New Mexico (New Mexico State University Main Campus) Annual Report - FY2024

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Contributing Organizations

New Mexico State University Main Campus

Executive Summary

Overview

The College of Agricultural, Consumer, and Environmental Sciences (ACES) at New Mexico State University is committed to improving the well-being of New Mexicans and beyond through research, teaching, and Extension programs. With continued efforts to address pressing challenges, NMSU's College of ACES research and Extension efforts focus on four critical issues: Food & Fiber Production and Marketing, Water Use and Conservation, Family Development and Health of New Mexicans, and Environmental Stewardship, with additional priorities of digital agriculture and artificial intelligence in agriculture. These initiatives are grounded by our dedication to educating and training skilled professionals in the field of agriculture.

The Agricultural Experiment Station (AES) system encompasses scientists based at the main campus and 12 Agricultural Science and Research Centers throughout the state. Each center functions as a vital outdoor research space, reflecting the geographical and environmental diversity of New Mexico. Strategically located in different climate zones, the Agricultural Science Centers (ASCs) enable regionally relevant research that addresses New Mexico's wide-ranging agricultural and environmental needs and issues faced across the broader Southwestern United States. New Mexico is unique, with three crop production regions, ten plant hardiness zones, five defined watersheds, and 126 distinct soil types. The NMSU AES supports research that addresses real-world problems. Research is at the core of NMSU's mission to improve the lives of people in New Mexico and globally.

In 2024, AES worked to refine research efforts in the area of digital agriculture to include the following:

- **Virtual Fencing**: Virtual fencing is being researched to improve livestock grazing and land management for ranchers. It uses GPS collars with audio cues and mild electric pulses to keep cattle within boundaries without physical fences. This system, tested at the NMSU Chihuahuan Desert Rangeland Research Center, allows for adaptive grazing management in desert and mountain pastures, reducing the need for costly infrastructure. The technology is being evaluated for scalability and cost-effectiveness in conserving rangeland resources.
- **Smart Feeding Systems**: The Corona Range and Livestock Research Center continues to use C-LOCK Super Smart Feeding Systems, which uses electronic ear tags to provide specific feeds to

individual animals. These solar-powered systems help researchers study strategic supplementation and improve livestock management. Future integration with weighing and water monitoring systems, along with artificial intelligence, could enhance data collection and optimize feeding strategies while monitoring animal health and performance.

- **Green Feed Systems**: The Clayton Livestock Research Center uses C-LOCK Smart Feeders and Green Feed Systems to monitor individual cattle feed intake and measure gas emissions from digestion. These systems enable the study of rumen emissions, comparing different feeding practices and supporting research for both backgrounding and feeding phases.
- **Agrivoltaics**: AES has secured funding to support the installation of solar panel arrays at three agricultural science centers throughout the state (rangeland and cropland). The goal of the agrivoltaic systems is to maintain and enhance agricultural productivity and environmental benefits while providing renewable energy and diversified income opportunities for farmers, ranchers, and rural communities. New Mexico is fortunate to be one of the top three states in the U.S. for Solar Energy Potential, making it an ideal location to study the potential benefits to agriculture that might be provided through shading and reduced stress. This research program is one way that NMSU is supporting research and development on the nexus of energy generation and sustainable food production in arid and semi-arid environments. The design process for this project is underway, anticipating at least one array installed by 2026.

In addition, NMSU researchers have remained committed to identifying, verifying, and disseminating cost-effective practices for soil health management in all major land use types (i.e. croplands, rangelands, forests, and urban fields). In 2024, researchers continued to engage farmers, ranchers, and other stakeholders in soil health management research, outreach, and extension activities. Research and demonstration activities are underway at seven of the twelve Agricultural Science centers, and an outreach conference on Soil Health and Carbon Management occurred in July 2024, attracting more than 140 farmers, ranchers, and landowners.

The multidisciplinary collaborative projects that were initiated in 2023 have completed their first full year of research. The 14 project areas are guided by the four identified critical issues and include the following topic areas:

- Genetic Enhancement in Crop and Livestock Systems;
- Animal Health and Welfare;
- Food and Fiber Supply Chain;
- Food Bioengineering, Processing, and Safety;
- Alternative Crops for Water Limited Systems;
- Water Quality and Availability;
- Sustainable Management of Water Resources;
- Agriculture Literacy and Education;
- Pathways to Human Health and Well-being;
- Increasing Economic Opportunities in New Mexico;
- Carbon, Food, Energy and Water Systems;
- Ecosystem Structure and Function in a Changing World;
- Climate Adaptation and Resilience; and
- Land use and Environmental Function.

The selected project highlights throughout this report provide an overview of the research progress from this past year. This approach has allowed researchers to boost collaboration across disciplines, which will result in broader impacts across New Mexico, the southwest region, and globally. The researchers work with members of local communities to support sustainable agriculture, healthy ecosystems, and vibrant rural and urban life.

The Cooperative Extension Service (CES) focuses on collaboration to foster economic, educational, and community development, keeping the needs of New Mexicans at the forefront. With offices in all 33 counties and many Tribal areas in New Mexico, CES is positioned to be responsive to community needs and collaborates with more than 1,000 organizations, including state and federal agencies, and other universities. CES also relies heavily on about 10,000 volunteers to ensure that quality programs reach diverse clientele. Extension faculty reached over 620,000 New Mexicans in 2024, who benefit from wide-ranging CES educational programs in critical areas. Extension efforts related to agriculture and natural resources, positive youth development, community development, and the health and wellness of New Mexico families have been priorities.

AES research projects and CES programs are adapted to meet stakeholder needs with attention to agricultural production, environmental stressors, and family health and youth development. The dedicated team of researchers and Extension professionals work together to ensure that the voices of all New Mexicans are heard.

Critical Issue: Environmental Stewardship

Water scarcity, soil degradation, and intense changes in weather are some of the most challenging issues facing sustainable agriculture and food security in New Mexico. These issues are intensified in severe arid and semi-arid regions, thus the need for environmental stewardship remains imperative. AES and CES are leading the way in addressing these challenges through efforts to understand and develop solutions.

Throughout 2024, several research projects focused on understanding these challenges and identifying solutions. One example of this work includes a project that aims to improve the understanding of diverse agricultural systems' carbon sequestration potential. This past year, five sites were identified for this study to represent crop production fields, livestock grazed sites, and rangeland sites, soil samples are being analyzed for nutrient content, soil organic matter, and microbial activity. The next steps will be to develop adaptable soil and crop management strategies for arid and semi-arid agroecosystems.

Another project that focuses on environmental stewardship has the goal to integrate current issues, and through a horizon scan, identify emerging challenges that impact the health, environmental quality, and economic well-being of New Mexicans. The group of multidisciplinary researchers have compiled specific issues that are relatively unknown but have the potential to occur. The next step is to present these issues to other experts in the field and have them assessed for perceived threats.

Extension's commitment to community resilience is demonstrated through a growing portfolio of disaster recovery support and intense weather variability initiatives. These programs prioritize sustainable land stewardship, post-disaster assistance, and environmental practices that address New Mexico communities' distinctive weather challenges.

In the aftermath of natural disasters, CES provides vital resources and educational support to aid recovery and restoration efforts. A key initiative includes promoting drought-resilient tree species, which serve as essential tools for landscape regeneration, shade equity in urban and rural spaces, and long-term environmental stability. Tree species are selected for their ability to thrive under New Mexico's arid conditions and to provide enduring ecological benefits.

Held in July/August 2024, the Inaugural NM Soil Health and Soil Carbon Conference united researchers, Extension professionals, and producers. In partnership with NMDA and Western SARE, the event focused on research and practices in carbon management, strategies to enhance soil health for weather resilience, and outreach to empower agricultural stakeholders statewide. This conference represented a pivotal step toward climate-smart agriculture that boosts productivity and sustainability.

New Mexico LandLink is a critical platform connecting landowners with land seekers while equipping NMSU Extension agents with the tools to guide residents through land access challenges, promote community-based solutions to land use and stewardship, and expand equity in agricultural opportunities. The program reinforces Extension's commitment to equitable and sustainable land transitions. CES continues to lead with targeted programming focused on building ecological resilience.

Current and emerging priorities include:

- A prescribed fire curriculum to support ecosystem health and wildfire mitigation
- Soil fertility initiatives to address food security challenges
- Promotion of soil health practices tailored to arid and water-limited environments

Through strategic partnerships and community driven innovation, these initiatives are generating tangible outcomes, such as improved wildfire management strategies, increased agricultural productivity, and sustained cultural and ecological heritage.

Collectively, these CES programs are essential for shaping a resilient and sustainable future for New Mexico. They empower communities, safeguard natural resources, and promote long-term environmental and economic sustainability.

Critical Issue: Family Development and Health of New Mexicans

A wide range of CES programs are dedicated to enhancing family development and health across New Mexico. These initiatives address complex challenges while engaging diverse age groups with tailored education, skills training, and wellness support.

The continued expansion of award-winning initiatives like the "Shattered Lives Program," which raises awareness about the dangers of drinking and driving among high school students, and the "Walk with EaseW initiative, which promotes active lifestyles among adults aged 50 and older, is critical. Both programs emphasize prevention, education, and behavior change to improve health outcomes across generations.

Programs such as "Teen Cuisine" and "Athletic Nutrition" promote healthy dietary practices, culinary skills, and agricultural literacy.

- Teen Cuisine, delivered to fifth-grade students, teaches essential skills such as meal planning, nutrition basics, food safety, and healthier food choices by encouraging increased consumption of fruits, vegetables, whole grains, and lean proteins.
- Athletic Nutrition workshops equip high school athletes with the knowledge to support performance and mental health through better eating habits. These sessions focus on understanding food groups, reading nutrition labels, recognizing disordered eating behaviors, and making informed dietary choices.

The Crafting for Your Mental Health program integrates stress reduction techniques from Mind Matters with guided breathing exercises and hands-on creative activities. This combination encourages relaxation, personal expression, and social interaction, supporting emotional well-being.

The NMSU Tribal Agriculture Agent partnered with the Four Corners Detox Recovery Center to introduce gardening-based therapy for individuals in substance abuse recovery. These activities, held throughout the growing season in McKinley County, New Mexico, engage Native men and women in healing, skill-building, and cultural reconnection through agriculture.

Together, these programs contribute to healthier and more resilient communities by empowering individuals with the knowledge, practical skills, and resources to support lifelong wellness, family development, and sustainable health outcomes.

Critical Issue: Food & Fiber Production and Marketing

Agriculture remains an important industry in New Mexico, with cash receipts totaling $3.99 billion in 2023. When looking at the entire food and fiber supply chain aspect, the economic impact increases to $21 billion in direct output and $45 billion in total output. AES and CES continue to support production agriculture in the state through efforts that support the growth, improvement, and quality of agricultural products in New Mexico. Specific goals over the past year include developing and boosting value-added products within the state and supporting new farmers.

AES has a broad range of research projects that support this critical issue for New Mexico. Some of the primary agricultural markets within the state include chile, onions, pecans, cotton, and livestock. One project specifically focuses on improving animal health for livestock producers throughout all segments of production, including disease, nutrition, and fertility. Over the past year, researchers have made progress towards understanding the role of microbes and pathogens in animal health by sampling beef calves and their dams to evaluate the establishment of bacteria that can lead to pneumonia under stress conditions. This research will help in understanding beef cattle health and allow for quicker responses to how and when beef cattle become diseased.

A project that focuses on a different, but equally important side of the agricultural production industry has a goal to address food bioengineering and food safety through innovative food processing technologies. This research team has developed natural bioactive compounds such as antioxidants, probiotics, and prebiotics, and proteins that can be used as ingredients in food products. These alternative compounds can allow consumers to benefit from healthier and more stable food products.

New Mexico has a diverse geographical climate, with a lot of variation from one side of the state to the other. In addition to the geographical differences, farmers are also challenged with ongoing drought in

an already arid to semi-arid climate. Therefore, the need for genetic enhancement in crop systems and identifying alternative crops is vital for continued crop production in the state. Researchers are responding to this need by focusing their research on breeding and germplasm development and cultivating more sustainable fruit production in parts of the state known for late frosts.

CES continues to make valuable contributions across agriculture, nutrition, education, community empowerment, and cultural preservation. Recent initiatives demonstrate impact through strategic partnerships, hands-on learning, and innovative outreach.

The New Mexico Farm to School and Farm to Institution Program enhances access to fresh produce by reimbursing institutions for purchasing locally grown fruits and vegetables. This effort benefits both producers and consumers while strengthening local food systems. CES, in partnership with NMDA and the New Mexico Farmers Marketing Association, supports this initiative through food safety education, outreach, and technical assistance for schools, gardens, and community producers.

The Extension Master Gardener Program is responding to the increasing demand for home gardening education. Updated data indicate a strong community interest, and the program now provides comprehensive horticulture training, hands-on instruction, and opportunities for community engagement. These initiatives empower residents with the skills and confidence to grow their own food and enhance the well-being of their neighborhoods.

The Extension Dairy Specialist, NMDA, and the U.S.-Indonesia Dairy Partnership (USIDP) support Indonesia's ambitious goal of establishing a free lunch program for over 80 million schoolchildren. Launched in November 2024, USIDP unites the U.S. Dairy Export Council, NMDA, NMSU CES, Indonesian dairy experts, and academic partners. Together, they provide training on best practices for small and mid-sized Indonesian dairy farms to improve milk production and quality while promoting global food security.

The Vet Summer Camp offers 8th to 12th graders an immersive experience in animal science and veterinary medicine. Held in May, the Vet Camp welcomed 20 students from across the region for facility tours, career exploration, and hands-on activities in animal care.

The Small Acreage Stewardship and Homesteading Skills workshop series helps landowners become better stewards while developing practical homesteading skills. The sessions cover natural resource management, value-added production, and sustainable practices. Extension staff from Santa Fe, Taos, Los Alamos, Rio Arriba, and Southern Pueblos collaborate to deliver this impactful program.

Founded by a 4-H member with autism, the P.I.G. (Inspire Greatness) Unlimited Livestock Show at the San Juan County Fair celebrates youth with autism and developmental disabilities. This inclusive livestock show fosters autism awareness, developmental inclusion, leadership, and confidence among young people in agriculture.

Additional CES programs continue to support genetic improvement initiatives for cattle and pasture productivity demonstrations aimed at sustainable land use. These efforts contribute to a resilient and economically vibrant agricultural sector.

Together, these initiatives illustrate the work of Cooperative Extension in:

- Empowering individuals and communities
- Driving economic development
- Preserving cultural and agricultural heritage
- Addressing critical challenges in food access, sustainability, and education

Critical Issue: Water Use and Conservation

Water is the most limiting resource in New Mexico and continues to be an intense challenge for agricultural producers. Prolonged drought, and conversely periods of intense flooding, have caused water to rise as a top concern of most New Mexicans, especially for those whose livelihood depends on agricultural production.

Many of the ongoing research projects within AES overlap with multiple critical issues of New Mexico, as water use and conservation have an impact on all areas of agricultural production, profitability, and human health.

Water conservation is critical in New Mexico and surrounding Southwestern states due to increased drought conditions and changing water uses. Public attitudes and knowledge regarding water use play a huge role in steering policies and water management strategies. AES researchers are developing a survey instrument designed to assess public perspectives on water conservation in Arizona and New Mexico. This survey will provide insights for policymakers, environmental organizations, and water management agencies by identifying public knowledge gaps, conservation behaviors, and the level of trust in water management institutions.

In addition to identifying solutions for water usage and conservation, another concern for many New Mexicans is water quality. Citizens need to know how safe their water is to drink and if there are chemicals in their water that will cause future health risks. AES researchers have a goal to improve understanding of water quality issues and alleviate concerns for New Mexicans. Scientists have begun to collect water and soil samples from different sources near Corona and Tucumcari, New Mexico. The water sources included city potable water, canal water from Conchas Dam (after flowing 40 miles in the canal), well water, and treated municipal wastewater. Soil from the Tucumcari Agricultural Science Center, which has used treated wastewater irrigation for 10 years, has no detection of PFAS, which suggests negligible accumulation in soil under these conditions. The next steps will be to continue water and soil sampling for further analysis and comparison.

CES continues to lead impactful efforts in water conservation, climate resilience, and sustainable agriculture. Programs and partnerships throughout the state are making significant strides in promoting environmental education, resource stewardship, and community engagement.

The Hydroponics in the Classroom initiative featured in the STEM Learning and Healthy Eating Impact Statement promotes sustainable agriculture while enhancing student awareness of fresh food systems. This hands-on program teaches hydroponic and aquaponic systems, as well as the nutritional benefits of fresh produce, environmental stewardship, and water conservation. By fostering curiosity and healthy habits, the program supports long-term health and ecological awareness among youth.

The 58th Western Pecan Growers Association Conference, held in Las Cruces in March 2024, brought together producers, educators, and industry leaders to support pecan advocacy and education.

Founded in 1966, the association continues to promote pecan production across western states, partnering with CES and national and state agencies, and offering marketing, outreach, and training for pecan growers. The association's partnership with Extension strengthens the economic and educational infrastructure supporting the regional pecan industry.

Newly launched, Cozy River Valley is an innovative water management simulation game developed by NMSU's Learning Games Lab and Innovation Media Research and Extension team. Designed as a data-driven educational tool, the game engages players in balancing water consumption, community needs, environmental protection, and financial viability. Although the crops in the game are fictional, they are modeled using real-world data and climate predictions over a 60-year horizon.

Together, these CES initiatives address the urgent challenge of water scarcity, equip residents with tools for decision-making and stewardship, support sustainable agriculture and local food systems, and enhance climate literacy through both traditional and innovative outreach methods. Funding was also secured in 2024, and the CES is currently conducting a national search for an Extension Water Specialist to coordinate and deliver educational programs in water resource management for cropping systems, efficient irrigation systems, water use in urban and suburban landscapes, water use in animal production systems, and wastewater management. These programs emphasize Extension's essential role in shaping a resilient, informed, and environmentally responsible New Mexico.

Merit and Scientific Peer Review Processes

Updates

With the organization of broader, collaborative projects that were implemented in 2023, AES has had fewer individual Hatch Regular projects initiated in 2024. The process for a new project outside of Hatch Regular funding includes the PI writing a proposal, seeking a peer-review, and then submitting to the AES director’s office before submission of the project to NIFA.

Stakeholder Input

Actions to seek stakeholder input that encouraged their participation with a brief explanation

AES held advisory committee meetings at each of the science centers with an advisory committee and hosted 12 field days where members of the public were encouraged to provide feedback regarding research projects. The advisory committee meetings are open to the public and publicly posted throughout the community. CES also hosted county advisory committee meetings throughout the year in all 33 county Extension offices

AES and CES are also actively involved with agricultural commodity associations throughout the state to help stay connected with New Mexican agricultural producers and seek input on developing projects and programs to meet their needs.

Methods to identify individuals and groups and brief explanation

AES and CES will continue to utilize US Census data to broaden the scope of potential audiences to minimize gaps in demographic parities.

Moving forward, AES and CES advisory committees have guidelines with term limits on membership, which should allow for more community members to serve and help inform research practices.

Methods for collecting stakeholder input and brief explanation

AES and CES use a variety of methods to collect stakeholder input. Primarily meetings of various stakeholder groups throughout the state, including virtual and in-person options. Additionally, surveys and interviews (both formal and informal) have continued to be used to collect input.

