

NIFA Food Loss and Waste Grants Exemplary Funding Guide

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Introduction

In this document you will find information regarding the National Institute of Agriculture (NIFA) programs that provide food loss and waste project funding of interest to local communities and other entities. This information is intended to serve as a guide for preliminary funding searches. For more detail, we encourage you to contact (NIFA) program staff listed for each program. For more information about NIFA and funding can be found at our website @ nifa.usda.gov and specific information and details of grants can be found by searching the title, or grant number via CRIS Assisted Search @ cris.nifa.usda.gov

Agriculture and Food Research Initiative Competitive Grants (AFRI)

The Global Food Security Program supports global efforts to strengthen agricultural production and end hunger by:

- Helping countries to improve their agricultural markets and increase food production
- Funding research to heighten disease resistance in beans and increase crop production
- Joining with USDA and other federal agencies on global initiatives intended to break the cycle of hunger and poverty
- Developing and testing new food products designed to improve the nutritional value of the food aid that is delivered overseas
- Strengthening developing countries' [extension systems](#)
- Helping developing countries improve their agricultural economies

Primary Point of Contact: [Michael McGirr](#)

Example of funded project(s) with a food loss and waste component:

Postharvest Physical Treatments to Reduce Losses of Organic And Other Locally-Grown Produce While Improving Quality And Extending Shelf Life (Expected date of completion: February 2018)

Local production is one of the fastest-growing segments of U.S. agriculture, with organics being among the most popular sectors. However, locally-grown produce has potential for shorter shelf life, and ultimately higher losses as a result of postharvest disease. In particular, small-acreage growers have little information available that is suitable for their operations, poor postharvest handling facilities, and many are first-generation farmers with no experience or infrastructure to reduce food losses. We will assess postharvest losses in high tunnel and open-field production

and determine optimum postharvest treatments including washing with NOP-approved products, heat treatment, and modified atmosphere packaging (MAP). The goal is to reduce decay while maintaining overall quality using tomato and spinach as model crops. Additionally, we will develop a digital tool suite to predict food losses of various crops and provide an on-farm tracking system for growers that can be implemented through smartphone technology. Our results will be disseminated directly to growers and agricultural educators via traditional and novel extension methods as well as a grower advisory panel. The advisory panel will oversee the project and evaluate postharvest handling procedures that are both practical and profitable. This project will reduce food losses by optimizing postharvest handling methods for small-acreage growers and increasing food access and availability to consumers by educating growers on methods that stabilize their production. This project directly addresses two priorities within the program area, "Reducing Crop and Livestock Losses" including: "Enhanced and innovative management practices and new approaches for encouraging producers to adopt loss reduction strategies".

The Improving Food Quality Program-is directed towards improving the production and quality of foods. Post-harvest losses, global competition, and rising consumer demand for better food quality requires scientists to understand the biological, physical, and chemical properties of food and food ingredients. The U.S. Department of Agriculture collaborates with academic, federal and industry partners to understand the science of foods and to improve processing and packaging technologies. These efforts help meet the demand for nutritious, convenient, and globally competitive food products.

Primary Point of Contact: [Jodi Williams, Ph.D.](#)

Advancements in science and technology continue to expand the breadth and quality of food production. As a result of rapidly evolving technologies, the public has been afforded access to a food supply that is abundant and diverse, available at a lower cost, resistant to spoilage, safe and nutritious.

NIFA initiatives are directed towards improving the production and quality of foods. The agency's projects are:

- Developing innovative processing technologies to improve the quality of foods and reduce post-harvest losses
- Conducting research to understand the molecular structure and functionality of foods and food ingredients
- Improving production efficiency and resource conservation in the food industry
- Advancing packaging science and engineering to improve food packaging materials and systems

Example of funded project:

Preventing Spoilage of Packaged Foods by Non-Migratory Active Packaging (Expected date of completion: January 2019)

Microbial food spoilage represents a significant economic and environmental issue: it is reported that 40% of food goes to waste, two thirds due to spoilage. Natural, food grade antimicrobials can be used to prevent such waste, and synthetic metal chelators like EDTA are commonly added in foods to enhance their antimicrobial activity. However, consumers are increasingly demanding removal of such label-unfriendly synthetic additives from foods. Advanced packaging technologies are a potential means to improve the quality, shelf-life, and therefore economic and environmental sustainability, of packaged foods. Current active packaging approaches require migration of the active agents to be active, have unacceptable effects on material mechanical properties, and typically exert low activity. We propose a non-migratory active packaging technology, in which hydroxamate chelating agents are grafted from a packaging materials surface by covalent linkages and enhance the activity of natural antimicrobials against spoilage organisms without migration to the food. The proposed materials will prevent growth of spoilage organisms, thus improving shelf life and reducing waste of packaged foods. The long term impact of the proposed research is in support of the USDA NIFA's goals to improve packaging technologies to enhance the quality and shelf life of foods and enhance the economic and environmental sustainability of agricultural and food systems.

