Irrigation Management of Strawberries

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Irrigation Scheduling

- Deciding when to irrigate
- Deciding how much to irrigate

Approaches to Irrigation Scheduling

Weather-based

Plant-based

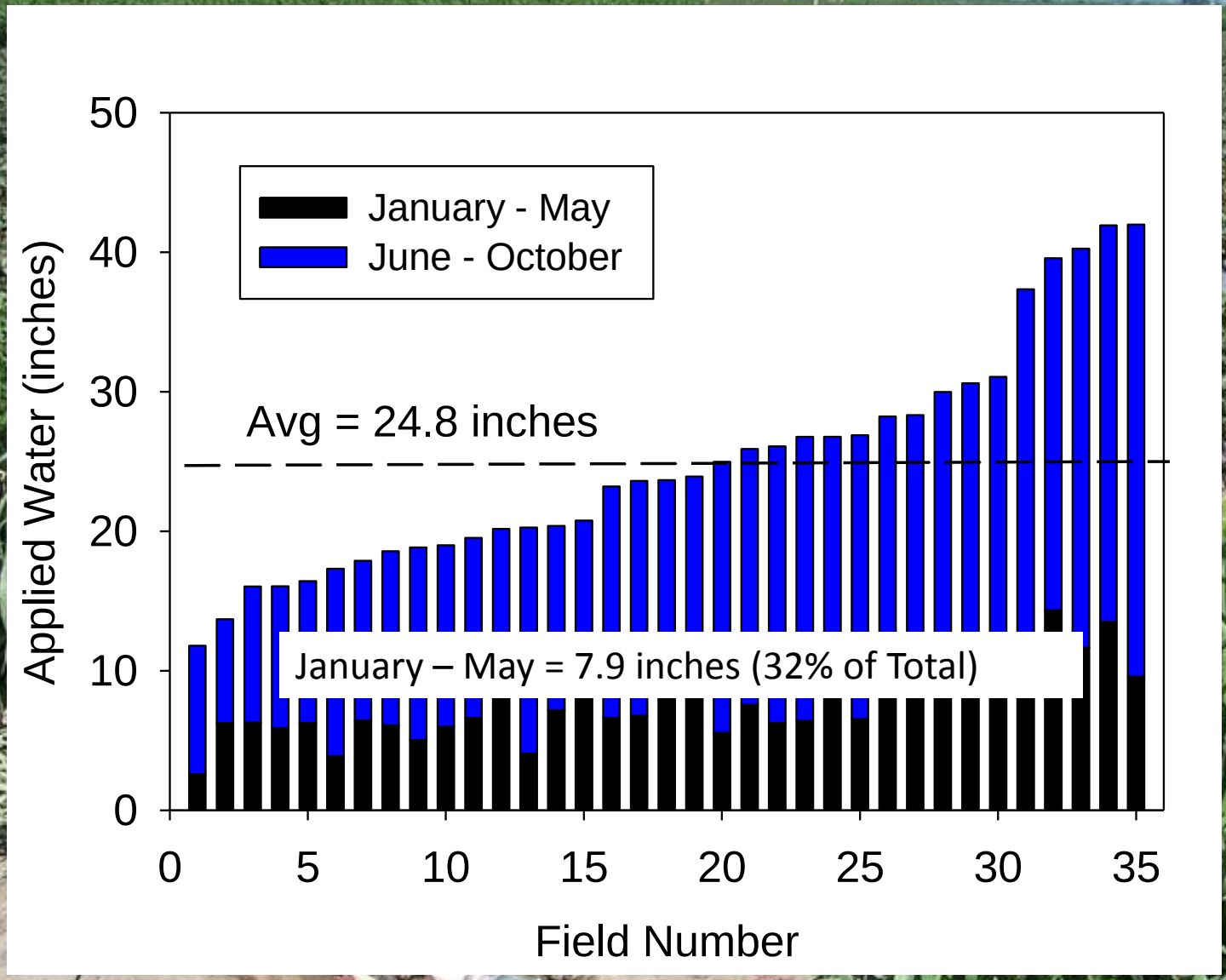
Soil-based

Tools for irrigation scheduling

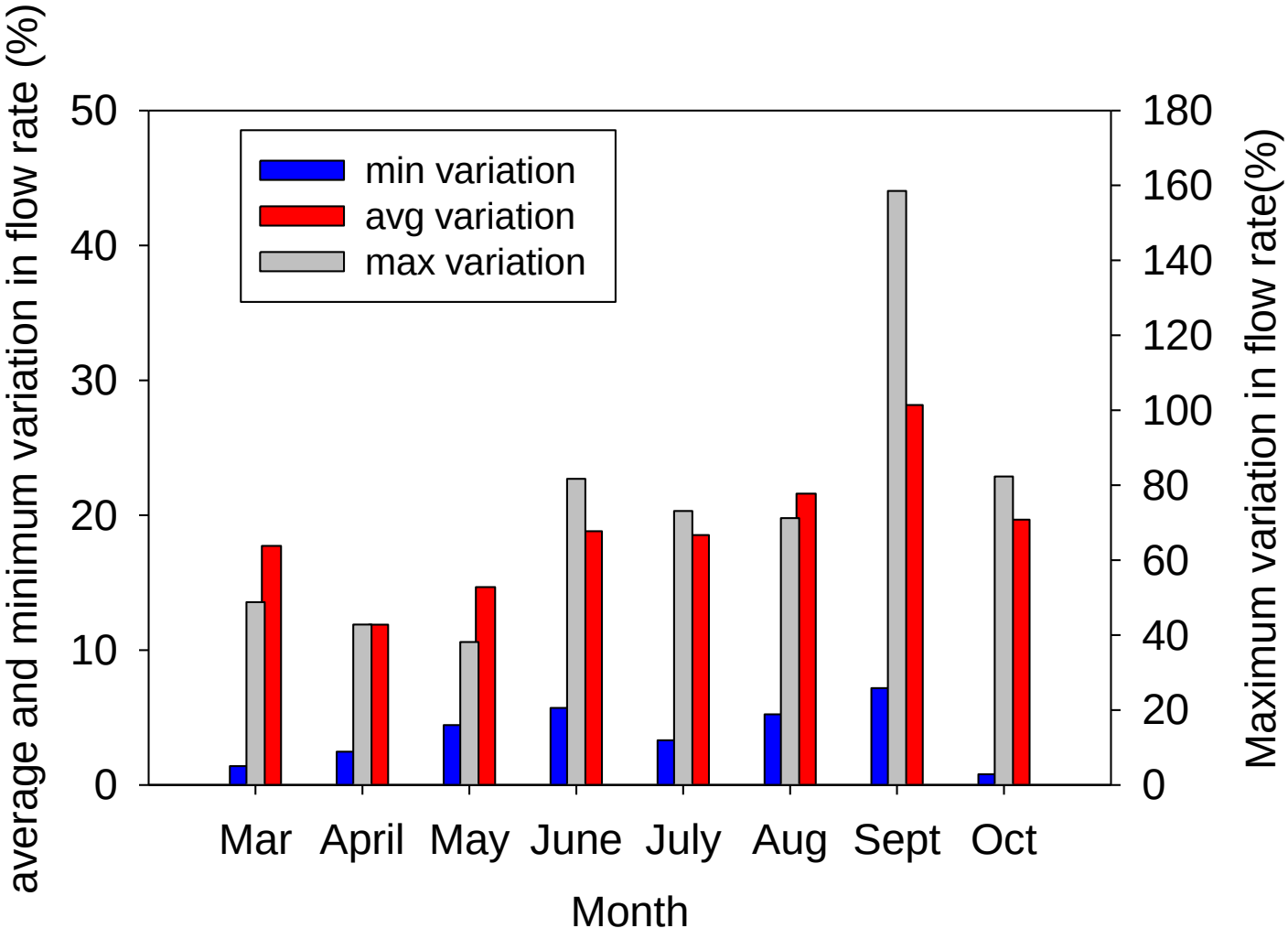
- Flowmeters and pressure regulators
- Crop ET
- Soil moisture sensors

