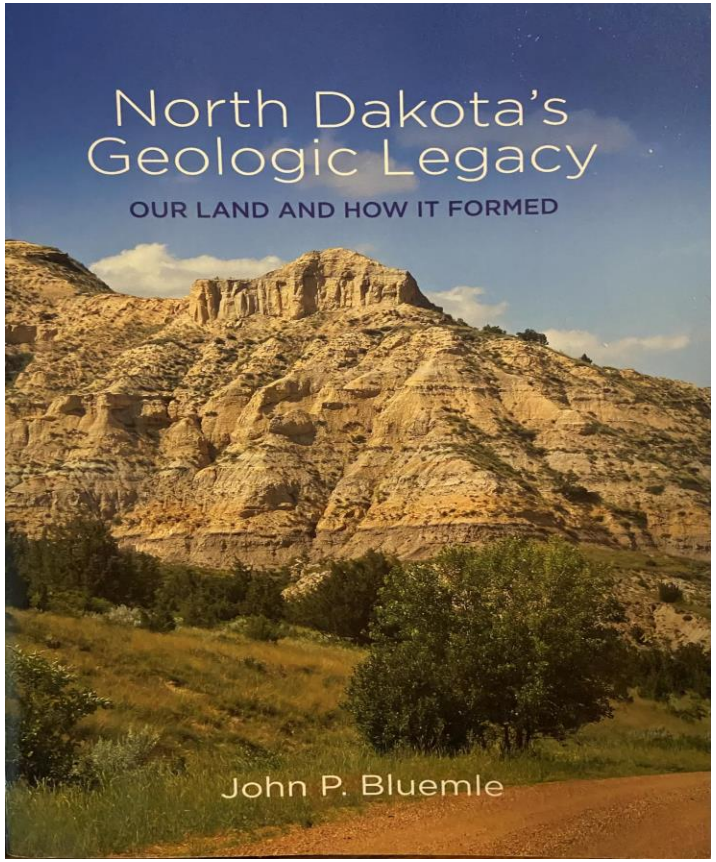
Principles in Practice

Adopting Soil Health to Place and Production

Menoken Farm

By: Jay Fuhrer | Conservationist /Retired NRCS/USDA | Bismarck, ND - USA
Burleigh County Soil Conservation District



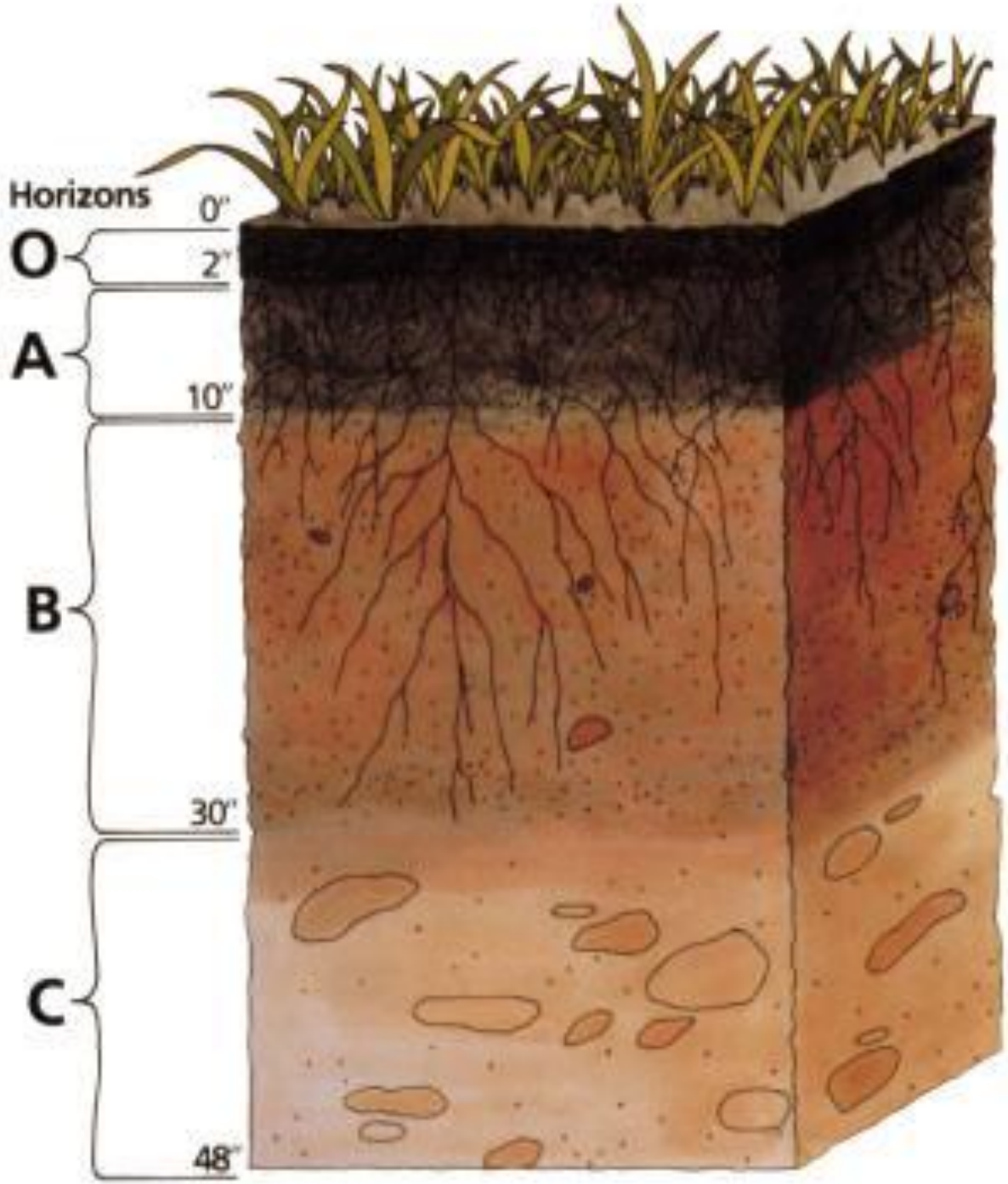
All Years Are Approximate (except a few).

