2014

Pots Plots and Plants: Annual Newsletter 2014

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POTS
PLOTS
AND
PLANTS

DEPARTMENT OF AGRONOMY AND HORTICULTURE
UNIVERSITY OF NEBRASKA–LINCOLN
ANNUAL NEWSLETTER 2014
Charles Wortmann’s research project aims to increase profits for African farmers
Letters | Department Head and associate head

Dr. roch gaussOn, Department head

Whoo Nellie! Sports commentator legend Keith Jackson was often cited as the source of the “Whoa Nellie!” idiom, yet Mr. Jackson himself credits the phrase to his grandfather, a farmer in the southeast United States (https://www.youtube.com/watch?v=INoEoGWgyyc). If you are a Google fanatic, you will find references to an early 1940s pinball machine called the “Whoa Nellie!” Regardless of the origin, the catchphrase is totally appropriate to describe yet another year of growth and accomplishment by faculty and staff in the Department of Agronomy and Horticulture. Historically we are on a six-year run of new and replacement hires with nearly 20 tenure and nontenured faculty hired from 2009 to 2013. In 2014 five faculty began their career at the University of Nebraska–Lincoln. Please see pages 18–20 of this newsletter for profiles of this outstanding group of hires. We also completed searches and hires for 2015 at the Panhandle Research and Extension Center in Scottsbluff—Mitchell Stephenson, range and forage management specialist, and Cody Creech, dryland cropping systems specialist. We are currently anticipating searches for nine or more replacement or new hires in 2015. Three faculty were promoted and/or received tenure in 2014 (see page 33).

Our undergraduate enrollment in the Agronomy and Plant Biology majors continues to grow, while our Horticulture and Turfgrass & Landscape Management majors are holding their own. Our undergraduate students are seeing record opportunities and compensation for completion of their degrees in our department. While students, they also are receiving honors and awards too numerous to describe. The department has had a banner year in competitive grant acquisition. Grants received by faculty topped $10 million and represent an amazing synergy among the new faculty hires, mentoring by senior faculty and alumni. My congratulations to all of our faculty and staff for their continued and positive momentum and the impact-rich activities and accomplishments of our research, teaching and extension programs. I simply drive the boat. Enjoy the newsletter.

Respectfully submitted,

Roch Gaussoin
Professor and Department Head
President, Crop Science Society of America

Dr. richard ferguson, associate department head

After moving onto East Campus in 2003 (I began my University of Nebraska career at the former South Central Research and Extension Center), I’ve had the opportunity to become more engaged with students at multiple levels. It’s probably coincidental that our department’s undergraduate student numbers soon began to increase after several years of decline, approximately doubling between 2008 and 2014. The senior level course that I teach in site-specific crop management has more than tripled in enrollment in the same period. The last five to seven years have been one of the most optimistic periods in production agriculture in recent decades, as commodity prices have fueled renewed enthusiasm for careers in agronomy and associated disciplines. Increased student numbers have certainly stretched our department’s capacity in many ways—courses have waiting lists for enrollment, classrooms are crowded with extra seats, and lab sections have been redesigned to deal with larger groups of students. Our graduates have little trouble finding employment in their field. While current reduced commodity prices may somewhat slow the rate at which new jobs become available, forecasts generally suggest a very positive job market in production agriculture for the foreseeable future. It is truly an exciting time to be in our department—as students, staff or faculty.

At the same time, it is interesting to observe the increasing lack of understanding of agriculture in much of our society today. I had the opportunity this winter to attend a dinner with some of our department’s undergraduate student leaders as part of a Women in Science Conference, which included top high school students from Nebraska with an interest in STEM fields (science, technology, engineering and mathematics). In general, the high school students I visited with anticipated studying medicine or physics in college; they didn’t really associate agriculture with being a STEM field. It was gratifying to observe our department’s student leaders—all women—articulate that disciplines such as agronomy; plant biology; range science, horticulture and turf science all have sound science at their core and that there are exciting, fulfilling jobs in these fields upon graduation.

Sincerely,

Richard Ferguson
Professor and Associate Department Head

Promotions and tenure

Jeff mower
Promoted to Associate professor with tenure

Hired, 2008, Ph.D. 2005 from Indiana University Bloomington. Mower holds a joint appointment with the Center for Plant Science Innovation and the Department of Agronomy and Horticulture. The Mower lab addresses fundamental questions on the evolution of genome structure, function and content in plants using a combination of experimental and computational approaches.

Clyde Ogg
Promoted to Extension Educator

Hired 1986, M.S. 1989, B.S. 1986 from the University of Nebraska–Lincoln. During his time at UNL, Ogg became an assistant extension educator in 2002 and an associate extension educator in 2008. He directs the Nebraska Pesticide Safety Education Program, which includes Integrated Pest Management for home and school environments and certification for pesticide applicators.

Dipak santra
Promoted to Associate Professor with tenure

Hired: 2008, Ph.D. 1999 from the University of Pune, India, and Washington State University. Santra develops and enhances germplasm and cultivars of new and existing alternative crops for sustainable production under dryland farming conditions in the northern high Plains of the United States.

New Faculty in 2015

Mitchell Stephenson – Range and Forage Management Specialist at Panhandle Research and Extension Center, started April 1

Cody Creech – Dryland Cropping Systems Specialist at Panhandle Research and Extension Center, started May 1

Christopher proctor – Weed Science Assistant Extension Educator, starts July 1
surface carbon dioxide exchange and fluxes of energy-funded carbon sequestration working mostly on the U.S. department between plants and their environment. Research examining the relationships Arkebauer in field-oriented physiological Dr. Charles Wortmann.

In 2001 I began working in research and Jerry Maranville and Dr. Robert Caldwell. In important in Nebraska, I worked with Dr. grain sorghum became less economically auspices of the INTSORMIL project. Along the way I obtained another master’s degree in agribusiness. As faculty retired and grain sorghum became less economically important in Nebraska, I worked with Dr. Jerry Maranville and Dr. Robert Caldwell. In 2001 I began working in research and extension soil fertility and biosolids under Dr. Charles Wortmann.

