Fertilizer Research and Education Program

Final Report

A. Project Information

Project Title: Ventura County Nitrogen Management Training Program
Project leaders: Jodi Switzer
Grant Number: 20-0878-000-SA
Project Duration: Start Date: Jan 1, 2021, End Date: Dec 31, 2025
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B. Abstract

The Ventura County Nitrogen Management Training Program was developed to provide growers with the knowledge, tools, and certification opportunities needed to comply with evolving Irrigated Lands Regulatory Program (ILRP) requirements while improving the agronomically efficient and environmentally sound use of nitrogen fertilizers. At the time the project was proposed, Ventura County growers were regulated under the Los Angeles Regional Water Quality Control Board's Conditional Waiver of Waste Discharge Requirements (Order No. R4-2016-0143). Under this framework, growers operating in Responsibility Areas with nitrogen water quality benchmark exceedances or subject to Total Maximum Daily Load (TMDL) requirements were required to develop certified Nitrogen Management Plans (NMPs), affecting approximately 70 percent of Ventura County irrigated agricultural acreage.

During the project period, the regulatory landscape changed substantially. On September 28, 2023, the Los Angeles Regional Board adopted a new Agricultural Order (Order No. R4-2023-0353), implementing precedential requirements from the 2018 East San Joaquin Waste Discharge Requirements. This transition replaced NMP requirements with expanded Irrigation and Nutrient Management Plan (INMP) and Irrigation and Nutrient Management Report (INMR) requirements and extended applicability to all growers subject to the ILRP in the Los Angeles Region. As a result, the need for standardized, locally relevant, and accessible training to support compliance and implementation increased significantly.

From 2021 through 2025, this project delivered and continuously refined a comprehensive nitrogen and irrigation management training program tailored to Ventura County cropping systems, regulatory requirements, and grower needs. Key outcomes include the development of a region-specific training curriculum and workbook, delivery of bilingual in-person and online training workshops, and certification of 274 growers between 2021 and 2025. The project improved grower readiness to comply with evolving regulatory requirements while supporting environmentally safe and agronomically sound nitrogen management practices.

C. Introduction

The Ventura County Nitrogen Management Training Program was initiated in response to increasing regulatory requirements and documented nitrogen-related water quality concerns in Ventura County. At the time of the original project proposal, agricultural operations in the region were regulated under the Los Angeles Regional Water Quality Control Board's Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order No. R4-2016-0143). This Conditional Waiver implemented the Irrigated Lands Regulatory Program (ILRP) in the Los Angeles Region and required growers located in Responsibility Areas with nitrogen water quality benchmark exceedances or nutrient-related Total Maximum Daily Loads (TMDLs) to develop certified, site-specific Nitrogen Management Plans. These requirements applied to approximately 70 percent of Ventura County's irrigated agricultural acreage.

The structure and content of these nitrogen management requirements were modeled after the Central Valley ILRP program, including a self-certification pathway requiring growers to complete CDFA FREP-approved training and pass an exam. However, Ventura County growers faced unique cropping systems, irrigation practices, and regional regulatory nuances that were not fully addressed by existing training materials. Recognizing both the regulatory need and the opportunity to improve nutrient management outcomes, the Ventura County Agricultural Irrigated Lands Group (VCAILG), administered by the Farm Bureau of Ventura County, partnered with University of California Cooperative Extension (UCCE), CDFA FREP, and other local partners to adapt existing Central Valley nitrogen management training materials for Ventura County conditions.

Over the course of the project, the regulatory framework governing nitrogen management evolved significantly. On September 28, 2023, the Los Angeles Regional Water Quality Control Board adopted a new Agricultural Order (Order No. R4-2023-0353), implementing precedential requirements first established in the 2018 East San Joaquin River Watershed Waste Discharge Requirements. This regulatory shift fundamentally changed the scope of nitrogen management in the region by converting the prior Nitrogen Management Plan requirement into Irrigation and Nutrient Management Plan and Reporting (INMP/INMR) requirements and expanding applicability to all growers regulated under the ILRP in the Los Angeles Region. The new framework also introduced reporting requirements for applied and removed nitrogen, substantially increasing both the scope and depth of compliance obligations for Ventura County growers.

