

Quality of the United States Soybean Crop: 2023

Seth Naeve and Jesse Christenson

14 November 2023



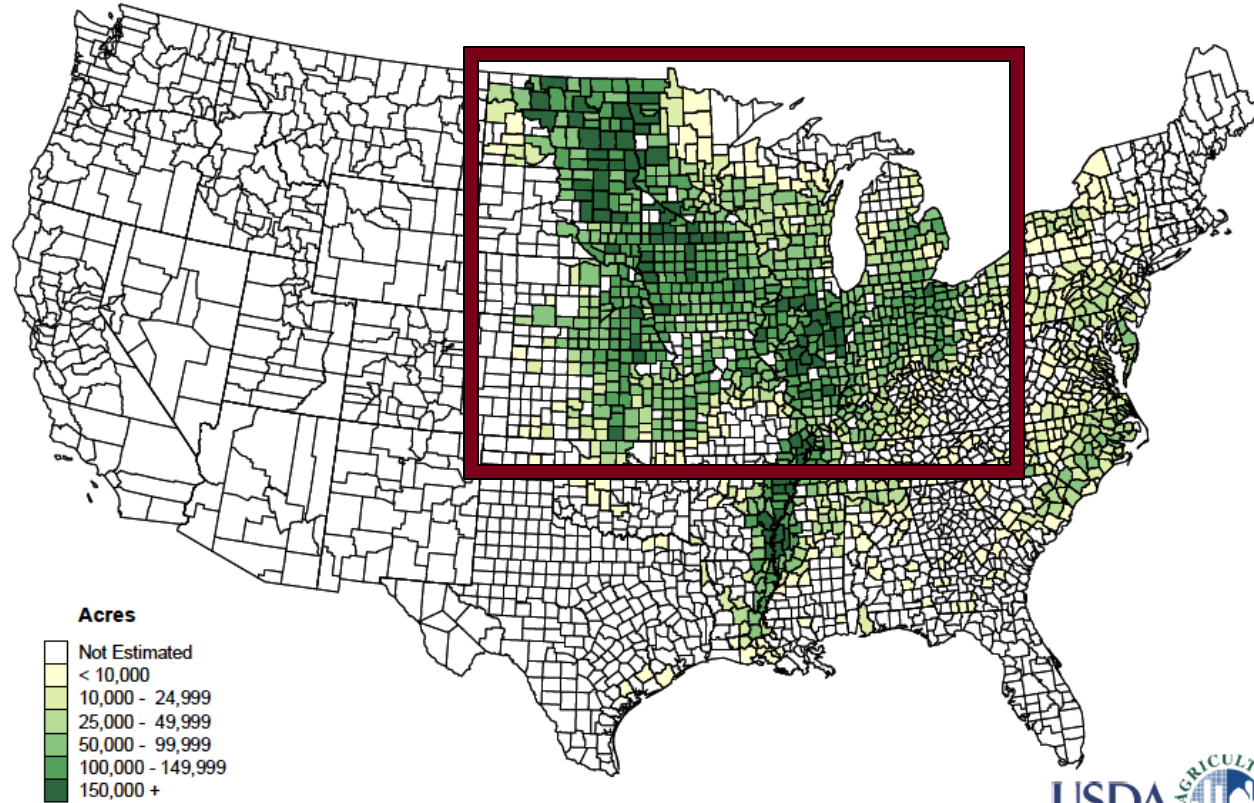
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CRITICAL WEATHER EVENTS



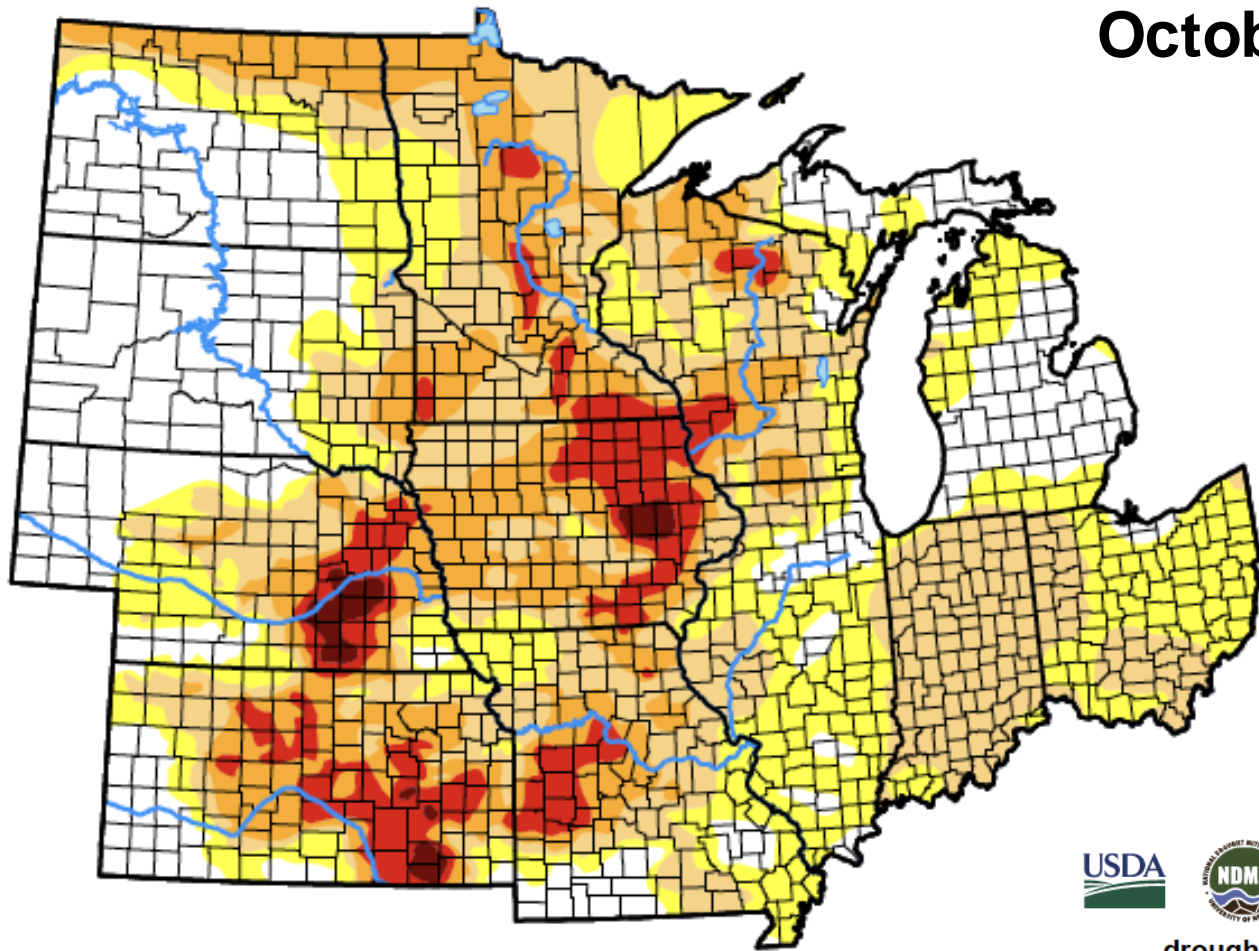
Soybeans 2022 Harvested Acres by County for Selected States



U.S. Department of Agriculture, National Agricultural Statistics Service



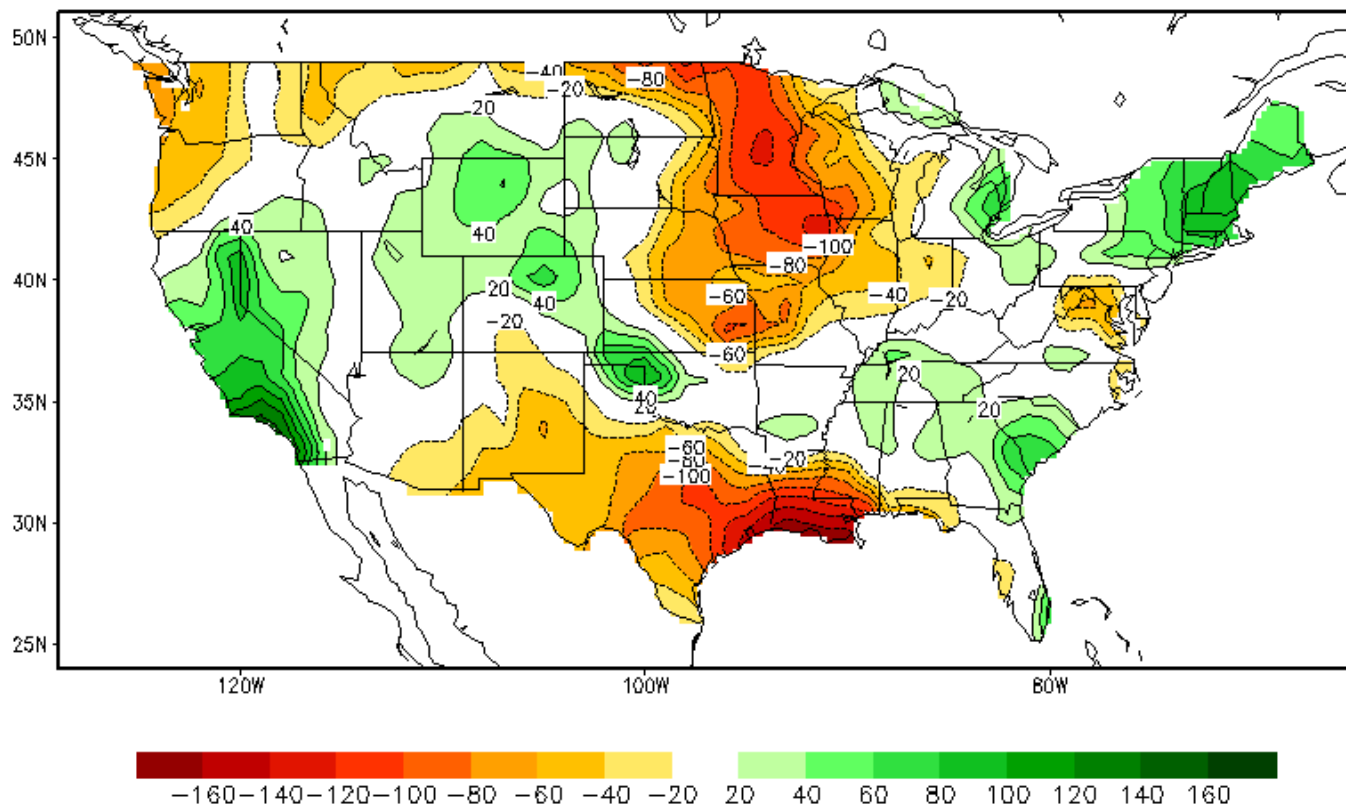
October 3, 2023

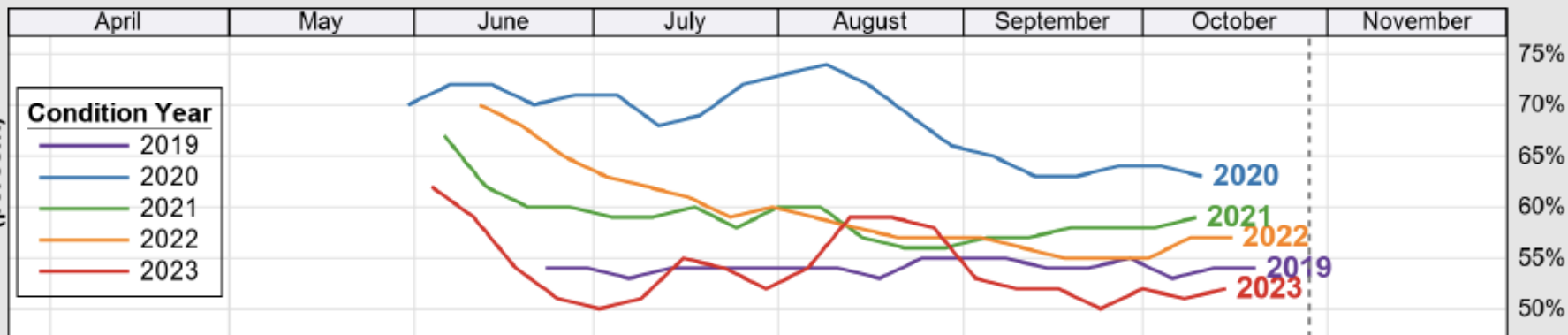
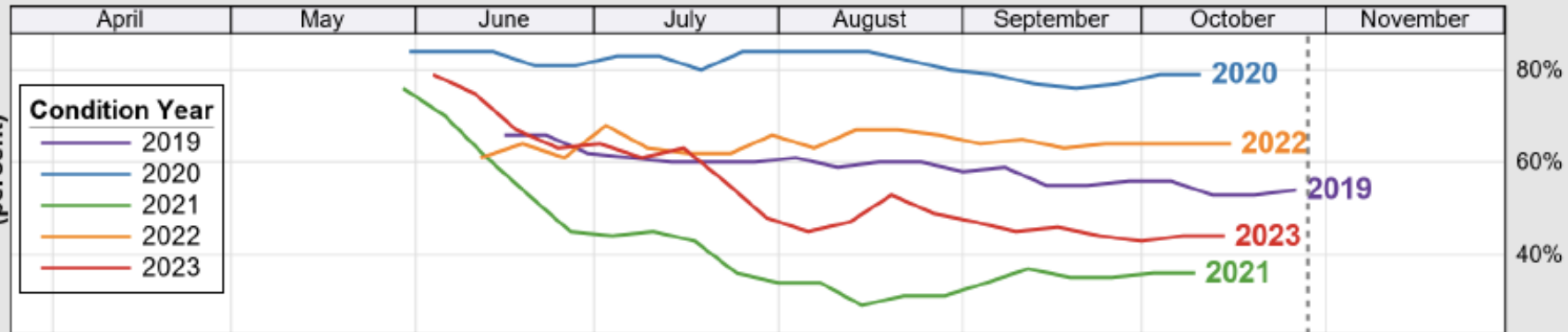


droughtmonitor.unl.edu



Calculated Soil Moisture Anomaly (mm) AUG, 2023



Good + Excellent
(percent)Good + Excellent
(percent)

