SOIL HEALTH & COVER CROPS

BEGINNING FARMERS

Plan to Improve Your Soil

This curriculum is useful for those who are more familiar with soil health and ready to take the next step, a deeper dive into building the soil.

TEACHING OBJECTIVES: WHY DO THIS?

- Putting soil health principles into action requires taking into account the environment and various needs on the farm.
- By going through this soil management planning based on a soil health assessment, participants will increase their knowledge and confidence before developing a soil management plan of their own.

BEST LOCATION

In a field or garden where soil can be dug in (a field with low to no known soil contaminants).

Building the plan and financing the plan activities can be done indoors.

BEST TIME OF YEAR

Not when the ground is frozen. Best to do after a heavy rainfall or in early spring as snow is melting Except funding practices can be discussed any time of the year.

LEARNING OBJECTIVES: WHAT CAN PARTICIPANTS LEARN?

- Consider how observations can be used to build a soil management plan
- Decide which needs should be addressed in the short-term (in 1-2 years) and which in the long-term (for more than 2 years).
- Create a soil health management plan for your farm or the example farm to reach goals.
- Familiarize participants with funding opportunities to implement soil health practices.

IMPORTANCE FOR BEGINNING FARMERS

In addition to growing good quality food, most farmers want to improve the land they farm on. Improving soil health can require additional, intentional planning before the start of the season which can be a busy time of the year already.

A soil management plan can increase your confidence of how to improve soil health over time. This process takes time as its a combination of field knowledge, soil test results crop.

All of this requires you to understand the plan and have enough help to make it happen.

UNIQUE ASPECTS OF THE CURRICULUM

This module includes elements that are covered in more detail in the other soil heath modules. After learning about soil health concepts, participants can then apply those concepts to the field going through all levels of learning.

This module guides participants through this assessment so they **evaluate** soil health needs in a field. Using this information, participants will then **create** a plan to improve a field's soil health. With this information, they can then approach organizations to financially support the needed management steps.

Facilitator Planning & Preparation

Activity	Est. Prep Time	Est. Instructional Time
Primary Activity 1: Assessing a field's soil health	1 Hour	2 Hours
Primary Activity 2: Building a soil health plan	30 Mins	1 Hour
Primary Activity 3: Financing soil health practices	1-2 Hours	1 Hour

Technical Content

KEY WORDS:

Soil Health — A suite of biological, chemical, and physical soil properties. With these interacting properties, the soil can function as a vital living ecosystem that supports life above and below the soil surface.

Tillage — Method of disturbing (turning over, opening it up) the soil to prepare it for crop planting and production.

Soil Nutrients — Nutrients found in the soil needed by plants to grow and thrive. They can come from the soil as rocks break down (1000s years) and inputs as well as compost fertilizer.

Soil Amendment — Substances added to the soil that will change soil characteristics.

Cover Crops — Cover crops are plants that are planted to cover the soil rather than for the purpose of being harvested. They help with soil erosion, improve soil health, crowd out weeds, control pests and diseases, increase biodiversity.

Soil Erosion — Soil erosion is the process of topsoil loss or movement due to water, wind, or tillage.

Biodiversity — Biodiversity is the variety of living species in an ecosystem, including plants, animals, bacteria and fungi.

Organic Matter — Soil organic matter is the portion of the soil that consists of plant or animal tissue in various stages of breakdown (decomposition).

Soil Aggregate — Soil aggregates are clumps of soil made of different sized particles and organic matter that have varied shapes. Aggregates allow for air and water movement and protect precious organic matter.

Fallow — Farmland that is left unplanted.

Technical Content

KEY WORDS (cont.):

Soil Texture	Texture indicates the percentage of sand, silt, or clay particles in the soil.
Water Logged Soils	When water is unable to drain away and it ponds on the surface-- this is bad for air movement through the soil and can lead to roots drowning. Water logging is common on naturally poorly drained soils or when heavy soils are compacted.
Interseeding	Planting crops from seed into a field already growing another crop. This provides longer soil cover which improves soil health and reduces erosion.
Crop Rotation	Planting a different crop in an area or row each growing season.

Technical Content

FACILITATOR BACKGROUND INFORMATION:

Many things can impact a soil's ability to function in a way that supports living ecosystems and sustainable agricultural production. The soil's ability to do this is discussed in terms of **soil health**. Uncontrollable factors like weather, topography, and soil type influence this, but management practices also play a role over time, either positively or negatively. A soil's loss of function results in many issues with production (such as not being able to cycle nutrients, unable to infiltrate or store water, no physical stability, or no habitat for soil life) but this can be resolved through management practices that follow principles of soil health.

