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ANNUAL NEWSLETTER 2016

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POTS PLOTS AND PLANTS

DEPARTMENT OF AGRONOMY AND HORTICULTURE
ANNUAL NEWSLETTER 2016

Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln

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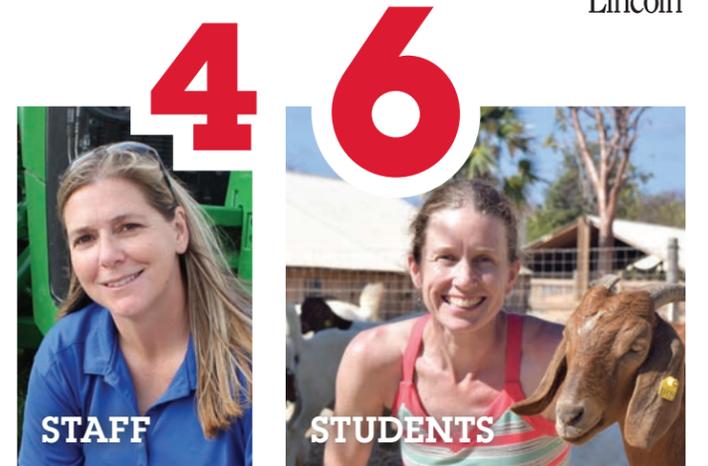
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ROCH GAUSSOIN

I WILL PREFACE THIS LETTER WITH SAYING WE HAVE FINALLY REACHED OUR GOAL THAT EVERY YEAR SEEMED UNSURMOUNTABLE! This is the first time in recent memory when our annual newsletter will be in print before nearly the middle of the subsequent year. Kudos to all involved!

I also want to share my intention of stepping away from my position as department head and returning to the faculty ranks effective June 30, 2017. Richard Ferguson will be the interim head upon my exit. Richard has been a critical member of the administrative team in the department since I started. While I made more than my share of unilateral decisions in my first couple of years, Richard became an essential sounding board for most major decisions in recent years. He will be an able and progressive head during the transition. Current plans are for Richard to serve as interim head during the completion of our five-year review, at which point IANR will initiate a national search for a permanent head.

I have, for the most part, truly enjoyed the experience for the last five-plus years. When you peruse this newsletter, I am sure you will sense what a strategic and adaptable place the department is in at this point in time. The department has seen record-breaking growth in student and faculty numbers. The growth in competitive grant acquisition has been equally phenomenal. Our faculty serve on prestigious national and internal boards and committees. Our students receive high-end accolades and awards, as do our faculty. I have sensed an amazing synergy with the addition of new faculty who feed on the wealth and breadth of the experience of our senior faculty. Staff and faculty worked diligently on creating a more civil and social environment for our department. It appears we have made dramatic improvements in respect and collegiality within the unit. I anticipate we will continue on this amazing trajectory for years to come. I feel privileged to have been a part of it.

Thanks for taking the time to let us share our 2016 story. Whether you read this cover to cover or scan it for highlights, I am confident you will find the contents to be a testament to the great work our department accomplished in 2016.

Respectfully submitted,

Roch Gaussoin
Professor and Department Head

RICHARD FERGUSON

AFTER HAVING BEEN A MEMBER OF THIS DEPARTMENT FOR OVER 30 YEARS, ONE WOULD THINK I SHOULD HAVE A FAIRLY GOOD GRASP OF WHAT WE DO. However, I continue to be amazed at the breadth of interests and activity in our department that I was not aware of. This newsletter is an example of that, illustrating the multi-faceted interests and efforts of our department's faculty, staff, students and graduates. It documents our vibrant student organizations; the regional, national and international recognition of our graduate students; the connections of our disciplines influencing many aspects of Nebraskans' lives; the use by our faculty of new and cutting-edge technologies in research, teaching and extension; and the success of our graduates. It truly has been and will continue to be a privilege to be part of a group of people who take seriously our mission to expand the science of providing food, fuel and fiber to mankind, in ways that reflect good

stewardship of our natural resources, and enabling our homes and workplaces to be attractive and productive environments. Thanks for your continued connection to our efforts.

You will note from Roch Gaussoin's message that he intends to step down as department head this summer. Roch's impact on this department over the past five years has been tremendous, and much appreciated. He will rejoin our faculty this summer, and we wish him well as he takes on new directions in his career.

Sincerely,

Richard Ferguson
Professor and Associate Department Head



"I have, for the most part, truly enjoyed the experience for the last five-plus years. When you peruse this newsletter, I am sure you will sense what a strategic and adaptable place the department is in at this point in time."

—Roch Gaussoin

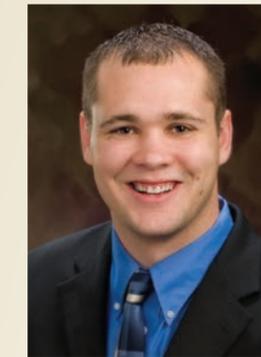
Roch Gaussoin (left) and Richard Ferguson

2016

PROMOTION AND TENURE

GREG KRUGER

Promoted to Associate Professor with Tenure



Hired: 2010, Ph.D. 2010, from Purdue University. Kruger's research interests are in pesticide application technology, drift management, herbicide resistance and weed management. His extension program is based on training growers and pesticide applicators how to apply different pesticides and how to most efficiently control weeds.

UNDERGRADUATE FALL ENROLLMENT



191 Agronomy



52 Horticulture



17 Plant Biology



31 Turfgrass & Landscape Management

STAFF AWARDS

Fran Benne: First-place Nebraska Press Women Design of Nonprofit Newsletter for *Pots Plots and Plants* 2014

Connie Hanson: Staff Advisory Committee Special Contributions Award

Lana Johnson: SAC Special Contributions Award and SAC Professional Development Award

ALUMNI AWARD

Ray Ward: CASNR Beachell Distinguished Alumni Award

ALUMNI ADVISORY COUNCIL MEMBERS 2016-2017

Julie Abendroth
Heather Byers
Matt Giese
Thomas Hoegemeyer
Richard McConnell
Jason Meyer

Chris Petersen
Rob Robinson
Bart Ruth
Dave Stock
David Vetter
Ray Ward

T.J. McANDREW

Research Facility Coordinator

I GREW UP IN ALLIANCE, NEBRASKA, WHERE MY DAD WAS A CPA AND MY UNCLE WAS A JOHN DEERE DEALER, so I was around both the economic and the equipment aspects of agriculture. I attended the University of Nebraska–Lincoln, where I obtained my undergraduate degree in agricultural education with a minor in ag economics, and although I never taught vocational ag in high school, I am thankful to have received a broad education in various agricultural fields.

After working on farms in western, central and eastern Nebraska, I returned to the university to get my master’s degree in ag economics. Following graduation, I applied for the research farm manager position with the Department of Agronomy and Horticulture. I enjoyed working with many different professors, research technologists, graduate students and student workers while managing the

research farms and learning the other side of farming. Being able to give hands-on assistance with the research projects was extremely rewarding. I am now the research facility coordinator for the department and I am thoroughly enjoying the challenges of the new position, but I do miss the days of crawling on a tractor and working ground or harvesting.

I met my wife, Nancy, while working in central Nebraska and was lucky enough

to have three great kids. As a result, I am now Papa to three grandkids with a fourth on the way in February. We started raising quarter horses in 1998 and discovered that training and working with them is a great stress reliever. The grandkids love feeding and caring for all the horses, especially the colts; the only problem is they want to name them all Shooting Star!



MIKE LIVINGSTON

Laboratory Operations Manager

MY CAREER IN THE DEPARTMENT OF AGRONOMY AND HORTICULTURE BEGAN IN JANUARY OF 1993 as a research technologist for Professor Jim Specht. During the course of the first year of my employment, scientist Kary Mullis was awarded the Nobel Prize for his invention of the polymerase chain reaction method. Jim said, “You should look into that.”

For 22 years I was able to be part of the newly developing world of plant genomics with the implementation of emerging technologies, new protocols and instrumentation. Our work led to the production and compilation of data that was part of the publication of the first comprehensive soybean genetic map.

With my familiarization of the wide array of instrumentation and equipment throughout the department and with the retirement of Jim, I was offered the unique opportunity and privilege to become the laboratory operations manager for the department. This position has proved to be rewarding, as each day I am challenged to find solutions to problems.

In this position I have the opportunity to work with the different disciplines in our department and with individuals from all over the world—these are the people that will feed the world. By collaborating and providing training opportunities, assisting with the development of protocols, and maintaining instrumentation, I am allowed to play a small role in the impact that our department will have around the globe. It is truly a privilege to work with the dedicated faculty and staff. It is a world-class team.

JENNY STEBBING

Research Manager

I FIRST CAME TO THE UNIVERSITY OF NEBRASKA–LINCOLN FROM MY HOMETOWN OF O’NEILL as an undergraduate majoring in agronomy. I was very lucky to spend those four years working in the department as a technician with Professors Alex Martin and Dave Mortensen, and I was able to learn a lot from them. I stayed within the department’s walls as I completed my master’s degree with Professor Robert Wilson in Scottsbluff, where I studied the effects of row spacing and sugarbeet variety on redroot pigweed.

With my dissertation focusing on the western corn rootworm, I completed my doctorate in the Entomology Department. I took a brief time-out from my career to stay at home and be a mom to my two sons. Then I spent several semesters as a lecturer for the Entomology Department and enjoyed working with the students.

Once my boys both reached school age, I applied for the position of weed technologist in the Department of Agronomy and Horticulture, where I assisted with research at the Havelock farm and the greenhouses. I then applied for a position with the Havelock Research Farm as a research technician III, and now I have become the research farm manager at Havelock and East Campus. As a native of rural Nebraska, I enjoy visiting the great state on many travels to my boys’ baseball games, fishing and camping—continuing to live the good life.



SUE WALKER

Business Manager

A LIFELONG NEBRASKAN, I SPENT MY YOUTH LIVING WITH MY GRANDPARENTS ON THEIR SMALL FARM in southeast Nebraska. My brothers and I grew up with chores; however, being the smallest and the only girl, I think I was spared much of the real work. I do remember having pet cows, and one chore was to bring the cows into the barnyard each evening. I also remember my

grandmother’s extremely large gardens.

I married a southeast Nebraska farmer and lived in a county with one stoplight—a frequent reference point when providing directions. After marriage and children, I attended college as a nontraditional student. We moved to Lincoln after college graduation and began work at the University of Nebraska–Lincoln for the Division of Continuing Studies, which was later dissolved.

One highlight of my career was assisting with the implementation of

SAP, the university’s financial and HR system, by serving on many committees associated with improving business processes. I still marvel at the incredible advancement from typing and snail-mailing forms to online, up-to-the-minute access to information. I thoroughly enjoyed being part of that major transformation of university processes.

Recruited to become a business manager for IANR in 2002, I began work in the newly formed HAPPI Business Center. In the ensuing years I reorganized HAPPI staffing from many departmental staff spending small portions of time to a fully dedicated staffing effort. HAPPI is a wonderful group of individuals, and I believe we provide high-quality customer service. We also specialize in problem solving with faculty and staff, training in business processes, and departmental fiscal support. If you have a question, we are here to help.

I have two grown children with spouses and am fortunate enough to have grandchildren here in Lincoln. Much of my spare time is spent with family, and I very much enjoy being Grandma! Other personal favorites include my Shepherd-Lab dog, Colorado and Wyoming mountains and reading.

STUDENTS JOIN THE CLUB



Range Management Club members Ethan Freese (from left), Autumn Dunn and Ryan Gardner attend the International Meeting of the Society for Range Management in Corpus Christi, Texas.

TALKING TURF

UNDERGRADUATE STUDENTS WHO LIKE TO “TALK TURF” CAN DO JUST THAT BY JOINING TURF CLUB. The club’s primary goal is to connect turfgrass management students with one another and with professional members of the turfgrass industry. Oftentimes, students form relationships that lead to future internships and, ideally, careers after graduation.