Since 2003, I have worked with Dr. Tim Arkebauer in field-oriented physiological research examining the relationships between plants and their environment. Working mostly on the U.S. Department of Energy-funded Carbon Sequestration Project Team, we examine leaf and soil surface carbon dioxide exchange and fluxes of greenhouse gases from the soil. We also quantify various aspects of crop growth and development. More recently our project has started investigating photoprotective mechanisms in plants such as chloroplast avoidance movement and other plant stress responses.

The crops, equipment and my research emphasis have changed over the past three decades, but my enjoyment of working with motivated and creative faculty and students continues to make each day interesting and rewarding.

Away from work I volunteer my time with several animal rescue and advocacy groups. I also serve on the board of directors of the Great Plains Trails Network and the Nebraska Trails Foundation.

FRAN BENNE Design and Communications Specialist

AS A UNIVERSITY OF NEBRASKA-LINCOLN COLLEGE OF JOURNALISM GRADUATE and former athlete, I consider myself a Husker for life. So it felt like coming home when I accepted a position in the department in 2012 after working in the private advertising and graphic design industry for 18 years.

My first exposure to the department came in 2011 when I decided to follow my passion for gardening and landscaping and become an Extension Master Gardener volunteer. Having grown up on a farm near Arapahoe, Neb., I respected the agriculture industry and I wanted to get back to my roots and learn more about plants. Little did I know that someday I would get the chance to work on beautiful East Campus and merge my interests and skills into a job I love.

It has been a blessing to collaborate with such positive and inspiring faculty, staff and students. I am thankful for the opportunity to create, design and communicate to the public, students and the university the new and interesting research, educational opportunities and events happening in our department. I basically get to do a little bit of everything I enjoy—photography, layout and design, website management and design, social media marketing, writing, editing and video production.

Away from work I’m involved with my daughter’s activities and volunteering at my church. I like running on the trails with friends, gardening, boating and fishing with my family, and working on house and landscaping projects with my husband.

CHERYL BOGENRIEF Accounting Associate

I CAME TO THE UNIVERSITY OF NEBRASKA-LINCOLN IN THE FALL OF 2008 after having worked for a propane service and an interior design firm. My work experiences as an office manager and bookkeeper prepared me for my position in the HAPPI Business Center, where I have been an accounting associate for more than six years.

I enjoy helping faculty and staff with the financial aspects of their teaching and research. My primary accounting duties involve general customer service, revolving accounts, purchasing cards and travel. Working in the Department of Agronomy and Horticulture has been a nice experience for me because of the great group of co-workers and students. I like having the opportunity to help others with their work.

Originally from Brunswick, Neb., I graduated from Plainview High School and came to Lincoln to go to school and never left. I currently volunteer with the Lancaster County Election Commission, so you might see me working at a polling place on Election Day.

Antiquing—consignment stores and flea markets—collecting cookbooks, sewing and crafting are a few of my hobbies. I also like to do a bit of traveling and I have been to Alaska twice to visit my sister.

STEPHEN GAMET Research Technologist

IN AUGUST OF 2002 I DECIDED A CHANGE WAS NEEDED in my lifelong goals. I was fortunate to find an opening in a new horticultural program at the University of Nebraska—Lincoln called viticulture—the study of wine grapes—in the corn state of Nebraska.

Who could have imagined? Dr. Paul Read did, and viticulture has been a perfect fit for both of us.

In 2000 my immediate family established a vineyard in western Nebraska. Now I work with grapes in eastern and western Nebraska with only 325 miles in between.

I received a degree in agronomy with an emphasis in horticulture from UNL and have worked in the Nebraska nursery industry for more than 25 years. Before joining Dr. Read and the viticulture program, I enjoyed working for UNL Landscape Services as an area manager on City Campus. Eventually I began looking for something more unique and challenging that I could continue after retirement.

Grapes in Nebraska fit the bill better than anything I could have imagined. Along with working with Dr. Read, I have helped establish a growers group in western Nebraska that has a combined vineyard acreage of more than 25 acres. We have also purchased the first mechanical grape harvester in the state. We now do custom harvesting and last year harvested over 60 acres of grapes.

Besides growing grapes I also enjoy making and drinking wine, so it’s an all-encompassing passion. My wife Kim of 29 years and two daughters, Mikayla, 22, and Meredith, 13, are also very involved in all aspects of what we call “grapes.” My oldest builds wine racks and the youngest is out in the field helping, particularly at harvest time. Kim is my cheerleader. And when I’m not playing in the grapes, I try to get in a little golf.
The Range Management Club started out the year with the Welcome Back Barbeque in conjunction with the Agronomy Club. In October, some of the club members attended the Nebraska Section of Range Management meeting in Ainsworth, Neb. During this meeting and joining with the Chadron State College Ag Club, the club held an annual auction fundraiser. The auction was a success and the generosity of the donors was greatly appreciated. The rest of the fall consisted of preparing for the Annual Society of Range Management meeting in early February. Members practiced their presentations and prepared for competitions. The club was also able to tour Spring Creek Prairie Audubon Center near Denton, Neb. The fall semester ended with a bowling event and the annual Christmas party hosted by Dr. Walt Schacht. The beginning of the spring semester was very busy as the final preparations were made for the Annual SRM meeting in Orlando, Fla. The club had excellent participation in the meeting with 11 undergraduates and two graduate students attending. The graduate students presented their research projects. The undergraduates competed in at least two of the following: the plant identification contest, the range management exam, extemporaneous speaking and the paper contest. While in Florida the club toured The Nature Conservancy’s 11,500-acre Disney Wilderness Preserve and Deseret Cattle & Citrus Ranch. The club finished the school year discussing a couple of possible tours to take in the fall semester. During Dead Week and finals the club participated in laser tag and held a potluck dinner.

The UNL Range Management Club would like to thank everyone who helped and supported the club—making this year such a success.

—Kyra Baldwin, Range Management Club President
EVEN SINCE I WAS YOUNG I have had a passion for crop production and farming. My upbringing and work experience on my family farm sparked a desire to become an agronomist.

Three other job experiences and my classes at the University of Nebraska–Lincoln have aided in solidifying my future career path. My first job experience was working at Hoegemeyer Hybrids, where I was able to get a glimpse of both the agronomic and business side of a seed company. My office experience at Hoegemeyer Hybrids pushed me to take up an agricultural economics minor.

