

## The Effects of TerraNu Fertilizers on Corn and Soybean Production in Renville County, ND

### Trial Design

In 2023, the efficacy of TerraNu fertilizers was assessed on corn and soybean fields in Renville County, ND. TerraNu products were applied as a replacement for traditional phosphorus fertilizers at a reduced application rate compared to the competitive fertilizers (table 1). Both the corn and soybean treatment and control fields were managed with grower standard crop protection products.

**Table 1:** Applied fertilizer rates for 2023 TerraNu trials in Renville County, ND

Crop	Field	Applied Fertilizer	Applied Phosphorus
Soybeans	Control	70 Lb/A MAP (11-52-0) 60 Lb/A SOP	36.4
Soybeans	Treatment	35 Lb/A TN Ignite 35 Lb/A MAP (11-52-0) 60 Lb/A SOP	26.6
Corn	Control	70 Lb/A MAP (11-52-0) 60 Lb/A SOP	36.4
Corn	Treatment	35 Lb/A TN Ignite 35 Lb/A MAP (11-52-0) 60 Lb/A SOP	26.6

### Corn Trial:

The treatment and control field's fertilizers were banded with a shank style strip till implement on 22-inch rows. Standard crop protection practices were applied to both fields. The TerraNu treatment field was planted on 5/11/2023 with an RM 81 VT Double Pro RIB Complete Corn Hybrid at a population averaging 31,966.95 seeds per acre. The control field was planted on 5/16/2023. 16.7 acres of the control field was planted with an RM 81 VT Double Pro RIB Complete Corn Hybrid at a population averaging 29935.48 seeds per acre. The remaining 104.8 acres of the control field was planted on 5/16/2023 with an RM 79 VT Double Pro RIB Complete Corn Hybrid at a population averaging 26059.13 seeds per acre.

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## Soybean Trial:

Fertilizer placement on the soybean control field was performed with an air drill at 15 inch spacing. The fertilizer placement on the treatment field was with a shank style strip till implement on 22 inch spacing. A Mustang Hybrid XF01223 was planted on both the control and the treatment fields. The target planting population on the treatment field was 150,000 seeds per acre and 140,000 seeds per acre on the control field.

In season soil and plant tissue data were collected on 7/17/2023. Soil and plant tissue samples were analyzed with standard soil and plant tissue testing methodologies via Midwest Laboratories. For a more comprehensive assessment of nutrient release and plant uptake, soil samples were also analyzed using saturated paste testing methodologies.

## In-Season Soil and Plant Tissue Sample Results

### Corn Trial:

- Nitrate nitrogen increased 89% in the soil solution and 12% in the plant tissue in the treatment versus the control field.
- Soil pH's for both the control and the treatment fields were observed to be highly alkaline, averaging 8.3. In the highly alkaline soil environment, the treatment field bi-carbonate soil phosphorus test increased 177% and 21% in the plant tissue versus the control.
- Soil potassium increased 15.9%, soluble potassium increased 74%, and plant tissue potassium increased 7% in the treatment field versus the control.
- Soil sulfur increased 75.9%, soluble sulfur increased 64%, and plant tissue increased 49% in the treatment versus the control field.
- Soil calcium increased 10.6%, soluble calcium increased 117%, and plant tissue calcium increased 7% in the treatment versus the control field.
- Soil zinc levels increased 11.8% in the treatment field versus the control field.
- Soluble boron increased 13% in the soil and 31% in the plant tissue in the treatment versus the control field.
- Plant tissue Manganese increased 62% in the treatment versus the control field.
- Plant tissue Copper increased 17% in the treatment versus the control field.
- Plant tissue Iron increased 17% in the treatment versus the control field.

## In-Season Soil and Plant Tissue Sample Results (Continued)

### Soybean Trial:

- Nitrate nitrogen increased 121% in the soil solution in the treatment field. Soil and plant tissue nitrogen levels did not report increased levels in the treatment field.
- Bi-carbonate soil phosphorus increased 11.1% in the treatment field and 16% in the treatment field’s plant tissue.
- Soil potassium increased 27.1%, soluble potassium increased 79%, and plant tissue potassium increased 1% in the treatment field versus the control.

### Yield Data

2023 yield data comparing the treatment versus the control is summarized in Table 2 (see below).

