

## **A. Cover Page**

### **1. Project Title**

Plant Nutrients in the Classroom

### **2. Project Leaders:**

Judy Culbertson

California Foundation for Agriculture in the Classroom (CFAITC)

2300 River Plaza Drive, Sacramento, CA 95833

(916) 561-5625

[Judy@LearnAboutAg.org](mailto:Judy@LearnAboutAg.org)

**Mindy DeRohan**

**Project Coordinator**

**California Foundation for Agriculture in the Classroom**

**2300 River Plaza Drive**

**Sacramento, CA 95833**

**(916) 561-5625**

**[Mindy@LearnAboutAg.org](mailto:Mindy@LearnAboutAg.org)**

### **3. Cooperators**

Renee Pinel

Executive Director

Western Plant Health Association

4460 Duckhorn Drive, Ste A

Sacramento, CA 95834

(916) 574-9744

[reneep@healthyplants.org](mailto:reneep@healthyplants.org)

### **4. Supporters**

Raymond Burnell

Executive Director

Powerhouse Science Center

3615 Auburn Blvd.

Sacramento, CA 95821

(916) 853-0315

[Ray.Burnell@synergex.com](mailto:Ray.Burnell@synergex.com)

Lee Gardiner

Vice President/Operations

CALAMCO

1776 West March Lane, Suite 420

Stockton, CA 95207

(209) 982-1000

[lee.gardiner@calamco.com](mailto:lee.gardiner@calamco.com)

### **5. CDFA Funding Request Amount/Other Funding**

CFAITC requests \$141,741.62 from CDFA to conduct this project. No other organizations will be approached to fund this project.

6. Agreement Manager

Lyn Hyatt  
Administrative Coordinator  
California Foundation for Agriculture in the Classroom  
2300 River Plaza Drive  
Sacramento, CA 95832  
(916) 561-5625  
(916) 561-5632 direct  
Lyn@LearnAboutAg.org

## B. Executive Summary

### 1. Problem

California is the leading agricultural producer in the United States. As our population increases and farmland disappears to commercial and residential development, farmers and ranchers work to produce food, clothing, forest, and floral products on less land for more people. Plant nutrients play a crucial role in meeting these needs. Students make up a large portion of our consumer population, are forming opinions about food production and are needed to fill the roles of future agricultural and food professionals. It is essential, for the vitality of our industry and California, to prepare young people to make informed decisions about agricultural issues as they mature into adults.

With FREP funding, CFAITC has recently completed several educational resources focusing on plant nutrients for use in elementary, middle, and high school classrooms. A comprehensive outreach plan is needed to take full advantage of FREP's investment in these resources by promoting them and helping teachers incorporate the lessons into their curriculum.

### 2. Objectives, Approach, and Evaluation

#### Objectives:

1. Engage marketing partners such as the Discovery Museum Science and Space Center of Sacramento and other science centers to teach CFAITC's plant nutrient lessons to students attending afterschool programs and to encourage teachers to utilize CFAITC lessons in their classrooms.
2. Engage a public relations agency to develop and implement promotion strategies for CFAITC's plant nutrient lessons to education audiences throughout the state.
3. Advertise in California Science Teacher Association publication, California Agriculture Teacher's Association Golden Slate newsletter, and other educational publications.
4. Engage an evaluation specialist to measure the number of teachers and students reached through promotional activities, and what students learned using CFAITC plant nutrient resources.
5. Provide 60 educators in the **Bay Area and Southern California** with grade appropriate lab kits for use with plant nutrient lessons.
  - a. CFAITC will purchase materials and assemble lab kits specific for each of the following FREP-sponsored, plant nutrient units:
    - K-3 grade *Educator's Guide to Fun With the Plant Nutrient Team*
    - 2-4 grade *What Do Plants Need To Grow?*
    - 5-8 grade *Too Much? Too Little?*
    - 9-12 grade *Chemistry, Fertilizer, and the Environment*
6. Require teachers receiving the lab kits to participate in a survey which will allow CFAITC to understand what students are learning from plant nutrient lessons.
7. Engage the California Fertilizer Foundation to help distribute and promote CFAITC's lab kits and plant nutrient units to teachers in their garden grant program.
8. Identify science centers to supply with lab kits and plant nutrient units.
9. Establish a web page containing CFAITC developed and approved resources relating to plant nutrients. On average, more than 5,000 visitors access resources from CFAITC's website every month.

