VOLUME 2 | SPRING 2017

# IN THE FIELD

## Joan Rose Dives Deep

Meet Michigan State University's internationally-renowned water researcher.

MICHIGAN STATE UNIVERSITY
**COLLEGE OF AGRICULTURE & NATURAL RESOURCES**

# IN THE FIELD

For alumni, donors and friends of the Michigan State University College of Agriculture and Natural Resources.

*In the Field*, published once a year, is devoted to bringing to light the stories of the College of Agriculture and Natural Resources and its people.

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Associate Dean and Director for Academic and Student Affairs

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Jeffrey W. Dwyer
Director of MSU Extension

George W. Smith
Associate Dean for Research and Associate Director of MSU AgBioResearch

Gretchen C. Neisler
Director of Center for Global Connections in Food, Agriculture and Natural Resources

**Contributing Writers**

Sean Corp
Tom Cummins
Eileen C. Gianiodis
James Dau
Cindy Hudson
Brenna Lashbrook
Abby Rubley
Cameron Rudolph
Beth Stuever
Mindy Tape
Holly M. Whetstone
Jamie Wilson

**Photography**

Tom Gennara
JeanaDee Allen
MSU Communications and Brand Strategy photographers
ANR Communications staff members

**Design & Production**

Redhead Design Studio
University Lithoprinters

We like to say that the issues we deal with on a regular basis have never been more relevant. I wonder, however, at what time clean water; healthy, safe food and an environment that provides for all would not be relevant? The answer, of course, is never.

Herein lies both the challenge and the opportunity for all of us in the College of Agriculture and Natural Resources at Michigan State University. The same issues that affect our stakeholders every single day are the same ones we're looking for answers to.

Anyone who woke up this morning and had breakfast is our stakeholder, and anyone who didn't eat breakfast is also our stakeholder. Stakeholders live in East Lansing, Michigan, and across the globe in Bangladesh or Indonesia or Malawi or Guatemala.

As you will read in this issue, our students, faculty and staff members continue to work relentlessly on clean water, food security and safety, animal welfare and sustainable living. They do this work because all of these issues impact the daily lives of people around the world.

Recognizing the importance of this work, our alumni and donors work just as hard, establishing endowed faculty positions, student scholarships and program support. They do this because they know that our work will always be relevant to the world, making a difference in individuals' lives—near and far.

None of us do this alone, however. It's only by working together, each of us doing our individual part, that we can and will change the world. We continue to make great strides in water research, thanks to Joan B. Rose, the Homer Nowlin Endowed Chair of Water Research, co-director of the Center for Water Sciences and the Center for Advancing Microbial Risk Assessment, and supervisor of the WQEMM (Water Quality, Environmental, and Molecular Microbiology) Laboratory.

But Rose doesn't work in a vacuum; not many of our college's researchers do. They work hard to teach undergraduate and graduate students the hows and whys of the work they do, and take time to learn from our students.

It's the work we do in collaborative partnership—whether it's a researcher across campus, in another country, a commodity group, a student, or another faculty member in our college—that will lead to answers to these problems.

That's what researchers like Joan Rose, Karim Maredia, Mywish Maredia and Janice Siegford know. That's what our MSU Extension team, working in Flint, knows. It's what our students are learning to do.

These partnerships don't always lead to recognition for the individuals; and they are fine with that.

If I've learned anything from my time as a student and now as dean, we do this work for the change it brings, not for the recognition or fame.

Enjoy reading about the work that's going on across the college. Spartans Will.

**Ron Hendrick**
Professor and Dean
College of Agriculture and Natural Resources

**WANT TO LEARN MORE ABOUT OUR COVER AND HOW WE PULLED IT OFF?**

Check out *In the Field* online at canr.msu.edu/inthefield for more photos and video with the participants.

## LET'S BE BRIEF



## GLOBAL PERSPECTIVE



## COVER STORY



## FEATURES



## SMALL BITES

LET'S BE BRIEF

## Detroit Serves as Classroom to Students

Last summer 60 MSU students and faculty lived, worked, played and learned in Detroit as part of DETxMSU, a pilot program that immersed students from six colleges throughout the city, where they partnered with stakeholders to work on projects ranging from entrepreneurship and business to urban design and media production.

"The problems we are facing today cannot be solved by one discipline or one way of thinking. It takes bringing many different people together to create solutions that bridge ways of thinking and seeing the world," said Pat Crawford, associate professor, School of Planning, Design and Construction and DETxMSU coordinator. "By immersing the students in the realities of Detroit, we provided an opportune environment for them to practice and learn in collaboration with community partners."

The program, made up of seven separate groups of students from different colleges and majors across MSU, worked on a variety of projects. The colleges included the Residential College in the Arts and Humanities (RCAH), the College of Communication Arts and Sciences, the Broad College of Business, the College of Arts and Letters and the College of Engineering. Students from the College of Agriculture and Natural Resources' (CANR) School of Planning, Design and Construction participated, too.

DesignThink, the CANR group, teamed up with the Michigan Department of Natural Resources to create a plan for transforming Belle Isle's landscape into a prominent feature of the city.

The students also participated in discussion groups, networking opportunities, and several discovery events. The experience helped students narrow their career interests.

Students from across MSU also participated in InnovateGov. They were placed within Detroit's core public or nonprofit policy making institutions and became involved in the design and implementation of innovative approaches to an intensely challenging public problem: The looming foreclosure of an estimated 60,000 properties.

"The MSU interns were critical to substantially decreasing the number of foreclosed properties. On their first day, they hit the ground running and with their assistance, we were able to reach 8,000 taxpayers," said Eric Sabree, treasurer, Wayne County. "These enthusiastic, creative and dedicated students also met with a variety of nonprofit and public entities to develop a best practices plan for future foreclosure prevention communication. I greatly appreciate the partnership with MSU and the opportunity to work with this amazing group of future leaders."

DETxMSU was a collaborative effort. Students were housed in Wayne State University residence halls, and the overall program received financial support from the Quicken Loans Family of Companies to introduce students to Detroit, in hope that they consider working there one day.

"I truly learned and witnessed the adage 'the whole is greater than the sum of its parts.' When working in such a cohesive group, it is not your individual product that shines but the abilities and contributions of the group," said Rachel Wilke, a junior in the landscape architecture program. "My time in Detroit enhanced my education and allowed me to see solutions through multiple viewpoints and consider strategies I may not otherwise have in a traditional classroom."

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## Study Abroad Leads To Lifetime Impact

When Joshua Knoll left for Japan last October, he never imagined his brief trip would produce such a long-term effect in his life.

Knoll represented MSU at the International Student Summit on Agriculture, Food and the Environment, and then opted to stay an additional week. The Comprehensive International Education Program is the student food security session that takes place after the conference.

"It's optional, so there were fewer attendees, but it had a solid group of international scholars," Knoll said.

During the International Summit, students from around the world present papers on agriculture and natural resources topics; his presentation considered how land sharing is superior to land sparing.

"My presentation was about land sharing—or utilizing land for ecology as well as farming, and why it is, generally, a superior practice to land sparing, which is the separation of agricultural and ecological land, which usually leads to intensification," he said.

Interacting with students from around the world provided him a glimpse into his future.

"I got to know an incredible cohort of students from around the world and gained a lot of cultural and intellectual insight from them," he said.

Knoll already has plans to partner with his counterparts across the globe on a research project, possibly even studying abroad for graduate school to broaden his international exposure.

"I returned with a renewed desire to help promote intercultural exchange on campus and to push for collaborations among students from diverse backgrounds—to share ideas and figure out solutions to tough problems. I am partnering with others to look more closely at food insecurity and poverty," Knoll said. "I'm excited to have the opportunity to work with MSU's diverse student body in seeing this vision through."

"The most important thing I learned is that problems like climate change and food security cannot be solved by one nation alone," he said. "All must participate to prevent serious repercussions. It may sound cliché, but it is true that we can't do it alone; and it's even more true when it comes to nations."

**LEARN MORE**
*canr.msu.edu/inthefield*

## Dr. Gore Goes To Washington

What would you do if you were in a basement in Washington, D.C., surrounded by a series of doors—none of which had an actual handle?

Meredith Gore, associate professor in MSU's Department of Fisheries and Wildlife and the School of Criminal Justice, recently found herself in just such a place. As she stood there, staring at the handle-less doors, she thought of how she got there.

Gore is currently serving as a Jefferson Science Fellow in the U.S. Department of State. The Jefferson Science Fellowship program places tenured faculty members from U.S. universities in the State Department or at USAID, where they spend a year away from their academic institution,

working for the federal government as science advisors on foreign policy and international development issues.

Gore's responsibilities include providing expertise on the rapidly changing environment and in the science, technology and health arenas, including wildlife trafficking and climate change. The environmental consequences of these matters routinely influence policy decisions confronted by the U.S. department of State—and the science must be accurate and up-to-date for the State department to respond responsibly and appropriately. Gore has to be ready at all times to thoroughly answer information requests from all areas of the intelligence community from all parts of the world.

Although there was a day when Gore was unsure of which door to go through, she quickly figured it out. Just as she is navigating her way through the international intelligence community as the first Jefferson Science Fellow from Michigan State University.

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## Save the Dates

**March 4-11**
**ANR Week**
Campuswide
*anrweek.canr.msu.edu*

**March 7**
**ANR Week luncheon**
Kellogg Hotel & Conference Center

**April 22**
**Small Animals Day**
Campuswide
*canr.msu.edu/smallanimalsday*

**May 5-7**
**Commencements**
Campuswide

**June 6**
**Golfing for Scholarships**
Forest Akers Golf Course
*canr.msu.edu/golfingforscholarships*

**June 29**
**FFA Masters Tournament**
Forest Akers Golf Course

**Aug. 24**
**MSU Agriculture Innovations: Focus on Forages and the Future**
Lake City Research Center, Lake City Michigan
*msue.anr.msu.edu/msuaginnovationday*

**Aug. 30**
**Classes begin**
Campuswide

**Nov. 4**
**AutumnFest**
MSU Pavilion for Agriculture and Livestock Education
*canr.msu.edu/alumni_donors/alumni/autumnfest*

# Tiny Home, Big Life: Sparty's Cabin

EILEEN C. GIANIODIS

Debra Levantrosser's experience in implementing lean manufacturing at companies for two decades might be one reason she thinks a lot about living small. Or, it might be the food truck she owns and runs.

