

WINTER 2022

IMPACT



**Meeting
the moment**

A NOTE FROM DEAN BUHR



Warm wishes from CFANS — I hope 2022 finds you healthy and well. While the weather remains wintry, spring semester is well underway. Our students may be bundled up as they briskly make their way to classes, but the energy they bring to our beautiful campus is unmistakable. Despite the ongoing challenges of COVID-19, they are meeting the moment with tenacity and grace.

This issue of *Impact* includes a variety of stories that illustrate how CFANS is turning today's challenges into tomorrow's opportunities. In everything we do, we are meeting the moment with research, education and outreach, using science to find solutions that improve the world.

Frances Homans, PhD, professor and head of the Departments of Applied Economics and Agricultural Education, Communication and Marketing, discusses how CFANS is preparing students to be successful leaders, educators and communicators in the agricultural, food, and natural resources career fields. This is increasingly important as we work to help people understand the interactions along the food supply chain that impact the economy and environment — and sustainability is key to both.

From developing plant proteins and protecting forests, to upcycling food waste into animal feed and creating bio-based commercial adhesives, CFANS is striving to increase sustainability and grow the economy with innovative science and new opportunities. This issue shares these stories, as well as introduces two new faculty members in the Agricultural Research, Education, Extension and Technology Transfer (AGREETT) program, and recognizes alumni in leadership roles across the globe.

As always, I thank you for your continued support and generosity. With your partnership, CFANS will continue to meet the moment as times continue to change. Together, we're changing the world.

Sincerely,



Brian Buhr

Dean, College of Food, Agricultural and Natural Resource Sciences



ALUMNI LEADING ACROSS THE GLOBE

All around the world, CFANS alumni bring their rich experience and deep expertise to a wide variety of roles that focus on building a better tomorrow. Recently, three of our graduates — from Minnesota to Morocco — have made news for their distinctive achievements. We are #CFANSProud of Shefali, Mohamed, and Luke, and look forward to their continued leadership!



Shefali Mehta, PhD
Applied Economics '07

The U.S. Department of Agriculture recently named **Shefali Mehta** the Deputy Under Secretary for Research, Education and Economics. Mehta, an environmental and agricultural economist and statistician, has worked in roles across private, public and non-profit sectors.



Mohamed Sadiki, PhD
Plant Breeding '90

Morocco's King Mohammed VI appointed **Mohamed Sadiki** to the country's new government in fall 2021. Sadiki, who has extensive experience serving in Morocco's agricultural sector, was named the country's Minister of Agriculture, Maritime Fisheries, Rural Development, and Water and Forests.



Luke Becker, BS
Agricultural Education '09

Luke Becker, agricultural technology and physics teacher at Minnesota's Braham Area High School, was named Teacher of the Year by the Association for Career and Technical Education. Becker's students have filled a trophy case with technology competition awards, beating teams from universities such as Cal Poly, Texas A&M and Louisiana Tech.

MEET

AGREETT

**Advancing Minnesota
with new faculty
members**

In 2021, the Agricultural Research, Education and Extension Tech Transfer program (AGREETT) welcomed two new CFANS faculty members. AGREETT funds, approved by the Minnesota legislature, bring research faculty, graduate students and Extension to the University to tackle the critical challenges facing agriculture today. AGREETT advances our state's food, economy, communities, and environment — making Minnesota healthier and more sustainable for its residents.



Megan McCaghey, PhD, is an assistant professor in the Department of Plant Pathology. An expert in soil-borne fungal diseases of crop plants, she is interested in the ecology and epidemiology of soil-associated

fungi and oomycetes, and enhancing host disease resistance to improve crop management.

"As an AGREETT faculty member, I want to conduct translational, grower-driven research to progress tools for plant disease management," said McCaghey. "I look forward to building a network of grower, UMN, and regional colleagues to better understand disease challenges and pursue important research questions related to soilborne fungi."



Isaac Salfer, PhD, is an assistant professor in the Department of Animal Science. His research focuses on understanding the metabolic physiology of dairy cattle to develop nutritional strategies

to enhance the productivity and efficiency of dairy operations.

"As a U of M alumnus, I have an immense appreciation for the investment the state has made in the AGREETT program," said Salfer. "I am excited to use my role as a teaching and research faculty member to help advance the AGREETT mission, and educate future generations of leaders within the dairy industry."

