

## Final Report

### A. Project Information

**Report type:** Final Report

**FREP Grant Number:** 20-0961-000-SA

**Time covered by the grant period:**

**Start Date:** January 1, 2021

**End Date:** December 31, 2024

**Project Title:** Certification and Distance Learning for Fertigation

**Project Leaders:** Stuart Styles/ Sierra Layous

### B. Abstract

The intent of this project was to improve technical education regarding the need to apply nitrogen and other fertilizers with a high efficiency. California has over 4.1 million acres with intensively farmed drip/micro irrigation, and about 1 million more acres with sprinklers, almost all of which apply fertilizer through irrigation water (fertigation). The lack of readily available pragmatic information and training related to fertigation is a major stumbling block to improving nitrogen fertilizer efficiency.

This project developed a wealth of material regarding the chemicals, application hardware, techniques, and timing of fertilizer application through irrigation water. All material is publicly available in both English and Spanish on YouTube™ and through the ITRC website. The in-house English- and Spanish-language Certified Fertigator courses are active and open for enrollment on ITRC's website. Participants who pass the exam at the end of the course receive a certificate of completion.

The videos have received over 17,000 views with over 1,800 hours of viewing time. The in-house English- and Spanish-language Certified Fertigator courses are active and open for enrollment on ITRC's website. Participants who pass the exam at the end of the course receive a certificate of completion. There has been a total of 50 attendees and 36 recipients of the 'Certified Fertigator' certificate.

The program details are publicized on the ITRC website and have been presented at various conferences.

### C. Introduction

Fertigation and chemigation are terms that encompass the application of fertilizers plus water treatment chemicals such as soluble gypsum, acid, and other related chemicals to crops via irrigation systems. There is a lack of accessible training for irrigators and specialists regarding both simple and complex concepts of chemistry, fertilizer needs, application hardware, and irrigation system characteristics. This project intended to address that with both English and Spanish training materials and certifications.

## **D. Objectives**

This project had the following 5 objectives:

1. Develop 21 excellent distance-learning modules for various aspects of fertigation including nitrogen processes and management. These modules will utilize information available in the Irrigation Training and Research Center/FREP book *Fertigation* (2018) that was developed under FREP Grant Agreement 15-0393-SA.
2. Make fourteen of the basic modules available in both English and Spanish for free on YouTube.
3. Make the remaining seven modules in English available for free on YouTube.
4. Expand the first fourteen modules to include interactive quiz questions. Develop and implement a “California Fertigator” certification with these, targeting employees and employers involved in fertigation. This will be housed on ITRC’s online course website.
5. Provide the Irrigation Association with all materials and questions for a more complete Fertigation Certification program.

## **E. Methods**

Objective 1 was to develop twenty-one excellent distance-learning modules for various aspects of fertigation including nitrogen processes and management. These videos utilize information available in the ITRC/FREP book *Fertigation* (2018) that was developed under FREP Grant Agreement 15-0393-SA. In 2021, eight modules were completed. In 2022, twenty-two modules (rather than twenty-one) were completed.

Objective 2 was to make fourteen of the basic modules available in both English and Spanish for free on YouTube. Spanish versions were to have figures, tables, and text in Spanish. The remaining seven modules would be in English, available for free on YouTube. In 2021, the *Fertigation* book was translated to Spanish, edited, and reviewed. This was beyond the original objective, but the book is the main reference and supplement to the web-based training and the tables in the book are used in the web-based training. Translating the book initially ensured consistent terminology used throughout the Spanish-language training. In 2022, the *Fertigation* book was published

in Spanish (available for free download at [itrc.org](http://itrc.org)), and twenty-two videos were completed in both English and Spanish – well beyond the original objective. Eight of the English videos were placed on YouTube in November 2022. By the end of 2023, all videos were uploaded to YouTube and available to the general public as a playlist on the ITRC YouTube Channel.

Objective 3 was to expand the first fourteen modules to include interactive quiz questions. ITRC was to develop and implement a “California Fertigator” certification with these, targeting employees and employers involved in fertigation. This was to be housed on ITRC’s online course website. In 2022, the questions and answers for the first 10 videos were completed. In 2023, the asynchronous, online courses were developed based on the fertigation videos. A preliminary question bank was created for future quizzes and exams. Information about the book, videos, and ITRC course was presented by Carlos Orozco (technical translator working with ITRC) at the Annual Fertilizer Research and Education Program (FREP) and Western Plant Health (WPH) Nutrient Management Conference in November 2023 and October 2024.

Objective 4 was to provide the Irrigation Association (IA) with all materials and questions for a more complete Fertigation Certification program. In 2022, the offer to provide the materials to the IA was made. ITRC had been in contact with a revolving door of administrators for the Irrigation Association. In each case, there has been strong interest, but then the person leaves. In 2023, the IA had not pursued a partnership further, so ITRC investigated additional ways to market the course. In 2024, ITRC adapted the in-house “California Fertigator” program into an in-house “Certified Fertigator” program.

