ACES NM STATE MAGAZINE

COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

VOLUME 12 | FALL 2024

FORCE FOR GROWTH

ACES research and outreach help fuel New Mexico's economy

Josh Bachman

LIGHTS ON

Red and blue lights illuminate Gabriel Garcia and kale plants growing inside a container farm at NMSU Grants. Read about the container and other indoor agriculture projects on Page 22.

FROM THE DEAN

Greetings, Aggies and friends!

We're glad to bring you our fall edition of *ACES Magazine*.

In this issue, we're highlighting the college's economic contributions to New Mexico.

In our cover story, learn about the "ACES Effect" – how our research, instruction and outreach support economic vitality in our state. These activities help to increase agricultural productivity, build lifetime earnings for graduates and directly impact economic activity.

Agriculture in New Mexico generates significant cash sales. In 2022 alone, those sales reached $3.71 billion. In that same year, the College of ACES secured more than $24 million in external funding awarded to our faculty and staff through grants and contracts. These activities support economic life around New Mexico, including through our science centers in Alcalde, Artesia, Clayton, Clovis, Corona, Las Cruces, Farmington, Los Lunas, Mora and Tucumcari.

Research conducted by the college continues to benefit our state's future. In this issue, read about a systems-based approach to plant pathogens, electric mulch, indoor container farms, new varieties of alfalfa, ways of using brackish water, and exploration of high-value crops like saffron and jujube. Based on a recent economic analysis by Jay Lillywhite, the impact of agricultural research conducted by the college may be responsible for as many as 470 direct jobs, $13 million in direct-labor income and $28 million in gross domestic product (see Page 29 for details).

We hope you enjoy the magazine! Please stay in touch. We love to hear your feedback.

Rolando A. Flores Galarza
Dean and Chief Administrative Officer

Tomilee Turner

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FALL 2024

ON THE COVERS

Front: Ian Ray, left, and Christopher Pierce walk on an alfalfa research field at NMSU's Leyendecker Plant Science Research Center.

Back: A bee perches on a flowering blackberry bush at Don Bustos's Santa Cruz Farm in northern New Mexico.

NMSU photos by Josh Bachman

Jennifer Randall, a professor in NMSU's Department of Entomology, Plant Pathology and Weed Science, conducts research on plant genetics, development and diseases, microbe interactions, and food safety and security.

PATENT PRODUCER

Jennifer Randall develops game-changing technology to screen plants for toxins

BY TATIANA FAVELA

Randall works in a lab with NMSU Ph.D. student Paul Gabriel. Randall and a research team have received a patent for developing new agricultural contamination technology.

With career achievements recognized on a global scale, Jennifer Randall has played a significant role in revolutionizing the agriculture industry in and outside New Mexico while mentoring the next generation of scientists.

Randall is a professor in NMSU's Department of Entomology, Plant Pathology and Weed Science in the College of ACES and director of the Molecular Biology and Interdisciplinary Life Sciences Graduate Program. Her research focuses on plant genetics, development and diseases, microbe interactions, and food safety and security.

"I have mentored numerous undergraduate, graduate and Ph.D. students," she said. "I love working with my students and enjoy the excitement they bring to working in a lab and learning to perform research. I have published my research in scientific peer-reviewed journals and secured nearly $17 million in grants and contracts for research."

In one project poised to have a major impact on the agricultural industry, Randall and a team of NMSU researchers developed new agricultural contamination technology that uses a non-destructive method to screen plants for contaminants.

The researchers began working on the project in 2015. Nearly a decade later, they received a patent for their technology in December 2023 and published their work in 2024. The team includes Gary Eiceman, professor of chemical instrumentation; Gyougil Lee, senior research scientist; and Alexander Tarassov.

"We have developed technology and methods for continual non-destructive automated monitoring of aflatoxins to alert growers of crop contamination prior to regulatory testing," Randall said. "This technology is not meant to replace the well-established regulatory tests, but rather provide growers and industry professionals with a method to screen their products prior to their testing."

Aflatoxins are a family of toxins produced by certain fungi found in corn, peanuts, cottonseed, tree nuts and other crops. Aflatoxin contamination can lead to steep economic losses – tens of millions of dollars every year in the corn and peanut industries alone, according to research from the U.S. Department of Agriculture.

"Although destructive testing methods for aflatoxins are well-established, the methods have several drawbacks, including the tested sample being destroyed and the possibility that aflatoxin may be missed when a representative sample is tested and may be found upon re-testing elsewhere," Randall explained.

Earlier this year, Randall was among 10 recipients of the 2024 Conference USA Faculty Achievement Award. The award, established by the league's presidents and chancellors, recognizes exceptional contributions to teaching, research and service.

"This award reflects research I have conducted over the years," she said. "My research has focused on addressing critical issues in agriculture and food safety and developing innovative solutions that benefit communities and the broader agricultural sector. The recognition by NMSU underscores the significance and relevance of this research, along with the mentoring of students so they will lead the next generation of scientists."

Since completing her Ph.D. in molecular biology at NMSU in 2005, Randall said the College of ACES has been instrumental in her success and has provided many opportunities to advance her career as a faculty member.

"The college's commitment to fostering a collaborative and innovative academic environment has significantly enhanced my professional growth and research endeavors," she said. "The college has provided support in various forms for my research initiatives and enabled me to conduct cutting-edge studies in sustainable agriculture and apply my findings to real-world problems that will benefit growers and communities."

AXED'S **NEW ERA**

Department boosts student enrollment with newly revised programs

BY TAEYA M. PADILLA

The growth of NMSU's Department of Agricultural and Extension Education was no small feat for Steven Fraze and his faculty. Guided by a five-year goal of growing the department, Fraze and the AXED team built the Agricultural Communications program from the ground up and completely revised the Agricultural and Extension Education programs.

"One of the things I try to work on with my faculty is to make sure that they are student-first faculty," said Fraze, who has served as the AXED department head since joining NMSU in 2020. "They put students first in everything and make it a priority that they don't have a group of 20 students in their program – they have 20 individuals in their program and each one is different."

AXED faculty members collectively adhere to the philosophy of being a student-focused department and care deeply about their students and their success. Lacey Roberts-Hill, an assistant professor in the department, believes the care and passion from faculty strengthen retention and success, which does not go unrecognized by students.

Josh Bachman

Rebekah Roybal, left, and Daniel Martinez work together in an agricultural graphic design class taught by Lacey Roberts-Hill. AXED faculty have developed 14 new Agricultural Communications courses.

"I feel that I have helped the growth of the department by doing my best to develop and teach innovative and engaging courses that not only pique students' interest but equip them for future careers," Roberts-Hill said. "By being there for students in all facets possible, I feel as though I have made a small contribution to the overall success of AXED."

In his first year as department head, Fraze hired faculty members Don Edgar and Shannon Norris-Parish, followed by Roberts-Hill in 2021 and William Norris in 2022. Together, they developed a curriculum of 14 new courses in Agricultural Communications. In spring 2024, the first cohort of undergraduate students graduated from the Agricultural Communications program.

In 2021, together with the Department of Journalism and Media Students, AXED established the Agricultural Strategic Communications graduate program – an increasingly popular program among students. The department has since converted all of its graduate classes to online and has begun to offer summer courses, helping AXED double its graduate enrollment.The summer courses have also helped students stay on track to complete their degrees.

According to Fraze, AXED had more undergraduates enrolling in the 2024 summer orientation than before the COVID-19 pandemic, and the number of student-teachers in the Agricultural Education program have nearly doubled. The department also has a proposal to launch a new Ph.D. program, Human Dimensions of Agriculture, which brings together education, communication, business and Extension.

After four decades of working in higher education, including 32 years as a faculty member at Texas Tech University, Fraze plans to retire in January 2025. He said he has accomplished everything in his five-year growth plan for AXED, and much more.

"Coming over here was coming back to my roots a little bit," said Fraze, a native of Dora, New Mexico. "As an FFA member in high school, I was always active here in Las Cruces. So, it was kind of a unique situation for me to try to rebuild the department and get it back up."

Roberts-Hill added, "Dr. Fraze is a wonderful mentor and has been an incredible driver for our department."

Josh Bachman

Steven Fraze has served as the head of NMSU's Department of Agricultural and Extension Education since 2020. As part of a five-year plan, he led a complete overhaul of the department's programs and grew student enrollment.

Longtime agronomist aims to improve semi-arid lands with limited resources

BY CARLOS ANDRES LÓPEZ

Anowar Islam has dedicated his career to improving lands for producing food to feed the growing world population through innovative and sustainable research programs.

Islam, a longtime agronomist, joined NMSU in September 2023 to helm the Department of Plant and Environmental Sciences and the Department of Extension Plant Sciences in the College of ACES. His academic background includes stints at universities in Bangladesh, Australia, Japan, Canada, Oklahoma and Wyoming, where he served nearly 15 years as a faculty member and Extension specialist at the University of Wyoming.

For Islam, becoming an Aggie marks a fitting evolution in a career that essentially began when he first learned about gardening from his mother. He carried a deep interest in growing plants throughout his childhood and earned a bachelor's degree in agriculture in 1990. Over the following decade, he completed a master's degree in soil science and a Ph.D. in agronomy.

"My mother grew her own fruits and vegetables – and she inspired me to learn new ways to improve our lands and grow food with limited resources," he said.

Islam's research interests include germplasm search and evaluation for selection/cultivar development; best management practices for profitable and sustainable forage crop production; and forage-based cropping systems, among other areas.

Josh Bachman

As head of NMSU's Department of Plant and Environmental Sciences and Department of Extension Plant Sciences, Anowar Islam envisions creating efficient cropping systems.

Islam sees opportunities and challenges in New Mexico. His mission is to bring his academic and Extension departments to the forefront of creating efficient systems to grow food under stressful environments.

"We have plenty of resources in New Mexico, but we must utilize them with minimal water," he said. "That's where we will use the expertise we have in our departments. Our plant scientists, horticulturalists, geneticists, and soil and environmental scientists will lead the way in developing innovative cropping systems for semi-arid lands."

New leader strives to shape the future of agribusiness in New Mexico

BY TAEYA M. PADILLA

A globe-trotter who started his higher education journey in Honduras, Carlos Carpio Ochoa has built quite a résumé. Carpio Ochoa was named head of NMSU's Department of Agricultural Economics and Agricultural Business (AEAB) earlier this year.

"During the last couple of years, I have become increasingly involved as a collaborator and leader of various teams of academics conducting research projects in the United States and other parts of the world," Carpio Ochoa said.

After more than a decade as a faculty member at Texas Tech University, Carpio Ochoa joined NMSU's College of ACES and AEAB to help shape the future of agriculture and agribusiness in New Mexico.

His vision for the department is to focus on the needs of New Mexico stakeholders. He plans to expand AEAB's global reach, leverage its expertise in environmental and natural resources research, increase quantitative analysis, and boost collaboration with industry and government partners.

Carpio Ochoa believes he can fulfill these goals by educating future agribusiness leaders and conducting high-quality applied economics and business research.

"Providing New Mexicans with timely and relevant economic and business information and training opportunities can help them succeed in their business ventures, support the growth of the state's economy, and sustainably manage the state's natural resources," he said.

Josh Bachman

As the head of NMSU's Department of Agricultural Economics and Agricultural Business, Carlos Carpio Ochoa wants to help shape the future of agriculture and agribusiness in New Mexico.

Carpio Ochoa added that he is excited to collaborate with his faculty and staff to formulate and implement a new vision for the department.

Carpio Ochoa earned his bachelor's degree in agriculture from Universidad "El Zamorano" in Honduras in 1999, a master's degree in agricultural and applied economics from Texas Tech in 2002, and a Ph.D. in economics from North Carolina State University in 2006.

New scholarship honors renowned researcher

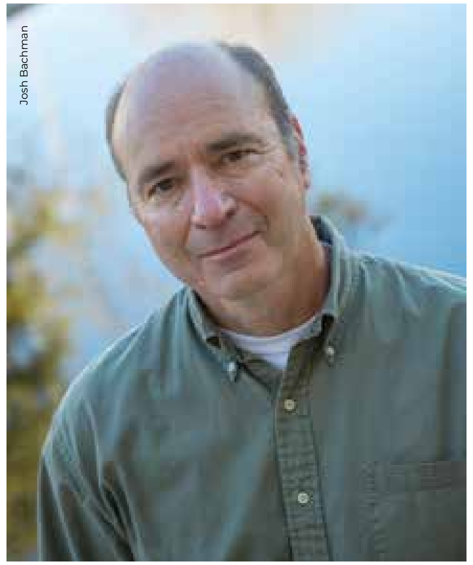
Friends and colleagues from the College of ACES have established a new scholarship to honor the legacy of Matthew Gompper. Gompper, who died in March 2024, served as the head of NMSU's Department of Fish, Wildlife and Conservation Ecology from 2019 to 2024.

