Optimizing Irrigation Management of Strawberries

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Acknowledgements

California Strawberry Commission:
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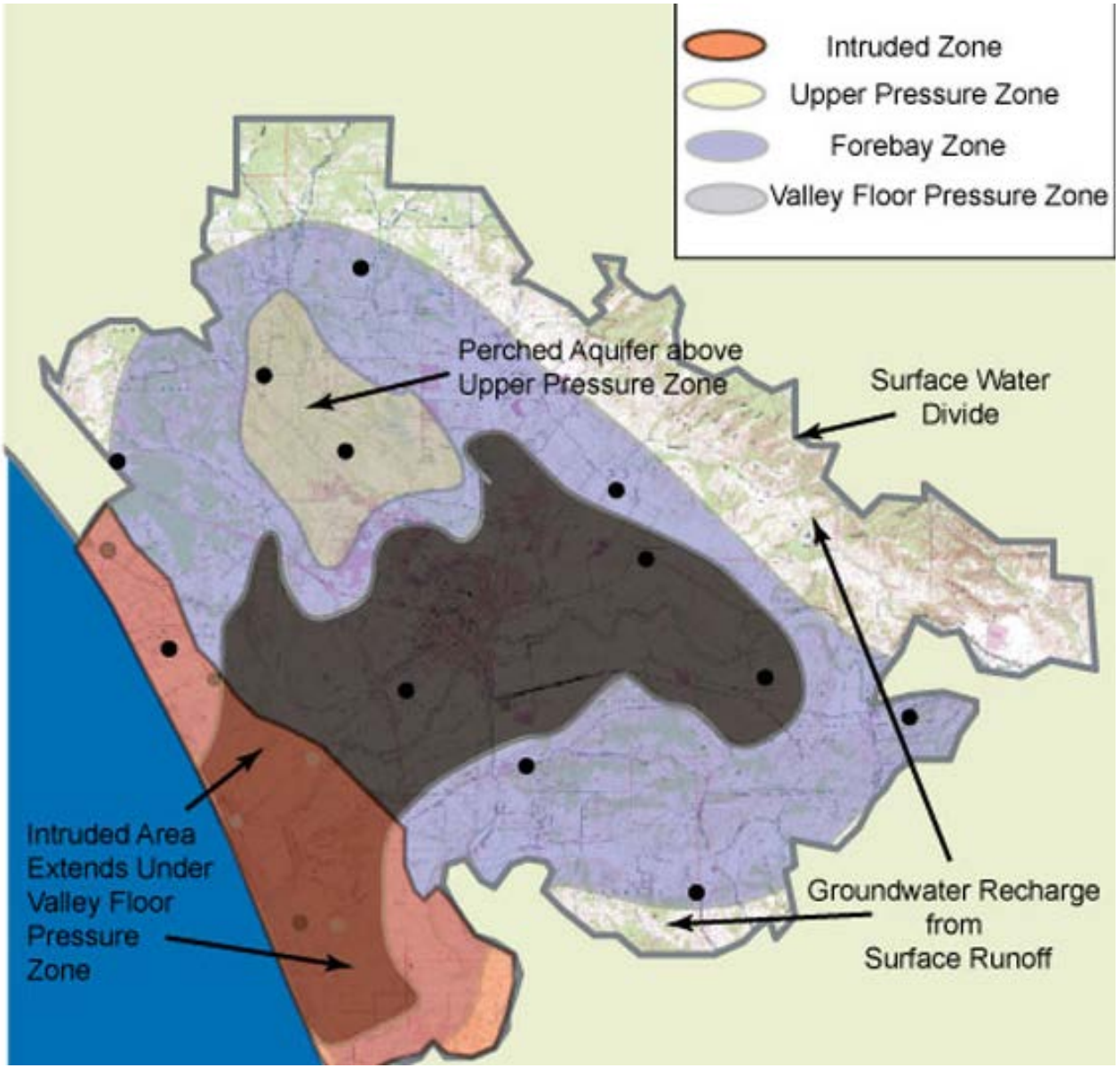
SUPPORT LOCAL GROWERS AND CATTLEMEN

PRAY FOR RAIN

CENTRAL COAST YOUNG FARMERS AND RANCHERS

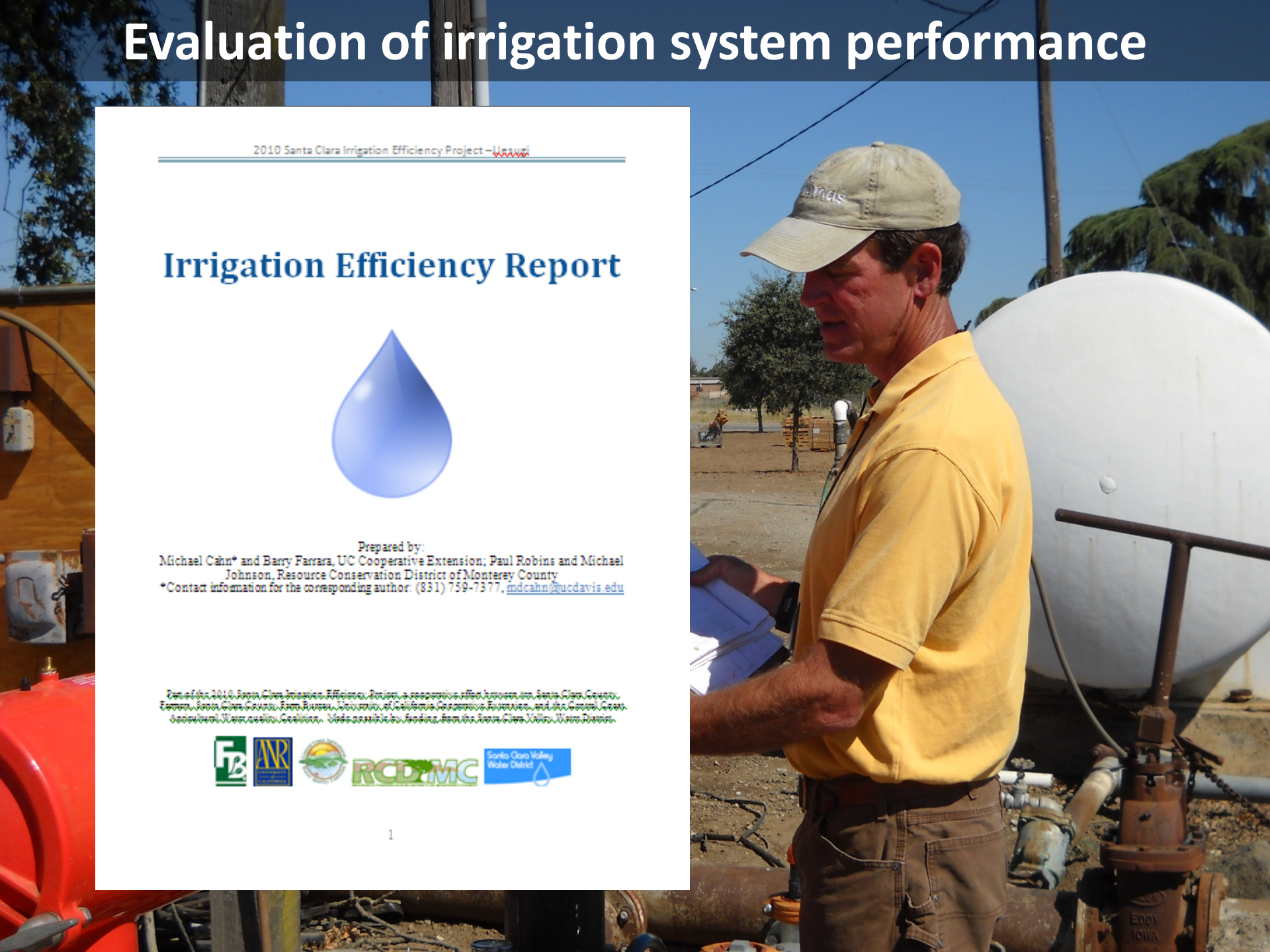
Pajaro Valley Basin



Eutrophication of Surface Water (P and N)

