FALL 2025

grow

College of Agricultural & Life Sciences
University of Wisconsin–Madison

Field-Tested

Agricultural research stations help Wisconsin farms flourish

PAGE 20

Natalia Teixeira, a doctoral student in animal sciences, obtains a blood sample from a camera-curious prepartum cow as part of cow-calf pairing study at UW's Dairy Cattle Center. Photo by MICHAEL P. KING


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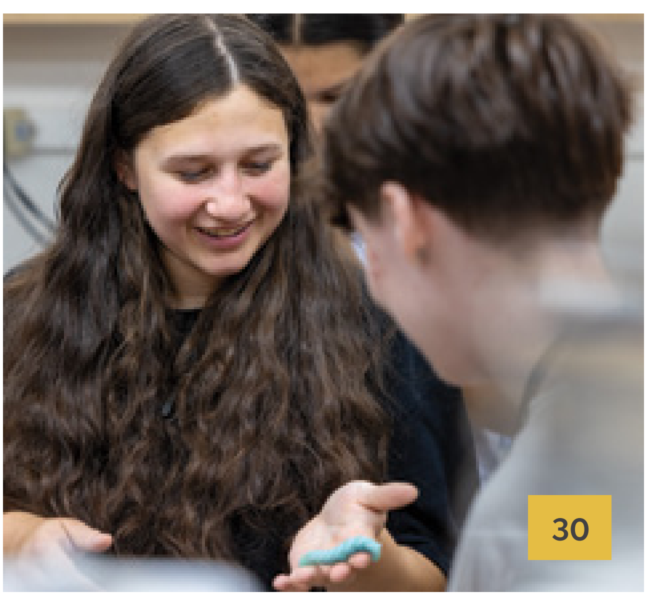

Wisconsin's Magazine for the Agricultural and Life Sciences

grow

VOLUME 19, ISSUE 1 | FALL 2025

FEATURES

DEPARTMENTS

ON THE COVER Contour farming at the Lancaster Agricultural Research Station in Lancaster, Wis. One of the primary goals of the 12 research stations maintained and operated statewide by CALS is to develop useful recommendations for farmers and landowners. Read more on page 20. Photo by MICHAEL P. KING

From top: Photo by JORI SKALITZKY, photos by MICHAEL P. KING [2]

In a greenhouse cultivation lab course, students Drew Smith, left, and Robin Grygleski check on sprouting seedlings in trays. It's an example of the experiential learning in which CALS students often engage.

Photo by MICHAEL P. KING

DEAN GLENDA GILLASPY

It's All About the Experience

Flip through the pages of any issue of *Grow*, and you might notice a thread connecting many of its stories. The students we highlight in this magazine can be found in fields and labs, in communities and classrooms, always learning through *experience.*

Experiential learning is a quintessential part of the CALS journey. Of course, we teach our students the fundamentals and evolution of advanced science; we teach them how to analyze and how to think (but not *what* to think). But it's not all theory — much of what we teach is hands-on, applied. Our land-grant mission requires that we create opportunities for students to "dig in" to things. With this academic foundation, we help them build a repertoire of professional and practical skills, skills needed for entering the workforce or pursuing an advanced degree.

Our graduate students also engage in experiential learning through their participation in what is essentially an apprenticeship model. They are paired with an expert in the field, a professor who serves as an advisor. In addition to helping graduate students hone their understanding of complex subject matter, professors assist them in gaining key research skills necessary to answer questions. This can include laboratory or field work — how to pipette, care for animals, plan and carry out a large-scale study over acres of land, and use microscopes and other complex instruments and equipment.

Faculty also guide graduate students through proper research and communication methods in their field. They demonstrate how best to convey a study's findings to farmers, industry, and others who need the information. And they model effective teaching in classrooms and provide occasions for graduate students to try them out. All the while, undergraduates participate in this process and gain related experience.

In broad strokes, this is how CALS faculty integrate teaching, research, and outreach into their daily work. In the process, they fashion numerous experiential learning opportunities for students of all levels. It's a major time commitment, one that extends beyond a 40-hour work week. But the blended nature of these activities makes it extremely difficult to strictly account for the hours spent on each one.

The Universities of Wisconsin does keep tabs on instructional hours. Records can be found on its Faculty and Instructional Academic Staff Teaching Workload website. However, this effort only tracks hours spent in the classroom. As I've shown, teaching and learning happen in many places, and as a land-grant college, we are required to extend the boundaries of learning to many different stakeholders. If the time professors spend in the classroom is the only activity taken into consideration, the comprehensive nature of education at places like UW and CALS goes unrecognized and underappreciated.

We'll continue to bring you stories of experiential learning in the pages of *Grow.* This issue includes several. Our Class Act story (page 8) highlights how student researchers can explore and learn while making significant contributions in the lab. One of our features focuses on the success of the UW Badger Pulling Team, an exceptional group of students who gain critical engineering knowledge through an international competition (see page 16). And another feature highlights a new initiative called the Wisconsin Rural Scholars program (see "A College Try at CALS" on page 30). The program gives high school students a taste of experiential learning before they even enroll in the college! It's just a preview of how they stand to benefit from an education — an experience — at CALS.

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College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN–MADISON

Myths and Misunderstandings about Rural America

Five insights into rural people and places that challenge conventional wisdom

By TIM SLACK BS'98

Rural America is substantial in its size, population share, and social and economic significance. Roughly one in five Americans live in rural areas, and the vast majority of the nation's land area is rural. Yet, in a nation with a mostly urban population, the challenges faced by rural people and places are often overlooked or misunderstood. Here are five myths and misunderstandings about rural America — a handful among many — related to population loss, employment, racial composition, health, and politics.

Myth 1 In the context of urbanization, rural America is fading away due to population loss. Over the course of U.S. history — as we transitioned from an agrarian to an industrial and now an information-based economy — populations have increasingly concentrated in urban areas. But urbanization has not been linear or unidirectional. In the 1970s and 1990s, rural areas experienced greater population growth than urban areas, periods coined "rural rebounds." And rural places with attractive natural amenities (e.g., lakes and mountains) consistently buck the depopulation trend. Paradoxically, the very definition of "rural" puts limits on growth. Many rural areas are vibrant and growing, but sustained population growth results in places being reclassified as urban. Much of what appears to be rural depopulation and urban growth in aggregate statistics stems from formerly rural people and places being moved to the urban side of the ledger over time.

Myth 2 Rural is synonymous with farming. Agriculture does constitute a greater share of employment in rural areas compared to urban areas, but this is also the case with other major sectors, including mining, construction, retail, manufacturing, and government. Nationally, just over 5% of employment in rural counties is in agriculture, and most farm families also engage in off-farm employment. Manufacturing is an especially important sector of employment in rural areas, where it provides a greater share of jobs and earnings than in cities, making deindustrialization especially painful in rural America. It is one thing for a plant to close in a large and diversified metropolis but quite another when it is the lone "good jobs" employer in town.

Myth 3 Rural America is not racially diverse. In truth, rural areas are much more diverse than commonly assumed. In 2020, about one in four people (24%) living in rural America were non-White, with Hispanic (9%) and Black (8%) people representing the two largest groups. Further, although Indigenous people represent a relatively small share of the rural U.S. population overall, no other group has more rural residents among its members. Notably, not only is the rural population more racially diverse than many believe, but it is becoming increasingly so — and children are the vanguard. In 2020, nearly one in three rural residents under age 18 was non-White.

Illustration by JORDYN VOWELS

In their recent book, *Rural and Small-Town America: Context, Composition, and Complexities* (University of California Press, 2024), Slack and Syracuse University sociology professor **Shannon Monnat** paint a social-scientific portrait of the problems and prospects facing the rural United States. The book won the 2025 Frederick H. Buttel Outstanding Scholarly Achievement Award from the Rural Sociological Society. The award is named in honor of **Fred Buttel** BS'70, MS'72, PhD'75, who was William H. Sewell Professor of Rural Sociology at UW.

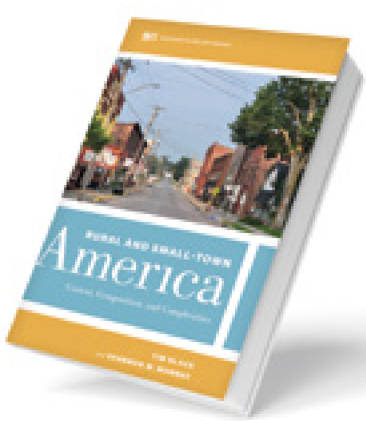


Image courtesy of UNIVERSITY OF CALIFORNIA PRESS

Myth 4 Rural America is healthier.

Age-adjusted mortality rates are actually higher in rural areas, and the rural-urban gap is wide, persistent, and growing. The COVID-19 pandemic exacerbated this disparity with disproportionately higher rates of death from the disease in rural communities. Perhaps most concerning is growing rural-urban inequality in mortality among working-age adults (25–64). This trend is being driven by nearly all major causes of death. Rural working-age mortality rates are higher for cancer, heart disease, COVID-19, transport accidents, suicide, alcohol misuse, diabetes, stroke, and problems related to or aggravated by pregnancy among women.

Myth 5 A "rural revolt" propelled the presidential elections of Donald Trump.

There is no doubt that rural voters have shown a clear preference for Trump in his three contests. But the rural U.S. vote has been trending Republican for decades. Since the 1976 election of Jimmy Carter — the last year in which rural-urban voter preferences were similar — the gap in the share of votes for Republican presidential candidates has steadily increased. In 2024, it was roughly a 20-point difference between rural and urban areas. So, while Trump has performed well with rural voters, doing so is consistent with a 50-year trend. Moreover, the big story in the 2024 contest was not about rural voter turnout, which held steady from 2020. Instead, it was the massive collapse in voter turnout in big cities, where both candidates got fewer votes than in 2020, and Kamala Harris captured roughly 8 million fewer votes than Joe Biden had four years before.

Tim Slack is professor of sociology at Louisiana State University. He received a bachelor's degree in rural sociology (now community and environmental sociology) from CALS in 1998 and completed his Ph.D. at Pennsylvania State University. His research and teaching focus on social and economic change, with an emphasis on rural people and places.

Waves of Curiosity

Creativity and an inquisitive nature lead biochemistry major and Goldwater Scholar Elliott Weix to a useful discovery.

By RENATA SOLAN MS'11

Photo by PAUL ESCALANTE

In fall 2022, **Elliott Weix** BSx'27 started his senior year of high school with a new career goal: scientist. Weix had spent his summer in the lab of biochemistry professor **Scott Coyle** as part of the High School Science Research Internship Program (SRI), a partnership between UW–Madison and the Madison Metropolitan School District. There, his interests shifted from investigative journalism to investigating the natural world.

"I went beyond textbooks in Scott's lab," Weix recalls. "I wasn't learning how a [cell signaling] pathway works or why my eyes aren't the same color as my mom's or dad's. It was bigger than that: Look at all these possibilities that exist in life. Can we figure out how and why things work and use that knowledge as building blocks to make something else? That was exciting."

When it came time to choose a college, staying close to family and continuing his research project made UW–Madison an easy choice. Now a junior majoring in biochemistry and math, Weix's three years in Coyle's lab have led him to exciting avenues of research.