10. Participate in a minimum of three educator conferences to network with science, technology, engineering and math educators and to promote plant nutrient units.
11. Print an appropriate supply (over a three year period) of plant nutrient units:
  - 3,000 copies of *Educator's Guide to Fun With the Plant Nutrient Team*
  - 3,000 copies of *What Do Plants Need To Grow?*
  - 3,000 copies of *Too Much? Too Little?*
  - 1,500 copies of *Chemistry, Fertilizer, and the Environment*

#### Approach:

In 2015 CFAITC will consult with a marketing partner such as the Discovery Museum Science and Space Center of Sacramento to engage educators in using CFAITC's plant nutrient lessons and to teach the lessons to students in their after school and education camp programs. CFAITC will also work with a public relations agency to develop and implement promotion strategies for CFAITC's plant nutrient lessons to education audiences throughout the state.

During the length of the grant period, CFAITC will continue to distribute the units through established avenues including teacher order fulfillment (50 to 60 per week on average), education workshops, and conferences and fairs (75 per year on average with thousands of students and teachers reached).

CFAITC will assess outreach at the end of 2015 and 2016 and will adjust strategies as necessary for each coming year. By the close of 2017, CFAITC will have collected data on outreach efforts and will report on the use of plant nutrient lessons in classrooms and afterschool programs.

#### Evaluation:

1. **60 educators in the Bay Area and Southern California** will be awarded lab kits to supplement the plant nutrient unit they are using in their classroom and will participate in an evaluation to show how lessons and lab kits were used and what students learned.
  - K-3 grade *Educator's Guide to Fun With the Plant Nutrient Team*
  - 2-4 grade *What Do Plants Need To Grow?*
  - 5-8 grade *Too Much? Too Little?*
  - 9-12 grade *Chemistry, Fertilizer, and the Environment*
2. Five teachers incorporate CFAITC's plant nutrient lessons into their classrooms through coordination with the California Fertilizer Foundation's garden grant program.
3. At least one science center such as the Discovery Museum Science and Space Center of Sacramento will use CFAITC's plant nutrient curriculum during instruction with students attending their after school or vacation camp programs.
4. Attract 500 visitors to CFAITC's plant nutrient web page.
5. Participate in a minimum of three educator conferences over the course of the grant to network with science, technology, engineering, and math educators and to promote plant nutrient units and lab kits.

#### 3. Audience

Our target audience includes California's K-12th grade students and their teachers. Four separate educational units on plant nutrients have been tailored to K-3, 2-4, 5-8, and 9-12 grade classrooms.

## **C. Justification**

### 1. Problem

As a \$43.5 billion industry, California continues to lead the nation in agriculture production. Challenges within the industry are numerous and California producers continually investigate the solution to feeding a growing population with finite resources. With these challenges in mind, it is increasingly important for farmers and ranchers to produce food, clothing, forest and floral products on less land for more people. Plant nutrients play a crucial role in improving agricultural efficiency.

Students will be our leaders and decision-makers in the future. It is essential for our industry to educate young people about the challenges facing agriculture, and the delicate balance between maximizing production and minimizing environmental impacts. CFAITC has developed four units of lesson plans focusing on agriculture and plant nutrients and wants to increase implementation of these lessons in elementary, middle, and high school classrooms through the development of a promotion plan. All educators should be aware that these free resources are available and will help them address California Content Standards through hands-on lessons that are related to the food we eat every day.

### 2. FREP Mission and Research Priorities

The proposed project addresses the FREP key research area “education and public information.” This project will fulfill this specific key research area by creating and implementing educational activities that result in a better understanding of the importance of plant nutrients, nutrient management practices, and technologies. The development of educational material about the role plant nutrients play in our society will educate students and teachers about the relationships between plant nutrients, food, nutrition, and the environment.

### 3. Impact

Over the past 27 years, CFAITC has successfully developed and distributed curricular programs to millions of students. The proposed project will impact teachers, students, and consumers who will be exposed to materials that foster an appreciation for responsible agricultural practices and the role plant nutrients play in agriculture production.

This project will significantly benefit hundreds of teachers and thousands of students. CFAITC will provide teachers with free and easy access to plant nutrient curriculum and accompanying lab kits that fit the needs of their classrooms. Lessons and lab activities are aligned to the most recent California Content Standards including Common Core and Next Generation Science Standards, providing teachers with an engaging way to teach problem-solving and critical thinking skills across academic disciplines while familiarizing students with California’s crop production.