"I am already well-versed on the intricacies of small water tanks, being in a confined space and taking care not to overextend the electrical capabilities," she said. Levantrosser placed the winning bid for Sparty's Cabin—a tiny home built by students in the MSU Chapter of the US Green Building Coalition to learn about the tiny home movement.

Students in the School of Planning Design and Construction (SPDC)—landscape architecture, interior design, urban planning, and construction management—and in the Department of Forestry gained valuable, hands-on experience working alongside faculty and volunteer industry experts on the planning, design and construction processes for this project.

"The Tiny House movement is fundamentally about a cultural change—how to live a rich life without being encumbered or held back by possessions," says Pat Crawford, associate director of SPDC and advisor to the student group.

Sparty's Cabin was built over six weeks during the spring semester 2016, with the help of more than 100 people from across campus and the community. This sustainable project included materials from the MSU Sustainable Wood Recovery Program and the MSU Shadows Collection, and featured MSU-made custom counter-tops, shelving and a ladder. In addition to MSU lumber, other materials were selected for their sustainable qualities, including double-pane windows, a composting toilet, recycled newspaper insulation, and a structural roof and wall system for reduced air leakage.

***"You don't have to be in a tiny house to embrace the movement; we can all make decisions every day that lower our impact on the environment, regardless of the size of our homes."***

The structure was built on a trailer, allowing it to be easily transported from place to place. Sparty's Cabin includes traditional hookups for sewer, water and electricity; however, it can be retrofitted in the future to go off the grid, which could be accomplished by capturing rainwater and using 100 percent solar power energy.

Sparty's Cabin was used as an educational tool to spread awareness to the local community about the alternative, sustainable lifestyle known as the Tiny House Movement. These types of houses offer the practicality of living in a space smaller than 1,000 square feet, allowing for a minimalist lifestyle, with the added advantage of being on wheels and, thus, mobile. The spirit of the Tiny House Movement is about filling life with experiences, not things. It is about stories that can be told and experiences that can be shared with friends and family.

Sparty's Cabin, MSU's first tiny home, was recently auctioned off by MSU's Surplus Store; Debra Levantrosser, an MSU alumna, was the highest bidder. The structure encompasses 177 square feet of space that sleeps three and features both an upstairs (sleeping loft and storage) and a downstairs (great room/kitchen, bathroom and bedroom).

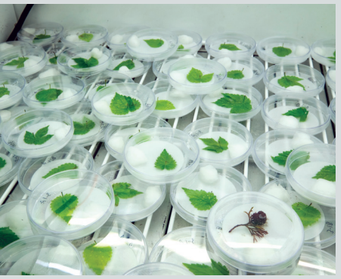
*Learn more at: canr.msu.edu/inthefield*





MSU Provost, June Yovatt, passes the key to Sparty's Cabin to Debra Levantrosser.

# From Lab To Field, Research Takes Food Where It's Needed Most



JAMES DAU

The right food for the right location: This has long been the mantra of agricultural research, which sought to develop the most productive varieties of food matched to their ideal climatic regions.

But what if that didn't have to be the case? What if farmers could grow corn in Florida or potatoes in Texas? What if any food could be grown wherever it was needed? These are the questions MSU plant geneticist Brad Day and his team are seeking to answer.

A self-proclaimed gene jockey, Day has spent much of his career conducting basic research on the genetic factors that determine how plants respond to stresses from changing environmental and disease conditions. Now, as head of one of the most cutting-edge plant science laboratories in the country, he is turning his attention toward finding applications for the fundamental work his team has produced.

"Being at MSU allows us to direct our fundamental research toward an intended purpose or outcome," said Day, associate professor in the Department of Plant, Soil and Microbial Sciences. "Day to day, we spend a lot of time cloning genes and studying minute processes within the plant, but we never forget that it has a long-term purpose in bringing better food to more people."

The inroads carved by Day and his team into the world of plant stress response could one day prove the key to developing crops more capable of resisting conditions that today spell disaster, like drought or epidemic. Now, he and his team are looking to apply their genomic expertise to fast-track those super crops and deliver them to the fields where they are most needed.

## A SPIRIT OF COLLABORATION

Forging connections with MSU's distinguished community of plant scientists, from geneticists to breeders to pathologists, is key to bridging the gap between fundamental research and its long-term field applications. Through the Plant Resilience Institute, Day's team is beginning to partner with the accomplished dry bean breeding program of CANR researcher James Kelly, which has produced 47 dry bean varieties over the last 35 years.

"We're helping each other," Day said. "They're helping us find applications for all the lab work we've done over the years and we're helping them fast-track their decades-long breeding programs. We all want to take advantage of the incredible environment we have here at the College of Agriculture and Natural Resources."

That same spirit of collaboration has already yielded results. Working with researchers from several departments on campus, Day's team has helped adapt a biosensor created to detect pathogens in humans into a tool that can do the same for plants, making it a potent instrument for farmers to identify and track plant disease outbreaks and epidemics.

Amy Baetsen-Young, PhD student and co-inventor of the biosensor, came to MSU in part for the opportunity offered at labs like Day's to see research move from the lab to field applications. Working with three lab groups on campus, including Day's, has been fulfilling work.

"We see both sides of the coin in this lab," Baetsen-Young said. "We're doing biochemistry experiments, but we're thinking about how they could apply to places in the world that have real needs. A collaborative environment like this allows for translational research that starts with basic biology and ends up on farms."

## AN EYE TO THE FUTURE

The farm isn't a place Day visits often in fact; it was at MSU that he first set foot in a farm field. While certainly a personal milestone, it represented something more than that—the direction of the future of his lab, the merger of fundamental laboratory science with applied fieldwork.

"I felt like Neil Armstrong," Day said. "It made me more anxious to see our work find applications out in the world, whether that comes from me directly or through partnerships with the phenomenal colleagues I have here in the college."

The energy and accomplishments of Day's lab continues to bring new researchers into the CANR and push research forward. Miranda Hous, a postdoctoral scientist from St. Louis, Missouri, joined Day's lab to study the impact of biotic and abiotic stress on common beans.

"My partner and I were incredibly lucky when we were looking for research opportunities," Hous said. "We ultimately made the decision to come to MSU because of the network of people here and the opportunities for interaction and collaboration with so many other scientists. We knew it was the place where we could become better scientists."

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# Ripe For The Taking

***The fields of tomorrow are vast, varied and full of opportunity for graduates***

TOM CUMMINS

Imagine a state-of-the-art greenhouse so big it disappears into the horizon. One that uses advanced technology like energy curtains and automated harvest carts to provide fresh produce year round.

It may sound like a field of the future but it is one that has already arrived. Unfortunately, for many businesses around the country, suitably qualified employees have not. According to a 2015 USDA report, over the next five years there will be almost twice as many average annual job openings than there will be graduates with expertise in food, agriculture, renewable natural resources and the environment to fill them.

CANR graduates are prime candidates to respond to this need. Keeping pace with a growing industry requires a curriculum that keeps in touch with the needs of employers.

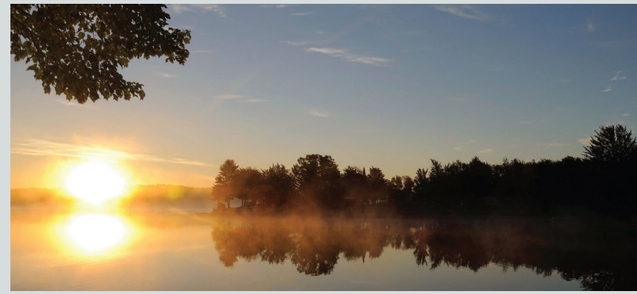
"We can't be insular," said Kelly Millenbah, associate dean of the CANR. "We must engage with our employers and the folks who will be hiring our students to understand what their needs are and use that information and data to better inform our curriculum."

This dynamic approach to curriculum development helps the college foster an interdisciplinary approach and produce graduates with a depth and breadth that is well suited to the career opportunities of today and tomorrow.

For David Karapetian, human resources executive advisor for Mastronardi Produce, this breadth of learning is a key piece of what makes CANR graduates such attractive prospects to hire. "A large part of the attraction is the range of studies the university (MSU) offers and so when a large employer like us is considering hiring undergrads and grads, we naturally want to recruit from a pool that will optimize the odds that we'll find the skillsets we'll need."

Study abroad and internship opportunities further encourage CANR students to view their particular disciplines with a wider lens. Recent CANR graduate David Penterics, currently a crop consultant at Crop Production Services in Michigan, credits his success and quick job placement to the college's student organizations and networking opportunities with industry representatives.

"My involvement with the college, my fraternity and student senate all did so much to help my professional development. If I hadn't joined CANR, I would never have pushed myself the way I did. The college



opened my eyes and showed me different career paths that I hadn't thought about and showed me that there are hundreds of different businesses around me and tons of opportunities to grow."

The same USDA report highlights career pathways that lead beyond the traditional fields that often spring to mind when people think about the college. With almost half of these employment opportunities between 2015 and 2020 being in management and business, one such pathway could lead to employers like Michigan-based GreenStone Farm Credit who greatly value having CANR grads in their own "backyard."

"Graduates with the knowledge of both business and agriculture are our ideal candidates," said Jonna Meyers, human resources generalist at GreenStone. "It allows them to have an incredible foundation for what we do and have a passion for serving the agriculture industry. It's a tremendous opportunity to have that so close and for us to be involved in the things students do on campus."

The net result is an approach to shaping successful graduates that is constantly evolving to fit the industry needs and the greater needs related to food, energy and the environment, faced by communities in Michigan and around the world.

"I think it's really important to recognize that we should never be satisfied that the curriculum is exactly where it needs to be. What does the industry anticipate needing five to 10 years from now? How do we react to that to make sure our students meet that demand?" said Millenbah.

While the number of job openings will change from one year to the next, as Spartans, CANR graduates have never been deterred by a little competition. Given the quality of educational and professional opportunities available to them in the CANR, they don't need to start now.

**LEARN MORE**
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# ENTOMOLOGIST. WORLD-TRAVELER. BIOTECH PIONEER.

HOLLY M. WHETSTONE

Born in a tiny, remote village in India, Karim Maredia left home at the age of 5. He went to live with his aunt and uncle in Mumbai—the country's most populous city, 400 miles away from home.

