Adapting CropManage Irrigation and Nitrogen Management Decision Support Tool for Peppers

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Acknowledgements:

- Aziz Baameur, Richard Smith, Patricia Love, Barry Farrara
- UC ANR and Breyta Inc. programming staff
- CDFA-Fertilizer Research Education Program
- California Pepper Commission
- Cooperating Growers

Nitrogen Use Reporting

TIER 2/TIER 3 FARMS WITH HIGH NITRATE LOADING RISK

TOTAL NITROGEN APPLIED REPORT - RANCH/RISK UNIT & FIELD/BLOCK

Page 1 of 3 - September 26, 2016 Version

EMAIL FORM AS AN ATTACHMENT: Attach completed and saved form to an email and send to AgNOI@waterboards.ca.gov

Reporting Period: 09/01/2015 to 08/31/2016

Any changes to the reporting period must be approved or form will not be accepted.

CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM IRRIGATED LANDS - REGIONAL BOARD ORDER R3-2012-0011

Annually by October 1st, Tier 2 and Tier 3 dischargers with High Nitrate Loading Risk must report total nitrogen applied and present in the soil.

Hover over the cells/boxes with your mouse for more information on what is required. Refer to instructions for further detail.

Click below to clear the corresponding section of the form.

Section I | Section II | Section III | Section IV | All

SECTION I: GENERAL RANCH INFORMATION *(Space for more parcels and multiple counties available on page 2)*

AW#: | Ranch Global ID: | Ranch/Risk Unit or Field/Block Name: | Physical Ranch Acres Reporting:

County: | APN(s): | Fallow Acres: *(If fallow entire report period)*

If ranch is a greenhouse, nursery, or hydroponic, select from the dropdown: | Sum of Total Crop Acres: 0.0 *(Auto-calculates from Section IV)*

SECTION II: NITROGEN APPLIED WITH IRRIGATION WATER *(Include all uses, e.g. leaching; and all sources, e.g. CSIP or PVWMA delivered water)*

Section II-A: PVWMA/CSIP water use	Section II-B: PVWMA/CSIP water	Section II-C: Well/city water (or other non-PVWMA/CSIP source)	Section II-D: Nitrogen applied
Was PVWMA/CSIP water used during the reporting period?		**Average Nitrate Concentration in Well/City Water** *(mg/L)*	**Nitrogen Applied with Irrigation Water** *(lbs/ranch-ac)*
		☐ as Nitrate (NO3) ☐ as Nitrogen (NO3-N or N)	**Estimated Total Volume of Well/City Water Applied to Entire Reporting Acres During Reporting Period** *(gallons)*
Section II-D will auto-calculate based on Sections II-B, II-C, and ranch acreage.		*To calculate the weighted average concentration if more than one sample from one or more sources of irrigation water was used, use the Excel tool 'weighted_avg_conc'*	*This field can be erased before submittal. Do not include volume of PVWMA/CSIP water applied. To convert from acre-feet or acre-inches to gallons, use the Excel tool 'convert_to_gallons'*

Section II-E: Volume check

This field auto-calculates. After completing Sections I-IV, check the estimated average acre-feet of water applied to each crop-acre grown

SECTION III: NITROGEN APPLIED WITH COMPOST & AMENDMENTS

Physical Acres Receiving Compost & Amendments

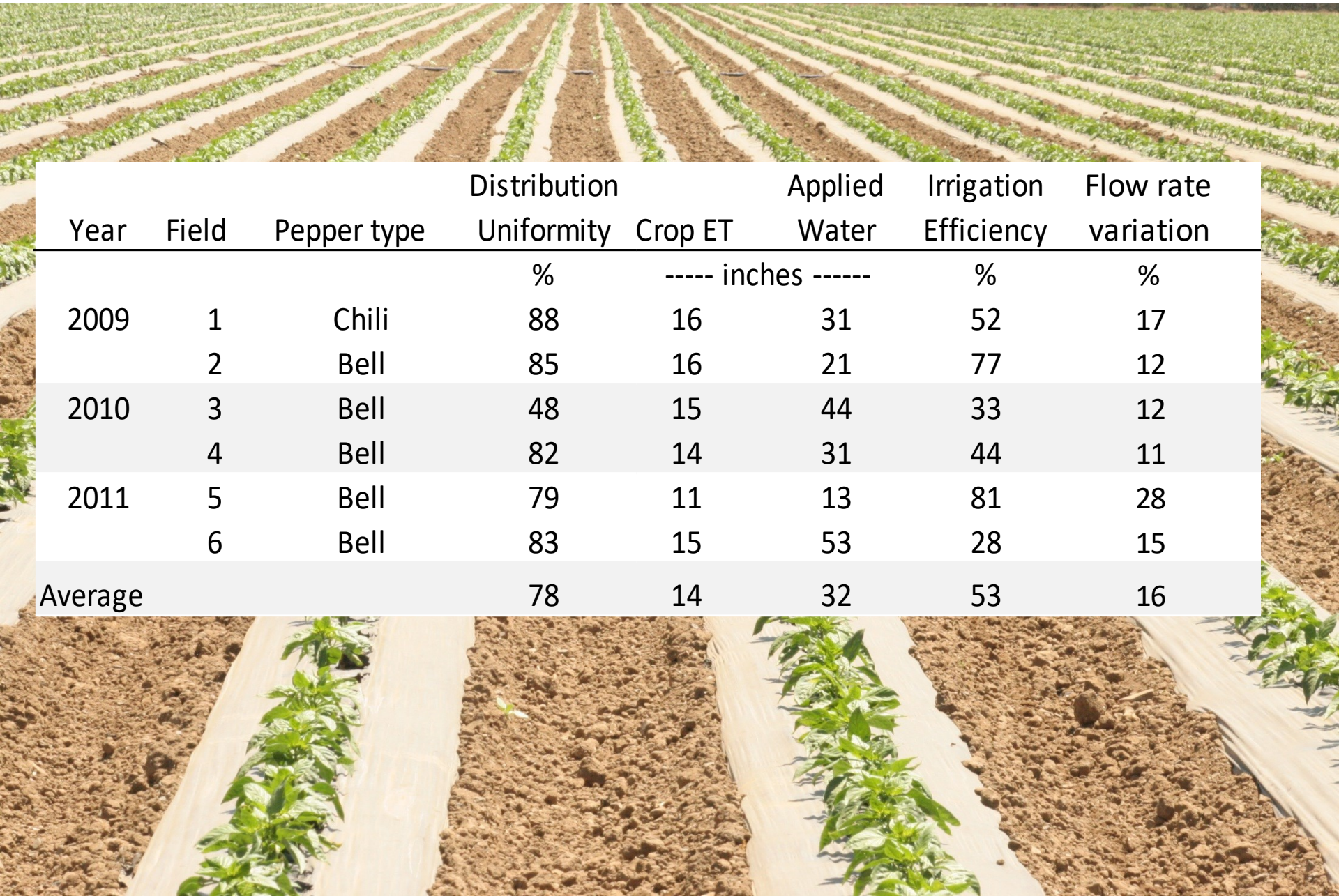
Nitrogen Applied in Compost & Amendments *(total lbs)*

