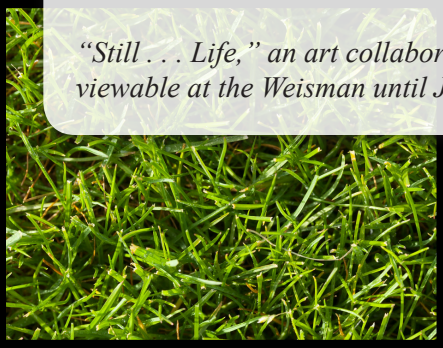
Department of Horticultural Science
Spring/Summer 2016

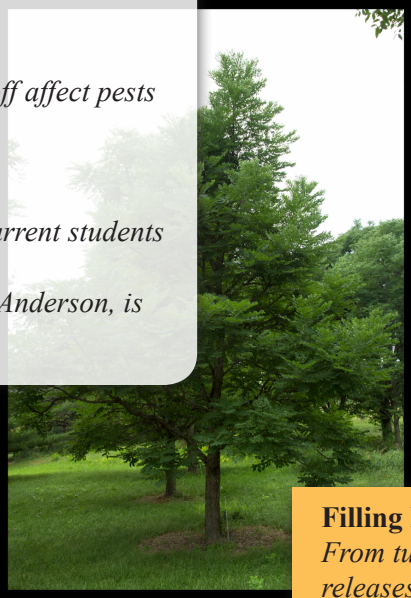
Horticulture

Adventure. Leadership. Excellence. Community.

INSIDE:

Horticulture. A culture of...





Filling Minnesota Landscapes
From turfgrass to azaleas to grapes, releases from the department are filling Minnesota yards and gardens. Read about some of the releases and how you can get them inside.

University of Minnesota
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Leadership.

Light Bulb Hunting: Student Spotlight on Soon Li Teh

It's a fungus that can devastate an entire grape crop from leaves to fruit, eliminating entire yields: powdery mildew. The fear of powdery mildew leads to frequent fungicide applications, but graduate student Soon Li Teh (*Applied Plant Science, Ph.D.*) hopes for a better way to control it. Advised by professors Jim Luby and Adrian Hegeman, he is combining DNA marker-assisted breeding with metabolomics to speed up the selection process towards powdery mildew-resistant wine grape varieties.

Originally from Malaysia, Teh has spent the last eight years studying in the United States. His dual undergraduate degree in agronomy and biochemistry from UW-Madison inspired him to pursue a research project that combined those two areas for his Ph.D. "It's like trying to find a broken light bulb in the basement of one house somewhere across the entire United States," says Teh, using an analogy coined by geneticist Francis S. Collins. In his case the light bulb is the exact area(s) of the genome that determines whether or not a grape vine is resistant to powdery mildew. The first step in finding that light bulb is through DNA mapping.

"We have about 125 individual plants in the vineyard at the Horticulture Research Center. We gave each of them a score for resistance to powdery mildew from 1–9 and then sent samples off for gene sequencing." Once he had the gene sequences he could look for patterns in them that mirrored the vines' resistance scores. These patterns can be turned into DNA markers, and can be used on seedlings to determine if they will be resistant without the cost of growing them for several years.

The genetics portion of his project has already yielded good results: two genetic regions linked to powdery mildew resistance, one of which has been previously reported. However, there's still a long road before he finds his light bulb. "So far, I've identified where the chromosomes are and what the regions are. And that gets me as close to saying it's in St. Paul, MN. We're not close to finding the exact spot yet, but closer than we were."

Moving into the final year of his Ph.D. program, Teh has turned his full attention to the metabolomics portion of his thesis, which will hopefully identify key chemical compounds that make grape resistant to powdery mildew. The process is similar in idea to creating a DNA marker, but at the analytical chemistry level. The results of his metabolomics research aren't available yet, but he is optimistic about the results he'll get this year.

Teh is eager to explain his work to others, "I made a point that I must be able to communicate what I'm working on. Otherwise it's pointless to work on it." To learn more details about Teh's research, accomplishments, and future plans read the full article online at *z.umn.edu/soonliteh*.