"Our department flourished under Matt's leadership, with the graduate program increasing by 25% and the addition of new faculty members. All of us in the department were stunned by Matt's sudden passing," said Martha Desmond, interim department head of FWCE. "He was a strong advocate for our faculty, staff and students, had a calm and gracious demeanor, and truly cared about the successes of everyone in the department. We miss his presence, his proud tweets and his guidance."

Originally from New York, Gompper earned a Ph.D. in life sciences from the University of Tennessee in 1994 and later completed post-doctoral research at the University of California, Los Angeles and University of Nevada, Reno. His research areas included wildlife disease ecology, mammalian ecology, conservation and management.

At NMSU, Gompper grew his reputation as a renowned researcher. In 2022 and 2023, Stanford University and Elsevier included Gompper in their annual list of the top 2 percent scientists in the world. He also advocated for underrepresented groups and helped champion a national consortium with the U.S. Fish and Wildlife Service that supports minority students pursuing careers in wildlife ecology and related fields.

Gompper's legacy will live on in a newly created scholarship to benefit FWCE students. To donate, visit **nmsu.link/gompper-scholarship**.



Matthew Gompper, who served as the head of NMSU's Department of Fish, Wildlife and Conservation Ecology from 2019 to 2024, was considered one of the top scientists in the world.

NMSU's Center of Excellence launches new wine analysis lab

Wine producers in New Mexico can now turn to NMSU for comprehensive wine analyses.

The Center of Excellence in Sustainable Food and Agricultural Systems at NMSU has launched a streamlined wine-quality analysis service in the new Food Science, Security and Safety Center on the Las Cruces campus.

"Until now, New Mexico lacked a dedicated wine analysis service, and CESFAS is working to fill the gap," said Govinda Sapkota, a postdoctoral researcher in the College of ACES who oversees the wine analysis lab at NMSU. "Our initiative aims to bring positive transformations across the state's wine industry."

The wine analysis lab features a state-of-the-art wine analyzer, and analyses will cover 11 key winemaking parameters.

"A standout feature of CESFAS's new service is its commitment to delivering results within 48 hours of receiving samples," Sapkota said. "This rapid turnaround promises winemakers quick and reliable insights into decision-making."

Wine producers should contact Sapkota at govinda@nmsu.edu to schedule an analysis.

Jay Lillywhite takes helm of NMSU's Agricultural Experiment Station

BY ADRIANA M. CHÁVEZ

Jay Lillywhite, center, director of NMSU's Agricultural Experiment Station, speaks with visitors during the 2024 field day at the Agricultural Science Center at Clovis.

From professor to assistant dean and co-director, Jay Lillywhite has worn many hats for the College of ACES over his 20-year career at NMSU. In July 2024, Lillywhite started the next phase of his career as an associate dean and director of NMSU's Agricultural Experiment Station.

In his new role, Lillywhite oversees the principal research unit of the College of ACES and its sprawling team of scientists on the Las Cruces campus and 12 other agricultural science and research centers throughout New Mexico.

"I am excited about the opportunity to more closely work with the faculty, staff and students in the College of ACES," Lillywhite said. "The college has excellent faculty, staff and students conducting cutting-edge, multidisciplinary research addressing real-world problems. Their research will continue to have significant and lasting impacts on New Mexico and beyond."

Lillywhite brings years of experience in farming and economics to his new role. He grew up in northern Utah and spent many years working on his grandfather's farm. He has three degrees in economics, including a Ph.D. from Purdue University, a master's degree from Utah State University and a bachelor's degree from Brigham Young University. He joined NMSU in 2003.

Lillywhite was the interim associate dean for the Agricultural Experiment Station from January to June 2024. Previously, he served as the college's assistant dean of economic development, head of the Department of Agricultural Economics and Agricultural Business and the Department of Extension Economics, and co-director for the Center of Excellence in Sustainable Food and Agricultural Systems.

"Jay brings a deep understanding of the College of ACES through his years of leadership experience and knows the importance of agricultural and value-added research in New Mexico," College of ACES Dean Rolando A. Flores Galarza said. "He is well-prepared to move the Agricultural Experiment Station forward, fulfilling our mission to serve as an engine for the economic and community development of New Mexico through teaching, research and Extension."

100 YEARS **STRONG**

NMSU's Department of Agricultural Economics and Agricultural Business marks century milestone

BY CARLOS ANDRES LÓPEZ

For a century, the Department of Agricultural Economics and Agricultural Business at NMSU has helped shape agribusiness and community development across New Mexico.

Originally founded in 1924, the department is celebrating its 100th anniversary. Back then, the department only offered a single bachelor's program in agricultural economics to students who had completed their freshman and sophomore years. Reginald George Howard was the first student to graduate from the program in 1933.

In 1956, the department launched a master's program in agricultural economics. Enrollment in the program climbed to eight students by the spring of 1960. Notable alumni who have earned degrees from the department include former New Mexico Gov. Garrey E. Carruthers and Jeff Witte, the current secretary of the New Mexico Department of Agriculture.


Wilson Hall housed the Department of Agricultural Economics and Agricultural Business until the building burned down in the 1930s. The department turns 100 years old this year.

"The department has significantly influenced agribusiness and community development in New Mexico over the past 100 years. It has produced successful leaders, entrepreneurs, academics and civil servants," said Carlos Carpio Ochoa, who became the department head earlier this year, assuming a role first held by Arthur LeRoy Walker.

Today, the department boasts about 120 undergraduate students and 20 graduate students. It offers academic programs in agricultural economics and agricultural business, and it collaborates with other departments to offer programs in economic development and water science and management. It has two bachelor's programs, four graduate programs and two undergraduate minors.

"The department's programs impact thousands of individuals annually, and its faculty are nationally and internationally recognized for their research in natural resources management and agribusiness economics," Carpio Ochoa said.

Soum Sanogo, a professor of fungal plant, is leading a national research project to combat *Phytophthora capsici* in peppers, cucurbits and other high-value crops.

NMSU researcher leads project to combat common plant pathogen

A four-year research project underway at NMSU aims to significantly reduce the risk of one of the most common plant pathogens in the United States.

Soum Sanogo, a professor of fungal plant pathology in the College of ACES, received a $5.9 million grant from the U.S. Department of Agriculture to lead a team of a dozen researchers from across the United States to develop a systems-based approach to curb *Phytophthora capsici* in peppers, cucurbits and other high-value crops.

Phytophthora capsici causes fruit rot, root rot, rapid wilting and plant death in vegetables and fruits like melons, cucumbers, pumpkins, squash, peppers, tomatoes, eggplants, snap beans and lima beans.

"This is a major pathogen in every state producing vegetables in the U.S.," Sanogo said. "Beyond the U.S., you will find this pathogen on every continent."

The project's main objectives include examining the pathogen's genetic diversity, identifying novel methods to detect the pathogen in soil and irrigation water, and developing management tools.

Earlier this year, Sanogo completed a series of seminars at universities in the Philippines and Vietnam, sharing his groundbreaking soilborne-disease research. He also received a $4,000 grant from the American Phytopathological Society Foundation to conduct a plant-disease workshop in the Philippines' Bataan Peninsula in March 2025.

National program aims to help minority students at NMSU

The Department of Fish, Wildlife and Conservation Ecology at NMSU continues its efforts as part of a national consortium with the U.S. Fish and Wildlife Service and a team of six other minority-serving institutions across the United States.

Martha Desmond, interim FWCE department head, and Janis Bush, of the Department of Integrative Biology at the University of Texas San Antonio, are leading the effort in collaboration with Tuskegee University, Fort Valley State University, Alabama A&M University, Bethune-Cookman University and Bowie State University.

Representatives from the seven institutions and USFWS met in Atlanta this summer to begin developing a shared vision for the partnership. It will include internship and career opportunities, student training, research development for students and faculty, student exchanges, shared field experiences and summer courses. The group will continue to meet this fall.

READY, SET, PLAY!

Learning Games Lab celebrates 20 years of teaching through interactive programs

BY ADRIANA M. CHÁVEZ

For the past 20 years, the Learning Games Lab at NMSU has been practicing innovative ways of helping youth and adults learn new content.

"*Innovation* is in our department name," said Barbara Chamberlin, department head of Innovative Media Research and Extension. "We build on the innovation of the faculty we work with, whether that's in research, teaching or Extension."

The department has created interactive games and programs since the early 1990s, when Jeanne Gleason, now professor emeritus, developed some of the first games and interactives in the national land-grant system.

In 2004, Chamberlin formalized research on user testing in the Learning Games Lab and began an outreach program using youth as design partners. The department

Josh Bachman

Postdoctoral scholar Ruth Torres Castillo, far right, works with Adriene Cervantes and Fatima Badawy in reviewing games made by the Learning Games Lab.

Developers in the Learning Games Lab receive feedback from two youth game consultants. From left, Arturo R. Ruiloba III, Tristan Bowden, Adrián Aguirre, Regina DeBord and Jeffrey Buras. The Learning Games Lab launched in 2004 as part of the Department of Innovative Media Research and Extension.

and lab have collaborated with many faculty members at NMSU and other universities as well as community organizations. This has generated global interest in the lab's animations, videos, games and interactive programs.

In 2023 alone, the lab's products had 5.7 million views, uses and downloads, including more than 2 million hits on 22 sites hosted by NMSU servers and another 2 million-plus interactions on the Game Up platform of BrainPOP, a leading educational media distributor.

"It's all part of discovering new ways of helping people learn," Chamberlin said. "The lab was designed as a research space for game development. Then, it became a powerful outreach program to help youth gain digital literacy."

The lab engages youth in design activities while they consult with developers during game testing. These game consultants offer ways to improve products produced by the department, apply critical skills and learn content.

"Everything we do in the lab with youth is intentional, from the session design activities, the games we play with them, to how we refer to youth who participate in the session," said Matheus Cezarotto, a coordinator for the Learning Games Lab. "We call them 'game consultants' because they provide valuable feedback in educational products under development."

The lab also works with adults on relevant games and applications, including content designed for farmers and ranchers managing their water use, students training as dieticians and visitors planning trips to White Sands National Park.

The lab has partnered with NMSU's STEM Outreach Center, the Gadsden Independent School District and national organizations like iThrive to test games under development and explore different ways to reach out to youth on issues like mental health, food waste, environmental impacts and other areas.

"When we design our games, we work with our audiences, whether it's students, farmers and ranchers, child care workers, financial educators or others out in the world doing their jobs," said Amy Smith Muise, an editor for Innovative Media Research and Extension. "We also design based on what transformation they're hoping to make, and we use three kinds of research: our content expert research, our research about how to make that transformative change, and user testing."

The lab's work has not gone unnoticed. It won the 2024 Intellectual Property Award from NMSU's Arrowhead Center and the Office of Research, Creativity and Economic Development. The team has trademarked Math Snacks, one of its most popular games, and secured copyrights for 14 games, four interactive programs, four apps and one app suite.

In December 2023, Math Snacks became available on the online educational

Standing from left, Buras, Tomilee Turner, Ruiloba, Evan Evans, Matheus Cezarotto and Aguirre. Seated from left, Torres Castillo, Anastasia Hames and Barbara Chamberlin.

distributor Game Learning, thanks to a commercial licensing agreement that Arrowhead Center helped facilitate. In 2025, Harvard Online LabXchange will begin distributing Math Snacks and other Learning Games Lab products.

The lab has also teamed up with the New Mexico Water Resources Research Institute, based at NMSU, to release a water game through a project with the University of California, Merced, focusing on farming in an arid system.

Up next, the team is working with the University of Arkansas to develop a learning game to assist vendors at farmers' markets in understanding how to store and serve food in the market environment. With the same collaborator, the lab will produce a series of interactive animations to help neurodiverse learners, and those who support them, in training for roles in production agriculture.

Over the years, the lab has collaborated with many faculty and programs across the College of ACES, including on the popular Science of Agriculture series. In partnership with NMSU's Extension Family and Consumer Sciences, the lab released iTIPS, a series of interactive food safety modules in Spanish and English that provide worker training tools for food-processing facilities, especially for underserved communities and niche or artisan processors.