"In addition to his scientific rigor and careful observation, Elliott is a creative thinker," Coyle says. "That creativity allows him to see possibilities in the unknown."

Curiosity led Weix, a 2025 Goldwater Scholar, to make a novel observation in the lab: unusual behavior in a system of proteins that may serve as a tool for studying cell development and differentiation. It's something he's exploring further this year.

In Coyle's lab, scientists design networks of proteins that interact to induce a new function in a cell and to help scientists understand existing cellular processes. Of particular interest are proteins that interact in ways that cause molecules to move in wave-like patterns in bacteria. Researchers in his lab explore how these proteins behave when the same system is engineered into a yeast or mammalian cell. Weix was tasked with characterizing the ways that thousands of variations to this system impact the length and speed of the waves in yeast cells.

"I was observing variations under the microscope, and I saw a wave pattern that was unlike the rest," Weix says. "I didn't know exactly what I was seeing, but seeing something unexpected gives us a chance to ask new questions."

The unique waves moved slowly — so slowly, in fact, that when the yeast cell divided, all the wave-inducing proteins were sequestered to one side, resulting in an asymmetrical division between the parent cell and its daughter.

Asymmetrical cell division lies at the crux of organismal development. Weix's observation may be the first step toward developing a tool that researchers can use to mimic and study early stages of embryonic development and how different body parts take form.

But, Coyle emphasizes, there's also inherent value in a young scientist like Weix simply exploring, without a specific goal in mind. "This is where Elliott's creativity comes into play. By inducing asymmetry, he can ask questions about what happens to one cell relative to the other when molecules are distributed asymmetrically. It's a great project for a student who just loves to learn new things."

+ WHAT IS THE GOLDWATER SCHOLARSHIP?

Named for American politician Barry Goldwater, it is widely considered the nation's most prestigious undergraduate scholarship in mathematics, the natural sciences, and engineering.

Red Corn Resurrection

Plant geneticists' collaboration with a Wisconsin bourbon business yields unique flavors.

By AUDRA KOSCIK

Almost 20 years ago, **Natalia de Leon** '00, '02 and **Shawn Kaeppler** BS'87, professors in the Department of Plant and Agroecosystem Sciences, set out to bring a crop back from the dead. Their goal: meet the scientific challenge of resurrecting an heirloom red corn variety and, in turn, help a local bourbon business breathe new life into its product. It took some serious seed vault sleuthing, a deep dive into a germplasm bank, and a retread of historical breeding efforts, but the bounty of those efforts is now flowing from fine oaken barrels.

The corn variety in question, a hybrid called W335A, has deep roots in Wisconsin. Originally developed in 1939 by scientists at CALS, it was then grown in the region for decades. However, by the 1970s, W335A had faded from farms as other varieties emerged.

For decades, W335A only existed in UW's seed vault. That is, until 2006, when the Henry family, owners of Henry Farms and J. Henry & Sons, expressed interest in growing and using W335A to craft high-quality bourbon.

The Henry family has a long history with this red corn variety. In 1946, **Jerry** and **Helen Henry** purchased a farm in Wisconsin, where they grew and sold W335A until new, more productive varieties hit the market.

"In the late 70s, [with the new varieties], you started seeing your average yield per acre just kind of skyrocket," says **Joe Henry, Jr.**, owner of J. Henry & Sons. "[W335A] is still an heirloom varietal, so it doesn't have the kind of yield potential that those more modern-day crops have. It would have gone completely extinct because nobody was going to grow it."

After many years, the Henry family, which had continued producing other types of corn, decided they wanted to branch out into bourbon. "We wanted to take our knowledge of raising seed corn and apply that to making really high-quality bourbon. And we wanted to do something that was tied to the region and had some history with our family," Henry says. "We started talking to the university because my dad remembered the cool, unique red color of that specific varietal."

The Henry family reached out to de Leon, project leader of the field corn breeding and genetics program at CALS. "The variety that [Jerry Henry] used at the beginning was this very specific corn variety that had really dark red kernels," de Leon says. "This variety is what we call a double hybrid."

To create a double hybrid, scientists start with four parent plants. Each of the four parents is from an inbred line, which is the result of a crop being pollinated only by itself. Scientists then pair the four parents and breed them, creating two new hybrid crops. Scientists cross these hybrids to create a double hybrid.

W335A, a red corn hybrid, grows on Henry Farms in Dane, Wis.

Photo courtesy of J. HENRY & SONS

This home is located on the Henry family's Wisconsin farm, which Jerry and Helen Henry purchased in 1946. The Henry family still owns and operates the farm today.

Photo courtesy of J. HENRY & SONS

"That's how hybrids were produced back then," de Leon says. "The inbred lines were so weak that in order to produce enough seed of any variety, you needed to do this double hybrid."

De Leon worked closely with Kaeppler, a collaborator in the field corn breeding and genetics program, to bring back the double hybrid. They looked in UW–Madison's seed vault to find the four original inbred seeds used to created W335A, but they quickly ran into issues. "In our cold rooms where we store our seed, we still only had seed for three of the four," de Leon says.

After connecting with other sources, such as the U.S. Department of Agriculture's North Central Region Plant Introduction Station, de Leon and Kaeppler found that the fourth inbred no longer existed. They were still determined to resurrect this red corn and decided to breed one of the original hybrids. Still, bringing back the hybrid was quite difficult since de Leon and Kaeppler's team had to start with the 1930s inbred seeds.

"Old inbreds are hard to increase," de Leon says. "The seed is very weak. We started working together, trying to produce enough seed, and we went through this cycle. We spent quite a bit of time just trying to get the volume of seed that [the Henrys] needed."

The Henry family was a supportive collaborator and provided funds to help this part of the process. After many iterations and lots of hard work, de Leon and Kaeppler's team was able to give the Henry family a healthy seed stock.

At that point, the Henrys were able to start growing their own crop, but they were still a long way from a finished product. To begin with, they had to produce enough corn to make bourbon. J. Henry & Sons farms all the corn, wheat, and rye used in their products, and it's the only known company to use the red corn variety. Next comes the complicated distilling process, and then storage and aging.

"We did a lot of research on the front end," says Henry. "When we're putting it into the barrel, we're constantly tracking it so that it doesn't provide any bad flavors. But, really, it's a huge risk starting a whiskey company because it is truly like four, five,

or six years before your actual product is ready for the market. Sixty-five percent of the final flavor comes from just the spirit interacting with those wooden oak casks."

Luckily, the risk paid off. J. Henry & Sons now has several flavors of award-winning bourbon that use this variation of W335A. Most bourbon companies use a bulk pool of variety nonspecific #2 yellow dent [a type of field corn widely grown in the U.S.] because it has high starch content. Higher starch levels offer a more efficient chemical reaction and produce greater volumes of alcohol. The red corn, however, produces a distinct flavor and is higher in protein, fat, and oil content.

"And that shift from where those grains are putting their nutritional value really does help improve the flavor," Henry says. "It's got a better texture, a better flavor, and it's a lot more complex. So, we're really sacrificing a little bit of efficiency for better quality, a better-tasting product."

"Early in my tenure as dean, I had the opportunity to visit J. Henry & Sons and see the impact a long-standing research collaboration with UW–Madison has had on their business," says Dean **Glenda Gillaspy**. "As Wisconsin's land-grant university, we have a long tradition of partnering with farmers and other agricultural businesses to solve the practical problems they face. Their successful business is an excellent example of the type of rural economic development that UW research supports across the state."

J. Henry & Sons barrels hold bourbon for at least five years before the product is ready for the market.
Photo by BRYANT VANDER WEERD, FULL POUR MEDIA

The effort to resurrect W335A also inspired de Leon and Kaeppler to launch a breeding program for developing modern, higher-yielding versions of the red-seeded variety to better serve other university partners. Helping growers and businesses have high-quality agricultural products and practices is central to the work that de Leon, Kaeppler, and many faculty do. Often, it starts with a simple email, like the one the Henry family sent to de Leon.

"Many times, I get an email, and it's not something I can directly help with," de Leon says. "But we always do our best to respond quickly and connect them to the right resources."

Victor Ujor works in his Babcock Hall lab. Ujor's genetically modified bacteria, *P. putida*, has the potential to eliminate a big roadbloack in bioenergy production.

Photo by CHELSEA MAMOTT

Rewired Microbe Scarfs Toxic Chemicals for Dinner (and Then Skips Dessert)

A new method for removing harmful by-products could help clear a major hurdle for plant-based fuel production.

By CHRIS HUBBUCH

Microbes are key to turning plants into liquid fuels. Yeasts and bacteria eat plant sugars, such as glucose, and turn them into alcohols, a process known as fermentation. But, when it comes to making biofuel from non-food plants, there's a problem: Most chemical treatments used to break down the plant fiber generate toxic by-products.

"One of the challenges with them is the inhibitors you get when you crack them open to get sugars," says **Victor Ujor**, an assistant professor of food science at CALS whose research focuses on using microorganisms to convert waste into valuable products. (See "How Waste Becomes a Resource," *Grow*, fall 2023.)

Ujor, an affiliate of UW's Wisconsin Energy Institute, has invented a genetically modified microbe that could solve the problem by removing the bad by-products but leaving the sugar for other microbes. The breakthrough could pave the way for turning lignocellulosic biomass — such as grasses and trees — into a potentially limitless source of low-carbon energy that can be grown on land not suitable for food crops.

Making fuel and other petrochemical alternatives from these types of energy crops requires deconstructing the plant fiber to release the energy-rich sugars in cellulose and hemicellulose. This process typically involves harsh chemical treatments that generate toxic chemicals called furans — primarily furfural and a related compound known as HMF, or 5-Hydroxymethylfurfural. These furans inhibit fermentation of the resulting broth. Many organisms naturally convert furans into other products, but those products can also limit fermentation.

"In the past, I've looked at different bugs that could reduce furfural and HMF to their respective alcohols, which are less toxic," Ujor says. "But less toxic doesn't mean nontoxic."

To solve the problem, Ujor wanted to find a microbe that would use furans as an energy source, removing them completely from the broth. Some bacteria, including the soil-dwelling *Pseudomonas putida*, naturally consume furfural and HMF. The problem is they also eat the sugars. So Ujor's team set out to edit the bug's genetic blueprint.

"We want to save the sugar for fermentation," says **Santosh Kumar**, who led the project as a postdoctoral researcher in Ujor's lab and is now an assistant professor of biology at McMurry University. "My purpose was to engineer a strain that can selectively utilize furans as a carbon source without touching the glucose and the other sugars."

First, the scientists deleted three genes that enable *P. putida* to consume glucose, the sugar in

cellulose. Then they inserted a cluster of genes from *Cupriavidus basilensis*, another soil microbe with an even greater appetite for furans. And rather than randomly inserting the foreign genes, Kumar put them in the same place as the deleted genes, allowing the bug's native upstream promoters to activate the new genes.

"Glucose doesn't get touched, and the furfural and HMF are mopped up," Ujor says.

Unlike previous efforts to engineer *P. putida*, the team also added genes involved in forming transporters, valve-like proteins that move certain products through the cell wall. The quicker these products can be moved into the cell, the faster they can be metabolized, Ujor says.

