

Fertilizer Research and Education Program

Final Report

A. Project Information

Project Title: Outreach and revenue generation for sustaining CropManage irrigation and nutrient management decision support tool

Project leader:

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B. Abstract

California farmers are under regulatory pressure to use fertilizer nitrogen efficiently and demonstrate that they are following best management practices. Tools such as CropManage (cropmanage.ucanr.edu) can assist growers in implementing best management practices for nitrogen on a field-by-field scale. The objective of this project was to increase outreach for the CropManage online irrigation and nutrient management decision support tool and implement strategies that financially sustain the software. Outreach activities included expanding online help support, developing an e-newsletter, introductory presentations, and in-depth hands-on trainings. Revenue generation activities encompassed the addition of a donation link, adding capabilities to track use by commodity and region, developing an application protocol interface for partnering with commercial software companies, and revamping the landing page to attract more users. Currently, a subscription revenue model, where users would pay for access to CropManage, was determined to not be viable. Increased effort was focused on community building around the CropManage platform by involving partner institutions, and UCANR, and UC campus professors, extension specialists, and farm advisors in collaborative projects. These collaborations generated funding to support the addition of new features and assisted with outreach to the agricultural industry. As a result of this project CropManage was financially supported, use increased by 72%, and many

improvements were implemented that will make the software more useful to clientele and lead to better management of nitrogen and irrigation water.

C. Introduction

California farmers are under regulatory pressure to use fertilizer nitrogen efficiently and demonstrate that they are following best management practices. Because nitrate can readily leach in soil, a combination of practices that help growers follow the 4Rs (right source, right amount, right time, right place) and optimize water management is required to achieve improved N use efficiency. UC research has greatly increased the understanding of crop N and water needs and resulted in several spreadsheet and online tools that growers can use to determine appropriate amounts of fertilizer and water to apply to their crops.

CropManage (CM) is an online decision support tool developed by UCANR for assisting growers with efficiently managing water and nitrogen fertilizer to match the site-specific needs of their crops. CM also allows growers to track fertilizer and water applications on each of their fields (Cahn et al. 2023). This record keeping capability of the software allows multiple users to share and review water and N applications on each field of their ranch, and for growers to maintain data required to comply with water quality regulations. With financial support of CDFA-FREP, CM was originally developed in 2011 to help farmers estimate irrigation schedules in lettuce using CIMIS ETo data and determine fertilizer N needs using the soil nitrate quick test and models of N uptake. Later CM was expanded to include other coastal crops, including baby salad greens, spinach, celery, broccoli, cabbage, cauliflower, and strawberries. Funding from CDFA-FREP and DWR facilitated adapting CM for central valley crops including alfalfa, almonds, and processing tomato.

CM is used by growers, farm managers, consultants, and governmental and nonprofit agencies. With the addition of new crops and features, grower adoption of CM has steadily increased during the past five years, often providing more than 2000 recommendations per month during the growing season (March – November). Nevertheless, more outreach in the form of dedicated user support, hands-on workshops, and presentations at industry meetings could potentially boost grower adoption of the decision support tool, especially for regions such as the Central Valley and the southern desert where growers are less familiar with CM, or with the new features and commodities that have been recently added to the software. Also training of technical support providers such as consultants, resource conservation staff, and extension advisors on CropManage is needed in these regions to facilitate grower adoption.

Although CM has always been free for users, fixed costs of maintaining and updating the software have become an increasing concern and could potentially limit the rate of future grower adoption. Several growers have expressed hesitation about adopting CM for their farming operations due to uncertainty about the longevity of the software.

Hosting CropManage on a professional cloud server and storing user data has fixed costs. UC Farm Advisors have relied on grants to pay these expenses as well as the salary of a full-time professional software engineer who keeps CropManage running smoothly and adds new capabilities and features to the decision support tool.

This project was intended to address both increasing outreach and training on CM to growers, consultants, technical support providers, and UC farm advisors as well as explore and implement a strategy to continue funding software development.

Implementing funding strategies such as subscriptions for a premium service and/or attracting industry sponsors will require fundamental changes to the software that requires an upfront investment. The funding requested in this proposal was proposed to be used primarily to evaluate revenue generating options and upgrade the software to accommodate their implementation. In addition, funding was needed for travel and outreach activities.

D. Objectives

Objective 1: Target outreach on irrigation and nitrogen management using the CropManage decision support tool for growers and industry groups producing commodities recently added to the software or are unfamiliar with the decision support tool.

Objective 2: Develop and implement a plan that would generate funding to sustain CropManage software into the future.

E. Methods

Outreach methods

Outreach targeted growers, consultants, and industry representatives on the Central and Southern Coast, Central Valley, and Southern Desert. Strategies included:

1. E-newsletter campaigns to alert clientele of new features in CropManage and opportunities for further training and assistance.
2. In-person hands-on workshops to introduce users to CropManage capabilities and provide step-by-step instruction.
3. Online and in-person training for small groups, as well as one-on-one in person training. Trainings were provided in both English and Spanish languages.

Sustainability methods

Steps for developing a revenue plan for CropManage included:

1. Organizing an oversight committee for CropManage comprised of farm advisors, specialists, and UCANR leadership who provide ideas on revenue generation and contribute to the development of new features and crops included in the decision support tool.
2. Adding a donation link to the CropManage application and landing page that is connected to a university account dedicated to sustaining CropManage.
3. Adding capabilities to track CM use by commodity and region for reporting clientele use to funders and CM supporters.
4. Adding features to increase CM marketability such as revamping the landing page, producing an introductory video, including testimony, and continued improvements to CM such as “task management,” summary reports, visualization of data, calculators, and application protocol interface (API).
5. Surveying CM users on barriers to adoption, revenue generation, and future directions.
6. Developing partnerships with commercial companies and public agencies.