## **F. Data/Results**

The project has developed a tremendous suite of excellent educational/awareness products. Twenty-two videos were completed in English and Spanish – well beyond the original objective. All videos were uploaded to YouTube and are available to the general public on the ITRC YouTube channel. A list of the videos and their durations are shown in Table 1. The in-house English- and Spanish-language Certified Fertigator courses are active and open for enrollment on ITRC’s website. Participants who pass the exam at the end of the course with a score of 70% or higher receive a certificate of completion.

**Table 1.** Summary of Fertigation videos

Language	Title	Duration (h:mm:ss)
English	1 - Overview	0:15:18
	2 - Basic Fertilizer Chemistry and Vocabulary	0:51:43
	3 - N and the Environment	0:15:15
	4 - Basic Soil Principles	0:52:55
	5 - Crop Fertilizer Requirements	1:05:31
	6 - Testing of Plants Soil and Water	0:41:20
	7 - Fertilizer Labels Characteristics and Usage	0:27:06
	8 - Nitrogen Conversions	0:18:35
	9 - Volatilization of ammonia from irrigation water	0:07:17
	10 - Irrigation System Uniformity and Efficiency	0:36:37
	11 - Safety	0:26:04
	12 - Purging Media Tanks of Chemicals	0:07:05
	13 - Calibration, Titration, and Travel Time	0:23:19
	14 - Varying Venturi Injection Rates	0:13:33
	15 - Chemigation for Soil Infiltration Problems	0:35:23
	16 - SO <sub>2</sub> Generators	0:12:38
	17 - Chemigation for Drip System Maintenance	0:28:36
	18 - Incompatibility of Different Fertilizers	0:13:22
	19 - Proportional Injection	0:35:02
	20 - Fertilizer and Chemical Injection Devices	0:37:39
	21 - Calibration of Fertilizer and Chemical Injectors	0:12:04
	22 - Fertigation for Specific Methods	0:33:21
Spanish	1 - Visión general	0:15:37
	2 - Química y Vocabulario Básico de Fertilizantes	0:51:15
	3 - Manejo del nitrógeno y medio ambiente	0:19:16
	4 - Principios básicos del suelo	1:01:26
	5 - Requisitos de fertilizantes de los cultivos	1:07:54
	6 - Análisis de plantas, suelo y agua	0:45:50
	7 - Etiquetas, características y uso de fertilizantes	0:33:08
	8 - Conversiones del nitrógeno	0:18:18
	9 - Volatilización de Amoníaco del Agua de Riego	0:08:34
	10 - Uniformidad y eficiencia del sistema de riego	0:41:24
	11 - Seguridad	0:29:50
	12 - Tiempo Requerido Para Purgar...	0:08:20
	13 - Calibración, Titulación y Tiempo de Viaje	0:27:31
	14 - Variación de Tasas de Inyección...	0:15:57
	15 - Quimigación para problemas de infiltración...	0:36:49
	16 - Generadores de SO <sub>2</sub>	0:14:51
	17 - Quimigación para el mantenimiento...	0:29:21
	18 - Incompatibilidad de Fertilizantes Diferentes	0:15:44
	19 - Inyección proporcional	0:41:21
	20 - Dispositivos de Inyección de Fertilizantes...	0:44:22
	21 - Calibración de Inyectores Químicos	0:14:14
	22 - Fertirrigación para Métodos Específicos de Riego	0:35:54

## **G. Discussion and Conclusions**

All objectives of the project were met and a variety of excellent, free training materials in English and Spanish were developed through this program, including books, instructional videos, and an online course. While the outputs of this project will continue to be available as a resource to those looking for information of fertigation, initial response has shown their value.

Twenty-two educational videos regarding many aspects of fertigation were completed in English and Spanish – well beyond the original objective. All videos were uploaded to YouTube and are available to the public as a playlist on the ITRC YouTube channel. There were over 17,000 views with over 1,800 hours of viewing time since the modules were posted, with approximately 11 percent of the views being of the Spanish modules. The videos that have, by far, the most interest are (1) Fertilizer and Chemical Injectors and (2) SO<sub>2</sub> Generators. These videos are the most popular in both English (well over 2500 views each) and Spanish (over 150 views each). All the videos are available in English and Spanish at no cost on YouTube. See <https://www.itrc.org/databases.htm>, and select “Free Resources” on the home page.

Due to issues within the IA, ITRC had to adapt the certification courses to be in-house Certified Fertigator courses. In the future, there may be the opportunity to offer the courses through the IA. Regardless, the in-house English- and Spanish-language Certified Fertigator courses are active and open for enrollment on ITRC’s website. Participants who pass the exam at the end of the course receive a certificate of completion. There has been a total of 50 attendees and 36 recipients of the ‘Certified Fertigator’ certificate. These courses are available at no cost via the ITRC website ([www.itrc.org/classes/fertigation.htm](http://www.itrc.org/classes/fertigation.htm)). Participants who pass an exam at the end of the course receive a certificate of completion.

