

# Evaluation of soil health measurement tools by current and future farmers to demonstrate the benefits of sustainable practices



NORTH CENTRAL  
**SARE**



Sustainable Agriculture  
Research & Education

# Project Design

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## **Field A- Bakken**

- Corn, Soybean, Oats Rotation
- Cover Crop planted after grain harvest
- Cover crop harvested in fall or spring
- No-till

## **Soil Health Measurements**

- Soil Samples each year
- Earth Scout soil monitoring

## **Data Digestion and Dissemination**

- High School Students
- Local Farmer Soil Health Group
- NRCS Workshop

## **Field B- Nigon**

- Corn on Corn Rotation
- Conventional tillage completed after harvest and in spring

## **Soil Analyses**

- Haney Tests
- Soil Health Score
- Organic N-Inorganic N
- Soil Respiration

## ☐ Earth Scout

In ground probes

Solar powered

Real-time monitoring

Data viewed via an app

Monitor soil moisture and temperature

Monitor air temperature

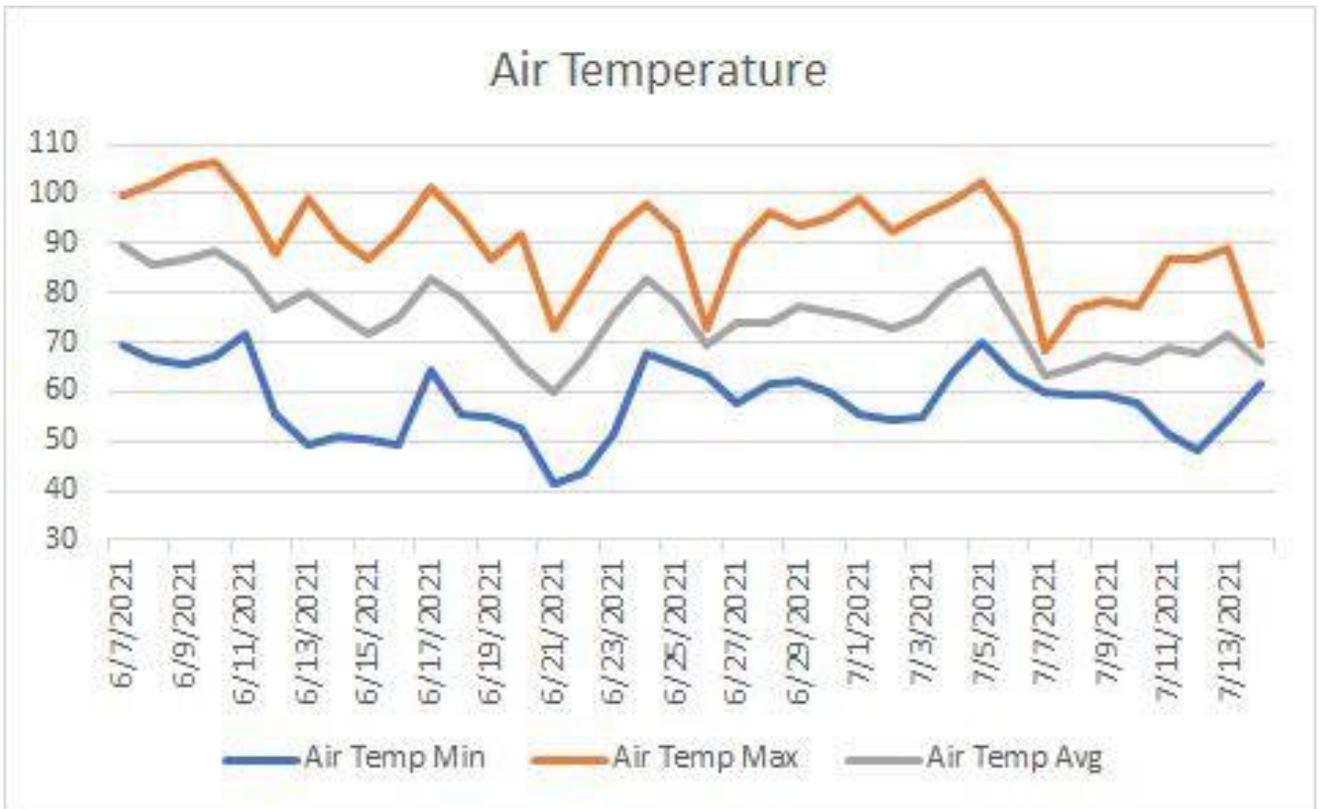
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Crop: Corn  
 Plant: 5/1/21  
 EarthScout data: 6/7-7/15

**EARTHS 000020**

Daily Air Temperature:

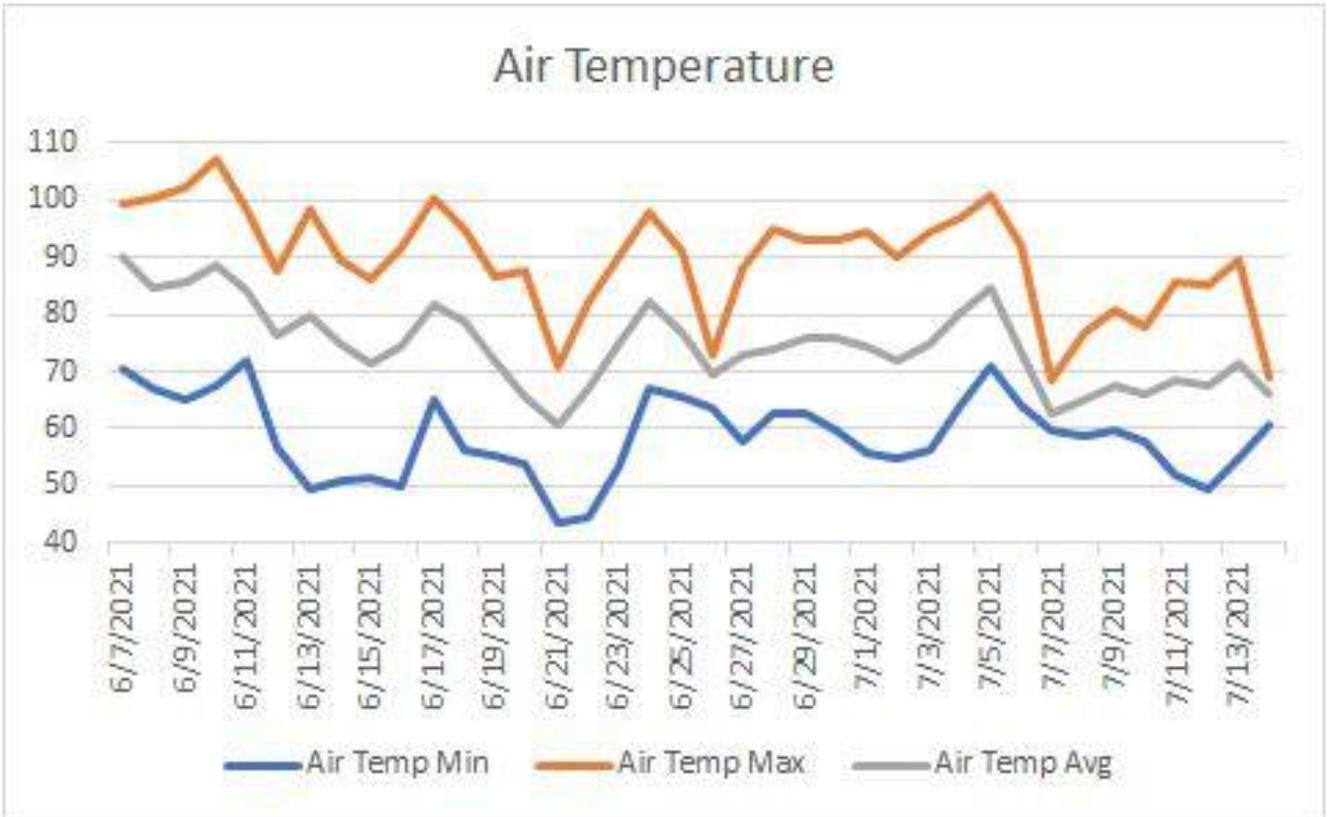


Heat stress normally occurs when temperatures rise above 86 degrees with dry soil conditions or 92 degrees with adequate soil moisture. Stress due to high temperatures before pollination can lower the potential amount of kernels per row. Heat stress paired with water stress right after tassel can cause silks to dessicate leading to low pollination rates. The second week of June came with temperature above 100 degrees multiple days. The second week of July was the coolest 10 days so far this season with temperatures in the upper 60's.

Crop: Corn  
 Plant: 5/1/21  
 EarthScout data: 6/7-7/15

**EARTHS 000022**

Daily Air Temperature:

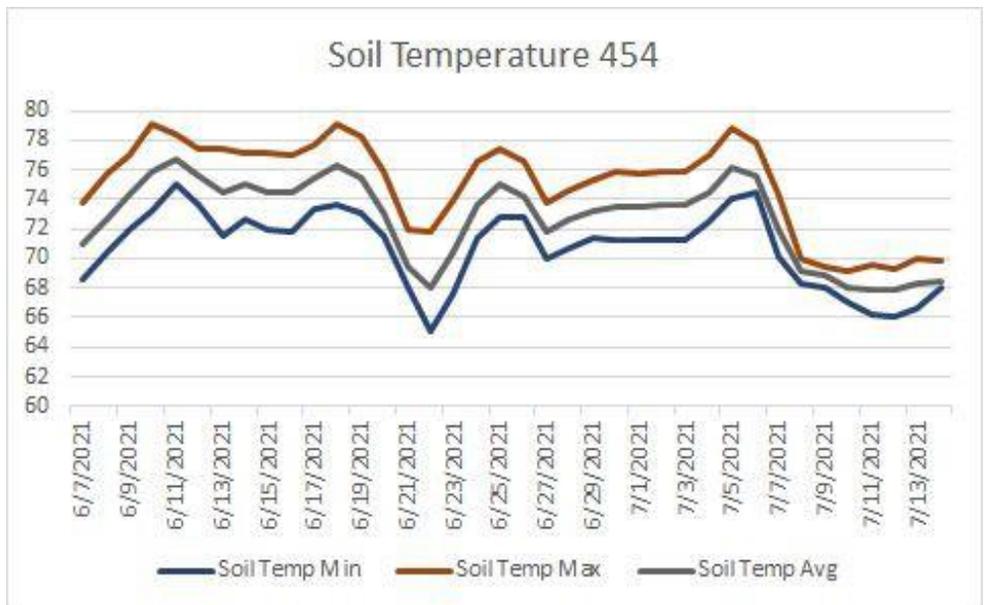
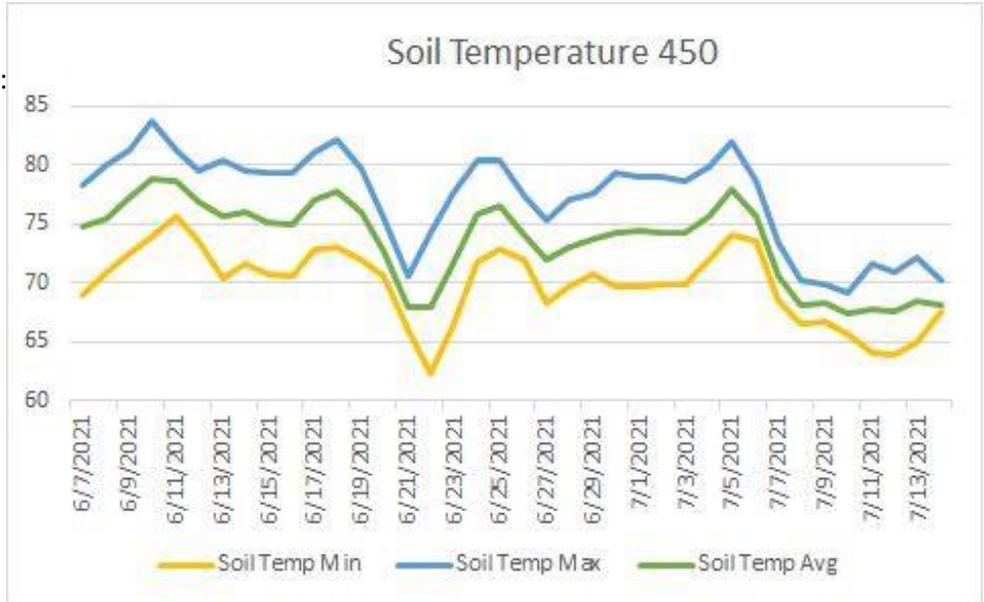


Air temperature at this field has trended above 100 in the second week of June and had a cooling event around June 20 lasting three days. The most recent cool down occurred July 6th-July 11th.

