



## California Department of Food and Agriculture Fertilizer Research and Education Program

### 2021 REQUEST FOR CONCEPT PROPOSALS

The California Department of Food and Agriculture's (CDFA) Fertilizer Research and Education Program (FREP), is currently accepting concept proposals for projects that will begin in January 2022. Proposals must focus on at least one of the priority areas listed below and may focus on research and/or education projects to provide growers and industry with cost-effective practices to improve the efficient use of fertilizer and minimize environmental impacts. All projects should have strong scientific merit (e.g. replicates, statistical analysis). Research projects must include outreach to end-users. Outreach and education projects should include measures of impact.

**FREP does not support proprietary product development, testing or promotions.**

Grant funding of \$75,000 per year for up to three years is typical for projects. Projects requesting more than \$75,000 per year and lasting longer than three years will be considered on a case-by-case basis. Concept proposals leveraging other sources of funding are strongly encouraged and are welcomed. Concept proposals may originate from outside California, but at least some of the work must be performed in California, and all the work must be relevant to California agriculture.

Concept proposals are due by 5:00 p.m. on Friday, January 29, 2021.

**No exceptions granted.**

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### 2021 PRIORITY FUNDING AREAS

FREP invites research and education project proposals in three priority areas: Improving Input Management, Understanding Soil-Plant Processes, and Characterizing Loss Pathways.

#### 1. IMPROVING INPUT MANAGEMENT:

##### A. Demonstrating and/or Validating Management Practices that Optimize Nutrient and/or Irrigation Water Use

Innovative management practices must be implemented on farms to promote agriculture sustainability and address agricultural challenges in California. Extension efforts that improve management practices and help implement

efficient nutrient management practices on growers' fields are a high priority. Important activities include:

- Field validation of, or improvements to, existing decision support tools to help make them more practical for growers, California conditions, or California cropping systems;
- Supporting peer-to-peer and community-based learning;
- Field-scale demonstration of recommended practices related to management of fertilizing materials, including replication where appropriate. These can include demonstrations of the effectiveness of implementing the 4 R's of nutrient stewardship, tissue and soil sampling and remote sensing to guide fertilizer application scheduling, and irrigation management to improve nutrient use efficiency, in view of field-scale variability in expected yields and other parameters;
- Refinement and demonstration of components relevant to Irrigation and Nitrogen Management Plans;
- Comparison of episodic vs high frequency fertigation events to implement the 4 R's principle (<https://nutrientstewardship.org/4rs/>); and
- Demonstration and/or evaluation of irrigation monitoring tools and practices appropriate to specific cropping systems.

## **B. Addressing Challenges and Barriers to Adoption of Management Practices**

A variety of money and time-saving management practices that improve environmental outcomes, with respect to nitrogen (N) loss, are available; however, many of these practices have not been adopted on a large scale. Research focused on addressing barriers to widespread adoption of improved management practices could include:

- Testing scalable incentives or programs that may increase grower implementation of practices to optimize water and fertilizer use; and
- Analyzing the costs, benefits, and economic thresholds associated with adoption of various improved management practices, including perceived and modeled costs of specific practices and how they are affected by different farm characteristics.

## **C. Education and Outreach (Technical Education)**

The implementation of optimal irrigation and nutrient management practices depends on skilled and knowledgeable growers, managers, and field staff. Technical trainings and education can increase grower and field staff knowledge leading to improvements in on-farm management practices. Development of educational and/or certification programs to improve nitrogen and irrigation management are encouraged.

Proposals should identify how implementation and impact will be measured over the course of the project. Proposals should also include a peer-review process to ensure a strong technical foundation. Special consideration will be given to projects that include online components. Education and outreach programs should include evaluation of stated learning and outreach goals. Evaluation is encouraged to include adoption of practices subsequent to project activities. Follow-up projects that evaluate previously funded education and training projects are welcome. Potential training topics include:

- Nutrient and irrigation management and fertigation training for agricultural staff at all levels; and
- Development of educational and training materials for non-English speakers and underserved populations.

## **2. UNDERSTANDING PLANT-SOIL PROCESSES:**

### **A. Filling Knowledge Gaps for Nitrogen Management in Specific Crops**

- Berries: more information is needed on nutrient management practices for cane berries and blueberries in California production systems;
- Root crops: more information is needed to optimize nitrogen management for carrots in sandy soil using sprinkler irrigation; other root crops needing nutrient management research specific to California include onions and potatoes;
- Vegetable crop transplant production systems: information is needed on nutrient management practices in nursery systems that grow vegetable transplants;
- Optimal crop rotations: information is needed to optimize fertilizer applications for crops in rotation and research is needed to describe how the previous crop (including cover crops) affects N availability to the current crop;
- Better understanding is needed for uptake, storage and remobilization pools of nitrogen in tree crops to better define when to start fertigating early in the season and when to end fertigating later in the crop season.

### **B. The Role of Organic Input Materials in Soil Nutrient Management**

Across California, organic materials are applied to agricultural soils to improve physical, chemical and biological properties of soil. More information on the plant-available nitrogen from organic sources is needed for management decisions, and to help growers estimate mineralization rates for nitrogen budgeting. These organic materials include, but are not limited to, wood chips from whole orchard recycling, nitrogen-containing soil amendments, and organic fertilizers.