"Everything we do has Extension at the heart," Chamberlin said. "Extension is how we apply the research of NMSU to change the lives of New Mexicans."

Josh Bachman

BUZZ KILLER

NMSU researchers turn to electric mulch to keep weeds and invasive trees at bay

BY ADRIANA M. CHÁVEZ

A research project at NMSU's Fabián García Science Center in Las Cruces is exploring the effectiveness of electric mulch.

Although small in scale, one research project at NMSU's Fabián García Science Center has the potential to revolutionize weed control without using chemicals.

Erik Lehnhoff, an associate professor of weed ecology, Leslie Beck, an Extension weed specialist, and Andres Indacochea, an electrical engineering master's student at NMSU, have teamed up to explore the use of electric mulch connected to solar panels to suppress weeds under crop canopies. The project – currently in use along a cluster of grapevine rows at the science center – has seen nearly 100% effectiveness.

In xeriscaping, electric mulch consists of metal mesh placed beneath layers of gravel that is connected to solar panels, with the bottom layer of gravel preventing water from reaching the mesh. This also hides the screen from view.

However, the project with grapevines at the Fabián García Science Center doesn't use any gravel. As is typical, the screen is loaded with a low dose of electrical power that's able to kill weeds and small invasive trees but not enough to be lethal to animals or humans.

"As the weed touches the screen, it gets a jolt of electricity, which keeps the plant from growing," Lehnhoff said. "The electricity acts essentially the same as a pre-emergent herbicide, killing weeds before they have an opportunity to interfere with crop growth. So far, we don't know the mechanism that kills the weed."

Lehnhoff said this is comparable to the development of herbicides. Initially, he explained, scientists didn't understand why some herbicides were effective. At NMSU, he said researchers have analyzed leaf-and-tissue samples from plants killed by electricity and found elevated stress responses compared to control samples.

"Collaborating with Dr. Donovan Bailey from the NMSU Department of Biology, we grew plants and applied sub-lethal doses of electricity," Lehnhoff said. "We collected leaves from the plants and used transcriptomics to test for elevated stress responses."

Indacochea said the heat produced by the electricity is strong enough to kill weeds, adding that grass has a higher thermal tolerance.

"Thermal is a big part, but other factors might play a bigger part," he said.

The idea for the research project started with Paul Neher, an electrical engineer at White Sands Missile Range who successfully experimented with using electricity to kill weeds and small trees at his home. Neher approached Lehnhoff about further research.

Lehnhoff said the electric mulch works when a weed touches the screen to complete the electrical circuit. The solar panels generate electricity, which flows through a wire to the screens.

"There is no electricity flowing until a weed comes up and touches the screen, and that completes the circuit," Lehnhoff said.

As far as costs, Indacochea said, the technology is relatively inexpensive. For its project, the NMSU team purchased solar panels – by far the biggest cost – at a home improvement store in Las Cruces. The wire mesh and system operation would generally cost less than a dollar or two a month. So far, the NMSU project has received funding from the Agricultural Experiment Station, the Western Integrated Pest Management Center and the Weed Science Society of America.

A similar project in Oregon has shown effectiveness in a blueberry field, Lehnhoff said. He hopes the technology will one day become available for commercial landscaping and residential uses. However, the method warrants additional research, particularly in large-scale farming, where introducing electricity as a weed control could present hazards with irrigation.

With solar panels providing electricity, Lehnhoff said a consumer could have effective weed control without relying on herbicides – a potential boon for organic crop production where herbicide use is strictly prohibited.


Josh Bachman

Erik Lehnhoff is working with Leslie Beck and Andres Indacochea to test electric mulch and its potential to control weeds without chemicals.


Josh Bachman


Josh Bachman

Top: Lehnhoff's project features a screen loaded with a low dose of electrical power. It provides enough electricity to kill weeds and small invasive trees but not enough to be harmful to animals or humans. Bottom: Indacochea is an electrical engineering master's student at NMSU.

INDOOR INSIGHTS

Josh Bachman

Gabriel Garcia points to kale plants growing inside a container farm on the NMSU Grants campus. The container arrived in 2021 through a partnership with Tri-State Generation and Transmission and the Electric Power Research Institute.

NMSU researchers look to container farms as sustainable growing alternatives

BY CARLOS ANDRES LÓPEZ

Near the entrance of a 40-foot container farm installed at NMSU Grants, dozens of 4-day-old kale plants lined a horizontal nursery bed, sprouting at various lengths in shades of electric green from miniature patches of densely packed soil.

Further inside, instructor Gabriel Garcia flipped a switch. Instantly, red and blue LED lights engulfed the space, illuminating the intricate vertical farming system in a shocking pink glow.

"The lights mimic the sun," Garcia explained on a July afternoon. "This is where we'll move the kale when their root structures develop, and they'll stay here until they reach maturity."

The container farm was one of the first projects shepherded by NMSU's Center of Excellence in Sustainable Food and Agricultural Systems, housed in the College of ACES.

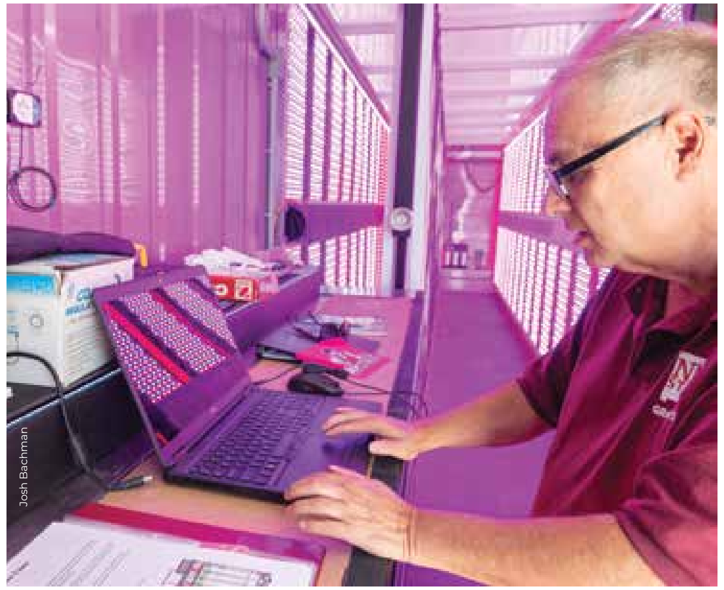
It came online in early 2021 through a partnership with Tri-State Generation and Transmission and the Electric Power Research Institute. Interest in indoor agriculture has grown in recent years as producers search for sustainable farming alternatives. Compared to conventional open-air growing, indoor systems like the container farm at NMSU Grants use less land and water resources and allow for year-round crop growing in temperature-controlled environments.

"Container farms have many advantages," College of ACES Dean Rolando A. Flores Galarza said. "They have the potential to address social, environmental and economic facets of sustainability and become a resource-efficient model for urban agriculture."

Since its unveiling three years ago at NMSU Grants, the container farm has become an important learning tool for researchers and students studying the viability of indoor agriculture in a semi-arid region like New Mexico.

Garcia, who teaches vocational courses, manages the container with a rotating group of students. He spent the first year or so learning and understanding the associated technology. The container features a system of vertical hanging plastic enclosures connected to a closed-loop plumbing system that recycles water. It also boasts efficient lighting, temperature controls and equipment that allows Garcia and others to monitor energy and water use and plant productivity via a computer.

By fall 2021, Garcia had grown the first crop of leafy greens inside the container. Since then, he estimates he's grown about 50 to 60 pounds of kale. Data collection is one of Garcia's primary responsibilities. He keeps meticulous records of each experiment



Garcia, right, an instructor at NMSU Grants, uses a computer to monitor plant productivity inside the container farm. Garcia manages the container with a rotating group of students. Since fall 2021, Garcia and his students have grown about 50 to 60 pounds of kale.

and shares his findings with researchers at NMSU's Las Cruces campus and EPRI, which has more than a dozen container farms across the United States.

"It grows successfully in chunks of time," he said. "The reason why is because we're learning how to maintain continual crop while understanding the maintenance and personality of the container."

Even with the learning curve, Garcia said the project has shown him the benefits and potential pitfalls of growing crops in an enclosed environment. But more importantly, it allowed him and his students to study new concepts in a way that wasn't possible before the container arrived.

"It's been such an enriching experience for us all," he said. "Our students have learned about agriculture, water use, pH levels, nutrients and temperatures for growing crops, and how to collect and record data using state-of-the-art technology. But that's not all: They've also been able to see and *taste* their successes along the way."

The success of the container farm in Grants has inspired a similar project in Las Cruces.

The College of ACES and CESFAS have teamed up with the College of Engineering and Doña Ana Community College to build a customized container farm for NMSU's Las Cruces campus.

Last fall, Flores Galarza and others from ACES approached the College of Engineering with the idea. They then enlisted a group of mechanical and electrical engineering students to design the container as part of a yearlong capstone course.

The project is currently in the construction phase, with Kevin Gall, an associate professor in the Building Construction Technology program at DACC, leading the

Doña Ana Community College students build and install an interior frame for a 20-foot container farm that will be housed on NMSU's Las Cruces campus. The Las Cruces container farm is a collaboration between the College of ACES, College of Engineering, DACC and NMSU's Center of Excellence in Sustainable Food and Agricultural Systems.

interior fabrication of the container. Gall and his students spent part of the fall 2024 semester installing walls and insulation inside the 20-foot container.

Jay Lillywhite, director of NMSU's Agricultural Experiment Station and associate dean for the College of ACES, said the Las Cruces container farm will have adjustable horizontal shelves throughout its interior to accommodate larger crops, among other features that will differ from the Grants container farm. Once completed by next spring, the container will be available to students and faculty for research projects.

"One of the exciting components of this project is the people we've had involved," Lillywhite said. "We've had agricultural faculty and staff involved on the development side, as well as a variety of engineering faculty and students. And now, on the production side, we have agronomists, economists and people working in marketing. So, it really has been this laboratory with all these different disciplines coming together and asking, 'How do we make this work?'"

ACES *Effect*

How the College of ACES impacts New Mexico's economy

BY JAY M. LILLYWHITE

New Mexico State University was founded as Las Cruces College in 1888. In 1889, the Legislature established the college as the state's land-grant agricultural college and experiment station. Since its establishment, the College of ACES has played a critical role in the success of the university.

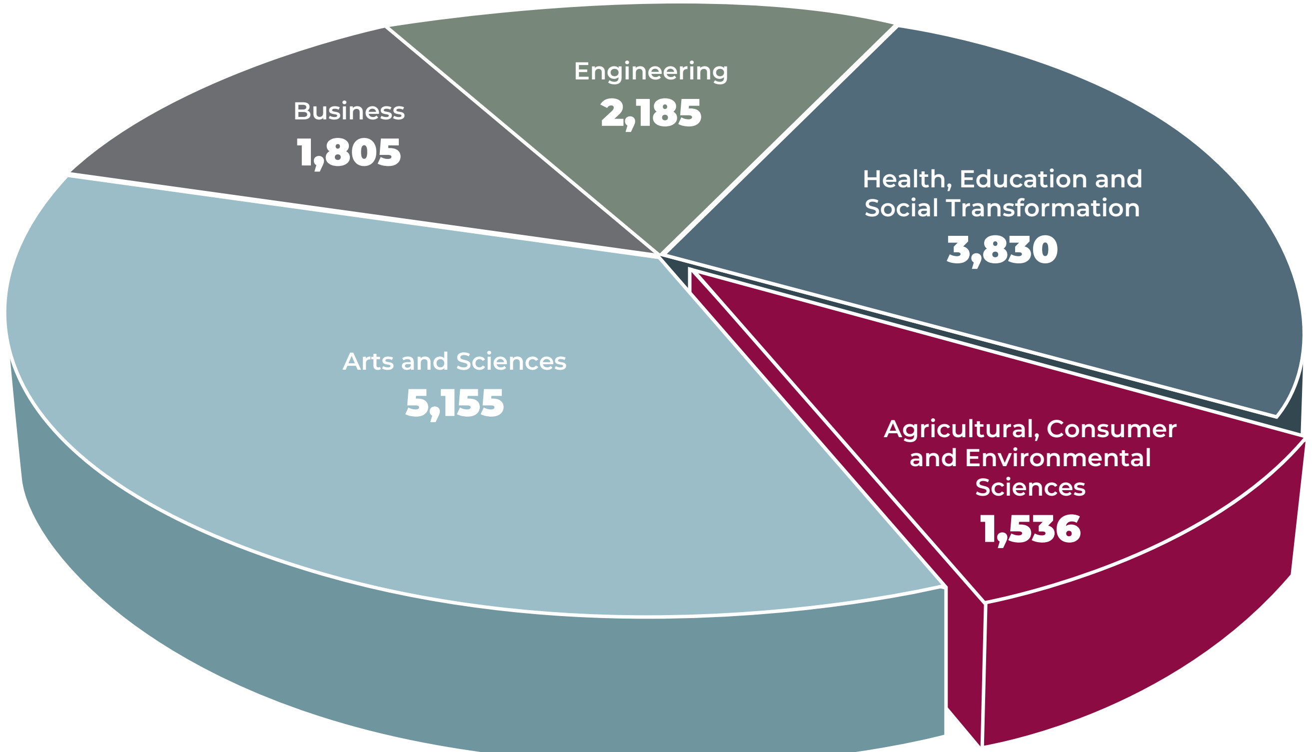
The College of ACES is one of five academic colleges at NMSU. It serves as an engine for economic and community development through its teaching, research and Extension efforts. Faculty, staff and students participating in these efforts are having meaningful and tangible impacts on all facets of New Mexico, including its economy. This analysis explores the economic impacts the college has via three distinct avenues:

- Research and Extension funding derived from external grants and contracts,
- Increased agricultural productivity and
- Increased earnings potential for graduates.

