



Implementation of the USDA FAS Sustainable Packaging Innovation Lab to Assist Specialty Crop Exports (ASCE-SPIL)



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Context/Background

Worldwide, emergent restrictions on the use of single-use and plastic packaging will limit access of specialty crops to global markets¹. Therefore, the United States Department of Agriculture's Foreign Agricultural Service (USDA FAS) has launched the Sustainable Packaging Innovation Lab as part of the Assisting Specialty Crop Exports (ASCE) initiative, to support U.S. specialty crop producers. Clemson University and The Foundation for Fresh Produce (FFP) of the International Fresh Produce Association (IFPA) are partnering with the Foundation for Food & Agriculture Research (FFAR) to implement the Sustainable Packaging Innovation Lab of the ASCE initiative (ASCE-SPIL)² by the United States Department of Agriculture Foreign Agricultural Service (USDA FAS). Therefore, applications are invited for participation in a Sustainable Packaging Innovation Lab program to develop packaging and packaging alternatives for specialty crops compliant with the emergent packaging regulations in the EU, UK, Canada, Japan and other key markets.

For the purposes of this program, the term "packaging" includes primary, retail and transportation packaging, ultra-thin bags for bulk fresh produce, box liners and moisture wicking pads, tags, labels and stickers affixed or attached to fresh produce or to other packaging for traceability, supply chain or inventory management. Proposals focusing on packaging alternatives capable of providing some of the same functions (for example, but not limited to the extension of shelf life, management of ripening, moisture and temperature control, prevention of molds, rots and other microbiological defects, and novel types of labeling) are also invited.

¹ Illustrative examples of finalized and pending regulations in major US trading partners could be found here:

(a) [//apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=European%20Union%20Finalizes%20New%20Rules%20for%20Packaging%20and%20Packaging%20Waste%20Reduction_Brussels%20USEU_European%20Union_E42024-0012.pdf](https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=European%20Union%20Finalizes%20New%20Rules%20for%20Packaging%20and%20Packaging%20Waste%20Reduction_Brussels%20USEU_European%20Union_E42024-0012.pdf)

(b) www.canada.ca/en/environment-climate-change/corporate/transparency/consultations/consultation-pollution-prevention-planning-notice-primary-food-plastic-packaging.html

(c) www.gov.uk/guidance/single-use-plastics-bans-and-restrictions#restricted-items

(d) www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=125439

(e) www.mhlw.go.jp/stf/newpage_36419.html

² <https://fas.usda.gov/sites/default/files/2024-05/FY24%20ASCE-Sustainable%20Packaging%20Innovation%20Lab%20NOFO.pdf>



For the purposes of this program, “containment of a product” is not the sole function of packaging, and applications focusing on materials, technologies or products that fulfil other functions typically associated with conventional packaging are welcome. The term “sustainable packaging” is defined situationally as “packaging that complies with the emergent packaging restrictions referenced in Footnote 1” and may include reusable and compostable packaging, packaging that is free from single-use plastics.

A broad adoption of packaging and packaging alternatives compliant with these emergent regulations will involve the development of entirely novel materials and technologies, optimization of the use of existing materials in novel formats, scale-up and pilots for novel packaging types or formats and technologies. Therefore, successful applicants to this program will be recruited into one of three tracks:

- (1) **Applied R&D** aimed at bringing a nascent packaging format to the pilot stage to demonstrate commercial readiness,
- (2) **Technology Accelerator** to commercialize a novel packaging or packaging alternative that are either in late stages of trials or market-ready or are already generating revenue through partnerships with end-users, industry mentorship and pilots; or
- (3) **Scale-up or pilot projects** to establish commercial feasibility / manufacturability of innovative packaging or packaging alternative solutions.

Only specialty crops that are listed on the following USDA website:

<https://www.ams.usda.gov/services/grants/scbqg/specialty-crop> are eligible for this program. Other commodities, other foods, including foods prepared from specialty crops through thermal processing or freezing, or any beverages are not eligible for this program.

