Aspiring for Profits & Partnerships

Tayler Ulbrich

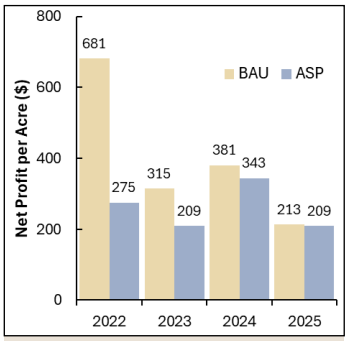
Five years ago at the first KBS LTAR symposium stakeholders and scientists envisioned "what Michigan agriculture could look like in 30 years." Now, four years into the experiment resulting from this vision, data are informing the real opportunities for regenerative practices to improve economic, environmental, and social outcomes. Nearly ever year since this 2021 meeting event participants have given the Aspirational System consistently high marks for its innovation, environmental benefits, and resilience, but have been less certain about its likely profits and manageability.

It's well known that profit and manageability are central to a farmer's decision to adopt a practice. Early results show that the economic gap between the Aspirational and Business-as-Usual system has closed substantially, and continues to close over time, as detailed later in this newsletter. Manageability is the next question. To push the boundaries of our agricultural systems we study practices that may seem "too out there" for some farmers. But, that's where partnerships are key. Our goal is to use LTAR data to demonstrate whether an "out there" practice can achieve desired outcomes. Then we can work with partners to identify technologies, technical support, and market structures that can help farmers adopt and manage appropriate "out-there" practices on their farms. We look forward to more conversations about how the Aspirational System can continue to push the boundaries and achieve our collective vision.

From the Director

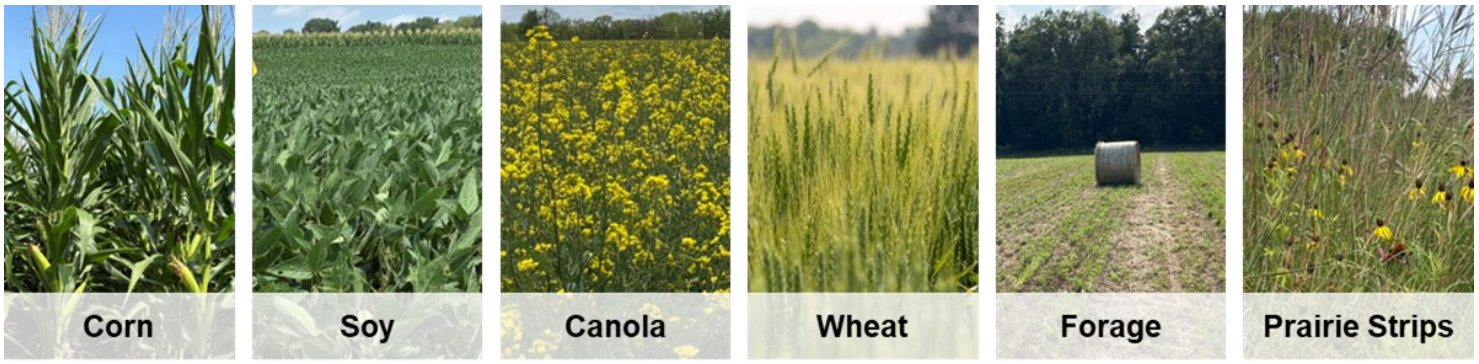
LTAR differs from many other agricultural research efforts in three important ways – it's stakeholder driven, systems-oriented, and intended to be long-term. But that it's long-term doesn't mean we have to wait a long time to draw conclusions and operationalize findings. Indeed, an early expectation voiced by stakeholders is that useful results will be reported, critiqued, and made usable far sooner than a typical scientific publication cycle.

One area that lends itself to immediate feedback is economics. On page 2 we present yields and profits for the 2025 growing season of the Aspirational Cropping System Experiment. We show that the economic gap between the Aspirational (ASP) and Business-as-Usual (BAU) Systems has closed substantially (see right). But details matter. For example, starting with corn or soybeans rather than with wheat, canola, or forage can avoid the economic gap altogether. Examining the costs and returns of individual practices can further reveal how to improve returns. We're hopeful such analyses will give farmers and advisers the insights needed to test practices on their own operations.



BAU vs. ASP System Net Profit from 2022-2025.

- Phil Robertson, KBS LTAR Director



Photos highlight 5-crop rotation in the LTAR Aspirational System. Prairie strips are planted in edges and low-yielding zones in fields.

