Efficient Fertilizer Consortium 2024 Request for Applications: Agronomic and Environmental Impact of Enhanced Efficiency Fertilizers Across the Globe

Key Dates

Pre-Application (Letter of Intent) Open: October 30, 2024, at 12:00pm ET

Informational Webinar: November 8, 2024

Pre-Application Due: December 11, 2024, by 5:00pm ET

NOTE: An approved pre-application with an invitation to submit a full application is required for submission.

Full Application Invitation and Receipt Open: February 5, 2025

Full Application Due: March 26, 2025, by 5:00 PM ET

Award Notification: Summer 2025

Anticipated Projects Start Date: Fall 2025/Winter 2026

The Efficient Fertilizer Consortium (EFC) announces a request for applications (RFA), facilitated by the Foundation for Food & Agriculture Research (FFAR).

I. Initiative Objective

The EFC supports applied research that accelerates the development and wider adoption of enhanced efficiency fertilizers (EEFs) that increase crop nutrient use efficiency, support desired crop yield and reduce nutrient loss to the environment as nitrous oxide, ammonia volatilization, nutrient leaching or runoff. In collaboration with scientific experts, the EFC has developed the *Field Trial Guidelines for Evaluating Enhanced Efficiency Fertilizers* that must be followed by all field trials funded by the EFC; please see the RFA webpage and informational webinar on November 8th for more details).

II. Application Requirements

Research Areas Supported

The EFC will consider applications for field trials to evaluate the agronomic performance and environmental impact of EEFs across a range of geographic locations, cropping systems, climates, and soil types. Applications must address one or more of the following:

- The impact of stacking EEF(s) with field management (e.g. tillage, cover crops, tile drainage) and 4R Nutrient Stewardship (4RNS) practices (right source, right rate, right time, and right placement of fertilizer in nutrient management; Fixen, 2020) to enhance understanding of how EEFs perform in a range of conditions and in crop rotations to better support producer decision making.
- Nutrient carryover effects from EEFs and crop rotations that include legumes.
- Identification of EEFs that work best to support crop nutrition, yield and nutrient use efficiency in specific climates, soils and cropping systems. This could include evaluating EEFs across various climate, cropping, or soil conditions.
- Agronomic and environmental tradeoffs resulting from the implementation of EEFs and other management and 4RNS practices.

Required Parameters

The following parameters must be included and described in detail:

- Fertilizer technologies: Enhanced efficiency fertilizers that aim to provide the targeted crop with adequate nutrition while increasing nutrient use efficiency or reducing nutrient losses to the environment. Supported categories of EEFs include enzyme inhibitors, slow- and controlled-release fertilizers, biofertilizers and nanofertilizers (defined below). These products must be commercially available in the region(s) of interest and have existing evidence of enhanced crop performance or nutrient use efficiency (NUE) in the field. Proposals must include sufficient preliminary data or references with evidence to support performance claims.
    - Enzyme inhibitors: Fertilizer additives designed to temporarily slow the biogeochemical transformation of urea (urease inhibitors) or ammoniacal (nitrification inhibitors) fertilizers.
    - Slow- and controlled-release fertilizers: Nutrients mixed or coated with one or more materials or additives to physically control or delay the release of nutrients.
    - Biofertilizers: Formulations that contain one or more strains of microorganisms that colonize the rhizosphere, rhizoplane or root interior of a plant and enhance its nutrition by mobilizing or increasing nutrient availability in the soil.
    - Nanofertilizers: Fertilizer particles with small size and high surface area that aim to enhance plant nutrient uptake through nanoscale pores in plant tissues, complexation with transporters or root exudates, or exploitation of ion channels.

- Nutrients: Nitrogen (N) and/or phosphorus (P).
- Countries: The research must either be conducted in one or more of the countries listed below, or directly benefit one or more of these countries due to similar climates, soils, cropping and production systems. Research relevant to more than one supported country or region is preferred.
    - Argentina, Australia, Bangladesh, Brazil, Canada, Denmark, Ethiopia, Ghana, India, Indonesia, Israel, Kenya, Mexico, Nigeria, Pakistan, Turkey, Ukraine, United States and Vietnam.
- Cropping systems and rotations:
    - Maize, soybean, cotton, wheat, canola, potatoes and tomatoes.
    - Rotations may include cover crops.
    - Crop rotations are encouraged.
- Measurements:
    - All proposals must include an evaluation of agronomic performance (i.e. crop yield or biomass).
    - All proposals must include some measure of NUE or nutrient recovery. These are important indicators that can be calculated in a number of different ways for different purposes depending on the trial objectives (see Scientific Panel on Responsible Plant Nutrition, 2023). The NUE calculation used is up to the researcher and must be described in the proposal.
    - Preference will be given to proposals also measuring relevant nutrient losses to the environment through nitrous oxide, ammonia volatilization, leaching, and/or runoff. Measuring the full scope of nutrient loss pathways to capture tradeoffs is strongly encouraged.