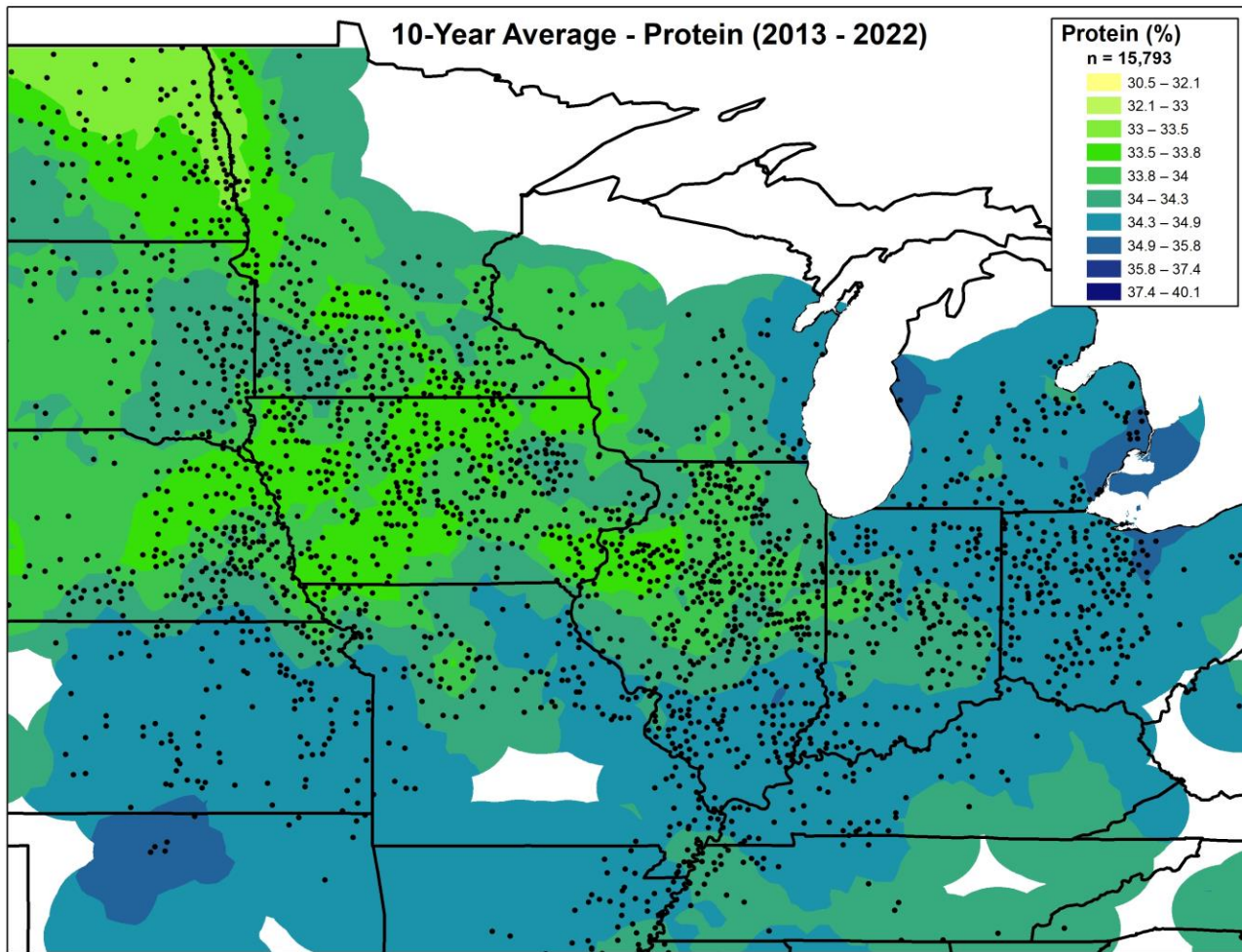


**QUALITY OF THE UNITED
STATES SOYBEAN CROP: 2023**



A close-up photograph of several soybean pods hanging from a stem. The pods are brown and have a fine, hair-like texture. The background is a soft, out-of-focus brown. A dark, semi-transparent rectangular box is overlaid in the center of the image, containing the title text in white, bold, uppercase letters.

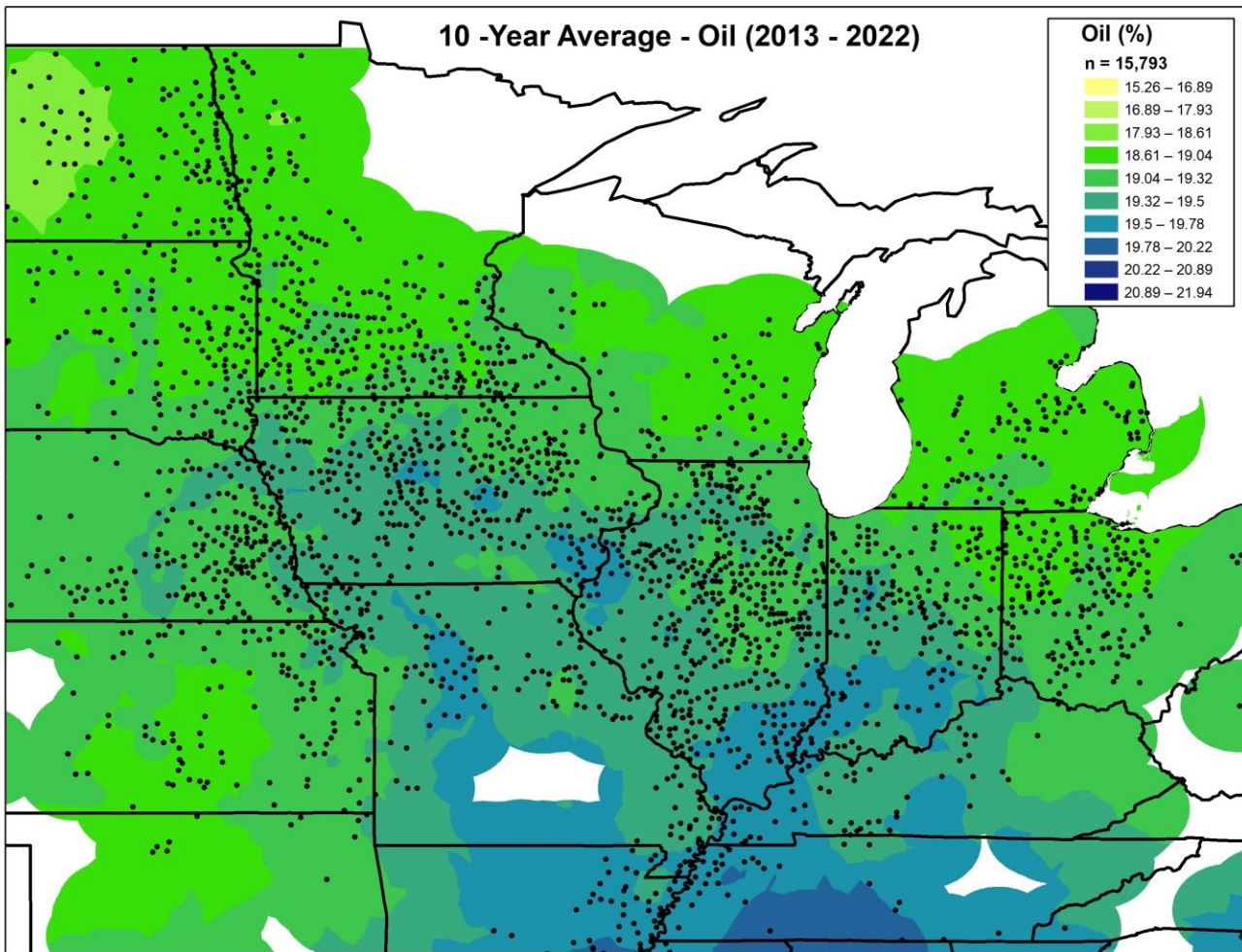
HISTORICAL PROTEIN AND OIL VARIATION



10 -Year Average - Oil (2013 - 2022)

Oil (%)

n = 15,793

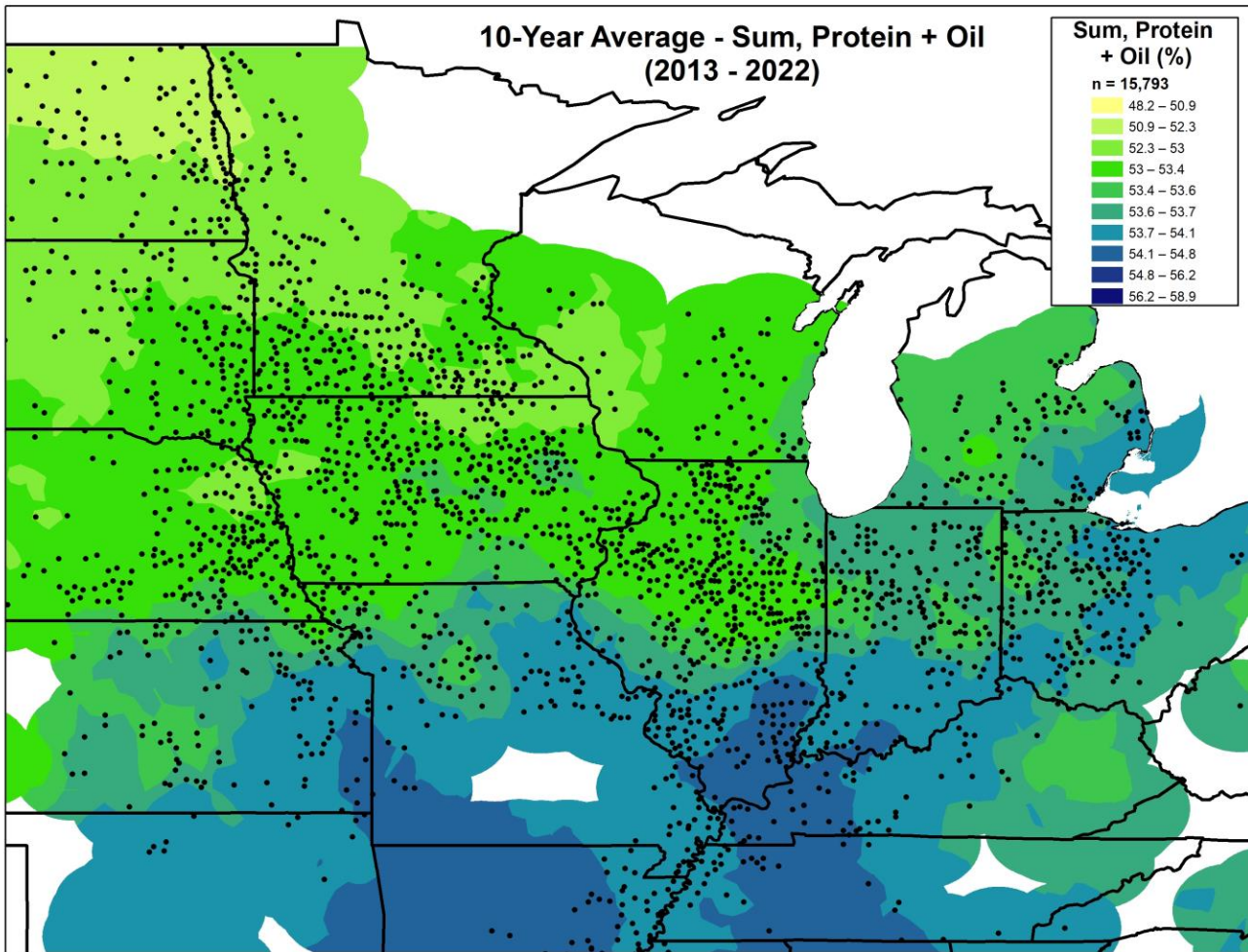


10-Year Average - Sum, Protein + Oil (2013 - 2022)

Sum, Protein + Oil (%)

n = 15,793

- 48.2 - 50.9
- 50.9 - 52.3
- 52.3 - 53
- 53 - 53.4
- 53.4 - 53.6
- 53.6 - 53.7
- 53.7 - 54.1
- 54.1 - 54.8
- 54.8 - 56.2
- 56.2 - 58.9



2023 SURVEY RESULTS



USSEC
2008 Food Soybean
Quality Survey

Variety (name/number and company): Soybean

Intended use:
 Tofu Natto

Additional characteristics:
 Special oil Miso Non-GMO Organic

Field location (zip code or town, state): NE

Producer name or specific field identifier: Soybean

Contracting company: 91%

USSEC
2008 Food Soybean
Quality Survey

Variety (name/number and company): Soybean

Intended use:
 Tofu Natto

Additional characteristics:
 Special oil Miso Non-GMO Organic

Field location (zip code or town, state): NE

Producer name or specific field identifier: DUANE BUNTON

Contracting company: 11.9%

USSEC
2008 Food Soybean
Quality Survey

Variety (name/number and company): 92037's

Intended use:
 Tofu Natto

Additional characteristics:
 Special oil Miso Non-GMO Organic

Field location (zip code or town, state): 12%

Producer name or specific field identifier: Charlottesville, VA

Contracting company: Citizens LLC

Contracting company: 0.6086/0

USSEC
2008 Food Soybean
Quality Survey

Variety (name/number and company): Soybean

Intended use:
 Tofu Natto

Additional characteristics:
 Special oil Miso Non-GMO Organic


Field location (zip code or town, state): 10.5%

Producer name or specific field identifier: Soybean

Contracting company: 10.5%

2023 Survey Methods

- In August, sample kits were mailed to 3,886 soybean producers based on soybean production by state
- By 2 November, 2023, 1,169 samples were returned for analysis



PLEASE SEND SAMPLES BY OCTOBER 22

FILL BAG TO HERE >

2023 SOYBEAN QUALITY SURVEY

Town nearest field sampled (zip code or name): _____

Variety (company and variety name): _____

If specialty variety, please check below:

High oleic Food grade Non-GMO


Questions? Call Dr. Seth Naeve (612) 625-4298 or email at naeve002@umn.edu

Please note changes to name or address:

_____ Ft. Elfsborg Rd _____

Salem, NJ _____

08079 _____



20234033001

PROTEIN AND OIL

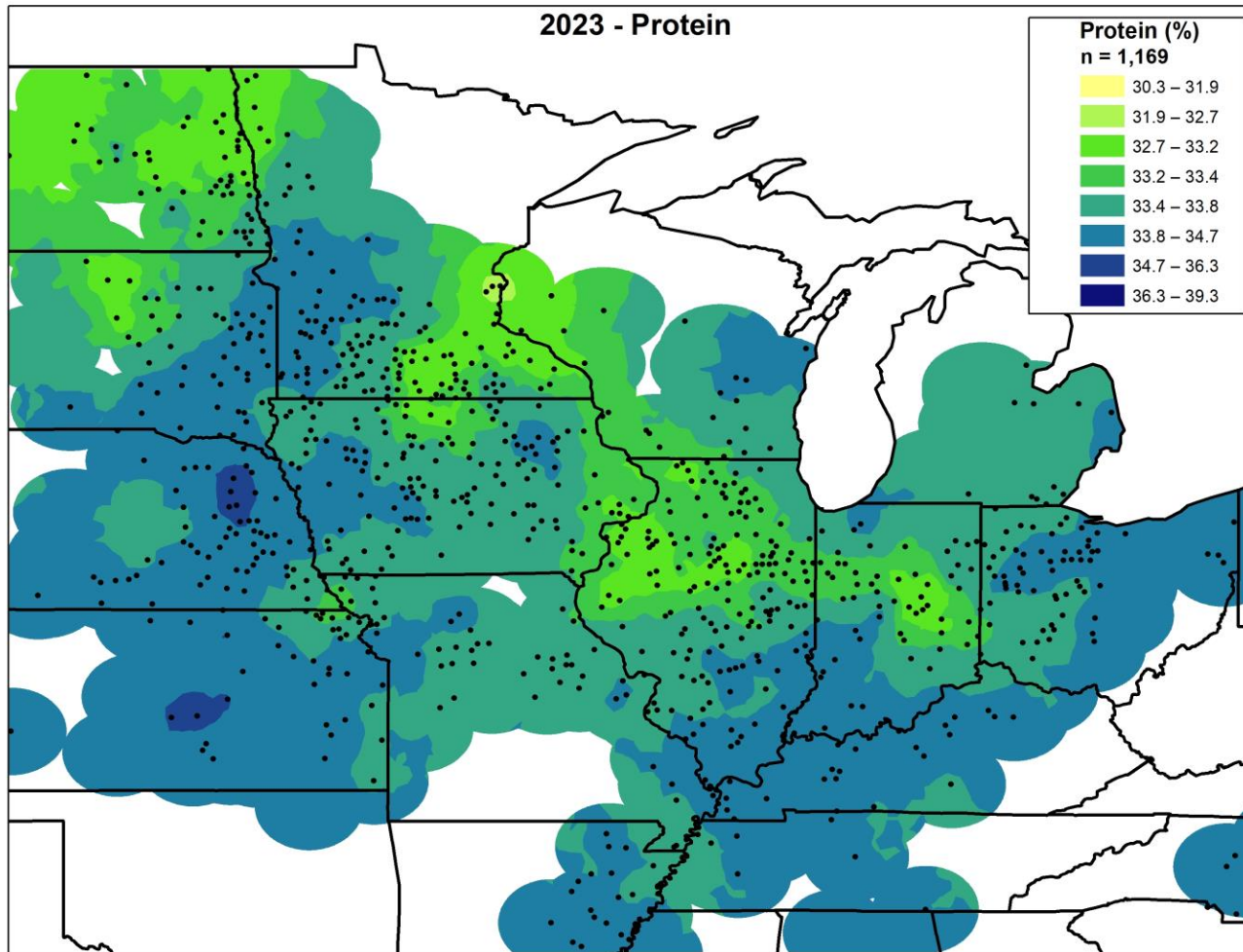


Region	Number of Samples	Protein (13%)	Change from 2022	Oil (13%)	Change from 2022	Seed Weight (g/100 seeds)
US Average	1,169	33.7		19.6		15.9
Average of 2023 Crop[†]		33.7	-0.2	19.6	0.1	15.8
US 2013-2022 Average [†]		34.2		19.3		

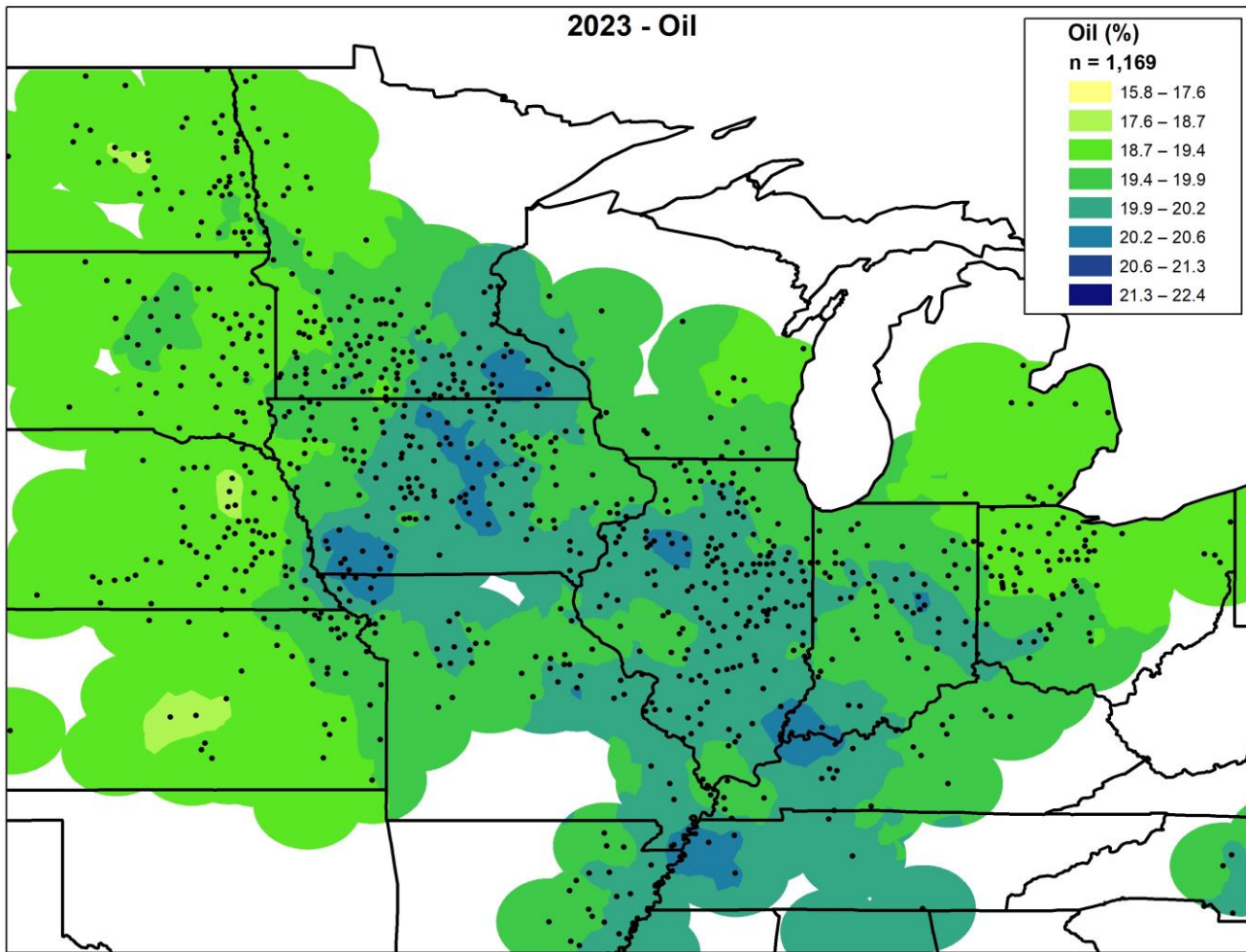
[†]US average values weighted based on estimated production by state, as estimated by USDA, NASS Crop Production Report (October, 2023)