Inspire the Future: Become an Alumni Ambassador

What sparked your interest in a career working with plants? Many people can trace their interest in plants back to one or two people. Sometimes it's a parent or grandparent, but it can be as simple as someone taking the time to share an experience or show you something interesting. Now you have a chance to get the next generation interested in horticulture. CFANS has started an exciting opportunity called the Alumni Ambassador Program, which invites alumni to share their professional and collegiate experiences with students who are looking to explore careers in the food, agricultural, and natural resource sciences.

CFANS Alumni Ambassadors represent CFANS across the country by attending local college or science fairs, STEM summits, and recruitment events. For alumni outside of Minnesota, this is a great opportunity to stay connected with the University even from a distance. That was what inspired Alison Leathers (B.S. Environmental Horticulture, '09) in Tennessee to sign up for the program. "I've always had it in the back of my mind that if there were interested students I wanted to help them learn more," says Leathers. "Being farther away, it's nice to still feel that connection to the U."

Alumni participants aren't expected to know everything about the U and CFANS. They're given training to keep up to date on what majors are offered and admission requirements, but what is really valuable is their passion for the U and their real experience, both here and in the field. It's experiences like yours that can lead a student towards a career in the plant sciences. No one can answer questions about what makes the University of Minnesota a great choice better than its alumni. If you're interested in learning more or applying to become an ambassador in your area, visit *z.umn.edu/cfansaa*.

Above: *Alison Leathers, Alumni Ambassador, bottom center with her family at an Ohio Gopher game.*

Excellence.

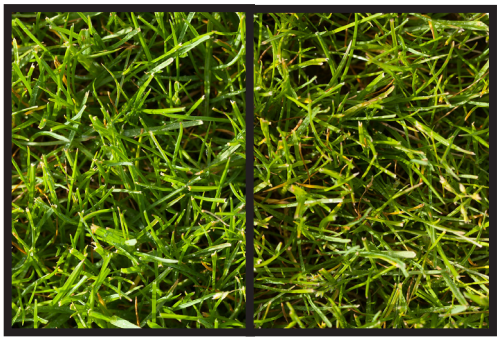
Thinking of Spring: Recent Plant Releases from the Department

In the spring of 2015, media outlets were buzzing with the news: there was a new Minnesota apple in need of a name. Thanks to Honeycrisp fame, new apple releases from the Department of Horticultural Science tend to get a lot of people excited. The new apple, MN-55, is still a ways from having a name and showing up on market shelves. However, other breeding programs within the department have been hard at work. Since 2013, ten new plants have been introduced into Minnesota gardens and landscapes, with several more on the horizon for this year and next. Read about some of these new plants below, and learn more about these and other plants available for home or commercial use at the new Minnesota Hardy website, *mnhardy.umn.edu.*

Pink Popcorn® Blueberry
Bound to be a talking point in a garden or pick-your-own operation, Pink Popcorn® is the only pink blueberry on the market that is hardy in zone four temperatures. Despite its color, the fruit has a great traditional blueberry taste and ripens mid-season. The bush also offers a great splash of color to the landscape: white flowers greet you in the spring and orange to maroon leaves signal fall weather.

Summer Cascade™ Wisteria
Summer Cascade™ wisteria, the U's first flowering vine, was released in 2013 and given the cultivar name 'Betty Matthews' after the White Bear Lake resident in whose yard it grew for many years. This beautiful ornamental vine produces large, lavender-blue flowers in early summer. It is a vigorous, twining grower and is great for covering an arbor or pergola to create a shaded seating area. It requires full sun for best growth and flowering.

Royal Green and Green Emperor
Recent releases from the turfgrass breeding program—perennial ryegrasses Royal Green and Green Emperor—are great examples of the more sustainable winter hardy varieties on which their program focuses. Both varieties are more winter hardy than previous releases in the program. Royal Green maintains a vibrant green color even during stress periods. Green Emperor is a darker green and mixes well with most commonly used varieties of Kentucky bluegrass or other elite turfgrasses, resulting in a more sustainable home lawn, golf course, or athletic field that maintains a traditional look.