"I left my parents to get an education," he said. "My aunt became like a mother to me. Mumbai was in another state, which had better schools, better education and better opportunities.

"My father was passionate about education. He was the first person in the whole village to pass high school. At the time, our country was under British rule and he had to travel 300 miles to take a high school exam."

Today, the MSU entomologist is one of the world's leading authorities on diverse agricultural topics such as biotechnology, biosafety and integrated pest management (IPM). It's a huge departure from the young boy who once used a broomstick and heat from the scorching Indian sun to keep birds and bugs from the family's harvested grains.

"In those days, there were no dryers and, in our village, there was no electricity. Putting those grains on the hot concrete roofs without pesticides, that was IPM," he said. "The kids stood there with broomsticks in hand for three hours until all of the bugs were dead. But it was so hot, it was my feeling that the bugs were dead within an hour."

Insects, however, were not always top of mind for Maredia. As a youngster, he yearned to become a veterinarian so that he could care for the buffalo on the family farm. Instead, a neighbor convinced his parents that entomology was a better career choice because of more job availability. To fill the void left by not pursuing veterinary medicine, Maredia befriended several animal science students in college.

"I'd tag along with them to class. Eventually, I got so good that some people really thought I was a veterinarian," he said. "I could do artificial insemination, and work on animal health. To this day, that is my one regret—not becoming a veterinarian."

Maredia earned his undergraduate degree in India, and both his master's and doctoral degrees in the United States. After that–he returned home and married a beautiful young lady from Mumbai who was chosen for him by his parents.

A few months later he landed a job in Mexico where he worked at the International Maize and Wheat Improvement Center, also known as CIMMYT. That's where he met Norman Bourlaug, Father of Green Revolution, a researcher Maredia had greatly admired from afar.

"India was in a food crisis in the '60s–a real, real food crisis," he said. "Millions of people would have died but that's when Dr. Bourlaug and the Green Revolution came about. They brought the new high-yielding dwarf wheat varieties from Mexico to India and helped to save millions of lives."

Maredia spent three years in Mexico working with plant breeder teams from around the world to help develop insect-resistant maize varieties. He and his wife, who also started work at CIMMYT, lived in the same apartment complex as Bourlaug. They observed the famed agricultural scientist who had earned the Nobel Peace Prize in 1970. "I saw Dr. Bourlaug and other researchers at CIMMYT bringing in scientists from all around the world, working closely with them and that really changed me. Just working in Mexico changed my whole life," he said.

The couple left Mexico and came to work at MSU in March 1989, where Maredia wanted to collaborate and build partnerships, and teach the "next generation of young minds." Eventually, he successfully lobbied faculty, received funding and started the first international pest management course at MSU.

Fascinated with biotechnology and its potential to help farmers and agriculture, Maredia has been leading a $20-million Bill and Melinda Gates Foundation project since 2010 which is guiding the development of biotechnology policy in Africa. He has brought hundreds of policy makers, regulators and legislative leaders from around the world to MSU to be trained on the topic.

"That's what I wanted to do—to share the knowledge and experience from Michigan with the world," he said. "There was so much good going on that could be shared with other countries, especially in terms of the approach, the methods and the tools we have at Michigan State."

Maredia and his wife, Mywish, an MSU agriculture economics professor, attribute their success in large part to Maredia's father, who came to Michigan to live with them in 1992 after his wife's death–Maredia's mother.

"My father believed in education and sharing of knowledge, and he constantly inspired us to do that," he said. "We were able to travel to do our work. My father took good care of our kids [both now in their 20s]."

The other credit, he says, goes to MSU. "This university has given us room to grow and to achieve our dreams," he said. "It's the openness, the support and the multicultural international environment, the flexibility and the reputation of MSU.

"I will never forget Michigan State. It's a special place. If I had been at any other university, I would not have been able to do what I've done here."

**NAME**
Karim Maredia

**EDUCATION**
Bachelor's in agriculture from Konkan Agricultural University in India, 1979

Master's in agriculture from Alabama A&M University, 1982

PhD in pest management and plant breeding from University of Arkansas, 1985

*Learn more at: canr.msu.edu/inthefield*

# BIOTECH IN INDONESIA & BANGLADESH

BRENNA LASHBROOK

Dave Douches loves potatoes. He grows them, breeds them, takes them around the world, and makes potato chips. He's even made his chips for former President Obama.

Douches, CANR potato breeder and professor in the Department of Plant, Soil, and Microbial Sciences, grows purple potatoes, tiny potatoes, and potatoes that are disease-resistant. He does all of this with the help of biotechnology and other scientific advancements, making an already substantial food crop even more beneficial for communities around the globe.

The potato has been a staple in diets around the globe for centuries. Originally from South America, it's been adapted to countless climates and situations to bring the nutritionally-dense foodstuff to impoverished regions.

"It's a starchy vegetable that's highly productive. It's nutritionally sound, and it's adaptable to grow around the world," Douches said.

Besides being highly productive, potatoes are a crop that farmers can invest in.

"With potatoes, farmers can invest in irrigation, invest in operations that will support the production whether by buying fertilizer or chemicals to protect the crop," he said.

Smallholder potato farmers also benefit in two ways, they are able to grow a crop that helps feed their families and they are able to grow enough potatoes that they can also make a profit. Because potato's perishability, it is unlikely the farmers will ever compete with large commercial farms. The potato forms a nutritional and financial foundation for these farmers.

"Late blight is actually one of the most challenging diseases we face because the pathogen is highly adaptive to what we throw at it," said Douches.

Late blight is probably most well known for its role in the Irish potato famine. "We're never going to stop the pathogen. We're going to manage it with host-plant resistance and other aspects. You don't put potatoes on a boat and ship them halfway around the world. You grow them mostly where you use them." This means we have to solve the problem of late blight in country, in the field, right where potatoes are grown.

Enter: biotechnology. Despite some societal trepidation surrounding biotechnological innovation, Douches insists that it's crucial for resistance.

"Biotechnology was that natural step in the late 80s early 90s," Douches said. "We were working on that, for insect resistance, and along came late blight in the U.S. as a major problem."

Douches, who mapped the potato genome, concluded that there wasn't one single answer, but a collection of tools that could compose a management plan.

"It was a realization that I couldn't sit there with a clear conscience and say I'm not going to explore these biotech tools because some people feel uncomfortable about them, when, as a scientist, I know that the technology is safe and can be used appropriately."

Much of Douches' work, especially in Indonesia and Bangladesh, is funded by the United States Agency for International Development. He said that, in part because of biotechnology, the project is poised for success.

"Technology has advanced. The scientific knowledge that we need has advanced. I believe we can meet our goals and objectives because we have the knowledge base and infrastructure to move forward in an efficient way."

For more than 30 years, Douches has led the way in potatoes, all the time at MSU. But he doesn't do it alone. He's known that MSU was the right place to do this work for a long time.

Through his own international graduate experience, Douches has recognized that global collaboration is crucial. MSU prepares a range of graduate students and international scholars to take their work beyond borders.

"Training graduate students is a key component in improving agriculture in countries around the world," he said. "In our lab, we have a truly diverse group of people. And it's really beautiful to see them interact."

*Learn more at:*
*canr.msu.edu/inthefield*

# SNARES TO WARES

EILEEN C. GIANIODIS

Murchison Falls National Park (MFNP) in Uganda is picturesque. It's exactly how you might imagine an African wildlife preserve—lions, elephants, giraffes, hippos and other wildlife roaming about the savannah.

At 1,480 square miles, MFNP is Uganda's largest national park. Divided east to west by the Victoria Nile for more than 70 miles, it is home to Murchison Falls, where the Nile River's waters converge through a narrow, 23-foot gorge before plunging a jaw-dropping 150 feet.

Despite its beauty, however, this park houses a serious threat to the wildlife: snares. It's a problem that MSU graduate student Tutillo Mudumba has been working to solve for years. And, it's one of the things that brought him to MSU to study. Mudumba, a doctoral student in the Department of Fisheries and Wildlife, is Ugandan.

While the snares themselves are simple devices, the reasons they are set in the park are not. The snares indiscriminately kill, maim and scar animals.

Wire snares are made from vehicle tires. The rubber from the tires is burned off and the internal wires, which give the tires their structural integrity, are turned into rudimentary but extremely strong and reliable snares intended to catch bush meat (usually antelope) in and around the park.

"While snaring presents considerable challenges for wildlife conservation, this is actually a human livelihood issue," Mudumba said. "This is not a prosperous area of the country, and people set snares to catch antelope and other bush meat for food."

MSU grad student, Tutillo Mudumba (top), Assistant Professor, Robert Montgomery, and Research Assistant, Sophia Jingo, look for wildlife in Murchison Falls.

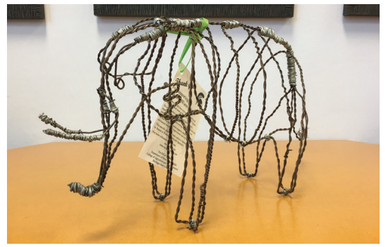

Mudumba's advisor, Robert Montgomery, assistant professor in the Department of Fisheries and Wildlife, agreed. "When you think of a park like Murchison Falls, you might envision that there's a fence around it or a border," said Montgomery. "There isn't. People live right at the edge of this park, and the abundant wildlife are right there. This makes human–wildlife interactions more common and potentially harmful—for the wildlife and humans."

The park's wildlife and natural resources are managed by the Uganda Wildlife Authority (UWA). They work regularly with researchers like Montgomery and Mudumba to develop innovations centered on wildlife conservation and human livelihood improvement.

Mudumba has led the charge to remove snares from the park, taking an approach he hopes will address several of the issues concerned: changing the value of the wires. Mudumba and some local youth have developed the Snares to Wares Initiative to turn these dangerous snares into works of art that can support a community.

Pakwach, with a population of about 22,000, is one of the poorest in Uganda. Its location, across the Nile River from MFNP, makes it a prime spot for poachers. And the group of young men targeted for poaching is especially vulnerable. "There are youth in Pakwach, 11 to 12 years old, who haven't qualified for secondary school and have little to do. As they get older, they become potential recruits for poachers—and part of the problem," Montgomery said.

