



**UNIT 2: FOOD AND
THE ENVIRONMENT**

L.17

RESILIENT AGRICULTURE

Note to Teachers

This lesson flips the question of prior lessons: If the last 500 years of agriculture demonstrate what farming with a growing disregard for nature looks like, what does farming with nature look like? What kind of mindset does this approach to farming require, and what are the practices associated with it? The rest of the lessons in this unit help to answer those questions. It introduces the notion of resilient farming, a philosophy and body of practices that are sustainable and can weather change over time. In the process, this lesson offers some of the language that students will need to understand alternative ways of producing food.

Goals *In this lesson, students will*

- learn key vocabulary to describe and compare conventional and resilient agricultural systems.
- begin to consider the advantages of renewing our relationship with nature.
- begin to appreciate the role and importance of the farmer as a steward of the land.

Objectives

- Students will use a short writing prompt and a series of slides to begin to explore and discuss foundational differences between conventional and resilient agricultural systems.
- The lesson asks students to think visually and comparatively to help define and sharpen their understanding of terms.

Materials

- Computer and projector
- Lesson 17 Slides



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Please use this margin to notate how to best adapt this curriculum to your students.

Introduction

1. Industrial agriculture in review:

FOCUSED FREE WRITE #1 (3 minutes): On the basis of what you have learned thus far, what are some of the problems associated with industrialized agriculture?

Share out, and—if helpful—make a list of big themes on the board

2. Announce: Let's think about the language of conventional agriculture.

- One term that can be applied to industrial or conventional agriculture is “extractive agriculture”

“Extraction” comes from the verb “to extract”

- Ask: students why conventional agriculture might be called “extractive?”

Students will likely be able to note that conventional agriculture prioritizes the ability to EXTRACT a certain amount of product from the land.

- Introduce as well the notion of “inputs” and “outputs”

– what is put onto or into the land

– what is taken from it

- On the basis of students' study so far, what might those inputs be?

seeds, fertilizers, pesticides, herbicides

And the outputs? crops and animal products

- Use the very simple image on **SLIDE 1** to provide a graphic representation of this system

As students begin to develop the language and model resilient farming, they will develop an alternative graphic model that will enable them to compare conventional and resilient farming directly.

3. Open the floor for students' questions and responses

4. Remind students that critics of conventional agriculture describe this system as fatally flawed. But why?

To help students begin to speculate on a response, show the students the **NEXT SERIES OF FOUR SLIDES**. Each illustrates an agricultural landscape.

Give them one minute with each slide, asking students to note everything they see in each image.

How were the most immediate signs of agriculture—crops and domestic animals—represented in these photographs?

What else did the photographs include? (Do not hesitate to go back through the slides.)

They should note the presence of wild animals, uncultivated spaces, human habitation, and the weather or sky.

Can your students hypothesize as to why these other elements are important?

The goal of these images is get students thinking about the idea that a field of corn (or soy or wheat...) does not sit in isolation. It is part of



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a larger ecosystem. If students grasp this, excellent. If they do not, it is enough right now to help them see that extraction farming focuses on the field or barnyard without taking into account the spaces and organisms that pass through and exist alongside those spaces.

Defining a Language of Resilient Farming

1. Resilient farming—farming practices that can protect the land in the long run and meet current and upcoming climate and other challenges—speaks a different language than that of extraction farming. The rest of the lesson is focused on identifying some of its central ideas.

Ask students whether the term “resilient” is familiar to them. Resilience is often applied to education.

What is a resilient student?

With luck, they will be able to identify resilience as an ability to thrive over time and the ability to meet challenges effectively along the way.

But what is the language of resilient agriculture?

2. Tell students that one of America’s first conservationists was a man named John Muir, who made the following statement [**SLIDE 6**]:

"When we try to pick out anything by itself, we find it hitched to everything else in the Universe."

1. **FFW #2** (3 minutes): What does that idea mean to you? Can you think of an example—say, from a subject you have studied in school—where that might be true?