BY FRANCES HOMANS

Addressing the disconnect between

FARM & FORK

You can't turn on the TV or scroll social media without seeing ads from food companies espousing how consumers should feel good about eating their products. From ethically raised animals, to environmentally conscious supply chains, to increased transparency about ingredients – consumers have more information at their disposal than ever before.

Yet there remains a disconnect between farm and fork. A recent consumer survey* shows that only 24 percent of U.S. adults have a high degree of trust in the information they receive about where their food is grown and how it is produced. For Generation Z (ages 18 to 25) the high trust level is just 17 percent. And with only 27 percent of survey respondents reporting a “very favorable” impression of agriculture and food production in the U.S., it is no surprise that farmers often feel misunderstood and under attack in the public eye.

At the University of Minnesota College of Food, Agricultural and Natural Resource Sciences (CFANS) we believe there is an urgent need to bridge this disconnect while at the same time investing in science-based solutions and dynamic partnerships to create a more sustainable global food system.

For the past nine years I've been fortunate to head up the Agricultural Education, Communication and Marketing unit within CFANS. Our mission

is to prepare students to be successful leaders, educators, and communicators in the agricultural, food, and natural resources career field. This includes teaching them how to talk about their work in a way that's clear, relatable and engaging.

One of the most exciting ways we've been able to do this is through our AgriCast project, thanks to funding from the CHS Foundation. AgriCast is a digital resource library dedicated to sharing science concepts and stories about agriculture. Here you can take virtual field trips to real farms, hear podcasts that challenge assumptions or explore a video library on topics including food and culture, microbes, and women in agriculture. The resource

center also includes lesson plans and other educational activities to help teachers easily integrate our students' videos, photos, and podcast stories about farms, food, and the environment into their classrooms. It's all created by our talented CFANS students in an effort to hone their communication skills while shedding light on complex topics involving the food chain.

At CFANS our goal is to prepare the next generation of leaders to sustainably solve the biggest challenges of a rapidly growing world. Doing that requires equipping people to teach our kids about agriculture, food and natural resources (AFNR). The demand for AFNR teachers is increasing, including in urban areas. According to the Minnesota Agricultural Education Leadership Council, since 2010, school districts have added 21 AFNR programs and

17%
of Gen Z (ages 18–25) have a high level of trust in information they received about where their food comes from.*

*This CFANS survey was conducted in January 2022 by ENGINE INSIGHTS, polling a demographically representative sample of 1,022 adults (ages 18+) in the United States.



83 additional teaching positions had to be filled across the state. This is a 38 percent increase in teaching positions over ten years, with no signs of demand slowing. CFANS is proud to be a leader in educating AFNR teachers to help meet this critical need.

AFNR education is important because worldwide, agriculture and the economy are intricately linked.

Here in Minnesota, farms generated 16.7 billion dollars worth of agricultural production last year, with farm products accounting for nearly one-third of the state's total merchandise exports in terms of value. However, the story doesn't start and end at the farm gate. It's why the department that I lead at the UMN has evolved over the last century from focusing solely on agricultural production to become the Department

of Applied Economics. Our research looks at the entire food system within the global economy, the economic effects of natural resource use, the importance of ecosystem services, and more.

As economists, we aim to understand the crucial role that efficiency plays in policy choices.

"Efficiency" may not sound exciting, but it's about finding win-win solutions. Whether it's about using big data to target spending on agricultural research or designing food assistance

programs to encourage healthier food choices, identifying efficient policy choices enables us to get more benefits from public budgets and keep tax burdens low.

Where our work may be most visible is at the consumer end of the supply chain. For example, my colleagues **Metin Çakır**, PhD, and **Hikaru Peterson**, PhD, are leading research that examines the economic

viability of grocery stores in rural areas. Another project looks at how farmers fare when selling their goods at Twin Cities farmers markets. Peterson is also examining the economics of household food waste, studying how consumers engage with curbside organic recycling programs in Minneapolis suburbs.

It's all an effort to better understand the interactions that happen along the food supply chain that ultimately impact the economy and the environment. As we equip future leaders to do this important work, we must continue to help them communicate about the value this research provides.