Mudumba sees another type of work for these boys, however. He thinks they can learn to make art out of the wire snares. He's already working with a group of former poachers who are doing exactly that. The boys Mudumba is working with are already using the wire to form small toy cars and pieces of art. It's more than a hobby. They are selling the pieces in Pakwach and would like to sell the art in MFNP and in Michigan to continue to support wildlife conservation.



"If we want to conserve wildlife, it's important that there are local pathways to do the work. Teaching children that supporting their families with a skill isn't a new concept, but this particular project is," Montgomery said.

Mudumba is in it to change a way of life, and he knows that won't happen overnight. There's still a lot more ground to cover in his quest to conserve some of his country's greatest natural resources – the wildlife that live there. "My mission is to make sure we get wire snares out of Uganda, starting with Murchison Falls National Park," he said.

*Learn more at:*
*canr.msu.edu/inthefield*

# PLANT PATHOLOGIST AMONG MOST RECENT CLASS OF UNIVERSITY **DISTINGUISHED PROFESSORS**

CAMERON RUDOLPH

Driving to work on a late August morning, Mary Hausbeck was concerned. The traffic wasn't particularly bothersome, and she didn't have car trouble. It was the weather that gave her pause, but not for the same reason the average driver might give. It was hot and extremely humid. "Today's weather is perfect for downy mildew," she thought.

Hausbeck is a University Distinguished Professor—an honor she earned in 2015—in the Department of Plant, Soil and Microbial Sciences at MSU. She has spent her 26-year career in plant pathology, troubleshooting crop disease issues for Michigan's vegetable and greenhouse ornamental industries. Downy mildew is the most persistent and problematic dilemma.

After more than a century as a very rare and easy-to-manage pathogen, the fungal-like disease made its way back to Michigan stronger than ever in 2005. Since then, downy mildew has devastated a wide array of vegetable crops, especially cucumbers.

"Michigan is No. 1 in the nation for pickling cucumbers," Hausbeck said. "But it's become harder to grow them each year. That's why our lab has spent a lot of time combating this disease. We are the lead on a national grant where we are working with six other universities to develop management techniques."

The four-year, $2.3 million grant from the U.S. Department of Agriculture was awarded to Hausbeck and MSU in 2016. Michigan growers are looking to Hausbeck, as they have for more than two decades, to come up with the answers.

"My responsibilities are especially broad, with 60 percent of my role in MSU Extension and 40 percent in research," Hausbeck said. "Many times I'm the first person to sort out whether a problem is from a plant pathogen or some kind of physiological stress. Growers know we are listening and are responsive to them. They expect us to solve the problems, and we do our best not to disappoint. I feel we've played an important role in keeping the Michigan vegetable industry healthy."

Believing her laboratory can act as a front door to growers seeking assistance from MSU, Hausbeck has built important relationships throughout the industry. Her efforts have led to her standing as a highly respected member of the agriculture community.

"Dr. Hausbeck is recognized nationally for the research and extension outreach she has done for a number of plant diseases, including downy mildew," said Dave Smith, executive director of the Michigan Vegetable Council. "She is a valuable asset to our state's vegetable growers and an excellent model for how research and extension specialists should operate. She addresses relevant disease problems and is successful in obtaining grants to fund her research.

## JOINING AN ELITE CLUB

The first University Distinguished Professors were named in 1990. In all, the title has been conferred on 144 MSU faculty, including Hausbeck as the 17th from the College of Agriculture and Natural Resources.

A candidate must meet several criteria, such as attaining the rank of full professor, performing nationally and internationally recognized scholarly work, and leading a superior teaching or outreach program. After nomination from faculty, deans, directors or chairpersons and review by an advisory committee, the MSU Board of Trustees awards University Distinguished Professorships based on recommendation from the president and provost.

"Faculty selected as University Distinguished Professors represent the most outstanding scholarship of MSU," Provost June Pierce Youatt said. "The superior achievements of Dr. Hausbeck set her apart as both deserving of this honor and worthy of joining this exclusive rank."

Hausbeck said it was a humbling experience to garner this recognition from an institution that has meant so much to her. She earned her bachelor's and master's degrees from MSU, met her husband on the East Lansing campus, and her three children are Spartans.

Conversely, she has greatly advanced the university's land-grant mission. Hausbeck's laboratory brings in an average of $1 million of external research funding each year, with a total of more than $26 million in her career to date. Although her dedication to the Michigan vegetable industry has never wavered and her competitiveness on the national grant scene remains strong, she refuses to take full credit.

"This award validates our team approach," Hausbeck said. "I'm a big believer in graduate and undergraduate education. While I don't have a teaching appointment, I employ a lot of undergraduates who are essential to our program. A lot of people at MSU have influenced my career, and it's truly a privilege to pass that on and serve as a mentor for young people who want to enter the agriculture field."

*Learn more at: canr.msu.edu/inthefield*

# FINDING HER PLACE **AT MSU**

"I started out as an economist but found a natural fit in working with smallholder farmers, especially women farmers."

Mywish Maredia likes getting her hands dirty. It took her a while, though, to figure out that this would be her life's work.

Maredia is a professor in the Department of Agricultural, Food, and Resource Economics. Born, raised and educated in India, Maredia began her career as an economist at the International Maize and Wheat Improvement Center (CIMMYT). Her work wasn't initially focused on food security issues in particular but more on the economics of wheat and maize production around the world. Her husband, Karim Maredia, was also working at CIMMYT with Norman Borlaug.

Borlaug was an American biologist and humanitarian who led worldwide initiatives that contributed to the extensive increases in agricultural production termed the Green Revolution. Borlaug was awarded multiple honors for his work, including the Nobel Peace Prize, the Presidential Medal of Freedom and the Congressional Gold Medal. In 1989, the Maredias started working at MSU and joined the College of Agriculture and Natural Resources. Maredia started her doctorate, while her husband took a faculty position in the college.

Once she completed her PhD, Maredia took a position with the Bean/Cowpea Collaborative Research Support Program (CRSP), now known as the Feed the Future Innovation Lab for Collaborative Research on Grain Legumes. She was attracted to working at a land-grant university. "MSU is well aligned with the goals of the USAID funded labs, which complete the loop of discovery, learning and teaching," said Maredia. "We bring the strength of these three together when we go into the developing world."

It is in the field where things started to become a more natural fit for Maredia. She began working in the field alongside researchers on food security issues centered on legumes. It is where she is most comfortable getting her hands dirty, mentoring students and making a noticeable difference with smallholder farmers around the world.

Maredia soon moved into a management position with the Bean/Cowpea CRSP but missed being in the field. So back she went to working with farmers and students on food security issues, this time with the world-renowned Food Security Group (FSG) at MSU. After moving into a full-time position with the FSG at MSU she was afforded opportunities to travel around the world, finding Aleppo, Syria, her favorite place to visit. It also put her back in her comfort zone, mentoring students (her favorite part of the job) and working with smallholder farmers. The Feed the Future Innovation Lab for Food Security Policy (Feed the Future Food Security Policy Lab) is responsible for helping U.S Agency for International Development (USAID)-supported countries in Africa, Asia, and Latin America to fight hunger, reduce poverty and improve nutritional outcomes through better food policy.

More recently, an opportunity arose that gave her a chance to move back into management as the director of the Innovation Lab for Food Security Policy. And though this position means less travel and more oversight work, there are still perks. When asked what her favorite part of this job is, she didn't hesitate to answer. "I got to meet President Obama and thank him for all that he has done. It was the highlight of my entire career."

Food security, as defined by the United Nations' Committee on World Food Security, is "the condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

MSU has been a leader in this work since the mid-1980s, having worked across the African continent with smallholder farmers, governments, universities, research institutes, and nonprofit organizations. Today many faculty and graduate students at MSU have been a part of this work over the years, today Maredia leads the Feed the Future Innovation Lab for Food Security Policy at MSU.

ABBY RUBLEY

*Learn more at:*
*canr.msu.edu/inthefield*

## RESTLESS SOUL LEADS TO

# LIFELONG WORK IN WATER

EILEEN C. GIANIODIS

*Featured photos by Tom Gennara*

Joan Rose is accomplished. And she improves lives every day for people she doesn't even know. But her story isn't finished.

She thinks there's a revolution on the horizon. "There are a lot of things that aren't finished," she said. "That's what keeps me up at night. We're at the point where something really revolutionary could happen around water."

Rose is MSU's Homer Nowlin Endowed Chair in Water Research, co-director of the Center for Water Sciences, and co-director of the Center for Advancing Microbial Risk Assessment. She supervises the Water Quality, Environmental, and Molecular Microbiology Laboratory (WQEMM). The Rose WQEMM laboratory consist of two labs, one in Natural Resources for general water quality testing and the second in Plant and Soil Sciences for environmental molecular microbiology assays. The Natural Resources' water quality laboratory houses the only EPA certified Cryptosporidium and Giardia program for water testing in the state of Michigan.

For 30 years Rose has been investigating water quality around the world. Last year, she was recognized with the Stockholm Water Prize, an international award often compared to the Nobel Prize for it prestige.

As a kid, Rose said she was always restless—and a bit of a go-getter. "I just felt like I hadn't found my place," she said. "I remember making a lot of lists of things to do when I was really young."

That feeling of restlessness left her when she found herself looking into a microscope studying water microbiology. She claims the restlessness is gone. It might just have been redirected . . .

"There's always another question to be answered," she said. "And with water degradation throughout the world, I hope we can move fast enough. I worry even more now that I have grandkids. Even in just 20 years, how stressed is the world's water going to be?"

Rose has been recognized for her work by the EPA, agencies in Canada, Singapore, Japan, and the state of Michigan; the list goes on and on. She travels internationally at a clip that would exhaust most people, often investigating waterborne outbreaks that threaten lives and communities.

> ***"You don't think about how important the work is until you've walked into a place where there's been a water-related outbreak and people are dying."***

At first, Rose said she didn't think about the impact of her work. "You don't' think about how important the work is until you've walked into a place where there's been a water-related outbreak and people are dying," she said. For Rose, that happened in 1993 in Milwaukee, Wisconsin, during the largest waterborne disease outbreak in documented US history. While the root cause was never confirmed, Rose was on the team that found the epidemic was caused by Cryptosporidium oocysts that passed through the filtration system of one of the city's water-treatment plants, arising from a sewage-treatment plant's outlet two miles upstream in Lake Michigan.

