Fiscal Year 2023 Description of Funded Projects

Number of Grants Awarded: 11
Amount of Funds Awarded: $9,445,205.49

For more information, please visit the grant program's website:
https://www.ams.usda.gov/services/grants/scmp

NOTE: The below project descriptions were provided by the grant recipients.

Alabama

Recipient: Auburn University
Project Type: Research
Award Amount: $900,000.00

Landscape Equipment Sustainability Strategies: Do More with Less

The modern landscape industry stands at a crossroads, balancing reliability, and efficiency with an ever-growing need for sustainable, eco-friendly practices. This project aims to comprehensively investigate zero-emission landscape maintenance equipment, not only catering to the environmental imperatives of our time but also driving operational efficiency, safety, and profitability for landscape industry stakeholders. Through a cohort investigation and controlled field and lab-based equipment assessment of gas-powered and battery-powered landscape maintenance equipment, the barriers to zero-emission equipment adoption will be addressed, namely costs and work capacity. A multidisciplinary team from Auburn University, the University of Georgia, and the University of Florida will conduct these investigations in the Southeastern states of Alabama, Florida, and Georgia where landscape maintenance has significant environmental footprints. This project will provide landscape professionals with comprehensive insights into long-term operational costs, leading to improved financial stability for Green Industry stakeholders. Identifying operational inefficiencies will result in greater awareness of the environmental impact of equipment facilitated maintenance activities, benefiting communities and the environment at large.

California

Recipient: California Department of Food and Agriculture
Project Type: Research
Award Amount: $998,941.00

Understanding and Breeding for Yield Under Water and Hear Stress

The project leverages work at Ohio State University and UC Davis to mine pepper landraces collected from semi-arid regions in the center of genetic diversity, Mexico, to identify, characterize, and breed sweet peppers tolerant to water-stress (WD) and heat stress (HS) for US markets. Outcomes are a survey of current varieties and tools to measure tolerance to WD and HS for farmers to make decisions on variety selection; tools and germplasm for efficient breeding of these traits into pepper; and evaluation of breeding strategies for complex traits in vegetables. Success will be monitored by assessing the use of information and tools by growers and extension personnel, adoption of DNA markers, and germplasm as varieties or licenses to the industry to produce hybrid peppers. Long-term outcomes include the reduction of economic losses, yield, and quality due to WD and HS in pepper. The strategies tested will serve as a model to breed these traits in other vegetable species. This project focuses on conducting research in plant breeding, genetics, and genomics to improve crop characteristics, but also addresses Improving production, processing, storage, and distribution efficiencies for conventionally or organically grown specialty crops; and reducing environmental impacts on pepper production in the U.S. The project complementarily represents research in a midwestern (OH) and a major pepper producing western state, CA.

Recipient: California Department of Food and Agriculture
Project Type: Research
Award Amount: $414,801.49

Climate-ready Crops: Coupling Dry-Farm Tomato Eco-Physiology with Farmer Adoption in California and Oregon

The project team from the University of California, Santa Cruz (UCSC) and Oregon State University (OSU) proposes to evaluate the physiological traits and environmental conditions associated with successful dry-farmed tomato production. Dry-farmed tomatoes are grown by small-scale organic farmers in coastal California and the Willamette Valley of Oregon. However, drought stress can exacerbate physiological disorders like blossom-end rot (BER), which can result in crop failure. Understanding the physiological traits that underpin dry-farmed tomato success will allow breeders and farmers to develop tomato varieties that can tolerate drought and produce high-quality fruit. This is especially important as climate change will result in hotter and drier summers in the western US. The project team will: (a) conduct and compare physiological measurements along with yield and fruit quality measurements using dry-farmed and irrigated tomatoes to determine how they differ, (b) evaluate relationships between physiological traits and yield and BER for dry-farmed tomatoes grown under different conditions, (c) conduct on-farm trials for high-performing varieties, allowing farmers to assess their quality, and (d) share project findings with dry-farmed vegetable growers in California and Oregon. We expect that some physiological traits will be associated with increased marketable yields and reduced

losses to physiological disorders, allowing farmers and breeders to better understand which traits to target when breeding tomatoes for dry farming. Access to irrigation remains a major concern for agriculture in the western US. By better understanding the physiology of dry-farmed crops, both dry-farmed tomato growers and the California processed tomato industry will be better equipped to breed varieties that resist drought stress.