Program Description

Clemson University and the Foundation for Fresh Produce (FFP) of the International Fresh Produce Association in partnership with FFAR were selected by USDA FAS for the implementation of the Assisting Specialty Crop Exports, Sustainable Packaging Innovation Lab (ASCE-SPIL). More information about the ASCE initiative and ASCE-SPIL can be found here: <https://fas.usda.gov/sites/default/files/2024-05/FY24%20ASCE-Sustainable%20Packaging%20Innovation%20Lab%20NOFO.pdf>

FFAR will conduct administrative screening and technical peer-review of the proposal applications from interested researchers based on the criteria identified below, under



Application Review Process. Highest scoring proposals will then be reviewed by the Program Executive Committee Review including industry and academic experts, specialty crop industry stakeholders as well as representatives from the USDA FAS. This selection committee will finalize projects for the three tracks based on the scoring of peer reviewers, programmatic fit and portfolio balance. Clemson University will carry out post-award management of the projects selected for Track 1 (Applied R&D) and Track 3 (Scale-up and pilot), while FFP will manage companies and researchers selected for Track 2 (Technology Accelerator).

All of these tracks are intended as 12 months-long programs, with the first deliverable by Sept 30, 2025.

Track 1 (Applied R&D) seeks proposals aimed at bringing a solution for specialty crop exports that is still at the laboratory stage but shows high promise to be implemented in pilot-scale manufacturing with minimal further effort. Such projects would exist at a Technology Readiness Level³ (TRL) of 4 or 5 (demonstration / validated in a laboratory or relevant environment) at project inception with the goal of moving the technology to the pilot stage where it can be demonstrated in a manufacturing or operational environment (TRL 6-8). It is highly recommended that applicants demonstrate capabilities to perform pilot scale operations toward project completion or join with an industry partner with such capabilities. Project activities could include product development, validation and testing of packaging performance, cost and lifecycle analysis of the manufacturing process, and other activities aimed toward pilot, an ultimately, commercial scale production.

Track 2 (Technology Accelerator) seeks proposals aimed at scaling innovations in sustainable packaging for the fresh produce industry. Projects selected for this track would exist in TRL 6-9. The program will begin with a week-long immersion tour to specialty crop grower/shipper, processing, packing and packaging operations. Participants in the program will be mentored by fresh produce industry expert, have access to the consumer, retailer and market data to optimize their packaging, and each participant will present their technologies to customers and investors during a “demo day” and showcase their products to the fresh produce industry during the Global Produce & Floral Show, the largest industry trade show. Companies, researchers and other innovators in the accelerator will experience a blend of tailored business development, real-world testing environments, and market

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www.dst.defence.gov.au/sites/default/files/basic_pages/documents/TRL%20Explanations_1.pdf



validation opportunities, helping them refine their packaging and packaging alternative solutions to prepare for successful market entry.

More information about the Accelerator can be found here:

<https://www.freshproduce.com/resources/technology/fresh-field-catalyst/>

Track 3 (Scale-up and pilot) seeks proposals to run pilot-scale manufacturing projects aimed at commercializing a packaging solution for specialty crop exports. Projects will consist of demonstrating the ability to commercialize a new packaging format, including initial pilot studies, process refinement, tooling, optimization for cost and repeatability, or refinement of a manufacturing process based on the needs of a new packaging format. The emphasis of this track is toward moving a product to commercial production, satisfying the needs of new packaging requirements described below. Projects selected for this track would exist in TRL 7-8.

Key Dates

Full Application opens on December 11, 2024

Applications are due by 5 PM (US Eastern Time) on **February 12, 2025**

Notification of selected grantees: on or after **April 4th, 2025**

Earliest project start date: **April 11th, 2025**

Award Information

Funding will be provided for up to twenty (20) awards of between \$50,000 and \$250,000 each. The performance period for the awards will be 12 months. This will be a reimbursable (not prepaid) award, with quarterly (based on the calendar year) invoicing and reporting. Indirect costs recovery is limited to 10% of total direct costs (TDC). In addition to funding, awardees will gain access to collaboration and networking opportunities, fresh produce industry and consumer insights, Life Cycle Analysis (LCA) tools and legal reviews of emergent packaging regulations.

