### **Designing a Crop Rotation Plan**

Planning your fields is more than checking each crop off a list-you need a plan to reduce pest problems and improve your soil

#### TEACHING OBJECTIVES: WHY DO THIS?

A crop rotation plan identifies what will be grown in your fields or gardens each year. It can be made to provide a map of what to grow in which row for the next 3 -5 years. The goal is to improve the crops and soil health. Keeping field notes on pest and disease problems and plant health each year will help with future crop planning decisions. After the first couple of years the farmers should refer to their field notes and consider if they should adjust the plan based on challenges and successes they experienced in production and markets.

#### **BEST LOCATION**

Collect crop notes from the field during the (example or farmers field). Then the crop rotation map can be made in a comfortable space indoors or out, referring to the crop notes.

#### **BEST TIME OF YEAR**

Collect information during the growing season then the farm plan and crop rotation plan can be done shortly after the harvest and record what was grown and how well it grew while memory is still fresh. In the future it is best to keep notes of planting and markets as the season moves along.

### LEARNING OBJECTIVES: WHAT CAN PARTICIPANTS LEARN?

- Develop a way that works for your farm to keep field and market notes. These will help you to plan your next year's crop rotation. Be prepared to train those working for you in this practice also.
- Learn how to manage records of successes and issues of each crop grown including variety, seed/plant sources, yields, harvest quality, and insect and disease outbreaks.
- Identify the plant families you grow and avoid planting same families in same rows each year. This will help reduce insects and diseases specific to each plant family.
- Select crop varieties that grow well in your field, you enjoy growing, and are liked by your customers.
- Follow a plan based on choosing which crops to grow based on soil texture and soil fertility while following a good crop rotation plan.
- Note that you may not always be able to follow the plan exactly, but it is a good starting point.





#### IMPORTANCE FOR BEGINNING FARMERS

### Developing a field map with a crop rotation plan:

- It is a key tool to planning your next year's field production.
- Will reduce many problems and challenges in the growing season (pests, confusion, seed orders,prediction of produce availability)
- Be able to identify which crops grow best in your field and are most successful at the markets.
- Making the crop rotation plan in the non growing season allows you to order seed and inputs you need and reduce decision making on the fly!!

### UNIQUE ASPECTS OF THE CURRICULUM

- Creating a farm plan that includes crop rotations of crops and cover crops with the other learners can allow growers to build on each other's experiences and knowledge.
- Having guidance to create your first crop rotation map will help you understand all the moving parts and exchange ideas.

### Facilitator Planning & Preparation

Activity	Est. Instructional & Interactive Time
Collecting Information To Build Your Farm Plan	2 hours
Making a farm map of fields	2 hours & 1 hour follow up
Designing Crop rotation plan	2 hours & 1 hour follow up
Including cover crops in your crop roation plan	1 hour



### **Technical Content**

### Key Words:

Plant families	Plants are divided by families based on traits they have in common, often based on flower structure. Plants in the same families are often susceptible to the same diseases and attract the same insect pests.
Disease life cycle	A disease cycle shows how the plant disease lives, multiplies and infects the plant which makes it sick.
Insect life cycle	Some insects feed on crops to complete their growth or life cycle: from eggs, to caterpillar to adult. The life cycle describes this process.
Crop Rotation Plan	A crop rotation plan shows what you planted last year in each row and what you plan to grow this year and the next few years.You try to follow it as closely as possible to limit planting the same family in the same row.

#### Plant variety

Within the same kind of plant, there are different versions that have unique colors, shapes, flavors, caused by the plant's genetics. These different versions are called varieties. All plants typically have more than one variety.

Erosion

When heavy rains or excess water moves top soil from the field. This often carries nutrients with the soil, a precious commodity that takes 1000's of years to make.

Hardpan

s

When a field has been plowed where the plow scraped the soil at the same depth many times. From this repeated action a hardened surface forms, making it difficult for roots and water to go beyond. This hardpan can cause plants to be stunted, such as when carrot roots grow curled instead of straight.