2016 has been one of the busiest years to date. In January, several students attended the Sports Turf Managers Association annual meeting in San Diego, California. There, they competed against other universities in the Student Challenge and claimed sixth place.

In February, six other students traveled to San Diego to attend the Golf Industry Show and compete in the Golf Course Superintendents Association of America’s annual Turf Bowl. Students were able to walk the trade show floor and meet members of the industry from across the country.

In April, the club traveled to Manhattan, Kansas, to battle the Kansas State University Turf Club for the Corn-Cat Cup. The club came out victorious in the scramble-style golf competition, and members defended their title in Lincoln this October.

In September, Turf Club helped with the aerification process at Indian Creek Golf Course in Omaha. Members gained hands-on experience that isn’t always available to students in their summer internships. The club also began to focus on and practice for the 2017 STMA and GCSAA meetings in Orlando, Florida.

Unrelated to turf, the club hosts occasional bowling nights on East Campus and organizes an intramural basketball team. To keep up with the latest happenings and learn more about Turf Club, follow [@unlturfclub](#) on Twitter.

Current officers are Andrew Getty, president; Jacob Fuehrer, vice president; Logan Leigh, secretary; and Kenton Fritson, treasurer. Anne Streich, associate professor of practice, is the club adviser. —**Andrew Getty, Turf Club president**



The Turf Club attends a meeting at the University of Nebraska–Lincoln East Campus turf research plots.

Horticulture Club members Elizabeth Lutz (from left), Nathan Duffy, Morgan Von Seggern and Chrissy Peters prepare for a plant sale. Below: The Horticulture Club enjoys a luau with club adviser Stacy Adams, on left.



HORTICULTURE CLUB LEAVES LASTING IMPRESSION WITH DONATION

2016 WAS A YEAR OF GROWTH, CHANGE AND GIVING FOR THE HORTICULTURE CLUB. The club annually organizes and hosts plant sales, and the profits from these sales enable club members to tour some of the country’s top-rated facilities. And this year, the club donated back to the university.

A donation of \$22,000, from past and present plant sales, was given for renovation of Plant Sciences Hall room 274. This room is principally used for horticulture laboratories. Renovation was completed in August 2016 in time for fall classes. “Current and former club members wanted to leave a lasting impression and plant a seed for the future of horticulture at the university,” Stacy Adams, club adviser, said.

The club has traditionally held two plant sales throughout the year; however, this past year the club introduced a fall sale that showcased pumpkin carving and holiday planters. In addition to the new sale, the club made plans to revitalize the poinsettia and spring sale with new and exciting plants and planters.

Horticulture Club thrives by creating new experiences that pique the interest and further the education of its members. Monthly tours to local and regional sites introduce members to diverse horticulture industries and help them discover a direction to take their talents. Perhaps the best stop on last year’s trip was to Minnesota Landscape Arboretum. There, students were able to see a larger variety of familial species side by side.

Make sure to like [Horticulture Club](#) on Facebook to keep up with important updates about the club’s sales and activities.

Current officers are Elizabeth Lutz, president; Chrissy Peters, vice president; Jaelyn Nelson, secretary; and Nathan Duffy, web coordinator. Adams and Dave Lambe, associate professors of practice, are the club advisers. —**Elizabeth Lutz, Horticulture Club president**

CONTESTS PREPARE CLUB MEMBERS FOR RANGE MANAGEMENT CAREERS

RANGE MANAGEMENT CLUB FOCUSES ON TEACHING STUDENTS ABOUT THE ECOLOGY AND MANAGEMENT OF RANGELAND ECOSYSTEMS and helps to prepare students for careers in range management. By connecting students with professionals, the club can help broaden students’ interests and expose them to rangeland ecosystems throughout the United States.

Each year, students attend the International Meeting of the Society for Range Management to practice their skills by participating in the plant identification contest and the undergraduate range management exam. Students can also present their own research and participate in other competitions, as well as attend seminars and network.

In February, four members of the club traveled to Corpus Christi, Texas, to attend the international meeting. There, they placed 10th in the URME out of over 20 universities. The club also attended the Nebraska Section Meeting of the Society for Range Management in Scottsbluff, where its annual Crazy Auction raised money for members to attend the international meeting. Students also had the opportunity to listen to speakers and network with professionals from around the state.

Cheryl Dunn, research manager herbarium curator, coaches the plant identification team and Professor Walter Schacht coaches the URME team. URME and plant identification teams meet every week until the international meeting in February. Range Management Club also has regular club meetings every other week on Wednesday evenings.

Current officers are Ethan Freese, president; Autumn Dunn, vice president/treasurer; and Ellen Dolph, primary programmer. Schacht and John Guretzky, associate professor, are the club advisers. —**Ethan Freese, Range Management Club president**



ABOVE: The Agronomy Club attends the annual Department of Agronomy and Horticulture Spring Appreciation Banquet. RIGHT: Club members Cody Keuster (from left), Brad Meusch, Amanda Vodvarka, Aliasha Dethlefs and Kristen Albrecht accept the Outstanding Student Organization award and the CASNR Alumni Association Engagement of Emeriti Faculty award at the CASNR Week awards banquet from CASNR Dean Steven Waller (center.)



AWARD-WINNING AGRONOMY CLUB

THE AGRONOMY CLUB HAS SEEN A LOT OF GROWTH OVER THE LAST FEW YEARS—growth in number, knowledge and experiences. This past year the club hosted emeriti members at the Emeriti Banquet, which was started in 2015. The event consisted of video presentations, an auction and networking with past professors. It was a great opportunity for current members to interact with emeriti members and hear their stories.

Various meetings and tours throughout the year kept club members busy. Industry leaders attended meetings to give presentations on career development, provide information on events taking place in the industry and share general knowledge of their business. The Agronomy Club toured plots at the Mead Agronomy Farm and the Lester F. Larsen Tractor Test & Power Museum. In addition, club members traveled to Lubbock, Texas, for this year's regional Students of Agronomy, Soils and Environmental Sciences conference. At SASES, students learned about Texas agriculture and had the opportunity to network with other agronomy clubs from around the nation.

The club's biggest highlight of the year was receiving two awards at the 16th annual CASNR Week awards banquet in April: Outstanding Student Organization and the CASNR Alumni Association Engagement of Emeriti Faculty. Also in the spring, the Crops Judging team attended contests and performed well.

The Agronomy Club is looking forward to another great year! Current officers are Cody McClellan, president; Kristen Albrecht, vice president; Katie Harrell, treasurer; Jeremy Kroeger, assistant treasurer; Sam Teten, secretary; and Aliasha Dethlefs, historian. Club advisers are Meghan Sindelar, assistant professor of practice, and Chris Proctor, assistant extension educator. —Aliasha Dethlefs, Agronomy Club historian

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GRADUATE STUDENT ASSOCIATION FILLS THE GAP FOR STUDENTS

SINCE 2014, THE AGRONOMY AND HORTICULTURE GRADUATE STUDENT ASSOCIATION HAS OFFERED A MENTORING PROGRAM TO ALL INCOMING STUDENTS in the departments of Agronomy and Horticulture and Plant Pathology. This program pairs new students with a senior graduate student for help in transitioning into graduate student life and living in Lincoln.

To promote interaction and networking among students from various specializations and expertise, this year AHGSA started two flagship programs: R-Club and SCImPLE (Scientific Communication and its Impact on Policy, Literacy and Education). R-club, which is led by Leonardo Bastos, Vikas Belamkar, Mon-Ray Shao and Sunil Kumar Kenchanmane Raju, has more than 60 registered participants who meet twice a month to learn about and discuss using R programming in research. SCImPLE, led by Jyothi Kumar, advocates the importance of science communication to peers and government agencies.

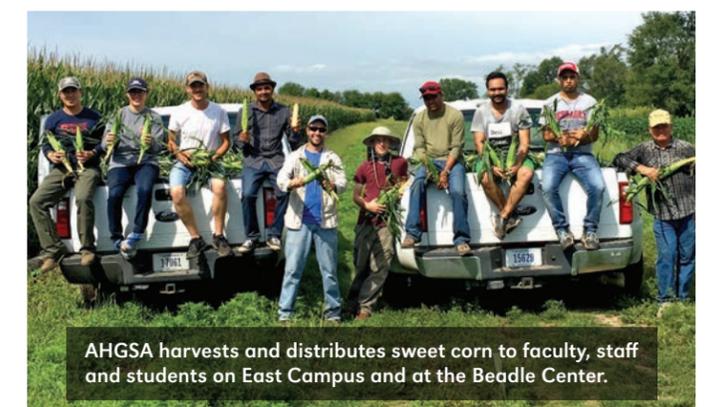
AHGSA meets monthly with invited speakers, including faculty members from the home departments and staff from various university programs, such as Graduate Studies and Career and Professional Development. In addition to regular meetings, the club organizes many social events, e.g., the Beadle Center Coffee Break, a chili cook-off, the annual Appreciation Banquet in the spring, a fall barbecue and holiday-themed parties for Thanksgiving and Christmas. AHGSA also coordinated with Professor Oscar Rodriguez and T.J. McAndrew, research facility coordinator, to harvest and distribute sweet corn to faculty,

staff and students on East Campus and at the Beadle Center in August.

Other activities of the club include industry tours. In August, club members traveled to Monsanto's Gothenburg Water Utilization Learning Center and the Dow AgroSciences operation in York. The club also participated in a fundraising event at Dow AgroSciences by helping harvest hybrid corn.

AHGSA thanks its advisers, Paul Read and Brian Waters, and Department Head Roch Gaussoin for their continued support.

Follow AHGSA on Twitter (@ahgsa_unl) and Facebook (UNL AHGSA.) —Sunil Kumar Kenchanmane Raju, president; Leonardo Bastos, vice president; Mon-Ray Shao, treasurer; and Parminder Chahal, secretary



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FROM CATCHING BABIES to flying drones

AMANDA SANFORD HAS ALWAYS HAD AN INVESTIGATIVE SPIRIT AND A NURTURING SOUL. She is a sort of scientist-mother hybrid, and that makes perfect sense when one considers her unusual career path, which includes dairy farms, midwifery, Army wife, goat producer and, now, graduate research assistant, at the University of Nebraska–Lincoln.

The mom of three owned up to the challenges of being a nontraditional student—what twenty-something has to pick up kids at gymnastics and be available to aging parents?—but she pointed out that there really aren't a lot of barriers. She also acknowledged the amazing support of the faculty. "They understand that life still takes priority," she said.

After graduating valedictorian of her high school class in Wisconsin, Sanford chose the University of North Carolina for college and graduated with a Bachelor of Arts in biology in 2000. Through her work on various organic vegetable farms, Sanford's interests shifted away from medicine and toward sustainable farming. She then attended the Wisconsin School for Beginning Dairy Farmers, a short course in the College of Agricultural and Life Sciences at the University of Wisconsin–Madison. After finishing the program in December 2001, Sanford

worked on a number of grass-based dairies and started her family.

In 2008 Sanford moved to Las Cruces, New Mexico, for midwifery school, and she became a Certified Professional Midwife in March 2010. "I caught about 120 babies in New Mexico and Wisconsin," she said.

When the Army sent the family to Oklahoma in 2011, they bought an acreage. "It was too small for cows, so we began raising goats," she said. Sanford also took advantage of nearby Cameron University to attain a Bachelor of Science in agriculture with an environmental science concentration in 2014. There, a range management professor told her that she had the potential to go through graduate school and encouraged her to keep going.

Sanford, who applied for a grant-funded position with the Department of Agronomy and Horticulture after seeing it advertised on a Texas A&M job board, joined the university in January 2016. Her family, along with 16 goats, followed her to Lincoln in June. Sanford's passion for animals is unmistakable (she jokingly called her goats "the love of my life") and this passion, no doubt, fuels her research.