Crop: Corn  
 Plant: 5/1/21  
 EarthScout data: 6/7-7/15

**EARTHS 000020**

Daily Soil Temperature:

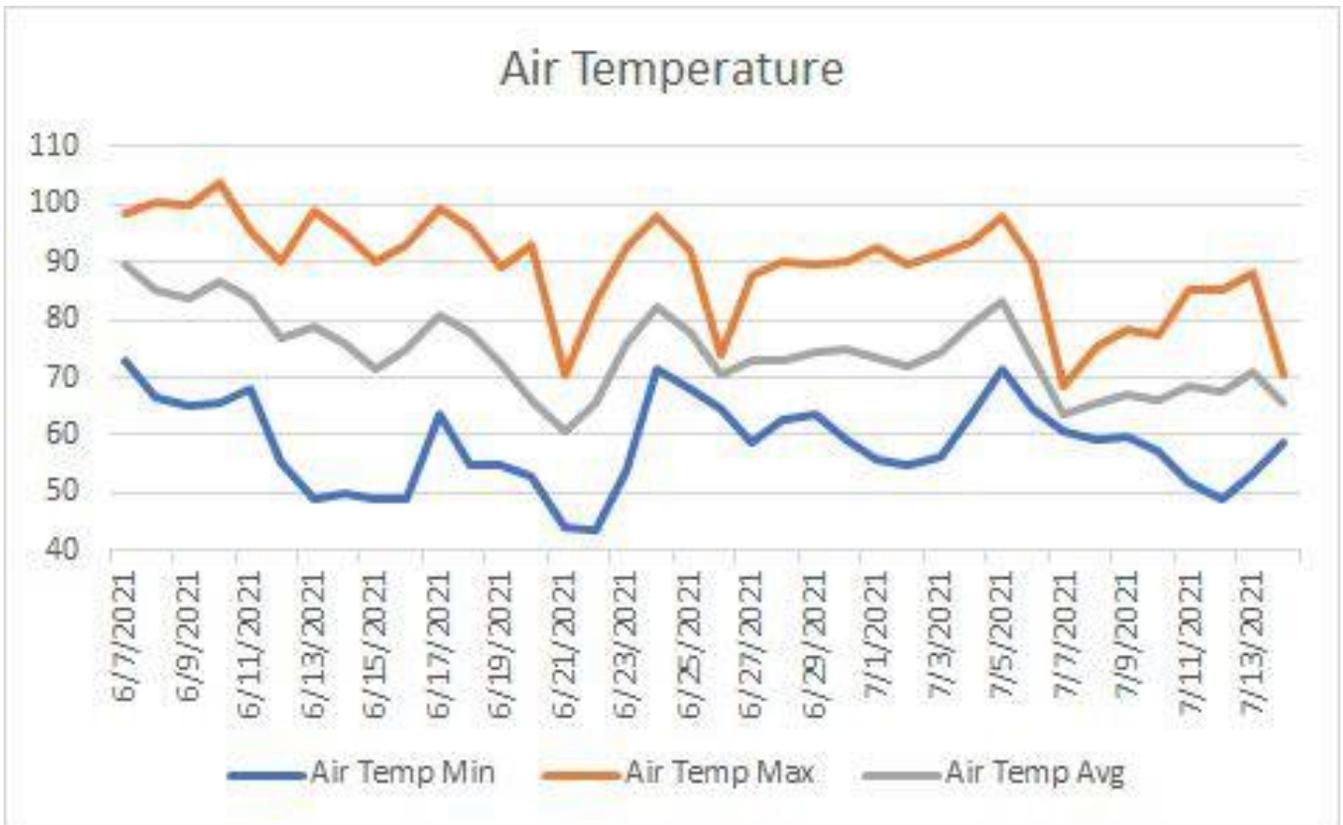


Soil temperature at planting time should be near 50 degrees. Corn seeds absorb almost 30 percent of their weight in water no matter the temperature. If the soil is cooler than 50 degrees the seed will still absorb water but it will not start shoot or root growth which can lead to seed rots and poor emergence. Soil temperatures in early June reached up to 83 degrees but cooled significantly starting around the 4th of July.

Crop: Corn  
 Plant: 4/30/21  
 EarthScout data: 6/7-7/15

**EARTHS 000066**

Daily Air Temperature:

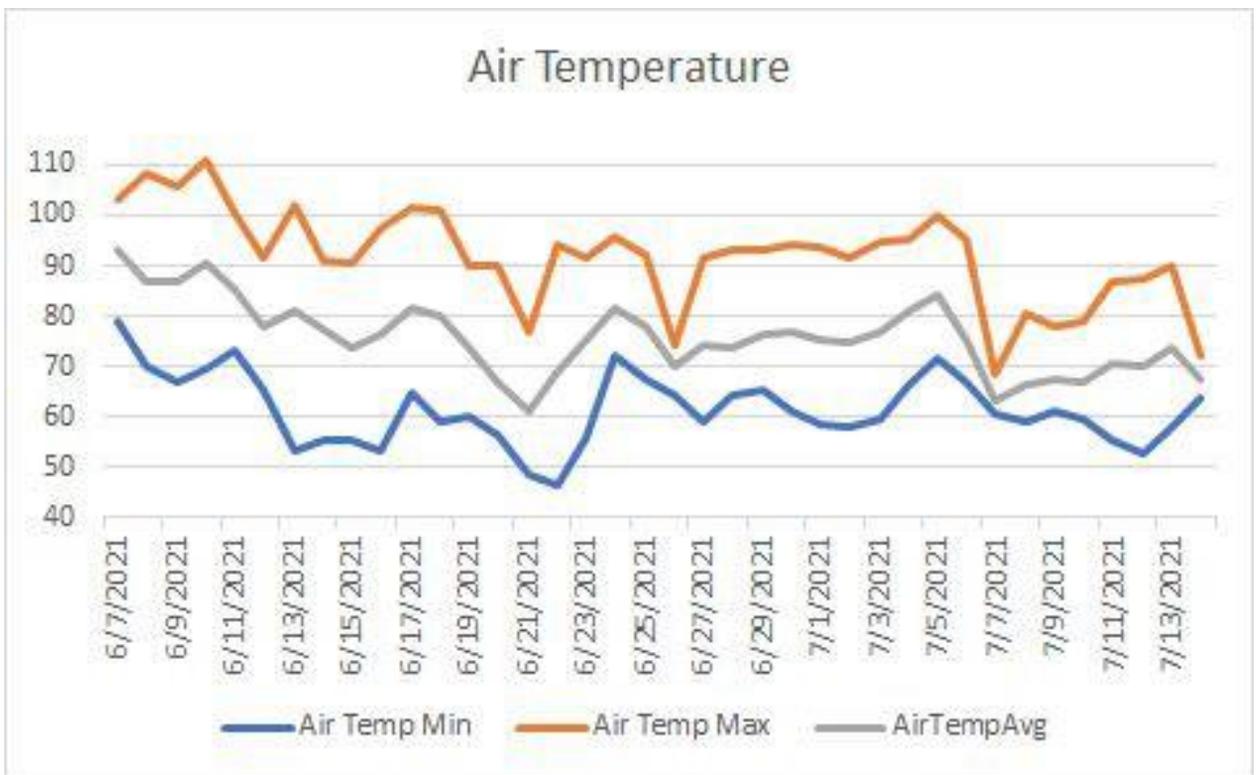


Air temperatures at Nigon Flat have stayed under 100 for the majority of the season and cooled off significantly after the 4th of July. The second week of June saw daytime temperatures reaching the high 90's while dipping down to the mid 60's at night.

Crop: Corn  
 Plant: 4/30/21  
 EarthScout data:6/7-7/15

**EARTHS 000067**

Daily Air Temperature:

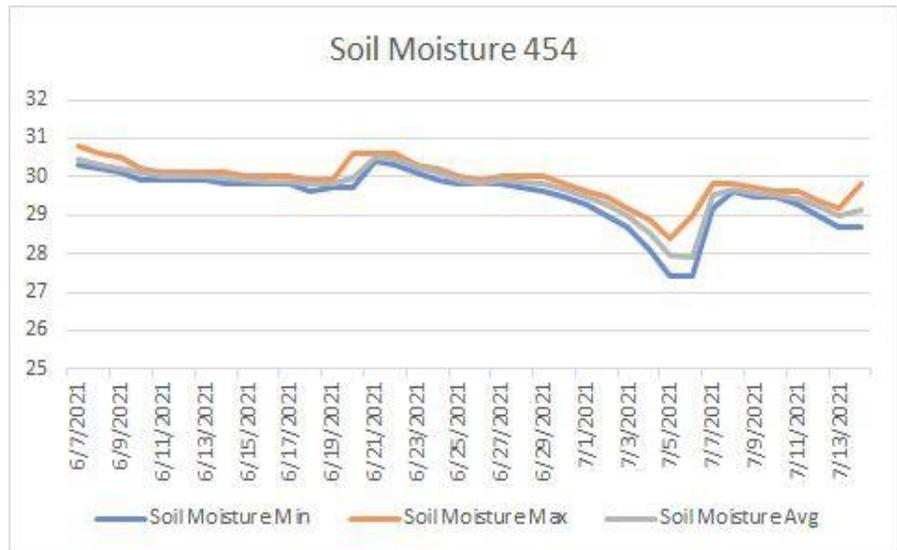
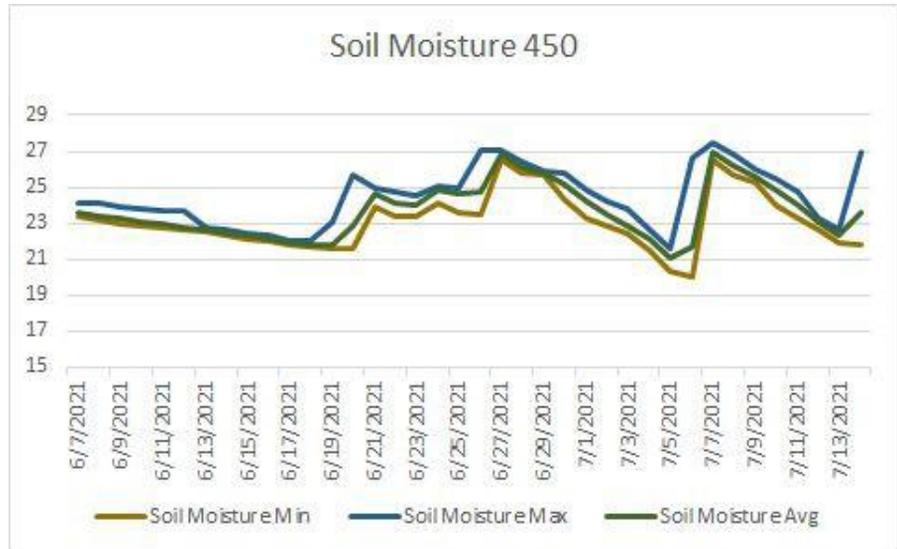


Air temperature dipping below the mid 30's with no wind can cause frost damage in the early season. With little wind heat is transferred from the air closest to the ground to the air above it. This can cause cooler temperatures near the soil surface. Frost damage can be worse in low areas, field edges, recently cultivated fields and fields with high levels of surface residue. Nigon Knoll has experienced some consistent temperatures through mid June and early July with a cool down occurring after the 4th of July.