How much water did you apply?

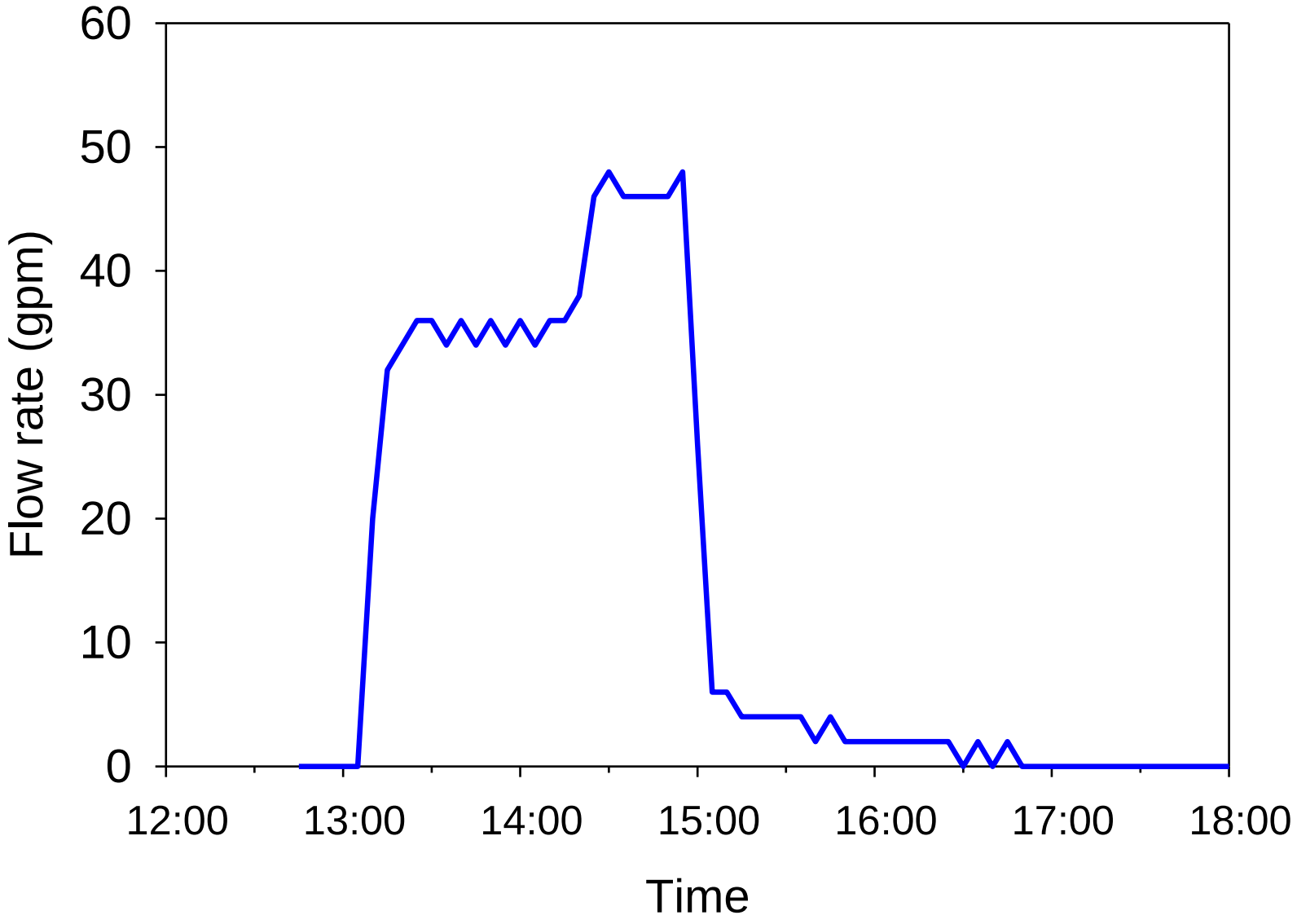
Total Seasonal Applied Water 2011

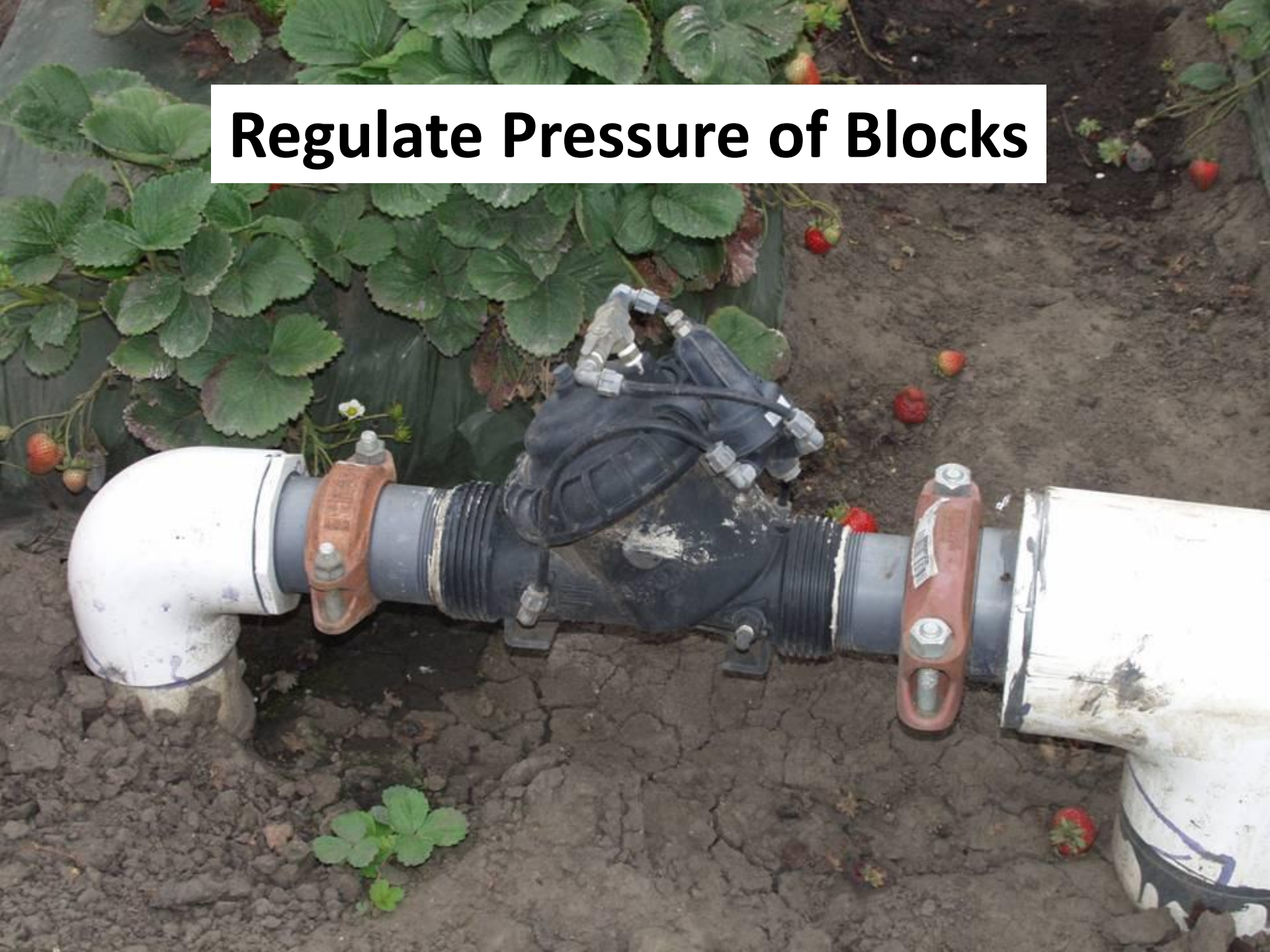


2010 Average system flow rate variation = 19%



Flow rate *vs* Time




