Final IDP
FY22

1.0 PROJECT PROPOSAL SUMMARY SHEET

Project title: **Menoken Farm Planting Green Phase II Project**

Lead project sponsor: Burleigh County Soil Conservation District
Contact persons:

Project director: Connie Bryant, District Clerk
Burleigh County Soil Conservation District
701-250-4518, ext. 3, or constance.bryant@nd.nacdnet.net

Other contacts: Darrell Oswald, District Technician/Menoken Farm Manager
Burleigh County Soil Conservation District
701-250-4518, ext. 3, or darrell.oswald@nd.nacdnet.net

State: North Dakota
Hydrologic unit code: Statewide
High priority watershed: N/A
Project type: Information and education
Waterbody types: Other – crosscuts all categories
NPS category: Other – crosscuts all categories; emphasizes nutrient management
Project location: Burleigh County, North Dakota

Summarization of major goal: Demonstrate and educate how planting green—integrating cover crops into simple rotations—can fill in crop fallow seasons and provide benefits such as improved water quality; erosion control; salinity management; and improved soil health.

Project description: Burleigh County SCD will continue to monitor and provide information and education on planting annual cash crops into live, standing, green cover crops. This relatively new concept, called "planting green," will be conducted at Menoken Farm, Burleigh County SCD's 150-acre soil health demonstration site.

Planting green has the potential of implementing cover crops into low crop diversity cropping systems in the Northern Plains, where cold, wet springs have slowed the adoption of the five major soil health principles. Initially, cereal rye would be seeded immediately after the cash crop harvest. Some years, this would result in little to no fall cover crop growth. However, the stage would be set for spring cover crop growth. Planting green concentrates on spring establishment of soybean, sunflowers, edible beans, etc., into actively growing and green cover crops. Broadcasting or interseeding a cover crop earlier in the growing cash crop may also be an option.

We will inform and educate the agricultural community on planting green's improvements to soil health, resulting in restored water and nutrient cycles.

FY2022 Section 319 funds requested:	$ 156,410
Match:	$ 104,273
Other federal funds:	$ 0
Total project cost:	$ 260,683
319 funded personnel:	.5

2.0 STATEMENT OF NEED

2.1 Water quality priorities

The Menoken Farm Planting Green Phase II Project is a continuation of the three previous Menoken Farm soil food web projects. The primary target audience will consist of farmers, ranchers, landlords, educators, agriculture lenders, foresters, wildlife conservationists and gardeners. (See attached three monitoring slides) *(See Attachment A for past accomplishments)*

Short growing seasons and cold wet springs—combined with simple crop rotations—have slowed the adoption of the five soil health principles: 1) Soil armor; 2) minimizing soil disturbance; 3) plant diversity; 4) continual live plant/root; and 5) livestock integration.

This is particularly the case with cover crops and livestock integration. The area's primary resource concerns are wind and water erosion; salinity; water quality; and carbon-deficient soils. In addition, spring wheat acres have been decreasing and soybean acres have been increasing. This results in fewer acres where cover crops can be seeded in the early fall.

Annual, biennial and perennial covers are all cropping system integration alternatives. Presently, the biennial option shows new potential, with a few lead North Dakota farmers now planting green. They are utilizing a late seeded cereal rye cover crop after harvest to provide erosion protection; grow out water through transpiration in lieu of soil evaporation; secure post-harvest inorganic nutrient; gather additional carbon dioxide; and provide a live seed bed in the spring.

In the environment of the Northern Plains, with its short growing season, the cover would have little to no fall growth before the onset of winter. However, it would emerge in the spring to provide a live seed bed.

The benefits of planting green are as follows:

- *Improved water quality*: Securing post-harvest inorganic nutrients in a green plant, and released for cash crop uptake when the cover crop is terminated.
- *Subsurface water drainage:* As an alternative to tile drainage, the cover would help utilize excess water in wet years and be managed with earlier termination during dry years.
- *Erosion control:* Providing live soil armor to reduce wind and water erosion, especially during the critical spring period.
- *Salinity management:* Growing out our water through green plant transpiration with a salt-tolerant cover crop in lieu of soil evaporation.
- *Improved trafficability:* Fields with green cover crops actively growing have more load bearing capabilities, assisting spring seeding operation in wet springs.
- *Increased crop diversity:* A corn/soybean crop sequence consists of two crop types: 1) a warm season grass; and 2) a warm season broadleaf. Adding cereal rye, a cool season grass, increases crop diversity from two crop types to three crop types. This, in turn, provides additional pest management and crop rotation benefits.
- *Less hairpinning:* Greater ease of seed soil contact for planting operations.
- *Livestock integration:* Creating a window of opportunity to return livestock to the landscape.

- *Improved soil health:* Green cover crops give us the opportunity to harvest additional CO2. This provides the soil food web with additional nourishment to complete soil services such as cycling nutrients; improving infiltration; storing additional water; and increasing soil organic matter.
- *Weed suppression:* Cereal rye is known to suppress weeds and improve herbicide resistant weed control.

There is a need for continuing education to keep abreast of new practices such as planting green. Using cover crops provides more ground cover and cycling of nutrients, especially those nutrients that have leeched into deeper soil depths beyond the reach of typical crop roots. These benefits are consistent with the intended results for many of the practices promoted and supported by the ND NPS Pollution Management Plan. (*See Attachment B for a map of the farm site)*

3.0 PROJECT DESCRIPTION

3.1 Goal

The primary goal of this project is to increase the ability of the agricultural community to improve water quality and use efficiency through soil health improvement. Water use efficiency will improve when reducing evaporation from bare soil and redirecting water through cover crop plant transpiration. This will be accomplished by designing and implementing a planting green project that will integrate cover crops and livestock into simple crop rotations in the Northern Plains. By filling in the fallow seasons with live green plants, we will demonstrate numerous benefits such as the improvement of water usage and drainage; a reduction of wind and water erosion; and adding more carbon to the soil. (*See Attachment C for Menoken Farm history)*

This planting green phase II project's activities will be monitored and shared as part of the overall Burleigh County SCD/Menoken Farm natural resources educational program. Outreach will consist of hosting groups and entities, speaking requests, articles and multiple videos. The area of impact will include local, regional and national.

3.2 Objectives and tasks

OBJECTIVE 1 – *Develop and deliver a planting green cropping plan:* The Burleigh County SCD team will design a cropping plan that includes crop diversity, cover crops, compost and the two gardens. It will include planning for a window of opportunity to seed covers into corn, followed by soybeans the following spring. Burleigh County SCD will annually provide one part-time employee for technical assistance, day-to-day practice and system implementation to manage and maintain a Menoken Farm cropping system.

Task 1 *– Seed and maintain fields and gardens:* After seeding, the Burleigh County SCD team will manage all herbicides, spraying, harvesting and trucking. This task will also include annual crop rotation and planting green cover crop management.

Product: A work plan that is carried out for seeding, annual crop rotation, managing herbicides, spraying, harvesting and trucking

Estimated cost: $46,170 from 319 grant and $30,480 match

$12,000/seed; $6,000/seeding; $9,000/herbicide; $9,000/harvesting; $6,000/trucking; $4,170/other materials and labor

Task 2 – *Manage and maintain compost materials:* The Burleigh County SCD team will perform all composting duties, such as adding new materials, aerating the pile, curing the compost and distributing the final compost to fields and the garden.

Product: Successful management and maintenance of compost materials

Estimated cost: $6,800 from 319 grant and $4,534 match

$5,300/compost materials; $500 compost turning; $1,000/labor

Task 3 – *Maintain and manage high tunnel garden and Hunger Free Garden:* The Burleigh County SCD will annually provide management and maintenance for the high tunnel garden, along with the outside Hunger Free Garden. All produce will be donated to the Bismarck/Mandan food pantries.

Product: Properly maintained high tunnel greenhouse and outdoor garden

Estimated cost: $2,520 from 319 grant and $1,680 match

$500/seed; $1,270/labor; $350/cover crops; $400/water

OBJECTIVE 2 – ***Develop and deliver a planting green grazing plan:*** The Burleigh County SCD team will design a grazing plan that addresses such things as the green cover crops, animals and rotational grazing. It will include planning for a window of opportunity to graze animals in the spring prior to seeding soybeans. Burleigh County SCD will annually provide one part-time employee for technical assistance, day-to-day practice and system implementation to manage and maintain a Menoken Farm grazing system.

Task 4 – *Manage cover crop rotational grazing:* The plan will cover the proper schedules for cover crop grazing rotations during this plant green project.

Product: Successful management and use of grazing animals

Estimated cost: $17,500 from 319 grant and $11,667 match

$10,000/labor; $4,500/cover crops; $3,000 fencing

OBJECTIVE 3 – ***Monitor planting green benefits***: We will gather and analyze pertinent monitoring information, which will speak directly to NPS pollution and water quality. The Haney Soil Health Test, standard soil test and the phospholipid fatty acid analysis will be used to perform a total of approximately 60 soil tests.

Task 5 – *Annually monitor impacts from all 10 Menoken Farm fields:* Approximately 60 soil samples will be taken and analyzed over the three-year period of this project.

Product: Approximately 60 completed and analyzed soil samples.

Estimated cost: $9,720 from 319 grant and $6,480 match

$9,000/soil sample analysis; $720/labor

OBJECTIVE 4 – ***Inform and educate the agricultural community:*** The Burleigh County SCD will provide information, education and demonstration activities for specific groups, such as farmers, ranchers, gardeners, small landowners, lenders, educators, wildlife groups, forestry groups and landlords. Educational events will be held at the Menoken Farm site east of Bismarck so participants can tour the fields, view the gardens and compost pile, and take part in the on-site demonstrations, such as this plant green project.