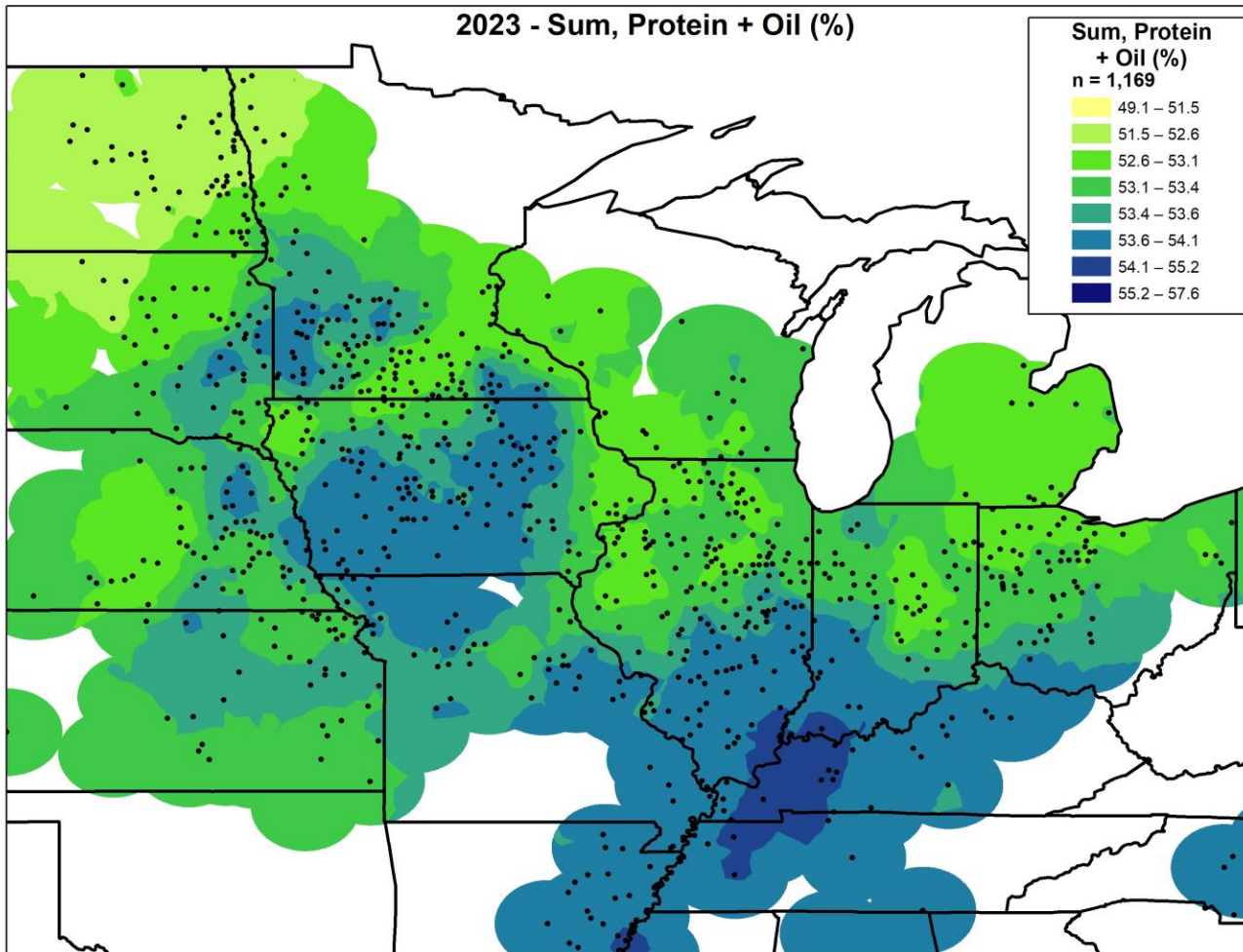
2023 - Protein

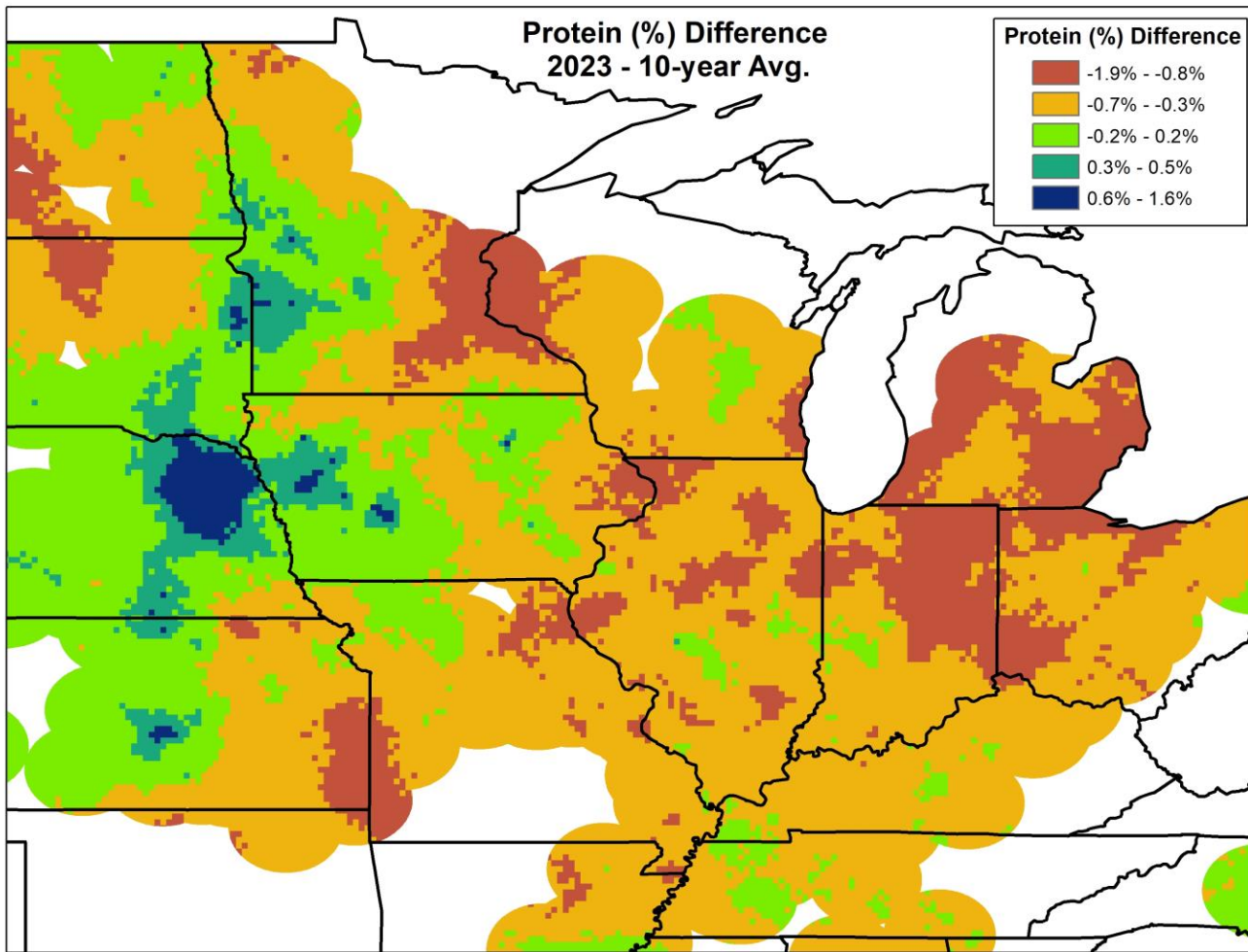


2023 - Oil

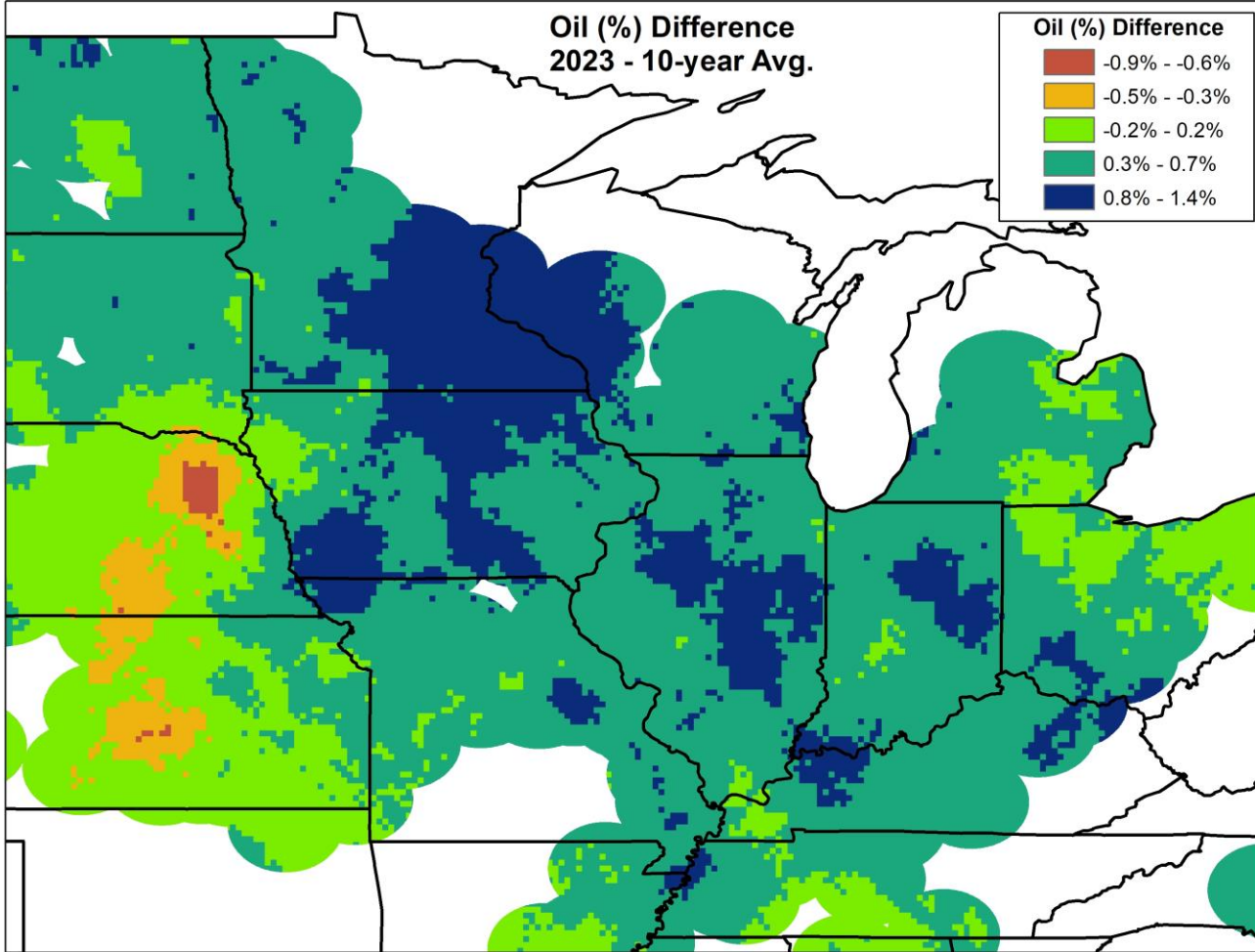
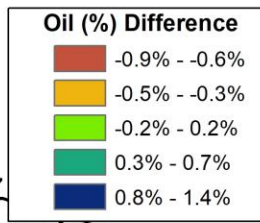


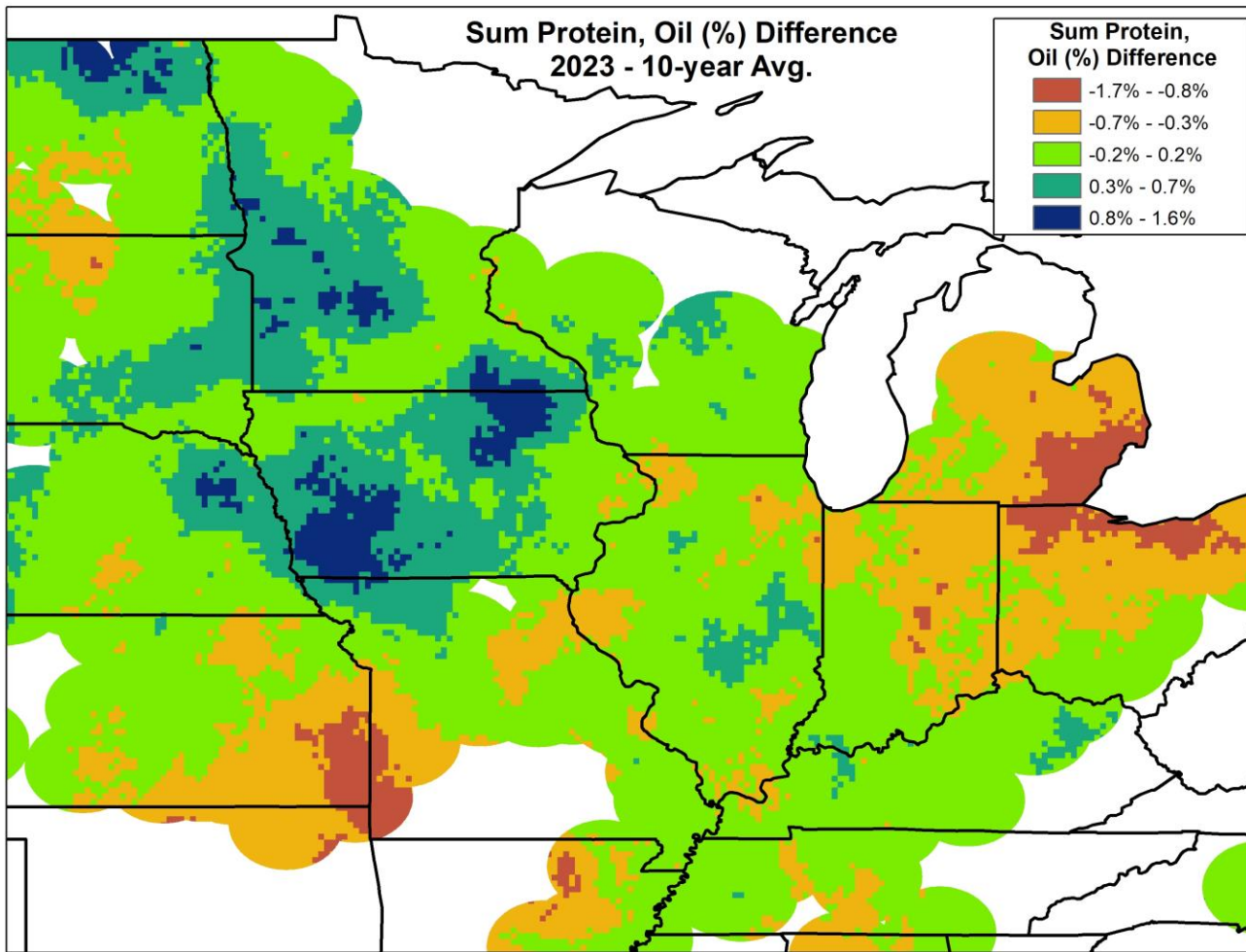
2023 - Sum, Protein + Oil (%)