F. Results and Discussion

Outreach

Outreach activities from January 1, 2021 – December 31, 2025 included more than 50 educational events, ranging from intensive hands-on-trainings (22) to targeted grower trainings (6), as well as introductory presentations on CropManage (23). These workshops, trainings, and presentations were attended by a total of 1,354 participants over the 4 years of the project and took place through California (Imperial, Riverside, Ventura, Kern, Fresno, Stanislaus, Tulare, Santa Cruz, Santa Clara, Monterey, Yolo, San Joaquin counties). In addition, 22 e-newsletters, announcing training opportunities as well as new features, were distributed to registered CropManage users during the the project.

Progress on increasing CropManage sustainability

Two main approaches explored to financially sustain CropManage were to:

1. Develop procedures to accept funds from users.
2. Build community around the software platform that increases the number of users and collaborators involved in improving and promoting the online decision support tool.

Direct funding

A donation link was added to CropManage in 2021, which has received approximately \$46,000 directly from users and donors. Feedback from users suggested that donations

were complicated for growers to complete because they could not use their business purchase cards to make online transactions, but rather needed to send a check or have prior approval from upper management to complete a donation via a credit card.

Discussions within UCANR leadership explored the possibility of setting up a paid subscription service which could be purchased using a credit card transaction, while maintaining a free version of the software. However, UCANR leadership was concerned that the cost of the effort to restructure CropManage would likely be greater than the revenue generated through subscriptions. For example, reorganization of the software would be needed so that a free version would be accessible to everyone and a paid version would include additional features. It was unclear which features should be offered for free and which should be associated with a subscription model. There were also concerns that ANR would be competing with commercial companies rather than supporting them through the CropManage API.

Several collaborative efforts were pursued with commercial companies that potentially could lead to revenue generation. GeoVisual Analytics modified their Seedgreen farm management software to include CropManage fertilizer and irrigation recommendations through the CropManage Application Protocol Interface (API), a protocol that allows different software to communicate with each other. Additionally, a large vegetable production company adopted the CM irrigation and nitrogen recommendations in their farming operations and sponsored the development of a customized phone app for use with CropManage during the 2023 and 2024 seasons. The app also communicated with CropManage through the API. In both cases, changes in management within these partner companies ended direct collaboration with the CropManage team.

Building community

Building community around CropManage has increased the number of collaborators that contribute to features and commodities supported by the software, as well as outreach to clientele, and funding that supports software improvements and maintenance.

By far, the most consistent funding source has been through grants from researchers and institutions collaborating on improving and expanding CM capabilities. These grants helped widen the adoption of CM as new features and more commodities were added to the decision support platform. They have also helped expand the geographical range that CM serves by adding weather data from other states and the OpenET platform, which covers the western US. One example of this collaboration is the University of Hawaii, which has provided more than \$70 K to add capabilities to bring weather data from the Pacific islands into CropManage. Another example, is the collaboration with California State University, Monterey Bay, which has cooperated on field trials to validate the CropManage irrigation recommendations as well as conducted research to validate Crop Coefficients used in the evapotranspiration algorithms. Many other projects in collaboration with UC professors, specialists, and farm advisors have

provided funding to support CropManage. More details of these grants are provided in Table 1.

Table 1. Grant funding that fully or partially supports CropManage from 2021 -2025.

Title	PI	Lead Institution/Agency	end date	Support
Extension of CropManage Decision Support System to Viticultural Management	L. Johnson	CSU Monterey Bay/CDFA Specialty Crop	6/30/2023	\$106,885
Improving Water Use Efficiency of Cool Season Vegetable Crops	M. Cahn	CDFA Specialty Crop	1/2/2024	\$333,435
Evapotranspiration monitoring of three major Salinas Valley Specialty Crops	L. Johnson	CSU Monterey Bay/CDFA Specialty Crop	6/30/2024	\$175,535
Accelerating adoption of irrigation scheduling with satellite-based precision evapotranspiration from OpenET	R. Allen	Univ. of Nebraska	7/17/2025	\$68,577
Enhancing Resource Utilization for Sustainable Lettuce Production in Changing Climates	R. Mitchelmore	UC Davis, USDA NIFA	8/31/2025	\$333,516
Forecasting Daily Reference Evapotranspiration and Rainfall for Water Resources Conservation and Sustainable Agriculture	S. Batani	Univ. of Hawaii	2/27/2026	\$11,836
Advancing adoption of decision-support systems for irrigation management of vegetable crops	L. Johnson	CSU Monterey Bay	6/30/2026	\$60,000
The role of irrigation management for improving nitrogen use efficiency for broccoli grown with nitrate contaminated irrigation water	C DeCock	CalPoly /CDFA FREP	11/30/2026	\$21,425
Targeted Nitrogen and Irrigation Education in California Nitrate Impacted Regions	E. Porse	CDFA FREP	12/31/2026	\$44,000
Pajaro Valley Water Management Agency Water Conservation Program	D. Hermstad	Santa Cruz County RCD	3/31/2027	\$179,998
Development of Three Citrus Modules in The Decision Support Tool CropManage for Orange, Mandarin, and Lemon	K. Miller	Formation Env./CDFA FREP	11/30/2027	\$156,942
Developing tools and information to enhance water-nitrogen use efficiency and sustainability of avocado production systems	A. Montazar	CDFA FREP	12/31/2028	\$55,000
Farmer Driven Evaluation and Adoption of an Artificial Intelligence-Enhanced Weather-Based Irrigation Scheduling Tool	S. Batani	Univ. of Hawaii	8/30/2029	\$64,888

