

Seeding Solutions 2023 Request for Application

Matching funds are required for this program

Key Dates

Pre-Application Open: January 25, 2023, at 12:00pm ET

Pre-Applications Due: March 8, 2023, by 5:00pm ET

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

Full Application Receipt Open: April 26, 2023, at 12:00 PM ET

Full Applications Due: June 28, 2023, by 5:00 PM ET

Award Notification: Fall 2023

Anticipated Project Start Date: Early 2024

The Foundation for Food & Agriculture Research (FFAR) announces the 2023 Seeding Solutions program. We invite applications for innovative and transformative research to benefit farmers, consumers, and the environment. FFAR seeks to award approximately ten meritorious applications, prioritizing those that emphasize a commitment to cross-sector partnerships.

Program Priorities and Requirements

FFAR seeks projects that foster innovation with the potential for transformative impact within FFAR's Challenge Areas and AgMission Initiative. Applications that address the following will receive preference:

1. Contribute to the goal of sustainable food and agriculture, defined as practices that "satisfy human food and fiber needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; make the most efficient use of

nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm operation; and enhance the quality of life for farmers and society as a whole." (Food and Agriculture, Conservation and Trade Act of 1990, Public Law 101-624, Title XVI, Subtitle A, Section 1603).

2. Accelerate innovation within FFAR's Challenge Areas and AgMission. For this request for applications (RFA), FFAR defines innovation as follows:
 - *Radical Innovation*: **Development of new technologies**, software, algorithms, methodology, or products with the potential to transform agricultural systems.
 - *Applied Innovation*: **Application and validation of new or emerging technologies, processes, or management strategies** to address significant challenges in food and agriculture systems.
 - *Re-imagined Innovation*: **Adaptation of existing technologies, processes, or management strategies for entirely new agricultural applications.**
3. Address an aspect of the following [Challenge Area](#) or [AgMission](#) priorities. Additional information is available through the links provided. We encourage applicants to contact the Scientific Program Director of the appropriate Challenge Area or Initiative of interest to hone ideas before submitting a pre-application (see [Application Assistance](#)).
 - [Soil Health](#): Advanced understanding of what soil health is, how it is measured, and how to manage and optimize the sustainable delivery of the ecosystem services that soils provide.
 - [Sustainable Water Management](#): Interdisciplinary, model-based research to enhance terrestrial water quality and supplies and minimize linked environmental impacts while maximizing crop production through increased adoption of strategically placed and designed agricultural water management practices.
 - [Next Generation Crops](#): Advanced breeding methods and development of biotic and abiotic stress tolerance for crops grown in organic and conventional cropping systems to increase farmer profitability and environmental resilience.
 - [Advanced Animal Systems](#): Improved animal health, welfare and productivity, antibiotic stewardship, and environmental sustainability. We particularly encourage research with outcomes relevant to multiple species and/or One Health approaches that incorporate transdisciplinary research relevant to animals, humans and the environment.
 - [Urban Food Systems](#): Elucidation of connections between urban food systems and

the urban environment, in addition to the connections between rural and urban communities to improve food and nutritional security, human health outcomes, economic opportunities, and food system resiliency through transdisciplinary partnerships.

- [Health- Agriculture Nexus](#): Systems-level approaches (both technological and non-technological) aimed at reducing food and nutritional insecurity and improving human health in the United States and worldwide.
 - [AgMission](#): Innovative research and integrated data systems to advance knowledge and adoption of Climate-Smart Agriculture practices, focusing on co-design with agricultural stakeholders and understanding enabling conditions for systems-level change.
4. Demonstrate fully integrated partnerships with different sectors so research outcomes may be scalable and applicable to food and agriculture systems.

The development of public-private partnerships is central to FFAR's vision and core mission: *Building unique partnerships to support innovative science addressing today's food and agriculture challenges*. External matching funds (i.e., contributions provided by partners outside of an applicant's home institution) will strengthen the application's standing. These partners may include but are not limited to private and public corporations, non-profits, foundations, commodity and trade groups, and state and local governments. Federal agencies can serve as co-investigators, however, FFAR cannot match their contributions. Unique partnerships with organizations that may not typically work in agriculture are strongly encouraged.