Task 6 – *Conduct three major educational/demonstration events:* One major workshop/tour will be held each year, for a total of three major events. Infiltration, rainfall simulator, slake, crop and grass root boxes and tabletop runoff demonstrations will be conducted.

Product: A total of three major education and demonstration events that provide education and training on the management of systems and technology that can be implemented to improve soil health, plant and animal biodiversity, and other practices that ultimately protect and improve water quality.

Estimated cost: $6,660 from 319 grant and $4,440 match
$3,330/speaker fees; $3,330/marketing materials

Task 7 *– Arrange and host 30 summer tours.* We will plan and carry out 10 summer tours per year at the Menoken Farm site. These workshops/tours are primarily for farmers and ranchers and include all the demonstrations listed in Task 7. These tours will include a grazing component that focuses on the planting green project.

Product: A total of 30 completed summer tours
Estimated cost: $16,688 from 319 grant and $11,125 match
$15,938/outreach and marketing; $750/labor

Task 8 *– Produce three educational videos:* We will work with a local video company to produce three videos of the three annual major workshops. These videos will be posted on YouTube and the Web sites of Menoken Farm, Burleigh County SCD, the North Dakota Department of Agriculture/Division of Water Quality, NRCS and others.

Product: Three professionally-produced videos posted on YouTube and Web sites
Estimated cost: $12,960 from 319 grant and $8,640 match
$12,960/contractual

Task 9 *–Maintain the Menoken Farm Web site.* The new Menoken Farm Web site, www.menokenfarm, will be updated regularly with videos, podcasts and other resulting products from this project.

Products: Maintenance of the new stand-alone Web site for Menoken Farm that was created in 2017 to reach the Menoken Farm target audience.
Estimated cost: $3,677 from 319 grant and $2,451 match
$3,677 Maintenance, event postings, video postings, etc.

3.3 Project schedule

We propose a project work plan that begins July 1, 2022, and ends June 30, 2025. *(See Attachment D for Milestone Table or Budget Table)*

3.4 Appropriate entity

Burleigh County SCD has been in operation for more than 35 years. It is considered a leader in its field and is one of the first organizations in North Dakota to embrace new and innovative ideas to test in its area. Burleigh County SCD employs four full-time and one part-time employee and has technical assistance on this project from one retired NRCS employee. The SCD has a proven history of innovative projects, knowledgeable employees and detailed tracking of data and outcomes of its projects.

3.5 Plan for proper operation and maintenance

The Burleigh County SCD has ongoing discussion on this project at monthly board meetings. At these meetings the project and expenses are discussed and approved by the board. At the end of each year the project staff has planning sessions for additions/changes for the farm for the coming season. The plan is presented to the board for approval and is put in its annual work plan, which is the SCD's primary work document.

4.0 COORDINATION PLAN

4.1 Lead project sponsor and cooperating organizations

The Burleigh County SCD will implement all activities of the project and will have the primary responsibility for project planning, contracting, coordination, implementation, financial assistance and timely submission of project payment applications.

USDA Agriculture Research Service (ARS)

Personnel from the USDA-ARS Northern Great Plains Lab will provide technical assistance and instruction for project workshops, tours and demonstrations. These activities will be conducted in accordance with the agency's mission.

North Dakota State University (NDSU) Extension Service

The Burleigh County Extension Service agent will provide technical assistance for project workshops, tours and demonstrations. These activities will be conducted in accordance with the university's mission.

North Dakota Department of Health

Personnel will oversee 319 funding and assist with planning and implementation of educational events when possible.

4.2 Local support for the project

There is widespread support for the project by farm groups and agencies throughout North Dakota. As a sample, we have three letters of support by our closest partners attached and two on file. A summary of each follows:

1. *USDA Agricultural Research Service:* David Archer, research leader, pledges technical assistance for a planting green project that will involve integrating cover crops into simple rotations. The ARS will provide technical assistance as needed for project workshops, tours, and demonstration events at Menoken Farm. We will also coordinate and partner with BCSCD on planning activities.
2. *NDSU Burleigh County Extension Service*: Aaron Field, Program Coordinator, states Menoken Farm has been a valuable resource, both locally and throughout North Dakota , and "we are proud to have this leading soil health demonstration site in our state." He continues with, Growers in North Dakota, and surrounding states, have great need for additional conservation-oriented practices that do not conflict with production goals. Having these practices demonstrated by a trusted partner with excellent reach and visibility, like Menoken Farm, is a strong step toward increasing adoption of these practices.
3. *Dakota College-Bottineau:* Keith Knudson, Agriculture/Horticulture Chair, states Menoken Farm has been a valuable resource, both locally and throughout North Dakota. The combination of natural resource education and systems approach conservation at Menoken Farm continues to capture the attention and interest from people not only through North Dakota, but the United States and the world.
4. *(These three letters of support are attached.)*

4.3 Coordination with other education programs

Burleigh County SCD will coordinate with other active 319 information and education projects, such as the North Dakota Grazing Lands Coalition and Ducks Unlimited. The outcomes and data will be shared with other organizations and agencies. Information will be exchanged in tours, workshops and by personal contact.

4.4 Similar activities in project area

To our knowledge there is not another program in North Dakota that measures the biological outcomes and demonstrates the "whole" concept of restoring soil health on field scale.

5.0 Evaluation and monitoring plan

5.1 Plans for evaluating project goals, objectives and tasks

The following evaluation measures will be conducted for the products outlined in this proposal:

a) Personnel and support: Hours spent on each activity will be documented and actual costs for training and supplies will be tracked with receipts.
b) Deliver a cropping plan: Burleigh County SCD will record this information on the Project Outcome section of the reimbursement for each activity.
c) Deliver a grazing plan: Burleigh County SCD will record this information on the Project Outcome section of the reimbursement for each activity.
d) Monitor planting green benefits: Through either or both observation or collecting numerical data, each of the benefits listed in section 5.2-5.4 will be documented annually and also compared. Each field is divided into two halves, with soil food web applied to only one of the halves. Ward Laboratory of Kearney, Neb., will test each half annually and compare the soil biology results. In addition, grain yields will be documented annually and also compared. Parameters that will be evaluated include PFLA and Haney Analysis.
e) Inform and educate the agricultural community: The number of tours and workshops implemented, the date held and the number of people in attendance will be recorded for each event.

f) Reporting: The information obtained from the evaluation measures will be compiled by Burleigh County SCD.

5.2-5.4 Demonstration project monitoring

This planting green demonstration project will be actively monitored and data recorded on the following expected benefits and means collected:

1. *Improved water quality:* Numerical data
2. *Subsurface water drainage:* Observation
3. *Erosion control:* Observation
4. *Salinity management:* Numerical data
5. *Improved trafficability:* Observation
6. *Increased crop diversity:* Numerical
7. *Less hairpinning:* Numerical data
8. *Livestock integration:* Observation
9. *Improved soil health:* Numerical data and observation
10. *Weed suppression:* Numerical

5.5 How and when data will be stored, managed and reported

We will compile all information obtained and both keep on file at the offices of Burleigh County SCD and submit it to the North Dakota Department of Environmntal Quality in annual reports and the final report. This information will include the number of individuals reached and the number of organizations and counties represented throughout the project period.

An example of data tracked that is on file is the soil food web and carbon over a ten-year period.

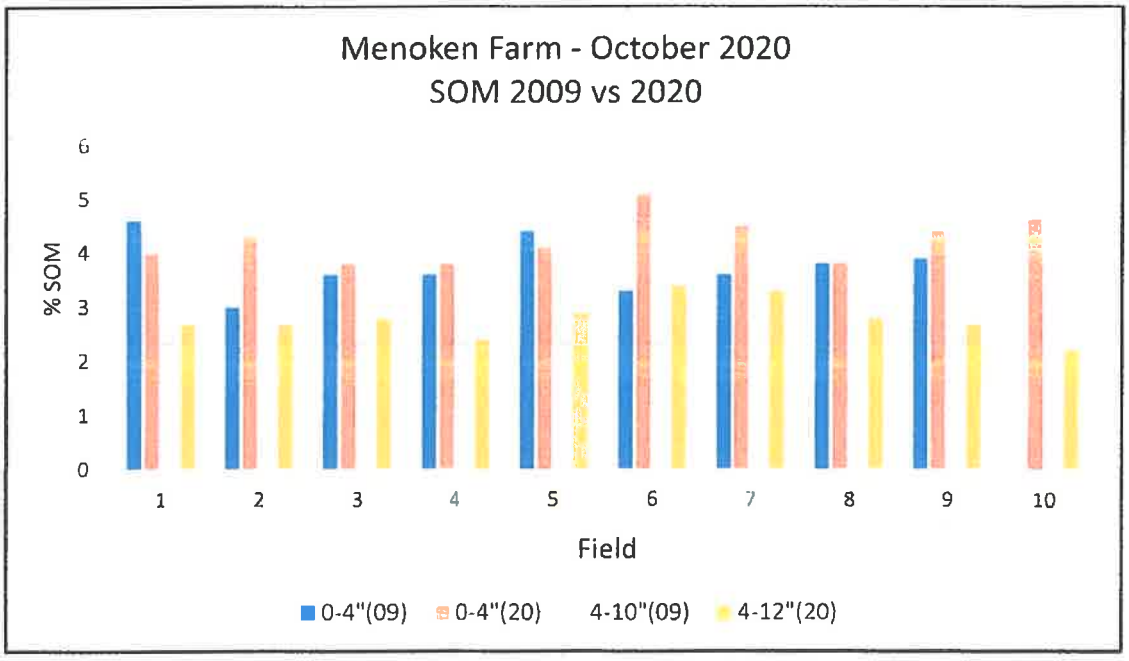
The soil food web (phospholipid fatty acid) and carbon (soil respiration ppm C) were tracked over a ten-year period. For example, annual plants versus perennials support the soil food web at different levels. Drought conditions have occurred in 2020 and 2021. A comparison of the soil respiration (Haney Analysis) and the Total Biomass (PLFA) for annual plants and perennials, clearly illustrates how the managed grazed perennial fields function at a higher level. Consequently, livestock on the landscape continue to be important. (*See Attachment E for perennial impacts*)