The Fertigation book was translated to Spanish, edited, and reviewed. This was beyond the original objectives, but the book is the main reference and supplement to the web-based training and the tables in the book are used in the web-based training. Translating the book initially ensured consistent terminology used throughout the Spanish-language training. The “Fertigation” (in English) and “Fertirrigación” (in Spanish) books are available for download via the ITRC website ([www.itrc.org/books/](http://www.itrc.org/books/)). The two books have been downloaded over 1,100 times.

## **H. Challenges**

There were several challenges encountered during the project. During and after development of the material, ITRC was in contact with the IA to establish them as an option for implementation of a “certified” course. ITRC found that the Irrigation

Association (IA) management was in a state of change, and despite promises, there was no progress on development of a certification program with the IA. ITRC intends to continue to work with the IA on the potential of a certification program through the IA for several years after the project ends. To ensure that a certification program was established, ITRC implemented an in-house “Certified Fertigator” program in both English and Spanish. This program complements existing in-house “Certified Irrigation System Evaluator” and “Certified Irrigator” programs.

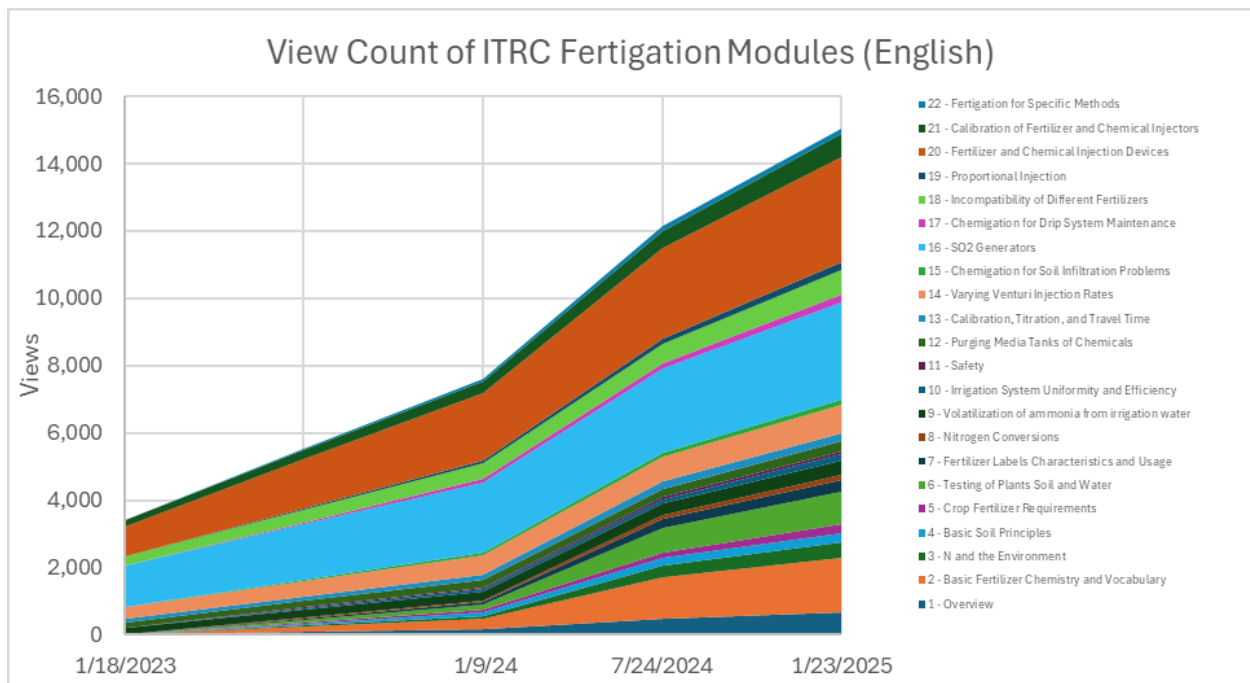
The translation from English to Spanish for all material (book, slides, narration) was difficult to ensure that the correct translations for Spanish speaking participants were used. ITRC found it challenging to match agricultural terminology, requiring careful adaptation to maintain clarity and meaning. This process highlighted the importance of including Spanish speakers with expertise in agriculture and irrigation to review and refine translations. As a result, ITRC found that collaboration with technical bilingual speakers is essential to ensure translations are not only accurate language-wise but also technically precise. This approach improved the quality of the materials and ensured they were accessible and effective for the intended audience.