A statement of how the input will be considered and brief explanation of what you learned from your stakeholders

Stakeholder input is gathered throughout the year to assist in planning and developing projects and programs that will continue to support all citizens of New Mexico. State legislators continue to be a connection to the various regions of New Mexico, along with the presence of Extension in all 33 counties around the state and 12 Agricultural Science Centers located throughout the state.

CES and AES advisory committees represent agricultural producers and community members from their specific regions of the state and can present concerns or requests for community education and research throughout the year or at one of the bi-annual meetings that are offered.

In response to feedback received from stakeholders on the Eastern side of New Mexico, who rely on the Ogallala Aquifer for watering crops, the Clovis Agricultural Science Center has implemented research into low-input water cropping systems.

Highlighted Results by Project or Program

Critical Issue

Environmental Stewardship

Current and Future Issues of Southwestern Ecosystem Structure and Function

Project Director
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7006687

Current and Future Issues of Southwestern Ecosystem Structure and Function

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Issues such as increasing extreme heat, drought, flooding, wildfire activity and invasive species, threaten ecosystem structure and function as well as the physical and mental health of residents in the southwestern United States. At local and regional scales, the causes and solutions to these problems are complex and transdisciplinary in nature. Potential solutions to these issues require a forward-thinking and collaborative team. The purpose of this study is to synthesize current issues and, through a horizon scan, identify emerging issues that affect the health, environmental quality and economic well-being of New Mexicans, discern potential data gaps hindering our ability to address these topics, and highlight areas in which we might be able to build resiliency into New Mexico's socio-ecological ecosystems.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We are documenting realized or potential drivers of environmental crises, loss of species, and disrupted ecosystem function. A graduate student at New Mexico State University (Melanie Solis) recently joined our team to facilitate upcoming discussions for the ranking of issues and our estimation of the probability that these issues will be realized. We, as experts, have compiled specific issues that are relatively unknown, but have the potential to occur, and if they do would severely threaten ecosystem structure and function (e.g., mismatches between predator-prey communities, emerging zoonotic diseases, etc.). This method is known as a horizon scan. The next step is to present these specific issues to other experts in the field and have them assess if they agree with the perceived threat.

Briefly describe how your target audience benefited from your project's activities.

Horizon scanning is a transdisciplinary, collaborative exercise, which aims to enable scientists, policymakers, and practitioners to better understand, manage, and/or mitigate emerging threats. The process promotes strategic responses to emerging issues. Our target audience includes natural resource agencies, policymakers, scientists, non-governmental organizations, and citizens of New Mexico. These individuals and entities have contributed to our preliminary list of issues that threaten ecosystem structure and function in New Mexico and will be the primary audience to whom we will disseminate results. Discussions of such issues allow for the development of collaborative approaches to address emerging threats now and into the future to enhance sustainable ecosystems and resources.

Briefly describe how the broader public benefited from your project's activities.

We are completing the steps of a horizon scan, which can help to identify vital, often overlooked, issues. The knowledge generated through this process should help us identify threats and potential solutions that could help the health and livelihoods of people living in

New Mexico. Results from our study will also highlight areas in which we might be able to build resiliency into ecosystems of New Mexico. Horizon scans are challenging activities but may allow for sufficient lead time to develop solutions and act on emerging issues as they arise or prevent their realization in the first place.

Land Use and Environmental Function

Project Director
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Accession Number
7006709

2024 Results Land Use and Environmental Function

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Agricultural land use practices, whether on croplands or rangelands, have the potential to negatively affect ecosystem function and sustainability. Impacts may include soil erosion, degraded soil health, soil microbes, and more. Research is needed to evaluate impacts of agricultural practices in both croplands and rangelands, and to develop new sustainable management practices to confront the challenges of increasing yield and managing pests.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A long-term study is being conducted at the NMSU Leyendecker Plant Science Research Center to assess how compost-biochar (a form of charcoal intended to improve soil quality), cover crops (triticale, barley, Austrian winter peas, and tillage radish), and different types of tillage (no-tillage, strip tillage, and plow tillage) can improve the health of soils. Both biochar and cover crops improved multiple soil health indicators and enhanced crop water-use efficiency. For example, a mixture of cover crops reduced the electrical conductivity of the soil (a measure of how much salt is in the soil) by more than 41% and increased the amount of nitrate (a valuable nutrient) by more than 40%. The addition of biochar increased organic matter and the nutrients nitrate, phosphorus, and potassium by 32%, 16%, 105% and 25%, respectively. Cover crops also benefited the soil microbial community, more than doubling the biomass of important soil microbes including total bacteria, total fungi, and arbuscular mycorrhizal fungi (a beneficial fungus which helps plants obtain phosphorus and water). The biomass of these microorganisms also increased with the addition of biochar. Cover crop treatments reduced weed biomass and severity compared to treatment without cover crops, highlighting their effectiveness in weed management, and plow-till led to lower weed severity than no-till.

A separate study evaluated the use of electricity ('electric mulch') for weed management in vineyards (NMSU Fabian Garcia vineyard in Las Cruces, NM, and a private grower in Engle, NM). Electric mulch effectively controlled weeds in small plots, with electric mulch being more effective than herbicide and equal to the traditional plastic mulch, for season long weed control. The weed cover in electric mulch plots was near zero compared to ~20-60% in untreated controls and ~5-50% in herbicide plots. The soil microbial community was assessed, and soil health was not negatively affected. More testing and development will be needed to increase the size of plots that can effectively be managed by electricity.

Our research in rangelands evaluated harvester ant collection of seeds sown for restoration. Harvester ants are sometimes considered a problem because they collect seeds and prevent plant growth immediately around their nests; however, they are beneficial and important for many other reasons. We tested ant preference for seeds of common restoration plants, including three grasses (black grama, Indian ricegrass, and alkali sacaton) and one flowering forb (prairie coneflower). Experiments were done at the NMSU Chihuahuan Desert Rangeland Research Center near Las Cruces, and the NMSU Corona Range and Livestock Research Center in Corona, NM, with four trials run during the summer and early fall of 2024. On three of the four sampling dates, ants took very few of the seeds (nearly zero), but in one of the trials ants took many more seeds, including up to 100% from some of the containers. Overall, ants did not prefer any particular seeds, and took few seeds throughout the course of the study. It is clear though that the ants harvest fewer or more seeds at different times of the year, and this knowledge can help with planning of timing for seeding. We are continuing this research to evaluate how temperatures and rainfall affect seed harvesting.

Briefly describe how your target audience benefited from your project's activities.

Knowledge of biochar, cover crops, and tillage will benefit farmers by providing information to help them improve the long-term health of their soil, and short term management of weeds. Specifically, adding biochar and including cover crops will help improve soil health, and can help suppress weeds. Likewise, electrical weed management, which is in its early stages of development, provides a promising new technology for weed management. Knowledge of harvester ants will assist with rangeland restoration via seeding.

Briefly describe how the broader public benefited from your project's activities.

As individual farmers benefit from our research, so will the broader public. Farming practices that improve soil health and improve weed management will mean that farmers can continue to reliably produce food. Furthermore, sustainable practices that limit the need for outside inputs to improve soil nutrition or manage weeds will mean that foods can be grown cheaper, benefiting the public. Similarly, electric weed management will greatly reduce the need for herbicides, and thus have the potential to reduce production costs. Finally, our efforts to better understand the role of harvester ants in rangeland restoration will ultimately benefit the broader public by improving rangelands, thereby increasing their capacity for producing livestock.

Carbon-Food-Energy-Water in New Mexico Agricultural Systems

Project Director

RAJAN GHIMIRE

Organization

New Mexico State University Main Campus

Accession Number

7006674

Carbon-Food-Energy-Water in New Mexico Agricultural Systems: First Year Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Water scarcity, soil degradation, and global warming are the most challenging issues facing sustainable agriculture and food security. These issues are more severe in arid and semi-arid regions as climate change is adding pressure on marginalized communities and vulnerable ecosystems. This project aimed to improve understanding of diverse agricultural systems' carbon sequestration and greenhouse gas (GHG) mitigation potential, enhance water utilization and conservation efficiency across agricultural systems, and increase agricultural literacy among stakeholders and the public.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Five sites representing at least five NMSU Agricultural Science Centers were identified for this study. These sites represent annual and perennial grain and forage crop production fields, livestock grazed sites, and rangeland sites with diverse management practices. Soil samples were collected from selected sites to measure soil carbon and its relationship with food production, water dynamics, and energy use. These soil samples were analyzed for nutrient content, soil organic carbon, and microbial activity by phospholipid fatty acids (PLFA) analysis. Data on annual and perennial crop yields, forage quality, production input, and energy equivalents were collected from selected sites. We identified additional sites for evaluating rangeland's response to management and their soil carbon and water/energy dynamics. Preliminary results of the projects were shared with farmers, ranchers, and local stakeholders during Agricultural Science Center Clovis, Clayton, Farmington, and Los Lunas field days. In addition, researchers on this team organized the New Mexico Soil Health and Carbon Management conference for farmers and agricultural stakeholders in the summer of 2024, which discussed the role of regenerative practices on soil carbon and soil health management in cropland, rangeland, and urban environments.

Briefly describe how your target audience benefited from your project's activities.

Farmers and ranchers in New Mexico are seeking scientifically tested information on agricultural strategies that increase soil organic carbon (SOC) storage, improve water conservation, and sustain crop production in low-fertility soils and water-limited environments. The establishment of systematic research on management strategies to strengthen carbon-food-energy-water systems in diverse agricultural systems of New Mexico is expected to provide information on the best management practices for farmers, ranchers, and land managers in the region. Specifically, the economy of marginal and vulnerable rural communities can benefit from improved knowledge of carbon-food-energy-water systems in their farms and ranches.

Briefly describe how the broader public benefited from your project's activities.

Developing adaptable soil and crop management strategies for arid and semi-arid agroecosystems by evaluating various best management practices will strengthen carbon-food-energy-water systems across the landscape and benefit the economy of marginal and vulnerable communities in arid and semi-arid regions across the southwestern USA.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

N/A

Discovering Climate Change Impacts and Adaptation Strategies in Arid and Semi-Arid Regions

Project Director
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7006696

Climate Adaptation and Resilience Hatch Project Annual Report FY 2024

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

This project addresses the challenges posed by climate change in agriculture, focusing on arid and semi-arid regions. It has two objectives: one is to examine the impacts of climate change on agriculture and assess the role of water policies in climate adaptation, and the other is to examine the impacts of crop improvement and pest management on climate change adaptation.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This project examined crop response to planting date, irrigation technologies, and irrigation regimes, including full irrigation that meets crop water requirements and deficit irrigation regimes for water-saving strategies with a non-significant impact on crop yield and system sustainability. Test crops include potatoes, chile peppers, pumpkins, maize, and cotton. Additionally, plant germplasms were evaluated for adaptation to local climate, disease pressure, and yield potential, with test crops including alfalfa, grain and forage maize hybrids, winter canola, potatoes, wheat, and triticale. Progress is also being made to assess the impact of extreme weather on crop yields.

The project also investigated the life history of the beet leafhopper, *Neoaliturus* (*Circulifer*) *tenellus*, studied on weed hosts in southern New Mexico during 2008-2009. Weekly counts of leafhopper adults, nymphs, and eggs were taken from London rocket (*Sisymbrium irio*), an overwintering annual weed, and kochia (*Kochia scoparia*) at two field sites. The relationship between leafhopper and the phenology of the host plants was documented. The results suggested this species is univoltine in agricultural regions of southern New Mexico, with some evidence of a second generation. The beet leafhopper flights and timing of kochia emergence were also studied in 2016-2017 and 2020-2023. The timing of the initial kochia emergence moved from mid-April in 2008-2009 to late January - early February in 2016-2017 and 2020-2023. The early emergence of kochia allows the overlap of the two plant hosts of the beet leafhopper, and the plant virus that it vectors, beet curly top virus, increasing the potential for disease. A mid-season emergence of kochia was triggered by summer rains, which can lead to a second generation of leafhoppers.

Progress was also made in microbiome research, with techniques established and validated for extracting DNA from dried and fresh pecan leaf tissues for microbiome analysis. Dried pecan samples from various dates (1886-2012) were obtained from the NMSU Herbarium, and DNA was successfully extracted and sequenced using MiSeq to determine bacterial and fungal populations. The data was recently received at NMSU and is currently being analyzed. Additionally, pecan multiple clonal rootstock trials are in progress at Leyendecker at New Mexico State University and in Bowie, Arizona. Samples from the root rhizosphere were collected from potted plants in a greenhouse and field trials (using the same pecan genotypes), with DNA extracted and sent for MiSeq analysis.

Finally, progress is being made in developing interactive labs that help students envision themselves in agricultural careers. Innovative Media Research and Extension department developers created a thematic script for videos featuring current researchers from ACES. These researchers will share their backgrounds and careers in agriculture, and professors will distribute the resulting videos during the introductory plant and environmental science courses. A grant project on these topics is currently being considered by NSF.

Briefly describe how your target audience benefited from your project's activities.

The project's activities benefit agricultural producers, policymakers, researchers, and other stakeholders. The project provides valuable insights into crop response to different irrigation regimes. This could help optimize water use and improve crop yield and sustainability. Further, the

project provides valuable information on the impact of climate change on the beet leafhopper and its plant hosts, which will inform the timing of weed removal recommendations for kochia *(Kochia scoparia)*. Additionally, the research on microbiomes will allow for comparisons of tree microbiomes from the past to the present, helping to understand how soil, water, climate, and genetics shape root microbiomes. This is crucial for improving tree health, disease resistance, and nutrient uptake, with insights for better crop management.

Briefly describe how the broader public benefited from your project's activities.

The broader public benefits from the project through advancements in sustainable agriculture practices, crop improvements, and the promotion of climate change adaptation strategies. The project also contributes to the agricultural sector by addressing foundational questions about rangeland function and crop resilience. The public would also benefit from insights into how soil, water, climate, and genetics influence root microbiomes. Moreover, the development of interactive labs and educational modules helps students, especially from marginalized groups, envision careers in agriculture.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

The project is set to achieve continued progress in the coming years, with collaborators sharing key findings through published research articles.

Enhancing Soil Fertility for Sustainable Agriculture

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7007045

Managing Soil Health for Resiliency of Cropping Systems in the Irrigated Arid Southwest

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Crop production in the irrigated arid Southwest faces significant soil health challenges, including low organic matter, reduced moisture retention, microbial imbalance, and declining yields. With the increasing severity of climate change and drought, addressing these issues is critical to ensuring sustainable productivity and long-term agricultural resilience.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Statewide Soil Health Conference attracted 2,000 participants, equipping them with effective soil management practices.
- Hands-on demonstrations and workshops provided producers with practical solutions for improving soil structure and fertility.
- 94% of surveyed participants reported increased knowledge of soil health best practices.
- 84% of Master Gardener trainees improved their understanding of soil management.
- 50% of biochar and soil health field day attendees planned to implement at least one soil-enhancing practice on their land.

Briefly describe how your target audience benefited from your project's activities.

- Crop producers, Extension Agents, and land managers gained technical knowledge and access to best practices for soil health improvement.
- Small farmers, urban growers, and home gardeners learned strategies for increasing soil fertility and moisture retention.
- Agricultural professionals, including Certified Crop Advisors and state agency personnel, received advanced training to support sustainable land management.

Briefly describe how the broader public benefited from your project's activities.

- Improved soil health can increase net farm profit by $45 per acre.
- Reducing wind and water erosion helps maintain soil stability and ecosystem health.
- Enhanced soil fertility supports pollinators and beneficial insects, contributing to biodiversity.
- Lower reliance on synthetic inputs promotes sustainable, environmentally friendly farming.

Soil health is crucial for the long-term sustainability of agriculture in the Southwest. By adopting biochar, conservation tillage, and cover cropping, farmers and land managers can enhance soil quality, increase water efficiency, and boost ecosystem resilience. This program ensures that New Mexico's agricultural lands remain productive and resilient to climate change for future generations.

Mitigating Wildfire Risks in New Mexico: Community Education & Preparedness

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002277

Agriventure Symposium: Advancing Agriculture Through Research and Collaboration

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

For several years, farmers and agricultural entrepreneurs in northern New Mexico have lacked access to updated research, modern technology, and networking opportunities. The increasing effects of climate change on agricultural practices further highlight the need for education on sustainability and adaptation strategies. The Agriventure Symposium was designed to bridge this gap by showcasing cutting-edge research from New Mexico State University (NMSU) and fostering collaboration among key agricultural stakeholders.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- 121 participants attended, including farmers, researchers, extension agents, and agricultural entrepreneurs from across the region.
    - Taos County: 28 attendees
    - Mora County: 8 attendees
    - Rio Arriba County: 8 attendees
- Keynote presentations addressed climate change impacts on agriculture and sustainable farming strategies.
- Panel discussions featured experts on market development, sustainable agriculture, and emerging ag technologies.
- Workshops provided hands-on training in grant writing, business development, and technology integration in farming.
- 85% of attendees reported gaining valuable new knowledge on sustainable agricultural practices, technology adoption, and climate change adaptation.
- 70% of participants expressed interest in attending future workshops, and a contact list of 111 participants was created for ongoing outreach and educational programming.

Briefly describe how your target audience benefited from your project's activities.

- Farmers and agricultural entrepreneurs accessed scientific research, market insights, and technical assistance for sustainable farming innovations.
- Networking sessions encouraged collaboration among farmers, researchers, and industry experts, fostering future partnerships and business opportunities.

Briefly describe how the broader public benefited from your project's activities.

- Increased awareness of climate change adaptation strategies supports long-term agricultural resilience.
- Expanded access to NMSU research and extension resources aids producers in implementing sustainable practices.
- Strengthened regional agricultural networks foster economic growth and environmental sustainability in rural areas Mexico.

The Agriventure Symposium offered essential education on sustainable agriculture, climate resilience, and emerging technologies, benefiting both individual producers and the wider agricultural community. By promoting research-driven solutions and collaboration, the event established the groundwork for future innovations, partnerships, and long-term sustainability in New Mexico's rural economies.

Expanding Climate-Ready Trees Across New Mexico to Enhance Urban Resilience

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Urban trees provide essential environmental and public health benefits, such as carbon sequestration, heat mitigation, stormwater runoff reduction, and wildlife habitat. However, tree species that were historically planted are no longer viable due to climate change, rising temperatures, and drought conditions. To ensure sustainable urban forestry, communities in New Mexico require climate-adapted tree species that can flourish under future conditions.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Developed regional Climate-Ready Tree lists for New Mexico's USDA Cold Hardiness Zones, helping cities and residents select drought-tolerant, resilient trees.
- Partnered with New Mexico State Forestry, Tree New Mexico, the Nature Conservancy, and municipal organizations to expand outreach.

- Integrated recommendations into the Treebate Program, which has provided over $370,000 in rebates since 2018 for sustainable tree planting.

- Supported Let's Plant Albuquerque, a campaign to plant 100,000 trees by 2030 to strengthen urban canopies.

- Delivered presentations to over a dozen communities and professional audiences, including landscapers, municipal planners, and homeowners.

Partners:
New Mexico State Forestry, Tree New Mexico, Nature Conservancy, Albuquerque Bernalillo County Water Utility Authority, City of Las Cruces Water Conservation Program, New Mexico Tree Alliance.

Briefly describe how your target audience benefited from your project's activities.

- Municipal governments, homeowners, and landscapers received guidance on selecting climate-adapted species to improve long-term tree survival.

- Urban forestry programs gained research-backed data, enabling strategic tree planting that enhances shade coverage and promotes water conservation.

- Community members accessed rebates and planting incentives, helping to reduce urban heat islands and improve air quality.