My second job experience, an internship this past summer for Ag Valley Co-op, has proven to be the most influential in confirming my future career as an agronomist. At Ag Valley Co-op I had the great opportunity to shadow an agronomist to see what the job entails. Additionally, I had the chance to go out on my own to scout fields, collect tissue samples and even meet up with a few of the producers.

Finally, becoming a UNL teaching assistant for the introductory plant science course AGRO 131 has allowed me to work on important skills including relationship building, communication, and effectively explaining concepts and ideas to those who are not familiar with them.

I’m currently involved in Crops Judging and Agronomy Club. I served as the club secretary for the 2014–15 school year and have been elected club president for 2015–16.

As a senior majoring in agronomy and minoring in agricultural economics, I’ve found that my passion for crop production has not wavered. My goal is to graduate, become an agronomist and return to our 1,500-acre family farm to assist with the production of row crops—corn, soybeans and alfalfa. The agronomy industry has the potential for growth in the years to come, and I honestly can’t wait to see what is in store for me! — Amanda Vodvarka

UNDERGRADUATE STUDENT AWARDS

<table>
<thead>
<tr>
<th>Name</th>
<th>Award Description</th>
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</thead>
<tbody>
<tr>
<td>Marissa Grooms</td>
<td>Second Annual Engler Quick Pitch Junior/Senior Division Winner</td>
</tr>
<tr>
<td>Seth Gurley</td>
<td>Outstanding West Central Division Intern Award – Helena Chemical Company, company branch in Osmond, Neb.</td>
</tr>
<tr>
<td>Logan Smith</td>
<td>Engler Agribusiness Entrepreneurship Program Business Plan Competition Winner</td>
</tr>
<tr>
<td>Rachel Stevens</td>
<td>3-2-1 Quick Pitch Winner – UNL Center for Entrepreneurship, Second place Winner – North America Colleges and Teachers of Agriculture Four-year Division Collegiate Soils Contest</td>
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<tr>
<td>Amanda Vodvarka</td>
<td>Student Intern of the Year – Ag Valley Co-op, Edison, Neb.</td>
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UNDERGRADUATE FALL ENROLLMENT

- Agronomy – 221
- Horticulture – 65
- Plant Biology – 17
- Turfgrass & Landscape Management – 41

AGRONOMY IT’S IN MY ROOTS
I’ve always been fascinated with agriculture, insects and health, yet at the beginning of my academic path, I wasn’t quite sure how these interests would come together for a meaningful career. This connection first came when I was on a World Food Prize Borlaug-Ruan International internship at the International Center of Insect Physiology and Ecology in Kenya. For the small-holder farmers of western Kenya, the barriers to food security were a dynamic interplay between inadequate agronomic techniques and the constant threat of malaria. During this experience, my research matched sugars found in local plants to determine feeding preference of *Anopheles gambiae* mosquitoes and how this affects their survival and fecundity. This experience played a key role in contextualizing the complex and uncertain obstacles in feeding a rapidly-growing global population. Food stability for the nearly 1 billion hungry is much more than food production alone. It contains a vast array of daily challenges from health- and disease-related issues to agricultural techniques. Each of these has an integral role in equitably supporting the nutritional needs of the global population to maintain an active and healthy lifestyle.

Following this experience, I was awarded the World Food Prize John Chrystall award for this research in “improving international understanding and peaceful cooperation through agriculture and food security” alongside Senators Robert Dole and George McGovern, who were awarded the World Food Prize. What had once been fascinations of mine had suddenly become an opportunity to take my passions and apply them in a global setting.

After completing my bachelor’s degree in biology, international relations, and environmental sciences at Creighton University, I completed a Master of Science degree in control of infectious diseases in London, United Kingdom. During this degree, I completed my thesis research at the Pan African Malaria Vector Research Consortium in Tanzania in a small farming community located at the base of Mount Kilimanjaro in which I looked to bridge agricultural insecticides for the control of medically important disease vectors. Currently there are only four classes of medically important contact insecticides, all of which have insecticide resistance emerging against them. With limited development of contact insecticides, it was the aim of my research to develop a novel method to deliver agricultural oral insecticides. While it is a common misconception that blood is the primary nutrient source for mosquitoes, mosquitoes actually rely on plant sugars for the majority of their lives as their primary food source, with females only blood feeding during periods of reproduction. This feeding behavior allowed me and my research team to develop and patent an exciting new tool for malaria control which uses several classes of ingestion-based insecticides and combine it with a plant based attractant to attract and kill malaria-resistant mosquitoes. This attractive toxic sugar bait tool is hung in a hut and attracts mosquitoes which were originally attempting to blood feed on a human. After the mosquito feeds on the ATSB, nearly 100 percent of the resistant, malaria-transmitting mosquitoes were killed. The findings of this study were recently published in the journal *PLOS ONE*.

Currently I’m working on my Ph.D. in agronomy under the supervision of Dr. Charles Shapiro at the University of Nebraska–Lincoln, where I’m continuing to work on bridging agriculture and health. My current dissertation research is evaluating foliar micronutrient treatments as a tool to increase yields and biofortify (increase nutrient density) corn. In sub-Saharan Africa, appropriate agronomic techniques and improved soil fertility are keys to supporting genetically-improved crop varieties which spearheaded the achievements of the Green Revolution in Asia, Latin America and the Middle East. Soil fertility has been the limiting factor for Africa in hindering the huge crop yield increases from improved crop varieties as seen by the rest of the world during the Green Revolution. The potentials of genetically improved crops in Africa cannot and have not been realized when soil properties and plant nutrients are depleted.