A field assessment is a great way to initially determine a soil's health. Soil health is assessed through the soil's physical, chemical, or biological properties. **Activity 1 (Assessing a field's soil health)** will guide particpants through the soil health assessment process by prompting them to oberve these different soil properties as indicators of soil health. Once observations on what soil health issues exsist in a field, a holistic management plan can be made.

Generally, to improve biological and physical soil health you can adjust your farming based on the following management strategies (addressed in Modules 1 & 2):

- Reducing or Modifying Tillage
- Adjusting Crop Rotation
- Cover Cropping or Interseeding
- Adding Soil Amendments

Within each of these strategies there are several options! **Activity 2 (Building a soil health plan),** will provide participants with a menu of management options to address the soil health needs observed during Activity 1. From this menu, participants will prioritize what makes sense to pursue in the next year and in the future. As time goes on, plans can be more complex but this activity will require only choosing 2-3 management activities and planning when to do them.
During **Activity 3 (Financing soil health practices)**, participants will meet groups that may be able to financially support a soil health management plan. Potential organizations to reach out to may include the Natural Resource Conservation Service (NRCS), Conservation Districts, or local Watershed groups.

KWL Process

Know, Want to Know, Learn

Suggested prompting questions for farmers to share from their experience:

- How can you tell when a soil is “good” or “healthy”? What do you look for?
- When have plans been helpful? When have they not worked?
- Do you have long-term goals for your farm? If so, what are they?
- Do you have any soil health related goals? If so, what are they?

Suggested prompting questions to find out what participants want to learn:

- What kinds of questions or issues arise in the middle or end of the season that you wished you had planned for?
- What soil realated issues or challenges do you want to address on your farm?

Primary Activities

Overview of the main activities in this module

Activity 1

Assessing a Field's Soil Health

Use the Soil Health Card to guide the questions and discussions. As the learners walk through they field they can discuss their answers to the questions. Encourage them to consider how their observations can affect crops and other dynamics on the farm.

Activity 2

Building a Soil Health Plan

Participants will develop priortized actions and strategies in a planning format to address soil health goals for an example farm.

Activity 3

Financial Support for Soil Health Practices

There are many different cost share opportunities to support growers in implementing soil health practices on their farm. The challenge often is knowing where these opportunities are.
This activity provides time for growers to talk directly with agencies or NGO personnel about cost-share or grants programs that fit their goals.

1. Assessing a Field's Soil Health

OVERVIEW

When making a decision on the farm, there are so many factors that needed to be weighed. Oftentimes, it can be difficult to develop a strategic approach to decision making and long-term planning.

In this activity, participants will work together to go through a visual soil health assessment to determine goals to improve soil health.

MATERIALS NEEDED

- Pens or pencils
- Shovel and trowel
- Printed out copies of the soil health assessment card (https://www.canr.msu.edu/soil_health/uploads/Mich%20SH%20Progress%20Report%20Card.pdf)
- Wire flag (or long piece of wire for compaction demonstration)
- Clipboard for ease of writing in the field

FACILITATOR BACKGROUND INFORMATION

Meet in the agricultural field or garden where you will be completing this activity and discuss the opening questions listed above (for example, "How can you tell when a soil is "good" or "healthy"? What do you look for?").

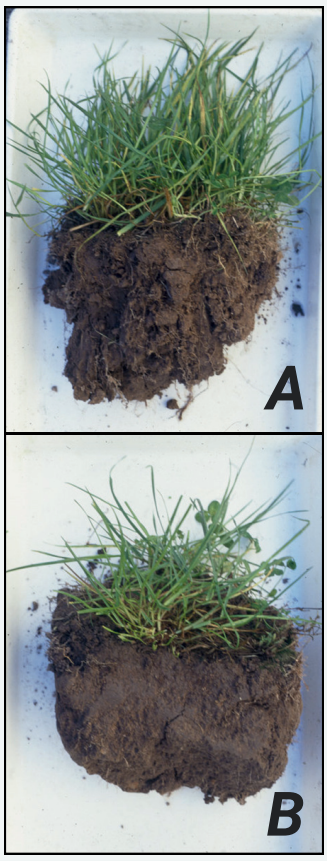
Start the session by describing what soil health is (see the "Techincial Content" pages for this module) and how the properties of soil are used as indicators of soil health. Introduce the Soil Health Progress Report as a tool to self-assess the health of soil in a field. Pass out printed cards to all participants. The group will be going through each section of the soil health card and how to complete each assessment. Each member will write down their own observations and give their own score as you all go through the process.