With a specialization in range and forage sciences, Sanford's research studies the effect of grazing strategy on dung distribution and nutrient cycling in

pastures. Grazing trials are conducted at the Barta Brothers Ranch near Ainsworth over the summer months, and Sanford is hoping to spend more time there during the next research season. "The landscape there is so beautiful, so unexpected," she said.

By springtime, Sanford will be certified to fly drones, which are used to take images of pastures at the ranch.

By springtime, Sanford will be certified to fly drones, which are used to take images of pastures at the ranch. Then a geographic information system will be used to model the dung distribution spatially and temporally, helping researchers better understand how nutrients are returned to and cycled through the grazing ecosystem. Sanford has always loved caring for animals (her nurturing soul), and she is excited for the potential this research holds for grassland management (her investigative spirit).



Amanda Sanford

GRADUATE STUDENT AWARDS 2016

Nonoy Bandillo: International Quantitative Genetics Conference Fellowship Recipient

Angela Bastidas Gutierrez: Widaman Trust Distinguished Graduate Assistant Award

Leonardo Bastos: International Society of Precision Agriculture Outstanding Graduate Student Award, North Central Extension-Industry Soil Fertility Conference Outstanding Graduate Student Award, First-place American Society of Agronomy–Precision Agriculture Systems Community Graduate Student Poster Competition, First-place North Central Extension-Industry Soil Fertility Conference Student Poster

Madhav Bhatta: David H. & Anne E. Larrick Memorial Student Travel Fund Award, Second-place ASA-CSSA-SSSA Meetings Crop Breeding & Genetics Poster

Christine Bielski: First-place Society for Range Management Graduate Oral Paper Presentation, Hutchinson Travel Grant

Sarah Blecha: William J. Curtis Fellowship

Thomas Butts: Milton E. Mohr Fellowship, First-place North Central Weed Science Society Meeting Student Video

Daniel Santana de Carvalho: Milton E. Mohr Fellowship–Biotechnology Degree Program Recipient

Parminder Chahal: Graduate Studies Ph.D. Travel Grant, Third-place NCWSS Weed Contest Overall Graduate Team, David H. & Anne E. Larrick Memorial Student Travel Fund Award

Joel Crowther: Charles C. Cooper/Emma I. Sharpless Fellowship

Amanda Easterly: Operation Student Connection Fellowship, Al Moseman International Fellowship, Water For Food Institute Graduate Student Support Funding

Karen Ferreira da Silva: Milton E. Mohr Fellowship

Zahoor Ganie: Graduate Studies Ph.D. Travel Grant, Milton E. Mohr Fellowship

Mary Happ: Othmer Fellowship

Waseem Hussain: USDA Graduate Student Fellowship, International

Quantitative Genetics Conference Fellowship Recipient

Sunil Kumar Kenchanmane Raju: Graduate Studies Ph.D. Travel Grant, Henry M. Beachell Fellowship, Genetics and Genomics of Crop Improvement Symposium Best Poster

Jyothi Kumar: Milton E. Mohr Fellowship–Biotechnology Degree Program Recipient

Hardik S. Kundariya: Milton E. Mohr Fellowship–Biotechnology Degree Program Recipient

Torie Lindsey: Hutchinson Travel Grant

Samantha McConaughy: Great Lakes National Scholarship Program Recipient, International Quantitative Genetics Conference Fellowship Recipient

Margarita Rosa Marroquin Guzman: XVII IS-MPMI International Congress Travel Award, Milton E. Mohr Fellowship

Joshua Miller: David H. & Anne E. Larrick Memorial Student Travel Fund Award, Milton E. Mohr Fellowship, Second- and Third-place ASA Photography Contest, J. Artie and Arra Browning Plant Medicine and Health Travel Award

Matthew Nelson: First-place NCWSS Meeting Herbicide Physiology Graduate Poster, First-place NCWSS Meeting Application Methods and Equipment Graduate Presentation

Maxwel Oliveira: Third-place NCWSS Weed Contest Overall Graduate Team, First-place Weed Science Society of America Poster Presentation

Matthew Pedersen: USDA-Microsoft Innovation Challenge Honorable Mention–Open Source Application and Best Student-made App

Manbir Kaur Rakkar: SSSA Soil and Water Management and Conservation Division Graduate Student Oral Presentation Award

Morgan McPherson: Chancellor's Doctoral Fellowship

Raquel de Oliveira Rocha: Graduate Studies Ph.D. Travel Grant, Spring Graduate Research and Creative Activities Poster Session Winner, David H. & Anne E. Larrick Memorial Student Travel Fund

Award, Nebraska Agricultural and Life Sciences Spring Research Fair Poster Competition Winner

Caleb Roberts: Great Plains Graduate Fellow, Hutchinson Travel Grant

Leah Ruff: Agronomy and Horticulture Graduate Student Association Outstanding Member

Debalin Sarangi: Graduate Studies Ph.D. Travel Grant, Second-place NCWSS Weed Contest Agronomic Crops Graduate Student Poster

Lauren Segal: NASA Nebraska Space Grant Fellowship

Mon-Ray Shao: Widaman Trust Distinguished Graduate Assistant Award

Michael Sindelar: Daniel T. Walters Graduate Student Travel Fund, Third-place SSSA Soil Physics and Hydrology Division Oral Presentation and Poster

Zachary Stewart: Wirth/McGowen Global Food and Nutrition Security Fellowship, Gerald O. Mott Meritorious Graduate Student Award in Crop Science, Great Plains Soil Fertility Conference Outstanding Graduate Student, McNair Scholars Program Graduate Student Appreciation Award

Guangchao Sun: Milton E. Mohr Fellowship

Fatima Amor Tenorio: Widaman Trust Distinguished Graduate Assistant Award, David H. & Anne E. Larrick Memorial Student Travel Fund Award, Nebraska Agricultural and Life Sciences Spring Research Fair Poster Competition Winner

Don Treptow: Third-place NCWSS Weed Contest Overall Graduate Team

Bruno Canella Vieira: Third-place NCWSS Weed Contest Overall Graduate Team

Jorge Venegas: Widaman Trust Distinguished Graduate Assistant Award

Rodrigo Werle: WSSA Outstanding Graduate Student Award, North Central Extension-Industry Soil Fertility Conference Outstanding Graduate Student Award

Jacob Ziggafos: Sorghum Improvement Conference of North America Graduate Student Registration Scholarship

FROM FIELD TO FIELD

Foltz leaves a legacy

Editors' Note: Traditionally this newsletter features a senior student, which is determined well in advance of publication. We had decided to feature Sam Foltz nearly a year ago. Life is precious.

SAM FOLTZ LIVED MUCH OF HIS LIFE ON A FIELD.

Raised on the family farm in central Nebraska, Foltz followed his dream of being a Husker and walked on to the team in 2012. By 2014 he had earned a football scholarship, and in 2015 he was the Eddleman-Fields Big Ten Punter of the Year. In May of 2016, Foltz graduated from the University of Nebraska-Lincoln with a degree in agronomy.

Foltz, who was set to play his final year of football as a Nebraska graduate student, died in a tragic car accident on July 23, 2016, in Wisconsin, where he was assisting at a youth kicking camp.

Equally at home on the football field and in a field on his family's farm near Greeley, Foltz was proud of his background in agriculture and didn't want to be known as only a football player. According to Sam Hahn, a fellow farm kid and walk-on Husker who finished his degree in agronomy in December 2016, Foltz would sometimes say, "I'm not Sam the football player. I'm Sam the farmer, that's all I am."^{*}

That sounds like the kind of humility Foltz demonstrated every day. Truly, his life reflected six powerful words from his Twitter profile: "Dream Big, Work Hard, Stay Humble." He understood that big dreams take hard work. And he definitely worked hard. Then, after realizing a dream, he remained humble. Now that's a legacy worth leaving.

In last year's newsletter, Foltz's name appeared on page 10 in a list of undergraduate student awards. In November 2015, he had been named to Franco's List, an elite roster of University of Nebraska-Lincoln students who demonstrate outstanding integrity and strong moral character. According to Professor Dennis McCallister, who was Foltz's academic

adviser, his selection was well-deserved. He said that Foltz, like many student-athletes who juggle class schedules with sports calendars, approached time conflicts with an attitude of "how can we make this work?"

"I can't speak to his potential for a football career beyond college, but I am sure he would have been a fine professional agronomist and a good man in anything he chose to pursue," McCallister said. Department Head Roch Gaussoin was less reserved regarding Foltz's chances of playing professional football. He said, "Sam would have been drafted early and would have made a significant contribution before returning to his agronomic roots. Return he would have, given his passion for family and farming."

A month after Foltz's death, the Department of Athletics announced several initiatives to honor him, including awarding a football scholarship in his memory and renaming one of the athletic program's Life Skills awards. To recognize his

contributions in the community, the Hero Leadership Award will be renamed the Sam Foltz Hero 27 Leadership Award.

In the classroom, too, Foltz was a leader. "He was always eager to answer questions, unafraid to be incorrect but happy to be corrected, and enthusiastic when he was right, infusing the room with energy," said Salvador Ramirez II, who was Foltz's lab instructor for Agronomy 426 last spring. "He contributed to the atmosphere of learning and enthusiasm I was trying to create," Ramirez said.

According to Gaussoin, Foltz made a difference in the lives of students and faculty who interacted with him. "They were affected by his death, in awe of his academic achievements while playing D1 football and, most significantly, encouraged by his humble character and engaging personality." It's clear that while Foltz's life ended too soon, his legacy is just beginning.

^{*}Christopherson, Brian. "Foltz's Legacy of Hard Work Connects to Grand Island, Greeley, Family." *Lincoln Journal Star*, July 26, 2016.

IN REMEMBRANCE

CHARLES ROBERT FENSTER

July 16, 1919 – February 10, 2016



Professor Emeritus Charles Robert Fenster, age 96, died Feb. 10, 2016. Fenster was a dryland cropping systems specialist for the University of Nebraska-Lincoln at the Panhandle Research and Extension Center from 1956 until retiring in 1983. He was faculty supervisor at the High Plains Agricultural Laboratory north of Sidney from its establishment in 1970 until he retired 13 years later.

The HPAL building, built in 2014, was named after Fenster in 2015. His research at HPAL on dryland farming practices has had a widespread and lasting impact on wheat yields, soil and water conservation, and profitability. It has helped transform the way dryland farmers raise crops in the High Plains, from the original wheat-black fallow rotation, which was associated with dust storms and severe wind erosion, into the more productive, sustainable conservation tillage systems used today.

A Chappell native, Fenster taught vocational agriculture before going to work for the USDA Soil Conservation Service. He accepted a university assignment in 1956 to address soil and water management problems of dryland farming in the Panhandle. He operated first from the Box Butte Station at Alliance (since closed), then the Scottsbluff Station at Mitchell, and finally at the Panhandle Research and Extension Center at Scottsbluff. Wheat farmers came to regard Fenster as the authority in dryland crop and soil management.

In 1966 Fenster became a full professor and extension agronomist, one of few to earn the academic rank without a doctorate. He was inducted into the Nebraska Hall of Agricultural Achievement in 1983, and in 1991 he was

recognized as an honoree for the Nebraska Hall of Agricultural Achievement. In 2000 he was recognized as an honoree for the Nebraska Agribusiness Club's Public Service to Agriculture Award. He was the 2008 recipient of the Outstanding Service to Panhandle Agriculture Award.

In 2005 the Fensters, Charlie and his wife Eunice, endowed a major gift to establish an endowed professorship at the Panhandle Center, the Charles R. and Eunice R. Fenster Professorship Fund at the University of Nebraska Foundation.

BRANDON W. GERDES

June 26, 1995 – December 6, 2016



Brandon W. Gerdes, age 21, died Dec. 6, 2016. Gerdes attended Pierce Public Schools and graduated in 2014. He attended Northeast Community College before transferring to the University of Nebraska-Lincoln, where he majored in agronomy and was a member of the university Agronomy Club.