Increasing the use of CropManage by the agricultural industry is key to the sustainability of the decision support tool. Granting agencies are more likely to award funding if there are metrics showing significant use of the tool by the industry or savings on nitrogen and water. Unlike commercial tech companies, CropManage does not have a sales force to assist with promotion and adoption of the online tool. However, partnering with UC and non-UC collaborators has greatly boosted outreach to the agriculture industry. Collaborators include UC professors, Farm advisors, and Specialists, as well as faculty at other universities and colleges. For example, several Farm Advisors in the Central Valley have integrated CropManage into their extension program and offer workshops on using the decision support tool and one-on-one assistance. Also, extension faculty at the University of Hawaii have been demonstrating CropManage to commercial vegetable growers on Oahu and Maui during the last three years. Other groups and individuals that have helped with outreach include Resource Conservation Districts, Irrigation districts, water quality coalitions, non-profit organizations, and consultants.

Many upgrades to CropManage were made to improve the user experience and build community with the objective of increasing the user base. Currently there are 5500 registered CropManage users. Upgrades included step-by-step onboarding of users (Fig. 1), reorganization of the user interface, improved graphics, addition of task management capabilities (Fig. 2), and visualization of data. Simplified ET and irrigation recommendation calculators (<https://cropmanage.ucanr.edu/et-calculator>, <https://cropmanage.ucanr.edu/ir-calculator>) were added to the CM website so that users can quickly estimate the seasonal ET requirement (Fig. 3), or irrigation requirement of commodities supported in CM (Fig. 4). A Discord page was set up for CropManage

where users can ask questions or discuss features of CM. Links were added for users to provide feedback, report technical problems, or offer suggestions. Additionally, the landing page was greatly improved to attract new users to the decision support platform and provide background on CropManage capabilities and success stories. A summary of features added to CropManage are listed in Table 2.

Table 2. Improvements to CropManage irrigation and nitrogen management decision support tool accomplished during the grant period.

Description
Improved user experience
Reorganization of crop settings for plantings
Improved user experience for adjusting canopy curve
Added task management to planting cards
Guided step-by-step process for creating new plantings
Automated recalculation of recommendations when planting settings are changed
Increased readability of icons and graphics
Increased Spanish language support
Build community
Added user feedback and support links
Created a Discord page for CropManage
Improved and expanded landing page (cropmanage.ucanr.edu)
Added donation link to CropManage menu and landing page
Linked CropManage user database to mailchimp software
Created queries of CropManage activity by county and commodity
New features
Developed single call Application Protocol Interface (API)
Seasonal Crop Water use calculator
Irrigation recommendation calculator
Automated import of reference ET and rainfall data from arizona weather stations (AZMET)
Automated import of reference ET and rainfall data from Hawaii and Pacific Islands
Automated import of reference ET, rainfall, and Satellite data from OpenET
Soil water balance visualization
User defined water stress in planting settings
N mineralization model for organic fertilizers and amendments
Ability to export data in tables and graphs as pdf and csv files
Ability to account for plastic mulch in ET and rainfall calculations
Ability to define period of season with macro tunnels