Ground Dew™ and Ground Jewel™
These little tomato plants pack a big punch. The first dwarf tomato varieties to be released from the U, Ground Dew™ and Ground Jewel™ each produce approximately 100 tomatoes per plant while only taking up 1 square foot of land. The main difference between these two varieties is the coloring of the unripe tomatoes; Ground Dew™ is white whereas Ground Jewel™ is green and white. Because they take up so little space, they're great for potted plants and small gardens. On larger scale farms, these two varieties will produce up to 40 tons of fresh tomatoes per acre. Ground Dew™ and Ground Jewel™ have a growing season of just about a month and a half, ripen in late July, and are excellent for either fresh eating or processing.

An extended list of new releases can be viewed at *z.umn.edu/recentreleases*. If you're interested in purchasing any of these new plants, you can contact your local nursery to see if any are available. Commercial growers should reference the Minnesota Hardy website for more information on commercialization and licensing, plant availability, and growing information. If you're interested in Ground Jewel or Ground Dew, contact Thomas Hutton at tkhutton@umn.edu or 612-626-3429.

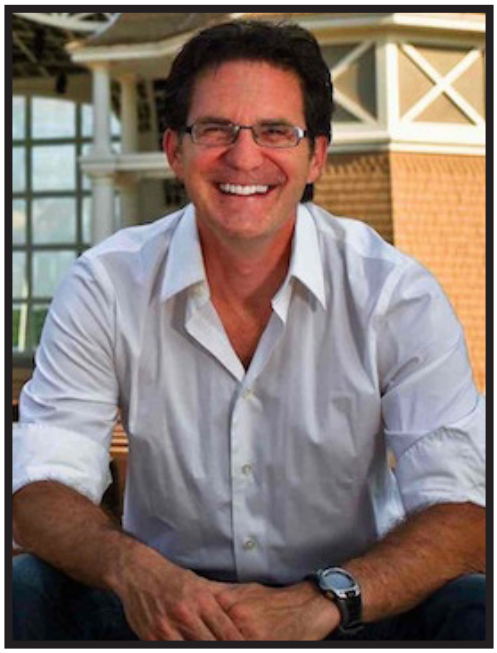
Adventure.

What Drives John Erwin to Make Plants Scream?

Vervet monkeys have specific alarm calls for leopards, snakes, and eagles. Blackbirds give off a high *seee* call when birds of prey are nearby. And plants get…gassy? Over the last 30 years research has shown that plants, much like animals, 'scream' at each other when being attacked by pests through the specific gasses they give off. Plants can even tell the difference between an insect bite and general tearing and adjust the signal they give off accordingly. Recent findings in John Erwin's lab, however, indicate that these gasses do more than just warn nearby plants to be on high alert: they also call in beneficial insects.

The idea that plants communicate with one another isn't new — it was first put forth through two studies published in 1983 on willow trees, poplars, and sugar maples. In the last 33 years more scientists have explored the nuances of whether and how plants communicate, including Erwin's lab. Specifically, his lab has looked at the effects of methyl jasmonate (MeJA), an organic compound that plants emit to 'tell' surrounding plants that they are being attacked so the other plants can turn on defenses, which lessens those plants' chances of being attacked by pests.

"We turned on all their defenses by exposing plants to small amounts of MeJA gas in the greenhouse," says Erwin. "By doing that, all the plants in that greenhouse are on high alert and would be naturally defended against pests and we would need to use less pesticide." The findings, which were published in the scientific journal *Entomologia Experimentalis et Applicata*, showed that plants exposed to MeJA actually produced more compounds that give pests indigestion.



