UPPER MIDWEST

REGIONAL AGRICULTURE PAIN POINT REPORT

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NSF AgTech Engine in North Dakota

OVERVIEW

The Upper Midwest is a powerhouse of agricultural production, home to more than 118,000 farms growing everything from staple crops like corn, soybeans, and wheat to specialty crops like sugar beets and canola[1]. But growers across North Dakota, South Dakota, and Minnesota face mounting challenges—economic instability, chemical resistance, unclear regulations, and siloed industry dynamics—that impact the ability to run their businesses.

Innovation in agriculture only works when it starts with the real-world challenges growers face. The Regional Agriculture Pain Point Report (RAPPR) bridges the gap between growers and innovators by spotlighting the most pressing challenges in the region. Now in its fourth edition, the RAPPR provides a blueprint for researchers, startups, policymakers, and industry leaders to develop solutions that meet growers where they are.

The Regional Agriculture Pain Point Report isn't just a document: it's a starting point. We believe that by clearly identifying grower-driven challenges in the Upper Midwest, we can bridge the gap between innovation and implementation.

METHODOLOGY

This report was built through a rigorous, multi-step process to ensure relevance, accuracy, and actionability:

- **SCOPING:** Defined the geographic region and identified relevant commodity groups and stakeholders.
- **DATA COLLECTION**: Reviewed public research priorities, conducted direct outreach, and performed literature reviews across 14 commodity groups and councils.
- **PAIN POINT SCORING:** Collected and grouped common challenges, then scored them based on frequency, severity, economic impact, and regional footprint.
- **PRIORITY RANKING**: Identified and ranked the top four pain point priorities.
- **IMPACT/OPPORTUNITY ANALYSIS:** Collected data on pain point frequency, management practices, economic impact, crops affected, and opportunities.

[1] *Source: USDA 2022 Farm Census*

1. PEST MANAGEMENT
2. AGRICULTURAL EQUIPMENT DEVELOPMENT
3. SOIL HEALTH
4. SITE-SPECIFIC CROP MANAGEMENT

1 PEST MANAGEMENT

WHY IT MATTERS

Pests—especially herbicide-resistant weeds, emerging crop diseases, and hard-to-predict insect outbreaks—are increasing in both frequency and cost. In 2022 alone, growers in the region spent $2.88 billion on crop chemicals, a 37% increase from 2017[1]. Many of these treatments have narrow application windows, rising resistance, and limited long-term effectiveness, putting growers in a reactive and expensive position each season.

KEY CHALLENGES

- Weeds, insects, and diseases evolving resistance
- Inefficient and costly crop scouting
- Few remediation options once pests establish
- Precise applications required, but hard to achieve

SCOPE OF OPPORTUNITY

Crop pests are the chief concern for nearly all growers. New crop threats are on the horizon and rapid innovation is needed to keep growers ahead of the curve.

Developing new tools for integrated pest management that address these key challenges could greatly impact farm finances.

DID YOU KNOW?

Herbicide resistant weeds can drastically reduce crop yields. Palmer Amaranth has shown to reduce yields in corn by 91% and soybeans by 78%.[2]

[1] Source: USDA 2022 Farm Census
[2] Source: NDSU Extension

2 AGRICULTURAL EQUIPMENT DEVELOPMENT

WHY IT MATTERS

Agricultural equipment is evolving, but many growers face high costs, poor access to service networks, and tools that aren't designed with their needs in mind. Meanwhile, digital tools come with cybersecurity risks and unclear data ownership, leaving many hesitant to adopt. Layer on top of this a persistent labor shortage, and the farms of today can't take advantage of modern equipment and practices.

KEY CHALLENGES

- High equipment and repair costs
- Cybersecurity risks in digital agriculture infrastructure
- Unclear ownership of farm data
- Limited access to early-stage technology and drones
- Labor shortage and limited skilled workforce

SCOPE OF OPPORTUNITY

The region's predominantly rural agricultural communities often sit at the end of the road when it comes to accessing technology and infrastructure. This phenomenon tends to lead to high costs, poor service availability, and a lack of skilled laborers when technologies and inputs do arrive.

Targeted investment in this area could help work to bring down barriers to technology adoption and aid growers in meeting their labor needs.

DID YOU KNOW?

Farms in the Upper Midwest spend over $2.4B on labor each year, yet 54.76% of hired workers are seasonal (under 150 days), and 56.42% of all laborers are unpaid.[1]

[1] *Source: USDA 2022 Farm Census*

3 SOIL HEALTH

WHY IT MATTERS

Nutrient depletion and erosion are longstanding concerns across the Upper Midwest. Fertilizer costs are up, runoff regulations are tightening, and growers face conflicting messaging on practices like cover crops and no-till. At the same time, carbon markets tied to soil practices are difficult to navigate and often undervalue grower contributions.

KEY CHALLENGES

- Nutrient loss and rising input costs
- Confusing and inconsistent carbon programs
- Lack of infrastructure for cover crops or livestock integration
- Pressure to adopt no-till despite practical constraints
- Erosion concerns from wind, water, and tillage

SCOPE OF OPPORTUNITY

Soils are the foundation of a crop's success. Growers take extensive care to address the gaps and needs that are expressed in their fields; however each year that task gets harder and more expensive.

Innovators hoping to solve challenges around soil health have the potential to help ensure growers have long-term sustainability for their soils and potentially provide new revenue sources through financial incentives.

DID YOU KNOW?

Cultivated lands in the Upper Midwest region see an annual loss of 3-5 tons of topsoil due to erosion.[1]

[1] *Source: NDSU Extension*

4 SITE-SPECIFIC CROP MANAGEMENT

WHY IT MATTERS

No two fields are alike, but most tools still treat them that way. Growers face information gaps in monitoring plant health, nutrient needs, and ideal application timing. Many management decisions are made using broad estimates, resulting in missed windows, wasted inputs, and yield losses. While precision agriculture tools exist, they're often too expensive, incompatible with older equipment, or hard to implement.

KEY CHALLENGES

- Limited visibility into plant health and nutrient use
- Guesswork in timing critical applications
- High cost or tech barriers for precision agriculture
- Poor traceability of commodity crops in bulk systems

SCOPE OF OPPORTUNITY

Each year growers attempt to maximize efficiency and profitability on every acre. Until recently the tools and methods to do that effectively haven't been available. Even with new technologies being utilized, challenges remain in ensuring that inputs, time, and efforts are spent without waste.

New tools and technologies can ensure that growers have the ability to get the most out of their acreage.

DID YOU KNOW?

In the Upper Midwest region, over 9 million acres are irrigated with that number growing each year.[1]

[1] *Source: USDA 2022 Farm Census*

THANK YOU TO OUR CONTRIBUTING PARTNERS

North Dakota Soybean Council
North Dakota Corn Utilization Council
North Dakota Dry Bean Council
North Dakota Wheat Commission
Northarvest Bean Growers Association
Red River Valley Sugarbeet Growers Association
Minnesota Wheat Research & Promotion Council
Minnesota Corn Research & Promotion Council
MN Soybean Research & Promotion Council
National Sunflower Association
American Malting Barley Association
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