If possible, have the farmer or gardener walk through this activity with you to describe things they have observed with their soil over time (ex: "When it rains, where does the rain sit? Does it infiltrate?").

1. Assessing a Field's Soil Health

PROCEDURE

Distribute materials to participants and explain the activity and its goals (see "Facilitator Background Information"). Make observations in areas where crops are usually planted, and if time allows, in unplanted areas (e.g., field edges or near woods). Compare how similar soils can differ under different management. Natural areas near fields can serve as a soil health benchmark. Sections marked with "***" may require farmer input rather than visual observation.



Note the well aggregated soil in image A and compare it to the poorly aggregated soil in image B. The soil in image B has little poor space.

SOIL STRUCTURE: Dig a shovel full of soil in an area that is typically planted. Go through the following questions as a group. Ask participates to take notes and record their own scores.

a. Notice the surface of the soil. Does the surface of the soil have a crust? (This would be especially visible after a dry period) Does it look easy to plant into?
b. Looking at this shovelful of soil, what do you see? Visible space? (These are known as pores) Do you see roots?
c. Ease of break up (indicates moisture retention): When pressing the soil, do ***soil aggregates*** (clumps of soil) readily crumble with your fingers? Do soil aggregates crumble when you use your whole hand? Does it take considerable force to crumble the soil? Does it become powdery when pressed?
d. What are the size of the aggregates when you crumble the soil? Mostly small? (Think chocolate cake texture) A mix of large and small? Mostly large? Are there too few to indentify?
e. What do the aggregates look like? Soil aggregates are naturally rounded, whereas soil with poor structure looks sharp and angular with few pores
f. Allow particpants to write their scores and observations given this conversation

1. Assessing a Field's Soil Health

PROCEDURE (cont.)

BIOLOGICAL ACTIVITY: Dig up a shovel full of soil in an area that is typically planted (or use the same shovel full). Go through the following questions as a group. Ask participates to take notes and record their own scores.

a. Is there very visible old residue in the soil? Or does this residue look decomposed? Intact residue with little decomposition can be a sign of low biological activity.
b. Do you see soil organisms (worms, insects, etc.)? Is it a diverse population?

*** **EROSION**: Erosion is best observed after harvest and during high-wind periods or after heavy rain. This can also be well assessed after planting. If none of those conditions apply, these are questions the farmer can answer if they are with you during this assessment.

a. Are there visible gullies, or channels in the field, after a heavy rain event?
b. Are there visible areas vs. dark spots in the field? Spots near the top of high places may indicate that soil has eroded into lower laying places in the field.
c. If snowy… Is there visible soil accumulation in snow on the edge of the field?

*** **SOIL TEST ORGANIC MATTER:** Needs to be completed in a lab; this value is often included in soil chemical tests. Over time, you can keep track of how this value changes. If you are with the farmer, ask if or how organic matter values have changed in their field over time.

SOIL COMPACTION: Take the wire flag and stick it in the soil.

a. Does the flag easily go down? Does it start to bend with pressure? How far does the flag go into the soil? A hard stop may indicate a compaction layer. Compare this is area to areas outside of the field. Is the flag able to move more easily or with more difficulty than in the field?
b. Ask to dig up a nearby crop (try to keep roots intact) if there are any planted. Do the roots grow downward, or do they flatten? Plant roots cannot move through soil compaction and will grow over it- displaying a flattened root system.
c. Go through the following questions as a group. Ask participates to take notes and record their own scores.

1. Assessing a Field's Soil Health

PROCEDURE (cont.)

PLANT HEALTH & WATER HOLDING CAPACITY: If there are plants growing in a field, discuss how they look.

a. Are the plants wilted and curled even a few days after rain events? Yellowing stems? Many factors go into plant health but two of which can be helped with effective soil management- water availability and nutrient cycling/availability.

RESIDUE: Observe the soil surface and dig up some soil.

a. How much plant residue is on the surface of the soil? How much root mass is in the subsoil, or found when you dig into the soil? Surface residue and subsoil root mass helps with protecting the soil from erosion and adds organic matter to the soil

*** **INFILTRATION**: Best observed a few days after a rain event. If none of those conditions apply, these are questions the farmer can answer if they are with you during this assessment.

a. Is there visible ponding after it rains?
b. How long is the ponding visible after the rain? For more than 2 days?