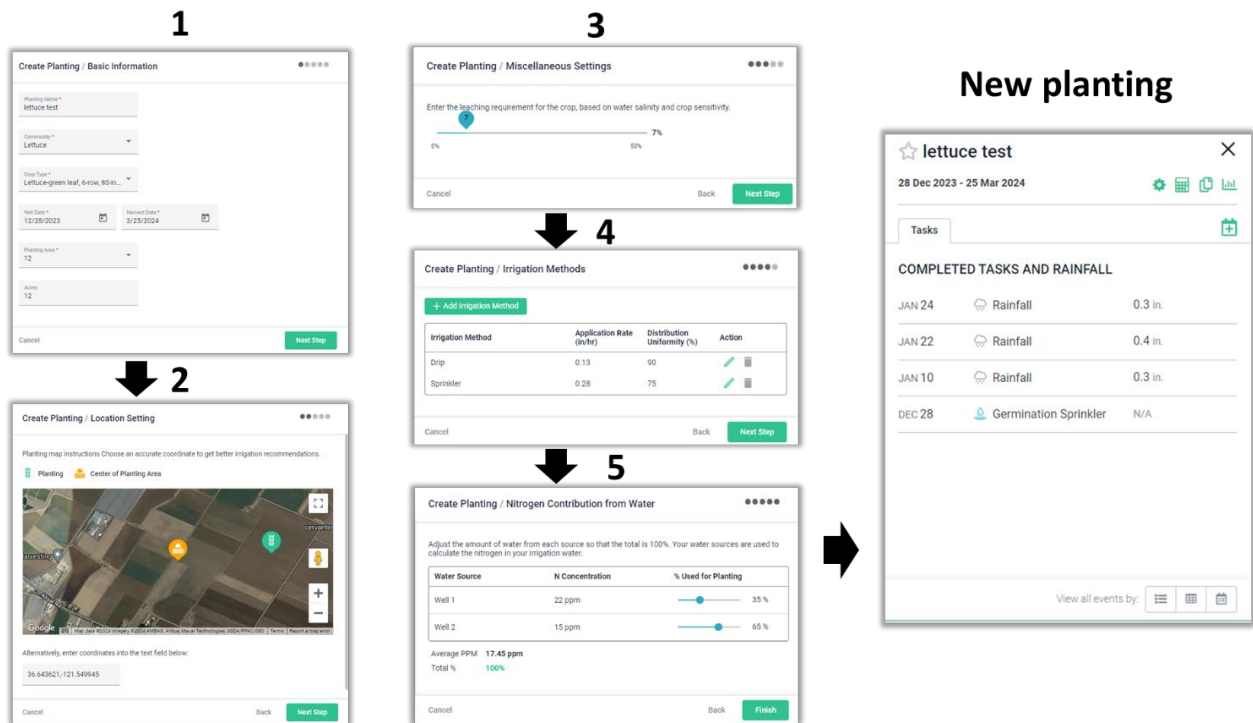


Figure 1. Simplified onboarding experience in CropManage guides users to create new plantings in 5 steps.

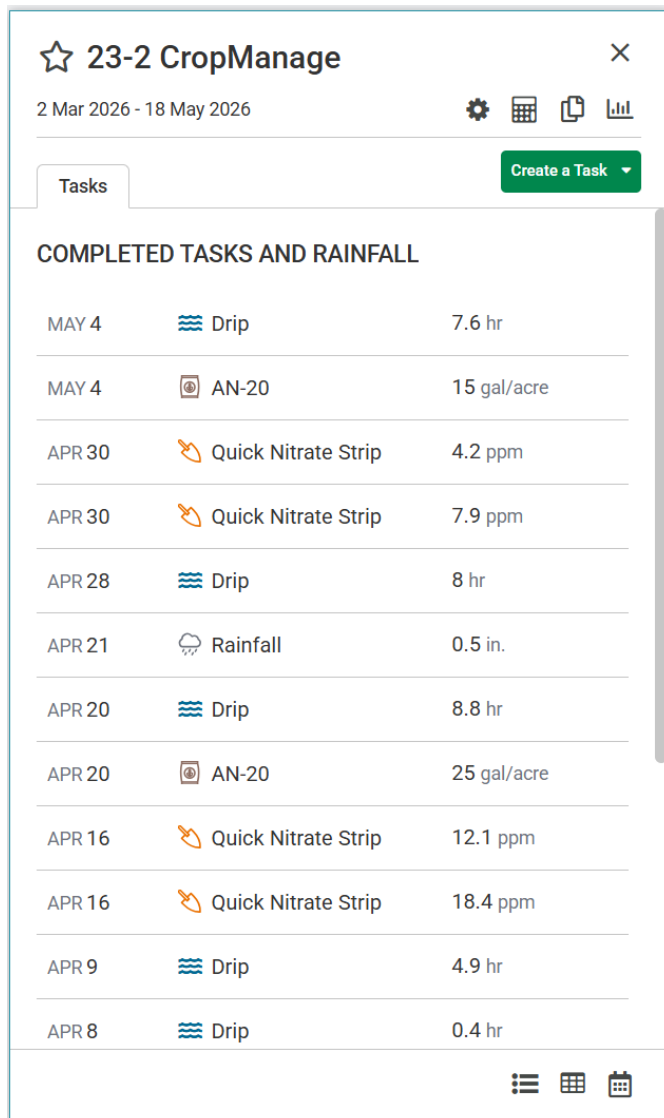


Figure 2. Planting summary card graphics are organized around future and completed tasks.

[← Back](#)

ET Calculation Results

Start Date Jul 1, 2025 **End Date** Oct 3, 2025**Crop Type** Broccoli 2 row, 40-inch bed, summer**Weather Station** Salinas South II

Highcharts.com

Total Reference ET (in.)	17.04
Total Rain (in.)	0.58
Total Crop ET (in.)	11.24

Figure 3. A crop ET calculator was added to the CropManage website so that users can quickly estimate past crop water use for locations within California, Hawaii, and Arizona. The calculator is available for incorporation into other websites.

Click the location of your planting on the map. CropManage will use your location to get accurate weather and soil data used for ET calculation.



Nearest Weather Station: Salinas South II
Distance: 4.46 miles

Recommended Amount (Hours)	2 hours 24 minutes
Recommended Amount (Inches)	0.36 in.
Days Since Last Irrigation	4 days
Total Reference ET	0.64 in.
Total Rainfall	0.00 in.

Get Full Irrigation Recommendations

Register now to access our full-featured irrigation recommendations! By registering, you'll benefit from:

- **More Accurate Calculations:** Our algorithm takes applied water into account, ensuring precise irrigation recommendations tailored to your specific needs.
- **Soil Water Balance Tracking:** Gain valuable insights into your soil moisture levels with our comprehensive soil water balance tracking feature.
- **Deficit irrigation planning:** Save water without harming your crops by using deficit irrigation planning, which optimizes water usage while maintaining crop health and yield.

Don't miss out on these powerful tools designed to optimize your irrigation management. Register today and take your irrigation planning to the next level!

[Register Now](#)

Figure 4. An irrigation recommendation calculator was added to the CropManage website so that users can quickly receive a recommendation of how much and long to irrigate their crops within California, Hawaii, and Arizona. The calculator is available for incorporation into other websites.