Kansas

Recipient: Kansas State University
Project Type: Research, Crop-Specific
Award Amount: $993,207.00

Increasing the Diversity of Sod Production through Sustainable Turfgrass Adoption

Sod is an important specialty crop used to create green space and prevent erosion. Regulations aimed at reducing soil erosion and changing building and residential codes are increasing sod demand, especially low-input species, which are currently in very short supply. Recent advances in low-input, cool-season grass breeding and projected demand for these grasses provides an opportunity to increase sustainable landscape management in northern states. Currently, less than 0.1% of the 129,621 acres of cool season turfgrass production in the US is fine fescue. Fewer than 14 of 500 sod farms in the northern state are growing this low-input species on their farms. Despite research completed by our team from 2019-2021 documenting that fine fescue species (especially, strong creeping red fescue) make excellent sod with comparable or superior sod strength to Kentucky bluegrass, farmers have not adopted the use of low-input grasses. Seventy-five percent of sod farms were interested in increasing the use of low-input varieties on their farms, but all were still reluctant to change. If the low-input sod is not commercially available, it cannot be installed, and if the low-input sod is not being specified by consumers, it will not be grown by the farmer. An opportunity exists for US sod farmers to shift production from high-input varieties to specialized low input species.

North Dakota

Recipient: North Dakota State University
Project Type: Research
Award Amount: $1,000,000.00

Using Machine Learning Algorithms for Optimizing Lettuce Production, Ensuring Food Safety, And Mitigating Environmental Impact.

This proposal aims to apply machine learning algorithms to develop classification, estimation, and prediction models for lettuce crops thus enhancing production efficiency and food safety while minimizing the environmental impact. Over 2,000 lettuce samples will be collected from plants grown using (1) nine combinations of fertilizers (nitrogen and phosphorus) and three watering regimes and (2) applying egg-washing wastewater in controlled environmental agriculture units. Challenges and opportunities associated with using egg-washing wastewater for lettuce cultivation will be studied. The use of wastewater conserves water resources and provides valuable nutrients to the crops, reducing freshwater usage and fertilizer costs. To address concerns about potential bacterial contamination,

bacteriological analyses will be conducted on wastewater samples, informing farmers and policymakers about adopting wastewater as a safe source for crop irrigation and fertilization. The study's outcomes may contribute to a wider adoption of wastewater treatment and reuse practices, ensuring compliance with regulatory standards and enhancing food safety. The dissemination of findings through research articles, conferences, and seminars aims to broaden the understanding of sustainable agricultural practices and wastewater management in the scientific community and among stakeholders. Over 2,500 hyperspectral and 5,000 true color (red, green, blue) imagery data along with the in-situ laboratory measured data will be collected and analyzed using machine learning algorithm-based models. Classification and regression models will be developed based on machine learning algorithms. The acquired data from this research will serve as baseline data for the development of smart fertilizer and water management systems for mass lettuce production.

Oregon

Recipient: Oregon State University
Project Type: Research, Crop-Specific, & Marketing and promotion
Award Amount: $893,500.00

Developing Pacific Dulse as A Valuable USDA Specialty Crop for Sustainable Nutrition and Coastal Economy.

The project aims to support the growth of Pacific dulse (Devaleraea mollis, red macroalgae) farming on the U.S. Pacific coast. The team from Oregon State University (OR), University of California Davis Aquaculture Cooperative Extension (CA), Kelp Line LLC (AK), and University of Alaska Fairbanks (AK) will work collaboratively to provide much-needed R&D and outreach support for dulse growers. The multifaceted project approach will tackle the current challenges of dulse farming by i) improving production yield of and comparing production costs for tankversus ocean-cultivated dulse to inform the broader industry of the feasibility of each approach in the context of communities with high and low utility costs, ii) boosting market establishment by nutritional benefit assessment, product development, and consumers engagement, and iii) providing educational programs on seaweed farming and processing practices for stakeholders. This effort is timely and crucial given the sharply rising consumer interests in not only nutritious and health-conscious but also environmentally sustainable food sources. Dulse is an emerging food crop that satisfies these critical needs. Furthermore, Pacific dulse offers a viable opportunity for improving depressed coastal economies and supporting indigenous tribal communities that lack economic opportunities. While providing sustainable nutrition for the human population, dulse farming will advance the nation in the global seaweed production scene, of which currently the U.S. has a very little share. Our project will provide critical support for current and beginning dulse growers including indigenous communities by strengthening production practices, marketing, and education.