5.6 Any models used

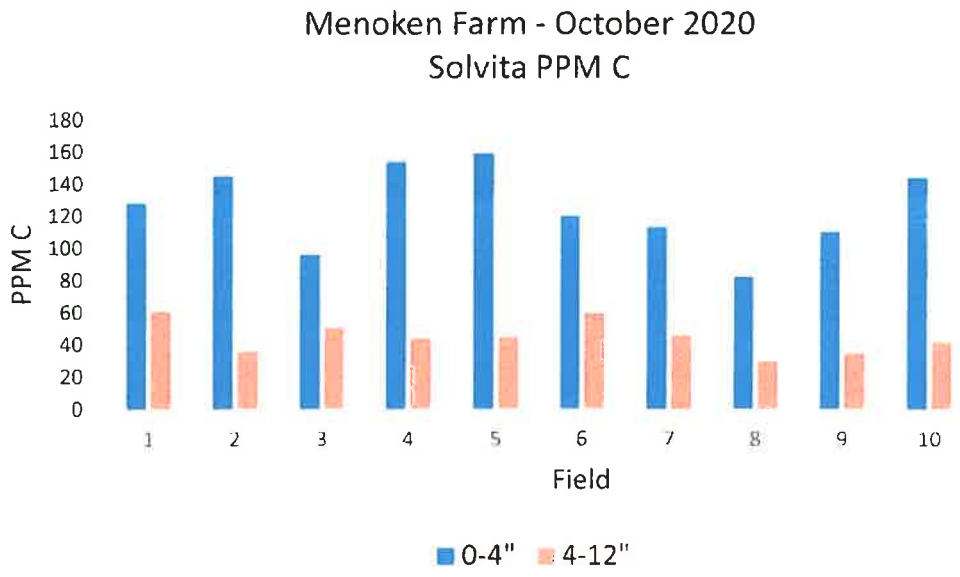
Non applicable.

5.7. Long-term funding plans for the operation and maintenance of activities

Burleigh County Soil Conservation District general operating budget.



Field 6 has the most crop diversity, cover crop, and livestock integration.

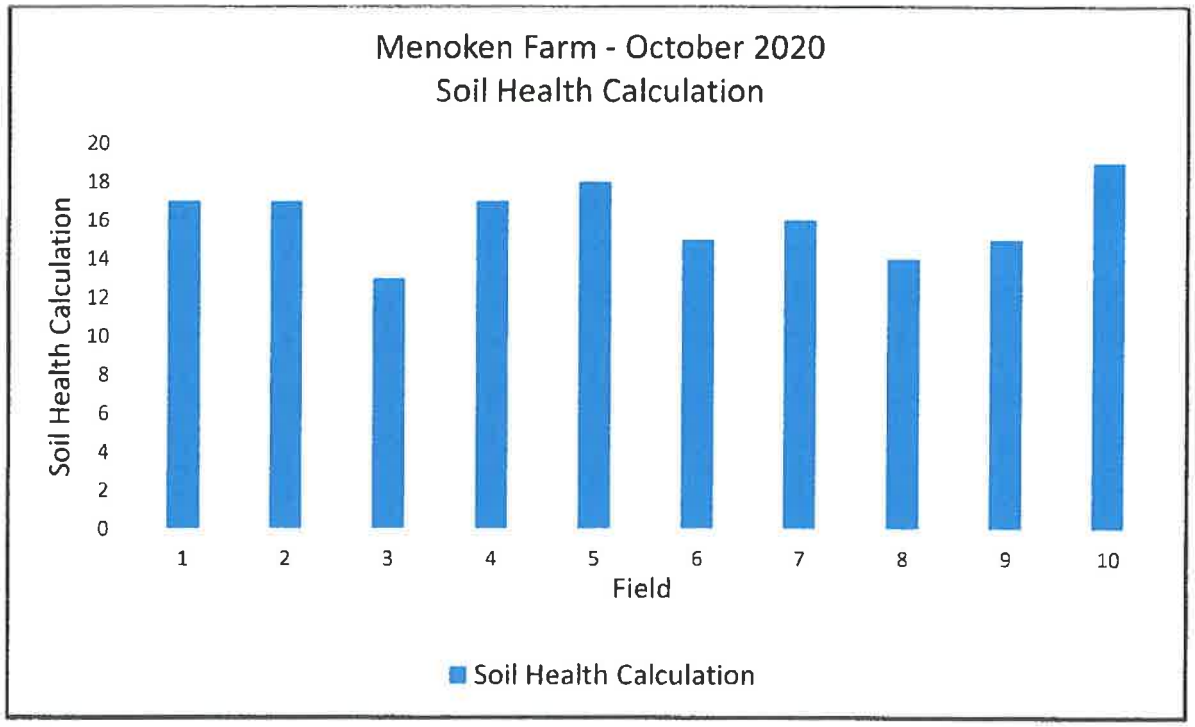


Solvita is microbial activity measured in CO2 release.

Soil Respiration Ranking Table:

CO2-C in ppm	Ranking	Implications
0-10	Very Low	Very little potential for microbial activity; slow nutrient cycling and residue decomposition; high carbon residue may last >2-3 yrs. with limited moisture; Nearly no N credit given; Additional N may be required due to microbial immobilization
11-20	Low	Minimal potential for nutrient cycling; residue management can still be a problem; Very little to no N credit given
21-30	Below Average	Some potential for nutrient cycling; residue management can still be a problem with prolonged use of high carbon crops; Little N credit given
31-50	Slightly Below Average	Low to moderate potential for microbial activity; Some N credit may be given
51-70	Slightly Below Average	Moderate potential for microbial activity; Moderate N credit may be given; May be able to start reducing some N fertilizer application
71-100	Above Average	Good potential for microbial activity; Moderate N credit may be given depending on size of organic N pool; Can typically reduce N application rates
101-200	High	High potential for microbial activity; more carbon inputs may be needed to sustain microbial biomass; moderate to high N credit from available organic N pools may be given; N fertilizer reduction can be substantial
>201	Very High	High to very high potential for microbial activity; residue decomposition may be <1 yr.; keeping the soil covered could be a problem in some systems; high potential for N mineralization and N credits from available organic N pools may be given; N fertilizer reduction can be substantial

Field 3 has no history of cover crops, crop diversity, or livestock integration. Field 8 has a corn/bean rotation.



Soil Health Score: The soil health score is a summary of the soil respiration, WEOC and WEON measured by the Haney Test and represents the current health level of your soil based on these indicators. The score is aimed at providing a producer a quick reference regarding the health of their soil compared to other soils under different types of management. The score can range anywhere from 0 to 50, but most soils do not score higher than 30. In general, the higher the score the better. We like to see the score above 7, but 7 is simply a starting point. To get a better understanding of what your score is telling you we have to make comparisons between different land managements, soil types and climatic regions.

Field 3 has no history of cover crops, crop diversity, or livestock integration.

USDA
United States Department of Agriculture

Research, Education, and Economics
Agricultural Research Service

September 24, 2021

Mr. Greg Sandness, NSP Coordinator
North Dakota Department of Health/Water Quality
4201 Normandy Street
Bismarck, ND 58503-1324

Dear Mr. Sandness,

The USDA, Agricultural Research Service (ARS) agrees to participate as a collaborator on the proposed Menoken Farm Planting Green Phase II Project application submitted by Burleigh County Soil Conservation District (BSSCD).

The ARS collaboration will be under the primary direction of Dr. David Archer and will include providing technical assistance for a planting green project that will involve integrating crops into simple rotations. The ARS will provide technical assistance as needed for project workshops, tours, and demonstration events at Menoken Farm. We will also coordinate and partner with BCSCD on planning activities.

The proposed collaboration has been reviewed and approved by the appropriate personnel at the ARS. If the proposal is selected for funding, it is the Agency's intent to collaborate with each other and/or commit resources as described above and found in the proposal documents.

We appreciate the opportunity for this collaboration.

Sincerely,

David W. Archer

DAVID W. ARCHER
Research Leader
Authorized Representative

Plains Area • Northern Great Plains Research Laboratory
P.O. Box 459 • Highway 6 South • Mandan, ND 58554-0459
Voice: 701-663-6445 • FAX: 701-667-3054
https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/

Mr. Greg Sandness, NSP Coordinator
North Dakota Department of Environmental Quality
4201 Normandy Street
Bismarck, ND 58503-1324

Dear Mr. Sandness:

I am writing to offer my support for the Menoken Farm Planting Green Phase II Project application submitted by Burleigh County Soil Conservation District (BSSCD).

Menoken Farm has been a valuable resource, both locally and throughout North Dakota. We are proud to have this leading soil health demonstration site in our state. The combination of natural resource education and systems approach conservation at Menoken Farm continues to capture the attention and interest from people not only through North Dakota, but the United States and the world.

I am happy to provide technical assistance, and to assist in coordinating other NDSU Extension assistance, as needed for project workshops, tours and demonstration events at Menoken Farm. I will also coordinate and partner with BCSCD on planning activities.

I am excited to see what this planting green project can produce. Growers in North Dakota, and surrounding states, have great need for additional conservation-oriented practices that do not conflict with production goals. Having these practices demonstrated by a trusted partner with excellent reach and visibility, like Menoken Farm, is a strong step toward increasing adoption of these practices.