Years Ago	Event
13,810,000,000	Big Bang
3,480,000,000	First Microbial Communities
458,000,000	First Land Plants
359,000,000	Bakken Formation deposited
159,000,000	First Mammals
3,500,000	Ice Age Begins
200,000	Humans started looking like they do today
100,000	Homo Sapiens appear in the fossil record
13,800	Earliest flooding by Lake Agassiz
12, 000	Devils Lake forms
11,000	Last active glacial ice melts from ND
9,000	Last stagnant glacial ice melts from ND
8,300	Lake Agassiz drains from ND for the last time
220	Lewis & Clark winter with the Mandan Indians
220	First recorded "crop" in ND
150	Bonanza Farms in ND – Mid 1870's
135	North Dakota statehood – November 2, 1889
71	I was born

Personal Goal

“I Want To Farm Forever”

Resource Concerns



- Soil horizons differ in a number of easily seen soil properties such as color, texture, structure, and thickness. Other properties are less visible. Properties, such as chemical and mineral content, consistence, and reaction require special laboratory tests. All these properties are used to define types of soil horizons.
- Soil scientists use the capital letters **O**, **A**, **B**, **C**, and **E** to identify the master horizons, and lowercase letters for distinctions of these horizons. Most soils have three major horizons -- the surface horizon (**A**), the subsoil (**B**), and the substratum (**C**). Some soils have an organic horizon (**O**) on the surface, but this horizon can also be buried. The master horizon, **E**, is used for subsurface

Menoken Farm
Broadcasting Clover
Into Winter Wheat.
April 11, 2024

- Berseem
- Crimson
- Subterranean

No Herbicide
No Insecticide
No Fungicide
No Commercial
Fertilizer

Menoken Farm
Winter Wheat

No Dessicant

Cover Crop
understory

Life and Color
Observations

Menoken Farm
Seed Coating

- Biology
- Minerals
- Humic Acid

Field 1 **Bio Inoculant**
Total Living Microbial Biomass 3461
Field 1C **No Bio Inoculant**
Total Living Microbial Biomass 1006
Fall 2024: High 4409 Low 1006

Field 1 **Bio Inoculant**
Total Bacteria 1654
Field 1C **No Bio Inoculant**
Total Bacteria 508
Fall 2024: High 2073 Low 380

Field 1 **Bio Inoculant**
Total Fungi ng/g 404
Field 1C **No Bio Inoculant**
Total Fungi ng/g 130
Fall 2024: High 687 Low 88

Broadleaf Planting Green Into Cereal Rye

Field 3S **No Pesticide-Grazed**
Total Living Microbal Biomass ng/g 3920
Field 3S **Pesticide-Grazed**
Total Living Microbial Biomass ng/g 2790
Fall 2024: High 4409 Low 1006

Field 3S **No Pesticide-Grazed**
Total Bacteria 1819
Field 3S **Pesticide-Grazed**
Total Bacteria 1315
Fall 2024: High 2073 Low 380

Field 3S **No Pesticide-Grazed**
Total Fungi ng/g 458
Field 3S **Pesticide-Grazed**
Total Fungi ng/g 383
Fall 2024: High 687 Low 88

Plant Analysis Report

WARD Laboratories, Inc.

