Update on CropManage Irrigation and Nitrogen Management Decision Support Tool

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Drivers for better management of water and nitrogen

OPTIMIZING YIELD AND QUALITY

WATER QUALITY REGULATIONS

SUSTAINABLE GROUND WATER MANAGEMENT ACT

SUSTAINABILITY METRICS

Water quality regulations in California are becoming stricter and will require improvements in water and nitrogen management

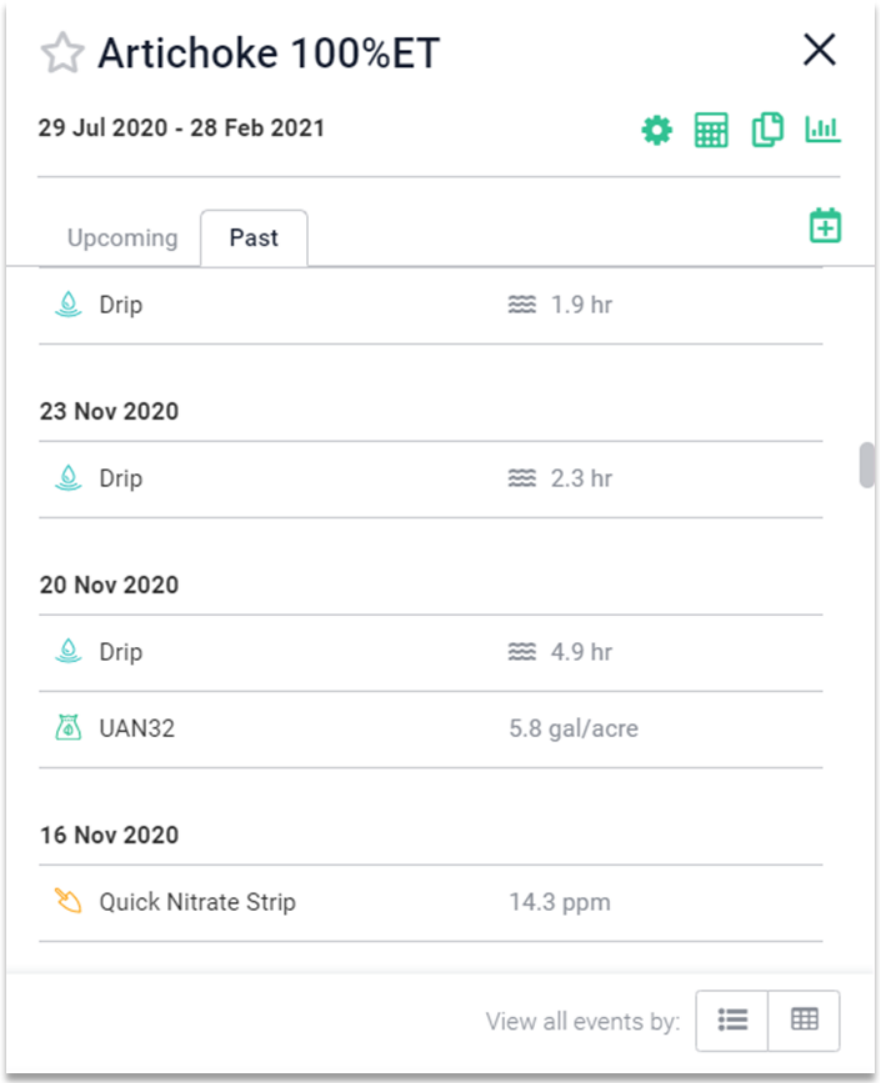
Table C.1-2. Time Schedule for Nitrogen Discharge Targets and Limits

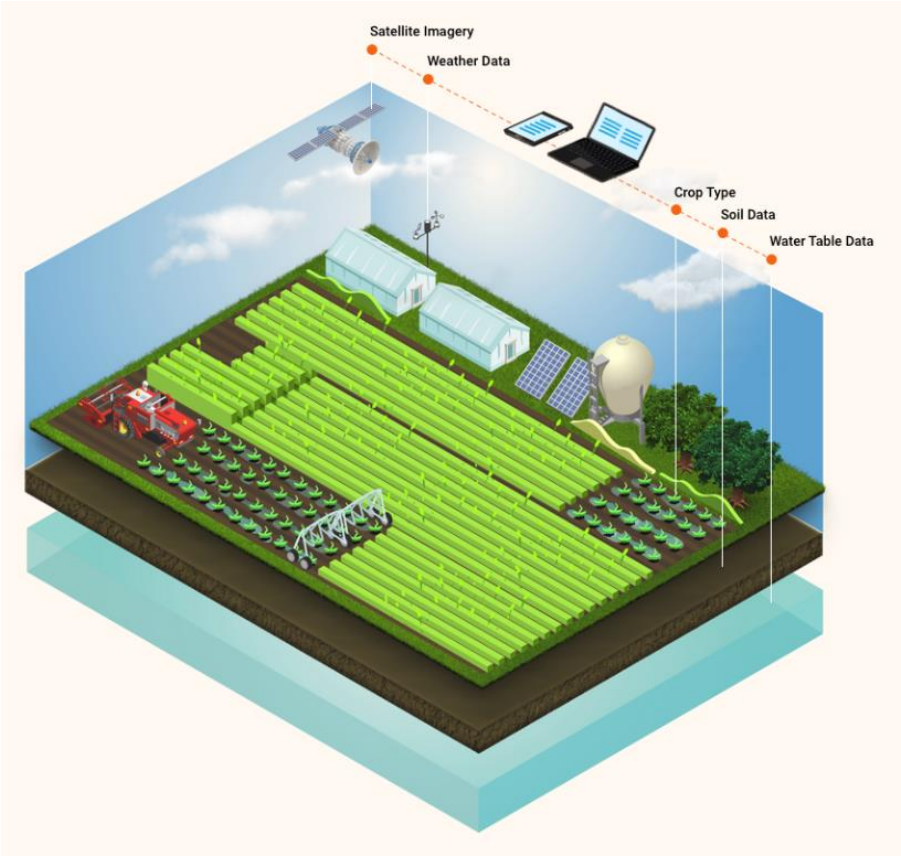
Compliance Pathway 1 $A_{FER} + C \times A_{COMP} + A_{IRR} - R =$	Compliance Pathway 2	Year	Target or Limit
500	$A_{FER} + C \times A_{COMP} = R$	2022	Target
400		2024	Target
300		2026	Limit
200		2030	Limit
150		2035	Limit
100		2040	Limit
50		2050	Limit