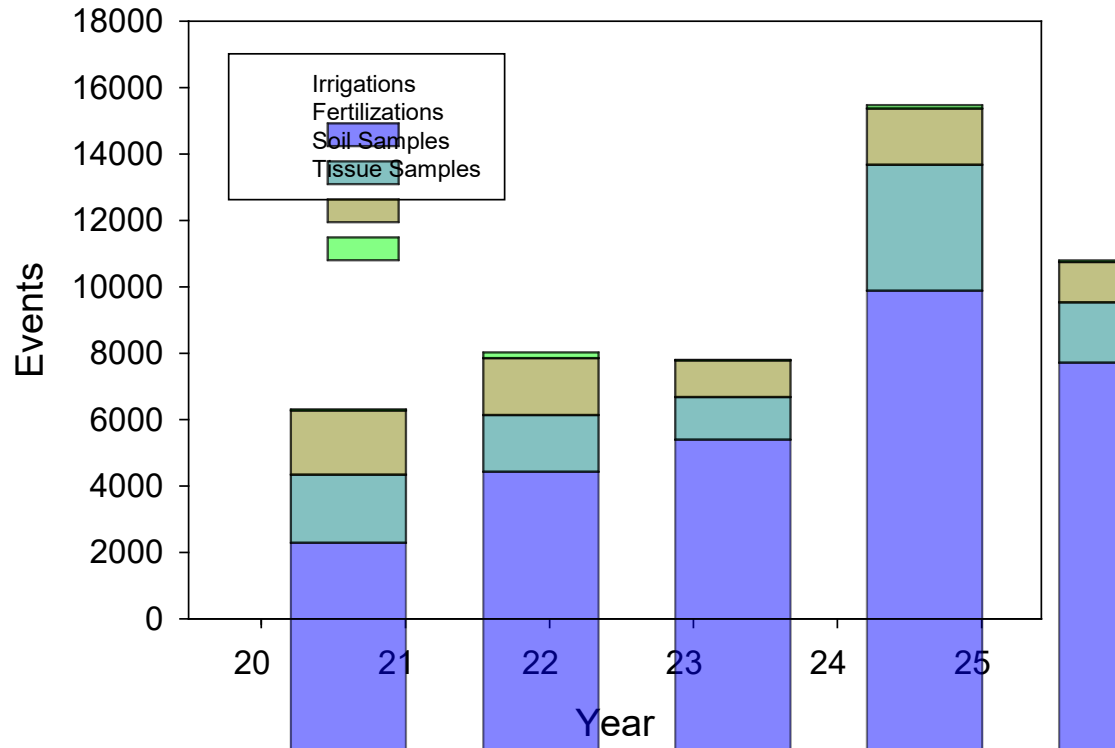


Figure 5. Irrigation, fertilizer, soil sample, and tissue sample events entered into CropManage by users.

G. Conclusions

This project resulted in many improvements in the CropManage irrigation and nutrient management decision support tool that led to increased adoption of nitrogen management best management practices by growers. Although the donation link raised some funds to support CropManage from users, most of the support was through grants from collaborating researchers, extension personnel, and technical assistance providers. Continued efforts to increase CropManage adoption and use through outreach activities, as well as improving the user experience of the application will be very important for sustaining the platform in the future.

H. Challenges

Significant challenges were confronted when working with large produce companies and when cooperating with commercial agtech companies. Changes in management or objectives within the companies ended successful collaborative efforts to increase CropManage implementation. It was also difficult to record all the impacts of CropManage on nitrogen management because many growers use the software intermittently to check their practices but do not record all their irrigation and fertilizer applications in CropManage. Although grants were shown to be the most reliable source of funding to sustain the decision support tool, leadership was required to coordinate funding, collaborative projects, and oversee progress of the software engineer. Though CropManage use significantly increased during the period of the project, the remanding of the AgOrder on the central coast region reduced the pressure on growers to improve nitrogen management and lessened the urgency to implement improve practices.

I. Project Impacts

- 72% increase in the use of CropManage was measured in 2025 compared to 2020, the year before the start of the project (Fig. 5)
- 52 outreach events were conducted with more than 1300 attendees
- More than 30 academic collaborators contributed to CropManage improvements and outreach
- Approximately \$1.6 million supported CropManage and extension activities during the period of the project through collaborative relationships
- CropManage userbase increased to more than 5500

J. Outreach Activities Summary

Table 4. Summary of outreach activities from 2021-25

#	Date	Meeting name	Presentation Topic	Sponsors/Co-Sponsors	Location	Attendance
1	5/4/2021	CropManage Hands-on training workshop	Intro and hands-on exercises on CropManage	UCCE Monterey and Ventura	Webinar	61
2	5/21/2021	Plant mineral nutrition course	Decision support tools for optimizing N management of	UC Davis Plant Sciences Dept.	Zoom presentation	20
3	8/11/2021	Irrigation decision support system field day	CropManage for irrigation decision support	UC Davis LAWR	Winters CA	12
4	8/25/2021	Management Meeting for Berry and Vegetable Crops	CropManage update	UCCE Ventura	Zoom presentation	70
5	1/12/2022	2022 San Joaquin Valley Grape Virtual Symposium	CropManage Irrigation and Nitrogen Tool for Grapevines	UCCE Fresno	Zoom presentation	85
6	1/14/2022	SJC and Delta Field Crops VIRTUAL Meeting	Decision Support Tool for Irrigation Scheduling and Nitrogen Management	UCCE San Joaquin	Zoom presentation	43
7	1/26/2022	CropManage Workshop	CropManage hands-on training	UCCE Stanislaus	Modesto CA	12
8	2/9/2022	CropManage Workshop	CropManage hands-on training	UCCE Imperial	Coachella CA	11
9	2/10/2022	CropManage Workshop	CropManage hands-on training	UCCE Imperial	Imperial CA	3
10	5/10/2022	CropManage Workshop	CropManage hands-on training	UCCE Santa Cruz\RCD SSC	Watsonville CA	15 ST
11	5/20/2022	Irrigation and Nutrient Management Workshop	Introduction to CropManage	UC ANR, UC Riverside and FREP	Parlier CA	45
12	5/20/2022	CropManage Workshop	CropManage hands-on training	UC ANR, UC Riverside and FREP	Parlier CA	15
13	7/15/2022	CropManage Workshop	CropManage Vineyard hands-on training	UCCE Monterey	Soledad CA	5
14	8/31/2022	UCCE Ventura water and nutrient management meeting	CropManage update	UCCE Ventura	Oxnard	60 ST
15	10/18/2022	Plant Science Lab 110	Decision support tools for optimizing N management of vegetables	UC Davis	Zoom	30