Soil, Plant, Water, & Environmental Soil Program 2025 NAPT Participating Laboratory

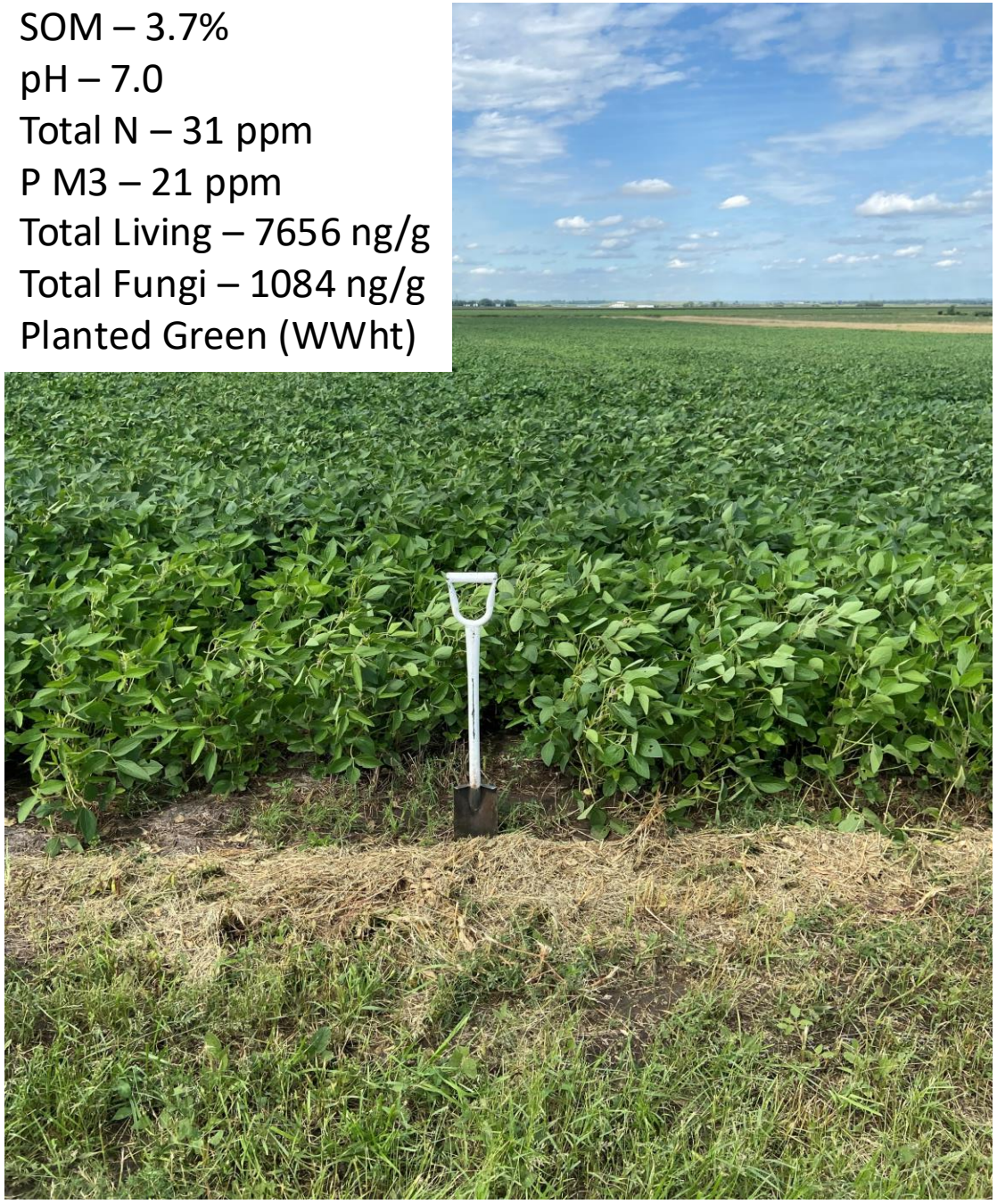
Account ID: 21172
BURLEIGH CO SOIL CONS DIST
916 E INTERSTATE AVE STE 6
BISMARCK, ND 58503-0548

Report Type: Soybean
Stage: Flower
Invoice Number: 1501903
Date Received: 07/30/2025
Date Reported: 08/01/2025
Lab ID: 6311

