

For the Land and Its People



Winter 2025

This issue of *For the Land and Its People* highlights how the people of NDSU Agriculture are driving progress through cutting-edge research, hands-on learning and responsiveness when communities are in need. This commitment to innovation and impact is a cornerstone of NDSU Agriculture's mission, propelling us toward a brighter future for the people we serve. I encourage you to explore our progress in the following pages.

Enjoy.

Greg Lardy

Joe and Norma Peltier Vice President for Agriculture

NDSU NORTH DAKOTA
STATE UNIVERSITY

College of Agriculture, Food Systems, and Natural Resources
North Dakota Agricultural Experiment Station
NDSU Extension

NDSU's dry bean breeding program seeks to impact global food security

Against the backdrop of a growing world population and evolving environmental conditions, strengthening food security is imperative for those involved in agriculture, particularly researchers and plant breeders.

More than 40% of dry beans produced in the U.S. come from North Dakota. The most prominently grown market classes in the state are pinto, navy, black, kidney, great northern, small red and pink beans.

Developing crop varieties adapted to drought, excessive heat and flooding, while maintaining resistance to diseases, is a challenge faced by the 12 plant breeding programs at North Dakota State University.

Osorno awarded inaugural Jim Kirkeide Dry Bean Breeding Faculty Fellowship

Juan Osorno, NDSU Department of Plant Sciences professor and dry bean breeder, has been honored with the inaugural Jim Kirkeide Dry Bean Breeding Faculty Fellowship. This recognition highlights Osorno's significant contributions to agriculture and his dedication to improving dry bean varieties for farmers locally and globally.

Established to honor the memory and contributions of Jim Kirkeide, the fellowship supports innovation in dry bean breeding, ensuring the continued success of the agriculture industry.

"Beans have taken me around the world and transformed me as a person," Osorno shared. "It's humbling and fulfilling to contribute to global food security while helping farmers succeed."

Osorno utilizes advanced genotyping and phenotyping technologies to develop high-performing dry bean varieties, ensuring they meet the needs of farmers and consumers. His use of a winter nursery allows for two growing seasons in a single year, accelerating the delivery of improved varieties. These efforts bolster the region's status as a leading producer of dry edible beans — an affordable, high-protein food source critical to global nutrition.



JUAN OSORNO

The dry bean breeding program led by Juan Osorno, NDSU professor of plant sciences and dry bean breeder, is one of those successful programs. The demand for dry beans is growing everywhere because of growing desire to eat healthier, plant-based proteins. Younger generations have become more interested in environmentally friendly

food products as well. Breeding and releasing dry bean varieties that can adapt to various weather conditions and develop resistance to diseases while maintaining high productivity and good quality is a priority for Osorno and his team.

The dry bean breeding program started at NDSU in 1980 with Ken Grafton as the first breeder. Osorno is the second breeder, having taken over the program in 2007.

"The NDSU program is the youngest in the U.S. and has grown to be the largest dry bean public breeding program in the nation," Osorno says. "Across those years, NDSU has developed and released more than 20 varieties across multiple market classes."

The importance of breeding varieties comes down to one main goal: increasing seed yield while maintaining the desired quality and commercial characteristics required by the rest of the value chain actors in the industry. Osorno has worked with Phil McClean, NDSU plant sciences professor, during the breeding process, which includes incorporating advanced genomic tools into traditional breeding.

“Juan and I have worked closely together since he became the head of the dry bean breeding program here at NDSU,” McClean says. “My research group collaborates with Juan’s team to release new dry bean varieties of value to North Dakota and Minnesota dry bean producers. We have developed multiple genomic and genetic tools to identify the genetic factors associated with important traits such as disease resistance and adaptation to adverse climatic conditions. These tools include high-quality, reference-grade genomic sequences that are used to identify molecular marker tools that allow us to track specific traits throughout the selection process.”

A DNA diagnostic tool contains more than 4,000 markers for multiple traits that are essential for a new dry bean variety to be valuable to growers, McClean says.

There are many aspects to the genetic makeup of dry beans at play, including size, shape, color, canning/cooking capabilities and nutritional benefits.

“The most important are increasing yield/productivity, seed quality, disease resistance and tolerance, upright plant architecture, harvest maturity and some environmental stresses such as flooding and soil salinity tolerance,” Osorno says. “We use conventional genetics but also new tools like DNA technology, data science, genomics/bioinformatics and high-throughput phenotyping that includes drones and robots.”

