

Research Approach

Christopher Kniffen, Director of Research

Midwestern BioAg Applied Research Department - Goals

To enable the value transfer of our proprietary innovations to our customers and channel partners

Through observation and implementation of the scientific method, we can improve agronomic decision making on farm through data

Bridge the data and communication gaps between universities, contract research organizations, and farmers

SCIENTIFIC METHOD



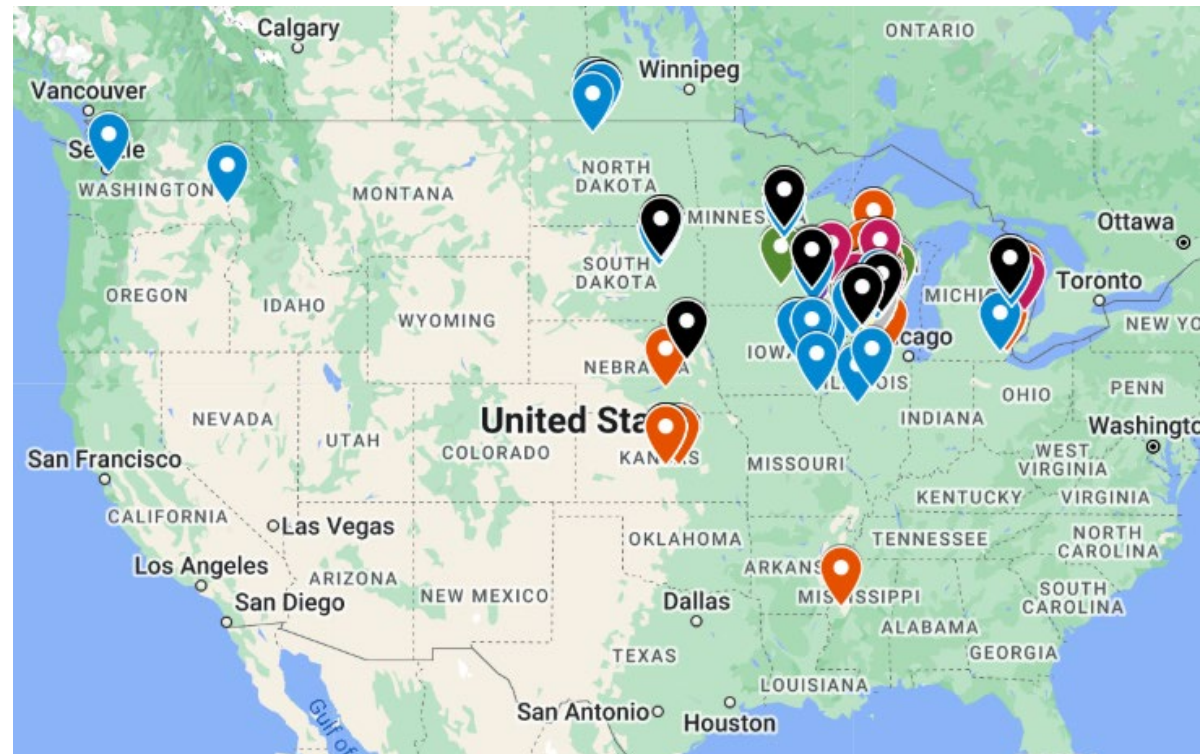
Midwestern BioAg Applied Research Department - Development

2024 Trial Locations

MBA product and system trials
increased 45 % for 2024

Research team collected
approximately 2440 pounds of
soil from our experimental sites