Research Areas *Not* Supported

The EFC will not consider applications including:

- Product development or environmental toxicity evaluations. Products included in trials should be commercially available and ready to use in the field by producers. Products should have already undergone proof of concept evaluation in laboratory and/or greenhouse studies.
- Specialty crops (fruits, vegetables, tree nuts, horticulture, turf) with the exception of potatoes and tomatoes.
- Crop breeding, genomics or cultivar screening, including biological nitrification inhibition (BNI).
- Projects solely focused on the following soil amendments: Manure, compost, hormones, non-microbial biostimulants, seaweed products, organominerals, biochar and products intended to primarily support carbon sequestration. These product types may be combined with the identified EEFs of interest; however, they cannot be the primary focus of the project.
- Life cycle analyses or socioeconomic analyses of fertilizer products or EEFs. While the data generated could inform life cycle or socioeconomic analyses, the primary use of the funding must be for field trials.
- Projects evaluating novel measurement techniques or technologies.
- Projects solely focused on modeling exercises. While the data generated could inform models, the primary use of the funding must be for field trials.

Additional Guidance to Applicants

Proposals must include:

- A statement about how the research results will be broadly impactful on an international scale. The statement should include specific regions or countries with similar climate, soils, or cropping systems where the results can be applied.
- How the proposed research builds upon existing knowledge or related research projects.
- Justification for location selection, methodology and measurements (i.e. likelihood of crop response to fertilizer addition, nutrient loss risk and relevant nutrient loss pathways).
- Description of how the methodologies and research plan will follow the *Field Trial Guidelines for Evaluating Enhanced Efficiency Fertilizers*, including data publication and stewardship. Proper controls and treatments must be detailed thoroughly in the project description. Preference will be given to trials that include a range of both suboptimum and optimum fertilizer rates for each fertilizer source, as recommended by the *Field Trial Guidelines for Evaluating Enhanced Efficiency Fertilizers*.

Applicants are encouraged to address the following elements in submitted applications:

- Justification for product selection, including details on the environmental footprint of the EEF production when available (e.g. emissions factors for manufacturing the EEF).
- Impact of proposed research on the greater agricultural community.
- Potential of products and practices to support production goals and address environmental concerns for the targeted cropping system(s).
- How the proposed research will address climate change mitigation through fertilizer selection and management.
- Explanation of how the proposed research may contribute to a greater understanding of how EEFs can best fit into production systems that utilize the 4RNS framework.
- Potential for products or practices to be implemented at scale into existing production systems.
- Reproducibility of proposed work.
- Collaborative research projects across a diversity of locations/soils/climates are encouraged.
- Applicants are encouraged to work with existing field trial locations and networks to maximize reach, have a thorough understanding of field conditions and management history and reduce infrastructure limitations.
- Multi-year trials with crops rotations are strongly encouraged.
- Potential for fertilizer product or practice adoption by the farming community, including estimated cost effectiveness or potential barriers to adoption by farmers using the EEF(s) of interest. While the primary use of the funding must be for field trials, supporting economic information is desired when available.

III. Eligibility

The EFC welcomes applications from all domestic and international higher education institutions, non-profit and for-profit organizations, and government-affiliated research agencies. Multiple applications are allowed.

Any individual(s) with the skills, knowledge and resources necessary to perform the proposed research as Program Director(s)/Principal Investigator(s) may apply through their home institution or organization.

IV. Funding Availability and Award Information

A maximum request of up to USD$1,000,000 are available for all proposed projects, however smaller projects will be considered and are welcome. Projects from two (2) to five (5) years in length are eligible for funding and may be expected to follow federal government funding guidelines. Successful projects will receive semiannual or annual disbursements contingent upon meeting reporting requirements (see Section VIII).

Key budget considerations are noted below, and additional budgetary guidelines can be found on FFAR's website. Applicants are encouraged to contact FFAR's Grants Team to discuss any concerns.