Health and agriculture are fundamentally intertwined with the daily struggles of the poorest 1 billion in achieving food security. There is much to be learned in this cross-disciplinary interaction in providing the fundamental right of every human to maintain survival in supplying food for themselves and their families. It is my sincerest hope to be a part of the solutions to these monumental challenges, and I know my continued education at UNL within the Department of Agronomy and Horticulture will help me achieve my current and future goals. —Zachary Stewart

**Health and Agriculture Are Fundamentally Intertwined With the Daily Struggles of the Poorest One Billion in Achieving Food Security.**

**Graduate Student Awards**

Graduate Student Awards

**Grady Obear:** Presentation Competition Award Winner at CSSA Meeting

Matthew Pedersen: John & Louise Skala Fellowship

Pamela Peña-Pedrono: Widaman Trust Distinguished Graduate Assistant Award, Milton E. Mohr Fellowship

Miles Redden: Irvin A. & Agnes E. Nelson Memorial Fellowship

Leah Ruff: American Seed Trade Research Foundation's Roger Krueger Scholarship

Debalin Sarangi: David H. & Anne E. Larrick Memorial Travel Award to attend NCWSS Annual Meeting, Third-place NCWSS Best Graduate Student Weed Science Team

Brad Schick: Daniel T. Walters Travel Fund

Zachary Stewart: North Central Extension–Industry Soil Fertility Conference Outstanding Graduate Student Award

Kayla Tarr: Arthur William Sampson Fellowship

Laura Thompson: International Society for Precision Agriculture Outstanding Graduate Student Award

Rodrigo Werle: University of Nebraska–Lincoln Dean’s Fellowship, Milton E. Mohr Fellowship, McDonald Fellowship, Third-place NCWSS Best Graduate Student Weed Science Team

**Nonoy Bandillo:** Hardin Distinguished Graduate Fellowship, UNL Plant Science Retreat Best Poster Presentation

Ben Beckman: W.R. Chapline Fellowship

Samuel Bledsoe: Gerald O. Mott Award for Meritorious Graduate Students in Crop Science

Cody Creech: Third-place North Central Weed Science Society Best Graduate Student Weed Science Team

Jason Danley: Hardin Distinguished Graduate Fellowship

Amanda Easterly: Orthmer Fellowship

Katherine Frels: Henry M. Beachell Fellowship

Chenchou Han: Second-place Winner – New Venture Pitch Competition, Northwest Missouri State University

Lucy Jo Leibhart: Widaman Trust Distinguished Graduate Assistant Award, First-place NCWSS Paper Presentation

Luqi Li: Winner of the CSSA C-5 Turf Division Poster Contest for Management and Establishment

Jonathan Luetkens: Milton E. Mohr Fellowship

Julianne Matcysyn: Milton E. Mohr Fellowship

Samantha McNally: Milton E. Mohr Fellowship

Darrell Michael: Henry M. Beachell Fellowship

Joshua “Jay” Miller: Third-place NCWSS Best Graduate Student Weed Science Team

Stewart’s malaria trial site was located in Tanzania in a small farming community at the base of Mount Kilimanjaro.
Organic farming

SALE OF ORGANIC FOODS IN THE UNITED STATES REPRESENTED $42 BILLION IN 2014, and the sector is projected to grow at nearly 15 percent per year over the next decade. Several faculty in IANR conduct research related to organic farming production systems, and this article presents an overview of that work.

Faculty involved in these collaborative projects are in Entomology, School of Natural Resources, Food Science and Technology and Agricultural Economics in addition to Agronomy and Horticulture. Organic farmers are part of the research. In 2005 a group of IANR faculty received a USDA grant to develop four certified organic areas across the state. These were located near Sidney (HPAL), Clay Center (SCAL), Mead (ARDC) and Concord (HAL). After the three-year transition period, all sites were successfully certified. A second grant focused on winter wheat quality, and a third grant continued the research on organic farming practices and the assessment of the farm impacts on surrounding wildlife, with bird populations and diversity as indicators.

Based on principles of agroecology and uniqueness of place, and the diversity of land and climate as well as interests of faculty across Nebraska, each of the four sites has a research focus appropriate to that district. The main focus for all projects is to identify ways to improve organic production systems, not to compare to conventional systems. At Sidney, the focus is on rotations that contribute nitrogen through associated legume cover crops but do not use too much water. At Clay Center, we established several rotations to determine the benefits of a three-year versus a four-year rotation. The organic certified land at the ARDC site is located on the forestry section within the long-term windbreaks established over 50 years ago. The focus there is to verify the impacts of a winter wheat-soybean green manure-corn-soybean rotation. In addition, we study the release of nitrogen from legume cover crops and the impact of underseeding browns within the winter wheat. Another noncertified long-term experiment at ARDC compares organic rotations based on animal manure for fertility with those based only on cover crops and recycling nutrients from residues.

Since there are also conventional treatments, research on variety by system interactions has been conducted. Other organic experiments at ARDC look at crop/weed and crop/cover crop interactions and the effect competition for resources has on plant physiology. At the Concord site the focus was on propane flame weeding and on nutrient management. The propane flame weeding deserves special mention since the project, led by Dr. Stevan Knezovic, has developed into a world-renowned program that has produced dozens of publications including a comprehensive manual available on the Internet. It has resulted in additional grants from the Propane Foundation, established linkages with heat shield engineers and produced a spin-off business. Most importantly from the organic farming perspective, the project has developed equipment that is safer and more energy efficient than before, and our specialists have demonstrated how to utilize this weed management method successfully on organic farms.

The nutrient management component includes on-farm trials that are placed on certified organic farms located primarily in the eastern third of Nebraska. The goal is to investigate the relative productivity of the organic farm nutrient and weed management systems. On these farms, extra nutrients were provided with additional manure or compost, and extra weed control was provided by timely management. For the most part, with the exception of one farm that was severely deficient, the additional inputs had only minor yield enhancing effects. The intent is to determine whether additional nutrient or weed management would increase productivity.

Engaging with organic farmers and those interested in organic farming has been a substantial part of the project. During the life of the two main USDA grants, annual advisory meetings were held to enhance project collaboration. There have been on-farm trials of the farmer’s choosing to determine the effects of multiple and site-specific production practices. Of much interest to the organic farming community is the reduction of tillage by the use of a roller crimper that is used to kill a cover crop, leaving a mulch to suppress weeds and reduce the need for tillage and several cultivations. The short answer for this research on farms and at the research laboratories is that cover crops need to be crimped early in the season and the weather has to cooperate; otherwise, the late planting and cover crop regrowth will combine to severely limit grain crop production.