Disease resistance is a priority in the breeding process as diseases can have a major role in reducing yields. These diseases include white mold, bean rust, anthracnose, common bacterial blight and fusarium.

“In each case, Juan’s group collected disease response data, and my group used molecular marker technology to genetically map factors associated with resistance to those diseases,” McClean says. “From that work, molecular

markers were developed that can be used in Juan’s breeding program to select new genetic lines with resistance to these diseases.”

A new trait Osorno and McClean’s teams are working on is called “slow-darkening.” Beans darken as they are stored, which increases cooking time — something consumers consider undesirable.

They discovered that beans with the slow-darkening trait also have increased iron availability, which results in beans with improved nutritional

value. Additionally, they cook faster than regular darkening pintos.

As the demand for dry beans grows in the consumer market, the importance of NDSU breeding program does as well, especially for growers in North Dakota and Minnesota.

“If we are more productive locally, thanks to improved varieties and other factors, we can have more beans available for both the domestic and international markets,” Osorno says.

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More than 40% of dry beans produced in the U.S. come from North Dakota

Thompson honored as inaugural Johansen-Thompson Endowed Professor in Potato Breeding



Susie Thompson, NDSU Department of Plant Sciences professor and potato breed, has been honored as the inaugural Johansen-Thompson Endowed Professor in Potato Breeding. This prestigious \$1.5 million endowment, supported by potato growers in North Dakota and Minnesota, the North Dakota Challenge Grant and regional potato advocates, is a milestone for NDSU’s agricultural research.

The endowment pays tribute to two of NDSU’s most influential potato breeders: Robert Johansen, who dedicated over 40 years to potato breeding at NDSU, and Susie Thompson, who has led the program since 2001. The funds generated by this endowment will help strengthen research, teaching and the overall impact of NDSU’s potato breeding program.

The Northern Plains rank as the third-largest potato-producing region in the United States, producing 2.6 billion pounds annually, valued at \$500 million. With this significant role in agriculture, a robust potato breeding program is vital to advancing research, improving production and supporting both local and national markets.

Thompson’s contributions have been groundbreaking. Her Dakota Russet potato variety was accepted by McDonald’s in 2022 as a top-tier option for their McFry products — the first variety approved since 2016. This accomplishment further highlighted the importance of NDSU’s potato breeding efforts and inspired the creation of the endowment.

The Johansen-Thompson Endowed Professorship was officially awarded to Susie Thompson during NDSU’s 50th Harvest Bowl celebration on Nov. 15, 2024.

NDSU's new Peltier Complex sets the stage for emerging food scientists



DIEGO VARGAS YANA

Ph.D. student Diego Vargas Yana never thought about working with food when he was younger.

After completing a biotechnical engineering degree in Peru, Vargas Yana worked in a food science lab where he learned about how food impacts communities.

"We worked a lot with the rural communities in the High Andes. We were trying to get these people to rediscover their traditional crops and the value in them," says Vargas Yana. "I grew to understand how important foods were at a cultural level, not by their nutrients."

He says that idea is echoed by the values of NDSU, which tries to connect with the people it helps.

"I didn't know I'd end up here, but looking back, it all makes so much sense," says Vargas Yana. "Now I can improve the lives of people in Fargo and of my people back in Peru."

At NDSU, he worked toward his cereal science master's degree and became enamored with all the things he could learn.

His personal work is on dietary fiber and how it can affect the immunological system and its communication with gut bacteria.

"Science is not only about numbers and data, but about the people behind those numbers," says Vargas Yana. "This environment pushes us toward that understanding."

Before the Peltier Complex, most food science researchers were split between Harris Hall and the Quentin Burdick Building. Now, researchers can connect with one another in the next office over or share equipment. Vargas Yana says the spacious building is a testament to the perseverance of the students and staff.

"This has become the face of what we want to be," says Vargas Yana. "There are people from all around the world here, and now we can get to know each other better professionally and personally."

Kiersten Gundersen didn't come from an agricultural background. She remembers asking her mom where meat comes from, to which she replied, "The store."

Now a doctoral candidate at NDSU, Gundersen is the first meat science grad student to conduct research in the Peltier Complex. Her research focuses on meat safety and quality assurance with an emphasis on microbiology.

She was sold on the promise that the department would foster personal connections and that she'd have the freedom to create her opportunities through her own research.

After a three-year master's program, she faced a decision of either continuing with a doctoral degree or pursuing a career in the meat industry.