Crop: Corn  
 Plant: 5/1/21  
 EarthScout data: 6/7-7/15

**EARTHS 000020**

Daily Soil Moisture:

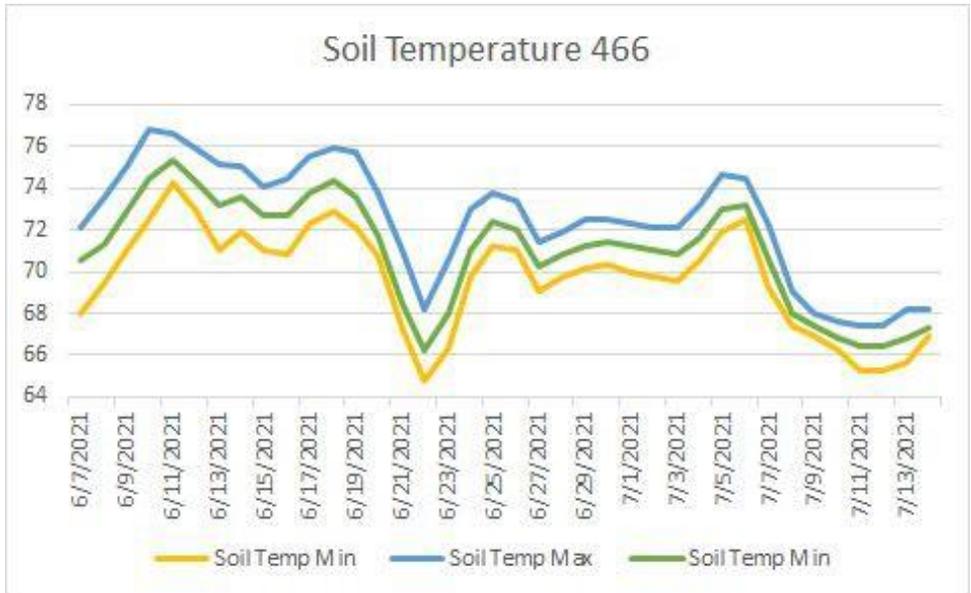
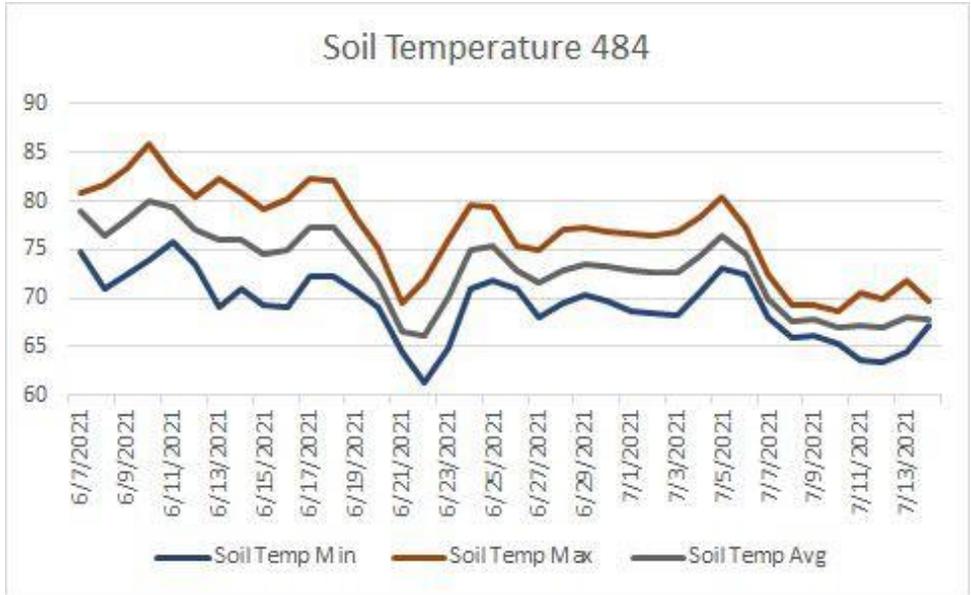


Water stress from tassel to dent directly affects yield. Plant moisture stress usually begins 25% or so above the PWP (plant wilting point) or PEL (plant extraction limit). Water stress before pollination affects number of potential kernels per row and can also cause the timing of pollen shed and silking to get out of sync. Water stress after pollination can cause kernel loss mostly on ear tips. Sensor 450 was more responsive to moisture events and did drop below 25% all of June and for about 10 days from June 26th to July 6th. Sensor 454 has not dropped below 25% so far this season.

Crop: Corn  
 Plant: 5/1/21  
 EarthScout data: 6/7-7/15

**EARTHS 000022**

Daily Soil Temperature:

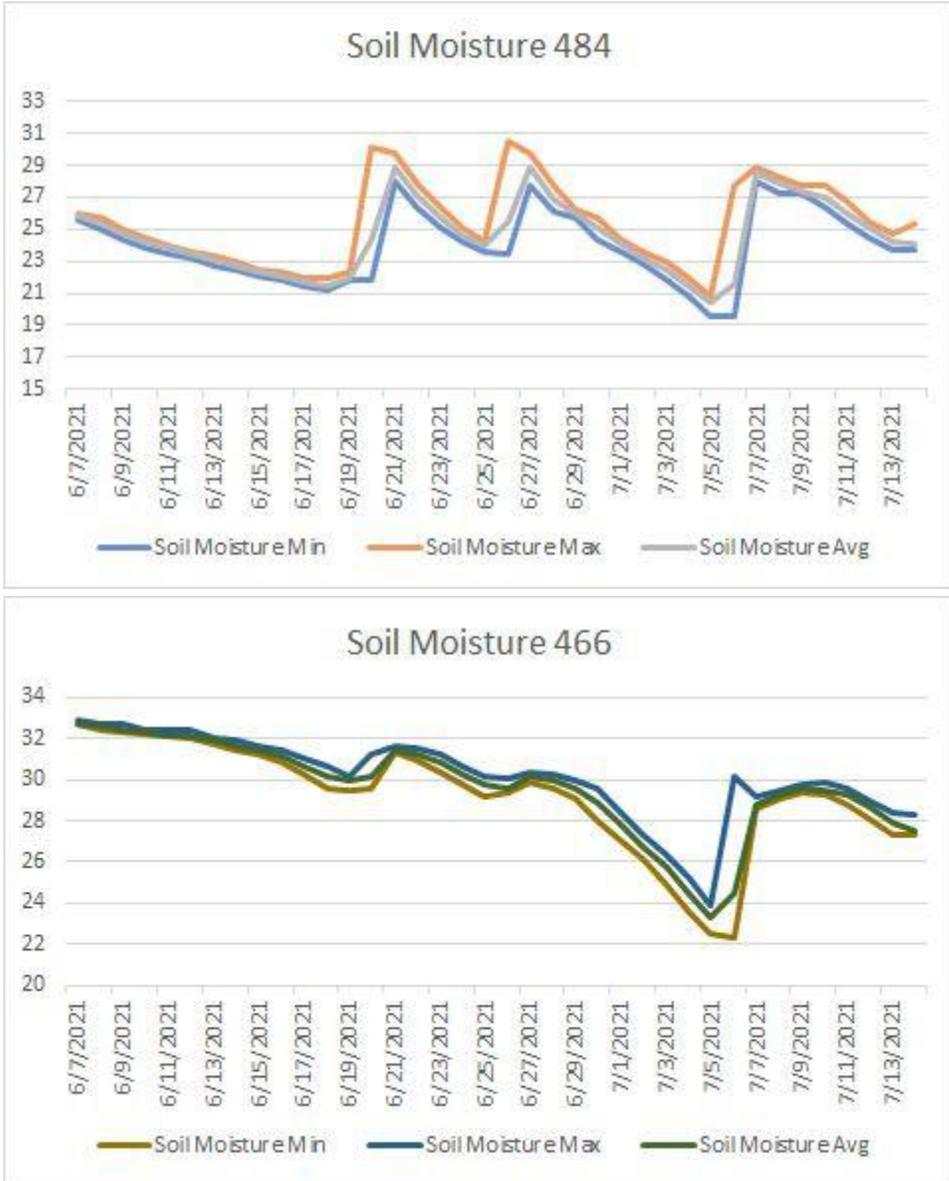


Soil temperatures from Sensor 484 are trending higher than Sensor 466 so I assume that Sensor 484 is at a shallower depth than Sensor 468. The cooler air temperatures in the middle of July are also reflected in the soil temperatures readings.

Crop: Corn  
 Plant: 5/1/21  
 EarthScout data: 6/7-7/15

**EARTHS 000022**

Daily Soil Moisture:

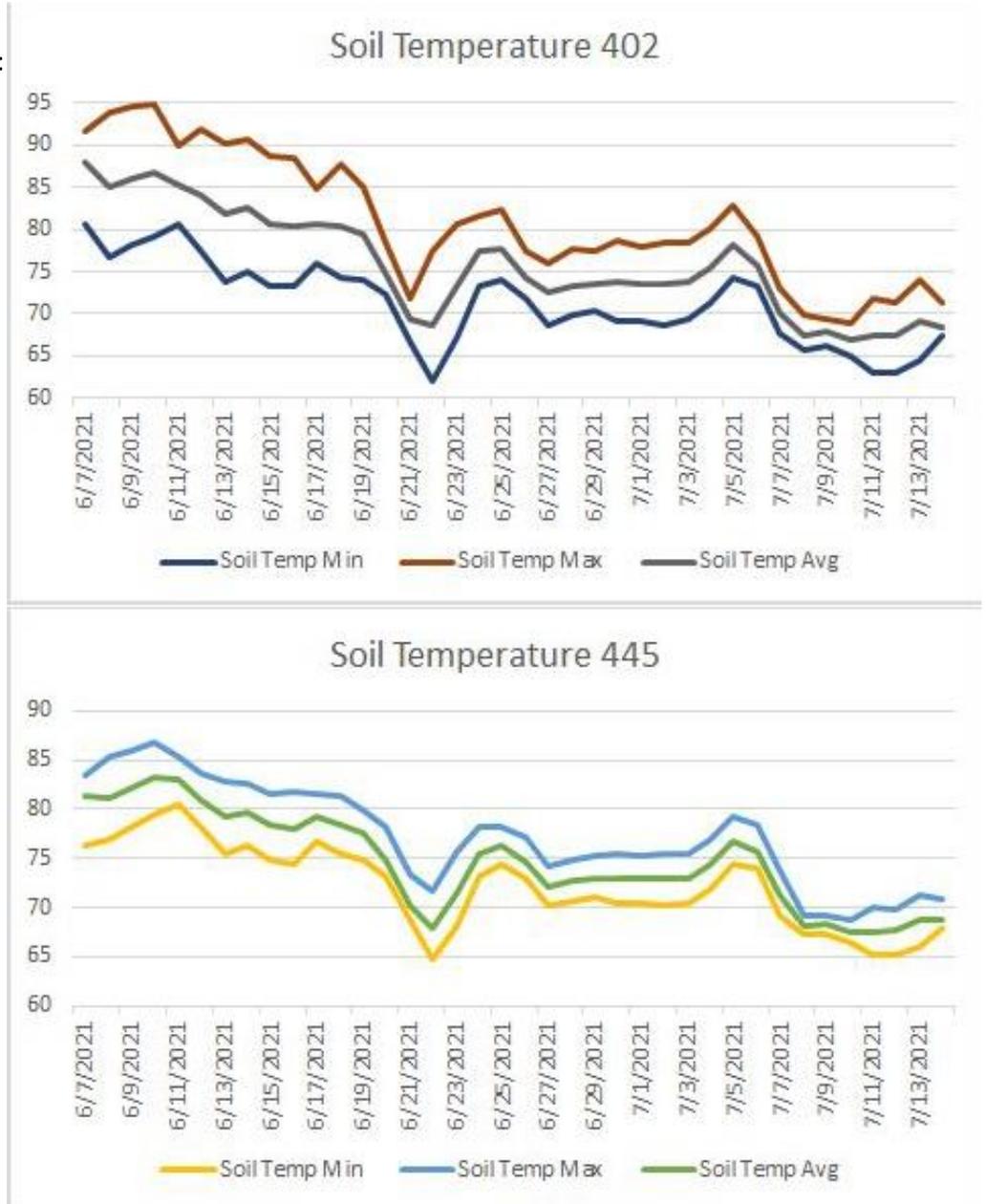


Sensor 484 is very responsive to moisture events and spikes much higher than sensor 466. There appear to be three moisture events in this date range and field capacity appears to be around 29-27% based on these data points. Soil moisture for Sensor 484 was below 25% ever since it was installed up until June 20th when a moisture event occurred. Four days later it was back down to 25% and the same occurred after the second moisture event as well. Sensor 466 had a sharp decline from June 29th - July 6th.