## I. Project Impacts

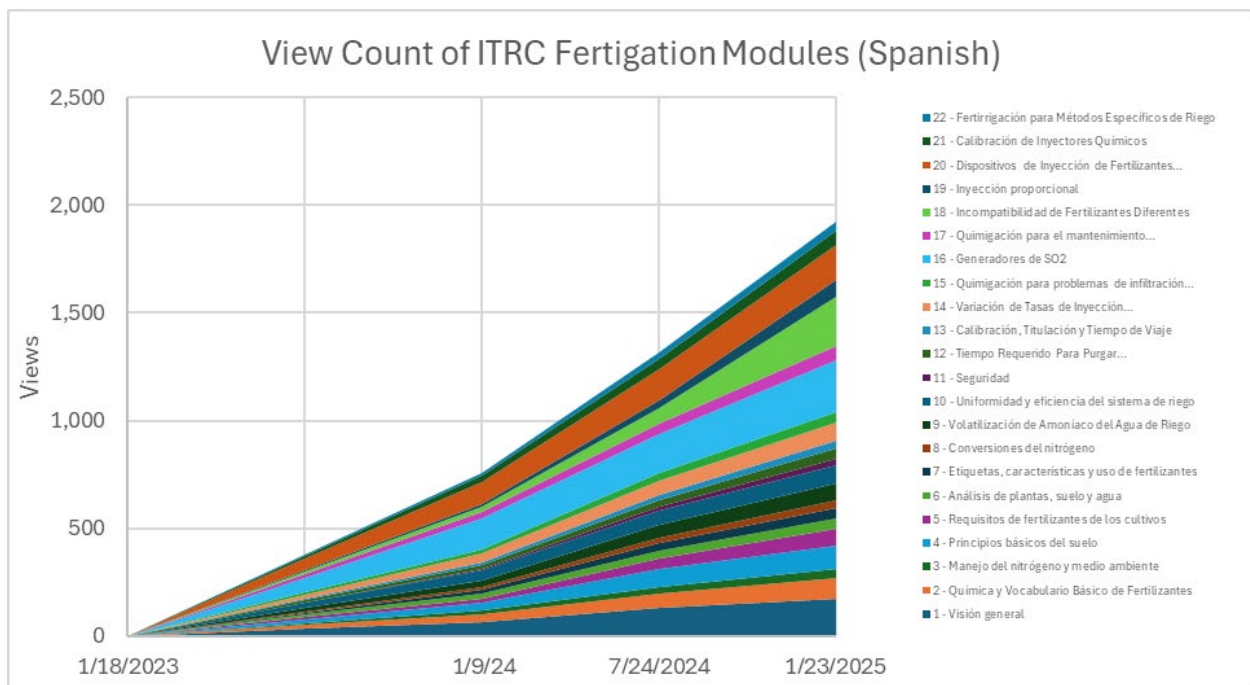
The quantifiable impacts of the project include view counts and viewing time of the modules as well as counts of the participants who accessed and/or completed the “Certified Fertigator” course. The development of these materials means the impacts are ongoing and will continue well beyond the end of the project.

The view counts over time of the YouTube videos are shown in Figure 1 and Figure 2. There were over **17,000 unique module views** encompassing over **1,800 hours** of viewing since the modules were posted. Approximately 11 percent of the views were for the Spanish modules. The videos that have, by far, the most interest are (1) Fertilizer and Chemical Injectors and (2) SO<sub>2</sub> Generators. These videos are the most popular in both English (well over 2,500 views each) and Spanish (over 150 views each). The current metrics regarding watch time and views are summarized below.

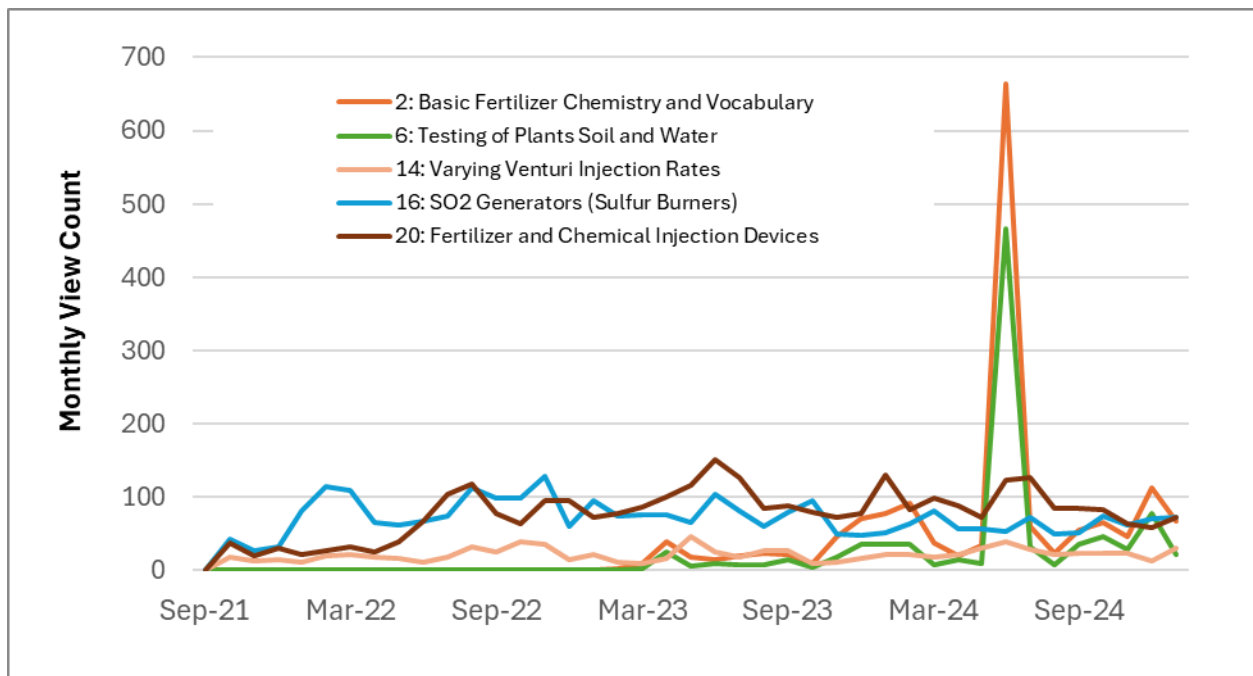
- YouTube Videos
  - Watch time:
    - Fertigation (E): 1,630 hours
    - Fertirrigacion (S): 178 hours
  - Views:
    - Fertigation (E): 15,170
    - Fertirrigacion (S): 1,933