Pajaro River Nitrate TMDL
Pajaro Nutrient TMDL
Salinas Nutrient TMDL
Ag Order (ground water)

Evaluation of irrigation system performance



2010 Santa Clara Irrigation Efficiency Project – Usuvi

Irrigation Efficiency Report

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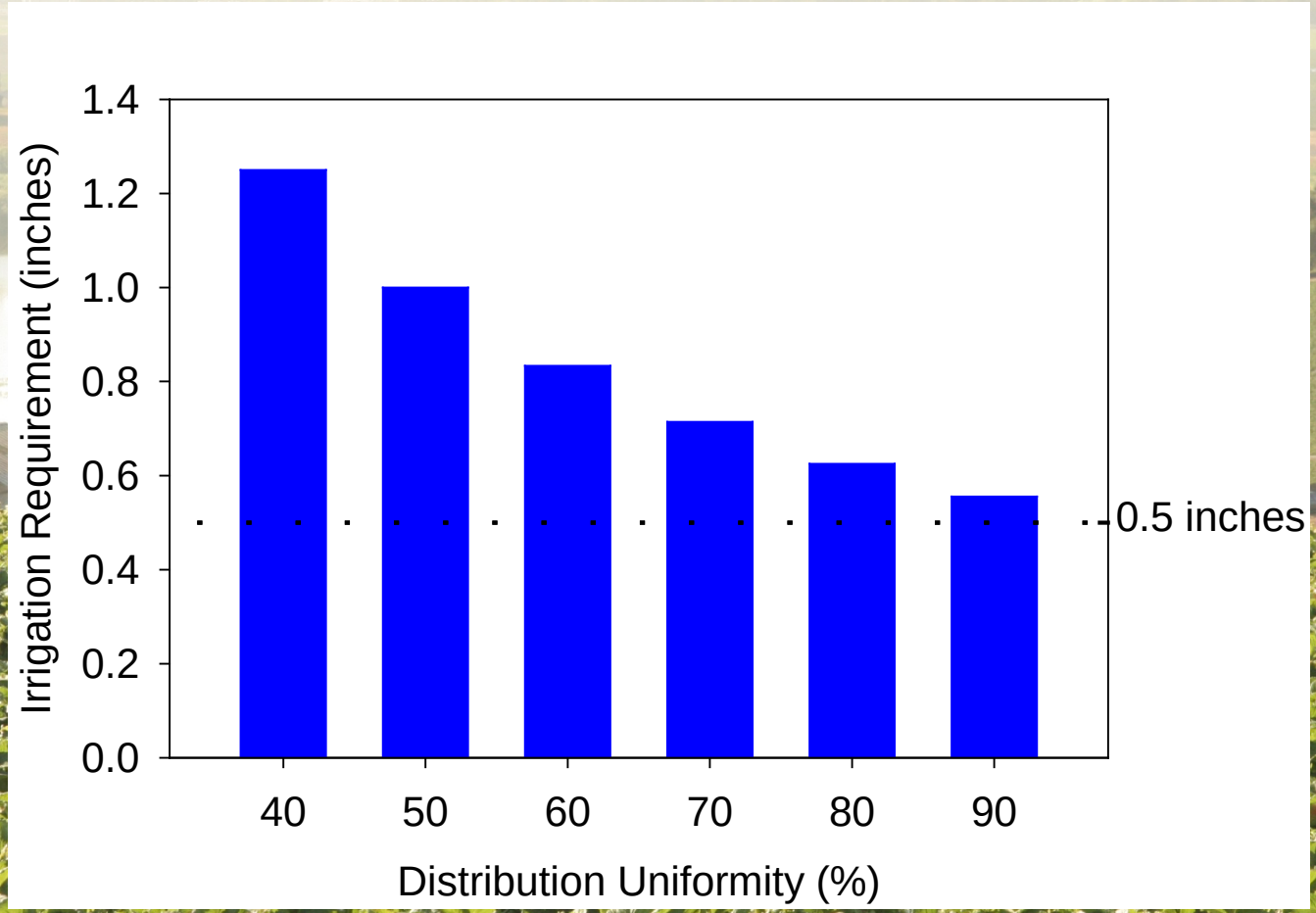
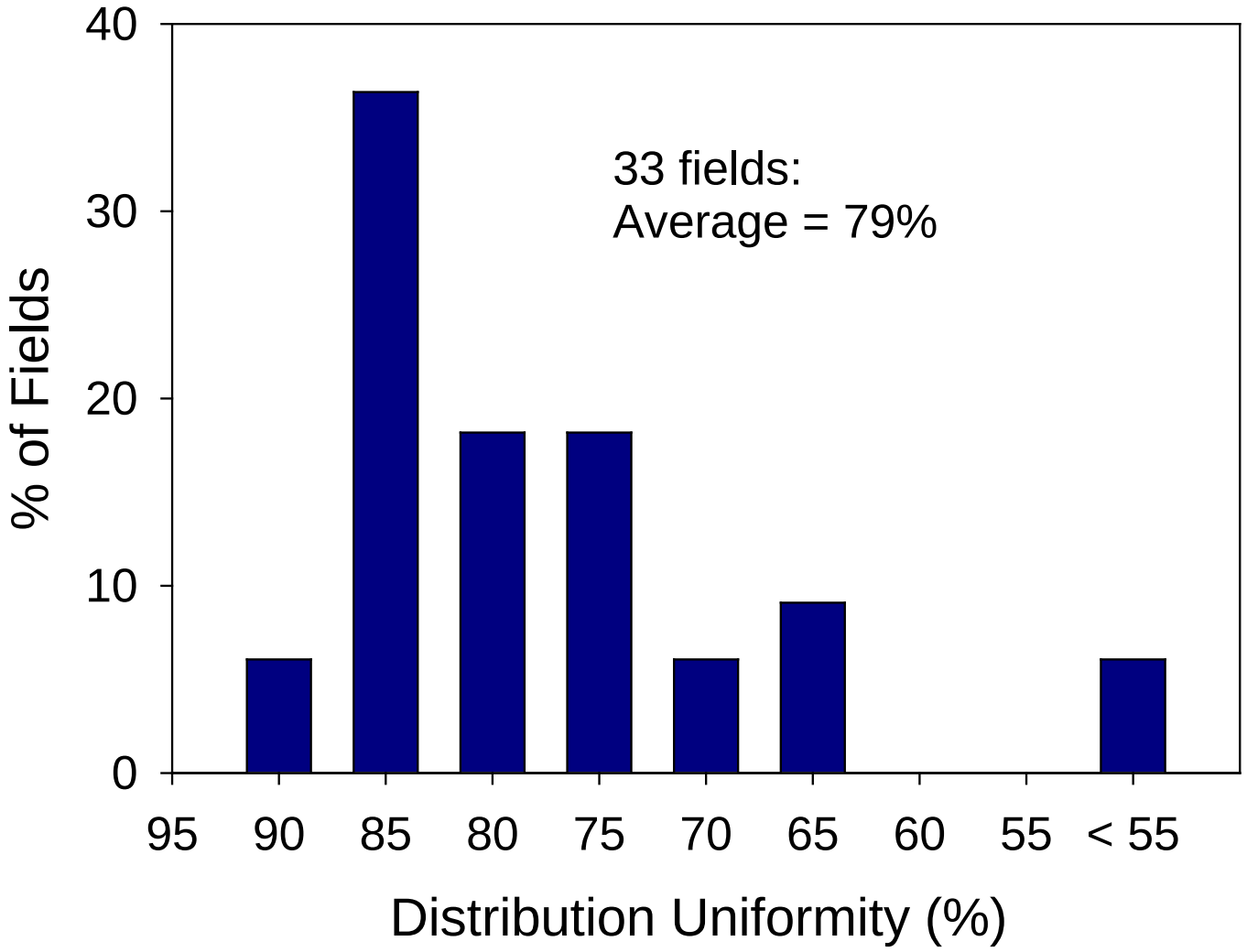
How uniformly is water applied?