### **Technical Content**

### Key Words: (cont)

Cover crop	Cover crops are crops grown to improve the soil and are not harvested. They are grown when crops are not in the ground, such as in the fall or in between summer crops. They are grown to improve the soil, provide organic matter, and bring up nutrients through their roots. The also hold on to nutrients that are left over from the previous growing season and keep them from leaching into the groundwater.
different f Soil texture	s Soil texture depends how much sand, silt and clay are in the soil. These are the three ingredients that make up soil. But how much of each varies with each soil type and impacts how crops grow. A sandy soil has very good drainage while a clay soil holds water sometimes too well. A mix of soil textures is the best, some sand, some silt and some clay. This soil type is called a loam.



### **Technical Content**

# FACILITATOR BACKGROUND INFORMATION:

- Record keeping of production and yields is important for farmers. Keeping production notes is just as important as keeping financial records. They will be useful not only to know:
- what is available for sale
- what did not work in the previous year
- where were the best (and worst) seeds purchased.
- which crops suffered from attack by insects and/or diseases.
- But also for your farm's long term goals and plans!



To make a good farm plan you need to take all these points into consideration, a balance. You want to grow the best crops possible for the markets so you must consider all points in above diagram.

https://www.sare.org/wpcontent/uploads/Crop-Rotation-on-Organic-Farms.pdf



### **Technical Content**

### FACILITATOR BACKGROUND INFORMATION (cont.):

**Cover crops:** These are crops grown typically just for to improve soil health, not as a cash crop. They are grown just till they start flowering then cut or mowed then turned into the soil.

Growing cover crops is a good multi-purpose tool to improve soil and reduce weeds. Note including them in your crop rotation, requires planning and knowing what the soil needs. this knowledge can be gained through a soil test and observations of health of previous crops.



Cover crops provide organic matter, weed competition, food for soil microbes, nitrogen, especially from legumes, and a way to rotate crops. Growing cover crops is one management tool to improve soil quality. Consider how they fit into an overall building soil health plan.

There are different cover crop types and each offer different values: Cereals such as rye or oats are often grown since they are easy to grow, have deep fibrous roots and can offer a straw-type mulch once cut.



### **Technical Content**

### FACILITATOR BACKGROUND INFORMATION (cont.):

Choosing the right cover crop is important. Farmers need to consider the needs of the soil and what equipment they have to manage the growth of these plants. Beginning farmers often rely on a soil test to tell what to add to the soil. Keep in mind that a cover crop does provide some of the nutrients that can add to the contribution of a fertilizer to improving the soil. An overall guide of cover crop types are legumes, like clover can provide nitrogen and grass plants like rye have deep hairy roots to carry up nutrients in the soil and hold water and soil in place (reduce erosion).



Use the "Managing Cover Crops Profitably" (https://www.sare.org/wpcontent/uploads/Managing-Cover-Crops-Profitably.pdf) book for more examples and charts to help plan cover crops.(https://www.sare.org/wpcontent/uploads/Managing-Cover-Crops-Profitably.pdf). The tables will guide you to select the appropriate cover crops depending on need, time available in the field and your climate. Another useful guide are the online selector tools. There are several at this link and the appropriate one to use depends on the field location. For those in the Midwest USA:

https://www.midwestcovercrops.org/getting-started-correct/ For those in the South and 'East Coast: https://covercrop-selector.org/

Other regions and states in the USA do not yet have such a tool but consider using the Managing Cover Crops Profitably book noted above. The link for that book offers the entire book as a PDF, free.https://www.sare.org/wpcontent/uploads/Managing-Cover-Crops-Profitably.pdf



### **KWL Process**

Know, Want to Know, Learn



 What other approaches can you use to reduce insects and diseases while contributing to soil health (ex. growing legumes)?



### **Primary Activities**

Overview of the main activities in this module

### Activity 1

### Activity 2

## Collecting information to build your farm plan

This activity can be done as a group, through sharing of experiences and ideas of ways to keep farm records. Share approaches that have and have not worked. If you have not farmed, an example can be created with the group. Identify the crops in year 1, field size, which rows were the plants grown in year 1. Those with experiences share typical problems (insects, diseases, weeds). Production notes need to capture the whole season. Examples of approaches can be followed such as planning for a big trip or when you organize an event. Good note taking is important for any event or activity that the past can influence the future, and that is the case with farming. Here is a link to take a look at some approaches. It is a You Tube so enjoy!