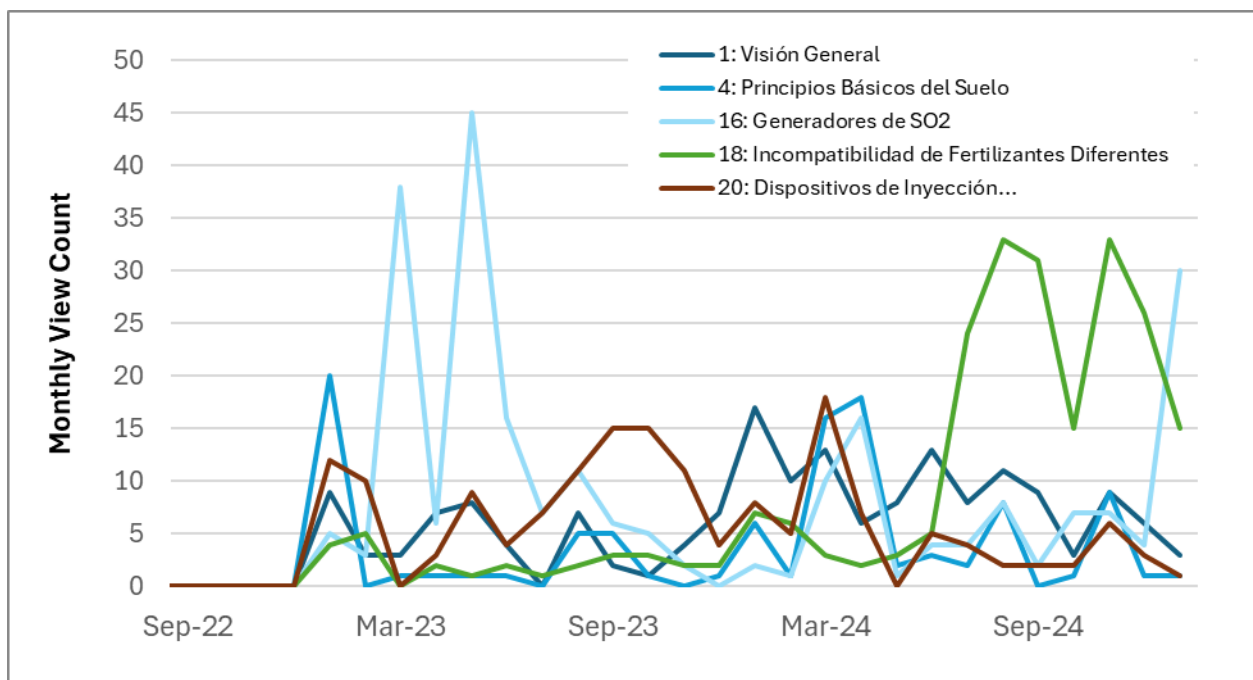
**Figure 1.** View count of ITRC fertigation modules (English)



**Figure 2.** View count of ITRC fertigation modules (Spanish)



**Figure 3.** Monthly view counts for most-watched English Fertigation videos



**Figure 4.** Monthly view counts for most-watched Spanish Fertigation videos



The asynchronous, online courses, available in both English and Spanish, are being utilized. To date, there have been a total of **50 attendees** and **36 recipients** of the 'Certified Fertigator' certificate.