There is a UNL course on science-based organic farming that has been taught in spring term every year since 1998. This continues to attract students from our department as well as the School of Natural Resources and an increasing number of interested students from urban backgrounds. The course is taught in the evenings to accommodate people from the community with an interest in organic practices and systems. One spin-off from the course is a student Community-Supported Agriculture organic farm, initiated in 2013 based on interest generated in a course in agroecology, and in the organic farming course. In 2014 their new CSA had 13 subscribers, and they are recruiting younger students to take a leadership role. A recently-funded project from the corn and soybean check-off boards is supporting cover crop research across the state, with results highly valuable for organic farmers. There is a new Hatch project, recently approved, that will focus on long-term experiments, including rotations and cover crops, and will provide an integrated research platform for cooperative projects that will serve both organic and conventional farmers across Nebraska.

With the ending of the large USDA grants, the status of organic farming research at IANR is at a crossroads. Funding for the organic farming extension educator position ended in 2013, and there is now no one with organic farming extension in their position description. Several of the faculty who were on the original 2006 grant have retired, left the university or will be leaving soon. Two of the four sites are not certified as organic, and the other two have an uncertain future. Active faculty with research interests in the areas of weed control, cover crops, food quality, plant breeding, environmental impact and other disciplines remain. It is essential that our department seeks continuing internal as well as grant support to continue these projects that can inform farmers about organic practices and systems that fuel the growing markets in this special sector of U.S. agriculture. —Charles Shapiro

Soil Science and Crop Nutrition
THE DAUGHERTY WATER FOR FOOD INSTITUTE: FEEDING A GROWING WORLD

Imagine watching a river basin as the winter ice melts and wildflowers stretch up from the ground, clouds rolling overhead like cotton balls dumped out of a giant bag in the sky, flowers blooming, seeds blowing in an autumn breeze, then snowflakes covering the dry grass as the year circles back—all within 60 seconds.

This is a glimpse of the Phocalstream project, one of several research projects supported by the Robert B. Daugherty Water for Food Institute at the University of Nebraska. The project involves taking one photo an hour of areas up and down the Platte River Basin to develop a time-lapse view of the land and weather. Using advanced software, researchers can quickly navigate the 1.5 terabyte image library, linking rich photographs to data from the US Drought Monitor or USGS Water Data. Through Phocalstream, audiences can literally see man and nature’s impact from the US Drought Monitor or USGS Water Data. Through Phocalstream, audiences can literally see man and nature’s impact.

The institute supports and shares this type of research to address the global challenge of achieving food security with limited water resources. In the next 35 years, the world’s population is expected to grow beyond 9 billion. Water shortages already occur in many parts of the world and are expected to become more prevalent as global climate change increases demands on water resources. In the next 35 years, the world’s population is expected to grow beyond 9 billion. Water shortages already occur in many parts of the world and are expected to become more prevalent as global climate change increases demands on water resources.

In addition to supporting and promoting the Fellows’ water- and food-related research projects and sharing news and data with a variety of stakeholders, including policy makers, the institute hosts an annual Water for Food Global Conference. These conferences bring together global thought leaders and experts to discuss potential solutions to the challenge of doubling our agricultural production by 2050 and doing it with less water than we use today.

The 2014 conference included more than 250 participants from 35 countries and focused on the role of data and information in transforming our agricultural yields and water management. Videos from the conference sessions and blog summaries are available at waterforfood.nebraska.edu/2014.

To carry out its mission, the institute encourages collaborative research between Fellows with different backgrounds. For example, Cassman, Grasini and Yang are leveraging their respective expertise in plant nutrition and crop physiology, yield gaps, resources and energy use efficiency and crop modeling to configure the GYGA in a comprehensive manner. Mamo, a soil scientist, and Regassa, a cropping systems expert, worked with three Fellows outside their department to assess food security in Ethiopian villages. This included interviewing scores of farmers, meeting with nongovernmental organizations and collaborating with two Ethiopian universities. Ultimately, their groundwork led to an important -...
INTERNATIONAL RESEARCH PROJECT AIMS TO INCREASE PROFITS FOR AFRICAN FARMERS

FOR MANY PEOPLE, A TRIP TO AFRICA CONJURES UP IMAGES OF WILDLIFE SAFARIS AND SUNSETS ON THE SAVANNA. Not so for Professor Charles Wortmann, who is more likely to visualize maps of soil properties, spreadsheets of crop data, and charts of response functions. Since the July 2013 launch of his project, Optimizing Fertilizer Recommendations in Africa, Wortmann has filled more than 30 pages in his passport and has visited all 13 countries participating in the three-year project. Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda, and Zambia. Agriculturally important to Africa, these sub-Saharan countries represent portions of about 40 different agroecological zones and grow annual food crops such as maize, sorghum, rice, dry beans and soybeans.

CHARTING RESPONSE FUNCTIONS

Existing data on crop-nutrient response functions, together with new data, is being used to determine the most profitable rate of fertilization for various crops. For example, farmers growing maize can maximize the return on their investment by applying nitrogen at the rate where the response curve is steepest (i.e., where the yield is greatly increased with the least cost of fertilizer).

So far OFRA has created approximately 3,500 response functions for different combinations of crops and nutrients in various zones. Yet more work remains, and data collection continues. “We know there’s still quite a lot out there in different people’s files and we just haven’t convinced them to let it go,” said Wortmann.

CONDUCTING FIELD RESEARCH

While a lot of response functions have been charted for some crops—maize, for example—other target crops have received less attention. To verify data from previous research and to fill in gaps where information is missing, field trials are being conducted in partnership with national teams from each of the countries. Nouri Maman, who earned master’s and doctoral degrees from UNL, serves as the regional coordinator for western Africa, and Kayuki Kaizzi fulfills that role for eastern and southern Africa.

Field research on another continent involves understanding local farming systems and how they influence crop production. The poor soil in Mali and Niger, for instance, is improved by the presence of a unique tree that loses its leaves during the rainy season (reverse leaf phenology). Crops are able to grow beneath these trees where the soil is enriched without competing for sunlight. The tool then uses response functions to determine which crop-nutrient combinations provide the best return on investment.

