

Irrigation Research and Extension at Edisto REC

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Pee Dee River Basin Council Meeting
Florence, SC
March 28, 2022



Outline

1. Center Pivot Mapping Software
2. Drip Fertigation Calculator
3. Center Pivot Fertigation Calculator
4. Watermark Soil Moisture Calculator
5. Center Pivot Irrigation Testing Extension Program
6. Other Edisto REC Water/Irrigation Work



Outline

- 1. Center Pivot Mapping Software**
2. Drip Fertigation Calculator
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Center Pivot Mapper – Overview

https://www.clemson.edu/extension/agronomy/PrecisionAgriculture/Software/center_pivot_mapper.html

- Windows desktop software
- GIS mapping tool for center pivot irrigation systems
- Layout, planning, management
- Exports: ESRI shapefile, Google Earth KML, and PDF
- Published February 2021



C.P.M.
Center Pivot Mapper



Center Pivot Mapper – Mark Center and End

Center Pivot Mapper 1.1.1.1 - (c) 2021 Clemson Precision Agriculture - Kendall R. Kirk

Search | Pivot Center | End Position | Fwd Stop | Rev Stop | Endgun Radius | Move | Export

Pivot Info
Lat/Lng: 33.4671324, -81.1433633
Machine length: 768.9 ft
End/Endgun Radius: 0.0 ft
Angle between stops: 360.0°
Area under structure: 42.6 ac
Area under end/endgun: 0.0 ac
Total wetted area: 42.6 ac

If pivot is full circle, click 'Skip'. Otherwise, define forward stop position anywhere along line between center and stop. Double click position or enter below.

Fwd Stop Lat: Add Fwd Stop To Map
Fwd Stop Lng:

Delete Fwd Stop Skip Stops ->

CLEMSON PRECISION AGRICULTURE

C.P.M. Center Pivot Mapper Clear All and Start Over

©2021 Microsoft Corporation ©2021 NAVTEQ ©2021 Image courtesy of NASA

RTClick=Pan | M.Wheel=Zoom



Center Pivot Mapper – Mark Center and End

Center Pivot Mapper 1.1.1.1 - (c) 2021 Clemson Precision Agriculture - Kendall R. Kirk



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C.P.M.
Center Pivot Mapper

Clear All
and Start
Over

Search | Pivot Center | End Position | Fwd Stop | Rev Stop | Endgun Radius | Move | Export

Pivot Info

Lat/Lng: 33.4671324, -81.1433633
Machine length: 768.9 ft
End/Endgun Radius: 0.0 ft
Angle between stops: 180.6°
Area under structure: 21.4 ac
Area under end/endgun: 0.0 ac
Total wetted area: 21.4 ac

If pivot stops were added but area is inverted, click "Swap Stops" button. Enter endgun radius in feet. For no endgun, enter radius of outermost sprinkler.

Endgun radius, ft:

100

Set This
Value

Swap Pivot
Stops



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CLEMSON
COOPERATIVE EXTENSION

Center Pivot Mapper – Add Endgun Radius

Center Pivot Mapper 1.1.1.1 - (c) 2021 Clemson Precision Agriculture - Kendall R. Kirk

Search | Pivot Center | End Position | Fwd Stop | Rev Stop | Endgun Radius | Move | Export

If you wish to relocate components: Select component(s) to be moved. Click "Move Now" button. Left click and drag on the map. Release mouse button to set position.

Move ALL Center Position Forward Stop End Position Reverse Stop

Move Now

Next ->

Pivot Info

Lat/Lng: 33.4671324, -81.1433633
Machine length: 768.9 ft
End/Endgun Radius: 100.0 ft
Angle between stops: 180.6°
Area under structure: 21.4 ac
Area under end/endgun: 5.9 ac
Total wetted area: 27.3 ac

CLEMSON PRECISION AGRICULTURE

C.P.M. Center Pivot Mapper Clear All and Start Over

©2021 Microsoft Corporation. ©2021 MAPRED. ©2021 Integrated by CLEMSON

RightClick=Pan | M.Wheel=Zoom



Center Pivot Mapper – Pivot Info

The screenshot displays the Center Pivot Mapper software interface. At the top, the title bar reads "Center Pivot Mapper 1.1.1.1 - (c) 2021 Clemson Precision Agriculture - Kendall R. Kirk". The interface includes a search bar, navigation buttons (Pivot Center, End Position, Fwd Stop, Rev Stop, Endgun Radius, Move, Export), and a "Pivot Info" window. The "Pivot Info" window contains the following data:

- Lat/Lng: 33.4671324, -81.1433633
- Machine length: 768.9 ft
- End/Endgun Radius: 100.0 ft
- Angle between stops: 180.6°
- Area under structure: 21.4 ac
- Area under end/endgun: 5.9 ac
- Total wetted area: 27.3 ac

The main map area shows an aerial view of a pivot system with circular lines. Labels on the map include "Wise Ave", "Youmonville Rd", and "Folgers Ln". The interface also features the "CLEMSON PRECISION AGRICULTURE" logo, the "C.P.M. Center Pivot Mapper" logo, and a "Clear All and Start Over" button.

Pivot Info

Lat/Lng: 33.4671324, -81.1433633
Machine length: 768.9 ft
End/Endgun Radius: 100.0 ft
Angle between stops: 180.6°
Area under structure: 21.4 ac
Area under end/endgun: 5.9 ac
Total wetted area: 27.3 ac



Center Pivot Mapper – PDF Export



Pivot Layout: ERBC Sample



Report generated using Center Pivot Mapper Software (v.1.1.1.1)

User Inputs

Pivot center position: 33.4671324086174°, -81.1433632671833°
End/Endgun position: 33.4682880722117°, -81.1454728245735°
Forward stop position: 33.4660835718331°, -81.1414340883493°
Reverse stop position: 33.4681650109938°, -81.1453058570623°
Endgun or last sprinkler radius: 100.0 ft

Calculated Outputs

Machine length: 768.9 ft
Wetted radius: 868.9 ft
Angle between stops: 180.6°
Machine travel between stops (at end): 2423.6 ft
Area inside end/endgun position: 21.39 ac
Area outside end/endgun position: 5.93 ac
Total wetted area: 27.32 ac
24/7 flow required for 1 in. per week: 74 gpm
24/7 flow required for 2 in. per week: 147 gpm
Date of report generation: May 25, 2021



Center Pivot Mapper – SHP/KML Export



Center Pivot Mapper – Future Work

- Manage/view multiple pivots
- Record keeping
 - Application depths
 - Sprinkler charts
 - Service history
- Endgun shutoff recommendations
- Output irrigation management plans
 - Irrigation scheduling by crop/soil/region
 - Depth per application recommendations



C.P.M.
Center Pivot Mapper



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Drip Fertigation Calculator - Overview

<https://precisionag.sites.clemson.edu/Calculators/Fertigation/Drip/>

- App for calculating proper drip fertigation rates
- Inputs
 - Fertilizer Product
 - N Rate or Crop/Growth Stage
 - Area fertigated
- Outputs
 - Gallons per acre per day and per week
- Benefits
 - Encourages use of fertigation
 - Eliminates “guess-timates”
 - Cited recommendations
 - Encourages leaf tissue sampling



Drip Fertigation Calculator

Select Nominal Fertilizer



Fertigation Event Description:
ERBC Example
(Optional) For reference if email sent below.

Use nominal fertilizer data ▾

Fertilizer Product:

- 7-0-7
- 4-0-8
- 7-0-7
- 7-1-7 Liberty Acres
- 8-0-8
- 10-0-10

density: 10.4
n density,
er data" entry

Manually enter N rate ▾

Nitrogen Rate (lb/ac/day):
1

Area Fertigated (ac): 1

Drip Fertigation Calculator

Input Custom Fertilizer

Percent Nitrogen:
10

Product Density, lb/gal:
10

Fertigation Event Description:
ERBC Example
(Optional) For reference if email sent below.

Use custom fertilizer data

Percent Nitrogen:
10

Product Density, lb/gal:
10

Manually enter N rate

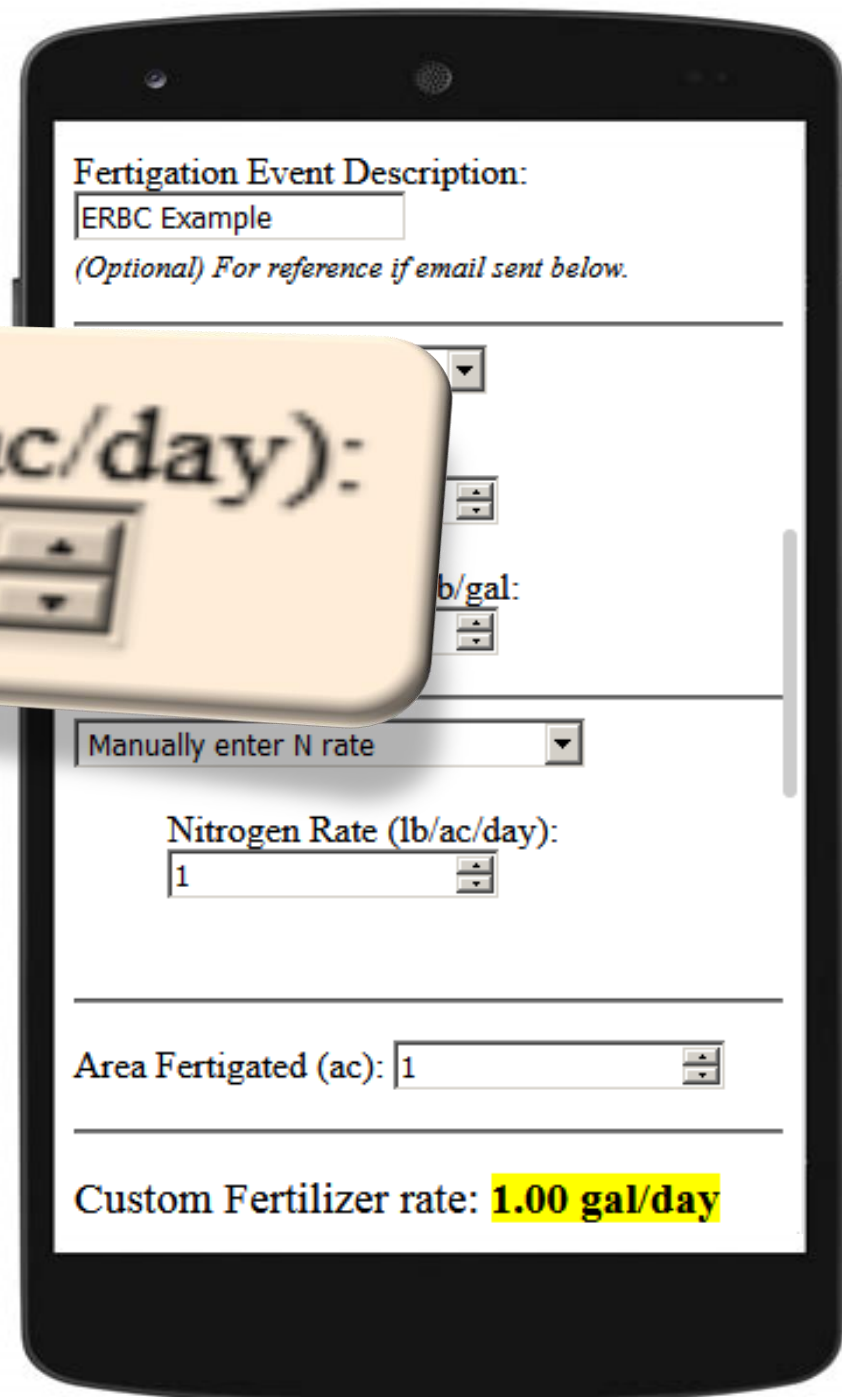
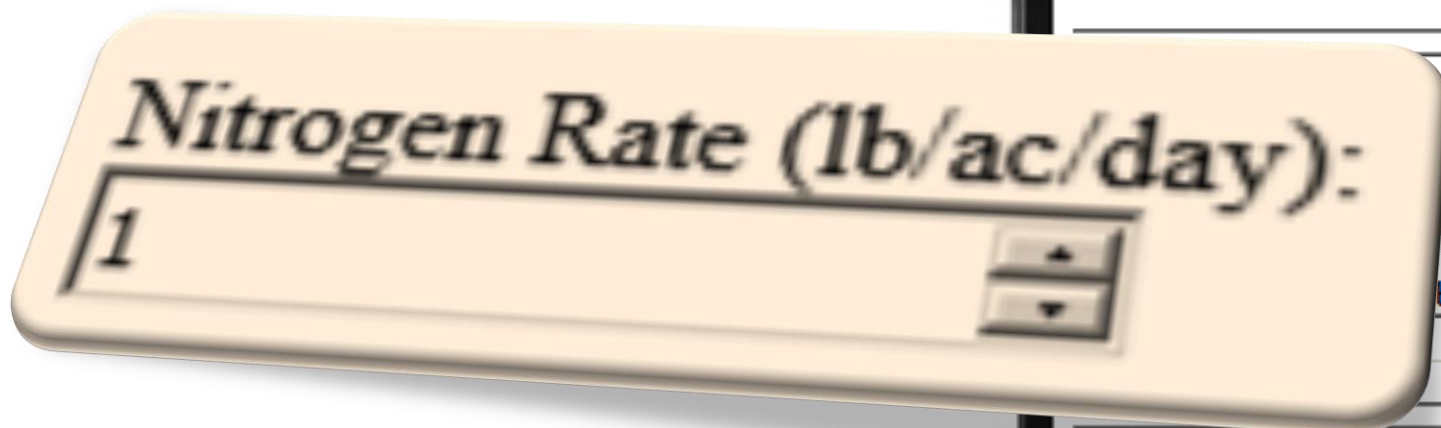
Nitrogen Rate (lb/ac/day):
1