What We Are Seeking

Through the three tracks of the program, we are seeking to identify and support companies of all sizes (from start-ups to established well-capitalized enterprises), academic or federal

researchers to develop, scale-up and commercialize solutions that address emergent packaging regulations either pending approval or already in effect.

We seek novel sustainable packaging or packaging alternatives that can replace single-use packaging and single-use plastic packaging but can offer at least some of the same functions (for example, extension of shelf life, delay or management of ripening of climacteric fruits and florals, reduction of physical damage, reduction of food loss and waste, prevention of cross-contamination, absorption of moisture, containment or reconstitution of modified atmosphere, conveyance of information on traceability, indicator of food quality, safety and integrity, reduction of oxidative damage to fresh-cut and value-added products) in an economical and scalable manner.

Examples may include (but are not limited to):

- Increasing post-consumer recycled (PCR) content in primary food packaging
- Increasing reusability in transport and group packaging including traceability
- Compostable (home and/or industrially) packaging
- Finding new formats to replace banned materials such as per- and polyfluoroalkyl substances (PFAS) coatings
- Alternatives to shrink-wrapped individual containers, and containers for produce under 1.5 kg
- Developing sticky labels for fresh fruit and vegetables that are both home and industrially compostable
- Laser etching
- Edible coatings
- Compostable pads for absorbing moisture in clamshells or lidded trays
- Compostable or reusable inserts or satchels for sequestering ethylene or carbon dioxide
- Food-safe antimicrobial coatings for reusable packaging
- Devices or systems for tracking, collection and return of reusable packaging

Applications focusing on packaging and/or packaging alternatives for fresh-cut and value-added products (such as pre-made salads, peeled, sliced and/or diced ready-to-eat fresh fruits and vegetables currently sold in single use packaging) are especially encouraged.

We take a material-agnostic view, however, single-use plastic packaging is not compliant with packaging restrictions being imposed by global markets, as referenced in Footnote 1.

Proposals that focus on the development of novel materials must clearly indicate the source of the material, its uniformity and its availability at the scale needed to provide packaging or packaging alternatives for a meaningful segment of ~7million tons of specialty crops exported by the U.S. producers. Proposals that focus on compostable packaging must indicate compliance with common home and industrially compostable standards or plans to determine compostability of the packaging construct. Proposals describing “biodegradable” packaging (other than home and industrially compostable) must clearly explain end-of-life of the packaging. Proposals that focus on reusable packaging must take into consideration the regulations that require reusable packaging to be collected and returned to the origin, and then reused for the same intended purpose.

Program Priorities & Requirements

All research activities must be structured to answer, directly or indirectly, at least two of the following questions before, during, and after the development and dissemination of research and development or commercialization outputs:

- How does the activity advance the goals of maintaining or increasing U.S. exports of specialty crops?
How does the activity enable U.S. exporters to comply with emerging regulatory requirements (see Footnote 1) for packaging and labeling?
- How does the activity support the development of packaging materials that are alternatives to single-use plastic packaging?
- How does the activity support the development of reusable packaging systems for the export of specialty crops?
- How does the activity support the export of specialty crops that will be sold at retail without packaging?
- How does the activity reduce food loss and waste of exported fresh produce?
- How does the activity promote the implementation of novel sustainable packaging at a commercial scale for exports of specialty crops?

Successful grantees are expected to develop KPIs or metrics to track progress toward these program-wide goals.

Types of Activities That Will Not Be Considered

The following projects are not eligible for this opportunity:

1. Development or improvement of infrastructure for composting or recycling or refill or reuse;
2. Projects that are broadly considered as “social science research”, for example (but not limited to) surveys of any kind, consumer and/or retailer education or behavior modification;
3. Fundamental research on materials that have no clear viable pathway to pilot scale production, or cannot be demonstrated so in the project timespan;
4. Packaging for foods and/or commodities other than specialty crops;
5. Packaging formats that need to be separated to be recyclable or compostable (for example, a compostable fiber tray with a single-use plastic non-compostable lid, or a cardboard tray with a non-compostable plastic liner that needs to be peeled off, etc);
6. Shopping bags and alternatives;
7. Biodegradable or compostable packaging that generates known harmful by-products;
8. Packaging containing PFAS or other fluorocarbons;
9. Packaging containing materials that can be recycled, but for which collection and/or recycling infrastructure currently does not exist in key markets (Canada, EU, UK).