Distribution Uniformity of strawberry drip systems (2011-2013)



Main challenges that limited drip uniformity (CA Strawberry Commission Survey)

Pressure

- Maintaining similar pressures among submains
- Low pressure
- Managing pressure on slopes

Design

- Submain diameter *vs* flow rate
- Leads too narrow (caused excessive pressure loss)
- Managing drain down on slopes

Maintenance

- Flushing drip lines
- Cleaning filter
- Leaks

Getting the pressure right is critical for drip

Hands on Workshop for Strawberry Irrigators and Supervisors (March 11th and 12th)

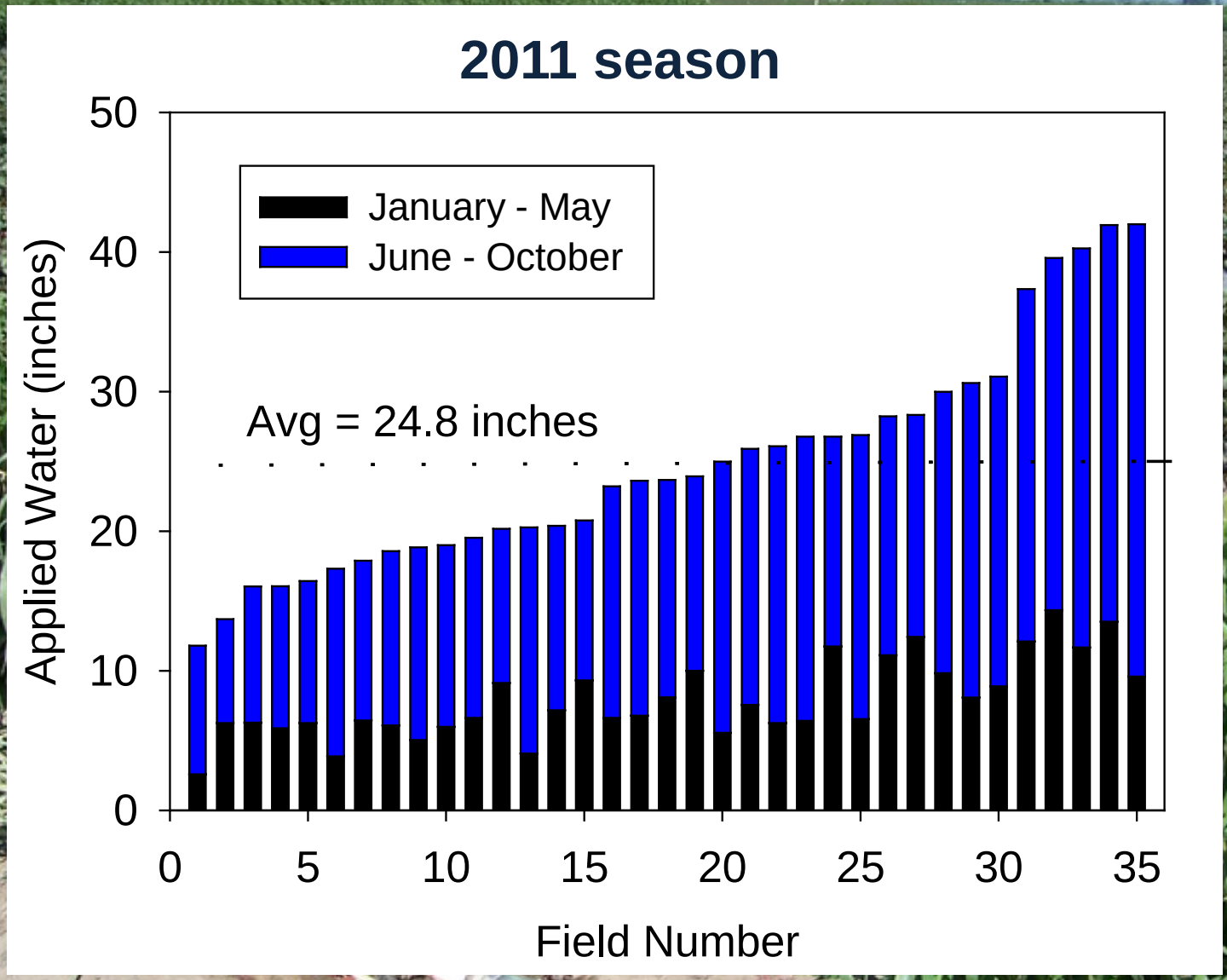
Skill development:

- **Measuring pressure**
- **Distribution Uniformity**
- **Pressure regulators**
- **Record keeping**
- **Trouble shooting problems**