Area Fertigated (ac): 1

Custom Fertilizer rate: **1.00 gal/day**

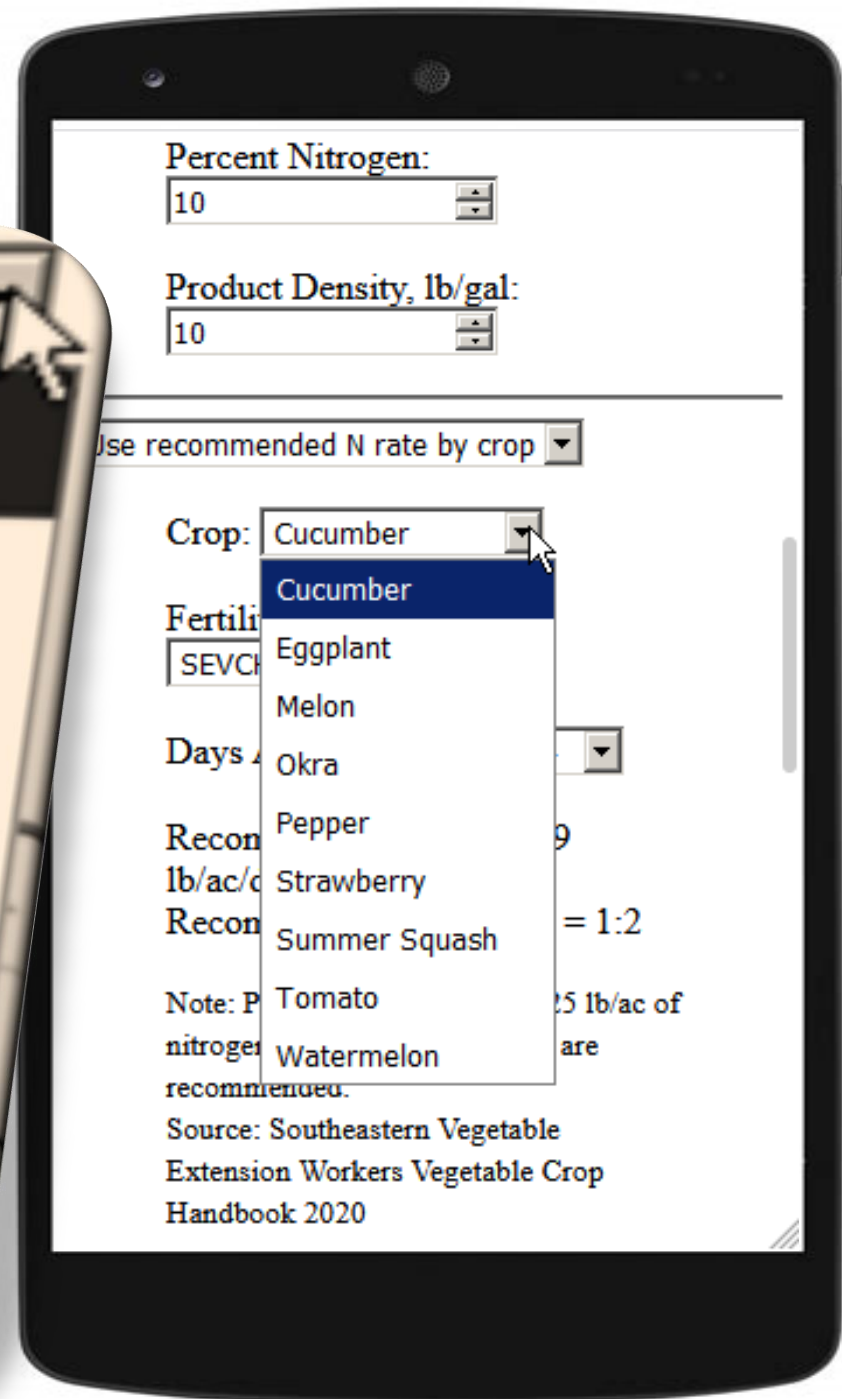
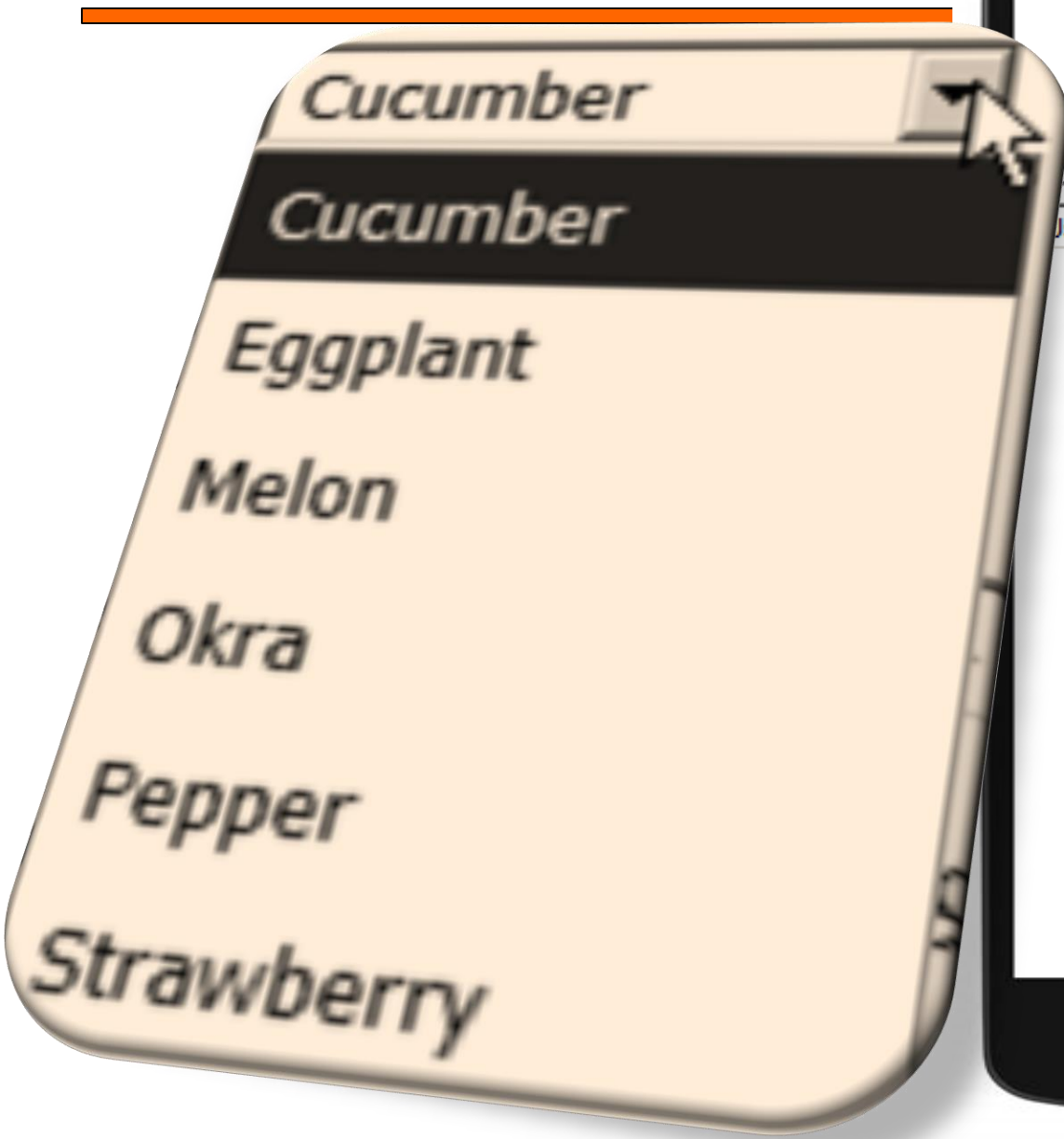
Drip Fertigation Calculator

Input Manual N-Rate



Drip Fertigation Calculator

Get N-Rec by Crop/Stage



Drip Fertigation Calculator

Get N-Rec by Crop/Stage

Crop:

Fertility Program:

Days After Planting:

Recommended N Rate: 0.5
lb/ac/day

Recommended N:K Ratio = 1:1

Use recommended N rate by crop

Crop:

Fertility Program:

Days After Planting:

Recommended N Rate: 0.5
lb/ac/day

Recommended N:K Ratio = 1:1

Note: Before mulching, adjust soil pH to 6.5, and in the absence of a soil test, apply enough fertilizer to supply 50 pounds per acre of N, P₂O₅ and K₂O, (some soils will require 100 pounds per acre of K₂O) then thoroughly incorporate into the soil. On soils testing low-medium for boron, also include 0.5 pound per acre of actual boron. The first soluble fertilizer application should be applied through the drip irrigation system within a week after transplanting the

Drip Fertigation Calculator

Input Area Fertigated

Days After Planting:

Recommended N Rate: 0.5
lb/ac/day

Recommended N:K Ratio = 1:1

Note: Before mulching, adjust soil pH to 6.5, and in the absence of a soil test, apply enough fertilizer to supply 50 pounds per acre of N, P₂O₅ and K₂O, (some soils will require 100 pounds per acre of K₂O) then thoroughly incorporate into the soil. On soils testing low-medium for boron, also include 0.5 pound per acre of actual boron. The first soluble fertilizer application should be

Extension workers vegetable
Handbook 2020

Area Fertigated (ac):

Area Fertigated (ac):

Drip Fertigation Calculator

Output: Fertilizer Rate

Custom Fertilizer rate: **0.50 gal/day**

Custom Fertilizer rate: **3.50 gal/week**

Custom Fertilizer rate: **0.50 gal/day**

Custom Fertilizer rate: **3.50 gal/week**

...generally be adjusted based

[Hyperlink to This Setup](#)

Recipient email:

Multiple? Separate multiple emails by commas.



I'm not a robot



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Privacy - Terms

EMAIL THESE OUTPUTS

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Pivot Fertigation Calculator - Overview

<https://precisionag.sites.clemson.edu/Calculators/Fertigation/Pivot/>

- App for calculating proper center pivot fertigation rates

- Inputs

- Fertilizer Product
- Pivot Size/Travel Time
- Nutrient Rate (lb/ac)
- Injection Pump Model