Briefly describe how the broader public benefited from your project's activities.

- The increased adoption of climate-ready trees will lower urban temperatures, enhance public health, and reduce energy costs through natural cooling. I

- It will also strengthen urban ecosystems and biodiversity by promoting tree species that support pollinators and wildlife.

- This approach improves water-use efficiency in landscaping, assisting cities in conserving resources and reducing runoff issues.

As New Mexico's climate warms, the survival of urban trees relies on selecting climate-ready species. By offering research-backed tree recommendations and incentive

programs, the Climate-Ready Trees Program ensures sustainable urban forestry, strengthens ecosystems, and promotes long-term environmental resilience. Planting the right tree today will benefit generations to come.

Supporting Post-Disaster Agricultural Recovery Through the Agriculture Resilience Event

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Farmers and ranchers in northern New Mexico are increasingly affected by wildfires, floods, and droughts, resulting in soil degradation, invasive weeds, livestock health issues, and difficulties in documenting losses for disaster relief claims. Producers require practical knowledge and access to resources to assist in post-disaster recovery and long-term resilience. The Agriculture Resilience Event, held on July 17, 2024, aimed to address these challenges through educational presentations, consultations, and access to disaster recovery resources.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- 64 participants attended (49 in person, 15 virtually), demonstrating strong interest in disaster recovery education.
- Expert-led presentations covered topics such as:
  - Soil Health & Invasive Weeds (NMDA specialists)
  - Livestock Health & Disaster Documentation (New Mexico State Veterinarian)
  - Enterprise Budgeting & Record Keeping for Disaster Claims (NMSU Extension)
  - Value-Added Agriculture for Economic Resilience (NMSU Extension)
- Hands-on booths staffed by FEMA, NRCS, and the New Mexico State Veterinarian's Office provided personalized support.

- Actionable results included plans to develop:
  - A flyer outlining acceptable agricultural loss documentation for FEMA claims.
  - Public service announcements (PSAs) on invasive weed management, shared via local media and social platforms.
- Participant feedback showed increased understanding of disaster documentation, soil health restoration, and pest management strategies.
- Partners:
  New Mexico State University Cooperative Extension, FEMA, NRCS, and New Mexico Department of Agriculture (NMDA**)**.

Briefly describe how your target audience benefited from your project's activities.

- Farmers and ranchers gained direct access to disaster recovery resources and technical guidance.
- Producers learned effective strategies for documenting agricultural losses for FEMA relief claims.
- Increased awareness of soil health and invasive weed control will help mitigate long-term land degradation.

Briefly describe how the broader public benefited from your project's activities.

- Improved soil health and weed management benefit local ecosystems and reduce erosion risks.
- Better financial preparedness for disaster recovery strengthens the economic stability of farms and reduces reliance on public assistance programs.
- Strengthened regional agricultural resilience ensures continued food production and economic sustainability.

The Agriculture Resilience Event empowered farmers and ranchers with essential knowledge for post-disaster recovery, bolstering economic stability, environmental stewardship, and long-term agricultural resilience. By enhancing disaster preparedness, soil health, and invasive species management, this initiative strengthens both the agricultural sector and the surrounding communities.

Critical Issue

Family Development and Health of New Mexicans

New Mexico Sustainable Rural Economic Development

Project Director
Keith Mandabach
Organization
New Mexico State University Main Campus
Accession Number
7006578

New Mexico Sustainable Rural Economic Development

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

This project is designed to study, assist, and support sustainable rural business expansion and economic development in New Mexico. The focus is to link our rural communities' agricultural stakeholders with the growing demand for rural tourism and rural lifestyles. Rural tourism plays a pivotal role in promoting economic growth and preserving cultural heritage while fostering sustainable business practices.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The project is establishing economic impact benchmarks for rural tourism businesses and encourages collaboration among various stakeholders. Forging partnerships between rural tourism, lodging establishments, agricultural tourism, and artisanal, cultural, and culinary sectors, this initiative seeks to create a vibrant ecosystem that can serve as a model for rural tourism development across the state and the Southwest. The project encouraged the sustainability of employment in rural communities by studying and developing solutions for technology skills gaps. The eight participating researchers and practitioners' collective interests all focus on training and supporting stakeholders in their specific areas.

The major activities that helped our project make progress began with planning and outreach. Each member of the team interacted and planned their activities for the year to deliver needed support for their stakeholders. In the tourism area, Dr. Mandabach planned

and investigated tourism businesses and activities in eight rural counties as well as reviewed the economic impact in each county. He also planned outreach to the New Mexico Department of Tourism and convention and visitor bureaus in Silver City, Las Cruces, Grants, Roswell, Taos, Carlsbad, Farmington, and Ruidoso. He also contributed to planning for an upcoming study to help better understand how extension agents might better support rural and outdoor tourism organizations. Dr. Stringam planned the delivery of hospitality technology training and a study to evaluate its effectiveness. Dr. Hertzman planned activities and outreach to the NM Wine Association, the New Mexico Restaurant Association, the El Paso Lodging Association, the American Hotel and Lodging Association, and the New Mexico and Albuquerque Hospitality Associations. She also planned and facilitated the training of high school hospitality and tourism teachers in structured online on-demand classes.

Other members of the group planned and developed trainings and studies. Dr. Flores planned and delivered food safety training for small-volume food manufacturers as well as served a flavor analysis resource. Dr. Hagevort planned training and outreach with his dairy stakeholders. Dr. Torell supported the project by planning outreach efforts to cattle ranchers and farmers. Dr. Ahn planned community outreach in fashion design and merchandising and researched fashion technology training and sustainable fashion manufacturing. Dr. Robinson planned a research project focused on succession and transition planning for rural business owners.

Briefly describe how your target audience benefited from your project's activities.

The initial analysis of tourism data from the New Mexico State Tourism Department by county indicated that the three largest counties in New Mexico accounted for almost 65% of the gross state tourism product (GSTD). We studied and analyzed 8 rural counties to calculate a total of GSTD, cataloged with contacts the tourism business activity operating in Chavez (2.54%), Cibola (.51%), Eddy (2.7%), Grant (.73%), Lincoln (2.04%), San Juan (4.27%), Sierra (.45%) and Taos (3.5%), for a GSTD of almost 17% of the entire states total. This research provided information to use in research projects for 2025 which are being prepared for submission for human subject review. A summary of the results will be published this year. Dr. Torell focused on cattle production as well as stakeholder input into water modeling. These are two important areas affecting the rural economy of New Mexico.

Outreach included sessions and meetings with New Mexico Department of Tourism, industry associations including hospitality, hotel and lodging, restaurant, chef, outdoor recreation, wine, beer, and distilleries as well as field days at NMSU Agricultural Science Centers in Las Cruces, Alcade, Farmington and Los Lunas. An interesting upcoming event is the 100-year anniversary of the founding of Route 66 in 2026, it is expected to boost rural tourism across the state. Graduate student David Nidel has been involved for the project. He is also investigating issues with agricultural tourism. Dr. Hertzman continued outreach to stakeholders providing professional development to culinary and hospitality high school teachers designed to connect teachers to sustainable agriculture systems with five separate online course trainings.

A seminar on learning outcomes and assessment for internship training programs in hospitality was presented by Dr. Mandabach at the International Council of Hotel, Restaurant and Institutional Educators (ICHRIE) regional annual conference as well as the

New Mexico Higher Education Assessment conference. As a result of this presentation, Dr. Mandabach was asked to participate in a Western Region Land Grant University group discussion about tourism, outdoor recreation and the need for extension agent training in this area. A tentative study by the group is in the planning stage and the project will participate. A presentation on the “New Mexico Sustainable Rural Economic Development” project will be presented at the West ICHRIE conference in Dallas 02/25. Dr. Mandabach wrote a book chapter for stakeholders titled “The Art of Meeting Tourist Needs and Delivering Exceptional Quality” for the Handbook of Leadership that was accepted and will be published this year.

Wine: One of the important aspects of the project is connecting the growers, vintners, and the tourism industry with other rural businesses. New Mexico has been producing wine since 1628 and currently has over 60 wineries producing 9000,000 gallons of wine a year, Dr Hertzman facilitated an undergraduate internship with the New Mexico Wine Association group in Albuquerque and integrates New Mexico Wine into her undergraduate wine class. The association sponsored wines for HRTM’s Chef Artist Dinner on March 23 at Los Poblanos Historic Inn and Organic Farm in Albuquerque, the ACES Open House on April 6, HRTM’s Celebrate New Mexico Dinner on September 26, and AG Day on November 9. They recently opened a tasting room in Albuquerque and we are considering opportunities for a joint research project.

Technology Training in Hospitality: Our study of the hospitality industry's use of robotics and technology training is very successful. Dr. Stringam and her team met with and facilitated the set-up of a training site in Las Vegas, Nevada. The group identified vendors and worked with them to ‘train the trainer. Pre and post-training surveys started last July. Her team has 6 months of data and presented preliminary analysis to the training center. They will continue to collect 6 more months of data. The project targeted digital literacy training for hotel housekeeping trainees. The project was featured by UNITE HERE in the AFL CIO Labor Innovation and Technology Conference in January.

Food Safety Training: Our food safety expert Dr. Flores presented a wide variety of seminars before she retired in 07/2024. She presented a seminar on the NMSU global online on-demand program titled Navigating Extension Family Consumer Science training A search for a replacement for Dr. Flores is in progress and the online training she developed continues to be available to stakeholders.

Dairy: Dr.Hagevoort presented on labor issues at the High Plains Dairy Conference and Vermiculture Field in 2024. His outreach included making dairy operators aware of the video series he directed and produced, “Considering Human and Animal Safety: Dairy Safety Training”, which is designed to educate dairy farm workers on practices that will keep both the workers and the cows safe and healthy. These educational videos were produced by the Southern Great Plains Dairy Consortium in partnership with New Mexico State University Cooperative Extension and other partners.

Fashion and Design: Dr. Ahn is leading our outreach to the New Mexico fashion industry. One focus is the use of technology in the fashion industry. She is studying the evolving landscape of the fashion industry, where digital innovation and sustainability are reshaping consumer expectations. As technological advancements like augmented reality and virtual fitting rooms revolutionize customer experiences, brands face increasing pressure to

adopt eco-friendly practices and ethical production methods. A peer-reviewed journal article was published this year.

Succession and Transition Training: Dr. Robinson led the project efforts to support aging individuals and businesses in rural communities considering succession or transitioning their operations. Through outreach to extension programs, her group are collecting details from 36 U.S. Extension programs on succession training and preparation for transitioning. NMSU researchers and Extension personnel will develop a New Mexico-based succession and transition training program.

In summary, our work continues on tourism's economic impact in New Mexico. Outreach initiatives included collaborations with the tourism industry, professional development for hospitality educators, and digital literacy training for hotel staff, as well as efforts to connect agriculture and tourism through training hospitality and culinary teachers, and partnerships with other hospitality and tourism industry associations. Additional programs focused on food safety, dairy industry training, rural succession planning, sustainable fashion research and rural economic development.

Briefly describe how the broader public benefited from your project's activities.

This project holds significant public value as it fosters sustainable rural economic development in New Mexico by connecting agriculture, tourism, and technology. By supporting rural businesses, promoting eco-friendly practices, and enhancing workforce skills, it strengthens the economic vitality of rural communities while preserving cultural heritage. The initiative has positively impacted local stakeholders, including farmers, hospitality workers, educators, and artisans, by providing training, professional development, and partnerships that create job opportunities and improve business sustainability. By addressing critical issues like succession planning, technological skills gaps, and sustainable practices, the project ensures long-term prosperity and resilience for New Mexico's rural economy, serving as a model for other regions in the Southwest.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

We lost our food safety expert and hope to have a new member in place this year. One of our members focused on the economics of cattle production and modeling water usage for stakeholders because of stakeholder demand. Supporting our stakeholders is our top priority.

Agricultural Literacy and Education

Project Director

Charles Bundy

Organization

New Mexico State University Main Campus
Accession Number
7006748

Agricultural Literacy and Education

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The purpose of our research is to provide effective tools and strategies to inform and educate constituents on critical concepts related to agriculture. Specifically, we want to provide agricultural content and concepts to the public, students, and educators in using research-based methods to help change behaviors/perceptions related to agriculture. We also wish to use these concepts to increase student interest in science careers in agriculturally related disciplines.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Objective 1: Conduct research on agricultural literacy and educational practice and application

Members of our group conducted research on a wide range of topics related to agricultural education and literacy. Research topics included assessment of agricultural educators with traumatic situations, the impact of agricultural educators on students with adverse childhood experiences, multi-state ag literacy assessments of extension professionals, examination of the cultural preferences of Ugandan educators in teaching agriculture, assessment of teaching biofuel principles, education on food safety, water scarcity, agricultural technology, etc.

Objective 2: Apply research toward the development of formal and informal learning opportunities
to include the development of learning curricula and tools

Our group has taken the results of their research as well as incorporating the expertise of researchers in a wide range of agricultural disciplines such as agricultural education, entomology, animal science, horticulture, food safety, crop production, etc. to develop a variety of learning opportunities. We are developing and evaluating learning curricula and innovative teaching methods to better engage students in agricultural instruction and literacy, as well as training the general public on these topics. For example, two members of our group studied the impact that agricultural educators have on students who have experienced Adverse Childhood Experiences (ACEs). Their data show three emergent themes: 1) ag educators often emotionally support students with ACEs due to close teacher-student relationships and the socioeconomics of the school district; 2) students with ACEs are often drawn to ag teachers due, in part, to the experiential nature of the coursework in those classes; and 3) ag educators engage teacher and school-driven strategies to support students experiencing ACEs. As a result, they recommend increased training for handling ACEs.

Approximately 17 research articles, 10 social media campaigns, 5 educational websites, 19 animations, 13 videos, 2 games, 8 online interactive modules. Numerous presentations were given at professional meetings, and 100s of presentations to approximately 15,000 stakeholders in New Mexico.

Objective 3: Establish new partnerships for research and development of learning opportunities

Members of our group have worked to generate numerous grant proposals and research and educational collaborations with a wide range of cooperators related to agricultural literacy and education.

Briefly describe how your target audience benefited from your project's activities.

Our target audience includes researchers in agricultural literacy, developers of learning curricula, and tools, educators, and learning stakeholders (including students, agricultural producers, and the general public). Approximately 17 research articles, 10 social media campaigns, 5 educational websites, 19 animations, 13 videos, 2 games, and 8 online interactive modules related to our research areas were generated this year. Numerous presentations were given at professional meetings, and 100s of presentations to approximately 15,000 stakeholders in New Mexico.

Briefly describe how the broader public benefited from your project's activities.

Effectively communicating important concepts on topics related to agricultural disciplines is the primary focus of this group. Therefore, the majority of the many educational products created, and the presentations that were given, specifically targeted the public. For example, the games, videos, animations, etc. are available for use by the general public and target many different age groups. The numerous educational presentations given on topics from insect science to horticultural concepts specifically targeted the general public (pre-K through adult).

Closing Out (end date 09/09/2025)

ICAN - Ideas for Cooking and Nutrition

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002267

Improving Well-Being and Productivity in New Mexico Through Ideas for Cooking and Nutrition (ICAN)

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Food insecurity and poor nutrition are significant concerns in New Mexico, where 35.9% of residents live at or below 185% of the Federal Poverty Level. With 77.7% of students eligible for free or reduced-price lunch and 18.1% of households relying on SNAP benefits, nutrition education is critical for preventing chronic diseases, improving food security, and reducing healthcare costs. Obesity rates are high among both youth (22% of SNAP-eligible children) and adults (69.3% of SNAP-eligible adults), which increases the risk of diabetes, hypertension, and other health issues conditions.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

ICAN offers free, evidence-based nutrition education and community health initiatives for SNAP-eligible individuals throughout New Mexico. Through a statewide network of peer educators, the program provides both in-person and online cooking and nutrition classes, food gardening workshops, and produce distribution events. In 2024, ICAN engaged over 55,000 New Mexicans, enhancing diet quality, food resource management, and physical activity behaviors.

- 95% of adult graduates improved one or more dietary habits.
- 88% improved food resource management skills, such as meal planning and cooking at home.
- 70% increased physical activity levels.
- 92% of youth improved their ability to select healthy foods according to federal dietary guidelines.
- A recent study found that for every $1 spent on ICAN’s EFNEP education program, $9.23 in economic benefits is generated through improved health and productivity.

Briefly describe how your target audience benefited from your project's activities.

SNAP-eligible families acquired practical skills in nutrition, meal planning, and food budgeting, empowering them to make healthier food choices, lower grocery costs, and enhance their overall well-being.

Briefly describe how the broader public benefited from your project's activities.

By promoting healthier eating habits and preventing obesity, ICAN helps reduce healthcare costs, strengthen the workforce, and enhance community health. The program also improves food security by increasing access to fresh produce and local food systems, benefiting both participants and their communities.

Breaking the Cycle: Battling Substance Abuse Across Generations in New Mexico

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7007085

Growing Food for Recovery: Gardening as a Tool for Substance Abuse Rehabilitation

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Substance abuse recovery requires holistic approaches that provide therapeutic outlets, life skills, and emotional support. Research indicates that gardening can serve as an effective tool for overcoming drug and alcohol dependency by reducing stress, enhancing physical activity, and fostering a sense of responsibility and purpose. Gardening also promotes mindfulness, patience, and a connection to nature, all of which are essential for individuals in early recovery who are seeking new challenges and coping strategies.

Participants/Target Audience: Native men and women in recovery from substance abuse at the Four Corners Detox Recovery Center in McKinley County, New Mexico.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The NMSU Tribal Agriculture Agent collaborated with Four Corners Detox Recovery Center to implement gardening-based recovery activities throughout the growing season, reaching 191 participants through 11 educational sessions.

- Seed Germination: Teaching participants how to start plants for the growing season.

- Tree Planting & Garden Expansion: Creating a dedicated growing space with seating for reflection.

- Transplanting Seedlings: Hands-on training in planting food crops in raised beds.

- Garden Maintenance: Covering watering, fertilization, integrated pest management (IPM), and wind protection.

- Harvesting & Food Utilization: Engaging participants in harvesting and discussing nutritional benefits.

- Cool Season Planting: Extending the season with fall crops, reinforcing ongoing engagement.

Demographics of Participants:
191 total individuals (135 men, 56 women)
117 Native, 38 Hispanic, 34 Anglo, 2 African American

Briefly describe how your target audience benefited from your project's activities.

The integration of horticulture education into substance abuse recovery programs is transformative, providing individuals with practical skills, mental well-being, and a renewed sense of purpose.

- Gardening activities helped participants manage stress, reduce cravings, and prevent relapse by creating structured, engaging routines.

- Learning to nurture plants paralleled their recovery journey, reinforcing patience, discipline, and commitment.

- Working together in the garden strengthened relationships among participants, fostering mutual aid and support networks crucial for sustained recovery.

- Gardening provided participants with basic agricultural knowledge that could lead to employment opportunities in farming, landscaping, or conservation.

- Expanded growing spaces ensure continued opportunities for future recovery groups.

Participant Reflection:
-*"Taking care of plants gave me something to focus on other than my addiction. It's peaceful, and I feel like I'm growing, too."*
-*"I never thought I'd enjoy working in the dirt, but it has helped me stay present and feel*

like I'm doing something productive."
-"Gardening is something I can do when I leave here—it's a skill I want to take with me."

Target Audience Benefit:

• Participants developed practical gardening skills while experiencing stress relief and personal empowerment.
• Through engaging in structured and meaningful activities, participants built resilience against relapse and gained confidence in their ability to maintain sobriety.
• The program encouraged positive lifestyle changes, including healthy eating habits and increased physical activity.