Over two weeks, 403,000 city residents had become ill, and 104 deaths were attributed to the outbreak. "It is devastating when you're in a community that's losing its most sensitive populations—babies, the elderly, those with compromised immune systems," she said.

Notwithstanding Milwaukee—and the recent Flint water crisis, Rose said Americans live in a relatively stable environment when it comes to water. "You don't really see it until you travel," she said.. Working on water across the globe was what brought Rose to MSU.

"As soon as I got here I was able do international work," she said. "I can work on a global level—and I can work in the Great Lakes, which is essentially my backyard. My position as the Nowlin Chair gives me a freedom to match research dollars. The opportunities here are so much greater than anywhere else."

So what's the future of water research? Climate change? Feeding global populations? Yes to all, but Rose suggests that the biggest opportunity for innovation lies in work in wastewater. She said for every dollar invested in wastewater, there's a four dollar return.

"Groundwater is part of this whole picture, too," she said. "It's often 'out of sight, out of mind,' but it's the biggest source of water for agriculture, and you don't know the value until it's gone."

Rose knows the power of water. It's a source of life, livelihood and hope. Water affects more than agriculture and lush landscapes; it affects people and societies.

"When we stress natural resources like water, we will run into hard economic times," said Rose. "Look at the Middle East; when it dried up, everyone left. And when young people don't see a future, they look for one. Hard economic times can push people toward instability—political and personal."

Rose wonders about the connections between environmental protection and health. "When people don't feel well, do they take the same precautions they would when they do? Do they

use all that we've developed to help make water safe? Maybe we need to focus on heath, too."

While her restlessness might feel quelled, for Rose the biggest questions just keep her working. "What will we do when this isn't the land of plenty anymore?"

*Learn more at:*
*canr.msu.edu/inthefield*

# GIFTS THAT **CONTINUE TO GIVE**

Although all gifts to MSU contribute to the high quality of education, research and outreach, endowments are particularly meaningful because they offer a dependable, perpetual source of funding.

The investment made with the creation of an MSU endowment provides the type of support that makes a real difference in the lives of students, faculty, and staff, enhancing their education, research, daily work, future inventions and academic excellence. Endowed gifts enable MSU to offer a world-class educational experience.

Endowed funds differ from other funds and support in that the total amount of the gift is invested. Each year, only a portion of the income earned is spent while the remainder is added to the principal for growth. In this respect, an endowment is a perpetual gift. (See graphic.)

Endowments allow donors to leave a legacy, support their passion in perpetuity or honor someone they love.

**LEAVE A LEGACY**

Imagine making a contribution that leaves a legacy for generations to come. This lasting impact can easily be made through the establishment of an endowment to the College of Agriculture and Natural Resources. Considered one of the most advantageous sources of funding, endowments enable the university to attract excellent students, support exceptional faculty and expand and develop new programs by providing a steady, consistent and perpetual source of income. This steady stream of funding ensures that the college's needs to recruit and to retain the best and brightest students and faculty are met and provides access to the most contemporary education possible.

**SUPPORT A PASSION**

One of the advantages of creating an endowment is the freedom to choose how your investment will support the college. Once you have chosen an area you would like to support, you should assess the impact you would like your gift to have.

Endowments inherently bring about a profound impact because of their longevity. The perpetuity of your gift will help the college sustain support in the area of your choosing.

**HONOR A LOVED ONE**

Endowments are an excellent way to permanently honor your family, a mentor or a loved one. Once you have created an endowment, your gift becomes part of the CANR's heritage and tradition. In fact, loved ones may also choose to contribute to your fund when they know how special it is to you.

Your family and MSU have the opportunity to enjoy a long relationship built around something you value.

**1**
ENDOWMENT GIFT OF
**$100,000**
IN 2007

OVER A
**10**
YEAR PERIOD
**$48,000**
IS PROVIDED

**4.8%**

The programmatic spending rate currently stands at 4.8 percent of a 20 quarter average of the market value of those funds invested in the CIF. The spending rate is reviewed annually against the projected long-term CIF returns and the impact of inflation and was reduced from 5.0 percent in 2016. The rate is intended to protect against inflation and provide a modest increase for endowment growth.

FUNDING
**21**
**$2,500**
AWARDS EACH

AND IT CONTINUES TO GROW

**.55%**

Reasonable and appropriate investment fees will continue to be charged against the endowment. On December 10, 2010, the MSU Board of Trustees amended the endowment spending policy to authorize annual assessments of up to 1 percent of the market value of these endowments in the CIF for reasonable and appropriate endowment stewardship costs, including fundraising. Based on recommendations of the Investment Advisory Subcommittee, an endowment stewardship charge of .59 percent of the available 1 percent was implemented in the 2011/12 fiscal year, and the charge remained unchanged through the 2015/16 fiscal year. The stewardship charge was reduced to .55 percent beginning in the 2016/17 fiscal year.

INITIAL INVESTMENT GROWS TO
**$103,000**
BY 2016

# AN ENDOWMENT STORY

The donors noted in this story wish to remain anonymous; their gift, however, will make a lasting impact on the college and MSU.

Forty years spent in research and teaching affects a lot of students and garners many awards. In this particular case, 37 graduate students; 45 postdocs and visiting scientists; a National Science Foundation Senior Postdoctoral Fellow; and election to the National Academies of Sciences and the American Society for Horticulture Science Hall of Fame.

The donor's work in the industry, however, led to several patents and practices currently in use by the horticultural industry, namely the regulation of flowering and fruit growth, the promotion of fruit abscission, thinning and more efficient application and use of pesticide chemicals.

Even in retirement, this donor continues to research, write and mentor.

The partner in this donor couple spent years working on campus, volunteering locally at Sparrow Hospital and for the Red Cross and staffing disasters, including the California earthquake, floods in Missouri and Louisiana, tornadoes in Michigan and Texas, and hurricanes in Florida.

The couple's $1M endowment will fund a named professorship in tree fruit physiology in the Department of Horticulture. The faculty fellow will have an interest in research and outreach related to tree fruit physiology and will support industry connections and Extension activities that benefit the tree fruit industry.

**ENDOWED CHAIRS**

DAVID KENT BEEDE
Clinton E. Meadows Chair in Dairy Science

RICHARD MICHAEL FOSTER
W. K. Kellogg Chair for Food, Society and Sustainability

WEIMING LI
Frederick E. J. Fry Chair for Environmental Physiology

JIANGUO LIU
Rachel Carson Chair in Ecological Sustainability
University Distinguished Professor

PATRICIA NORRIS
Gordon and Norma Guyer and Gary L. Seevers Chair in Natural Resource Conservation

PAUL THOMPSON
W. K. Kellogg Chair in Agricultural, Food and Community Ethics

H. CHRISTOPHER PETERSON
Homer E. Nowlin Chair in Consumer Responsive Produce Agriculture

JOAN BRAY ROSE
Homer E. Nowlin Chair in Water Research

MICHAEL W. HAMM
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RICHARD LENSKI
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ADESOJI OBAFEMI ADELAJA
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DAVID A. HENNESSY
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FELICIA WU
John A. Hannah Distinguished Professor

**NAMED CHAIRS WITH NO ENDOWMENT**

MIKE JONES
Peter A. Larkin Professor of Fisheries Partner: Great Lakes Fishery Commission, Dr. Lambe to Dean Poston

SHAWN RILEY
Parrish Storrs Lovejoy Professor of Wildlife Management
Partner: Michigan Department of Natural Resources – Wildlife Division, Dr. Mason to Dean Poston

JIM BENCE
William E. Ricker Professor of Fisheries Management
Partner: Michigan Department of Natural Resources – Fisheries Division, Dr. Dexter to Dean Poston

**MSU FOUNDATION PROFESSORS**

THOMAS S. JAYNE
BARRY PITTENDRIGH



*Michael Holsapple*

# CENTER FOCUSING ON INGREDIENT SAFETY:

## RESEARCH, COMMUNICATIONS, TRAINING

The modern-day consumer is more engaged than ever. But with an endless stream of internet content from educational articles to blogs and social media, the waters get muddied quickly. Controversial topics such as food and personal care product safety can be difficult to navigate, with information—and misinformation—at everyone's fingertips.

MSU has created an independent entity to research the safety of everyday products, train the next generation of food and ingredient safety professionals, and educate the public. In partnership with more than 20 food, beverage and personal care product industry organizations, as well as the Grocery Manufacturers Association (GMA), the Center for Research on Ingredient Safety (CRIS) launched in 2014.

"MSU has a long history of helping to answer toxicological questions," said Michael Holsapple, the director of CRIS. "Because the university is home to a very accomplished group of food safety and toxicology researchers, MSU leadership thought we could find a niche in this area and add a significant voice to this important topic."

Holsapple was named director in 2015 after a nationwide search. In addition to serving as director of CRIS, Holsapple is the Endowed Chair in Ingredient Safety. The endowment, funded by GMA and industrial organizations interested in the mission of CRIS, will become fully funded at $4 million in 2017, a year ahead of schedule. GMA and industry organizations have agreed to continue contributing toward research once the endowment is reached.

MSU also pledged $8 million in support of CRIS. These funds have covered salary and startup costs for Holsapple's laboratory, and two tenure-stream faculty who will be aligned with CRIS research objectives.

### A THREE-PRONGED APPROACH

There are unique challenges facing researchers who work with ingredient safety. How do you prove an ingredient is safe? Who sets research priorities? Where can consumers receive unbiased information? To answer questions like these, CRIS has devoted resources to three primary areas: research, communications and training.

MSU faculty from a variety of departments will conduct the research. Much of Holsapple's first year has been spent garnering support for CRIS around campus and meeting researchers. In summer 2016, CRIS issued a request for proposals with the plan to fund two to three projects. Preliminary results from these initiatives are anticipated in summer 2017.

Research priorities are generated by both the researchers and CRIS's Emerging Issues Committee. The group is made up of Holsapple, five representatives from the industry, two from academia outside of MSU, two from government research facilities, one from a nongovernmental organization and one from the communications team at Arizona State University (ASU) assisting CRIS.