- Outputs

- Product Rate (lb/ac, gpm)
- Injection Pump Setting
- Fertigation Schedule

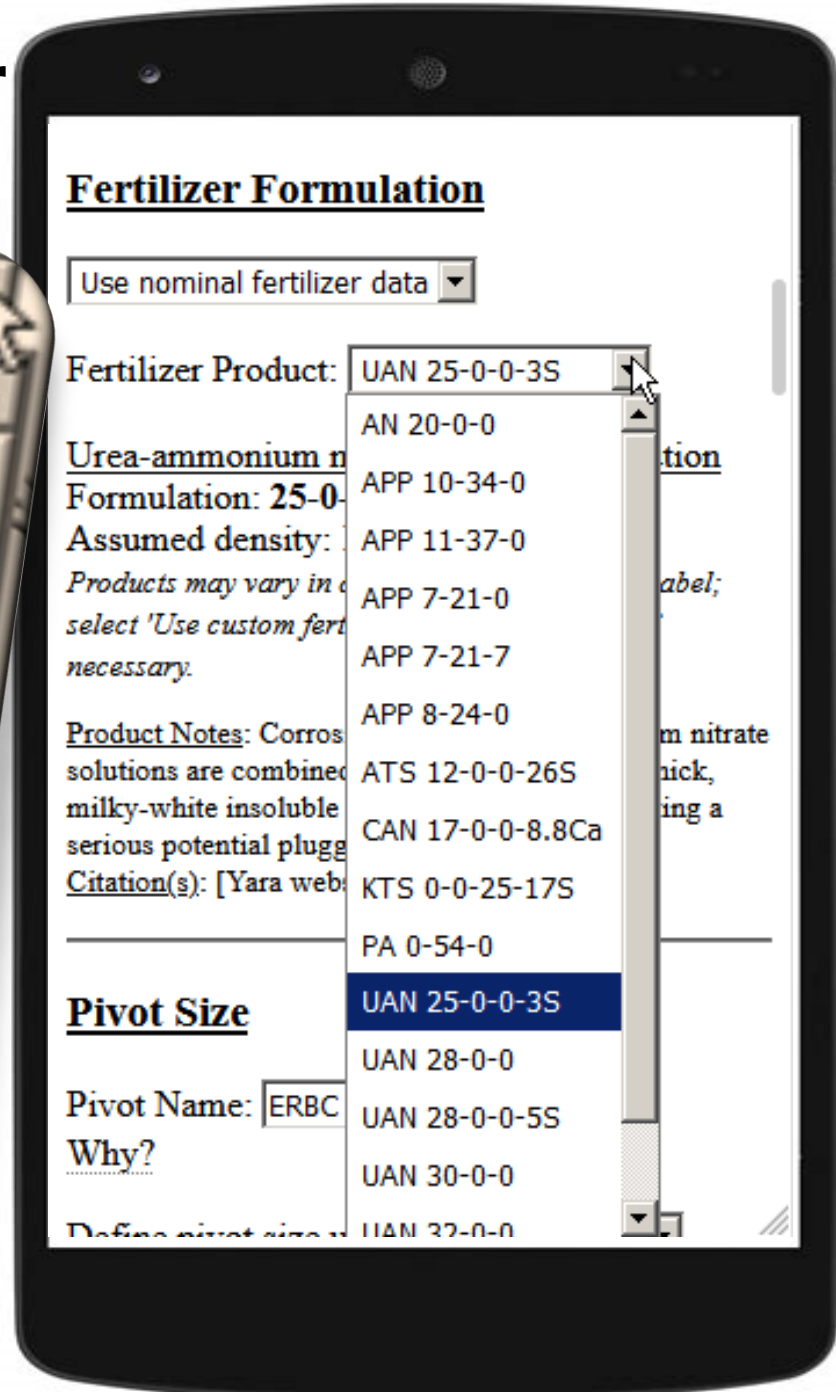
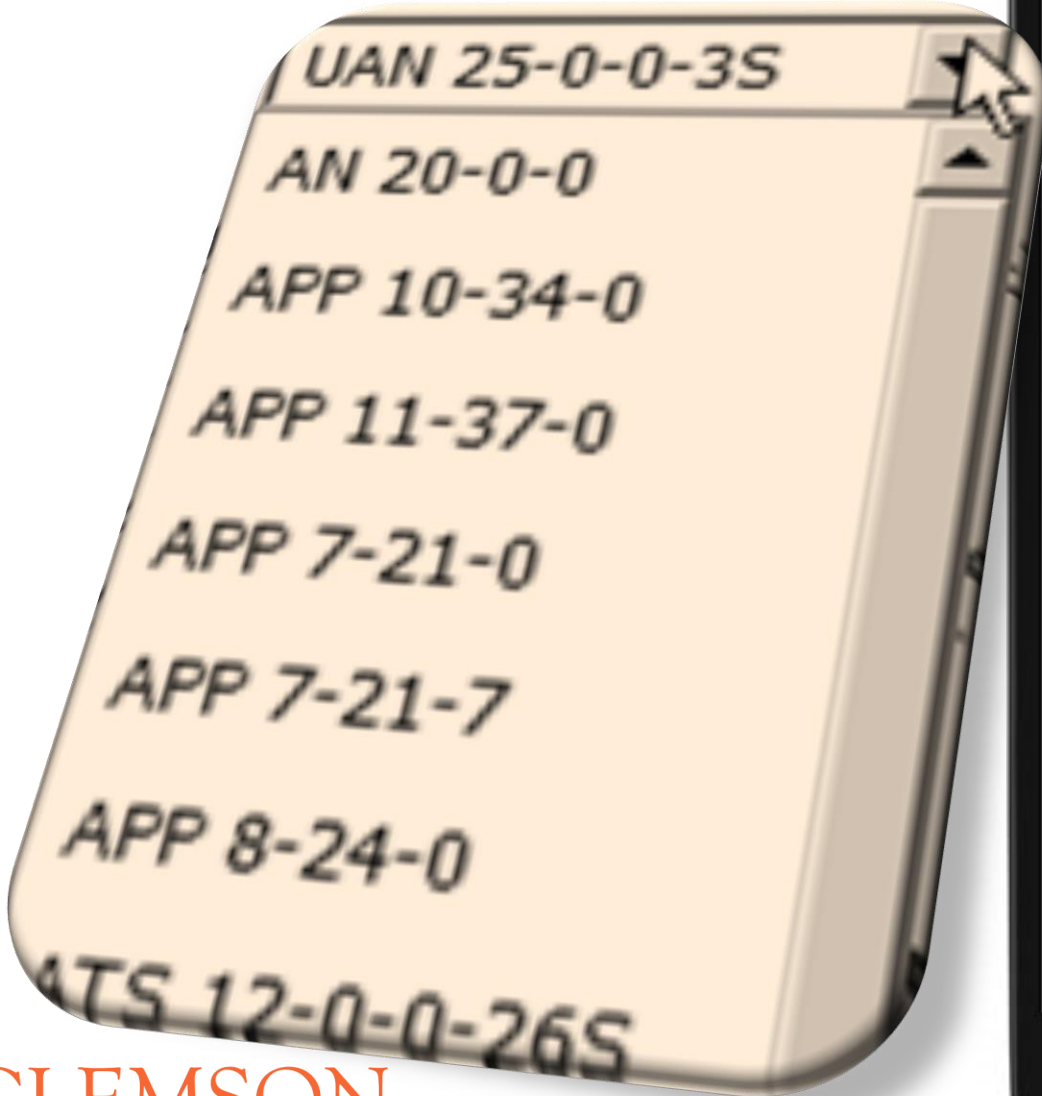
- Benefits

- Encourages use of fertigation
- Eliminates “guess-timates”
- Reduces over-fertilization



Pivot Fertigation Calculator

Select Nominal Fertilizer



Pivot Fertigation Calculator

Nominal Fertilizer Info

Fertilizer Formulation

Use nominal fertilizer data ▾

Fertilizer Product: UAN 25-0-0-3S ▾

Urea-ammonium nitrate plus sulfur solution

Formulation: 25-0-0-3 S

Assumed density: 10.52 lb/gal

Products may vary in density, please check the label;

Urea-ammonium nitrate plus sulfur solution
Formulation: 25-0-0-3 S
Assumed density: 10.52 lb/gal

Pivot Size

Pivot Name: ERBC Example

Why?

Define pivot size units: United States ▾

Pivot Fertigation Calculator

Input Custom Fertilizer

Fertilizer Formulation

Use custom fertilizer data

Product Density, lb/gal:

Product Formulation:

25 - 0 - 0 - 3 S

% Nitrogen (N)

% Phosphate (P_2O_5)

% Potash (K_2O)

(optional) 4th nutrient:

% S

Pivot Size

Pivot Name:

...y?

Define pivot size using:

Wetted radius, ft:

Product Density, lb/gal:

Product Formulation:

25 - 0 - 0 - 3 S

% Nitrogen (N)

% Phosphate (P_2O_5)

% Potash (K_2O)

(optional) 4th nutrient:

% S

Pivot Fertigation Calculator

Input Pivot Size

Pivot Size

Pivot Name:

Why?

Define pivot size using:

ac:

en stops, degrees:

us = 1008 ft

umference: 4752 ft

Travel Time

*etermining travel times, be sure to use
r settings planned to be used during
1.*

Define pivot size using:

Wetted area, ac:

Help?

Pivot rotation:

Angle between stops, degrees:

Help?

Wetted Radius = 1008 ft

Wetted Circumference: 4752 ft

Pivot Fertigation Calculator

Input Pivot Travel Time

Pivot Travel Time

** For determining travel times, be sure to use pivot timer settings planned to be used during fertigation.*

Speed Setting:

Why?

Input time to travel:

Input time as:

full circle (360 degrees):

: 7.89 ac/hr

Rate

for setting rate:

Input time to travel:

Input time as:

Time to travel full circle (360 degrees):

hours

Field Capacity: 7.89 ac/hr

Pivot Fertigation Calculator

Input Component Rate

Fertilizer Rate

Component for setting rate:

Desired **N** rate, lb/ac:

Fertilizer Rate per Unit Area

25 - 0 - 0 - 3 S Rate: **5.941 gal/ac**

N Rate: **15.00 lb/ac**

Component for setting rate:

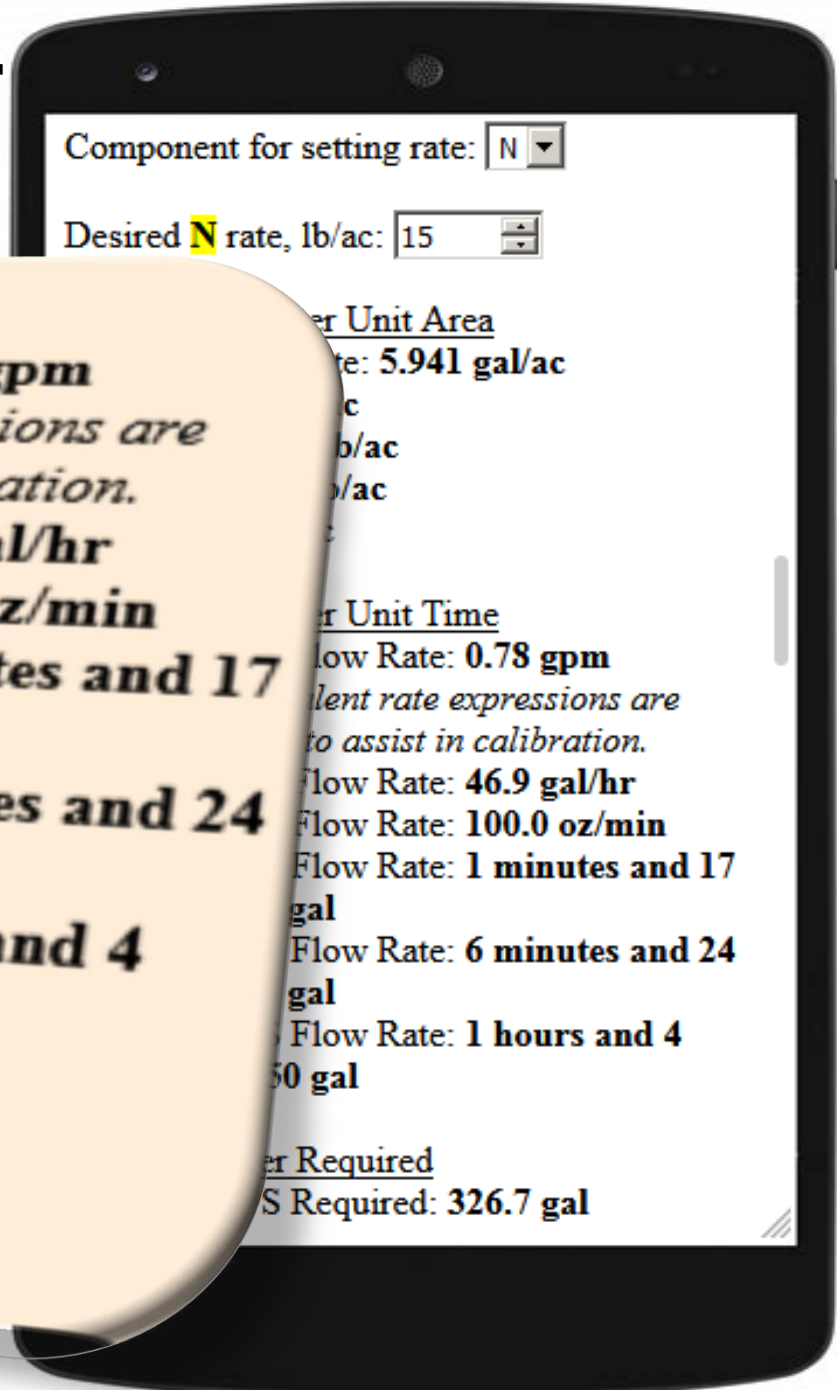
*Desired **N** rate, lb/ac:*

seconds per 5 gal

25 - 0 - 0 - 3 S Flow Rate: **1 hours and 4 minutes per 50 gal**

Pivot Fertigation Calculator

Output: Fertilizer Rate



Fertilizer Rate per Unit Time

25 - 0 - 0 - 3 S Flow Rate: **0.78 gpm**

** Several equivalent rate expressions are provided below to assist in calibration.*

25 - 0 - 0 - 3 S Flow Rate: **46.9 gal/hr**

25 - 0 - 0 - 3 S Flow Rate: **100.0 oz/min**

25 - 0 - 0 - 3 S Flow Rate: **1 minutes and 17 seconds per 1 gal**

25 - 0 - 0 - 3 S Flow Rate: **6 minutes and 24 seconds per 5 gal**

25 - 0 - 0 - 3 S Flow Rate: **1 hours and 4 minutes per 50 gal**

Total Fertilizer Required

25 - 0 - 0 - 3 S Required: **326.7 gal**

Pivot Fertigation Calculator

Select Injection Pump Model

Injection Pump

** If you have a pump model not listed that you would like added, please contact us using the link at the bottom of the page and we will try to add it.*

Pump Manufacturer:

Pump Model:

Injection Pump Sett

- John Blue
- Agri-Inject
- Inject-O-Meter
- John Blue
- Neptune

Pump Manufacturer:

Pump Model:

Injection Pump Sett

Neptune

* Note: Pump perform

Pivot Fertigation Calculator

Output: Injection Pump Setting

Injection Pump Setting(s)

** Note: Pump performance can be affected by a number of factors. It is **critical** to confirm flow for a given setting.*

Pump: John Blue IN-31310

Target Flow: 46.9 gal/hr

Settings are provided below for each of the four possible pump configurations.

Config: Low Range / Simplex

Stroke Setting: n/a (> 10)

Note: Below is factory standard config.