Above: *Professor John Erwin is doing research on communication between plants and beneficial insects in his lab.*

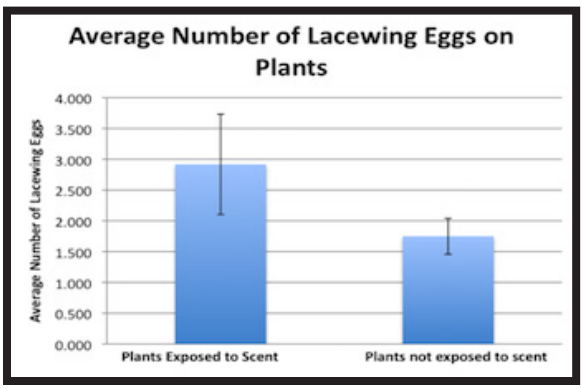
Last year, Erwin decided to take the concept of plants communicating with one another to his Plant Production I class. The class was divided into groups; each had to develop a hypothesis about plant communication and an experiment to test it. One group submitted a proposal that caught Erwin's interest: Do the gasses plants give off to communicate with each other also affect beneficial insects?

To find the answer the students used soybeans, aphids, and lacewings (an aphid predator). "They set up three cages with soybeans in them," says Erwin. "Cage one, the control, was put in a greenhouse that had no aphids. Cage two we infested with aphids, and right next to it we placed the third cage." The third cage wasn't infested with aphids, but it was exposed to the air given off by the plant being attacked by aphids.

After being exposed to the 'aphid air', cage three was then moved next to the control group and lacewings were released. Students then documented where the lacewings chose to lay their eggs. Lacewings flocked to cage three, even though no aphids were physically present on the plant to attract them. Erwin comments, "We know that when plants are exposed to aphids, or any other pest, the plants near them turn on genes to help defend themselves. What this experiment suggests is that turning on those genes not only makes the plants less attractive to pests, but may make them more attractive to beneficial insects — plants are 'calling' to other organisms to defend them."

The practical applications for this research are still being explored, but it has a lot of potential for use in greenhouses. "Instead of applying pesticides, we could apply attractants to allow natural beneficial pests to better focus on pest infestations," says Erwin. Since it's a closed system, even just a small amount of MeJA could turn on defenses in the whole greenhouse. "The goal is to reduce pesticide use, which is good for the environment and reduces costs. It's also something organic farmers could use, because it's a natural compound."

And it doesn't stop there. While Erwin's research focuses on greenhouses, there's potential application to field production as well — but more research is needed. As research continues, don't be surprised to see more producers using this plant alarm system to keep their crops safe in a more natural way. ♦



Did You Know?

Methyl jasmonate is a commonly found gas that is present in many perfumes. It evaporates off of jasmine oil.

Community.

Four Alumni Return to Pass on Advice

As Jack Pahl (*B.S. Horticulture '14*) picks up a slice of pizza and heads to the table at the front of 310 Alderman Hall, he admits this is the first time he's been back to campus since his graduation. Since leaving the U he's been hard at work at Pahl's Market Garden Center in Apple Valley, where he's learning the ropes to manage the 6th-generation family-owned farm. What brought him back for his first visit to Saint Paul was the chance to sit on the department's inaugural alumni panel to share with students the the lessons he's learned since graduation.

Pahl is the first to arrive, but it's not long before the other panelists enter the room, joined by current undergraduate and graduate students, staff, and faculty. It's mid-April and the question "What happens after graduation?" is on everyone's mind. Chris Tritabaugh (*B.S. Animal & Plant Systems '01*) readily offers his frank perspective about his time at the U and shortly after.

"I was a terrible student," Tritabaugh admits to the crowd right away, the sentiment met with appreciative laughs. "I wasn't really mentally ready for college when I was here." As Tritabaugh has risen to a prestigious position as superintendent of Hazeltine Golf Course, site of the 2016 Ryder Cup, his comments give hope to struggling students. Despite his admission, he still reflects back on his time here fondly, "The knowledge I gained here and the relationships with Extension have been invaluable."

His sentiments are echoed by panelist Bailey Webster (*B.S. Horticulture '13*), the owner of Four O'Clock Farm, an organic farm she started up in Prescott, WI shortly after graduation. "My internship had more hands-on farming experience than my other classes did, but what I did get was the 'why' behind what I'm doing on the farm. Knowing the science behind what I do helps me to be a better farmer." Even though her farm is based in Wisconsin, she often turns to U of M Extension for advice, or to her college mentors.