Finish

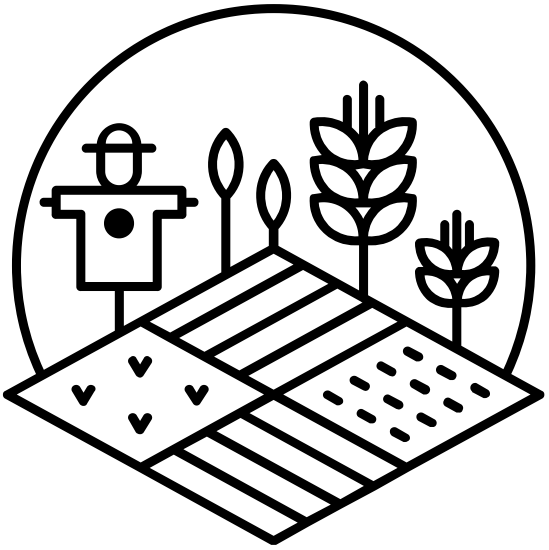
Take a moment for particpants to add up their scores. How does the soil health of the farm field rank? If there is time, make the same observations in a natural area. How do the scores of the natural area compare?

After tallying the scores, ask particpants to note which indicators ranked the lowest. These will be priority soil health goals to address in Activity 2. **Remind particpants to keep their Soil Health Progress Report Card for when Activity 2 of this module will be completed**, or offer to store their observations for the next time you meet to complete Activity 2.

1. Assessing a Field's Soil Health

DIVE DEEPER

- Have particpants go through the same soil health progress report card and the same series of questions for their own farms.



Plan to Improve Your Soil

ACTIVITY 1 - HANDOUT

Many things can impact a soil's ability to function in a way that supports living ecosystems and sustainable agricultural production. The soil's ability to do this is discussed in terms of soil health. Uncontrollable factors like weather, topography, and soil type influence this, but management practices also play a role over time, either positively or negatively. A soil's loss of function results in many issues with production (such as not being able to cycle nutrients, unable to infiltrate or store water, no physical stability, or no habitat for soil life).

A field assessment is a great way to initially determine a soil's health. Soil health is assessed through the soil's physical, chemical, or biological properties. In this activity, you will through a soil health progess report card and oberve these different soil properties as indicators of soil health.

Notes about the farm and its soil health overall:

List out the lowest ranking indicators:

1

2

3

Michigan Soil Health Progress Report

The Michigan Soil Health Progress Report was developed to assist farmers, agribusinesses, and agency professionals to assess the health of the soil using biological and physical indicators in the field. The progress report is most effective when filled out by the same person over time, according to the suggested assessment timing. It provides the farmer with a qualitative assessment of the soil. The evaluation scores do not represent absolute measures or values, and the progress report does not negate the importance of an analysis at a certified laboratory. Using this progress report and recording values can serve as a guide to evaluate soil health practices implemented over time.

Suggested Assessment Timing

1. Soil Structure	After rainfall events or irrigation
2. Biological Activity	Early season, mid-season, end of season
3. Erosion	After harvest and during high-wind periods or after heavy rain. Also assess after planting.
4. Soil Test Organic Matter	After reviewing soil test data. Assess in fall or spring.
5. Soil Compaction	Spring to when plants are about 10" tall
6. Plant Health	Summer to late summer
7. Residue	Post-harvest, pre-plant, growing season
8. Infiltration	After rainfall events
9. Water-Holding Capacity	After soil is at field moisture capacity. Assess during growing season.

Adapted from *Nebraska Soil Quality Card* by the United States Department of Agriculture, Natural Resources Conservation Service and the University of Nebraska Cooperative Extension, n.d. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053871