Again, I strongly support the request for funding through a NSP Water Quality Grant for the Menoken Farm Planting Green Phase II Project.

Sincerely,

Aaron Field
Program Coordinator
Soil and Water Leadership Development
NDSU Extension
701.425.3920

DAKOTA COLLEGE

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"This institution is an equal opportunity provider."

September 28, 2021

Mr. Greg Sandness, NSP Coordinator
North Dakota Department of Health/Water Quality
4201 Normandy Street
Bismarck, ND 58503-1324

Dear Mr. Sandness:

Dakota College at Bottineau is committed to and supports the Menoken Farm Planting Green Phase II Project application submitted by Burleigh County Soil Conservation District (BCSCD)

Our office will provide technical assistance as needed for project workshops, tours and demonstration events at Menoken Farm. We will also coordinate and partner with BCSCD on planning activities.

Menoken Farm has been a valuable resource, both locally and throughout North Dakota. We are proud to have this leading soil health demonstration site in our state. The combination of natural resource education and systems approach conservation at Menoken Farm continues to capture the attention and interest from people not only through North Dakota, but the United States and the world.

Dakota College Bottineau is committed to this new proposal for a planting green project that will involve integrating crops into simple rotations. This project supports the Soil Health Principles and should boost interest in the advantages of soil armor; minimizing soil disturbance; plant diversity, continual live plant/root; and livestock integration. This, in turn, will address the area's primary resource concerns of wind and water erosion, salinity, water quality and carbon-deficient soils.

Again, we strongly support the request for funding through a NSP Water Quality Grant for the Menoken Farm Planting Green Phase II Project

Sincerely,

Keith A Knudson

Keith A. Knudson
Agriculture/Horticulture Department Chair
Dakota College at Bottineau

Section 319/Non-Federal Budget	2022/2023	2023/2024	2024/2025	Total Costs	Cash Match	In-kind Match	319 Fund
PERSONNEL/SUPPORT							
Salary (Menoken Farm labor)	20,554	20,554	20,553	61,661	24,664	0	36,997
Grants administration	4,400	4,400	4,400	13,200	5,280	0	7,919
Menoken Farm utilities and other overhead expenses	0	0	3,000	3,000	1,200	0	1,800
Subtotals	**$24,954**	**$24,954**	**$27,953**	**$77,861**	**$31,144**	**$0**	**$46,716**
OBJECTIVE 1: Deliver a planting green cropping plan							
Task 1: Seed and maintain the 10 12-acre fields	0	38,475	38,475	76,950	30,780	0	46,170
Task 2: Manage and maintain compost materials	0	5,667	5,667	11,334	4,534	0	6,801
Task 3: Plant and maintain high tunnel and outdoor gardens	1,400	1,400	1,400	4,200	1,680	0	2,520
Subtotals	**$1,400**	**$45,542**	**$45,542**	**$92,484**	**$36,994**	**$0**	**$55,491**
Task 4: Manage cover crop rotational grazing	4,950	4,950	19,267	29,167	11,667	0	17,500
Subtotals	**$4,950**	**$4,950**	**$19,267**	**$29,167**	**$11,667**	**$0**	**$17,500**
OBJECTIVE 3: Monitor planting green benefits							
Task 5: Annually monitor impacts from all 10 fields	5,400	5,400	5,400	16,200	6,480	0	9,720
Subtotals	**$5,400**	**$5,400**	**$5,400**	**$16,200**	**$6,480**	**$0**	**$9,720**
OBJECTIVE 4: Inform and educate the agricultural community							
Task 6: Arrange and host 30 summer tours	9,271	9,271	9,271	27,813	11,125	0	16,688
Task 7: Produce three educational farmer/rancher grazing cover crop videos	3,677	3,677	3,676	11,030	4,412	0	6,618
Task 8: Maintain Web site	1,314	1,314	3,500	6,128	2,451	0	3,677
Subtotals	**$14,262**	**$14,262**	**$16,447**	**$44,971**	**$17,988**	**$0**	**$26,983**
TOTAL 319/Non-Federal Budget	**$50,966**	**$95,107**	**$114,609**	**$260,683**	**$104,273**	**$0**	**$156,410**

BUDGET TABLE FOR MENOKEN FARM SOIL PLANTING GREEN PROJECT

Part 1 – Funding Sources	2022/2023	2023/2024	2024/2025	TOTAL
EPA SECTION 319 FUNDS				
1) FY2022 Section 319 Funds	$30,580	$57,064	$68,766	$156,410
Subtotals	**$30,580**	**$57,064**	**$68,766**	**$156,410**
STATE/LOCAL MATCH				
1) Burleigh County SCD*	$20,387	$38,043	$45,843	$104,273
Subtotals	**$20,387**	**$38,043**	**$45,843**	**$104,273**
TOTAL BUDGET	**$50,967**	**$95,107**	**$114,609**	**$260,683**

SCD: Soil Conservation District

* Volunteer labor and BCSCD general budget

* Menoken Farm tours, educational events, salaries, educational videos

ATTACHMENT A

Past Accomplishments

PAST ACCOMPLISHMENTS

Menoken Farm Soil Foodweb I, II, and Planting Green Information & Education Program

Burleigh County Soil Conservation District completed Menoken Farm Soil Foodweb I and is in its fourth and final year of the Menoken Farm Planting Green Project.

Accomplishments to date under the three projects under this program are as follows:

Program coordination and administration services

The Burleigh County Soil Conservation District has ongoing discussions on Menoken Farm projects at monthly SCD board meetings. At these meetings the project and expenses are discussed and approved by the board. At the end of each year the project staff has planning sessions for additions/changes for the farm for the coming season. The plan is presented to the board for approval and is put in its annual work plan, which is the SCD's primary work document.

Outreach information

Events, articles and videos were posted on the Burleigh County SCD Web site as events occurred. These items are now posted on the new stand-alone Web site for Menoken Farm, www.menokenfarm.com, which was completed during the summer of 2017.

Also on the new Menoken Farm Web site are 68 new videos from the most recent major educational events held. The three Planting Green videos were completed. Two planting green videos were shot in August 2020 with Dana Fletcher, who farms near Courtney and Tony Fisher, who farms near Ypsilanti. The third planting green video was shot in 2021 with Robert Heidrich, who farms near Strasburg. The three edited videos, titled "The Benefits of Planting Green," are edited and posted on the Menoken Farm website at https://menokenfarm.com/videos.

Under the Planting Green project to date, 31 flyers or brochures were created and distributed to market the 36 major workshop events that have been planned and successfully held.

Two major brochures were completed and widely distributed during the summer of 2017. The first was a general Menoken Farm informational brochure. The second was a brochure that features the five soil health principles: 1) Soil armor; 2) minimizing soil disturbance; 3) plant diversity; 4) continual live plant/root; and 5) livestock integration. The brochure, which was written by Jay Fuhrer, is posted on the Menoken Farm Web site and is also available at the Burleigh County SCD and NRCS offices.

Workshops and field events

A total of 36 major events to provide education and training on the management of systems and technology that can be implemented to improve soil health, plant and animal biodiversity and other practices that ultimately protect and improve water quality have been held to date under the

ten-year projects of Soil Foodweb I; Soil Foodweb II; and Planting Green. A total of 5,396 attended the 36 major workshops, which are as follows:

2012 events

- *Soil Health Garden Tour:* This major garden tour was held July 25. It covered topics that included: 1) Soil demonstration with slake test; 2) infiltration and rainfall simulator; 3) making compost and applying compost tea; 4) cover crops for the garden; 5) mulch planted potatoes; and 6) combination plants and pollinators. This event was attended by 102 people.

2013 events

- *Soil Health Workshop:* Held Jan. 8, this "Advancing Soil Health" was held in Bismarck. Guest speaker was David Brandt of Brandt Farms of Carroll, Ohio, who talked about "Building Better Soils." Other speakers included Paul Brown, Joshua Dukart, Jay Fuhrer and Dr. Jonathan Lundgren. The workshop drew 424 participants of which 100 were students and three were instructors.
- *Soil Health Garden Tour:* The 2013 garden tour was held Aug. 14. Covered topics included: 1) Soil demonstrations with slake tests; 2) infiltration and the rainfall simulator; 3) making compost and applying compost tea; 4) cool season cover crop combinations; and 5) growing corn, squash and pole beans together. This event was attended by 116 people.

2014 events

- *Soil Health Workshop:* This one-day Jan. 23 event taught building healthy soils and improving nutrient efficiency to producers, college students and agency personnel. The theme was "Finding Our Path" and the event was held in Bismarck. Main speakers were Dr. Rick Haney, an ARS soil scientist from Texas, and Ray Archuleta, a soil health specialist/agronomist from North Carolina. A total of 370 attended this event.
- *Soil Health Garden Tour:* Jay Fuhrer presented an activity that involved adults and children explaining soil during the Aug. 5 garden tour. Topics were presented on: 1) Brix testing; 2) planning for pollinators; 3) insects in North Dakota; and 4) diversity. The garden tour was attended by 80 people.

2015 events

- *Soil Health Garden Tour:* Following an opening welcome and soil scum demonstration during this July 23 event, rotating topics and speakers were: 1) High tunnel production, Lori Martin; 2) compost and cover crops, Ken Miller; 3) flowering shrubs, Darrell Oswald; 4) food and nutrition, Karen and Duane Ehrens; and 5) new strategies for controlling bugs in gardens, Tom Kalb. About 65 attended the event.
- *Agricultural Lenders and Landowners Informational Meeting:* The agenda for this Oct. 22 event included: 1) Investing in long-term farm and ranch sustainability; 2) no-till equipment; 3) livestock watering systems; 4) crop diversity and cover crops; 5) grazing systems; and 6) conservation practices. About 45 people attended, including 10 bankers; 21 landowners; 3 BCSCD board members; 4 BCSCD staff members; 3 NRCS staff members; and 1 RC&D staff member.