These changes more than doubled the acreage subject to formal nutrient management planning and reporting requirements and intensified the need for accessible, consistent, and locally relevant training. In response, this project evolved beyond its original scope to incorporate updated regulatory requirements, revised definitions of management units, the addition of a Ranch Builder planning step, and enhanced reporting concepts. The training program was repeatedly updated between 2021 and 2025 to ensure

alignment with current regulations, incorporate grower feedback, and address the practical realities of on-farm implementation.

Throughout the project period, the program emphasized education as a foundational tool for improving nitrogen use efficiency and protecting water quality. Through curriculum revision, bilingual material development, and delivery of in-person and online workshops, the project equipped growers with the knowledge, tools, and certification needed to comply with evolving ILRP requirements while supporting environmentally safe and agronomically sound use of nitrogen fertilizers.

D. Objectives

The objectives of this project were to:

1. **Provide Ventura County growers with the information and credentials needed to develop site-specific Nitrogen Management Plans (NMPs) and Irrigation and Nutrient Management Plans (INMPs).**
   This objective responds to both previous and current regulatory requirements. Under the Conditional Waiver, growers located in Responsibility Areas associated with nutrient water quality exceedances or nutrient TMDLs were required to develop certified NMPs to adequately address water quality benchmark exceedances. With the adoption of the 2023 Ag Order (Order No. R4-2023-0353), all Ventura County growers are now required to develop certified INMPs that meet the updated Irrigated Lands Regulatory Program requirements, including nitrogen tracking and reporting, regardless of water quality conditions in their area. The workshops demonstrate the value of NMPs and INMPs as practical management tools rather than purely regulatory forms, using example scenarios to guide growers in developing, applying, and fully utilizing the information generated. Certification in-house supports compliance in a cost-effective manner and ensures growers are prepared to meet existing regulatory requirements.
2. **Expand training availability to field workers responsible for implementing the plans.**
   Personnel who implement NMPs and INMPs benefit from the same knowledge as those who develop the plans. This objective ensures training is accessible to field staff, addressing language barriers through Spanish translation and offering multiple workshop dates to accommodate seasonal work schedules.
3. **Improve surface and groundwater quality through an education program focused on crop-specific irrigation and nutrient management.**
   The training emphasizes the 4R principles—right source, right rate, right time, and right place—to match nutrient application to plant demand. This approach reduces the potential for excess fertilizer to leach into groundwater or run off into surface waters, supporting overall water quality goals.
4. **Increase awareness of grower resources, including crop-specific nitrogen demand and removal factors.**

Research-based nitrogen removal coefficients for various crops are made available to growers through this program. By connecting growers with subject matter experts and regulatory guidance, the training bridges the gap between research and practice, promoting efficient and environmentally responsible nutrient management.

5. **Address barriers to education by providing Spanish translation.** Spanish-language access is critical for many agricultural workers. Beginning in 2024, this project offers at least one workshop annually with active and written Spanish translation, enabling broader participation among growers and field staff.
6. **Incentivize workshop attendance by maintaining free or low-cost registration and offering a variety of dates throughout the year.** Keeping registration costs low and scheduling multiple sessions ensures greater participation and allows growers to send additional staff who would benefit from the training.

E. Methods

This project was implemented as an outreach and education program. Core methods included curriculum development, stakeholder collaboration, translation of educational materials, and delivery of in-person and hybrid training events.

Curriculum Development:
The CDFA FREP Central Valley INMP curriculum was reviewed and adapted to Ventura County agriculture. Updates included Ventura County–specific crop examples, irrigation practices, nitrogen application scenarios, and alignment with Region 4 Ag Order requirements. Additional program development work included creation of INMP and INMR templates, compilation of nitrogen removal coefficients through literature review, and coordination with Regional Board staff to clarify regulatory interpretation.

Training Delivery:
The majority of these trainings were delivered using a hybrid format combining in-person instruction and live Zoom participation. Sessions included lectures, worked examples, workbook exercises, and a proctored self-certification exam. Program promotion targeted growers subject to nitrogen management requirements through coalition communications and partner organizations.

Spanish-Language Access:
Training materials, including presentations, workbooks, handouts, and exams, were translated into Spanish to improve accessibility for Spanish-speaking growers. Select in-person trainings also included live Spanish interpretation. In addition, a Spanish-language online self-certification module, utilizing the translated curriculum, was recently launched through the CDFA FREP online training portal, further expanding equitable access to certification opportunities.