Regulate Pressure of Blocks

Evapotranspiration can be estimated using CIMIS weather stations:

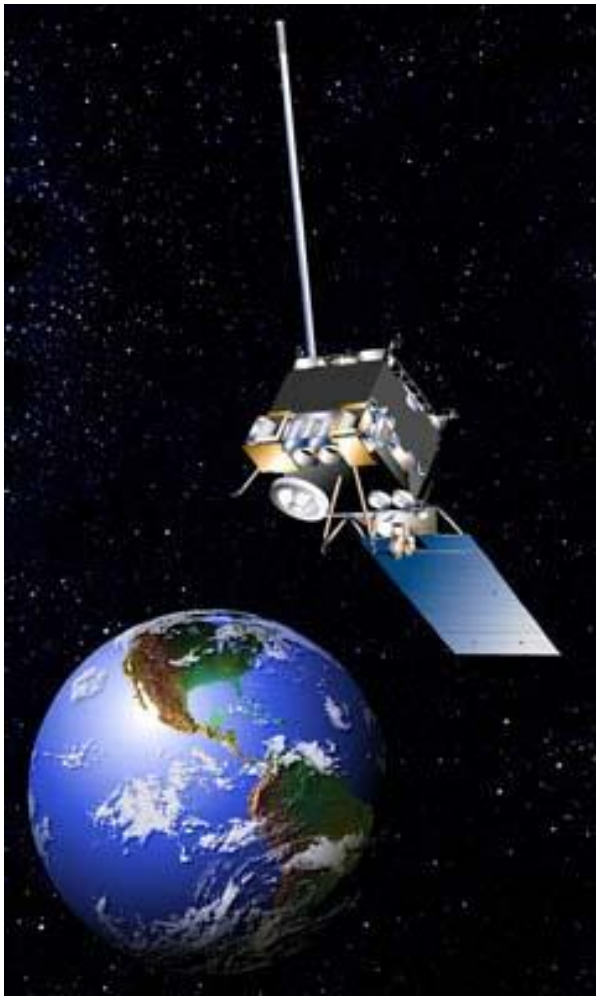
- Solar Radiation
- Wind Speed
- Relative Humidity
- Air Temperature