Briefly describe how the broader public benefited from your project's activities.

- Substance abuse costs the U.S. economy over $600 billion annually, with recovery and relapse prevention playing a crucial role in reducing societal costs (National Institute on Drug Abuse).

- Gardening-based therapy has been shown to reduce anxiety and depression, leading to improved mental health and decreased burden on healthcare and social services.

- Successful recovery outcomes contribute to safer communities, lower crime rates, and reduced incarceration costs.

- Employment readiness and skill-building programs like this help reintegrate individuals into society, reducing unemployment and dependence on public assistance.

Partners:

Four Corners Recovery Center and its counselors
NMSU Cooperative Extension – Tribal Agriculture Program

Future Plans:

- Expand the garden to accommodate more participants and provide additional therapeutic outdoor spaces.

- Introduce a nutrition and cooking component to teach participants how to use their harvested crops in healthy meals.

- Develop a sustainable gardening mentorship program, allowing program graduates to return as peer mentors.

Preventing Impaired and Distracted Driving Among Youth

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

New Mexico consistently ranks among the top three states for alcohol-related deaths, with a 2022 rate of 42.7 deaths per 100,000 people, the highest in the U.S. Young drivers are disproportionately affected, with those aged 16–20 accounting for 19% of fatal alcohol-related crashes. Impaired and distracted driving are leading causes of preventable traffic fatalities, underscoring the urgent need for comprehensive education and prevention programs for youth programs.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- The Shattered Lives of Doña Ana County program was implemented at Centennial High School, engaging 1,650 students in awareness activities.
- A two-day simulated crash event demonstrated the consequences of impaired and distracted driving, including mock police interventions, funeral home tours, and real-world testimonials.
- 28 students participated in the “Living Dead” cohort, symbolizing lives lost to impaired driving, with 166 surveyed on program impact.
- 89% of students found the program realistic, and 66% reported increased awareness of the dangers of driving under the influence.
- 45% of students stated they are more likely to discuss the risks of underage drinking with peers.
- 34% of educators observed increased student awareness, and 34% reported increased discussions about personal responsibility and peer pressure.

Briefly describe how your target audience benefited from your project's activities.

High school students gained a deeper understanding of the risks of impaired and distracted driving, real-life consequences, and legal implications. The program provided interactive learning experiences, connecting students with professionals in law enforcement, emergency services, and counseling to reinforce responsible decision-making.

Briefly describe how the broader public benefited from your project's activities.

By educating young people about the dangers of impaired driving, the program helps to reduce traffic fatalities, enhance road safety, and promote a culture of responsible driving. Increased awareness and peer discussions contribute to long-term behavioral change, resulting in safer communities and less strain on emergency response systems.

Health Equity Initiatives: Tackling Chronic Diseases in New Mexico

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7004850

Chronic Disease Self-Management Educational Program

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

As of 2015, 1.2 million New Mexicans had at least one chronic disease, with 490,000 experiencing two or more. The cost of chronic disease in New Mexico is projected to reach $268 billion by 2030 (Partnership to Fight Chronic Disease). Chronic diseases are among the most common, costly, and preventable health issues; however, self-management strategies can significantly reduce their impact. Research from the New Mexico Indicator-Based Information System highlights that evidence-based interventions promoting healthy lifestyles can prevent, slow, and manage chronic conditions, thereby improving the quality of life for individuals and lowering healthcare costs.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The NMSU Extension Chronic Disease Self-Management Educational Program (CDSMEP) provides free self-management workshops for adults of all ages, including those with disabilities and individuals managing conditions such as arthritis, chronic pain, diabetes, asthma, cancer, HIV, high blood pressure, and heart disease.

In 2024, five workshops were conducted across Southern New Mexico, including sessions:

- Led by trained facilitators, including Promotoras de la Salud, offering culturally relevant guidance and peer support.
- Offered in English and Spanish, ensuring linguistic and cultural accessibility.
- Available in both in-person and distance learning formats, increasing participation and flexibility.
- Held in Chaparral, NM, through community partnerships, and in Otero County at the Extension Office.

In total, NMSU Extension provided 570 educational hours of chronic disease self-management programming across New Mexico.

Briefly describe how your target audience benefited from your project's activities.

- 58 participants enrolled in the six-week CDSMP program, with all five workshops achieving a 100% completion rate in FY 2023-24.
- Due to high completion rates and strong collaboration with partners, New Mexico Health increased funding for NMSU Extension CDSMEP in FY 2024-25, allowing for expanded reach across additional New Mexico communities.

Participant Reflections:
“This program gave me the tools to manage my diabetes better. I feel more confident in my ability to make healthy choices.”
“I now understand how to set small goals that improve my health and well-being.”

Participants gained confidence in managing their chronic conditions, reducing their risk of complications, improving their quality of life, and strengthening their ability to advocate for their health. Peer-led workshops fostered a supportive environment, reducing feelings of isolation and reinforcing healthy behaviors through education and group interaction.

Briefly describe how the broader public benefited from your project's activities.

Chronic diseases are strongly linked to social determinants of health, including poverty, lack of access to healthcare, and inadequate education. Research from the National Institutes of Health (NIH) shows that individuals with lower income and education levels are at higher risk of having multiple chronic diseases. By providing free, evidence-based education, NMSU Extension helps reduce health disparities, lower healthcare costs, and empower individuals to take control of their well-being.

Kitchen Creations: A Cooking School for People with Diabetes and Their Families

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

New Mexico has the fifth highest diabetes mortality rate in the United States, with diabetes-related costs exceeding $2 billion annually. Many families struggle to adopt healthy eating habits to effectively manage diabetes due to limited access to nutrition education and diabetes professionals, particularly in rural and underserved areas communities.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

To address these challenges, the New Mexico State University (NMSU) Cooperative Extension Service collaborated with partners across the state to offer 24 Kitchen Creations diabetes cooking schools, reaching 289 participants in 16 counties. Classes provided 12 hours of hands-on instruction, led by Extension Agents, Registered Dietitian Nutritionists, and Certified Diabetes Care and Education Specialists. Participants received educational manuals and diabetes-friendly cookbooks to support sustainable behavior change.

- 99% of participants reported satisfaction with program content and delivery.

- Participants adopted four key diabetes-friendly behaviors:
    - Reading food labels to monitor carbohydrate intake.
    - Using herbs and spices instead of salt or fat.

- Measuring food portions for better blood sugar control.

- Planning balanced meals using the 50/50 or Diabetes Plate method.

Briefly describe how your target audience benefited from your project's activities.

Adults with diabetes and their caregivers learned practical techniques for meal planning, cooking, and nutrition strategies to support blood sugar control and overall health. Many participants experienced lower blood sugar levels, weight loss, and improved diabetes management, which led to reduced reliance on medication.

"My blood sugars are lower, and I have lost 8 lbs since the start of the class."
"My blood sugar levels have dropped by 35 points, and I'm using less insulin."

Briefly describe how the broader public benefited from your project's activities.

Kitchen Creations helps alleviate the burden of diabetes on families, healthcare systems, and workplaces by equipping participants with skills to prevent complications and enhance long-term health. The program's estimated healthcare and productivity cost savings exceed $345,000 annually, showcasing its public health and economic value to New Mexico communities.

Navigating Youth Resilience

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002269

Building Life and STEM Skills Through Afterschool & Skills School Programs

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Youth in Socorro County face significant challenges, including high poverty rates (35% of children under 18), low graduation rates (67.2%), and high levels of mental distress among middle schoolers (32.3%). Many lack access to safe, structured learning environments that foster positive youth development, STEM engagement, and essential life skills. The 4-H Skills Schools and 4-H STEM Afterschool programs offer

opportunities for hands-on learning, leadership development, and agricultural literacy, ensuring that at-risk youth acquire the skills necessary for personal and academic success.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The 4-H STEM Afterschool program, offered weekly at the extension office, engages students in hands-on engineering and STEM activities, including participation in the Institute of Competition Sciences' Plant the Moon Challenge. In Fall 2024, the program expanded to Sarracino Middle School's MESA (Mathematics, Engineering, and Science Achievement) class, broadening its STEM outreach.

The 4-H Skills School, a partnership with the City of Socorro Youth Center, delivers weekly hands-on lessons in leadership development, STEM education, and agricultural literacy. Topics include plant science, animal science, and the agricultural industry. Lessons are structured in 4- to 6-week units to ensure sustained engagement and skill-building.

In total, 71 youth participated, with 69 students new to 4-H, expanding the program's reach to previously underserved youth. Over 95% of participants attended Socorro Consolidated Schools and qualified for free or reduced-price lunch, underscoring the program's focus on youth from lower-income backgrounds. Additionally, 41% of participants were middle school students, a demographic identified as at-risk based on NM Youth Risk and Resiliency Surveys.

Briefly describe how your target audience benefited from your project's activities.

Students developed teamwork, communication, and leadership skills through hands-on experiential learning. Surveys revealed that 100% of participants enhanced their problem-solving, planning, and organizational skills; most noted improvements in their social and communication abilities. One student reflected, "Teamwork can be tricky, but negotiating brings out the best aspects of each plan. Planning keeps the project realistic. Always communicate what you're doing, or chaos ensues."

Briefly describe how the broader public benefited from your project's activities.

These programs provide youth with the confidence and skills necessary for future success by encouraging engagement in STEM and fostering life skills. The collaboration between the NMSU Socorro County Extension Service, Socorro Consolidated Schools, and the City of Socorro Youth Center ensures that young people in the community have access to enriching educational opportunities that promote resilience, academic achievement, and career readiness.

Inspiring Future FCS Leaders

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Family and Consumer Sciences (FCS) addresses societal challenges such as health behaviors, financial literacy, food safety, and sustainable consumption (USDA NIFA, 2024). However, the shortage of FCS professionals in secondary education, higher education, and Extension poses a threat to the field's ability to meet growing demands (Bowers & Myers, 2019). It is crucial to develop awareness of FCS career pathways and to engage students early to sustain the field and ensure that future professionals can positively impact individuals, families, and communities.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In June 2024, thirty high school students from Hatch, NM, who participated in the TRIO program, attended a weeklong summer camp that introduced them to five major areas of Family and Consumer Sciences (FCS). The students collaborated in teams to develop revitalization plans for a fictional underutilized community center, integrating FCS principles such as these:

- Nutrition and lifespan health – Planning food offerings that meet diverse needs.
- Human development – Building community cohesion by considering lifespan needs
- Fashion and design – Creating employee uniforms for function and comfort.
- Resource management – Addressing food waste, transportation, and accessibility.
- Education and cultural identity – Designing programs that reflect community demographics.

Throughout the camp, students engaged with technology, developed teamwork and communication skills, and refined their public speaking as they prepared final presentations for a panel of judges. The Extension Health and Well-Being Specialist led the camp planning, secured funding, coordinated faculty presentations, acquired iPads for documentation, and supported the students teams.

Briefly describe how your target audience benefited from your project's activities.

Impact and Feedback:

- 70% of participants reported they were more likely to attend NMSU because of their FCS Camp experience.

- 95% identified one or more subject areas or facts they would share with their family or friends.

- 100% felt comfortable and familiar with the NMSU campus after camp.

- Students gained valuable life skills in technology, teamwork, and public speaking and explored career pathways.

Student Reflections:
"It (FCS Camp) gave a lot of info on food, family, communication, and stress management. It was exciting, engaging, and informative… not to mention the warm welcomes they give daily!"
"Studying family and consumer sciences education is important. I now know some programs and degrees support individuals and families in making healthier habits."

Target Audience Benefit:
Students gained practical knowledge in FCS fields while exploring academic and career pathways. The camp fostered critical thinking, problem-solving, and leadership skills, empowering participants to apply FCS concepts in real-life settings.

Briefly describe how the broader public benefited from your project's activities.

By introducing youth to FCS careers and life skills, this program helps address workforce shortages while strengthening community well-being. Educating students in nutrition, resource management, and family development ensures a more prepared, informed, and resilient future generation.

Partners:

- Federal TRIO Program

- Hatch Public Schools

- New Mexico State University

- FCS & EFCS faculty, staff, and students

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

New Mexico is predominantly rural, with 26 of 33 counties designated as rural or frontier, including Sierra County. The state averages one healthcare provider for every 3,500 residents, with even more pronounced shortages in rural areas. Consequently, mortality rates in rural counties are significantly higher than those in urban areas, partly due to longer emergency response times. Training community members in basic first aid, CPR, and emergency response skills can address this critical gap, potentially saving lives before professional help arrives.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In partnership with Hot Springs High School FFA classrooms, Sierra Vista Hospital, and Extension, EMS Week provided training and certification in:
Basic First Aid
CPR
Stop the Bleed
Austere Medicine (providing medical aid in remote or resource-limited settings)

Through this initiative:

- Two high school agriculture instructors helped implement the training.
- 250 students received certifications in lifesaving emergency response skills.
- Students expressed enthusiasm for hands-on learning, recognizing the impact these skills could have in their rural communities.
- Several students secured internships with healthcare providers and began exploring careers in emergency response and healthcare fields.

Briefly describe how your target audience benefited from your project's activities.

High school students acquired valuable, real-world emergency response skills, enhancing community resilience and potentially saving lives. The training also created opportunities for career pathways, motivating students to pursue healthcare-related professions.

Briefly describe how the broader public benefited from your project's activities.

This program strengthens rural healthcare preparedness, reduces preventable deaths, and enhances community safety by equipping youth with emergency response skills. Immediate, trained bystander intervention can significantly improve survival rates in critical situations, especially in areas with limited access to emergency services.

Partners:

- Hot Springs FFA
- Sierra Vista Hospital

Addressing Childhood Obesity Among NM Youth

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002281

Athletic Nutrition: Empowering High School Athletes with Healthy Eating Habits

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

High school athletes face increased risks of disordered eating, with adolescent athletes being three times more likely to develop eating disorders than their non-athletic peers. Research estimates that 45% of teenage athletes engage in disordered eating behaviors; yet, 71% receive no education on nutrition or eating disorders. In New Mexico, 9% of individuals will experience an eating disorder in their lifetime, contributing to over 10,200 deaths annually in the U.S. The sports culture often prioritizes weight, body size, and appearance, making comprehensive nutrition education essential for fostering healthy, lifelong eating habits among student-athletes.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Athletic Nutrition Program offered sport-specific nutritional training workshops for 65 high school athletes, consisting of 48 wrestlers and 17 cross-country runners, along with eight coaches and 10 parents. The workshops emphasized reading nutrition labels, understanding food groups, recognizing disordered eating behaviors, and connecting nutrition to athletic performance and mental health.

Results from participant evaluations indicated:
-85% of athletes can now identify signs of disordered eating.
-85% correctly categorize common foods into their appropriate food groups.
-90% understand how each food group supports their body.
-98% acknowledge the direct impact of nutrition and hydration on performance and mental health.
-Two high school teams incorporated the athletic nutrition education into their NMAA weight management practices program.

Briefly describe how your target audience benefited from your project's activities.

High school athletes developed a healthier relationship with food and gained the knowledge necessary to fuel their bodies effectively for performance and recovery. Coaches reported that the program helped shift team culture, reinforcing the importance of proper nutrition from an outside expert. Parents also gained insights into supporting their athletes' nutrition needs at home.

Briefly describe how the broader public benefited from your project's activities.

This program addresses eating disorders and promotes healthy nutrition habits, reducing long-term healthcare costs and improving overall athlete well-being. With New Mexico's economic burden of eating disorders totaling $414.4 million, investing in preventative education can significantly reduce healthcare and productivity losses while fostering healthier communities.

Partners:

- New Mexico Athletic Association (NMAA)

- Local high school athletic programs

Diabetes Education in McKinley County: Empowering Communities for Better Health

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

McKinley County ranks last (32nd out of 32) in New Mexico for overall health outcomes and factors, with the highest diagnosed diabetes prevalence in the state (NM Department of Health). Contributing factors include 44% obesity, 31% physical inactivity, and limited access to exercise opportunities (41%). Diabetes disproportionately affects Native American populations at three times the rate of white adults and is more prevalent in low-income communities, where 42% of children in McKinley County live in poverty. Diabetes is a leading cause of heart disease, kidney failure, lower limb amputation, and

adult-onset blindness; therefore, prevention and education are critical to improving health outcomes.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

To increase diabetes awareness and promote healthier lifestyles, three educational initiatives were implemented for youth through adults in McKinley County:

- Ft. Wingate FACE (Family and Child Education) Diabetes Series – A five-part workshop for parents and caregivers that covers diabetes basics, community resources, and exercise.

- Health is Life in Balance – A six-part interactive series for first graders, focusing on healthy eating, physical activity, and diabetes prevention.

- Zuni Middle School Health Series – A six-part series on diabetes, physical activity, and stress management. Students read and summarized diabetes-related articles, created health-focused summer camp menus, and participated in fitness activities challenges.

Briefly describe how your target audience benefited from your project's activities.

Ft. Wingate FACE Diabetes Series:

- 100% of participants had a family member or friend with diabetes, with several personally diagnosed with pre-diabetes.

- 85% planned to implement at least one health strategy learned.

- Participants discovered new diabetes services and exercise resources in their community.

Health is Life in Balance (First Grade):

- 90% of students had heard of "Diabetes" before the program, but few understood it.

- Students remembered and applied previous lessons, setting goals for healthier eating and increased physical activity.

- Due to strong engagement, the program was requested again for the 2024/2025 school year.

Zuni Middle School Health Series:

- 100% of students knew someone with diabetes and learned a new fact about diabetes.
- 100% increased or maintained their physical fitness assessment scores after implementing their activity goals.
- Students expressed commitment to stress management and reducing anxiety through exercise.

Target Audience Benefit:
Participants gained essential knowledge about diabetes prevention, healthy eating, and physical activity, empowering them to make healthier choices for themselves and their families. Young learners developed lifelong habits by setting achievable health goals and engaging in interactive, hands-on activities.

Briefly describe how the broader public benefited from your project's activities.

This initiative helps reduce obesity, improve long-term health outcomes, and lower the burden on the healthcare system by expanding diabetes education and increasing physical activity in McKinley County. Family-based education ensures a lasting impact as parents and children collaborate to adopt healthier habits. These efforts contribute to decreasing rates of diabetes-related complications such as kidney failure, amputations, and blindness.

Partners:

- Ft. Wingate FACE Program
- Gallup Indian Medical Center: Diabetes Program (DMP)
- Gallup Community Health: Certified Diabetes Care and Education Specialist
- Gallup Indian Medical Center: Health Promotion
- Red Rock Elementary (First Grade Program)
- Zuni Middle School: Zuni Language/Food Handlers Class

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Many young people lack basic cooking skills, leading to a reliance on processed and restaurant foods that are often high in calories, fat, and sodium, while missing essential nutrients. This decline in home cooking skills is linked with poor dietary habits, increasing the risk of obesity and chronic diseases. Moreover, childhood obesity remains a national concern, affecting 16.2% of youth aged 10-17, with notable racial and ethnic disparities. Poor nutrition and limited physical activity can also negatively impact students' academic performance and overall well-being.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Teen Cuisine program, delivered to 113 fifth-grade students at Chamisa Elementary School, taught essential nutrition and cooking skills. Participants learned about food safety, meal planning, and how to make healthier food choices by incorporating more fruits, vegetables, whole grains, and lean proteins into their diets. Over three semesters, students engaged in four to six interactive sessions, totaling approximately 50 hours of hands-on learning. Data from post-program surveys showed positive behavioral changes: 69% of participants reported eating breakfast regularly, 77% paid attention to their water intake, and 72% ate meals with their families daily. Additionally, 91% of students demonstrated safe knife-handling skills, and 80.5% learned to follow a recipe correctly. The Veggie Meter assessment indicated a 9% increase in carotenoid levels, signaling improved fruit and vegetable consumption.