Josh Bachman

Visitors listen to a research presentation at the 2024 field day at NMSU's Leyendecker Plant Science Research Center. In fiscal year 2022, the College of ACES was successful in securing more than $24 million in grants and contracts, most of which came from outside sources.

Fall 2023 Student Enrollment, by College. Source: NMSU OIA.



This analysis provides estimates of the college's economic impact on the state's economy based on various assumptions described in the body of the text. Other less tangible and harder-to-measure impacts should not be discounted, but they are not discussed here.

Economic Impacts Associated with Research Expenditures

Faculty, staff and students in the College of ACES participate regularly in research projects funded by external sources. While relatively smaller than other colleges at NMSU in terms of enrollment (chart above) and faculty employment, the college is a leader in obtaining external funds to support research. In fiscal year 2022, the College of ACES was successful in securing more than $24 million in grants and contracts (graph on Page 28). Much of the college's research grant and contract funding comes from out-of-state sources, e.g., the federal government. The college has averaged more than $30 million in federal restricted expenditures annually over the last three years.

From an economic impact viewpoint, federal research expenditures from sources outside of the state have a direct impact on the state's economy. These direct impacts are then "multiplied" as they spur additional upstream economic activity, referred to as indirect (business-to-business) and induced (spending of labor income) effects. For example, a professor's research expenditures may include supplies purchased from a local business (an indirect effect). An employee of the local business that is providing those supplies likely, in turn, makes purchases of groceries at a local grocery store (an induced effect).

The college's research expenditures in fiscal year 2024 were associated with direct employment impacts of more than 335 jobs, labor income of more than

$23 million, and value-added (contribution to state gross domestic product or GDP) of more than $28 million. When the upstream impacts are included, the total impact of research expenditures on the state was more than 434 jobs, $28 million in labor income, and $38 million in contributions to the state's GDP. Associated multipliers suggest that for every job created by research expenditures, an additional 0.2 jobs are created in upstream sectors. Similarly, for every dollar in GDP created by the college's research expenditures, an additional $0.35 in GDP contributions are created via upstream linkages.

Impacts Associated with Increased Agricultural Productivity

New Mexico's 24,100 farms and ranches generated $3.71 billion in cash sales in 2022, an increase from the $3.17 billion generated in 2021. More than 80% of total cash receipts come from livestock products, a majority of which is associated with milk production (milk sales generate 45% of total cash receipts). The cash receipts associated with crops came from a variety of crops, including feed crops (forages), vegetables and pecans.

Agricultural productivity in the United States is impressive. Between 1948 and 2021, a period of 73 years, farm output increased almost 200% while farm inputs usage decreased slowly, according to 2024 figures from the USDA's Economic Research Service.

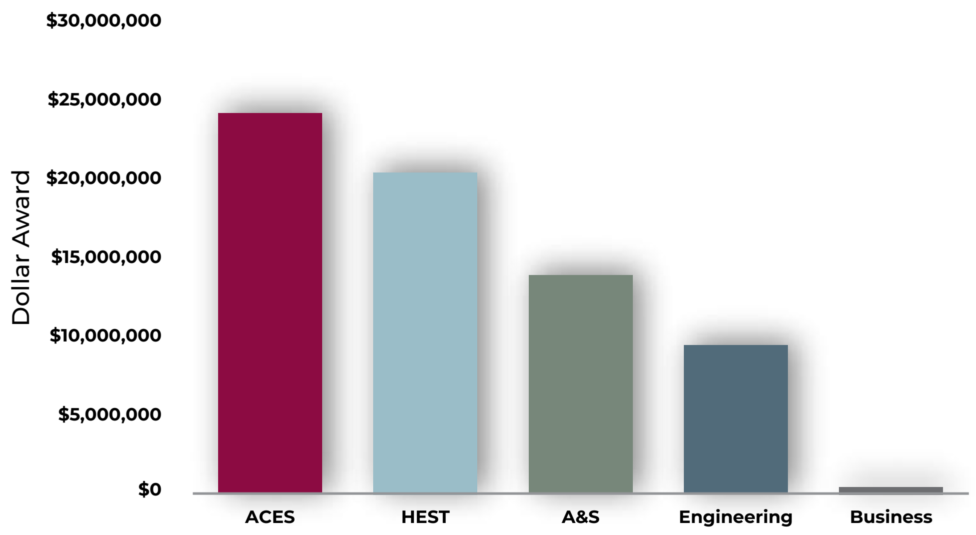
New Mexico's agricultural productivity has exhibited trends similar to the U.S trends over time, although more of the state's increase in farm output is associated with increased input use. Between 1960 and 2004 (most recent data available), New Mexico ranked seventh in the country in farm output growth, with an average 2.25% growth rate over the period, but was second highest in terms of input use growth, with an annual average input use growth of 0.80%. The associated annual increase in total factor productivity growth was 1.44%, ranking the state 42nd in 2004, according to 2024 figures from the USDA's Economic Research Service.

If the total factor productivity growth observed between 1960 and 2004 continues today, then approximately $53.4 million ($3.71 million in cash receipts in 2022 x 1.44% productivity increase) of increases in agricultural output each year can be attributed to increased productivity.

It is difficult to know how much agricultural research and outreach conducted by the College of ACES has impacted the productivity of New Mexico producers compared to other contributors, e.g., private industry. Still, the college's research has had an impact.

The table on Page 29 shows the potential impacts (direct and total) that may be attributable to agricultural research conducted by the college, depending on how much of the increased productivity could rightfully be attributed to the college's efforts. The potential impacts, using the assumptions described above, range from zero (NMSU did not contribute to productivity increases) to more than 470 direct jobs, $13 million in direct labor income, and $28 million in gross domestic product.

Grants & Contracts Awarded in FY22 by College. Source: NMSU VPR, 2024.



Impacts Associated with Increased Potential Earnings for Graduates

The College of ACES is home to eight academic departments and offers 20 undergraduate degrees, according to NMSU's Fall 2023 Enrollment Report.

Table 4. Potential Impact of ACES Research on Agricultural Productivity & Output.

% of Increased Output Attributable to ACES	Employment		Labor Income		Value Added	
	Direct	*Total*	*Direct*	*Total*	*Direct*	*Total*
0%	0.0	0.0	$0	$0	$0	$0
10%	47.3	60.5	$1,344,465	$1,977,060	$2,863,566	$4,214,525
20%	94.5	121.1	$2,688,929	$3,954,120	$5,727,132	$8,429,049
30%	141.8	181.6	$4,033,394	$5,931,180	$8,590,698	$12,643,574
40%	189.1	242.2	$5,377,859	$7,908,239	$11,454,264	$16,858,099
50%	236.3	302.7	$6,722,323	$9,885,299	$14,317,830	$21,072,623
60%	283.6	363.3	$8,066,788	$11,862,359	$17,181,396	$25,287,148
70%	330.9	423.8	$9,411,253	$13,839,419	$20,044,962	$29,501,673
80%	378.1	484.4	$10,755,717	$15,816,479	$22,908,528	$33,716,197
90%	425.4	544.9	$12,100,182	$17,793,539	$25,772,094	$37,930,722
100%	472.7	605.5	$13,444,647	$19,770,598	$28,635,659	$42,145,247

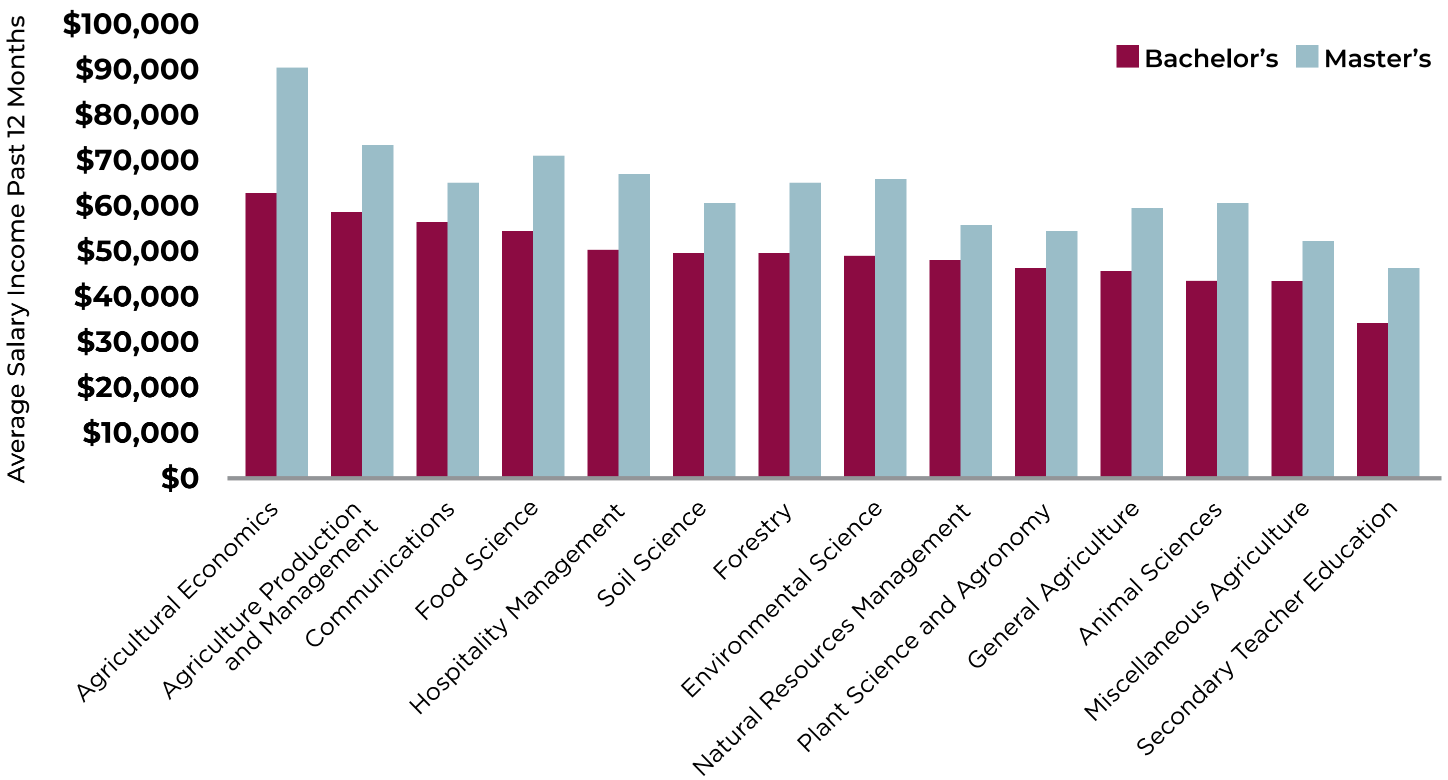
- Animal and Range Science (ANRS),
- Family and Consumer Sciences (FCS),
- Plant and Environmental Sciences (PES),
- Fish, Wildlife, and Conservation Ecology (FWCE),
- Hotel, Restaurant and Tourism Management (HRTM),
- Agricultural Economics and Agricultural Business (AEAB),
- Agricultural and Extension Education (AXED), and
- Entomology, Plant Pathology and Weed Science (EPPWS).

