News from NSF AgTech Engine in North Dakota

Fall 2025/Winter 2026 Newsletter

A Message from Dr. Hollie Mackey, NSF AgTech Engine in North Dakota CEO

Dear Friends, Partners, and Supporters,

As we move through the fall season and into winter, I want to take a moment to reflect on the incredible momentum we continue to build together at the NSF AgTech Engine.

This time of year invites both gratitude and anticipation—gratitude for the partners, innovators, farmers, researchers, and entrepreneurs who are driving meaningful progress across our agtech ecosystem, and anticipation for the opportunities ahead. From advancing applied research to accelerating technologies that strengthen agricultural resilience and sustainability, your commitment and collaboration are what make this work possible.

Fall has brought exciting convenings, new partnerships, and promising innovations moving closer to real-world impact. As winter approaches, we remain focused on deepening collaboration, supporting adoption-ready technologies, and preparing for another year of growth and impact in agriculture and climate innovation.

Thank you for being an essential part of the NSF AgTech Engine community. I wish you a productive close to the year, a season of rest and reflection, and a hopeful start to the year ahead.

Dr. Hollie Mackey
CEO, NSF AgTech Engine in North Dakota

Spur AgConverge Brings Innovation to the Field

In September, Spur Ventures—an innovation hub and venture lab within the Department of Biological Systems Engineering at the University of Nebraska–Lincoln—hosted its inaugural Spur AgConverge in Grothenberg, Nebraska. Designed to accelerate innovation at the intersection of agriculture and climate, the event convened agtech startups, farmers, researchers, and industry leaders with a shared goal: turning applied research into practical, farm-ready solutions. The atmosphere was collaborative and forward-looking, underscoring the power of bringing those who develop technology together with those who use it every day.

The NSF AgTech Engine was proud to sponsor and participate in this landmark event. Attendees gained valuable insights from keynote speakers **Roric Paulman**, founder of Paulman Farms, and **Aman Anand,** Head of Business Development and Strategic Partnerships at Greeneye Technology. Their perspectives bridged on-the-ground farming experience with cutting-edge agtech innovation, reinforcing the importance of scalable, real-world solutions that meet farmers where they are.

A highlight of Spur AgConverge was the Farm Tech Adoption Challenge, where startups pitched directly to farmers, focusing on solutions to real pain points. Farmers evaluated each technology based on its potential to improve operations and its ease of adoption —putting end users squarely at the center of the innovation process. The first- and second-place teams were awarded funds to invest in implementing the technology on their farms, ensuring that promising ideas moved beyond the pitch stage and into the field. Spur AgConverge set a strong precedent for farmer-driven innovation, and it’s just the beginning of what’s possible when research, technology, and agriculture converge.

Learn More About the Tech Adoption Challenge

Beet Ball: Monitoring Sugar Beet Piles from the Inside Out

Sugar beet pile spoilage costs Red River Valley growers nearly $100 million every year. Although drones equipped with infrared cameras are currently used to monitor beet piles, these tools can only detect spoilage once it has already progressed—because they only capture what's happening on the surface.

Researchers at North Dakota State University, **Dr. Benjamin Braaten** and **Jeffery Erickson**, are working to reduce these losses with a new technology called Beet Ball. Supported by funding from the USDA and the NSF AgTech Engine in North Dakota, Beet Ball is a next-generation sensor designed to be placed inside sugar beet piles. It continuously measures temperature, humidity, and CO_2 levels, allowing growers to identify hot spots early and take action before spoilage occurs. By slicing beets sooner, growers can save hundreds of tons of beets and improve profitability.

Sugar beet piles present unique challenges due to their massive size—up to 200 feet wide, 20 feet high, and holding as many as 90,000 tons of beets. Sensors must be durable enough to be embedded at least 30 feet into the pile, transmit accurate data in real time, operate in extreme temperatures, and withstand heavy pressure from both the pile and handling equipment.

Beet Ball was engineered to meet all of these demands. Built from steel, Beet Balls are strong enough to endure harsh conditions and include tilt sensors that alert operators when beets need removed, helping prevent damage during pile management. The sensors have performed reliably in the variable temperatures of North Dakota's beet harvest, and their batteries last up to 265 days—well suited for long-term beet storage, which can extend to 280 days.

Initial trials have been successful, thanks in part to collaboration with the **Minn-Dak Farmers Cooperative**. By involving growers throughout the development process, the

research team has ensured the technology aligns with real-world needs and is positioned for future adoption.

The next generation of Beet Ball is scheduled for release in Fall 2026, with plans to expand sensor placement across all beet piles and enable communication between sensors. Stay tuned for updates.

Canada Thistle Detection Project Targets Invasive Weed Before It Reaches Farmland

A research initiative led by **Dr. Arjun Upadhyay,** Postdoctoral Research Fellow at North Dakota State University, is taking aim at the early detection of Canada Thistle—a persistent and invasive weed that threatens both cropland and grazing areas across the Northern Plains.

In collaboration with the NSF AgTech Engine and Botlink, a leader in automated drone flight software, Dr. Upadhyay is developing an AI-based algorithm designed to identify and map Canada Thistle growth in its early patch stages—before it spreads into productive agricultural areas.

To capture high-resolution imagery, the project is deploying drones from Packet Digital equipped with advanced Sony LRI cameras. Initial test sites include water control project areas in Minnesota and North Dakota, where natural grass and

prairie plantings have been reestablished following engineering work. Additional testing will also be conducted on Conservation Reserve Program (CRP) lands, offering a diverse landscape for validating the algorithm across different environments.

“This work is about proactive land management,” says Dr. Upadhyay. “By detecting thistle in non-crop environments before it migrates, we can reduce the ecological and economic costs of invasive species on working lands.”

The project gathered a full season of growth data in Fall 2025, with onsite field trials occurring in September 2025. They evaluated the performance of the detection system in real-world settings and guide further refinements.

By combining aerial imaging, machine learning, and advanced drone automation, this project represents an important step forward in using technology to support conservation and protect farmland from costly infestations.

Welcome to Our New Strategic Board Members—and Thank You to Our Departing Leaders

We are pleased to welcome five outstanding leaders to the NSF AgTech Engine Strategic Board: **Kyle Courtney,** CEO of Courtney Farms**, Pete Nelson,** President of AgLaunch**, Michelle Tressel,** My Ag Data CEO**, Dr. Mark Stone,** Professor of Sustainable Engineering Systems at University of Nebraska-Lincoln**, and Josh Gelinske,** Chief Technology Officer, NDeavor Barry D. Batcheller Tech Park .

Each brings valuable expertise, diverse perspectives, and a strong commitment to advancing innovation in agriculture and technology. We are excited to work with them as they help guide the Engine's strategic direction and continued growth.

At the same time, we extend our sincere gratitude to **Dr. Heidi Grunwald,** Interim VP NDSU Research and Creative Activity**,** and **Dr. John MacEvoy,** NDSU Microbiological Sciences Department Head, as they conclude their service on the Strategic Board. Their leadership, insight, and dedication have played an important role in shaping the NSF AgTech

Engine, and we are thankful for the time and energy they contributed to our mission.

We've Moved! New Office, Same Mission

We're excited to share that we've officially outgrown our former office and, this fall, moved into a new space on the campus of North Dakota State University. You can now find us in the **Research 2 Building** at the NDSU Research Park.

Our new address is:
NSF AgTech Engine
1805 NDSU Research Park Drive
Research Building 2, Office 118
Fargo, ND 58102

This move marks an exciting new chapter for our team and reflects the continued growth of our work and partnerships. If

you’re in the neighborhood, we’d love for you to stop by, say hello, and see our new space!

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