Applications of nitrogen from compost and amendments (not fertilizers) made to improve soil properties, and/or as a source of nitrogen to ALL crops grown during the reporting period may be reported here. Alternatively, the nitrogen may be distributed accordingly between the crops and reported in Section IV. Do not report this information in both sections.

SECTION IV: NITROGEN APPLIED WITH FERTILIZERS & OTHER MATERIALS AND NITROGEN PRESENT IN SOIL *(The Excel tool 'N_from_fertilizers' assists with calculations in this section)*

	Specific Crop(s) Grown and Harvested During Reporting Period *(Select from List on Page 3)*	Total Crop Acres	Nitrogen Present in Soil *(lbs/ac)*	Nitrogen Applied in Fertilizers and Other Materials *(lbs/crop-ac)*	O/C	Additional Information		Specific Crop(s) Grown and Harvested During Reporting Period *(Select from List on Page 3)*	Total Crop Acres	Nitrogen Present in Soil *(lbs/ac)*	Nitrogen Applied in Fertilizers and Other Materials *(lbs/crop-ac)*	O/C	Additional Information
1.							11.						
2.							12.						
3.							13.						
4.							14.						
5.							15.						
6.							16.						
7.							17.						
8.							18.						

Irrigation Evaluation in Pepper



Year	Field	Pepper type	Distribution Uniformity	Crop ET	Applied Water	Irrigation Efficiency	Flow rate variation
			%	----- inches ------		%	%
2009	1	Chili	88	16	31	52	17
	2	Bell	85	16	21	77	12
2010	3	Bell	48	15	44	33	12
	4	Bell	82	14	31	44	11
2011	5	Bell	79	11	13	81	28
	6	Bell	83	15	53	28	15
Average			78	14	32	53	16

Tools for Managing Water and Nitrogen Fertilizer in Vegetables

- Soil nitrate quick test

- Weather-based irrigation scheduling

Soil Nitrate Quick Test

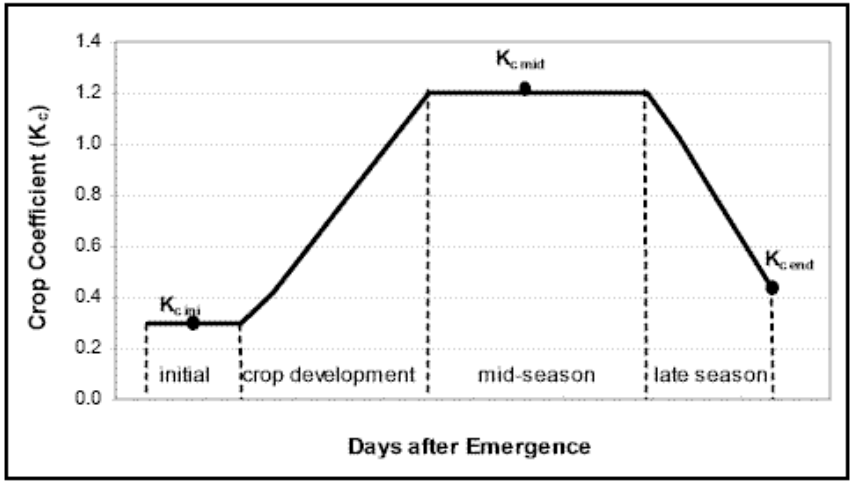
http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=4406