Gerdes' church was an important part of his life. He enjoyed spending time with his family and friends

listening to country music. He loved hunting, farming the family farm and raising livestock. He kept busy, going to school and working for Tvrdy Farms in Ceresco, Aschoff Brothers Farms in Osmond and Keck Crop Consulting in Plainview.

Gerdes was a member of Christ Lutheran Church in Pierce, where he taught Sunday school and was in the youth group. He was a member of the Future Farmers of America and Fellowship of Christian Athletes. He was on his high school honor roll, principal's honor roll and the boys letter club for four years. He played on the Pierce High School football and golf teams and was a member of the band for four years.

Sam Foltz



UNIVERSITY OF NEBRASKA-LINCOLN SOIL JUDGING TEAM
Third-place Region V and National Qualifier



GUSTAVO RODRIGUEZ (THIRD FROM LEFT) WITH
STEVEN KAISER (FROM LEFT), STEVEN WALLER
AND ROCH GAUSSOIN
CASNR Spirit Award



JOSE HENRIQUE SCARPARO DE SANCTIS
(FROM LEFT), FELIPE DE ANDRADE FALECO,
RODGER FARR AND RYAN LANGEMEIER
Third-place North Central Weed Science Society
Student Weed Contest Undergraduate Team

JACLYN NELSON
AmericanHort HortScholar



UNDERGRADUATE STUDENT AWARDS 2016

Isidor Ceperkovic: Second-place North Central Weed Science Society Meeting Poster Competition

Nathan Duffy: Western Nursery & Landscape Association's Student Advisory Committee, Milton E. Mohr Award-Biotechnology Degree Recipient

Felipe de Andrade Faleco: Third-place NCWSS Student Weed Contest Team, First-place NCWSS Meeting Poster Competition

Rodger Farr: Third-place NCWSS Student Weed Contest Team, Third-place Region V Team Soil Judging Contest-National Qualifier

Joe Foral: Sixth-place Sports Turf Managers Association Team Student Challenge

Neal Fulton: Chancellor's Scholar

Kolby Grint: Third-place Region V Team Soil Judging Contest-National Qualifier

Grace Hansen: University of Nebraska-Lincoln Center for Entrepreneurship 3-2-1 Quick Pich Winner

Ryan Langemeier: First-place NCWSS Student Weed Contest-Undergraduate Herbicide ID Category, Third-place NCWSS Student Weed Contest Team

Jeff Lenihan: STMA Safer Athletic Fields for Everyone Scholarship, Sixth-place STMA Team Student Challenge

Jennifer Myers: Milton E. Mohr Award-Biotechnology Degree Recipient

Jaclyn Nelson: AmericanHort HortScholar, Joseph Shinoda Memorial Scholarship, American Floral Endowment Mosmiller Intern Scholarship, AFE Jacob and Rita Van Namen Marketing Scholarship

Andjela Obradovic: Second-place NCWSS Student Weed Contest-Equipment and Application Methods Student Poster

Elizabeth Pierson: *Lawn & Landscape Magazine's* Richard Foster Award

Gustavo Rodriguez: CASNR Spirit Award

Jose Henrique Scarparo de Sanctis: Third-place NCWSS Student Weed Contest Team

Robyn Sullivan: Sixth-place STMA Team Student Challenge

Samantha Teten: Helena Chemical Company West Central Division Intern Award Winner, Third-place Region V Team Soil Judging Contest-National Qualifier

Josh Wehrbein: Milton E. Mohr Award-Biotechnology Degree Recipient

Amanda Vodvarka: American Society of Agronomy National Student Recognition Program, Martin Massengale Outstanding Senior Award

Milos Zaric: Second-place NCWSS Student Weed Contest-Herbicide Physiology Student Poster

SORGHUM

for the future of biofuels



Daniel Schachtman

BIOFUELS IN THE UNITED STATES ARE MAINLY PRODUCED USING CORN, BUT THE U.S. DEPARTMENT OF ENERGY IS AIMING TO EFFICIENTLY PRODUCE BIOFUELS FROM CELLULOSIC PLANT BIOMASS INSTEAD OF GRAINS. Sorghum, which is easy to plant and manage with current production systems, is likely to be a major player in the future of biofuels because it is stress tolerant and produces massive amounts of biomass.

While many scientists are engaged in making the chemical conversion of cellulose more efficient, members of the Department of Agronomy and Horticulture are focused on creating sustainable systems

for growing large amounts of sorghum biomass for biofuel production. In 2015 Daniel Schachtman, professor of agronomy and horticulture at the University of Nebraska-Lincoln, led a team of 14 researchers from across the nation to compete for funding to create a sustainable system for sorghum biomass. Other team members include Ismail Dweikat, sorghum breeder and professor of agronomy and horticulture, and Arthur Zygielbaum, remote sensing expert and associate research professor of natural resources.

The team's \$13.8 million proposal was funded, and now the researchers are actively engaged in testing 30 diverse

sorghum varieties and studying the root and leaf microbes under drought conditions in Scottsbluff and under low nitrogen conditions near Grand Island and Mead, Nebraska. The goal of the project is to develop the most nitrogen- and water-efficient sorghum lines and to identify soil microbes that will assist in nitrogen and water acquisition. Microbial solutions to improve crop productivity in marginal areas that lack nitrogen and water have not been extensively studied, so this project will also advance scientific understanding of microbes for other crops such as corn. —**Daniel Schachtman, professor, plant molecular physiologist, director of Center for Biotechnology**

Craig Chandler | University Communication

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A GLOBAL PERSPECTIVE DRIVES NEBRASKA'S DRY BEAN BREEDING PROGRAM



THE UNIVERSITY OF NEBRASKA DRY BEAN BREEDING PROGRAM IS DEVELOPING IMPROVED VARIETIES AND GERMLASM WITH HIGH YIELD POTENTIAL, resistance to multiple diseases, upright plant architecture, greater water use efficiency and better seed quality to maintain market competitiveness for the Nebraska bean industry. Breeding for disease resistance will lead to less chemical use, thereby favoring the environment and reducing production costs. Breeding for greater water use efficiency will allow for production using less water.

EXPANDING THE GENETIC RESEARCH

To take advantage of global opportunities, Carlos Urrea, dry bean breeding specialist, has expanded his genetics research to include additional market classes not previously grown extensively in this region. Several advanced, intermediate and early generation lines of great northern, pinto, small red, black, light red kidney, cranberry and yellow beans tested during the 2015 and 2016 growing season showed promising performance. When compared with the commercial checks, they had higher yield, better disease resistance and excellent seed quality.

During winter 2015, elite Nebraska-adapted great northern, pinto, light red kidney, cranberry, small red, black and yellow lines were crossed with several sources of germplasm possessing disease resistance, drought/heat tolerance and desirable agronomic traits (earliness and plant architecture) using the "Good x Good" approach. Hybridizations were performed to transfer specific genes, broaden the Nebraska genetic base and obtain desirable combinations. Single, double, three-way and multiple crosses were accomplished. Ninety-seven new F1s were produced, including 33 great northern/pinto, 7 light red kidney, 17 cranberry, 19 calima, 9 African and 12 yellow bean market classes. The F1 produced in the greenhouse at the Panhandle Research and Extension Center in Scottsbluff will be advanced to the F4 generation by bulking one pod per plant. Individual F5 plants will be selected considering plant architecture, disease resistance, earliness, seed quality and plant appearance.

DNA marker-assisted selection continues. Sequence characterized amplified region markers, or SCAR markers, are being used to incorporate and pyramid disease resistance genes. Marker-assisted selection complements disease screening through all breeding

generations. Through the use of a genome-wide association study, we detected 54 candidate genes based on both a priori, and gene search strategy in the 200kb surrounding region of significantly associated single-nucleotide polymorphisms with agronomic traits. We are studying the epigenetics for drought/heat tolerance to discover factors that regulate DNA control over expression of these traits.

Nebraska's program collaborates with other breeders/researchers both within the United States and internationally. International efforts include research on root rot, drought, bean common rust and common bacterial blight in Mozambique, Zambia and Uganda. Domestic collaborations include the Midwestern Regional Bean Performance Nursery (Nebraska, Colorado, North Dakota and Michigan), Western Regional Bean Trial (Nebraska, Washington, Idaho and Colorado), National Cooperative Dry Bean Nursery (10 states across the United States), National White Mold Nursery, and the shuttle breeding program between Nebraska and Puerto Rico. Urrea also serves as coordinator for the WRBT and CDBN, which involves procuring and distributing seeds, compiling the data and summarizing the results.

DEVELOPING A NEW CULTIVAR

Great northern common bean cultivar Panhandle Pride, developed by the dry bean breeding program in the Agricultural Research Division of the University of Nebraska Institute of Agriculture and Natural Resources, was released in 2016. Panhandle Pride was bred specifically for adaptation to the common bean growing conditions of Nebraska and for enhanced resistance to common bacterial blight, a major disease of common bean, and for improved resistance to common bean rust. Inoculation with several bean rust races under greenhouse conditions at Lincoln, Nebraska, in 2016 provided evidence for the presence of three genes for resistance to common bean rust that were confirmed with the SCAR markers.

Panhandle Pride exhibits a semi-upright indeterminate growth habit, has white flowers, blooms 44 days after planting, is a midseason bean maturing 87 days after planting and has an average seed size of 34.8 grams per 100 seeds. Breeder seed was increased in Powell, Washington, and foundation seed will be increased during 2017 in collaboration with Husker Genetics through the North Dakota State University Seed Foundation Program.

SHARING THE RESEARCH

Extension activities include mother and baby trials where elite lines are planted in growers' fields adjacent to local checks, thus allowing comparison of performance under actual agronomic conditions as displayed during the associated field days. Research results are published in refereed journals and shared with the Nebraska bean industry through articles in *The Bean Bag* and the agricultural section of the local newspaper as well as local radio and television stories.

Summer student employees are trained and participate in all dry bean breeding activities. Some have subsequently joined the program as summer interns, gaining credits toward their degrees. —**Carlos A. Urrea, associate professor and dry bean breeding specialist, Panhandle Research and Extension Center**



ABOVE LEFT: Researchers from Wyoming, Michigan, Nebraska, Puerto Rico and CIAT, Colombia, take data on the cultivar Coyne, pictured on right. This great northern bean, released in 2008, shows common bacterial blight resistance compared to the commercial cultivar, on left. ABOVE: Plants are showing an upright plant architecture in Puerto Rico, 2016.

ORNAMENTAL PEARL MILLET: Breeding for Beauty

WITH ITS UNIQUE UPRIGHT STATURE, WIDE LEAVES, SEED HEADS THAT RESEMBLE CATTAILS AND DARK PURPLE COLOR, PURPLE MAJESTY WON THE 2003 ALL-AMERICA SELECTION GOLD MEDAL. It was the first major ornamental release of pearl millet, which is often regarded as a grain or forage crop and is recognized for its exceptional heat and drought tolerance. Interesting off-types, such as plants with purple leaves, heavily bristled seed heads resembling a bottle brush or cattail and dwarf stature, were recognized for their beauty and developed further as ornamentals for the landscape. The ornamental pearl millet breeding program, established by Emeritus Research Professor David Andrews, has since released Purple Baron, Jester, Jade Princess and, most recently, Copper Prince.

Keenan Amundsen and his lab and nursery manager, Carol Caha, feverishly work to keep pace with Andrews to learn the intricacies of breeding ornamental pearl millet as they assume leadership of the breeding program. Amundsen said that the learning curve is steep; however, it is also a lot of fun. Unlike breeding for complex traits with marginal gains, when ornamental traits are recombined, the results can usually be seen in the next generation of plants. The breeding goals are to create vibrant colors and textures so that ornamental pearl millet adds to the beauty of a garden and, when highlighted, becomes a showpiece.