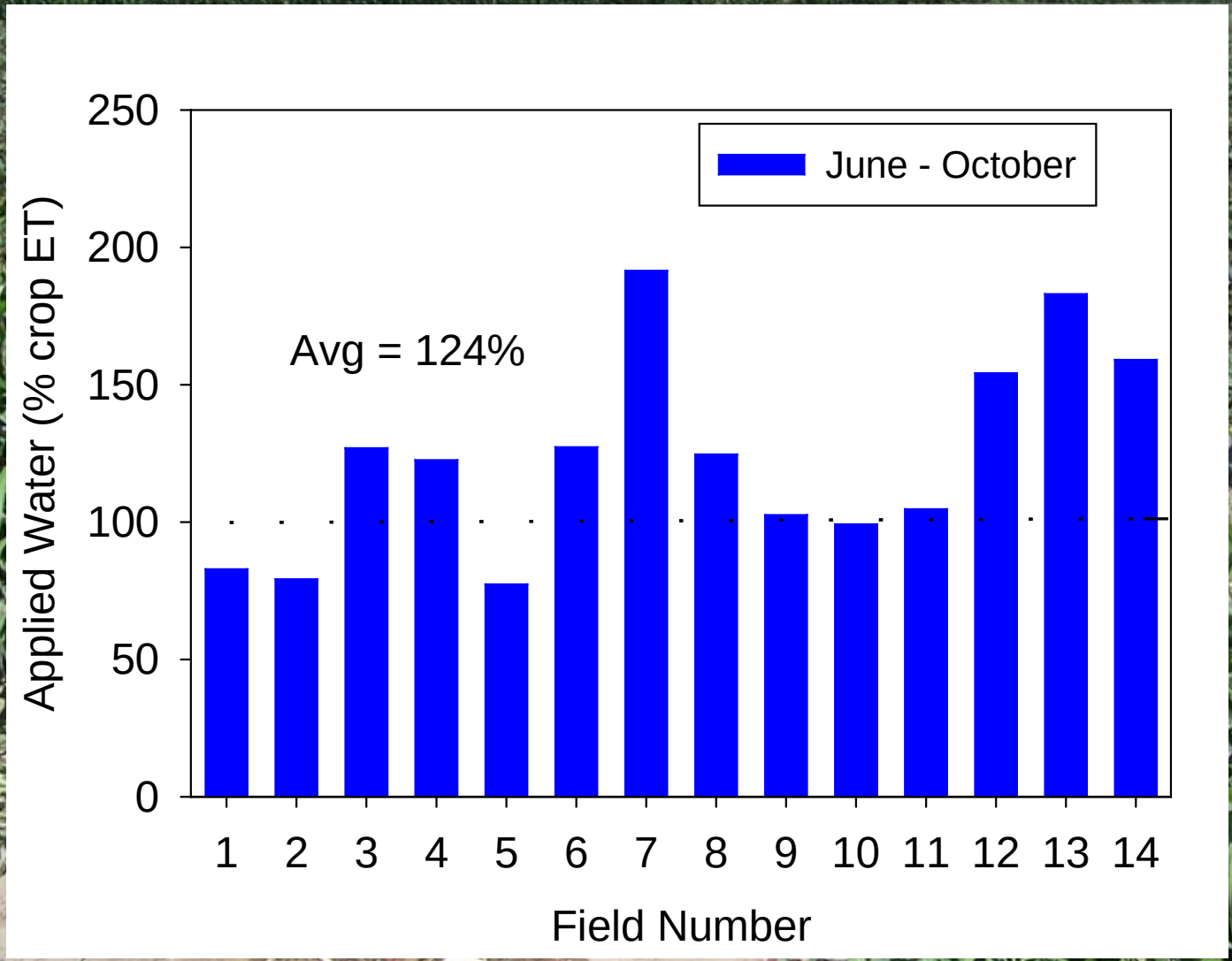
Improving Irrigation Scheduling

- Deciding when to irrigate
- Deciding how much to irrigate

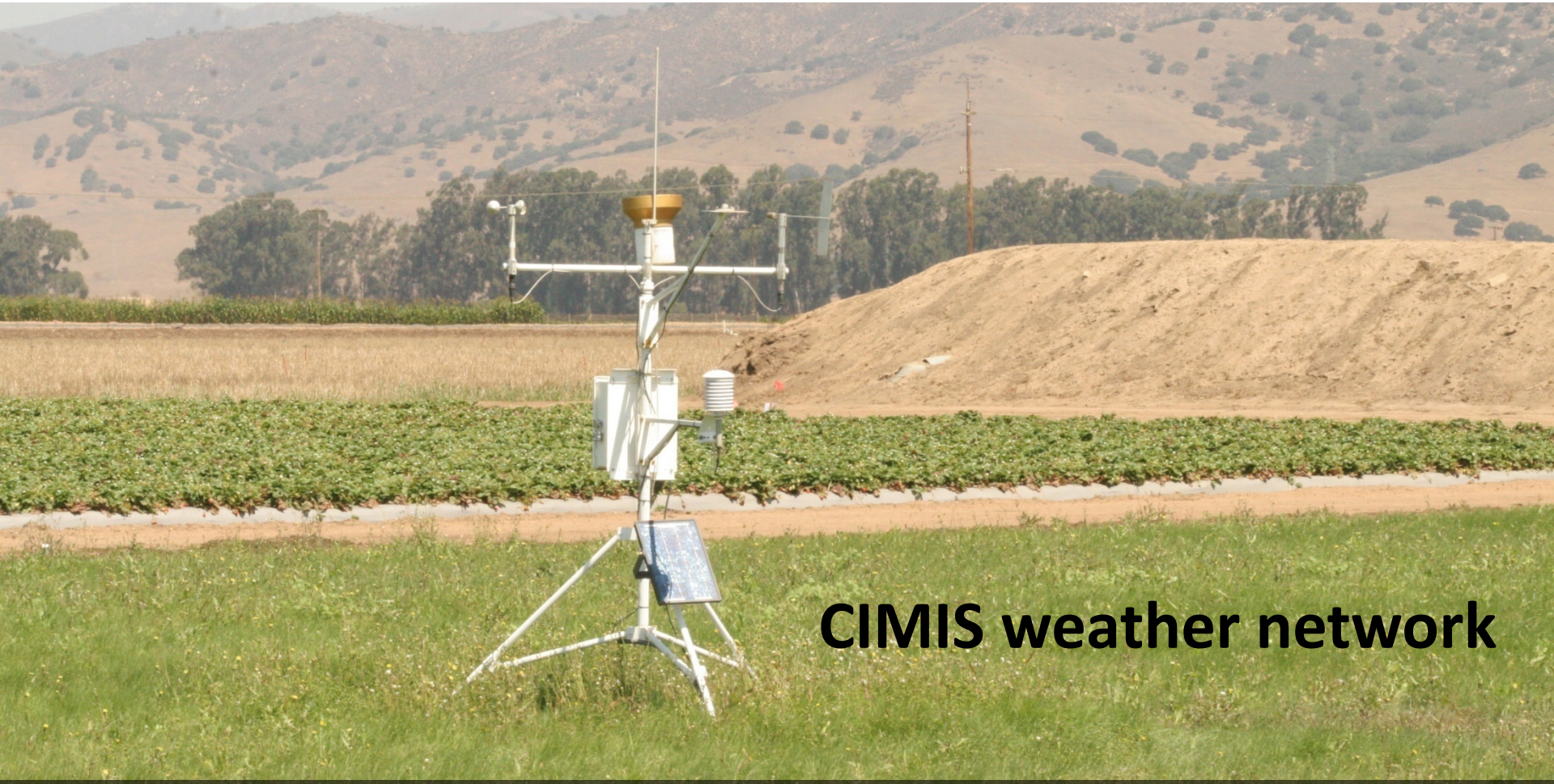
How much water do strawberry growers apply?



Applied Water as Percentage of ET (June – October 2011)



Can crop water needs be estimated using weather data?



Evapotranspiration (ET) = Solar Radiation + Relative Humidity + Air Temperature + Wind Speed

Welcome Back MIKE

Log Off
Hourly
Daily
Daily ETo Variance
Monthly
Monthly Average ETo

Quality Control

QC Overview
Current Flag Summary
Current Hourly Flags
Current Daily Flags
Former Flag Summary
Former Hourly Flags
Former Daily Flags

More Info

Station List
Data Types
Data Formats
Data Size

Daily

Daily data is either the sum/average of the 1440 minute-by-minute readings or the sum/average of hourly values depending on the weather parameter. Some daily values are calculated by the dataloggers at the station and others are calculated by the CIMIS computer in Sacramento.

Standard Daily Report consists of 14 pre-determined sensors: ETo; precipitation; solar radiation; average vapor pressure; maximum, minimum, and average air temperature; maximum, minimum, and average relative humidity; dew point; wind speed; wind run; and average soil temperature. Daily Report by Sensor can be generated by selecting specific sensors from the Sensors section below.

Note: Multiple selections can be made by holding down the "Ctrl" or "Shift" keys while making selections.

Stations

Select a station(s) from the following categories. By default, only the checkbox for Active Stations is checked. Click on the checkboxes for Inactive Stations, Region, County, and Zip Code to see their respective selection boxes. Selecting a station(s) from these lists produces standard reports.