Evaluation:
Project success was evaluated using training attendance, exam performance, and

participant feedback. Metrics included number of trainings delivered, number of participants served, exam pass rates, and use of translated materials. Feedback was used to refine training content and delivery.

F. Data/Results

a. Material Deliverables

Over the course of the project (2021–2025), the following outreach and educational materials were developed, revised, and distributed to support grower compliance with nitrogen and irrigation management requirements:

- Ventura County-specific Irrigation and Nutrient Management Plan (INMP) Self-Certification training presentation (English and Spanish)
- Ventura County-specific Irrigation and Nutrient Management Plan (INMP) Self-Certification training workbook (English and Spanish)

All materials were designed to reflect Ventura County cropping systems, regulatory requirements, and reporting expectations under the ILRP.

b. Information on Events

Between 2021 and 2025, the project delivered multiple in-person, hybrid, and online nitrogen and irrigation management trainings for Ventura County growers and agricultural professionals.

Training Events Summary (final totals to be confirmed):

- Total trainings delivered: Six 6-hour workshops
- Total participants served: 414 (with 23 utilizing Spanish interpretation)
- Total exam takers: 301
- Total certifications issued: 274

Refer to the following table for a comprehensive summary of education events.

Table 1 Summary of Education Events and Outcomes

Year	Dates	Locations	Event Name/ Presentation Titles	Number of Participants	Exam Results	Type of Audience	Supporting Documentation	CEUs Offered
2021	Apr 6-7, 2021	**Remote:** Go to Training	Nitrogen Management Plan Self-Certification Webinar	In-Person: N/A Remote:31 **TOTAL: 31**	Passed: 28 Failed: 0 **TOTAL: 28**	Growers, farm managers, commodity group reps	Agendas, Go to Training attendance report, exam scores	6 VCAILG / 6 INMP CEUs
	Nov 3-4, 2021	**Remote:** Go to Training	Nitrogen Management Plan Self-Certification Webinar	In-Person: N/A Remote:12 **TOTAL: 12**	Passed: 9 Failed: 1 Retake: 0 **TOTAL: 10**	Growers, farm managers, commodity group reps	Agendas, Go to Training attendance report, exam scores	6 VCAILG / 6 INMP CEUs
2022-2023	No workshop offered due to in-progress regulatory revision							
2024	Aug 29-30, 2024	**In-Person:** United Water Conservation District Oxnard, CA **Remote**: Zoom	INMP Self-Certification Training	In-Person: 31 Remote:90 **TOTAL:121**	Passed: 82 Failed: 2 Retake: 0 **TOTAL: 84**	Growers, farm managers, commodity group reps	Agendas, sign-in sheets/Zoom attendance report, exam scores	6 VCAILG / 6 INMP CEUs
	Nov 12, 2024	**In-Person:** United Water Conservation District Oxnard, CA **Remote**: Zoom	Irrigation and Nutrient Management Refresher Training	In-Person: 10 Remote:49 **TOTAL:59**	N/A	Growers, farm managers, commodity group reps	Agendas, sign-in sheets/Zoom attendance report	2 VCAILG / 2 INMP CEUs
2025	Jan 29-30, 2025	**In-Person:** United Water Conservation District Oxnard, CA **Remote**: Zoom	INMP Self-Certification Training	In-Person: 42 Remote:83 **TOTAL: 125**	Passed: 83 Failed: 14 Retake: 5 **TOTAL:97**	Growers, farm managers, commodity group reps	Agendas, sign-in sheets/Zoom attendance report, exam scores	6 VCAILG / 6 INMP CEUs
	Feb 25-26, 2025	**In-Person:** United Water Conservation District Oxnard, CA **Remote**: Zoom	INMP Self-Certification Training	In-Person: 44 (21 w/ Spanish Interpretation) Remote:42 **TOTAL: 86**	Passed: 52 Failed: 17 Retake: 2 **TOTAL: 69**	Growers, farm managers, commodity group reps	Agendas, sign-in sheets/Zoom attendance report, exam scores	6 VCAILG / 6 INMP CEUs
	Dec 9-10, 2025	**In-Person:** Holiday Inn Ventura-Oxnard, Oxnard, CA	INMP Self-Certification Training	In-Person: 39 (2 w/ Spanish Interpretation) **TOTAL:39**	Passed: 13 Failed: 0 **TOTAL: 13**	Growers, farm managers, commodity group reps	Agendas, sign-in sheets, exam scores	6 VCAILG / 6 INMP CEUs
				Total Attendees*: 414 (23 w/ Spanish Interpretation)	**Total Certified: 274**			

* Does not include Nov 12, 2024, Refresher Training attendees due to their prior attendance at a full self-certification training event

c. Impact Measures
Project impact was evaluated using attendance records, participant exams, and post-training feedback collected during and after training sessions. Exam performance served as a primary metric for assessing knowledge transfer and comprehension of nitrogen management concepts and regulatory requirements.