The modified microbe, which Ujor is seeking to patent, not only outperformed the native strain, it also was able to handle furan concentrations two times higher than previously engineered strains. Now the goal is to further tweak the genome to create a strain that can tolerate the higher concentrations of furans in real-world hydrolysates.

"Hopefully we can move it one notch up," Ujor says.

FOLLOW-UP

HOW SWEET IT IS

In "Sweet Solution," (*Grow*, fall 2022), **Jori Skalitzky** BS'22 introduced a team of UW scientists who were transforming a remnant of Greek yogurt production into a high-quality "dairy syrup" that could be used as a food sweetener. The idea was to turn a common waste product into a potential moneymaker for the dairy industry.

Since then, the team and its leaders — research specialist **Jarryd Featherman** and professor **George W. Huber** from the UW Department of Chemical Engineering, and food science professor and department chair **Scott Rankin** — have realized their vision for this technology.

They have further refined their manufacturing process and scaled it up. And, in 2023, they founded a spin-off company called Galasys to bring the technology to market. The Galasys method converts lactose — sugars found in Greek yogurt acid whey (GAW), sweet whey, and other dairy waste streams — into tagatose, a natural, low-calorie sweetener.

Tagatose has 63% fewer calories and a 95% lower glycemic index than table sugar. However, compared to many sugar alternatives, it tastes and functions more like real sugar, according to the Galasys team. It can also help prevent tooth decay and support gut and immune health with prebiotic benefits. And repurposing lactose rather than disposing of it can save the environment from the negative effects of its high acidity.

"This gives food companies a better option for creating reduced-sugar products," says Rankin, who is also an extension specialist. "It also provides the dairy industry with a high-value revenue stream and adds a new sustainable solution for dairy waste disposal while addressing food industry gaps."

Galasys was rewarded for their efforts in 2025 with a first-place finish in the Advanced Manufacturing category of the 22nd annual Wisconsin Governor's Business Plan Contest.

—Nicole Miller MS'06 and Nik Hawkins

+ FEDERALLY FUNDED RESEARCH

Galasys arose from a cross-campus research project funded by the U.S. Department of Agriculture. It also received support from the National Dairy Council, UW Center for Dairy Research, UW Dairy Innovation Hub, Dairy Management Inc., and Wisconsin Alumni Research Foundation.

Photo by UNSPLASH.COM/ALEXANDER GREY

Roots in Motion

A genetics department collaboration uses art to help Wisconsin kids unearth a hidden world of plant growth.

By CAROLINE SCHNEIDER MS'11

"How does your garden grow?" It's a question posed often enough that it even appears in a classic nursery rhyme. When **Angela Johnson**, a local artist and teaching faculty member in the UW Art Department, was asked to create a hands-on experience for kids to answer that question, she turned to another childhood favorite: flip books.

To get the books flipping, Johnson teamed up with genetics professor **Patrick Masson**. Masson studies molecular mechanisms that allow roots to respond to parameters in their environment, such as gravity and touch. He was recently awarded a grant from the National Science Foundation for a research project centered on root growth, and it included funding for outreach. So Masson and Johnson, who has worked on art and science fusion projects since 2006 and studied as a bookmaker, came up with the idea to help kids create flip books to illustrate the root growth concept.

"We wanted a hands-on experience that could help kids understand what ingredients are needed for roots to grow," Johnson says. "I wanted it to be something they could hold and make themselves so they could see the progress of the root growth on every page."

After some early trials and retooling, the team landed on a simple instruction sheet inside a kit that includes all the necessary supplies to create the flip book. Each participating child would choose a plant and then follow their instruction sheet to draw their plant growing at different stages. First, they would think about questions posted on the sheet (e.g., "How do roots know where to go?").

Top: Flip book makers draw images of their plants in different growth stages during an event at the Madison Children's Museum. Books were provided to help inspire ideas.

The flip book kits each include an instruction sheet and all necessary supplies.

Photos courtesy of ANGELA JOHNSON

Next, with their drawings of the different stages of growth complete, the budding artists assembled their books and "animated" them by rapidly flipping the pages.

Volunteers from the Pinney Branch of the Madison Public Library produced, packed, and distributed more than 500 kits to botanical gardens, libraries, museums, and other locations throughout Wisconsin in 2024 and early 2025. At many locations, families had the option to grab a kit to take home or to sit down at a hosted event to create their flip book. Some kids arrived with specific ideas, while others looked through materials to find their chosen root.

"One boy wanted to draw a carrot that would get eaten by a rabbit," Johnson says. "We wanted to leave it open-ended so families and kids could choose their own plant and their growing conditions. We worked with youth librarians to find books and reading suggestions to go with the activity."

Johnson staffed a flip book activity table at the Wisconsin Science Festival this fall, and root growth lessons for elementary school teachers are online at **go.wisc.edu/masson-outreach**. Johnson heard positive feedback about the kits throughout the project, and kids provided important suggestions that she and Masson hope to use as updates in their next version, such as perforated pages and seed packets that could be grown at home, if further funding is approved.

"The development of the project was so great," Masson says. "We had such an advantage with Angela here because, when you're doing plant research, things seem obvious that probably aren't obvious to kids. Angela kept asking us how we could simplify our ideas at every step. And it came out so well."

+ EXPLORE ONLINE

Artist Angela Johnson has illustrated other scientific concepts for the genetics department, including a recently finished triptych (crafted with wood, embroidery, botanical greenery, and integrated lights) that represents different aspects of plant growth. Learn more about the piece at **go.wisc.edu/threads-of-growth**.

THOUGHT FOR FOOD

Use your head to ace our **Final Exam** and you could score a gift box of cheese from the Babcock Dairy Store!

Test your CALS knowledge at **grow.cals.wisc.edu**.

NUMBER CRUNCHING

100 MILLION CRITTERS CAUGHT ON CAMERA

Snapshot Wisconsin is a community-based science program led by the Wisconsin Department of Natural Resources (DNR). It utilizes a network of trail cameras — hosted by Wisconsin landowners — to capture images of wildlife across the state. The trail photos are downloaded into a central database where volunteer "citizen scientists" comb through the images and classify them.

The DNR uses the data to monitor wildlife populations and make management decisions. Researchers have used it as the basis for more than 20 scientific papers. Now, with 10 years under its belt, Snapshot Wisconsin has captured over **100 million** photos. And it all started with a little help from CALS.

Initial funding for the project came from a NASA grant written by **Phil Townsend** and **Ben Zuckerberg**, professors in the forest and wildlife ecology department, and UW Division of Extension Dean **Karl Martin**, who was the DNR's director of science services at the time. DNR employees **Christine Anhalt-Depies** PhD'20 and **Jennifer Stenglein** MS'13, PhD'14, both CALS grads, were also instrumental in getting the project up and running. (See "Candid Camera," *Grow*, summer 2017.)

Snapshot Wisconsin is set to continue with expanded data-capturing capabilities thanks to a new, three-year NASA grant.

Photo illustration by JANELLE JORDAN NAAB with image courtesy of SNAPSHOT WISCONSIN

HOW TO PULL AWAY FROM THE PACK *WITH PANACHE*

The UW Badger Pulling Team uses ingenuity, skill, and style to make its tractor design stand out at an international competition.

By Nik Hawkins

When undergraduate Devin Digman bought a 90s-era Kawasaki motorcycle earlier this year, he didn't expect its purple and turquoise color scheme to bleed into other areas of his life. But the palette expanded. It became the retro body finish for a mini tractor he and the UW Badger Pulling Team entered in a major competition. The same hues also adorned their team attire. And it's likely the crew's flashy, tongue-in-cheek look helped them take home some impressive hardware.

The contest in question is the International Quarter-Scale Student Design Competition, hosted annually for almost three decades by the American Society of Agricultural and Biological Engineers. Each team is given an engine and tires, but they're required to craft and submit their own tractor design and build the machine themselves. Industry experts judge entries based on innovation, manufacturability, serviceability, and other real-world factors.

For the 2025 edition, twenty-three teams from across the United States and Canada gathered in late spring in Peoria, Illinois, to put their tractors to the test. This year's UW Badger Pulling Team — which includes biological systems engineering (BSE) majors Garrison Korn BSx'25, Kaedyn Peterson-Rucker BS'25, MSx'27, and Nathan Sorensen BSx'25; agricultural business management major Brandon Boyd BSx'27; and engineering students Jackson Barta and Digman — secured sixth place overall. They also came away with the Maneuverability Award, the Safety Award, and the Best Appearance Award.

"We are incredibly proud of their dedication and their success," says Brian Luck, a BSE associate professor and extension specialist who serves as the team's co-advisor. "Their overall finish and the other awards they earned against such strong international competition highlight their hard work, ingenuity, and collaborative spirit."

Members of the UW Badger Pulling Team escort their tractor during the International Quarter-Scale Student Design Competition, held in Peoria, Ill., in late spring 2025. The team earned multiple awards. Photo submitted


Kawasaki
UW-MADISON
KONDEX
HYDAC
ASABE
6

In a nutshell, the team's awards say this: Their tractor moved exceedingly well, it operated with above-and-beyond attention to safety, and it looked great while doing it. As one would expect, there's a story behind the machine's eye-catching, passé pastels. At first, the team was simply inspired to paint it to match Digman's motorcycle (which, as a Kawasaki, coincidentally matched the brand of the tractor's engine). But it went even further.

"It wasn't until we actually bought the paint that our advisors took us seriously," says Peterson-Rucker. "Then [co-advisor and BSE instructor Kody Habeck BS'08, MS'11] said, 'If you're committing to this, you have to get tracksuits.' " And they did, thanks to a surprise gift from Habeck and BSE professor emerit David Bonhoff BS'78, MS'85, PhD'88. Although the slick, nostalgic look no doubt contributed to the pulling team's success in the appearance award, aesthetics is only skin (or paint, or fabric) deep. Many other factors related to artisanship, skill, and design came into play.

"From the precision fabrication to the meticulous wiring and hose routing, every component reflected their dedication to craftsmanship," Habeck says. "I have no doubt this all contributed to their success, especially with the Best Appearance Award, but also in other categories."

The Maneuverability Award recognizes the team's exceptional engineering and design, which allowed their quarter-scale tractor to navigate a challenging course with precision and control. Their success here might be owed in part to the new controller they installed. The system, an improvement from last year's contest entry, integrates buttons and the joystick in proximity. This helps the operator always keep a hand on the controls while accessing multiple functions.

The Safety Award underscores the team's focused attention to safety protocols throughout the design, construction, and operation of their vehicle, which is a critical aspect in any engineering endeavor. They installed turn signals, a back-up beeper, and a horn. Perhaps the most significant safety features were the hydraulic ramps, which allow the tractor to start

UW Badger Pulling Team members work on their award-winning quarter-scale tractor in the Biological Systems Engineering Shop. Photo submitted

Top: From left, graduate student Kaedyn Peterson-Rucker, associate professor Brian Luck, professor John Shutske, and teaching faculty Kody Habeck, all from the Department of Biological Systems Engineering (BSE), showcase the pulling team's tractor to a group of visiting high school students in the BSE Shop. Photo by MICHAEL P. KING and stop quickly but without jerking and potentially throwing an operator out of the seat. Peterson-Rucker says they tweaked the system tirelessly to find the right balance.