**Oil (%) Difference
2023 - 10-year Avg.**

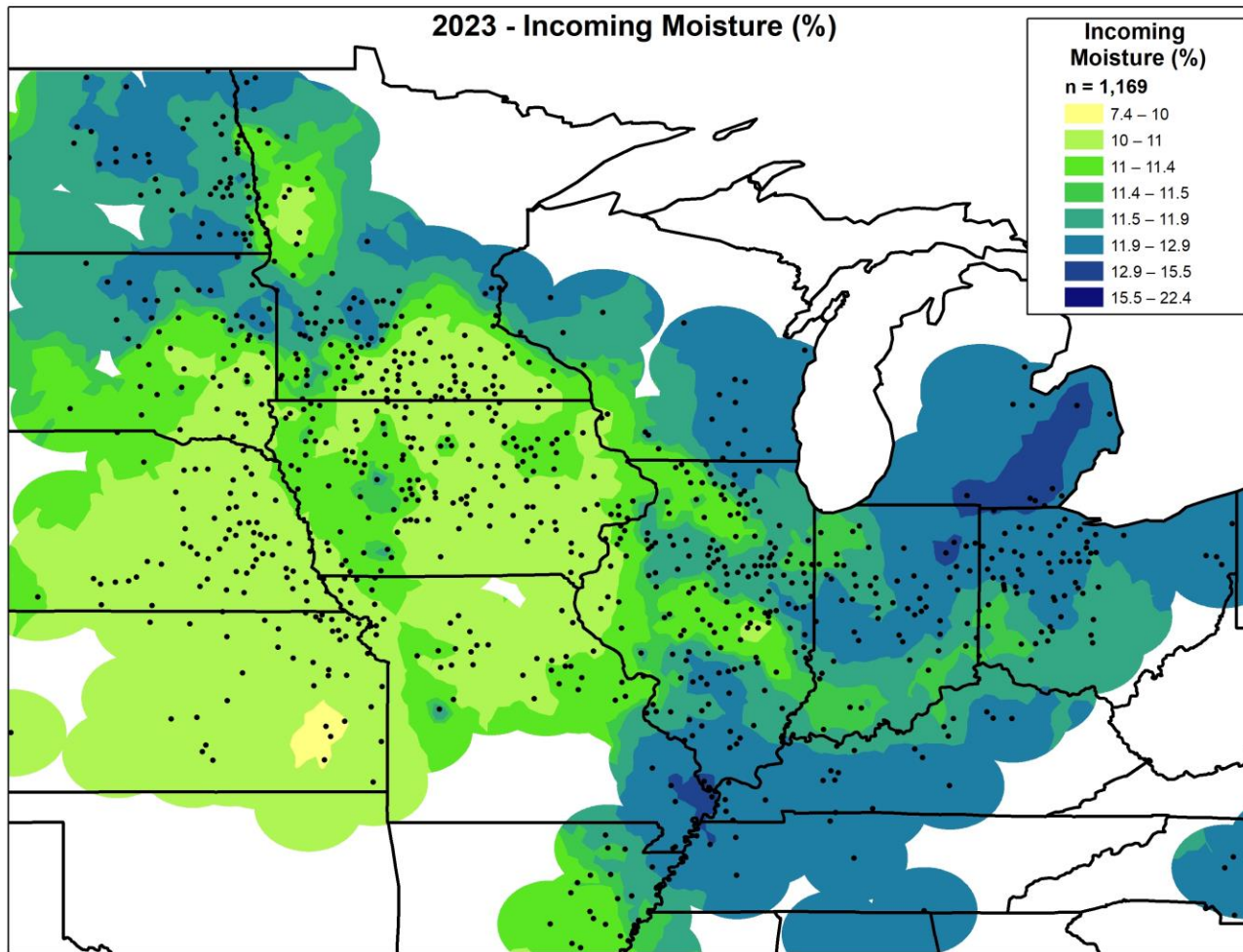




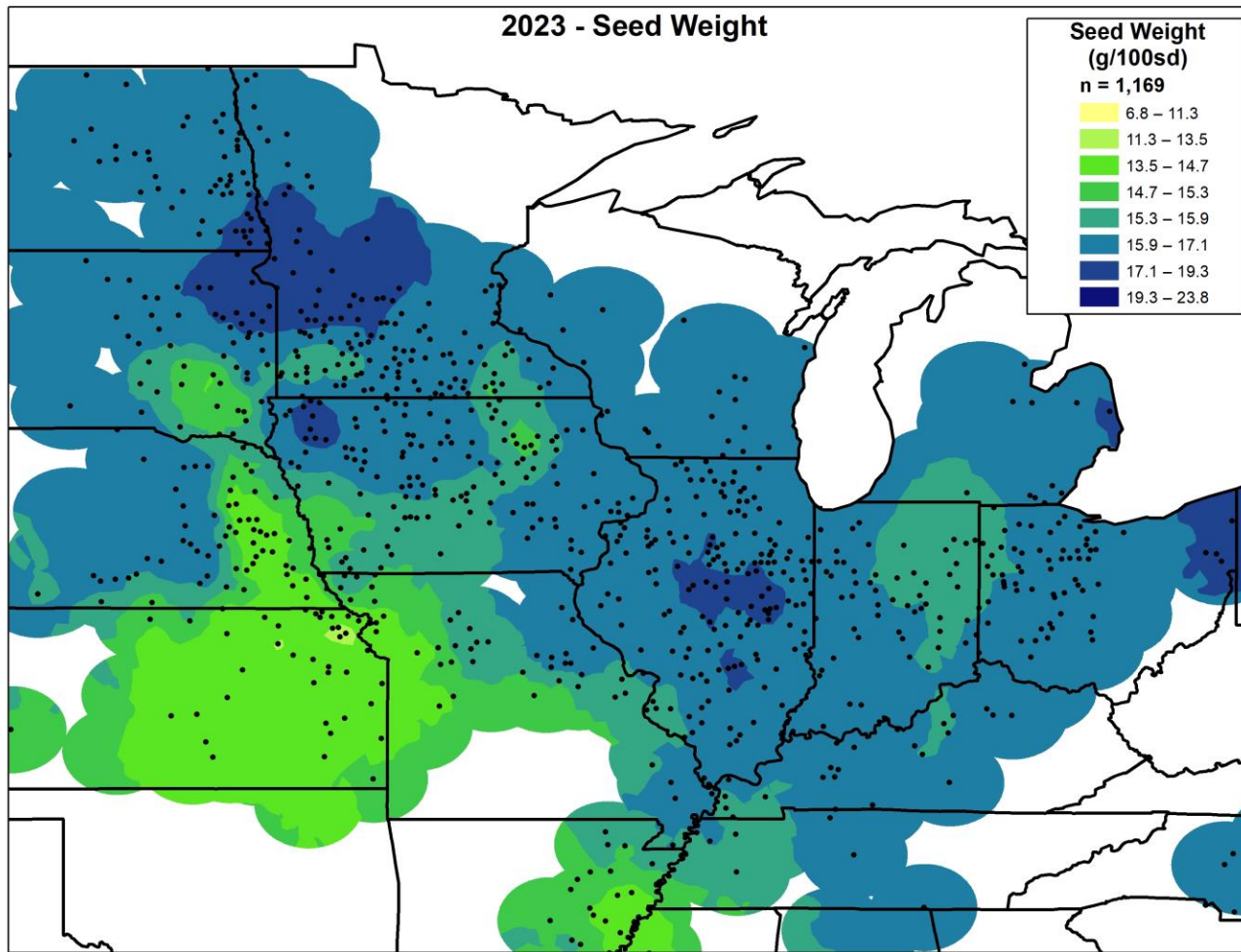


PHYSICAL CHARACTERISTICS

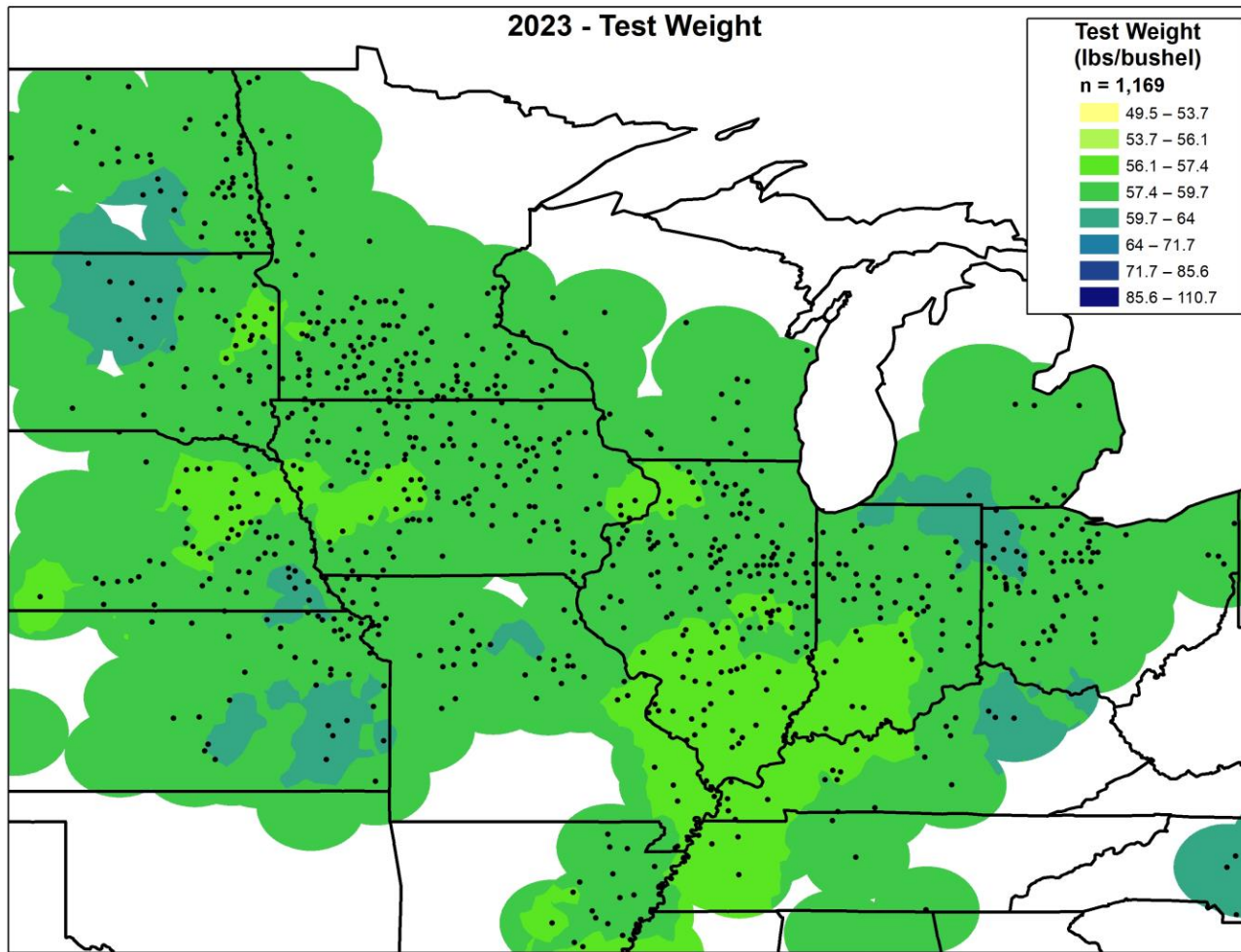
2023 - Incoming Moisture (%)