Weather-based irrigation scheduling

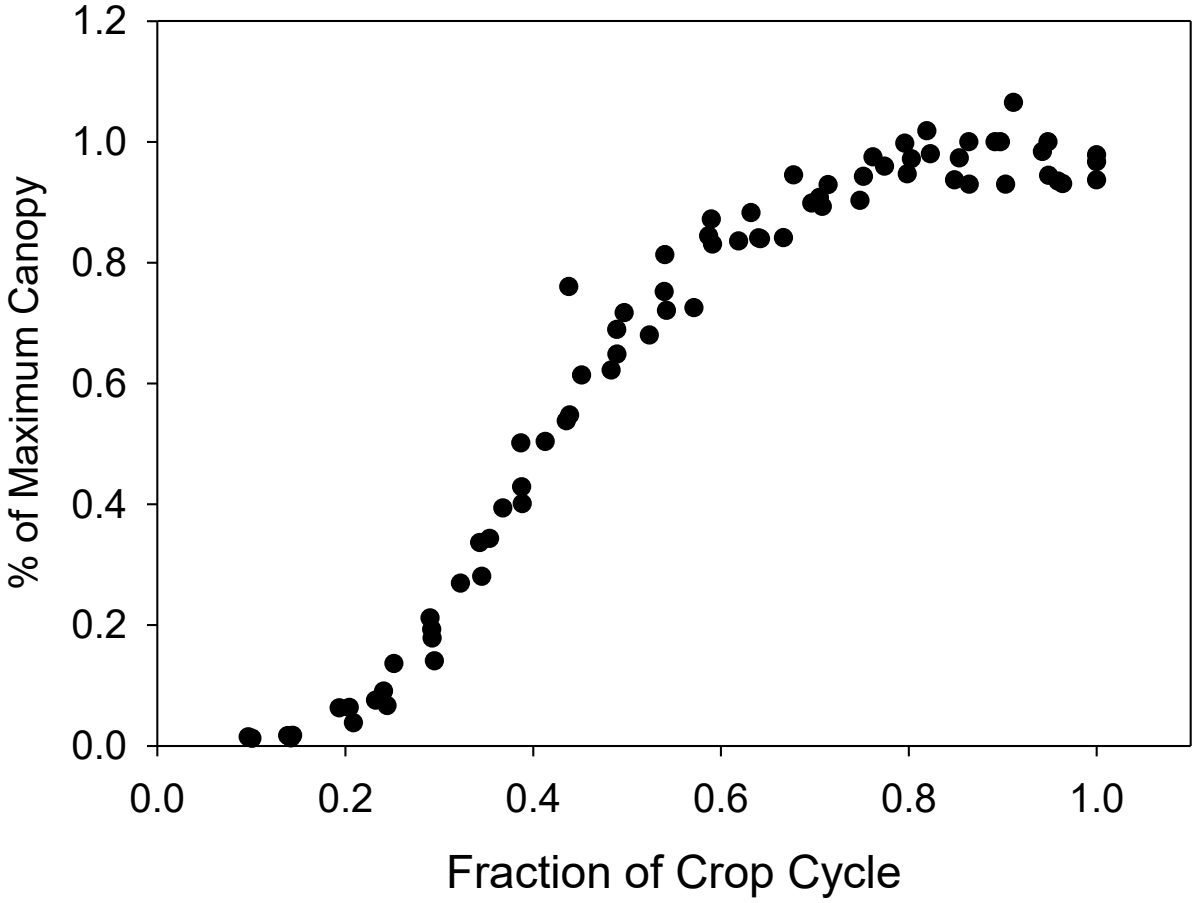
Converting Reference ET to Crop ET:

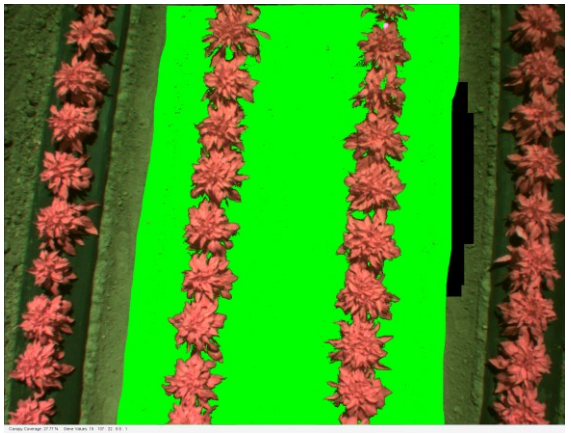
$$ET_{crop} = ET_{ref} \times K_{crop}$$

K_c can vary from 0.1 to 1.2

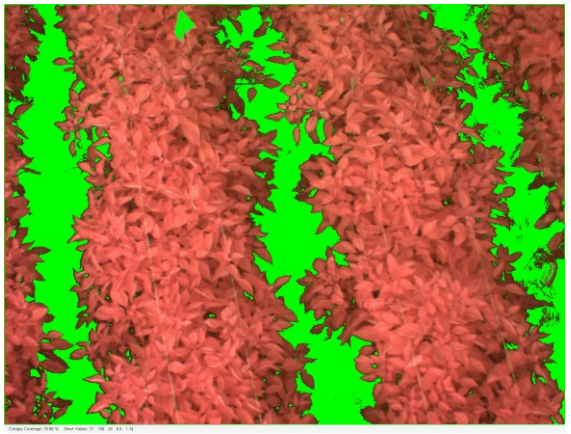


Canopy Cover of Bell Peppers (Red)