Michigan Soil Health Progress Report Recording Sheet

DATE:_____ CROP: _____

FIELD LOCATION:_____ YEAR OF PLANTING:_____

SOIL MOISTURE AT TIME OF SAMPLING: ___DRY ___ADEQUATE ___WET

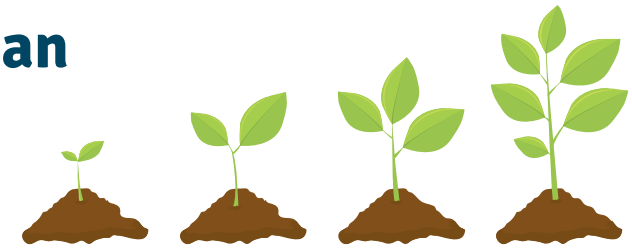
Indicator	Observations	Poor–Fair (0–3)	Fair–Good (4–7)	Good–Excellent (8–10)	Score
1. Soil Structure		Hard, no surface residue Powder when dry, crusts easily after a hard rain Large, hard clods, very hard to prepare seed bed	Crumbles with pressure Some residue and organic matter Crust only in areas such as wheel tracks	Very crumbly No crusting, residue prevents surface hardening Mellow, ready to plant	
2. Biological Activity		Very old residue that does not decompose, no sign of soil life (insects, worms, etc.)	Moderate decomposition of residue, few soil organisms (insects or worms)	Rapid decomposition of residue, many soil organism and diverse population	
3. Erosion		Signs of severe wind stress or gullies throughout field	Adequate control after windy period or hard rain	Excellent control after hard wind or hard rain	
4. Soil Test Organic Matter		Downward trend	Static trend	Upward trend	
5. Soil Compaction		Hard pan stops roots, roots grow laterally	Few roots grow through, some grow laterally	Roots grow straight down	

Indicator	Observations	Poor–Fair (0–3)	Fair–Good (4–7)	Good–Excellent (8–10)	Score
6. Plant Health		Yellow, thin stems	Yellow-green, medium stems	Dark green, thick stems	
7. Residue		Little or no surface residue, few roots in subsoil	Moderate surface residue, moderate roots	Heavy surface residue, dense roots, tunnels of decomposed roots	
8. Infiltration		Ponding visible	Some ponding visible after 12–24 hours	No ponding	
9. Water-Holding Capacity		Crops wilt quickly after water events	Crops curl or wilt but quickly come back	Crops tolerate draughty conditions	
Score Results		**Poor–Fair 12–36pts**	**Fair–Good 37–72pts**	**Good–Excellent 73–108pts**	**TOTAL**

Adapted from Nebraska Soil Quality Card by the United States Department of Agriculture, Natural Resources Conservation Service and the University of Nebraska Cooperative Extension, n.d. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053871

MICHIGAN STATE UNIVERSITY | Extension

2. Building a soil health plan



OVERVIEW

A management plan is a list of activities needed to achieve a goal on the farm. Typically we think of management plans when it comes to crop production or profitability. You can also make goals and a plan for improving your soil health!

In this activity, participants will create a management plan that aligns with the 2-3 goals generated from Module 3, Activity 1. If not using information from Activity 1, leaders can provide some example priorities instead.

MATERIALS NEEDED

- Pens or pencils
- Obervations and notes from Activity 1

FACILITATOR BACKGROUND INFORMATION

After determining your priorities you can then figure out what can be done to address them. To prepare for this activity, review the Cornell Soil Health Management Planning Framework, Section 3 (http://www.hort.cornell.edu/extension/soil-health/3management.pdf).

Generally, to improve soil health you can adjust your farming in the following four management strategies:

1. Reducing or Modifying Tillage
2. Adjusting Crop Rotation
3. Cover cropping or interseeding
4. Adding soil amendments

Within each of those management strageries are numerous options! This is where creativity and environmental context comes into play. To start, this activity will introduce participants to how they can implement these management strageies into an actionable plan.

2. Building a soil health plan

PROCEDURE

Match your goals to the work:

1. Re-visit the list of 2-3 lowest ranking soil health indicators from Activity 1. These will serve as priorirty management goals for this activity.
2. Using the “Management Suggestions” worksheets, have particpants discuss in groups what actions can be done to address the management goals. Are there options you have heard of that are not listed?
3. Select some management options could work for this farm in the short term (what can they do starting this year?).
4. Determine which management options could work for this farm in the long term (what actions can they do year after year to work on this goal?).

- Feel free to be creative! Consider that the same constraint might be overcome through a variety of management approaches, but do not overwhelm yourself with too many new management actions in one year. Consider addressing each management goal with one management action at first and see how well it works for you. As you go on, consider stacking more actions to address the same goal or adjusting the first action. Do this in a way that works economically and logistically for your operation. Consider the equipment and assets (or lack) you may have discussed in Activity 1.