For extra amenities, the team added speakers, a cup holder, and a phone charger. "These are things you don't always think of for a tractor until you're sitting in it and then realize, man, this would be nice," Peterson-Rucker says.

Pulling team members accumulate a great deal of practical experience from the design and building process leading up to the competition and from the competition itself. Some of the knowledge they acquire while problem-solving — hydraulics, power systems, wiring, electrical schematics, coding — they may not have yet tackled in their courses. These skills apply beyond agricultural implements, in areas such as marine and automobile engineering.

Participants also learn the design-to-manufacturing process. "It's thinking through how something is going to be put together *as* you design it," Peterson-Rucker says.

At the competition, in addition to engaging in three performance events (tractor pull, maneuverability course, and durability course), teams must "sell" their design in a formal presentation to industry experts who play the role of a corporate management team. This includes deciding on a sales price, estimating annual sales and profit margins, and describing how the design serves the needs of a specific market. The UW Badger Pulling Team marketed their tractor for small hobby farms, orchards, and agritourism businesses. This explains the addition of the speakers, which can double as an audio system for tours.

Pulling team members also leave the competition with a burgeoning network of career contacts. Students get to mingle with judges, who represent major companies, from John Deere to Kubota to Vermeer, and more.

"For some of us, this was our third time competing, and it's been rewarding to build our connections with the other students, judges, and industry professionals," says Sorensen, who co-captained the team with Digman this year. "It's also fulfilling to show our sponsors how the tractor turned out and continue building those relationships. It's helped many of us land internships with leading agricultural companies."

The competition pushes students to apply classroom knowledge to practical, real-world engineering challenges, Sorensen says. Knowing this, companies participate in the contest to look for students with this kind of hands-on experience.

"I think I speak for a lot of members when I say that being a part of this team has been one of the best ways to prepare for a career after school," Sorensen says. g

The members of the 2025 UW Badger Pulling Team, from left: Kaedyn Peterson-Rucker, Nathan Sorensen, Devin Digman, Jackson Barta, Garrison Korn, and Brandon Boyd (kneeling).
Photo submitted


Contour farming at the Lancaster Agricultural Research Station in Lancaster, Wis.

Field-Tested, Farmer Approved

At UW's agricultural research stations, CALS scientists work with Wisconsin producers, growers, and landowners to find the most effective and economical methods for their acreage.

Story by **Chris Barncard** ■ Photos by **Michael P. King**

Rodrigo Werle wonders if anybody is ever really happy to see him.

He is, after all, a weed scientist. He specializes in some of the nastiest, most unwelcome guests to visit Wisconsin farm fields. The kind that just won't leave.

"Nobody wants to be in the same field where we do research," says Werle, an associate professor of plant and agroecosystem sciences and extension scientist. "We want to work where there's giant ragweed and waterhemp and all the hardest-to-control weeds we have out there."

So, when he first laid eyes on Arlington Agricultural Research Station during his 2017 job interview, he began imagining all kinds of research possibilities. Arlington is one of 12 UW agricultural research stations dotting Wisconsin. One of the primary goals of these stations, which are maintained and operated by CALS, is to develop useful recommendations for farmers and landowners.

"During the tour, I thought, 'Wow, imagine what I could do at a place like this,' " Werle says.

What he could do was dig in alongside the herbicide-resistant weeds and figure out how to get under their skin. He could try out ways farmers can control weeds with less herbicide — while protecting or even improving precious soil — in an environment that represents the best possible combination of working farm and working laboratory.

"There's a tremendous need for long-term studies that lead to meaningful conclusions supporting useful recommendations for farmers," Werle says.

But testing new ideas is labor-intensive for farmers who are trying to keep their operations profitable. It requires an unwavering commitment of acreage and time. And it demands a willingness to accept the prospect of failure. That's a lot to pile on top of the market swings, weather extremes, and razor-thin margins farmers already face.

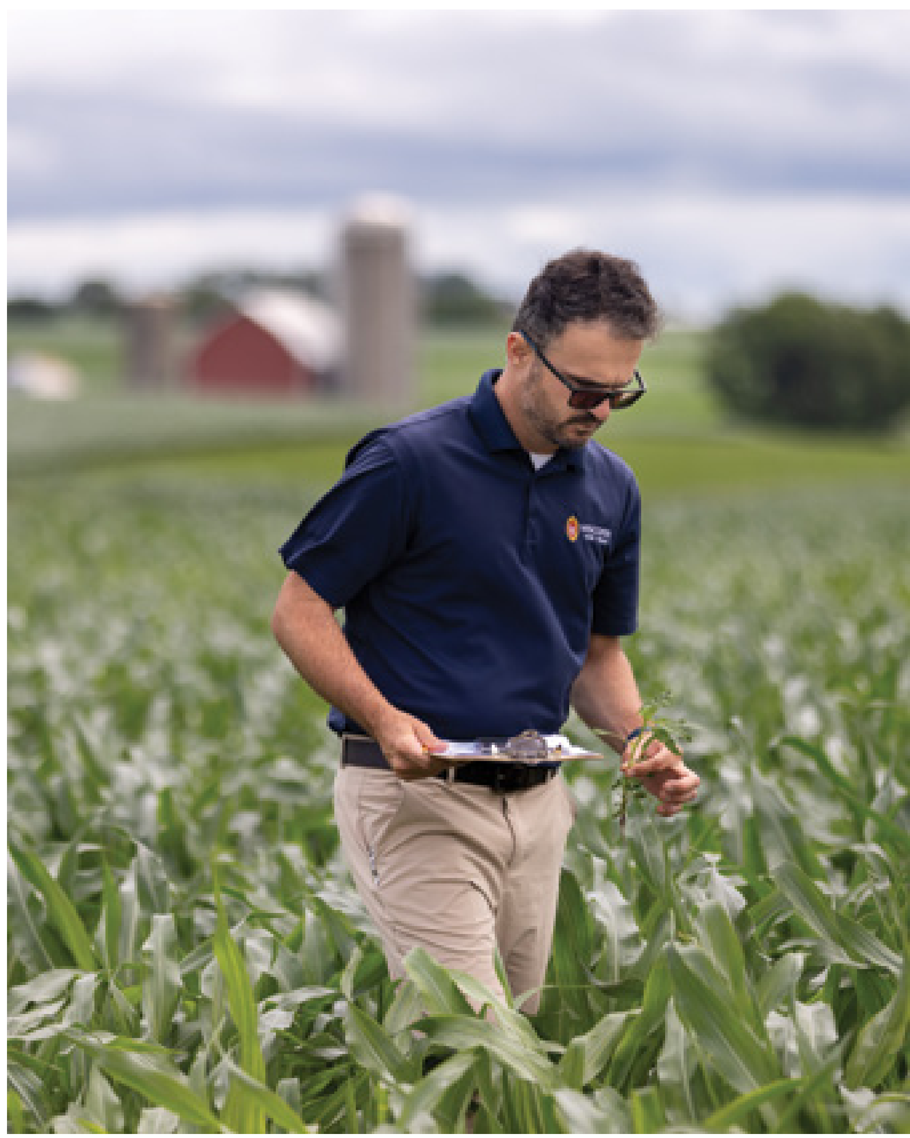
"Our farmers are great partners, but maintaining complex, long-term studies, year after year on their farms would be very difficult," Werle says. "We can do those studies at our research stations, which reflect the soil and practices of the stakeholders in the region, and in fields they can walk into to see the results for themselves."

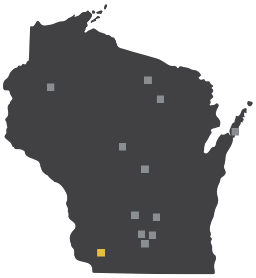
That was the goal from the start when what would become UW's College of Agricultural and Life Sciences began establishing research outposts more than a century ago in places like Marshfield, Sturgeon Bay, and Spooner.

"Wisconsin is very diverse when you think of all the soil types and agricultural commodities grown in different parts of the state," says Mike Peters BS'95, director of the Agricultural Research Stations. "We do great work at Arlington, but it sits on 24 inches of beautiful topsoil. What works in that environment is not going to convince someone farming the sandy loam soil near Spooner."

One thing the stations have in common is the way they've drawn talented scientists from around the country and the world to work shoulder-to-shoulder with Wisconsin farmers to solve specific problems and keep them competitive in global markets.

Rodrigo Werle plucks a weed while scouting a research field at Lancaster Agricultural Research Station in Lancaster, Wis.





Lancaster

Not long after Werle started at UW, the unique conditions in southwestern Wisconsin drew him to the Lancaster Agricultural Research Station. It was founded in the 1960s with a focus on developing conservation farming and grazing methods that would revitalize farms where prevailing methods had worn out land and washed valuable topsoil off the rolling slopes of the Driftless region.

"Lancaster station has a special place in my heart," Werle says. "When I started working at UW, waterhemp, the worst weed for corn and soybean production in the state, was present, which enabled us to establish high-impact research immediately after my arrival in Wisconsin."

Waterhemp is a stubborn type of pigweed that crowds out corn and soybeans and robs them of nutrients, water, and space. It has a particular knack for outfoxing the chemicals designed to kill it, developing resistance to herbicides almost as fast as they can be approved for use.

Every year, farmers bring him garbage bags full of weeds from their fields for his lab to test for resistance. Six years ago, about 10% of the waterhemp plants screened survived labeled rates of auxin herbicides, common synthetic weed killers. By 2023, it was already up to 50%.

Herbicide-resistant waterhemp, a weed, infests a conventionally managed plot of corn in a research field at Lancaster station.

Inset: Close-up of herbicide-resistant waterhemp.

"Relying on chemistry alone is not sustainable because of that resistance evolution speed observed in waterhemp," Werle says.

Since 2018, Werle and Daniel Smith MS'16, crops and soils program manager for the UW Division of Extension, have kept up an experiment comparing different weed management practices side-by-side, from the most conventionally tilled soil sprayed repeatedly with herbicides to no-till plots that cut back on spraying in favor of cover crops — in this case, winter (cereal) rye.

"We agreed that we need to do something different, something that stakeholders can buy into," Smith says. "So, we started designing a trial we thought would be applicable to the Driftless region. And we do this same thing at Arlington, with a range of no-tillage approaches to manage soil retention, moisture, and weeds."

The differences are stark, even on a windy day in late June, when the corn stalks still seem so small. The tilled rows, where the soil has been turned over year after year, sit noticeably lower, some of the soil washed away forever without roots to retain it. And there's waterhemp. Even after fresh applications of herbicide, many of the weeds are hanging on, only slightly damaged.

But where they've grown winter rye as a cover crop, barely any weeds are visible. In fact, you can hardly see anything for the dense carpet of rye stalks covering the ground. Werle and Smith have let the winter rye grow right up to the moment farmers "plant green" — planting rows of corn directly into the still-thriving cover crop. Then they kill off the rye with a single application of an herbicide, which doesn't bother the corn. Organic farmers could use a roller crimper machine to kill the rye without an herbicide.

"This cover crop, if you let it grow long enough and develop enough biomass, becomes a mulch on top of the soil surface," Werle says. "That mulch alters the environmental conditions in the top layer of soil. Most weeds, like our waterhemp, need fluctuations in the temperature of the soil to trigger seed germination. The mulch buffers those temperature fluctuations and tricks the weed seeds into not germinating. It's fascinating."