Source: http://twomenandalittlefarm.blogspot.com/ 2011/06/inspiration-thursday\_30.html

## Making a field map of your farm

Creating a field map s a great way to use your field notes from the first season of production and put them to work.

#### A plan will help to:

- Identify which crops should be grown where in the field (not same families as previous year).
- Choose crop varieties that grew well (not attacked by pests) (insects and diseases).
- Plan what to grow in line with land availability, equipment, seed or transplant availability, and market demand.
- There is a 3 page blank table for the learners to use to enter their information on crops and timing. Find this in handouts of this module for learners, Soil health-Building a farm plan.
- Also here is a video to explain crop rotation and the value of including the practice. https://youtu.be/64YapgN6G2w? si=HstWdDafyChaRDgn



### **Primary Activities (cont.)**

Overview of the main activities in this module

### Activity 3

#### Making a Crop rotation plan for your farm

Creating a crop rotation plan is a great way to use your field notes from the first season of production and put them to work.

#### A plan will help to:

- Identify which crops should be grown where in the field (not same families as previous year).
- Choose crop varieties that grew well (not attacked by pests) (insects and diseases).
- Plan what to grow in line with land availability, equipment, seed or transplant availability, and market demand.
- There is a 3 page blank table for the learners to use to enter their information on crops and timing. Find this in handouts of this module for learners, Soil health- Building a farm plan.
- Also here is a video to explain crop rotation and the value of including the practice. https://youtu.be/64YapgN6G2w? si=HstWdDafyChaRDgn

### Activity 4

#### Including cover crops in your crop rotation plan

Growing cover crops is a smart practice to improve soil health and soil fertility. This activity will guide you to determine the best cover crop or mix depending on

- What are your goals when growing cover crops
- When is there open space in the field
- What time of year can the cover be grown based on weather
- Do you have the equipment needed to manage it, to get the most out of it



Buckwheat is a summer cover crop. Here is it being grown between cabbages in a vegetable garden. Buckwheat helps to bring up phosphorous that is deep in the soil.



# **1. Collecting information to build your farm** plan

### **OVERVIEW**

There are many approaches to collect information but whichever you choose should be convenient to you and employees and easy to understand when using 3-6 months later when creating a crop rotation plan. for the upcoming year. This collected information has many uses beyond the crop rotation plan so spend some time to make the system work for you.

### **MATERIALS NEEDED**

- Use clipboard and paper or a small computer tablet **or**
- Recorder to carry on farm while scouting and managing farm actions to record voice
- A clean place to store data collection away from water, mice and weather

### FACILITATOR BACKGROUND INFORMATION

A field map will guide the grower to know what was planted where the previous year. ?Recording the state of the crops and locations will help build a crop rotation plan to reduce, insect pests, plant diseases and improve soil health. Plant loving pests tend to prefer only one family type (group of plants with similarities like broccoli and cabbage, they are both from the Brassica family ). This approach can save the farmer time and increases accuracy of making a sound crop rotation plan.

### The information collected each season should include:

- · Field map with rows identified
- What is being grown in that row (include all crops that will be grown in that row over the season.
- Dates of planting and harvest (apx)
- Identifying problems and attacks by insects and diseases
- Identify the location in the field of a bad weed problem (not grow small seeded crops there)



# **1. Collecting information to build your farm** plan

### PROCEDURE

As you prepare to plant know how much seed to buy by measuring your fields and include spacing that is needed for each plant type. Consider walkways, arrangement of drip irrigation lines, and how large the plants will grow when they are mature.

Just like tracking financial information keep track of the seeds and plants that you buy, planting times and locations. This information will help to make smart decisions for future planning and purchases.

#### Record the following information:

- Date
- Field name
- Plant type/s for each row
- Describe any problems
- Note how many plants affected

Keep this information up to date, following each field visit or scouting when you check on plants' health and production.

- Visit field to check on status of plants at least 1 x/week
- Take notes on every crop to indicate health, stage of growth and any questions you may need to address with help (book, ask, photos, online)
- Use whatever method works best for you-tablet, phone, clipboard, notebook. always record info while in the field so you do not forget or get mixed if you try to do it later.



# **1. Collecting information to build your** farm plan

### PROCEDURE

Here is a sample of a template to collect planting info. Note S stands for seed planted and P stands for plants or transplants.