Outputs include the recommended fertilizer and application rate for each crop, the estimated mean effect on yields and the expected net returns of fertilizer use. The tool also uses response functions to determine which crop-nutrient-rate combinations provide the best return on investment. Outputs include the recommended fertilizer and application rate for each crop, the estimated mean effect on yields and the expected net returns of fertilizer use.

In Uganda alone, more than 700 advisors of farmers have been trained to use this tool. The goal is that this practical tool will help African farmers make scientifically-sound decisions about fertilizer application. As a result, yields and farmer profitability will increase—ultimately helping to reduce hunger across Africa.

Building on previous work in Uganda, Wortmann wrote the preliminary proposal for the project and works closely with the Centre for Agriculture and Biosciences International in the United Kingdom. CABI provides project management, while UNL offers technical and scientific leadership. Funding for the $5.6 million project is provided by the Bill & Melinda Gates Foundation through the Alliance for a Green Revolution in Africa.
DANIEL SCHACHTMAN

**Plant Molecular Physiologist**

**DANIEL SCHACHTMAN JOINED THE DEPARTMENT IN FEBRUARY 2014.**

Schachtman's research focuses on plant molecular physiology. His research includes various projects such as understanding how plant roots respond to changes in soil conditions, and how soil microbes influence plant productivity. Schachtman is also interested in the interaction between plant roots and soil microbes, and how these interactions affect plant performance.

Schachtman joined the faculty at the University of Nebraska-Lincoln in 2014. He received his Ph.D. from The Australian National University in plant physiology and genetics.

Now at UNL, Schachtman co-leads a new cover crop research project supported by the Nebraska Soybean Board and the Nebraska Corn Board with Humberto Blanco and several other colleagues. He is also a B. Keith and Norma Heuermann Chair and Robert B. Daugherty Water for Food Institute Faculty Fellow.

He enjoys his family and working outside. Elmore and his wife Ann live in Lincoln and have three adult children, two adult children-in-law, four grandchildren and one granddaughter.

WILLIAM “BILL” KREUSER

**Extension Turfgrass Specialist**

**BILL KREUSER JOINED THE DEPARTMENT AS AN ASSISTANT PROFESSOR IN JANUARY OF 2014.**

Kreuser joined the department as an assistant professor in January 2014. He oversees the turfgrass education and extension team focused on developing and applying integrated crop management strategies. His research focuses on understanding how plant roots respond to changes in soil conditions, and how soil microbes influence plant productivity. Kreuser is also interested in the interaction between plant roots and soil microbes, and how these interactions affect plant performance.

Kreuser has a strong interest in gardening and indoor plants and eventually found his career in agricultural research during his master’s degree at UC Davis and Ph.D. at CSIRO in Australia.

Schachtman’s hobbies include hiking, biking, travel, wines, the stock market, and food—eating and growing.

Schachtman has a strong interest in gardening and indoor plants and eventually found his career in agricultural research during his master’s degree at UC Davis and Ph.D. at CSIRO in Australia.

Schachtman’s hobbies include hiking, biking, travel, wines, the stock market, and food—eating and growing.

Kreuser’s extension goal is to increase the turfgrass management precision. To achieve this goal, Kreuser is developing new web-based tools and education opportunities to help turfgrass managers learn when and where it’s required.

He received his bachelor’s and master’s degree in soil science at the University of Wisconsin-Madison with a specialization in turf and grounds management. His master’s work focused on putting green nutrient requirements and plant growth regulator degradation. Kreuser received his Ph.D. from Cornell University, where he studied production systems and increased plant health and reduce reliance on pesticides.

DARREN REDFEARN

**Forage/Crop Residue Specialist**

**DARREN REDFEARN JOINED THE FACULTY IN JUNE 2014 as a part of an interdisciplinary research and extension team focused on enhancing and developing integrated forage-based crop and livestock production systems.**

Redfearn has a strong interest in forage and pasture management. He completed his Ph.D. in agronomy with a range and forage specialization from the University of Nebraska-Lincoln in 1995.

A unique opportunity exists in Nebraska to guide sustainable integration of forage crops and crop residue into these production systems. This includes research on nutrient management strategies that enhance crop and livestock productivity.

Redfearn is joined in Lincoln by his wife Kasi, who is employed by Lincoln Public Schools as the librarian at McPhee Elementary School. His two daughters, Kelsi and Shelbi, were both born in Lincoln during his graduate program. Kelsi is currently employed at NASA in Johnson Space Center in Houston, Texas, as an EHTOS flight controller, and Shelbi is initiating her pursuit of graduate studies in speech and language pathology.

According to Redfearn, one measure of success is to identify forages that can produce high rates of livestock gain during each month of the year. Simultaneously, Redfearn feels it is also critical that proper grazing and harvest management techniques are developed to maintain or enhance soil health and water use for these types of systems. Redfearn is also involved in interdisciplinary research and extension focused on forage and crop residues. This involves developing strategies to address these diverse production systems. Redfearn's extension program incorporates and enhances the use of crop residues and annual forage crops into existing beef production systems, as well as implementing economical crop residue harvest and grazing methods. His research program will address the management, production and utilization strategies for annual double-crop forages, study the influence of crop residue management systems on establishment of annual forage double crops, and create unique crop residue management systems that facilitate the use of annual forage double-crop systems.
Brian Krienke grew up in Pierce, Neb., where he enjoyed helping on the family grain farm. This exposure and experience drove Krienke’s passion for agriculture. He received his B.S. and M.S. in agronomy from UNL, and he is currently a Ph.D. candidate finishing his degree in agronomy. Krienke became a soil assistant extension educator in the department in May 2014. Much of his background is with soil fertility with corn and soybean production. He has experience with nitrogen management, which includes using remote sensing technologies such as unmanned aerial vehicles in his research. Current projects with regard to soil fertility include updating resource material for producers, conducting on-farm research and developing curriculum for producers that connects the classroom environment to the experience from the field on soil fertility issues. Krienke loves to spend time with his wife of eight years, Abbey. The two enjoy hiking/backpacking, gardening, having friends over for game night and something as simple as a good cup of coffee.

James Schnable joined the department in May 2014. His research focuses on comparative genomics of grain crops. His lab is working on identifying the genetic changes that make many grain crops more tolerant of cold and more efficient in their use of water than corn and sorghum as well as supporting genomics-assisted breeding of Nebraska grain crops such as proso millet. Schnable, who grew up in Iowa, received his undergraduate and graduate training in New York and California respectively. He is very happy his career has brought him back to the Midwest.