And it's effective. By reducing their exclusive reliance on herbicide for waterhemp management, farmers give the weed fewer chances to develop resistance to the chemicals.

Hundreds of farmers have seen the results during research station field days, where Werle, Smith, and other researchers can quite literally walk them through the experiments. It's a chance for crowds of growers to step through rows of cover crop examples, herbicide trials, new technology demonstrations and, for experienced farmers like Jake Kaderly, to pepper Werle with questions.

"In the old days, herbicides worked on everything," says Kaderly, who farms near Juda and works as an agronomist advising other farmers. "But nature adapts and overcomes, so we need to find ways to stay ahead."

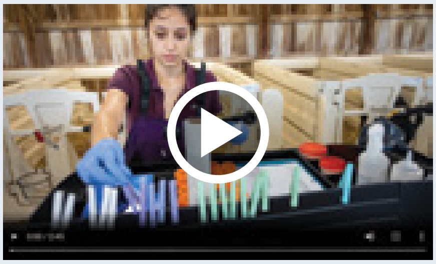
His clients, though, are often reluctant to shift away from practices they've grown comfortable with, even as those practices become less successful.

"It's not easy to talk about these things if it's not the way their farm's been working for years," Kaderly says. "You're not going to consider a change if it feels like a risk. Well, in Rodrigo's research fields, you can see it working. You see the proof."

Soybeans are planted into a cover crop in a research field at Lancaster station. The cover crop has successfully kept herbicide-resistant waterhemp at bay.

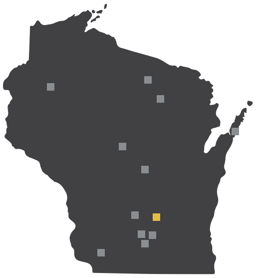
Left, top: Tracks between rows in a research field at Lancaster Agricultural Research Station are evidence of rill erosion. The research is showing that cover crops are keeping herbicide-resistant weeds at bay and preventing costly soil loss.

Left, bottom: Rodrigo Werle and Dan Smith, far right, inspect a research field at Lancaster station. At left, corn struggles under conventional herbicide management and is still infested with weeds. At right is a successful stand of corn that was planted into a cover crop.



Explore Online

The digital edition of this issue of *Grow* includes three videos that showcase the research happening at UW's Agricultural Research Stations through interviews with the scientists behind the studies. See science in action at **go.wisc.edu /grow-field-tested.**



Arlington

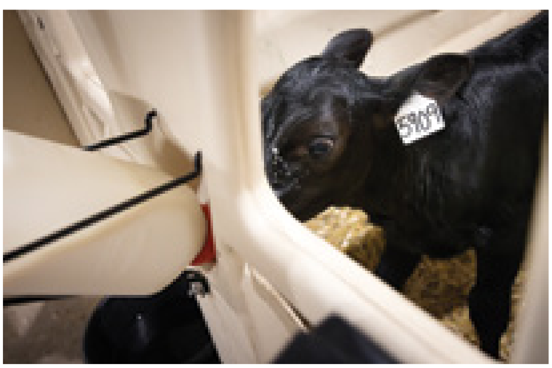
Werle's work shows farmers that a change in methods can improve their productivity and their bottom line. Meanwhile, at Arlington Agricultural Research Station (only about 20 miles north of the UW campus), Lautaro Rostoll-Cangiano is studying how differences in diet and environment affect the development of bovine immune systems. An assistant professor of animal and dairy sciences, he is conducting this research to help Wisconsin farmers as they race into lucrative new ways of managing their beef and dairy cattle while also improving herd health and disease resilience.

To keep producing milk, dairy cows need to give birth to new calves every year. For decades, farmers focused on using calves to replace milking cows and improve their productivity over time. But Heather White, an animal and dairy sciences professor who studies cow nutrition, says breeding has become so successful that farmers no longer need so many replacement calves to achieve those goals. "But we still need to have calves for milk production, so the farmers went looking for other opportunities," she adds.

Between record high beef prices and some of the lowest numbers of dairy herds and cows in decades, dairy farmers have found the new and profitable solution of breeding some of their less-productive milking animals — as much as half their herd in some cases — with meat-producing breeds like Angus cattle. Those crossbred calves, called "beef x dairy" or "beef-on-dairy" crosses, are sold or raised as beef cattle.

"They're getting premium prices that they'd never get for dairy calves," says Arin Crooks BS'97, MS'00, who is superintendent of the Lancaster station and has expertise in animal genetics and meat science. "Dairy farmers have really run with this, and you can't blame them."

But they're also running into relatively unknown territory. "More and more farmers are breeding their dairy cows with beef cattle," says Rostoll-Cangiano. "But we don't know much about the best ways to raise those calves."



Inset: A beef-on-dairy calf eagerly feeds from a bottle of milk replacer at the Arlington Agricultural Research Station beef unit in Arlington, Wis.

Caleb Karls, beef and sheep research farms supervisor, delivers buckets of milk replacer for the early morning feeding of beef-on-dairy calves at the Arlington station beef unit. Some buckets have a placebo, and others have an experimental supplement as part of a nutritional and immunology study.

Decades of nutritional research have led to optimized diets that look very different depending on a cow's future "career" as a meat or milk producer. All calves, White explains, need to start on colostrum — the milk produced by their dam (mother) shortly after calving. But after that, the plane of nutrition needs may differ. Dairy calves are fed to mature quickly so they can have a calf of their own within two years and start being milked.

"Beef calves, however, are generally raised suckling their dam on pasture," White says. "That represents a different nutritional plane, with the primary goal of achieving desired muscle qualities."

But, what to do with beef-on-dairy crosses? Should they eat what a dairy calf eats or what a beef calf eats? Or should they have a hybrid diet?

"The farmers have a lot of questions on how to raise these animals, how to feed these animals," says Rostoll-Cangiano. "We want to know how to use that diet to best program their immune system to keep them healthy."

His lab is studying a group of new beef-on-dairy calves, trying out a diet with probiotics to see how they affect microbial communities in the calves' guts and shape their immune systems.

Little black calves growing up at the Arlington station are fed experimental diets and tracked as they grow. When they are one month old and then again at two months, Rostoll-Cangiano and graduate student Martina Mancheno take tissue samples in a procedure that looks a lot like a human colonoscopy. While the calm, curious animals sniff medical equipment, Mancheno operates an instrument that collects tiny bits of the inner walls of the animal's lower intestines. From those samples, they can isolate the different immune cell types developing in the calves' digestive tracts and assess their defenses against infections and other disorders.

"It's interesting to work in the lab, where the results tell us what's going on," Mancheno says. "But I like to come out here and work on the farm more, to be with the animals."

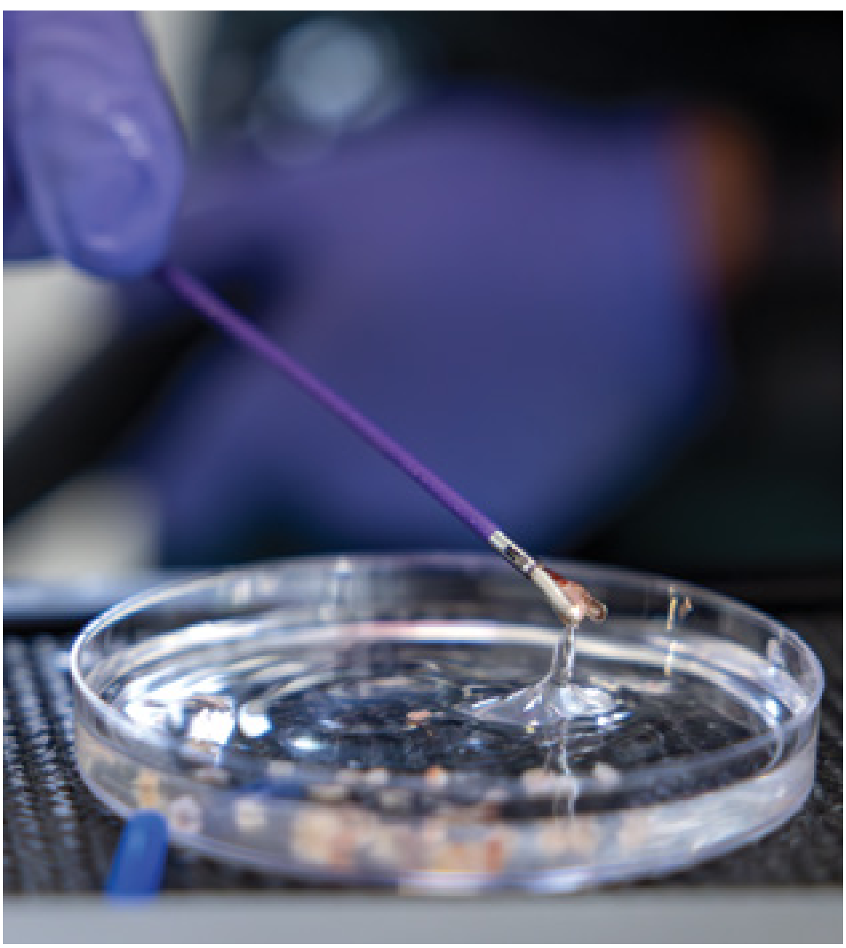
That, Rostoll-Cangiano says, is what makes Arlington — with its large herd of cows and centers for sheep and pigs and plant and soil science, to boot — an invaluable resource.

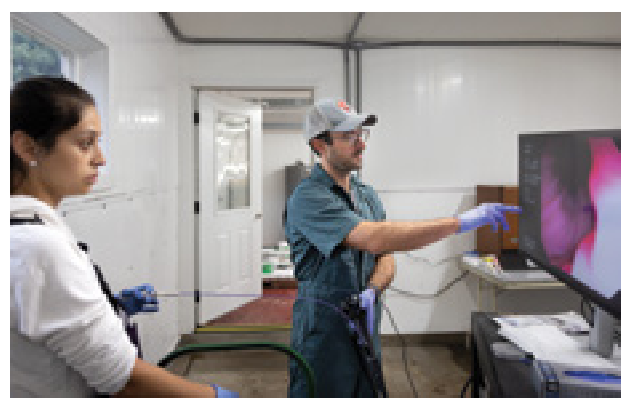
"We have tremendous facilities," he says. "We are one of the only universities in the country that has this kind of access to animals and also the staff that understand both a research facility and a farm environment in a way that makes our research as useful as it can be."

Below: Lauraro Rostoll-Cangiano places colon tissue samples from a beef-on-dairy calf into a petri dish for a bovine immunology study.

Lower right, top: Rostoll-Cangiano and Martina Mancheno obtain colon tissue samples from a beef-on-dairy calf at Arlington station.

Lower right, bottom: Mancheno gives some comforting head touches to a beef-on-dairy calf during routine health checks at Arlington station.





Eve Lazarski, an undergraduate student studying biology in CALS, sprays corn plants with a combination of beneficial bacteria in a field trial at Hancock Agricultural Research Station.

Inset: Graduate student Mingda Wu measures out a precise amount of beneficial bacteria for mixing in a backpack sprayer at Hancock station.