- You may also need to fill out more details than the ones listed in the tables (like what type of cover crops or the kind of tillage you will be using)! Your plan should be clear enough to follow if someone else revisited the notes. While this exercise will only address one field, know that a specific short-term schedule of management activities and an overall long term management strategy should be developed for each field or management unit. Plans can cover 1 year at a time or multiple years. Revisiting the plan in the future to see if something worked or didn’t may be helpful to improve the plan over time.

2. Building a soil health plan

DIVE DEEPER

Build up your options list to make your plan more specific! Do some research or talk to folks about specific options within the following management approaches:

Reducing or Modifying Tillage

- What kind of tools work to reduce tillage or plowing?
- How many times does a person till?

Adjusting Crop Rotation

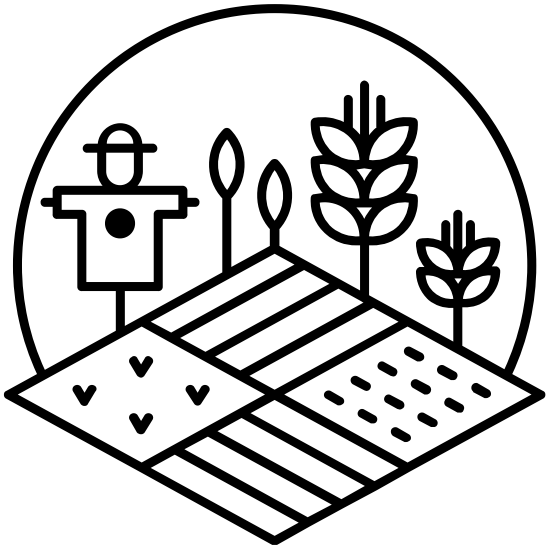
- What kind of rotations work well for your crops and environment?
- How long should a rotation be to avoid disease?
- What rotations don't work well? Why?

Cover cropping or inter-seeding

- What cover crops work for your region?
- What challenges exist with using cover crops?

Adding soil amendments

- What soil amendments exist near you? What works for others?
- What are the pros and cons to your different amendment options?



Management Suggestions for Soil Constraints

Format and resources below are based on the Cornell Soil Health Management Planning Framework (http://www.hort.cornell.edu/extension/soil-health/3management.pdf)

Management Suggestions for Physical and Biological Constraints		
Constraint/Challenge	**Short Term Management Options (To do within the next year)**	**Long Term Management Options (To do for more than 1 year)**
Soils prone to drought	○ Add stable organic materials, (like mulch, living cover crop) ○ Add compost ○ Incorporate high biomass cover crop	○ Reduce tillage ○ Rotate with a cover crop ○ Incorporate high biomass cover crop
Surface compaction/hardness	○ Perform some mechanical soil loosening (strip till, aerators, broadfork, spader, roto-tiller) ○ Use a living mulch or interseed a cover crop between crops/rows	○ Grow shallow-rooted cover/rotation crops ○ Avoid traffic on wet soils, monitor ○ Avoid excessive traffic/tillage ○ Avoid tillage at same depth each pass ○ Use designated growing and driving areas/patterns (controlled traffic)
Subsurface compaction/hardness	○ Use targeted deep tillage (subsoiler, yeomans plow, chisel plow, spader) ○ Plant deep rooted cover crops and crops such as daikon radish and cereal rye	○ Avoid plows/disks that create hard-pans ○ Avoid heavy loads driven across field ○ Avoid traffic when soil is wet

Management Suggestions for Soil Constraints

Management Suggestions for Physical and Biological Constraints cont.		
Constraint/Challenge	**Short Term Management Option (To do within the next year)**	**Long Term Management Option (To do for more than 1 year)**
Low Organic Matter Content (relative to OM content of nearby uncultivated areas)	○ Add stable organic materials (like mulch) ○ Add compost and manure ○ Incorporate high biomass cover crop	○ Reduce tillage/mechanical cultivation ○ Rotate with a perennial cover ○ Incorporate high biomass cover crop regularly
Little aggregation (define)	○ Incorporate fresh organic materials ○ Use shallow-rooted cover/rotation crops ○ Add manure, green manure, mulch, compost	○ Reduce tillage ○ Use a surface mulch ○ Rotate with a perennial cover
Little to no observed biological activity	○ Maintain plant cover throughout season ○ Add fresh organic materials ○ Add manure, green manure (cuttings of cover crops) ○ Consider reducing pesticide usage	○ Reduce tillage/mechanical cultivation ○ Increase rotational diversity ○ Maintain plant cover throughout season