Faculty Awards

Stephen Baenziger: Daugherty Water for Food Institute Fellow, National Council of Commercial Plant Breeders Genetics and Plant Breeding Award

Roch Gaussoin: CSSA President-Elect, Outstanding Alumnus Award from the Department of Plant & Environmental Sciences – New Mexico State University

John Guretzky: 2014 Agronomy Journal Outstanding Associate Editor

Gary Hein: NACTA Teaching Award of Merit Certificate

Greg Kruger: NCWSS Young Scientist Award

Dave Lambe: IANR Dinsdale Family Faculty Award, UNL Teaching Council and Parents Association Contribution to Students Award, Black Masque Chapter of Mortar Board February Professor of the Month

Sally Mackenzie: Gates Foundation Award

Deana Namuth Covert: Holling Family Senior Faculty Teaching Excellence Award

Daren Redfearn: Editor – Forage and Grazinglands

Zac Reicher: CSSA Chair-Elect of CS Turf Division, UNL Teaching Council and Parents Association Contribution to Students Award

Richard Sutton: UNL Teaching Council and Parents Association Contribution to Students Award

Kim Todd: Tau Sigma Delta Honor Society – Architecture and Allied Arts (nominated and accepted into membership)

Dirac Twidwell: Society for Range Management, Texas Section – 2014 Publication Award

Anita Wingeyer: 2014 Outstanding Postdoc Award

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FACULTY AWARDS

JAMES SCHNABLE Computation Biologist

JAMES SCHNABLE JOINED THE DEPARTMENT IN MAY 2014. His research focuses on comparative genomics of grain crops. His lab is working on identifying the genetic changes that make many grain crops more tolerant of cold and more efficient in their use of water than corn and sorghum as well as supporting genomics-assisted breeding of Nebraska grain crops such as proso millet. Schnable, who grew up in Iowa, received his undergraduate and graduate training in New York and California respectively. He is very happy his career has brought him back to the Midwest.

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TOM HOEGEMEYER, PROFESSOR OF PRACTICE at the University of Nebraska–Lincoln, retired on Jan. 15, 2015. Again, Hoegemeyer previously retired in 2008 as the CEO of Hoegemeyer Hybrids, the family business that he had no intention of joining. That first retirement is what enabled him to top off a career in plant breeding at UNL, where his interest in genetics took root.

UNDERGRAD WITH GOOD FORTUNE

Hoegemeyer didn’t know what he wanted to do when he arrived at UNL in 1966. Then he had a genetics class with Professor Dave McGill. “I just really liked him and the subject matter,” Hoegemeyer said.

Later, Hoegemeyer worked for Professor Charlie Gardner, a corn quantitative geneticist. “He was also really good to me,” Hoegemeyer said. When it was time to choose a graduate school, Gardner called people he knew. “He was the one who made connections for me,” Hoegemeyer said. “I was fortunate to have had such great mentors.”

WORLD-RENOVATED CORN BREEDER

After Hoegemeyer obtained his doctorate in plant breeding at Iowa State University in 1974, he decided to help run the family seed business for a few years.

A few years turned into a few decades, and the little seed company in Hooper, Neb., grew to be a significant player in the industry. Along the way, Hoegemeyer became an internationally recognized breeder of corn hybrids.

In 2005, Hoegemeyer sold the genetics and breeding portion of the company to Syngenta and worked as a scientist for them for several years.

HIGHLY REGARDED FACULTY MEMBER

Initially recruited for a UNL fund-raising campaign in 2009, Hoegemeyer signed on to teach as well. “After having been out of the academic world as long as I had been, I was a little intimidated at first,” Hoegemeyer admitted.

But Hoegemeyer found the transition to be smoother than expected. “The department has been so gracious to me,” he said. “I am just very appreciative of all the opportunities I’ve been given.”

Colleagues, too, expressed sentiments of appreciation. “Having Tom in the department was one of the highlights of my experience here. In the corn breeding nursery, I was able to satisfy Tom’s addiction to corn breeding. In exchange, my students and I benefited from Tom’s vast knowledge, which he freely shared in the field,” said Aaron Lorenz, former assistant professor. “As the department’s first plant breeder in residence, Tom was superb and will be the model for all who follow,” said Professor Stephen Baenziger, who taught a plant breeding course with Hoegemeyer.

In addition, Hoegemeyer wrote and taught three other courses offered to both resident and distance-learning students. These courses gave students all over the world access to Hoegemeyer’s firsthand experience in the field. “Tom was our window into private plant breeding, and our students will be forever in his debt. He helped shape their futures while shaping ours,” said Baenziger.

Easing out of academic life, Hoegemeyer will serve in an adjunct capacity while he assists several graduate students to finish their programs. He will also continue helping students make connections with people in the plant breeding industry, just as Professor Gardner once helped make a connection for him.

SEED-PLANTING, GLOBE-TROTTING RETIREE

So what’s next for a fellow who has planted seeds most of his life? “I’m going to plant some wild rice and grow some hops,” Hoegemeyer said.

He is also looking forward to spending time with his family and traveling. In July, he and his wife Linda plan to trade Nebraska cornfields for fields of lavender and wine tasting in Provence, France.

“I’ve lived a charmed life,” said Hoegemeyer. Perhaps. But one gets the sense that Hoegemeyer has simply reaped what he has sown.
Thomas Elthon—25 Years

Robert Wilson—39 Years

James Specht—40 Years

Tom Hoegemeyer—Six Years

Alumni Advisory Council Holds Meeting

The Agronomy and Horticulture Alumni Advisory Council held its inaugural meeting on Friday, December 5, 2014, on UNL East Campus. The AHAAC is built on the voluntary participation of alumni with notable early and late career credentials. The mission of the AHAAC is to aid and counsel the head of the department in alumni engagement, financial stability, industry relations and student interaction with alumni. Members participate in a semiannual meeting with the department and throughout the year as needed.