Please select:

- [x] Active Stations
- [ ] Inactive Stations
- [ ] Stations by Region
- [ ] Stations by County
- [ ] Stations by Zip Code

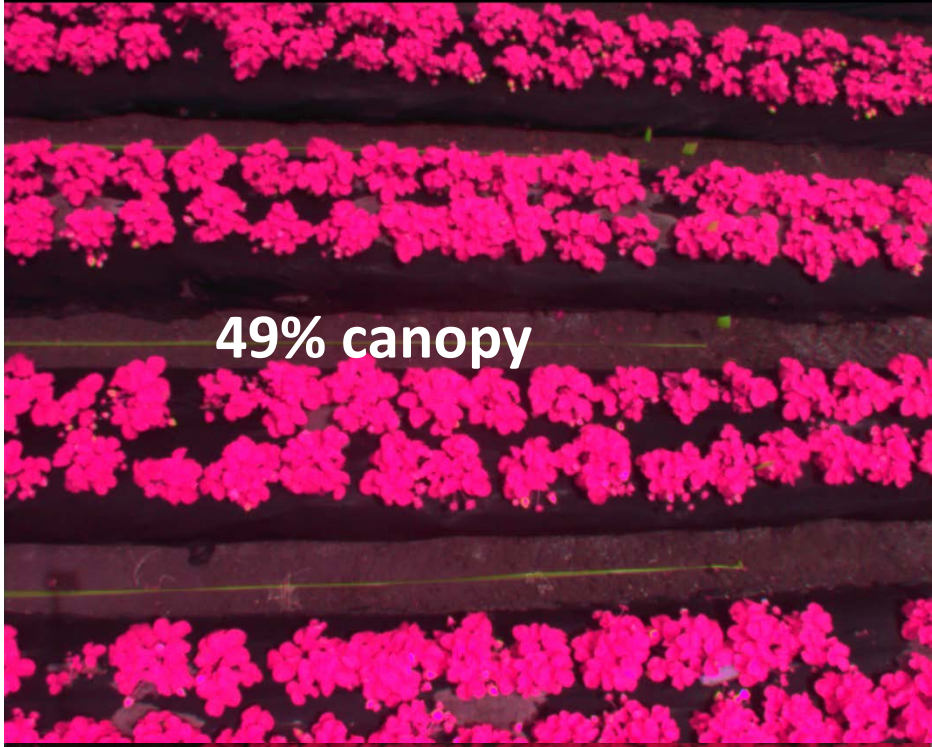
Station List:

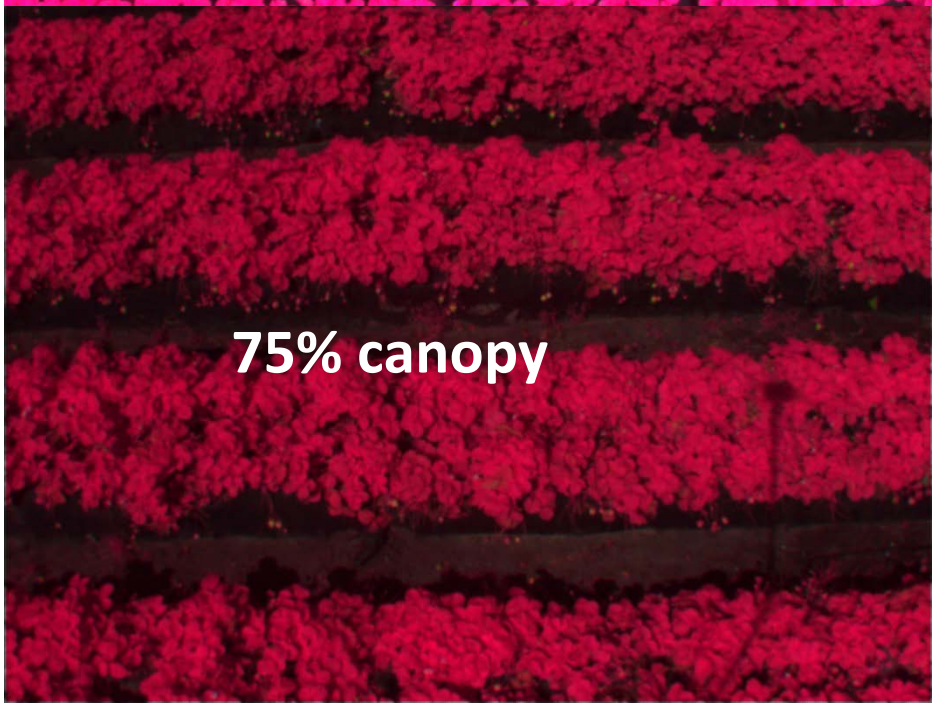
118 - Cathedral City, Since Dec/1995
121 - Dixon, Since Sep/1994
124 - Panoche, Since Jul/1995
125 - Arvin-Edison, Since Mar/1995
126 - San Benito, Since Jun/1994
129 - Pajaro, Since Sep/1995
131 - Fair Oaks, Since Apr/1997
133 - Glendale, Since Aug/1996

Crop coefficients are needed to calculate crop ET

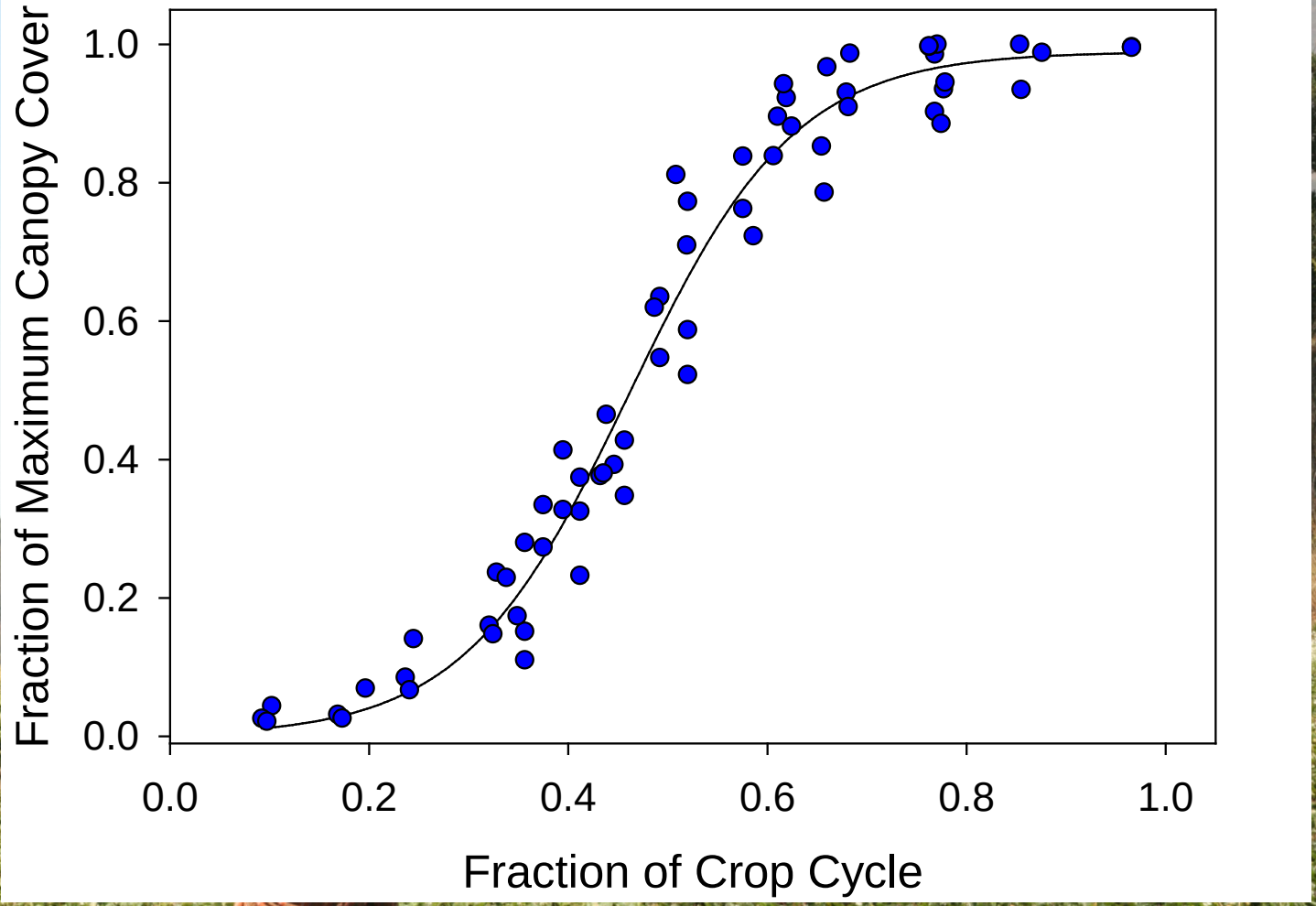
$$ET_{crop} = ET_{ref} \times K_{crop}$$