Note: All units are in pounds of nitrogen per acre per year and represent all crops grown and harvested on the entire ranch.

A_{FER} is the amount of fertilizer nitrogen applied in pounds per acre.
C is the compost discount factor used to represent the amount of compost nitrogen mineralized during the year that the compost was applied.
A_{COMP} is the total amount of compost nitrogen applied in pounds per acre.
A_{IRR} is the amount of irrigation water nitrogen applied in pounds per acre.
R is the amount of nitrogen removed from the field through harvest, sequestration, or other removal methods, in pounds per acre.

CropManage: Online irrigation and nitrogen management decision support

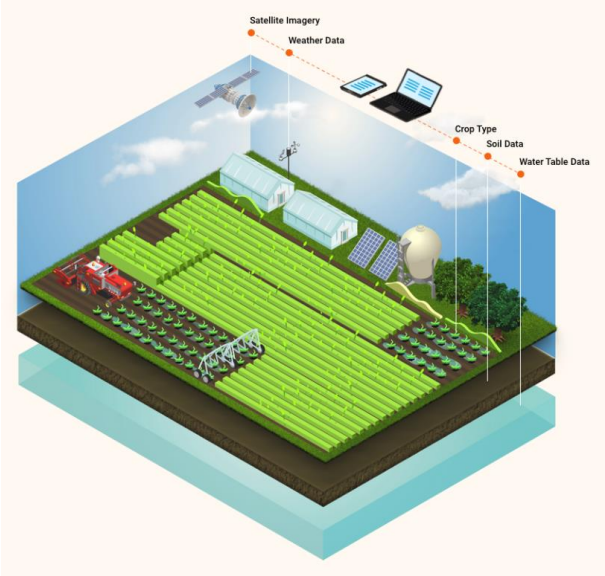




cropmanage.ucanr.edu

What CropManage does:

- ✓ Provides site-specific recommendations for irrigation and nitrogen management based on soil type, climate, crop type, and crop development stage
- ✓ Uses science-based algorithms for developing recommendations
- ✓ Maintains records on water and nutrient management (export for regulatory compliance)



A few simple steps to using CropManage

- Open web browser to: cropmanage.ucanr.edu
- Establish user login (free)
- Set up a ranch
- Create a planting
- Enter soil and tissue tests, fertilizer, or irrigation events

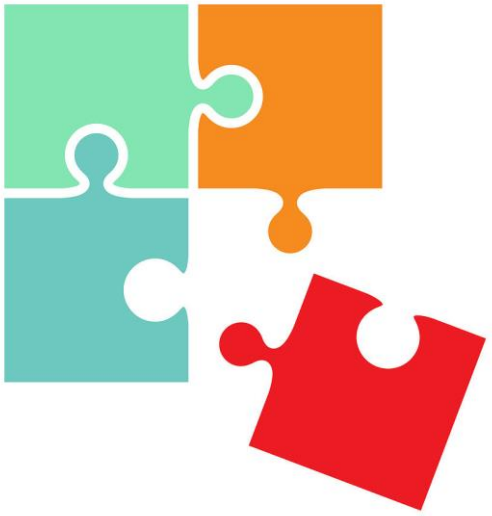
Account for all sources of nitrogen

- Residual mineral N in soil (Nitrate and ammonium)
- N in irrigation water
- Nitrogen mineralization from soil, amendments, and previous crop residues