Crop: Corn  
 Plant: 4/30/21  
 EarthScout data: 6/7-7/15

**EARTHS 000066**

Daily Soil Temperature:

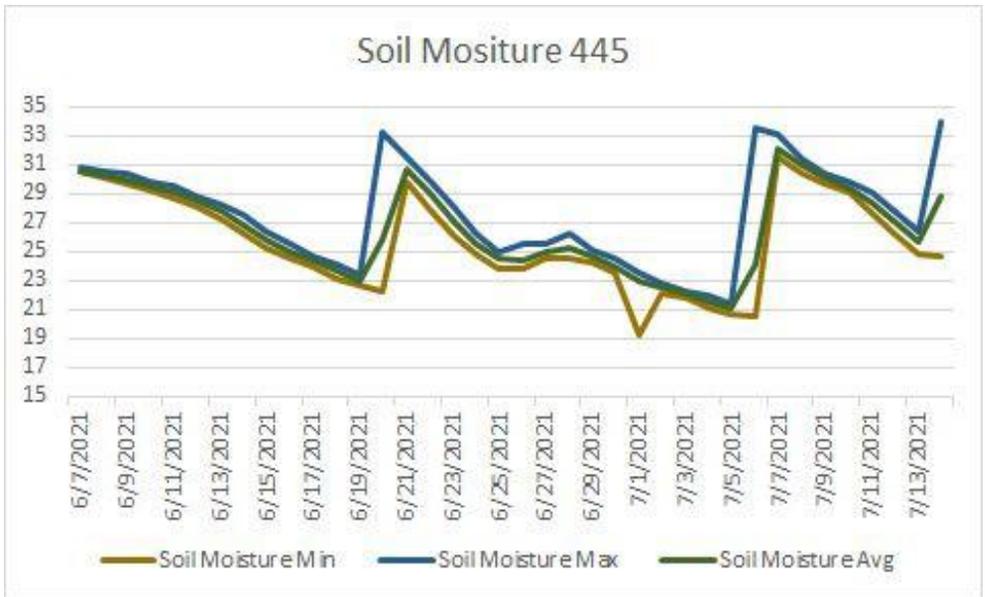
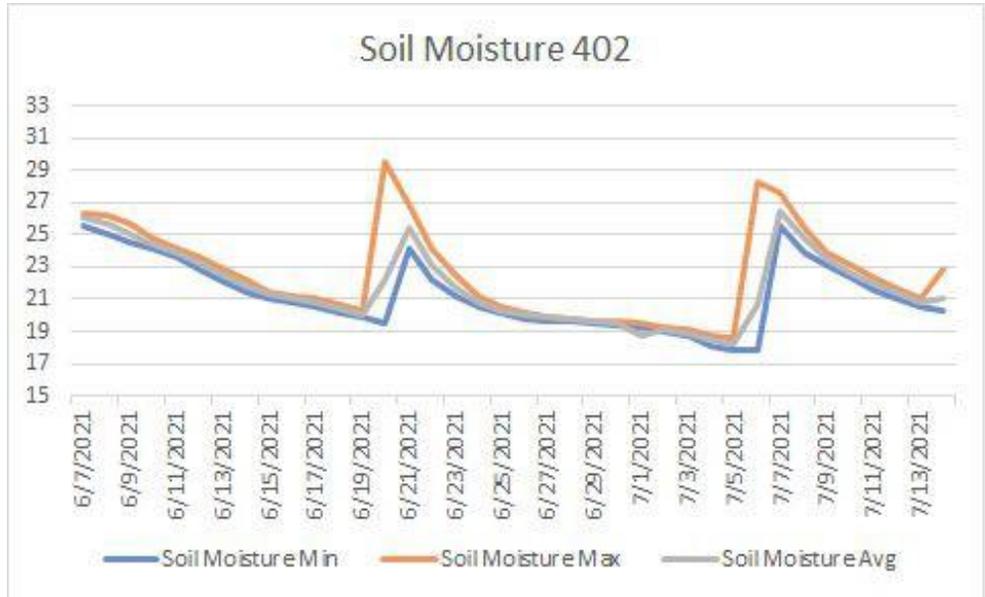


Soil temperatures for Sensor 402 (the shallower sensor) reached the low 90's the second week of June but has cooled off after June 19th and hasn't reached that high since then. Sensor 445 has a more stable soil temperature because of its depth.

Crop: Corn  
 Plant: 4/30/21  
 EarthScout data:6/7-7/15

**EARTHS 000066**

Daily Soil Moisture:

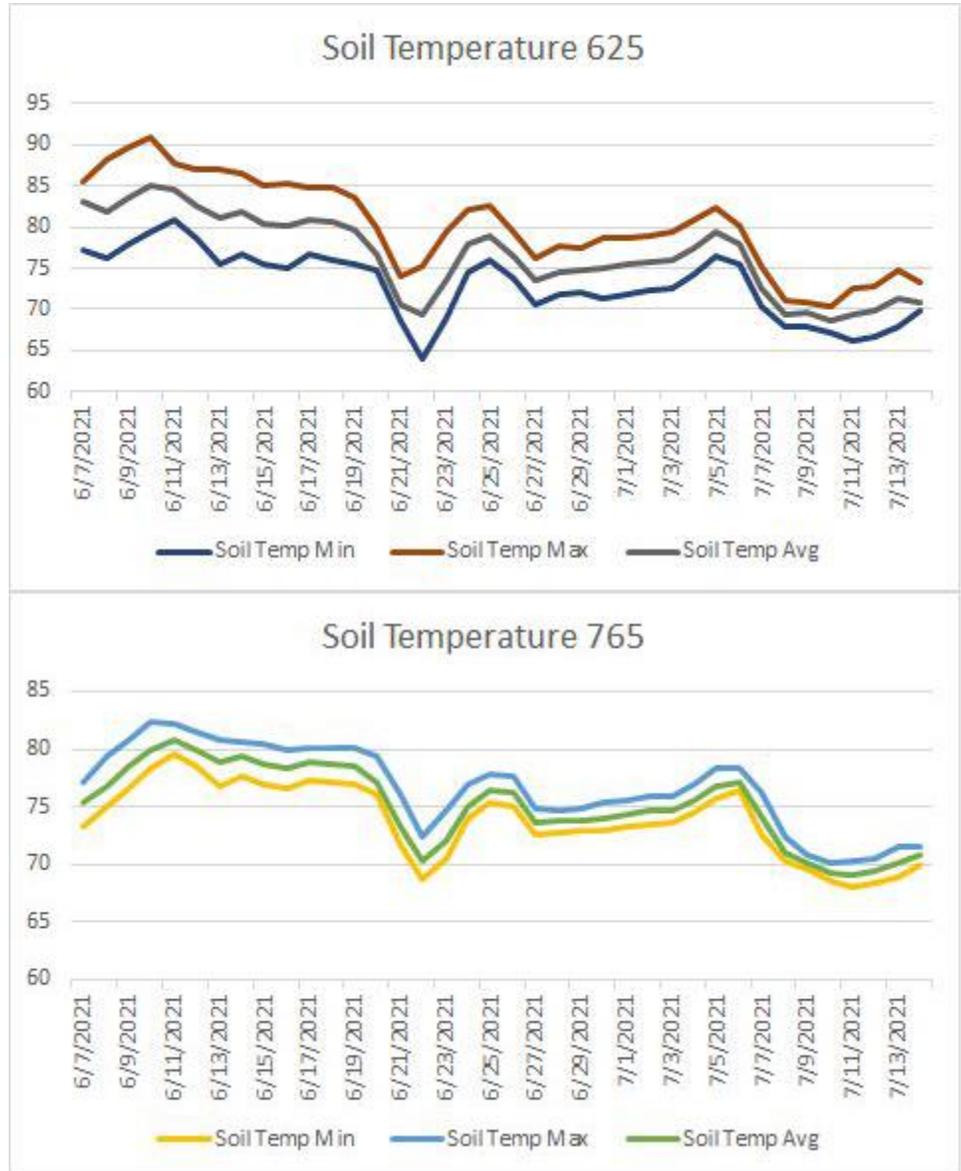


Soil moisture slowly declined over the month of June with Sensor 402 reaching as low as 19% and Sensor 445 reading 22% by June 20th. There have been three obvious moisture events and maybe a few smaller ones June 26th-28th that caused some response in the shallow sensor but not the deeper one.

Crop: Corn  
 Plant: 4/30/21  
 EarthScout data:6/7-7/15

**EARTHS 000067**

Daily Soil Temperature:

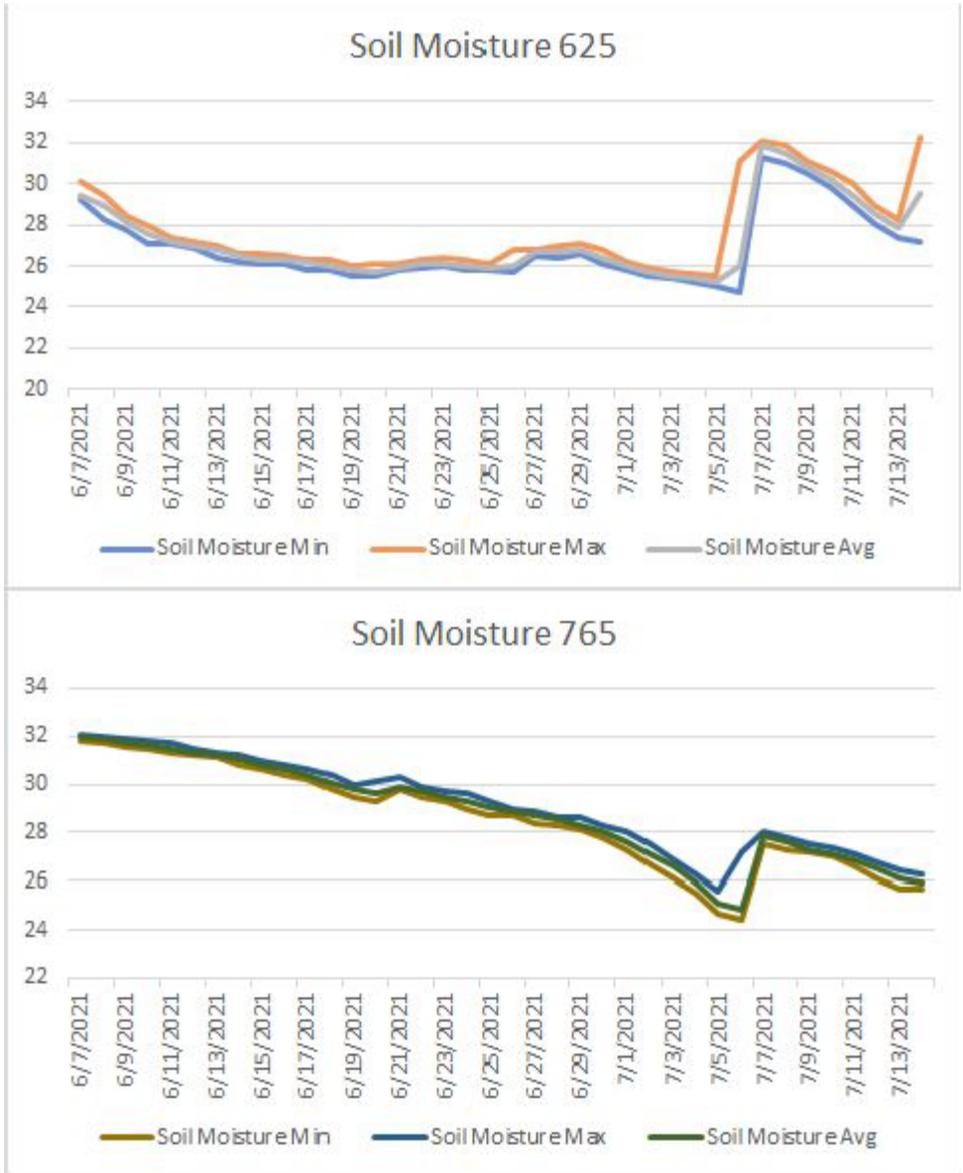


Soil temperatures from sensor 625 (the shallower sensor) have not reached over 100 and have more variability than temperatures from the deeper sensor (765). Sensor 765 has less swings in temperature and are more consistent.

Crop: Corn  
 Plant: 4/30/21  
 EarthScout data:6/7-7/15

**EARTHS 000067**

Daily Soil Moisture:



Soil moisture in sensor 625 have trended consistently downward for much of June until a rain event on July 5th that increased soil moisture from 25% to 32% in one event. The deeper sensor experience the same trend with a similar jump in moisture but still lower overall.

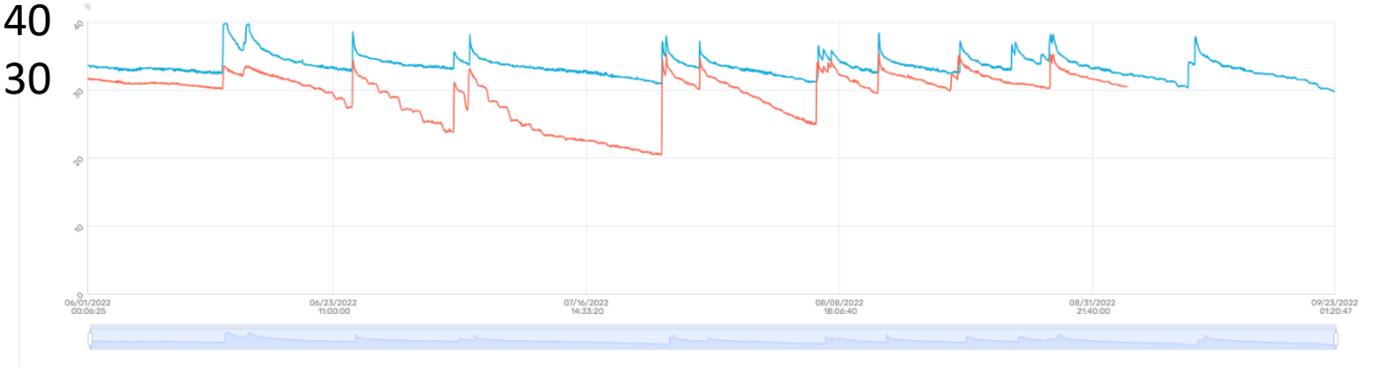
# 2022 Lower Soil Moisture

6/1/2022 - 10/1/2022

Advanced Comparative Chart

Markers X

<b>EARTHS-000022 Bakken NORTH</b> EARTHS-000022 Sensor 486 Lower Soil 690070466 Soil moisture (%)	<b>EARTHS-000066- Nigon Flat</b> EARTHS-000066 Sensor 445 Lower Soil 690070445 Soil moisture (%)
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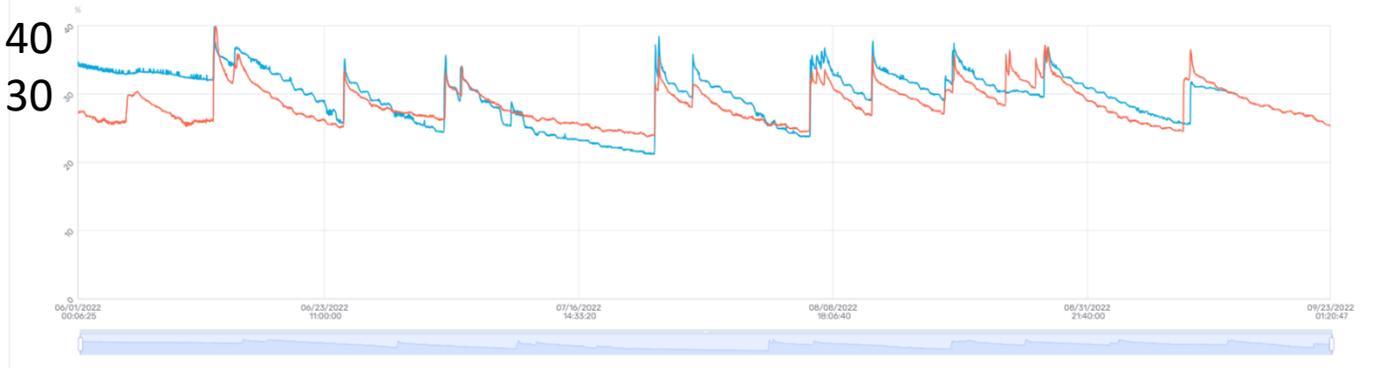
# 2022 Upper Soil Moisture