Results For: MENOKEN FARM **Location:** SOYBEAN **Sample ID:** FIELD 4

	Result Dry Basis	Sufficiency Levels: Deficient / Low / Sufficient / High
Sodium, % Na	0.00	
Nitrogen, % N	4.716	118%
Phosphorus, % P	0.449	138%
Potassium, % K	2.68	142%
Calcium, % Ca	1.359	143%
Magnesium, % Mg	0.592	131%
Sulfur, % S	0.336	157%
Zinc, ppm Zn	45	142%
Iron, ppm Fe	185	127%
Manganese, ppm Mn	98	129%
Copper, ppm Cu	13.5	116%
Boron, ppm B	40.2	125%
Molybdenum, ppm Mo	0.39	95%

Spring 2025 Soil Test
SOM – 3.7%
pH – 7.0
Total N – 31 ppm
P M3 – 21 ppm
Total Living – 7656 ng/g
Total Fungi – 1084 ng/g
Planted Green (WWht)



Menoken Farm
Fall Seed Cover Crop (Annuals) Brown and Green

Menoken Farm High Tunnel

Cover Crop Species

- Cereal Rye
- Buckwheat
- Berseem Clover
- Crimson Clover
- Subterranean Clover
- Phacelia
- Barley
- Oat
- Brassica

(Just One Example)

Menoken Farm High Tunnel
Fall 2023

Cover Crops

- Soil Armor
- Building Soil Aggregates.
- Cycling Nutrients.
- Fostering Life
- Photosynthesis
- Salinity Management

Remember - High Tunnels Are Like Farming In the Tropics.

Menoken Farm Cover Crop Termination

- The sunlight is removed for 10 days.

Menoken Farm

Alex Frasier – Faulkton, SD. (Concept)

Soybean planted on 15”.

Covers planted in-between rows.

Termination 6-8 wks after spring seeding.

2025 Sp - Water Stable Aggregates 25%
2025 Fall - Water Stable Aggregates 49%

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Account ID: 21172
BURLEIGH CO SOIL CONS DIST
916 E INTERSTATE AVE STE 6
BISMARCK, ND 58503-0548

Report Type: Soybean
Stage: Flower
Invoice Number: 1501903
Date Received: 07/30/2025
Date Reported: 08/01/2025
Lab ID: 6318

Results For: MENOKEN FARM **Location:** SOYBEAN **Sample ID:** FIELD 9

	Result Dry Basis	Sufficiency Levels: Deficient / Low / Sufficient / High
Sodium, % Na	0.00	
Nitrogen, % N	5.210	138%
Phosphorus, % P	0.406	129%
Potassium, % K	2.83	151%
Calcium, % Ca	1.480	149%
Magnesium, % Mg	0.649	136%
Sulfur, % S	0.336	157%
Zinc, ppm Zn	44	141%
Iron, ppm Fe	134	117%
Manganese, ppm Mn	107	133%
Copper, ppm Cu	10.1	109%
Boron, ppm B	40.5	125%
Molybdenum, ppm Mo	0.44	101%

Spring 2025 Soil Test
SOM – 4.2%
pH – 6.9
Total N – 33 ppm
P M3 – 17 ppm
Total Living – 8781ng/g
Total Fungi – 980 ng/g
Planted with Cover Crops

GMO Corn RR
No Commercial Fertilizer

Prior Year Full Season Cover Crop – Managed Grazed.

Excellent Ground Cover.

Plant Analysis Report

WARD Laboratories, Inc.

Soil, Plant, Water, & Environmental Soil Program 2025 NAPT Participating Laboratory

Account ID: 21172
BURLEIGH CO SOIL CONS DIST
916 E INTERSTATE AVE STE 6
BISMARCK, ND 58503-0548

Report Type: Corn
Stage: 15-18 L
Invoice Number: 1501903
Date Received: 07/30/2025
Date Reported: 08/01/2025
Lab ID: 6322

Results For: MENOKEN FARM **Location:** CORN **Sample ID:** FIELD 10

	Result Dry Basis	Sufficiency Levels (Deficient / Low / Sufficient / High)
Sodium, % Na	0.00	
Nitrogen, % N	3.297	136%
Phosphorus, % P	0.364	147%
Potassium, % K	2.32	127%
Calcium, % Ca	0.341	108%
Magnesium, % Mg	0.232	119%
Sulfur, % S	0.229	136%
Zinc, ppm Zn	30	113%
Iron, ppm Fe	105	114%
Manganese, ppm Mn	64	117%
Copper, ppm Cu	10.1	116%
Boron, ppm B	8.1	108%
Molybdenum, ppm Mo	0.61	108%

Spring 2025 Soil Test
SOM – 4.1%
pH – 7.2
P M3 – 30 ppm
N – 31 ppm
Total Living 10,871 ng/g
Total Fungi 1323 ng/g

