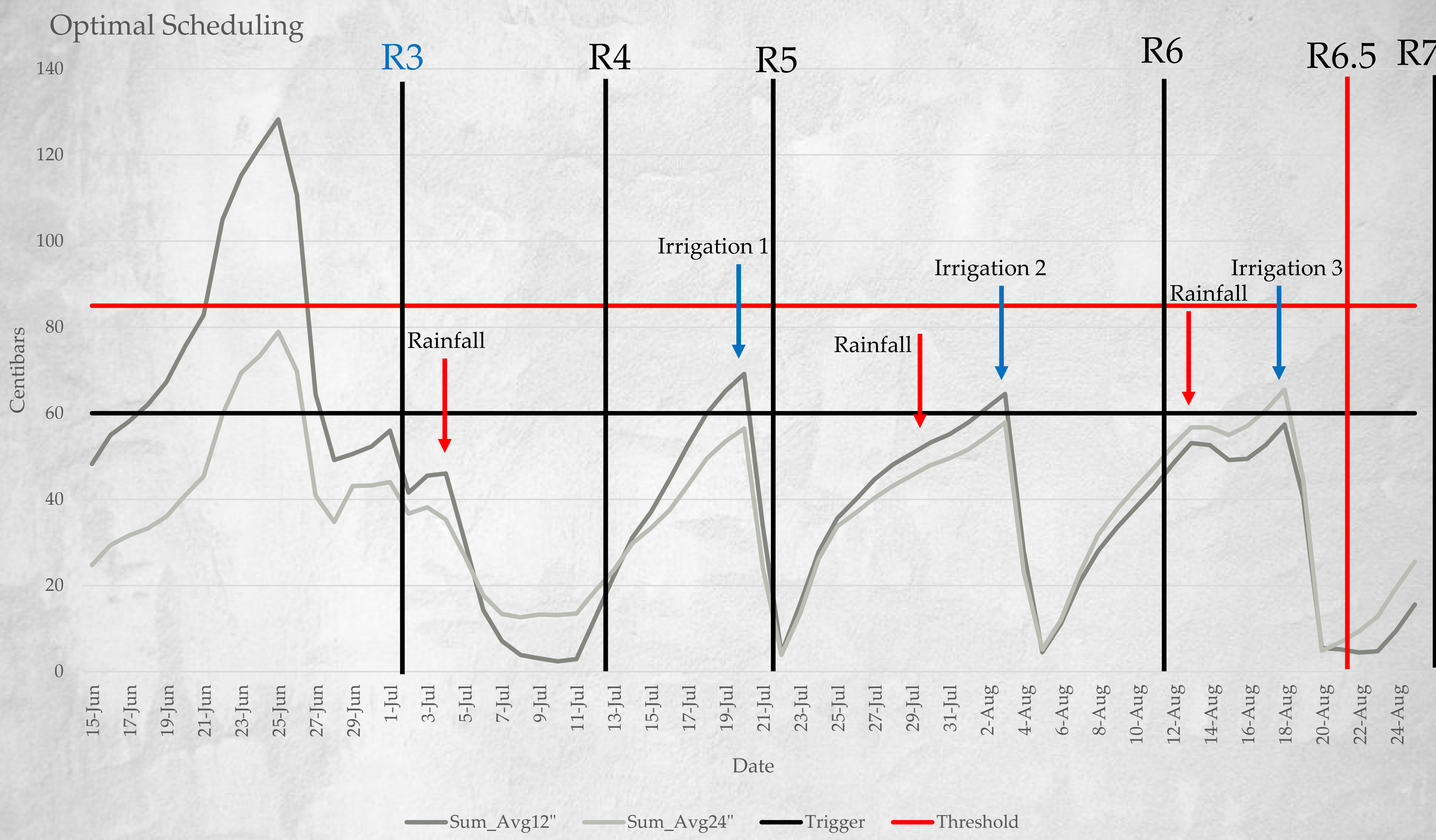
Growth Stage	Active Rooting Depth Average Sensor Readings in Centibar
V1-R3	80-90
R3-R6	75
R6	Irrigate if needed to supply needs to R6.5
R6.5	Terminate Irrigation



Irrigation Guide for Corn

Growth Stage	Active Rooting Depth Average Sensor Readings in Centibar
Emergence to V-14	90-100
V-15 to Tasseling (wet at tasseling)	80
Dent to Black Layer	90