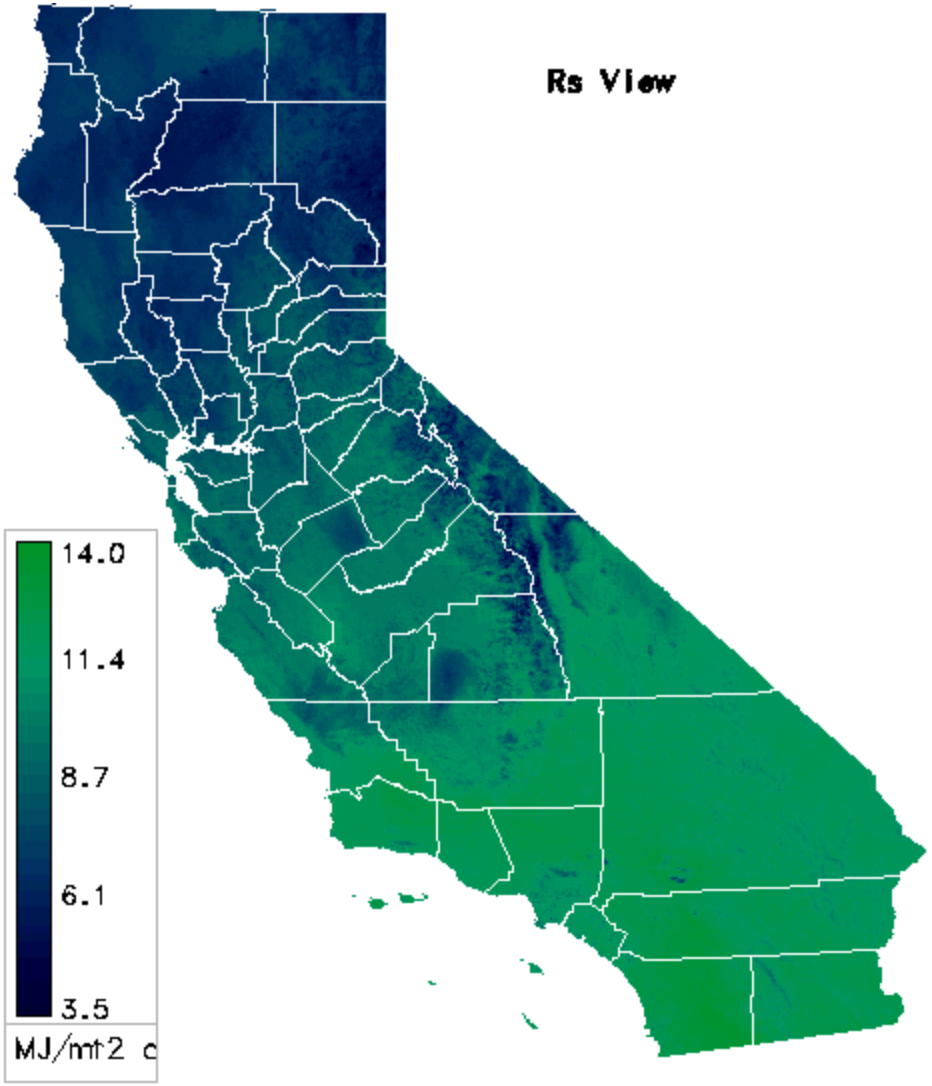
Active CIMIS Stations:

Santa Ynez (64)
Cuyuma (88)
Goleta Foothills (94)
Santa Barbara (107)
Sisquoc (165)
Lompoc (231)
Santa Maria II (232)
Nipomo (202)
San Luis Obispo West (160)

wwwcimis.water.ca.gov

Spatial CIMIS ETo Reporting





Welcome Back MIKE

My Reports
My Station Lists
My Preferences

Account Management

Log Off
Edit Registration
Change Password

My Reports

The **My Reports** allows you to perform single-click reporting, select report preferences, and prepare custom reports. There are three station lists (List 1, List 2, and List 3) and each list can hold up to a maximum of 10 stations. A list must contain at least one station before executing reports from this page. You can add and remove station(s) from the list by clicking on Create/Change Station Lists and clicking on Remove. Once a list has been created, clicking on a station number will provide detailed information about the station.

After specifying Station Lists, you can generate a report in any one of the report options listed under Quick Reports by clicking on the list number to the right (list 1, list 2, or list 3). These reports are generated using the Preferences listed at the bottom of the Station Lists. Preferences for Quick Reports can be changed by clicking on Change Preferences at the bottom of the Station Lists. Custom reports allows the user to select the options (climatic parameters), to be reported.

Quick Reports

Report Options	
Standard Hourly (using prefs)	list 1 | list 2 | list 3
Standard Daily (using prefs)	list 1 | list 2 | list 3
Standard Daily ETo Variance (using prefs)	list 1 | list 2 | list 3
Standard Monthly (using prefs)	list 1 | list 2 | list 3
Standard Monthly Average ETo (using prefs)	list 1 | list 2 | list 3

My Custom Reports

Report Options	
pajaro	list 1 | list 2 | list 3 | customize
salinas	list 1 | list 2 | list 3 | customize
undefined	| customize
undefined	| customize

Tip: When specifying the stations for station-lists, group stations by geographic proximity. You can then report by geographic region. Reports based on stations in close proximity can be a useful tool for understanding data patterns in and around the area of interest.

My Station Lists

List 1	List 2	List 3
037	111	019
129	129	028
177		053
--	--	089
--	--	116
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--

Create/Change Station Lists

My Preferences

Name	Value
Zip Codes	
Units	English
Output	WEB Report
Hourly Report	7 Days
Daily Report	7 Days
Monthly Report	12 Months