To guide CRIS's outreach, the center has enlisted the assistance of Andrew Maynard, an expert in communicating scientific matters to the public and the director of the Risk Innovation Lab at ASU. Maynard's team is utilizing multiple communication channels, including the CRIS Bits blog, a YouTube channel called Risk Bites and The Conversation, an independent source for informed commentary and analysis where members of the academic and research communities can post articles for public consumption.

Professional training will be a part of the Environmental and Integrative Toxicological Sciences program at MSU, and CRIS will offer a graduate degree track for students to pursue food toxicology and ingredient safety. The new program launched in fall 2016 and capitalizes on several courses already available at MSU.

"One of the most important aspects of CRIS is training new scientists," Holsapple said. "I think our leadership in food safety and toxicology will make this a popular program. There's a lot going on with CRIS right now, and I think we're all excited to continue the momentum."

For more information on CRIS, visit cris.msu.edu. The website includes links to CRIS Connects, a monthly e-newsletter produced and distributed by the CRIS director's office.

CAMERON RUDOLPH

*Learn more at:*
*canr.msu.edu/inthefield*

WATER, WATER EVERYWHERE

# BUT NOT A DROP TO DRINK

SEAN CORP

The water crisis in Flint shook an entire nation. And, as the city's most vulnerable population—its children—tested positive for elevated lead levels in their blood, most people knew recovery would be a long haul.

That's when MSU Extension's Terry McLean sprang into action. McLean and other MSU Extension staffers were able to successfully respond to the emergency because they had spent years preparing for it without realizing it.

"In Flint, credibility is built up over years, not days," said McLean, a longtime MSU Extension educator based in Flint. McLean spends sunny summer afternoons at garden-starter events on the city's north side hosted by Edible Flint, a community organization she helps run as part of her role with Extension. Held at the Neighborhood Engagement Hub on Martin Luther King Avenue, the event uses grant funding from the Charles Stewart Mott Foundation to greatly reduce the cost of seed kits, plants and water filters.

McLean said credibility is what allowed MSU Extension to act quickly and decisively. MSU Extension connected with the Michigan Milk Producers Association and the Food Bank of Eastern Michigan to deliver 12,000 gallons of milk. It became a key member of the Pediatric Public Health Initiative along with Flint's Hurley Children's Hospital and others to coordinate testing, research and outreach.

"None of it would have been possible without the many years MSU Extension staff had put in earning the trust of the city's residents," said Jeff Dwyer, director of MSU Extension. "Our staff members didn't have to rush into Flint to respond to this emergency because MSU Extension had already been in the city for a century."

MSU Extension educators ramped up programming and added important information about mitigating the effects of lead in existing classes targeted to the most at-risk neighborhoods. Through additional grant funding, reallocated staff, identifying partners at the state level and developing ways to promote and distribute food, water filters and soil test kits, MSU Extension found ways to serve.

The U.S. Department of Agriculture awarded MSU Extension a five-year grant as part of its Children Youth and Families at Risk Sustainable Communities Project to provide two Flint neighborhoods with the highest levels of lead contamination a parenting education initiative and early childhood education resources.

Other initiatives have included creating nutrition flyers and cookbooks; soil health information; classes on food access, food safety, nutrition, stress management, breastfeeding; and even a 4-H club focused on water filtration.

The biggest emphasis has been on how nutrition can help mitigate the effects of lead exposure, especially in young children. Lynette Kaiser, an MSU Extension program associate, has been with MSU Extension eight years. She said that while the water situation is tragic, it also exemplifies the strength of the city's residents.

"The people of Flint never give up," Kaiser said. "We need to keep fighting for the people of Flint because they're fighting every day and they deserve a champion."

In Flint, Kaiser coordinates Cooking Matters, which teaches participants how to buy healthy foods on a budget. Kasier and her co-workers teach the classes in schools, community centers and church basements—wherever they can find space and a willing audience. Kaiser is also a regular at the Flint Farmers Market hosting cooking demonstrations to show residents how to make affordable, healthful meals mainly on those that mitigate the effects of lead.

The solutions to the lead issue, Kaiser said, are similar to the solutions she encourages in her nutrition classes.

"There is no easy answer," she said. "It takes a lot of hard work, sometimes years, to make lasting change. We didn't get into this mess overnight and we won't get out of it overnight, either. But MSU Extension will be right here. We're not going anywhere."

For Flint residents like Evelyn, that's good. She has taken nutrition classes from MSU Extension and is a regular at Edible Flint events.

Asked about the lead emergency, and what kind of help the residents of Flint need, Evelyn looked equally bemused and annoyed. It's a question she's been asked many times.

"I don't need no one to hold my hand," she said. "All I need is someone to point the way."

*Learn more at:*
*canr.msu.edu/inthefield*

When news of the water emergency in Flint became public, MSU Extension staff members put to use its 100-year history and long-established relationships to offer trusted help to city residents. This quick and comprehensive response helped them earn an Abraham Lincoln Honor Award for External Partnerships, one of U.S. Department of Agriculture's highest honors.

"I'm proud that MSU Extension was able to quickly mobilize and lead the university-wide response to the Flint water emergency," director of MSU Extension, Jeff Dwyer said. "Our team members in Flint quickly identified community needs; developed materials to educate the community about the dangers of lead absorption, especially in young children; taught how to mitigate the effects of lead with quality nutrition; and worked with community and statewide partners to raise awareness and facilitate donations of healthy foods and drinks to area food banks."

Former U.S. Agriculture Secretary Tom Vilsack (left) and USDA Assistant Secretary Gregory Parham (right) present the group leaders Jeff Dwyer and Deanna East on September 13, 2016.
USDA photo by Bob Nichols.

# AGRISCIENCE EDUCATION PROGRAM **LIGHTS FLAME OF PASSION, IMPROVES COMMUNITY**

Connor Hubbard was 16 years old when he first took an elective environmental science class with Brian Matchett, then an Alcona Community School agriscience teacher. Matchett was working to develop an experiential place-based education (PBE) program for his high school students.

"It changed my life," said Hubbard, who received his bachelor's of science in Environmental Studies and agriscience education from MSU in 2015. "It was a driving factor for the direction where I headed. I didn't know what I wanted to do when I left high school but having the experience with Brian helped me find my way to MSU and agriscience education."

Matchett, now coordinator for MSU's Institute of Agricultural Technology in northwestern upper Michigan, wanted his students to be actively involved in a community project, experiencing stewardship firsthand and providing a valuable service in their community. Together with MSU's Michigan Sea Grant Extension educator Brandon Schroeder and other partners, he piloted a place-based education stewardship project promoting Lake Huron's coastal tourism at Negwegon State Park. Students visited the park and studied shoreline, forest and wetland habitats, wildlife interactions and archeological artifacts.

Hubbard was involved in that first project. "I think teachers anticipated students would create a brochure or a website. But the kids decided there were so many cool things at the park that we needed signs to help park visitors find what was there."

From the very beginning, Matchett placed his students in charge of all the details. Over a three-year period, more than 75 students had a hand in the project, working with the state Department of Natural Resources and other partners, designing and installing the signs. "The students did something very important for the region with this project," Schroeder said. "The signs they created accomplished a priority goal, identified by the community, of promoting sustainable coastal tourism."

This initial project created a place-based education movement that, as part of the statewide Great Lakes Stewardship Initiative and supported by funding from the Great Lakes Fishery Trust, has grown into the Northeast Michigan Great Lakes Stewardship Initiative.

And the network keeps growing with leadership from MSU Extension partners such as Michigan Sea Grant, Michigan Natural Features Inventory and 4-H, as well as many community and state partners. It promotes Great Lakes literacy and supports an environmental stewardship culture among many northeast Michigan schools and communities and recently the network received a national $25,000 Environmental-STEM Innovative Education Award.

Since 2006, more than 19,000 youth have helped to conserve Lake Huron's biodiversity, map threatened and endangered species habitat, restore native fisheries, monitor vernal pool wetlands, and manage invasive species. Other students monitor water quality, enhance aquatic habitat, and investigate marine debris. E-STEM learning is evident when students work with scientists to design environmental research projects, use GPS and GIS technology to map water data, engineer underwater robots and contribute to fisheries science, and employ math to track populations of both rare and invasive species. The network reaches more than 20 percent of the students in its targeted eight counties.

"Community partners have sometimes been hesitant to work with youth," said Tracy D'Augustino, a self-described science geek who coordinates Extension's E-STEM statewide program. And youth also have their beliefs about the older generation, too.

"The most valuable piece of being involved with place-based education is seeing the change of attitude," she said. "The older generation begins to recognize the value youth enthusiasm and energy bring to the community and the youth learn to respect the experience and abilities of the adults. In our small community, it's been awesome to see the different groups come together."

In recent years, more than 100 community partners have participated each year. In Alcona, Hubbard returned as the school's agriscience teacher and FFA advisor—the same position his mentor Matchett once held. "When I contacted Brian to let him know, he said it was nice to know he had passed the torch on," Hubbard said.

Before this school year even began, Hubbard was planning to incorporate PBE into his agriscience class. He plans for students to be out in the community, introducing themselves and finding out what is needed. And he hopes he inspires students in the same way Matchett inspired him.

"The thing about the projects is that you can go out and see what you did," Hubbard said. "As a high school graduate, those memories still stick with me. There's something meaningful in it."

*Connor Hubbard*

CINDY HUDSON

*Learn more at: canr.msu.edu/inthefield*

TOP LEFT: Packed wagons shuttled more than 400 attendees to nine educational stations throughout the Saginaw Valley Research and Extension Center in Frankenmuth during the inaugural Agriculture Innovation Day.

LEFT: MSU CANR Dean Ron Hendrick inspected the soil pit at Frank Gibbs' tile smoking demonstration up close.

ABOVE: Participants were able to see what different varieties of cover crop seeds looked like.

OPPOSITE PAGE: Attendees waited for small puffs of smoke to rise from the ground to see how badly compacted the soils were in the test field.



MSU AGRICULTURE

# INNOVATION DAY

As they did in the days of the now retired MSU Ag Expo, farmers, researchers and agriculture industry representatives across Michigan gathered in late August to learn about the latest agriculture research and farming recommendations from MSU.