Briefly describe how your target audience benefited from your project's activities.

Youth participants gained confidence in meal preparation, making healthier choices, and practicing food safety techniques. These skills empower them to cultivate lifelong healthy eating habits, which can help prevent chronic diseases and enhance academic success.

Briefly describe how the broader public benefited from your project's activities.

The program promotes healthier communities by equipping youth with crucial cooking and nutrition skills. It reduces reliance on processed foods, diminishes food-related health disparities, and encourages family meal preparation. Enhanced culinary literacy can lead

to long-term public health benefits, including reduced healthcare costs and improved well-being across generations.

Financial Wellness

Project Director

LaJoy Spears

Organization

New Mexico State University Main Campus

Accession Number

7004851

Personal and Family Finance: Leaders Training on Estate Planning

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Estate planning is often overlooked or postponed, yet it is essential for protecting assets, minimizing family conflict, and ensuring financial security for loved ones. Many individuals mistakenly believe estate planning is unnecessary or depressing, but without a clear plan, families may face probate delays, high legal costs, and financial uncertainty.
In the U.S.:

- 35% of adults report experiencing family conflict due to a lack of estate planning.
- Probate costs can consume up to 10% of an estate's value and take months or years to settle.
- 31% of individuals say the most damaging result of poor estate planning is leaving loved ones financially vulnerable.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Recognizing the significance of estate planning education, the Chaves County Extension Family and Consumer Sciences (FCS) Agent collaborated with Dr. Bryce Jorgensen, NMSU Resource Specialist, to enhance an existing Estate Planning program tailored to the community's needs.

- Six annual trainings were developed and presented at Chaves County Extension Club Council meetings.

- Five club representatives were trained and delivered the program to their clubs, reaching approximately 40 participants.

- Each participant received a “Peace of Mind Estate Planning Guide,” equipping them with practical tools for starting estate planning.

Survey Results:

- 100% of participants reported an increase in their knowledge of wills and estate planning, with 40% indicating a significant increase.

- 100% felt a stronger commitment to creating a will, with 40% stating their desire increased significantly.

- 80% reported a better understanding of life insurance and its role in financial security.

- 100% of participants expressed greater awareness of the importance of a living will for medical decisions.

- 100% of participants intended to take an estate-planning action step, such as creating a will, obtaining power of attorney, or discussing their plans with family plans.

Briefly describe how your target audience benefited from your project's activities.

Participants left the program better equipped to make informed financial decisions, reducing uncertainty and ensuring their wishes are honored. Many planned to take concrete steps toward estate planning, enhancing their financial stability and the peace of mind of their families.

Briefly describe how the broader public benefited from your project's activities.

Estate planning safeguards families from legal and financial difficulties, minimizing probate delays and court expenses. Raising awareness and eliminating barriers to estate planning can enhance long-term economic stability in communities by ensuring that financial assets are effectively managed and passed down across generations.

Planning for the Future Workshop: Succession Planning for Farmers and Ranchers

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Nearly 70% of family farmers and ranchers expect their operations to remain family-owned after they're gone, yet only 23% have a formal succession plan (USDA, 2017 Census of Agriculture). With the average age of U.S. farmers now at 57, succession planning is crucial for ensuring smooth transitions, preserving agricultural legacies, and preventing financial risks. Without estate and transition planning, family disputes, tax burdens, and legal complications can jeopardize the future of farms and their viability ranches.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Recognizing the need for succession planning education, the Quay County Cooperative Extension Service hosted a " Planning for the Future " workshop. The workshop covered critical aspects of farm and ranch transition planning, including:- Wills and estate planning- Retirement considerations- Management transitions- Tax burdens and financial risks- Developing a transition plan- Renewable energy lease agreements- Farm and ranch leasing strategies. A Texas AgriLife Extension lawyer from Texas A&M assisted in securing expert speakers to provide comprehensive guidance.

• Twenty-four farmers and ranchers participated in the training.
• Twenty-two participants reported increased knowledge of succession planning. One hundred percent of participants intended to use the information for future decision-making.
• Twelve participants committed to making changes to their business planning.
• All participants gained a clearer understanding of the steps involved in farm and ranch succession planning.
• Participants' feedback emphasized the value of the workshop, with three individuals specifically noting how informative and beneficial the training was.

Briefly describe how your target audience benefited from your project's activities.

Participants left the workshop equipped with concrete strategies to secure their farm or ranch's future, protect financial assets, and navigate the legal and tax complexities of transitioning their business to the next generation.

Briefly describe how the broader public benefited from your project's activities.

Succession planning minimizes financial and legal risks for agricultural operations, promoting the economic stability and sustainability of family farms and ranches. By

fostering long-term agricultural business viability, communities gain stronger rural economies, preserved farmland, and ongoing food production.

The 4 Laws of Financial Prosperity: Improving Financial Literacy and Stability in New Mexico

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

New Mexico ranks 45th in per capita income and 46th in median household income in the U.S., with a poverty rate of 18.3%, significantly higher than the national average of 12.5% (Urban Institute, 2024). Financial instability impacts individuals and families, making it difficult to cover basic needs such as housing, food, and healthcare, while also limiting the ability to plan for future financial security. Tracking expenses, setting financial goals, and developing better money management habits can help reduce financial stress, increase savings, and improve long-term financial well-being.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

To address financial literacy and stability, NMSU Extension hosted a webinar book club featuring the book *The 4 Laws of Financial Prosperity* by Blaine Harris and Charles Coonradt.

-30 participants from 13 counties engaged in weekly discussions, readings, quizzes, worksheets, and interactive activities focused on:

- Tracking expenses to identify spending habits.
- Targeting financial goals and prioritizing debt reduction.
- Trimming unnecessary expenses to increase savings.
- Training in financial discipline for long-term success.

-The first 10 participants in each county received a free book, provided by the NMSU Family Resource Specialist.
-An additional week on wealth-building strategies was added to the series.
-Participants shared real-life applications of financial tools, tracking spending leaks, and goal-setting strategies for 2024.

Briefly describe how your target audience benefited from your project's activities.

- **100% of surveyed participants** reported **intending to change and improve their financial behaviors**.

- Participants gained **practical tools for budgeting, expense tracking, and financial goal-setting**, leading to **better financial decision-making**.

Specific participant outcomes included:

- *"I became more aware of what I was spending on food and how much I was wasting."*

- *"I found an extra $50 a month from canceling an unneeded subscription and eliminating bank fees."*

- *"Tracking expenses and using the provided tools was very helpful."*

- *"I learned how to create SMART goals and set realistic financial targets."*

Briefly describe how the broader public benefited from your project's activities.

By increasing financial literacy and stability, this program helps reduce financial stress, strengthen household financial security, and improve overall well-being. Financial education leads to better economic decision-making, which contributes to lower poverty rates, reduced dependence on public assistance, and improved mental and physical health outcomes.

Partners:

- New Mexico State University (NMSU) Extension

- Bryce Jorgensen, NMSU Family Resource Management Specialist

- County Extension Offices in Bernalillo, Los Alamos, McKinley, Santa Fe, and Valencia Counties

Future Plans: Due to the program’s success, additional financial book club webinars are planned for 2025.

The Next Chapter: Life Skills and Job Readiness

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Hidalgo County faces high rates of drug and alcohol use, generational poverty, and limited access to life and job readiness resources. Only 49.8% of the population aged 16 and older participates in the labor force, and many individuals lack the skills, confidence, or motivation to seek and maintain employment. Local recovery programs such as Hope Haven's Recovery Management Center (RMC), the Substance Prevention Network, the Hidalgo County Health Coalition, and DWI programs require additional resources to help participants build essential life skills, financial literacy, and employability skills.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

To support individuals in recovery and community members seeking self-improvement, NMSU Cooperative Extension Service partnered with Hope Haven's RMC to offer a six-class series focusing on financial literacy and job readiness. The program was incorporated into the RMC's Family Day, allowing both participants and their families to engage in skill-building activities.

- 100% of participants reported they would use the provided planners, budget trackers, and binders to manage daily life.
- 75% of participants set achievable life goals after attending the classes.
- 81% of participants committed to changing daily habits based on what they learned.
- 100% of participants felt more confident after learning about job interviews and employability skills.
- 100% of participants reported an improved understanding of money management.
- Two participants obtained jobs, and one couple opened a bank account during the program.

Briefly describe how your target audience benefited from your project's activities.

Participants in substance recovery and job readiness programs acquired practical tools to enhance their financial management and employment prospects. Many experienced increased confidence, took tangible steps toward financial independence, and developed skills necessary for securing stable employment.

- *“I now feel prepared for job interviews.”*
- *“I finally understand how to manage my money and make a budget.”*
- *“Attending these classes has helped me set goals I can actually reach.”*

Briefly describe how the broader public benefited from your project's activities.

The program helped reduce stigma surrounding individuals in recovery by encouraging community interaction and support. Participants’ improved financial stability and job readiness contribute to lower unemployment rates, decreased reliance on social services, and a stronger local workforce. By breaking cycles of poverty and addiction, the program fosters long-term economic and social improvements for Hidalgo County.

Embracing Aging

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7000107

Crafting for Your Mental Health

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The World Health Organization (WHO) states that “there is no health without mental health,” as mental well-being is closely tied to physical health, chronic disease prevention, and overall quality of life. According to New Mexico Health, mental health significantly impacts the outcomes of diabetes, heart disease, and cancer. Additionally, mental health plays a critical role in emotional, psychological, and social well-being, influencing daily functioning, relationships, and overall happiness.

Research shows that creativity and socialization protect against mental health challenges by reducing stress, anxiety, and depression while fostering self-expression, social

connection, and a sense of accomplishment. These benefits are especially valuable for seniors, as they enhance emotional resilience, confidence, and social engagement.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Tamara Schubert, a Chaves County Family and Consumer Sciences Educator, developed the Crafting for Your Mental Health program. It offers monthly sessions at ENMMC Senior Circle and Hagerman Joy Center. Each session incorporates breathing techniques from Mind Matters for stress reduction and body awareness, followed by a hands-on crafting activity to encourage creativity, relaxation, and social interaction.

Over the past year, the program engaged 159 senior participants, with an average monthly attendance of 20.

Pre- and post-surveys showed:

- All participants reported feeling a sense of accomplishment and satisfaction from crafting.
- They found breathing techniques helpful for managing stress, with 28% intending to use them beyond the program.
- More than half of the participants, specifically 57%, stated they felt better after the session compared to before.
- Every participant experienced either a reduction in stress or an improvement in mood, with 57% noting a significant enhancement.
- Observational data indicated increased laughter, social interaction, and confidence among participants, particularly with many seniors becoming more engaged and expressive.

Briefly describe how your target audience benefited from your project's activities.

Through creative expression and guided relaxation techniques, seniors in Chaves County experienced improved moods, reduced stress, and enhanced confidence. The program offered a safe and welcoming space for socialization, helping participants connect with others, form friendships, and improve emotional resilience.

Briefly describe how the broader public benefited from your project's activities.

The program enhances mental health and well-being, contributing to a higher quality of life and lowering long-term healthcare costs related to stress-related conditions. Mentally healthy individuals participate more actively in their communities, nurturing stronger social connections and a deeper sense of purpose.

Extension Get Fit – NM: Strength Training for Healthy Aging and Fall Prevention

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Falls are the leading cause of injury-related deaths and hospitalizations among adults aged 65 and older, with one in four experiencing a fall each year (CDC, 2024). Muscle mass, strength, flexibility, and balance decline with age, which increases the risk of falls, fractures, and reduced mobility. Additionally, osteoporosis impacts over 10 million Americans, with another 44 million at high risk, resulting in increased bone fractures, disability, and loss of independence.

Despite the proven benefits of physical activity, only 30% of adults aged 45-64 engage in regular exercise, dropping to 15% for those aged 65-75 and just 5% for adults over 85 (NIH). Lack of access, motivation, and structured programs hinder many older adults from participating in essential strength training activities that could reduce falls and improve health. The Extension Get Fit (EGF) program was developed to tackle these challenges by offering accessible, structured strength training sessions tailored to older adults in New Mexico.

Participants/Target Audience:

- Adults aged 45 and older, focusing on older adults at risk of falls, osteoporosis, and mobility issues.
- Community members in Bernalillo, Los Alamos, and additional counties will benefit from structured strength training and fall prevention education.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Through an Extension Innovation Grant, nine County Extension Agents and two Extension Associates received training from the University of Arkansas to deliver Extension Get Fit (EGF), a structured 12-week strength training program that utilizes dumbbells and progressive resistance training. The program consists of organized sessions over 12 weeks, meeting twice a week for one hour.

Video resources were developed in collaboration with NMSU Media Productions to support the training for agents and peer leaders. Additionally, there are 24 slide decks featuring structured workout routines designed to assist agents and facilitators in leading classes. The EGF peer-led training model has been expanded to sustain classes beyond the initial Extension facilitation.

Briefly describe how your target audience benefited from your project's activities.

Since the training, Extension Get Fit has launched in two counties—Bernalillo and Los Alamos—impacting a total of 34 participants.

- All participants reported satisfaction with the program.
- 99% reported improved physical strength and overall health.
- 87% reported better sleep quality.
- 94% reported increased energy levels.
- 90% reported reduced joint pain.
- All participants would recommend the program to others.

Success Stories

“Balance is improved, not running into walls. The strength in my wrist is amazing! My flexibility is awesome! Have enjoyed this program and look forward to each morning to work out!”
“Motivation to improve health has increased. I feel better and have more energy.”
“This class served as a recovery for me after a stressful family event. I have gotten stronger in both mind and body.”
“Sleeping better, able to get more done every day, posture better, grip strength improved.”
“Balance much improved, definitely strength improved, even hand/grip strength significant improvement. Better range of motion in joints. Better stamina.”

Benefits

- Older adults improved their strength, balance, and flexibility, reducing the risk of falls and injuries.

- Participants experienced increased mobility and energy, leading to greater independence in daily activities.

- Reduced joint pain, improved sleep, and enhanced well-being contributed to better mental and physical health.

- Peer-led training ensures program sustainability and ongoing support for older adults in local communities.

Briefly describe how the broader public benefited from your project's activities.

Falls among older adults result in over $50 billion annually in direct medical costs, including hospitalizations, rehabilitation, and long-term care (CDC). Research shows that strength training and balance exercises can reduce fall-related hospitalizations by nearly 50%, leading to significant cost savings for individuals, families, and healthcare systems.

- A 20% reduction in fall-related injuries could save the U.S. healthcare system $12 billion annually.

- For every $1 invested in fall prevention, there is a return of up to $3 in healthcare savings (Health Affairs).

- By promoting independence and reducing long-term care needs, EGF enhances quality of life and reduces financial burdens on families and public health systems.

Program to Encourage Active Rewarding Lives (PEARLS)

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Depression is a growing concern among older adults in New Mexico, with 10-15% experiencing clinically significant depressive symptoms and up to 30% exhibiting some form of depressive symptomatology at any given time. Risk factors include chronic illness, social isolation, medication side effects, and loss of independence, all of which contribute to reduced quality of life, increased hospitalization rates, and worsened health outcomes. Although mild depression may not lead to an immediate crisis, it significantly impacts mental, emotional, and physical health. Addressing depression in seniors through lifestyle changes, social engagement, and skill-building programs can enhance long-term well-being and reduce healthcare costs costs.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Recognizing the urgent need for accessible mental health support, NMSU Extension introduced PEARLS (Program to Encourage Active Rewarding Lives), an evidence-based program from the University of Washington, to New Mexico seniors in 2024. Five Family and Consumer Sciences (FCS) Agents from Bernalillo, Santa Fe, Sandoval, McKinley, and Guadalupe counties partnered with the New Mexico Diabetes Advisory Council and the Administration of Community Living (ACL) to implement PEARLS. Key activities and outcomes included:

Training Extension Agents to deliver PEARLS, leading to 14 seniors participating in one-on-one coaching sessions focused on problem-solving, social engagement, and mental well-being.
Conducting outreach efforts, including:

- Emailing brochures statewide to raise awareness.

- Hosting a senior wellness event with 75 participants, promoting mental health resources while boosting local business engagement.

- Presenting PEARLS to Senior Center staff and featuring it in a Senior Center Magazine.
  Helping seniors increase social and physical activities, reduce depressive symptoms, and improve problem-solving skills through six to eight coaching sessions per participant.
  Introducing group PEARLS sessions to expand social interaction opportunities and maximize program impact.

Briefly describe how your target audience benefited from your project's activities.

Participants reported **improvements in mental health, confidence, and ability to manage stress**. PEARLS coaching helped seniors **identify and address personal challenges**, engage in **new activities**, and **enhance their overall well-being**. Participant feedback included:
“Thank you, this has made such a difference in my life.”
“I feel so much better. I’m doing the things I love to do again.”
"*PEARLS problem-solving has been so helpful to me. Having my PEARLS Coach connect me with an NMSU Family Resource Specialist helped me make important financial decisions.”*

Briefly describe how the broader public benefited from your project's activities.

Depression in older adults can lead to higher rates of chronic illness, hospitalization, and long-term care costs. Research from the University of Washington indicates that PEARLS

participants experience fewer hospitalizations, shorter nursing home stays, and lower healthcare costs. Supporting mental well-being in seniors through PEARLS can enhance quality of life, decrease reliance on emergency care, and alleviate the financial burden on families and the healthcare system systems.

Promoting Engagement and Well-Being for Seniors

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Rural New Mexico's senior population is growing rapidly, yet many older adults lack access to affordable and engaging activities that promote overall health, wellness, and social connection. Financial limitations, limited transportation, and lingering isolation from the COVID-19 pandemic further hinder participation in community activities.
According to the World Health Organization (WHO), the global senior population is expected to double by 2050, reaching 2.1 billion people. As people age, their physical, cognitive, and emotional well-being declines, with depression and loneliness contributing to cognitive decline, poor sleep, and reduced quality of life. Accessible community-based programs are essential for improving the mental, physical, and social health of older adults.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Torrance County Cooperative Extension Service provided 14 workshops to 46 adult participants and 12 youth participants, promoting holistic well-being through hands-on activities, nutrition education, mental health awareness, and skill-building.

Workshops included:
Nutrition education and cooking demonstrations to support healthy eating habits and diabetes management.
Mind Matters curriculum on mindfulness, improving stress management, cognitive function, and emotional well-being.
Exercise and movement activities to encourage physical health and mobility.
Creative and marketable skill-building, including fiber arts, candle making, beading, leather craft, ceramics, and pottery.
Collaboration with the local food bank to ensure accessibility and community engagement.

Impact and Feedback:
All participants reported gaining new knowledge and improving skills through the workshops.
Participants shared what they learned with others in the community, increasing program reach.
Hands-on workshops helped participants generate income by selling handmade goods.

Participant Reflections:

- *"The nutrition education helps with caring for my diabetic friend. The other classes were great since I love crafts and sell some for a little money to supplement my social security."*

- *"Learning how to use the most of your mind, healthy cooking, and learning new things like knitting."*

Briefly describe how your target audience benefited from your project's activities.