—**Keenan Amundsen, assistant professor and turfgrass geneticist**



BUILDING a better BEAN

THE UNIVERSITY OF NEBRASKA-LINCOLN IS WORKING TO DEVELOP A BETTER SOYBEAN FOR PRODUCERS AND CONSUMERS. Three programs in the Department of Agronomy and Horticulture help that effort with their work in soybean genomics, biotechnology and breeding. The overall goal in plant breeding and genetics is to improve the crop through a better understanding of the relationship between the forms of genes in the crop, called genotype, and how those genes affect a trait, which we call phenotype. By understanding the genetics and how genes interact with each other as well as how the environment affects the genes that result in the final phenotype, we can do a better job of creating superior genotypes and phenotypes for breeding and production.

RECOMBINATION OF SOYBEAN GENES

In breeding, we want to create new genetic variation that we can then evaluate and select for improved traits of interest, e.g., yield, compositional quality, resistance to pests and diseases, and improved quality for end use applications like feed, food and industrial applications. Soybean is an amazing crop that produces a high-quality vegetable oil and protein meal, both well-suited for feed, food and industrial uses. One source of new variation is the genes already present in soybean. We can recombine those genes in new ways through breeding to create new combinations of genes, or genotypes, that result in improved yield or other traits of interest.

A valuable resource is the USDA Soybean Germplasm Collection, which contains more than 20,000 soybean accessions, or different genotypes, collected from places where soybean originated—China, Japan, Korea and Russia as well as from

other countries around the world. Over 85 percent of the current commercial soybean germplasm pool in the United States is based on fewer than 17 original soybean accessions. So one large coordinated effort led by the University of Nebraska is to evaluate a large number of accessions in the collection for yield and other agronomic traits, and use recently developed genomic tools, such as the DNA genotype information available for all accessions, to identify superior genotypes out of those 20,000 that will help us make better and quicker progress in our breeding programs.

SOYBEAN IS AN AMAZING CROP THAT PRODUCES A HIGH-QUALITY VEGETABLE OIL AND PROTEIN MEAL, BOTH WELL-SUITED FOR FEED, FOOD AND INDUSTRIAL USES.

To get a good idea of the yield and performance of new soybean lines we develop from crossing, the soybean breeding program evaluates thousands of new lines each year at 12 or more locations in farmers' fields in Nebraska. Those locations represent the soybean production areas in Nebraska and provide replicated test information over multiple locations to identify superior yielding lines.



One current research project, supported by the North Central Soybean Research Program, is to correlate the genotype information on thousands of lines from different crosses with their yield and other phenotype information from those multiple locations and years. Then we can develop prediction models and select soybean lines from new crosses based on their genotype information. That is "genomic selection," and it could help us increase the genetic gain per year by increasing effectiveness of selection and decreasing the time between cycles of breeding.

The soybean breeding program has been successful in developing superior soybean cultivars for Nebraska producers. Some current releases include the following:

- (1) U11-614093 soybean, which was the highest yielding line in both irrigated and drought tests and has been a consistent high yielder across locations and years. It is an early maturity group 3 line well adapted to Nebraska production environments.
- (2) U11-911079 soybean has excellent resistance to soybean cyst nematode and yields well in both SCN-infested and non-SCN-infested fields. It also has excellent resistance to phytophthora root rot and tolerance to iron deficiency chlorosis in high-pH soils. This mid-maturity group 2 line is well adapted to Nebraska production environments, especially those with SCN, higher pH or phytophthora issues.
- (3) U11-920017 soybean is a late maturity group 2 soybean with superior yield and excellent phytophthora resistance. It was the No. 1 yielding line in the USDA Uniform Soybean Tests across the

north-central region for the 2014–2015 two-year average and is well adapted to Nebraska production environments.

These and other new releases are available for Nebraska producers. We continue to evaluate new ways to improve our efficiency and effectiveness to provide superior yield, quality and stability for Nebraska soybean producers.

IDENTIFICATION OF HIGH-YIELD GENES

One of these new ways to improve soybean breeding has been genomics. We strive to take basic genetic and genomic discoveries in soybean and translate that knowledge into applied methods that can be incorporated into the breeding program for real-world improvement of soybean lines. This research includes developing new molecular marker methods and strategies to better utilize and incorporate genetic diversity into newly developed lines. The soybean genomics program also works to understand the genetic basis of agronomically important traits: yield, drought tolerance, iron deficiency chlorosis, soybean cyst nematode, sudden death syndrome, phytophthora resistance and response to water abundance. Understanding the genetic basis of these traits will help the continued improvement of these traits even as we may face more extreme environmental conditions in Nebraska fields. We also work to develop molecular methods to more efficiently incorporate the genes responsible for these traits into high-yield soybean varieties.

One project currently funded by the Nebraska Soybean Board looks to help stabilize yield across the diverse Nebraska environments where farmers grow their soybeans. Any newly released cultivar has to have consistent high yields across a large geographical region. Many experimental varieties are eliminated in advanced yield trials because they may yield at the top of some yield tests but near the bottom of other tests. This ability to consistently yield across diverse environments is likely due to yield stability genes.

Currently we are working to find molecular markers associated with yield stability across Nebraska soybean production areas and to understand the genetics of these yield stability genes. To study yield stability, we are taking advanced lines from the current breeding program and will be testing them across several test locations over multiple years to measure their yield stability. We will also determine the genetic sequence of each line and, using advanced analysis techniques, determine regions in the soybean genome contributing to the ability of some soybean cultivars to yield consistently across environments. With this information we will be able to deploy tools such as molecular markers in the soybean breeding program to enrich and enhance the breeding populations for yield stability earlier in the breeding program.

CONTINUED ON PAGE 20.



Kampachi (*Seriola rivoliana*) production

BUILDING A BETTER BEAN, CONTINUED FROM PAGE 19.

MODIFICATION OF SOYBEAN GENES

While many traits are improved through soybean breeding and genomics, there are some traits where biotechnology is essential for creating new traits that add value to the soybean seed. Biotechnology may be used to modify expression of genes that already exist in the soybean plant, resulting in a new, desired phenotype. One example of this is the successful development of a soybean that produces oil high in oleic acid. The oil is more than 70 percent oleic acid, which is closer to the composition of olive oil, and is useful for many food applications. In addition, the high-oleic acid oil has been shown to be superior to normal soybean oil in biodiesel applications as well. In this case, biotechnology provides new variation by modulating expression of existing genes in the plant.

Another powerful way that biotechnology contributes to improved crops is by adding new genes that do not currently exist in the plant. An example of that is producing high omega-3 fish oils in the soybean. The capacity for that does not exist among the 20,000 soybean accessions in the USDA collection nor, for that matter, in any soybean collection around the world. However, the plant transformation group at the University of Nebraska, supported by the Nebraska Soybean Board, has successfully developed soybean plants that produce true fish oils in the soybean seed.

Currently, the aquaculture industry sources its protein and oil almost exclusively from wild-caught fisheries. With fish consumption increasing throughout the world, more than half of the future fish harvest is predicted to be farm-raised. The expected demand on the wild fisheries, to meet the expansion of aquaculture, is likely unsustainable. To address this challenge, a transdisciplinary team of researchers was assembled with expertise in aquaculture, feed formulation, agriculture economics, biotechnology and biochemistry. The goal was to design a sustainable aquaculture feed devoid of marine ingredients with emphasis on the three prongs of sustainability: environmental impacts, societal impacts and economic viability. Toward this goal a soybean-based aquafeed formulation has been evaluated in feeding trials with a high-end finfish, Kampachi (*Seriola rivoliana*), farmed on aquaculture cages off the coast of Kona, Hawaii.



Late development stage soybean seeds—commodity soybean on left and carotenoid-producing soybean on right.

The tested aquaculture feed is formulated with 40 percent soybean protein concentrate inclusion level, and 50 percent of the oil component of the feed pellet is sourced from high omega-3 fatty acid soybean oil. These feeding trials demonstrated that this 40 percent SPC aquafeed formulation has similar feed conversion and growth rates as compared to commercial control aquafeed, which consists of 60 percent fishmeal and 100 percent fish oil. Importantly, harvested filets from these trials revealed more total omega-3 fatty acids in the flesh SPC formulation, relative to filets obtained from control-fed fish. Moreover, a taste-testing panel study showed consumers were unable to differentiate filets harvested from the SPC formulation diet from those obtained from the commercial-fed diet in flavor, texture or appearance. Cost estimates on this SPC-formulated aquafeed are comparable to the current commercial formulated feeds.

The team is exploiting the tools of synthetic biology to introduce novel genetic variation into soybean for the simultaneous production of oil that mirrors fish oil, along with the synthesis of a high value (\$500 to \$1,500 per kilogram) carotenoid utilized in many feed formulations. With these dual value-added co-products, the soybean is, in essence, the prototype soybean-based feedstock for aquaculture. This designer soybean accumulates the high value protein, for the displacement of fishmeal, while the enhanced oil characteristics can effectively displace the fish oil component of aquafeeds. The hurdles that remain in bringing to fruition such technology onto the marketplace reside primarily in overcoming the global regulatory issues that govern utility of such innovations by society. —Tom Clemente, Eugene W. Price Distinguished Professor of Biotechnology; George Graef, Nebraska Soybean Producers' Presidential Chair in Soybean Breeding; and David Hyten, Haskins Professor of Plant Genetics and associate professor of soybean genetics and genomics



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Nebraska researchers establish center focused on root metabolism

THE CENTER FOR ROOT AND RHIZOBIOME INNOVATION WAS FUNDED BY THE NATIONAL SCIENCE FOUNDATION'S EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH on June 11, 2016, for \$20 million, with \$12 million directed toward research. A collaborative grant, CRRI includes researchers from University of Nebraska-Lincoln, University of Nebraska at Kearney, University of Nebraska Medical Center and Doane University.

CRRI establishes a multidisciplinary project aimed at understanding how root metabolism affects the types of soil microbes that interact with roots. This basic research will be linked to greenhouse- and field-based studies that will determine whether root interactions with specific soil microbes improves plant health and performance in response to low soil nitrogen and water stress. The project also includes a synthetic biology component that will develop advanced tools for rapid and precise crop improvement. These tools will be applied to alter root metabolism with the goal of testing whether tailored exudate compositions can attract beneficial soil microbes to roots.

The research will be conducted using an extensive collection of maize genotypes and wild relatives to understand how genetic diversity affects root exudates and root-associated microbes. It is envisioned that the project will lead to novel, sustainable approaches for improving crop productivity with reduced soil fertility and water inputs as well as increase the university's capabilities in next-generation biotechnology for precise and predictive crop improvement.

Although the project is focused on maize, the findings will be applicable to other Nebraska crops, including soybean, wheat and sorghum. Central to CRRI's success will be use of the Department of Agronomy and Horticulture field and greenhouse resources and participation by a number of the department's faculty, including Professor Tom Clemente, Professor Rhae Drijber, Professor Daniel Schachtman, Associate Professor Harkamal Walia and Assistant Professor James Schnable. —Edgar Cahoon, George W. Holmes Professor of Biochemistry and director of Center for Plant Science Innovation

Edgar Cahoon, professor of biochemistry and director of Center for Plant Science Innovation, and James Alfano, professor of plant pathology, are leading a \$20 million, Nebraska-based research effort to improve crop productivity. ABOVE: The Center for Root and Rhizobiome Innovation includes researchers from the University of Nebraska-Lincoln, University of Nebraska at Kearney, University of Nebraska Medical Center and Doane University.



Craig Chandler | University Communication



TOP: Edgar Cahoon (left), professor of biochemistry and director of Center for Plant Science Innovation, and James Alfano, professor of plant pathology, are leading a \$20 million, Nebraska-based research effort to improve crop productivity. ABOVE: The Center for Root and Rhizobiome Innovation includes researchers from the University of Nebraska-Lincoln, University of Nebraska at Kearney, University of Nebraska Medical Center and Doane University.

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JUST LIKE HUMANS, CATTLE MAKE MULTIPLE DECISIONS THROUGHOUT THE DAY ON WHERE AND WHAT THEY EAT.