Evaluation Results – 2021-2025 training period:

- First-attempt exam pass rate: 89%
- Retake success rate: 7 of 8 participants

These results indicate strong participant understanding of training material and effective knowledge transfer. Ongoing curriculum refinement, incorporation of grower feedback, and bilingual delivery further supported participant engagement and successful certification outcomes.

G. Discussion and Conclusions
The project successfully met its objectives by establishing a locally relevant, scalable nitrogen management training program for Ventura County growers. Despite delays caused by regulatory extensions, the project demonstrated flexibility and rapid implementation once regulatory certainty was achieved.

High exam pass rates indicate that the curriculum effectively conveyed nitrogen management principles and regulatory requirements. Expanded Spanish-language access addressed an important equity and outreach need within the agricultural community.

H. Challenges
Regulatory timing remained the most significant challenge during the early years of the project, as delays in adoption of the Los Angeles Region Irrigated Lands Regulatory Program (ILRP) Order postponed implementation of Region 4-specific training content. This challenge was addressed through approved no-cost extensions and by advancing project components that could proceed independently, including translation of training materials and core program development activities.

An additional challenge identified during the implementation phase was the potential introduction of a grower attendance fee-based cost-share, as requested by the FREP Technical Advisory Subcommittee (TASC). While a cost-share approach may support long-term program sustainability, implementation presented a significant administrative burden. Evaluation of electronic payment collection options showed that platform subscription fees, transaction costs, staff time, and accounting requirements would exceed the anticipated revenue generated from modest registration fees.

As a result, a fee-based cost-share was not implemented during the grant period. Lessons learned from this evaluation highlighted the need for any future cost-share

structure to be designed at a scale sufficient to offset administrative and platform costs. Additional options will be evaluated moving forward, including increasing the grower cost-share amount or identifying alternative payment mechanisms to support the ongoing implementation of the training program beyond the grant period.

At the same time, the project benefited from significant cost savings through a partnership with United Water Conservation District (UWCD). UWCD provided no-cost access to a hybrid-equipped boardroom for in-person trainings, along with IT staff support to facilitate remote participation. This partnership eliminated the need to secure a private venue and contract audiovisual services, resulting in an estimated cost savings of approximately $8,500 over the course of the project - funds that otherwise would have been required to host comparable trainings at private facilities.

I. Project Impacts

This project advanced the environmentally safe and agronomically sound use of fertilizing materials in Ventura County by providing growers with practical, locally relevant training and the certification required to implement site-specific irrigation and nutrient management. Through education and regulatory-aligned tools, the program improved grower understanding of crop nitrogen demand, nitrogen application timing, and nitrogen removal, strengthening the linkage between agronomic decision-making and water quality protection.

As a result of this project, growers increased adoption of formal nutrient management planning and recordkeeping practices, enhanced their ability to track applied and removed nitrogen, and improved preparedness to meet evolving Irrigated Lands Regulatory Program (ILRP) requirements, including INMP and INMR reporting. By translating complex regulatory and technical concepts into accessible, Ventura County-specific guidance, the project reduced compliance barriers while promoting more efficient nitrogen use, thereby reducing the potential for excess nitrogen losses to surface and groundwater resources.

Beyond improving the nutrient management practices of individual operations, the project established a long-term regional training framework, including locally focused content, bilingual materials, online self-certification options, that will continue to support nutrient management improvements, regulatory compliance, and water quality protection well beyond the project period.

J. Outreach Activities Summary

A summary of the education and outreach activities conducted under this project is provided in **Section F. Data/Results**. All outreach efforts consisted exclusively of the nitrogen and irrigation management workshops delivered between 2021 and 2025. These workshops represent the entirety of project outreach and included in-person and online sessions, bilingual materials, and self-certification opportunities. No additional outreach events were conducted outside of these workshops. A detailed table

summarizing each workshop, including dates, locations, audience type, participant numbers, and supporting documentation, is included in Section F.