Participants gained insights into nutrition, mental health, and skill-building, resulting in enhanced well-being, greater social engagement, and access to financial support opportunities. This blend of education, creativity, and social interaction fosters a stronger, healthier, and more connected senior community.

Briefly describe how the broader public benefited from your project's activities.

These workshops promote senior engagement and well-being, reduce social isolation, improve mental health, and support economic stability through skill development. By encouraging lifelong learning and social connections, they enhance community resilience and the quality of life for aging populations.
Partners:
• Bethel Community Storehouse – Food Distribution Center

Critical Issue

Food & Fiber Production and Marketing

A Multifaceted Approach to Strengthening the Food Supply Chain

Project Director
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2024 Results for "Multifaceted Approach to Strengthening the Food Supply Chain"

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The food supply chains serving New Mexico, the border-region, and the United States include producers, processors, marketers, and consumers. Each link in these chains features inefficiencies that can cause higher prices and shortages for consumers and diminished economic returns for producers, processors, and marketers. Further, each inefficiency is a failure to make the best use of the

limited natural resources that enable food production and distribution. Thus, to ensure that food supply chains better serve their current and future participants, entire systems for producing, processing, distributing, and consuming food need to be more effective, efficient, and less wasteful.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In Fiscal Year 2024, we conducted a series of studies that addressed specific shortcomings in the production, processing, distribution, and consumption of food in the United States.

With respect to food production, we completed and published a literature review that identified environmental factors influencing the longevity of weed seeds in the soil. This new knowledge will support the development of novel, broadly applicable, management tactics for reducing the number of weed seeds in the soil. We also determined the economic costs and benefits for barley cover crops that are mowed and incorporated into the soil (herein “barley green manure”). Results indicated that barley green manure suppresses early-season weeds and reduces hand-hoeing requirements in the subsequent cash crop (chile pepper). Finally, we conducted a study that evaluated cold storage as a method to extend the shelf-life for jujube. Results suggested the jujube cultivar ‘Dongzao’ could be stored for 5 weeks without reduction in qualities valued for the fresh market.

With respect to food processing, our research focused on maize inflorescences (a polyphenol-rich by-product generated abundantly from corn production) and cheese whey (a lactose-rich by-product vastly produced from the cheesemaking process). We developed methodology for adding maize-inflorescences powder into concentrated cheese whey to create a lactose solution with high antioxidant activity. Our method involved trapping polyphenols in crystals, which prevented polyphenol degradation by UV-A radiation. Also, our work on food processing included studies on saffron flowers as sources of phenolic compounds with antioxidant activity. Results indicated saffron stigmas (a floral part) and saffron flowers are good sources of phenolic compounds, with phenolic contents and antioxidant potentials greater for saffron stigmas compared to saffron flowers without stigmas.

With respect to food distribution, we published a study that determined the impact of online grocery shopping and food delivery services on food insecurity before and during the COVID-19 pandemic. Results indicated online grocery shopping increased food insecurity, and households with female primary shoppers were less likely to be food insecure than households with male primary shoppers. Further, households with children were more likely to be food insecure. Minority households such as Black, Hispanic, Native American, and younger households were more likely to be food insecure.

With respect to food consumption, we completed a review of the status of and best practices for composting food waste on university campuses. Specifically, we identified 11 campuses throughout the United States and compared them with New Mexico State University. These reviews included information on the history of the programs, types of

composting systems, how much waste was collected, and how the compost materials are used. We identified composting programs at specific universities that can serve as models for expanded composting efforts at New Mexico State University.

Briefly describe how your target audience benefited from your project's activities.

For project activities on food production, the target audience includes vegetable crop growers and their consultants, as well as small farmers and fruit growers, in New Mexico. These growers and agricultural professionals have gained knowledge of methods for improving the profitability and sustainability of their farm operations.

For project activities on food processing, the target audience includes the value-added agriculture industry in New Mexico. From this project, the value-added agriculture industry has gained opportunities for new products that contain high concentrations of antioxidants derived from plants.

For project activities on food distribution, the target audience includes policymakers who develop government-supported assistance programs for obtaining food. These policymakers have gained a better understanding of the impact of online shopping on nutritional security.

For project activities on food consumption, the target audience in FY 2024 was food and beverage operations on college campuses. From this project, food and beverage operations on college campuses have become more knowledgeable on methods for reducing food waste contributions to landfills.

Briefly describe how the broader public benefited from your project's activities.

Recognizing that a food supply chain cannot be improved with a single action that affects the entire system, we are conducting a series of studies that address specific shortcomings in the production, processing, distribution and consumption of food in New Mexico, the border-region, and the United States. Specifically, we are (1) developing climate and market smart strategies that add value to and improve the efficiency of food production in New Mexico, (2) conducting innovative research that supports the development of new technologies for enhancing the antioxidant capacities of food products, (3) evaluating food distribution and marketing programs to enhance their abilities to reach food-insecure households, and (4) developing strategies to reduce food waste contributions to landfills. Through these actions, we are generating information that decision-makers can use to increase economic returns from food production, enhance the nutritional qualities of food products, diminish food insecurity among consumers, and promote greater sustainability in the handling of food waste.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or

program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

Publications directly related to this project:

- Sapkota, S.C., Dsouza, A. and Acharya, R.N. 2024. Impact of online grocery and food delivery services on food insecurity: a case of US households, before and during the COVID-19 pandemic. Journal of Agribusiness in Developing and Emerging Economies https://doi.org/10.1108/JADEE-01-2024-0030

- Rashid A., S. Sanogo, E. A. Lehnhoff, L. Beck. B.J. Schutte. 2025. Soil pH is an underappreciated influence on germination- and microbial-based methods for reducing weed seedbanks in croplands. Weed Research 65:e70002. https://doi.org/10.1111/wre.70002

Animal Health and Wellness in New Mexico

Project Director
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Animal Health and Wellness in New Mexico Livestock

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

It is the goal of livestock producers to improve animal health and welfare throughout all segments of production by providing sound animal husbandry practices. Beef producers deliver a high-quality, low-cost product keeping in mind sustainability. For beef cattle production, the industry has sought to financially reward managerial strategies that minimize calf sickness and death while maximizing calf health and performance beyond the ranch of origin. Animal health has been reported to have a significant effect on performance in the feedlot and on the final product. In addition, there has been more focus on consumer preference with the consumer demanding more information on where their food comes from. There are several factors that impact animal health and wellness in livestock. These factors range from bovine respiratory disease for the beef industry, to reproductive efficiency, animal traceability, vectors for livestock, and other agriculture commodities. This research has focused on identifying when bacteria that can cause

bovine respiratory disease are established. Work has also focused on management practices for equine producers including deworming practices and potential management factors for toxic plants.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Progress towards the role of animal health and welfare on fertility included laboratory work that was conducted to determine if maternal supplemental arginine during gestation can alter transporters, enzymes, and hormones in the developing fetus. In this series of experiments, dams were fed normal or restricted amounts of feed with additional arginine or no arginine. Thus far, these results have demonstrated that dietary restriction of the dam does reduce some of the key metabolic hormones that control blood vessel development. Likewise, glucose transporters are also impacted. Provision of supplemental arginine to dams subjected to restricted feed intake had similar hormone levels and transporters to that of controls. Thereby indicating that arginine could serve as a nutrient that could rescue compromised fetal development. Laboratory work investigating chemokine production and amino acid transporters was also completed. Maternal nutrient restriction negatively impacted CXCR4 and CXCR7 chemokine expression in the fetal portion of the placenta, however, the provision of arginine fed during maternal nutrient restriction increased chemokine expression to that of well-fed dams. Supplemental arginine during gestation did increase liver expression of GLUT-2 glucose transporters and decreased Glucokinase expression whereas arginine supplementation during late gestation increased expression of liver Phosphoenolpyruvate Carboxykinase. All of which demonstrate how supplemental arginine fed to dams during gestation can alter offspring's ability to carry out gluconeogenesis.

With respect to the role of microbes/pathogens/ pests/vectors in animal health, studies were conducted sampling beef calves at arrival along with their dams and also dairy cattle and their dams to evaluate the establishment of Mannheimia haemolytica (a bacteria that is normally present in the nasal cavity of cattle). Establishment of the bacteria can lead to bacterial pneumonia under stress conditions. However, when the animals are colonized is not known. We sampled calves' nasal passages at birth, six, twelve, and 24 hours after birth for analysis of M. haemolytica. Also, at birth, we sampled the cow's reproductive tract and udder. Samples were submitted to a diagnostic lab for bacterial culture plating and real-time PCR (rt-PCR) to isolate and identify bacteria as well as detect bacterial and virus nucleic acid. Associations of bacteria and viruses between dam and offspring are unclear with the findings of this study, warranting further research.

Over the past year, the impact of nutrition on animal health and production was evaluated by reviewing the available literature on deworming strategies for equine internal parasites The findings from this review are to be included in two original peer-reviewed Cooperative Extension Service (CES) publications. This scholarly effort also led to the publication of a peer-reviewed article in the Animal Frontiers journal. In addition, two CES publications that were due for scheduled updates were revised. These publications concerning poisonous plants and equine health and production also contribute to the objectives of this project. Colleagues translated the two revised CES publications into Spanish which makes the recommendations more readily accessible to some of the target audience identified in the

project. Other areas of inquiry included evaluating temperatures of cattle as related to visual observation.

The locoweeds Astragalus and Oxytropis in the Americas and Swainsona in Australia harbor Alternaria section Undifilum spp., endophytes that produce swainsonine and induce “locoism” or “pea struck” diseases in grazing animals. While long known to cause toxicoses, many of these fungi were never characterized to the species level. Our study characterized swainsonine-producing Alternaria species isolated from Astragalus wetherilli, and Astragalus pubentissimus, from the western US and from Swainsona canescens, Swainsona galegifolia, Swainsona luteola, and Swainsona brachycarpa from Australia. Morphological identification revealed the production of conidia that produced a wavy germ tube for the endophytes from Astragalus pubentissimus species, Swainsona canescens, and Swainsona galegifolia, which is a distinctive feature of Alternaria section Undifilum spp. Sequence analysis of the ITS region and the swnK gene and the swnH2 – swnK intergenic region of these fungi suggest that the fungi isolated from Astragalus are closely related and distinct from the fungi isolated from Swainsona. Fungi isolated from Astragalus spp. differed in color, growth, and conidium size, and/or their sequences. Fungi isolated from Swainsona canescens and Swainsona galegifolia endophytes differed in color, growth, and conidium size. Sequence from all Swainsonina endophytes from all three sequenced regions did not vary by more than a single base and were concluded to be the same species. The new species described here are Alternaria wetherum, Alternaria pubentissuin, Alternaria pubentiwy, and Alternaria swainsonum, Characterization of this important group of fungi aids in the understating of their association with their plant hosts and provide insights into their toxicoses.

Briefly describe how your target audience benefited from your project's activities.

The target audience for this research includes livestock producers (cattle, equine), veterinarians, academics, industry personnel, and academic professionals. In addition, Spanish-speaking equine producers, veterinarians, academics, and industry personnel benefitted from the activities. Clientele can make recommendations to producers on management factors to improve reproductive efficiency, potential development of strategies for improvement of organisms responsible for bovine respiratory disease, and identification of fungi that cause toxicosis from the plants commonly referred to as locoweed.

Briefly describe how the broader public benefited from your project's activities.

There is more public scrutiny of the health and well-being of livestock in general. The broader public will benefit from work identifying the establishment of bacteria that cause respiratory disease. This work may help to identify probiotics or prebiotics to improve the health of beef cattle. Equine producers often rely on technical information from animal health companies. Although these companies provide adequate information, they are more product-driven in the information presented. Providing unbiased data on deworming practices will enhance the well-being of the equine industry. Fungi produce toxins that can affect many classes of livestock. Characterization of the association of the various fungi

with the plant hosts provide not only insights into their toxicosis, they may provide prevention or treatment of the toxicosis.

Genetic enhancement in crop systems

Project Director
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Accession Number
7006719

Improved Sustainability of Crop Production in New Mexico's Arid Lands Through Genetics

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Through breeding and germplasm development, new crop cultivars must be supported to counter increasing environmental challenges. Resulting increases to yields, quality attributes, and disease resistance in these lines will provide producers in New Mexico with increased sustainability in crop production, and economic benefits to farms, supporting industries and state clientele.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Pecans: The genetic diversity of pecans, which originated from Oaxaca, Mexico, to Illinois, USA was investigated. This research investigated how pecan trees responded to various stresses including increased heat, drought stress, and salinity. In addition, the impact of nutrient uptake under high heat conditions was also investigated. By 2100, U.S. temperatures are projected to rise between 3°F and 12°F. The study screened six pecan genotypes that originated from the Northern USA to South Mexico. These trees were introduced into tissue culture to produce genetic copies of the trees. These micropropagated trees were then screened under heat conditions of 110°F at different time frames. We saw physiological stress responses in the trees after two hours at 110F and checked gene expression of a HSP70, commonly known to be expressed during heat stress to confirm that the trees were indeed responding to heat. Interestingly, we found that trees that originated from the Northern USA (Giles and Ohio) showed leaf scorching from the heat treatment compared to the trees that originated from the South (such as Elliott) where we saw little to no impact on the trees. We then used a technique known as RNA-Sequencing to determine what genes were impacted by heat stress. Preliminary analyses indicate that different genes are turned on in the genes that tolerate heat stress than the trees that are not able to tolerate heat stress. We are currently analyzing and identifying gene networks

that are involved in heat tolerance. The micropropagated trees were also used for salt and drought studies. With these studies we also saw physiological differences between trees that originated from the northern climates and southern climates. We also used RNA-Sequencing to look at gene expression from trees that tolerated salt tolerance and drought tolerance. We are currently characterizing these genes and their pathways. Experimentally we have found that specific LEA genes are activated during salt stress. These genes are being analyzed in other systems for their ability to confer salt tolerance and if they play a role in drought tolerance.

Additionally, the ability of the micropropagated trees to uptake Zinc, an essential micronutrient, was evaluated under high heat temperatures conditions. The identification of ZIP genes that uptake zinc in pecan was performed and their impact under high heat conditions is currently in the process of being evaluated. The ultimate goal of the research is to develop genotypes better suited to specific geographic regions and specific climates.

Valencia Peanuts: Valencia peanuts are primarily sold as in-shell peanuts and have low yields compared to other types. Due to declining irrigation water, efforts proceeded toward the development of high-yielding varieties to sustain agriculture in eastern New Mexico and west Texas. Peanut breeding has significantly contributed to improved cultivars, accounting for 70% of seed acreage in the region. In the 2024 growing season, variety trials were conducted at four locations in eastern New Mexico and west Texas regions where Valencia peanuts are grown, evaluating advanced lines for agronomic traits. Using this approach, a few lines with advanced yield potential were identified that will be recycled in the breeding program to recover the preferred Valencia traits (3-4 seeded pods and red-skin kernels with sweet taste) and to achieve this, a recurrent backcross breeding approach is being followed. The aim is to identify and select promising lines with desirable characteristics to produce at least three promising lines for future breeding programs. In 2024, three lines look promising under drought stress conditions. We will repeat the studies again in 2025 to confirm our results.

Short-day Onions: The onion research program focused on increasing Fusarium basal rot (FBR) resistance in onion germplasm and assessed current resistance levels through an artificial inoculation screening method. The program also targeted reduced onion thrips damage and Iris yellow spot (IYS) symptoms in germplasm under conducive conditions. Additionally, evaluation of the suitability of commercial short-day onion cultivars for mechanical harvesting by analyzing bulb size and quality traits was initiated. Progress in 2024 included evaluating breeding lines for FBR resistance, which revealed difficulties distinguishing susceptible and resistant cultivars. For several populations, our evaluation method was ineffective at discriminating between the FBR-susceptible and FBR-resistant control cultivars used in the screening. We observed reduced IYS symptoms in certain lines compared to thrips-attractive cultivars. A study of 28 commercial cultivars highlighted variations in adaptability, maturity, bulb size, and firmness relevant to mechanical harvesting, showing a negative correlation between bulb firmness and size. The program also hosted an Onion Research Workshop at NMSU, attended by 46 participants

Chile Peppers: The chile pepper research program focused on utilizing genomic approaches to develop stress-resilient chile pepper (*Capsicum annuum* L.) cultivars. Drought has been one the major constraints for chile pepper production in New Mexico. To address this production issue, the NMSU Chile Pepper Breeding program is developing an

optimized drought screening protocol using polyethylene glycol (PEG)-simulated water stress at the Fabian Garcia Science Center Greenhouse, Las Cruces, NM. In 2024, five *Capsicum* genotypes (three New Mexican pod-types (NuMex Odyssey, NuMex Joe E. Parker, and NM-9), one jalapeno (NuMex Vaquero) and one serrano (NuMex Enchantment)) have been selected for drought study. Screening for drought resistance using 0, 15, and 30% PEG treatments will be performed in the greenhouse. The germination rates of each genotype for each treatment will be examined, and drought resistance will be linked to the rate of germination. The optimized drought screening protocol will be implemented in screening $F_{3:4}$ and $F_{4:5}$ segregating populations of NM-pod type breeding lines, and a diversity panel for genomewide association mapping to dissect the genetic basis of drought resistance in chile pepper for the 2025 growing season.

Communication to Clientele: The team effectively communicated their research findings to various audiences, including the community, producers, and growers through multiple methods.

The team shared their findings with the public in an accessible manner, using mediums such as videos, animations, social media educational campaigns, and websites.

Extension publications, including guides and circulars, are in development through team member collaboration.

Presentations on the latest research discoveries were given to stakeholders.

In 2024, student interns were trained and taught through the ACES Cooperative Extension Service about onion pests (e.g., thrips). One of the students presented at the Onion Research Workshop and expressed that the experience was informative and valuable.

Finally, the 2025 New Mexico Chile Conference and the 2024 Onion Research Workshop were coordinated. Both of these events showcased the latest research findings for their respective crops to benefit the profitability and sustainability of producing these crops in the state.

Briefly describe how your target audience benefited from your project's activities.

Producers and processors learned the project's latest research findings through attendance at our field days, conferences, written and multimedia venues on our progress in genetic development of new cultivars and germplasm. This allowed for informed selection and use of best genetic lines for their operations.

Briefly describe how the broader public benefited from your project's activities.

The public benefited from new and improved cultivar and germplasm development thereby increasing their access to local, sustainable crops produced in New Mexico.

Food Bioengineering Processing and Safety

Project Director

Efren Delgado

Organization

New Mexico State University Main Campus

Accession Number

7006720

Food Bioengineering Processing and Safety

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Food bioengineering and food safety can contribute to food security through innovative food processing technologies and the development of healthy, functional foods while enhancing food production and safety.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The team developed natural bioactive compounds such as antioxidants, probiotics and prebiotics, and proteins that can be used as ingredients in food products. Some of these compounds can have antimicrobial and antioxidant compounds that have not only a shelf life stability benefit but also health benefits such as increasing good gut microflora. We have also worked with new protein sources to be used to protect bioactive compounds such as antioxidants. Researchers conducted food safety evaluations of foods (>100) that contained preservatives. Researchers also conducted training in food safety. The team is also working with food processors in New Mexico to establish Safe Quality Foods (SQF) documentation to prepare them for third-party audits. The team has worked on developing Interactive Labs Which Help Students See Themselves in Agricultural Careers. The initiative seeks to provide students with insights into the experiences of professionals who have excelled in agriculture, demonstrating positive role models in the field. The project is being developed with animations, interactives, and videos to be tested in intro courses within the plant and environmental sciences.

Briefly describe how your target audience benefited from your project's activities.