Change Preferences

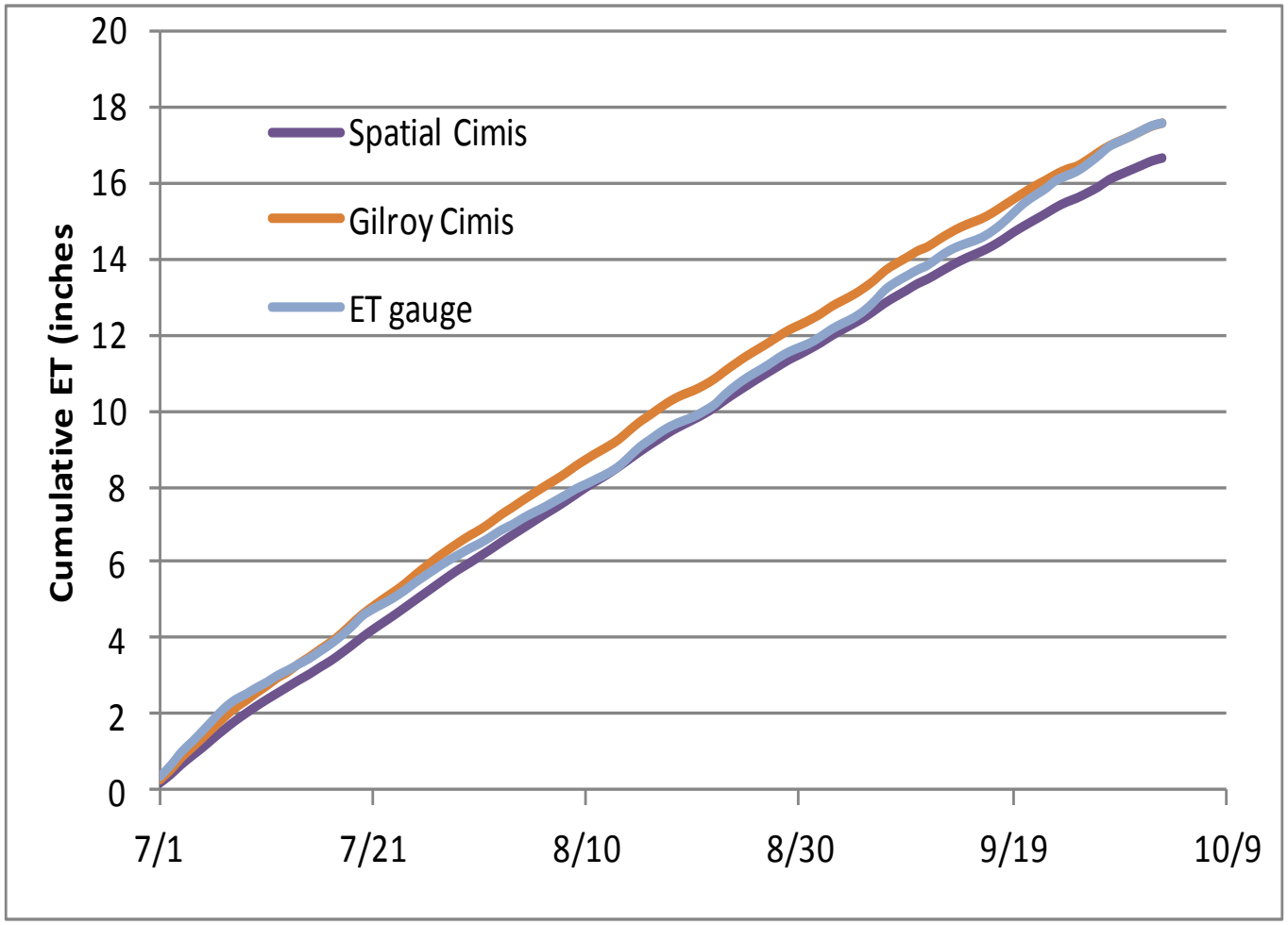
Evapotranspiration

Ranch System

CIMIS weather station

Atmometer

Comparison of different methods of estimated ETo



Crop coefficients for strawberry were based on canopy cover:

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

K_c varied from 0.05 to 0.95

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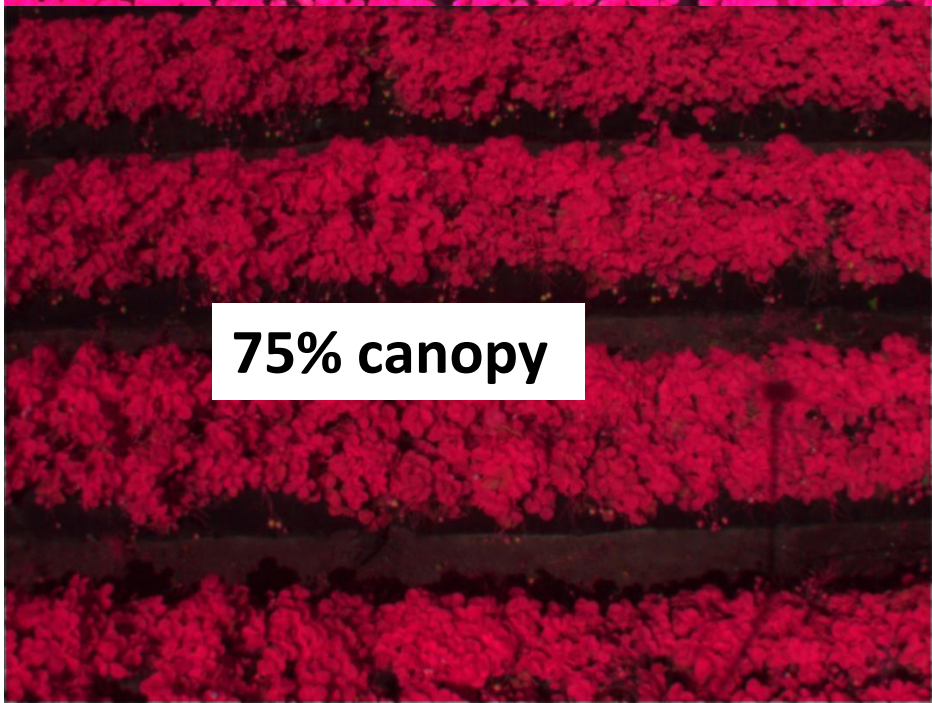
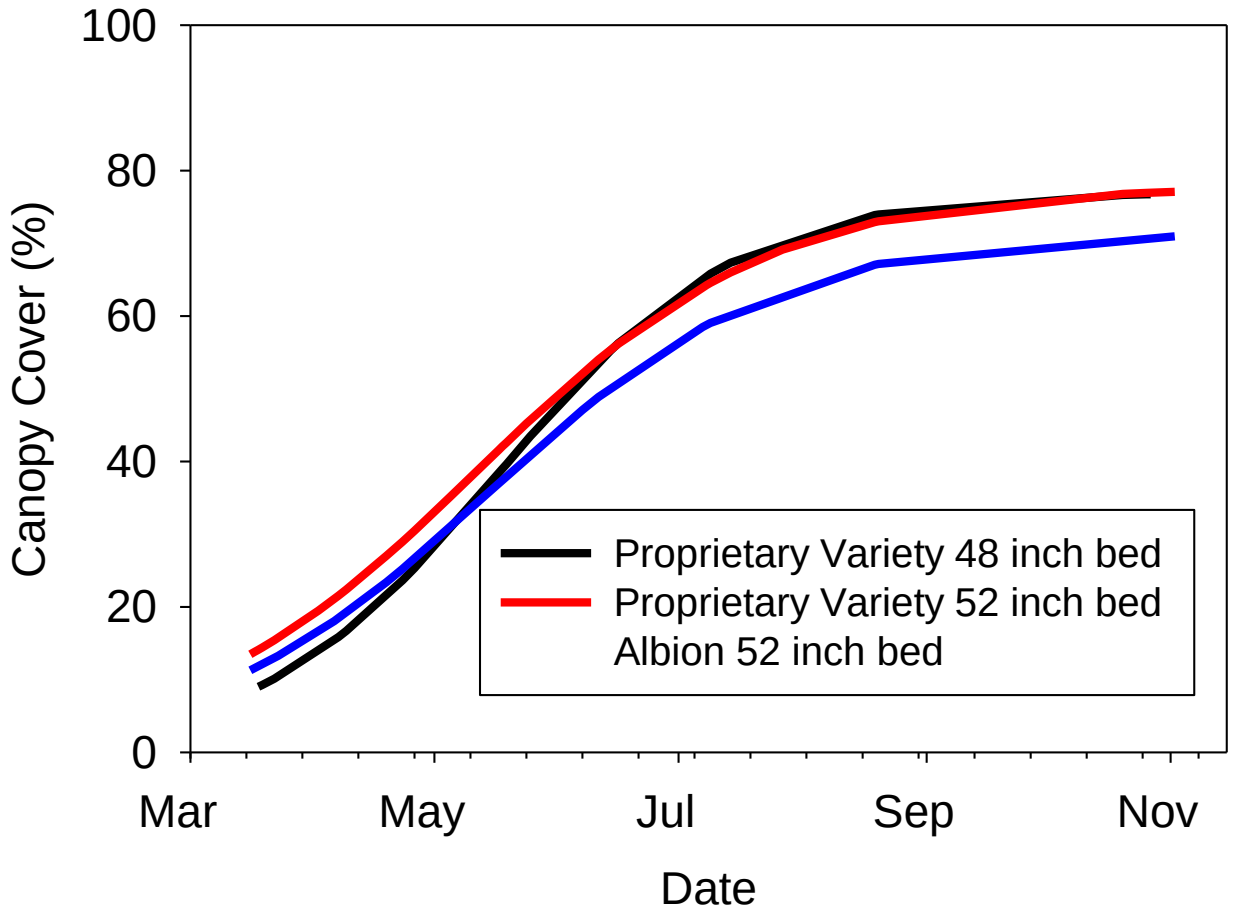
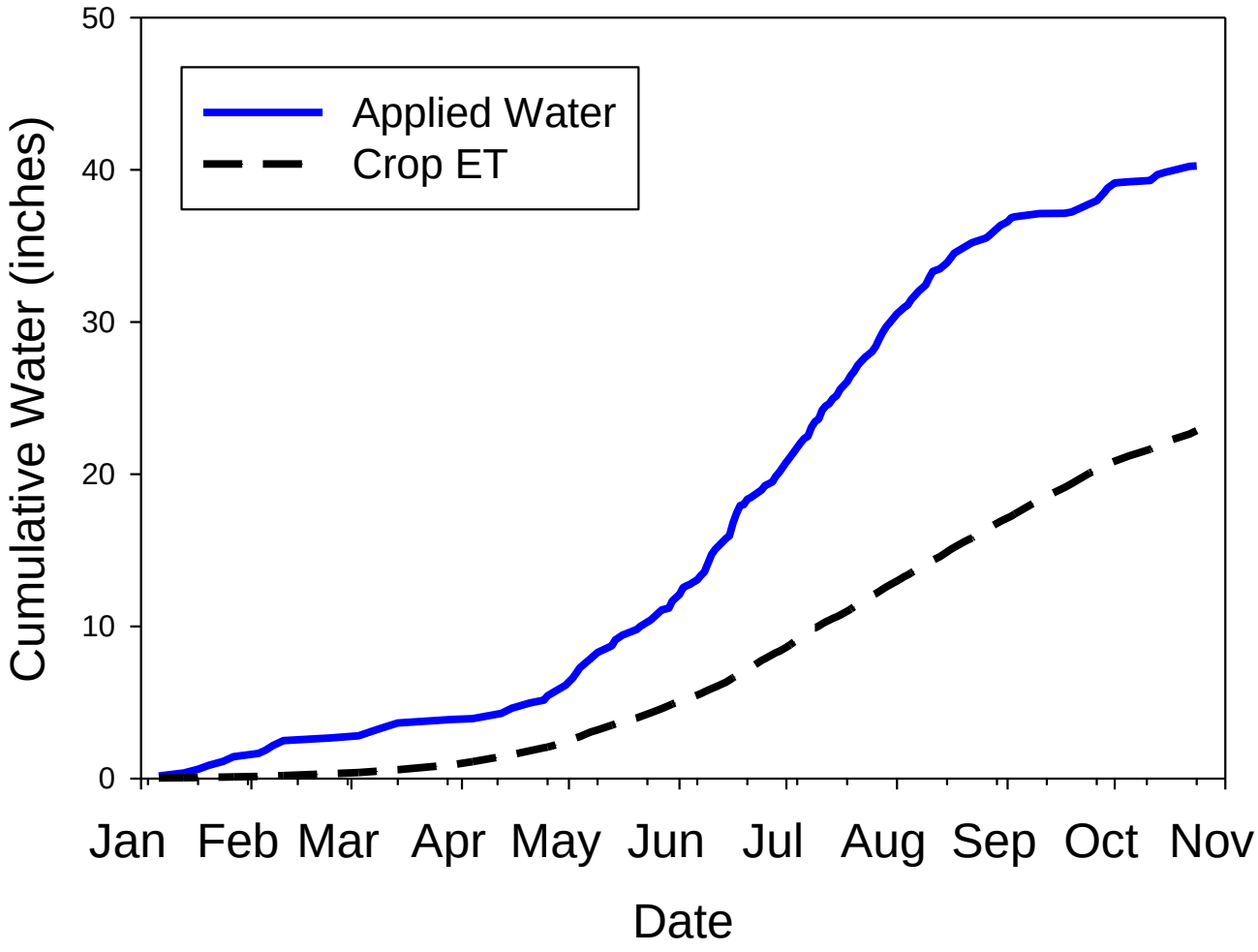