- Evaluating the influence of organic inputs on total nitrogen budgeting; and Evaluating the effects of liquid ammonia products from organic sources on microbial communities, plant development, and soil health parameters.

### 3. **LOSS PATHWAYS:**

#### **A. Understanding Nitrogen Movement from the Root Zone**

Our understanding of nitrogen movement from the root zone to groundwater and atmosphere is insufficient. This lack of information has resulted in incomplete modeling of the transport and fate of nitrogen through agroecosystems and uncertainties in estimates of the quantity of nitrate from nitrogen fertilizers accumulating in groundwater and  $N_2O$  and  $NO_x$  compounds released into the air. Research is needed to understand how management practices influence nitrate movement out of the root zone. Research may include, but is not limited to:

- Managed aquifer recharge: timing and effect on nitrogen loss;
- Nonproprietary research using instruments and sensors to measure N loss; and
- Understanding other potential loss pathways (e.g. tile drains, gaseous losses).

#### **B. Mitigation Strategies to Reduce Nitrogen Losses**

There are technologies and practices that may mitigate nitrogen losses via various loss pathways. Research is needed to better understand the technologies and strategies that can minimize N losses and maximize nitrogen use efficiency.

- Testing and verification of management practices to reduce nitrate leaching from root zones;
- Innovative strategies to capture nitrogen leached below the root zone (e.g. trap crops, cover crops); and
- Novel fertilizer sources including, but not limited to, enhanced efficiency fertilizers (e.g. urease inhibitors, nitrification inhibitors, and slow release fertilizers).

### **CONTENT AND FORMATTING**

Concept proposals must not exceed two pages. Please include the following information:

- Project title, location, duration, and project leader(s) contact information (name, title, affiliation, and email address). Limit to  $\frac{1}{2}$  page.
- A simple and concise summary of the problem to be addressed.

- Description of the target audience.
- Objective(s) of the proposed project.
- A description of the general approach to be used.
- Plans for outreach and measurable outcomes.
- Estimated funding that will be requested.  
(*Note: A budget is not required for concept proposals.*)

Please follow these formatting requirements:

- Do not use logos or a letterhead.
  - For consistency and uniformity, use Arial font throughout the proposal as follows:
    - 12-point bold title case for project title and section headings
    - 12-point normal or regular font for body text
  - Use 1-inch margins on all sides, set alignment to left, and do not use borders.
  - Set paragraph line spacing to single space and double space between paragraphs. Do not indent the first lines of paragraphs.
  - Add page numbers as a footer; align right.
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## HOW TO APPLY

Submit an electronic version of your proposal to: [FREP@cdfa.ca.gov](mailto:FREP@cdfa.ca.gov).

Concept proposals are due by **5:00 p.m. on January 29, 2021**. No exceptions granted. Concept proposals must be submitted via email; mailed and faxed copies will not be accepted.

FREP staff will reply with a confirmation email when concept proposals are received; contact us by calling (916) 900-5022 if you have not received a confirmation email within two business days of your submission. FREP is not responsible for incomplete email transmissions.

Proposals that are incomplete, late, or exceed two pages will be returned and eliminated from consideration. Examples of successful concept proposals from previous years are available on the FREP website ([www.cdfa.ca.gov/go/FREP](http://www.cdfa.ca.gov/go/FREP)). FREP staff is available to answer questions about the proposal process; however, to ensure fair competition, we do not provide guidance on the development of proposals.

## EVALUATION PROCESS

FREP has a Technical Advisory Subcommittee (TASC) consisting of subject matter experts who are responsible for the review and evaluation of submitted concept proposals. TASC selects concept proposals to be developed into full proposals based on alignment with the program's priority research areas, project concept, scientific merit, impact, methodology, and feasibility. FREP staff notifies applicants of the TASC decision and invites selected applicants to submit full proposals. Full proposals go through an outside peer review process and are evaluated by TASC. TASC then sends their recommendations to the Fertilizer Inspection Advisory Board (FIAB). FIAB

determines whether to approve the TASC's recommendations for proposed funding. FIAB recommendations are forwarded to the Secretary for final approval and award of FREP grants. FREP staff initiates the grant agreements for the approved projects.

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**TIMELINE**

Request for concept proposals announced.....	December 14, 2020
Concept proposals due.....	January 29, 2021
Advancement of concepts to full proposals announced.....	March 2021
Full proposals due.....	May 17, 2021
Award notification by.....	October 2021
Project initiation.....	January 1, 2022

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**ADDITIONAL INFORMATION**

FREP funds and facilitates research and education to advance the environmentally safe and agronomically sound use and handling of fertilizer materials. FREP serves growers, agricultural supply and service professionals, extension personnel, public agencies, consultants, and other interested parties.

This solicitation, as well as information about FREP activities and sponsored projects, is available by contacting FREP staff at [FREP@cdfa.ca.gov](mailto:FREP@cdfa.ca.gov) or (916) 900-5022, and by visiting the FREP website at [www.cdfa.ca.gov/go/FREP](http://www.cdfa.ca.gov/go/FREP).