6/1/2022 - 10/1/2022

Advanced Comparative Chart

Markers X

<b>EARTHS-000066- Nigon Flat</b> EARTHS-000066 Sensor 811 Upper Soil 690070481 Soil moisture (%)	<b>EARTHS-000022 Bakken NORTH</b> EARTHS-000022 Sensor 484 Upper Soil 690070484 Soil moisture (%)
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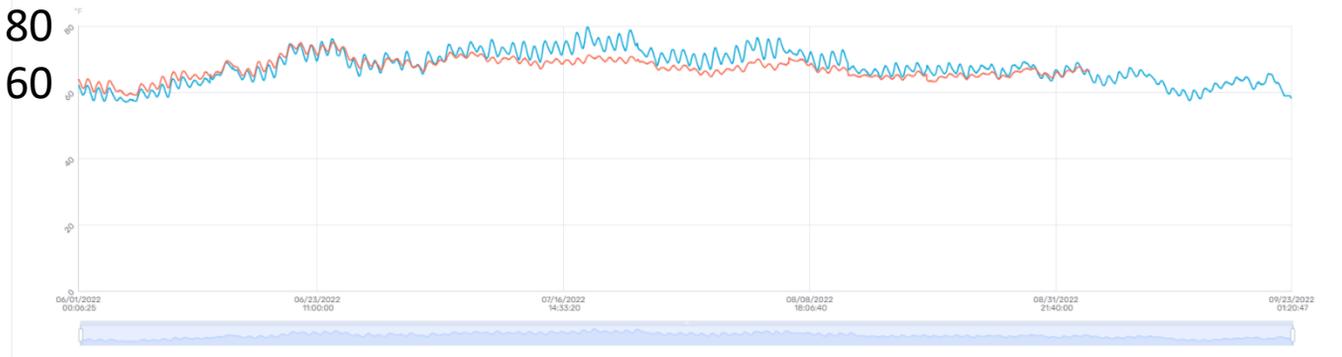
# 2022 Lower Soil Temp

6/1/2022 - 10/1/2022

Advanced Comparative Chart

Markers X

<b>EARTHS-000022 Bakken NORTH</b> EARTHS-000022 Sensor 488 Lower Soil 490070466 Soil temperature (°F)	<b>EARTHS-000066- Nigon Flat</b> EARTHS-000066 Sensor 445 Lower Soil 690070445 Soil temperature (°F)
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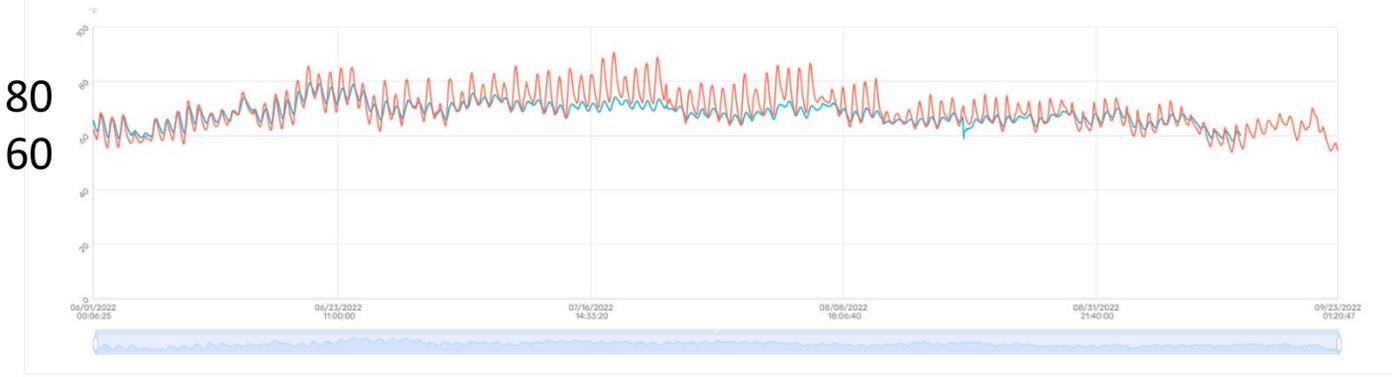
# 2022 Upper Soil Temp

6/1/2022 - 10/1/2022

Advanced Comparative Chart

Markers X

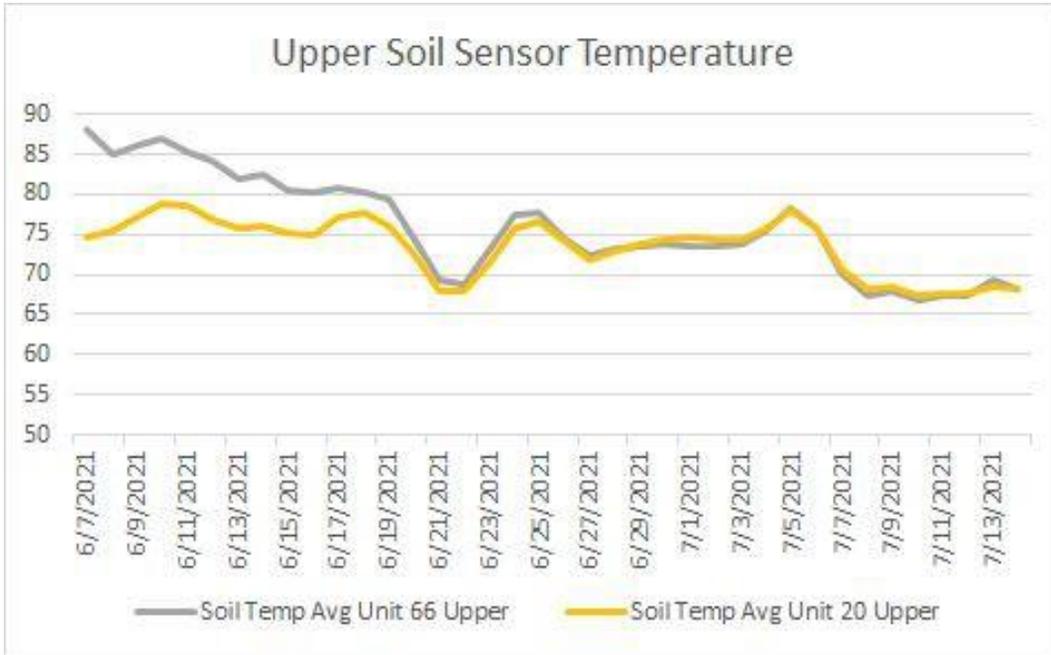
<b>EARTHS-000066- Nigon Flat</b> EARTHS-000066 Sensor 841 Upper Soil 690070441 Soil temperature (°F)	<b>EARTHS-000022 Bakken NORTH</b> EARTHS-000022 Sensor 484 Upper Soil 690070484 Soil temperature (°F)
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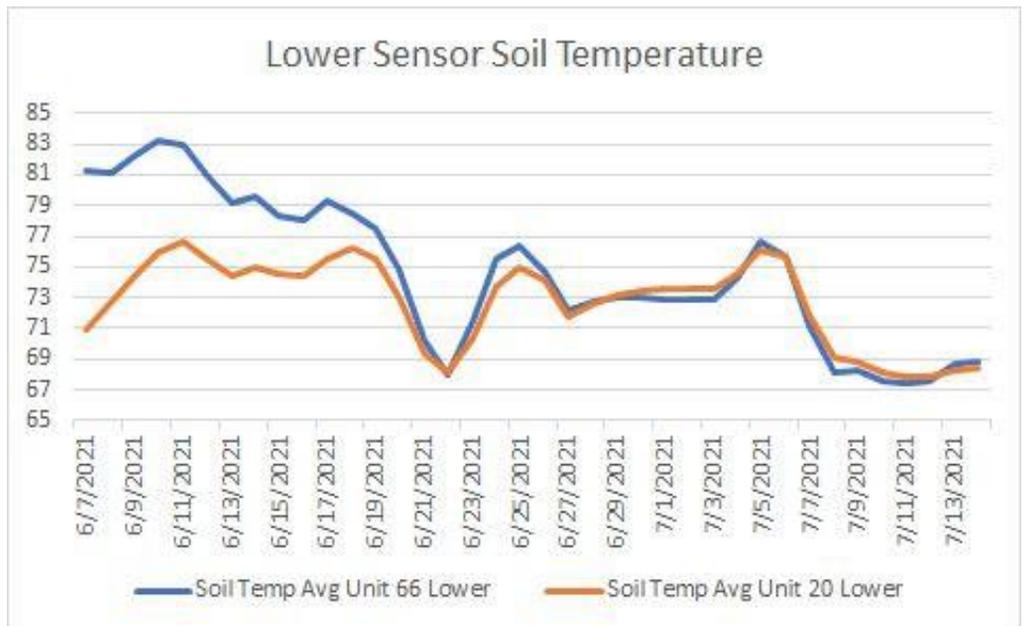
Crop:  
 Plant:  
 EarthScout data:6/7-7/15

### Unit 20 and 66 Comparison

Daily Average Soil Temperature:



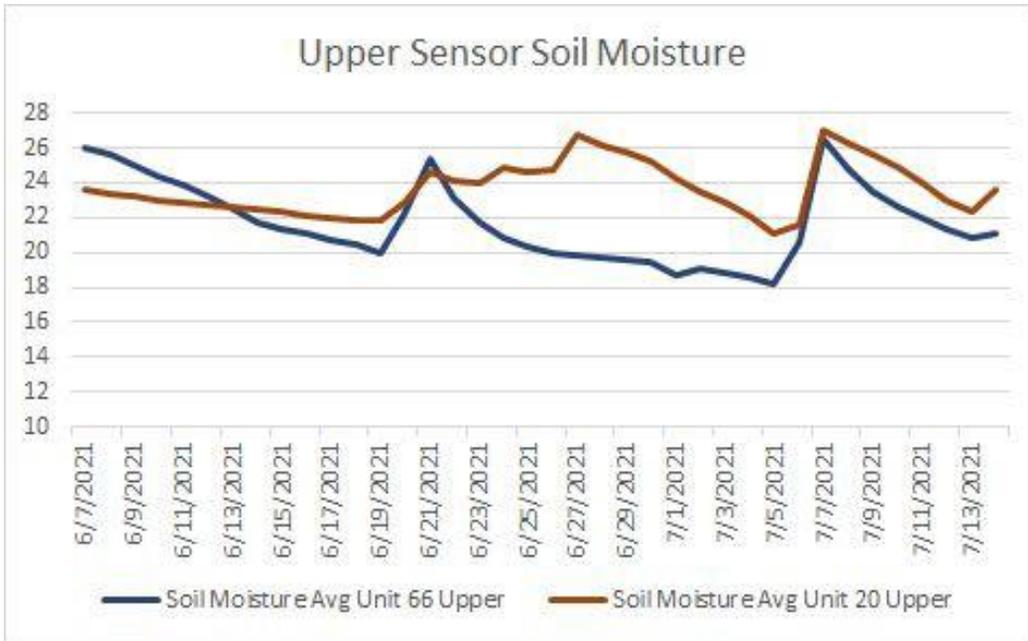
The upper sensor for units 20 and 66 were quite different through most of June and then towards the end of June they started to trend the same. The lower sensors for these units followed the same trends as the upper sensors. The beginning of June there was a 10 degree difference and they slowly started to trend the same around June 20th.