Working with new bioactive compounds such as antioxidants, antimicrobials, or new protein sources, consumers can benefit from healthier and more stable food products. With our research, we can protect antioxidants through microencapsulation to make them more stable to heat. The protected antioxidants can then be used as ingredients in food products. The food safety training that is conducted helps New Mexico Indian Health Services (IHS) inspectors better understand the risks involved in the manufacture and storage of foods for which they are responsible. NMSU and IHS are planning to

partner on a surveillance study of foods that are produced on tribal lands in New Mexico. Faculty also worked with food processors in New Mexico, Texas, and Colorado to develop food safety plans (Hazard Analysis and Critical Control Point), enabling them to comply with state and federal regulations. Our interactive lab work provides students with insights into the experiences of professionals from different backgrounds who have excelled in agriculture, demonstrating positive role models in the field.

Briefly describe how the broader public benefited from your project's activities.

The general public benefits from food products that are safe for consumption without cross-contamination. Utilization of alternative food ingredients can help to find alternative food proteins that can be consumed by a certain population that has allergies to specific protein sources. It also supports the food safety of food products in the region and country.

Our efforts equip produce farms with educational resources that promote the health and hygiene of workers. These resources enable farmers to adhere to the Food Safety Modernization Act Produce Safety Rule (FSMA-PSR) nationwide.

Apple rootstock trial with tall spindle system in New Mexico

Project Director
Shengrui Yao
Organization
New Mexico State University Main Campus
Accession Number
7005055

Apple rootstock trials with tall spindle system in New Mexico-2024 annual report

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

In New Mexico, there were no apple rootstock trials or high-density planting before this trial. Our current organic apple rootstock trial was established in 2015 at Alcalde, NM. It is one of the NC140projects and NM is one of the ten sites for the organic apple rootstock trials across the country. This is the first formal apple rootstock trial in high-density planting in New Mexico which has been a great demonstration for fruit growers. 2024 was the last year of the 10-year commitment for NC 140 projects. After 10 years, this project will stay and keep functioning as a demonstration for growers.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives

described in your non-technical summary.

Goal and objectives:

a. To evaluate the influence of rootstocks on vegetative and reproductive growth and development of temperate-zone fruit trees, orchard productivity and labor efficiency, and sustainable orchard management practices across diverse soils and climatic regions.

b. To investigate the influence of rootstocks on physiological processes and resilience to biotic and abiotic stresses.

c. To integrate and disseminate research-based information and decision support tools that facilitate successful stakeholder adoption of rootstock technologies.

Trees in this organic apple rootstock trial grew and produced a nice crop in 2024. Due to severe elk damage, we collected the data but not representative since all fruit below 6 ft were eaten by elks.

As Chair, we hosted the NC140 annual meeting at Santa Fe from Nov 5-8, 2024 with 32 attendees from 20 states and one Canadian Province.

Briefly describe how your target audience benefited from your project's activities.

New Mexico fruit growers and home gardeners in north and central New Mexico will benefit from this project. They will use the rootstock performance data to guide their rootstock selections. So far, G890 performed the best in northern NM.

During Alcalde Field Days and pruning workshops, this organic apple rootstock is always a popular stop to educate them about apple rootstock selections in NM.

Briefly describe how the broader public benefited from your project's activities.

During Alcalde Field Days and pruning workshops, this organic apple rootstock is always a popular stop to educate them about apple rootstock selections in NM. Visitors can also check the rootstock performance at Alcalde, NM.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

2024 was the first time for New Mexico to host the NC140 Annual Meeting at Santa Fe, NM.

Cultivating Urban Landscapes: Empowering Communities with Extension Master Gardener Training and Programming

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7007071

Enhancing Horticulture Education and Community Outreach

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Many residents of New Mexico lack access to science-based horticultural education, resulting in inefficient water use, poor gardening practices, and food insecurity. The COVID-19 pandemic intensified the demand for home food production, leading to a remarkable 1,740% increase in gardening inquiries in 2020. To address this growing need, the Extension Master Gardener (EMG) Program trains volunteers to serve as community educators, ensuring that reliable, research-based gardening information is accessible throughout the state.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Launched a 15-week online EMG training program in 2023, offering flexible learning options.
- 272 Master Gardener interns enrolled, with an 82% course completion rate (224 interns).
- 188 interns (84%) completed volunteer hours to become Certified Extension Master Gardeners.
- Online training effectiveness: 82% of participants rated the program as very to extremely effective.
- 169 veteran Master Gardeners took advanced diagnostics and hands-on training.

- 25 food donation gardens maintained by EMGVs produced 41,368 pounds of fresh food for local pantries.

Briefly describe how your target audience benefited from your project's activities.

Certified Master Gardener Volunteers gained extensive knowledge in soil health, pest management, and home food production, which equipped them to educate community members. The flexible online format facilitated a 60% increase in younger volunteers (under 55 and employed full-time), enhancing program sustainability.

Briefly describe how the broader public benefited from your project's activities.

- The program supports food security by providing fresh produce to food-insecure families.
- EMG volunteers expanded the Extension Service's outreach, answering thousands of public inquiries on sustainable gardening.
- Volunteer service valued at $1,256,511, equivalent to hiring 27 entry-level Extension Agents.
- Enhanced water conservation, urban forestry, and pollinator habitat education.

New Mexico ranks eighth in the nation for food insecurity, with 1 in 7 adults and 1 in 5 children facing hunger. The Master Gardener Program enhances access to fresh food, promotes environmental stewardship, and strengthens the Extension’s capacity to serve communities statewide.

NM Farm to School

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002256

Farm to School; Farm to Institution – Ensuring Safe, Local Food for New Mexico

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Foodborne illness outbreaks in 2024, such as E. coli in onions, romaine lettuce, and baby carrots, and Salmonella in cucumbers, have raised consumer concerns about food safety. Institutional buyers, including schools, senior care facilities, and early childhood centers, require farmers to be trained and certified in safe food handling before selling fresh produce to their institutions. The New Mexico State Legislature allocated $5.1 million for institutions to purchase "NM Grown" products in FY 2024-25, with $3.8 million earmarked for locally grown fruits and vegetables. To ensure safe, high-quality local food, farmers must meet food safety requirements, including Good Agricultural Practices (GAPs) and Produce Safety Alliance (PSA) training.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

To support New Mexico farmers, Master Gardeners, and community/school gardens, Cooperative Extension, NMDA, and the New Mexico Farmers Marketing Association provided food safety education, outreach, and technical assistance.

- 290 individuals completed Tier 1–Tier 2 food safety training.
- 75 producers across New Mexico and the U.S. completed Produce Safety Alliance (PSA) training.
- Extension assisted farmers in writing and reviewing food safety plans to ensure they met institutional buyer standards.
- The Approved Supplier Program registered 24 new farm vendors, raising the total to 71 certified produce farms that supply safe, local food.
- Nearly 60% of training attendees were new or beginning farmers (with less than five years of experience), helping them access more market opportunities.

Briefly describe how your target audience benefited from your project's activities.

New Mexico farmers received essential food safety training, which enabled them to sell fresh produce to institutions, restaurants, and retail markets. Institutional buyers, such as schools and senior centers, gained confidence in sourcing safe, locally grown produce food.

Briefly describe how the broader public benefited from your project's activities.

Reduced risk of foodborne illnesses, protecting children and seniors.
Healthier food access, leading to better nutrition, lower BMI, and improved blood sugar and blood pressure levels in vulnerable populations.
Economic impact: The $3.8 million investment in local produce is projected to reinvest $2.25–$2.8 million into the local economy, supporting infrastructure, schools, and community services.

Partners:

- New Mexico Farmers Marketing Association
- New Mexico Department of Agriculture – Produce Division

Nourishing New Mexico: Addressing Food Insecurity and Supporting Agricultural Sustainability

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7007072

Empowering New Farmers and Ranchers Through Land Access and Training

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Between 2007 and 2012, the number of beginning farmers in the U.S. declined by 20%, with access to land and capital being the most significant barriers for new producers. Despite representing 25% of U.S. farms, beginning farmers produce only 15% of the nation's agricultural products. To sustain the agricultural industry and encourage new entrants into farming and ranching, support programs must address land access, business skills, and production knowledge.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives

described in your non-technical summary.

- Established the Beginning Farmer and Rancher Land Access Program, making 4,200 acres available for new producers.
- Conducted eight farmer trainings covering business planning, crop and livestock production, hoop house construction, and lease agreements.
- 42 farmers and ranchers graduated from the program between 2018-2024.
- 16 graduates successfully started or improved their farm businesses.
- Four graduates secured Farm Service Agency (FSA) loans, and two received grants from NRCS to support their operations.
- Beginning farmers who started businesses increased their income by up to $7,000 annually by selling produce and meat at local farmers' markets.
- The program contributed to revitalizing farmland, reactivating water rights, and restoring soil structures, supporting environmental sustainability.

Briefly describe how your target audience benefited from your project's activities.

- New and beginning farmers received hands-on training, business mentorship, and access to farmland, reducing entry barriers into the industry.
- Participants learned how to develop business plans, secure funding, and navigate lease agreements, ensuring long-term financial sustainability.

Briefly describe how the broader public benefited from your project's activities.

- Increased local food availability and economic development by supporting new agricultural businesses.
- Strengthened rural economies by creating jobs and increasing farm-generated income.

- Promoted environmental conservation by restoring old farmland and improving water resource management.

Increasing Fruit Production and Engagement Through Fruit Tree Integrated Pest Management

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Taos County, New Mexico, has a long-standing tradition of growing fruit trees, with many properties boasting apple, pear, and stone fruit trees. However, due to non-commercial orchard management, infestation rates of the Codling Moth, the most destructive pest of apples, range from 50% to 90%. After multiple community apple pressing events in 2023 revealed these high infestation rates, home orchardists sought assistance from the Cooperative Extension Service (CES) to develop solutions for pest control and sustainable fruit production.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- 41 pheromone traps distributed to 24 participants, covering 38 orchard sites.
- 158 individuals trained in fruit tree care and integrated pest management (IPM) through workshops and field visits.
- Public outreach through news articles, social media, and mass media coverage increased awareness across the county.
- Codling moth infestation rates dropped from 75% to 40% for most participants, with some achieving 20% infestation rates through full IPM adoption.
- First agricultural support program for 60% of participants, engaging small-scale and backyard orchard growers who had never accessed Extension resources before.
- Collaborated on an NRCS Specialty Crop Block Grant to expand the program to Rio Arriba County and increase participation to 75 growers in 2024-2025.

Briefly describe how your target audience benefited from your project's activities.

- Home orchardists, backyard growers, and public institutions enhanced pest management practices and increased fruit production.

- Participants received hands-on training in pruning, irrigation management, pest identification, and organic spray application.

- New and small-scale growers were introduced to Extension resources and agricultural cost-sharing programs.

Briefly describe how the broader public benefited from your project's activities.

- Ensured long-term sustainability of fruit trees as a vital part of Taos County's food system and cultural heritage.

- Strengthened local food distribution by increasing fruit donations to schools, senior centers, and farmers' markets.

- Expanded awareness of organic pest management and sustainable orchard care, ensuring healthier fruit production for future generations.

  This program revitalizes backyard orchards and small-scale fruit production, offering pest management solutions that directly enhance food security, agricultural sustainability, and cultural preservation. By engaging a diverse group of growers, CES has expanded community involvement in local food production, ecosystem health, and sustainable agriculture practices.

Cultivating Unity: Collaborative Growth for Native American Producers

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002263

Empowering Native American Livestock Producers Through the New Mexico Indian Livestock Days

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Native American livestock producers encounter distinct challenges related to rangeland management, herd health, operational efficiency, and cultural preservation. Unlike mainstream cattle ranchers, many tribal producers incorporate cultural and spiritual values into their land and livestock management practices. Access to modern technology, sustainable practices, and tailored educational programs is essential for ensuring the profitability and resilience of Native American ranching operations. The New Mexico Indian Livestock Days offers a collaborative, grassroots-driven platform to tackle these challenges, guaranteeing relevant, community-focused education and outreach.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Attendance grew from 65 (1985) to 235 attendees (2024), demonstrating the increasing impact of the event.
- Hands-on workshops provided practical skills in livestock branding, herd health management, and rangeland conservation.
- Technology-focused sessions, such as Virtual Fencing, introduced GPS, mobile apps, and solar-powered stations to help ranchers improve efficiency, reduce labor costs, and promote sustainable land use.
- Participant-reported impacts:
    - 82% saw increased profitability in their ranching operations.
    - 84% improved rangeland management techniques.
    - 92% increased herd health and wellness.
    - 89% improved ranch facilities to enhance efficiency and sustainability.
- Expanded tribal engagement in Extension planning led to a more inclusive, community-driven approach to programming.

Briefly describe how your target audience benefited from your project's activities.

- Native American ranchers and producers gained valuable hands-on training, access to expert guidance, and exposure to innovative ranching technologies.

- Cattle producers improved livestock health, land management strategies, and branding techniques, ensuring stronger business viability.

- Extension services strengthened partnerships with tribal communities, enhancing culturally relevant programming.

Briefly describe how the broader public benefited from your project's activities.

- Increased local livestock production strengthens regional food systems, reducing dependency on external markets.

- Economic benefits include job creation and expanded agricultural business opportunities in rural and tribal communities.

- Blending traditional ranching knowledge with modern technology ensures environmental sustainability, cultural preservation, and economic resilience.

The New Mexico Indian Livestock Days enhances tribal agricultural resilience, strengthens local food systems, and ensures the long-term success of Native American livestock producers. By integrating cultural traditions with modern innovations, the program empowers Native producers to manage livestock efficiently, improve sustainability, and preserve their agricultural heritage for future generations.

Strengthening Pueblo Agriculture and Natural Resource Stewardship Through Education and Technical Assistance

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

According to the 2017 USDA NASS Agricultural Census, there are 8,523 Native Americans in New Mexico who are agricultural producers, many of whom are beginning farmers and ranchers. The Southern Pueblos collectively manage 2,923 square miles of

land, which they depend on for food production, livestock grazing, and natural resource conservation. As they reclaim their relationship with the land, Pueblo producers seek technical and managerial expertise to support self-sufficiency, sustainable land management, and the protection of natural resources. This culturally relevant educational initiative aims to empower Pueblo farmers, ranchers, and natural resource managers with the skills and knowledge necessary to enhance land stewardship, livestock production, and agriculture literacy.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Reached 306 Pueblo producers across 11 Southern Pueblo communities (Acoma, Laguna, Isleta, Sandia, Santa Ana, Zia, Jemez, San Felipe, Kewa, Cochiti, and Zuni).

- 11 workshops and training sessions provided technical education on vegetable gardening, Pueblo agricultural practices, rodent control, Beef Quality Assurance (BQA), financial literacy, and soil health.

- 20 office hours in San Felipe Pueblo and educational booths at two resource fairs provided one-on-one technical assistance.

- Soil Health Workshop Series (Santa Ana Pueblo & Alcalde Agricultural Research Center):
    - 102 producers trained in soil testing, cover cropping, and soil amendment strategies.

    - Knowledge gains:
        - 59% increase in understanding of cover crop benefits.

        - 64% increase in knowledge of cover crop selection.

        - 59% increase in planting considerations for soil health improvement.

- Santo Domingo Pueblo Livestock Day:
    - 25 producers trained in livestock health, cattle pricing, and NRCS programming.

    - 100% of participants improved knowledge in Beef Quality Assurance (BQA).

    - 20 producers became BQA-certified, improving marketability and sustainability of their livestock operations.

    - First-ever livestock day event hosted by Santo Domingo Pueblo, set to become an annual training initiative.

- Rodent Control & Wildlife Management Training:
    - 100% of participants plan to implement new wildlife management strategies on their lands.

- Financial Agricultural Literacy Training:
    - 73% increase in knowledge of record-keeping for agricultural enterprises.

    - 53% increase in understanding of NRCS programming opportunities.

    - 53% increase in financial skills, including cash flow and profitability analysis.

Briefly describe how your target audience benefited from your project's activities.

- Pueblo farmers and ranchers gained skills in sustainable agriculture, livestock management, and land stewardship.

- Natural resource departments and Pueblo agricultural leaders received technical assistance and training, ensuring long-term environmental sustainability.

- Expanded understanding of financial literacy and record-keeping allows producers to access USDA and NRCS programs for funding and technical support.

Briefly describe how the broader public benefited from your project's activities.

- Strengthened Pueblo food systems and land conservation efforts, reducing reliance on external markets.

- Increased soil health awareness and implementation of cover cropping supports sustainable agriculture.

- Expanded Beef Quality Assurance (BQA) certification enhances economic opportunities for Pueblo livestock producers.

- The initiative preserves cultural agricultural traditions while integrating modern conservation and production practices.

Reconnecting with the land is vital for Pueblo communities. This initiative guarantees that Pueblo producers can sustainably manage their land and livestock while preserving their agricultural heritage by offering agricultural literacy, technical assistance, and culturally relevant training. Strengthening Pueblo-led agricultural practices improves food security, economic resilience, and environmental sustainability for future generations.

Growing New Mexico's Agriculture: Engaging Youth for the Future

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7002522

Agtoberfest: Cultivating Agricultural Awareness Through Hands-On Education

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

As urbanization increases and the gap from agriculture widens, many youth and adults struggle to understand the origins of their food, fiber, and everyday products. Agricultural education plays a vital role in helping individuals appreciate the significance of farming, ranching, and resource management in supporting communities and economies. Agtoberfest serves as an engaging platform that offers interactive, hands-on agricultural experiences to close this knowledge gap.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Agtoberfest targeted children under 18, offering free admission on Friday of fair week and promoting participation through flyers, community banners, social media, newspaper articles, and radio announcements. The event attracted 150 youth, parents, and grandparents actively engaging in diverse agricultural presentations.

Participants explored key agricultural concepts through:

- Southwest Mobile Dairy milking demonstration – Understanding dairy production.

- Food safety presentation – Learning about food protection and emergency preparedness.

- Interactive roping and rope-making demonstrations – Showcasing traditional ranching skills.

- Butter-making and farming activities – Connecting youth with local farmers and hands-on food production

- Tractors Then and Now – Comparing antique and modern farm equipment.

- Animal by-products presentation – Identifying products made from cattle and pigs.

- Live reptile presentation – Exploring the role of reptiles in agriculture and ecosystems.

- Electrical safety and erosion model demonstrations – Highlighting natural resource management.

- Post-event activities included pumpkin painting, ice cream making, and interactions with Luna County 4-H members and the New Mexico Department of Game and Fish.

Briefly describe how your target audience benefited from your project's activities.

- 150 local youth and their families gained a deeper understanding of agriculture's role in daily life.

- Participants expressed excitement about learning, with one youth particularly enthusiastic about reptiles and their agricultural significance.

- Community members celebrated the revitalization of Agtoberfest, with adults offering support for future events.

Youth and families gained firsthand exposure to agricultural practices, increasing their awareness of food production, farm equipment, natural resources, and livestock management. These hands-on experiences strengthened their connection to agriculture and sparked their interest in future agricultural careers.

Briefly describe how the broader public benefited from your project's activities.

Agtoberfest helps bridge the gap between rural and urban communities by fostering agricultural literacy and appreciation. Educating youth and families on where their food and everyday products come from strengthens support for local farmers, ranchers, and the agricultural industry, ensuring a more informed public.