K_c varied from 0.05 to 0.95

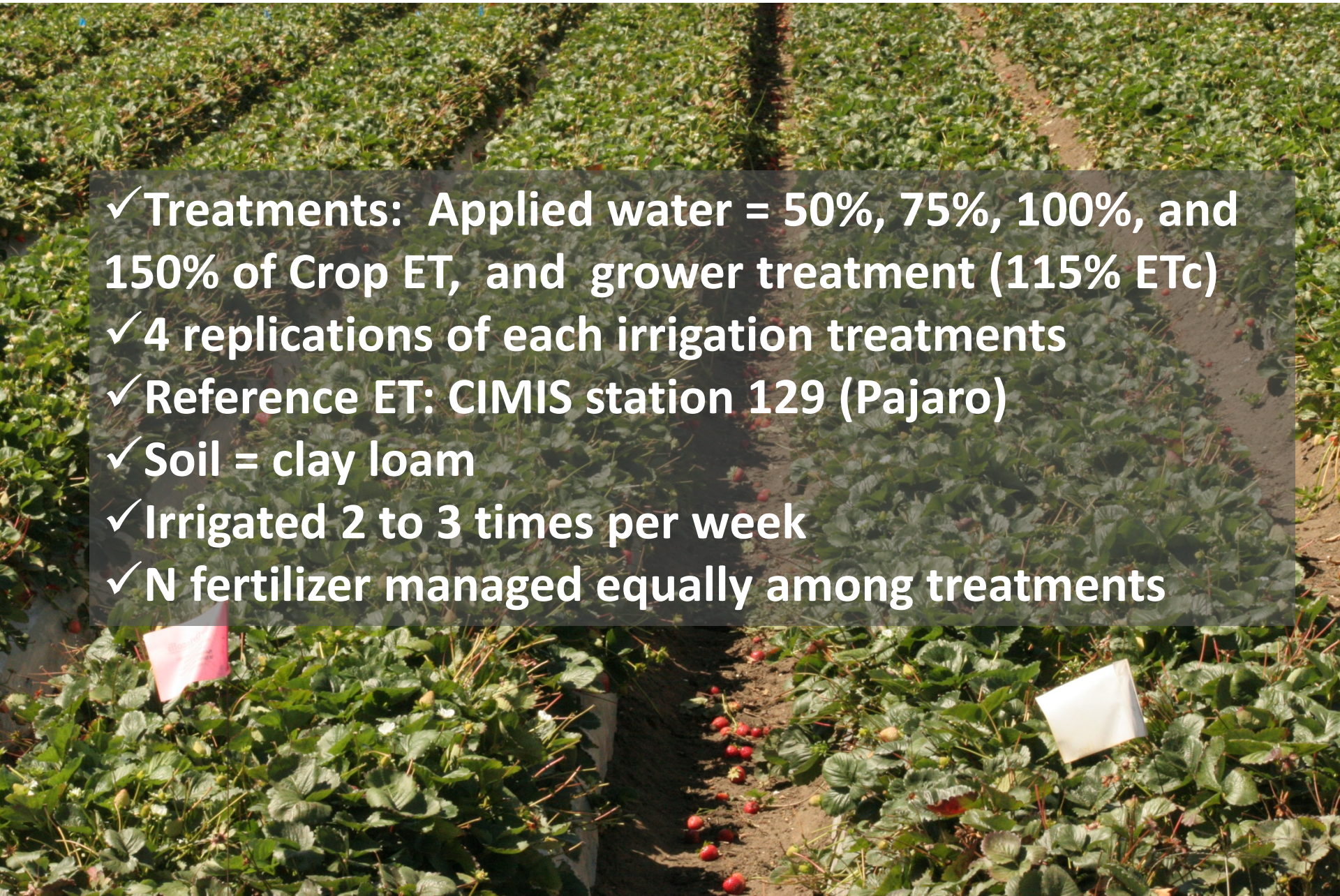




Albion, 52-inch wide beds

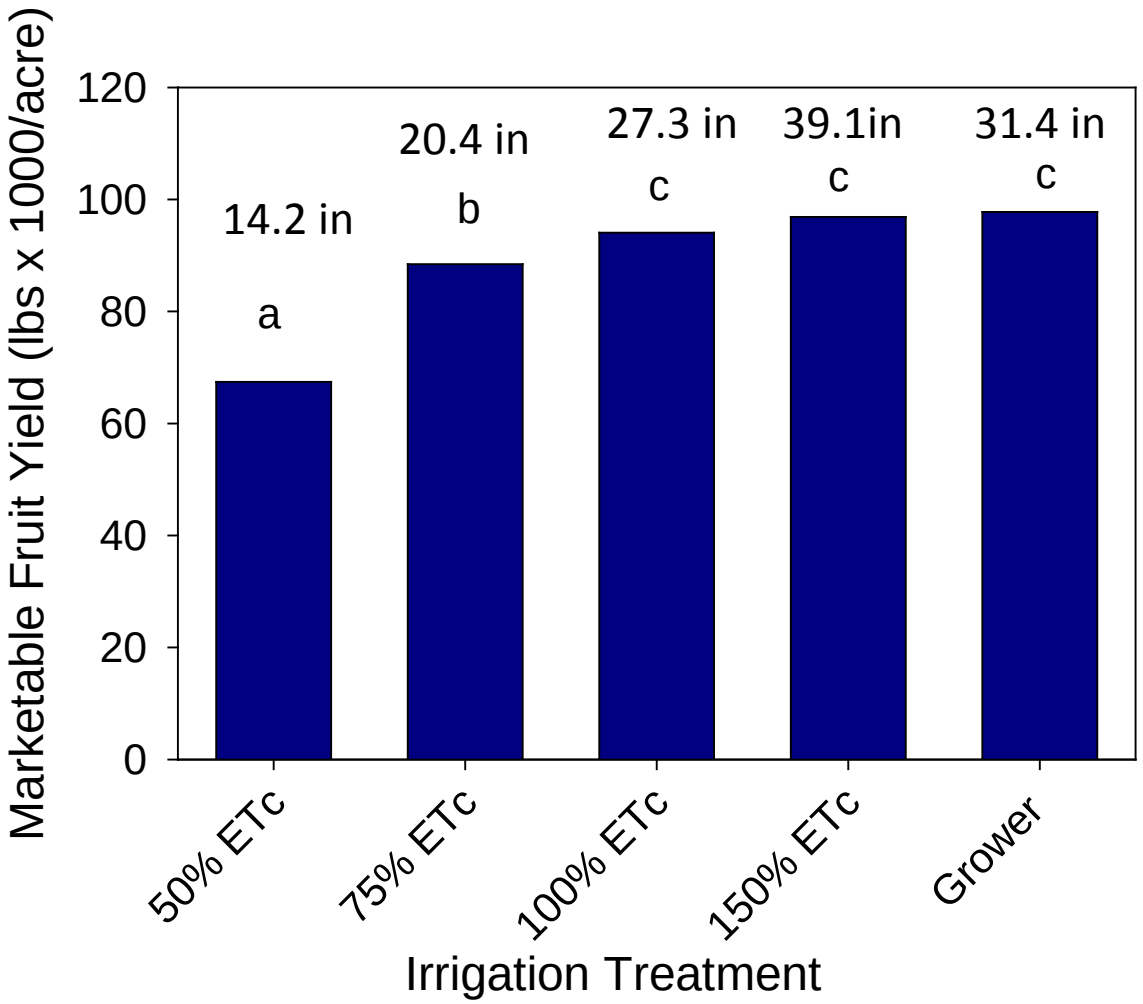


Replicated Irrigation Trial

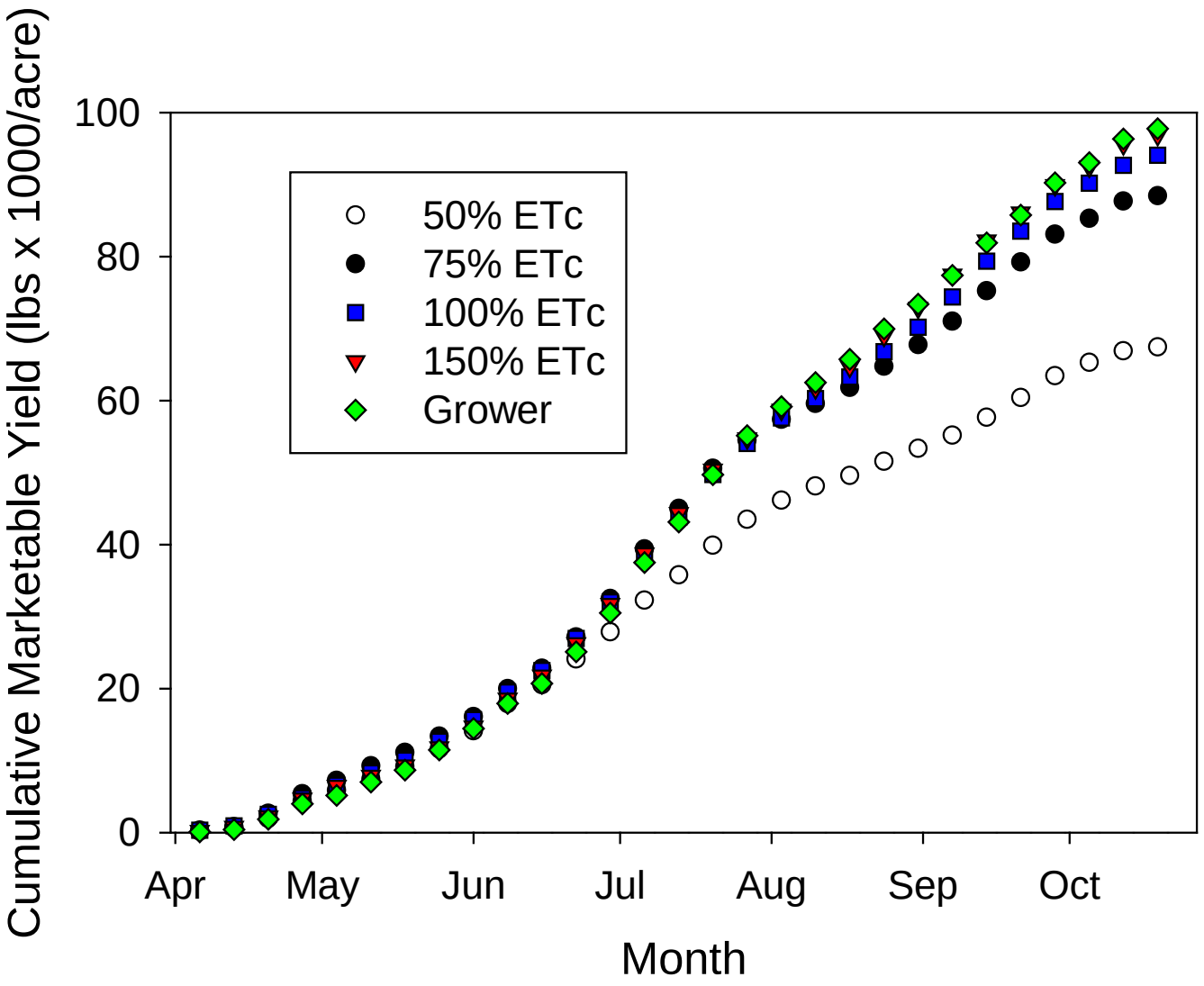


- ✓Treatments: Applied water = 50%, 75%, 100%, and 150% of Crop ET, and grower treatment (115% ETc)
- ✓4 replications of each irrigation treatments
- ✓Reference ET: CIMIS station 129 (Pajaro)
- ✓Soil = clay loam
- ✓Irrigated 2 to 3 times per week
- ✓N fertilizer managed equally among treatments