2016 events

■ *Winter Grazing and Feeding Tour:* This Feb. 16 event drew 55 participants to the Ken Miller Ranch near Fort Rice and the Agricultural Research Service Station south of Mandan. The event, "Waste Not, Want Not: Benefits of Building Soil Biology," covered winter grazing strategies; building soil health with bale grazing; animal performance review; nutritional requirements for livestock in winter; grazing corn stalks and winter grazing alternatives.

■ *Soil Health Garden Tour:* Held July 21 with 83 in attendance, the annual garden tour featured an opening session by Joshua Dukart. The five rotating topics and presenters were: 1) High tunnel opportunities, Peder Gulleson; 2) planning your garden, Jackie Buckley; 3) environmental lawn care, Tom Kalb; 4) the role plants and insects play, Dave Dewald; and 5) understanding the soil resource, Susan Samson-Liebig.

■ *Forestry/Wildlife Workshop:* This Sept. 15 event featured Jay Fuhrer as the moderator. Presenters and their topics were: 1) ground preparation and site consideration for tree plantings, Rhonda Kelsch; 2) tree species selection, Darrell Oswald; 3) tree planting demonstration with machine planter and hand planting, Chad Thorson; 4) providing food and cover, Dave Dewald; and 5) tree care and maintenance, Craig Stange. The event drew 50 people.

■ *Cover Crop Tour:* A total of 80 people attended the annual cover crop tour held Sept. 28. The tour hosts were Jay Fuhrer, Darrell Oswald and Ken Miller. Topics included: 1) Why plant cover crops; 2) designing cover crop mixtures; 3) crop rotations with cover crops; 4) grazing cover crops; and 5) season long cover crops and fall cover crops.

2017 events

■ *Grazing/cover crop workshop:* Johann Zeitsmann, a renowned grazier from Zimbabwe, was the featured speaker during "Ranching in Dynamic Times" on Jan. 16. A total of 35 attended the event.

■ *Soil health workshop:* Held March 1, "Building the Soil Health Foundation" drew 122 people to hear featured speaker Paul Jasa. Jasa in an Extension engineer at the University of Nebraska-Lincoln.

■ *Planter clinic:* About 25 people attended this March 2, 2017, event that featured Paul Jasa.

■ *Trading Biodiversity for Pest Problems:* Dr. Jonathan Lundgren led this public event that was held July 12, 2017, with about 30 in attendance.

■ *Entomology and Agricultural Landscapes:* This crop and pasture walk featured Dr. Johnathan Lundgren identifying pests and beneficials in live ecosystems. A total of 45 participated in this July 13, 2017, event.

■ *Menoken Farm Garden Tour:* The July 13, 2017, annual garden tour featured Dr. Jonathan Lundgren speaking on entomology. Other topics and speakers were: 1) Pollinators, Darrell Oswald and Chad Thorson; 2) Hugelkultur, Derek Lowstuter; and soils, Jay Fuhrer. A total of 75 attended.

■ *Northern Plains Grasslands Symposium:* Allan Savory, grasslands leader and founder of the Savory Institute, presented "How Livestock & Grassland Soils Can Save Civilization" at a major educational event July 19, 2017. It was followed by a Q&A session and Savory reception. In attendance were 332 people from North Dakota and surrounding region.

■ *Agricultural Policy Discussion with Allan Savory:* Farm institutions and government agencies were invited to attend a July 19 session with Allan Savory titled "Agriculture Policy: America's Achilles Heel." A total of 40 attended the event.

■ *Resource Management on a Working Ranch:* Led by Allan Savory and Savory Institute colleague Byron Shelton, this July 19, 2017, event took place at Black Leg Ranch owned and operated by Jerry and Renae Doan and family. A total of 197 people attended.

■ *Restoring Perennial Grasslands to Support People, Crops & Wildlife:* This second working ranch tour featuring Allan Savory and Byron Shelton, was held July 20, 2017. A total of 175 people attended this event, which was held at the Ken and Bonnie Miller Ranch near Fort Rice.

■ *Cover Crop Tour:* Justin Zahradka, a crop consultant and farmer from Lawton, was the featured speaker at the Sept. 14, 2017, cover crop tour. A total of 62 people were in attendance.

2018 Events

■ *Soil Health Summit:* "Regenerating Soil With Diversity" was held at the National Energy Center of Excellence on the campus of Bismarck State College, Bismarck, ND November 7 and November 8, 2018. A total of 398 attended the two- day event. Featured speakers on the first day included: 1) Loran Steinlage, Iowa farmer; 2) Jeremy Wilson, North Dakota farmer; 3) Dr. Kris Nichols, KRIS Systems Educating and Consulting; 4) Blaine and Kent Schmaltz, North Dakota farmers; 5) Russell Hedrick; 6) Alan Newport, editor of the Beef Producer Magazine; and 7) Gabe Brown, North Dakota farmer. Featured speakers on the second day included: 1) Jason Mauck, Indiana farmer; 2) Jimmy Emmons, Oklahoma farmer; 3) Derek Axten, Saskatchewan farmer; 4) Dr. Jonathan Lundgren, South Dakota farmer and entomologist; 5) Lon Tonneson, editor of the Dakota Farmer Magazine; 6) Dr. Dwayne Beck, Dakota Lakes Research Farm and South Dakota State University; and 7) Francis Akolbila, Ghana. Jay /Fuhrer, a soil health specialist with NRCS, led Q&A sessions both days.

2019 Events

■ *Menoken Farm Garden Tour:* "Composting & Gardening: Just Do It!" featured Dr. David Johnson and Hui-Chun Su Johnson of New Mexico. They developed an inexpensive do-it-yourself bioreactor for producing fungal-rich compost for gardens and rangelands. They led an afternoon event on static compost management and compost application. Then, for the early evening session, they were part of five 20-minute rotating learning stations. The other four learning station speakers were Dr. Marko Davinic, soil biology; Keith Knudson, aquaponics, Casey Williams; high tunnels; and Joe Zeleznik, trees and shrubs. New for the 2019 annual garden tour was a children's session from 5:30 to 7:30 p.m. It was led by Nolan Swenson of Burleigh County SCD. A total of 169 attended the 2019 Garden Tour events.

■ *Menoken Farm Cover Crop and Grazing Tour*: "Crops, Covers and Cows" was held from 4 to 7 p.m. at Menoken Farm July 23, 2019. The three featured speakers were 1) Steve Groff, who farms in Lancaster County and is the founder of Cover Crop Solutions; 2) Justin Zahradka, a farmer and rancher near Lawton, ND, who is also a crop consultant; and 3) Aaron Steckler, a farmer and rancher near St. Anthony, N.D., who is also a supervisor for Morton County SCD. A total of 132 attended the event.

■ *Soil Health Summit*: "Edible Landscapes" was held from 9 a.m. to 6 p.m. November 6, 2019 and from 9 a.m. to 3:15 p.m. Nov. 7, 2019 at the National Energy Center of Excellence on the campus of Bismarck State College. The keynote speaker was Dan Kittredge with the Bionutrient Food Association. Other speakers included Jon Stika, Jonathan Moser, Raychel Santo, Lindsay Rebhan, Lyle Perman, Morgan Jacobs, Lana Shaw, Shanon and Melinda Sims, David Bailey, and Steve Tucker. Speaker panels were held at the end of each day with Nolan

Swenson moderating the first day and Darrell Oswald moderating the second day. A total of 135 attended over the two days.

2020 Eents

- *Farming and Ranching for the Bottom Line:* "Discover the Triple Botton Line: Economics, Ecology & Society" was held from 9 a.m. to 4:30 p.m. Feb. 25, 2020 and from 9 a.m. to 4 p.m. Feb. 26, 2020 at the National Energy Center of Excellence on the campus of Bismarck State College in Bismarck. Burleigh County SCD staff helps plan and sponsor the second day of this annual conference. They work in collaboration with USDA Agricultural Research Services/Northern Great Plains Research Lab. The featured 2020 speaker was Dr. Fred Provenza, author of the book "*Nourishment: What Animals Can Teach Us about Rediscovery Our Nutritional Wisdom.*" Other speakers on Feb. 26 included Dr. David Toledo, John Pfaff; Laura Edwards; Greg Busch and Dr. Jerry Hatfield. A total of 400 attended the event over the two days.
- *Holistic Management Course*: Joshua and Tara Dukart led this three-day workshop March 3 through 5, 2020 at Menoken Farm. Burleigh County SCD and the North Dakota Grazing Lands Coalition each provided $100 scholarships for each participant. A total of 36 attended the training.
- *Build your Own Rain Barrel or Compost Tumbler Workshop:* Nolan Swenson of Burleigh County SCD led this event at Menoken Farm May 16, 2020. One hands-on session was held in the morning and one in the afternoon. Participants were supplied a 55-gallon plastic barrel and the supplies needed to build either a rain barrel or compost tumbler, which they then took home. Registration was limited due to the Covid-19 pandemic and social distancing was practiced. The event was livestreamed for those who wanted to register and pick up a barrel kit, but did not want to attend in person. A total of 24 participants attended the event in person. The rest completed their projects at home. A total of 36 rain barrels were constructed and 16 compost tumblers were constructed.
- *Menoken Farm Garden Tour*: The annual Garden Tour at Menoken Farm June 25, 2020, featured Jon Stika, author of the book, "*A Soil Owner's Manual: How to Restore and Maintain Soil Health.*" Because of the Covid-19 pandemic, registrations were limited and the event was livestreamed for those who could not attend in person. Stika, Jay Fuhrer and Darrell Oswald led a "Walk of Life" event from 3 to 5 p.m. for those who wanted to come early to tour the farm and its fields. The evening session, held from 5:30 to 7:30 p.m. included the topics of: Making garden soil healthy, composting; milpa gardening; and high tunnel production. A total of 90 people attended the 2020 Menoken Farm Garden Tour.
- *Permaculture Workshop: Focusing on the Home and Homestead:* A total of 25 attended this introductory to permaculture workshop held via Zoom October 9 and 10, 2020. Instructors were Bill and Becky Wilson who created Midwest Permaculture as a hub for education to share with their community and students. Topics covered included: 1) An introduction to ethics and principles; 2) sequential steps and priorities for design; 3) how to assess your property; 4) creative ideas, solutions and examples; and 5) our individual role in creating a more permanent culture.