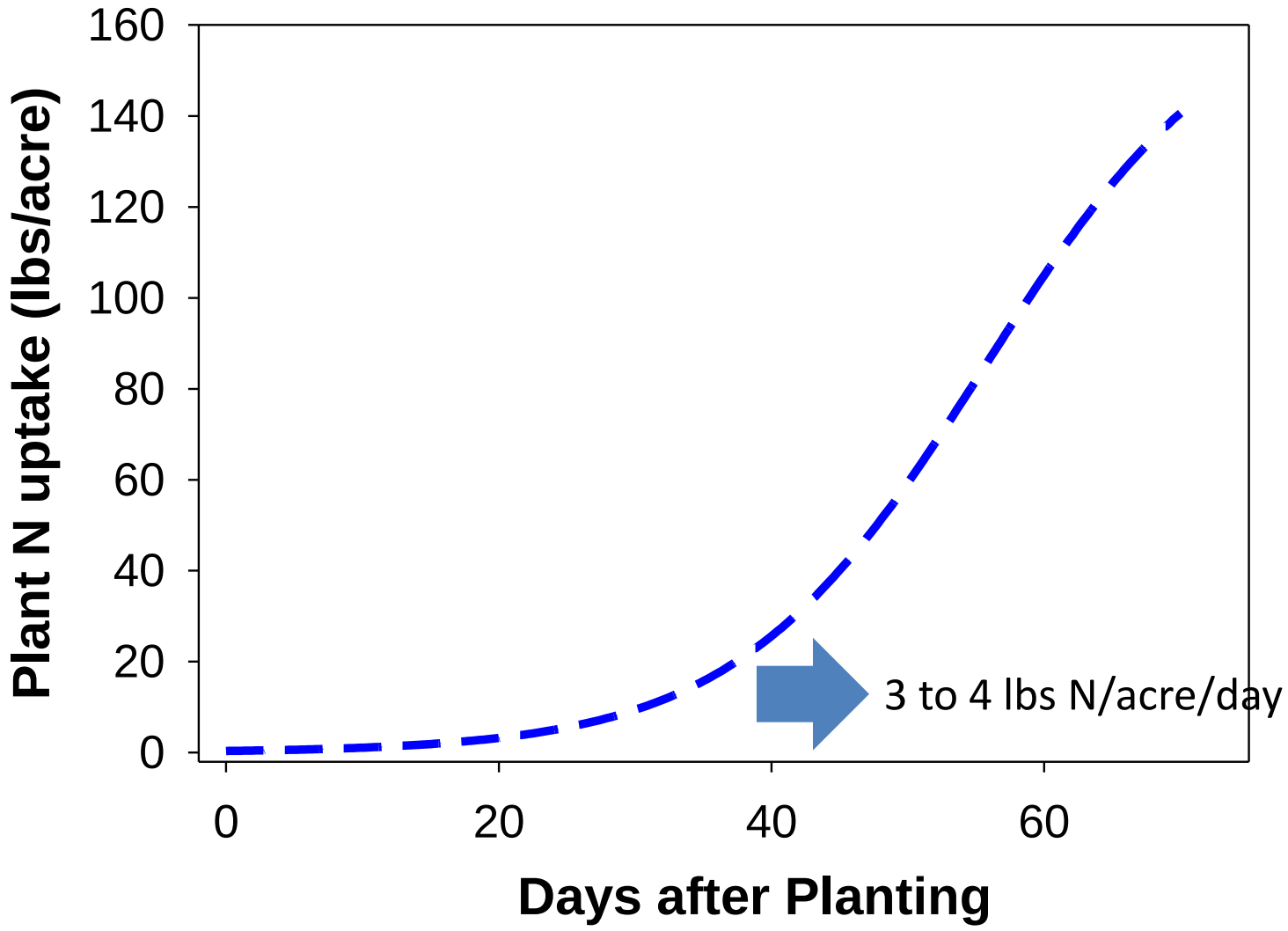
soil

water

crop residue



Match N fertilizer applications with crop uptake

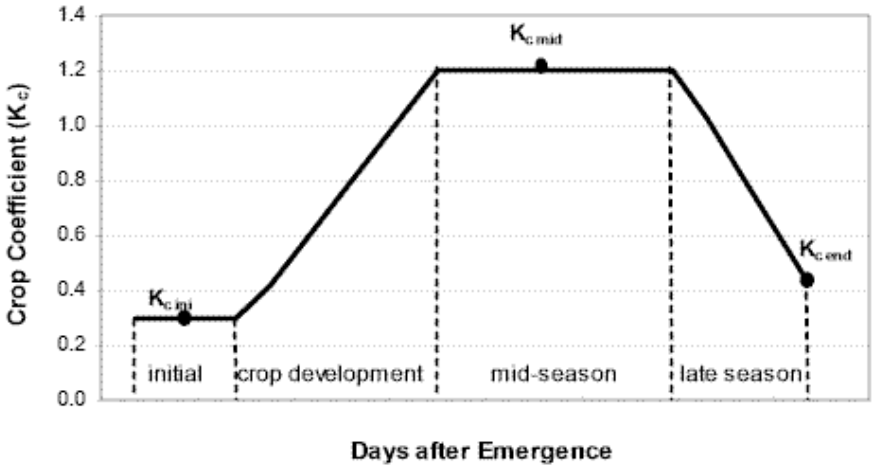