5. Uphold FFAR's commitment to diversity, equity, and inclusion by seeking unique perspectives through participatory stakeholder engagement and developing results to serve the diverse stakeholders committed to addressing challenges related to food supply and agricultural sustainability.

FFAR envisions a world where everyone can access affordable, nutritious food grown on thriving farms. By building collaborative partnerships, we support audacious science that tackles today's food and agriculture challenges. We value and integrate diversity, equity and inclusion (DEI) into our efforts to ensure our work reaches everyone. FFAR holds itself accountable to potential partners and stakeholders, by proactively committing time and opportunities to build outreach, programs and relationships that reflect inclusivity and equity.

6. Serve the public good by making data open and accessible, creating unique economic development opportunities, or contributing to food and agriculture workforce development.

FFAR, as a part of its mission, seeks "not only brilliant minds but also diverse and innovative perspectives tackling today's challenges in food and agriculture." FFAR also understands that the outside-the-box thinking needed to drive innovation occurs when researchers with different skill sets and experiences collaborate. Cross-disciplinary research teams, especially those that include disciplines not traditionally associated with food or agriculture science, are strongly encouraged to explore innovative solutions through the Seeding Solutions program.

Eligibility

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

The Foundation for Food & Agriculture Research welcomes applications from all domestic and international higher education institutions, non-profit and for-profit organizations, and U.S. government-affiliated research agencies. The following principles guide FFAR's international engagement under this Seeding Solutions RFA:

- The proposal must identify a clear benefit to the U.S. food and agriculture system and a clear pathway to commercialize or deploy the technology or solution in the U.S.
- FFAR will prioritize research that delivers broader benefits across geographies and production systems while ensuring mutual benefit for the U.S. and other nations.

FFAR will not support research that addresses a challenge primarily limited to another country or region outside the U.S. or where the technology or solution is not broadly relevant to the U.S.

Funding Availability and Award Information

At FFAR's discretion, we will award of approximately U.S. \$10 million in grants through the 2023 Seeding Solution program. Individual awards will range from U.S. \$300,000.00 to U.S. \$1 million. All projects must have planned durations ranging between 12 and 60 months. Successful projects will receive annual disbursements.

Key budget considerations are noted below, and additional budgetary guidelines can be found on our [website](#). Applicants are encouraged to contact [FFAR's Grant Team](#) to discuss any concerns related to the matching requirements (see [Matching Guidelines](#)).

- **All grants require matching contributions equal to or greater than the FFAR funding request.** Matching funds must come from a non-U.S. Federal Government entity. Excess match will not influence the potential success of an application.

- Matching funds cannot supplement or supplant preexisting funds for projects initiated before or during 2023. Matching funds must correspond to line items in the full application budget. At least 50% of matching funds must be a cash match per FFAR's definition of cash. The remainder may be an in-kind match per FFAR's definition of in-kind.
- A maximum of 10% of the total award may be used for indirect costs. FFAR's indirect cost allotment is not an indirect cost rate applied to the total modified direct costs; instead, it is an overall allotment from the Total Funds Request, also known as the Total Project Costs. This requirement means 90% of the total funds requested must go directly to the proposed research.
- Reasonable budgets work in favor of the applicant. Budgets that are not commensurate with the proposed work or poorly justified will negatively affect the application's overall evaluation.

Application Components

Applicants must submit the pre-application using FFAR'S Grant Management System. All information provided will be treated as confidential. The most innovative and cutting-edge projects with significant potential for advancing FFAR's mission will be invited to submit a full application. **Applicants must submit a pre-application to be invited to submit a full application.**

Pre-Application Components

- Organization information
- Principal investigator information
- Key project personnel – name(s), affiliation, expertise
- Project title (*up to 50 words*)
- Locations of performance
- Project timeline
 - Proposed project start date
 - Proposed project duration (*in calendar months*)
- Pre-proposal project description (*up to 2,000 words*)
 - What challenge or existing paradigm is the project addressing? What are the underlying research hypotheses?
 - How will the project address the stated challenge and advance understanding of an understudied research topic or information gap?
 - What innovative outcomes will the project generate? How will the project solve challenges to food supply or sustainable agriculture.
 - Why is FFAR ideally positioned to fund this project?
 - How does the project contribute to addressing inequities?