Config: Low Range / Duplex

*Note: Below is factory standard config.
Config: Low Range / Duplex
Stroke Setting: 5.5*

Pivot Fertigation Calculator

Input Schedule Builder Parameters

Schedule Builder

Start Date: < Mon May 24 2021 >

Start Time: << < 12:45:00 PM > >>

End Time: **Mon May 24 2021 7:43:00 PM**

Start Date: < Mon May 24 2021 >

Start Time: << < 12:45:00 PM > >>

End Time: **Mon May 24 2021 7:43:00 PM**

Start Angle: 0 (optional)

Travel Direction: Forward (optional)

Tank Start Level, gal: 500 (optional)

(optional)
: Forward (optional)
l, gal: 500 (optional)
val: 15 min

calculated below are functions of
vided. If table does not match
check inputs and/or pump

	Pivot Angle	Tank Level
M	0°	500 gal
M	10°	488 gal

Pivot Fertigation Calculator

Output: Fertigation Schedule

Time	Pivot Angle	Tank Level
Mon 12:45PM	0°	500 gal
Mon 1:00PM	10°	488 gal
Mon 1:15PM	19°	477 gal
Mon 1:30PM	29°	465 gal
Mon 1:45PM	39°	453 gal
Mon 2:00PM	48°	441 gal
Mon 2:15PM	58°	430 gal
Mon 2:30PM	68°	418 gal

Time	Pivot Angle	Tank Level
Mon 12:45PM	0°	500 gal
Mon 1:00PM	10°	488 gal
Mon 1:15PM	19°	477 gal
Mon 1:30PM	29°	465 gal
Mon 1:45PM	39°	453 gal

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Watermark Soil Moisture Calculator - Overview

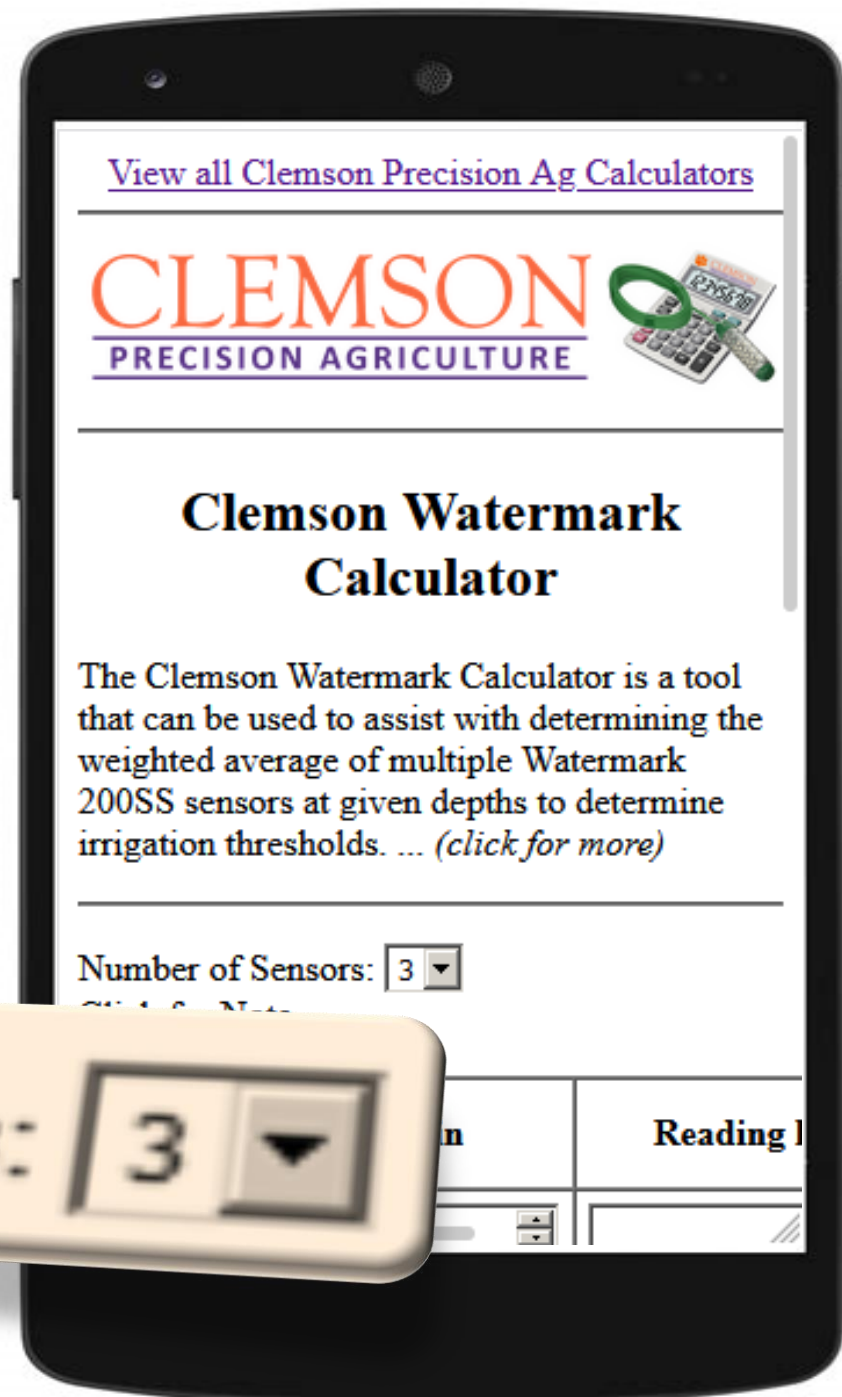
<https://precisionag.sites.clemson.edu/Calculators/Irrigation/WatermarkCalculator/>

- App for recommending when to irrigate based on Watermark sensor readings
- Inputs
 - Soil tension at multiple depths
 - Irrigation threshold
- Outputs
 - Weighted soil tension
 - Irrigation recommendation