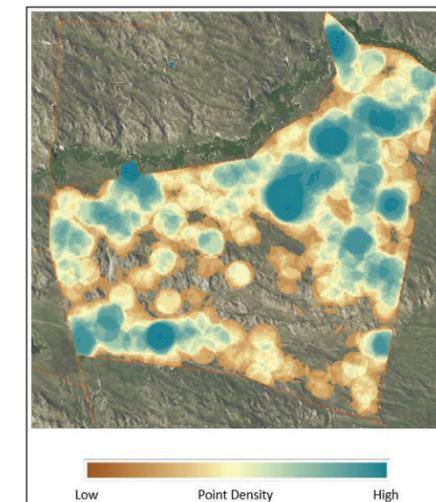
Many rangelands have a variety of resources for cattle to choose from when they select grazing sites. Free-ranging cattle in large pastures often select some areas of a pasture more frequently than other areas. This selection pressure can potentially lead to heavy grazing, and subsequent reduced rangeland health, on some areas, while other areas of the pasture receive little to no grazing.

Current research in the Nebraska Sandhills is evaluating what factors influence cattle grazing site selection and

how these decisions change throughout the growing season. To accomplish the objectives of this research, global positioning system technology is being used to continuously track cattle movements within pastures.

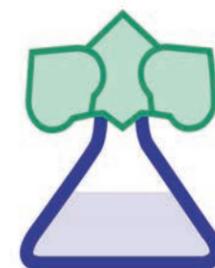
Cattle are fitted with GPS tracking collars that record their precise location at 10-minute intervals. Over the course of the summer, the collars will record approximately 14,000 independent locations for each collared cow. The collars also have a movement sensor that records side-to-side and up-and-down head movements of the cattle. With this sensor, researchers are able to correlate head movements with visual observations of cattle activity to determine when cattle are grazing, walking or resting. As a result, locations of cattle within the pasture as well as when and where they are grazing can be determined and evaluated.

Overall, the goal of this research is to better understand how cattle grazing behavior can be incorporated into grazing management decisions to



Map of cattle GPS locations in the late summer on Sandhills rangelands. Areas with high point densities are more highly selected for by cattle compared to areas with low point densities. Small blue dots represent water locations.

better utilize rangeland resources in the Nebraska Sandhills. —Mitchell B. Stephenson, assistant professor, range and forage management specialist, Panhandle Research and Extension Center



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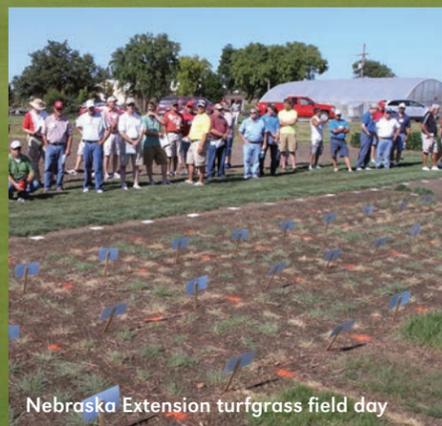
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Nebraska Extension turfgrass field day



Nebraska Extension turfgrass field day, turf research plots, East Campus

Gramineae under foot

ASSISTANT PROFESSOR KEENAN AMUNDSEN EXPLAINED TO HIS INTRODUCTORY TURFGRASS MANAGEMENT CLASS WHY THERE WAS STILL A LOT OF WORK AHEAD FOR HIS INDUSTRY. The students, arriving for the 8 a.m. class, were coming in out of the rain and drying off. He said that on his drive to work that morning, he passed at least three lawn irrigation systems that were running even though it had been raining all night and water was standing throughout Lincoln. Across the country, water conservation is probably the single most important challenge facing modern agriculture and the turfgrass industry.

Amundsen, who joined the Department of Agronomy and Horticulture in 2011, leads the turfgrass breeding program. He got his start in the turfgrass industry golfing with his father in Lansing, Michigan, at the Waverly Country Club, which is no longer a golf course and is now farmed. He was a student in the turfgrass management program at Michigan State University and believed that if turfgrass systems could be managed in a more sustainable way, it would lead to resource conservation, reduced applications and equipment wear, fewer labor hours and

smaller budgets—ultimately saving golf courses and jobs. He felt the two ways of addressing turfgrass system sustainability were through better management practices or through improved turfgrass cultivars that could be managed with fewer inputs; he embraced the latter and began his pursuit of a career in turfgrass breeding.

Amundsen was hired into the department as a turfgrass geneticist because he has formal training in bioinformatics and computational biology, which, he explained, is really just a fancy way of saying that he uses computers to analyze complex biological data sets. He uses these skills to develop molecular markers associated with desirable traits that can be applied to his breeding program and improve how quickly he can develop new cultivars, and to characterize genetic relationships among his germplasm collection. He loves the excitement of creating new turfgrasses through crosses that no one has seen before. Combining desirable turfgrass traits with pest tolerance and abiotic stress resistance into a single genetic background is his biggest yet most rewarding challenge. These breeding efforts align directly with his long-term

goal for improving the sustainability of managed turfgrass systems.

Assistant Professor Cole Thompson, the newest research faculty member of the turfgrass science team, joined the department in the summer of 2016. Thompson became interested in turfgrass management through an interest in golf. A voluntary position picking the driving range at the 9-hole country club in his hometown of Beloit, Kansas, turned into a summer position on the golf course maintenance staff during his high school years. Thompson continued to work on golf courses as he studied turfgrass science at Kansas State University.

Thompson is an integrated turfgrass systems management specialist with research focused on input-limited weed and disease management in all turfgrass settings, especially considering cultural and alternative pest management strategies for difficult-to-control weeds and diseases, and ecological aspects of pest prevalence. He is working to modify pest management recommendations to increase flexibility for professional turfgrass managers by more precisely accounting for factors that do or do not affect the efficacy of control strategies.

His research is also helping to more precisely describe levels of pest incidence that are commercially acceptable to increase fiscal savings and reduce environmental risk through reduced pesticide applications. In the long term, this research will link acceptable levels of weed incidence to the minimum levels of plant biodiversity required to provide ecosystem services such as insect and microorganism habitat. Thompson is also hoping to develop and oversee a lab that will diagnose turfgrass diseases and provide management recommendations for professional turfgrass managers in the region.

The third member of the turfgrass science team is Assistant Professor William “Bill” Kreuser, extension turfgrass specialist. A native of Wisconsin, Kreuser jumped into the turfgrass industry when he installed a USGA putting green in his parents’ backyard at the age of 15. After working at local country clubs in high school, Kreuser pursued a B.S. in soil science with a turf and grounds management specialization at the University of Wisconsin–Madison. There, Kreuser discovered his love of research and saw the power of extension. “It’s great to help everyone from homeowners to lawn care operators to golf and sports turf managers grow grass in an environmentally and economically friendly manner,” Kreuser said.

After completing a Master of Science degree at Wisconsin and a doctorate in horticulture at Cornell University, Kreuser joined the turf team in January of 2014. His research focuses on turfgrass ecology and stress physiology. Kreuser described himself as the physical therapist or dietitian of the team because he stresses the importance of sound management to reduce the reliance on water and pesticides.

GAME PLAN FOR BETTER TURF: EXTENSION, RESEARCH, TEACHING

Together, Thompson and Kreuser spearhead extension programming and work to encourage precision turfgrass management in all settings and for all stakeholders, including homeowners and professional turfgrass managers. They work to educate practitioners about expectations and how those are integrated into turfgrass management and pest control strategies and to encourage input-limited management while maximizing turfgrass performance. Since taking the reins, they have reformatted the annual Turfgrass Conference in La Vista, Nebraska; constructed a new turfgrass research and extension facility on East Campus, where they hosted the 2016

project is to develop best management practices to help reduce water use and pesticide requirements on golf course fairways with native buffalograss. This research is being conducted on the new East Campus turf plots and replicated on a fairway at Holmes Golf Course in Lincoln.

In addition to educating turfgrass managers, a significant portion of the team’s time is devoted to training the next generation of hobbyist and professional turfgrass managers. Amundsen teaches an introductory turfgrass management course, Kreuser teaches the junior level turfgrass science and management course, and Thompson teaches the capstone turfgrass systems management course.



University of Nebraska–Lincoln turf research plots, East Campus

Summer Turfgrass Field Day in July; and expanded the amount and types of extension materials online. In 2016, the turf program released a decision support tool called GreenKeeper, greenkeeperapp.com, to help golf course superintendents schedule and record fertilizer and pesticide applications.

A key to having a successful extension program is having a dynamic, well-integrated and applicable research program. While Amundsen, Thompson and Kreuser appear to have diverse research interests, they work together to address some of the biggest challenges facing the turfgrass industry right now. For example, new research in 2017 will investigate the feasibility of buffalograss fairways in the Great Plains region. The goal of this

Enrollment has continued to be strong relative to peer institutions, in part, from the recruiting and advising work of Anne Streich, associate professor of practice and undergraduate recruitment specialist. Streich teaches the survey of turf and landscape management course, organizes the internship program and advises the turf competition teams. The program has maintained extremely high job placement within the industry for more than a decade. Amundsen, Kreuser and Thompson attribute their success to overwhelming support from the department, institute, university and local stakeholders such as the Nebraska Turfgrass Association and countless others. —**Bill Kreuser, assistant professor and extension turfgrass specialist**

BETTER TURF THROUGH RESEARCH AND EDUCATION

The Nebraska Turfgrass Association seeks to provide better turf for all aspects of the industry and works in conjunction with the University of Nebraska, Institute of Agriculture and Natural Resources, and the Department of Agronomy and Horticulture. NTA also allocates funds for the direct support of the University of Nebraska turfgrass research program.

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SCIENTISTS EVALUATE LOCALLY ADAPTED HOP CULTIVARS

HOPS (*HUMULUS LUPULUS*) WERE HISTORICALLY GROWN IN THE EASTERN UNITED STATES, WHERE THEY WERE INTRODUCED BY EUROPEAN SETTLERS. In the early 1900s, hop production in the east was decimated by disease. Shortly thereafter, prohibition was enacted and local demand for hops declined.

The U.S. hop industry rebounded in the Pacific Northwest region to satisfy international demand for hops following the loss of production in Europe during World War I. Today the Pacific Northwest is the primary domestic producing region, accounting for approximately 95 percent of all U.S. hops. With the focus of production on the Pacific Northwest, hop cultivar selection and management practices were adapted specific to that growing region.

Increased consumer interest and demand for craft brews could change that. Craft breweries distinguish their brews from others by offering unique flavors and locally sourced ingredients, including hops. Beer flavor is influenced by the content of hop alpha acids, affecting bitterness, and essential oils, providing distinct aromas.

The Department of Agronomy and Horticulture initiated an effort, led by Stacy Adams and Keenan Amundsen, to educate hobbyist and commercial growers and to develop locally adapted hop cultivars. Amundsen is identifying Nebraska heirloom hops possessing local adaptation traits believed to have originated as hops were transported across the country during the early to mid-1900s. He then plans to develop new cultivars that have superior brewing qualities that also grow well and resist regional pests.

Adams is evaluating the performance of eight brewer-desired hop cultivars in different growing environments and monitoring for potential pests and diseases across the state. He uses the information to educate and inform growers. Increasing demand for information is evident by a recent growers seminar organized by Adams that had 84 attendees, most of whom had little prior knowledge of hops. —Stacy Adams, associate professor of practice, and Keenan Amundsen, assistant professor



ABOVE: Keenan Amundsen joins a local expedition to collect Nebraska heirloom hops near Ord, Nebraska. RIGHT: Brewer's Gold hops are ready for harvest in August at the University of Nebraska-Lincoln Teaching and Extension Garden.



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Exploring the intersection of ecology and society in tACAS lab

Carissa Wonkka

I HAVE BEEN A POSTDOCTORAL RESEARCH ASSOCIATE IN THE APPLIED COMPLEX ADAPTIVE SYSTEMS LAB, LED BY ASSISTANT PROFESSOR DIRAC TWIDWELL, FOR TWO YEARS.