Corn yields increased 20 bushels per acre in the treatment field vs. the control. The predominate yield increases were reported in the Hamlet-Souris Tonka complex and Wyndmere fine sandy loam soil types.

Soybean yields increased 6.84 bushels per acre in the treatment field vs. the control. The predominate yield increases in the soybean trials were on the Wyndmere fine sandy loam soil type.

**Table 2:** Yields by soil type from 2023 TerraNu Trial, Renville, ND

Soybeans - Average Yield (bu/ac)					
Soil Type	Soil Name	Control	TerraNu	TerraNu Advantage	% Change
F158A	Hamlet-Souris-Tonka complex; 0 to 3 percent slopes	32.23	39.29	7.06	22%
F100A	Hamerly-Tonka complex; 0 to 3 percent slopes	31.24	30.14	-1.1	-4%
F329A	Wyndmere fine sandy loam; 0 to 2 percent slopes	30.92	45.47	14.55	47%
F25A	Marysland loam; 0 to 1 percent slopes	12.41	-	-	-
F366A	Hecla loamy fine sand; 0 to 2 percent slopes	-	30.05	-	-
	<b>TOTAL</b>	26.7	36.24	<b>6.84</b>	<b>22%</b>

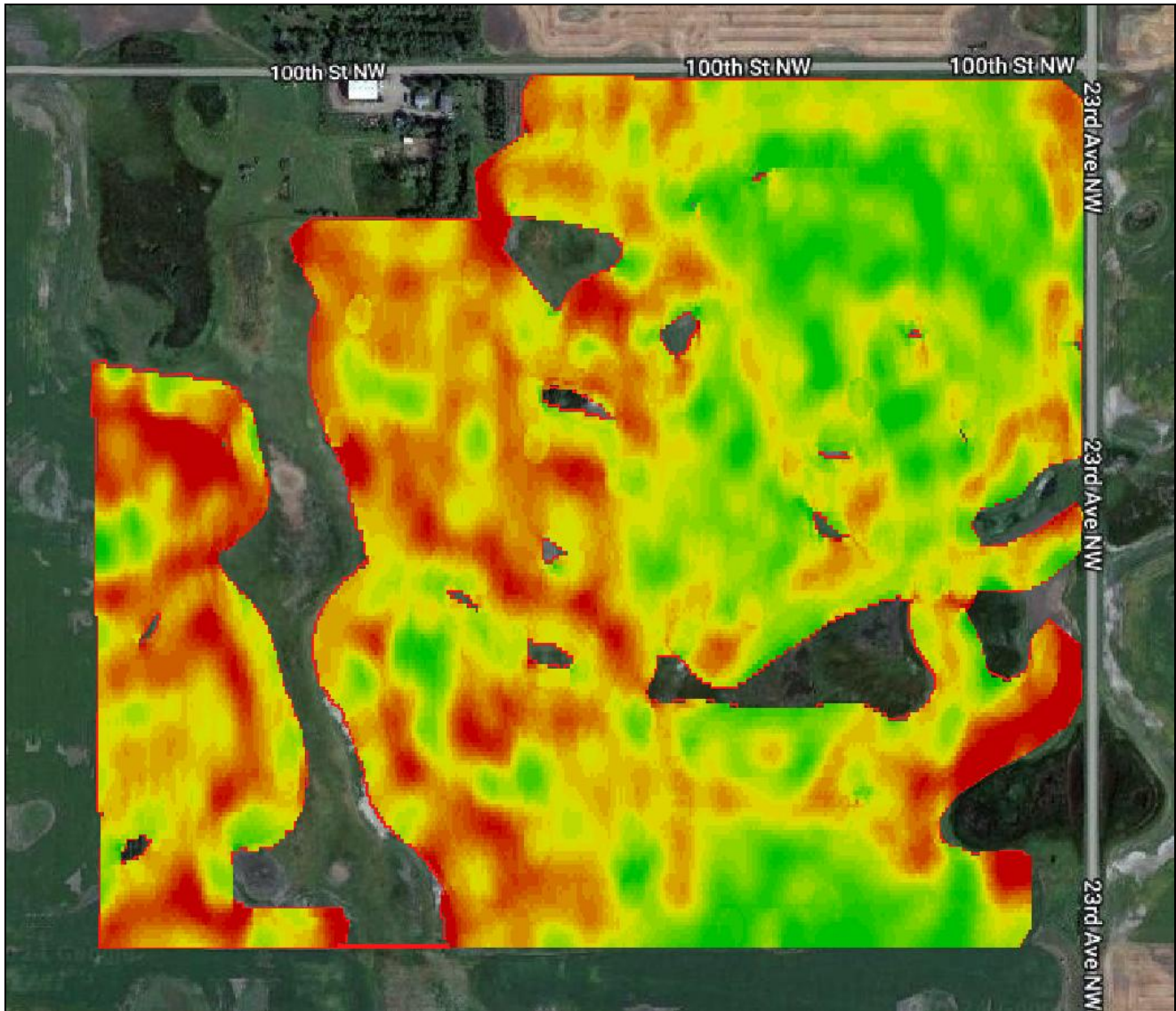
Corn - Average Yield (bu/ac)					
Soil Type	Soil Name	Control	TerraNu	TerraNu Advantage	% Change
F158A	Hamlet-Souris-Tonka complex; 0 to 3 percent slopes	114.12	134.4	20.28	18%
F100A	Hamerly-Tonka complex; 0 to 3 percent slopes	94.38	110.12	15.74	17%
F731A	Swenoda fine sandy loam; 0 to 3 percent slopes	91.53	-	-	-
F376A	Embden fine sandy loam; 0 to 2 percent slopes	85.89	-	-	-
F329A	Wyndmere fine sandy loam; 0 to 2 percent slopes	82.4	108.93	26.53	32%
	<b>TOTAL</b>	93.66	117.82	<b>20.85</b>	<b>22%</b>

