

# IMPACT



**Driving growth for  
a healthier, more  
sustainable future**



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## A NOTE FROM DEAN BUHR

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**W**elcome to the spring issue of *Impact*. I hope the season finds you well and that you are experiencing a sense of renewal as we wrap up the semester and look ahead to summer and an in-person return to campus in the fall.

The stories you'll find within relate to a core CFANS objective — driving growth. In everything we do, CFANS is committed to cultivating the next generation of leaders, expanding the boundaries of science, advancing Minnesota's economy, and solving the grand challenges that will lead to a healthier, more sustainable future for all. Driving growth is why we're here.

Thanks to the encouragement and generosity of people like you, CFANS continues to grow in ways that change the world. We provide our students with world-class experiential learning opportunities and pioneer new frontiers in research.

Students are at the heart of everything we do, and CFANS supporters help our students take their growth opportunities to exciting new levels. This spring we are honored and proud to celebrate the 443 undergraduate students and 139 graduate students who are receiving their CFANS degrees and heading into the future filled with purpose.

I think you'll enjoy learning about the discoveries of our award-winning Soil Judging Team and the student creation of a tasty new snack made with upcycled ingredients from food waste products. We also share stories of CFANS' one-of-a-kind research in areas ranging from turf grass seed development in northern Minnesota to integrated animal systems biology.

As always, I thank you for your support and wish you goodness and growth in the months ahead.

Sincerely,



**Brian Buhr**

Dean, College of Food, Agricultural and Natural Resource Sciences



ON THE COVER:

CFANS STUDENT **LEAH RUEN** (BS '21 WITH A MAJOR IN AGRICULTURAL AND FOOD BUSINESS MANAGEMENT AND A MINOR IN ANIMAL SCIENCE) WORKS WITH A LAMB DURING THE SHEEP PRODUCTION SYSTEMS MANAGEMENT COURSE ON THE ST. PAUL CAMPUS THIS SPRING.

THE U OF M SOIL JUDGING TEAM IN FALL 2020.



STUDENTS ANALYZE SOIL SPECIMENS DURING A FIELD STUDIES CLASS.

## STUDENTS of the SOIL

The work is dirty, but it helps us understand and protect a natural resource that sustains us all — soil. Soil judging, the field component of soil science, is a diverse discipline that combines geology, chemistry, physics, and biology.

Thanks to funding that is 100 percent provided by generous donors, students on the U of M's Soil Judging Team are able to participate in hands-on learning and travel to competitions around the country.

Last year, the team won big at the Region 5 Soil Judging Contest, a tradition since 1961 in which students enter pits about four feet deep to analyze the horizons of the soil and look at distinguishing characteristics such as color, structure and texture. (Due to COVID-19, the team competed virtually in 2020, with soils brought to them.) The students make conclusions about the soil's hydraulic conductivity, effective soil depth, and more — allowing them to determine how suitable the soil would be for placement of things like septic tank systems, local roads, and dwellings without basements.

The team finished first place overall, first place in group judging, and had numerous individual placements.

**"Soil judging helped me to learn important life lessons in self-responsibility and reflection, problem-solving, teamwork, and just discover a lot about myself. It also gave me a passion, direction, and was a catalyst for finding a job after graduation,"**

**— Abigail Clapp**, a December 2020 graduate who now works in Colorado as a USDA Natural Resources Conservation Service soil scientist.



## INTRODUCING TRIUMPH™

The latest apple cultivar from the renowned U of M apple breeding team is a triumph! Triumph™, originally known as MN80 cultivar, was recently released to nurseries for propagation.

A small number of Midwest growers will plant Triumph™ trees this spring, with more trees available to purchase at local garden centers in

2022. In five or six years, the trees will produce delicious fruit for apple aficionados

to enjoy from local and organic orchards, the Minnesota Landscape Arboretum, or their own backyards.