REPORT NUMBER
22-161-0084
COMPLETED DATE
Jun 14, 2022
ACCOUNT
65051
RECEIVED DATE
Jun 10, 2022

Midwest Laboratories®
13611 B Street • Omaha, Nebraska 68144-3693 • (402) 334-7770
www.midwestlabs.com

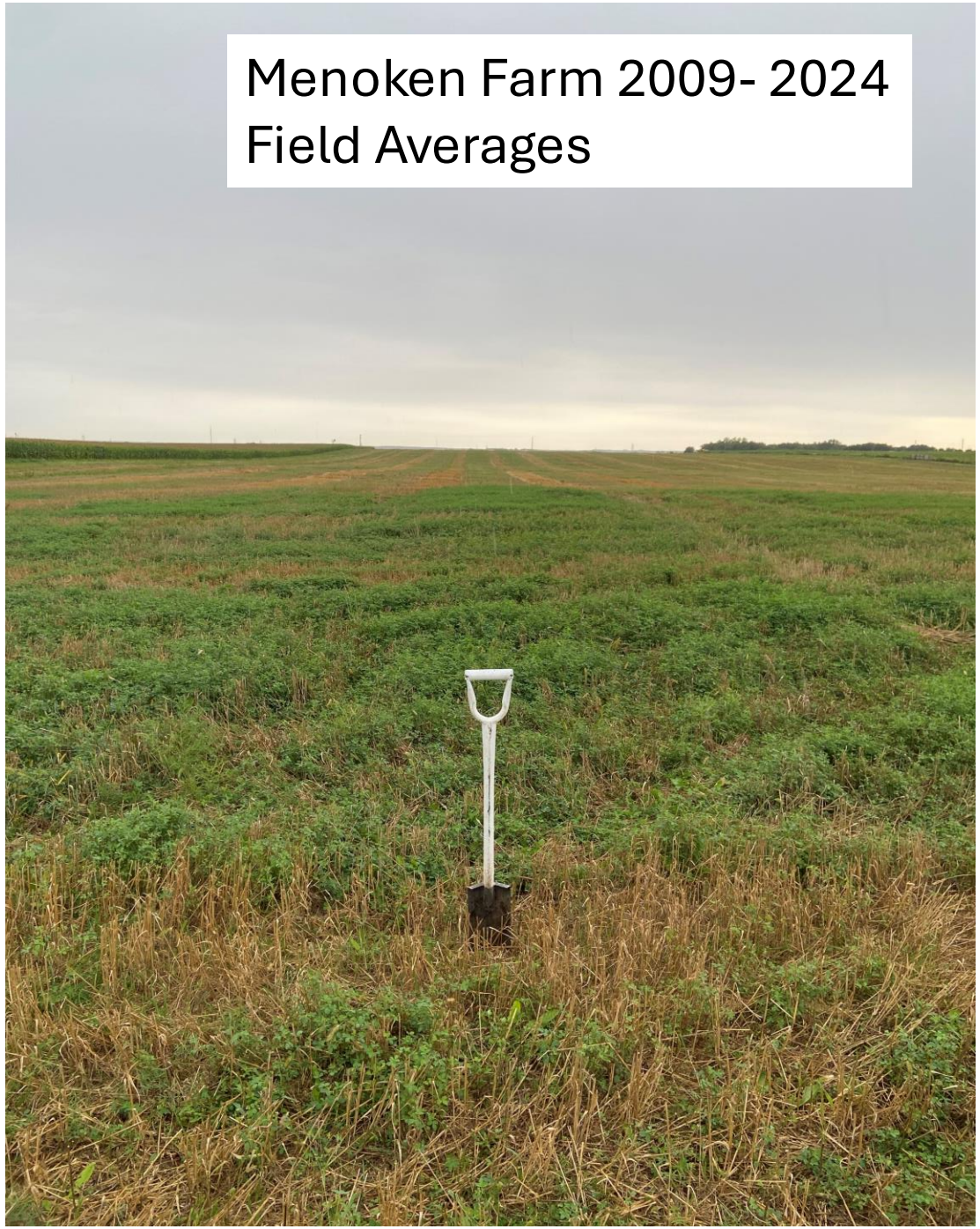
TODAY'S DATE
Jun 14, 2022

Burleigh County Soil
Jaden Deckert
916 E Interstate Ave Ste 6
Bismarck ND 58503-1227