This outreach plan will provide a unified message to Californians on behalf of all California farmers and ranchers. The state is home to 80,500 farms and ranches that depend on careful

monitoring of their land and plant nutrients to maintain a sustainable and profitable operation. California's farms and ranches produced \$44.7 billion in market value for their output in 2012. Every Californian consumes these products and should have a basic understanding of how they are produced, including the role that plant nutrients play in their production. The value of a consumer-friendly outreach message is immeasurable.

#### 4. Long-Term Solutions

This project will provide long-term progress towards solving industry challenges by teaching students about the essential role of plant nutrients in crop production and the agriculture industry's efforts to constantly improve efficiency and environmental stewardship. California producers will benefit as future decision makers respond to positive outreach messages through their spending habits and decisions.

In addition, by providing students with educational experiences related to plant nutrients, environmental stewardship, and agriculture production, this project aims to interest students in science and encourage them to pursue careers in plant sciences. Long-term, the agriculture industry will benefit from an increased number of young people pursuing agricultural careers with an established foundation of knowledge. This is an important message as 25,000 skilled jobs in agriculture go unfilled each year, often because students are unaware of those career paths.

#### 5. Related Research

Teachers and website visitors have downloaded nearly 20,000 copies of CFAITC's fertilizer education units and nearly 28,000 copies of Plant Nutrient Fact Sheets over the past three years. Based on CFAITC's experience with previous plant nutrient education efforts, we can conclude that teachers are hungry for more information about this topic.

In 2007, CFAITC developed a 16-page newspaper, *What's Growin' On?* which focused on fertilizer use and labeling. The newspaper was distributed to 500,000 students, educators and consumers, receiving praise for increased public understanding of fertilizers and agriculture.

CFAITC received a FREP grant in 2010 to create a new comprehensive unit on *Chemistry, Fertilizer and the Environment* for grades 8-12 and to update and align the already existing unit, *What Do Plants Need to Grow?* for grades 2-4. This curriculum was completed May 31, 2013. To date, 7,205 copies of the *Chemistry, Fertilizer and the Environment* unit have been downloaded or mail ordered and 16,728 copies of *What Do Plants Need to Grow?* have been downloaded or mail ordered.

In 2011, FREP funded CFAITC's project to update a unit focusing on fertilizer called, *Too Much? Too Little?* for 5<sup>th</sup>-8<sup>th</sup> grade students. 971 copies of this updated unit have been downloaded or mail ordered since its release four months ago. The second part of the project involved developing an educator's guide for the *Fun With the Plant Nutrient Team* activity book. This curriculum was completed December 31, 2013 and has been downloaded or mail ordered 1,019 times since its release.

In 2012, CFAITC developed a second 16-page newspaper, *What's Growin' On?* which focused on plant nutrients and the nitrogen cycle. The newspaper has been distributed to more than one million students, educators and consumers.

#### 6. Contribution to Knowledge Base

This project will increase the knowledge base of both educators and students who adopt plant nutrient education in the classroom or science center program. The proposed project will serve as a powerful means of connecting California students to the importance of plant health, as well as the agriculture industry in general.

Teachers and students alike will develop a greater knowledge base of plant nutrients, best management practices, and the science that goes into producing our abundant food supply. At the same time, lessons will reinforce Common Core Standards and Next Generation Science Standards for California public schools. This project will provide a significant resource for the thousands of California educators who are either uninformed or misinformed about the science and technology involved in modern agriculture.

#### 7. Grower Use

The proposed project will greatly benefit growers by providing a unified message on behalf of all California farmers and ranchers. Growers throughout the state will reap the benefits of increased student understanding of the essential role of plant nutrients in agriculture production and enhanced student appreciation of the agriculture industry's efforts to protect our air, water, and soil quality. Over time, many of these informed decision makers will provide oversight to the industry, determine market trends, and continue to share the positive story of California agriculture. The benefits derived from this project will go beyond the grant period.

### **D. Objectives**

1. Promotional activities will result in more teachers and educational organizations using CFAITC-developed, FREP-funded units in the Classroom:
  - *Chemistry Fertilizer and the Environment*
  - *What Do Plants Need to Grow?*
  - *Too Much? Too Little?*
  - *Educator's Guide to Fun With the Plant Nutrient Team*
2. **Sixty teachers in the Bay Area and Southern California** will be selected to receive lab kits from CFAITC to enhance the use of the units listed above in their classrooms.
3. As a result of participating in unit lessons at different grade levels, students will learn about:
  - a. Plant growth requirements.
  - b. Plant structures and functions.
  - c. Soil composition.
  - d. Water quality for plant growth.
  - e. Plant nutrients, and proper choice and preparation of plant nutrient applications.
  - f. Opportunities in careers related to modern agriculture.
  - g. The importance of informed decision making.