- Project key words (*20-word limit*)
- Budget
 - Total FFAR funding request
 - Total matching funds (*at least 50% of match must be cash per [FFAR matching guidelines](#)*)
 - Total proposed budget (*FFAR funds + matching funds*)
- Matching funder information: List any committed or potential funding partners
- Optional Attachment
 - Additional Co-Investigators: Applicants with more than three (3) co-investigators must upload a table including the name, institution, expertise, role, email, and phone number of co-investigators in addition to the three (3) individuals listed on the Contact Information section of the online application.

Applications that demonstrate strong partnerships by matching from external sources outside the applicant institutions are encouraged. These partners may include but are not limited to the private sector, non-profits, commodity and trade groups, state governments, and others that do not traditionally work in agriculture.

Full Application Components

Required components

- Organization information
- Principal investigator information
- Key project personnel – name(s), affiliation, expertise, project role
- Project title (*up to 50 words*)
- Project timeline
 - Proposed project start date
 - Proposed project duration (*in calendar months*)
- Locations of performance and USDA involvement
- Abstract (*up to 500 words*)
- Goals and objectives (*up to 500 words*)
- Project milestones by year, linked to objectives (*up to 500 words per year described*)
- Project justification and approach (*up to 5000 words*)
- Anticipated outcomes or outputs (*up to 500 words*)
- Plans for stakeholder engagement (*up to 500 words*)
- Data management plan (*up to 500 words*)
- Barriers to adoption of the research outcome(s) (*Note: FFAR strongly encourages applicants to address social and economic factors in the project design, evaluation processes, and outcomes, where applicable.*) (*up to 500 words*)

- Project Suitability: Why is FFAR ideally positioned to fund this project? (*up to 250 words*)
 - Project funding overlap
 - Proposed budget
 - Total FFAR funding request
 - Total matching funds (*at least 50% of match must be cash per [FFAR matching guidelines](#)*)
 - Total proposed budget (*FFAR funds + matching funds*)
 - Budget narrative: For each research objective, provide a brief overview of the underlying tasks, their expected timeframes for completion and the associated estimated budget. The budget outline should parallel the approach outlined in the project's description and the budget worksheet. Address costs related to personnel, equipment, and facilities, and analytics (*up to 1000 words*)
 - Budget justification by year (*up to 1000 words*)
 - Matching funder information
 - Organization Assurances
- **Required Attachments:** Failure to provide these attachments will result in the application's disqualification.
- Project Description and References Cited: **This should be identical to the Project Description written out in the Full Proposal Application form**, but may include graphics, figures, equations, and tables. Please also include up to five pages of references cited, which will not count toward the word limit. (*up to 5000 words*)
 - [Budget Form](#)
 - [P.I. and Key Personnel Biosketch](#): five-page limit per individual listed as P.I. or key personnel in the project
 - Project timeline (by year)
 - Matching Fund Verification Letter(s)
- **Optional attachments:** Applicants can upload any of the following as a single PDF document.
- Five (5)-slide summary or description of the project
 - Letters of Support: Applicants can provide letters of support for the proposed project, especially from matching funders.
 - Graphics, Figures, Equations, and Tables not included in the Project Description: Applicants may upload a PDF document with graphics, figures, tables, or a list of equations to support the research program plan. **Five-page limit.**

How to Apply

All proposals must be submitted through FFAR's online application Grant Management Account. Pre-applications and invited full 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.

[Please click here to start a new application](#). 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.