Seed and Plant Source							
Farm ID:	Name:						
Сгор	Variety/Lot	Vendor	or Contact Information				
	1		1			1	

Here is a sample of a template to collect information about howmuch the crop produced, imporatnt to know if this is a good variety to continue growing.

Production Record: Planting and Harvesting											
Name:	Farm ID:		Harvest	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest		
Crop	Field	Planting Date	Acres or # of Rows	Date/ Unit (Ibs.)	Yield = total units / total acres						

These templates came from this bulletin that can help you track information about production and results on your farm:. <u>http://www.flaginc.org/wp-content/uploads/2016/05/FLAG\_RecordkeepingToolkit-20160502.pdf</u>



# **1. Collecting information to build your farm plan:** *Selecting an approach to keep field records*

### PROCEDURE

This activity can use actual farm information or facilitator provides an example to engage the learners. In this activity they will draw a map of their farm. This reference: (https://www.sare.org/wp-content/uploads/Crop-Rotation-on-Organic-Farms.pdf) is a guide that shows how to build a crop rotation plan in *CHAPTER 5 | A Crop Rotat*ion Planning Procedure, starting on page 69 and can be found in Handouts of this module. Pages 58-67.

#### Step 1. List (see template at end of unit) the following information:

- Which crops will be planted in each row.
- Length and number of rows to be planted of each crop
- Number of times a crop is planted in that row (sequence) and approximate dates
- Space needed between each plant within the row

### Step 2. Refer to harvest field records that show how much was grown and problems of each crop

- What was grown in which row in the past year
- Note which crops (varieties) had disease problems
- Which crops had insect damage (only if more than just a few plants were affected)
- Areas in the field where plants did not grow well but grew well in other locations in the field

#### Step 3: Draw a map on paper large enough to include needed details.

- Draw and label all fields, rows, pathways, pack sheds, and water sources.
- Identify and label on map any perennial gardens, trees, and greenhouses/hoophouses



# **1. Collecting information to build your farm plan:** *Selecting an approach to keep field records*

### **PROCEDURE (cont.)**

#### An alternative plan is to invite a farmer to share their plan with the group.

- The crop rotation plan will allow users to see where cover crops can fit and what plant problems need to be addressed (such as hardpans, excessive weeds, poor drainage, erosion, poor crop growth, or low soil organic matter).
- Organize field notes that can be used to build the crop rotation plan (next activity). Note a useful book can be downloaded free at https://www.sare.org/wp-content/uploads/Crop-Rotation-on-Organic-Farms.pdf. it is offered by USDA SARE pages 64-67.
- Use the vegetable family guide in the learner handout to determine which crops can be grown where.
- If reducing insects and diseases are key goals and you need more information, consider visiting the *Integrated pest management curriculum LINK*?



# **1. Collecting information to build your** farm plan

### **DIVE DEEPER**

This information that you are gathering and keeping up to date will be useful not only to help you know what to plant where but also keeping track of expenses and profits will help to determine your best opportunities for markets. These three topics are included in this Beginning Farmer Curricula. See connections to the below.

### CONNECTIONS TO OTHER MODULES

- Beginning farmer Marketing
  Curriculum
- Beginning farmer Farm Financials
  Curriculum
- Beginning Farmer Integrated pest management will help you collect information on insects and diseases.

### VARIATIONS

If you have not yet grown a field of vegetables for sale you can work with others or by yourself to create an example of what you may plant in a field and go from there to identify which crops should follow. in a crop rotation plan (next activity)

Also, before you start making the Rotation Plan ask others or the facilitator which diseases and insects are common in the area.

You can find this information by looking at your Cooperative Extension Newsletters and Fact sheets located in your state.if possible invite a farmer to speak with the group or even the group can visit the farm and ask questions and see vegetable crops growing.



### 2. Making a Field Map of the Farm

### **OVERVIEW**

Here you will use the information you created in Activity 1, information of what is planted where in your garden/farm.

This information will include the location of the crops in the fields and when they were planted. This information will guide you to know what is growing, how well it is growing, and is it worth growing again.

This information will guide you to draw a map of the farm and identify each row and bed of what grows where.