Students can major in degrees offered in one of the eight departments. The college's average fall enrollment over the past five years (2019 through 2023) was just under 1,600 students in total (1,585), 86% undergraduate and 14% graduate.

The value of a college education has been discussed in many venues and formats, including the popular press, academic outlets and outlets of the federal government. These discussions often, though not always, focus on either on either educational attainment or specific occupations. For example, the U.S. Bureau of Labor Statistics publishes an annual series titled "Education Pays" that outlines median weekly earnings and unemployment rates for different levels of educational attainment. Additionally, BLS provides other information related to employment and education, e.g., education level and projected job openings and projected job openings by occupation.

One way to consider the value of a college degree and its potential impact on the state's economy is to view the degree as an investment. That approach focuses on the present value of increased earnings attributable to a college education over a work life to the costs of obtaining the education. Earnings differentials for various ACES-related degrees and occupations vary. The graph on Page 30 shows the average earnings by degree using the U.S. Census Bureau's microdata. Earnings also vary by age (or how long an individual is in the workforce). The graph on Page 31 shows the average ACES-related median salary and the average salary for an individual with a high school diploma.

Average Annual Salaries for ACES-Related Degrees. Source: U.S. Census ACS 5-Year Estimates.



Potential increased earnings were estimated using the data from the graph on Page 31. Tuition and fee costs for four years were estimated to equal $33,832 ($4,229 per semester). The "investment" horizon is assumed to be between the ages 18 and 60 years, a 43-year investment horizon. Salary differences in future years are discounted to a present value using a discount rate of 8.29%, the real rate of return for the S&P 500 between 1982 and 2022.

Net present value is one of the most often used measures of returns to capital investments. The net present value is the difference between cash inflows and outflows over time, measured in current or "present" dollars. The measure accounts for the timing of cash inflows and outflows and adjusts returns to reflect the time value of money. A net present value greater than zero indicates an investment where the present value of cash inflows is greater than the present value of cash outflows. In this case, the investment should be made. A related measure is the internal rate of return. The internal rate of return is the discount rate, in percentage terms, associated with a net present value of zero. If the internal rate of return is greater than the cost of capital, the investment should be made.

The net present value of investing in a college degree associated with the College of ACES, with a real discount rate of 8.29% and a work-life of 39 years, was estimated to equal $136,956. The internal rate of return was estimated to be 18%. Both measures suggest earning an ACES-related bachelor's degree provides positive earning potential and is a good investment. Another way of exploring the differentials is a focus on their future value; that is, to assume that the differentials are invested every year, and the differentials, along with their investment earnings, are available for retirement. Using the same data and assumptions described above, the invested returns at an age of 61 (retirement age) would be more than $4.5 million.

While the analysis does not directly examine the impact of an ACES degree on the economy of the state of New Mexico, it does suggest that impacts exist. For example, to the extent businesses are attracted to and remain in the state due to the availability of a qualified local workforce, the college's academic training for graduates contributes to the state's economy.

The College of ACES is a vital contributor to New Mexico's economy. Contributions include those associated with research expenditures where funds were obtained from outside sources, increased agricultural productivity, and improved human capital as expressed by increased lifetime earnings for college graduates. This analysis has attempted to quantify some of these impacts. It shows that the returns to New Mexico and to the college's students are significant.

Resources

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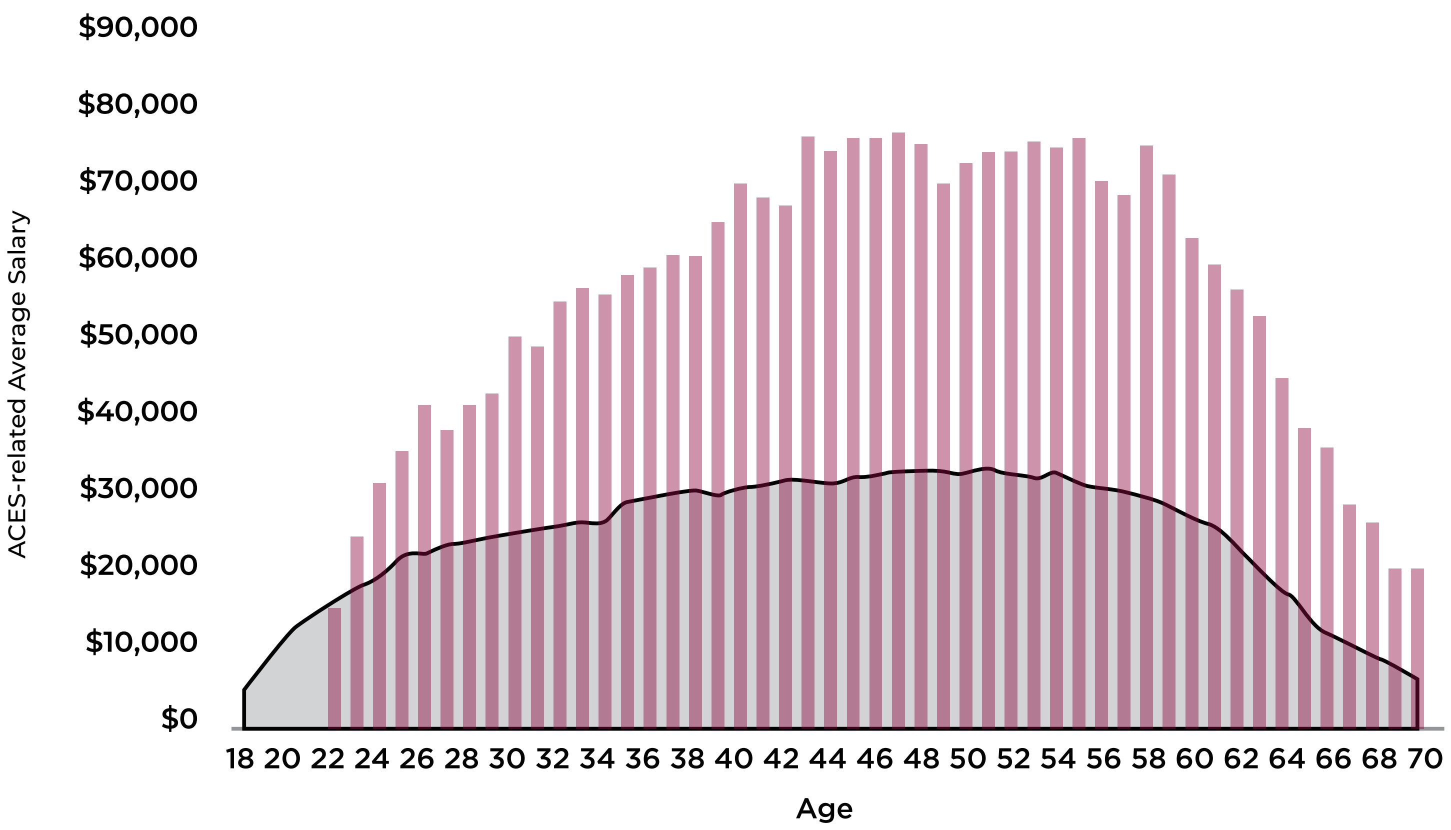
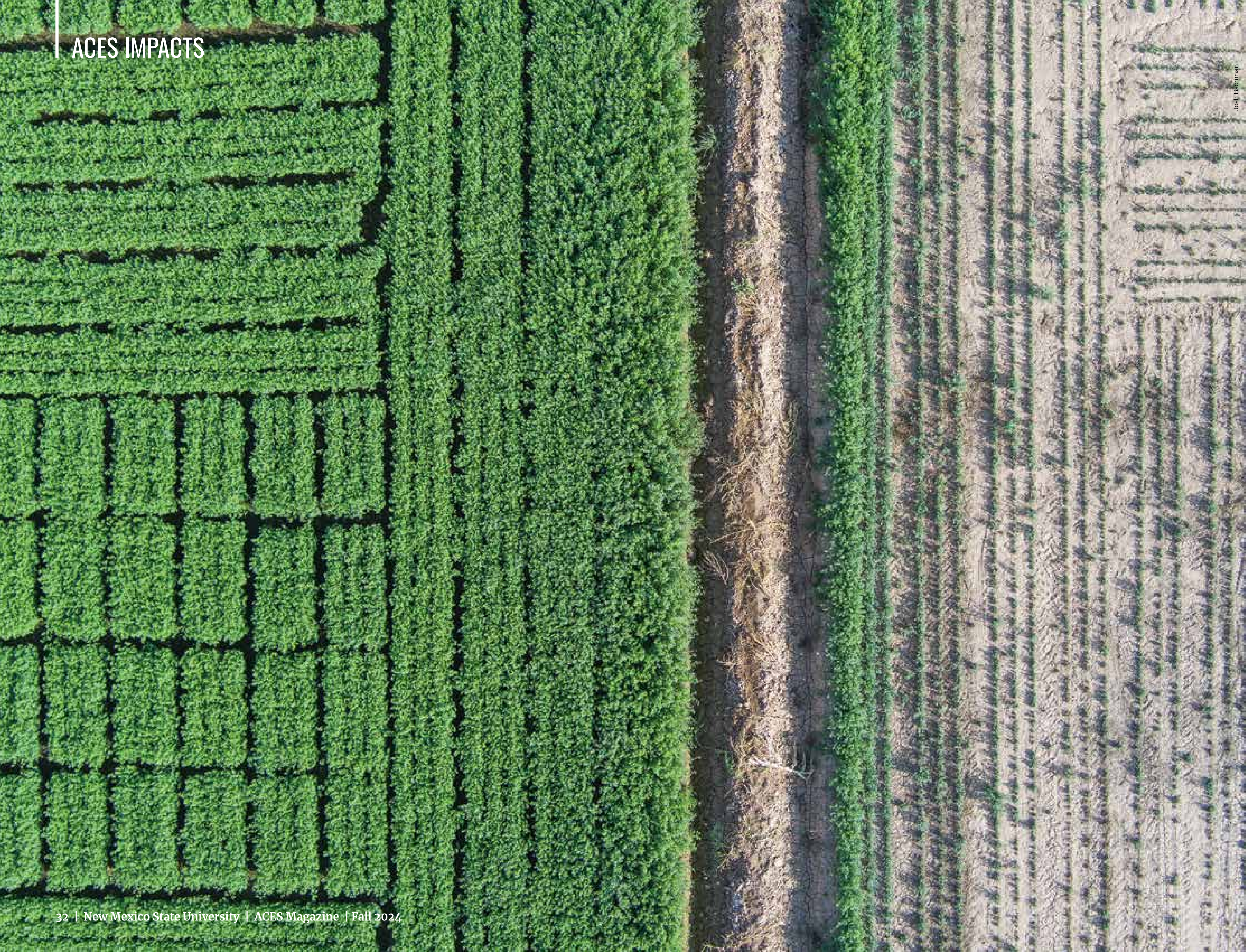
- New Mexico State University. "Fall 2023 Enrollment Report." No date.
- USDA Economic Research Service. "Agricultural Productivity in the U.S." Data project. Updated January 2024.

Average ACES-Related Degree Salary by Age. Source: American Community Survey, 2021.





TOP CROP

NMSU scientists join forces to advance alfalfa research

BY CARLOS ANDRES LÓPEZ

A breeze wafted through the air on a late summer morning, rustling neatly kept plots of lush-green alfalfa at NMSU's Leyendecker Plant Science Research Center. The field had all the signs of a well-maintained crop of forage. But its neighboring field was an entirely different story.

A short distance away, withering alfalfa remnants, unlike their vibrant, purple-flowering counterparts, dotted a square acre of dry and cracked soil. Here, NMSU researchers are testing multiple varieties of drought-resilient alfalfa developed over 25 years, using molecular techniques and conventional breeding approaches.

"The fields are growing the same alfalfa but look completely different," said Ian Ray, an emeritus professor of agronomy at NMSU who headed the project.

The stark contrast between the two fields is the result of growing the varieties under well-watered and water-deficit conditions. Researchers regularly watered one field and harvested it seven times from March to November. Meanwhile, they only irrigated the other field from March to June and harvested it three times during spring. That meant, by late July, very little forage growth was present in the water-deficit field.

