Department of Horticultural Science
Fall/Winter 2017

Horticulture

Adventure. Leadership. Excellence. Community.

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Breaking Barriers

Collaboration across disciplines, locations, and organizations makes departmental research stronger.

Students from three summer programs work between two departments to research pollinator diversity in urban communities. Learn more on page 6.

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Alumni Award Winner Eric Lee-Mader to Present at HortSci Grows: Sustainability

Community

We invite you to join us for HortSci Grows on April 11, 2018. HortSci Grows is a daylong event that celebrates where Horticultural Science has been and where we're going. This year our theme is sustainability, featuring Eric Lee-Mader (*M.Ag. 2005*) as keynote speaker and recipient of the 2018 Distinguished Alumnus Award.

Since graduating in 2005, Lee-Mader has established himself as one of the world's leading voices for pollinator and insect conservation. His work has been used in national strategies to promote honeybee and pollinator health, and he has spearheaded initiatives that have created over 700,000 acres of habitat for pollinators throughout the United States. He has helped negotiate more than $12 million in investments from corporations and foundations to support pollinator conservation efforts and currently co-directs the world's largest team of pollinator ecologists through the Xerces Society.

This is only the beginning of what Lee-Mader has done for pollinators and conservation. Activities at HortSci Grows will include an opportunity to hear about Lee-Mader's work as well as sustainability work done by faculty and staff in the department. See the current day's schedule at *z.umn.edu/hortscigrows*. ♦

A Computational Genetics Approach to Potato Breeding

Introducing assistant professor Laura Shannon

The Department of Horticultural Science is excited to welcome Laura Shannon as our newest faculty member, studying potato breeding and genetics. Shannon comes to Minnesota from the University of Wisconsin-Madison, where she worked in Jeff Endelman's potato breeding lab. In collaboration with the International Potato Center in Peru, she is working with genotyping data from the Peruvian gene bank, the largest and most diverse set of potatoes in the world to identify the underlying morphology of genes in Peruvian varieties and to more fully describe potato history and the extent of potato diversity.

Because potatoes have four copies of each chromosome (called tetraploidy) and primarily reproduce by making clones, they are actually more genetically complex than corn or even dogs—two other species that Shannon has worked with in her career. "I look forward to uncovering ways in which these differences change the genetic signatures of domestication and crop improvement," says Shannon. "This in turn will inform their breeding strategies." Shannon will be using computational genetics—which pairs computational and statistical analysis with genome sequences—to better understand genetic markers and interactions in plants, leading to the development of better varieties.

Most of all, Shannon is excited to work with Minnesota growers and the North Central potato community to rebuild the Minnesota breeding program and develop new varieties that will assist Minnesota growers in facing new environmental and disease challenges. ♦

Bailey Foundation

Expands the Family Legacy

Above: Dean Brian Buhr, Department Head Emily Hoover with members of the Bailey Family: Melissa Bailey Cullen, Ginny Bartch, and Ben Bailey.
Below: A young Gordon and Margaret Bailey.

For over a century, the Bailey family has been a philanthropic leader in CFANS. They have created multiple scholarships, established the first endowed faculty chair in CFANS, and supported countless events and endeavors around campus. In August, they showed their commitment to the next generation of horticulturists yet again through a $1 million gift from the Gordon and Margaret Bailey Foundation to support students studying horticulture.

"We wanted to honor the legacy of Gordon and Margaret Bailey by supporting student learning and developing the talent of future generations in the nursery industry," says Melissa Bailey Cullen, president of the Bailey Foundation. Gordon Sr. was a graduate of the University of Minnesota with the class of 1925, and his and Margaret's dedication to family leadership in the nursery industry has helped Bailey Nurseries grow into one of the largest nurseries in the United States.

Their gift also honors the people who have fueled the success of Bailey Nurseries, including its founder J.V. Bailey and his wife Elizabeth who were both graduates of the University of Minnesota. Honoring the Bailey family's passion for supporting the next generation of nursery professionals, the majority of the gift will provide scholarships for students studying horticulture. The Bailey Foundation's gift will nearly double the annual amount of scholarships given to students studying horticulture.