"I kept asking what projects there are to focus on and kept receiving the same answer: You can create your own opportunities," says Gundersen. "That's when I realized I had to fully understand the research process to turn an idea into a cohesive project."

Now, she's in the last six months of her doctoral program.

Nearly all of her projects have been novel, which means she's exploring ideas that haven't been researched or published. As a young adult about to enter her career, being a part of innovative projects is exciting.

"This generation of students is being challenged because they need to come up with research that hasn't been explored yet," says Gundersen. "They need to understand the foundation of what they're learning to take it a step further, and ask themselves 'what do we not know?'"

Though she feels bittersweet about leaving soon, Gundersen takes pride in knowing the Peltier Complex will support future scientists.

"This building is a sign of the progress that we see," says Gundersen. "The research that comes out of NDSU is renowned, and now we have a building that represents that and matches the industry standard. I can teach students in an environment that looks like their futures."

FOR MORE INFORMATION:

"Peltier Complex: A Partnership for Agriculture's Future"—www.ndsu.edu/vpag/newsletter/peltier_complex_a_partnership_for_agricultures_future

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KIERSTEN GUNDERSEN



Wachenheim brings ag education knowledge as NACTA president

Cheryl Wachenheim, NDSU professor of agribusiness and applied economics, shares her time as president of North American Colleges and Teachers of Agriculture.

NACTA is a member-driven organization focused on helping educators grow by sharing research on teaching. The group has around 800 members from all around the country.

Wachenheim was selected as president-elect of NACTA in 2023 and began her one-year term as president in June 2024.

"It's an honor to have the opportunity to see what members bring forth as their own creations without expecting credit or recognition," says Wachenheim.

NDSU is an institutional member of NACTA, and Wachenheim brings valuable agriculture education knowledge obtained through participation in NACTA to her teaching.

NACTA's focus on education is narrow for an agricultural economist, but the organization is comprised of a group with a diverse set of experiences and backgrounds from a broad range of fields within agriculture.

"We all have the passion for the same thing," says Wachenheim. "Even as our lives get more complicated, people show up and they care about learning and helping others learn."

Wachenheim says the leadership model inspires collaboration, and she encourages getting involved in groups with similar passions.

"You have to trust people," she advises. "Trust them responding to your ideas."

After her time as president is done in June 2025, she will carry out duties in a one-year role as a past president.



Hoffman named inaugural Kirkeide Extension Fellow

Meagan Hoffman, NDSU Extension 4-H youth development specialist, has been named the inaugural Kirkeide Extension Fellow. This fellowship is made possible by a generous endowed gift from the Kirkeide family.

The Kirkeide Extension Fellowship honors the legacy of LeVon C. Kirkeide, who served as the NDSU Extension agent in Wells County from 1959 to 1986. The fellowship aims to support innovative projects that will contribute to a resilient, diverse and capable workforce in the fields of food, agriculture, natural resources, technology, business and human and social sciences.

Over the next two years, Hoffman will enhance two innovative projects: Careers in a Box and LaunchSkills Virtual Career Camp. Both initiatives are designed to raise awareness of career opportunities in food, agriculture, natural resources and human sciences (FANH). Her work aligns perfectly with the fellowship's goals, focusing on engaging parents and role models, experiential learning and innovating teaching practices. Through partnerships with agricultural industry leaders and schools across North Dakota, these initiatives will significantly elevate awareness and understanding of the diverse career paths in FANH fields.

NDSU Extension addresses

When wildfires broke out in several regions of North Dakota in October 2024, the state faced an agricultural crisis of significant proportions. Fueled by dry conditions, high winds and abundant dry forage from a wet spring, fires caused widespread damage to farms, ranches and communities. North Dakota State University (NDSU) Extension stepped forward as a key player in prevention efforts, disaster response and recovery.

Statewide prevention efforts

“The weather reports in the early part of the week indicated a high risk of fire danger, so we knew we needed to do all we could to increase awareness of the dangers and give people actionable information about how to prevent fires,” says Angie Johnson, NDSU Extension farm and ranch safety coordinator.

Collaborating with the North Dakota Forest Service, North Dakota Parks and Recreation Department and the North Dakota Game and Fish Department, the team disseminated safety messages via radio, news releases and social media outreach to inform farmers, hunters and recreational vehicle users about fire risks.

needs in wildfire aftermath

Rapid mobilization

Once wildfires broke out in multiple parts of the state, NDSU Extension quickly mobilized its network of Extension county agents and specialists to address urgent needs. Working with agencies and organizations in the state, NDSU Extension worked to provide a cumulative resource list on [NDResponse.gov](https://www.ndresponse.gov), making critical recovery information accessible to all.