"Based on one stress cycle of early irrigation termination, from July 2023 to February 2024," Ray said, "our research shows that many of our new varieties can survive eight months without regular watering and

NMSU researchers are testing multiple varieties of drought-resilient alfalfa at NMSU's Leyendecker Plant Science Research Center. The stark contrast between the two fields is the result of growing the varieties under well-watered and water-deficit conditions.

Ian Ray, left, and Christopher Pierce have collaborated on alfalfa research at NMSU for several years. Ray's research team will release three drought-tolerant varieties over the next year, potentially benefiting the $12 billion alfalfa industry in the United States.

still produce economical yields the following year once they are irrigated again."

The results suggest that if growers have limited irrigation, they can potentially apply their full water allotment in the spring to maximize alfalfa yield. Then, they may be able to terminate irrigation for the remainder of the growing season without killing the alfalfa.

Ray's team will release three drought-tolerant varieties over the next year, potentially benefiting the $12 billion alfalfa industry at a time when water resources continue to diminish across much of the Great Plains and western U.S.

Whether used in irrigated pastures or as hay, alfalfa is one of the most economically important crops in the nation, feeding the $50 billion livestock industry and contributing to sales of meat, dairy and other livestock-generated products.

In New Mexico, alfalfa is often the No. 1 forage crop and competes with pecans as the state's top cash crop. In 2023, New Mexico had 145,000 acres of alfalfa in production, a 22,000-acre increase from the previous year. At an average of $304 per ton, estimated gross returns from alfalfa hay produced in 2023 totaled more than $238 million.

NMSU has been a leader in advancing alfalfa drought-tolerance research since the 1940s.

Ray began his work in 1994 when he joined NMSU to head the forage breeding program. His research centered on decoding the genetics of alfalfa, while building on the groundbreaking work of his predecessors, Billy Melton and Marvin Wilson.

Working with a research team, Ray conducted field studies to identify DNA in alfalfa associated with drought tolerance. He then used those markers to help move natural-occurring drought-tolerance genes into high-yielding alfalfa varieties to improve their resilience.

More than two decades later, the result is three new alfalfa varieties – 'NuMex 501', 'NuMex 801' and 'NuMex 802' – each of which are suited for different climate zones in New Mexico and regions outside the state with similar climates. Ray's team selected the varieties to maintain productivity under deficit-irrigation management.

The varieties underwent testing across New Mexico via NMSU's alfalfa variety testing program, overseen by Leonard Lauriault, a forage management scientist at the Rex E. Kirksey Agricultural Science Center at Tucumcari.

"We're one of the few remaining non-commercial entities conducting testing in the country to provide unbiased information about commercial varieties to alfalfa growers," Lauriault said of the program. "We evaluate public and private experimental material to help breeders gain information about where their materials are adapted and how they perform against available varieties."

Pierce points to a flowering alfalfa plant. In addition to being a forage crop, alfalfa serves as a vital source of pollen and nectar to bees and other pollinators.

NMSU researchers will continue to evaluate the alfalfa fields at the Leyendecker Plant Science Research Center for two more years to measure the impact of early irrigation termination management over time on forage yield of different varieties.

Today, New Mexico produces some of the highest-quality alfalfa in the U.S. But because of persistent drought, production across the state has plummeted to a 20-year low, said Mark Marsalis, an Extension forage specialist at the Agricultural Science Center at Los Lunas.

"Even though alfalfa gets a negative rap for water use, it is a very environmentally conscious crop plant, in my opinion," he said. "They're all sorts of benefits to alfalfa other than just economics."

For one, he said, alfalfa is a perennial crop that sequesters carbon in soil, reduces soil erosion and provides legume nitrogen credits. It also serves as a vital source of pollen and nectar to bees and other pollinators.

"Even under drought conditions," he added, "alfalfa can survive, persist and be productive in so many ways."

FULL BLOOM

NMSU helps 400-year-old family farm thrive in the 21st century

BY CARLOS ANDRES LÓPEZ

Thirty miles north of Santa Fe, a winding road leads to a four-and-a-half-acre farm surrounded by the Sangre de Cristo Mountains in the heart of Santa Cruz. It's where Don Bustos fuses centuries of tradition with modern touches to yield a picturesque bounty that feeds communities near and far.

Santa Cruz Farm has been in the hands of Bustos's family for more than 400 years.

Bustos grew up on the farm and later inherited it during the 1980s. He has since carried the farm into the 21st century, transforming it into a thriving operation that grows 72 varieties of produce and grosses six figures annually. It runs entirely on solar power and water from one of only two acequias in New Mexico that flow north.

He is well-known across northern New Mexico as a leader in sustainable agriculture and a colorful purveyor of berries, corn, squash, asparagus, leafy greens and other fresh foods.

He was one of the first growers in the state to adopt organic farming practices and has long advocated for land and water protections to preserve the environment for future generations. His work supports underserved communities and new farmers, whom he often mentors, passing on knowledge gleaned from years working on the farm.

Bustos attributes much of his success to taking risks, leaning on scientific advances, and adhering to sacred family traditions and ancestral farming practices. But it is also the product of a longstanding relationship with NMSU, the College of ACES and, more specifically, the Sustainable Agriculture Science Center at Alcalde.

Walking through the farm in mid-July, Bustos explained, "We have four seasons in New Mexico, and we're able to produce

Josh Bachman

Don Bustos walks through blackberry bushes at Santa Cruz Farm in northern New Mexico. Bustos's family has operated the farm for more than 400 years.

TOP: Bustos was one of the first growers in New Mexico to adopt organic farming practices. Today, his family farm grows 72 varieties of produce and grosses six figures annually. Bottom: Bustos at the Sustainable Agriculture Science Center at Alcalde in August 2009.

all four seasons using the knowledge that comes from the Alcalde science center and all the research they've done."

Bustos's father, Frank, forged the connection to the science center decades ago. Bustos has maintained the ties since taking over the farm and currently serves on the center's eight-member advisory committee.

Holding one of his free-roaming turkeys, Bustos quickly recited the names of researchers and Extension agents who have helped the farm flourish, including Ron Walser, Del Jimenez, Edmund Gomez, Charles Martin and Rich Phillips. He pointed to the ripening blackberry bushes and recalled that Walser's economic analyses of soft fruits ultimately convinced him to grow berries.

Blackberries are now among Bustos's best-selling and most profitable crops.

"Ron did a lot of research around northern New Mexico and discovered that there was no soft fruit being grown, like blackberries, strawberries and raspberries," Bustos said.

According to Bustos, Walser conducted years of tests before recommending three blackberry varieties. Bustos eventually settled on growing the Triple Crown, a fresh-market variety known for its large size and sweet aromatic flavor.

"We've been selling those for 25 years since Ron first brought them on board," said Bustos, who also grows highly sought-after strawberries and raspberries. "The Alcalde science center has taught us to grow a lot of different crops that are sometimes more economically viable than other times, but always beneficial."

Asparagus is another consumer-favorite crop Bustos added to his fields years ago, thanks to Phillips.

Bustos also credits NMSU with helping him better understand the financial

Blackberries are among Bustos's best-selling and most profitable crops. He decided to grow blackberries and other berries after Ron Walser, an Extension fruit specialist at NMSU, tested several varieties suitable or growing in northern New Mexico.

side of operating a farm. Thirty years ago, he said, he took business training classes at the science center.

"One of the best things Edmond did was start a business class," he said. "I went through the classes twice a week, and that really helped me identify what kind of crops we needed to grow and what was missing from the area."

Bustos's success is a testament to the College of ACES and its mission to foster economic and community development in New Mexico, said Saeid Zehtab Salmasi, the research director at the Sustainable Agriculture Science Center at Alcalde.

Salmasi, who joined NMSU in 2023, said his vision for the science center includes increasing community engagement with growers like Bustos through workshops and trainings. This summer and fall, the center teamed up with the Cooperative Extension Service in Santa Fe County to host 19 workshops on various agricultural topics. More than 100 individuals also attended the center's annual field day this year.

"For the Sustainable Agriculture Science Center at Alcalde, it is very important to work with pioneer farmers like Don Bustos, who is the chair of our advisory committee," Salmasi said. "I believe this will help make research in sustainable and organic farming more useful for communities across New Mexico."

TAKING ROOT

NMSU's Sustainable Agriculture Science Center at Alcalde explores non-traditional crops

BY ADRIANA M. CHÁVEZ

While New Mexico has built a strong economy based on several of its best-known crops like chile and pecans, NMSU researchers are taking a closer look at non-traditional crops that may be adaptable to the state's climates and regions – and how these crops may impact the state's economy.

Saeid Zehtab Salmasi, the research director of the NMSU Sustainable Agriculture Science Center at Alcalde, is leading one such project. Last fall, Salmasi and his team successfully harvested flowers from about 2,000 saffron corms planted in hoop houses and open fields. He is now assessing the viability of saffron production in northern New Mexico.

"Saffron has a unique growing cycle wherein flowers emerge during fall, followed by leaf growth until May," Salmasi said. "Subsequently, the leaves desiccate, leading to a dormant period until late September when new corms develop to yield flowers for the succeeding year."

In the late summer and early fall of 2024, Salmasi's research team planted 2,000 saffron corms to investigate how planting timing and varying irrigation levels influence saffron cultivation.

Josh Bachman

Shengrui Yao, an Extension fruit specialist in NMSU's Department of Plant and Environmental Sciences, works with jujubes, peaches, cherries and other fruits at the Sustainable Agriculture Science Center at Alcalde.

Saeid Zehtab Salmasi, the research director of the Sustainable Agriculture Science Center at Alcalde, holds a vial of saffron. Salmasi is leading a research project assessing the viability of saffron production in northern New Mexico.

Josh Bachman

Saffron is commonly known as the world's most expensive spice – with an average price of $30 per gram for saffron grown in the United States. That could potentially generate more than $50,000 in net revenue per acre.

"Diversification toward high-value crops can be a promising strategy to enhance farmers' economic welfare in the region," Salmasi said. "This project will produce new knowledge and promote high-value, low-input plants to the growers of northern New Mexico, while soil health and environmental benefits can improve overall on-farm resiliency, reduce off-farm inputs and increase biodiversity."

Another project focuses on the selection of hardy lavender cultivars and how they adapted to the growing conditions of northern New Mexico. The project is a collaboration between NMSU research specialist Robert Heyduck and Kevin Lombard, the research director of the NMSU Agricultural Science Center at Farmington.

In 2018, researchers collected seeds from elder lavender plants that have survived extreme heat and cold, infrequent irrigation and weeding, suboptimal management conditions and long-term soilborne diseases.

Lavender is a high-value medicinal herb and ornamental plant commonly used in soaps and cleaning products. It is drought-tolerant and grows well in alkaline, sandy and low-fertility soils. Farmers also often grow lavender to promote agritourism.

Shengrui Yao, an Extension fruit specialist in NMSU's Department of Plant and Environmental Sciences, conducts research on jujubes, also known as Chinese dates, at the Sustainable Agriculture Science Center at Alcalde, the Agricultural Science Center at Los Lunas and the Leyendecker Plant Science Research Center.

Jujubes grow and produce well in the Southwest, specifically between central and southern New Mexico. While jujubes continue to grow in popularity in the U.S., researchers are still identifying ways to best market the fruit, which is rich in vitamin C and can be eaten fresh or dried.

Yao is also working on research projects involving stone fruits like peaches and cherries at the Alcalde science center. Some of her colleagues are studying other non-traditional crops to address unique challenges facing New Mexico, including labor, water and climate issues, and the amount of acreage available to growers.

"Farmers are great entrepreneurs," said Jay Lillywhite, associate dean of the College of ACES and director of the NMSU Agricultural Experiment Station. "Many farmers innovate by reducing costs and identifying new crops or value-added opportunities."

Lillywhite and Adedapo Oyenugo, a master's student studying agricultural economics and agricultural business, are working with NMSU researchers in Alcalde on an economic feasibility study to better understand the value of non-traditional crops. They are developing a financial model to examine potential returns to growing and processing these crops.

"The analysis will help producers determine if growing and processing these crops can be profitable," Lillywhite said.

Saeid Zehtab Salmasi

Josh Bachman

In fall 2023, researchers at the Sustainable Agriculture Science Center at Alcalde successfully harvested flowers from about 2,000 saffron corms, pictured above, planted in hoop houses and open fields on the center's grounds.