- h. California farmers and ranchers using the latest science and technology to precisely manage plant nutrients and water for healthy and sustained crop production.

## E. Work Plans and Methods

### 1. Work Plan

Work Plan Year 1 (2015)

Project Task & Description	Product/Results	Completion Date
1. Engage marketing partners and public relations agency	Determine interest in project	February 30, 2015
2. Meet with selected marketing partners and public relations agency	Review and plan strategies to market CFAITC plant nutrient curriculum to teachers and education organizations and to track outreach	March 15, 2015
3. Print copies of each of the four plant nutrient units		March 15, 2015
4. Begin placing advertisements for CFAITC's plant nutrient curriculum in educational publications	Include Ca. Science Teacher Association, The Golden Slate and other publications as specified by marketing partners	March 30, 2015
5. Fulfill orders for plant nutrient units		Ongoing
6. Research and interview evaluation specialists		February 30, 2015
7. Meet with selected evaluation specialist	Review and plan strategies to measure student learning in sample of classrooms using CFAITC's plant nutrient curriculum with lab kits	March 30, 2015
8. Develop student assessments	Evaluation specialist will work with CFAITC to develop student assessments to accompany each of the four plant nutrient units	June 30, 2015
9. Design selection process for 60 educators to receive lab kits to accompany plant nutrient units	Work with marketing partners and evaluation specialist on educator selection process. Also work with organizations such as California Fertilizer Foundation for selection and distribution to educators.	June 30, 2015
10. Prepare 60 lab kits	Purchase lab equipment to enhance lessons from plant nutrient units. Assemble 60 lab kits.	July 30, 2015
11. Choose 60 educators to receive lab kits	Educators agree to participate in webinar training and student evaluation	August 30 – October 15, 2015
12. Communicate with	Provide instructions on lab kit use	December 5, 2015



educators receiving lab kits through webinar	with lessons and evaluation procedures via webinar	
13. Mail lab kits to educators who participated in webinar		December 30, 2015
14. Attend at least one regional science educator conference	Promote plant nutrient lessons	December 30, 2015

#### Work Plan Year 2 (2016)

Project Task	Product/Results	Completion Date
1. Print copies of each of the four plant nutrient units		January 30, 2016
2. Analyze outreach results	Work with marketing partners to evaluate outreach results for 2015 and plan outreach strategy for 2016	January 30, 2016
3. Educators participating in evaluation use lessons in class and complete surveys	Guidance provided from CFAITC and evaluation specialist	January – May, 2016
4. Gather and analyze evaluations	Work with evaluation specialist to assess students learning from plant nutrient units (Ramona Carlos, advisor)	July 15, 2016
5. Compile survey results	Report and suggestions for improving units and or information to assist teachers in educating students	November 30, 2016
6. Attend at least one regional science educator conference	Promote plant nutrient lessons	December 30, 2016

#### Work Plan Year 3 (2017)

Project Task	Product/Results	Completion Date
1. Print copies of each of the four plant nutrient units		January 30, 2017
2. Analyze outreach results	Work with marketing partners to evaluate outreach results for 2016 and plan outreach strategy for 2017	January 30, 2017
3. Attend at least one regional science educator conference	Promote plant nutrient lessons	June 30, 2017
4. Complete all components for plant nutrient web page	Page will be in various stages of production during, 2015, 2016, 2017	August 30, 2017
5. Data collection and compilation	Compile outreach and evaluation results to prepare final report on plant nutrient lesson distribution, use, and learning	December 15, 2017

## 2. Methods

CFAITC will consult with marketing partners such as the Discovery Museum Science and Space Center of Sacramento, the California Fertilizer Foundation, and other educational organizations

to design and implement an outreach program for distribution of CFAITC's existing plant nutrient units for elementary through high school students. Our marketing partners work closely with school districts, teachers, and students, and have numerous opportunities for sharing CFAITC's lessons. For example, the Discovery Museum delivers classes to students attending afterschool programs and vacation camps in the Sacramento area and has ties with other science centers throughout California. The California Fertilizer Foundation works with a number of teachers through their school garden grant program. In addition to working with marketing partners, CFAITC will also promote the FREP funded plant nutrient units through advertisements in publications for educators and at educator workshops in various areas of the state.