Canola harvest in July

Sprayer drone, Ruben Ulbrich & Anthony Moreno

Agronomy and Economics

Brook Wilke

Mild spring conditions in 2025 led to excellent wheat and canola development and good planting/emergence of corn and soybeans. Warm weather in June shortened grain fill periods, and reduced yield potential of wheat and canola. August and September were dry, which limited soybean and corn yields. Other noteworthy observations:

- Cabbage seedpod weevils reduced canola yields by ~25%.
- Volunteer canola reduced yields of first forage cutting.
- Unlike 2024, slug populations were low, resulting in good stands of ASP soybeans.
- A fall drought led to premature senescence of corn and soybeans, particularly in BAU fields. Conversely, areas with more soil moisture had very high corn yields, resulting in substantial variation within fields.

Overall, in 2025 BAU and ASP returned similar system level net profits at the plot scale, though market prices drove lower profits than previous years. ASP net profits reflected poor returns from canola and forage, while corn and wheat out-performed BAU crops. Prairie strips were harvested for the first time, providing $79/Acre (excluding 2022 establishment costs).

2025 SUMMARY	Business-As-Usual		Aspirational		Michigan Average Yields
Crop	Yield	Profit	Yield	Profit	
Corn	207Bu/A	$251/A	222 Bu/A	$448/A	178 Bu/A
Soybeans	56 Bu/A	$175/A	56 Bu/A	$200/A	50 Bu/A
Wheat Grain			96 Bu/A	$158/A	90 Bu/A
Wheat Straw			2 Tons/A	$157/A	
ASP Wheat Total				$315/A	
ASP Winter Canola			35 Bu/A	$64/A	63 Bu/A
ASP Forage			3 Tons/A	$18/A	3 Tons/A
ASP Prairie			3 Tons/A	$79/A	NA
Whole System		**$213/A**		**$209/A**	

Precision Fertilizer by Drone

Bruno Basso and Ruben Ulbrich

Nitrogen (N) limits crop yield, and its uneven availability within fields challenges farmers' N management. Research shows that conventional, uniform-rate N applications can reduce profits and harm the environment by polluting water sources and increasing emissions of nitrous oxide (N_2O), a greenhouse gas with 300 times the warming potential of carbon dioxide. Drone-based fertilizer applications may offer a partial solution to this challenge.

Sprayer drone applies fertilizer over corn field.

Graduate student Francesca Mignola of the Basso Lab is studying how N_2O emissions and wheat and corn yields compare when N is applied via traditional ground-based (BAU) methods versus sprayer drone applications (UAV).

The experiment tested equal total N applications with different timing: BAU used a single side-dress application (60 lbs/A for wheat; 120 lbs/A for corn), whereas UAV split the same amount across multiple applications (5 for wheat, 12 for corn). Early results indicate that multiple smaller applications with a UAV can significantly reduce N_2O emissions without affecting wheat and corn yields. In wheat, BAU's single application combined with rainfall caused higher emissions, while the UAV had up to 4 times lower emissions. For corn, emissions were more variable and higher under BAU. Ultimately, since yields remained stable and emissions decreased with UAV applications, splitting N applications may be an effective strategy to reduce environmental impact while maintaining productivity.

Water infiltration in ASP forage field, Sandip Mondal

Cover crop trials: 17 species (L), precision planting (R)

Environmental Impact Updates

Phil Robertson

It can take years to decades to fully know how changes in agricultural management affect the environment. This is disappointing because we'd like to know sooner than later if we're in for unpleasant surprises or – in more hopeful cases – if we've hit an environmental sweet spot. At KBS LTAR we test for many environmental outcomes: water quality, air quality, soil loss, changes to biodiversity, and a host of other consequences that can help us design systems that conserve and even bolster nature.

Water quality is one of the most important environmental outcomes for Michiganders. Even in our early years, it is apparent that ASP can better resist erosion and sediment runoff. Following unusually heavy rains in May 2024, pictures showed significant erosion in BAU fields and none in ASP. Measuring erosion is a heavy lift and this fall we began installing erosion flumes to capture soil washed from field edges. This project, led by Dr. Subhasis Giri and with funding from the MDARD-MSU Agricultural Resiliency Program, will allow us to quantify exactly how big a problem soil loss is becoming with greater storm intensities, and whether ASP practices can help keep soil in place, where we need it.

We also have our first year of nitrate leaching results – showing very low nitrate loss to groundwater in some ASP treatments. Examining the impact of each crop on leaching and soil health will help us understand which combination of practices have the best outcome for nitrogen retention, soil fertility, and water quality.

Side by side comparison of corn grown in conventional (BAU) and regenerative (ASP) system in July 2025.