After obtaining a juris doctor degree from Suffolk Law School and a master's degree and doctorate in ecosystem science and management from Texas A&M, I was searching for a position that would allow me to combine the skillsets developed through those programs. Twidwell's lab, known as tACAS, provided that opportunity.

The lab undertakes broad, transdisciplinary research to focus on system-level approaches to understanding complex dynamics in socio-ecological (combined human-environment) systems. I get to use my understanding of the legal system, which often constrains human interactions with ecological systems, to explore pressing socio-ecological issues. The large lab, composed of a mix of talented doctoral and master's students with myriad backgrounds, provides a unique and productive lab culture. We are able to act as sounding boards for each other, often engaging in lively lab discussions as well as collaborating with one another on research projects to take advantage of the wide range of expertise represented in the lab.

to be invited as a research collaborator to lead a discussion on legal constraints to the use of prescribed fire during the development of the landowner-led Nebraska Prescribed Fire Council.

Twidwell and tACAS lab foster these types of opportunities. This is important to me as a scientist who strives to undertake usable science that benefits Nebraska's ecosystems and the people who depend on them. I look forward to having a role in developing a greater understanding of dynamic socio-ecological interactions as the lab moves forward in this exciting area of research. —**Carissa Wonkka, postdoctoral research associate**

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“I get to use my understanding of the legal system, which often constrains human interactions with ecological systems, to explore pressing socio-ecological issues.”

I have been able to participate in a wide variety of projects, including quantifying components of ecosystem resilience to wildfire and exploring the vulnerability of non-forested ecosystems to climate change. I've also been afforded opportunities to work with landowners and agency personnel to develop research aimed at addressing important socio-ecological problems in Nebraska. For instance, I was excited

NEW FACULTY HIRES



Christian Elowsky

Assistant Professor of Practice

CHRISTIAN ELOWSKY JOINED THE DEPARTMENT AUG. 17. His current appointment is 60 percent teaching of plant science courses including an introductory botany course. He is also developing a plant anatomy course and other hands-on courses and labs.

The other 40 percent of his appointment is based in the Morrison Microscopy Core Research Facility at the Beadle Center, utilizing confocal microscopy techniques for a wide variety of biological samples. His current research interests revolve around confocal microscopy and forensic biology.

Elowsky received a bachelor's degree in horticulture from the University of Nebraska-Lincoln and went on to earn a master's degree in the School of Biological Sciences. He completed his doctorate in the School of Natural Resources.

Elowsky credits Jay Fitzgerald, emeritus professor of horticulture, for persuading him to attend Nebraska and his hometown FFA program in Schuyler, Nebraska, with directing him to horticultural sciences.

In his spare time, Elowsky keeps tarantulas and enjoys macrophotography. He has also been involved with raptor rescue since 2005. He hopes to start tour biking when time allows.



Terri James

Assistant Extension Educator

TERRI JAMES IS NO STRANGER TO THE UNIVERSITY OF NEBRASKA-LINCOLN. She grew up on a small, family-owned farm just south of Lincoln. In 2003 she received a bachelor's degree in horticulture with an emphasis on design from Nebraska. She was then offered a position with the Nebraska State Fair Park in Lincoln as the property's horticulturist, and she managed the 200-acre property for the next five years.

She returned to the university and the department in 2008, taking the position of extension assistant for urban gardening, and continued her education at Nebraska by pursuing a master's degree in public horticulture. She received her master's degree in May 2016.

James joined the department faculty Aug. 1 as an extension educator. She is coordinating the Nebraska Master Gardener program and working with Backyard Farmer.

James said her goal is to increase participation in and awareness of these programs in the state and region. She would like both to be the place to go for quality, science-based horticultural information. She plans to accomplish this through print media and constantly evolving multimedia communications.

James has lived in south Lincoln for the past three years with her husband, Russ, and their chocolate lab, Ace, and she continues to add to and improve her own urban landscape.

NEW FACULTY HIRES



Joe Keaschall

Professor of Practice
and Plant Breeder

JOE KEASCHALL GREW UP ON A CROP AND LIVESTOCK FARM NEAR RAVENNA, NEBRASKA.

He joined the department Aug. 15 as the new plant breeding professor of practice. He comes to the University of Nebraska–Lincoln from DuPont Pioneer, where he was the corn product program director for Latin America and the Southern/Western United States. He also served on the leadership team for the Ag Traits group.

He earned a bachelor's degree in agronomy with high distinction and a master's degree in plant breeding and genetics both from Nebraska. He went on to earn a doctorate in plant breeding and genetics at Purdue University in sorghum breeding.

He was a corn breeder for Pioneer Hi-Bred International, Inc. at Windfall, Indiana, for 11 years. He later became a research director for DuPont Pioneer in Johnston, Iowa, for 19 years.

Keaschall's research involves drought tolerance improvement and yield enhancement and stabilization of crops in Nebraska and the world. He is currently teaching graduate courses in plant breeding.

Keaschall is a sports enthusiast with an affection for the Nebraska Cornhuskers, Purdue Boilermakers, Indianapolis Colts and Kansas City Royals. He also enjoys spending time with his wife, Deb, and their three adult sons.



Nevin Lawrence

Assistant Professor
and Integrated Weed
Management Specialist

NEVIN LAWRENCE WAS BORN IN HOT SPRINGS, SOUTH DAKOTA, BUT GREW UP IN CASPER, WYOMING.

He first became interested in weed management while working for a local weed and pest district reducing invasive weeds in rangeland and natural areas.

His passion led him to earn a bachelor's degree in agroecology and a master's degree in agronomy from the University of Wyoming before earning a doctorate in crop science from Washington State University. His master's focused on the impacts to weed communities from the long-term use of glyphosate-resistant crops. For his doctorate he studied the adaptation of *Bromus tectorum* (downy brome or cheatgrass) to both small grain production systems and climate change.

Lawrence started his current role at the University of Nebraska–Lincoln Panhandle Research and Extension Center Jan. 4, 2016. He was interested in working in Nebraska because of the diversity of crops and production practices found across the state. Lawrence is currently establishing field plots to study how weed species diversity and richness can be manipulated through management practices, and if the metrics of diversity and richness can serve as a heuristic for long-term sustainability of the production system.

Lawrence's spare time is spent helping his wife chase their two young children and getting outdoors as much as possible.



Bijesh Maharjan

Assistant Professor
and Soil Nutrient
Management Specialist

BIJESH MAHARJAN COMES FROM THE HIMALAYAN COUNTRY OF NEPAL.

He received his master's degree in environmental engineering in 2008 from the University of North Dakota. He earned a doctorate in land and atmospheric science (soil science track) in December 2013 from the University of Minnesota. His doctoral research focus was corn production and environmental implications under varying nitrogen and management practices.

Maharjan was a postdoc research associate in the Department of Agronomy and Horticulture at the University of Nebraska–Lincoln where he had been working in several collaborative soil-fertility related projects. He joined the faculty at the Panhandle Research and Extension Center on Sept. 6.

Maharjan is responsible for conducting research and extension programs focused on improved soil productivity and precision nutrient management in irrigated, limited-irrigation and rain-fed crop and forage production systems in the Panhandle. His overall objective is to help develop and continue cost-effective, efficient and sustainable production systems that optimize profitability along with improving soil productivity, nutrient utilization, improved nutrient management and variable rate nutrient application.

Maharjan is waiting for his wife and two-year-old daughter to join him soon from Sri Lanka. He enjoys the great outdoor activities the Panhandle and neighboring areas have to offer.



Cole Thompson

Assistant Professor
and Integrated Turfgrass
Management Specialist

COLE THOMPSON JOINED THE DEPARTMENT

FACULTY JULY 1 after working for two years as an assistant professor of landscape and turfgrass physiology at California Polytechnic State University–San Luis Obispo. In this previous position, Thompson had a primary teaching role, but he said he is excited about his extension, research and teaching opportunities here at the university. He is currently working on input-limited turfgrass management that minimizes environmental risk.

Thompson's expertise in applied turfgrass pathology and weed science complements the existing skills of the Nebraska Turf Program.

A native of Beloit, Kansas, Thompson received a bachelor's degree in agronomy and his advanced degrees from Kansas State University. His master's degree research focused on silvery-thread moss control on putting greens and creeping bentgrass cultivar susceptibility to dollar spot. His doctoral research focused on management and control of rough bluegrass (*Poa trivialis*) – a challenging weed to control in turf.

Thompson's applied industry experience comes from his previous work as an assistant golf course superintendent and an internship with the United States Golf Association.

Thompson and his wife, Sally, have a one-year-old son named Owen.

NEW FACULTY HIRES



Rodrigo Werle

Assistant Professor and Cropping Systems Specialist

RODRIGO WERLE WAS BORN IN A SMALL FARMING COMMUNITY OF DUTCH IMMIGRANTS IN THE STATE OF SÃO PAULO IN SOUTHEASTERN BRAZIL. He received a bachelor's degree in agronomy from the College of Agricultural Sciences, São Paulo State University, Brazil.

In 2009, before graduation, he did an internship at the University of Nebraska-Lincoln, working in weed science. In pursuit of his master's degree, he had the opportunity to return to Nebraska, where he studied the emergence patterns and overwintering survival of several winter annual weed species. In May 2016, he obtained his doctorate from the university, studying resistance to acetolactate synthase-inhibiting herbicides in weedy sorghum species.

Werle joined the department faculty at the West Central Research and Extension Center April 15 and is conducting research on alternative crops and cover crops, and exploring how they may influence overall systems productivity and profitability, water availability and weed dynamics. He is excited to continue the legacy started by Professor Robert Klein, and establish an internationally recognized research and extension program.

Outside of work, Werle enjoys spending time with his wife, Lia, and daughter, Leila. They moved to North Platte in the spring and are enjoying life in western Nebraska.



Sam Wortman

Assistant Professor and Environmental Horticulturist

A NEBRASKA NATIVE FROM ELKHORN, SAM WORTMAN RECEIVED A BACHELOR'S DEGREE IN BIOLOGY AND ENVIRONMENTAL STUDIES from the University of St. Thomas, St. Paul, Minnesota, and a master's degree and doctorate in agronomy from the University of Nebraska-Lincoln.

After spending four years as an assistant professor at the University of Illinois, Wortman said this new position at Nebraska provided a rare opportunity to relocate closer to family and to join a growing department and university with an incredible wealth of talented and diverse faculty.

Wortman will be teaching Plant Propagation in the department and is excited to develop new courses focused on agricultural innovation and global food production systems. Wortman currently studies bio-based mulch products for use in high-value fruit and vegetable production systems. He is exploring management strategies for speeding biodegradation of mulch after incorporation in soil and tracking which microbial groups are driving the degradation process.

In his spare time, Wortman likes to play golf and attempt to teach his three-year-old daughter and one-year-old son how to swing a golf club (unsuccessfully so far). He also enjoys gardening, spending time at the lake with family and exploring state and national parks.