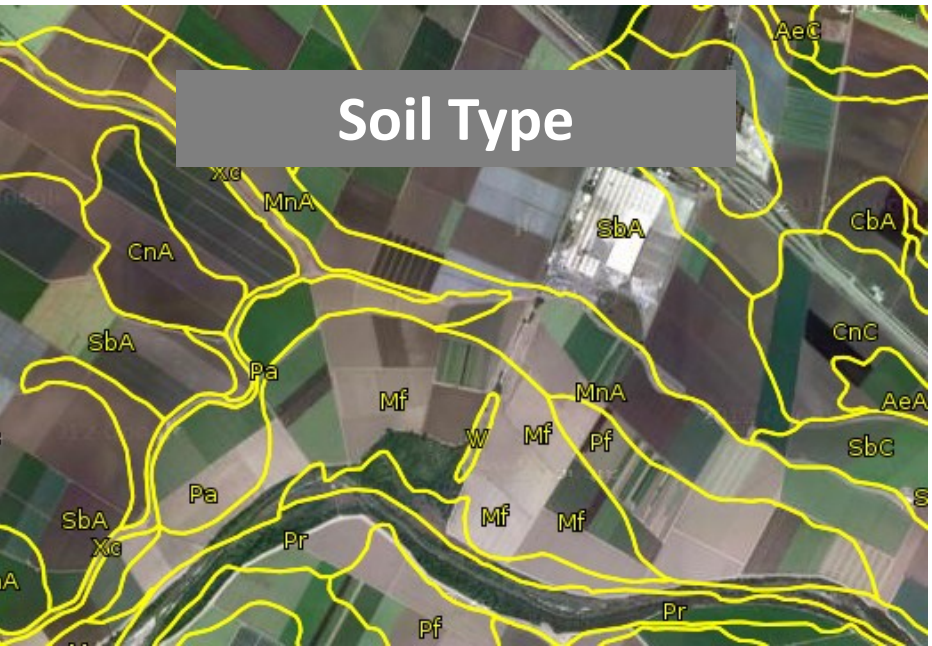


28% Cover



79% Cover

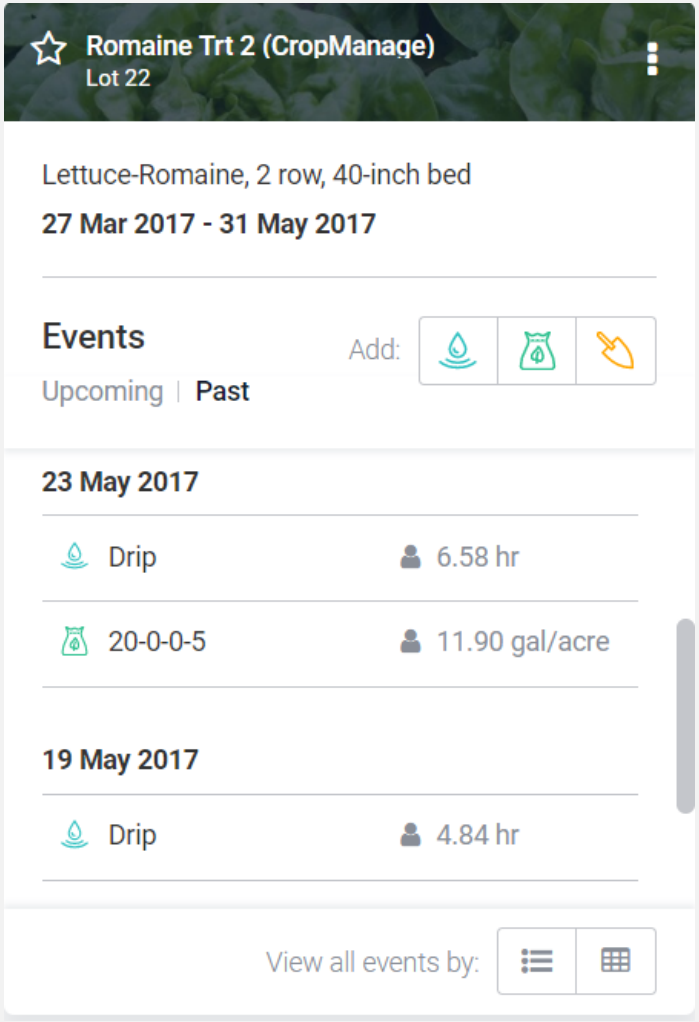
Other information needs to be considered



On-farm challenges in implementing tools for managing water and fertilizer:

- ✓ Multiple fields to manage and track
- ✓ Other decisions and activities to coordinate
- ✓ Calculations involved for N and water management decisions are time consuming
- ✓ Collected data needs to be available to the decision maker(s) and decisions need to be communicated to field staff

CropManage: Online irrigation and nitrogen management decision support tool



v3.cropmanage.ucanr.edu

CropManage

Integrate information from multiple sources

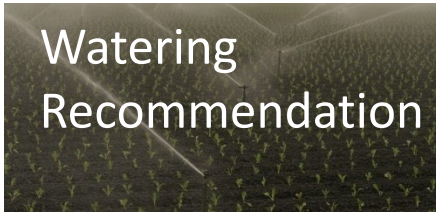
Soil and Ranch

Database driven web application

Crop ET model

Crop N model

Display and export water and fertilizer records



Decision support using crop models

Crops currently supported

Vegetables:

- Romaine lettuce
- Iceberg lettuce
- Leaf lettuce
- Baby lettuce (red, green)
- Broccoli
- Cauliflower
- Cabbage (red and green)
- Celery
- Spinach (baby, teen, bunch)
- Mizuna
- Cilantro
- Peppers

Berries

- Strawberry (UC and proprietary varieties)
- Raspberry (proprietary variety)

Steps to Using CropManage

1. Establish user login (free)
2. Request access to a ranch or set up a new ranch
3. View a planting within ranch or add a new planting
4. View or enter soil tests, fertilizer, or irrigation events

How is N fertilizer rate determined from the soil nitrate quick test?