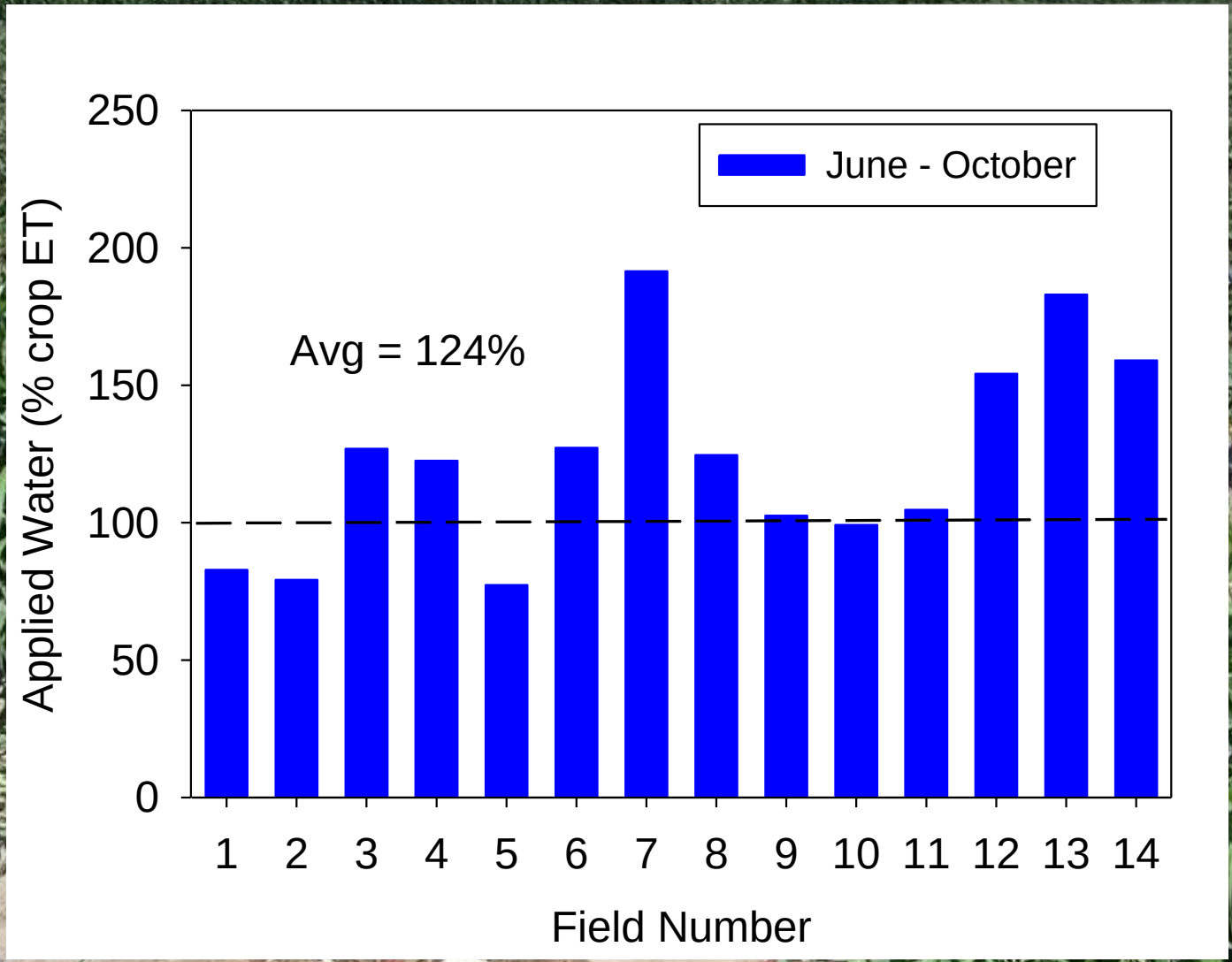
Canopy development was similar among varieties and planting configurations