Management Suggestions for Soil Constraints

Format and resources below are based on the Cornell Soil Health Management Planning Framework (http://www.hort.cornell.edu/extension/soil-health/3management.pdf)

Management Suggestions for Chemical Constraints		
Constraint/Challenge	**Short Term Management Option (To do within the next year)**	**Long Term Management Option (To do for more than 1 year)**
Soil pH Low	○ Add lime or pure wood ash per soil test recommendations ○ Add calcium sulfate (gypsum) in addition to lime if aluminum is high ○ Use less direct N sources for fertilizer (ex: ammonium, urea, blood meal)	○ Test soil every 3 years & add "maintenance" lime per soil test recommendations to keep pH in range ○ Increase organic matter to improve buffering capacity
Soil pH High	○ Stop adding lime or wood ash ○ Add elemental sulfur per soil test recommendations ○ Use blood meal for N source	○ Test soil every 3 years ○ Use higher % ammonium or urea ○ Mix blood meal with compost for N source
Phosphorus (P) Low	○ Add P amendments per soil test recommendations ○ Use cover crops to recycle P in the soil	○ Promote mycorrhizal (fungal) populations in soil ○ Use cover crops to recycle phosphorous (P)

Management Suggestions for Soil Constraints

Management Suggestions for Chemical Constraints		
Constraint/Challenge	**Short Term Management Option (To do within the next year)**	**Long Term Management Option (To do for more than 1 year)**
Phosphorus (P) High	○ Stop adding manure and compost ○ Choose low or no-P fertilizer blend ○ Apply only 20 lbs/ac starter P if needed immediately for early crop growth ○ Apply P at or below crop removal rates	○ Use cover crops that accumulate P, harvest the biomass, and move to low P fields or offsite
Potassium (K) Low	○ Add wood ash, fertilizer, manure, or compost per soil test recommendations ○ Use cover crops to recycle K ○ Choose a high K fertilizer blend	○ Use cover crops to recycle K ○ Add "maintenance" K per soil recommendations each year to keep K consistently available

What about Nitrogen (N)?

If you have taken a soil test, you may notice that the amount of nitrogen in your soil is not included in your report. Why is that?

Nitrogen (N) is not directly measured in a typical soil fertility test, despite being an essential macro-nutrient for plants, because it is very mobile. As a dynamic nutrient with various pathways of movement in the soil and to the plant, N content changes quickly. Accurate testing for N content in the soil requires immediate freezing and is an expensive process. Therefore, official N recommendations are based on multiple calculations and your observations. Recommendations typically consider soil fertility research, the soil's organic matter content, the cropping history, your observations from the previous crop,and the N requirements for upcoming crop.

Building a Soil Health Plan for Soil Health Management (Example)

Field: Example Scenario	
Management Goal(s): Increase organic matter- especially to improve soil structure Increase soil pH	
Management Action(s): • Incorporate cover crops in areas that are eroded and in the beds in the fall • Apply lime material (likely wood ash) in the fall	
Spring	Take soil samples for soil test Plant red clover along bed edges and eroded walking paths
Summer	
Late Summer/ Early Fall	After final harvest: • Apply wood ash to increase soil pH, till in • Plant oats and crimson clover as cover crops
Late Fall	
Long Term	• Incorporate strip tillage as a reduced tillage option (use broadfork in strips, not across the field) • Incorporate compost to the rotation (ask around for a)

Building a Soil Health Plan for Soil Health Management (worksheet)

Field:	
Management Goal(s):	
Management Action(s):	
Spring	
Summer	
Late Summer/ Early Fall	
Late Fall	
Long Term	

3. Financial Support for the Soil Health Plan

OVERVIEW

Participants will be introduced to organizations that may provide funding opportunities for pursuing soil health practices on their farm. Funding opportunities may be available in the form of grants, cost sharing, or loans. Invited professionals can talk through how participants can apply for funding, potential requirements, and the differences between funding types.