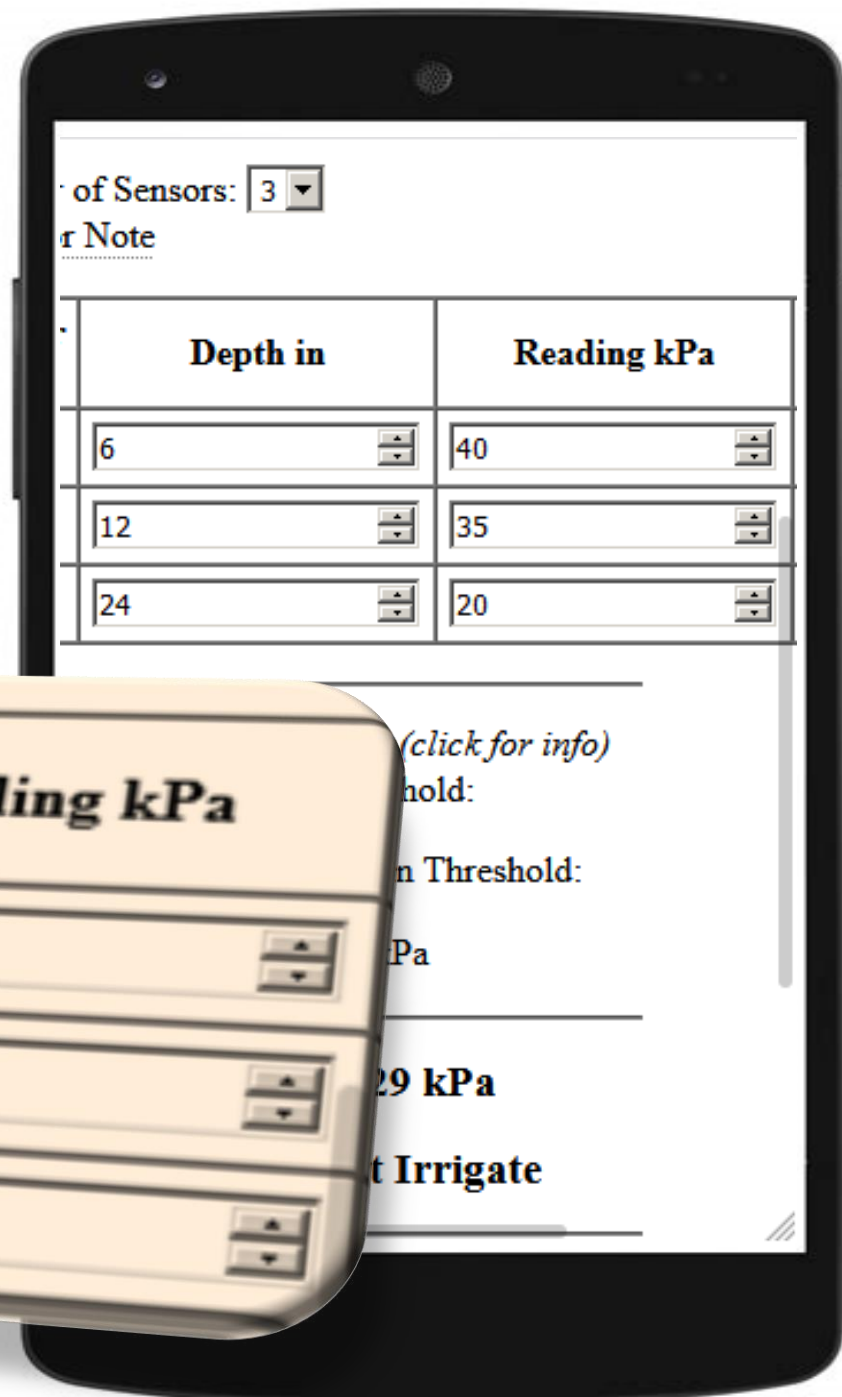
Watermark Calculator

Select Number of Sensors



Watermark Calculator

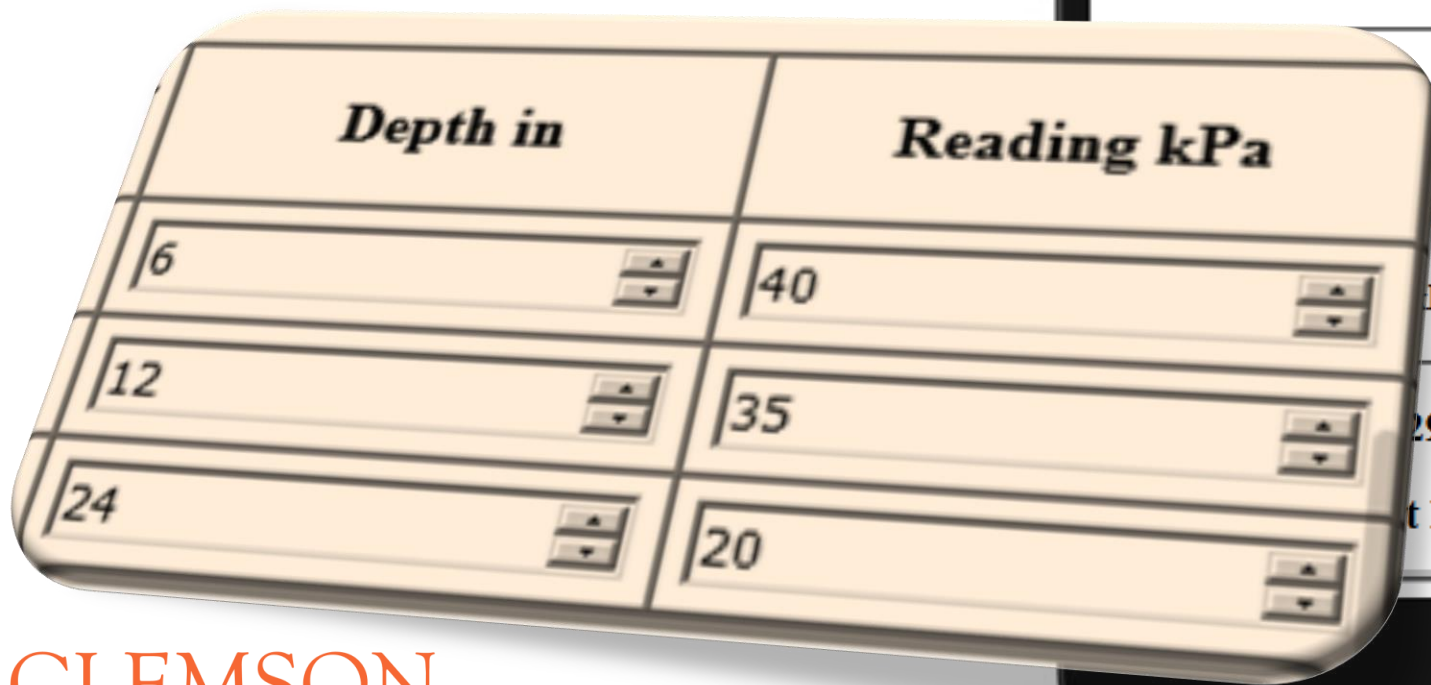
Input Sensor Readings



Number of Sensors: 3

Sensor Note

Depth in	Reading kPa
6	40
12	35
24	20



Depth in

Reading kPa

6

40

12

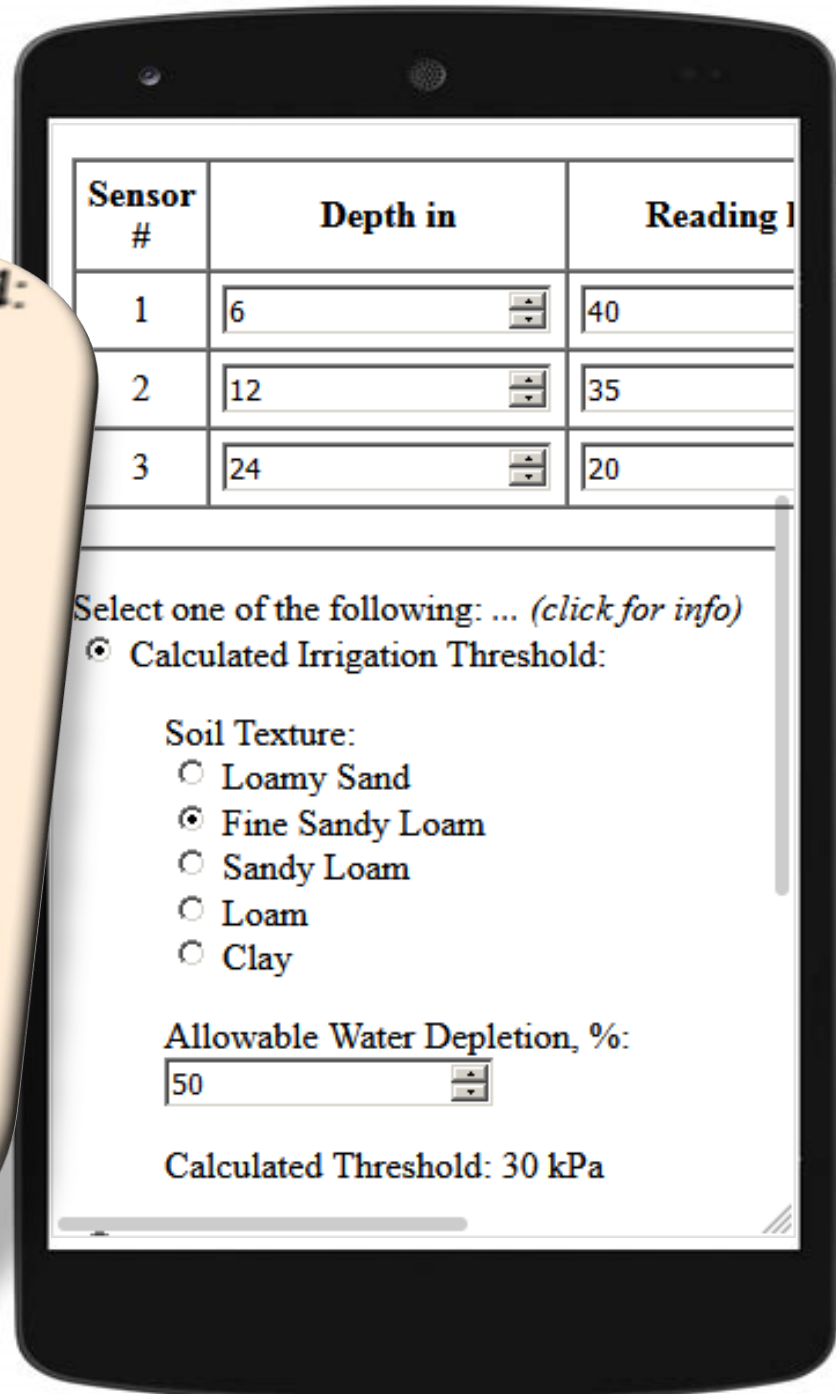
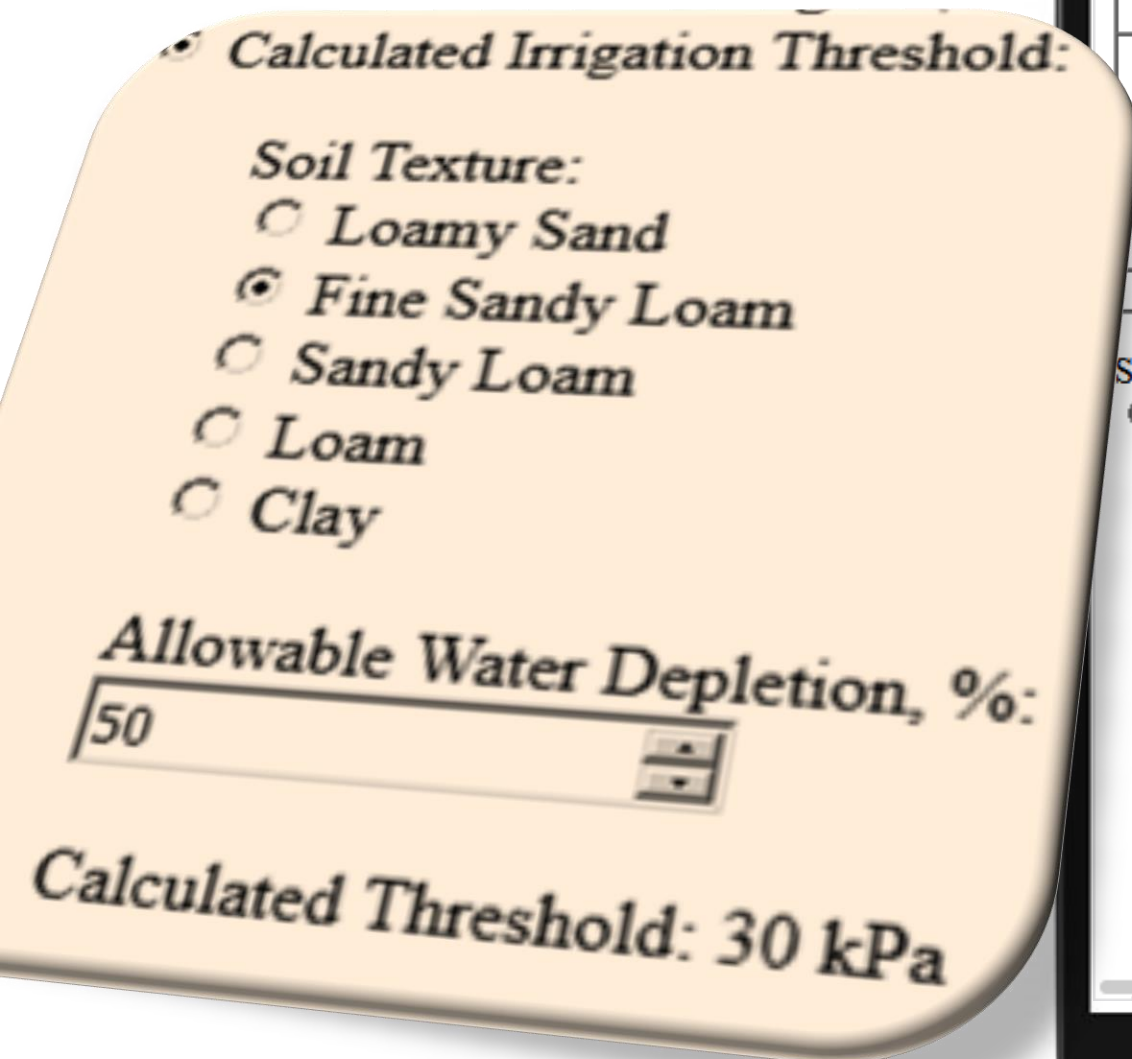
35

24

20

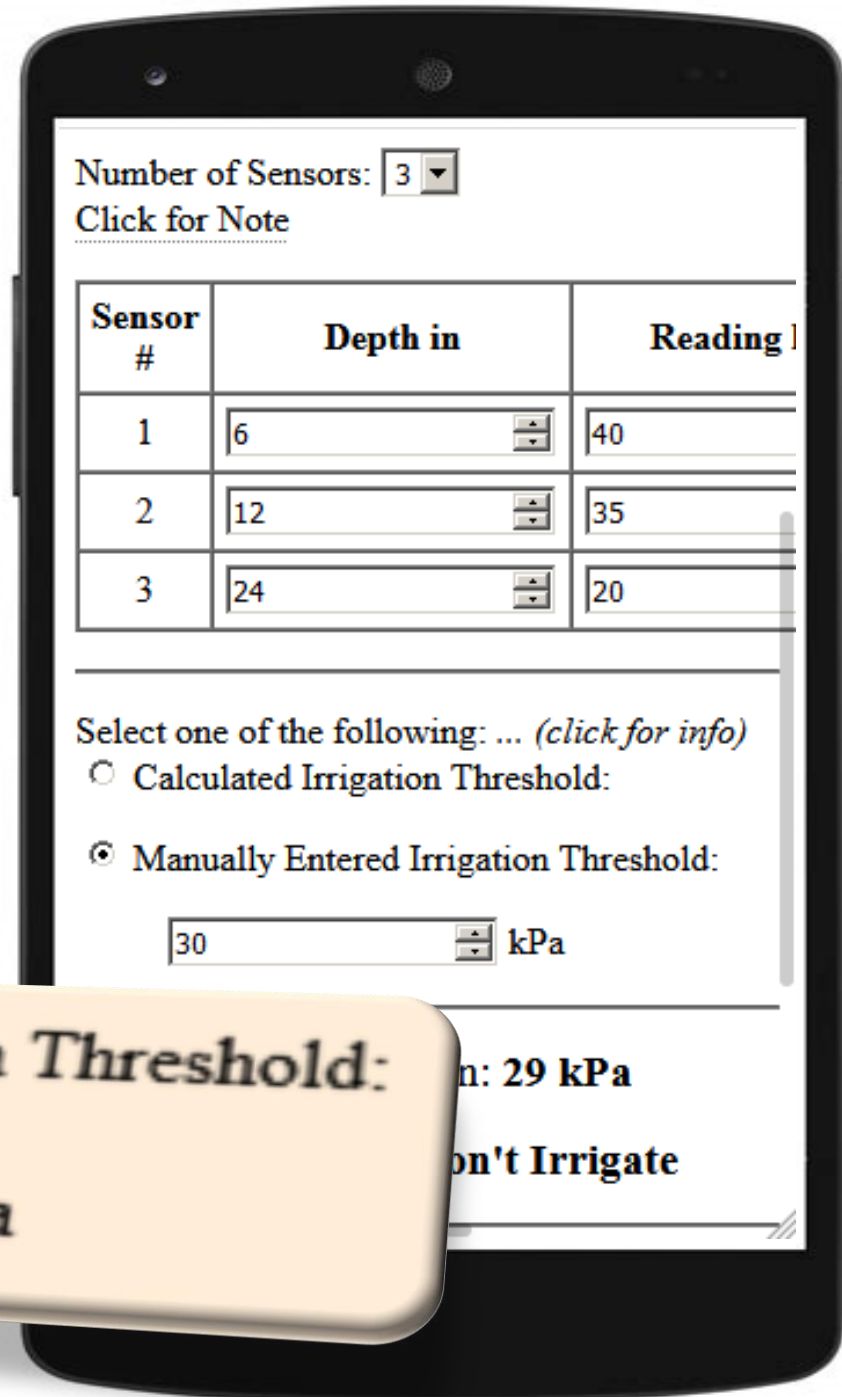
Watermark Calculator

Calculated Irrigation Threshold



Watermark Calculator

Manual Irrigation Threshold



Manually Entered Irrigation Threshold:

30 kPa

Watermark Calculator

Output: Irrigation Recommendation

Weighted Soil Tension: 29 kPa

Recommendation: Don't Irrigate

Number of Sensors:

[Click for Note](#)

Sensor #	Depth in	Reading
1	<input type="text" value="6"/>	<input type="text" value="40"/>
2	<input type="text" value="12"/>	<input type="text" value="35"/>
3	<input type="text" value="24"/>	<input type="text" value="20"/>

Select one of the following: ... *(click for info)*

Calculated Irrigation Threshold:

Manually Entered Irrigation Threshold:

kPa

Weighted Soil Tension: **29 kPa**

Recommendation: **Don't Irrigate**

Watermark Calculator

Output: Irrigation Recommendation

Weighted Soil Tension: 34 kPa

Recommendation: Irrigate

Number of Sensors:
[Click for Note](#)

Sensor #	Depth in	Reading
1	<input type="text" value="6"/> <input type="button" value="v"/>	40
2	<input type="text" value="12"/> <input type="button" value="v"/>	35
3	<input type="text" value="24"/> <input type="button" value="v"/>	30

Select one of the following: ... *(click for info)*

Calculated Irrigation Threshold:

Manually Entered Irrigation Threshold:

kPa

Weighted Soil Tension: 34 kPa

Recommendation: Irrigate

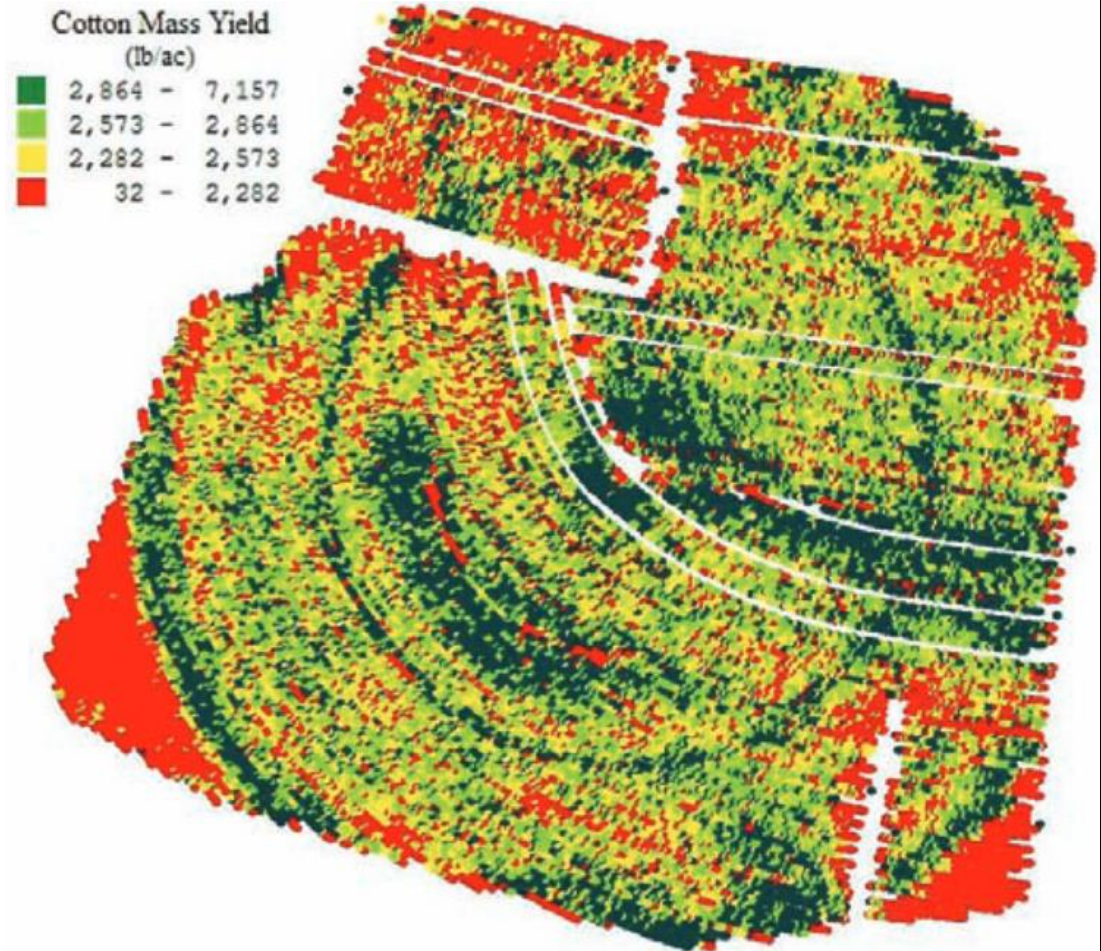
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Irrigation System Assessment – Why???