- Match is optional but accepted for this RFA. If matching funds are included in your project, it must meet FFAR's guidelines. Matching funds must come from a non-U.S. Federal Government entity.
- Matching funds cannot supplement or supplant preexisting funds for projects initiated before or during 2024. Matching funds must correspond to project costs in the budget justification.
- A maximum of 10% of direct costs may be used for indirect costs.
- Reasonable budgets work in favor of the applicant. Budgets that are not commensurate with proposed work or poorly justified likely will negatively affect the overall evaluation of the application.
- Proposals leveraging existing equipment, resulting in a lesser proportion of the budget to be used for equipment purchases, will be prioritized. Any equipment purchased must be justified and purchased directly for the research funded by this grant. Equipment purchases will be limited and considered as part of project evaluation and selection. We will not be providing funding to fully equip new research locations.

V. Application Components

All applicants must submit their application through FFAR's online Grant Management System.

Pre-Application Components

- Organization Information
- Organization Personnel Contact Information
- Principal Investigator (PI) and Key Personnel Contact Information
- Project title (*up to 250 characters*)

- Project Information
- Project description (*up to 1000 words total*)
    - What challenge or existing paradigm is the project addressing? (*up to 250 words*)
    - How will the project address the stated challenge and advance understanding of an understudied research topic or information gap? (*up to 250 words*)
    - What innovative outcomes will the project generate? Describe how the project will solve challenges to food supply or sustainable agriculture. (*up to 250 words*)
    - Why is the Efficient Fertilizer Consortium (EFC) ideally positioned to fund this project? (*up to 250 words*)
- Budget
    - Total proposed budget
    - Total EFC funding request
    - Total Matching contributions, if applicable (*matching funds are optional but accepted for this funding opportunity*)
    - Matching funder information, if applicable
- Organizational assurances

Optional Attachments

- Additional Key Personnel

Full Application Components

- Organization Information
- Organization Personnel Contact Information
- PI and Key Personnel Contact Project title (*up to 250 characters*)
- Project Information
- Project abstract (*up to 250 words*)
- Why is the Efficient Fertilizer Consortium (EFC) ideally positioned to fund this project? (*up to 250 words*)
- Goals and objectives (*up to 250 words*)
- Project description and approach – text only (*up to 1500 words*)
- Anticipated outcomes or outputs (*up to 500 words*)
- Data management plan (*up to 250 words*)
- Barriers to adoption of the research outcome(s) (*Note: The EFC strongly encourages applicants to address social and economic factors in the project design, evaluation processes, and outcomes, where applicable*.) (*up to 250 words*)
- Proposed budget
    - Total proposed budget
    - Total EFC funding request
    - Total Matching contributions, if applicable (*matching funds are optional but accepted for this funding opportunity*)
    - Budget justification by year (*up to 500 words*)
    - Matching funder information, if applicable
- Organizational assurances

Required Attachments

Failure to provide these attachments will result in the application's disqualification.

- Budget Form
- Current and Pending Support form. Required for PI and Key Personnel of the project
- Project timeline (*by year*)
- References cited (*will not count towards total word limit*)
- PI and Key Personnel Biosketches (*five-page limit per individual listed as PI or Key Personnel)*
- Supporting figures, tables, graphics or equations (*will not count towards total word limit)*

Optional Attachments

- Additional Key Personnel
- Three-slide summary or description of the project
- Matching Fund Verification Letter(s) - if applicable

VI. How to Apply

All proposals must be submitted by the deadline date through FFAR's online application Grant Management System. Applications submitted outside of this System will not be considered. To start a new Efficient Fertilizer Consortium application, please click here. If you are a new user, register for an account by clicking "Create Account" button located under the email address field on the left side of the home page.

Once you log in, you may begin working on your application. Please be sure to save your work often by clicking on "Save and Finish Later." To access a saved application, please do so through your Grant Management Account.

Only pre-applications and invited full proposals submitted by the deadline through FFAR's Grant Management System will be accepted and considered eligible for evaluation. To be fair to all our applicants, FFAR will not grant extensions to applicants who missed the deadlines posted in the Key Dates section.

VII. Evaluation Criteria

All applications will be screened for relevance, accuracy, completeness and compliance with EFC guidelines stated in this RFA. Pre-applications must demonstrate the potential to meet the evaluation criteria. Full applications then will be evaluated on the following criteria:

Qualifications and Research Environment (25%)

- Has the P.I. assembled a qualified research team with access to the appropriate field and laboratory facilities?
- Were all equipment purchases justified and to be used directly for the proposed research?
- Does the application identify how/why the EFC is uniquely positioned to fund this project?