Recommended Fertilizer N = Future Crop N uptake

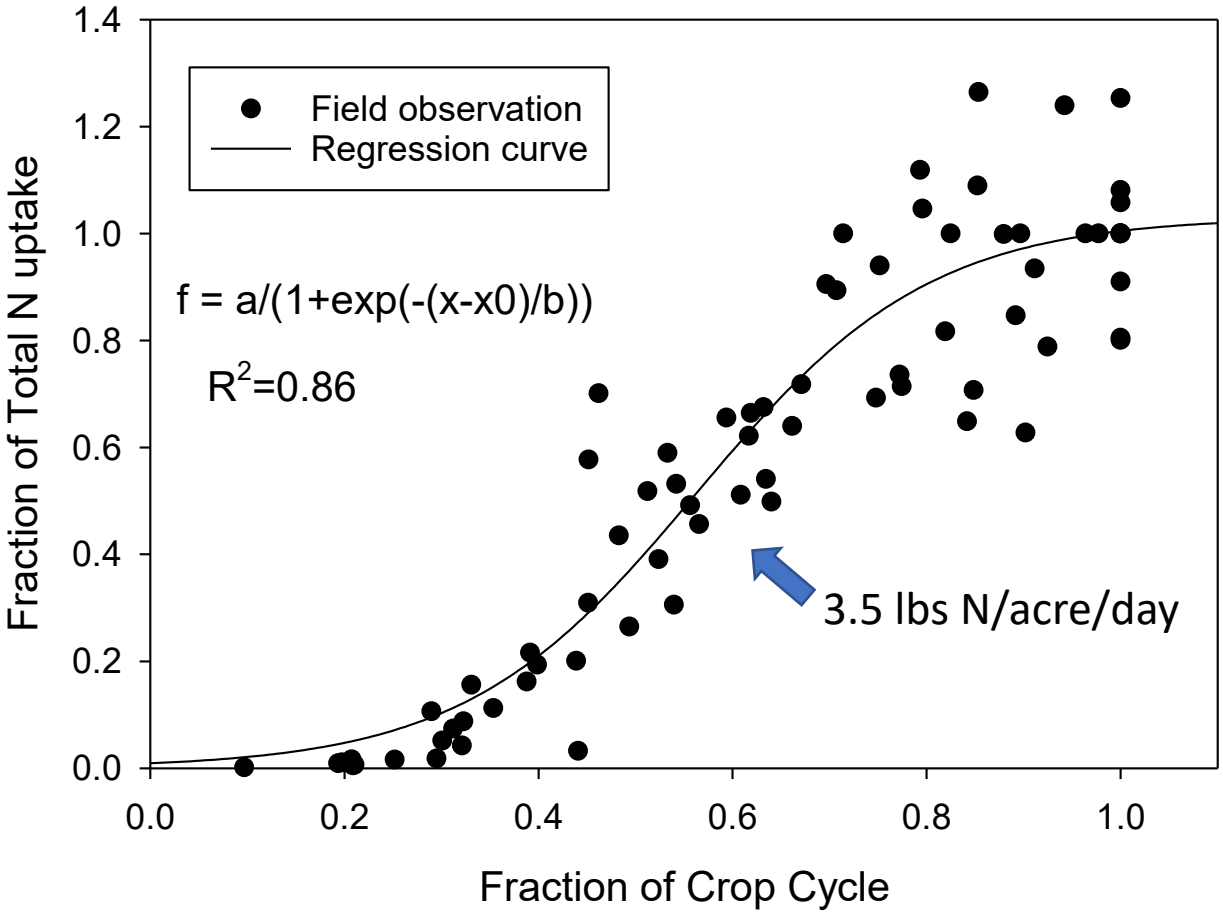
– (Quick Test N - threshold NO_3-N)