CFANS is a safe, open place to have the conversations that will turn disconnect into understanding. We will continue to pioneer the way forward, driving science, outreach and education throughout the entire food supply chain — from the soil and seeds in the ground all the way to the consumer's plate.



STUDENTS LEARN DIGITAL COMMUNICATIONS

\$16.7 billion

Generated by agricultural production in Minnesota in 2021
(Minnesota Department of Agriculture)

Frances Homans, PhD, is professor and head of the Department of Applied Economics. She also heads the Department of Agricultural Education, Communication and Marketing.





ACCOUNTING FOR CARBON

Managing forests to store carbon is a key approach to lessening the effects of human-induced climate change. Forests sequester more carbon annually than any other land use and have the potential to offset carbon released through energy production, transportation, manufacturing, agriculture, and forestry.

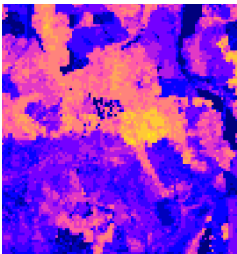
However, we can't manage what we can't measure. So how do we measure, with certainty, the carbon stored in our forest lands?

Chad Babcock, PhD, assistant professor in the Department of Forest Resources, and research associate and master's student **Ethan Emick** are taking inventory of carbon stocks at the Cloquet Forestry Center in northeastern Minnesota using a fusion of forest measurements and remote sensing data.

The carbon cycle — a system where carbon in various chemical forms flows from land and water through the atmosphere and back — is fundamental to life on earth, explains Babcock.

"Forests play an important role in this cycle by sequestering carbon from the atmosphere, and releasing carbon through decay and disturbances, such as timber harvests and fire," he said. "Forests are the largest terrestrial carbon sink on the planet, and managing them to store carbon can be an effective way to offset atmospheric CO₂ emissions."

Forest carbon has been commoditized through the creation of forest carbon markets. However, measuring the amount of carbon stored can be prohibitively expensive, especially for small forest landowners. Babcock and Emick are working on a new approach to spatially predict and map forest carbon to help reduce the costs of monitoring.



"There are many ways to map forest carbon with remote sensing data and field observations," said Emick. "What's missing is an ability to characterize uncertainty in a way that's useful for trading. To trade on the market, forest carbon must be estimated with statistical rigor, meaning that any estimates of carbon storage must be statistically defensible."

The CFANS team's approach aims to address this issue using light detection and ranging (lidar) data from Minnesota and Bayesian hierarchical spatial modeling (a statistical model written in multiple levels). The spatial model relates the CFC field plot observations and the lidar variables, explains Emick, providing excellent predictions and, more importantly, confidence intervals that accurately describe how certain they are in their predictions. Learn more at cfc.cfans.umn.edu.



WASTE NEWLY PLACED

Did you know that up to 40 percent of the American food supply goes to waste each year? In the U.S. alone, we discard nearly 80 billion pounds. In fact, food waste is the largest category of municipal solid wastes in the country. It takes up significant landfill space and is a major contributor to the greenhouse gas emissions from our food system.

Across the country, animal scientists and others are searching for solutions to address this issue by turning food waste into animal feed using thermal processing. **Gerald Shurson**, PhD, professor, and **Pedro Urriola**, PhD, research associate professor (both in the Department of Animal Science) have been working on ways to recycle food waste into animal feeds since 2014.

Since that time, their extensive, collaborative research with others on numerous studies has yielded promising potential. "We obtained great results showing that the feeding value of several food waste sources is equal to, or exceeds, traditional ingredients like corn and soybean meal for pigs, which could repurpose food waste from being an enormous environmental burden into a valuable resource in pig diets," said Shurson, who is an author of many related publications, including the recent paper: "What a Waste — Can We Improve Sustainability in Animal Production Systems by Recycling Food Waste Streams into Animal Feed in an Era of Health, Climate, and Economic Crises?"

"If we're going to feed a growing population of people, we must first do a better job at preventing food waste and ultimately the food waste that can't be prevented must be recycled to the highest possible value, which is feeding it to animals," he said.

WANTED: The next generation of food ingredients

When it comes to building a better veggie burger, developing a more delicious plant-based beverage or cooking up protein-rich pasta alternatives, the food industry is racing to keep up with consumer demand.