2021 Events

- *Farming and Ranching for the Bottom Line:* "Linking Soil to Well-Being" was held Feb. 23 and 24, 2021 via Zoom due to the Covid-19 pandemic. A total of 872 registered for the

electronic event. Burleigh County SCD planned and sponsored the second day (Feb. 24) of this event. The five featured speakers were John Kempf; Derek and Tannis Axten; Chris Teachout; and Darrell Oswald. Kempf is the founder of Advancing Eco Agriculture, a plant nutrition and biostimulants consulting company founded in 2006. His three presentations on Feb. 24 were: 1) Reducing Fertilizer Use; 2) Water Use Efficiency; and 3) Using Inoculants Effectively. The Axtens and Teachout were part of "An Innovative Producer Panel: Bringing Life Back to the Farm Using Bioinoculants." The Axtens are third-generation owners of "Axten Farms, a diversified grain farm near Minton, Saskatchewan. Teachout is a fifth-generation producer on a farm near Shenandoah, Iowa, that dates back in his family to 1876. Oswald, a Burleigh County SCD employee, has managed Menoken Farm since 2016. His presentation was titled "What's Going on at Menoken Farm?"

- *Reconnect With Your Food:* This event was held from 10 a.m. to 3 p.m. May 22, 2021, in Burleigh County with 73 people attending. This event was the first in a four-part food/gardening series planned for 2021. The series featured the following topics: 1) Planning and planting; 2) growing and tending; 3) nutrition; and 4) harvesting and preserving. Speakers and locations for "Reconnect With Your Food" were as follows: Wanda and Dennis Burrer farm near Wing, ND; Ella and Nolan Swenson farm near Wing; and Kara and Austin Winkler farm near Menoken, ND. Bus transportation was provided for attendees.
- *Local Treasures, 2021 Garden Tour:* This event, which was held June 22, 2021, at Menoken Farm, was the second in the four-part food/gardening series. Attendance at the afternoon "Walk of Life" session was 108. Attendance for the evening "Gardening Local Treasures" was 139. Keith Knudson of the Entrepreneurial Center for Horticulture at Dakota College at Bottineau, and Jay Fuhrer led a walking tour of the gardens and trailers rides to the fields for the 2 to 4 p.m. event. The evening event from 5 to 7 p.m. featured four rotating stations that featured the following speakers and topics: 1) Knudson; Summer Horticultural Projects at Dakota College at Bottineau; 2) Lori Martin, Roving Donkey Farm: High-value Crop Production in Protected Environments; 3) Jonathan Moser, Forager Farm; Successional Planting for Constant, Consistent Harvests; and 4) Roberta Thorson, Thorson Gardens: Matching Produce Varieties to your Environment and Business.
- *Crops, Covers & Cows II:* A total of 189 people attended this tour July 29, 2021 at Menoken Farm. The e4vent was from 4 to 7 p.m. The five featured speakers were Jimmy Emmons, Steve Kenyon, Chris Teachout, David Bauer and Cody Kologi. Bauer and Kologi are Burleigh County SCD board members. Emmons farms and ranches 2,000 acres near Leedey, OK. Kenyon operates Greener Pastures Ranching Ltd. Near Busy, Alberta (Canada), Teachout is a fifth-generation farmers in Southwest Iowa.
- *The Future of Food:* This third event was held August 4, 2021 from 5 to 7:30 p.m. at the North Dakota Heritage Center in Bismarck, N.D. A total of 162 attended the event. The three high-profile speakers were Dan Kittredge, Joel Salatin and Mark Schatzker. Kittredge has been an organic farmer for more than 30 years and is the founder and executive director of the Bionutrient Food Association. Salatin raises livestock on his Polyface Farm near Swoope, Va. He has authored 13 books. Schatzker is an award-winning writer based in Toronto. He is the author of "The Dorito Effect: The Surprising New Truth about Food and Flavor."
- *North Dakota Conservation Award Tour:* Burleigh County SCD, along with its partners, Morton County SCD and NRCS, helped sponsor the North Dakota Leopold Conservation Award Winner Tour at the Dockter-Jensen Ranch at 1 p.m. August 25, 2021. About 110 people attended the event. The featured speaker was Doug Peterson, an NRCS employee in Missouri

for more than 32 years, along with Kevin Sedivec, Rangeland Specialist - NDSU. Tour highlights included rotational grazing; crop rotation; no-till and cover crops; and erosion prevention. A dinner was held at 5 p.m at the Ducks Unlimited Coteau Ranch.

- *Food Preservation Workshop:* A total of 143 people attended the fourth event, "Food Preservation Workshop" that was held August 26, 2021 from 5 to 7 p.m. at Menoken Farm. The three speakers and their presentation titles were 1)Sue Balcom;, "Pressure Canning vs. Water Bath Canning;" 2) Diane Schmidt, "How to Make Sauerkraut;" and 3) Shaundra Ziemnn-Bolinske, "Freezing & Drying Fruits and Vegetables and the Latest and Greatest in Canning." Balcom and Schmidt are longtime gardeners and farmers market sellers and Ziemann-Bolinske works as an NDSU Extension agent for Burleigh County.

Information and education

A total of 182 tours have been hosted at Menoken Farm since the beginning of the Menoken Farm Soil Foodweb I project, under the Foodweb II project, and under the Planting Green project to date. Groups from North Dakota and throughout the United States, along with grade schools, high schools and colleges, have toured Menoken Farm. These 182 events represent 4,521 people who have toured Menoken Farm to date since May 1, 2012, the start of Foodweb I.

The number of tours each year and the total people they represent are as follows:

- *2012 summer tours:* Menoken Farm hosted 18 tour groups, which represented 359 people receiving soil and water quality information and education.
- *2013 summer tours:* Menoken Farm hosted 18 tour groups, which represented 852 people receiving soil and water quality information and education.
- *2014 summer tours:* Menoken Farm hosted 17 tour groups, which represented 476 people receiving soil and water quality information and education.
- 2015 *summer tours*: Menoken Farm hosted 21 tour groups, which represented 447 people receiving soil and water quality information and education.
- *2016 summer tours:* Menoken Farm hosted 30 tour groups, which represented 625 people receiving soil and water quality information and education.
- *2017 summer tours:* Menoken Farm hosted 22 tour groups, which represented 403 people receiving soil and water quality information and education.
- *2018 summer tours:* Menoken Farm hosted 10 tour groups, which represented 209 people receiving soil and water quality information and education.
- *2019 summer tours:* Menoken Farm hosted 24 tour groups, which represented 641 people receiving soil and water quality information and education
- *2020 summer tours:* Menoken Farm hosted 6 tour groups, which represented 45 people receiving soil and water quality information and education
- *2021 summer tours:* To date, Menoken Farm has hosted 16 tour groups, which represented 464 people receiving soil and water quality information and education

Equipment, land, supplies and materials

This grant has allowed Burleigh County SCD to purchase a few pieces of critical equipment to operate the Menoken Farm education site. This includes the following:

- A 2001 JD tractor for $80,000. A total of $30,000 was paid down when the tractor was leased on April 3, 2013. Then, another payment of $26,036.91 was made on April 1, 2014. Another lease payment of $26,036.91 is due April 3, 2015.
- A 5100 White corn planter with 7 splitters for $12,000
- A spray coupe for $2,500
- A pallet fork (and charges to install on loader bucket): $9,156.78
- A Precision Ag 4 Row planter w/5 row interseeder for $62,168
- A John Deere sprayer for $43,450
- A Caterpillar Skid Steer loader for $44,075
- A 2019 Yamaha Viking VI ATV for $13,400

During the first year of Soil Foodweb II, cattle were introduced to the fields, which required adding good quality drinking water and perimeter fencing and cross-fencing. Because the recovery time is increased with single wire electric fence, this was used rather than woven fencing. A single-wire fence was built east of the garden around field 1 and installed for field 10.

In addition, new water pipeline and water tanks were installed and are supplying the cattle with fresh, good quality drinking water. The animals were comingled when grazing the perennial pastures. The yearling heifers grazed annual cool season and warm season covers as well. The pasture and cattle are managed using short exposure periods and long recovery periods for maximum, animal input and soil regeneration effects. The cattle are periodically weighed to determine weight gain.