"After our last Ag Expo, we decided the event no longer met the needs of Michigan's agriculture industry," said Ron Bates, MSU Extension director of agriculture and agribusiness institute. "A steering committee of Michigan agricultural leaders was formed to advise the college on what would better suit the needs of Michigan agriculture in the future."

MINDY TAPE

LEFT: MSU president Lou Anna K. Simon and MSU Extension director Ron Bates tour various educational stops at Agriculture Innovation Day.

TOP LEFT: A cover crops demonstration gave innovative management strategies to maximize biomass and increase soil health in corn fields. Participants were able to inspect different varieties of cover crop seeds during a session on cover crops.

ABOVE: Lisa Tiemann, assistant professor, MSU Plant and Soil Microbial Sciencers, demonstrated the advantages of utilizing cover crops and diversified crop rotation to improve soil health

TOP RIGHT: MSU Extension educator Paul Gross utilized the MSU rainfall simulator to demonstrate the effect rainfall has on soil with varying levels of vegetation and compaction.

The industry recommendation: MSU should host an annual educational event delivering information specific to current issues facing Michigan agriculture. The retooled annual event—now called MSU Agriculture Innovation Day—emphasizes a greater focus on research and education.

To keep it fresh and relevant, the annual event is slated to move throughout the state, focusing on topics that are important to the different regions of Michigan agriculture. This will help MSU meet the needs of Michigan's diverse agriculture industry by delivering cutting-edge research directly to producers who will ultimately help feed the world.

"Agriculture Innovation Day is a way for us to meet people close to where they live, to showcase some of the best we have in terms of research and to extend an opportunity to engage with us," said CANR Dean Ron Hendrick.

With the theme "Focus on Soils," last summer's event featured nine hands-on educational stations at MSU's Saginaw Valley Research and Extension Center in Frankenmuth. As the foundation of agriculture, soil is an essential resource that must be kept healthy to optimize crop production for current and future generations. Understanding the dynamics of soil, water and biology give greater insight into successful management of this critical resource.

Educational sessions during the day displayed the yield-robbing effects of below-ground soil compaction and offered the latest technology and management strategies to increase soil health. More than 400 farmers and agriculture industry representatives got a first-hand look at the difference cover crops can make in soil structure and learned how to manage tile and cropping systems to keep nutrients in the field and out of surface waters.

"We hope this day has a lasting impact on you and that you think about it in terms of what you've learned, how being green every day on your land makes a huge difference in your capacity to be competitive," MSU President Lou Anna K. Simon said during the day's activities. "Doing the things that we talked about with soils means that you are preserving that land for future generations in ways that it is even more productive and more sustainable than it is today."

In 2017, Agriculture Innovation Day will take place at the MSU Lake City Research and Extension Center in Lake City, and will feature a new topic of importance for state producers—grazing. All to help ensure that Michigan will succeed as a world leader in agriculture.

*Learn more at:*
*canr.msu.edu/inthefield*

PhD Candidate in Packaging

# PATRICK MCDAVID

Specializing in distribution dynamics

***"Wherever you go in the packaging industry, you're going to meet a Spartan. We have a special bond. We stay involved and share our experiences. It makes us all better in the end."***

Photo by JeanaDee Allen

## AN INVESTMENT IN EDUCATION

Patrick McDavid heard Alan Crawford speak at several industry functions. He quickly came to realize that he and Crawford, a fellow Spartan, shared a common belief that packaging plays an integral role in society.

Shortly after he died in 2010, Crawford's wife, Linda, helped create the Linda and Alan Crawford Graduate Assistantship in Packaging. Alan, a 1969 graduate of MSU's School of Packaging, believed scholarship money is best invested in top-performing students who are working on promising research.

McDavid's vibration simulation platform fits the bill. He and Gary Burgess, are investigating how multiple degrees of freedom in transport affect load stability and product quality. The research has the potential to facilitate sustainability in product packaging.

"Alan believed strongly in the profession and the future of packaging," Linda said. "I am happy that this assistantship can help his legacy live on."

At age 43, Patrick McDavid is right where he wants to be—back at his alma mater working on a PhD and teaching young minds about package engineering.

"Pretty good for a guy who almost dropped out of Michigan State the first time around, huh?" McDavid said with a shy grin. "I wasn't prepared for college. High school was easy for me, so I didn't know how to be a college student," he explained. "I thought I wanted to work with polymers, but after a year as a chemical engineering major I found out about package engineering."

McDavid's real passion is helping with the end user experience. His undergraduate degree led to a fruitful career with UPS and then the U.S. Department of Energy. He picked up a master's degree in supply chain management and an MBA along the way, but something was still missing.

"In my early 30s, I realized that I wanted to teach," he said. "At UPS I was always looking for opportunities to educate our sales force and loss-prevention team about the power of packaging, so I started teaching informally."

The stars aligned and McDavid quit his job and moved his family from Texas to Michigan when he was awarded a fellowship in MSU's School of Packaging in 2015. After one year as a teaching assistant, he was asked to join the faculty and teach a 400-level course.

"This is what being a Spartan is about," he said. "I can continue my research and share everything I learned in industry with the next generation of packaging professionals."

BETH STUEVER

*Learn more at:*
*canr.msu.edu/inthefield*

Master of Science Candidate

# QIUXIA CHEN

Plant Breeding, Genetics, and Biotechnology - Horticulture

Photo by JeanaDee Allen

***"My experience has been nothing short of incredible. On top of all that, the faculty and staff have been so supportive, and my mentor has been amazing."***

**GETTING INVOLVED MEANS GETTING CONNECTED**

Chen describes the Department of Horticulture as a tight-knit group of top-notch faculty.

"I came here because this department was extremely welcoming," Chen said. "But what I've discovered is that this attitude is not unique to the Department of Horticulture. I've found that I can go to any faculty member, anywhere on campus, and they are always open and willing to share their ideas. It's part of the Spartan culture."

Chen discovered this through her involvement with Graduate Women in Science and the Horticulture Organization of Graduate students—affectionately known as HOGS. They are two of more than 700 registered student organizations at MSU, 43 of which reside in the College of Agriculture and Natural Resources.

"Being part of a student organization can deeply enrich a student's educational experience," said Kelly Millenbah, associate dean of CANR. "Students can choose an organization that relates to their academic program or one of their personal interests. The possibilities are endless."

QiuXia (pronounced Kee-sha) Chen lights up when she talks about the lessons she learned from her high school English teacher, but it isn't a love of literature or precise grammar that drew her attention. "She taught me how to grow tomatoes," Chen said.

The lesson came after Chen discovered an abandoned greenhouse on the roof of her five-story high school in the Bronx, New York. She and a handful of fellow students tracked down a retired teacher who once used the greenhouse and recruited him in a cleanup effort. Once it was operational, an English teacher stepped forward to teach them the basics of growing food and flowers. Although Chen spent many hours nurturing various vegetables in that controlled environment, gardening was never part of her formal instruction.

"I never even thought about plant science when I was in high school. I just knew I liked plants," she explained. "The words 'agriculture' and 'horticulture' weren't even in my vocabulary."

Fast forward a decade and Chen is preparing to receive a master's degree in plant breeding, genetics, and biotechnology – horticulture. She chose to continue her studies at Michigan State after completing undergraduate degrees in horticulture and Spanish at Kansas State.

Chen hopes to marry her love of molecular science with the joys of horticulture therapy. This age-old concept helps improve the quality of life for those who work with plants. Horticulture therapy has proven to help improve memory, cognitive abilities, task initiation, language skills and socialization.

Plus, Chen said, it helps connect people to nature and makes science more accessible to those who don't link it to their daily lives. "It's hard to explain my love of ornamental plants," she said. "The plants I work with don't feed the world; instead, they nourish the soul."

BETH STUEVER

*Learn more at:*
*canr.msu.edu/inthefield*

# THE WINDING ROAD

***"If we can develop a system that allows chickens to engage in more chicken-like behaviors, like dust baths and freely perching and nesting, we can reduce stress on each individual and, therefore, boost the overall production of the farm."***

Janice Siegford knew she wanted to work with animals, but her journey to MSU was anything but direct.

The Montana native went from one end of the country to the other and through many different fields before she finally arrived in East Lansing. Circuitous as the road was, she is the first to say that each step taught her something important.

Siegford, an associate professor of animal behavior and welfare in the Department of Animal Science, studies animal behavior to develop and implement safe animal housing systems that improve quality of life.

She was introduced to the world of animal science through the classes required by her major at Cornell: communication. Siegford was so fascinated by the subject that it dominated much of her time there. "The people in the Animal Science Department thought I was one of their majors because of all the time I spent there," Siegford recalled. "I wanted a job that involved animals and behavior. Science communication seemed like a good place to start, because it helped people understand animal science and how it worked." After a year writing technical manuals and press releases, Siegford realized she wanted more.

This leg of the journey took her west to the University of Idaho, where she pursued a master's in zoology. Her experience and talent for communication would continue to be an advantage in unexpected ways. "My professor said it was easier to teach someone how to do science than how to write," Siegford said. During this time she had her first experience with animal behavior.

The National Institute for Aging was looking for an alternative animal model to mice that better reflected the impact of aging on human cognition. Siegford tested the memory and learning ability of parakeets, which age much slower than mice relative to their body size. She found that while older birds were slower to learn something than their youthful counterparts, they were also more likely to retain it. This piqued her interest in the outcomes of cognition and took her further west to Washington State University and a doctoral program in animal neuroscience.

"Although my project was focused on how motor neurons develop in the spinal cord, I learned a lot about how the brain drove behavior," Siegford said. "Toward the end, I worked with a woman involved tangentially with animal welfare issues and found that I wanted to move in the direction of working with animals for animals."

## BRINGING IT ALL TOGETHER

That new focus drew Siegford east, to MSU, where today she applies all of her experience in developing systems that maximize animal welfare while still serving the needs of farms. Her work includes pigs, dairy and beef cattle, and most recently, laying hens.

With support from the Michigan Alliance for Animal Agriculture, a partnership between MSU and Michigan's animal agriculture industry, Siegford and her students study the impact of enclosures that allow hens more space to roost, eat and move about on their health, safety and well-being.