The Fertigation book was translated into Spanish using this budget, even though that was beyond the original objectives; this allowed the course to have supplemental material available in both languages. The book is available for free download at [itrc.org](http://itrc.org). To date, **773** copies of "Fertigation" (English) and **349** copies of "Fertirrigación" (Spanish) have been downloaded.

These achievements highlight the growing recognition of practices of fertigation within the industry.

## **J. Outreach Activities Summary**

Outreach for this project came in the form of videos that are posted on YouTube, notifications to ITRC's e-mail list (sent October 2021, January 2024), advertising on ITRC's webpage (see <https://www.itrc.org/classes/fertigation.htm>), and conference attendance promoting the videos, courses, and material.

In addition to being publicly accessible on YouTube, the videos are available at [www.itrc.org/fertigation/videos.html](http://www.itrc.org/fertigation/videos.html). There are currently 870 subscribers to the ITRC YouTube channel. These subscribers are notified whenever ITRC posts new content.

ITRC presented the material at the following outreach events:

- California Agricultural Irrigation Association Fall Conference 2021
  - Date: Sept. 15, 2021
  - Location: Pismo beach
  - Activity: Presentation "Fertigation Update"
  - Number of Participants: 30+ attendees
  - Type of Audience: Irrigation industry professionals
  - Effectiveness/Impact: well-received
- CDFA/FREP Conference 2021
  - Date: Oct. 27, 2021
  - Location: San Luis Obispo
  - Activity: Advertised the availability of materials with a booth
  - Number of Participants: 100+ attendees
  - Type of Audience: Agriculture industry professionals
  - Effectiveness/Impact: well-received
- Irrigation Association Annual Conference 2021
  - Date: December 8-9, 2021

- Location: San Diego
- Activity: Featured the FREP materials in a booth; discussed certification with the new IA Executive Director
- Number of Participants: ~4,000 conference attendees
- Type of Audience: Irrigation industry professionals (engineers, dealers, growers)
- Effectiveness/Impact: Booth material was well received; IA ED showed high level of interest
- CDFA/FREP Conference 2023
  - Date: November 8-9, 2023
  - Location: Modesto
  - Activity: Presented the availability of materials with a presentation and poster.
  - Number of Participants: 120 attendees
  - Type of Audience: Agriculture industry professionals
  - Effectiveness/Impact: well-received
- CDFA/FREP Conference 2024
  - Date: October 29-30, 2024
  - Location: Seaside
  - Activity: Presented the availability of materials with a poster.
  - Number of Participants: unknown
  - Type of Audience: Agriculture industry professionals
  - Effectiveness/Impact: well-received

## **K. References**

Burt, C.M. 2019. Fertigation. Irrigation Training & Research Center, California Polytechnic State University, San Luis Obispo, California, USA. Second Edition. 280 pp.

Burt, C.M. 2021. Fertirrigación. Irrigation Training & Research Center, California Polytechnic State University, San Luis Obispo, California, USA. Second Edition. 280 pp.

## **L. Appendix**

*No appendix materials included in this report. All figures and tables are incorporated with the text.*

## M. Factsheet/Database

**1. Project Title:** Certification and Distance Learning for Fertigation

**2. Grant Number:** 20-0961-000-SA

**3. Project Leaders:** Stuart Styles

**4. Start Date:** Jan. 1, 2021    **End Date:** Dec. 31, 2024

**5. Location:** Cal Poly State University, San Luis Obispo, California

**6. County:** San Luis Obispo County

**7. Highlights:** Twenty-two videos were developed and available for viewing in English and Spanish on YouTube. Additionally, asynchronous, online courses were developed in English and Spanish based on the fertigation videos. The Fertigation book was translated into Spanish using this budget, even though that was beyond the original objectives; this allowed the course to have supplemental material available in both languages. The book is available for free download at [itrc.org](http://itrc.org).

The videos have received over 17,000 views with over 1,800 hours of viewing time. The in-house English- and Spanish-language Certified Fertigator courses are active and open for enrollment on ITRC's website. Participants who pass the exam at the end of the course receive a certificate of completion. There have been a total of 50 attendees and 36 recipients of the 'Certified Fertigator' certificate.

**8. Introduction:** Fertigation and chemigation are terms that encompass the application of fertilizers plus water treatment chemicals such as soluble gypsum, acid, and other related chemicals to crops via irrigation systems. There is a lack of accessible training for irrigators and specialists regarding both simple and complex concepts of chemistry, fertilizer needs, application hardware, and irrigation system characteristics. This project intended to address that with both English and Spanish training materials and certifications.

**9. Methods/Management:** The project consisted of 5 objectives. Objective 1 was to develop 21 excellent distance-learning modules for various aspects of fertigation including nitrogen processes and management. These videos utilize information available in the ITRC/FREP book Fertigation (2018) that was developed under FREP Grant Agreement 15-0393-SA. The modules were developed over the course of two years, with all English-language modules being completed by the end of 2022.