– Soil mineralization N

– Plant residue N

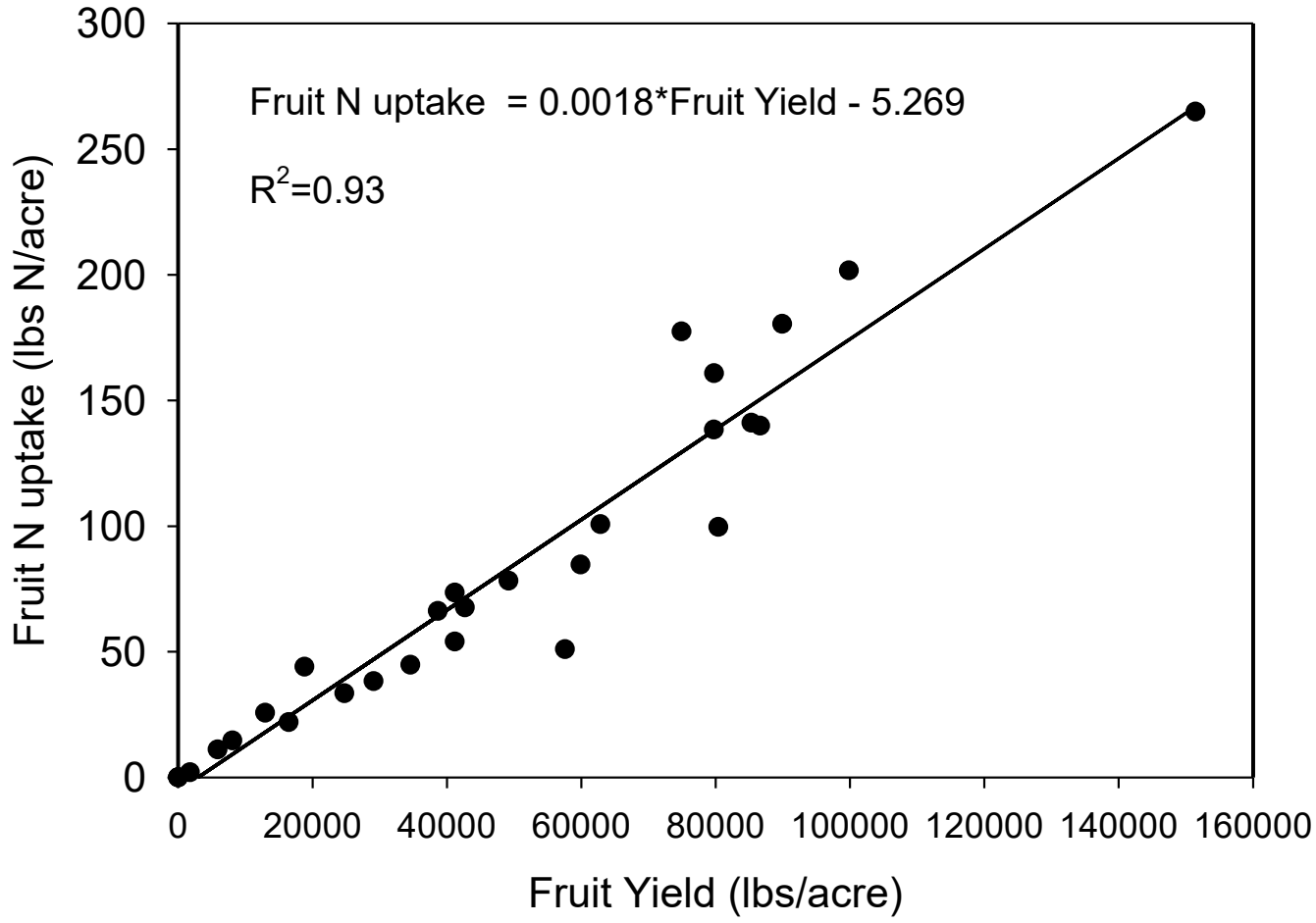
– N in irrigation water

Pepper N uptake

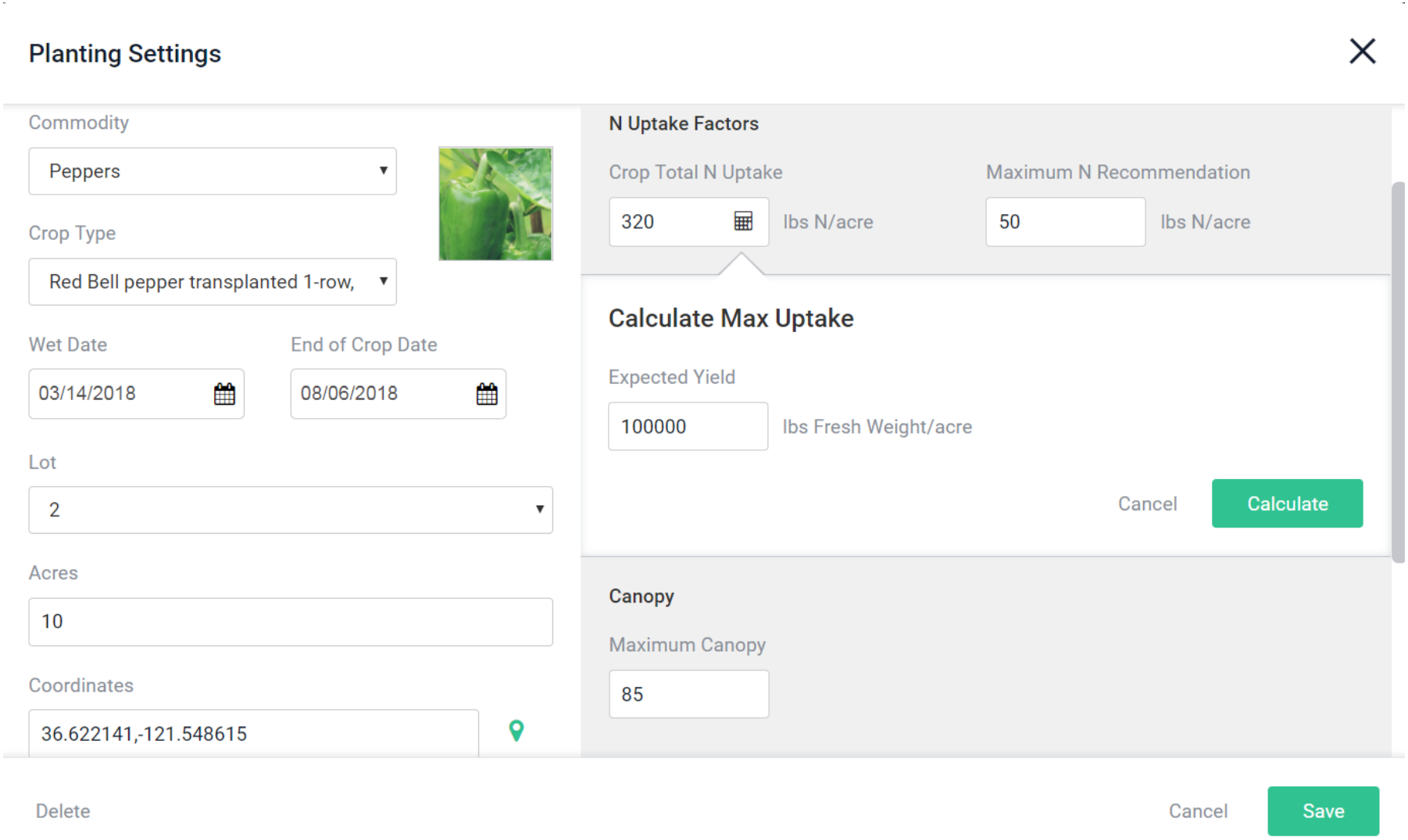