Childhood Obesity Prevention Challenge Area focuses on the societal challenge to end obesity among children, the number one nutrition-related problem in the United States.

Primary Point of Contact: [Deirdra Chester, Ph.D., RDN](#)

Example of funded project:

Technology And Design Innovation To Support 21st Century School Nutrition (Expected date of completion: March 2017)

This integrated education, extension, and research project addresses the need for school-based solutions to address childhood obesity by testing innovative 21st-century student-centered strategies based on behavioral economics to increase student participation in the school lunch program and reduce plate waste. Building upon several successful pilots, the project will be led by university-based child obesity and nutrition researchers in collaboration with Cooperative Extension and school district administration and staff. Using a cluster-randomized controlled trial design, we will assess the 2-year impact of implementing a 3-pronged intervention involving a SmartMeal technology platform, distributed points of sale, and staff promotion of school meals. We will assess impacts on school lunch participation and intake of fruits and vegetables by students from 12 middle and high schools compared to 12 control schools. All schools have diverse student bodies, with 70% of students eligible for free and reduced-price meals on

average. We also will determine if the initial investment in the intervention will be returned by increased revenue from school meals. Finally we will examine sustainability by monitoring adoption of the intervention by control schools and continuance of the intervention by intervention schools the year after the trial. We will disseminate findings by publishing a minimum of two journal articles, distributing a policy brief, engaging extension's Healthy Food Choices in Schools Community of Practice, giving oral presentations to stakeholders and the scientific community, and creating an online project tool kit so that other schools can replicate the intervention.

Other programs:

1890's Institutions Capacity Building Program is intended to strengthen research, extension and teaching in the food and agricultural sciences by building the institutional capacities of the 1890 Institutions. The 1890 CBG Program is intended to support research, teaching, and extension by awarding grants that address key problems of national, regional, and multi-institutional importance in sustaining all components of agriculture, including farm efficiency and profitability, ranching, renewable energy, forestry (both urban and agroforestry), aquaculture, rural communities and entrepreneurship, human nutrition, food safety, family and consumer sciences, biotechnology, and conventional breeding. Providing this support requires the CBG program to build and strengthen research, teaching and extension capacity needed to advance fundamental sciences as well as translational research and development in support of agriculture; and coordinate opportunities to build on these discoveries at the 1890 Land-grant Universities.

Primary Point of Contact: [Edwin Lewis](#)

Example of funded projects:

Building Capacity in Post-Harvest and Food Processing Technology for Limited Resource Farmers (Expected date of completion: August 2017)

About 54% of small farmers in the Southeastern US farm on fewer than 100 acres; in Alabama, the number is 60%) with 60% of them having sales of less than \$10,000 annually; in Alabama, the number is 69%). This is more prominent among limited resource, minority and socially disadvantaged farmers. These farmers face severe constraints along the food chain leading to postharvest food loss equaling that of developing country producers. These constraints include inadequate production techniques leading to low yields; over-reliance on traditional varieties that depress market prices; lack of temperature management leading to limited marketing windows before spoilage; and limited marketing opportunities due to low volume at upicks, roadside stands, and farmers markets. This project will use research, extension and education to improve post-harvest and processing quality and reduce food loss and waste among ten popularly grown vegetable crops, by developing and implementing a sustained annual short

training course (2 weeks) in post-harvest technologies with visits to post harvest and food processing facilities. The project will assess safety of harvested produce including storage (temperature and humidity), to compare safety (microorganisms) and quality (texture, color, visual appearance, nutritional value) as well as the effect of washing solution, and packing methods. It is expected that at the end of this project there will be an increased awareness and change in knowledge on the importance of proper post-harvest handling; a change in behavior towards post harvesting; increased number of small farmers deciding to participate, adopt and practice post harvesting techniques. Over the long-term it is expected that there will be reduced postharvest losses and waste, increased quantity and raw product quality of produce in Alabama and the Southeast; enhanced food safety; increased income; and improved living conditions.