- Components wear and malfunction with time
- Demonstrate cost-benefit of repairs
- Improve irrigation water use efficiency by 17% (SWFWMD)



Cotton Yield Maps:
Tools for Increasing Efficiency and Profitability
Cotton Inc.: Vellidis, Barnes, and Brannen, 2012



Center Pivot Irrigation Testing (CPIT) Program

- What is it?
 - Service for center pivot efficiency assessments
 - Similar programs in Florida, Georgia, others
- Short-Term: MIL Pilot Program funded by NRCS
 - **Aiken SWCD**, NRCS, SCDNR, SCFB, Clemson University, and Ag South
 - Pre- and post-retrofit audits on 24 pivots in S.C.
 - Retrofits to quantify water savings potential
- Long-Term: Extension Service to S.C. growers
 - Clemson Extension: Water Resources and Agronomic Crops Teams
 - Software development by Clemson Precision Ag



Center Pivot Irrigation Testing Pilot Program

- Provides S.C. growers with a “health checkup” on their center pivots (~2/3 of ag irrigation in S.C.)
- Information for better water management
 - Calibrated application depths
 - Endgun shutoff recommendations
 - Soil moisture sensor placement
 - Cost of irrigating a particular depth
 - Cost of under- and over-irrigation
- Information to drive improvements
 - Increased profitability
 - Increased irrigation water use efficiency
 - Support for cost-share programs



Clemson Center Pivot Irrigation Test (CPIT) program



CPIT Screenshot: Data Collection Screen

Clemson P.A.T. 1.0.0.31 | BRIAN MCCLAM | M3 FARMS | MILLWOOD LAND CO. LLC | 20210416 135403

Map Settings

Follow Me
 Sat. Image

GPS Data

Source	Mouse (Demo)	Dist. to last	
Setup Serial Port			
Latitude	33.63781974	Dist. to center	920.8 ft
Longitude	-79.77063417		

Open Questionnaire

Mark Pivot Center	Add Tower or Wheel Track
Mark Reverse Stop	Mark Forward Stop
Mark Endgun	Endgun Arc
Start Pivot Speed Timer	End Pivot Speed Timer
Add GeoNote	Add Catch Cup
Generate Report	

Rt Click to Pan

©2021 Microsoft Corporation, ©2021 NAVTEQ, ©2021 Image courtesy of NASA



CPIT Report



General System Information

WATEREE PRISON FARM | DURAI | DURAI 1 | 3/30/2021

Pivot Description

Pivot Make: VALLEY

Controller Make: VALLEY

Sprinkler Make: NELSON

Sprinkler Model: ROTATOR

Pivot Age: 8 yr

Sprinkler Age: 8 yr

Number of Spans: 4

Sprinkler Height: 6 ft

Pivot Options

Chemigation/Fertigation: No

Endgun: Yes

Regulators: Yes, bottom of drops

Swing Arm: No

Variable Frequency Drive: No

Pump Description

Water Source: Groundwater/Well

Booster Pump: Yes

Phase Converter: No

Variable Frequency Drive: No

Energy Consumption

Energy Source: Electricity - Three Phase

Assumed Energy Cost: \$0.057/kWh

Metered Rate: 22.0 kWh/hr

Irrigation Cost: \$1.954/acre-inch

Irrigation Cost: \$85.28/inch @ 44 ac



CPIT Report



General System Information

WATEREE PRISON FARM | DURAI | DURAI 1 | 3/30/2021

System Dimensions

Wetted Area: 43.6 ac
Machine Area: 36.6 ac
Machine Travel: 360 deg
Endgun Area: 7 ac @100%
Machine Length: 711.9 ft
Endgun Throw: 66.0 ft
Wetted Radius: 777.9 ft
Endgun Centerline: 0 deg
Endgun Sweep: 180 deg

Flow Rate

Design Flow: 400 gpm
Meter Flow: N/A
Caught Flow: 290.4 gpm
App. Rate: 6.65 gpm/ac
App. Rate: 0.35 in./day
App. Rate: 2.5 in./wk
App. Depth: 0.060 in.@100%

Pressure

Design: 65 psi @ pivot
Observed: 40 psi @ pivot
Observed: N/A @ end

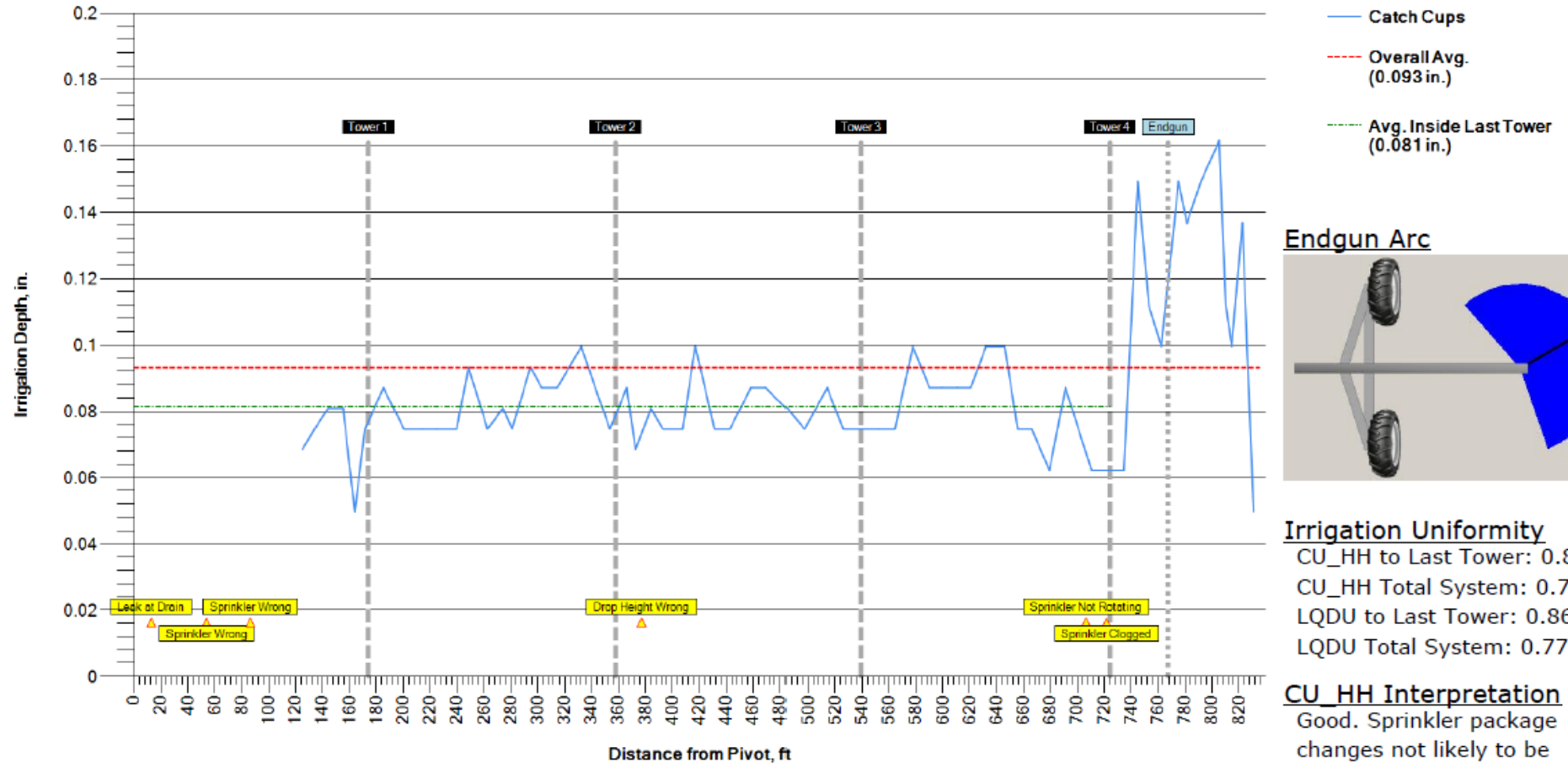


CPIT Report



Irrigation Uniformity

WATEREE PRISON FARM | DURAI | DURAI 2 | 3/30/2021



Irrigation Uniformity
 CU_HH to Last Tower: 0.89
 CU_HH Total System: 0.77
 LQDU to Last Tower: 0.86
 LQDU Total System: 0.77

CU_HH Interpretation
 Good. Sprinkler package changes not likely to be profitable.