Weather-based irrigation scheduling

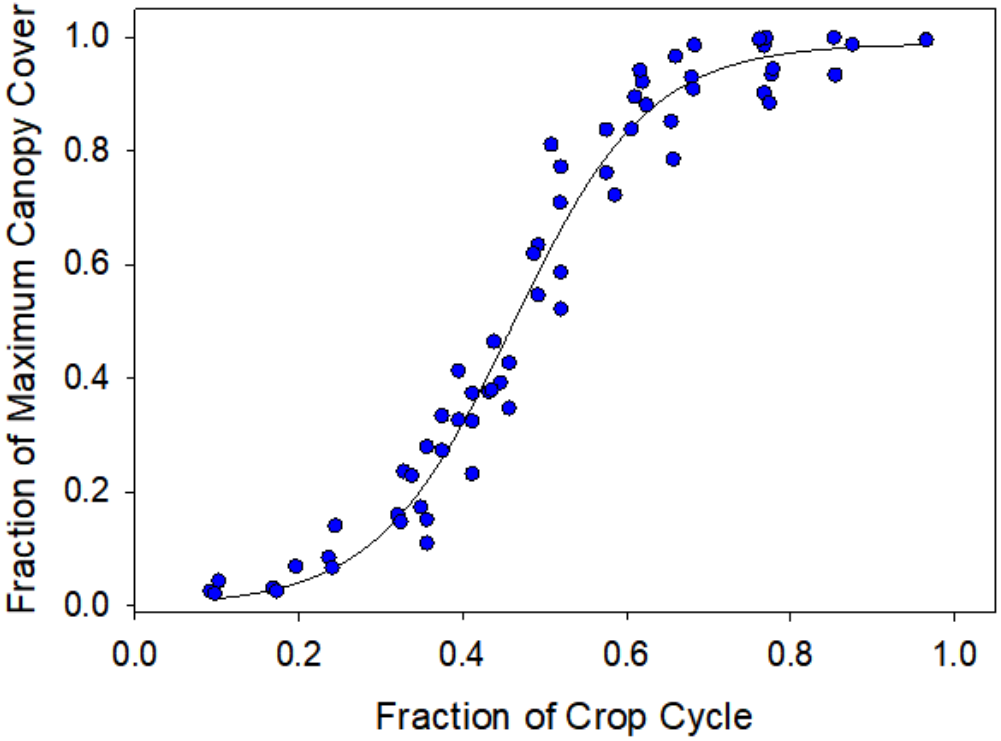
Converting Reference ET to Crop ET:

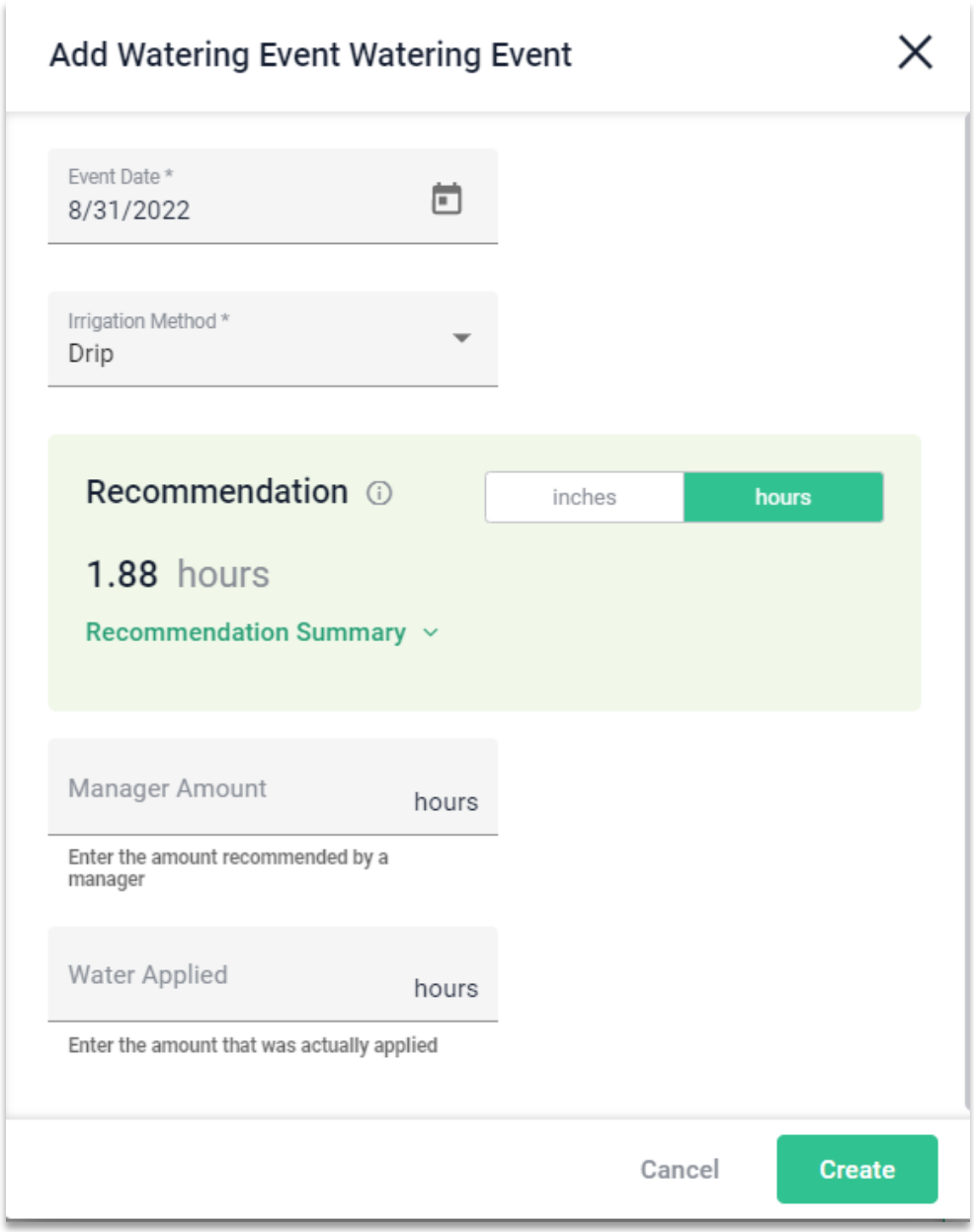
$$ET_{crop} = ET_{ref} \times K_{crop}$$