A web page on CFAITC's website will be developed to feature support materials for the plant nutrient lessons along with links to relevant educational information. All plant nutrient related materials will be promoted through CFAITC's monthly electronic newsletter to all administrators in the state, and in CFAITC's listing of resources.

A total of sixty lab kits will be assembled to supplement lessons in each of the four plant nutrient units of study. This will include twenty kits that are customized for each unit. Lab kits will be awarded to educators who complete a simple application process. Selected educators will be required to participate in a webinar that explains how to use the lab kits with lessons and procedures for an evaluation process to assess what students learn from the lessons. CFAITC will consult with an evaluation specialist to design the assessment, collect, and analyze results.

### 3. Experimental Site

NA

## **F. Project Management, Evaluation, and Outreach**

### 1. Management

Judy Culbertson, executive director of the California Foundation for Agriculture in the Classroom (CFAITC) will oversee the project. Shaney Emerson, curriculum coordinator for CFAITC will manage the project. Contractors will be engaged to plan and implement marketing and evaluation strategies.

### 2. Evaluation

CFAITC will consult with an evaluation specialist, **Ramona Carlos has agreed to serve as our advisor**, to design an assessment for a sample of teachers to implement with students who have participated in CFAITC's plant nutrient lessons.

The evaluation specialist will assist with dissemination, collection, and analysis of the assessment. Marketing partners from selected educational organizations will be involved in outreach and tracking of CFAITC's distributed plant nutrient lessons.

### 3. Outreach

The target audience for outreach will include educators of students in kindergarten through twelfth grade. Educators include formal classroom teachers, school garden coordinators, and educators at community science museums. CFAITC will promote plant nutrient units and

supporting lab kits and web page to these educators through the assistance of marketing partners at science museums, school districts, and the California Fertilizer foundation. These partners will use their networks to distribute and teach CFAITC plant nutrient units. Plant nutrient lessons are broken down into appropriate units for grade levels K-3, 2-4, 5-8, and 9-12. Outreach will also include distribution and workshops at educator events such as the California Science Teachers Conference, and other regional conferences throughout the state. CFAITC will also advertise the plant nutrient units through social media and in publications for educators.

## **G. Budget Narrative**

### **a. Personnel Expenses**

**Mindy DeRohan, CFAITC Communication Coordinator** - \$18,888 plus 34.03% benefits  
**Terri Salmond, CFAITC Administrative Assistant** - \$3,588 plus 34.03% benefits

### **b. Operating Expenses**

- Supplies
  - None
- Equipment
  - None
- Travel - \$4,200
  - Registration, hotel, travel and meals for CFAITC Program Coordinator to attend and promote project at three educator conferences such as California Science Teachers Association, California Ag Teachers Association. (one per year)
    - Average registration fee per conference - \$350
    - Average mileage or airfare per conference - \$500
    - Average hotel per conference - \$130 x 2 nights per conference (actual expense will be limited to state rate allowable)
    - Average meals - \$46 state rate per diem x 2 days per conference
- Professional/Consultant Services - \$29,000
  - Evaluation Consultant – \$8,000 for 160 hours over 3 years. (\$4,000 in 2015; \$2,000 in 2016; and \$2,000 in 2017)
  - **Ramona Carlos has agreed to serve as our evaluation advisor.**
  - Marketing Fees to Organizations - \$9,000 for marketing partners over 3 years
    - Science Centers such as the Powerhouse Science Center \$300 per class x 15 classes over 3 years = \$4,500
    - Other educational organizations/science centers payment for teaching CFAITC lessons to classes over course of 3 years = \$4,500
  - Marketing Specialist to identify CFAITC plant nutrient audiences and promotion outreach over course of 3 years = \$12,000. (\$8,000 in 2015; \$2,000 in 2016; and \$2,000 in 2017)
- Other Expenses - \$67,700
  - Advertising Fees in education publications – 10 ads x \$450 = \$4,500 (\$1500 per year)
  - Printing of units - \$3 each x 10,500 = \$31,500 (\$10,500 per year)
  - Teacher stipends to participate in training webinar – 60 teachers x \$100 = \$6,000 (2016)

- Temporary Staffing Agency Fees – 3 days to assemble kits - \$500 (2015)
- Lab Kits – \$8,500 (2015)
- Postage to mail kits – 60 x \$10 = \$600 (\$200 per year)
- Postage to mail resource orders - \$3 per package x 1,750 packages per year. (\$5,250 per year. \$3 per package is a 50% pro rata share of cost. Remaining distribution to exhibits and workshops will not require postage.)
- Webinar software - \$350 (2015)

c. Other Funding Sources

None