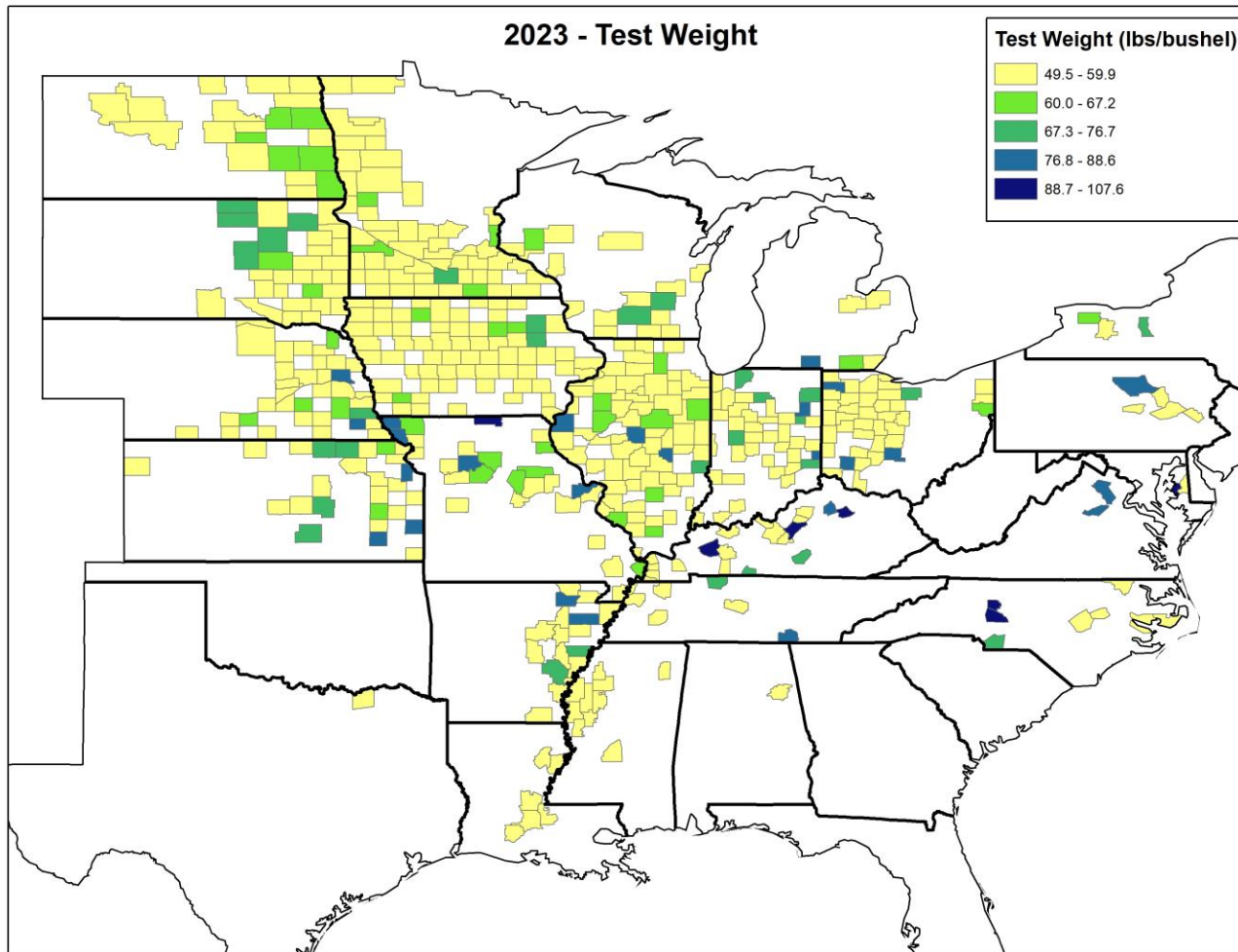
2023 - Seed Weight



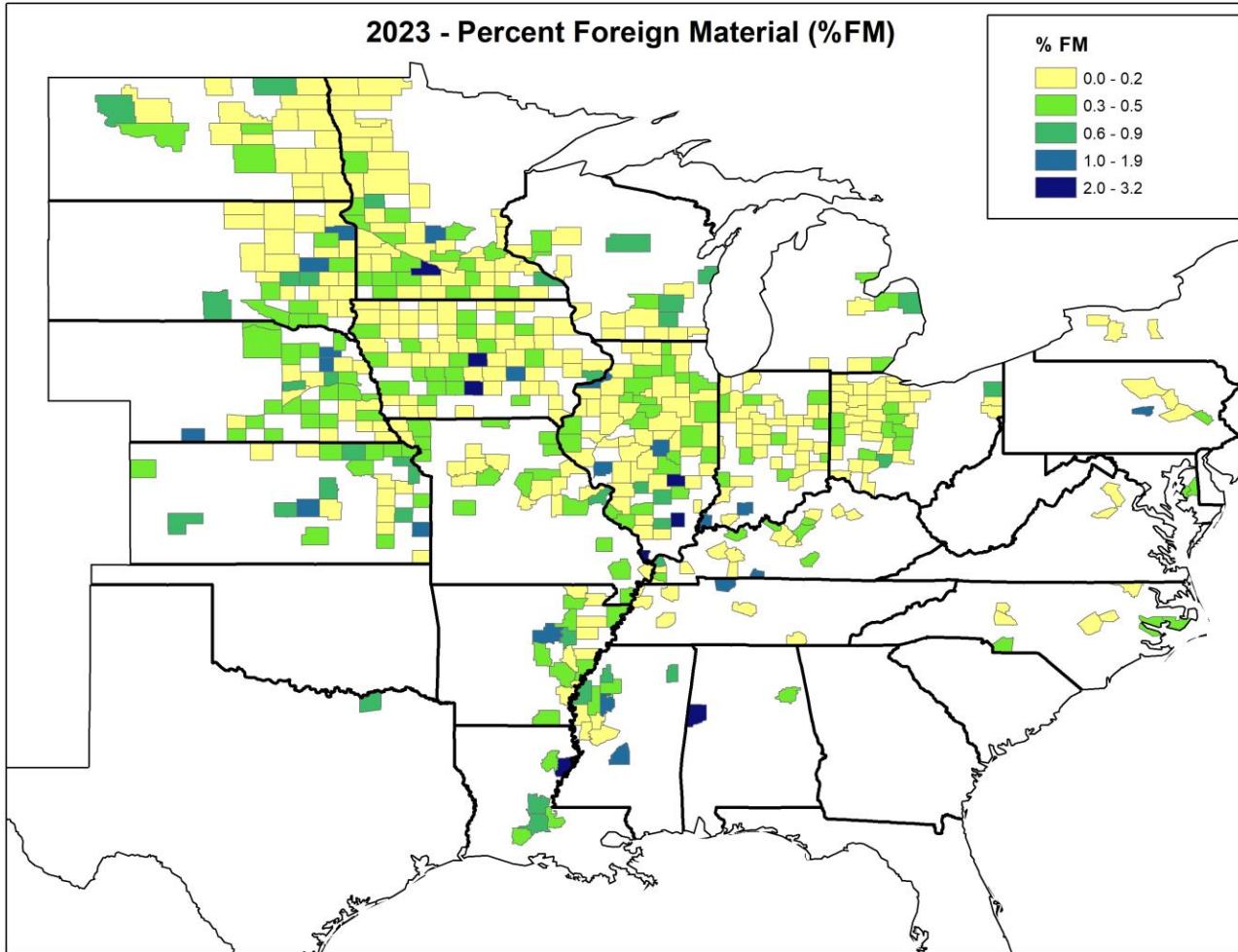
2023 - Test Weight



2023 - Test Weight



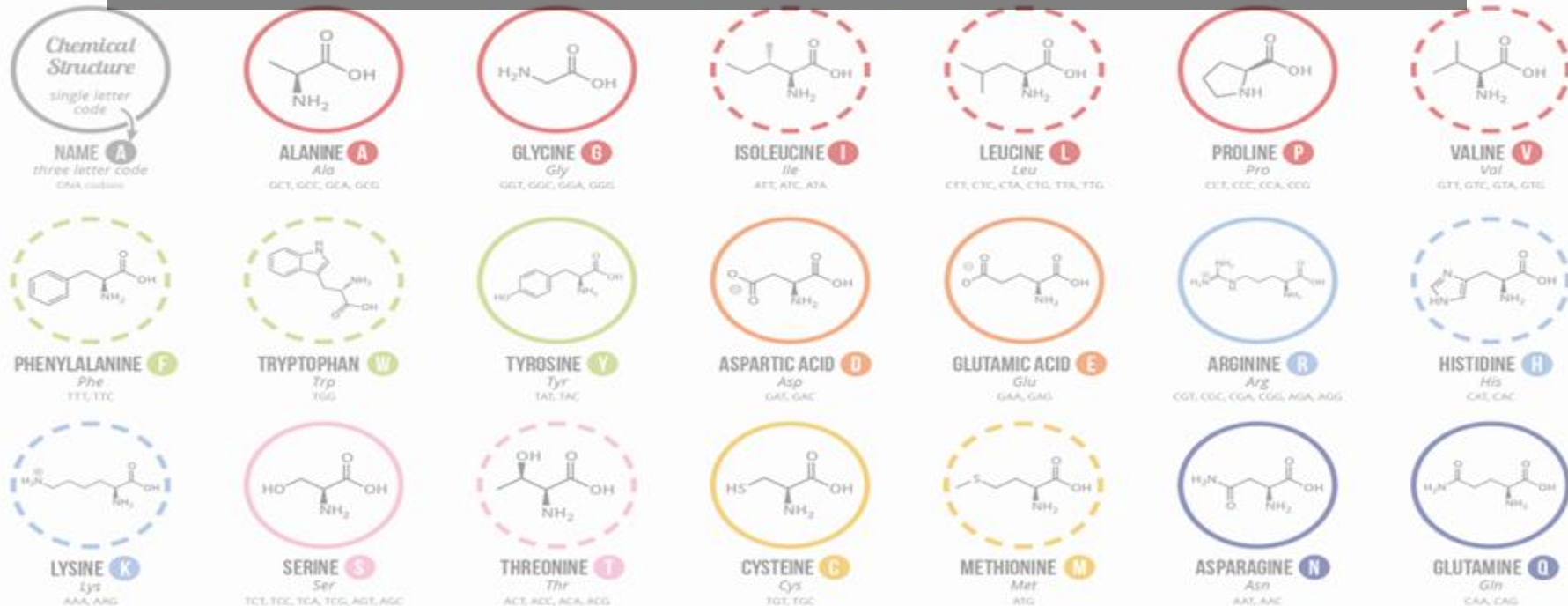
2023 - Percent Foreign Material (%FM)



BETTER MEASURES OF QUALITY:

AMINO ACIDS ARE THE BUILDING BLOCKS OF PROTEINS IN LIVING ORGANISMS. THERE ARE OVER 500 AMINO ACIDS FOUND IN NATURE - HOWEVER, THE HUMAN GENETIC CODE ONLY DIRECTLY ENCODES 20, 'ESSENTIAL' AMINO ACIDS. THE OTHER 30 'NON-ESSENTIAL' AMINO ACIDS CAN BE SYNTHESISED IN THE BODY.

Chart Key: ● ALIPHATIC ● AROMATIC ● ACIDIC ● BASIC ● HYDROPHOBIC ● HYDROPHILIC ● SULFONIC ● AMIDIC ○ NON-ESSENTIAL ○ ESSENTIAL



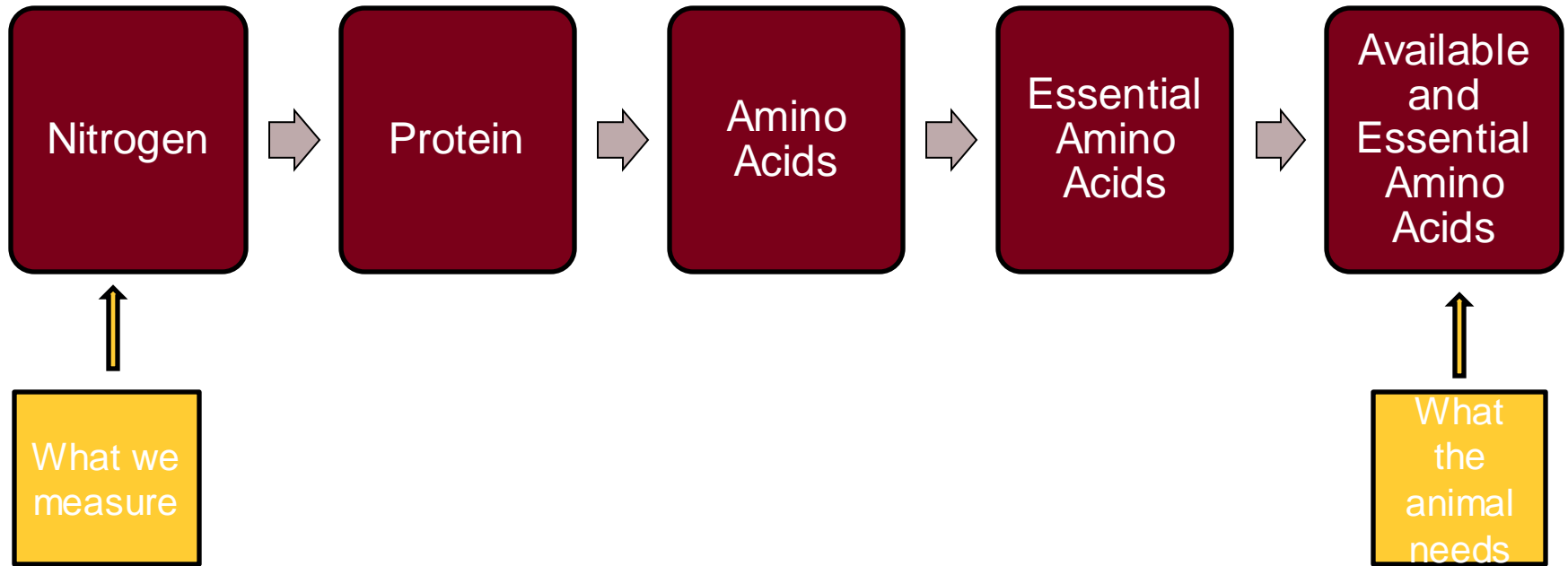
Note: This chart only shows those amino acids for which the human genetic code directly codes for. Selenocysteine is often referred to as the 21st amino acid, but is encoded in a special manner. In some cases, distinguishing between asparagine/aspartic acid and glutamine/glutamic acid is difficult. In these cases, the codes asx (B) and glx (Z) are respectively used.

Better measures of the value of soybeans

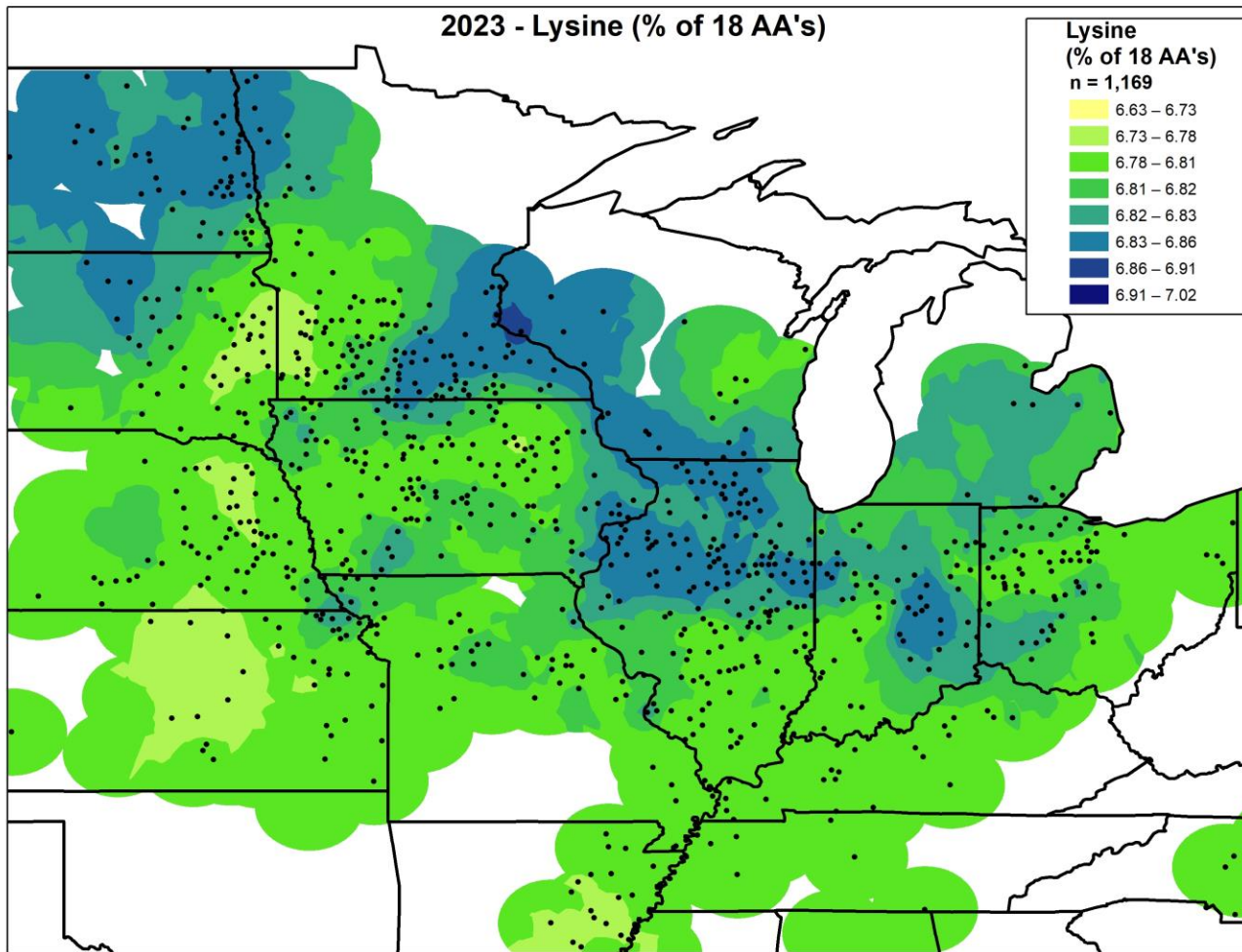
- Soybean is a complex and variable product/commodity.
- Traditional grading systems do not correlate well with actual value.
- Soybeans & soybean meal have been valued primarily on an indirect measure of protein – ‘crude protein’
- Crude protein is probably not the best measure of a soybean (or a soybean meal’s) value
- The first purchasers who can find hidden value will capture additional profit.

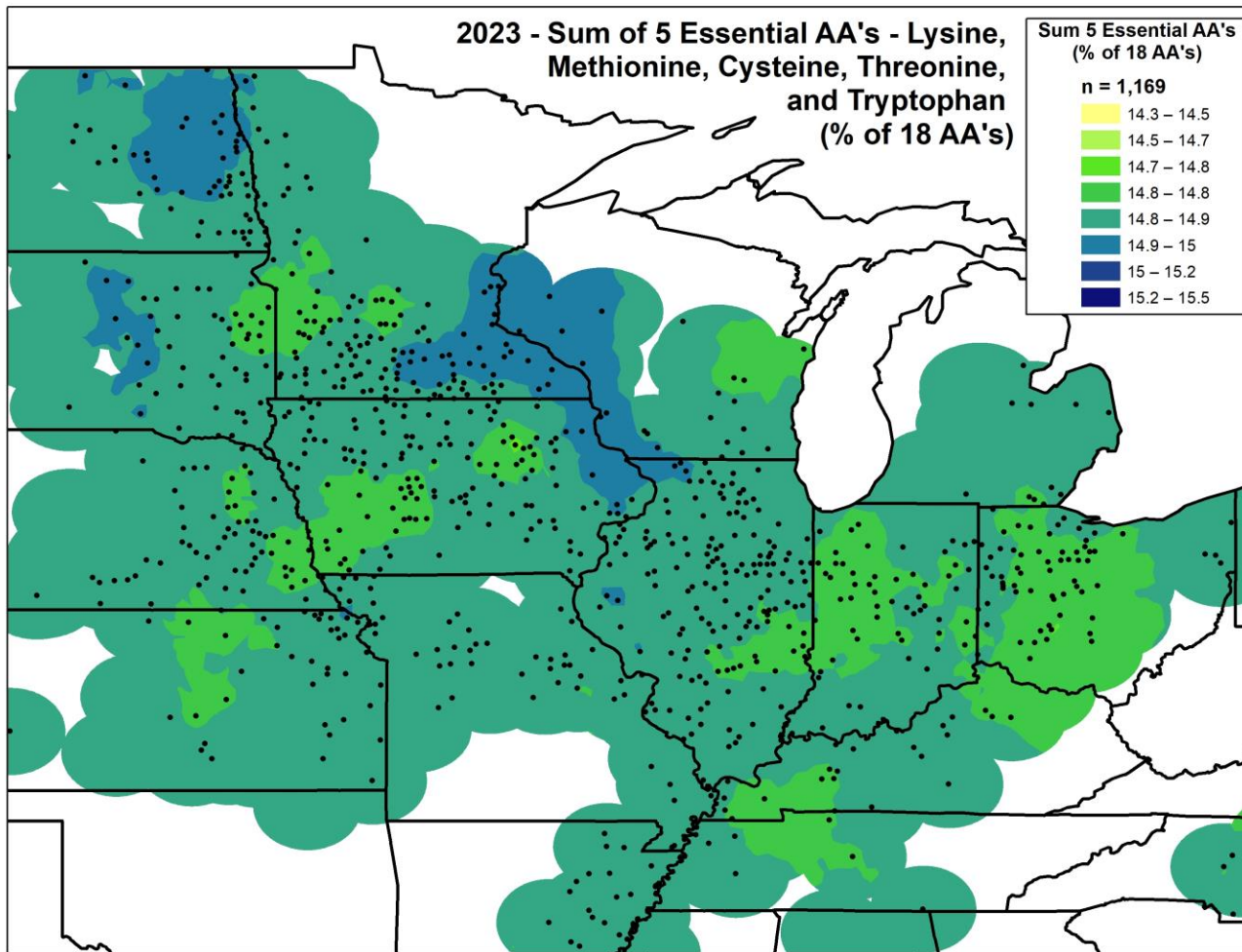


CP (N) is an indirect measure of quality



2023 - Lysine (% of 18 AA's)