K_c can vary from 0.1 to 1.2



Crop coefficient (Kc) is related to canopy cover




Add Watering Event Watering Event
Event Date *
8/31/2022
Irrigation Method *
Drip
Recommendation
inches
hours
1.88 hours
Recommendation Summary
Manager Amount
hours
Enter the amount recommended by a manager
Water Applied
hours
Enter the amount that was actually applied
Cancel
Create

Crops currently supported

- Vegetables (artichoke, broccoli, cabbage, cauliflower, celery, lettuce, pepper, spinach, tomato, etc.)
- Berry crops (raspberry, strawberry)
- Tree crops (almond, walnut, pistachio)
- Field crops (alfalfa, corn)

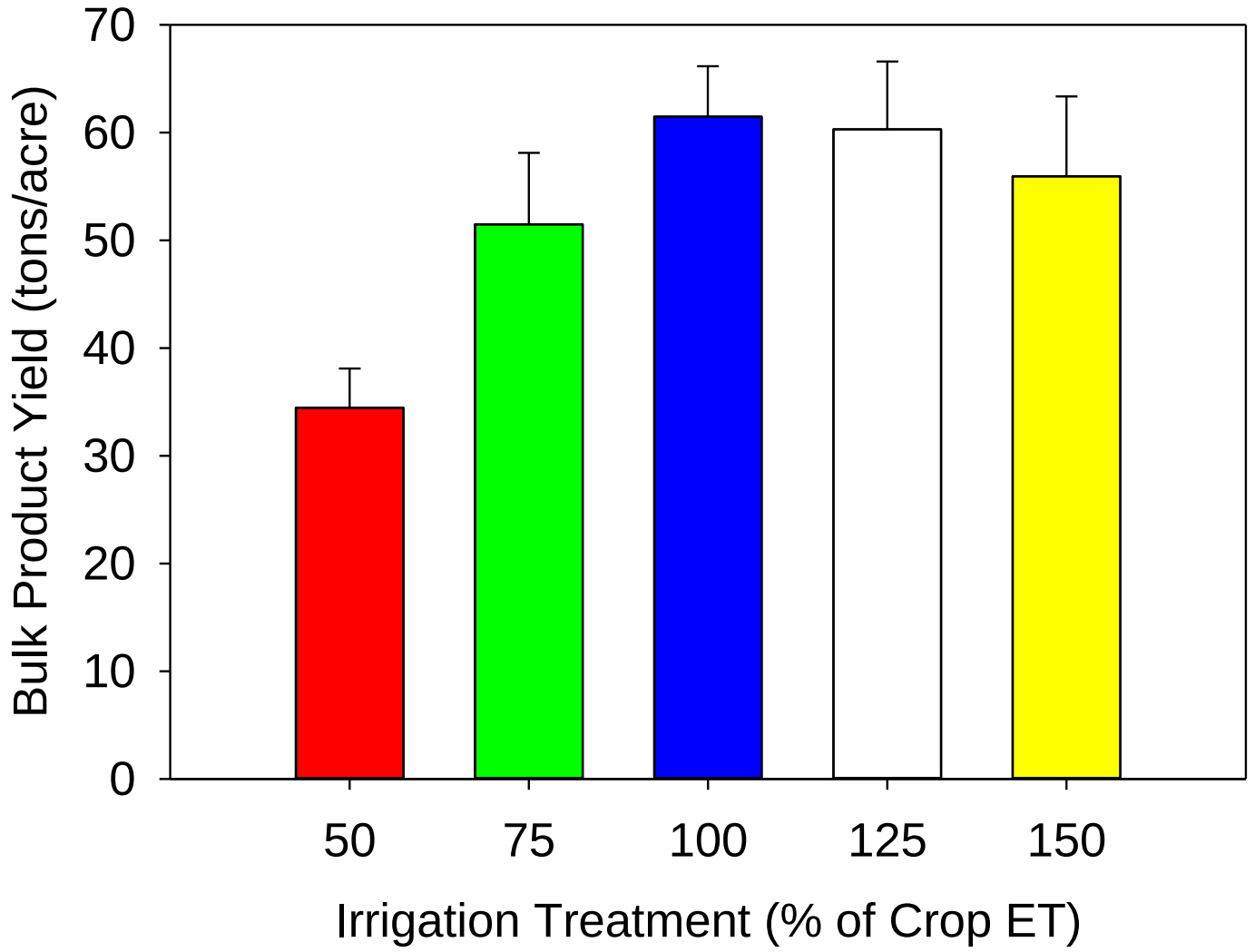
CropManage has been extensively field trialed

- Artichoke
- Head lettuce
- Romaine lettuce
- Green cabbage
- Red cabbage
- Broccoli
- Cauliflower
- Celery
- Strawberry
- Raspberry