Additional Information

Review Process

Pre-Application Review: Submitted pre-applications undergo an internal review by FFAR's science team to assess its relevance to the Seeding Solutions RFA and its potential to meet the evaluation criteria. The most innovative and cutting-edge projects with significant potential for advancing FFAR's mission are invited to submit a full application. ***Applicants must submit a pre-application to be eligible to submit a full application.***

Full Application Review: Full proposals undergo a three-stage peer-review process. First, each submission is assigned to an external review panel of at least three subject experts. In the second stage, external experts serving on Advisory Councils for each of FFAR's Challenge Areas and AgMission provide funding recommendations based on the initial peer reviews and a comparative evaluation of how well submissions meet the Seeding Solutions program objectives and advance FFAR's mission. Finally, FFAR's Executive Director will review positive funding recommendations with consideration to the Advisory Councils' program priorities, the portfolio balance across FFAR programs, and available funding.

All external reviewers must agree and adhere to the terms outlined in FFAR's [Conflict of Interest Policy](#) and [Non-Disclosure Agreement](#). FFAR 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 the related discussions. Each stage of the review is

conducted confidentially, and as such, FFAR is responsible for protecting the confidentiality of the contents of the applications.

Review Criteria

All proposals will be screened for relevance, accuracy, completeness, and compliance with FFAR policies. Pre-proposal applications must demonstrate the potential to meet the criteria for full proposals. These include the following:

Novelty, Innovation, and Originality (30%)

- Does the proposed project innovatively address a challenge related to our food supply or sustainable agriculture?
- Does the proposal challenge an existing paradigm(s) in food and agriculture science?

Technical Merit and Feasibility (30%)

- Does the proposal clearly outline the goals, objectives and underlying hypotheses?
- Does the proposal include appropriately thorough, tractable, and feasible methods?
- Has the principal investigator assembled a qualified research team with access to the appropriate field and laboratory facilities?
- Does the proposal present a tractable timeline and budget?
- Does the proposal include adequate risk evaluation and a mitigation plan?
- Does the proposal include an adequate data management plan with a commitment to public access?

Impacts and Outcomes (25%)

- Does the proposal adequately describe its potential, significant impact and applied relevance to U.S food and agriculture systems, with far-reaching, global impacts? Will the investigators be able to extrapolate their results beyond the study location and domain?
- Does the proposal present a plan for disseminating the project outcomes?
- Will results have relevance and reach to underrepresented and diverse communities of agricultural producers?
- Will the project provide training and support accessibility to a diversity of emerging scientists?
- Does the proposal identify how FFAR is uniquely positioned to fund this project?
- Does the proposal align with FFAR's Challenge Area or AgMission priorities?

Partnerships (15%)

- Does the project present a compelling and novel partnership opportunity?
- Does the proposal include adequate confirmation of partner commitment(s)?

Award Administration

Funding Notification: FFAR notifies applicants of their awards through email. If an application is selected for funding, FFAR reserves the right to request additional or clarifying information for any reason deemed necessary. The notice does not constitute an award or obligate funding from FFAR until there is a fully executed Grant Agreement. Potential grantees are free to accept or reject the Grant Agreement as offered. FFAR encourages applicants to review a sample Grant Agreement before applying to ensure they know the terms under which grants are offered.

Post-award Management

Grant Period: Upon receipt of the Grant Agreement, the grantee should confirm the project's start and end dates. Once signed, the start date cannot be changed. Grantees may use FFAR funds only on project expenditures on or after the Grant Agreement is fully executed or with prior approval of pre-award expenditure. Charging expenditures to the grant before the fully executed date is strictly prohibited. Likewise, grantees may not use FFAR funds after the end date except to pay allowable project costs committed on or before that date.

A grantee may request a no-cost extension of up to 12 months to complete the work's planned scope. The request must be communicated to FFAR and submitted through the Grant Management System at least thirty (30) days before the end date of the grant. The request must justify the need for the extension, including a summary of the unobligated, remaining funds, and provide a plan for fulfilling the project's terms. If a no-cost extension request is approved, FFAR will amend the Grant Agreement. This extension will not be approved merely for using unexpended funds.

Annual Reporting Requirements: After FFAR confers a grant, the grantee must provide annual scientific and financial progress reports. The report should include activities carried out 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, outline the final project accomplishments, and include a final project accounting of all grant funds.