South Carolina

Recipient: South Carolina Department of Agriculture
Project Type: Plant Pests and Diseases
Award Amount: $883,000.00

Sustainable Peach Disease Management Tools with Reduced Pesticide Input in The Southeastern USA

The purpose of this project is to develop tools and strategies that will substantially reduce conventional pesticide usage and associated risks in southeastern peach production. Increasing regulatory and consumer/market pressures demand peach production with less conventional pesticide input. To meet this need without compromising yield, fruit quality, or other aspects of production, we propose to 1) develop and validate a web-based disease risk alert system that will reduce the number of required fungicide and bactericide applications based on weather-informed assessment of disease risk, 2) optimize safer product mixtures consisting of biological control agents (BCAs) and low rates of DMI fungicides (BCA strategic mixtures), 3) evaluate the combination of the disease risk alert system with BCA strategic mixtures for disease management, phytotoxicity, yield and fruit quality, and resistance selection in bacterial and fungal pathogen populations, and 4) conduct outreach activities to disseminate research results to stakeholders, Extension personnel, and the scientific community. This project will deliver a web- and mobile phone-based disease risk alert system with safer pesticide mixtures to manage important diseases of peach with reduced conventional pesticide usage. The expected project outcomes include 1) reduced conventional pesticide input and associated negative impact on human health and environment, 2) reduced occurrence of chemical resistance/tolerance in pathogen populations, and 3) increased economic return (cost savings due to fewer sprays) in southeastern peach production. The project will benefit peach producers, field workers, consumers, and strengthen the sustainability and profitability of the peach industry.

Texas

Recipient: Texas Department of Agriculture
Project Type: Research
Award Amount: $890,500.00

Enhancing Tomato Production Systems to Increase Resilience Against Climate Change

There is high interest in high-tunnel tomato production in Texas, Nevada, and Florida where there are more than 42,000 small-scale farms, combined. Increasing awareness of healthy eating and interest in environmental and social benefits of consuming locally produced foods have increased the demand for local, fresh-market tomatoes. However, multiple environmental factors reduce the potential production of open field-grown tomatoes, including extreme weather events, disease, lack of adapted varieties, and limiting nutrient availability. The purpose of this project is to significantly contribute to the sustainability of fresh-market tomato production with an emphasis on high tunnel systems in these three states. The project objectives are centered on the development of management practices for organic and conventional growing conditions (grafting, nitrogen fertilization, and soil amendments); screening and selecting the best tomato genotypes and grafting combinations for high tunnels and open fields, and

economic analysis and outreach education. These objectives will be accomplished through the collaboration and multi-disciplinary expertise of a highly qualified team involved in tomato research, extension, and education. This project will provide small-scale farmers with new recommendations on alternative production systems to effectively increase yield, quality, and profitability under high-tunnel systems. By integrating and adopting these practices, we expect to enhance the competitiveness of tomato growers and the tomato industry as it strives to meet the demands for fresh, local produce. Our participatory research and educational efforts in collaboration with growers, industry, and growers' associations in these states will contribute to enhance the availability of local tomatoes and regional rural economies.

Recipient: Texas Department of Agriculture
Project Type: Research and Plant Pests and Diseases
Award Amount: $887,000.00

Integrative strategies for the surveillance, detection and management of resistance breaking (RB) strains of tomato spotted wilt virus (TSWV) and its supervector, thrips.