Hancock

Located in Wisconsin's aptly named Central Sands region, Hancock Agricultural Research Station might just usher in a new era for corn growers in Wisconsin and around the world.

As one might guess, ample watering is necessary in these sandy fields that drain like a bathtub with the plug pulled, washing away most of the nutrients in the process — including all of the nitrogen. As it happens, that's exactly what Jean-Michel Ané was looking for.

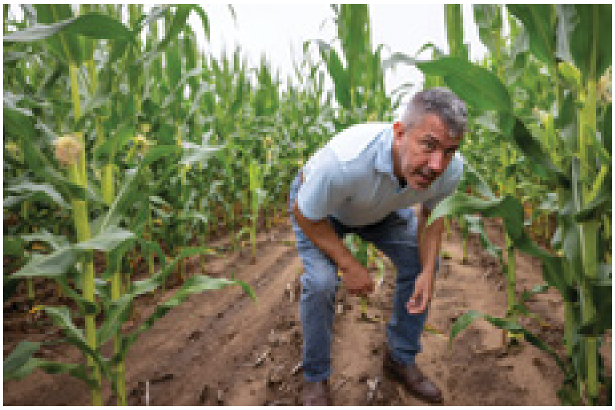
"We're so lucky to have Hancock station," says Ané, a professor of plant and agroecosystem sciences and bacteriology whose work is supported by the U.S. Department of Agriculture, the U.S. Department of Energy, and the National Science Foundation. "It's actually very unique in the United States and perfect for field trials of our corn hybrids."

To fully grasp the significance of these hybrids, it's important to know that corn needs nitrogen to grow — a lot of it. Farmers in the United States spent around $11 billion on synthetic nitrogen fertilizer for roughly 95 million acres of corn in 2025. But that's not the only way to measure the cost, says Ané. For example, some of the fertilizer tends to leach out of fields after it's applied. Nitrates, compounds formed when the nitrogen-laden ammonia in fertilizer reacts with oxygen, are the most widespread pollutants in Wisconsin's groundwater.

For more than a decade, Ané has been studying varieties of corn from Oaxaca, Mexico, that have found their own source of nitrogen: They pull it right out of the air. (See "Of Mutant Wranglers and Slime Whisperers," *Grow*, fall 2020.)

It's a trick that beans and peas and other legumes have already mastered — with help from symbiotic bacteria. These microbes convert, or "fix," the airborne nitrogen, which floats around as paired atoms of nitrogen, into molecules of ammonia (three hydrogen atoms bound to one nitrogen atom). The microbes' partner plants can use the nitrogen in ammonia to build necessary proteins and DNA.

"These cultivars of maize from Mexico also have this relationship with nitrogen-fixing bacteria that is very happy living in a gel produced by bundles of



roots that grow out from the stalks into the air," Ané says. "They can get as much as 80% of their nitrogen from the air through bacterial colonies that live on their roots."

That's very unusual for corn. Corn varieties typically grown in the Midwestern United States are getting 99% of their nitrogen from their farmers. They're built just right for the Midwest in other ways, too. They've been bred and selected to sprout, flower, and produce ears of corn at just the right times for Wisconsin's growing season and in just the right stature (10 to 12 feet) to line up neatly in rows and bask in the sun.

The Oaxacan corn is quite different. It grows to 16 feet or more, towering over typical Midwestern farm varieties. It's comfortable in three- or four-plant clumps, not straight rows, and it likes to grow side stalks that don't produce ears of kernels. It also prefers to flower on a tropical calendar.

In short, the Oaxacan corn is prone to falling over in Wisconsin weather and wasting its energy as well as a farmer's time and money. Ané's lab wants to breed those unappealing characteristics out of the corn while keeping its amazing nitrogen-fixing ability intact.

"We're crossing the Oaxacan plants with Midwest corn varieties to get plants that do what Wisconsin farmers want them to do without needing nitrogen fertilizer," says Rubens Diogo Jr., a postdoctoral researcher in Ané's lab.

Diogo has spent many of his summer days at the Hancock station running field trials of the nitrogen-fixing corn hybrids. In 2024, they grew 12 hybrids. That season went so well, Diogo reports with a giddy smile, that the lab crossed promising varieties from 2024 with even more Midwestern varieties to create 152 new hybrids to grow in 2025. The scale of the study is staggering: 1,400 plots with more than 200,000 corn plants and (maybe) a new future emerging from Hancock fields.

"In 2024, some of our crosses got no added nitrogen at all but produced the same yield as the plants that got all the fertilizer they would on a typical farm," Diogo says. "That's big."

Hancock's sandy soil drains so thoroughly it is almost completely empty of nitrogen when the calendar turns to spring. "That gives us a very useful baseline to work from in our experiments," Diogo says. "We know if we don't put nitrogen into a field like a typical farm would, the plants in that field aren't getting nitrogen left over from past years."

Back in the early summer of 2025, Diogo's crew of undergraduate students had walked the rows of hybrid corn, spraying the plants with a slurry that includes three strains of nitrogen-fixing bacteria grown in Ané's lab. About half the plants of each hybrid corn variety were fertilized like a typical Wisconsin corn field in their own plot. The other half, grown in a separate plot, went without.

Mucilage is seen on the aerial roots of corn plants in a research field at Hancock Agricultural Research Station.

Left top: Rubens Diogo crouches to inspect corn plants in a research field at Hancock station.

Left bottom: Diogo shows the texture of the soil in the Central Sands region.

Then, in late July, crunching through a sandy Hancock field between tall stalks of corn, Diogo points out rows of experimental hybrids that look promising — with clumps of chubby roots reaching out into the air about 10 inches off the ground — and rows that look like duds, sporting few or no air roots and withering leaves.

These plants will be harvested in the fall and analyzed for key production measures, such as height, flowering times, and grain quantity. That data will help them answer the most common question they get from the Wisconsin farmers who have both seen the plants and heard Diogo and Ané describe their promising results.

"They want to know about applying the bacteria and yield and things like that," Diogo says. "But they get excited and, really, they have one question for us: When will I be able to plant these plants?"

For the Future of Farming

The future is where the farmers are looking when they turn to the UW scientists and staff working at the research stations. It could be a generation in the future. Or next year. Or later that afternoon, as they speed-dial Rodrigo Werle's phone while standing over a stubborn patch of weeds.

"It's a great team, with Extension," Charles Hammer says of the UW researchers. "They have ideas. We have ideas. We're coming together to compare notes as we go. To have a group like this, people that are always looking to the future, is very valuable."

Hammer, with a partner, farms about 1,800 acres in Dodge County, growing corn, soybeans and wheat, among other things. To maximize his farm's success, he makes sure he takes every opportunity to pick scientists' brains and walk the station fields where they've done their work.

That makes looking after the future of the Agricultural Research Stations important, too.

Mike Peters can rattle off a seemingly endless list of projects around the network of research stations. Scientists are tracking diseases such as potato blight, publishing annual reports on new varieties of crops, working on drought-hardy turfgrass, and more. While the researchers working at the stations are constantly pushing boundaries and producing new knowledge, the facilities themselves only age.

"UW faculty are charged with solving the next generation's problems," Peters says. "All the producers in the state of Wisconsin, regardless of agricultural commodity, rely on UW–Madison for information to help them succeed. We want to be forward-thinking for those people. With support, we can make investments in technologies and equipment and facilities that address emerging problems and emerging crops and supply new ideas for Wisconsin to grow." g

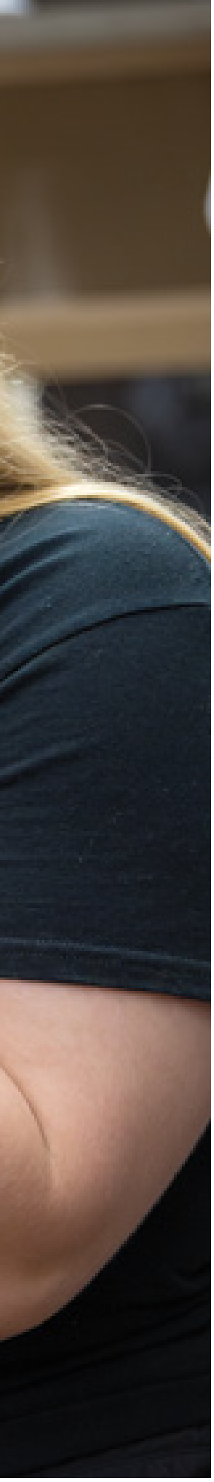
Funding Research for Farmers

UW's Agricultural Research Station network is supported by the university and state and federal funding. Individual on-station research projects are funded by a variety of sources, including the U.S. Department of Agriculture, National Science Foundation, U.S. Department of Energy, National Aeronautics and Space Administration, Wisconsin Department of Natural Resources, agricultural commodity groups, private industry, and other sources.

Rodrigo Werle talks about herbicide resistance in weeds such as waterhemp at the Agronomy and Soils Field Day at Arlington Agricultural Research Station.

Charley Mingus of Waterford Union High School, an attendee of the Wisconsin Rural Scholars Program, handles a tobacco hornworm during a visit to the lab of Sean Schoville, professor of entomology, in Russell Laboratories.

LEFT: Wisconsin Rural Scholars Program director Tanya Cutsforth speaks to attendees before a Q & A session in the Agricultural Hall lecture hall.



A College Try at CALS

Made possible by federal funding, a new college program immerses rural Wisconsin high school students in the campus experience and opens their eyes to new possibilities.

STORY BY Caroline Schneider MS'11 ▶ PHOTOS BY Michael P. King

The UW campus tends to be quiet in the middle of June. Commencement has been celebrated, dorms have emptied. Although classes continue during the summer term, some students take online courses from home, and others complete off-campus internships. But this past June, things were a little different. The CALS end of campus was abuzz with the excited faces and voices of participants in the inaugural Wisconsin Rural Scholars Program.

The new CALS program welcomed 26 rural high school juniors and seniors and seven of their teachers. From June 19–26, they stayed in the dorms, ate in the dining halls, visited labs, and attended lectures. It gives students a look at college life at CALS and helps them think about what higher education could mean for them. For many participants, this was one of their first forays into a university.

"I didn't think about college until last year, and I didn't know CALS was a part of Madison, that there was an entire place dedicated to agriculture," says Ted Furan, a student from Necedah High School. "My original idea after high school was culinary arts, and I didn't know about food science as a topic. Here, I figured out I can change food, change the way it tastes and looks in so many different ways. I think culinary arts is just going to be a hobby, but I can actually change the way people enjoy food."

That process of discovery is one of the main purposes of the rural scholars program. Its director, Tanya Cutsforth BS'08, MS'10, wants to highlight CALS academic programs and research as well as the complete undergraduate student experience — what students can expect upon graduating high school and attending a college or university. It provides valuable insight into college life and CALS specifically.

The program also helps make Madison and the university seem smaller. The idea of a big city and campus with thousands of students can be intimidating for some rural students. Through rural scholars activities, students connect with peers and other friendly faces so they can feel more comfortable at UW–Madison and find a sense of belonging at CALS.

"For many rural districts, college resources and experiences are limited by cost and distance from a large campus like UW–Madison," Cutsforth says. "We want the program to connect students and their teachers with everything CALS has to offer. We want them to see themselves here on campus and experience what college life could be like for them. And we want to provide this free of charge."