Hand pulled samples – carried out
of the field by our field team



2024 Trial Site link

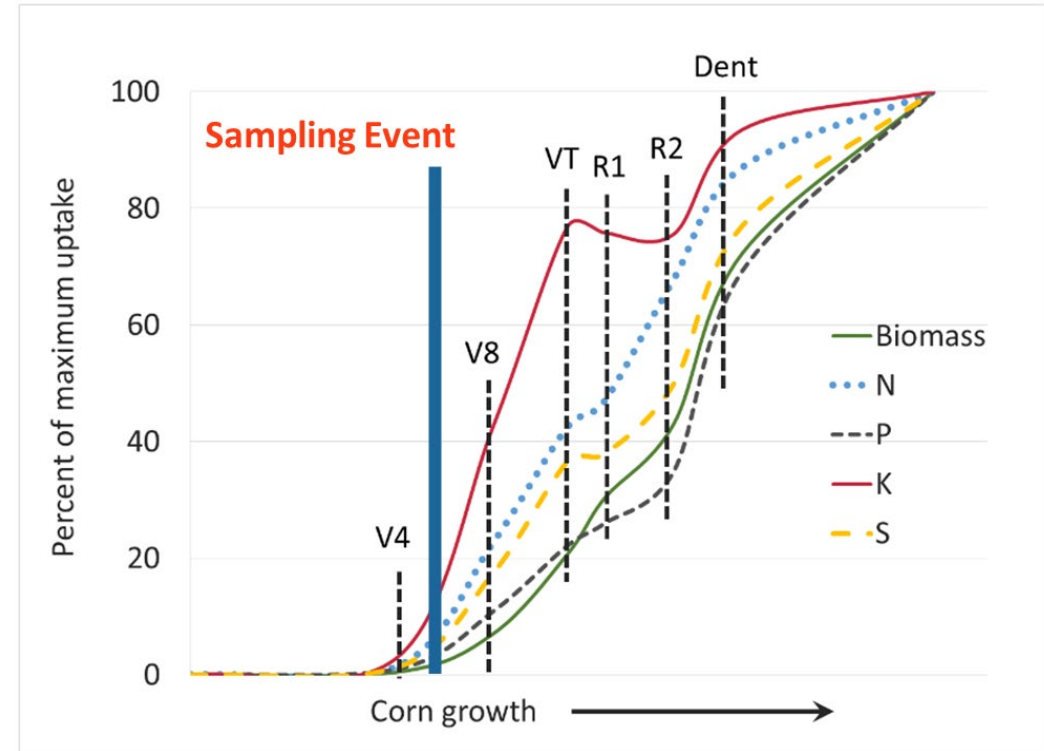
www.google.com/maps/d/u/1/edit?mid=1-fznpTt0_LPCfJt_rmf5AmKlpW0gZU&usp=sharing

2023 Trial Site Link

https://www.google.com/maps/d/viewer?mid=1HYQhYbk_ZYMmvyA8jyVC3piTwuBqfBU&ll=44.65557010102023%2C-89.21510576015625&z=6

Midwestern BioAg Applied Research Department - Methods

- Time point sampling events for assessing nutrient mobility responses
- At each experimental site, individual fields were split into two physical blocks: control and treatment
- Within each physical block, replications were established based on SSURGO soil series layers and precision ag software
- Yield data cleaning to ensure data integrity



Source: Heard, J. 2006. [Nutrient accumulation and partitioning by grain corn in Manitoba](#). In: Great Plains Soil Fertility Conference Proceedings. A. Schlegel (ed). Vol. 11. March 7-8, 2006. Denver, Colorado. p. 180-185.

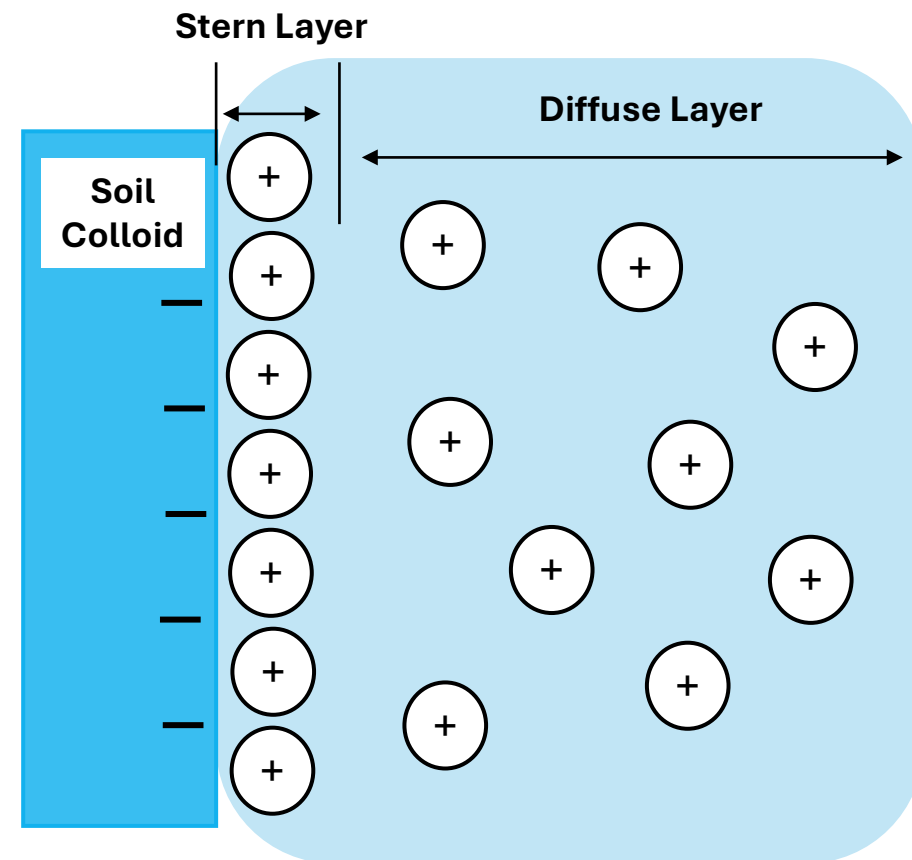
Data collection from both soluble and plant available nutrient pools provide insights into nutrient mobility from the soil to the soil solution