Scale Neutral Harvest Aid System And Sensor Technologies To Improve Harvest Efficiency And Handling Of Fresh Market Highbush Blueberries (Expected date of completion: August 2018)

The U.S. blueberry industry accounts for almost two thirds of the world's production, constituting an important engine of economic growth in rural communities across the nation. Despite its remarkable growth in the past three decades, a shortage of labor for hand harvesting, the increasingly high labor costs, and low harvest efficiencies are becoming bottlenecks for sustainable development of the fresh market industry. Current mechanical harvesters substantially reduce harvesting costs but still result in significant yield losses, poor fruit quality, and are unaffordable for small- to medium-sized producers. Therefore, an affordable harvesting system that maintains fruit quality and reduces ground loss would be embraced by stakeholders of all farm sizes. This Standard Research and Extension Project will greatly improve harvest efficiency and fruit quality of fresh-market highbush blueberries through a systems approach and transdisciplinary research and extension effort integrating four major themes: (i) achieving high fruit quality and low yield loss by developing an affordable and efficient semi-mechanical, ergonomically optimized harvest-aid and conveyance system; (ii) aiding accelerated breeding for mechanical harvestability by developing high-throughput phenotyping systems using imaging techniques; (iii) developing the next generation berry impact recording device to better understand and improve harvest and postharvest handling systems; and iv) describing the dynamics of potential microbial contamination in the new harvest system. A cross-cutting goal is to conduct outreach, as well as economic and ergonomic studies to promote grower adoption. This project addresses all five focus areas of the SCRI and priorities established in stakeholder surveys.

The Small Business Innovation Research Program (SBIR) competitively awards grants to qualified small businesses to support high quality, advanced concepts research related to important scientific problems and opportunities in agriculture that could lead to significant public benefits.

The SBIR Program has five main objectives:

- stimulate technological innovations in the private sector;
- strengthen the role of small businesses in meeting Federal research and development needs;
- increase private sector commercialization of innovations derived from USDA-supported research and development efforts; and
- foster and encourage participation by women-owned and socially and economically disadvantaged small business firms in technological innovations.

Primary Point of Contact: [Charles F. Cleland](#)

Example of funded projects:

Development of water based 1-methylcyclopropene formulation for modifying ethylene response of fruit and field crops (Phase II) (Expected date of completion: August 2017)

FAO estimates annual global food loss and waste at roughly 30% of cereal crops, 40 to 50% of root crops, fruits and vegetables and 20percent of oilseed crops with an estimated value for total food loss at US\$1-trillion. Many factors along the value chain from farm fields to the family table contribute to food loss and waste however one unseen factor goes unnoticed, the plant hormone ethylene. Ethylene triggers over ripening in bananas, tomatoes, apples and other fruits and vegetables leading to spoilage and food waste. In cereal and oilseed crops, heat and drought stress triggers over production of ethylene leading to reduced pollination, reduced seed weight, and yield loss. Controlling the effects of ethylene both in fruit and vegetable packages, storage, shipment and at the retailer and in the fields greatly contribute to reducing food loss and waste. Research underway by MirTech is leading to novel ways to deliver of an ethylene blocking agent, a bio-pesticide known as 1-MCP (1-methyl cyclopropene). This new delivery technology will enable farmers, food packers, shipping companies, retailers and wholesalers to reduce food loss and waste by maintaining fruit quality and freshness and preventing yield losses in the field to fruit, vegetable, cereal crops and oilseed crop. Already MirTech has been granted patents on this new area of technology. If ultimately successful, MirTech will deliver a critically important tool into the hands of US growers, food packers and shippers and ultimately benefit every consumer.

Development of Dose Breach Indicator Labels for Chlorine Dioxide Sanitation of Fruits and Vegetables (Completed as of: February 2016)

Spoilage losses of fresh fruits and vegetables are estimated to account for 20% of all edible food losses in the U.S. alone. This loss is significantly higher in developing countries due to less sophisticated harvesting and processing equipment and practices. For instance, it is believed that 40% of all food production is lost due to spoilage in India. Microbial contamination of the

harvested produce, if left unchecked, leads to infection and subsequent rotting of the fruits and vegetables while routing to the consumer, as well as potential human illness if the consumer eats contaminated produce. If the proposed system is successfully utilized by produce processing and distribution companies, fruits and vegetables will be exposed to an efficacious dose of chlorine dioxide resulting in a dramatic reduction of microbial threats. This reduction in microbial threats will increase food security by dramatically reducing naturally occurring or intentional food contamination. Likewise, the significant reduction in microbial threats will reduce spoilage to allow for more availability of fruits and vegetables in under-served areas.