The 28th U of M apple variety, Triumph™ joins an

esteemed collection that includes the popular First Kiss® apple introduced in 2017. Triumph™, which was created by crossing the Honeycrisp and Liberty varieties, is a firm fruit with red skin and a pleasantly tart, well-balanced flavor.

Triumph™ has proven winter hardy in the southern part of Minnesota. One of its exciting features is excellent resistance to apple scab, which is caused by a fungus that infects both leaves and fruit and is the most common disease of apple and crabapple trees in Minnesota. It contains two forms of genetic scab resistance, which should allow growers to reduce chemical spray.

While disease resistance is important, U of M apple breeder **David Bedford** says the culinary characteristics favored by consumers are equally important in a new variety's success. "Combined with a firm but crisp texture, good storage life and an attractive red overcolor, Triumph™ should be a welcome addition to the apple market," he said.



# SEEDING MINNESOTA'S ECONOMY

In the Roseau and Lake of the Woods region of northern Minnesota, watching the grass grow is anything but boring. Just ask **Donald Wyse**, PhD, professor and researcher in the Department of Agronomy and Plant Genetics. An expert in the biology and ecology of invasive weeds, he made his first trip to Roseau in 1974 to develop a quackgrass management system for turf and forage grass species.

Approximately 55,000 acres of grass seed farms thrive in northern Minnesota, where a cooler, wetter microclimate offers favorable growing conditions. These farms contribute \$270 million to Minnesota's rural economy annually. The industry, which provides hundreds of jobs in Minnesota and thousands of jobs in the U.S. through the production and distribution of seed for global turf grass needs — including lawns, sports fields and parks — has grown exponentially since it began in the region in the 1950s, when the U of M released 'Park' Kentucky bluegrass

"When I started my career, quackgrass was the primary deterrent to producing high quality grass seed turf in the region," said Wyse, noting that it also was prohibiting the expansion of new turf species like perennial ryegrass, which today contributes significantly to the region's economy. About 150 growers now produce around 45,000 acres of perennial ryegrass for seed, due primarily to U of M research in partnership with growers and seed processors.



PROFESSOR **DONALD WYSE** IN A SUSTAINABLE AGRICULTURE PLOT ON THE ST. PAUL CAMPUS.

BELOW: CFANS CONDUCTS RESEARCH ON THE DEVELOPMENT OF LOW-INPUT TURFGRASS CULTIVARS FOR USE IN COLD CLIMATES.



PERENNIAL RYEGRASS IS HARVESTED IN ROSEAU, MN.

## THE ROOTS OF PERENNIAL RYEGRASS

In 1986, **Nancy Jo Ehlike**, PhD, professor in the Department of Agronomy and Plant Genetics, joined the University as a plant breeder and seed production agronomist. Wyse and Ehlike combined their plant breeding, seed production and weed management expertise to develop new varieties and production systems for northern Minnesota seed producers.

While demand for perennial ryegrass turf seed increased, producers weren't able to capitalize on it due to quackgrass and lack of winter hardiness. Wyse's herbicide biochemistry team was first in the world to discover the mode of action of new herbicide families, providing a quackgrass control solution. Concurrently, the breeding program worked to improve winter hardiness.

This work helped establish the U of M's perennial ryegrass breeding program and initiated seed production in the region, leading to successful varieties that maximize seed yield and survive the winter. Today, the team

continues to develop new varieties with unique traits for seed production in Minnesota.

Perennial crops have environmental benefits as well. "They protect the soil from wind and water erosion by maintaining vegetative cover on the soil and limiting tilling operations," said Ehlike. "The fields also provide habitat for wildlife and promote diversity in agricultural practices."

The introduction of perennial ryegrass for seed production is a success worth celebrating; today it has the largest market share of turf seed produced in the U.S.

Wyse's team also discovered new herbicides to control quackgrass in creeping red fescue, sheep fescue, and hard fescue, opening the potential to produce these species in the region. In years following, **Eric Watkins**, PhD, professor in the Department of Horticultural Science, capitalized on this development, releasing a new, high-yielding hard fescue variety for production. With a growing number of consumers seeking low input turf, this variety should yield returns for grass seed growers.