Partners:

- AgXplorers
- Farm Bureau
- American Ag Credit
- Luna County 4-H
- Deming FFA
- NRCS
- NMSU
- Southwest Border Food Protection
- Southwest Mobile Dairy
- Local farmers and ranchers
- Dona Ana County Extension
- Deming High School National Honor Society

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

As society becomes increasingly disconnected from agriculture, many young people lack awareness of where their food and fiber originate and the critical role agriculture plays in daily life. Despite the growing demand for agricultural professionals, which includes 58,000 annual job openings in food, agriculture, renewable natural resources, and environmental sciences (USDA), only 35,000 graduates enter these fields each year. With the global population anticipated to reach 9 billion by 2050, a deeper understanding of agriculture is essential for addressing future food security and sustainability needs. Programs like Sierra County Ag Day help bridge this gap by educating youth about the significance of agriculture and inspiring future careers in the industry.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Sierra County Ag Day engaged 365 third through fifth grade students in hands-on, interactive agricultural education. Supported by 16 industry presenters and Hot Springs FFA members, students rotated through 15-minute instructional sessions, exploring diverse agricultural sectors such as livestock production, soil and water conservation, and food processing. The program concluded with a large demonstration and lunch, reinforcing key concepts in an engaging environment.

Briefly describe how your target audience benefited from your project's activities.

Survey responses and participant feedback indicate that students gained:

- A stronger understanding of where food and fiber originate.
- Increased awareness of the various sectors within agriculture.
- Recognition of agriculture’s daily impact on their lives and communities.

Students developed a deeper appreciation for agriculture and its career opportunities, sparking curiosity and interest in food production, environmental sustainability, and agribusiness. By engaging youth early, Sierra County Ag Day fosters agricultural literacy and career exploration, potentially shaping future industry leaders.

Briefly describe how the broader public benefited from your project's activities.

This program bridges the gap between education and agriculture to ensure a knowledgeable future workforce capable of addressing food security, sustainable energy, and environmental challenges. Increased agricultural literacy among youth benefits communities by fostering more informed consumers, future industry professionals, and advocates for agriculture.

Partners:

- Sierra County Soil and Water Conservation District
- Sierra County Farm Bureau
- Hot Springs FFA
- New Mexico Beef Council

P.I.G. Inspire Greatness Unlimited Livestock Show: Promoting Autism Awareness and Inclusion

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

As of 2024, the CDC reports that 1 in 36 youth are diagnosed with Autism Spectrum Disorder (ASD), while 1 in 6 youth are identified with a developmental disorder. Employment rates among individuals with disabilities remain low, with only 21% securing jobs; however, nearly 60% gain employment after receiving vocational rehabilitation services that offer job placement support and workplace accommodations.
Additionally, individuals with autism face higher rates of bullying—35% of teens with autism experience bullying daily, while 46% encounter it at least weekly (Autism Research Institute). A recent incident involving a 4-H member with autism in San Juan County highlighted the need for greater inclusivity and awareness in 4-H programming. Since belonging is a core value of 4-H, fostering a supportive and inclusive culture is essential to ensure that all youth thrive within the 4-H framework organization.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In response, a 4-H member with autism, with the support of family and 4-H leaders, launched the P.I.G. (Inspire Greatness) Unlimited Livestock Show at the San Juan County Fair to raise awareness and promote inclusivity for youth with autism and developmental disorders.

The event incorporated research-based interventions, including Animal-Assisted Therapy, Social Skills Training, and Occupational Therapy, to create an inclusive, supportive environment. 4-H youth showing pigs were paired with community members with autism or developmental disorders, who served as mentors throughout the event.

Additional inclusivity measures included:

- A sensory-safe space facilitated by the San Juan County Council, where participants could self-soothe and regulate sensory input.
- Sensory tools and educational resources were provided for families and attendees to take home.
- Accommodations for participants ensured accessibility and a positive experience in the livestock show ring.

Briefly describe how your target audience benefited from your project's activities.

- 20 4-H youth mentors developed leadership, compassion, and inclusion skills.
- 10 adult organizers engaged in networking and mutual support while providing resources to families.
- 15 special-needs youth gained a sense of belonging, social skills, and stress management techniques.
- 2 self-identified 4-H youth with autism served as mentors, embracing pride in their diagnosis.
- 5 self-identified 4-H youth with special needs showcased their livestock talents, building confidence and gaining positive recognition from the community.

Community Feedback:

"We will be doing this every year!" – San Juan Fairboard Vice President
"This was the most beautiful part of the fair." – 4-H Parent
"Thank you all so much for putting this together! My girls had a blast!" – Mother of twins with special needs
"All of these guys (4-H mentors and adult volunteers) are just absolutely amazing for putting this show together for these kids! Thank you so much!" – Special Needs Resource Advocate

The P.I.G. Unlimited Livestock Show offered youth with autism and developmental disorders a chance to participate in 4-H in a safe and supportive environment. This fosters confidence, skill-building, and social inclusion. 4-H youth mentors develop crucial leadership skills, empathy, and a deeper understanding of inclusivity.

Briefly describe how the broader public benefited from your project's activities.

Autism and developmental disorders create economic challenges. The estimated financial burden of ASD in the U.S. is projected to reach $461 billion by 2025, comparable to the cost of diabetes (Value in Health Journal). Employment rates for individuals with disabilities remain low, but vocational training and inclusive experiences, such as the P.I.G. Unlimited Livestock Show, help bridge gaps in workforce readiness. Programs that promote inclusion and skill-building from a young age lead to better employment outcomes, reduced healthcare costs, and stronger community support networks.

Partners:
San Juan County Fair
Four Corners Stockman's Association

Critical Issue

Water Use and Conservation

Sustainable Management of Water Resources

Project Director
Alexander Fernald
Organization
New Mexico State University Main Campus
Accession Number
7006695

FY24 Results Sustainable Management of Water Resources

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Water conservation is a critical issue in New Mexico and Arizona due to increasing drought conditions and changing water uses, which put significant pressure on water resources. Public attitudes, knowledge, and behaviors regarding water use play a crucial role in shaping policies and effective water management strategies.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Over the past year, our team has made substantial progress in developing and implementing a survey instrument designed to assess public perspectives on water conservation in Arizona and New Mexico. The survey development involved collaboration with experts in water resource management, climate policy, and social research to ensure comprehensive and effective data collection. Institutional Review Board (IRB) approval was secured, and the survey is now in the process of being conducted. This survey specifically supports Objective A of the project, focusing on understanding public knowledge of water sources, conservation behaviors, and willingness to support changes in water management strategies.

Briefly describe how your target audience benefited from your project's activities.

The survey will provide valuable insights for policymakers, environmental organizations, and water management agencies by identifying public knowledge gaps, conservation behaviors, and the level of public trust in water management institutions. This information will help shape more effective and community-driven conservation efforts tailored to the needs and perceptions of the residents of Arizona and New Mexico. The survey that was developed over this past year will be used to inform the other research objectives of this project.

Briefly describe how the broader public benefited from your project's activities.

By identifying key barriers and motivators for public engagement in water conservation, this research will contribute to long-term sustainability and resilience in a region where water is an essential and limited resource. The findings may support the development of targeted educational campaigns and policy recommendations, ensuring that conservation strategies are both practical and widely accessible.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

A major milestone achieved this year was obtaining IRB approval and initiating the survey process. Looking ahead, the project will focus on data analysis and dissemination of results to communities of interest through reports and outreach efforts. Future activities will also include identifying opportunities for training and professional development related to water conservation education and policy development.

Water Quality and Availability in New Mexico

Project Director

April Ulery
Organization
New Mexico State University Main Campus
Accession Number
7006726

Water Quality and Availability

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

New Mexico communities and those around the western U.S. are experiencing increased severity and frequency of droughts. In New Mexico, most households as well as multi-generation farmers are worried about the sustainability of future water supplies. However, the public is just as concerned about the quality of their water, they need to know if it is safe to drink and what unknown chemicals are in their water causing future health risks. Our goal is to improve our understanding of water quality issues and alleviate concerns for NM citizens where there are no issues.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Numerous water, wastewater, and soil samples were collected and analyzed from sources at or near Corona and Tucumcari Agricultural Science Centers. The water sources were city potable water, canal water from Conchas Dam after flowing 40 miles in the canal, Tucumcari domestic well water from about 140 deep (which also is watering livestock at the center), and treated municipal wastewater. Treated city wastewater had the highest pH (8.8-9.3), Total Dissolved Solids (613-662 ppm) or salinity (~1 dS/m), and the most potassium. Additionally, treated wastewater contained 3 individual PFAS (per- and polyfluoroalkyl substances) chemicals above the lower detection limits. However, there were no PFAS detections in the 55 soil samples (which included samples collected at up to 4 depths at several locations). The soil has received treated wastewater irrigation for 10 years, which suggests negligible accumulation in these soils under the site conditions.

Water samples were collected at the Las Campanas golf course in Santa Fe, NM which uses treated effluent in part for irrigation. The Carroll Lab at NMSU tested the water for PFAS and found PFOA (Perfluorooctanoic acid) and PFDA (Perfluorodecanoic acid) but no PFHxS (Perfluorodecanoic acid) or PFNA (Perfluorodecanoic acid).

Two short-term greenhouse experiments were conducted to assess soil chemistry, plant health, and leachate composition when irrigated with potable water, household graywater, and varying concentrations of synthetic graywater. Results indicate that graywater at typical household concentrations supports healthy plant growth without harmful nutrient accumulation. However, high concentrations of synthetic graywater (e.g., 1000x household levels) resulted in plant stress, elevated leachate volume, and excessive levels of sodium, boron, nitrate, and phosphorus in the upper soil layers. The study confirmed that while graywater is a viable irrigation option, long-term effects on soil chemistry and

plant health require further study. Current progress includes transitioning this research into a formal publication, ensuring its findings contribute to the broader scientific discussion on water conservation and sustainable landscaping. Future research should assess long-term impacts, regulatory implications, and best management practices for household graywater use.

Briefly describe how your target audience benefited from your project's activities.

Gaining information and a better understanding of the quality and availability of New Mexico water supplies benefits both the targeted audience and the broader public. Collaborations have been established between stakeholders and research/extension faculty around the state of New Mexico.

Briefly describe how the broader public benefited from your project's activities.

The overall goal of this project is to ensure that citizens in New Mexico can trust their water for consumption and agricultural use. The steps toward understanding the quality and availability of water in New Mexico will take time, but over the past year, at least seven peer-reviewed journal articles have been published, and several presentations have been made at professional meetings that share the results of this project. A list of the papers is listed in the comments section.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals. Use this field for impact statements and publications, if applicable.

Water samples collected from a golf course in NM indicate the presence of some PFAS. The next logical step would be to take soil and/or plant samples and analyze them for PFAS. When soil samples from Tucumcari Ag Sci Ctr were analyzed, there was no PFAS detected in the soil. Unfortunately, Dr. Carroll's lab at NMSU lost the ability to analyze for the compounds and our Umbrella project money does not cover testing at a commercial lab. Our team is not sure where we will go from here without the ability to test in-house.

Published peer-reviewed papers:

Kaown, D., K.C. Carroll, J. Mahlknecht, Y.J. Kim, J.-Y. Shin, S.-S. Lee, K.-K. Lee (2025) Influence of saline water and heavy rain on the fate of chlorinated ethenes in groundwater characterized by compound-specific isotope and microbial data. Journal of Hazardous Materials, 137238, ISSN 0304-3894, https://doi.org/10.1016/j.jhazmat.2025.137238.

Mohamed, R.A.M., M.R. Soltanian, D. Wang, K.C. Carroll (2024) Sensitivity of Mass Flux Reduction and Mass Removal of Perfluoroalkyl Substances to Groundwater Flow and Transport Parameter Variability and Heterogeneity. Journal of Hydrology, 645, Part B, 132268, ISSN 0022-1694. https://doi.org/10.1016/j.jhydrol.2024.132268.

Song, Z., J. He, S.M.T. Kouzehkanan, T.-S. Oh, Y. Olshansky, E.C. Duin, K.C. Carroll, D. Wang (2024) Enhanced sorption and destruction of PFAS by biochar-enabled advanced reduction process. Chemosphere, 363, 142760, ISSN 0045-6535. https://doi.org/10.1016/j.chemosphere.2024.142760.

Moeini, F., R. Ershadnia, R.L. Rubinstein, R.Versteeg, P. Li, J.T. McGarr, A. Meyal, C.D. Wallace, Z. Dai, K.C. Carroll, M.R. Soltanian (2024) Employing generative adversarial neural networks as surrogate model for reactive transport modeling in the hyporheic zone. Journal of Hydrology, 131485, ISSN 0022-1694. https://doi.org/10.1016/j.jhydrol.2024.131485.

Carroll, K.C., M.L. Brusseau, G.R. Tick, and M.R. Soltanian (2024) Rethinking pump-and-treat remediation as maximizing contaminated groundwater. Science of The Total Environment, 918, 170600, ISSN 0048-9697. https://doi.org/10.1016/j.scitotenv.2024.170600.

Doughman, M.S., K.E. O'Shea, N.P. Qafoku, , H.P. Emerson, J.E. Szecsody, K.C. Carroll, and Y.P. Katsenovich (2024) Impact of chromium (VI) as a co-contaminant on the sorption and co-precipitation of uranium (VI) in sediments under mildly alkaline oxic conditions. Journal of Environmental Management, 349, 119463, ISSN 0301-4797. https://doi.org/10.1016/j.jenvman.2023.119463.

Hu, Y., Q. Xue, H. Chen, H. Guo, K.C. Carroll, and S. Wang (2024) Mechanistic insight into Cr(VI) retention by Si-containing ferrihydrite. Journal of Environmental Sciences, 139, Pages 217-225, ISSN 1001-0742. https://doi.org/10.1016/j.jes.2023.05.040.

Water Wise: Educating for Conservation in New Mexico

Project Director
LaJoy Spears
Organization
New Mexico State University Main Campus
Accession Number
7004640

Hydroponics in the Classroom: STEM Learning and Healthy Eating Impact Statement

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Many students, especially those from underserved communities, have limited access to fresh produce and agricultural education. This lack of exposure contributes to poor nutrition and limited engagement in STEM fields. Integrating hydroponics into classrooms offers hands-on learning opportunities that teach plant biology, sustainability, and healthy eating while fostering critical thinking and problem-solving skills.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The hydroponics program engaged 1,460 students across 70 classrooms in seven schools. Each class received a hydroponics system, and students collaborated with teachers to grow tomatoes, salad greens, jalapeños, and herbs. Through hands-on activities such as monitoring pH levels, adjusting nutrient mixtures, and measuring plant growth, students applied STEM concepts in real-world scenarios. These lessons integrated literacy and math, reinforcing sustainability concepts while enhancing problem-solving and teamwork skills. The program culminated in student-led "salad parties," where many students experienced fresh produce for the first time. A hydroponics exhibit at the Bernalillo County Extension Office extended the program's impact by educating the broader community about sustainable agriculture and nutrition.

Briefly describe how your target audience benefited from your project's activities.

Students gained a clearer understanding of plant biology, sustainable farming, and healthy eating habits. Many acquired hands-on STEM experience and boosted their confidence in science and math. The program also offered equitable access to innovative education, particularly benefiting students in Title I homeless programs who might have limited access to fresh foods and practical STEM learning.

Briefly describe how the broader public benefited from your project's activities.

The program promotes sustainable agriculture and raises awareness of fresh produce, supporting long-term health and environmental benefits. The hydroponics exhibit acts as a community learning tool, inspiring visitors to explore innovative farming techniques and fostering healthier eating habits. Additionally, the program guarantees lasting educational benefits for future students by equipping teachers with resources and strategies for curriculum integration.

Preserving New Mexico's Water: Unified Conservation Efforts

Project Director

LaJoy Spears

Organization

New Mexico State University Main Campus
Accession Number
7002279

Enhancing Pecan Production Through Education at the 2024 Western Pecan Growers Association Conference

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Pecan growers in New Mexico face drought conditions, salinity issues, alkaline soils, insect pests, and rising input costs, all of which threaten profitability. Moreover, pecan prices have been below average for the past four seasons, making efficient resource management even more critical. Growers require research-based knowledge on water use efficiency, pest control, and orchard management strategies to sustain production and enhance profitability.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Hosted the 2024 Western Pecan Growers Association (WPGA) Conference from March 3-5 in Las Cruces, NM, providing 15 expert-led educational presentations.
- Topics covered water use efficiency, soil health, pecan weevil management, AI in agriculture, hedging/topping techniques, and stress management for farmers.
- 635 attendees participated, engaging with scientists, industry experts, and vendors to learn the latest research and production techniques.
- Post-conference survey showed that 100% of respondents planned to apply knowledge gained in their orchards during the upcoming season.
- 97.5% of attendees planned to return for the 2025 WPGA Conference and would recommend it to other growers.

Briefly describe how your target audience benefited from your project's activities.

- Pecan producers gained research-based insights on irrigation efficiency, pest management, and orchard best practices, improving their ability to manage crops under challenging conditions.

- Farmers received practical guidance on financial sustainability and stress management, supporting long-term resilience in the industry.

Briefly describe how the broader public benefited from your project's activities.

- Increased irrigation efficiency ensures better water conservation, helping sustain New Mexico's limited water resources.

- Improved pecan production practices support New Mexico's $177.7 million pecan industry, benefiting local economies.

- Reducing losses from pests and soil degradation enhances long-term agricultural sustainability.

The pecan industry contributes $177.7 million annually to New Mexico's economy, but drought and resource challenges threaten its sustainability. The 2024 WPGA Conference provided research-driven solutions to improve water efficiency, pest management, and financial resilience, ensuring the long-term success of pecan growers in the irrigated Southwest.

Sustainable Turfgrass Management in Arid Environments: Enhancing Water Conservation and Urban Green Spaces

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Turfgrass areas provide aesthetic, recreational, functional, and environmental benefits, supporting soil stabilization, reducing air and noise pollution, and cooling microclimates. In New Mexico, the green industry generates $1.3 billion annually, with turfgrass and golf courses contributing $661 million. However, water shortages and limited knowledge of sustainable turf management create challenges for homeowners, county agents, and professional turf managers in efficiently maintaining turf areas. Without proper management, turfgrass areas can waste significant amounts of water, leading to unnecessary consumption of limited water resources.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- Conducted statewide training workshops and seminars on sustainable turfgrass maintenance.

- Educated turf managers, homeowners, master gardeners, and Extension agents on best management practices.

- 90% of participants reported increased knowledge of turfgrass benefits in desert climates.

- 85% of participants learned about efficient irrigation methods and new technologies to reduce water use.

- Estimated 30-50% water savings from improved irrigation practices after training implementation.

Briefly describe how your target audience benefited from your project's activities.

- Turf managers, homeowners, and Extension professionals gained expertise in turfgrass irrigation efficiency, soil health, and water conservation.

- Increased awareness of minimum irrigation requirements, preventing overuse of potable water.

- Enhanced knowledge of sustainable turf maintenance, reducing environmental impact while preserving green spaces.

Briefly describe how the broader public benefited from your project's activities.

- Water conservation efforts help sustain limited water resources, ensuring long-term environmental resilience.

- Turfgrass areas reduce air pollution, stabilize soil, and create safe playing surfaces, reducing injuries for recreational and professional athletes.

- Urban green spaces improve mental and physical health, enhancing quality of life and increasing property values.

Turfgrass areas are essential for sustainable urban environments, providing recreational, economic, and environmental benefits. By educating professionals and homeowners on water-efficient turf management, this program ensures healthier communities, improved water conservation, and resilient green spaces in arid regions.

Type

Projects / Programs without a Critical Issue

Projects / Programs

0

Not Provided