#	Date	Meeting name	Presentation Topic	Sponsors/Co-Sponsors	Location	Attendance
16	11/22/2022	D'Arrigo Fall Research Review	CropManage Can do more to support Irrigation & Nutrient	D'Arrigo Bro	Salinas CA	20
17	1/23/2023	CalPoly nutrient management class	CropManage irrigation and nutrient management decision support tool	CalPoly CSU	Zoom presentation	15
18	2/23/2023	Southwest Agricultural Summit	Irrigation Efficiency in Salinas Leafy Green Production	University of Arizona	Yuma AZ	15
19	3/7/2023	UCCE Monterey vineyard meeting	Adapting CropManage Irrigation and Nitrogen Decision Support Tool for Grapevines	UCCE Monterey	Salinas CA	30
20	3/9/2023	Western Nutrient Management Conference	Support Tool for Improving Irrigation and Nutrient Use Efficiency of Cool Season Vegetables	Western nutrient management conference, WERA-103	Reno NV	25
21	3/15/2023	CropManage overview	Introduction to CropManage for vineyards	Scheid Vineyards	Greenfield CA	4
22	4/4/2023	Sustainable Agriculture with Artificial Intelligence Extension Workshop	CropManage Decision Support Tool for Improving Irrigation and Nutrient Use Efficiency	University of Arizona, AI4SA	Maricopa AZ	14
23	4/6/2023	Sustainable Agriculture with Artificial Intelligence Extension Workshop	CropManage Decision Support Tool for Improving Irrigation and Nutrient Use Efficiency	Colorado State University, AI4SA	Loma CO	25
24	5/17/2023	Cal Poly lecture: Current Issues in the Strawberry Industry	Water and Nutrient Management	Cal Poly	San Luis Obispo CA	25
25	7/7/2023	CropManage tailgate meeting	Review irrigation of strawberries	SCC RCD	Aromas CA	8
26	8/3/2023	Vineyard team podcast	CropManage: Improving the Precision of Water and Fertilizer Inputs in Vineyards	Vineyard team	podcast	> 695 downloads
27	9/12/2023	22nd Annual strawberry production meeting in Ventura county	Irrigation and nutrient management of strawberry	UCCE Ventura	Ventura CA	72
28	9/22/2023	Strawberry training	Irrigation and nutrient management in strawberry	CalPoly Reiter Berry	San Luis Obispo CA	60
29	10/31/2023	Advances in water management in grapes workshop	Adaptación de la herramienta CropManage de apoyo para la toma de decisiones sobre riego y nitrógeno para su uso en vid	UC Davis, Centro de Estudios Vitivinícolas del CETYS Universidad	Encenada, Baja N. Mexico	40 SP
30	11/9/2023	Fertilizer Research and Education Program Annual Conference	Update on CropManage Online Irrigation and Nutrient Management Decision Support Tool	CDFA/FREP	Modesto CA	100

#	Date	Meeting name	Presentation Topic	Sponsors/Co-Sponsors	Location	Attendance
31	2/20/2024	2024 Irrigation and Nutrient Meeting	Using CropManage for AgOrder compliance	UCCE Monterey	Salinas CA	110
32	3/1/2024	Advance Irrigation and Nutrition Management (AGPS415)	Introduction to CropManage	CSU Monterey Bay UCCE	Marina CA	35
33	3/7/2024	CropManage Hands-on Workshop	Introduction and Hands-on Training for using CropManage	Monterey/Santa Cruz Co. RCD	Watsonville CA	30 ST
34	3/14/2024	CropManage Hands-on Workshop	Introduction and Hands-on Training for using CropManage	UCCE Stanislaus UCCE	Modesto CA	26
35	4/3/2024	CropManage Hands-on Workshop	Introduction and Hands-on Training for using CropManage	Monterey/Santa Clara/Santa Cruz UCCE Santa	Salinas CA	18
36	4/10/2024	CropManage Hands-on Workshop	Introduction and Hands-on Training for using CropManage	Clara/Santa Cruz Co. RCD	San Martin CA	15
37	4/12/2024	Viticulture Research Download - 2024	CropManage 2023 season review and update	The Wine Group	Chowchilla CA	18
38	4/25/2024	Monterey Pacific Vineyards Grower Meeting	CropManage 2023 season review and update	Monterey Pacific Vineyards	Arroyo Seco CA	5
39	1/23/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE Monterey/SCC RCD	Watsonville CA	18
40	1/28/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE/Formation	Bakersfield CA	11
41	1/29/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE/Formation	Parlier CA	15
42	1/30/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE/Formation	Tulare CA	11
43	2/4/2025	Annual Grower Meeting	CropManage review in processing tomato	UCCE/UCD	Winters CA	5
44	2/26/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE Bakersfield	Bakersfield CA	13
45	3/10/2025	Field Demo of CropManage System for cucurbit growers in Manteca	CropManage introduction	UCCE San Joaquin	Manteca CA	5
46	3/12/2025	CropManage workshop	CropManage training for processing tomato growers	UCCE San Joaquin	Woodland CA	6
47	3/14/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE Monterey/SCC RCD	Watsonville CA	10
48	3/18/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE Monterey/SCC RCD	Salinas CA	18
49	3/20/2025	CropManage online training	CropManage online demo to tomato growers	UCCE San Joaquin	Merced County	3
50	3/21/2025	CropManage train the trainer workshop	Hands-on training on getting started with CropManage	UCCE Formation	Stockton CA	18
51	3/27/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCC/SCC RCD	San Martin CA	6
52	5/8/2025	CropManage Hands-on training workshop	Hands-on training on getting started with CropManage	UCCE Ventura	Ventura CA	18