Eligibility

Clemson University and FFP welcome applications from domestic or international companies of all scales (from start-ups to well-capitalized enterprises), institutions of higher education, non-profit and for-profit organizations, and government-affiliated researchers. Applications from international entities are invited as long as there is a clearly described collaboration with U.S.-based researchers, packaging companies or exporters of specialty crops.

All applicants must have a UIE (Unique Entity Identifier) number, which could be obtained via registration in the U.S. Government System for Award Management (www.sam.gov) before receiving any funds. Applicants with inactive, expired, pending, or excluded listings will be deemed ineligible. Exceptions, waivers, or extensions will not be considered.

Any individual(s) with the skills, knowledge, and resources necessary to carry out the proposed research as Program Director(s)/Principal Investigator(s) is invited to work with their organization to develop an application for support.

Application Components

Full Proposal

General consideration: please use a common font not smaller than 11 points throughout the document. **The application must not exceed 7 pages, single-spaced text.** Relevant figures, data (tables) and flowcharts are encouraged, but must be legible and must be uploaded as a separate document to be excluded from the page limit. Key Personnel, Budget, Budget Justification, Current and Pending Support, References Cited and required Attachment documents are not included in the page limit.

1) Project Information

- Project Title
- Project Start and End Dates. Projects are expected to start no later than April 15, 2025, and have a first clear deliverable by Sept 30, 2025
- List specialty crop(s) that are the focus of the work
- Is this a technology suitable for a value-add (such as pre-made salads) or fresh-cut products
- Identify Track for which this application should be considered (Track 1 – Applied R&D, Track 2 – Technology Accelerator, Track 3 – Pilots)
- Technology readiness level (TRL)⁴
- Geographic Location(s) (city(ies), state(s), congressional district(s)) where the proposed research will be conducted
- Total annual budget request. Please note that indirect cost (IDC) recovery is capped at 10% of the total direct costs.
- Total optional matching funds

2) Project Executive Summary (one (1) page limit)

The Executive Summary must include all of the following components:

- Area/s of research
- Narrowly tailored problem statement
- Overall rationale for the project

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www.dst.defence.gov.au/sites/default/files/basic_pages/documents/TRL%20Explanations_1.pdf

- Specific objectives of the study
- Anticipated deliverables
- Commercial viability and path to scale-up

3) Project Description (six (6) page limit)

Description must include:

- Short introduction/state of the science review. Programmatic fit (see Program Priorities & Requirements) must be clearly articulated. (no more than 300 words);
- Project objectives, including: A detailed description of objectives and tasks, linked to the problem statement;
- Existing partnerships in the specialty crop industry;
- Project methods, including:
 - A clear and detailed description of the innovative packaging or a packaging alternative. Materials and their sources must be described with sufficient detail and clarity to allow a meaningful peer review of the application by technical and non-technical experts;
 - Plans to demonstrate compliance of the packaging or packaging alternative with regulations in the EU, UK, Canada and/or other markets;
 - Plans to pilot, commercialize or scale-up the novel technology, including discussion of the likely cost of resulting product;
 - A description of possible barriers and approaches for overcoming them.
- Anticipated Deliverables and Outcomes.
- Key performance indicators that describe progress toward completion.
- Include a discussion of the likely cost of the product in the context of the benefits that it provides to the exporter and to the industry.
- Intellectual Property Management Plan

4) Additional Required Attachments not included in the 7-page limit:

- References Cited
- Budget Justification (up to 1000 words)
- Qualifications and commitment of Key Personnel (no more than 5 pages, CV's can be included, but not to exceed 2 pages per Key Person)
- Organizational Assurances (Excluded from the page limit, and only if applicable):
 - Research involving human subjects
 - Research involving Recombinant DNA
 - Research involving national security implications
 - Research involving hazardous materials



- Budget Form: Optional matching funds
 - Quarterly Gantt chart of Project Goals, Objectives and Timeline
- 5) Optional attachments to support project description (PDF). This section should not be used to circumvent the page limit for the Project Description Section.
- Graphics, Figures, Equations, and Tables (up to 5 pages).