K. References

There are no external references cited for this project.

L. Appendix

No supplemental figures, tables, or appendices are included for this project. All relevant project data, materials, and results are reported within the main body of this report.

M. Factsheet/Database Template

A 2-page project fact sheet summarizing the Ventura County Nitrogen Management Training Program is included on the following pages.

CDFA FREP Project Fact Sheet

1. Project Title: Ventura County Nitrogen Management Training Program

2. Grant Agreement Number (Assigned by CDFA): 20-0878-000-SA

3. Project Leaders

Jodi Switzer
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Farm Bureau of Ventura County / Ventura County Agricultural Irrigated Lands Group (VCAILG)

Collaborating partners:

CDFA Fertilizer Research and Education Program (FREP); UC Cooperative Extension; Fruit Growers Laboratory; Larry Walker Associates; NRCS; Ventura County Resource Conservation District

4. Start Year / End Year: 2021 – 2025

5. Location: Ventura County, California (in-person and online delivery)

6. County: Ventura County

7. Highlights

- Delivered six 6-hour hybrid and in-person nitrogen and irrigation management workshops.
- Trained 414 participants, with 301 taking exams and 274 achieving certification.
- Implemented bilingual materials and live Spanish interpretation, serving 23 Spanish-speaking participants.
- Transitioned training program from Conditional Waiver/NMP to Ag Order/INMP requirements.
- Developed Ventura County-specific training workbook, templates, and nitrogen removal coefficients approved by the Los Angeles Regional Water Quality Control Board.
- High first-attempt exam pass rate (89%) demonstrates effective knowledge transfer.
- Partnerships with United Water Conservation District enabled cost savings (~$8,500) and expanded remote access.

8. Introduction

The Ventura County Nitrogen Management Training Program was developed to provide growers with the tools, knowledge, and certification needed to meet evolving nitrogen management requirements. Under the Los Angeles Regional Water Quality Control Board's Conditional Waiver (Order No. R4-2016-0143), growers in Responsibility Areas with nitrogen benchmark exceedances or nutrient TMDLs were required to develop certified Nitrogen Management Plans (NMPs), affecting roughly 70% of Ventura County's irrigated acreage.

While similar requirements have existed in the Central Valley for over a decade, Ventura County lacked a locally tailored training program aligned with regional crops, irrigation practices, and regulatory nuances. To fill this gap, the program adapted CDFA FREP's Central Valley curriculum for Ventura County and provided bilingual, accessible training opportunities.

The 2023 Agricultural Order (R4-2023-0353) expanded applicability to all ILRP-regulated growers and introduced certified Irrigation and Nutrient Management Plans (INMPs) and Reports (INMRs). This increased the scope and complexity of compliance, highlighting the need for practical training and certification. The program equips growers to implement agronomically efficient, environmentally responsible nitrogen management while maintaining compliance readiness.

9. Methods / Management

This project focused on updating, translating, and delivering a Ventura County–specific INMP self-certification training program. Key activities included:

- Adapting the CDFA FREP Central Valley INMP curriculum to Ventura County crops, irrigation practices, and the Los Angeles Region's Ag Order requirements.
- Developing Ventura County–specific INMP and INMR templates and compiling nitrogen removal coefficients through literature review and consultation with Regional Board staff.
- Delivering six 6-hour hybrid and in-person workshops, with bilingual presentation, workbook, and exam materials.
- Translating all training materials - presentations, workbooks, handouts, and exams - into Spanish and providing live interpretation during select trainings.
- Supporting the creation of a Spanish-language online self-certification module to expand access for Spanish-speaking growers.
- Evaluating project success using multiple metrics, including participation rates, exam outcomes, and grower engagement, rather than attendance alone.

10. Findings

- Total participants: 414; total exam takers: 301; total certifications: 274.
- First-attempt exam pass rate: 89%; retake success: 7 of 8 participants.
- Spanish-language access enabled broader participation and equitable training opportunities.
- Growers now have locally relevant tools to implement NMPs/INMPs, track applied and removed nitrogen, and comply with both previous and current regulatory requirements.
- Program successfully bridged research and practice by making nitrogen removal coefficients, regulatory guidance, and management strategies accessible to the Ventura County agricultural community.
- Cost-saving partnerships enabled broader participation and resource efficiency, reinforcing the sustainability of ongoing training efforts.