Continuing their leadership in new philanthropic giving, ten percent of their gift will be used to fund student experiences in horticultural science. "We're thrilled about the gift as a whole," says Emily Hoover, head of the Department of Horticultural Science, "but this student experience component is unlike anything we have in the department currently." This portion of the gift can fund buses for class field trips, travel to conferences, field studies, technology upgrades, and more—all of which reduces costs for students.

Gifts like this are essential to creating a thriving student experience and easing the rising costs of higher education. The Gordon and Margaret Bailey Horticultural Science Scholarship is available to undergraduate and graduate students studying horticulture. If you're interested in starting or supporting a scholarship or endowment, contact Emily Hoover at hoover@umn.edu. ♦

Tell Me What You Want

Professor Yue connects horticultural research programs to economic realities

Why don't homeowners buy low-input, more sustainable turfgrass? Do genetic markers really save apple breeders money? Will people spend more money on produce grown with aquaponics? These kinds of questions are vital to the real-world success of applied plant research, but they require an entirely different kind of science: economics. Professor Chengyan Yue's work in horticultural marketing bridges the gap between economic realities and applied horticultural research.

Professor Yue is a unique faculty member in Horticultural Science, garnering her own research area on the department website. She holds the Todd & Barbara Bachman Endowed Chair in Horticultural Marketing, which is required to reside in Horticultural Science and jointly held with Applied Economics. "The joint appointment has been great," says Yue. "It keeps me connected with both sides, but being housed in horticulture keeps my projects focused on that area."

All of Yue's projects deal with horticulture, but no project is quite the same. Sometimes she works on specific plants, like turfgrass or apples, and sometimes production systems like aquaponics and hydroponics. Her latest project, funded by the American Floral Endowment, looked at how to market cut flowers to young consumers.

Even within similar areas, like when working with plant breeding programs, Yue is looking for different information. "With the turfgrass project, I'm doing focus groups with homeowners and seed producers to identify barriers for using or selling fine fescues," says Yue. "I also work with the RosBREED project, which works with apple, peach, and strawberry breeders. There I'm doing a cost-benefit analysis for using genetic markers in their breeding programs." This variety in her research projects keeps her job interesting. "I get excited about everything I work on, because they're all so different."

While her interdisciplinary work has been rewarding, it also presents challenges for Yue. "When I first started working in the department, it was challenging to communicate with the other scientists and in horticultural journals," says Yue, who had previously

only worked with other economists. "When I got my first paper published in *HortScience*, I used a lot of terms that are common with economists, but not with plant scientists. I had to learn how to communicate across disciplines."

Yue's research is an essential part of each project. Her research has informed how flower companies market products, determined whether certain labels mean consumers will pay more for the product, and focused plant breeding programs on consumer needs.

Yue is considered a pioneer in experimental and behavioral economics methods, which include techniques such as experimental auctions, audience surveys, and eye tracking studies. As proof of her commitment to the importance of marketing to the field of horticultural science, she initiated the Specialty Crop Economics Section within the Agricultural and Applied Economics Association. Through Yue's interdisciplinary collaborations with other faculty members in the department and beyond, her work will continue to break down barriers between real-world applications and applied horticultural research. ♦

Alex Liebman researches Colombian agricultural policy to inform future legislation

Using the Past to Change the Future

When master's student Alex Liebman, co-advised by Nick Jordan and Julie Grossman, traveled to Colombia to work at the International Center for Tropical Agriculture (CIAT), he planned to study how soil carbon changes over time and with the introduction of new plants. While there Liebman found himself asking questions about how Colombia's landscape had changed, how 60 years of civil war affected local farmers, and the relationship between agricultural policy and institutions like CIAT.

These questions led Liebman to analyze over a decade of policy documents tracing the history of agrarian land conflicts, reform, and counter reform in Colombia. Colombia's civil war caused huge land disparities in the country. "Most of the land belongs to just a few people," says Liebman, "but there are a lot of small farmers there that impact their local communities in ways that are often overlooked by the government." Though the current government claims that agrarian reform was one of its central aims, Liebman's research shows there has been little evidence pointing to a change. "There's a new bill now that is using similar language to a 1980's bill that hurt small farmers," says Liebman. "The jargon that they're using sounds good, but that's not how it's played out in the past."