Plant proteins are soaring in popularity among those in pursuit of options they feel are healthy, sustainable and support their lifestyles. At CFANS, the interdisciplinary Plant Protein Innovation Center (PPIC) is taking a collaborative approach to finding solutions.

The PPIC brings researchers and industry experts together to study and produce sustainable plant protein ingredients and products that are nutritious and acceptable to the consumer in terms of texture and flavor.

"We're listening to what consumers are asking for and to industry needs, and it's all underpinned by what's good for our environment," said **Pam Ismail**, PhD, PPIC founder/director and Department of Food Science and Nutrition professor.

The PPIC is the first of its kind in the nation, working from breeding and genetics to upstream and downstream processing, formulation, and marketing. Its philosophy is to focus on industry challenges and opportunities while addressing sustainable food production.

The challenges are complex: how to make plant proteins behave more like animal proteins in formulations; how to minimize processing to meet consumer demands for clean labels; how to

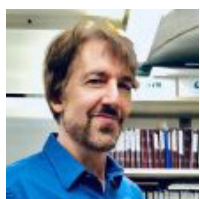
maximize the food ingredient potential of new protein crops; and many more.

Graduate research assistant **Holly Husband** started at the PPIC as an undergraduate student. Today, she focuses on improving pea protein functionality.

"My research is about making pea protein more appealing for consumers looking to incorporate plant-based foods into their diet without compromising on sensory attributes," said Husband. "The PPIC has been integral in making connections with the industry and figuring out how we can help meet the needs of consumers."



MAKING THINGS STICK WITH SUSTAINABLE SCIENCE



Steve Severtson, PhD, understands "sticky" situations. As a professor and scientist in the Department

of Bioproducts and Biosystems Engineering (BBE), he leads research in industrial adhesives, focused on those partially or entirely made of materials derived from biomass (renewable organic material, like soybeans and corn).

According to Severtson, companies implementing sustainable practices are moving to eco-friendly packaging, but current adhesive materials tend to interfere with processes such as recycling and composting. His research looks at the redesign of adhesives to promote a more circular

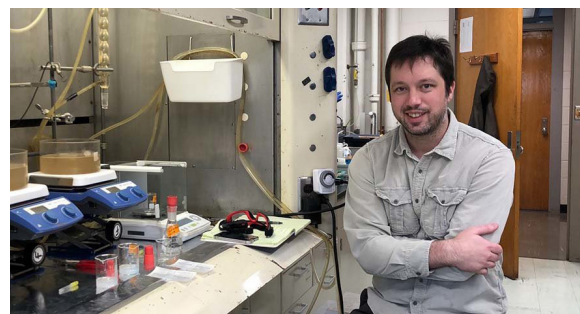
consumption model for disposable products.

Adhesives containing renewable biomass tend to biodegrade and are responsive to treatments such as industrial composting. Although adhesives typically comprise only a fraction of waste streams, their presence often interferes with recycling major waste components like paper and plastic bottles. Adhesives can also contaminate composting operations when combined with products designed for bioremediation.

Noting that major retailers and brands have made commitments to eco-friendly packaging, such as 100 percent recyclable, reusable, or industrial compostable by 2025, Severtson's efforts are focused on technologies that will work with the

existing infrastructure. He believes they can bridge the divide between an industry currently dependent almost exclusively on oil and natural gas and its future in which renewable biomass is a primary feedstock.

Some of the more exciting technologies developed in Severtson's labs include mixed or hybrid adhesives. "This approach allows us to drop renewable biomass into existing commercial formulations often with no changes to the manufacturing process and little or no impact on product performance," said Severtson.



DREW HAUGE BS BBE, '14, WORKS WITH SEVERTSON ON HIS RESEARCH.



CFANS
COLLEGE OF FOOD, AGRICULTURAL
AND NATURAL RESOURCE SCIENCES

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

CONNECT WITH US



cfans.umn.edu



WE WANT TO HEAR FROM YOU!

Your opinion is important to us.

Share your feedback on CFANS Impact and enter a drawing for a "swag bag" of CFANS-branded items!



Please take our brief survey via this QR code or online at z.umn.edu/impactsurvey.