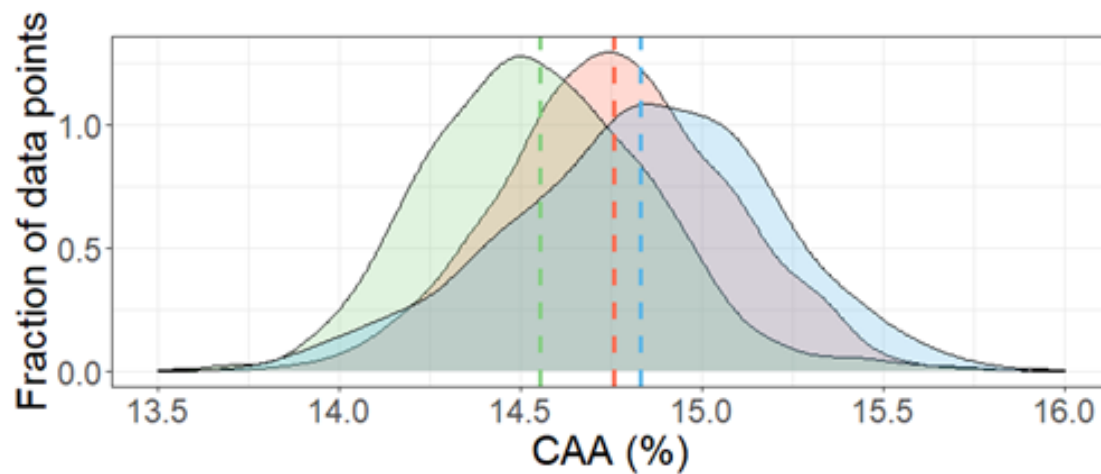
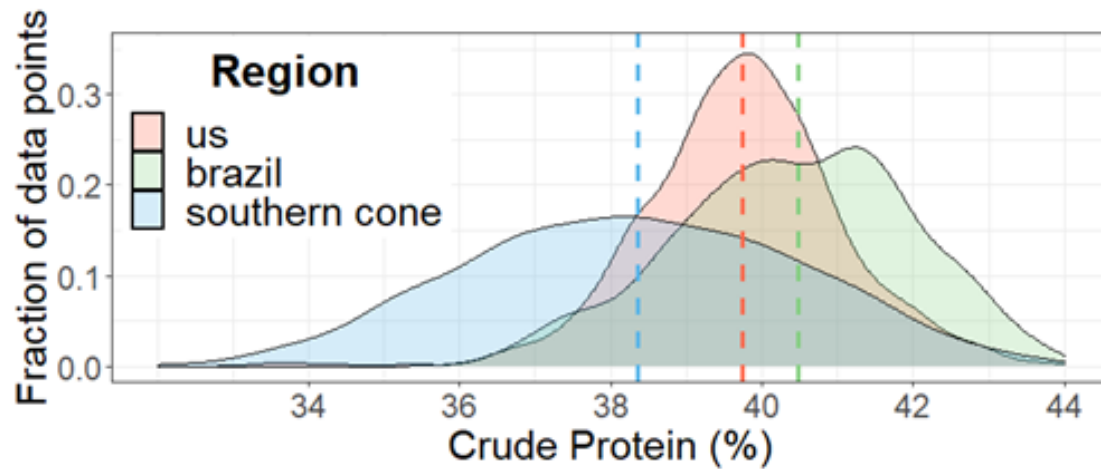
Western Hemisphere quality and production capacity of soybean protein

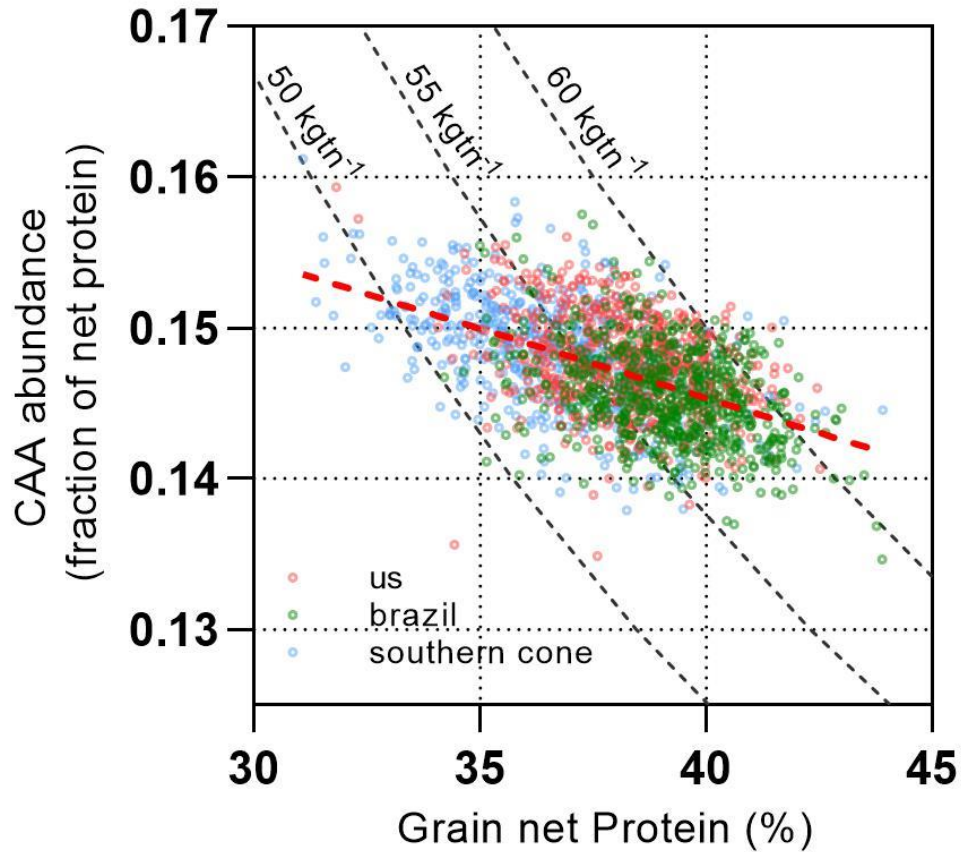
Anibal Cerrudo^{1,2*}, Jill Miller-Garvin¹ and Seth L. Naeve¹

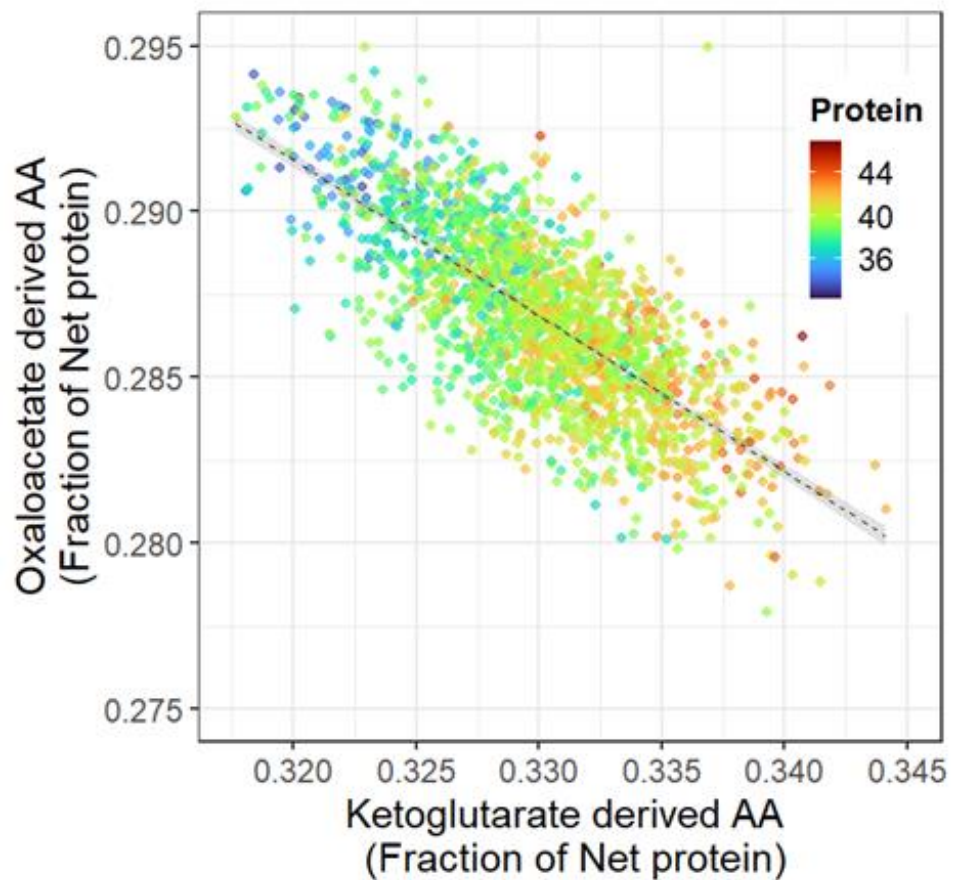
¹Department of Agronomy and Plant Genetics, University of Minnesota, Saint Paul, MN, United States,

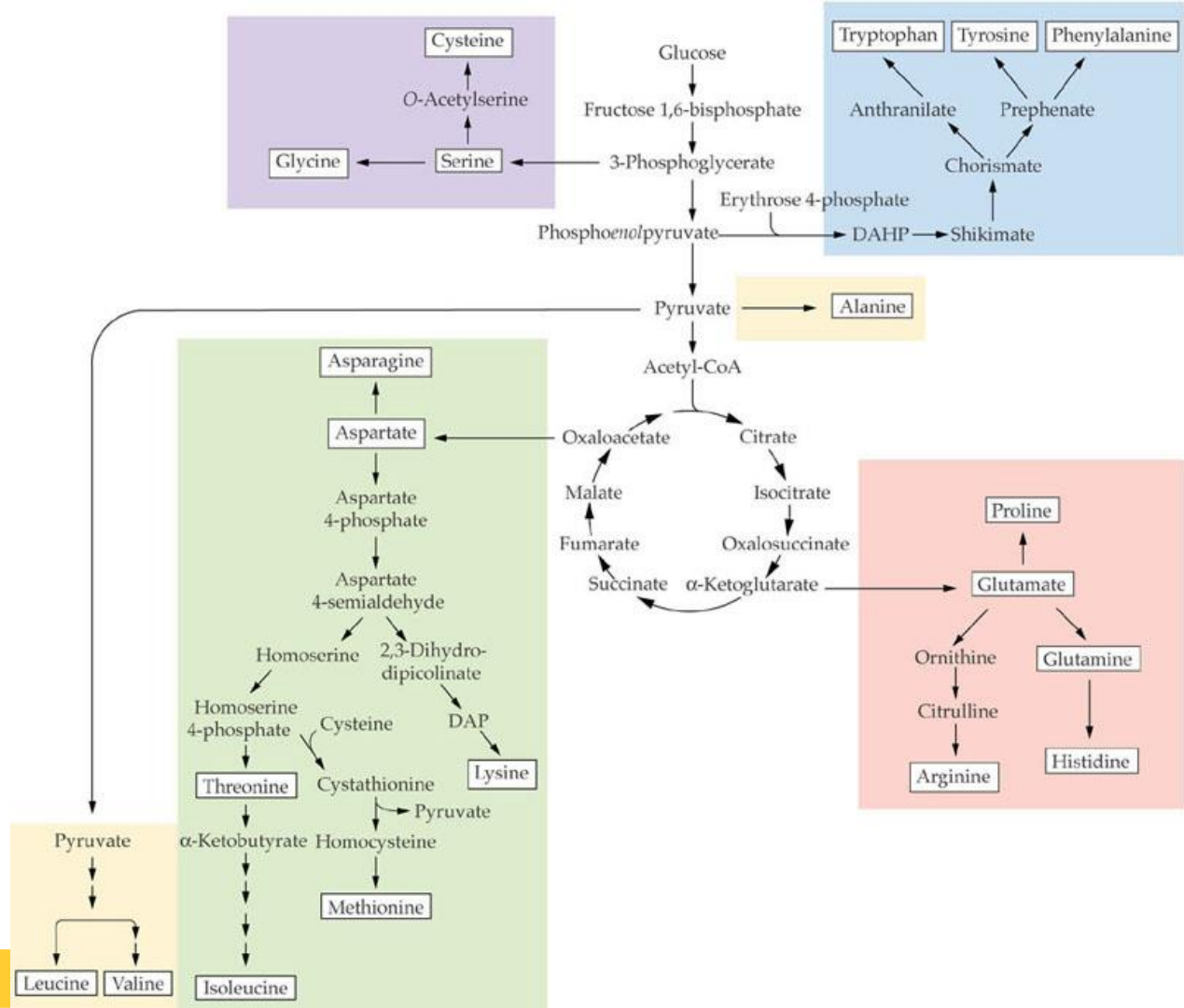
²Ecofisiología de cultivos, Unidad Integrada Balcarce (INTA-FCA), Balcarce, Argentina