Standard soil testing methodology (AA)

- Extractants are used to displace or remove ions from the soil after the sample is dried
- Provides a baseline consistent with traditional agronomy's best management practices

Saturated paste soil testing methodology (SPE)

- 1:1 soil / water solution and uses a vacuum to extract nutrients
- Extracts soluble nutrients residing in the diffuse layer of the soil
- Provides insights into near term nutrient availability, salinity, soil structure, and soil water availability



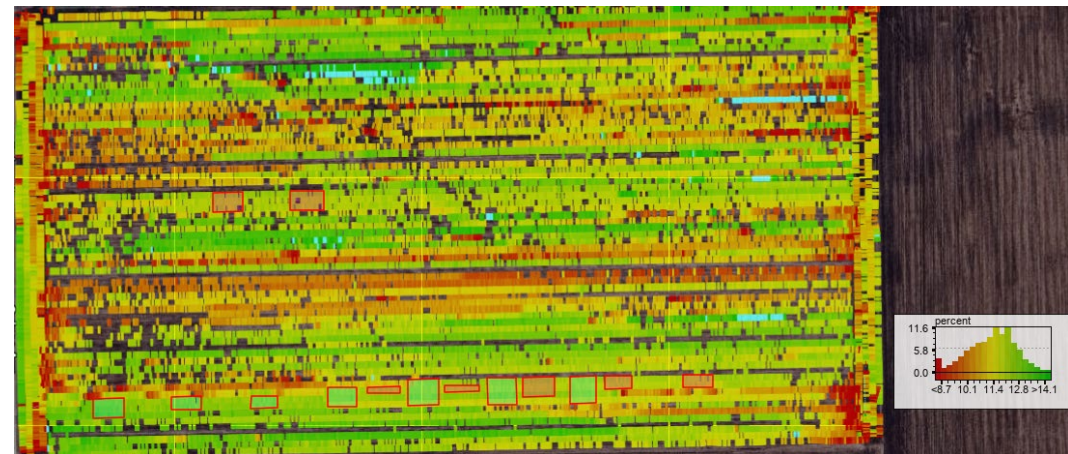
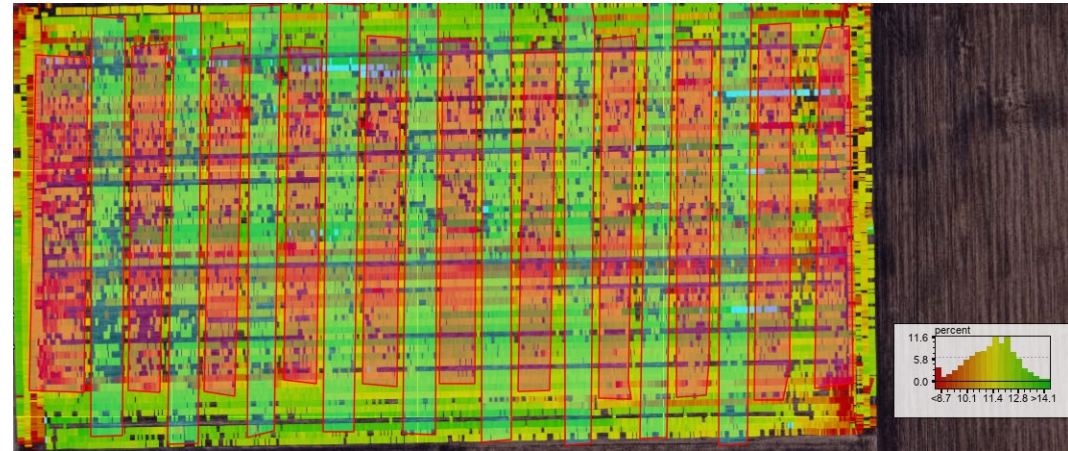
Normalizing farm machine data for speed improves the accuracy of yield data

Errors in calibration / GPS connectivity presented challenges in comparative analysis