### **MATERIALS NEEDED**

- Information recorded of what is growing where and when planted
- Field notes of which crops had diseases or suspected diseases
- Tape measure to measure field and rows.
- Paper or computer to draw farm map
- Rulers and markers if drawing on paper

### FACILITATOR BACKGROUND INFORMATION

A **farm map** shows where each crop is planted and when planted. The information recorded during weekly field scouting helps to determine if that variety should be grown in the following year, depending if it is healthy and provides good produce.

The map should show each field, number of rows, length of rows and width of each bed. So measurements of the field and rows need to be done to allow for good plant planning.

A good guide to determine suggested distances and number of seeds is Johnny's Selected Seed Catalog which can be found on line free or call company for free copies:

#### Access guide here



### 2. Making a Field Map of the Farm

### PROCEDURE

- Gather information of what is planted in each row.
- You will also need records that show what you plan to plan in the same season, such as if you grow radish first then following with zucchini in the same season.
- Prepare page to draw field map either on computer or on paper
- Use measurements of field and row lengths and indicate that on your map
- Indicate north, south, east and west directions
- Once map is drawn take it to the field to recheck you have the correct number of rows and length of rows.
- Perhaps laminate in clear plastic.
- Take notes each year on a separate paper so you can use this map each year, unless it changes.



Here is an example of a field map with fields, rows and roads/path



### Making a Field Map of the Farm

### **DIVE DEEPER**

- This information is useful for scouting the field to collect information on which pests are a problem.
- Just like planting information pest information should be recorded. At the end of they year when you review your notes you will be ble to decide if the specific variety is worth growing again.

### CONNECTIONS TO OTHER MODULES

This list of all the varieties begin grown will be useful for:

- In the marketing curriculum to help find the best markets
- The start to the pest data sheets during the weekly scouting, as noted in the Integrated Pest Management Curriculum.

### VARIATIONS

If you know a farmer in the area you can invite them to share their farm map and explain how it was made and how it is kept up to date.

You could also go to the farm and see not just the map but also the field that the map is drawn from.



### Making a Field Map of the Farm

#### Goal:

To create a field map that shows each field, each row, water sources, location of poor soils, best soils, roads, equipment sheds, and other farms nearby (especially if they are uphill) due to risk of nutrient and manure runoff. Indicate any important notes about the field (low spots, drain pipes). Then use that field map each year and label each row with what you grow there.



• Example of a field map-to guide you to follow to make your own

Scale: 1 square = 1 square foot

Source: https://kentuckypestnews.wordpress.com/2021/03/23/planning-a-vegetablegarden-4/



### 3. Making a Crop Rotation Plan for Your Farm

### **OVERVIEW**

Here you will use the field map that identifies what is growing where.

From this you can plan what will be planted in the following year, checking NOT to plant a crop from the same family in that row.

Included are diagrams that show families of plants. These guides should be used to select which crop will be planted in the following year.

Choose plants to grow in each row that are NOT in the same family as the plants that were grown in the year before.

### **MATERIALS NEEDED**

- Field map that was made in last activity
- List of crops that you want to grow the following year
- Either paper or a computer to create the crop rotation plan
- If using paper have markers to color code points on the plan as you like (families, perennials, irrigated, etc)

### FACILITATOR BACKGROUND INFORMATION

Once the learners have a field map drawn they can use that to guide them to create a crop rotation plan.

Note that plants are divided into families since they can have similar problems like insects and diseases. So by **not** planting the same family in the same row each year the plants are less likely to be infected or eaten by that pest.

A crop rotation plan includes where to plant crops and where to plant cover crops and time of year to plant them. Using last year's planting records guides the learners to determine what can be planted in that row.

A crop rotation plan should be made each year at the end of the growing season.Then when the farmer is ordering seeds and planning the information is there on the crop rotation plan to guide them.



### 3. Making a Crop Rotation Plan for Your Farm

### PROCEDURE

Refer to last year's field map or the one you just created based on memory and field notes Use your field map that you just made or from the previous year to determine which crops will be grown where

Consider which crops you will grow that were successful in the garden and for the market(s). Use the Vegetable Plant Family guide (below) to help know which vegetable is in which family Do not forget to consider including cover crops in the crop rotation plan. Select areas of the field where crops did not do well. These locations will benefit the most from cover crops. Cover crops will help the soil and reduce pest build up. So include cover crops in the crop rotation plan and which plant family they area in (See Soil Health, module 2 for more info on cover crops.)