This trip to Colombia lit a spark in Liebman, and now he hopes to work more with policy in the future. "I want to learn more and interface more with activists, organizers, and small farmers who are organizing around an alternative vision for rural areas," says Liebman. "It's important to push the dialogue forward, and do what I can to support the work that others are doing." ♦

Food Systems Major Examines the Bigger Picture

The systems that bring food to our tables are complex, and include everything from farming to consumption to recycling. While traditional horticultural and agronomic degrees study the plants that make up these systems, faculty members at the U of M saw a need for a degree that took a more holistic and interdisciplinary approach to food. In 2013 this led to the creation of the Food Systems major, which examines not just how to grow food, but how agricultural systems interact with the communities they serve and exist within.

The Food Systems major is unique. "Only a few universities in the United States offer a major like Food Systems," says Tom Michaels, major coordinator. "It's an emerging academic field, and is sought by both students and employers." Every student begins with a broad understanding of food systems through standard courses such as An Introduction to the Food System: Analysis, Management and Design; Sustainability of Food Systems: A Life Cycle Perspective; and Plant Production Systems.

High tunnels are just one growing method that food systems students study.

Students also select a track to gain expertise in at least one area related to food systems: organic and local food production, agroecology, consumers and markets, or an individualized program of study. "Tracks provide students the opportunity to match their particular area of interest within food systems with a coherent schedule of studies that emphasizes that area," says Michaels. "For students with unique or very specialized interests, the individualized track lets them pursue their goals under the guidance of a faculty mentor."

By learning discipline-specific tools in addition to their broad understanding, food systems students are better prepared to solve real-world problems. All students are also required to take a capstone course where they work with a community organization solving a problem they are currently facing. The projects selected for this course cover a wide array of topics such as food safety, community communications, growing methods, farm planning, and more.

Over 50 students have graduated from the major so far, and it continues to grow. Students have entered positions such as farmer's market manager, post-harvest assistant, specialty food producer, crop consultant, Extension educator, and more. Students have appreciated the ability of the major to adapt to different situations they might encounter when they start looking for a job. One student commented in an anonymous exit survey, "I feel confident that I could apply my degree in many different ways, from my own business to large companies." Other students have valued the added focus on social issues surrounding food and the involvement with the community. Students that leave the major start their careers well prepared with problem-solving capabilities to meet the challenges of a dynamic work place, and the companies they work for will ultimately benefit from their flexibility and breadth of knowledge. ♦

If You Build It, Will They Come?

Students test pollinator presence at urban garden sites

Above: Guido Quito and Ellie Huber collect insect specimens. **Right:** One of the bees collected during their project.

Each year new initiatives arise in urban environments to draw pollinators into concrete landscapes. With plot size limitations and resources, these projects can range from permanent installations at community gardens to annual planters that promote pollinator health. Students participating in the U of M Undergraduate Research Opportunity Program (UROP), the Urban Scholars Program, and the Step-Up Program worked with Rogers and Cariveau labs in Horticultural Science and Entomology to study floral and pollinator diversity at established urban community gardens and newly-planted pollinator gardens in Minneapolis.

The two UROP students, Melissa Trent and Elizabeth Huber, collected pollinators and plant samples at six urban community garden sites with the goal of examining which pollinators were attracted to which flowering plants throughout the season. Using this information, they hope to gain a better understanding of which pollinators are present in urban gardens and how floral diversity affects bee diversity. As the summer progressed, Trent focused on identifying the plants found at each site and Huber collected pollinator specimens from flowers in each garden.

Simultaneously, two students from St. Olaf College in the Urban Scholars program, Joey Dagher and Kevin Cheng, gathered the same data at six pollinator sites containing hexagonal planters. They wanted to know if the city's initiative to plant pollinator hexagons was successfully supporting pollinators. Guido Quito, a junior at South Senior High School, spent one day a week at each site through the Minneapolis Step-Up Achieve program so he could gain hands on experience with undergraduate research.

This was a massive undertaking for this team of young researchers, and there is a lot of data to organize before their findings are released. The UROP students hope to get a better understanding of plant and pollinator diversity in relation to the floral resources available at each site, while the Urban Scholar's data will help us understand how effective the new pollinator sites are. The research this group of students did was exploratory and observational, but the data discovered through this project could lead to further undergraduate work or even a future project for graduate students. ♦

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