Loamy Soil
Irrigation 1
Irrigation 2
Irrigation 3
Rainfall
Irrigation 4
Rainfall
Rainfall
Centibars
200
180
160
140
120
100
80
60
40
20
0
16-Jun
18-Jun
20-Jun
22-Jun
24-Jun
26-Jun
28-Jun
30-Jun
2-Jul
4-Jul
6-Jul
8-Jul
10-Jul
12-Jul
14-Jul
16-Jul
18-Jul
20-Jul
22-Jul
24-Jul
26-Jul
28-Jul
30-Jul
1-Aug
3-Aug
5-Aug
7-Aug
9-Aug
11-Aug
13-Aug
15-Aug
17-Aug
19-Aug
21-Aug
23-Aug
25-Aug
27-Aug
29-Aug
31-Aug
2-Sep
4-Sep
6-Sep
8-Sep
Date
Average of 6"
Average of 12"
Average of 24"



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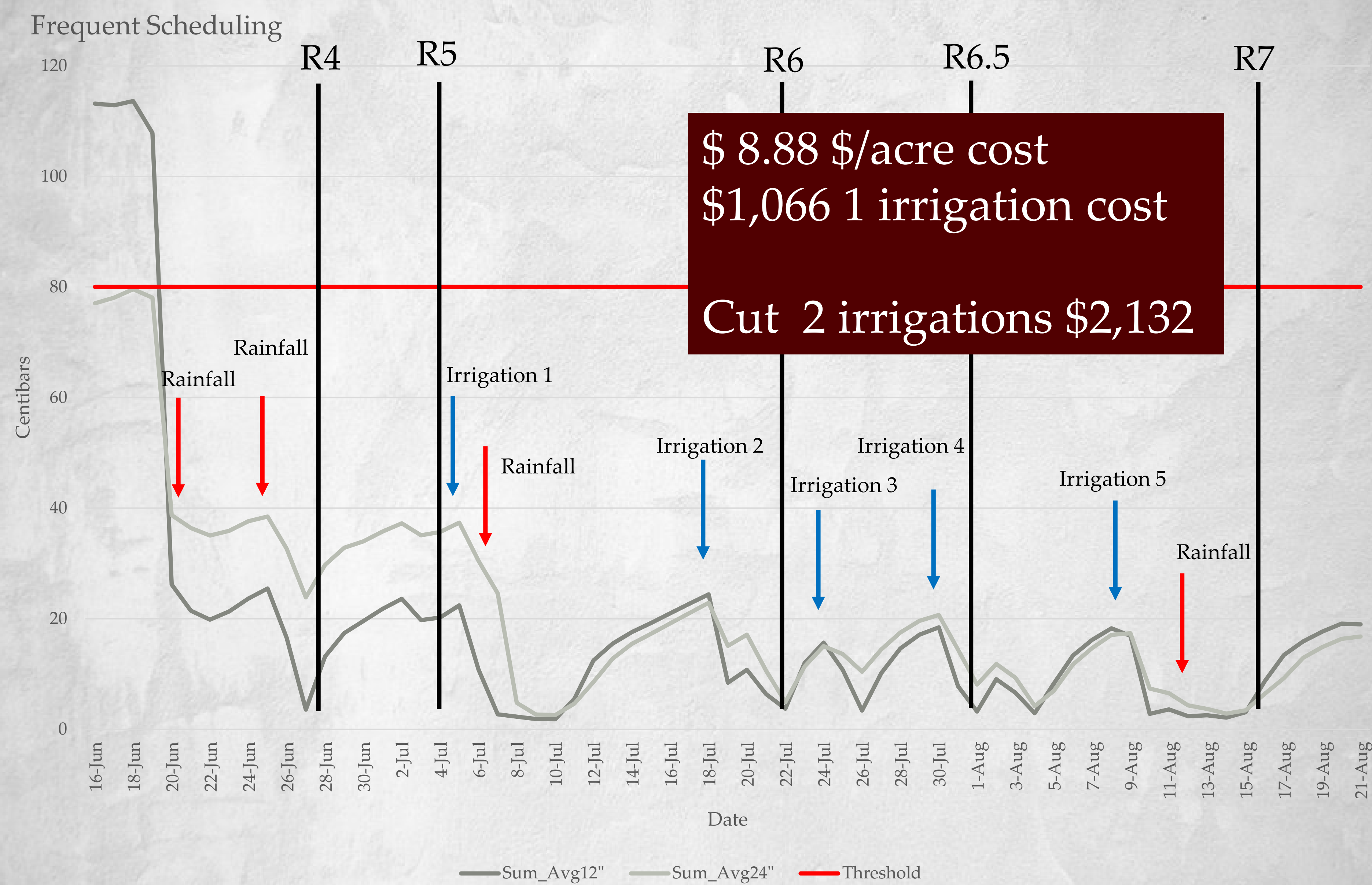