Application Submission Guidelines

Full proposals must be submitted by 5 PM (US Eastern Time) on February 12, 2025 through FFAR's online application Grant Management System. Applications submitted outside of this System will not be considered.

To start a [new](#) 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 submissions received by the deadline through FFAR's Grant Management System will be accepted and considered eligible for evaluation. To be fair to all applicants, FFAR will not grant extensions to applicants who missed the deadlines posted in the Key Dates section.

Application Review Process

Full Proposal Review

Applications submitted to all three tracks will be reviewed together, however, applications will be scored differently depending on track. Proposals for Track 1 must clearly focus on the feasibility to enter the pilot phase of development. Proposals for Track 2 and Track 3 will be evaluated based on the commercialization potential of the sustainable packaging or packaging alternative and the likelihood of its adoption by the industry.

Proposals will be first screened for the suitability based on the Executive Summary, and those focusing on ineligible activities, crops, or outputs; too early in the development

(TRL1-3); exceeding budget or IDC limits; involving materials or formats that are not sustainable or scalable or those that result in packaging or packaging alternatives that are not economical will not be further reviewed.

Selected full proposals will undergo further review using a two-stage review process: (1) External Peer Review (Primary Review), and (2) Program Executive Committee Review (Secondary Review). In the Primary Review stage, applications will be evaluated by an external peer review panel of scientific experts using the proposal review criteria posted in the RFA. In the Secondary Review stage, the top ranked proposals identified in the Primary Review stage will be reviewed by the Program Executive Committee.

All reviewers are required to read and acknowledge acceptance of FFAR's [Conflict of Interest Policy](#) and [Non-Disclosure Agreement](#). We make reasonable efforts to ensure that proposals are not assigned to reviewers with a real or apparent conflict with the applicant or project personnel. Reviewers with a conflict of interests are recused from evaluating or participating in discussions of proposals with which they have a conflict. Each stage of the review is conducted confidentially. Applicants are invited to identify individual reviewers with an apparent conflict of interest in a separate "Optional Attachment" document.

Review Criteria

Full proposals are evaluated based on scored Primary Review criteria and unscored Secondary Review criteria. The bullets under each criterion may serve as a guideline to applicants when writing their proposals and as a guideline to reviewers on what to consider when judging proposals. The bullets are illustrative and not intended to be comprehensive. Reviewers will evaluate and score each primary criterion. The overall assessment will not be an average score of the individual criteria; rather, it will reflect the reviewers' overall impression of the application. Evaluation of the scientific merit of each application is within the sole discretion of the peer reviewers and they may raise additional factors to consider that are not covered in the bullets for each criterion.

The following criteria are typically used when evaluating RFAs:

- Relevance to export of specialty crops
- Novelty or innovation
- Project strategy and feasibility to achieve project goals
- Technical or scientific merit
- Commercialization potential

- Compliance (or feasibility of compliance) with emergent packaging regulations in the EU, Canada, UK and/or Japan
- Source material availability for novel types of packaging and packaging formats, or packaging alternatives
- Likely cost of the final packaging or packaging alternative vs benefits it provides
- Organizational capacity/research environment
- Qualifications of the research team
- Budget and budget justification, including reasonableness of expenses

During the Secondary Review, the Program Executive Committee will review top ranked proposals and select those suitable for each of the three tracks based on the availability of seats within each track and the need to balance portfolio of investment into diverse technologies suitable for floral, fresh, fresh-cut and value-add fresh products.