The grass seed industry in northern Minnesota is a model for creating collaborative programs like the Forever Green Initiative, which develops new perennial and winter annual crops, including the intermediate wheatgrass Kernza®, that benefit the environment and economy.

"The U of M recently released the MN-Clearwater variety of Kernza®, the first perennial grain variety developed in the world and now available for production by Minnesota grain and seed producers," said Wyse.

Over the years, CFANS has conducted much of its research on the 40-acre Magnusson Research Farm near Roseau. The land was donated to the University by the Richard Magnusson family in 1998.

What began decades ago has sprouted into a successful 21st century Minnesota turf grass seed industry. By breeding seeds and blocking weeds, the U of M and partners have opened economic growth opportunities, proving the grass really is greener on the other side of science.

IASB TEAM MEMBERS (L TO R): MILENA SAQUI-SALCES, GERALD SHURSON, ANDRES GOMEZ, PEDRO URRIOLA, CHRIS FAULK, CHI CHEN.



## IT'S ALL ABOUT THE INTERACTIONS

What happens when scientists in gastrointestinal physiology, metabolomics, microbiomics, functional genomics, and animal nutrition get together? You find real-world solutions to complex animal production challenges.

At the heart of these discoveries is the Integrated Animal Systems Biology (IASB) team at CFANS. With state-of-the-art analytical methods in systems biology, IASB uses molecular biology, bioinformatics and data mining to uncover new information that can improve nutrition and management in commercial animal production systems.

"We're using science to lead the way to a more sustainable future," said **Gerald Shurson**, professor of swine nutrition in the CFANS Department of Animal Science and IASB team member. "We use different disciplines and platforms to break apart the biological responses occurring in the whole animal, then we bring the data together," he said.

By integrating information from micro to macro levels, IASB defines cause and effect relationships that show how nutrients, feed additives, animal hygiene and environmental conditions are involved in improving animal productivity, efficiency and health.

"We're taking animal science in a new direction by looking at the physiological, biochemical, gene expression and immunological pathways and processes involved in the interaction between an animal's intestinal tract and the components of feed ingredients or additives in a holistic way," said Shurson.

With its unique combination of molecular analytics and integration of data mined from a wide variety of sources, the team can form a comprehensive assessment of animal performance and efficiency. "When we make a change in one area, we can see the different responses happening in the animal and note how they're changing," said Shurson. "We're discovering why things happen the way they do, and that's what our industry partners are looking for to improve production."

## PROPOSING A "RETOAST" TO LESS FOOD WASTE

A team of food science and nutrition students with a passion to eliminate food waste has developed an innovative, award-winning cookie snack called ReToast. Made with 30 percent upcycled ingredients from various food waste products, it



CINNAMON SPICE FLAVORED RETOAST

includes bread scraps and brewers spent grain, a brewing industry byproduct.

These various wastes are used in the ReToast flour mix, which contains toasted bread scraps flour, spent grain flour and spent Kernza® flour. The product comes in recyclable packaging.

The team, led by PhD student **Radhika Bharathi**, was inspired to create a snack that is better for people and the planet, as about 40 percent of food produced in the U.S. gets wasted. Bread is the most eaten and ironically the most wasted food product, so the team wanted to promote sustainability by giving it a second chance.

"We collected leftover bread scraps from local bakeries and developed a self-curated quality process to make sure it is safe and ready for use as a functional, nutritive ingredient for baking. I wanted to incorporate Kernza®, because it fits the theme of using sustainably sourced ingredients," said Radhika.

Kernza® is a perennial grain crop with the potential to fight climate change. Radhika's research includes strategies to improve the functionality and end-use characteristics of Kernza® flour.

In the creation of ReToast, Radhika emphasizes the importance of applying technical skills learned in the classroom to solving real-world problems. "Only then can we move toward making a positive change in society," she said.

The team hopes to commercialize ReToast in the near future.



PROFESSOR JERRY COHEN WITH STUDENTS IN THE GREENHOUSE.