IDENTIFICATION
MENOKEN FARM

TOTAL SOIL REPORT

Lab Number	Sample ID	N ppm	S ppm	P ppm	K ppm	Mg ppm	Ca ppm	Na ppm	Fe ppm	Al ppm	Mn ppm	Cu ppm	Zn ppm
39828415	FIELD 1	1863	253	509	1923	2581	3309	39	11554	6137	431	9	51
39828416	FIELD 2	2171	232	468	1705	2684	3271	60	11908	6293	440	9	46
39828417	FIELD 3	2001	236	494	1652	2829	3534	42	12584	6569	525	10	50
39828418	FIELD 4	1945	220	553	1781	2996	3760	40	13483	5949	487	8	48
39828419	FIELD 5	2565	298	612	2250	2857	3840	41	12891	6859	579	11	55
39828420	FIELD 6	1887	256	554	1890	2985	3565	51	12778	6822	451	12	50
39828421	FIELD 7	2444	255	594	2060	3436	4068	50	13202	7453	439	13	53
39828422	FIELD 8	2502	262	640	1889	3345	4032	45	12527	6920	424	12	49
39828423	FIELD 9	2809	355	663	2111	3474	4384	49	13466	7293	489	12	55
39828424	FIELD 10	2743	291	585	1854	3169	3958	40	12634	6923	433	11	52



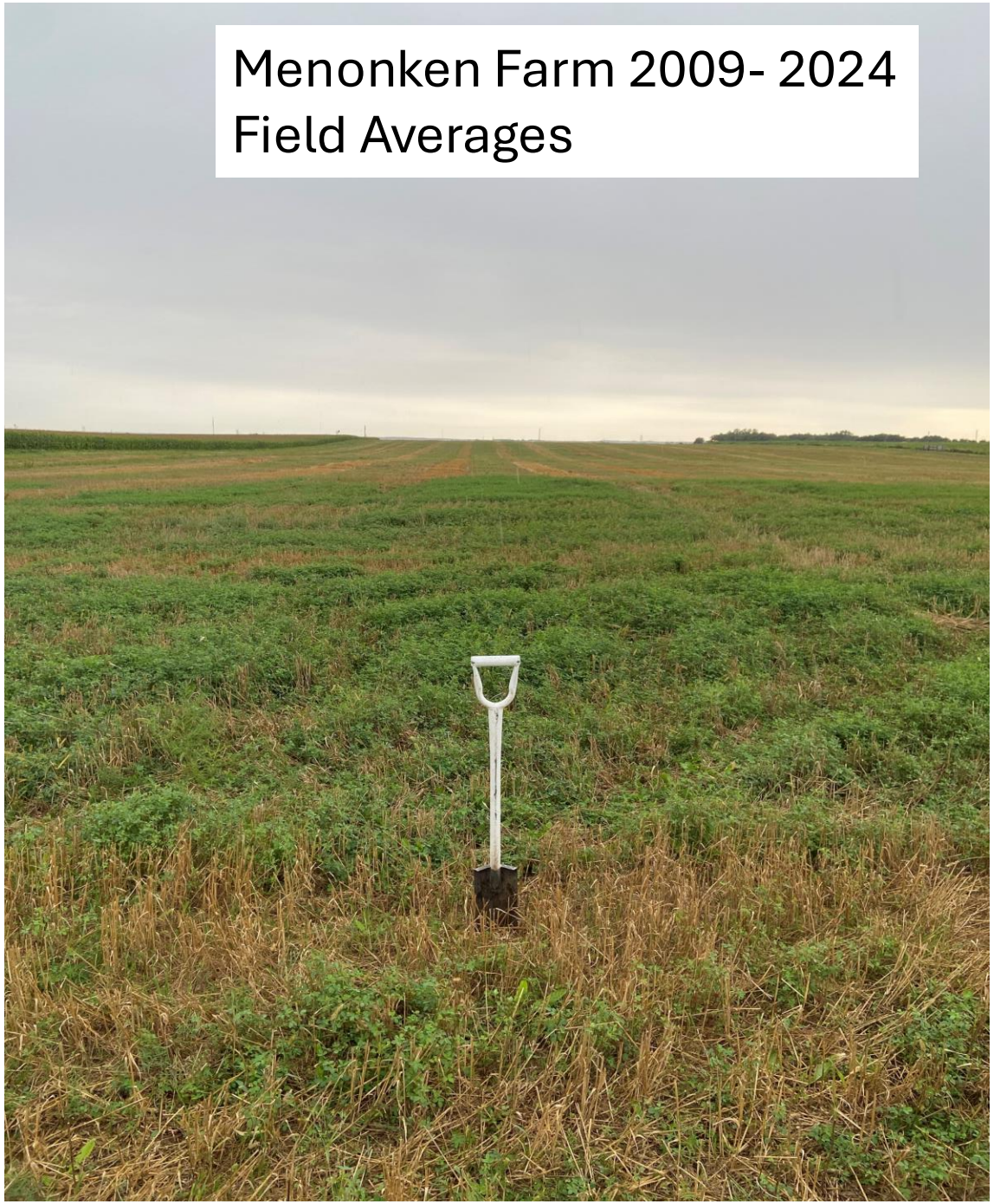
SOM Levels
Average 10 fields = 3.8%
Range 5.3% to 2.4% (Corn/Bean Field-Lowest)