Pepper Fruit N uptake = 1.8 lbs N/acre per 1000 lbs of fruit

Average Crop N uptake = 300 lbs N/acre (56% N in fruit)



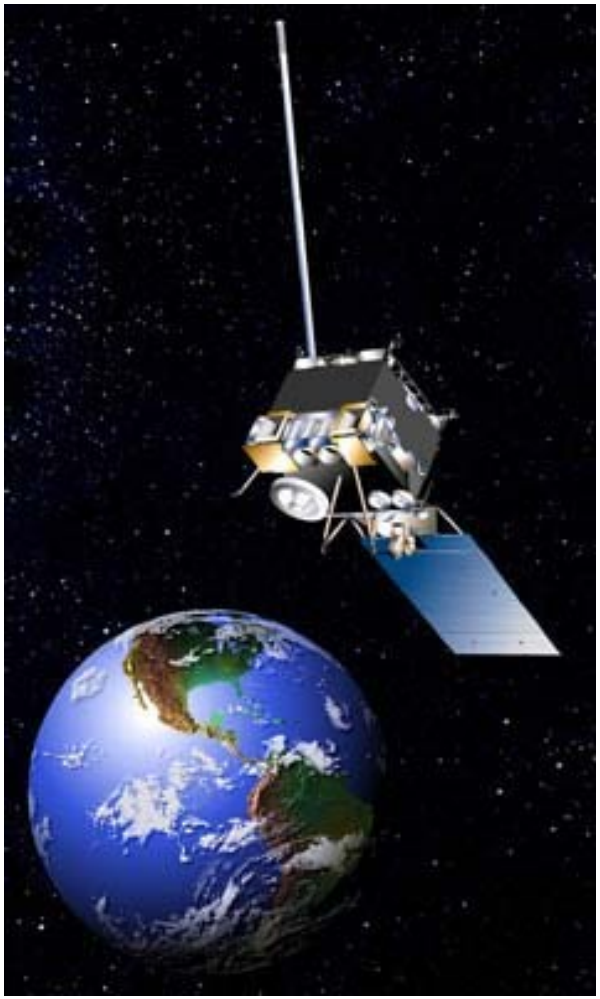
Crop N uptake can be adjusted based on expected fruit yield