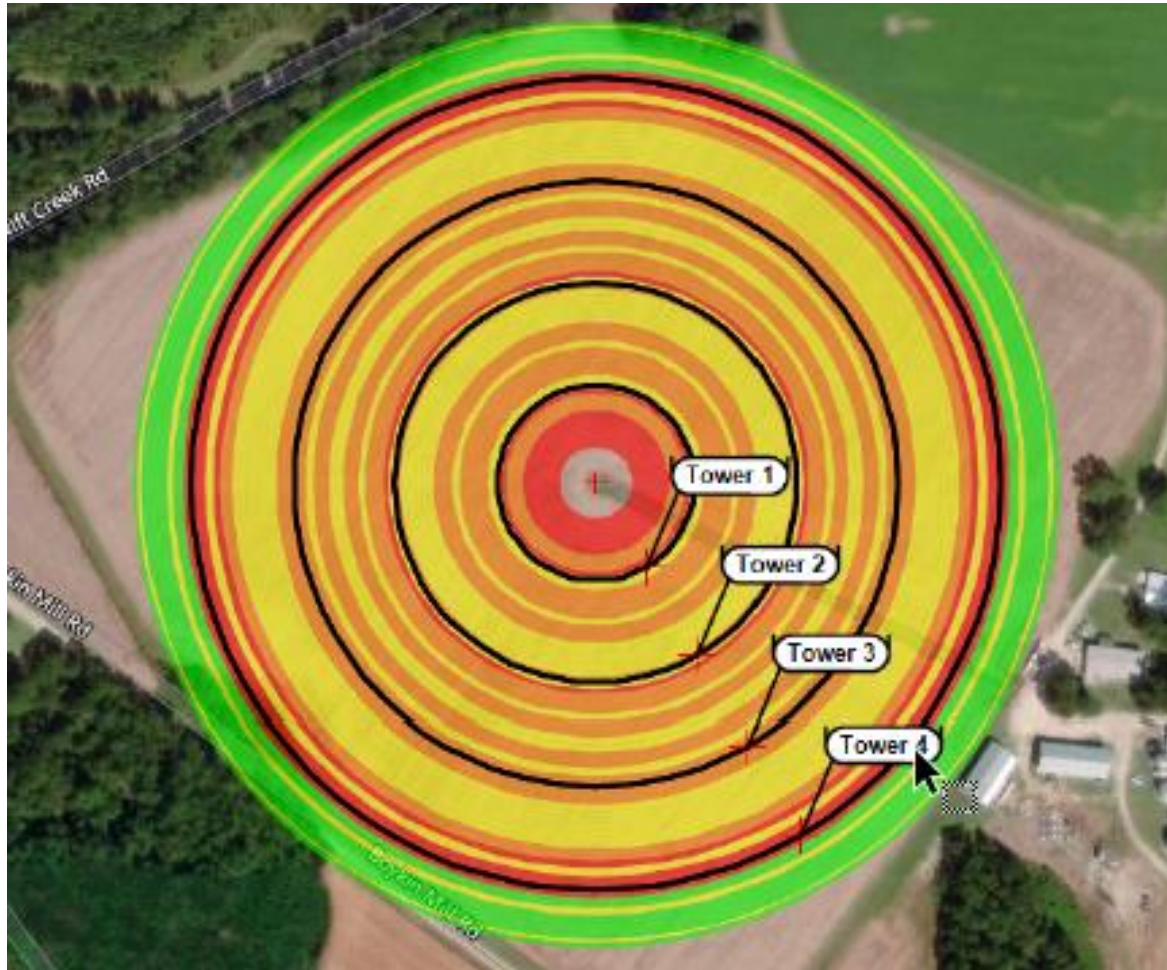


CPIT Report



Application Depth Map

WATEREE PRISON FARM | DURAI | DURAI 2 | 3/30/2021



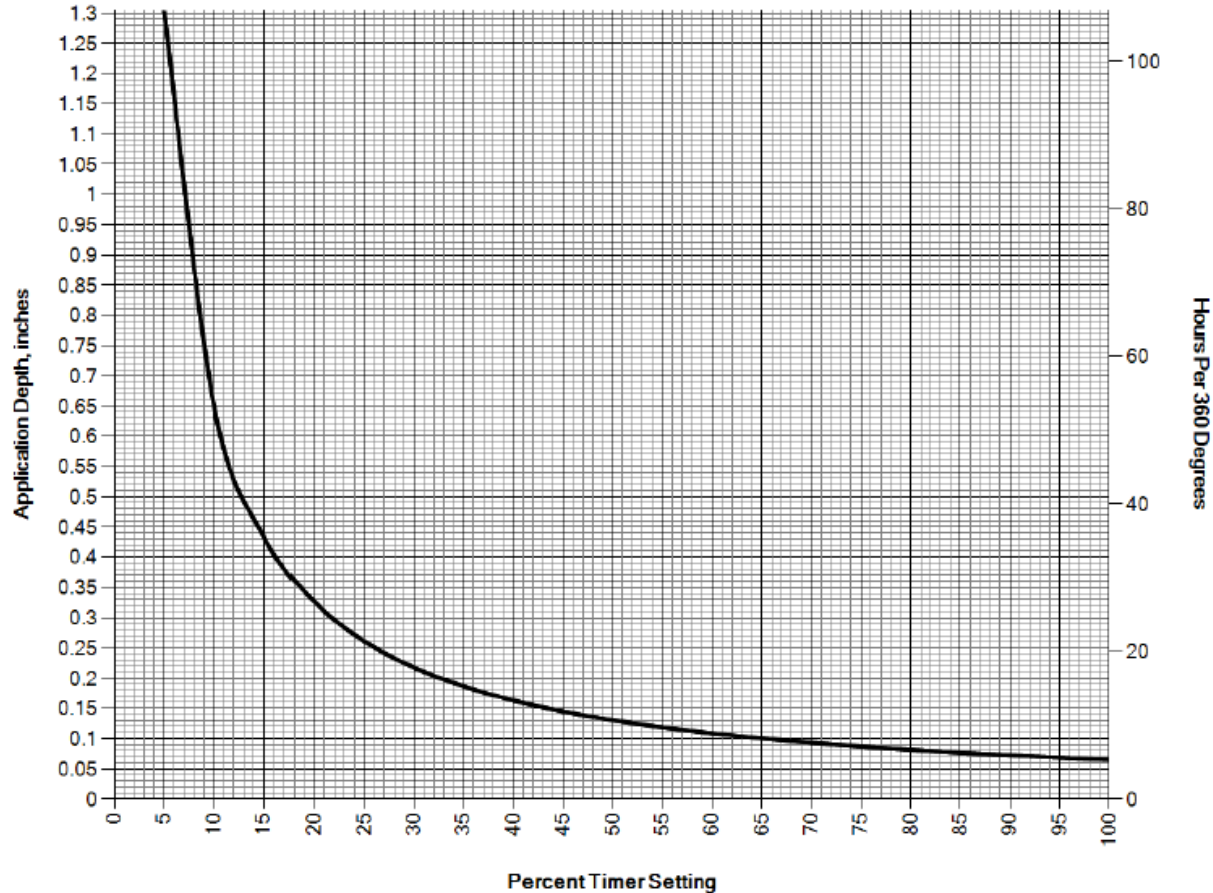
CPIT Report



Calibrated Timer Chart

WATEREE PRISON FARM | DURAI | DURAI 2 | 3/30/2021

Timer Setting %	Inches App.	Hrs Per 360 Deg	Acres Per Min
100	0.07	5.3	0.157
95	0.07	5.6	0.149
90	0.07	5.9	0.141
85	0.08	6.3	0.133
80	0.08	6.7	0.126
75	0.09	7.1	0.118
70	0.09	7.6	0.110
65	0.10	8.2	0.102
60	0.11	8.9	0.094
55	0.12	9.7	0.086
50	0.13	10.7	0.078
45	0.14	11.9	0.071
40	0.16	13.4	0.063
35	0.19	15.3	0.055
30	0.22	17.8	0.047
25	0.26	21.4	0.039
20	0.33	26.7	0.031
15	0.43	35.6	0.024
10	0.65	53.4	0.016
5	1.30	106.8	0.008



CPIT Report



Irrigation Economics

WATEREE PRISON FARM | DURAI | DURAI 2 | 3/30/2021

Estimated Cost of Suboptimal Irrigation

Estimates below are as compared to a system with CU_HH = 93%. Estimates do not consider uniformity beyond the last tower. Assumed irrigation cost: \$7.00 / ac-in. Estimated cost to retrofit sprinkler package for this pivot at \$5/ft is \$3,622. Costs to retrofit are dependent on a number of factors...consult your supplier. Estimated payoff period for retrofitting: 13.0 years.

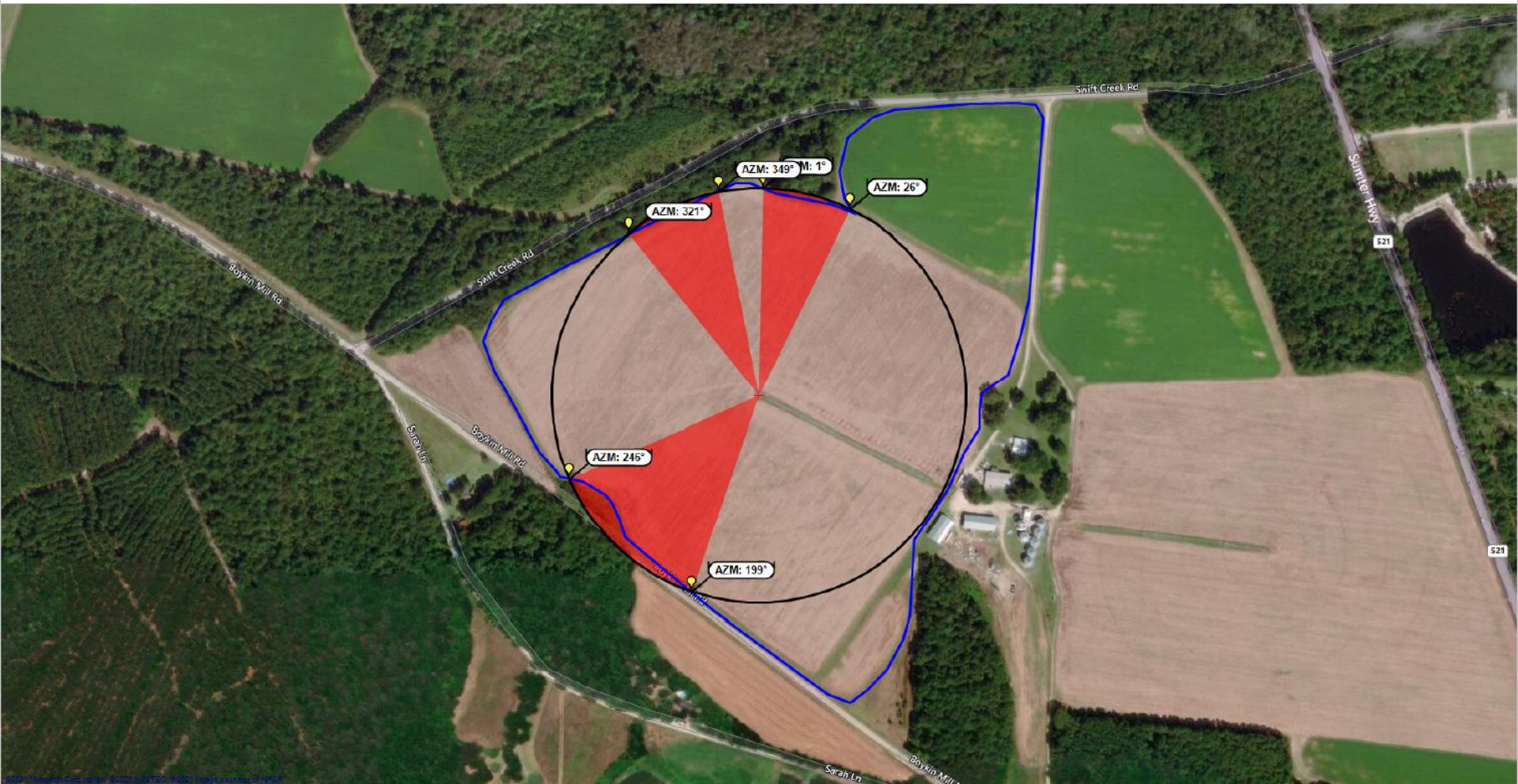
Crop Name	Assumed Yield Benefit from Irrigation	Assumed Crop Value	Assumed Annual Irrigation, Inches	Annual Cost of Under-Irrigation	Annual Cost of Over-Irrigation	Total Sub-Optimal Irrigation Cost	Total Sub-Optimal Irrigation Cost
Corn for grain	67.7 bu/ac	\$3.98 / bu	7.6	\$236	\$42	\$278	\$6.54 / ac
Full Crop Rotation			7.6	\$236	\$42	\$278	\$6.54 / ac