The meeting allowed opportunities for council members to interact with members of the department and the Institute of Agriculture and Natural Resources. Council members participated in student and faculty “fast break” sessions where five-minute speeches were given on specific topics of interest. In addition to the fast break sessions, council members had the opportunity to hear NU Vice President and IANR Harlan Vice Chancellor Ronnie Green share information on the progress of the institute and anticipated changes taking place over the next few years. AHAAC members were also invited to attend the department’s holiday luncheon to further engage with staff and faculty.

Roch Gaussoin, professor and head of the department, commented, “I see this as the beginning of a long and mutually beneficial relationship with our stakeholders. Putting the department in the position to have a meaningful interaction with alumni will be a tremendous opportunity for positive growth and relevance as an academic unit.”

STAFF AWARDS

Tomie Galusha: Staff Advisory Committee Special Contributions Award
Ben Loseke: SAC Professional Development Award
Matt Sousek: SAC Professional Development Award

In Remembrance

Emeritus Professor Dale Swartzendruber, age 89, passed on Oct. 21, 2014. Dr. Swartzendruber was a soil physics professor at the University of Nebraska-Lincoln from 1977 to 1998, when he retired. He was dedicated to excellence in research and teaching and was a member of the Soil Science Society of America and the American Geophysical Union. Prior to coming to the University of Nebraska, Swartzendruber was a distinguished member of the faculty at Purdue University. Some of his honors include SSSA and ASA Fellow as well as the Soil Science Society of America’s Distinguished Service Award, and he authored more than 85 publications throughout the course of his career.

Dr. Darrell Nelson, UNL emeritus professor and colleague of Swartzendruber, said, “Dr. Swartzendruber was one of the preeminent soil physicists in the United States. His work on water and heat flow in porous media was of groundbreaking quality and led to his receiving the SSSA Research Award.”

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Staff Awards

Tomie Galusha: Staff Advisory Committee Special Contributions Award
Ben Loseke: SAC Professional Development Award
Matt Sousek: SAC Professional Development Award
MARISSA GROOMS, A FORMER UNIVERSITY OF NEBRASKA-LINCOLN UNDERGRADUATE from Valentine, Neb., won the second annual Engler Quick Pitch Competition last spring. Rising to the top in a field of nearly 80 applicants, Grooms pitched a business idea for a soil-sampling lab for area producers with a high level of customer service and won $1,000 for her efforts. Shortly after winning, Grooms graduated with a B.S. in agronomy and started a job with agricultural giant Cargill. Cargill, one of the largest privately held corporations in the United States, provides food, agriculture, financial and industrial services, and products to 67 countries around the world.

Grooms believes the degree she received from UNL was well-rounded and beneficial in preparing her for a career in agronomy. “I’m glad I made connections and took advantage of the opportunities offered, such as Agronomy Club and out-of-state internships in New York and Kansas. My professors were good mentors—they enjoyed visiting with their students and offered advice,” Grooms said. She chose the soil science option under the agronomy major and took as many plant-related classes as possible while still graduating in three years. She appreciated the opportunity to choose her classes and mentioned her favorite class as AGRO 405 taught by Department of Agronomy and Horticulture Professor Steve Mason. “His class allowed me to look into the future. It gave me real-life experience and was easily the most difficult but beneficial and realistic class I took,” Grooms said.

Now she is putting her skill set to work at Cargill improving the efficiency of food production, and her future is looking bright. Grooms is currently working as a sales agronomist for the company. She sells crop inputs such as fertilizers, fungicides, insecticides and herbicides, as well as meeting with producers and finding solutions for their operations. “I’m in the office at times and other days I’m checking fields or visiting with producers, so it varies,” said Grooms. “I really enjoy my work and I am thankful for the opportunities and experiences I had at UNL which helped shape my future.” —Anthony Vance

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ALUMNI | VISITING SCIENTIST

BECOMING A VISITING SCIENTIST WAS A GOAL I WISHED TO FULFILL AFTER I FINISHED GRADUATE SCHOOL. My name is Piyaporn Phansak, but most people at UNL know me as Bee. I received my doctoral degree from the Department of Agronomy and Horticulture, University of Nebraska—Lincoln in 2010.

Under the supervision of Dr. James Specht, I worked with the soybean breeding program to complete my dissertation “Detection of soybean seed protein QTLs using selective genotyping.” After finishing my Ph.D., I decided to do postdoctoral research with Dr. Specht and Dr. Roch Gaussoin for another two years.

I returned to my home country, Thailand, in 2013. I soon wished to return to the United States to gain more research experience and learn new techniques and methods. With much kindness, Dr. Harkamal Walia accepted me to work in his lab as a visiting scientist.

At first, I was a little nervous. I didn’t know what the environment would be like or what type of work I would be doing. However, after only a couple weeks in the lab, I learned the system and became comfortable in the environment. My projects focused on salt tolerance in rice and submergence tolerance in maize.

Responsibilities included designing experiments, planting, collecting and analyzing data and assisting other lab members in time of need.

Most of my work was in the greenhouses. Some days I worked in the field with graduate students, while other days I worked in the lab. Working as a part of Walia’s lab, I saw not only the importance of people willing to help others but also how the lab members work as a family by lending assistance to get things done on time. It is this family-like environment that I also enjoy as a researcher and teacher in Thailand.

The Walia lab has been a great experience. Even though I worked as a visiting scientist for a short period of time, it was rewarding to experience the joy of a day’s work, people who help others, new techniques that can be applied to my future work and a place to make new friends. —Piyaporn “Bee” Phansak

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For this scholarship winner, there’s nothing stronger than his Nebraska roots.

Aaron Rerucha considers himself to be incredibly lucky. This Nebraska native has received both the Engler Scholarship and the Cabela’s Scholarship. The financial aid he received while still a student at UNL’s Department of Agronomy & Horticulture helped him start Oxbow Natural Landscaping on a 24-acre plot of land that has been in his family for generations.

Aaron is grateful for the scholarships he received. Grateful to all of the donors who make students’ dreams possible. Grateful to be able to make his grandfather and his great-great-grandfather proud.

You have the chance to make other students’ dreams come true. Give online at nufoundation.org/agronomyandhorticulture or contact Ann Bruntz at 402-458-1176 or abrun tz@nufoundation.org.