Boundary Area: 135.2 acre

Farm: Terranu Test  
Harvest Area: 119.5 acre

Field: Control Corn  
Harvest Date: 2023-10-16

2023 / Corn / Yield

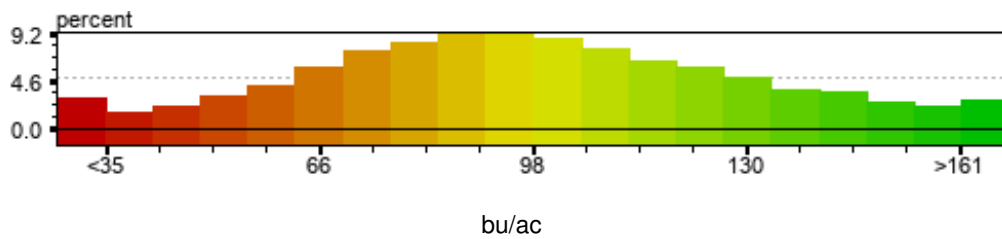


Minimum: 5.09 bu/ac

Maximum: 350.03 bu/ac

Average: 97.14 bu/ac

Total: 11611.1 bu

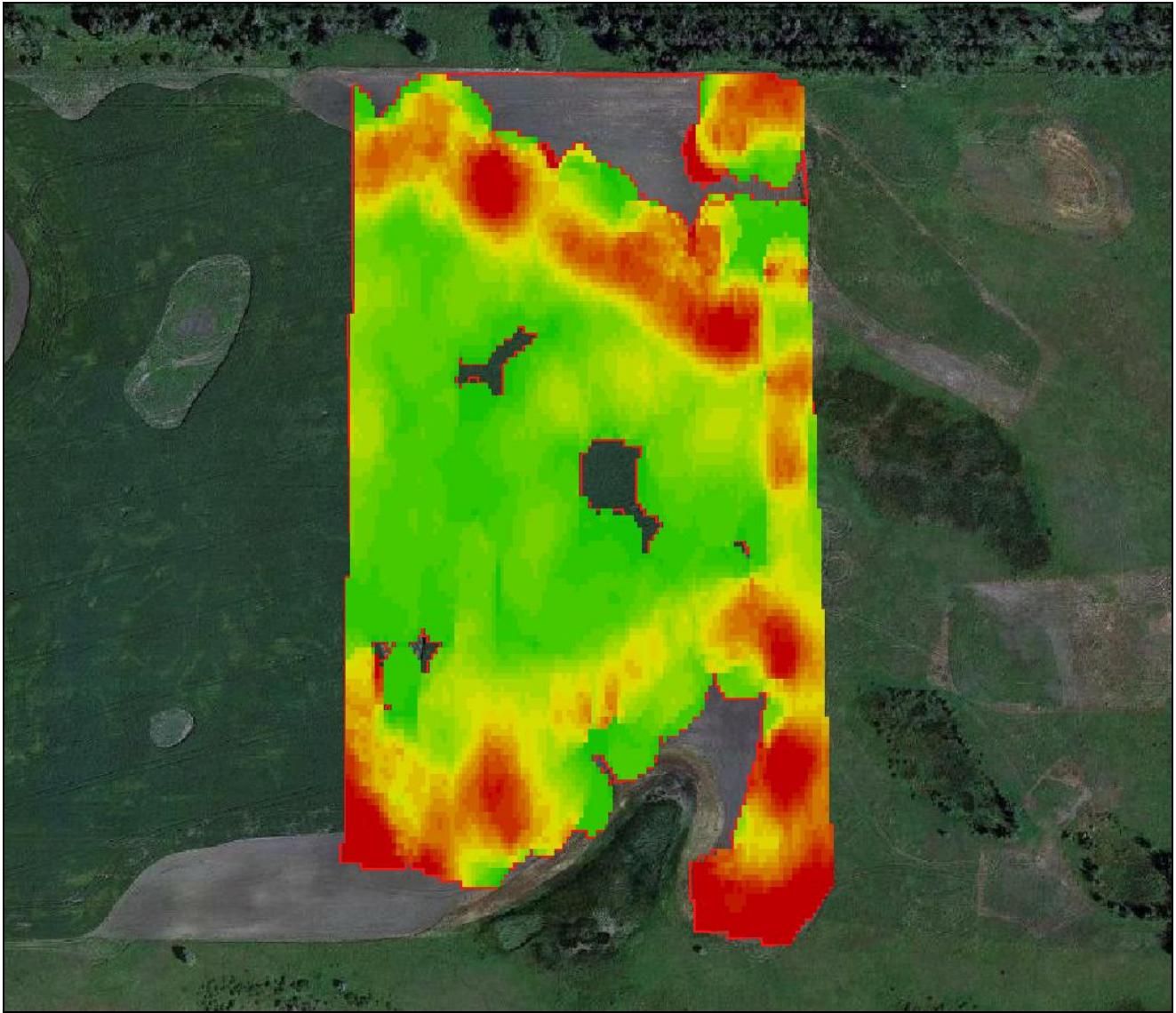


Boundary Area: 24.7 acre

Farm: Terranu Test  
Harvest Area: 14.7 acre

Field: Trial Corn  
Harvest Date: 2023-09-19

2023 / Corn / Yield

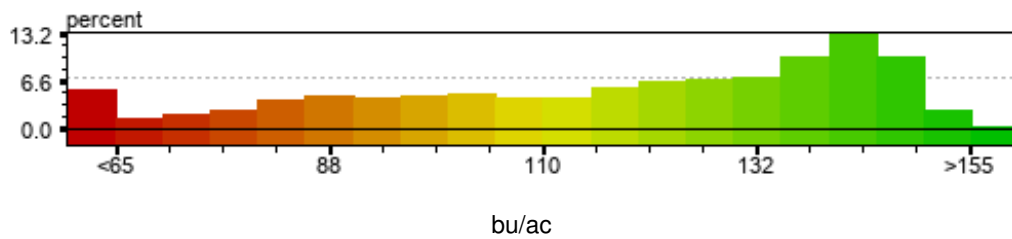


Minimum: 5.65 bu/ac

Maximum: 153.50 bu/ac

Average: 116.58 bu/ac

Total: 1711.4 bu