Students pay nothing to attend the rural scholars program, and teachers receive a stipend for their participation. It's supported by the Wisconsin Rural Partnerships Institute (WRPI), which is part of the Institute for Rural Partnerships, funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture. WRPI aims to provide opportunities for rural communities throughout Wisconsin.

"It's so exciting to see the launch of the Wisconsin Rural Scholars program," says CALS Dean Glenda Gillaspy. "During my first year as dean, I heard from many CALS alumni and stakeholders that students from rural Wisconsin were not inclined to think of UW–Madison when it came to choosing a college because they felt they wouldn't fit in here. This program gives students and their teachers a chance to visit their land-grant university and see all that CALS has to offer to students."

This summer's multi-day agenda included welcome events, talks focused on financial aid and applications, visits to labs, and time for socializing and campus exploration. During lab visits, professors and grad students introduced research concepts, such as growing plants in space and using fruit flies as models to learn about genetics. Faculty and staff also provided hands-on experiences. For example, in the biological systems engineering shop, anyone willing could drive a quarter-scale tractor and maneuver a track chair made to improve accessibility for farmers.

"These students are so attentive and interested," says genetics professor Patrick Masson, whose lab was a stop on the tour. "They are asking some really great questions, and many of them seem interested in the idea of bench work and research. It would be exciting to have them here."

In addition to the visits and talks, students were asked to work on a "college road map" throughout the program. These road maps helped students think about their backgrounds, their interests, and where they could see themselves going in the future. For some, the thought experiment opened new areas of possibility.

"I knew I was interested in biology, and I came in knowing about environmental science and ecology, but something I might explore is entomology, the study of bugs," says Charley Mingus, a student from Waterford. "I love animals, and when we were visiting entomology, there was a tarantula and a hornworm. When we got to the bug museum, I thought that was so cool."

Teachers participating in the program were provided with resources to take back to their schools as they sat in on student activities and attended sessions personalized for them. In one such meeting, Jane Duffstein, assistant dean for student recruitment and outreach, focused on what CALS can offer and how to help interested students make connections here or at other universities.

Of course, the teachers also got to experience the excitement of front row seats as students discovered possibilities and made realizations about their goals. Waterford teacher Craig Kohn BS'08 notes that the road map, which allows students to plot a course from high school to college, was especially valuable. He was happy to hear students talk about their aspirations and plans as they presented their road maps on the final day.

"This program is an opportunity to provide a path forward in a hands-on way that's meaningful to our students and in a way that helps them see a place for themselves well after high school," Kohn says. "Our students heard current undergraduates talk about

RIGHT, BOTTOM: Visiting teachers of Wisconsin Rural Scholars Program attendees discuss CALS recruitment and application processes with Jane Duffstein, assistant dean for student recruitment and outreach (second from right).

RIGHT, ABOVE: Patrick Masson, professor of genetics, speaks with Wisconsin Rural Scholars Program attendees about his plant genetics research and root growth behaviors on a tour of his lab.

their backgrounds and high schools. They saw the overlap between the people thriving here and their own histories and interests. I think that was one of the more important parts of this. They saw that UW–Madison is a place made up of people with the same backgrounds and experiences as they have, as well as so many others."

A key driver for the program: Help rural students see a place for themselves at UW and in CALS. Its first-hand, on-campus experiences can make all the difference for high schoolers who may be unsure if college is for them.

"One of my students didn't know anything about microbiology, and she found this entire new field she's really excited about. She wants to go home and research it," says BreEnna Gates, a teacher at Mayville High school. "Another student came here just because he thought it would be fun. Now he's super interested in college and is saying he has to do everything possible to get into this place. I'm so excited to see that in my students. That's why I brought them."

LEFT: Wisconsin Rural Scholars Program attendees look at a tube of fruit flies during a tour of the lab of Nathaniel Sharp, assistant professor of genetics, in the Genetics-Biotechnology Center Building.

BELOW: Wisconsin Rural Scholars Program attendee Al Dorn of Seymour Community High School attempts to maneuver an action trackchair to grab and transport a bucket in the Agricultural Engineering Lab.

Both the students and teachers note the value of seeing high school classroom concepts come to life in the labs. Kohn finds it inspiring, for himself and his students, to see the Wisconsin Idea in action as researchers work to solve real-world problems.

"Seeing the research on this campus — going into labs, going into gardens, going into the fields — was vital," Kohn says. "There are people on this campus every day addressing problems to make the lives of people in Wisconsin better, and that's one of the most valuable things to see."

"Checking out the labs was one of my highlights," adds Mingus, the student from Waterford. "I liked when we got to look through microscopes and see stuff that I learned in AP bio being applied in actual labs. I think that was important to me because it validated my learning and my experience with science."

While this was the program's first year, all those involved in the inaugural run hope it will continue for many years. Excitement and appreciation for the program is obvious: Many students say they can't wait to tell their friends about the experience.

"I would 100% recommend this program," says Furan, the student from Necedah. "It is a great way to experience college without having to pay and without going in blind. Staying in a dorm, talking to random people, meeting strangers — it's so nice experiencing college to see if it's truly what you would want."

The four-day visit to campus gave many of these rural students a close look at a college, a university, and a city, a combination of explorations they would not have gotten on their own. Cutsforth plans to use this summer's experience and feedback from participants to develop the program further and offer it as long as possible.

"We want more and more participants to see the possibilities that exist here," Cutsforth says. "We want rural students finding a home here, or in other colleges of their choice, going forward. This is just the beginning. We already have students and teachers asking if their school can come back next year."

Gates, the teacher from Mayville, also sees unparalleled value in the program. "This program would be great for so many teachers because the kids are expanding their knowledge and seeing opportunities that are going to broaden their horizons," she says. "Kids need to see these things. They can't learn this in a classroom. They have to literally be here and see it to really understand. Without my kids being here, they wouldn't have found what they needed." g

The Hunt for Biopesticides and Decontaminants that Cut the Mustard

Inna Popova is exploring the inherent powers of plants, such as mustard, to create new, safer ways to defeat pests. She's also studying the natural ability of burnt biomass to clean contaminated soil.

Interview by CAROLINE SCHNEIDER MS'11

Assistant professor of soil and environmental sciences Inna Popova stands near mass spectrometers in her Hiram Smith Annex laboratory at UW.

Above left: Mustard seeds and extraction stored in vials in Popova's lab.

Photos by MICHAEL P. KING

Inna Popova is a chemist who came to love soil. During her training in analytical and physical chemistry, she found herself increasingly drawn to questions about soil contamination and health. When she joined the Department of Soil and Environmental Sciences as an assistant professor in 2022, she found a community of like-minded colleagues. They have since become her invaluable collaborators, partners on chemical studies that look for ways to protect, sustain, and improve the soil and ensure healthy fields in the future.

Popova's research program looks at both sides of the sustainability coin. On one side, she wants to learn how to prevent contamination of the soil by using biopesticides instead of synthetic chemicals. On the other, she hopes to uncover methods for using biochar to remove contamination already in the soil. The motivation tying all of her work together? Practicality. She wants the solutions her research might yield to be affordable, accessible, and applicable for producers and homeowners.

What are biopesticides?

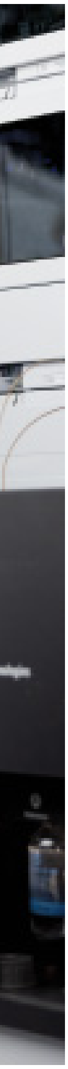
Plants rely on survival, and their survival is really limited. They cannot run away from danger, so they have to preserve themselves by producing chemicals that would make them immune to pests, to attacks. So, the idea is that if plants have those chemicals, then instead of synthesizing something in the lab, why can't we just see what is in the plant? Plants have already designed those chemicals, so these are sophisticated systems. The whole idea is to use what is already created by nature to our advantage.

Also, many plant-derived chemicals that can be used as pesticides have better properties in terms of biodegradability, so they might be less toxic. Often, they can be renewably produced, so if you have a plant that can be grown with relatively low inputs, you can have a more sustainable system.

You've published some studies on mustard plants. Why is mustard a good candidate for biopesticide?

First, I want to say that it's not my idea. There is a lot of cultural and historical knowledge about mustard keeping pests away. People may not know why, but they use it because it works. And we as scientists come and ask *why* it works.

Mustard is an industrial crop, and for the biopesticide we're using a part of the plant that is considered a waste from the



oil production. We're taking that waste and converting it into a product to maybe make it more profitable. And although we don't really grow a lot of mustard in the Midwest, we have different crops that can be grown here, like pennycress, that have similar chemistry. So, the research we do on one crop can be transferable to a different crop.

By producing this biopesticide, we could create new opportunities for growers to make a little bit of income from what they now must pay to dispose. When we look at these biopesticides, we want to know if it can be profitable. Can it actually help our producers? I want to see it being applied.

What kind of pests is the mustard by-product protecting against?

They work on a range of plants, pests, and insects. We look at weeds, wireworms, and potato nematodes. We're starting to look at whether biopesticides could control ticks. Ticks can be a really big problem for livestock in Wisconsin. For example, if you're involved in organic beef production and you are in an area with high tick density, you're really limited on the options for what you can use for pest control. So, biopesticides would be useful not only in crops but also in animal systems.

What other systems are you looking at for biopesticide use?

We're also looking at potatoes through a U.S. Department of Agriculture project called Potatoes and Pests — Actionable Science Against Nematodes, or, for short, PAPAS, the Latin word for potatoes. The goal is to develop tools to control potato nematodes. For our part, we are trying to see if we can design some biopesticides. Many of the pesticides that are currently used are toxic and being phased out.

We're looking at mustard as well as a very interesting crop, Litchi tomato. Litchi tomatoes are a wild relative of potatoes, and they are resistant to nematodes, so there is some chemical in the plant that kills the pests. When we domesticate plants for food quality and yields, we often lose some of the plant defense chemicals as a trade-off. But if we go back to the wild plant and find it, we could use it.

What about soils that are already contaminated?

With biopesticides, we're essentially trying to prevent contaminants from going into the soil. But if we're at the stage where we already have unwanted things in the soil, how do we deal with that?

Here in Wisconsin, we have the Central Sands, a large area with low organic carbon. With sandy soils, you can have many chemicals going into the groundwater, which is a concern for people who get their water from wells. We are looking at PFAS in these sandier soils. Because even if there are some data for PFAS fate (its behavior in the environment after being released) in soil from different states, they're not all going to have sandy soil, and they're not all going to have shallow aquifers. We're trying to address it at the state level and see what we can do. If you change the pH, use more fertilizer, what does it mean for the contaminants? Do they become more mobile and move into groundwater, or do they stick harder?

WHAT IS PFAS?

PFAS, which stands for per- or polyfluoroalkyl substances, are widely used, human-made chemicals that can be harmful to people and animals. They do not break down easily, and their persistence in the environment and in living bodies has earned them the nickname "forever chemicals."

How do you think biochar can help?

Biochar is essentially burned biomass that is lightweight and porous and has been shown to absorb pollutants from an environment. As we come across more and different contaminants, we're looking at using the biochars to see if they can bind up the contaminants and get them out of the system.