FACULTY AWARDS 2016

Humberto Blanco: Soil Science Society of America Division Chair Elect-Soil and Water Management and Conservation Division, SSSA Best Paper Award-Soil and Water Management and Conservation Division

Roger Elmore: American Society of Agronomy Extension Education Materials-Corn Growth & Development Award

Charles Francis: Norwegian Agency for Quality Assurance in Education National Teaching Quality Award Team Member

Roch Gaussoin: USDA National Agricultural Research, Extension, Education, and Economics Advisory Board

Patricio Grassini: Junior Faculty for Excellence in Research Award-Branham Endowment Fund, ASA Early Career Professional Award, Field to Market Science Advisory Council

Robert Graybosch: Nebraska Hall of Agricultural Achievement

David Hyten: Haskins Professor in Plant Genetics Professorship

Amit Jhala: North Central Weed Science Society of America Distinguished Achievement Young Weed Scientist Award

Bill Kreuser: UNL Teaching Council and Parents Association Contributions to Students Award

Dave Lambe: UNL Teaching Council and Parents Association Contributions to Students Award

Don Lee: UNL Teaching Council and Parents Association Contributions to Students Award

Martha Mamo: Aaron Douglas/John E. Weaver Professor of Agronomy and Horticulture Professorship, Senior Faculty Holling Family Award Recipient for Teaching Excellence

Scott Sattler: *Crop Science* Outstanding Associate Editor Award

Walter Schacht: UNL Teaching Council and Parents Association Contributions to Students Award

Richard Sutton: Green Roof Excellence Award for Research-Green Roofs for Healthy Cities

Kim Todd: UNL Teaching Council and Parents Association Contributions to Students Award, Epsilon Sigma Phi Outstanding Extension Leadership Mid-Career Award

Dirac Twidwell: Society for Range Management Outstanding Young Range Professional Award

Carlos A. Urrea: IANR Omtvedt Innovation Award

EMERITI

Ken Cassman: Named to "Highly Cited Researchers 2016" list, Water for Food Global Institute Recognition for Contributions to Improving Global Water and Food Security

James Specht: United Soybean Board Outstanding Achievement Award, Nebraska Agribusiness Club Public Service to Agriculture Award

MARTHA MAMO (LEFT) WITH STEVEN WALLER

Senior Faculty Holling Family Award Recipient for Teaching Excellence



CARLOS URREA (RIGHT) WITH RON YODER

IANR Omtvedt Innovation Award



PATRICIO GRASSINI (MIDDLE) AND ROCH GAUSSOIN (RIGHT) WITH RONNIE GREEN

Grassini - Junior Faculty for Excellence in Research Award
Gaussoin - USDA National Agricultural Advisory Board



RETIREMENTS

KENNETH CASSMAN — 20 YEARS



KENNETH CASSMAN RETIRED FEB. 29, 2016, AFTER 20 YEARS AT THE UNIVERSITY OF NEBRASKA-LINCOLN. The emeritus Robert B. Daugherty Professor of Agronomy and fellow of the University of Nebraska system's Daugherty Water for Food Global Institute began his career at Nebraska in 1996 as head of the Department of Agronomy and Horticulture. He was a past Heuermann Professor of Agronomy,

Director of the Nebraska Center for Energy Sciences Research and Chair of the Independent Science and Partnership Council/Consultative Group for International Agriculture Research. Cassman has worked with the International Rice Research Institute in the Philippines, was a faculty member at the University of California, Davis, and was a research agronomist in Brazil and Egypt. The focus of his work has been soil fertility and nutrient management, food security, and yield gap analysis at local to global spatial scales.

In collaboration with Wageningen University, Netherlands, Cassman has co-lead the **Global Yield Gap and Water Productivity Atlas**, an interactive, map-based web platform developed to estimate exploitable gaps in yield and water productivity for major food crops worldwide. The project helps farmers, governments, policymakers, foundations, private sector organizations and others identify regions with the greatest potential to sustainably produce more food.

He holds a doctorate and master's degree in agronomy and soil science from the University of Hawaii. He received the 2012 President's Award from the Crop Science Society of America and is a Fellow of the American Association for the Advancement of Science. Recently, the Swedish Academy of Sciences named Cassman the recipient of the 2017 Bertebos Prize for promoting education and research in the food chain. The Bertebos Prize is awarded by the Royal Swedish Academy of Agriculture and Forestry.

WILLIAM GUSTAFSON — 38 YEARS



WILLIAM GUSTAFSON RETIRED JAN. 3, 2016, AFTER 38 YEARS AT THE UNIVERSITY OF NEBRASKA-LINCOLN. The professor of horticulture and extension horticulture specialist began his career at Nebraska in 1978 as an assistant professor and part of the Southeast Research and Extension Center. He was promoted to full professor in 1993. He retired and was given emeritus status in 2003, at which time he resumed a teaching and

research appointment within the department.

Gustafson taught introduction to horticulture at the University of Nebraska Omaha and plant propagation at both Omaha and Lincoln, and he authored many publications on nut trees, fruit trees, strawberry cultivars and tree grafting.

His research interests included plant propagation; tree crops; native woody plants to be used as ornamental plants in horticulture botanic gardens; and the study of woody (ornamental and native) and herbaceous plant materials with emphasis on plant adaptability, selection and maintenance requirements.

Much of his research centered around the adaptation of ornamental plants introduced from China and Tibet to the Great Plains region of the United States. He spent 25 years working in China with Collaborative Research on Agricultural Technology and the International Cooperation and Development Scientific and Technical Exchange Program. He gave 38 presentations in China and was a frequent invited lecturer to the University of Tibet and Tibet Agriculture and Animal Husbandry College.

Gustafson holds a doctorate in horticulture from Texas A&M University. He received the Cyril Bish Family Professorship in 2001 and was awarded the Chinese Promulgating Friendship Award from the State Bureau of Foreign Experts of the Peoples Republic of China in 1998. He received an honorary professorship from Jilin Forestry College, Jilin City, Jilin, China, in 1993, and he was awarded the Big Nut Award from the Northern Nut Growers Association in 1989.



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ARROW SEED is firmly rooted in Girardin family



Leonard Girardin

Jim Girardin Jr.



LEONARD GIRARDIN MOVED HIS FAMILY TO CUSTER COUNTY IN 1946 TO MANAGE THE BROKEN BOW DIVISION OF A REGIONAL SEED COMPANY HE WOULD RENAME ARROW SEED.

Now, 70 years later, his son Jim Girardin Sr. has retired from the business; grandson Jim Girardin Jr. is the president of Arrow Seed; and great-grandson Logan Girardin, who joined the family business in March 2015, is a retail sales associate.

GENERATIONS ONE AND TWO: A SEEDSMAN AND HIS SON

When the original seed company went bankrupt in 1954, Leonard Girardin recognized the potential of the Broken Bow locale and purchased the division he had been managing. Leonard Girardin owned and operated Arrow Seed until his passing in 1977. At that time Jim Girardin Sr., who came to the business after he graduated from the University of Nebraska-Lincoln in 1959, took over. "It was his lifelong career, passion and love. Well, the business and my mom," said Jim Girardin Jr.

THE THIRD GENERATION: AN UNCERTAIN SUCCESSOR

Jim Girardin Jr. said he probably wasn't fully aware of everything that made up Arrow Seed in the 60s and 70s, but he had a pretty good idea. "I learned to sweep floors and stack seed very well," he said. Despite his sweeping and stacking skills, Jim Girardin Jr.'s future in the family business seemed somewhat unlikely because of his severe allergies. "I had hay fever pretty bad, and all of the seed dust made working around the plant very difficult back then."

After high school graduation, Jim Girardin Jr. enrolled in the College of Agricultural Sciences and Natural Resources at the University of Nebraska-Lincoln—a decision undoubtedly influenced by his early experience with the family business and growing up in an ag community. He earned a bachelor's degree

in agronomy in 1983 and went on to complete graduate work in the area of turfgrass research. Along the way, two of his advisers kept him interested in grasses: Emeriti Professors of Agronomy Lowell Moser, a range scientist, and Robert "Bob" C. Shearman, a turfgrass scientist. "They were solid role models who fostered my interest in grass."

A year working at the Lincoln Country Club during college also helped make Jim Girardin Jr. a self-proclaimed turf guy. "That's really what got me excited about being a golf course superintendent." From 1985 through 1994, Jim Girardin Jr. was a golf course superintendent at Riverside Golf Club in Grand Island, and it looked like he had established a career for himself apart from Arrow Seed.

However, the small-town seed company called him home, and son followed father into the business. After several years working side by side, Jim Girardin Sr. turned the reins over to Jim Girardin Jr. in 2011. "I would like to thank my father for

CONTINUED ON PAGE 36.



Leonard Girardin (center, with seed bags) and employees pose for a photo in front of the original Arrow Seed Company building in Broken Bow, Nebraska, circa the late 1950s.

ARROW SEED, CONTINUED FROM PAGE 35.

the opportunity he gave me and for growing the company from the 1970s to the 2000s. He really taught me the meaning of being a seedsman—one who not only sells seed but helps the customer select the best seed for their needs and provides sound advice for using the seed successfully.”

KEEPING THE BUSINESS ON TARGET

In the 1940s and 50s, the agricultural landscape in the area was primarily dryland farming, and there was significant seed production for alfalfa, clovers and grasses. “It made sense to locate a seed company in Custer County,” Jim Girardin Jr. said. As irrigation was introduced to the area in the 1960s and 70s, cropping practices and patterns changed and much of that seed production moved away. But Arrow Seed stayed. “Our business really fits the area now because we’re primarily a forage-based company, and the ultimate consumers of our products—the beef cow, the dairy cow, the cow-calf pair—are here,” he said. “The ultimate goal of our business is to provide the farmer/rancher with the best forage options for his or her herd.” To this end, Jim Girardin Jr. noted that “the University of Nebraska Extension has been a tremendous asset both to us and to the Nebraska cattle industry.” He also credited the university’s breeding programs for their instrumental role in developing crops important to Arrow Seed: native grasses, small grains, soybeans and buffalograss. According to Jim Girardin Jr., the buffalograss breeding program at Nebraska is “light years ahead of any other program in the country.” Without a doubt, investing in the science behind the seeds is one of the secrets to the success of Arrow Seed.



LEFT CLOCKWISE: Jim Girardin Sr. with Jr. in the seed lab, 1966. Jim Girardin Jr. stands in front of the current Arrow Seed store.



different way to a different consumer. Referring to the seeds selected for the food plots, Jim Girardin Jr. said, “We have a lot of experience in all of those plants; we’re just adapting them to a different kind of livestock.” Similarly, the cover crops used to improve soil health are oftentimes the same species used for forage. “There are tremendous opportunities in ag today, if one is willing to look outside the box for those value-added services and products,” he said.

“There are tremendous opportunities in ag today, if one is willing to look outside the box for those value-added services and products.”
—Jim Girardin Jr.

The basic products when the company started were alfalfa, clovers, pasture grass and small grains. In addition to those forage seeds, Arrow Seed now markets a turfgrass seed line for applications in golf, lawns, parks and sports turfs along with native grasses and wildflowers used in conservation and habitat plantings. The company’s newest product lines—food plots, cover crops and field peas—utilize many of the same species, just in a

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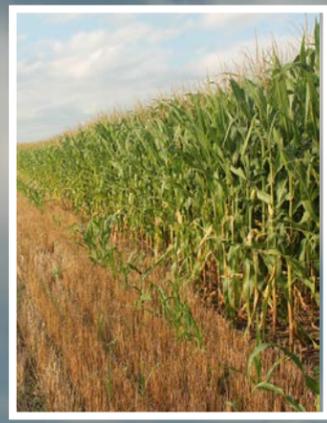
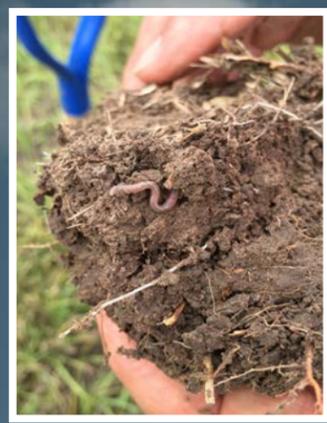
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NEBRASKA NATIVE HOPES TO SOW HER LOVE FOR NATIVE PLANTS

Elizabeth Lutz made an early decision to attend the University of Nebraska-Lincoln. She wasn't a typical early-decision student. She was in fourth grade. After spending much of her childhood hunting for prairie flowers on her family's homestead outside of Maxwell, Nebraska, a school field trip to the campus and its greenhouses sealed her fate. Now a senior at UNL, Elizabeth plans on staying in Nebraska after graduation and starting a greenhouse that produces native plant species. Through community education programs, she also wants to sow the metaphorical seeds of the benefits of native species.

To help students like Elizabeth, please donate to the Our Students, Our Future initiative. It seeks to increase private support to students who will contribute to the growth of our state for decades to come. To make a gift, visit nufoundation.org/agronomyandhorticulture.