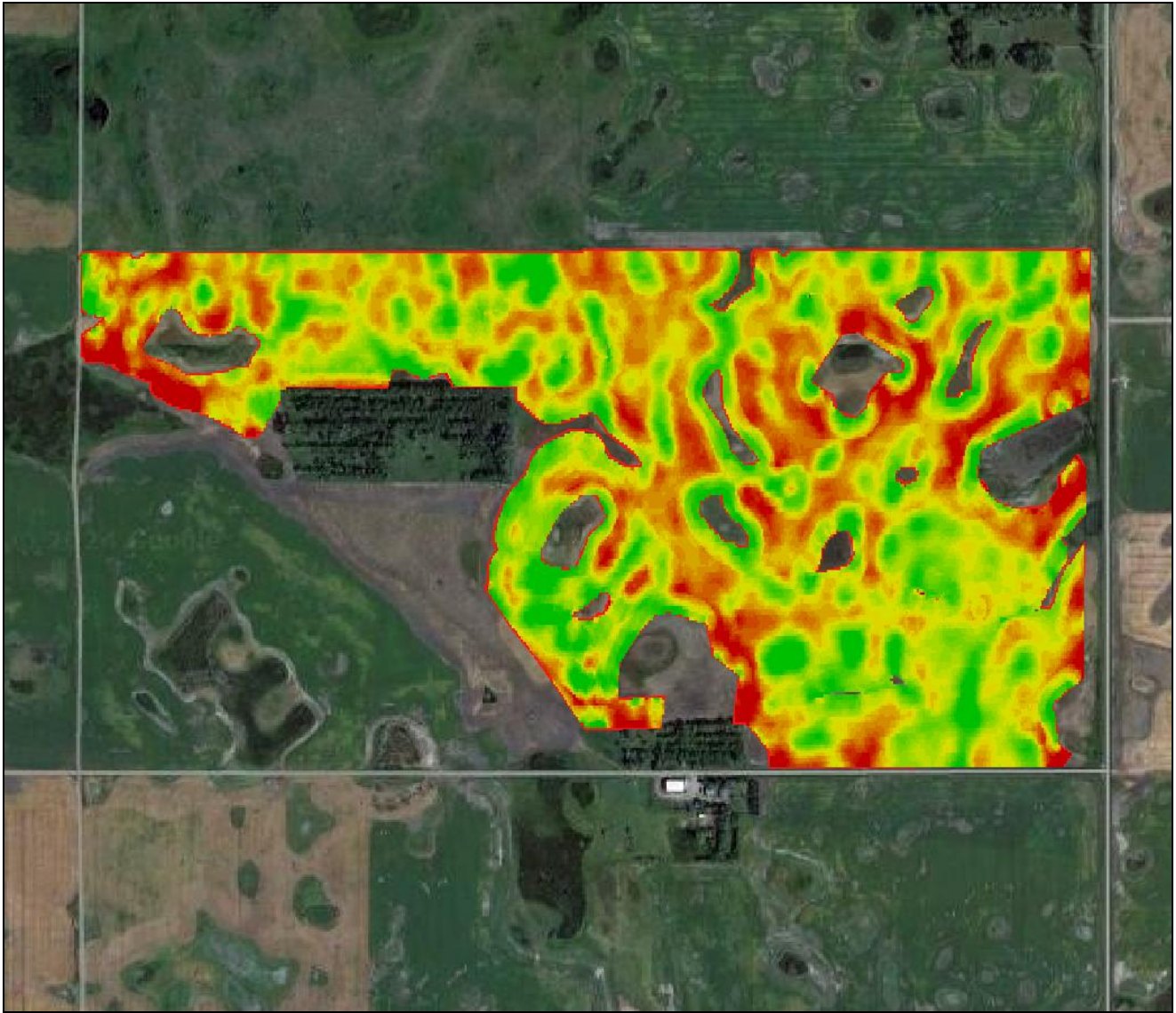


Boundary Area: 176.8 acre

Farm: Terranu Test  
Harvest Area: 176.8 acre

Field: Control Beans  
Harvest Date: 2023-09-29

2023 / Soybeans / Yield

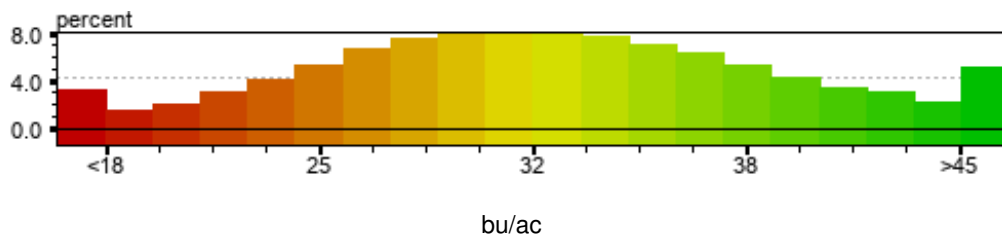


Minimum: 5.20 bu/ac

Maximum: 66.79 bu/ac

Average: 32.01 bu/ac