- Raw data yields
 - Control 279.05
 - Treatment 277.15
 - -1.9 bpa

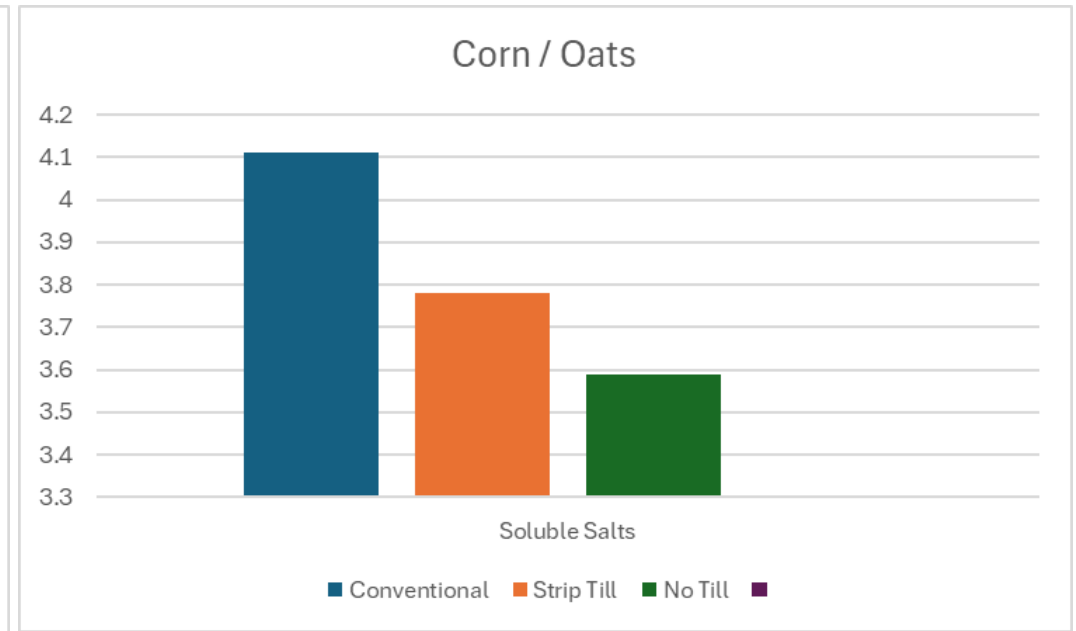
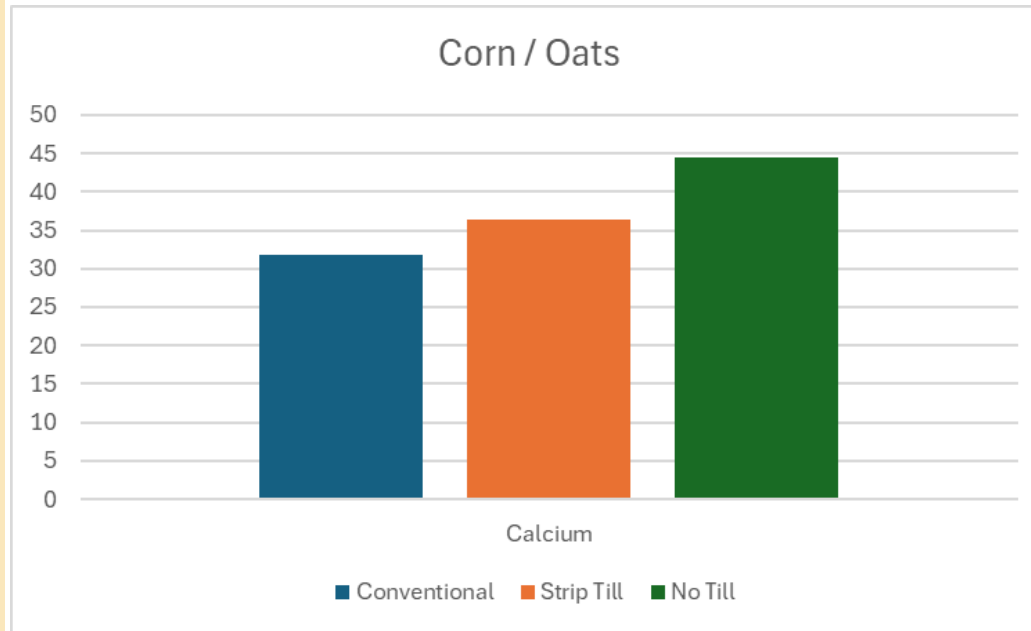
Normalizing for speed improves accuracy and precision in yield data collection

- Normalized data
 - Control 263.52
 - Treatment 272.75
 - +9.23



Results from 2024 tillage system trials validate in-season sampling as an effective tool for assessing performance

Research conducted in partnership with the Faribault Minnesota Soil and Water Conservation District



Data collected from tillage system trials suggested no-till farming systems approach to soil health formation is influenced by increases in soluble calcium along with a reduction in lowered soluble salts compared to strip-till and conventional tillage systems