Crop:  
Plant:  
EarthScout data:

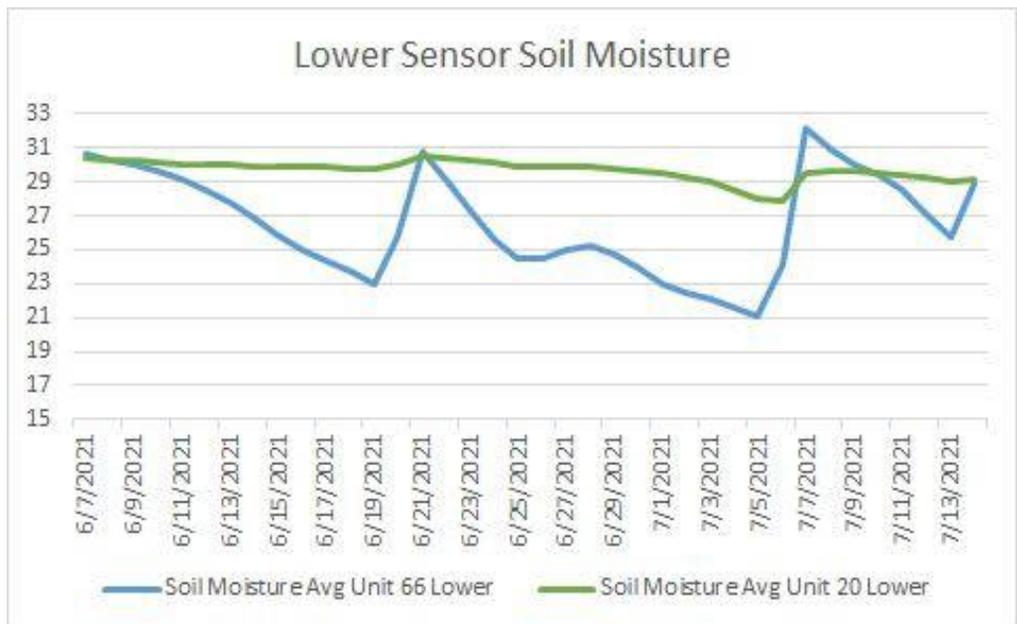
### Unit 20 and Unit 66 Comparison

Daily Average Soil Moisture:



The upper sensor on unit 66 stayed fairly consistent throughout the season with a moisture event June 20th and July 7th. Unit 20 saw more moisture events and had more variable moisture than unit 66.

Lower sensor 66 followed the same trends as the shallower sensor and peaked at higher moisture levels than its upper sensor. Unit 20 had very consistent moisture levels throughout the season staying around 28-30 percent from June through July.



# 2023 Lower Soil Moisture

6/1/2023 - 10/1/2023

Advanced Comparative Chart

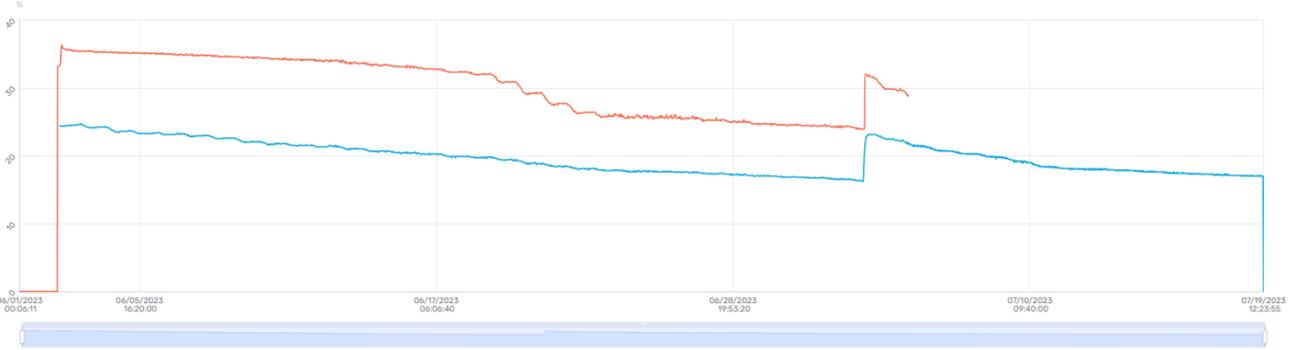
Markers X

EARTHS-000022 Bakken NORTH  
EARTHS-000022

Sensor 484 Lower  
Soil 690070445  
Soil moisture (%)

EARTHS-000066- Nigon Flat  
EARTHS-000066

Sensor 648 Lower  
Soil 690070441  
Soil moisture (%)



# 2023 Upper Soil Moisture

6/1/2023 - 10/1/2023

Advanced Comparative Chart

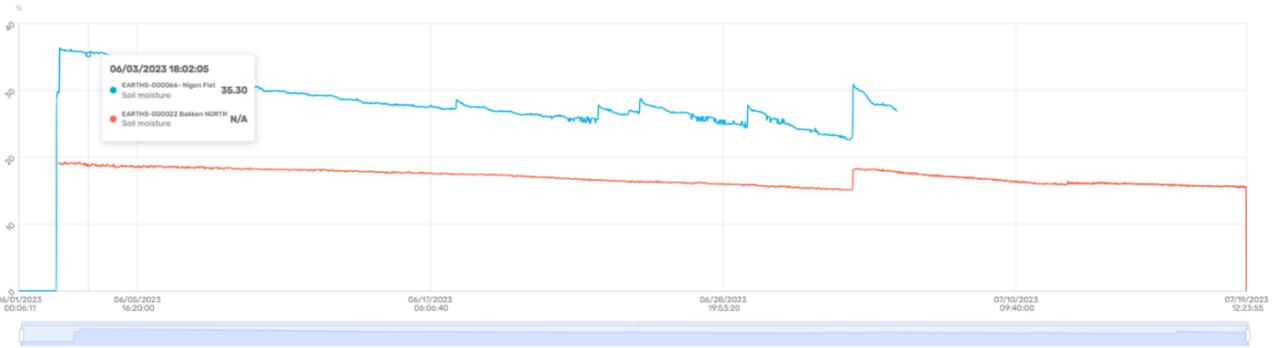
Markers X

EARTHS-000066- Nigon Flat  
EARTHS-000066

Sensor 445 Upper  
Soil 690070445  
Soil moisture (%)

EARTHS-000022 Bakken NORTH  
EARTHS-000022

Sensor 486 Upper  
Soil 690070445  
Soil moisture (%)



# 2023 Lower Soil Temp

6/1/2023 - 10/1/2023

Advanced Comparative Chart

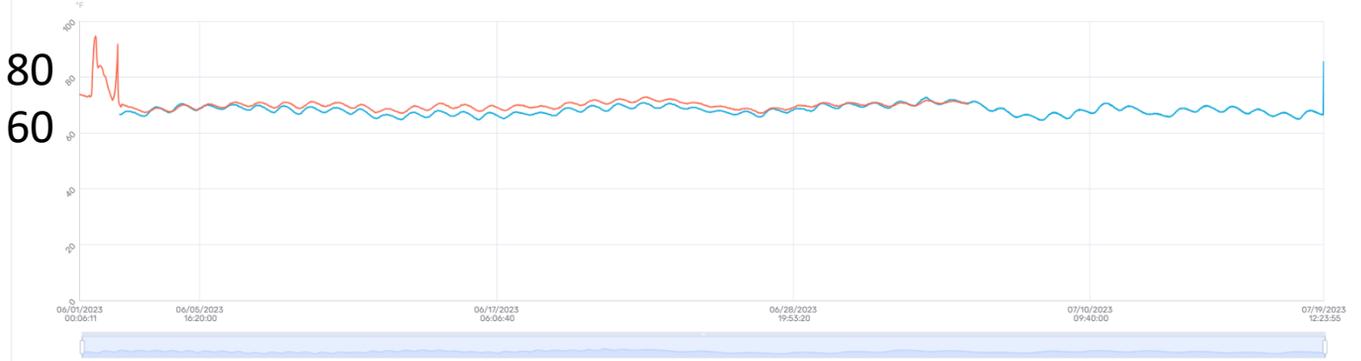
Markers

**EARTHS-000022 Bakken NORTH**  
EARTHS-000022

Sensor 404 Lower  
Soil 690070484  
Soil temperature (°F)

**EARTHS-000066- Nigon Flat**  
EARTHS-000066

Sensor 841 Lower  
Soil 690070641  
Soil temperature (°F)



# 2023 Upper Soil Temp

6/1/2023 - 10/1/2023

Advanced Comparative Chart

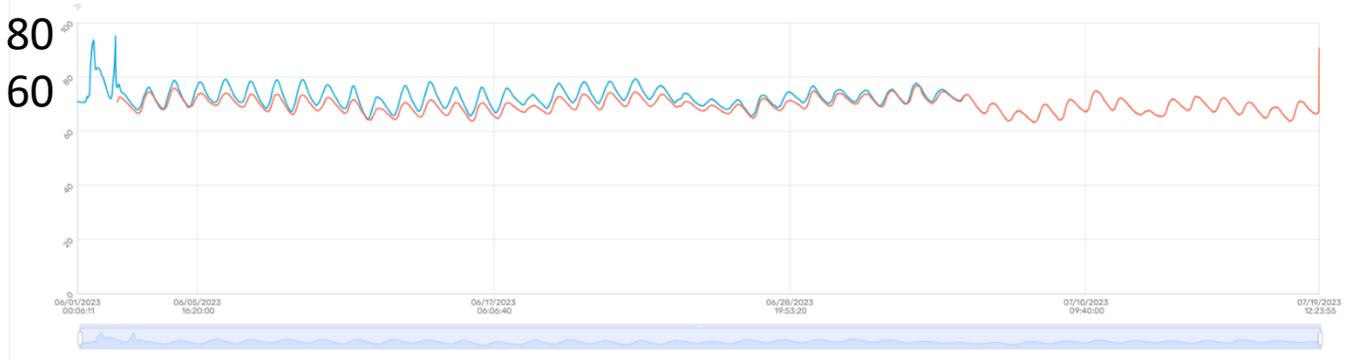
Markers

**EARTHS-000066- Nigon Flat**  
EARTHS-000066

Sensor 446 Upper  
Soil 690070445  
Soil temperature (°F)

**EARTHS-000022 Bakken NORTH**  
EARTHS-000022

Sensor 488 Upper  
Soil 690070465  
Soil temperature (°F)





Ag Testing - Consulting

Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

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Results For : MICHELLE ROSSMAN

Sample ID 1 : BAKKEN N

Sample ID 3 :

Sample ID 2 : 1

Sample ID 4 :

Lab No. : 4509

Soil Depth : 0 - 6 in

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Available Water g H <sub>2</sub> O g soil	0.06
Available Water inch H <sub>2</sub> O inch of soil	0.08
Total Available Water inches / sample	0.50
Field Capacity, % (wt.)	20.25
Permanent Wilting Point, % (wt.)	13.95

Reviewed By : Raymond Ward

Copy : 1

Bus: 308-234-2418  
Fax: 308-234-1940

web site  
[www.wardlab.com](http://www.wardlab.com)



Ag Testing - Consulting

Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

Results For : MICHELLE ROSSMAN

Sample ID 1 : BAKKEN N

Sample ID 3 :

Sample ID 2 : 2

Sample ID 4 :

Lab No. : 4510

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	6.6	ICAP Sulfur, ppm S	5.8
1:1 Soluble Salts, mmho/cm	0.14	ICAP Calcium, ppm Ca	584
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	155
Organic Matter, %LOI	3.6	ICAP Sodium, ppm Na	19
		ICAP Aluminum, ppm Al	122
Soil Respiration CO <sub>2</sub> -C, ppm C	192.0	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	132.5
Total Nitrogen, ppm N	18.5	Organic C : Organic N	9.8
Organic Nitrogen, ppm N	14.8	Organic N : Inorganic N	3.8
Total Organic Carbon, ppm C	145	Organic Nitrogen Release, ppm N	14.8
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	1.9	Organic Phosphorus Release, ppm P	15.1
Ammonium, ppm NH <sub>4</sub> -N	2.0	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	3.9	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	75	Soil Health Calculation	20.37
Inorganic (FIA) Phosphorus, ppm P	59.8	Cover Crop Suggestion	20% Legume 80% Grass
Organic Phosphorus, ppm P	15.1		
ICAP Potassium, ppm K	265		
ICAP Zinc, ppm Zn	12.85		
ICAP Iron, ppm Fe	93		
ICAP Manganese, ppm Mn	9.3		
ICAP Copper, ppm Cu	0.76		