Total: 5660.6 bu

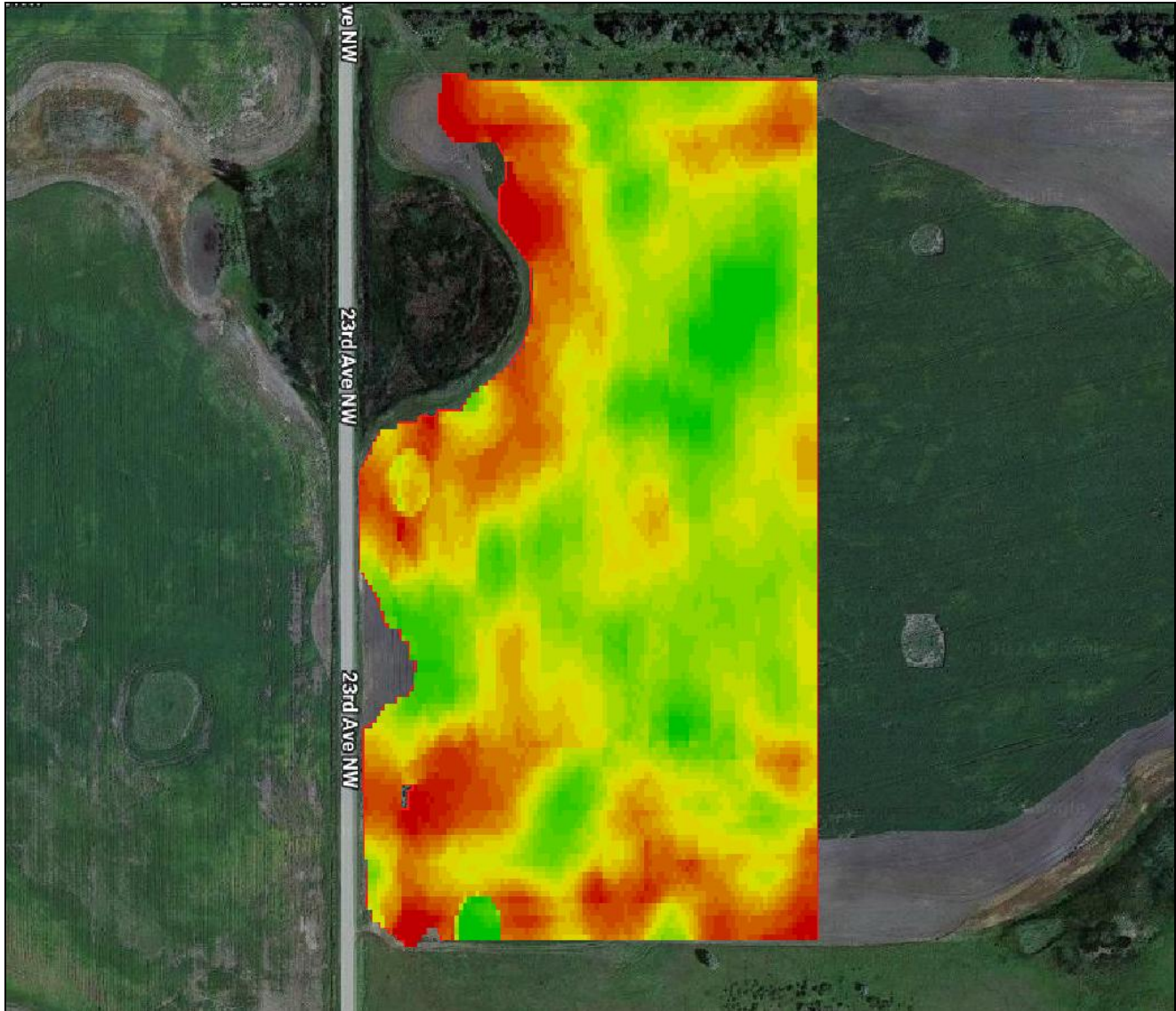


Boundary Area: 25.6 acre

Farm: Terranu Test  
Harvest Area: 25.6 acre

Field: Trial Beans  
Harvest Date: 2023-10-17

2023 / Soybeans / Yield



Minimum: 8.72 bu/ac

Maximum: 95.23 bu/ac

Average: 48.48 bu/ac

Total: 1242.1 bu