Objective 2 was to make 14 of the basic modules available in both English and Spanish for free on YouTube. Spanish versions were to have figures, tables, and text in Spanish. The remaining seven modules would be in English, available for free on YouTube. In 2021, the Fertigation book was translated to Spanish, edited, and reviewed. This was beyond the original objective, but the book is the main reference and supplement to the web-based training and the tables in the book are used in the web-based training.

Translating the book initially ensured consistent terminology used throughout the Spanish-language training material. In 2022, 22 videos were completed in both English and Spanish – well beyond the original objective. In 2023, all the videos were uploaded to YouTube and made available to the general public as a playlist on the ITRC YouTube Channel.

Objective 3 was to expand the first 14 modules to include interactive quiz questions, as well as develop and implement a “California Fertigator” certification with these, targeting employees and employers involved in fertigation. The certification was to be housed on ITRC’s online course website. In 2022, the questions and answers for the first 10 videos were completed. In 2023, asynchronous, online courses were developed based on the fertigation videos.

Objective 4 was to provide the Irrigation Association (IA) with all materials and questions for a more complete Fertigation Certification program. In 2022, the offer to provide the materials to the IA was made. ITRC had been in contact with a revolving door of administrators for the Irrigation Association. In each case, there has been strong interest, but then the person leaves. In 2023, the IA had not pursued a partnership further, so ITRC looked into additional ways to market the course. In 2024, ITRC adapted the in-house “California Fertigator” program into an in-house “Certified Fertigator” course.

**10. Findings:** Twenty-two videos were completed in English and Spanish – well beyond the original objective. All videos were uploaded to YouTube and are available to the general public as a playlist on the ITRC YouTube channel. There were over 17,000 unique module views with over 1,800 hours of viewing time since the modules were posted, with approximately 11 percent of the views being of the Spanish modules. The videos that have, by far, the most interest are (1) Fertilizer and Chemical Injectors and (2) SO<sub>2</sub> Generators. These videos are the most popular in both English (well over 2500 views each) and Spanish (over 150 views each).

The in-house English- and Spanish-language Certified Fertigator courses are active and open for enrollment on ITRC’s website. Participants who pass the exam at the end of the course receive a certificate of completion. There have been a total of 50 attendees and 36 recipients of the ‘Certified Fertigator’ certificate.