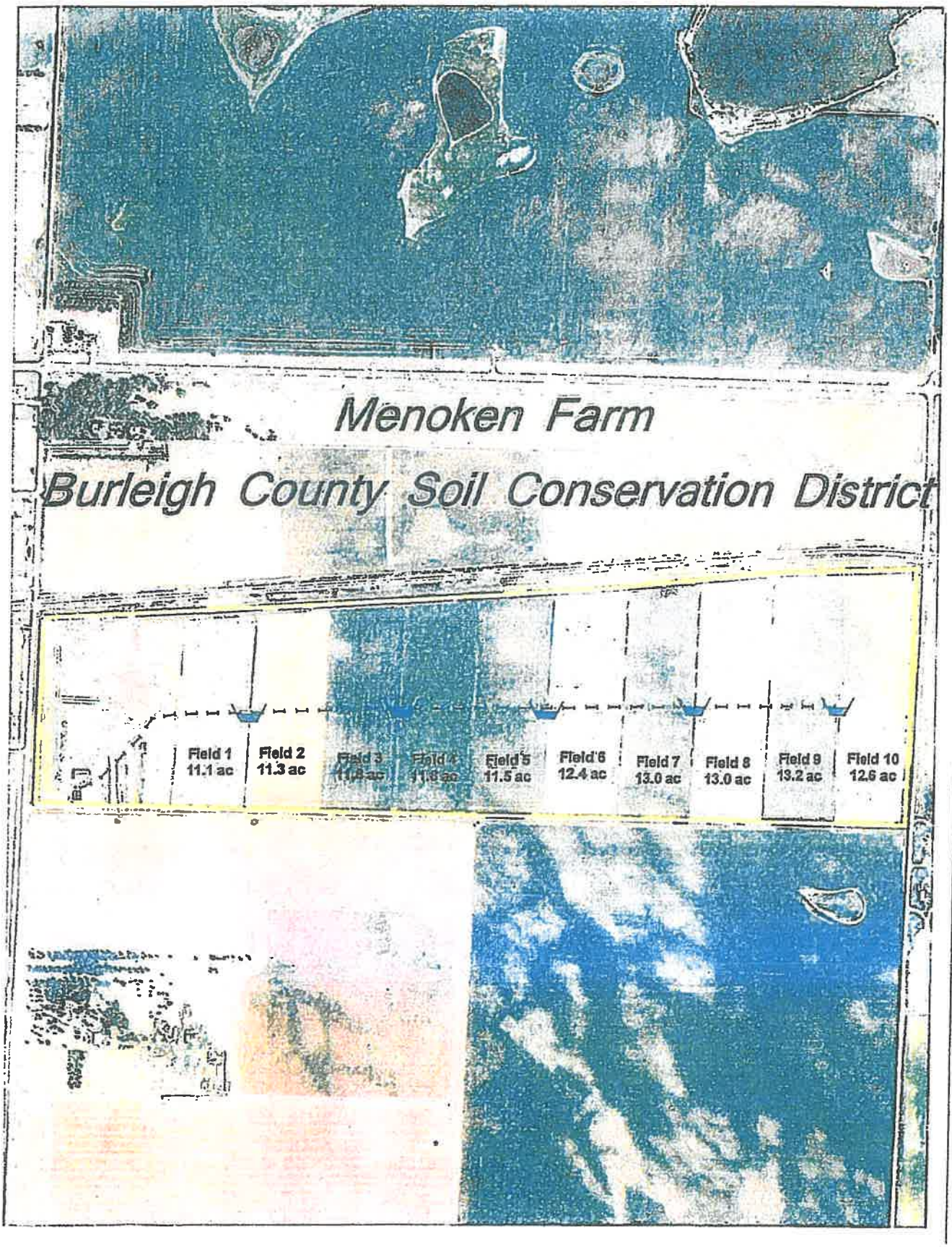
Because costs have been higher than anticipated, many supplies have been and will be supplied by Burleigh County SCD. In addition to fuel, cropping and composting expenses, Burleigh County SCD has spent money on electrical service, repairs and other necessary items.

Also, thousands of volunteer hours have gone into the farm during this period to make it sustainable. Some of these services include seeding, weeding and watering gardens; harvesting produce; making repairs; picking up seed and seeding cover crops and fields; planning and work on compost pile; turning compost pile; crop spraying; cleaning compost turner; tree planting; and placing weed barrier.

Burleigh County SCD continues to annually monitor impacts from all 10 of the Menoken Farm fields. To date under the Planting Green project, 480 soil samples have been taken and analyzed.

ATTACHMENT B

Map of Menoken Farm Site


Menoken Farm
Burleigh County Soil Conservation District
Field 1
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Field 2
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Field 4
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Field 5
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Field 6
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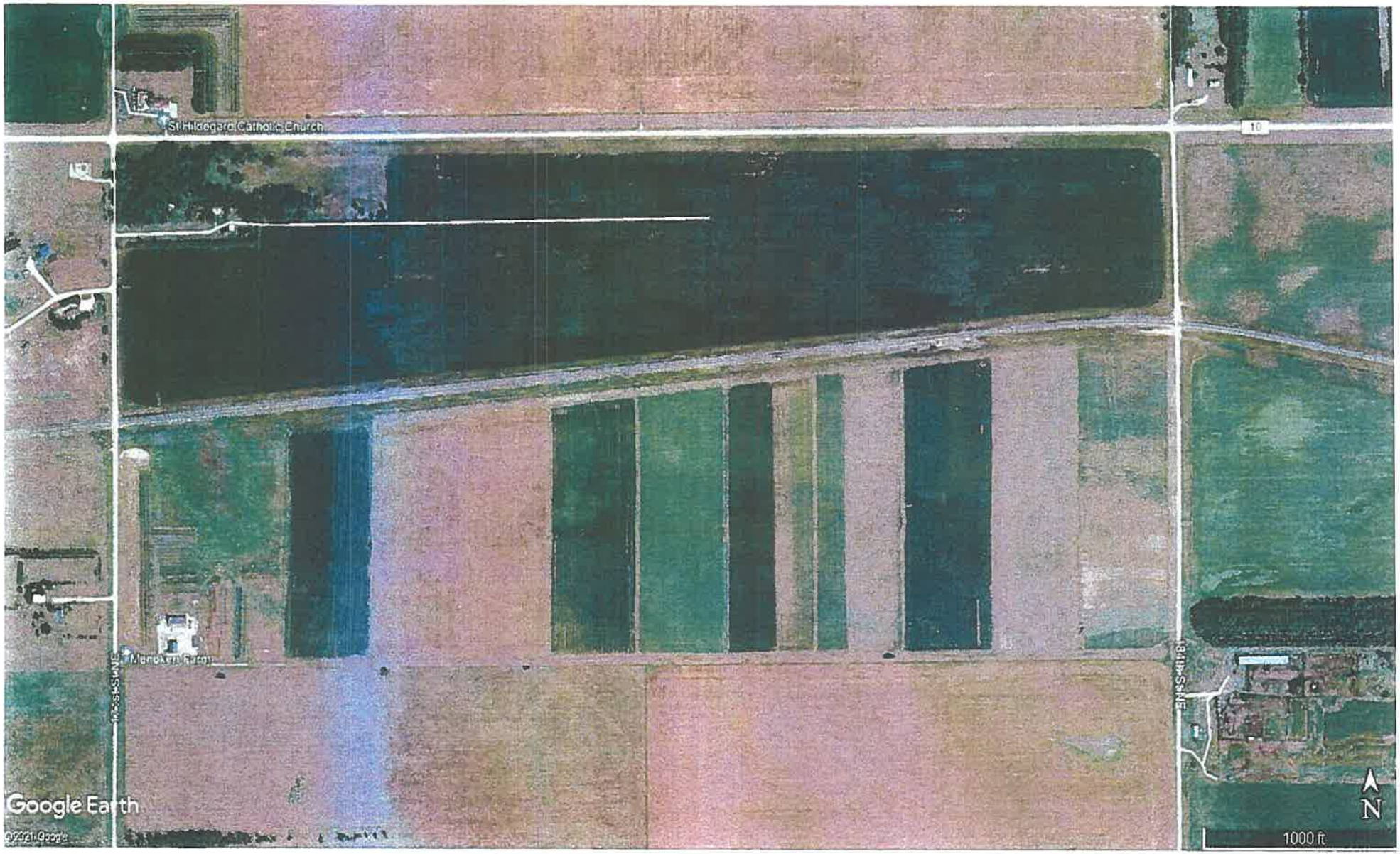
St Hildegard Catholic Church
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ATTACHMENT C

The Menoken Farm:
Advancing Soil Health

The Menoken Farm

"Advancing Soil Health"

Established 2009

Introduction

The Menoken Farm is an educational site consisting of 150 acres of cropland owned and operated by the Burleigh County Soil Conservation District. The purpose is to restore the health of the soils and move production agriculture toward sustainability; by eliminating fungicides, insecticides, GMO's, and commercial fertilizer; minimizing herbicides, soil disturbance, and fossil fuel impacts wherever feasible; all while increasing the health and resiliency of the entire ecosystem. The Soil Foodweb is enhanced by applying compost, compost extract, compost teas, fish emulsion, and seed inoculants on the east half of each field each year. Production method decisions mimic native rangeland with crop diversity, combination cover crops, a continuous live root allowing for maximum sunlight harvest, and appropriate animal impact. Native pollinators and beneficial insects are also encouraged in the holistic management strategy of the Menoken Farm.

Addressing Resource Concerns

The Burleigh County Soil Health Team identified a number of resource concerns across this landscape upon initial purchase. These included a lack of soil surface armor, minimal biological diversity, poor nutrient cycling, slow infiltration, collapsed soil aggregates, minimal soil organic matter composition, and little beneficial insect habitat.

2009: Concentrated on providing the basic building blocks to improve soil health; these included increasing soil cover (armor) and crop diversity by crop rolling and seeding cover crop mixes with high amounts of diversity. Feeding the soil a diverse and expanded diet was a key in jump starting the biological activity. A complete biological soils analysis was completed, with plans for future monitoring utilizing the baseline data.