Nitrogen
Approximately 2/3 Organic & 1/3 Inorganic
Average 10 Fields = 60 lbs N/ac
Range 65 to 40 lbs (Corn/Bean Field-Lowest)

Phosphorous
Average 10 Fields = 33 Mehlich (>25 High)
Range 63 to 13 (Corn/Bean Field-Lowest)

Potassium
Average 10 Fields = 409 (>160 High)
Range 701 to 235 (Corn/Bean Field-Lowest)

Sulfur
Average 10 Fields = 10.3 PPM (10-15 Medium)
Range 12.7 to 7.3 (Corn/Bean Field-Lowest)



Water Stable Aggregates
Average 10 Fields = 48%
Range 39 to 64 (Corn/Bean Field-44)

Organic C
Average 10 Fields = 241
Range 191 to 289 lbs (Corn/Bean Field-Lowest)

pH
Average 10 Fields = 6.5 (6.0-7.1 Neutral)
Range 6.2 to 7 (Corn/Bean Field- 6.6)

Calcium
Average 10 Fields = 2180 PPM (500-2500 Med)
Range 1858 to 2652 (Corn Bean Field - 1906)

Magnesium
Average 10 Fields = 516 PPM (50-150 Med)
Range 384 to 695 (Corn Bean Field – 538)

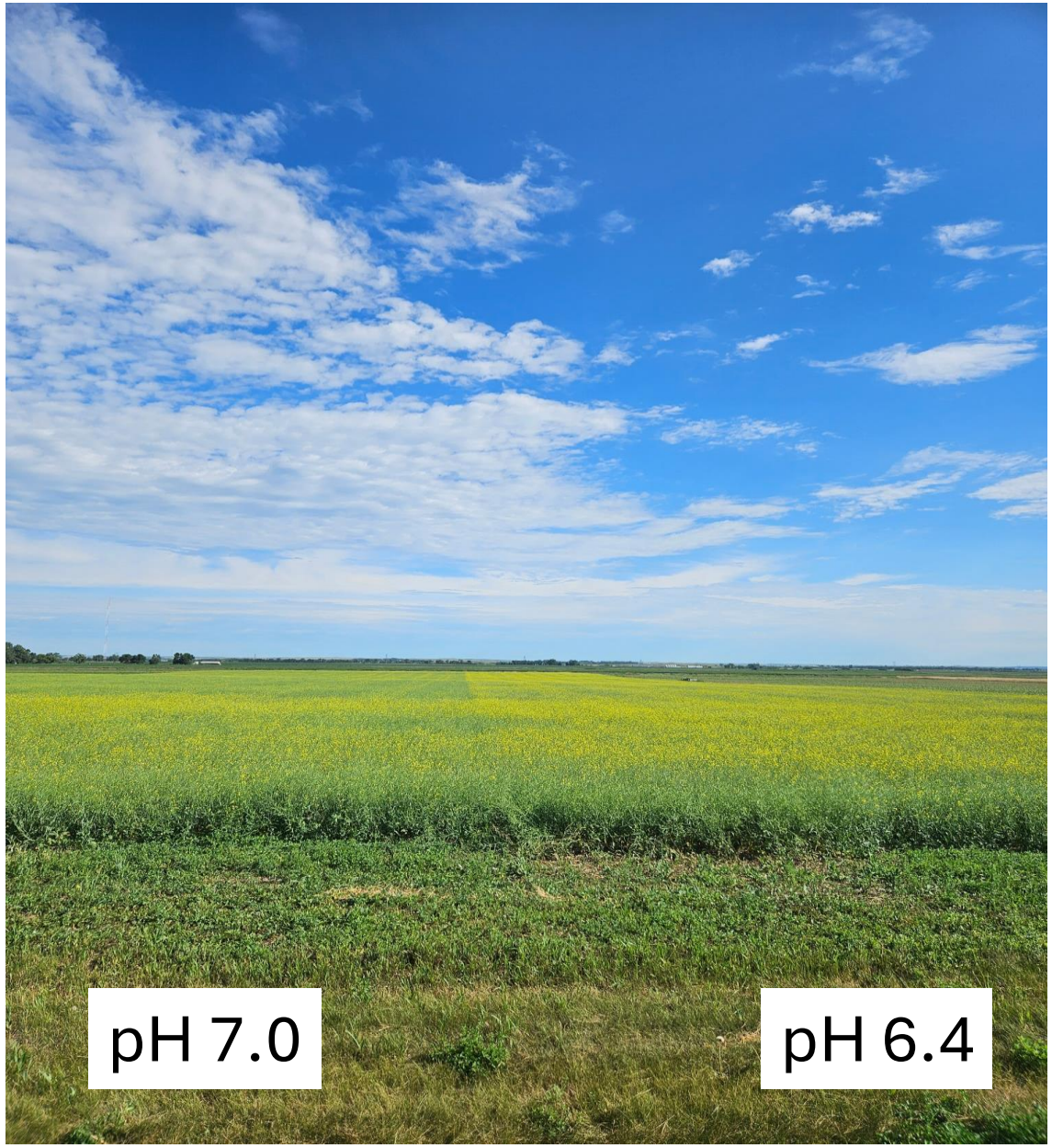
CEC
Average 10 Fields = 17.6
Range 14.7 to 21.7 (Corn/Bean Field-Lowest)