The Specialty Crop Research Initiative Program (SCRI) supports the specialty crop industry by developing and disseminating science-based tools to address the needs of specific crops. Specialty crops are defined in law as "fruits and vegetables, tree nuts, dried fruits, and horticulture and nursery crops, including floriculture. The intent of the SCRI is to promote collaboration, open communication, the exchange of information, and the development of resources that accelerate application of scientific discovery and technology to solving needs of the various specialty crop industries. SCRI will give priority to projects that are multistate, multi-institutional, or trans-disciplinary, and include explicit mechanisms to communicate results to producers and the public.

Except for eXtension Project applications and Research and Extension Planning Project applications, the SCRI program only accepts applications that integrate research and extension activities. Applicants are strongly encouraged to propose a unique approach to solving problems facing the specialty crop industry using a systems approach:

A systems approach is any process of estimating or inferring how local policies, actions, or changes influence the state of the neighboring universe. It is a framework that is based on the belief that the component parts of a system can best be understood in the context of relationships with each other and with other systems, rather than in isolation. The only way to fully understand why a problem or element occurs and persists is to understand the part in relation to the whole.

Primary Point of Contact: [Thomas \(Tom\) Bewick](#)

Example of funded project:

Innovative Technologies and Process Optimization for Food Safety Risk Reduction Associated with Fresh and Fresh-cut Leafy Green Vegetables (Completed as of: August 2015)

Food-borne illness outbreaks associated with leafy green vegetables have severely impacted public health, consumer confidence, the produce industry's economic well-being, and attainment of national nutritional goals. Currently, no processing technology eliminates human pathogens without compromising quality. Industry critically needs tools to reduce pathogen levels and prevent cross-contamination during fresh-cut processing, and prevent pathogen proliferation in the supply chain. This project addresses these needs using a systems-based, action-driven, multiple-hurdle approach. Our trans-disciplinary project comprises five main objectives: 1)

optimize produce wash systems to improve sanitizer efficacy and prevent cross-contamination during washing and cutting; 2) develop innovative washing processes using ultrasound, surfactants, and sanitizers to more effectively inactivate pathogens; 3) reduce pathogen proliferation by improving retail cold display; 4) disseminate information to end users and facilitate technology adoption; and 5) evaluate economic, social, and environmental impacts, including reduced water, energy, and chlorine consumption. This project uses an integrated system-based approach to fresh-cut processing and retail display, considering both food safety and quality. Key features include pathogen inoculation to emulate realistic field contamination, a dedicated semi-commercial pilot plant simulating commercial fresh-cut washing/cutting, and new retail cold-display technology. Industry support is evident through active input in proposal development, and significant in-kind commitments, including commercial-facility access. Ongoing industry consultation will ensure practical and cost-effective solutions, hastening adoption. Expected significant reductions in pathogen contamination will reduce food-borne illness, restore consumer confidence in leafy greens, promote sustained industry growth, and, in

The Agricultural Marketing Program funds research focused on markets and trade policy. Agriculture-in the broadest sense of the term-is in the midst of a major revolution that is changing the way farmers and ranchers produce, process, distribute, and market food and fiber in the United States and abroad. These changes significantly impact farm and ranch families, firms, agribusinesses, and rural communities by requiring them to make major strategic decisions to be successful.

Primary Point of Contact: [Robbin Shoemaker](#)

Example of funded project(s) with food loss and waste component-

Consumer Response to Information, Technology, and Risk (Expected date of completion: February 2018)

The long-term goal of the proposed project is to accurately assess food waste patterns in the United States, and to better understand how consumer behavior about food waste is affected by date labels and by technology. Many consumer advocate groups report that the prevalence of different date labels confuses consumers and leads to food waste. Some food producers support the use of new technologies, including genetically engineered specialty crop varieties, as a tool to help mitigate food waste. In particular, in this proposed research, we will work to achieve the following objectives: 1) To extend methodologies to collect experimental data that can be used to accurately represent the level and value of food waste by subjects. 2) To evaluate how food waste behavior among consumers is influenced by the use of specific date label language. 3) To assess the impact of information linking genetically engineered fruit and vegetable crops to reduced food waste on consumer behavior. 4) To develop a simulation model and use it to better understand how various policy options might affect the quantity and value of food that is wasted for different food product categories. This program area priority states interest in the economics

of food waste and loss within the supply chain, and the design of incentive mechanism to minimize losses.