Our interdisciplinary team of researchers from multi-state partnering institutions: Texas A&M AgriLife Research (Amarillo and Fort Worth), Texas A&M University (College Station), North Carolina State University (Raleigh, NC) and University of California, Davis (Davis, CA) will conduct a three-year study with the primary goal of developing integrative strategies for the surveillance, detection and management of novel resistance breaking (RB) strains of tomato spotted wilt virus, a pandemic agricultural pathogen and its cosmopolitan supervector, thrips. Current TSWV management strategies substantially rely on growing single gene-resistant cultivars of tomato ('Sw-5b' gene) and pepper ('Tsw' gene) combined with intensive use of highly toxic pesticides to control thrips. However, the global emergence of multiple RB strains of TSWV worldwide, including those reported by our labs in Texas, California, and North Carolina, and ineffectiveness/pesticide resistance development in thrips has escalated the unparalleled dual threat to global specialty crop production. This project aims to enhance the competitiveness of two specialty crops of paramount importance to the food and nutritional security of the US, tomato and pepper by conducting TSWV RB surveillance and economic impact assessment, developing cutting-edge RB strain detection tools, identifying strategies to disrupt TSWV transmission and disease cycle and developing cultivars with broad spectrum/novel form of resistance against prevalent RB strains.

Virginia

Recipient: Virginia Polytechnic Institute and State University
Project Type: Plant Pest and Disease
Award Amount: $734,256.00

Improved Phytophthora protection for cucurbits in the Eastern US through targeted fungicide use and integrating resistant cultivars.

The frequency and severity of crown and/or fruit rot experienced by growers of cucurbits have increased significantly over the last decade. Current management strategies for this soil-borne

pathogen, Phytophthora capsici, are complex; a “one size fits all” approach is not effective. Noninfested land suitable for vegetable production is limited but preventive and integrated strategies can reduce the risk of growing cucurbits. The Virginia Tech Eastern Shore Agriculture Research and Extension Center in collaboration with Michigan State University and the USDA-ARS Vegetable Laboratory plans to develop targeted Phytophthora management recommendations for Eastern US cucurbit growers to reduce the risk of growing these high-value and nutritious crops. To ensure that effective fungicides are used, pathogen populations will be characterized for fungicide sensitivity in key Eastern US production regions to tailor specific recommendations to the host and region. Novel integration strategies for specific cucurbit hosts combining fungicides with cultivar resistance will be tested through multi-location field research and demonstration studies to generate improved recommendations and engage growers. A coordinated extension education approach is planned to demystify crown and fruit rot management strategies with a focus on summer field days, individual farm visits, small group question and answer sessions, regional and national grower meetings, and printed and social media communication.

Washington

Recipient: Washington State Department of Agriculture
Project Type: Crop Specific
Award Amount: $850,000.00

Enhancing Low Temperature Resilience of Apple: A Study on Dormancy Dynamics, Phenology, and PGRs.

Over the past decade, climate shifts have increasingly disrupted apple trees' dormancy cycle, leading to heightened freeze risk. This project aims to produce critical information to protect crops against freeze and ensure consistent profitability and long-term market stability by overhauling traditional, often limited methods used for predicting and managing freeze threats in orchards. Current predictive models fall short in several areas: they do not provide temperature thresholds during critical fall acclimation and spring deacclimation periods, fail to capture the dynamic interaction between bud hardiness and temperature during dormancy, and have limited utility for modern apple cultivars. This project seeks to develop models for more precisely predicting the apple dormancy cycle and lethal temperatures for buds at various stages. The project involves in-depth bud dormancy and phenology studies in popular apple cultivars across four disparate climates (WA, MI, VA, and NC). New models of critical temperature thresholds and improved bud development predictions based on temperature responses will be advanced. The project also tests plant growth regulators to promote early cold acclimation. Dissemination of findings will occur through webinars and grower meetings. Anticipated outcomes include enhanced models for predicting apple tree developmental stages and lethal temperatures, deeper insights into dormancy dynamics and bud hardiness, and improved orchard management practices to mitigate crop losses due to freeze. Direct beneficiaries include apple growers in the four collaborating states – Washington, Michigan, North Carolina, and Virginia – and, indirectly, the entire community of approximately 5,000 US apple producers.