Frequent Scheduling
R4
R5
R6
R6.5
R7
120
100
80
60
40
20
0
Centibars
Rainfall
Rainfall
Irrigation 1
Rainfall
Irrigation 2
Irrigation 3
Irrigation 4
Irrigation 5
Rainfall
$ 8.88 $/acre cost
$1,066 1 irrigation cost
Cut 2 irrigations $2,132
16-Jun
18-Jun
20-Jun
22-Jun
24-Jun
26-Jun
28-Jun
30-Jun
2-Jul
4-Jul
6-Jul
8-Jul
10-Jul
12-Jul
14-Jul
16-Jul
18-Jul
20-Jul
22-Jul
24-Jul
26-Jul
28-Jul
30-Jul
1-Aug
3-Aug
5-Aug
7-Aug
9-Aug
11-Aug
13-Aug
15-Aug
17-Aug
19-Aug
21-Aug
Date
Sum_Avg12"
Sum_Avg24"
Threshold


65
MPH
20

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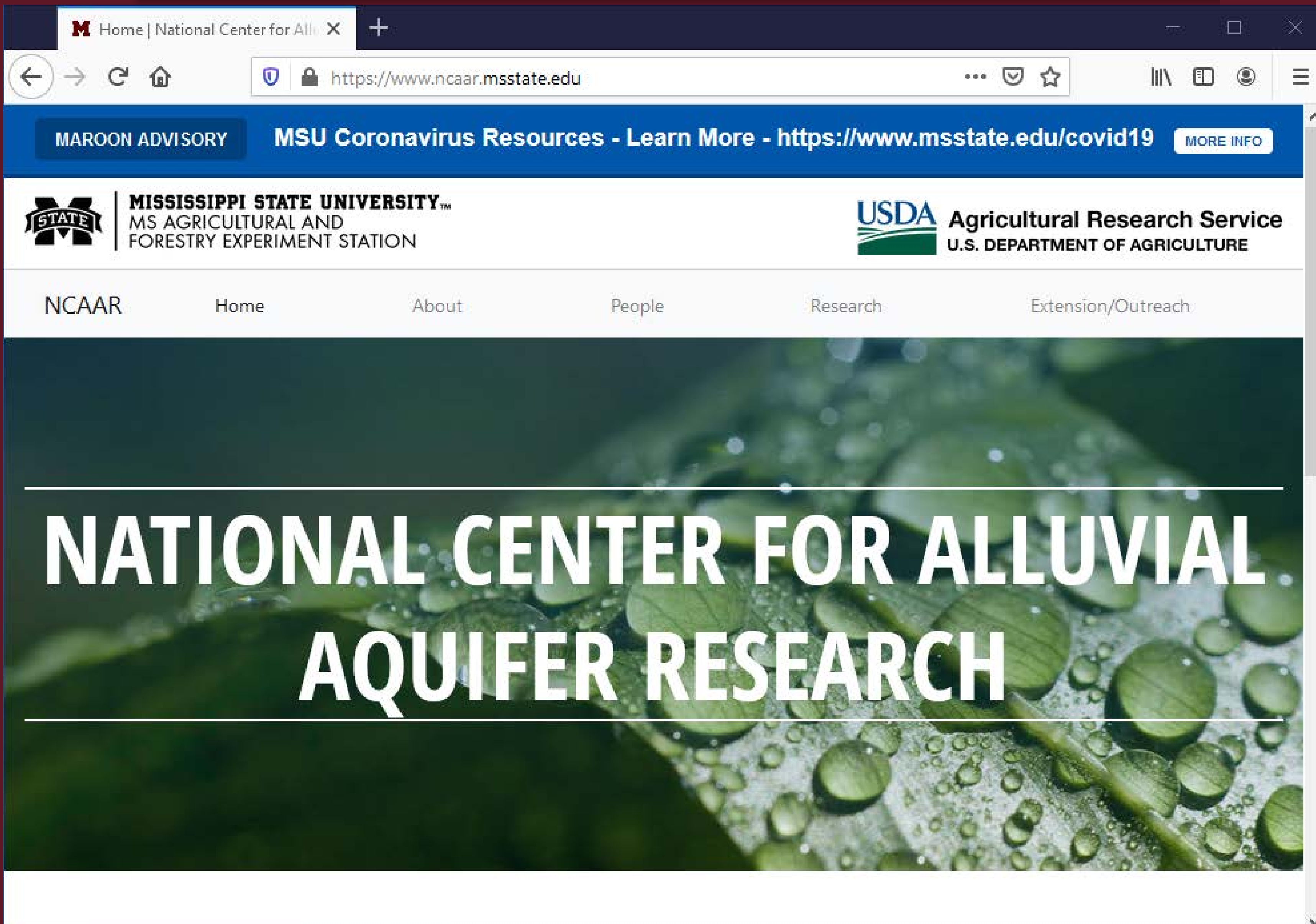
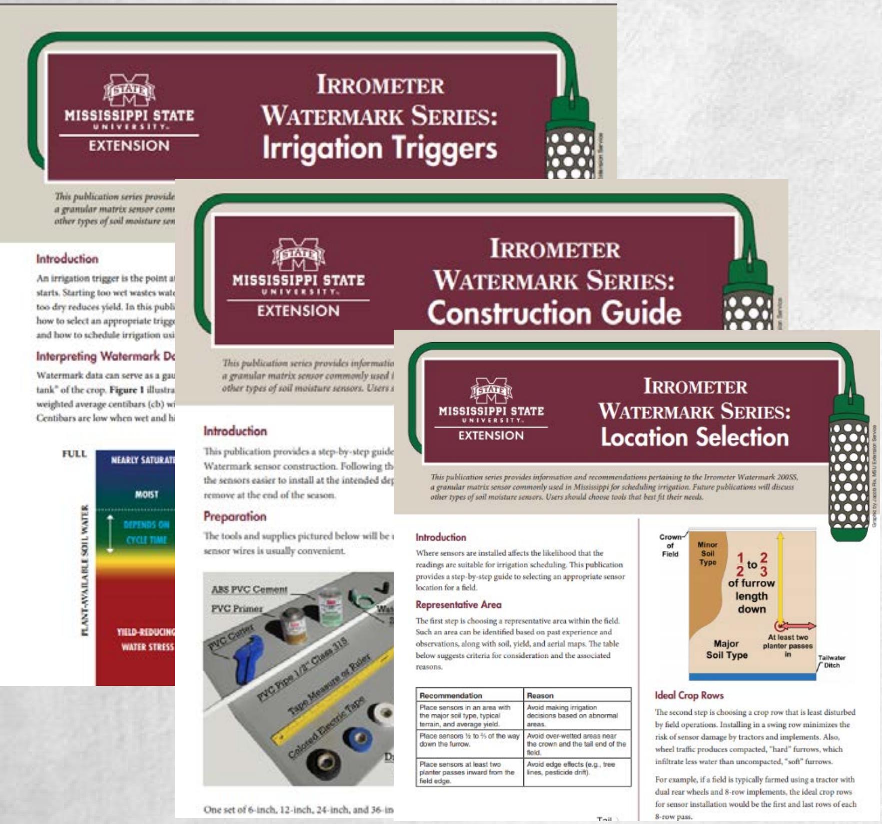


Watermark Fundamentals & Application



1. Scientific Background
2. Measurement Devices
3. Sensor Construction
4. Sensor Location
5. Sensor Installation
6. Irrigation Triggers

https://www.ncaar.msstate.edu/outreach#showcase

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Extension Publications | Soil Moisture Monitoring Showcase | Web Tools

Soil Moisture Monitoring Showcase

Welcome to the official website of the National Center for Alluvial Aquifer Research (NCAAR) soil moisture monitoring showcase! Please click on one of the buttons below.

General Information

Showcase Quick Links

- General Information
- Participating Vendors
- Irrometer Watermark 200SS
- Sentek Drill & Drop
- AquaSpy Vector Probe
- CropX Soil Sensor

Contact NCAAR

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Showcase Demo
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Row-crop Irrigation Science Extension and Research (RISER) Program

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