Irrigation treatments of 50% to 150% of recommended water

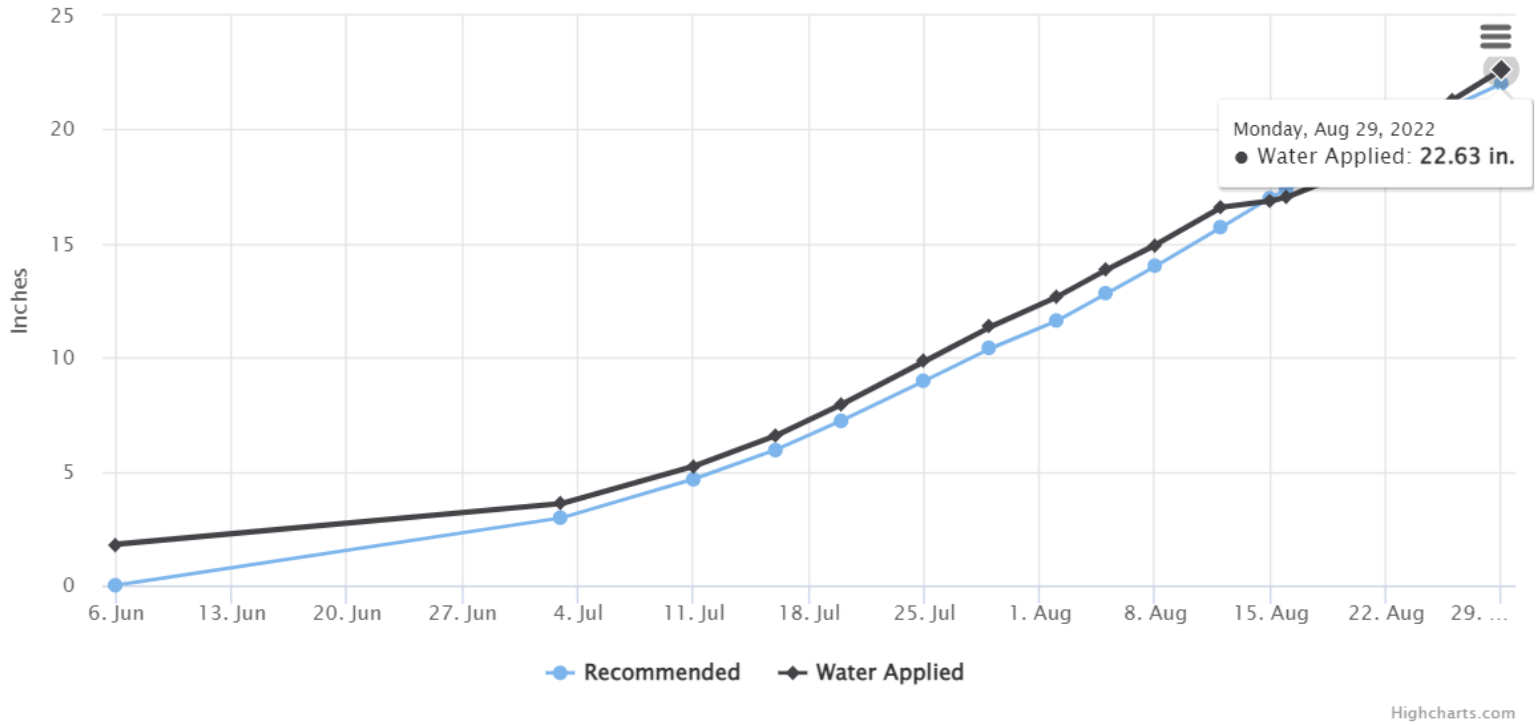

100% ET (Blue)
150% ET (Yellow)
late June ~mid-season

Bulk yield was maximized with the 100% ET treatment (avg. of 2 years)



Grower validation of recommendations

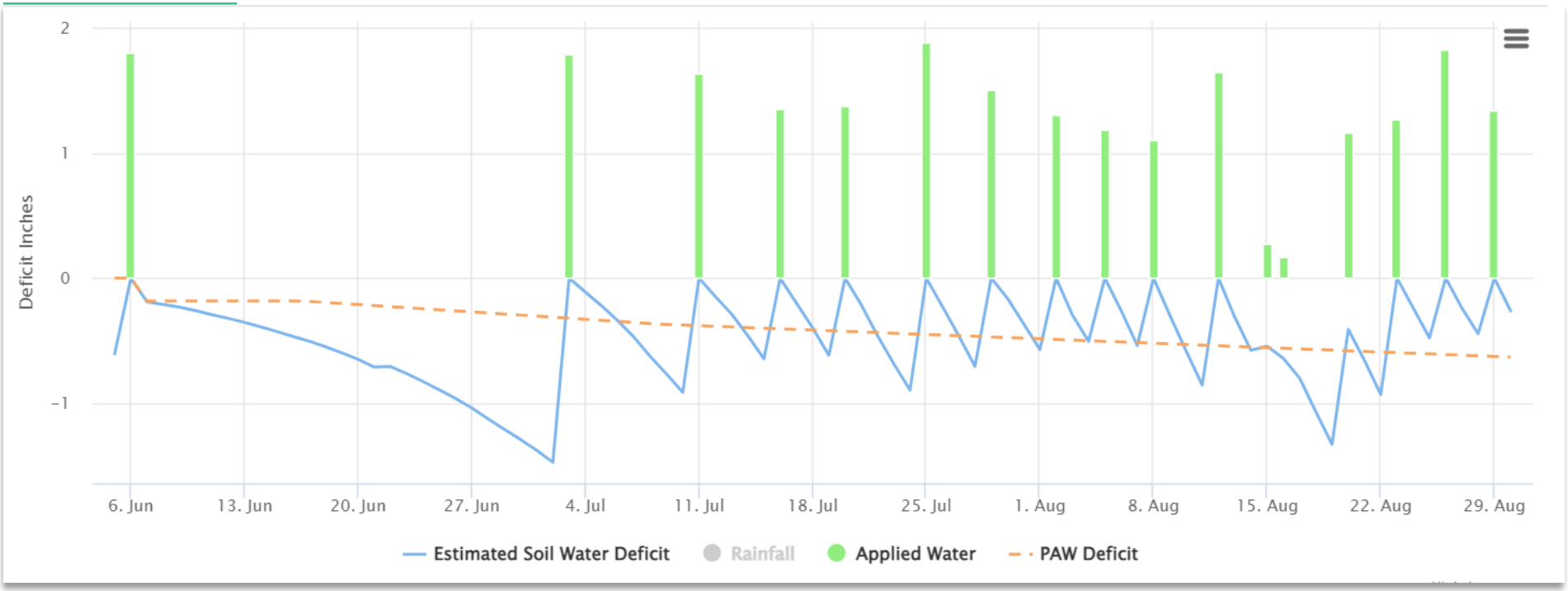
- ✓ Celery
- ✓ Lettuce
- ✓ Processing tomato
- ✓ Green cabbage
- ✓ Strawberry