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Ag Testing - Consulting

Lab No. : 4510

**Haney - Soil Health Analysis Contd.**

Nutrient Quantity Available for Next Crop		Nitrogen Savings by using the Haney Test	
Nitrogen, lbs N/A	33.5	Traditional evaluation, lbs N/A	3.3
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	172.3	Haney Test N evaluation, lbs N/A	33.5
Potassium, lbs K <sub>2</sub> O/A	317.6	Nitrogen Difference, lbs N/A	30.2
Nutrient Value, \$/A	247.48	N savings, \$/A	19.32

**Recommendations  
In Actual Pounds of Plant Nutrients per Acre**

N Credit :

Sub-Soils :

Cr op Yi el d	(Haney) Corn, BU
	225
Nitrogen N	185
Phosphorus P <sub>2</sub> O <sub>5</sub>	0
Potassium K <sub>2</sub> O	0
Sulfur S	25
Zinc Zn	0
Magnesium Mg	0
Iron Fe	0
Manganese Mn	0
Copper Cu	0
Aggregate Stability 1-2mm, %	40
Aggregate Stability 1-2mm in bulk soil, %	34



Ag Testing - Consulting

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

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Results For : MICHELLE ROSSMAN

Sample ID 1 : BAKKEN S

Sample ID 3 :

Sample ID 2 : 1

Sample ID 4 :

Lab No. : 4511

Soil Depth : 0 - 6 in

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Available Water g H <sub>2</sub> O g soil	0.05
Available Water inch H <sub>2</sub> O inch of soil	0.06
Total Available Water inches / sample	0.37
Field Capacity, % (wt.)	21.65
Permanent Wilting Point, % (wt.)	16.93

Reviewed By : Raymond Ward

Copy : 1

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Ag Testing - Consulting

Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

Results For : MICHELLE ROSSMAN

Sample ID 1 : BAKKEN S

Sample ID 3 :

Sample ID 2 : 2

Sample ID 4 :

Lab No. : 4512

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.7	ICAP Sulfur, ppm S	5.9
1:1 Soluble Salts, mmho/cm	0.09	ICAP Calcium, ppm Ca	484
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	120
Organic Matter, %LOI	4.2	ICAP Sodium, ppm Na	14
WDRF Buffer pH	6.3	ICAP Aluminum, ppm Al	188
Soil Respiration CO <sub>2</sub> -C, ppm C	230.5	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	197.8
Total Nitrogen, ppm N	10.7	Organic C : Organic N	13.8
Organic Nitrogen, ppm N	8.5	Organic N : Inorganic N	3.4
Total Organic Carbon, ppm C	117	Organic Nitrogen Release, ppm N	8.5
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	1.0	Organic Phosphorus Release, ppm P	8.9
Ammonium, ppm NH <sub>4</sub> -N	1.5	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	2.5	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	30	Soil Health Calculation	19.64
Inorganic (FIA) Phosphorus, ppm P	21.3	Cover Crop Suggestion	30% Legume 70% Grass
Organic Phosphorus, ppm P	8.9		
ICAP Potassium, ppm K	86		
ICAP Zinc, ppm Zn	7.82		
ICAP Iron, ppm Fe	84		
ICAP Manganese, ppm Mn	8.7		
ICAP Copper, ppm Cu	0.27		

Reviewed By : Raymond Ward

Copy : 1

Bus: 308-234-2418  
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web site  
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Ag Testing - Consulting

Lab No. : 4512

**Haney - Soil Health Analysis Contd.**

Nutrient Quantity Available for Next Crop		Nitrogen Savings by using the Haney Test	
Nitrogen, lbs N/A	19.7	Traditional evaluation, lbs N/A	1.7
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	69.5	Haney Test N evaluation, lbs N/A	19.7
Potassium, lbs K <sub>2</sub> O/A	103.6	Nitrogen Difference, lbs N/A	18.0
Nutrient Value, \$/A	91.54	N savings, \$/A	11.52

**Recommendations  
In Actual Pounds of Plant Nutrients per Acre**

N Credit :

Sub-Soils :

Cr	(Haney) Corn, BU
op	225
Yi	
el	
d	
Nitrogen N	200
Phosphorus P <sub>2</sub> O <sub>5</sub>	40
Potassium K <sub>2</sub> O	30
Sulfur S	25
Zinc Zn	0
Magnesium Mg	0
Iron Fe	0
Manganese Mn	0
Copper Cu	0
Lime, ECC Tons/Acre	0.0

Aggregate Stability 1-2mm, % 59

Aggregate Stability 1-2mm in bulk soil, % 57



Ag Testing - Consulting

Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

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Results For : MICHELLE ROSSMAN

Sample ID 1 : NIGON KNOLL

Sample ID 2 : 1

Lab No. : 4513

Sample ID 3 :

Sample ID 4 :

Soil Depth : 0 - 6 in

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Available Water g H <sub>2</sub> O g soil	0.10
Available Water inch H <sub>2</sub> O inch of soil	0.13
Total Available Water inches / sample	0.80
Field Capacity, % (wt.)	28.88
Permanent Wilting Point, % (wt.)	18.74

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Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

Results For : MICHELLE ROSSMAN

Sample ID 1 : NIGON KNOLL

Sample ID 3 :

Sample ID 2 : 2

Sample ID 4 :

Lab No. : 4514

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	6.0	ICAP Sulfur, ppm S	17.8
1:1 Soluble Salts, mmho/cm	0.46	ICAP Calcium, ppm Ca	454
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	125
Organic Matter, %LOI	3.3	ICAP Sodium, ppm Na	16
WDRF Buffer pH	6.8	ICAP Aluminum, ppm Al	162
Soil Respiration CO <sub>2</sub> -C, ppm C	160.0		
<b>Water Extract</b>		<b>Calculations</b>	
Total Nitrogen, ppm N	78.4	Microbially Active Carbon (%MAC)	135.6
Organic Nitrogen, ppm N	32.1	Organic C : Organic N	3.7
Total Organic Carbon, ppm C	118	Organic N : Inorganic N	0.7
		Organic Nitrogen Release, ppm N	32.1
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	27.9	Organic Phosphorus Release, ppm P	6.1
Ammonium, ppm NH <sub>4</sub> -N	18.9	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	46.8	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	18	Soil Health Calculation	18.68
Inorganic (FIA) Phosphorus, ppm P	11.8	Cover Crop Suggestion	10% Legume 90% Grass
Organic Phosphorus, ppm P	6.1		
ICAP Potassium, ppm K	52		
ICAP Zinc, ppm Zn	0.84		
ICAP Iron, ppm Fe	81		
ICAP Manganese, ppm Mn	11.1		
ICAP Copper, ppm Cu	0.18		

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Lab No. : 4514

**Haney - Soil Health Analysis Contd.**

Nutrient Quantity Available for Next Crop		Nitrogen Savings by using the Haney Test	
Nitrogen, lbs N/A	141.9	Traditional evaluation, lbs N/A	50.2
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	41.3	Haney Test N evaluation, lbs N/A	141.9
Potassium, lbs K <sub>2</sub> O/A	61.8	Nitrogen Difference, lbs N/A	91.7
Nutrient Value, \$/A	137.82	N savings, \$/A	58.70

**Recommendations  
In Actual Pounds of Plant Nutrients per Acre**

N Credit :

Sub-Soils :

Cr	(Haney) Corn, BU
op	225
Yi	
el	
d	
Nitrogen N	80
Phosphorus P <sub>2</sub> O <sub>5</sub>	60
Potassium K <sub>2</sub> O	50
Sulfur S	0
Zinc Zn	0
Magnesium Mg	0
Iron Fe	0
Manganese Mn	0
Copper Cu	0
Lime, ECC Tons/Acre	0.0

Aggregate Stability 1-2mm, % 50

Aggregate Stability 1-2mm in bulk soil, % 57



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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

---

Results For : MICHELLE ROSSMAN

Sample ID 1 : NIGON FLAT

Sample ID 3 :

Sample ID 2 : 2

Sample ID 4 :

Lab No. : 4515

Soil Depth : 0 - 6 in

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Available Water g H <sub>2</sub> O g soil	0.05
Available Water inch H <sub>2</sub> O inch of soil	0.07
Total Available Water inches / sample	0.42
Field Capacity, % (wt.)	27.81
Permanent Wilting Point, % (wt.)	22.52

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1344198  
Date Received : 05/05/2021  
Date Reported : 05/07/2021

Results For : MICHELLE ROSSMAN

Sample ID 1 : NIGON FLAT

Sample ID 3 :

Sample ID 2 : 2

Sample ID 4 :

Lab No. : 4516

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.9	ICAP Sulfur, ppm S	6.5
1:1 Soluble Salts, mmho/cm	0.17	ICAP Calcium, ppm Ca	797
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	136
Organic Matter, %LOI	4.8	ICAP Sodium, ppm Na	15
WDRF Buffer pH	6.5	ICAP Aluminum, ppm Al	161
Soil Respiration CO <sub>2</sub> -C, ppm C	79.2	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	77.0
Total Nitrogen, ppm N	14.3	Organic C : Organic N	12.4
Organic Nitrogen, ppm N	8.3	Organic N : Inorganic N	1.6
Total Organic Carbon, ppm C	103	Organic Nitrogen Release, ppm N	8.3
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	3.8	Organic Phosphorus Release, ppm P	4.8
Ammonium, ppm NH <sub>4</sub> -N	1.3	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	5.1	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	7	Soil Health Calculation	10.80
Inorganic (FIA) Phosphorus, ppm P	2.6	Cover Crop Suggestion	40% Legume 60% Grass
Organic Phosphorus, ppm P	4.8		
ICAP Potassium, ppm K	35		
ICAP Zinc, ppm Zn	0.18		
ICAP Iron, ppm Fe	79		
ICAP Manganese, ppm Mn	3.5		
ICAP Copper, ppm Cu	0.11		

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : JUNE 2021

Sample ID 3 :

Sample ID 2 : BAKKEN SOUTH

Sample ID 4 :

Lab No. : 3373

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.0	ICAP Sulfur, ppm S	10.4
1:1 Soluble Salts, mmho/cm	0.36	ICAP Calcium, ppm Ca	684
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	133
Organic Matter, %LOI	4.9	ICAP Sodium, ppm Na	13
WDRF Buffer pH	6.0	ICAP Aluminum, ppm Al	198
Soil Respiration CO <sub>2</sub> -C, ppm C	85.5	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	40.1
Total Nitrogen, ppm N	83.6	Organic C : Organic N	21.8
Organic Nitrogen, ppm N	9.8	Organic N : Inorganic N	0.1
Total Organic Carbon, ppm C	213	Organic Nitrogen Release, ppm N	9.8
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	73.3	Organic Phosphorus Release, ppm P	10.3
Ammonium, ppm NH <sub>4</sub> -N	4.2	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	77.5	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	41	Soil Health Calculation	13.79
Inorganic (FIA) Phosphorus, ppm P	30.4	Cover Crop Suggestion	60% Legume 40% Grass
Organic Phosphorus, ppm P	10.3		
ICAP Potassium, ppm K	78		
ICAP Zinc, ppm Zn	7.10		
ICAP Iron, ppm Fe	75		
ICAP Manganese, ppm Mn	15.9		
ICAP Copper, ppm Cu	0.41		

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### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	157.1
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	93.7
Potassium, lbs K <sub>2</sub> O/A	93.3
Nutrient Value, \$/A	183.73

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	132.0
Haney Test N evaluation, lbs N/A	157.1
Nitrogen Difference, lbs N/A	25.1
N savings, \$/A	16.09

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : JUNE 2021

Sample ID 3 :

Sample ID 2 : BAKKEN NORTH

Sample ID 4 :

Lab No. : 3374

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.9	ICAP Sulfur, ppm S	12.1
1:1 Soluble Salts, mmho/cm	0.42	ICAP Calcium, ppm Ca	970
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	200
Organic Matter, %LOI	4.7	ICAP Sodium, ppm Na	16
WDRF Buffer pH	6.6	ICAP Aluminum, ppm Al	145
Soil Respiration CO <sub>2</sub> -C, ppm C	71.8	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	36.3
Total Nitrogen, ppm N	92.5	Organic C : Organic N	23.0
Organic Nitrogen, ppm N	8.6	Organic N : Inorganic N	< 0.1
Total Organic Carbon, ppm C	198	Organic Nitrogen Release, ppm N	8.6
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	83.6	Organic Phosphorus Release, ppm P	4.5
Ammonium, ppm NH <sub>4</sub> -N	3.8	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	87.4	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	85	Soil Health Calculation	12.00
Inorganic (FIA) Phosphorus, ppm P	81.0	Cover Crop Suggestion	60% Legume 40% Grass
Organic Phosphorus, ppm P	4.5		
ICAP Potassium, ppm K	253		
ICAP Zinc, ppm Zn	12.63		
ICAP Iron, ppm Fe	90		
ICAP Manganese, ppm Mn	12.7		
ICAP Copper, ppm Cu	0.67		

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### Haney - Soil Health Analysis Contd.