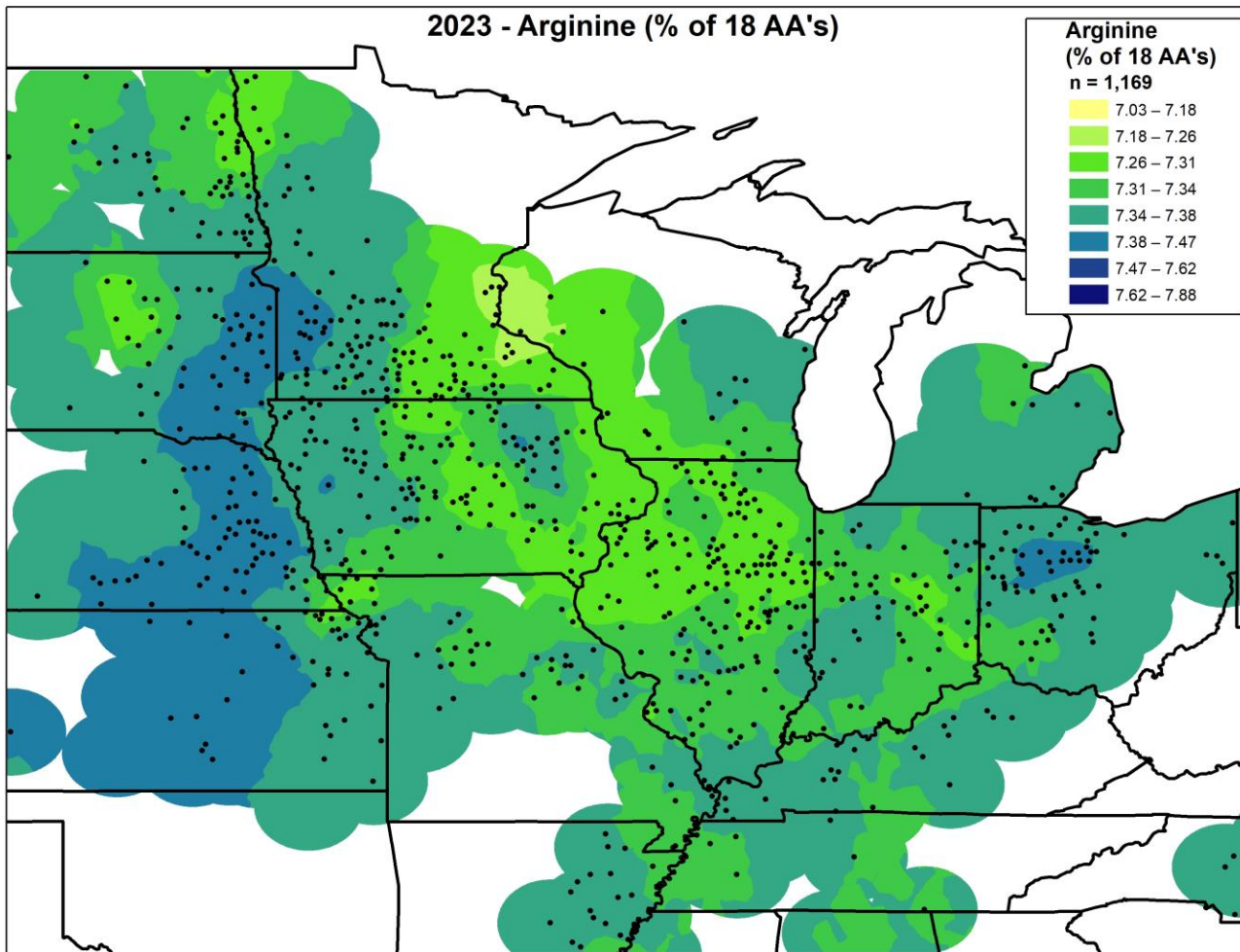




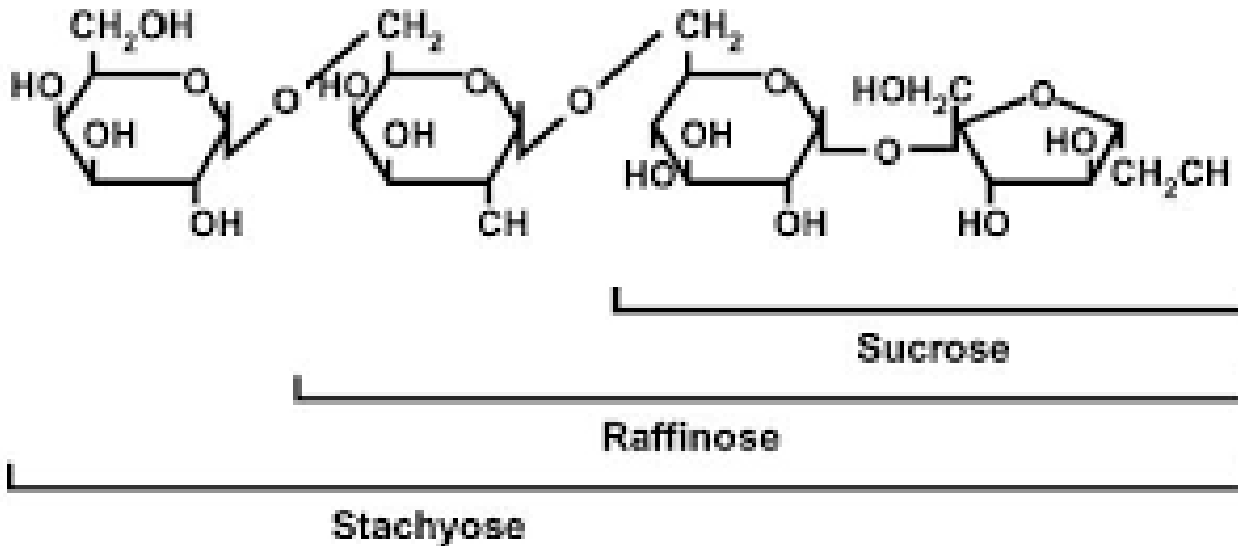




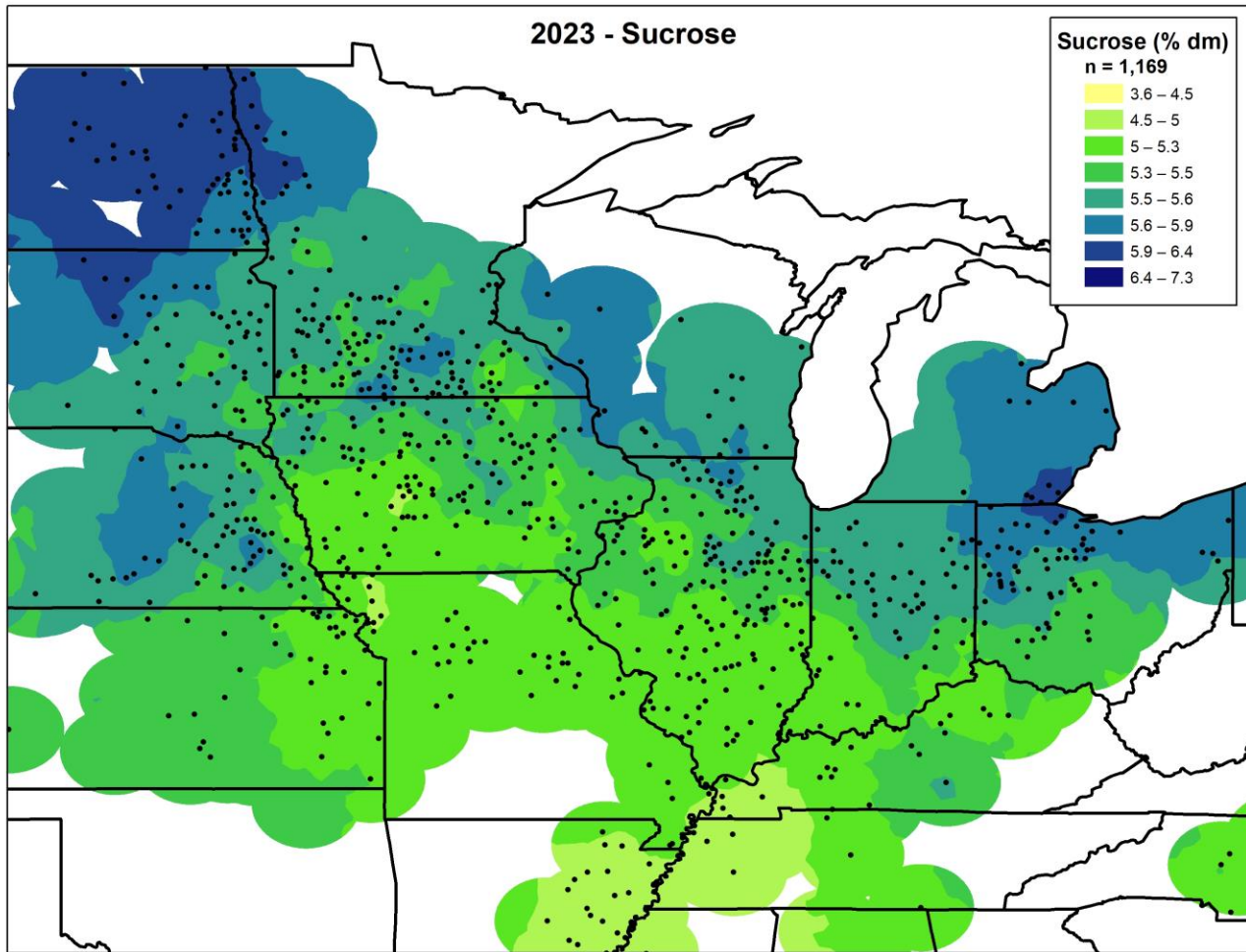
2023 - Arginine (% of 18 AA's)

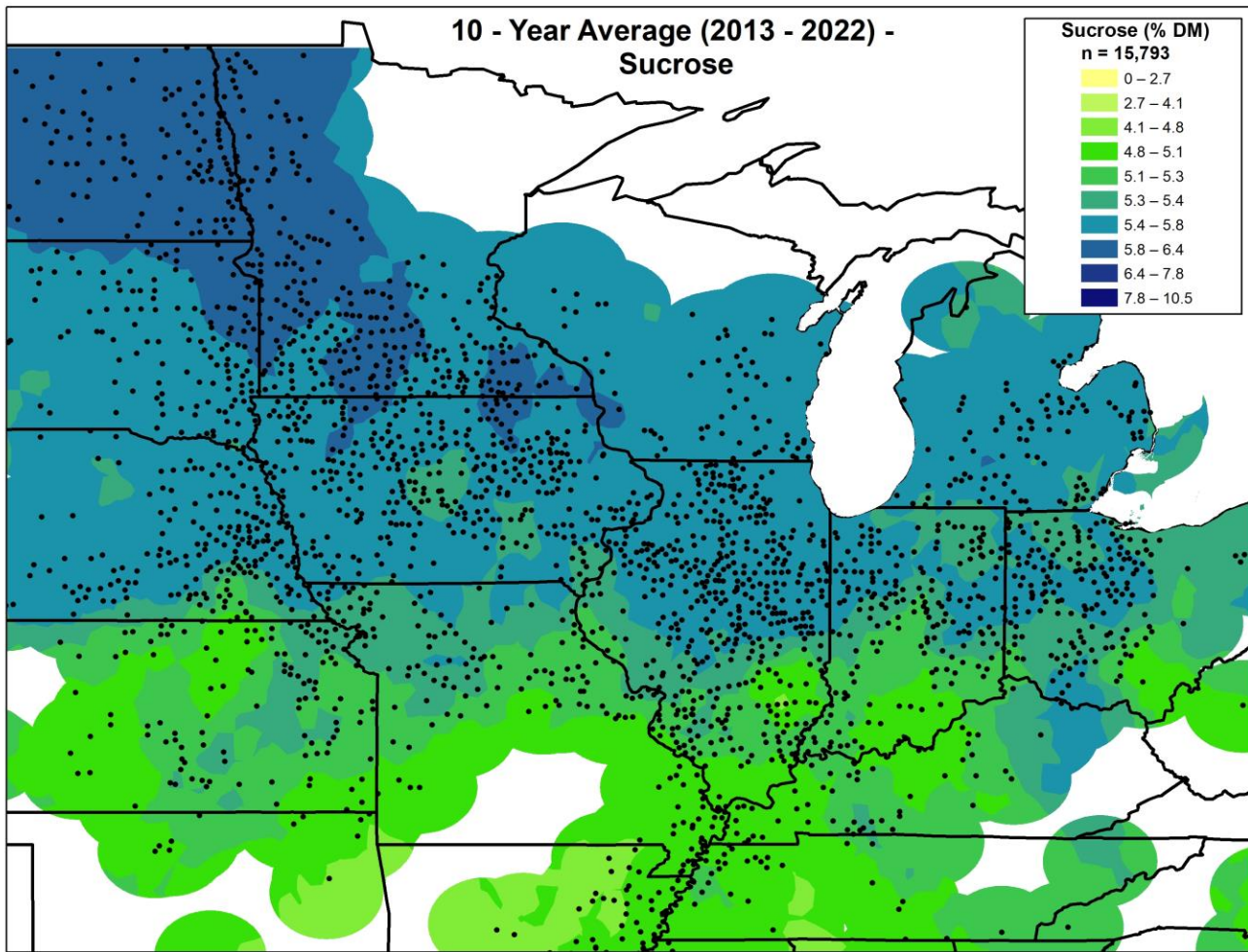


BETTER MEASURES OF QUALITY: SOLUBLE SUGARS



2023 - Sucrose





2023 Summary

- A severe and chronic drought affected soybean production across most of the major soybean states in 2023.
- Despite exceedingly challenging production environments, U.S. farmers will still produce a crop that averages 3.3 MT per ha. (~50 bushels per acre).
- Average composition of the crop is very similar to 2022.
- One could consider this an 'Oil Year.'
- Drier than normal soybeans will increase both protein and oil yields per ton due to increased 'as-is' values.
- Protein is not a good indicator of soybean quality or value



This work was made possible only through the generous support of the United Soybean Board



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