There are different ways to get biochar. You can create it yourself by pyrolyzing different materials — wood chips or grass — at specific temperatures. You can also buy commercial biochar. We're comparing these to see which might work better, what the trade-offs are. Maybe for some chemicals, you can only use something designed; and if they're especially toxic, that may justify the cost and effort. Maybe with other contaminants, you can use a more generic biochar and remove, say, 60% of the contamination, and that's good enough for safety.

What types of contamination are you looking to remove from soil?

We have several students working on different contaminants. As I mentioned, PFAS is one that is always of interest, and we are also looking at pesticides, namely neonicotinoids, a common class of insecticides known to affect pollinators. Another interesting project came from a student who wanted to look into concerns of contamination at the Badger Ammunition Plant in Baraboo, Wisconsin. She wants to study the interaction of biochars on the industrial chemicals in that area.

What we really want to know is if biochar can work for many things. And does it have to be custom-made? To make it practical, we have to understand the fundamental principles. We're building the blocks, and maybe a biological engineer or someone else can design something with the knowledge we're gathering.

$ FEDERALLY FUNDED RESEARCH

Popova's work has been supported by the U. S. Department of Agriculture (USDA) National Institute of Food and Agriculture (including an Agriculture and Food Research Initiative competitive grant and the PAPAS project); a USDA Western Sustainable Agriculture Research and Education project; and the National Institute of General Medical Sciences of the National Institutes of Health. Non-federal funding sources include the Wisconsin Potato and Vegetable Growers Association, the Freshwater Collaborative of Wisconsin, the Organic Farming Research Foundation, and UW's Dairy Innovation Hub.

The Family Way

Justin Meng carries the values of a family-run business, learned while he was a Renk Scholar at CALS, into his own business ventures abroad.

By KEEGAN GERING BSx'26

Justin Meng BS'15 came to UW–Madison from Guangdong, China, as a pre-business major with hopes of going into finance. But as he began exploring other fields — physics and statistics — he struggled to find the right fit. The turning point came thanks to his friend, **Annan Chen** BS'15, a CALS student with plans to launch a career with his family's food import business. The connection led Meng to also explore CALS, where he found a culture he admired and a new path to a career in business.

Meng's first CALS classes, Animal Science 101 and 102, quickly became favorites. He recalls being inspired by the late **Milton Sunde** MS'49, PhD'50, a professor emeritus who continued to teach the next generation of CALS students as a guest lecturer after his retirement.

"He was quite proud and happy about his work," Meng says. "That drew me in because I felt how people love what they do. You have to love what you do to make an impact."

The experience prompted Meng to major in agricultural and applied economics (AAE) through CALS. During his time with the college, he found other passionate professors, including **Sheldon Du**, who shaped his journey. Meng worked with Du on a Chicago commodity trading competition. He later received the prestigious Renk Scholarship, which helps students with financial support, networking, and business skills training. It's funded by the Renk family of Sun Prairie, Wisconsin — the founders of the Renk Seed Company.

For Meng, the Renk scholarship stood out for one key reason: inclusivity. "Most scholarships exclude international students," he says. "Renk didn't care where you were from, they just cared about your potential."

Through the Renk program, Meng visited with representatives of industry-leading companies such as Pepsi and John Deere. But the most meaningful trip was to the Renk family farm. Meng says the farm embodies more than just business success. It represents resilience, legacy, and the blending of values with a business — something that only a family business can achieve.

"Family businesses have a kind of trust and patience within them that you don't always see everywhere," he says.

These were the ideals Meng and Annan knew they wanted to bring to their own family food business, originally based in Xiamen, China. After graduating, Meng earned a graduate degree in applied economics from Cornell University and worked in Boston for the economic consulting firm Analysis Group. Meanwhile, Annan returned to China to expand his family's business into consumer-ready products.

In 2022, after the company was established, Meng joined as general manager to help scale it. First, he stopped at UW to reconnect with CALS faculty, including AAE professor and department chair **Guanming Shi**. Shi recalls the visit warmly.

"He had already graduated years ago, was preparing to start something exciting, and yet he took the time to come back and say hello," she says. "That small gesture showed gratitude, thoughtfulness, and character. It made me feel he was going to be successful."

Today, their company, Sanlin, is one of China's most popular coconut water brands and sells its products in every province. Unlike beverage giants with thousands of employees, Sanlin operates with just 55. They are known for their unique flavor made possible by a decades-long partnership with a Thai coconut supplier.

Left: Justin Meng holds a newly produced batch of coconut water at Sanlin's factory near Bangkok, Thailand.
Photo by ANNAN CHEN

Bottom: Coconut trees (left) and harvested coconuts in baskets (right) at a coconut farm near Sanlin's factory in Thailand. The harvest was occurring during a live broadcast for a major e-commerce platform.
Photos by JUSTIN MENG

"Most [coconut] factories in Thailand work with multiple brands," Meng says. "For now, we built the trust that we don't buy coconut water from anyone else, and they don't sell to anyone else. That's how we got here today. Those two conditions give us the unique flavor we have in China." Meng emphasizes that this is not an exclusive contract but rather a mutually beneficial arrangement that suits both family businesses for the time being.

Sanlin also sets itself apart with lower prices than other major drink brands, Meng says, by running operations in-house as a family business would. This cuts costs related to marketing, logistics, and distributor rebates and passes savings to consumers. "We started as a family business. That's our root," Meng explains. "We're so thankful for everything that has helped us get this far. And now our goal is to build something that can stand alongside the world's best."

UW connections still run deep in Meng's life and business. Three of Sanlin's top leaders are Badgers, and his first U.S. coconut water client was J&P Tian An Fresh Market, with locations on State Street and Watts Road in Madison. On a personal level, Madison also introduced Meng to his closest friends and his wife, UW alum **Yuwei Gao.**

"Warren Buffett says the two most important people in your life are who you work with and who you live with," Meng says with a smile. "For me, both are Badgers."

Looking ahead, Meng is committed to honoring the lessons learned at CALS. Whether launching new beverage lines, running his newly opened restaurant, Sanlin The Island in Shenzhen, or exploring opportunities in yogurt and whiskey, he is guided by the same values.

"China has been developing really fast in the past several decades, and few companies manage to survive more than a couple of economic cycles," he says. "But with the right values of trust, patience, and determination, you can build something that lasts. That's what CALS taught me."

ENGAGE

FIGHT FUNDING CUTS

Federally funded research at UW powers agricultural advancements, medical breakthroughs, and economic growth in Wisconsin. Pell Grants and federal financial aid make higher education attainable for thousands of students. But this vital support is in jeopardy. You can join fellow Badgers in the fight to preserve federal funding by sending a message to your members of Congress through a quick, customizable form at **go.wisc.edu/save-fed-funds**.

ACCOLADES

DISTINGUISHED ALUMNI

For this year's Honorary Recognition awards, CALS is honoring four outstanding alumni! The Distinguished Alumni Awards go to **Bill Kennedy** BS'72 and **Tom Kennedy** BS'68, MS'73, PhD'75, and the Distinguished Recent Graduate Awards go to **Dantrell Cotton** BS'14 and **Maya Warren** PhD'15. These are some of the highest honors bestowed by the college and are presented during the Honorary Recognition Ceremony every October.

HALL OF FAMERS

Three CALS alums have been selected for induction into the UW Athletic Hall of Fame Class of 2025. Landscape architecture major **Molly Engstrom** BS'07 (women's hockey) and life sciences communication majors **Frank Kaminsky** BS'15 (men's basketball) and **James White** BS'21 (football) were inducted in September.

High Priority: Tomorrow's Scientists

The CALS Fund can be a lifeline for graduate students during a time of unprecedented cuts in federal support for universities.

By NIK HAWKINS

The tradition of federal support for higher education in the United States goes back more than 160 years. Bolstered by federal funds, land-grant universities such as UW–Madison have diversified their public missions over time, expanding beyond instruction to also include research, outreach, and extension.

It's a massive commitment to the nation's citizens, and federal dollars are integral to the entire operation. For example, at UW, federal funding provides 25% of the overall budget.

Ongoing dramatic changes in the U.S. government threaten this major source of support for UW and other leading research universities. Sweeping policy shifts could severely cut financial aid through grants and loans, which would curtail access to higher education. The federal government is also dialing back on its usual contributions to research through competitive grants.

"All of this severely hinders the ability of universities to strengthen the nation's health and economy," says CALS Dean **Glenda Gillaspy**. "We're also particularly worried about the impact on graduate students. At CALS, we're educating about 500 graduate students supported by federal grants at any given time. These scientists-in-training are major participants in the research process, the leaders of future discoveries. But their assistantships in labs and classrooms rely on federal dollars. If they're forced to abandon their education due to funding, where will the innovators and teachers of tomorrow come from?"

CALS and UW continue to advocate for federal support in hopes of reversing the current course. They're also looking for ways to support graduate students in the near term. One potential tool is the CALS Fund. It's a flexible pool of private resources designed to help the college quickly adapt and respond to emerging needs. And it only exists thanks to generous gifts, large and small.

Brian BS'00, MS'03 and **Jill Huenink** BS'03, both agricultural engineering graduates, prioritized giving to CALS as soon as they could after earning their degrees. In addition to growing a scholarship fund, they make annual gifts to the CALS Fund.

Brian Huenink's motivation for giving stems from multiple personal experiences. For one, scholarships helped him complete his undergraduate education virtually debt free. And the CALS mission has always resonated with him.

Huenink is the manager of a product engineering division at John Deere, and he grew up on a farm in Sheboygan County, where he still farms today. For decades, he has witnessed how CALS scientists test new technologies on experimental plots and, through extension efforts, bring proven methods directly to farmers. This process assumes risks that growers and producers can't take themselves, he says.

"As a farmer, you don't have a lot of leeway to say, 'I'm going to plant these 80 acres with something experimental, and if they don't turn out, no big deal.' That's actually a *huge* deal," Huenink says. "You need to have some confidence that what you're trying out can ultimately improve your bottom line. I was able to see firsthand that connection to the university and the value that it provided."

Huenink understands how integral graduate students are to the research and extension process that benefits farmers. So, using the CALS Fund to retain graduate students has his full support.

"It brings students to campus that ultimately can enable or facilitate expanded research," he says. "One professor with a good group of grad students can really knock out a lot of research in a very short period of time."

Huenink says he hopes others will recognize the value and critical nature of graduate students by contributing to a fund that can help keep them on campus during a challenging period for higher education.

$ SUPPORT GRADUATE STUDENTS THROUGH THE CALS FUND

Contact Ayana Blair at 608-590-7062 or ayana.blair@supportuw.org, or visit **supportuw.org/giveto/cals**.

Graduate student Damayanti Rodriguez Ramos shares her research with visiting students in the lab of Erica L-W Majumder, assistant professor of bacteriology. Photo by MICHAEL P. KING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UMS

Entomology major Zelin (Tony) Shen BSx'26 captured this photo of a lichen katydid (*Markia nicolasi*) in a private nature preserve in southern Costa Rica. "Photography can act as both a scientific and artistic tool," Shen says. "It helps with species identification and documentation as well as displaying beauty in interesting compositions, in resolution the human eye can't achieve." Photo by ZELIN (TONY) SHEN