In the past, chicken enclosures were designed to optimize farm economics, food safety and chicken population management. This meant keeping chickens in small enclosures that protected them from some of their more dangerous behaviors like panic attacks or establishing a literal, violent pecking order. It inhibited their ability to engage, however, in other beneficial behaviors. In exploring new enclosure types, Siegford hopes to balance the needs of the farm and the safety of the chickens with the chickens' own behavioral health.

"Our needs and theirs aren't in perfect synchronicity," she said. "If we can develop a system that allows chickens to engage in more chicken-like behaviors, like dust baths and freely perching and nesting, we can reduce stress on each individual and, therefore, boost the overall production of the farm."

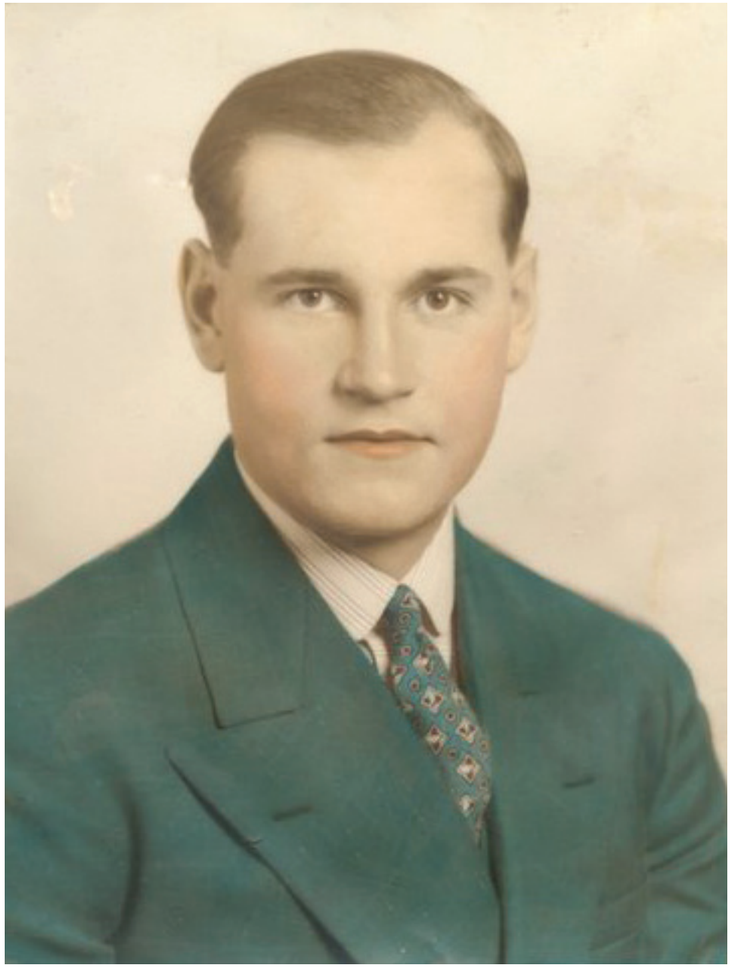
While the road may have been winding, Siegford is utilizing every step of the journey to effect a real, positive change in agriculture, from studying animal behavior to communicating those behaviors and their implications to farmers. For students she has this advice:

"Learning how to be a researcher, how to do good, sound science, is more important than the specific subject matter. Clearly, my projects weren't building toward one thing, they were broad, but they each taught me important skills I can apply to my passion now."

JAMES DAU

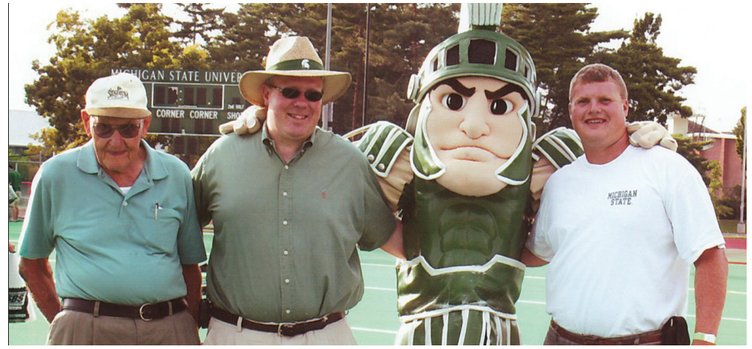
*Learn more at:*
*canr.msu.edu/inthefield*

**EDWIN L. CARPENTER**
1916-2014



# DEVOTED SPARTAN LEAVES LASTING LEGACY

JAMIE WILSON



*Left to right: Ed Carpenter, Scott Bigelow, Sparty and Frank Hull*

Edwin L. Carpenter loved three things in life: working, agriculture and MSU.

"Work came first, MSU came second and anything else was third," said Carpenter's close friend Frank Hull. "The only time Ed wasn't working was to watch MSU sports and if he needed to miss a game to work, he did."

As a result of his lifelong commitment to work—and the fruits of a career that lasted through age 90—Carpenter was able to make a gift upon his death in 2014 that jointly honored his two other loves: a $1.6 million donation to the College of Agriculture and Natural Resources. "He was very proud of giving to MSU," Carpenter's nephew, Tom Carpenter, said. "I think it is amazing what my uncle did and the legacy he left."

Although the amount of his last contribution may have suggested otherwise, Carpenter did not live a lavish lifestyle, nor was he the benefactor of old family money. He was simply a hard-working man who lived simply and saved money. "Ed was a workaholic," explained Hull. "He was a farmer and a land owner, and he had a gravel pit. He saved everything. He had a really modest lifestyle. He drove a beat-up pickup truck and had old equipment."

Born the son of a dairy farmer in Union City, Michigan, in 1916, Carpenter adopted his work ethic early in life. "I remember him telling the story of his dad hiring people to come in and tile his property," Hull said. "Ed and his brother helped dig big trenches with shovels; it took them the whole year to put clay tiles in. He grew up tough, that's how they did things."

With his younger brother Bob still at home to help with the farm, Carpenter was presented with an opportunity not many farm kids had at the time: a chance to go to college. "It was a great honor for him to be able to go to MSU; he was very proud of the fact that he went to college," Hull said. "He loved that he was there in the early days when it was MSC [Michigan State College]."

Carpenter graduated from MSC in 1941 with a degree in agriculture and natural resources and returned to the family farm before serving his country in World War II. Carpenter was stationed in California as a clerk. Upon his discharge, Carpenter came back home where he farmed alongside his brother Bob, growing corn, soybeans, oats and hay. During his 60s, Carpenter purchased a gravel pit, which he operated for nearly 30 years, until poor health forced him to stop.

Although the demands of farming and work kept Carpenter very busy, he was always able to find time for his beloved alma mater. A football season ticket holder since 1950, Carpenter loved Spartan athletics. "When we went to Thanksgiving, we were watching the Spartans with Ed," remembered Tom Carpenter. "If we went to Christmas, we were doing the same. I think Ed's biggest thrill in life came when he went out to the Rose Bowl game in California in 1985."

It was his love for Spartan sports that helped Carpenter develop a special relationship with Hull. The two began attending games together when the long drives from Union City became difficult for the aging Carpenter. "He was like a grandfather to me," explained Hull, who is also a farmer and lifelong MSU fan. "It was like we were meant to meet. He liked that what was important to him was important to me, so we developed a special relationship over the years."

Throughout the 12 years Carpenter and Hull attended games together, Hull learned valuable life lessons from Carpenter, who had no children of his own. "Every time I was worried about how hard farming was, he would always have something better or worse to compare it to," said Hull. "He always made me feel better because no matter how bad things were, he'd already seen it several times. He'd say 'Oh yeah, we had that happen once. Give it a week, it'll be all right.' And he was right, he was always right."

Although he didn't talk about it much, Hull believes Carpenter's interest in helping "MSU farm kids" was one of the reasons Carpenter left his final gift to the college. "Ed liked sports, but he was always interested in the classroom, too," said Hull. "I think he wanted to give farm kids like himself a chance to do something."

As a result of his contribution, the Edwin L. Carpenter Endowed Fund for CANR was created in 2015. An unrestricted endowment, the funds will be used at the discretion of the CANR dean, who can choose a different project each year.

"For our new dean to have this resource is incredibly valuable," explained Tami Baumann, senior director of development for CANR. "It improves our ability to offer special programs that prepare and retain students. Because of the fund, we will be able to create advantages for a new generation of CANR students—all thanks to our friend Mr. Carpenter."

*Learn more at:*
*canr.msu.edu/inthefield*

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## Farm Lane Society

***Mission***

The mission of the Farm Lane Society is to honor individuals who have demonstrated a commitment to the MSU College of Agriculture and Natural Resources as a CANR Alumni Association Board member or have brought honor to the College as a notable recipient of a CANR Alumni Association Award or the CANR Distinguished Service Award and to foster their continuing involvement in the College and Alumni Association.

***Membership***

Membership is granted to alumni who have served in an appointed position on the College of Agriculture and Natural Resources Alumni Association Board of Directors, received a College of Agriculture and Natural Resources Alumni Association Distinguished Service Award or the College of Human Ecology Outstanding Alumni Award (and have their home department currently housed in CANR). The Farm Lane Society has no membership dues and places no conditions of members.

***Benefits***

Benefits of the society will continue to develop as time moves forward. Current plans for members include:

- Special recognition with a Farm Lane Society lapel pin
- An annual program during ANR Week on campus
- Special behind-the-scenes tours of campus locations
- Special periodic programming on MSU properties and research centers

**LEARN MORE**
*www.canr.msu.edu/farmlane*


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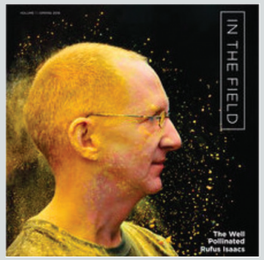


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**COLLEGE OF AGRICULTURE & NATURAL RESOURCES**

446 W. Circle Drive, Room 319
Justin S. Morrill Hall
of Agriculture
East Lansing, MI 48824

canralum@msu.edu
517-355-0284
canr.msu.edu

MICHIGAN STATE UNIVERSITY
**COLLEGE OF AGRICULTURE**
**& NATURAL RESOURCES**

446 W. Circle Drive, Room 319
Justin S. Morrill Hall of Agriculture
East Lansing, MI 48824

College of Agriculture
and Natural Resources
MICHIGAN STATE UNIVERSITY

517-355-0284
**canr.msu.edu**