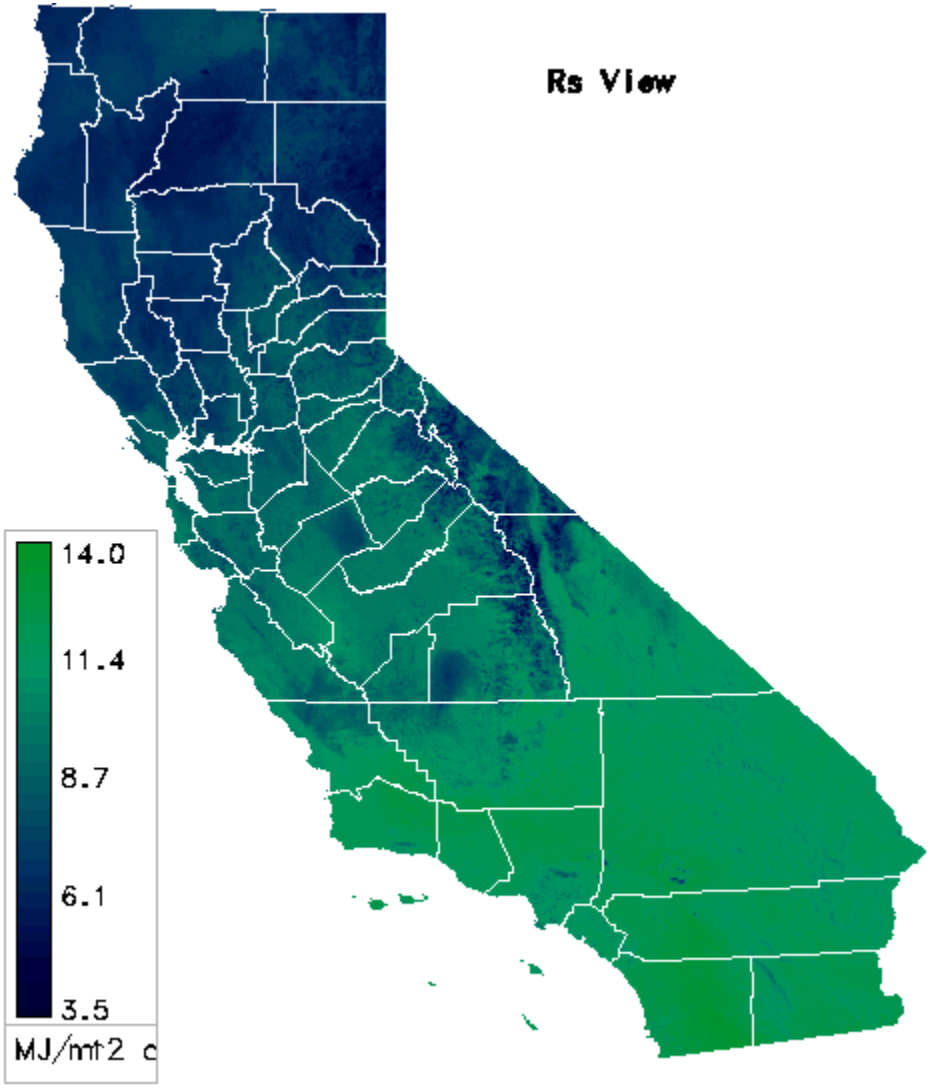


Interface with UCD SoilWeb Tool

Soil Type | Select Soil Type | Find Soil Type

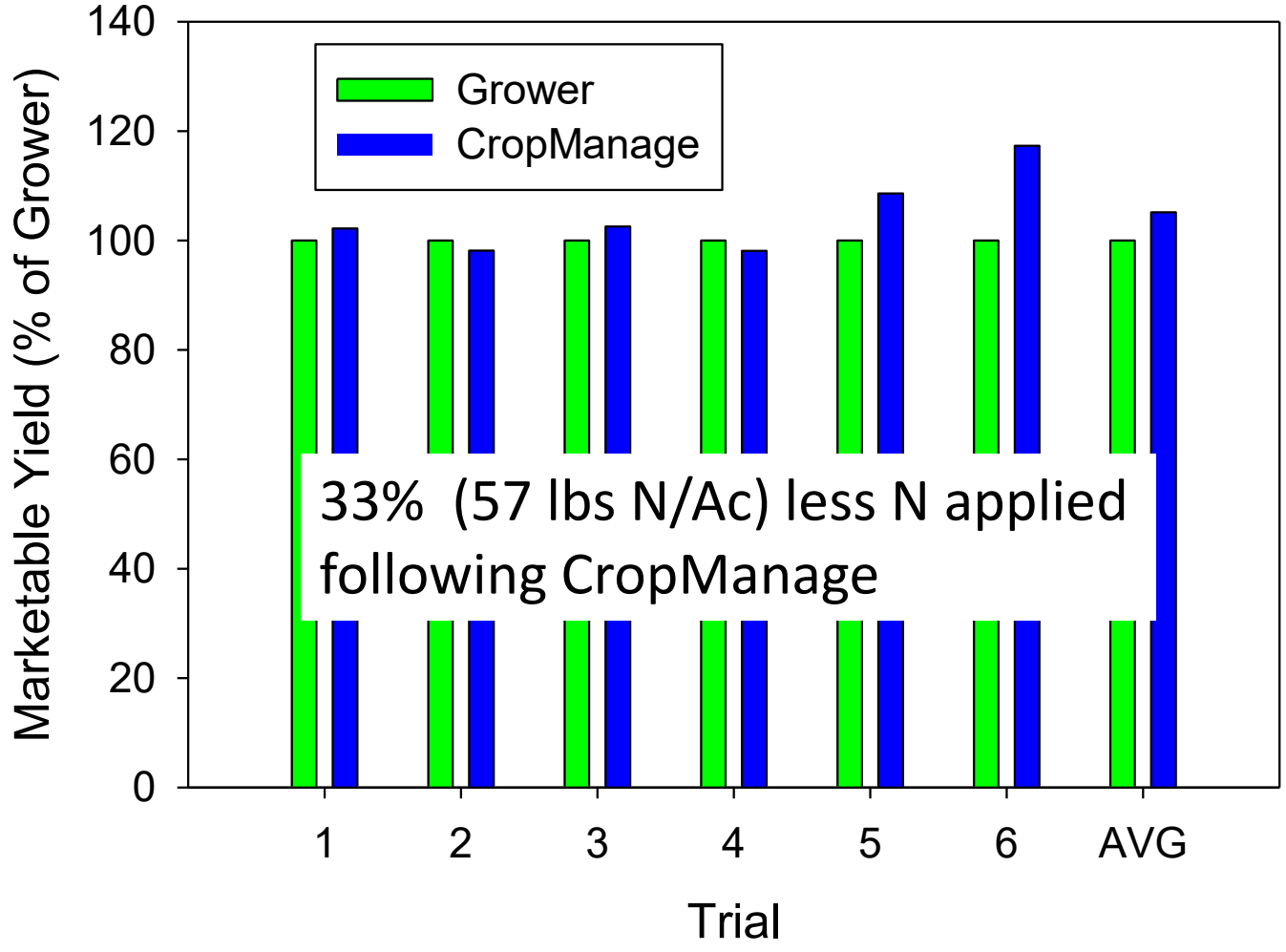
Spatial CIMIS ETo Reporting





CropManage can automatically import and display flowmeter data

Summary of Commercial Lettuce Strip Trials (2012-2013)



Clientele interest

> 1300 Users

> 900 Ranches

>3600 Plantings

>38000 Recommendations

Summary

- **Web applications can be useful for repackaging research into simple to use decision support tools**

- ***CropManage* is designed to help growers improve water and N management practices**

- **UC will continue to adapt CM to more commodities and add new features**

- ***CropManage* hands-on workshop is scheduled in Salinas for April 24th**

CropManage 2.0:
cropmanage.ucanr.edu

CropManage 3.0:
v3.cropmanage.ucanr.edu

CropManage API:
api.cropmanage.ucanr.edu