2010: Focused on seeding annual crops and cover crop mixtures. With the cover crop mixtures, we also added a very dynamic component in the form of pollinators. We felt that if we continue to build a healthy and diverse environment and supply it with a continual food source, it will attract the right balance of organisms, both above and below the soil surface. In addition, we applied compost, compost teas, compost extracts, and raw milk. Cattle were also introduced to provide additional diversity and utilize the tools of grazing and animal impact to place residue on the soil surface and cycle nutrients. We also started using compost that utilized our own raw materials from the farm along with some carbon and/or nitrogen based ingredients from nearby farms.

2015: First year for grazing the rotational perennials. Used a twice over grazing plan, usually the paddocks were approximately half an acre in size. The top half of the forage was grazed and the bottom half was trampled to the soil surface. Seeded the second field to rotational perennials, trying to maintain 20% of the land base in rotational perennials. Soil cores were taken to a 4foot depth on all fields and archived, with the assistance of ARS-Mandan. Crop diversity continues to be expanded with sunflowers interseeded with cover crops. Soil food web comparisons are continuing on all fields; with a comparison between rolled cover crops vs grazed cover crops. Spread wood chips from the PMC on the east half of field 2; will monitor the soil impacts.

2016: Concentrated on crop diversity and cover crops. Nutrient export was addressed for the first time by grazing a corn field in lieu of harvesting and exporting the corn. The livestock recycle the vast majority of the carbon, nitrogen, phosphorous, potassium, etc. The SCD now purchased its own livestock, combining the cattle and sheep into one herd. Second year of grazing the rotational perennials. The livestock are weighed before and after the grazing plan is completed. Soil aggregates are forming rapidly on the perennial fibrous root mass. The field the livestock are grazing records a higher PLFA amount, when grazing cover crops vs crop rolled cover crops is compared. Follow up on the wood chips spread on the east half of field two indicate the soil food web-PIFA levels have doubled vs the west half without wood chips.

2017: Set the stage for Planting Green by seeding rye at various fall stages. Early stages were seeded as cover crop mixtures with flowering plants; ie pea, radish, turnip, and phacelia. Later stages will be seeded as a rye monoculture. Will plan to seed broadleaf crops into the spring rye cover to address erosion, salinity, water quality, and lack of diversity. Will attempt to have landscapes with green plants during the usual fallow periods, before spring seeding and after harvest. Added Dry Distillers Grains to the compost process this year. Will monitor the compost when completed, appears to be an excellent fertility source. The high tunnel was converted from an overhead sprinkler system to a drip line. Greatly increasing the water use efficiency and plant survival. Captured long term Soil Food Web results from animal impact; losses, corrections, and gains. Third year of grazing the rotational perennials.

2018: Planted the first crops green at the Menoken Farm. Started with both soybean and canola with good results; easy to open and close the seed trench. The soybeans had excellent pod set. Built a static compost windrow using the tree fabric cardboard tubes for aeration. Fall cover crops included winter camelina, with seed secured from the University of Minnesota. Goats were introduced and were grazed separate from the yearlings and sheep, as their fencing requirement is greater. During the late fall/early winter 30 plastic shuttles were obtained locally at no cost, filled with organic materials, and the addition of red wrigglers and European nightcrawlers. Worm juice was extracted over the winter and stored in a separate shuttle.

2019: Roof runoff rainwater was captured and stored in large plastic tanks. It was used to water the static compost/worm bins, and the high tunnel garden. 60" corn with perennial covers was introduced; along with 15" wheat planted green. Cured compost was placed in rectangular livestock tanks, which sloped to one end. The liquid worm juice was then collected and used as a seed coating in both the annual crop production and the garden. A grain hopper and auger were added. The high tunnel garden now has the addition of herbs. A second year of goats also became the last year, with the decision to stay with yearling and dry ewes. Crimped a cereal rye field and then seeded soybean, with poor results due to the late date and dry condition which followed.

2020: Drought conditions occurred with the year ending at approximately 45% of normal precipitation. Covid 19 significantly reduced the number of outreach activities, as most events switched to virtual or were postponed. A livestock scale was added, with the yearlings being weighed after 7 different forages. Developed both pounds of beef produced per acre and individual yearling rate of gain data. Added annual flowers to the high tunnel for pollinators and rotation benefits; also added one fruit tree. Milpa was added to the outdoor garden, watering was necessary. Expanded the number of bins to three for vermicompost liquid extract collection; once again, used it as a bio inoculant on the annual crop seed and the garden seed.

2021: A second year of drought conditions with triple digit heat and a smokey atmosphere. The precipitation was once again around 45% of average. Farm tours increased compared to 2020, although Covid 19 was still making a suppressive impact. 60" corn with covers appeared to fair better than the 30" corn with no covers; the covers were seeded with the Truax drill at about the V5 stage. Sunflowers with covers also managed the dry and hot conditions. Increased the plant diversity in the high tunnel with companion crops such as onion-carrots-flax, and cucumber-flax. Added more fruit trees to the high tunnel, it now includes apple, cherry, and peach. The outdoor garden was planted to 8 rows of sweet corn with drip line irrigation, along with milpa in between the rows.

The Future

Production, profit, and the health of plants, animals, and people all directly relates to the health of the soils we manage. We expect to see a continuing positive trend in soil health as we introduce more and more diversity and focus on addressing the real problems in the ecosystem. With the holistic management approach taken at the Menoken Farm, we feel it can play a crucial and beneficial role in the experimentation and demonstration of sustainable agriculture and food production.

ATTACHMENT D

Milestone Table

MILESTONE TABLE
Menoken Farm Planting Green Project

TASK/RESPONSIBLE ORGANIZATIONS	OUTPUT	QUANTITY	Year 1	Year 2	Year 3
Objective 1: Deliver a planting green cropping plan					
Task 1 - Seed and maintain the 10 12-acre fields Group 1	Successful planting of all 10 fields and garden	10			
Task 2 - Manage and maintain compost materials Group 1	Large compost area used for the entire Menoken Farm	1			
Task 3 - Plant and maintain high tunnel and outdoor gardens Group 1	Successful planting of high tunnel garden and outdoor garden	2			
Objective 2: Deliver a planting green grazing plan					
Task 4 - Care for and handle animals	Healthy livestock herd	1			
Task 5: Manage cover crop rotational grazing Group 1	Successful cover crop rotational grazing	1			
Objective 3: Monitor planting green benefits					
Task 6 - Monitor impacts from all 10 Menoken Farm fields Group 1	Completed and analyzed soil samples	60			
Objective 4: Inform and educate the agricultural community					
Task 7 - Arrange and host 30 summer tours Group 1	Completed 30 summer tours at Menoken Farm	30			
Task 8 - Produce three educational farmer/rancher grazing cover crop videos Groups 1 and 2	Completion and posting of 3 educational videos	3			
Task 9 - Maintain Web site Groups 1 and 2	Maintain Menoken Farm Web site	1			

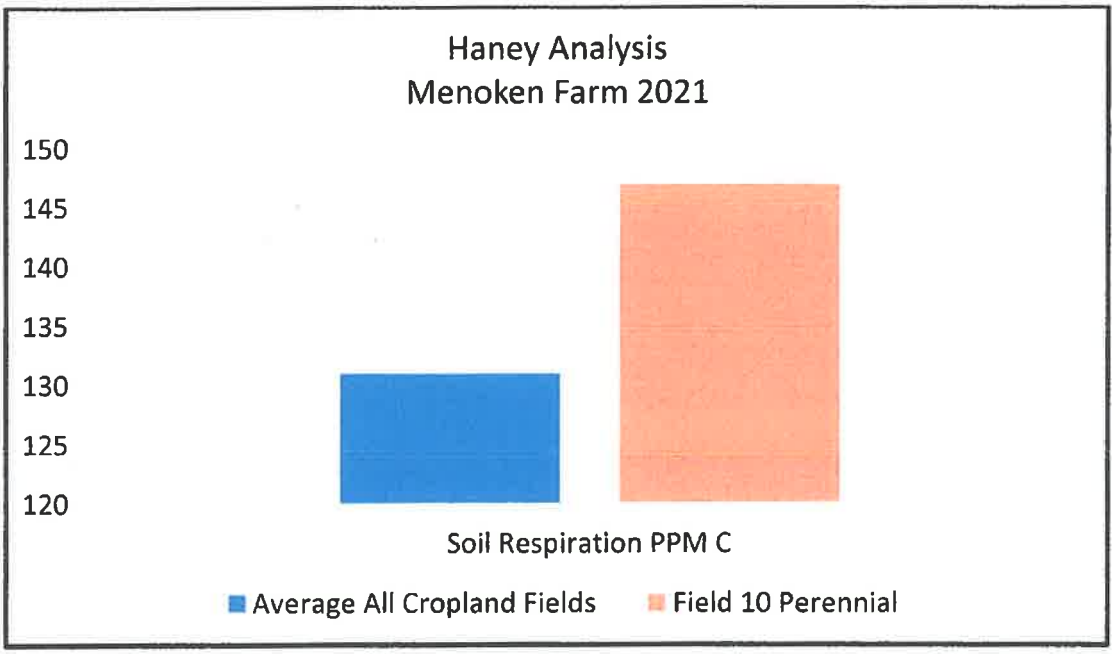
Group 1 - Burleigh County Soil Conservation District (SCD): Lead all work activities

Group 2 - North Dakota Department of Environmental Quality: Assist with data collection and dissemination

ATTACHMENT E

Grazing Impacts

Haney Analysis comparisons during drought conditions further supports the value of perennials. The following chart is the average Soil Respiration of annual crop production fields versus the Soil Respiration from Field 10 Perennial.



PLFA Analysis comparison during drought conditions also further supports the value of perennials. The following chart is the average Total Biomass of annual crop production fields versus the Total Biomass from Field 10 Perennial.