K. References

Cahn M., Smith R., Melton F. (2023) Field evaluations of the CropManage decision support tool for improving irrigation and nutrient use of cool season vegetables in California. *Agricultural water management* 287:108401. DOI: <https://doi.org/10.1016/j.agwat.2023.108401>
<https://www.sciencedirect.com/science/article/pii/S0378377423002664>

L. Appendix



CropManage News and Updates

January 24, 2022

Dear CropManage Users

During the last year we have made a lot of progress in improving and expanding the capabilities of the [CropManage Online Irrigation and Decision Support Tool](#). We added more commodities, created visualization tools, and streamlined the user interface so that CropManage is more intuitive and responsive. Some new features worth checking out are:

- Calendars for viewing and creating events.
- Charts comparing applied and recommended water and fertilizer.
- Graphical display of soil water status and crop evapotranspiration.
- Ability to view and edit daily rainfall and evapotranspiration data.
- Expanded [help documentation](#).
- Feedback link to report problems or give suggestions.

In addition to these features, we have improved many of the algorithms that drive CropManage, and added new commodities including tree crops (almond, pistachio, and walnut), alfalfa, and more vegetables (artichoke, carrot, Brussels sprout, pepper, and tomato).

CropManage remains a free online tool that is based on research conducted by Farm Advisors, Specialists, and Professors at the University of California. We continue conducting field trials to test and improve the decision support algorithms that drive CropManage.

Our collaborative approach is catching on. In recent years we are working closely with researchers and scientists at NASA, University of Arizona, University of Hawaii, and Oregon State University, as well as private companies such as [GeoVisual Analytics](#) to bring more capabilities, and more commodities to our decision support platform.



CropManage News and Updates

February 24, 2025



Winter 2025 Newsletter

As we begin another growing season, we want to update you on the latest features introduced to CropManage and announce upcoming training and learning opportunities. We have been continuing to improve CropManage over the winter. We hope that you find it easier to use and more crops available for making better decisions on irrigation and nutrient management.

Upcoming Trainings and Learning Opportunities

One of the best ways to learn more about the CropManage is to attend one of our upcoming in-person hands-on trainings. Bring your laptop or tablet computer to our workshops and we will show you step-by-step how to use CropManage. We will be conducting a workshop in Kern County on February 26th, and then in March, three more will be held in Watsonville (March 13th), Salinas (March 18th), and San Martin (March 27th), and one in May in Ventura (May 7th). See [below](#) for registration links.

If you cannot attend in person, then please visit our [online tutorials and documentation](#). If you have any questions or comments, please feel free to contact us through our feedback link in CropManage. There is also a technical support link where you can describe any bugs (errors) that you come across.

A More Intuitive User Experience

From setting up your farm for the first time to getting accurate irrigation and fertilization recommendations, we have simplified the user experience so that CropManage is quicker and more intuitive to use. CropManage leads you step-by-step when setting up a new planting. Need to make a change to an existing planting such as an update to the weather data, planting or irrigation date? CropManage automatically updates all the calculations behind each recommendation.

New crops

We have been working hard to increase the number of crops supported in CropManage. Developing models for new crops requires collaboration from researchers and growers who are willing to share their knowledge and expertise.

Most recently we added winegrapes and several additional tree crops. The most recent new vegetable crops are artichoke, carrot, and peas. For a complete list of crops available, check out this [blog post](#) on the CropManage Knowledge base, where you can learn more about CropManage features and find instructional tutorials.



CropManage Hands-on Workshop and Drop-in Office Hours

Bringing Irrigation and Nutrient Management Decision-Support to the Field

Date: Thursday, March 7, 2024

Course 10:30 am – 2 pm

Drop-in office hours 2-3:30 pm

Location: Watsonville Public Library

275 Main St., Suite 100, Watsonville, CA 95076

- Learn how to use [CropManage](#) to support irrigation and nutrient management decisions and record-keeping for your crops.
- Learn how to set up your ranch and crops in [CropManage](#).
- Learn about the latest updates and how [CropManage](#) can assist with Ag Order 4.0
- New—deep dive into advanced [CropManage](#) topics during office hours

[CropManage](#) is a free online decision-support tool for water and nutrient management of vegetables, berry, agronomic, and tree crops. Based on research and field studies conducted by the University of California Cooperative Extension, [CropManage](#) provides real-time recommendations for efficient and timely irrigation and fertilization applications while maintaining or improving overall yield.

At this **free** workshop, we will provide hands-on training so that you can learn to use the newest version of [CropManage](#). Crops currently supported include many vegetables (carrots, cabbage, celery, broccoli, lettuce, tomato, spinach, etc.), berry crops (raspberry and strawberry), tree crops (almond, walnut, pistachio, prunes, and pear), and agronomic crops (alfalfa and corn). [CropManage](#) is also available in Spanish.