CPIT Report

Endgun Shutoff Recommendation

WATEREE PRISON FARM | DURAI | DURAI 2 | 3/30/2021

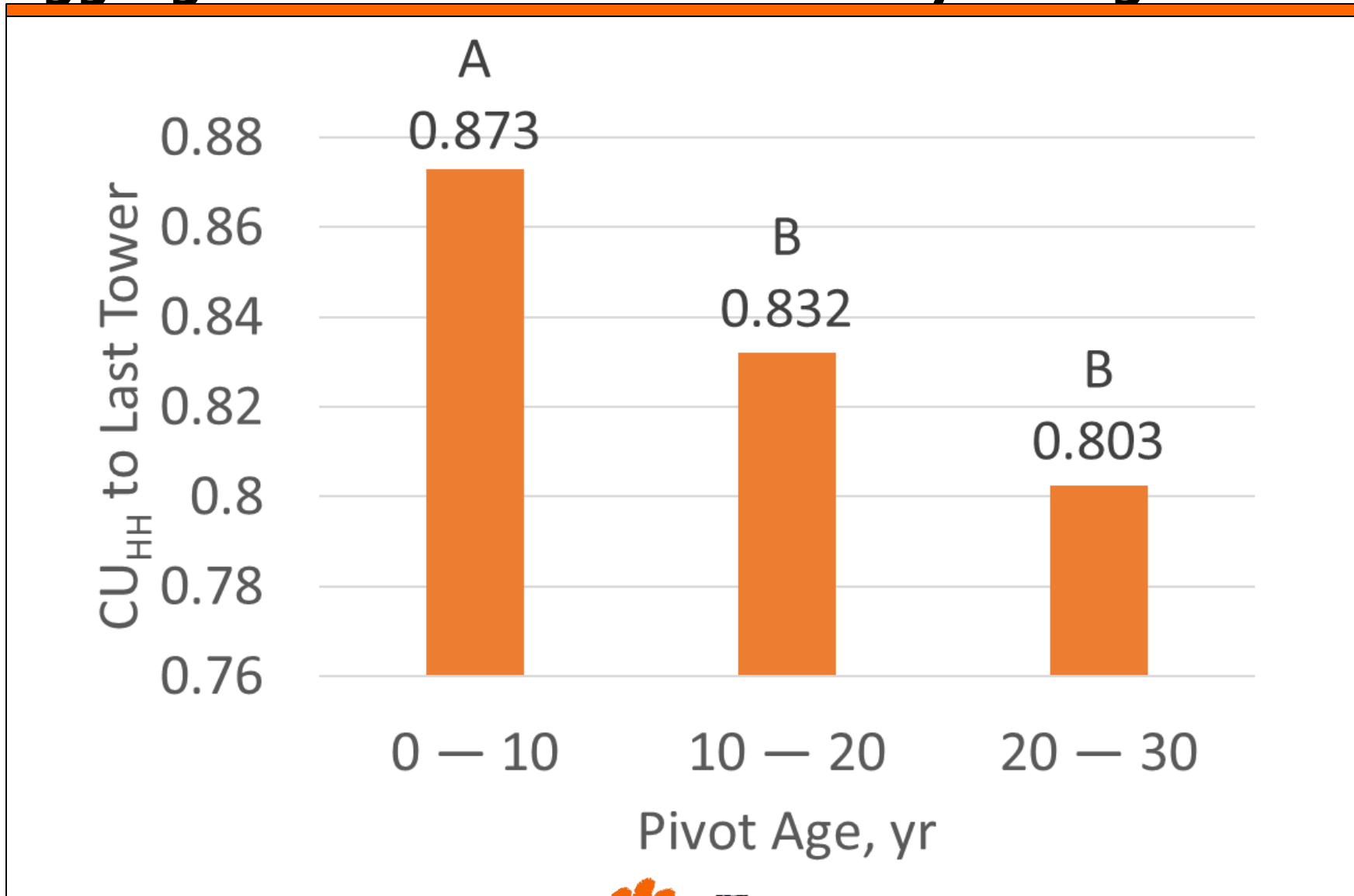


CPIT Program Update

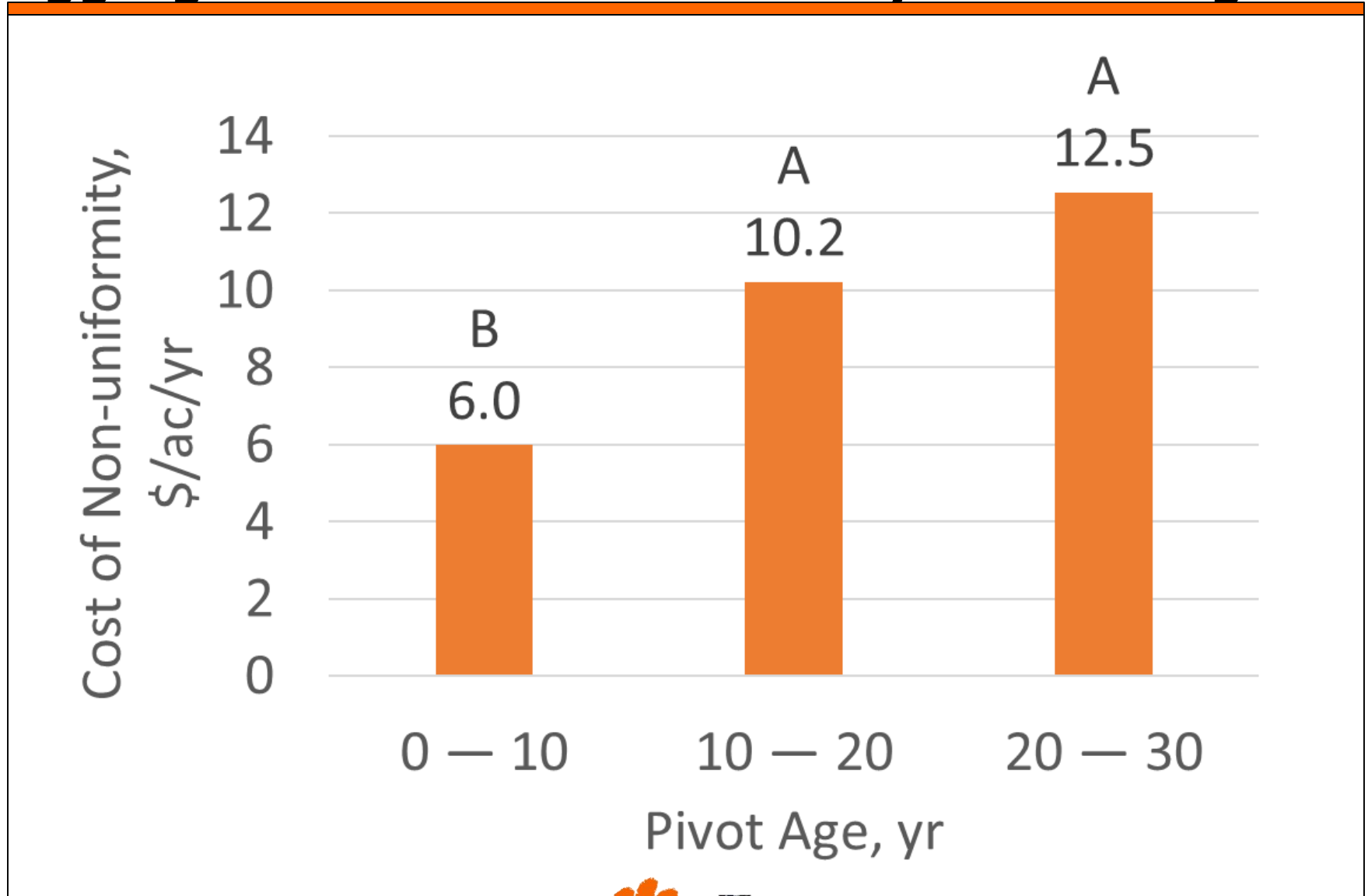
- Launched in February 2022
- Water Resources and Agronomic Crops agents trained in every (relevant) S.C. county
- Test kits distributed throughout the state
- >140 center pivots tested to-date
- NRCS-EQIP cost share for sprinkler package retrofits
- P.A.T. software may be made publicly available
- Anonymized, aggregated database from test results



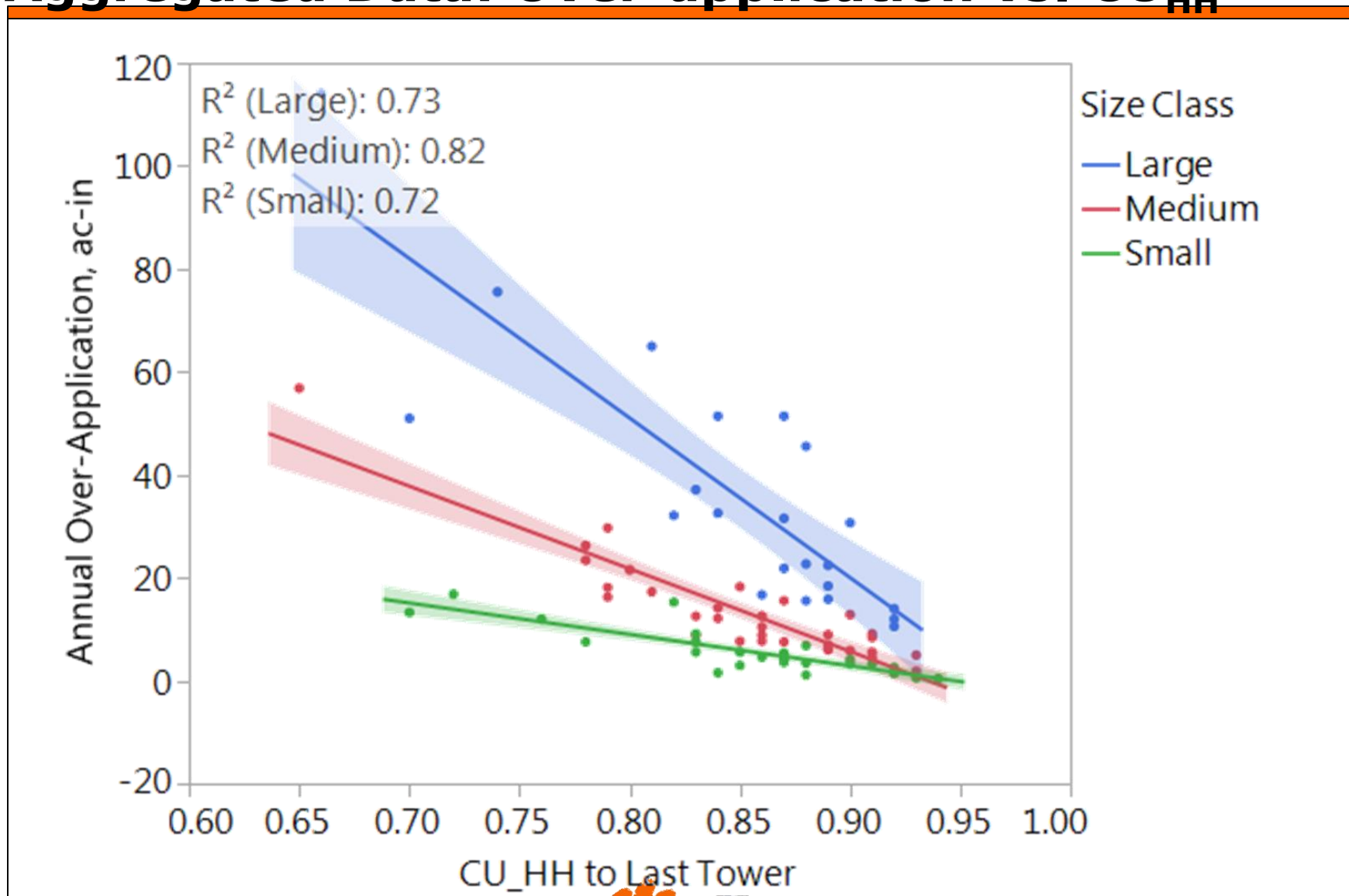
Aggregated CPIT Data: Uniformity vs. Age



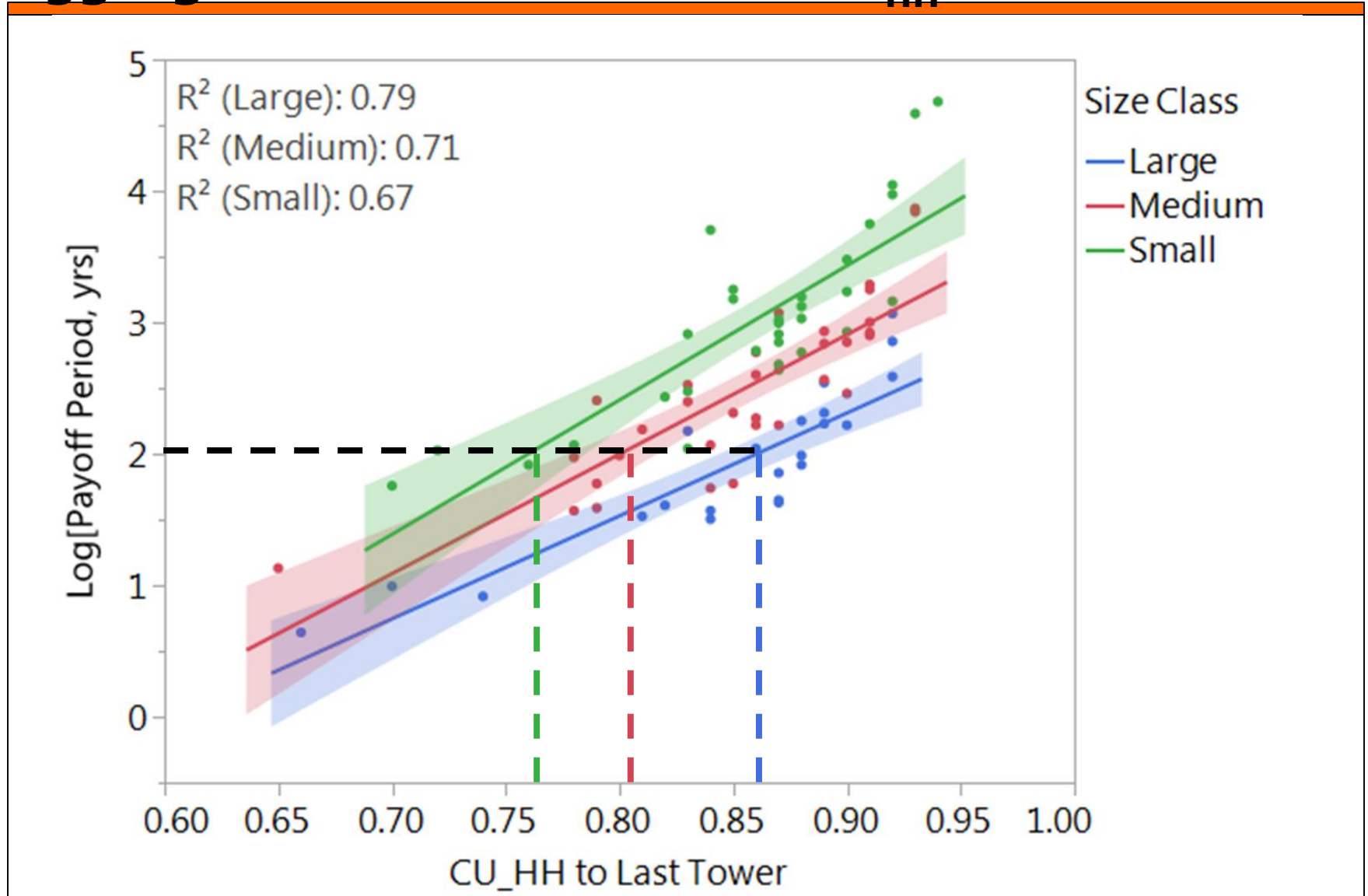
Aggregated Data: Nonuniformity Cost vs. Age



Aggregated Data: Over-application vs. CU_{HH}



Aggregated Data: Threshold CU_{HH} & Pivot Size



Outline

1. Center Pivot Mapping Software
2. Drip Fertigation Calculator
3. Center Pivot Fertigation Calculator
4. Center Pivot Irrigation Testing Extension Program
5. Watermark Soil Moisture Calculator
- 6. Other Edisto REC Water/Irrigation Work**



Edisto REC Irrigation Research

- Jose Payero, Irrigation Specialist
 - Sensor/weather telemetry
 - Irrigation scheduling
 - Evapotranspiration
 - Drip Irrigation
 - Variable Rate Irrigation
- Michael Plumblee, Corn & Soybean Specialist
 - Soil moisture sensor thresholds for irrigation scheduling
- Gilbert Miller
 - Drip irrigation and fertigation
 - Soil moisture sensing
- Multiple Researchers
 - Cover crop research



Questions?

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