Crop ET *vs* Applied Water in Strawberries



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

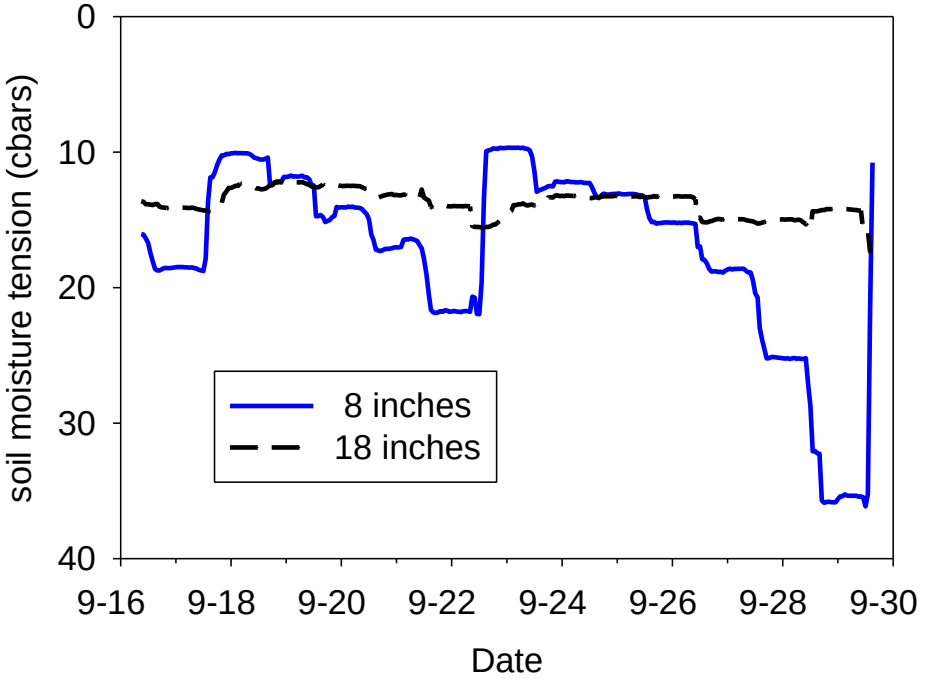



Soil probe for Gravimetric Moisture

Tensiometers monitor the matric potential (tension) of the soil

Measurement of soil moisture that is most related to water status in a plant

Logging tensiometers improves interpretation of readings



Electronic gauge

Soil tension sensor

Granular Matrix Blocks

+ inexpensive
+ low maintenance
+ can interface with datalogger
+ range of 0 – 199 cbar
+ relatively easy to install

- require good soil contact
- slow response time
- salinity interference > 2 dS/m
- wear out after 1 or 2 seasons

Dielectric Sensors (Volumetric):

- Time domain reflectometry (TDR)
- Frequency domain reflectometry (FDR)
- Capacitance

+ potentially accurate volumetric measurement
+ many configurations
+ interface with datalogger

- salinity and soil texture interference
- FDR and capacitance sense a small volume
- some types are difficult to install

Examples of Dielectric Sensors

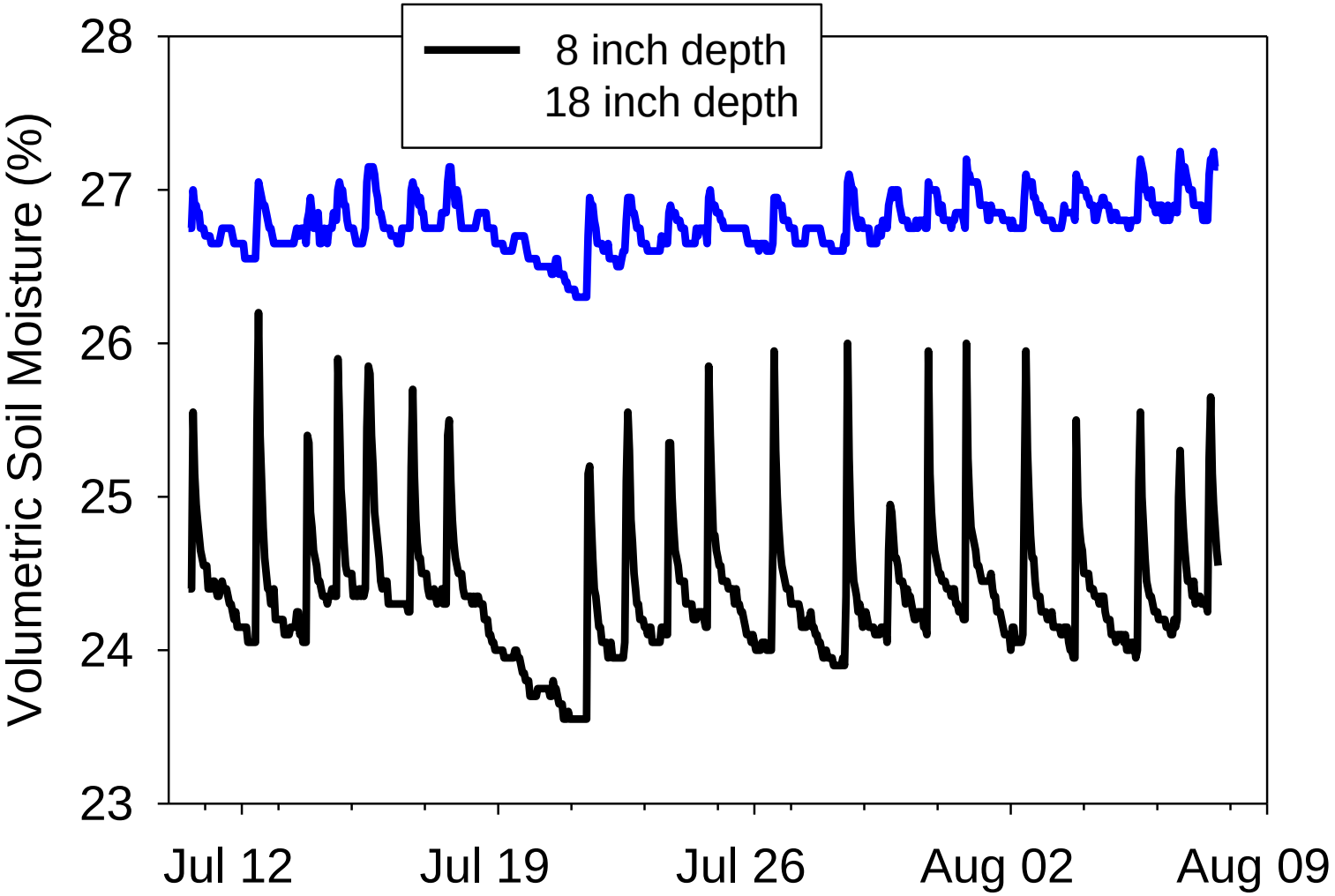
Decagon 10HS

Volumetric Soil Moisture Sensor

Soil Texture, Water Holding Capacity, and Available Moisture

	Tension 5 kPa		Tension 30 kPa		Tension 80 kPa	
Soil Texture	Available Moisture		Available Moisture		Available Moisture	
	%	inches/foot	%	inches/foot	%	inches/foot
Silty clay	45.7	5.48	42.6	0.37	40.9	0.58
Silty clay loam	38.6	4.63	35.5	0.38	33.7	0.58
Loam	31.1	3.73	27.2	0.47	25.0	0.73

Dielectric Soil Moisture Data in Strawberry



Summary

- An integrated approach to irrigation scheduling (ET and soil moisture monitoring) seems to work the best for berries.
- Many types of soil moisture sensors available—use as a tool to cross-check irrigation schedule.
- Improving irrigation management can potentially save water and fertilizer and optimize yield and quality


¡Muchas Gracias!
Thank you!