Source: https://images.app.goo.gl/UDfZuUf8m956Tiv36



### 3. Making a Crop Rotation Plan for Your Farm

## Review questions to promote discussion and review:

What is a crop rotation plan?

Do you think it will help you to manage your farm?

#### What can a crop rotation plan do for the crops?

Answer:Reduce diseases, weeds, and pests. Keeping the preferred food source away from the diseases and pests

#### How many years should the crop rotation plan cover? Why that length?

Answer: Many diseases last in the soil for up to 3 years. Insects may be overwintering in the soil in that row so by moving its preferred food you limit its ability to live.

#### Ask for other questions and additional ideas about crop rotation plans

Resource: Crop Rotation in the Vegetable Garden: https://yardandgarden.extension.iastate.edu/how-to/crop-rotation-vegetable-garden

and a PDF of document:

https://yardandgarden.extension.iastate.edu/how-to/crop-rotation-vegetable-garden





Soil Health and Cover Crops How Can You Improve Soil Health

### 4. Including Cover Crops for Your Crop Rotation Plan

### **OVERVIEW**

Planting cover crops is a good practice to improve soil health and fertility. Choosing the correct cover crop to meet a farm's objectives and time of year is important.

#### **MATERIALS NEEDED**

- Copy of Managing Cover Crops Profitably. SARE Handbook Series Book 9 (available free as a PDF from SARE): <u>https://www.sare.org/wpcontent/uploads/Managing-Cover-Crops-Profitably.pdf</u>
- Midwest Cover Crop Council Cover Crop Selector Tool: <u>https://www.midwestcovercrops.org/</u> <u>selector-tools/</u>
- Copy of MSUE Cover Crops for Vegetables <u>https://www.canr.msu.edu/uploads/r</u> <u>esources/pdfs/cover-crop-choices-</u> <u>for-michigan-vegetables\_(e2896).pdf</u>.

#### FACILITATOR BACKGROUND INFORMATION

- Cover crops are plants grown to improve soil health and productivity of agricultural fields and gardens.
- The crops are not grown for harvest but turned into the soil just at flowering.
- The cover crop needs to be chosen during a time of year when there is space in the field, often fall.

### Specific goals in using cover crops can include:

- Reducing wind and water erosion
- Increasing soil organic matter
- Improving soil structure and function (drainage, water holding capacity)
- Increasing microbial activity and diversity
- Reducing plant disease
- Reduce weed and insect problems
- Holding on to any leftover NPK before lost in the ground-water
- Creating habitat for beneficial organisms such as pollinators

Not every cover crop will meet all these goals so use the materials to the left to select the cover crop that meets farm's goals.



### 4. Including Cover Crops for Your Crop Rotation Plan

### PROCEDURE

Choose one or more exercises to demonstrate the values of cover crops.

Exercise 1- Provide a copy of of Managing Cover Crops Profitably or applicable charts from the book of the different cover crops that can be successfully grown in your area. Discuss the Pros and Cons of the selected types and list so all can see. Refer to the book, https://www.sare.org/resources/managing-cover-crops-profitably-3rd-edition/, highlight the charts that are on pages 68-74.

Exercise 2- Take a virtual tour of the Midwest Cover Crop Selector Tool, https://www.midwestcovercrops.org/selector-tools/. Explore how to use the tool.Go over the different boxes to be filled in and what they mean. Review the charts. There is a YouTube video on how to use the tool effectively, https://www.youtube.com/watch? v=I5YrsLD-i-8.

Exercise 3- Walk students through the Michigan Cover Crop Decision Tree. Explain that this is not a complete list but a good place for beginners to start.



Multiple benefits of cover crops SARE 2021, Freg Magdof and Fred Magdoff, Harold van Es In Building Soils for Better Crops <u>https://www.sare.org/wp-content/uploads/Building-Soils-for-Better-Crops.pdf</u>



### Soil Health and Cover Crops How Can You Improve Soil Health

### 4. Including Cover Crops for Your Crop Rotation Plan

### **DIVE DEEPER**

This extension will provide a chance to learn the environmental and agronomic role of cover crops. You can gain a deeper understanding of the environmental value of cover crops. These cover crop plants that are grown are very important to keep soil healthy and in place (reducing erosion). Over time they help to increase organic matter. This is the key helper for better soil and better crops.