A new addition to the workshop **are** drop-in office hours for anyone already familiar with [CropManage](#) and does not want to attend the full program but needs more advance assistance or may have specific questions. Stop by at 2 pm and we will be ready to help answer your questions and dive deep into more advanced topics.

Who should participate? Growers, farm managers, other farm staff, crop advisors, consultants, and technical service providers are welcome. The workshop is for both new and current [CropManage](#) users. Spanish translation will be available. **Lunch** will be provided.

What to bring? This is a participatory workshop. Please bring a tablet or laptop computer so that



M. Fact Sheet

Outreach and revenue generation for sustaining CropManage irrigation and nutrient management decision support tool

Grant agreement 20-0962-000-SA

Michael Cahn, Irrigation and Water Resources Advisor
UC Cooperative Extension, Monterey County
1432 Abbott St, Salinas, CA 93901

Start year: 2021, end year: 2025

Locations

Central Coast, Central Valley, Southern Desert regions of California

Highlights

- 72% increase in the use of CropManage was measured in 2025 compared to 2020, the year before the start of the project.
- 52 outreach events were conducted with more than 1300 attendees
- More than 30 academic collaborators contributed to CropManage improvements and outreach
- Approximately \$1.6 million supported CropManage and extension activities during the period of the project through collaborative relationships
- CropManage userbase increased to more than 5500

Introduction

California farmers are under regulatory pressure to use fertilizer nitrogen efficiently and demonstrate that they are following best management practices. Because nitrate can readily leach in soil, a combination of practices that help growers follow the 4Rs (right source, right amount, right time, right place) and optimize water management is required to achieve improved N use efficiency. CropManage (CM) is an online decision support tool developed by UCANR for assisting growers with efficiently managing water and nitrogen fertilizer to match the site-specific needs of their crops. CM also allows growers to track fertilizer and water applications on each of their fields (Fig. 1). The objective of this project was to increase outreach for the online irrigation and nutrient management decision support tool and implement strategies that financially sustain the software.

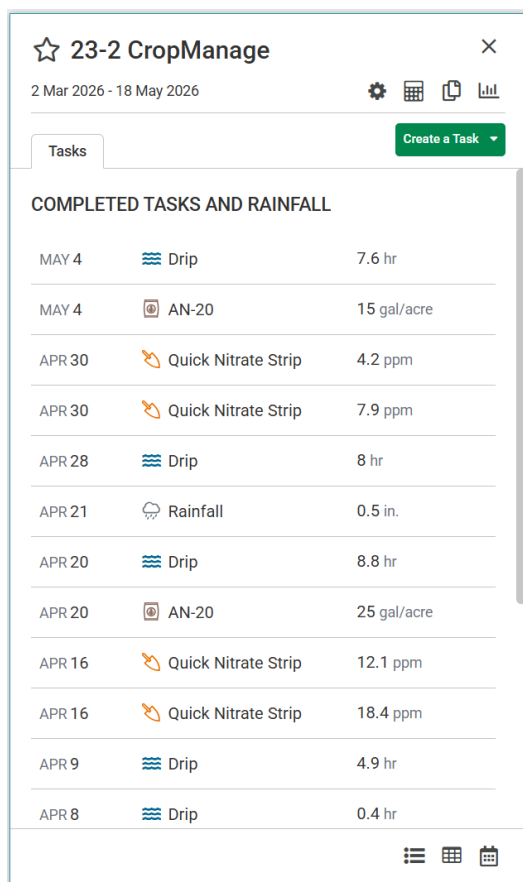


Figure 1. CropManage user interface allows users to track water and fertilizer use in individual plantings.

Management

More than 50 outreach events were conducted to introduce CropManage to the agricultural community and provide intensive training through hands—on workshops. Additionally, many enhancements were implemented to improve the user experience and revenue generation strategies were explored through discussions with users and collaborating organizations.

Findings

CropManage use increased by more than 70% by the end of the project (Fig. 2) as result of outreach efforts and an expansion of the commodities supported on the platform. Additionally, collaboration on new features and algorithms through grants has sustained the decision support platform and resulted in many useful additions and improvements that have attracted new users.

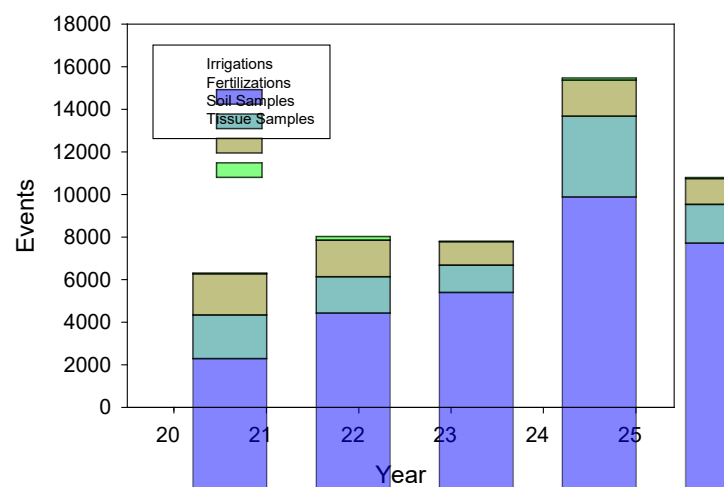


Figure 2. Irrigation, fertilizer, soil sample, and tissue sample events entered into CropManage by users during the project.