Irrigation Effects on Marketable Fruit Yields



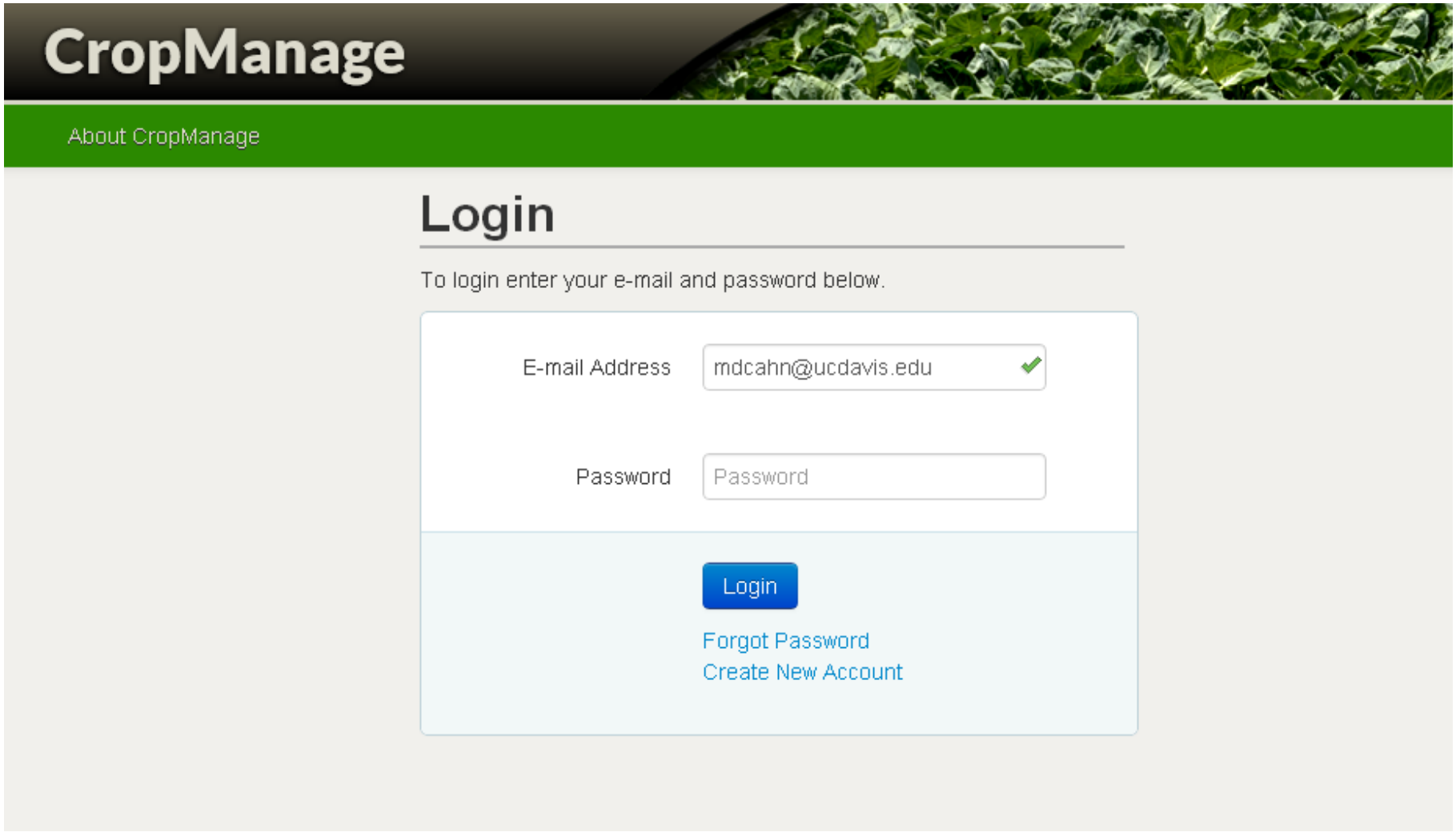
Cumulative Fruit Yields (Marketable)



Difficult to identify water stress early

Web-based Irrigation and N management software for coastal crops

https://ucanr.edu/cropmanage



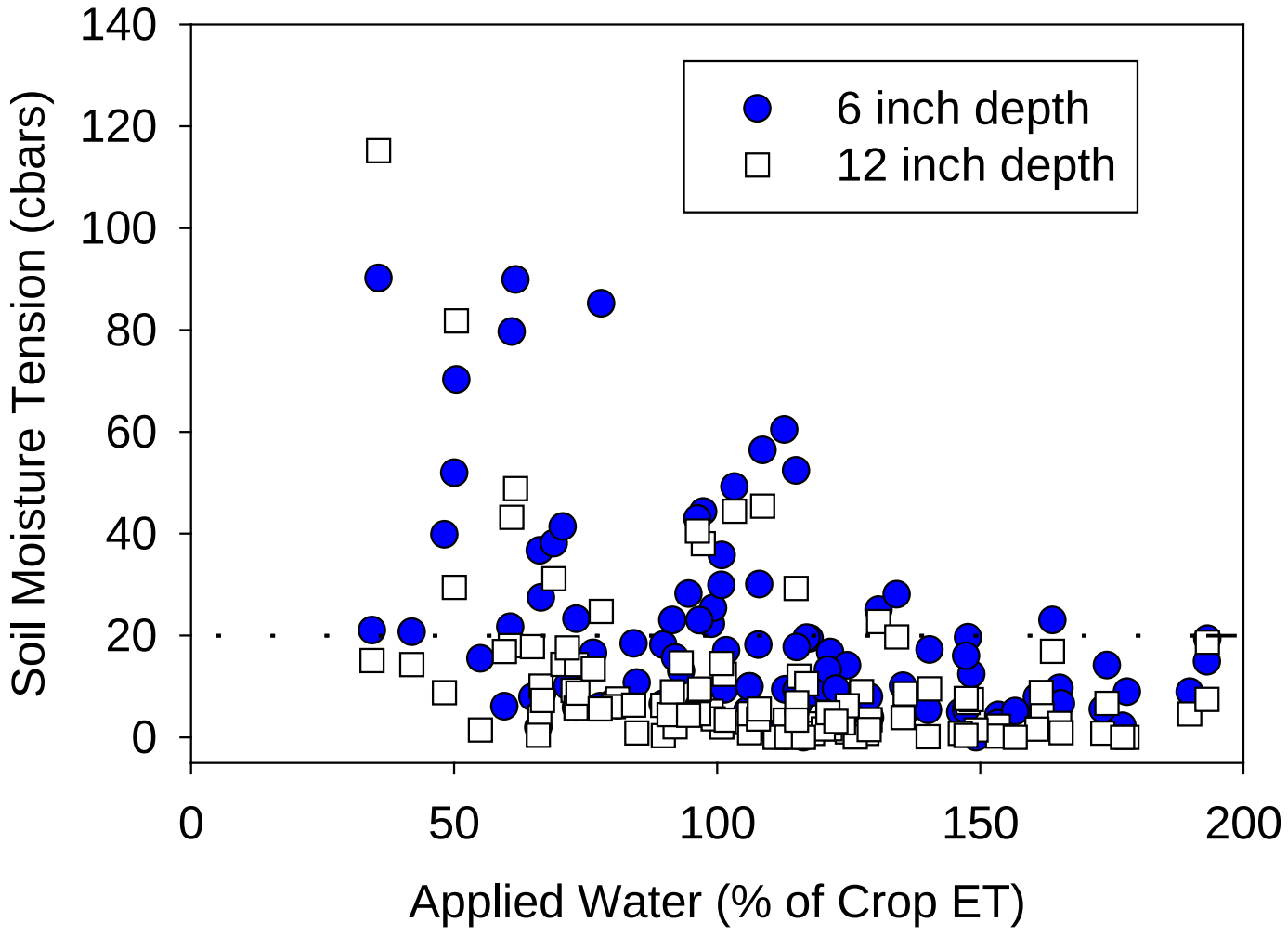
Irrigation Summary

Show / Hide Columns

Water Date	Irrigation Method	Recommended Irrigation Interval (days)	Recommended Irrigation Amount (inches)	Recommended Irrigation Time (hours)	Irrigation Water Applied (inches)
8/19/13	Drip	6.0	0.45 in	2.05 hrs	0.44 in
8/21/13	Drip	7.6	0.24 in	1.08 hrs	0.23 in
8/23/13	Drip	6.0	0.30 in	1.37 hrs	0.29 in
8/26/13	Drip	5.7	0.47 in	2.16 hrs	0.47 in
8/28/13	Drip	5.8	0.31 in	1.42 hrs	0.32 in
8/30/13	Drip	5.4	0.32 in	1.47 hrs	0.35 in
9/3/13	Drip	5.1	0.70 in	3.19 hrs	0.61 in
9/5/13	Drip	4.1	0.44 in	2.01 hrs	0.14 in
9/6/13	Drip	4.4	0.21 in	0.93 hrs	0.42 in

How does soil moisture monitoring fit in?

Soil moisture tension was lowest when applied water was > 100% Crop ET



Summary

Investing in irrigation management makes good business sense:

- ✓ **Train your staff**
- ✓ **Assess irrigation system performance**
- ✓ **Improve operation and maintenance**
- ✓ **Use a reliable strategy for scheduling irrigations**