Attendees ask a variety of questions about how to set themselves apart, what classes were most useful for panelists, and more specific questions about the panelists' current jobs. The students interested in graduate school turn to Alex Susko (*B.S. Horticulture '13*) to learn how the experience might be different from getting their undergraduate degree. Susko is currently pursuing his Ph.D. in plant breeding and molecular genetics under Stan Hokanson and Jim Bradeen in the Applied Plant Sciences program. He works extensively in the southern United States—with field research from Arkansas to Florida and a collaborating USDA lab in Mississippi—and is currently completing a fellowship at the Arnold Arboretum at Harvard University.

Susko's biggest advice for students was to get as much experience as possible. "Every activity you do while you're in school will give you a different experience. If you're interested in starting a business, become the secretary for a student club so you know more about handling finances. You can do a UROP, volunteer at events, take internships, and all of it helps you get skills that you can use later and network with people you won't meet if you just take classes."

After the panel concluded, alumni had some time to answer student questions one-on-one and speak with faculty members they hadn't seen in years. Current student Liam Genter (*B.S. Plant Science '16*) reflected on the panel, "It was nice to see and hear about what happens after graduation from a diverse group of alumni. Hearing everyone talk about their career and academic paths, including their various struggles and hardships, was really inspiring and by far the thing that will stick with me the most." Armed with the advice from those who have gone before them, the class of 2016 is moving onto the next stage of their careers a little more prepared for what faces them.♦

We're Online!

We know that you love getting the Horticultural Science newsletter in the mail, but did you know that there's another option? Last year we launched the electronic version of this newsletter, which is delivered directly to your preferred email.

For now you'll receive both the online and in-print version of the newsletter. However, if you would prefer to get one version over the other, please fill out our quick form, accessible using the QR code below or at *z.umn.edu/16jo,* or contact Echo Martin at 612-624-4242.

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This newsletter was written by Echo Martin, and edited by Samantha Grover and Lauren Matushin. Please direct any questions or comments to Echo at mart1794@umn.edu.

Where the Present Meets the Past: "Still . . . Life"

The structures of today morph into history alongside the innovations of tomorrow. This idea lays the groundwork behind the exhibition "Still . . . Life," a collaboration between three professors: Neil Anderson in the Department of Horticultural Science, Lynn Silverman in the Department of Photography at the Maryland Institute College of Art, and the late Mark Gilquist, who taught K–12 in the Department of Mathematics at Champlin Park High School, ISD-11.

During the 2010–2011 school year, when Neil and Lynn were on Fulbright sabbaticals in the Czech Republic, the three artists traveled to Jewish cemeteries around Bohemia and Moravia as an alternate way to explore the history of the Holocaust than the better-known concentration camps. Silverman's photographs document the intersection of modern Czech life with the Jewish cemeteries that were desecrated during the Holocaust. Anderson catalogues the various plants growing wild in these often overlooked places, including native and non-native sympathy plants that still thrive even seventy years after the violence of World War II. Taken from his wheelchair, Gilquists' photographs provide a unique perspective on the destruction that took place.

Above: *Neil Anderson catalogued the various plants present at the Jewish cemeteries, or židovské hřbitovy.*

Below: *The exhibit gives the feeling that the viewer is peeking through a window into a walled cemetery.*

The layout of the exhibit is reminiscent of the often-ignored walls of the cemeteries. Each photograph is flush with the wall as if you're peeking through a gap in the cemetery wall. Real vinca plants from the cemeteries in the Czech Republic grow along the floor as if trying to escape into the modern world while ivy cascades down from the top of the exhibit. The contributions from the three artists combine to form a powerful narrative of how life continues in tandem with the past.

The exhibit can be viewed at the Weisman Art Museum on the East Bank campus until Sunday, July 10, 2016. Admission is free and open to the public. ♦