Cover crops are grown by farmers to promote many benefits to the farm and crops. But they also provide important short and long term benefits to the soil. Adding cover crops is adding organic mater. Organic matter feeds soil microbes. It is these microbes that feed on the organic materials, break them down, and excrete (poop) them out. They contain nutrients that can be used by the plants and a sticky substances that helps to form soil aggregates. Soil aggregates contain organic matter which is security to your crops during tough times, like too much water from rains or periods of stress on the plants such as extended drought or winds.

Using cover crops over the long term will increase organic matter and increase the soil's ability to retain moisture, hold on to nutrients and soil so they do not run off and keep nutrients in place so plants can use them.

### VARIATIONS

Have several of the students enter information about their farm or planned farm and compare the results from the decision tool of which cover crops it suggests in each situation. Discuss how these cover crops differ in terms of growth, timing, and plant type (size and shape). How will each offer different "services".

To find other tools visit this site to find the NRCS office in your farm's area. https://www.nrcs.usda.gov/contact/fi nd-a-service-center.

If you want to calculate how much nitrogen you get from cover crops visit this video: https://www.youtube.com/watch? v=zumgLm\_6HKY

### CONNECTIONS

There are many more practices that farms can use to improve soil. Cover crops are just one of the tools that can be used in a whole farm plan.



### **Michigan Cover Crop Decision Tree** Follow this to help you choose which cover crop may work for your farm



**ACTIVITY 4** 



### **Additional Resources/Activities**

### **Resource 1**

#### A comprehensive book on crop rotations

Taking good field notes to help you make a sound crop rotation plan is critical. This is a book that offers every aspect to consider about crop rotations.These practices apply to all farm types, organic or not. It is very detailed but you can select points that are of most important to your farm and you.

#### https://www.sare.org/wp-content/uploads/Crop-Rotation-on-Organic-Farms.pdf

### **Resource 3**

### **Managing Cover Crops Profitably**

This is a free downloadable book from USDA SARE. It offers tables to guid you in cove crop selection, how to choose, plant and grow cover crops plus stories of farmers experiences. https://www.sare.org/wpcontent/uploads/Managing -Cover-Crops-Profitably.pdf



### **Resource 2**

### **Templates of farm plans**

Keep in mind that what is planted this year needs to be noted to guide the development of crop rotation in the following year. The goal is to reduce pest build up and improve use of nutrients in the soil, as every crop needs a little different recipe of nutrients . Likely, some part of your plan will need to be changed because of crop failure, unexpected weather events, new markets or new information on your part. No worries, this is a guide to help you, not make your life more complicated.

Here is a template with examples of farm crop rotation plans that includes cover crops along with crops to help improve the soil. It is a template (3 pages) so you can modify it to make it fit for your farm.

This is an excerpt from Crop Rotation on Organic Farms book but can also be found in Learners Handouts. The Crop Rotation Handbook is free and available from SARE as a PDF: https://www.sare.org/wpcontent/uploads/Crop-Rotation-on-Organic-Farms.pdf



### **Review and Encouraging Further Learning**

#### Module Review and Evaluation Questions:

- What are some ways to keep track of the field and crop information that do or may work for you?
- What information do you need to improve production, management and time efficiency
- Describe what is a crop rotation plan. What is its value for you as a farm manager and your farm in terms of crop and soil health?

#### **Activities for Review:**

- Once learners have created a data collection sheet they can exchange them with others in the class. They can ask each other questions about method of collection of information and how the information will be useful.
- With the completed crop rotation plan, working in groups, see how well a couple of the plans match the needs of the market in the coming year.



### **Review and Encouraging Further Learning (cont.)**

### Taking your knowledge back to the farm:

- Try out your data collection approach on your farm. Modify it as needed to make collection efficient and useful. Check the farm map for accuracy.
- Once your data collection approach is ready to use keep the information updated as you do your weekly scouting walks of your field. Also be sure to share your approach with any employees working with you.