Alba Lucker weighs a sample of ground plant tissue for phytochemical analysis in Geno Picchioni's lab at NMSU.

Josh Bachman

A SALTY SOLUTION

NMSU researcher taps into benefits of brackish water

BY TIFFANY ACOSTA

As the effects of long-term drought raise concern for New Mexico's agricultural producers, one NMSU researcher has taken a deep dive into an underleveraged resource that could bring profound changes in the industry.

With an estimated 600 billion to 1.2 trillion cubic meters of brackish groundwater thought to be available in New Mexico, a sustainable use of this natural resource would help save freshwater supplies. Geno Picchioni, a professor of plant and environmental sciences in the College of ACES, has lofty aspirations for brackish water, which is more saline than freshwater but less saline than true marine environments.

"Use of brackish water on salt-tolerant crops is an important addition to drought contingency planning," he said. "The scientific part is fascinating enough, but the potential real-world significance might be even more alluring when agriculture in New Mexico increases its reliance on saline groundwater. Significant savings in annual desalination costs could be realized if we can become more flexible about crop selection while using water that may be saltier than we are accustomed to."

Picchioni's research team, which included Alba Lucker, a former graduate student, and Jonathan Consford, a former undergraduate student, conducted a pair of experiments on salt-tolerant halophytes and published their findings in the journal Agricultural Water Management. The study was supported by a USDA-NIFA-AFRI grant.

The team conducted two six-week experiments on four-wing saltbush and quailbush. They irrigated with moderately saline brackish groundwater and the highly saline

Josh Bachman

From left, Jonathan Consford, Lucker and Picchioni conducted a pair of experiments on salt-tolerant halophytes and published their findings in the journal Agricultural Water Management. New Mexico has an estimated 600 billion to 1.2 trillion cubic meters of brackish groundwater available.

reverse-osmosis concentrate from the U.S. Bureau of Reclamation Brackish Groundwater National Desalination Research Facility in Alamogordo, New Mexico.

"We found that if you irrigate a heavy-hitting halophyte with high salinity, they are going to use the salt as a beneficial resource and their growth will be stimulated," Picchioni said. "By contrast, most crops are salt-intolerant and will show significant growth and yield losses in response to high salinity."

He continued, "Brine disposal is one of the biggest costs of desalination, so if we can put it to beneficial use and help the environment because of the saline intrusion risks, it's a win-win all the way around."

While some of the biggest crops in the state aren't very salt tolerant in their current genetic form, Picchioni believes there's potential for more salt-tolerant crops like cotton, barley, sugar beets, pistachio and asparagus, especially as the state begins to increase its dependence on brackish water sources.

Picchioni's team also compared the effects of salt stress and salt shock on salt-sensitive leaf lettuce and salt-tolerant Swiss chard. They used 6-week-old seedlings and compared 15-day treatments of a non-saline control, a sodium chloride lab solution and calcium sulfate-dominated brackish groundwater reverse-osmosis concentrate.

"Both lettuce and Swiss chard will respond to brackish water in a way that boosts their nutritional value," Picchioni said. "If you time brackish water toward the finishing stage, it may be particularly useful in improving nutritional value."

The team found similarly positive results using the sodium chloride and calcium sulfate brackish groundwater sources, which may help expand the available field of brackish groundwater for successfully irrigating crops.

"If you took a snapshot of the groundwaters holding salt in the U.S.," Picchioni said, "the majority would not be sodium chloride, which is the standard for salt-tolerance research. It may actually be calcium sulfate, which is really interesting."

An NMSU faculty member since 1996, Picchioni has studied plant salinity stress for more than four decades. He is one of about 200 faculty members engaged in water research at NMSU.

"We are fortunate to have exceptional professors and researchers addressing unique problems associated with water resources in New Mexico," Interim Provost Lakshmi Reddi said. "Water research encompasses diverse areas such as agriculture, produced water, water management, and water treatment and remediation."

Picchioni believes a broad interdisciplinary team of NMSU researchers and industry partners could create novel solutions with brackish water irrigation to address drought issues facing the state. He said he would like to see more emphasis on developing crop varieties that can take up salt and use it as a beneficial resource like their halophyte counterparts rather than reject it and fall victim to dehydration.

"Faster progress in that direction would be really exciting for the future," he said.

Josh Bachman

Josh Bachman

Top: Picchioni, who joined NMSU in 1996, has studied plant salinity stress for more than four decades.
Bottom: Lucker holds a small volume of plant ground tissue.

TURNING UP THE HEAT

NMSU's Roy Nakayama transformed New Mexico's chile industry with bigger, hotter peppers

BY AMANDA BRADFORD

NMSU Library, Archives and Special Collections: Image No: RG91-012-001

Above: Nakayama in 1976. Previous page: Portrait of Nakayama by Adrián Aguirre of NMSU's Department of Innovative Media Research and Extension. Nakayama's research projects at NMSU spanned more than 30 years and produce some of the most popular green chile varieties on the market.

If you've ever sat down to a relleno plate at your favorite restaurant and marveled at how much room for gooey melted cheese there is inside those big, flavorful chile pepper pods, you might owe a little thank you to Roy Nakayama, the man who helped turn the 'NuMex Big Jim' chile cultivar into the world's largest pepper pod and left an indelible mark on chile consumption in the United States.

Building on the work of horticulture researchers like Fabián García, Nakayama's collaborative research projects at NMSU spanned more than three decades and produce some of the most popular green chile varieties on the market. By some estimates, the cultivars developed by Nakayama and his collaborators bring in more than $10 million per year for producers in New Mexico.

"His impact in the world was very significant," said Frank Matta, a retired horticulturist and researcher who worked under Nakayama as a graduate research assistant at NMSU. "The chile cultivars that he developed go all over the world. He had a very big impact."

Nakayama was born in 1923 near Las Cruces to parents who had emigrated from Japan. He was one of eight children in a farming family and showed and judged livestock as a student at Las Cruces Union High School. Nakayama and six of his siblings attended New Mexico A&M – now known as NMSU.

Two years into his degree at NMSU, Nakayama enlisted in the army to serve in World War II. He was captured during the Battle of the Bulge and spent seven months as a prisoner of war in Germany. His time in captivity took a heavy toll – he weighed just 87 pounds when he was liberated, and the long-term effects on his body made it difficult to do heavy farm labor or tolerate cold temperatures.

Sentiments toward Japanese Americans during and after the war took their toll, as well. Upon his return to Las Cruces, Nakayama was initially refused re-admission to New Mexico A&M. His former professors lobbied on his behalf, and in 1948, he completed a bachelor's degree in botany. He went on to earn master's and doctoral degrees in plant pathology from Iowa State University before returning to New Mexico A&M to teach and conduct research in agriculture and horticulture.

Matta described Nakayama as a patient man who liked to take his time and get it right.

"While we worked in the field, he would teach," Matta said. "He would talk about the structures of the flowers, the pollination, everything. He was very thorough, very patient, and a good instructor, both in the classroom and in the field."

Matta said Nakayama was drawn to research that was responsive to the wants and needs of consumers and producers. He sought to develop cultivars that produced hotter chiles, more flavorful jalapeños, more productive plants.

One such research project that Matta and Nakayama collaborated on in northern New Mexico produced the 'NuMex Española Improved,' a pepper variety that matures faster to accommodate the shorter growing season and higher elevation. That hybrid chile pepper, released in 1984, was later selected from more than 40 pepper varieties to be grown aboard the International Space Station in 2021 as part of NASA's Plant Habitat-04 experiment. Nakayama and Matta's 'NuMex Española Improved' could one day be among the plants that accompany astronauts on their years-long journey to Mars and back.

While his impact on chile may ultimately prove to be interplanetary, that crop wasn't his only research interest. Nakayama also collaborated with other plant scientists to develop successful pecan cultivars and refine cultivation techniques for New Mexico's climate and soils.

For Matta, Nakayama's impact was more personal. "Working under him was a very good experience. I learned a lot from him, including how to be a good boss."

Although he retired in 1984 and died in 1988 in Las Cruces, Nakayama and his family continue to make an impact on students at NMSU through scholarship and research support. The Roy Nakayama Memorial Scholarship benefits students interested in agronomy. And Nakayama's brother Joe also established two research professorships in the College of ACES and College of Engineering, in honor of their parents, "John" Kaichiro and Tome Nakayama.

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Nakayama, right, attends a pecan conference with his wife, Rose. Nakayama collaborated with other scientists to develop successful pecan cultivars for New Mexico's climate and soils.

NMSU's Remade Runway Sustainable Met Gala Fashion Show is a popular experiential learning opportunity for many students in NMSU's Fashion Merchandising and Design program.

NEXT-LEVEL *LEARNING*

NMSU students dive into hands-on experiential opportunities

BY TATIANA FAVELA

Through NMSU's Fashion Merchandising and Design program, undergraduate student Lizbeth Nuñez learned the intricacies of custom boot-making and the importance of craftsmanship – and earned an internship to boot.

"This internship opportunity at Rocketbuster Handmade Custom Boots allowed me to develop valuable skills such as attention to detail, project management and working with a team of wonderful individuals," she said. "Moreover, working closely with passionate professionals has inspired me to pursue a career that values creativity and precision."

Nuñez is one of many students involved in experiential learning opportunities across the College of ACES. These programs open doors to self-discovery and allow students to tap into their creative side, learn business skills and gain hands-on professional experience before graduating.

"It can be in fashion, beauty, home goods, cosmetics – all those different areas. Our program is also a discovery program in many ways," said Kelley Coffeen, assistant professor in the Fashion Merchandising and Design program. "We are the only program in the state of New Mexico, and we have a lot of students from El Paso in our program. Some students come in on the creative side and a lot of them end up moving to the business side."

SUSTAINABLE FASHION

One increasingly popular experiential learning opportunity is the Remade Runway Sustainable Met Gala Fashion Show, hosted

Lizbeth Nuñez, an undergraduate student in NMSU's Fashion Merchandising and Design program, completed an internship at Rocketbuster Handmade Custom Boots in El Paso.

each spring by the Student Association of Fashion Merchandising and Management and the Aggie Fashion Club.

The fashion show brings together dozens of Fashion Merchandising and Design students who create sustainable, upcycled fashion using materials like paper, trash bags, shower curtains, bubble wrap, newspapers, water bottles and donated fabric. They showcase their designs in a runway show in Corbett Center Student Union while making a positive environmental difference and educating the public about sustainability.

"The fashion industry is making great strides in minimizing the industry's impact on the environment," Coffeen said. "Our students want to share alternative materials by upcycling and repurposing in design. Their designs are creative and inspirational."

NEW ERA FOR FOOD SCIENCE

With the opening of the new Food Science, Security and Safety Center in 2023, a new era of experiential learning dawned at NMSU. The state-of-the-art facility houses modern laboratories and classrooms used by researchers and students to advance food and meat science research in New Mexico. Once open, a student-run butcher shop – Pistol Pete's Premium Meats – will provide additional food service- and retail-training opportunities.

Francine Mezzomo Giotto, an assistant professor in the Food Science and Technology program, said the new facility has helped

Kallan Lightfoot constructs a garment using recycled material for the 2022 Remade Runway Sustainable Met Gala Fashion Show.

students understand career opportunities within the meat industry.

"Students are exposed to activities that promote critical thinking, professional development and teamwork abilities," Mezzomo Giotto said. "We teach everything from animal welfare, transportation, animal regulations, production, commercialization, safety, sensory analysis and product development. In addition, over the last year, some of our students traveled to Arkansas, Colorado and Nebraska to engage in professional development opportunities with the biggest processing facilities in the United States."

Andrea Solar, a graduate student in the Food Science and Technology program, said many of her classes have included hands-on components and trainings that have greatly increased her knowledge of meat science and food safety.

"The hands-on laboratory courses have been instrumental in deepening my understanding of food microbiology, which is crucial for ensuring compliance with industry food safety regulations," Solar said. "During my first year, I have been involved in three student training and education programs that will have an impact on my career. These programs exposed me to various career paths within the sector and included visits to meat-processing facilities."

INTERDISCIPLINARY COLLABORATION

Other students like Atlee Musgrave, an undergraduate in the Fashion Merchandising and Design program, have experienced interdisciplinary opportunities. Working with Coffeen and Merranda Marin, a professor in the Human Development and Family Science program, Musgrave conducted a research project on the impact of fashion in giving students a sense of belonging.