MATERIALS NEEDED

- Virtual or printed copies of questions to ask
- Computers, projector, other AV equipment as needed if hosting a virtual meeting

FACILITATOR BACKGROUND INFORMATION

Funding opportunities to support the adoption of soil health practices can be found through multiple avenues in Michigan. Check with some the local offices of the following organizations to see if they are able to speak on soil health funding opportunities:

- United State Department Agriculture (USDA) Natural Resources Conservation Service (NRCS) (www.offices.usda.gov)
- Michigan Association of Conservation Districts (CD) (www.macd.org)
- Check and see if you have a local watershed association offers financial support:
  - Find your local watersheds:
  - https://water.usgs.gov/wsc/map_index.html
  - Watershed groups in Michigan:
    - www.mymlsa.org/lake-and-watershed-management/managing-michigans-watersheds/
    - www.mi-wea.org/watershed_groups.php

3. Financial Support for the Soil Health Plan

PROCEDURE

- As a facilitator, reach out to local NRCS offices, Conservation District, and/or watershed groups to schedule a visit with the group of partipicants. Be sure to clarify that the visit should be conversational rather than a presentation.
    - A variation of this visit may also look like inviting multiple organizations to attend the same meeting and answer the same questions so particpants can to compare organizations.

- Explain that the prupose of the visit is to:
    - Meet local beginning farmers
    - Introduce their organizations
    - Discuss what kind of soil health or conservation practices they provide financial support for
    - Discuss different forms of financial support exist with their organization (grants, loans, or cost-sharing)
    - Talk about what is required to sign up for those funding sources

- Before the visit, share with participants who will be visiting, what kinds of questions will be asked, and encourage them to ask their own as well.

- If meeting in person, arrange seating in a circle. If meeting online or through a conference call, be sure all participants are able to connect to the platform.

- Ask the visitor(s) to introduce themselves, what they do for work, and what they like to do outside outside of work. Ask particpants to introduce themselves as well.

- Facilitator initiates question & answer conversation by inviting participants to ask questions of the visitor from the sheet of provided questions or others that they have come up with. From there the conversation can be free-flowing. If needed, the facilitator can prompt additional questions.

3. Financial Support for the Soil Health Plan

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- After the technician has departed, allow space for participants to process together as a group.
  - What was their biggest takeaway?
  - What interests do they have about the program and services?
  - What concerns do they have about the program and services?
  - How might these concerns be addressed?

VARIATIONS

Instead of just inviting one person from one organization, invite guests from multiple organizations to attend the same meeting and answer the same questions so participants can to compare organizations and funding opportunities.

Suggested Questions to Ask When Seeking Financial Supporting for a Soil Health Plan

- Tell us about your experience and background with agriculture.
- Tell us about the organization you work for. What does your organization do and why?
- How does your organization define soil health?
- What practices do you financially support or provide resources for?
- What kind of financial support does your organization offer? Are they loans?
- How does signing up for this funding or your programs work and are there contractually requirements?
- How much money can one person apply for and how long does the funding last?
- What was the smallest farm you've ever been on or worked with?
- Tell us about other types of services you can provide for a beginning farmer.
- What type of natural resource concerns are common in the area?

Additional Resources

Resource 1

Crop Rotation on Organic Farms, A Planning Manual
by Charles L. Mohler, Sue Ellen Johnson

"This manual provides an in-depth review of the applications of crop rotation- including improving soil quality and health, and managing pests, diseases, and weeds."

Linked Here

Resource 2

Building Soils for Better Crops Ecological Management for Healthy Soils
by Fred Magdoff, Harold van Es

"A practical guide to ecological soil management. It provides step-by-step information on soil-improving practices as well as in-depth background—from what soil is to the importance of organic matter."

Chapters of interest:

- Chapter 10: Cover Crops
- Chapter 13: Making and Using Compost
- Chapter 16: Minimizing Tillage
- Chapter 18: Nutrient Management: An Introduction

Linked Here

Resource 3

Part III Soil Health Management
by Cornell University

A guide for addressing constraints identified in the field through a planning process. This guide also details options for addressing soil health management.

Linked Here

Review and Encouraging Further Learning

Module Review and Evaluation Questions:

- What did you learn through this module?
- What did you find interesting (ah ha) going through this module that relates to your farm?
- What questions do you still have after completing this module?
- What about this module was helpful? What was not helpful?
- Was there other information you feel like would have been useful to have in order to complete this activity?
- Do you feel able to write a farm plan after completing these activities?

Review and Encouraging Further Learning (cont.)

Taking your knowledge back to the farm:

- Go through the Soil Health Assessment for your own farms as done in Activity 1 (Assessing a Field's Soil Health)
- Build out a farm management plan guided by the prompts in Activity 2 (Building a Soil Health Plan) given your farm's Soil Health Assessment collected in Activity 1