Innovations on the Horizon for ASP

Brook Wilke

KBS LTAR scientists and farmers work together to test new innovations that could improve outcomes of the Aspirational system (ASP). By documenting failures and successes alike, KBS LTAR offers a perfect platform to test new ideas so that farmers can adopt them with lower risk.

Marc Hasenick proudly shows his 17 species cover crop mix to KBS researcher, Bruno Basso.

Cover crops serve an important role in the ASP, and we are continuing to optimize the best plant species mixtures and management strategies. One trial includes a 17-species mix that was designed and currently grown (and grazed) at Hasenick Farms after wheat and canola. Marc Hasenick designed the mix to achieve multiple simultaneous benefits including nitrogen fixation, grazing potential, and a seamless transition to corn planting. We are also exploring precision cover cropping, including alternating rows of cover crop species like daikon radishes and clover to improve soil conditions through what we've termed bio-strip till.

We work with MSU colleagues James DeDecker, Emily Merewitz-Holm, Dennis Pennington, Nicole Shriner, & Maninder Singh to test additional innovations that may one day make their way to the ASP system, including:

- Alternative crops (e.g. barley, rye, sorghum) and varieties (e.g. open-pollinated & short-statured corn) which could add diversity to the cropping system.
- Double cropping winter barley (harvested in late June) with soybeans. Winter barley has limited market potential in Michigan, but there is also an opportunity to double crop soybean after winter wheat (harvested early July), adding additional profit per acre for MI farmers.
- Seeding winter wheat with precision planting and narrow row spacing to optimize yields. Several trials across the state report increased yields. This could improve profits and reduce risk to adding small grains to rotations.

OUR TEAM

Leadership

Tayler Ulbrich Phil Robertson Brook Wilke

Scientific Steering Committee

Bruno Basso, Hannah Burrack, Laura Campbell, James DeDecker, Sarah Evans, Nick Haddad, Sasha Kravchenko, Sandy Marquart-Pyatt, Christine Sprunger

Systems Integration Team

Dean Baas, Jennifer Blesh, Tim Boring, Kim Cassida, Marc Hasenick, Manni Singh

Stakeholder Advisory Board (2025)

Laura Campbell (Chair), Adam Reimer (Vice-Chair), Tom Butcher, Christine Charles, Colleen Forestieri, Randy Heinze, Laura Johnson, Cade Klein, Darin LaBar, Henry Miller, Mark Mills, Emily O'Halloran, Kristin Poley, Sherman Reed, Abby Smith, Jason Stegink, Ben Wickerham, Lisa Woodke, Andrea Zeeb Polverento

Upcoming Events

June 17: Food-Grade Grains Field Day
partnership with MiAA and MSU Extension

September 3: LTAR Field Day
partnership with MSU Extension

Contact Us

Email Kbs.ltar@msu.edu to get involved or be included in our list-serv.
Website: ltar.kbs.msu.edu

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Local Partnerships for National Impact

Tayler Ulbrich

Sites across the LTAR Network, led by Teferi Tsegaye, work collaboratively with agricultural stakeholders, farmers, and ranchers to ensure that innovations are meaningful, useful, and adopted on working lands. KBS LTAR stakeholders are key to our success, and are even recognized nationally. Our Stakeholder Advisory Board received the 2025 LTAR network stakeholder award, which recognizes LTAR partners who impact site and/or network science in meaningful ways. Together, LTAR sites seek to provide locally relevant research that can scale to national impact. Below we highlight a few key findings from other LTAR sites:

- In the Northern Plains, scientists found that soybean yields under drought were 29% greater in a system with high residue and cover crops compared to the BAU system without.
- In the Mississippi River Basin, a system with a three-crop rotation, cover crops, and no-till provided $75 more return per acre due to additional returns and carbon credits, compared to a BAU tilled-system.
- In Florida, scientists found that patch-burn grazing and over-seeding cover crops improves overall forage production, increases native plant diversity and digestibility, and reduces nutrient runoff.

Want to learn more?
Scan the QR codes to scroll through virtual storyboards about our goals and key findings!

KBS Network

Members of the KBS LTAR Stakeholder Advisory Board and Scientific Steering Committee at the annual July workshop (not all members pictured).

Staff Appreciation

Many make the KBS LTAR what it is today, and this year we give special thanks to Stacey VanderWulp. Stacey has been with KBS for 24 years, wearing many hats as the LTER, GLBRC, and LTAR Field Lab Coordinator and Manager. She supervises field sampling and lab analyses, ensures timely and safe data collection, and makes sure scientists have quality, reliable data for their analyses. People like Stacey make long-term science possible!

USDA AgBioResearch MICHIGAN STATE UNIVERSITY