Menoken Farm

The ruminant makes food available to the soil food web on day one.

Menoken Farm 2021 – Field 3 Winter Feeding

Menoken Farm 2025 – Field 3 Canola



Self Education

- A Soil Owner's Manual: Jon Stika
- The Buffalo Harvest: Frank Mayer
- Sapiens: Yuval Noah Harari
- Grow Your Soil: Diane Miessler
- Growing A Revolution: David Montgomery
- Dirt to Soil: Gabe Brown
- The Light Eaters: Zoe Schlanger
- The Soil Will Save Us: Kristin Ohlson
- The Nature and Properties of Soils – 14th Edition : Brady and Weil
- Journals of Lewis and Clark
- Buffalo Bird Women's Garden : Gilbert Wilson
- The One Straw Revolution: Masanobu Fukuoka
- Managing Cover Crops Profitably 3rd Edition
- A Sand County Almanac: Aldo Leopold
- Soil Biology Primer: by Elaine Ingham
- Life in the Soil: James Nardi
- An Agricultural Testament: Sir Albert Howard
- Dirt – The Erosion of Civilizations: David Montgomery
- Not Just Dirt: Kevin R. Elmy
- A Road To Fossil Fuel Free Farming: David Rourke
- Early Settlement of North Dakota: Clement Lounsberry
- 1491: Charles Mann
- The Soil – Human Health Nexus: Rattan Lal
- Civilization Critical: by Darrin Qualman
- What Your Food Ate: David Montgomery & Anne Bikle

www.menokenfarm.com

Click on the Learn tab.

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Extra Slides

Medallion Labs

800-245-5615
info@medlabs.com
www.medallionlabs.com

Final Report

Order # Sample ID: 2024-009938-03 **Company:** Burleigh Country Soil Conservation

Customer Sample ID: Field 3 South

Sample Description: Pesticide MRA - Glyphosate

Analytical Testing

Method:	Component:	Result:	Test Date:
[2] Glyphosate	Glyphosate Screen	Detect	18-Nov-2024
	Verified Residues	AMPA, Glyphosate	18-Nov-2024
	Glyphosate	3.180 mg/kg	18-Nov-2024
	AMPA	1.144 mg/kg	18-Nov-2024

Medallion Labs

800-245-5615
info@medlabs.com
www.medallionlabs.com

Final Report

Order # Sample ID: 2024-009938-01 **Company:** Burleigh Country Soil Conservation

Customer Sample ID: Field 1

Sample Description: Pesticide MRA - Organic Screen

Analytical Testing

Method:	Component:	Result:	Test Date:
Multi Residue Analysis	Organic Screen	Non-Detect	15-Nov-2024

Order # Sample ID: 2024-009938-02 **Company:** Burleigh Country Soil Conservation

Customer Sample ID: Field 3 North

Sample Description: Pesticide MRA - Glyphosate Test

Analytical Testing

Method:	Component:	Result:	Test Date:
[2] Glyphosate	Glyphosate Screen	Non-Detect	18-Nov-2024

What is the next step?

- Lower Pesticide levels
- Improve nutrient density
- Concentrate on nutrition for youth

Livestock winter integration

Soil Health Principle 2 – Minimize Soil Disturbance

- Chemical – Fungicides, Insecticides, Herbicides, Fertilizer
- Physical - Tillage
- Biological – Restricting CO2 and Sunlight Harvest