Award Administration

Selection Notice

Following the full proposal review, the Principal Investigator and the authorized organization representative listed on the project will be officially notified by email whether (1) the proposal has been selected for funding pending contract negotiations, or (2) the proposal has not been selected for funding. Applicants will receive a summary of reviewers' comments via email. If a proposal is selected for funding, USDA FAS, the Foundation for Food & Agriculture Research, Clemson University, and the Foundation for Fresh Produce of IFPA reserve the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to, additional project contributions, or other budget information.

Award Notice

FFAR notifies applicants of whether they are selected for funding via email. The notice does not constitute an award or obligate funding until there is a fully executed Grant Agreement. Contracts with selected applicants will be negotiated and completed either by Clemson University or by the Foundation for Fresh Produce of the International Fresh Produce Association following organizational procedures and in compliance with Part 2 CFR 200 as



amended on 10/02/2024⁵, to accomplish overall objectives of the ASCE initiative and ASCE-SPIL.⁶

Grant Period

Grantees may only use funds on project expenditures on or after the Start Date (April 15, 2025) of the Grant. Projects are expected to terminate within 12 months from the Start Date, and the first deliverable is expected by September 30, 2025. Charging expenditures to the grant prior to the effective date is strictly prohibited. Likewise, grantees may not use funds after the End Date except to satisfy obligations to pay allowable project costs committed on or before that date.

Post-Award Management

Reporting Requirements

After a grant is conferred, the grantee shall provide quarterly (based on the calendar year) technical and financial reports to either Clemson University or to the Foundation for Fresh Produce of IFPA per the terms of the Grant Agreement.

This will be a reimbursable, not pre-paid award. The grantee shall provide quarterly and annual progress reports showing activities being carried out under the grant, including but not limited to project accomplishments to date, and synthesis of results. The financial report and an invoice reflecting quarterly expenditures should accompany quarterly technical report. Within 90 days of the End Date, the grantee shall provide a final progress report, and the final quarterly payment is conditional upon the receipt of the final technical and final financial report. The final progress report should address the original objectives of the project as identified in the proposal, describe any changes in objectives, describe the final project accomplishments, and include a final project accounting of all grant funds, and a final invoice.

Successful grantees are expected to collaboratively develop KPIs or metrics to track progress toward the following program-wide goals:

⁵ <https://www.ecfr.gov/current/title-2/subtitle-A/chapter-II/part-200>

⁶ <https://fas.usda.gov/sites/default/files/2024-05/FY24%20ASCE-Sustainable%20Packaging%20Innovation%20Lab%20NOFO.pdf>

- How does the activity advance the goals of maintaining or increasing U.S. exports of specialty crops?
How does the activity enable U.S. exporters to comply with emerging regulatory requirements (see Footnote 1) for packaging and labeling?
- How does the activity support the development of packaging materials that are alternatives to single-use plastic packaging?
- How does the activity support the development of reusable packaging systems for the export of specialty crops?
- How does the activity support the export of specialty crops that will be sold at retail without packaging?
- How does the activity reduce food loss and waste of exported fresh produce?
- How does the activity promote the implementation of novel sustainable packaging at a commercial scale for exports of specialty crops?
- Potential for learning opportunities from piloting retail sales in sustainable packaging.

A sample of projects will be selected for review by an external evaluator to assess the effectiveness of the projects

Scientific Integrity

All funded projects must be conducted with the highest standards of scientific integrity in accordance with institutional or company policies. Organizational scientific and research integrity policies should comply with the USDA Scientific Integrity and Research Misconduct policies and guidelines⁷

Contact Information

All online application questions (technical support) should be emailed to grants@foundationfar.org. Scientific questions regarding Tracks 1 and 3 should be directed to Dr. James Sternberg (sternbe@g.clemson.edu), for Track 2 to Vonnie Estes (vestes@freshproduce.com).

Scientific, programmatic and grants inquiries must be submitted by email. We strive to respond to inquiries within three business days, but our response time depends on the

⁷ <https://www.usda.gov/our-agency/staff-offices/office-chief-scientist-ocs/scientific-integrity-and-research-misconduct>



volume of questions we receive, and the complexity of the questions asked. Please note that we do not monitor mailboxes in the evenings, weekends, or federal holidays.