## N. Copy of Products/Results

### Online modules (videos)

Language	Title	Links
English	1 - Overview	<a href="https://youtu.be/hywqsfFA-8Y">https://youtu.be/hywqsfFA-8Y</a>
	2 - Basic Fertilizer Chemistry and Vocabulary	<a href="https://youtu.be/dbIGAC8JFqA">https://youtu.be/dbIGAC8JFqA</a>
	3 - N and the Environment	<a href="https://youtu.be/ccLZI I XTW">https://youtu.be/ccLZI I XTW</a>
	4 - Basic Soil Principles	<a href="https://youtu.be/xS-iAtejfnE">https://youtu.be/xS-iAtejfnE</a>
	5 - Crop Fertilizer Requirements	<a href="https://youtu.be/WasPud7aeWE">https://youtu.be/WasPud7aeWE</a>
	6 - Testing of Plants Soil and Water	<a href="https://youtu.be/6jQy45l8HDs">https://youtu.be/6jQy45l8HDs</a>
	7 - Fertilizer Labels Characteristics and Usage	<a href="https://youtu.be/pdtKcwxIX9">https://youtu.be/pdtKcwxIX9</a>
	8 - Nitrogen Conversions	<a href="https://youtu.be/tR64vME64iA">https://youtu.be/tR64vME64iA</a>
	9 - Volatilization of ammonia from irrigation water	<a href="https://youtu.be/ECNVi4DVuxw">https://youtu.be/ECNVi4DVuxw</a>
	10 - Irrigation System Uniformity and Efficiency	<a href="https://youtu.be/QBGMV3IDfFI">https://youtu.be/QBGMV3IDfFI</a>
	11 - Safety	<a href="https://youtu.be/MXC7J3rME2I">https://youtu.be/MXC7J3rME2I</a>
	12 - Purging Media Tanks of Chemicals	<a href="https://youtu.be/dPvtNynLhnc">https://youtu.be/dPvtNynLhnc</a>
	13 - Calibration, Titration, and Travel Time	<a href="https://youtu.be/OtSZObWbWY">https://youtu.be/OtSZObWbWY</a>
	14 - Varying Venturi Injection Rates	<a href="https://youtu.be/1 ZyKo4WGqo">https://youtu.be/1 ZyKo4WGqo</a>
	15 - Chemigation for Soil Infiltration Problems	<a href="https://youtu.be/rBdqJTukfCI">https://youtu.be/rBdqJTukfCI</a>
	16 - SO2 Generators	<a href="https://youtu.be/Mq ThaRp1Kc">https://youtu.be/Mq ThaRp1Kc</a>
	17 - Chemigation for Drip System Maintenance	<a href="https://youtu.be/7qahyvZ--vs">https://youtu.be/7qahyvZ--vs</a>
	18 - Incompatibility of Different Fertilizers	<a href="https://youtu.be/6AJnn SA8pl">https://youtu.be/6AJnn SA8pl</a>
	19 - Proportional Injection	<a href="https://youtu.be/fc-Mi9omwO0">https://youtu.be/fc-Mi9omwO0</a>
	20 - Fertilizer and Chemical Injection Devices	<a href="https://youtu.be/XpxkkoYo3eA">https://youtu.be/XpxkkoYo3eA</a>
	21 - Calibration of Fertilizer and Chemical Injectors	<a href="https://youtu.be/ewOUzqA4bCI">https://youtu.be/ewOUzqA4bCI</a>
	22 - Fertigation for Specific Methods	<a href="https://youtu.be/MdsZZf8rWx8">https://youtu.be/MdsZZf8rWx8</a>
Spanish	1 - Visión general	<a href="https://youtu.be/GzOff6vomUo">https://youtu.be/GzOff6vomUo</a>
	2 - Química y Vocabulario Básico de Fertilizantes	<a href="https://youtu.be/tq1F0zTywBI">https://youtu.be/tq1F0zTywBI</a>
	3 - Manejo del nitrógeno y medio ambiente	<a href="https://youtu.be/cPDEyWj 01Q">https://youtu.be/cPDEyWj 01Q</a>
	4 - Principios básicos del suelo	<a href="https://youtu.be/PJmBb6HPRN4">https://youtu.be/PJmBb6HPRN4</a>
	5 - Requisitos de fertilizantes de los cultivos	<a href="https://youtu.be/XHBic6siAvw">https://youtu.be/XHBic6siAvw</a>
	6 - Análisis de plantas, suelo y agua	<a href="https://youtu.be/yILvsZRimS0">https://youtu.be/yILvsZRimS0</a>
	7 - Etiquetas, características y uso de fertilizantes	<a href="https://youtu.be/PE8hdDLmlzQ">https://youtu.be/PE8hdDLmlzQ</a>
	8 - Conversiones del nitrógeno	<a href="https://youtu.be/8tjse7FjNyE">https://youtu.be/8tjse7FjNyE</a>
	9 - Volatilización de Amoníaco del Agua de Riego	<a href="https://youtu.be/nODbjWgD0mA">https://youtu.be/nODbjWgD0mA</a>
	10 - Uniformidad y eficiencia del sistema de riego	<a href="https://youtu.be/rsryxkkH29Q">https://youtu.be/rsryxkkH29Q</a>
	11 - Seguridad	<a href="https://youtu.be/bkjCGkls4rQ">https://youtu.be/bkjCGkls4rQ</a>
	12 - Tiempo Requerido Para Purgar...	<a href="https://youtu.be/rj16zegG1Yk">https://youtu.be/rj16zegG1Yk</a>
	13 - Calibración, Titulación y Tiempo de Viaje	<a href="https://youtu.be/2ZmfOwzU cM">https://youtu.be/2ZmfOwzU cM</a>
	14 - Variación de Tasas de Inyección...	<a href="https://youtu.be/XLNS5tlMR4U">https://youtu.be/XLNS5tlMR4U</a>
	15 - Quimigación para problemas de infiltración...	<a href="https://youtu.be/YjRVxxOAq0E">https://youtu.be/YjRVxxOAq0E</a>
	16 - Generadores de SO2	<a href="https://youtu.be/CqHqGJ6Qrpq">https://youtu.be/CqHqGJ6Qrpq</a>
	17 - Quimigación para el mantenimiento...	<a href="https://youtu.be/tNmZhmZmxc8">https://youtu.be/tNmZhmZmxc8</a>
	18 - Incompatibilidad de Fertilizantes Diferentes	<a href="https://youtu.be/eMrCd5aMJPg">https://youtu.be/eMrCd5aMJPg</a>
	19 - Inyección proporcional	<a href="https://youtu.be/5-WMwAZtSI">https://youtu.be/5-WMwAZtSI</a>
	20 - Dispositivos de Inyección de Fertilizantes...	<a href="https://youtu.be/kT2GF pwG7c">https://youtu.be/kT2GF pwG7c</a>
	21 - Calibración de Inyectores Químicos	<a href="https://youtu.be/WEItByWA80I">https://youtu.be/WEItByWA80I</a>
	22 - Fertirrigación para Métodos Específicos de Riego	<a href="https://youtu.be/oQ33xifACwA">https://youtu.be/oQ33xifACwA</a>

## Example Certified Fertigator Certificate



## **Fertirrigación Book**

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“Fertirrigación” in Spanish is available for download via the ITRC website ([www.itrc.org/books/](http://www.itrc.org/books/)):