## GENEROSITY GROWS GENEROSITY

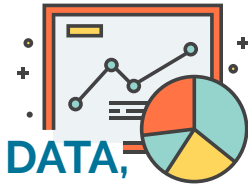
Ask **Jerry Cohen**, PhD, a distinguished professor in the Department of Horticultural Science and CFANS donor, why he gives, and he'll say he was "hired into a tradition of generosity." In 2000, he came to Minnesota to fill the *Bailey Chair in Environmental Horticulture*, a position made possible through a donation from the Gordon and Margaret Bailey family. Though he's humble about it, Cohen's giving to CFANS speaks volumes.

Cohen worked his way through college and graduate school. "I started working in the lab as a freshman — and never left," he said. With these experiences at heart, Cohen and his wife Sue sought opportunities to honor his parents by helping students.

They began with the *Horticultural Science Evadna Fern Cohen Fund*, honoring his mother by providing refreshments for the department's seminar series. He continues to grow the fund through regular payroll deductions and stresses that he didn't make a large donation to start it. "Anyone can make a difference. Be a catalyst for the change you want to see," he said.

His father Herman wanted to attend graduate school for horticulture, but it wasn't an option for him after World War II when restrictive admissions practices created significant barriers for Jewish students. Cohen turned his dad's disappointment into opportunities with *The Herman Charles Cohen Dissertation Improvement Fund* to help horticultural science graduate students.

The Cohens also created one of the first designated lactation spaces in Saint Paul; supported a redesign of the lights in the Alderman Hall lobby study space; and donated to the Itasca Campus Center building. "You do not have to be wealthy to see a need and make a difference. Seek out what you value, then keep your eyes and ears open to opportunities to do something," he said.



## DRIVEN BY DATA, CFANS ALUMNA PURSUES HER PASSION WITH PURPOSE

**Kehinde Bello** is passionate about the connection between data analysis and economics, especially how it can benefit the well-being and financial capital of communities of color.

Today, Bello (BS Applied Economics, '20) is applying that ambition in her role as a financial analyst with Public Financial Management (PFM).

She says her CFANS experiences prepared her well for success, citing her Entrepreneurship Fundamentals for Value-Added Rural Businesses class as particularly rewarding.

"I had to come up with a product, business plan, pitch video, and presentation," she said. "It taught me to think outside the box and complete a project by searching for resources on my own. This helped prepare me for my role at PFM, as I continue to learn new concepts about the inner workings of public finance."

At CFANS, Bello learned valuable prioritization skills and successfully balanced academics with athletics as a member of the Gopher Women's basketball team. And as part of her Applied Economics coursework, she analyzed and interpreted real-world data in meaningful ways.

"I believe data allows us to see trends, and economics help us learn what could be driving trends and patterns. I ultimately want to help change patterns that don't serve minority communities, particularly in the areas of equity and financial capital," said Bello. "My experience at CFANS put me in rooms with other like-minded people from different parts of the world, which enlightened me on the many ways I could go about pursuing this passion."



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277 Coffey Hall  
1420 Eckles Avenue  
St. Paul, MN 55108

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**MEET A 2021 GRAD**

**Leah Ruen**, BS Animal Science '21 (featured on cover), is eager to apply her CFANS experiences in her career after graduation. "I have grown so much in the past four years as a CFANS student," she said. "Being part of many clubs and organizations has given me the opportunity to take on leadership roles and do things I wouldn't have thought myself capable of before I came to college. These roles have pushed me and helped grow my passion for promoting the agricultural industry," she said. "I look forward to using my new skills and growth in my future career."

Introducing the **CLASS OF 2021**

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**443**  
undergraduate-level students  
(graduating May 2021)\*

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**139**  
graduate-level students  
(graduating May 2021)

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**85** Masters degree students      **54** PhD students

\*This spring semester, 443 undergraduate students are graduating, joining nearly 300 recent graduates from the previous fall and summer who completed their last term amidst the ongoing pandemic.