Nutrient Quantity Available for Next Crop		Nitrogen Savings by using the Haney Test	
Nitrogen, lbs N/A	172.9	Traditional evaluation, lbs N/A	150.5
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	196.6	Haney Test N evaluation, lbs N/A	172.9
Potassium, lbs K <sub>2</sub> O/A	303.3	Nitrogen Difference, lbs N/A	22.4
Nutrient Value, \$/A	338.97	N savings, \$/A	14.33

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : JUNE 2021

Sample ID 3 :

Sample ID 2 : NIGON KNOLL

Sample ID 4 :

Lab No. : 3375

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.9	ICAP Sulfur, ppm S	9.2
1:1 Soluble Salts, mmho/cm	0.36	ICAP Calcium, ppm Ca	644
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	136
Organic Matter, %LOI	3.0	ICAP Sodium, ppm Na	17
WDRF Buffer pH	6.8	ICAP Aluminum, ppm Al	197
Soil Respiration CO <sub>2</sub> -C, ppm C	43.3		
<b>Water Extract</b>		<b>Calculations</b>	
Total Nitrogen, ppm N	39.8	Microbially Active Carbon (%MAC)	34.9
Organic Nitrogen, ppm N	9.4	Organic C : Organic N	13.2
Total Organic Carbon, ppm C	124	Organic N : Inorganic N	0.3
		Organic Nitrogen Release, ppm N	9.4
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	31.7	Organic Phosphorus Release, ppm P	3.0
Ammonium, ppm NH <sub>4</sub> -N	2.0	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	33.7	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	8	Soil Health Calculation	7.74
Inorganic (FIA) Phosphorus, ppm P	5.0	Cover Crop Suggestion	10% Legume 90% Grass
Organic Phosphorus, ppm P	3.0		
ICAP Potassium, ppm K	49		
ICAP Zinc, ppm Zn	0.51		
ICAP Iron, ppm Fe	69		
ICAP Manganese, ppm Mn	4.4		
ICAP Copper, ppm Cu	0.48		

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Lab No. : 3375

### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	77.5
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	18.3
Potassium, lbs K <sub>2</sub> O/A	58.6
Nutrient Value, \$/A	86.10

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	57.1
Haney Test N evaluation, lbs N/A	77.5
Nitrogen Difference, lbs N/A	20.4
N savings, \$/A	13.08

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : JUNE 2021

Sample ID 2 : NIGON FLAT

Lab No. : 3376

Sample ID 3 :

Sample ID 4 :

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.5	ICAP Sulfur, ppm S	12.5
1:1 Soluble Salts, mmho/cm	0.44	ICAP Calcium, ppm Ca	1089
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	155
Organic Matter, %LOI	6.0	ICAP Sodium, ppm Na	16
WDRF Buffer pH	6.2	ICAP Aluminum, ppm Al	177
Soil Respiration CO <sub>2</sub> -C, ppm C	175.5		
<b>Water Extract</b>		<b>Calculations</b>	
Total Nitrogen, ppm N	57.9	Microbially Active Carbon (%MAC)	72.8
Organic Nitrogen, ppm N	9.2	Organic C : Organic N	26.1
Total Organic Carbon, ppm C	241	Organic N : Inorganic N	0.2
<b>H3A Extract</b>		Organic Nitrogen Release, ppm N	9.2
Nitrate, ppm NO <sub>3</sub> -N	47.3	Organic Nitrogen Reserve, ppm N	0.0
Ammonium, ppm NH <sub>4</sub> -N	4.5	Organic Phosphorus Release, ppm P	7.5
Inorganic Nitrogen, ppm N	51.8	Organic Phosphorus Reserve, ppm P	< 0.1
Total (ICAP) Phosphorus, ppm P	18	<b>Soil Health</b>	
Inorganic (FIA) Phosphorus, ppm P	10.3	Soil Health Calculation	20.37
Organic Phosphorus, ppm P	7.5	Cover Crop Suggestion	60% Legume 40% Grass
ICAP Potassium, ppm K	56		
ICAP Zinc, ppm Zn	0.88		
ICAP Iron, ppm Fe	80		
ICAP Manganese, ppm Mn	8.5		
ICAP Copper, ppm Cu	0.13		

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Lab No. : 3376

### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	109.9
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	40.9
Potassium, lbs K <sub>2</sub> O/A	67.2
Nutrient Value, \$/A	119.89

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	85.2
Haney Test N evaluation, lbs N/A	109.9
Nitrogen Difference, lbs N/A	24.7
N savings, \$/A	15.81

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : MAY 22

Sample ID 3 :

Sample ID 2 : BAKKEN SOUTH

Sample ID 4 :

Lab No. : 3369

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.6	ICAP Sulfur, ppm S	8.6
1:1 Soluble Salts, mmho/cm	0.14	ICAP Calcium, ppm Ca	660
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	127
Organic Matter, %LOI	4.7	ICAP Sodium, ppm Na	13
WDRF Buffer pH	6.1	ICAP Aluminum, ppm Al	191
Soil Respiration CO <sub>2</sub> -C, ppm C	134.0		
<b>Water Extract</b>		<b>Calculations</b>	
Total Nitrogen, ppm N	24.7	Microbially Active Carbon (%MAC)	64.8
Organic Nitrogen, ppm N	15.0	Organic C : Organic N	13.8
Total Organic Carbon, ppm C	207	Organic N : Inorganic N	1.1
		Organic Nitrogen Release, ppm N	15.0
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	8.0	Organic Phosphorus Release, ppm P	10.3
Ammonium, ppm NH <sub>4</sub> -N	5.4	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	13.4	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	31	Soil Health Calculation	16.81
Inorganic (FIA) Phosphorus, ppm P	20.5	Cover Crop Suggestion	30% Legume 70% Grass
Organic Phosphorus, ppm P	10.3		
ICAP Potassium, ppm K	87		
ICAP Zinc, ppm Zn	5.63		
ICAP Iron, ppm Fe	77		
ICAP Manganese, ppm Mn	10.8		
ICAP Copper, ppm Cu	0.38		

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Lab No. : 3369

### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	51.2
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	70.8
Potassium, lbs K <sub>2</sub> O/A	104.4
Nutrient Value, \$/A	112.54

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	14.4
Haney Test N evaluation, lbs N/A	51.2
Nitrogen Difference, lbs N/A	36.8
N savings, \$/A	23.53

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Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : MAY 22

Sample ID 3 :

Sample ID 2 : BAKKEN NORTH

Sample ID 4 :

Lab No. : 3370

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	6.5	ICAP Sulfur, ppm S	9.4
1:1 Soluble Salts, mmho/cm	0.16	ICAP Calcium, ppm Ca	1009
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	193
Organic Matter, %LOI	4.1	ICAP Sodium, ppm Na	13
WDRF Buffer pH	6.7	ICAP Aluminum, ppm Al	159
Soil Respiration CO <sub>2</sub> -C, ppm C	111.1	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	58.5
Total Nitrogen, ppm N	24.8	Organic C : Organic N	15.3
Organic Nitrogen, ppm N	12.4	Organic N : Inorganic N	0.8
Total Organic Carbon, ppm C	190	Organic Nitrogen Release, ppm N	12.4
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	8.8	Organic Phosphorus Release, ppm P	7.9
Ammonium, ppm NH <sub>4</sub> -N	7.7	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	16.6	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	68	Soil Health Calculation	14.30
Inorganic (FIA) Phosphorus, ppm P	60.4	Cover Crop Suggestion	40% Legume 60% Grass
Organic Phosphorus, ppm P	7.9		
ICAP Potassium, ppm K	191		
ICAP Zinc, ppm Zn	10.12		
ICAP Iron, ppm Fe	88		
ICAP Manganese, ppm Mn	9.9		
ICAP Copper, ppm Cu	0.51		

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Lab No. : 3370

### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	52.2
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	157.1
Potassium, lbs K <sub>2</sub> O/A	229.1
Nutrient Value, \$/A	209.26

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	15.9
Haney Test N evaluation, lbs N/A	52.2
Nitrogen Difference, lbs N/A	36.3
N savings, \$/A	23.24

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Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : MAY 22

Sample ID 3 :

Sample ID 2 : NIGON KNOLL

Sample ID 4 :

Lab No. : 3371

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	6.3	ICAP Sulfur, ppm S	6.7
1:1 Soluble Salts, mmho/cm	0.13	ICAP Calcium, ppm Ca	703
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	142
Organic Matter, %LOI	3.4	ICAP Sodium, ppm Na	14
WDRF Buffer pH	6.8	ICAP Aluminum, ppm Al	200
Soil Respiration CO <sub>2</sub> -C, ppm C	116.6	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	76.9
Total Nitrogen, ppm N	14.6	Organic C : Organic N	16.1
Organic Nitrogen, ppm N	9.4	Organic N : Inorganic N	1.5
Total Organic Carbon, ppm C	152	Organic Nitrogen Release, ppm N	9.4
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	3.1	Organic Phosphorus Release, ppm P	4.5
Ammonium, ppm NH <sub>4</sub> -N	3.3	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	6.4	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	14	Soil Health Calculation	13.69
Inorganic (FIA) Phosphorus, ppm P	9.0	Cover Crop Suggestion	40% Legume 60% Grass
Organic Phosphorus, ppm P	4.5		
ICAP Potassium, ppm K	57		
ICAP Zinc, ppm Zn	0.91		
ICAP Iron, ppm Fe	74		
ICAP Manganese, ppm Mn	6.7		
ICAP Copper, ppm Cu	0.44		

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Lab No. : 3371

### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	28.4
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	31.1
Potassium, lbs K <sub>2</sub> O/A	67.9
Nutrient Value, \$/A	64.24

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	5.6
Haney Test N evaluation, lbs N/A	28.4
Nitrogen Difference, lbs N/A	22.8
N savings, \$/A	14.60

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Ag Testing - Consulting

Account No. : 92208

Biological Soil Analysis Report

ROSSMAN, MICHELLE  
7000 70TH ST NW  
ORONOCO MN 55960

Invoice No. : 1375197  
Date Received : 07/05/2022  
Date Reported : 07/07/2022

Results For : MICHELLE ROSSMAN

Sample ID 1 : MAY 22

Sample ID 3 :

Sample ID 2 : NIGON FLAT

Sample ID 4 :

Lab No. : 3372

Soil Depth : 0 - 6 in

### Haney - Soil Health Analysis

1:1 Soil pH	5.4	ICAP Sulfur, ppm S	11.6
1:1 Soluble Salts, mmho/cm	0.29	ICAP Calcium, ppm Ca	993
Excess Lime Rating	NONE	ICAP Magnesium, ppm Mg	146
Organic Matter, %LOI	6.2	ICAP Sodium, ppm Na	14
WDRF Buffer pH	6.2	ICAP Aluminum, ppm Al	179
Soil Respiration CO <sub>2</sub> -C, ppm C	138.8	<b>Calculations</b>	
<b>Water Extract</b>		Microbially Active Carbon (%MAC)	60.8
Total Nitrogen, ppm N	43.7	Organic C : Organic N	17.7
Organic Nitrogen, ppm N	12.9	Organic N : Inorganic N	0.4
Total Organic Carbon, ppm C	228	Organic Nitrogen Release, ppm N	12.9
<b>H3A Extract</b>		Organic Nitrogen Reserve, ppm N	0.0
Nitrate, ppm NO <sub>3</sub> -N	23.7	Organic Phosphorus Release, ppm P	7.7
Ammonium, ppm NH <sub>4</sub> -N	5.2	Organic Phosphorus Reserve, ppm P	< 0.1
Inorganic Nitrogen, ppm N	28.9	<b>Soil Health</b>	
Total (ICAP) Phosphorus, ppm P	25	Soil Health Calculation	17.42
Inorganic (FIA) Phosphorus, ppm P	17.8	Cover Crop Suggestion	10% Legume 90% Grass
Organic Phosphorus, ppm P	7.7		
ICAP Potassium, ppm K	65		
ICAP Zinc, ppm Zn	1.15		
ICAP Iron, ppm Fe	83		
ICAP Manganese, ppm Mn	10.0		
ICAP Copper, ppm Cu	0.15		

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Lab No. : 3372

### Haney - Soil Health Analysis Contd.

#### Nutrient Quantity Available for Next Crop

Nitrogen, lbs N/A	75.3
Phosphorus, lbs P <sub>2</sub> O <sub>5</sub> /A	58.6
Potassium, lbs K <sub>2</sub> O/A	78.3
Nutrient Value, \$/A	110.15

#### Nitrogen Savings by using the Haney Test

Traditional evaluation, lbs N/A	42.7
Haney Test N evaluation, lbs N/A	75.3
Nitrogen Difference, lbs N/A	32.6
N savings, \$/A	20.85

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**Cattle grazing cover crop in the Spring**



**Cover crop growing in a no-till field**



## Interacting with senators and soil health advisors





**Sharing field maps and tillage practices**

# Seeding Cover Crop





**Reviewing soil sampling results with local farmers**