Researchers and students use the new laboratories and classrooms in NMSU's Food Science, Security and Safety Center to advance food and meat science research in New Mexico.

"Doing a research project that teamed fashion with the college community was a great opportunity," Musgrave said. "Dr. Marin and Dr. Coffeen walked me through and supported my research experience, which gave me confidence in doing research in the future."

Marin said it's not very common for fashion students to be interested in research-related areas.

"So, we worked together to help mentor this student so that he could go through the research process and could understand it," Marin said. "We talked about how wearing school colors and school gear could enhance a student's sense of belonging, and it gave the student a great foundation of understanding how to carry out his research study, and I think that's important, too."

Meanwhile, Marin said, the Human Development and Family Science program has made efforts in recent years to enhance its curriculum to help students meet their fullest potential. This includes adapting courses in the program for online accessibility to better accommodate non-traditional students, many of whom are working parents of young children.

"We've connected with NMSU Global, and we're moving our undergraduate program to be a completely online program," she said. "Working with NMSU Global has really forced us to really look at what our program outcome learning objectives are and see if they are accurate or reflective of the world that we're seeing today."

DECODING DRYLANDS

Niall Hanan seeks to understand the dynamics of desert grasslands

BY TAEYA M. PADILLA

From a young age, Niall Hanan has had a keen interest in agriculture. As a teenager, Hanan's first exposure to agriculture was as a migrant worker picking grapes in France and oranges and olives in Greece. From this experience, Hanan's curiosity in agronomy and applied ecology only grew.

"I worked at several land-grant schools before coming to Las Cruces in January 2017, and NMSU is my favorite," said Hanan, a professor of dryland ecology in the College of ACES. "NMSU is small enough for everyone to make an impact, but large enough to have a diversity of interesting colleagues and students, and for our teaching and research to be both diverse and impactful."

Hanan's research examines why desert grasslands in the southwestern United States are prone to shrub encroachment and focuses on the ecology and management of drylands and savannas in this region and elsewhere across the globe. His ongoing research projects center on the role of climate variability and human management of grazing; fire and other disturbances on ecosystem dynamics; and remote sensing to measure and model ecosystem dynamics at landscape, regional and global scales.

Josh Bachman

Niall Hanan, a professor of dryland ecology, joined NMSU in 2017. In addition to teaching and performing research, he leads the Jornada Basin Long-Term Ecological Research program.

Hanan also leads the Jornada Basin Long-Term Ecological Research program – a National Science Foundation-supported program examining why desert grasslands in the Southwest are so prone to shrub encroachment.

"I love the landscapes of the desert Southwest and living in the ecosystems that are the focus of my research," he said.

Hanan serves on the executive board of the U.S. Long-Term Ecological Research Network and the mission science teams for two of NASA's Earth observatories. He is the specialty chief editor of the journal Frontiers in Environmental Sciences – Drylands and an editor of the journal Environmental Research: Ecology.

Josh Bachman

Hanan's research examines why desert grasslands in the southwestern United States are prone to shrub encroachment and focuses on the ecology and management of drylands and savannas in this region and elsewhere across the globe.

He has published more than 100 peer-reviewed scientific papers, with research support from the NSF, NASA, U.S. Agency for International Development, U.S. Department of Agriculture, National Geographic, Fulbright, Department of Energy, National Oceanic and Atmospheric Administration, and other institutions.

At NMSU, Hanan teaches a graduate-level course in ecological modeling that builds on his extensive dryland ecology research. In this course, students learn how to mathematically model interactions between populations and communities. The course begins with basic population models, such as those illustrating population growth and interactions between predators and prey. Then, it gradually increases in complexity, allowing students to learn how to model ecological communities in space and time. After this, Hanan teaches how to model spatial interactions in landscapes and animal movements, showing how these movements impact other processes in that landscape.

Colleagues and students praise Hana's leadership. "I have known Dr. Hanan for seven years, and I couldn't have asked for a better mentor," said Julius Anchang, a research assistant professor at NMSU. "He is a world-class scientist who was very instrumental in allowing me to transition from a young and inexperienced Ph.D. graduate to a competent research scientist. On a more personal level, I couldn't have asked for a better supervisor and colleague."

HELPING **HANDS**

Extension Family and Consumer Sciences improves lives in New Mexico through outreach education

BY TIFFANY ACOSTA

NMSU's Extension Family and Consumer Sciences offers programs like Kitchen Creations across New Mexico. Kitchen Creations is a series of nutrition and cooking classes for adults with diabetes.

Josh Bachman

From the high-desert plains of northwestern New Mexico to the Chihuahuan Desert in the south and all points in between, NMSU's Extension Family and Consumer Sciences is focused on providing individuals, families and communities in New Mexico education and training on issues ranging from health and family and child development to finance and disaster preparedness.

In 2023, EFCS was awarded almost $4.5 million in grants that provided support to address issues like diabetes education, nutrition and health education, personal and family finance, stress and resilience, vaccine education and chronic disease prevention. Nearly 21,000 residents participated in EFCS education and training programs centered on improving behaviors and attitudes, with a potential economic impact of more than $16.4 million.

"Faculty and staff working within NMSU's Extension Family and Consumer Sciences provide research-based and current information on important and relevant topics that affect individuals, families and communities," said Efren Delgado, department head for EFCS.

A recent grant allowed the Ideas for Cooking and Nutrition, or ICAN, program to use its nutrition educators to help get the word out about free vaccines for eligible New Mexicans. Through the Extension Collaborative on Immunization Teaching and Engagement, or EXCITE, Bridge Access Project, ICAN staff members worked to inform community members on when and how to get a free updated COVID-19 vaccine and about the eligibility of the COVID-19 Bridge vaccine program for underinsured and uninsured individuals 18 years and older.

Josh Bachman

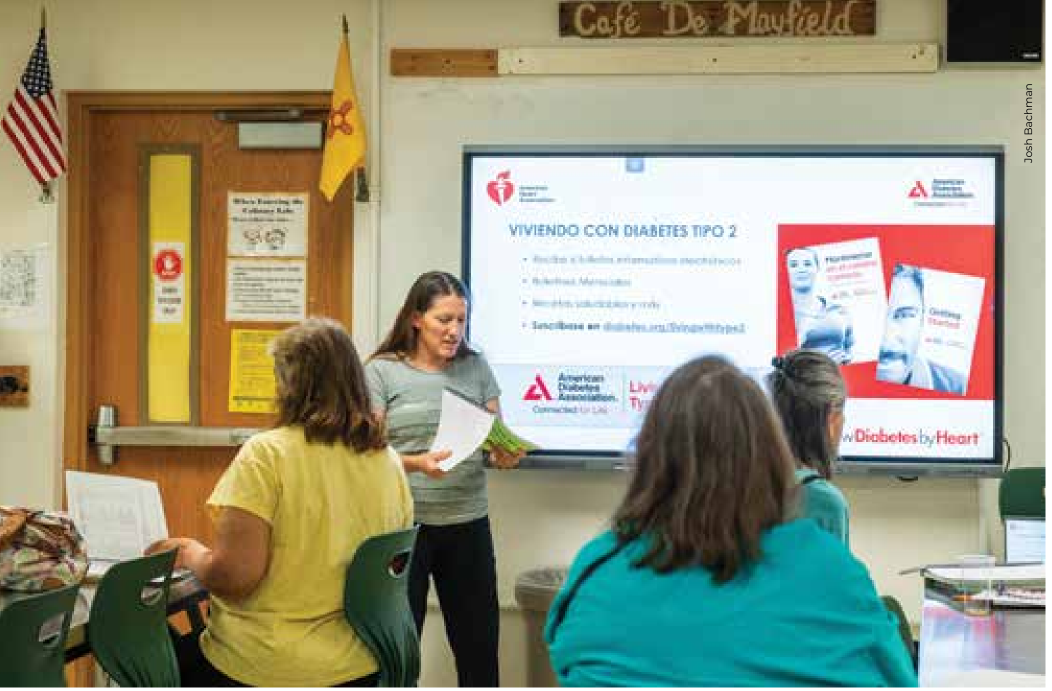
In 2023, Extension Family and Consumer Sciences received almost $4.5 million in grants to help address issues like diabetes education, nutrition and health education, personal and family finance, stress and resilience, vaccine education and chronic disease prevention.

"The grant we have received allows ICAN to continue important work that NMSU has done on the EXCITE Project in the past," ICAN Director Donna Sauter said. (Read more about the EXCITE project in the fall 2021 issue of *ACES Magazine.*) "Our educators' role is to provide referrals for resources in our communities throughout New Mexico."

To reach community members, ICAN educators handed out coupons for free vaccines after they taught classes or conducted recruiting events; hung posters in a variety of locations such as New Mexico Health Care Authority offices, Women, Infant and Children offices, laundromats, food banks, food distribution sites and grocery stores; and posted on social media sites. Materials were printed in both English and Spanish.

"This grant speaks to the recognition of how ICAN educators are deeply connected in their communities, many very rural communities, and to populations who may not have awareness or understanding of how to obtain vaccinations at little to no cost," said Laura Bittner, associate department head for EFCS.

One of the EFCS diabetes awareness programs, On the Road to Living Well with Diabetes, uses funding from the Paso del Norte Health Foundation to extend its reach across the state. A new grant will help enroll 150 participants into the program, expand its work in Luna and Otero counties, and continue its work in Doña Ana County.



Josh Bachman

Josh Bachman

A certified diabetes educator, registered dietitian or other health care professional with expertise in diabetes teaches the nutrition portion of each Kitchen Creations class. An Extension agent then typically leads participants in the cooking portion of each class.

On the Road to Living Well with Diabetes trains new community health workers and teaches participants how to manage glucose levels better and reduce the complications that may result from uncontrolled diabetes.

"We have found that community health workers play a vital role in this program – even when they are not facilitating a class, they will still share the information in an informal matter to loved ones and other community members," said Lourdes Olivas, program manager for On the Road to Living Well with Diabetes.

Not only does EFCS support the physical health of New Mexicans, it also advocates for their mental well-being. Established in 2021, the Center of Innovation for Behavioral Health and Wellbeing is an organization that strives to provide workforce development to ensure foundational support is available for New Mexico children and families.

COI works with state agencies, health care providers and community stakeholders to create programs, trainings and curriculum development to integrate inventive approaches and best practices within local communities. With these resources, COI works with Extension staff to share the resources in every county across the state. COI now has 38 staff members located throughout the state.

"We look for opportunities to collaborate and support each other," said Brooke Stanley Tou, director of COI. "We're committed to improving the well-being of New Mexicans and happy to be in the Extension family."

William Wallace II

Rancher turns family cattle operation into international success story

BY CARLOS ANDRES LÓPEZ

William "Bilo" Wallace II and his family have operated the historic Hacienda Rancho Corralitos in northern Mexico for four generations. Wallace grew up on the 60,000-acre cattle ranch near Casas Grandes, Chihuahua, and took over its operations after earning a bachelor's degree in animal and range sciences from NMSU in 1968.

Wallace credits his alma mater – and professors like Dan Dwyer, Jack Ruttle and Lewis Holland – for teaching him the skills that helped him grow the family ranch into a successful international business. Today, he raises upwards of 1,300 calves each year with four full-time employees, including his two sons, one of whom also graduated from NMSU.

"I'm a third-generation rancher, and I've lived here on this ranch all my life," Wallace said. "We are very lucky because we're only about 150 miles from the United States, and we raise our calves and ship them to the U.S. market."

It was NMSU's prime location along the U.S.-Mexico border that most appealed to Wallace, who decided early in life to follow his family's footsteps into the cattle industry. NMSU's proximity to Casas Grandes – a three-hour drive – meant he could easily visit the ranch on weekends. Although he was active in the agricultural fraternity Alpha Gamma Rho, Wallace said he mostly concentrated on schoolwork during his time at NMSU. After graduating, he went straight to working on his ranch, taking what he learned to streamline operations.

"What helped me the most was learning how to better our ranching practices and understanding the business side of things," he said.

Even as he ran his family ranch, Wallace found time to serve as the president of the Chihuahua Cattleman's Association, a role in which he became a leading advocate for livestock producers in Chihuahua. He also served as the head of the Chihuahua Animal Health Committee, which helps producers implement USDA regulations on steers and heifers entering the U.S., and was part of a binational committee working to eradicate tuberculosis and brucellosis in livestock.

J. Victor Espinoza

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