“With a presence in every county, we’re uniquely positioned to assess local needs and provide guidance,” says Miranda Meehan, NDSU Extension livestock environmental stewardship specialist and disaster education coordinator. “This connection allowed us to respond effectively and get resources to the right places quickly.”

Extension also worked to develop a survey tool to assess impacts. The information collected was shared with the North Dakota Department of Agriculture and other state and federal agencies to help determine immediate needs and shape state-level recovery efforts. This collaborative effort ensured comprehensive support for those affected by the disaster.

One key success was guiding farmers through federal programs like the Livestock Indemnity Program. NDSU Extension agents offered step-by-step assistance, helping ranchers document livestock losses and navigate complex applications.

Supporting long-term recovery

As the fires subsided, NDSU Extension turned its attention to recovery. NDSU Extension specialists provided resources to address pasture recovery, proper livestock disposal, soil rehabilitation, fire damaged grains, including grain storage structures, and mental health, and Extension county agents worked to connect those resources to those in need.

“Recovery is a long-term process, and Extension will be there every step of the way,” said Meehan. “From mental health support to agricultural recovery, we’re committed to helping communities rebuild.”

The October 2024 wildfires showcased NDSU Extension’s critical role in disaster response. By leveraging its deep connections and interdisciplinary expertise, Extension not only addressed the immediate crisis but also laid the groundwork for a resilient future.

FOR MORE INFORMATION:

NDSU Extension Disaster Preparedness and Recovery webpage—www.ndsu.edu/agriculture/ag-hub/ag-topics/disasters
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Recovery is a long-term process, and Extension will be there every step of the way

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Giving Hearts Day

is Thursday, February 13

NDSU's Land-Grant Mission

The College of Agriculture, Food Systems, and Natural Resources has a tradition of excellence in educating students for real-world careers. Our students learn from and work with world-class scientists in state-of-the-art facilities. These interactions, along with a relatively low student-faculty ratio, provide opportunities for students to develop their critical thinking skills, to work in a team setting, and to capitalize on hands-on learning experiences that will allow them to be competitive in a global economy.

The North Dakota Agricultural Experiment Station consists of seven Research Extension Centers placed strategically throughout the state, the Agronomy Seed Farm in Casselton and the Main Station in Fargo. We work to develop techniques and technologies to enhance the production and use of food, feed, fiber and fuel from crop and livestock enterprises.

NDSU Extension empowers North Dakotans to improve their lives and communities through science-based education. We serve all people of the state through our 52 county and Fort Berthold offices, seven Research Extension Centers and the main campus in Fargo.

For more information on the programs in this publication, contact the faculty and staff listed. For more information about our other programs or have questions, comments or suggestions, please contact me.

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8 www.ndsu.edu/agriculture

Founded in 2008, Giving Hearts Day is a 24-hour event for charities in North Dakota and northwest Minnesota. Each year, Giving Hearts Day provides a platform for charities to fund their missions through an ever-increasing community of donors. The longest-running giving day in the country, Giving Hearts Day has helped participating charities raise \$195 million since its founding.

The North Dakota 4-H Foundation and NDSU's Bison Strides Equine Assisted Services Program are two of the many organizations where support is needed.

North Dakota 4-H Foundation

4-H is a research-based organization that equips youth with the skills and experiences they need to grow into thriving individuals. Your generosity provides the North Dakota 4-H Foundation with financial support to ensure all North Dakota 4-H youth have the opportunity to participate in quality programming, camping opportunities, in-school activities and much more. As a result of your gift, youth who participate in 4-H are beyond ready for work and life!

NDSU Bison Strides Equine Assisted Services Program

Bison Strides provides veterans and people with physical, cognitive, emotional, behavioral and mental health challenges the opportunity to experience the therapeutic power of the horse. Through partnerships with horses, people experience more joy and confidently engage in their daily lives. They build core strength and balance, learn mindfulness and emotional regulation and strengthen problem-solving and cognitive skills. By supporting Bison Strides, you help create opportunities for people to experience the therapeutic power of the horse.

Giving is an easy way for donors to support causes they are most passionate about, such as NDSU's Bison Strides program or the North Dakota 4-H Foundation. To make your donation, visit the Giving Hearts Day website at <https://app.givingheartstoday.org/>.



Giving Hearts Day