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

Application Assistance

For questions related to the Seeding Solutions grant program or the online submission grant management system, please contact FFAR's Grant Management team at grants@foundationfar.org.

For questions related to the Challenge Areas, AgMission or programmatic questions, please contact the appropriate Scientific Program Director:

Challenge Area:

Soil Health

Sustainable Water Management

Next Generation Crops

Advanced Animal Systems

Health and Agriculture Nexus

Urban Food Systems

AgMission

Scientific Program Director (Email Contact):

LaKisha Odom (lodom@foundationfar.org)

Kathleen Boomer (kboomer@foundationfar.org)

Jeff Rosichan (jrosichan@foundationfar.org)

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John Reich (jreich@foundatonfar.org)

Allison Thomson (athomson@foundationfar.org)

We only accept scientific or programmatic grant inquiries by email. We strive 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 this mailbox on evenings, weekends, or federal holidays.

Challenge Area & AgMission Priorities

Soil Health

The Soil Health Challenge Area aims to increase soil health by building knowledge, fueling innovation, and enabling adoption of innovative practices. FFAR believes that strategic soil health research is essential to increasing farmer and rancher productivity and profitability. We support research that provides a better understanding of what soil health is, how it is measured and how to manage and optimize the sustainable and equitable delivery of the ecosystem services that soils provide.

While FFAR will not seek to limit pre-applications to specific target areas within this Challenge area, we encourage applications that propose innovations that address the following research topics:

- Climate resilient soil management practices
- Assessments of the Soil Microbiome
 - Measurements of microbial processes
 - Investigations of microbial communities at different scales, including spatial, temporal and molecular
- Soil Enhancing Techniques
 - Alternative Soil Amendments
 - Optimization of Nutrient Use Efficiencies
- Linkages between farm productivity and soil health
 - Quantitative assessments that demonstrate Soil health practice adoption and their connection to or impact on economic, socioeconomic, and physical health
- Novel/innovative strategies that explore and address barriers to adoption of soil health practices

Sustainable Water Management

The Sustainable Water Management Challenge Area supports research to enhance and protect an adequate supply of healthy natural waters to sustain long-term agricultural production and human/environmental health under shifting climate conditions. FFAR seeks to fund stakeholder-engaged, transdisciplinary research that directly informs decisions related to sustainable and equitable/inclusive/collaborative water management, thereby fostering broad-scale adoption of advanced management practices.

While FFAR will not limit pre-applications to specific target areas within this Challenge Area, we encourage applications to address the following:

- Evaluation of potential or unrecognized threats to ground- and surface-water resources
- Innovation in the designs, techniques, or strategies to advance sustainable water management
- Development of accessible precision decision tools and modeling systems to support sustainable agriculture and water management in the face of climate change
- Investigation of how to use science-based information effectively to address stakeholder concerns and effective outreach and collaborative strategies to increase adoption of conservation management strategies

Next Generation Crops

FFAR supports the advancement of novel, nutritious, profitable and resilient on-farm crops. There is a strong emphasis on increasing crop diversity and use of new technologies, both emerging and those rooted in traditional knowledge, to benefit consumers, producers and the environment. FFAR seeks to fund projects with an emphasis on innovative technologies and environmentally-sound production practices, as well as the discovery and development of new end uses for both conventional and non-traditional crops. We also prioritize advanced breeding methods and development of biotic and abiotic stress tolerance for crops grown in organic and conventional cropping systems with the aim of providing increased farmer profitability and environmental resilience. FFAR is seeking ground-breaking research leading to increasing adoption of innovations across the U.S. food system.

While FFAR will not seek to limit pre-applications to specific target areas within this Challenge Area, we encourage research applications that address any of the following areas:

- Crop diversification
- Crop resiliency
- Accelerated breeding methodologies

Preference will be given to applications that include:

- Emphasis on how we can increase on farm profitability.
- Creating additional consumer-based value at the farm level.
- More multifaceted teams that include economists, social scientists, and soil health scientists. Thinking beyond the primary target and extend that team to include individuals or communities who are thinking about food production from diverse perspectives, as well as overcoming barriers to adoption

Advanced Animal Systems

The Advanced Animal Systems Challenge Area aims to support innovations and collaborative partnerships that improve animal health, welfare and productivity, antibiotic and environmental stewardship--including the exploration of barriers to equitable, sustainable and/or regenerative systems.