Project Description and Approach (25%)

- Are the goals and objectives adequate to address the challenge?
- Does the application include appropriately thorough, tractable and feasible methods?
- Does the application identify potential pitfalls and include an adequate risk evaluation and mitigation plan?
- Does the application address how the *Field Trial Guidelines for Evaluating Enhanced Efficiency Fertilizers* will be followed?

Anticipated Outcomes and Outputs (25%)

- Does the application adequately describe the potential impact and applied relevance of the research?
- How significant, i.e. transformative, are the potential outcomes of the project? Will the results impact fertilizer use and crop production? Will the results be relevant to a specific region, or to global production systems?
- Is the budget justified by the work and potential outcomes outlined?

Data Management and Dissemination; Overcoming Barriers to Adoption (25%)

- Does the application include an adequate data management plan that aligns with the *Field Trial Guidelines for Evaluating Enhanced Efficiency Fertilizers* with a commitment to public access?
- Does the proposed project address 'public good' by making data open and accessible to the public while adhering to FFAR's intellectual property policy?
- Does the application emphasize scalability and present a plan for disseminating the project outcomes?
- Does the application address socioeconomic challenges and/or barriers to adoption regarding the proposed project?

VIII. Award Administration

Review Process

Pre-Application Review: Submitted pre-applications undergo an internal review by the EFC Executive Committee to assess if the project is relevant to the RFA and that the application demonstrates the potential to meet the evaluation criteria. Those applications deemed to have significant potential for advancing the EFC's objective will be invited by the EFC Executive Committee to submit a full application. ***Applicants must submit a pre-application to be eligible to submit a full application.***

Full Application Review: Full applications undergo a peer-review process. First, each submission is assigned to an external technical review by at least three subject experts. In the second stage, the EFC Executive Committee will provide funding recommendations based on the external peer reviews and a comparative evaluation of how well submissions meet the EFC's objectives. The EFC Executive Committee will then review positive funding recommendations and make final selection decisions.

All external reviewers must agree and adhere to the terms outlined in FFAR's Conflict of Interest Policy and Non-Disclosure Agreement. The EFC Executive Committee makes reasonable efforts to ensure that applications are not assigned to reviewers with a real or

apparent conflict with the applicant, institution, or project personnel. Reviewers with a conflict of interest are recused from evaluating or participating in related discussions. Each stage of the review is conducted confidentially, and as such, the EFC Executive Committee is responsible for protecting the confidentiality of the contents of the applications.

Award Administration

Selection Notice: Following the full application review process, the Principal Investigator and the Authorized Organization Representative listed on the project will be officially notified by email of the status of the application. If an application is selected for funding, the EFC reserves the right to request additional or clarifying information for any reason deemed necessary. Potential grantees are free to accept or reject the Grant Agreement as offered.

Intent to Fund Notification: The EFC (through FFAR) notifies applicants of their application status by email. The notice does not constitute an award or obligate funding from the EFC until there is a fully executed Grant Agreement.

Requirement to Demonstrate Matching Funds: **Matching funds are optional but accepted for this funding opportunity.** If the applicant provides matching funds, the applicant agrees to identify and certify matching funds annually before disbursement of award funds. The match share is intended to supplement, not supplant existing funding for the Principal Investigator. The applicant will abide by FFAR's Matching Funds Guidelines to meet FFAR's matching requirements. To constitute a valid match, all matching funds on a FFAR grant must be expended during the grant period.

Post-award Management

Semi -Annual Reporting Requirements: After the EFC confers a grant, the grantee must provide semi- annual update presentations to the EFC Executive Committee, as well as scientific and financial progress reports. The semi-annual reports should include activities performed under the grant, highlighting project accomplishments, and an account of all expenditures to date.

Final Report Requirements: Within 90 days of completing the project, the grantee shall provide a final project report. This report should address the project objectives outlined in the original grant application, describe any modifications to the project objectives and scope, describe the final project accomplishments, and include a final project accounting of all grant funds.

Scientific Integrity: The EFC strives to advance knowledge and the application of science to address challenges related to sustainable agriculture. The EFC's ability to pursue its objective depends on the integrity of the funded science projects. All EFC grants must be conducted with the highest standards of scientific integrity.

IX. Application Assistance

For questions related to the online submission system, please contact FFAR's Grants Management team at grants@foundationfar.org.

For questions related to the Efficient Fertilizer Consortium, please contact Dr. Sarah Lyons, Scientific Project Manager, at slyons@foundationfar.org.

FFAR strives to respond to inquiries within two business days, but our response time depends on the volume of questions received and the complexity of the questions asked. Please note that we do not monitor mailboxes on evenings, weekends, or federal holidays.