New or noteworthy features

- User interface is more intuitive and responds fast
- New commodities added (artichoke, Napa cabbage, carrot)
- Visualization of data improved
- Enhanced help section (tutorials, FAQ, e-news)
- Export summaries of water and nitrogen use by ranch, commodity, and crop.
- Calendar view of events
- API has been improved to allow CM to interface with other software

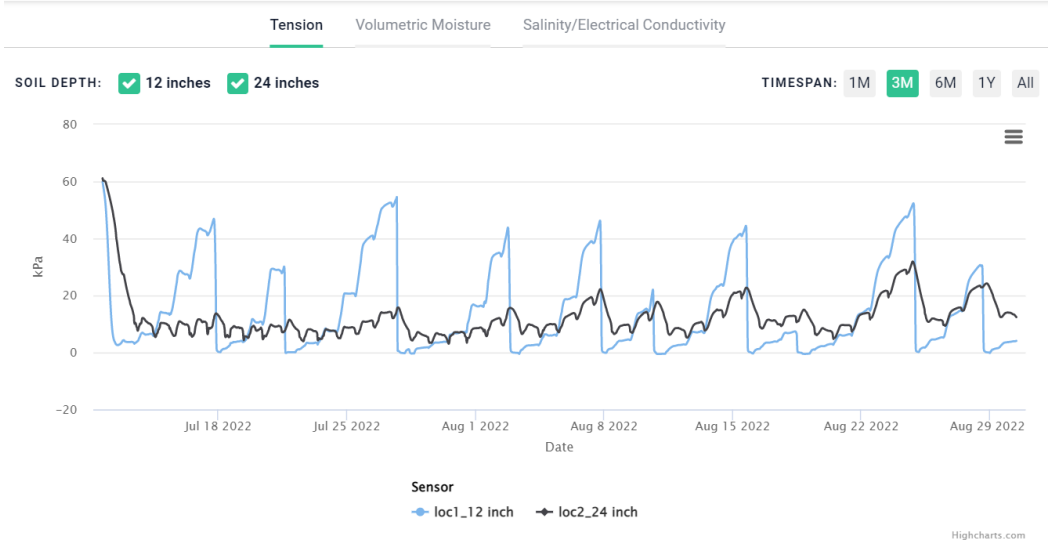
Soil Water Balance Visualization



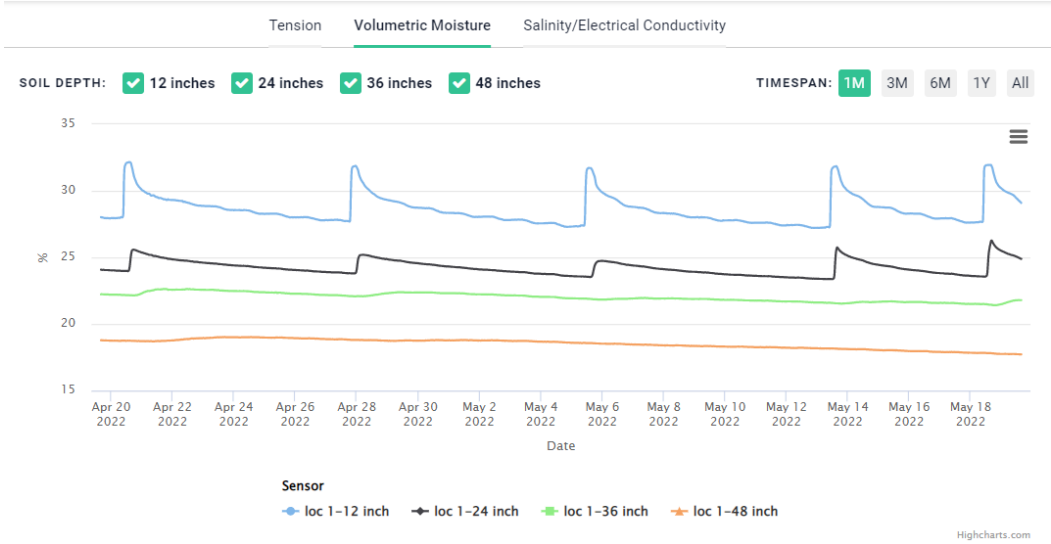
Enhanced field monitoring capabilities

Soil moisture data display

Tensiometer readings in celery



Volumetric soil moisture in a vineyard



Clientele interest

(since 2018)