FFAR will not seek to limit pre-applications to specific topics within the Advanced Animal Systems Challenge Area. Pre-applications should describe audacious research with the potential to shift paradigms in livestock production. FFAR recognizes the value of innovation and technology, including traditional land management practices and knowledge, as integral to building a more equitable agricultural production system; thus, we welcome proposals which seek to develop, understand, scale, and/or apply these practices.

Projects that directly involve producers or end-users, with potential for large-scale adoption of results, are highly encouraged.

Urban Food Systems

The Urban Food Systems Challenge Area explores areas of innovation with the potential to transform urban food systems to improve food and nutritional security, human health outcomes, economic opportunities, and food system resiliency. FFAR supports innovative, systems-level approaches aimed at creating healthy and equitable food systems. Emphasis is placed on transdisciplinary approaches that take into account the connections between urban food systems and the urban environment, in addition to the connections between rural and urban communities to achieve this goal.

While FFAR will not seek to limit pre-applications to specific target areas within urban food systems, we strongly encourage applications that take advantage of data and infrastructure that spans different sectors to address the following research topics:

- Increase our understanding of the impact of a region's collective or potential production systems as part of an overall strategy to promote urban health and well-being, ecosystem services, or climate variability risk mitigation
- Technologies and/or interventions that promote food and nutritional security within urban populations, including:
 - Utilizing existing interventions in novel ways
 - Transportation and/or the delivery of healthy and nutritious food
 - Increasing the affordability of healthy and nutritious food
 - Utilizing data across sectors to develop novel solutions
- Increasing our understanding of a region's foodshed

- Systems and technologies that advance the food and agriculture economy within a region, including:
 - Products: regional production, high-value products
 - Circular Economy: food production/system byproducts
 - Urban environment: design/organization to promote economic viability and efficiencies that enhance farmer profitability and long-term sustainability

Health-Agriculture Nexus

The Health-Agriculture Nexus Challenge Area supports innovative, systems-level approaches (both technological and non-technological) aimed at reducing food and nutritional insecurity, food waste and loss, and improving human health in the United States and around the globe.

COVID-19 has caused major disruptions across the food system, which affected food security in various communities throughout the U.S. In the 2023 Seeding Solutions program, the Health-Agriculture Nexus Challenge Area is seeking ground-breaking research leading to viable alternative distribution mechanisms to increase efficiency and resiliency of the distribution of and access to affordable and healthy foods, especially produce and protein products. Projects should take into consideration ecosystem factors needed to provide a viable, scaled solution such as affordability, consumer behavior, material sustainability (i.e., packaging), ability to scale and/or replicate nationally, as well as the social, environmental and economic impacts. Projects that emphasize these food distribution/access issues in underserved population(s) are strongly encouraged.

AgMission

The objective of AgMission is to support research, innovation and data systems to advance knowledge of climate-smart agriculture (CSA) practices and increase their adoption. CSA refers to practices that enhance resiliency and adaptation of agricultural lands and production systems as well as practices that reduce greenhouse gas (GHG) emissions and/or increase soil carbon. AgMission focuses on those practices and management changes directly under the control of the agricultural producers.

AgMission is a collaboration between FFAR and the World Farmers' Organisation and prioritizes research that is co-designed with agricultural stakeholders and collaboratively engages farmers and ranchers directly. While FFAR will not seek to limit pre-applications to specific target areas, we encourage applications that address the following research areas:

- Identify and quantify the greenhouse gas emissions reductions (CO₂, N₂O and CH₄) from CSA practices in combination with any associated agronomic and

- economic costs or benefits in specific geographies and production systems.
- Advance understanding of agricultural production systems that can withstand greater variability in precipitation and greater temperature extremes.
 - Examine and define the social, cultural, educational and/or technological conditions that lead to successful and equitable adoption and persistence of CSA practices

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