> 7200 soil samples

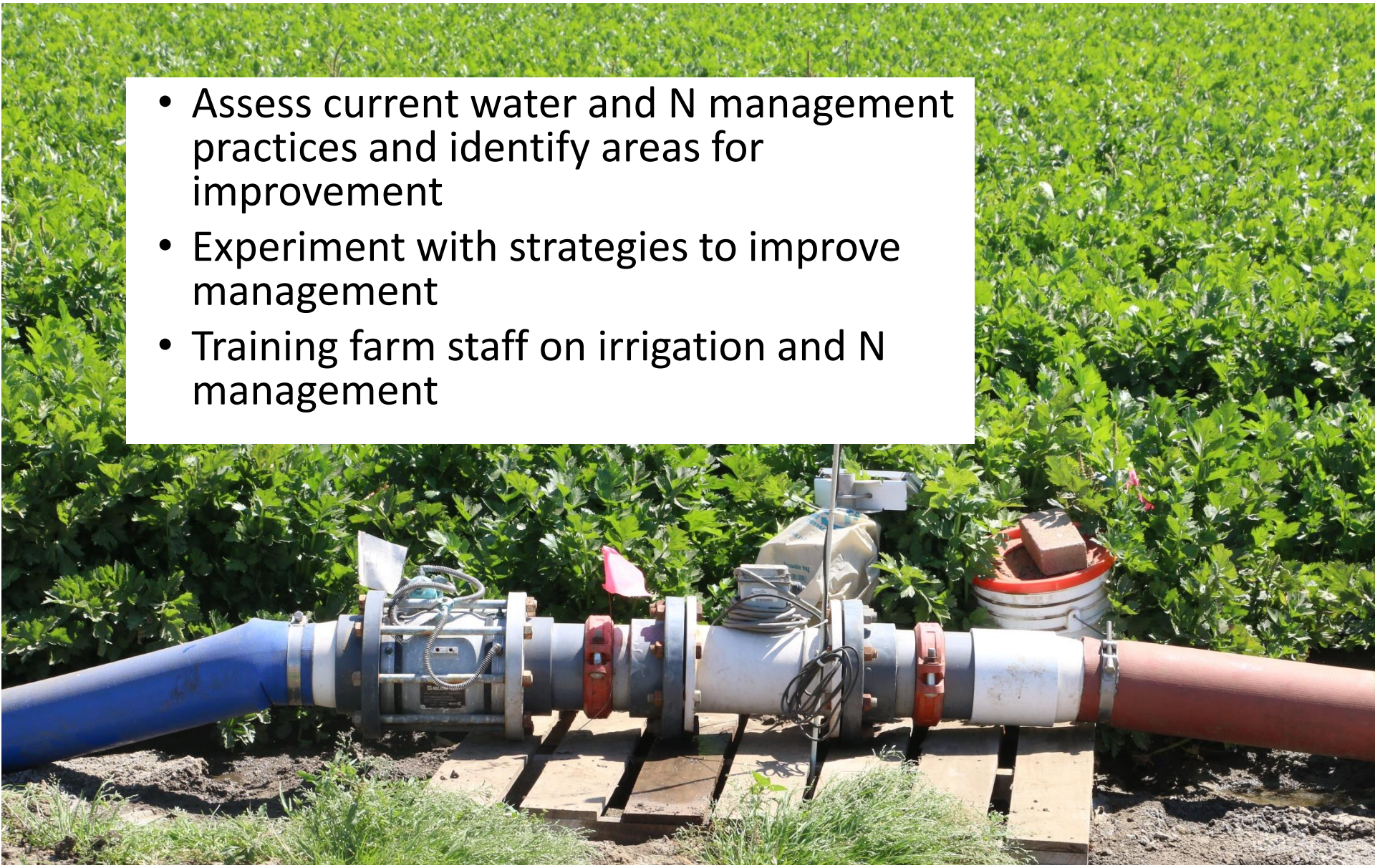
> 10,000 Fertilizer recommendations

> 35,000 Irrigation recommendations

How are Clientele using CropManage?

- Irrigation scheduling
- Nitrogen fertilizer management
- Seasonal estimates of crop water use or needs
- Regulatory compliance (record keeping)
- Training students
- Research trials

Tool to help growers and farm managers with irrigation and N management



- Assess current water and N management practices and identify areas for improvement
- Experiment with strategies to improve management
- Training farm staff on irrigation and N management

Looking Ahead

- Additional commodities (vineyards, Asian vegetables, tree and agronomic crops)
- Augment algorithms (leaching, soil mineralization, organic fertilizers)
- CropManage help (tutorials, FAQ, videos)
- Interface with OpenET and forecasted ET
- Task management

How to learn more:

- Attend a CropManage Workshop
- Targeted trainings
- Help links and comments
- CropManage hotline 831-759-7377