Selective share

FFW #3 (3 minutes): To what and whom are you hitched?

Selective share

2. Pose the following question: If we apply this idea to agriculture, it produces a very different way of thinking. Any idea how?

Open the floor for some speculation that should lead to the idea that fields are part of the ecosystem, rather than separate from it. What happens in the field should not threaten what is outside.

Students may go one step further and suggest (following Muir) that everything thing in the ecosystem is interrelated. If they do, congratulate them on their thoughtfulness.

3. One idea that emerges out of this way of thinking is the concept of the “biotic web”
 - a. There are two parts of that term. The first comes from “biome”

SLIDE 7: Biologist Neil Campbell describes a biome as a community, “classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment”¹⁾

There are both aquatic and land biomes and they are characterized by the organisms—plant, animal and microbial—that live there.

Check for student comprehension before you move on.

1) Campbell, Neil A. 1996. *Biology*, Fourth Edition. The Benjamin/Cummings Publishing Company, Inc. Menlo Park, CA.



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- b. We also need to acknowledge the second word in the concept: web or community.

Ask your students what the concept of web or community adds to the concept. (What is a web? What do we mean when we talk about a community?)

This term stresses interrelationships.

4. A biotic web, therefore, is a way of understanding and expressing an ecological system and its flora and fauna that both a) identifies these populations and b) highlights their relationships to each other.

Ask for student thoughts and questions. Then pose this question:

How is this idea different from the concept of inputs and outputs? If we were to represent the biotic web visually, what would it look like?

5. Resilient agriculture, therefore, focuses on the whole of an ecosystem (rather than just the crop or animal you want to produce) and how the different elements in that ecosystem are interrelated and interdependent.

[SLIDE 8] Here is the way one student characterized the biotic web of Stone Barns Center for Food and Agriculture.

Take a minute just to look at it.

What do you notice about it?

Have students share their observation.

6. So, resilient agriculture—agriculture that thrives over time and adapts successfully to challenges—looks for the ways in which parts of a larger ecosystem are interrelated and interdependent.

And uses the term “biotic web” to map those relationships.

7. We might ask, who is in the best position to know that ecosystem and to understand its relationships?

Students are likely to highlight scientists, as we often look to a scientific or technological solution to challenges.

Fred Kirschenmann, a farmer and philosopher, argues that it is farmers who best grasp those relationships because they get to know intimately the land they work.

- They know the contours of the land and what the land can support in each area
- They understand where the soil is most and least fertile
- They catalog the lands, water, mineral and other resources, and note its fragilities
- They notice changes due to climate or the land use

In contrast to conventional agriculture, which uses inputs to tailor an environment to the same general practices, resilient agriculture encourages us to adapt our agriculture practices and demands on the land on the basis of what we learn from it.

8. Step back to review: what are the takeaways for students? Do they generally appreciate this idea, or express skepticism?

Remind them that the following lessons will build a larger picture from this lesson’s foundation.



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JOHNNY CAKES WITH HONEY BUTTER

12 students

This recipe should be doubled for a class of 16. Split the class in half and have each group make the recipe once. Pull two students as the Johnny Cakes are being cooked to make the honey butter.

Equipment List

- 2 griddles (if cooking in a skillet, 2 skillets and 2 burners)
- 2 medium bowls
- 2 wooden mixing spoons
- 2 spoons or other utensils for scooping batter
- Stand mixer
- Small bowl
- Fine mesh sieve
- 2 flat spatulas
- 1 x 1 cup dry measure
- 2 x 1 Tbsp
- 2 x ¼ tsp
- 2 x 2 cup wet measures
- 2 spoons for honey

Food Items

- 1 cup cornmeal
- 1 Tbsp sugar
- ¼ tsp salt
- 1 ¼ cups boiling water, plus more if needed
- 1 pint heavy cream
- Honey

SHAGBARK HICKORY BARK SYRUP

Adapted from: Dave's Cupboard Blog

4 students

Cook alongside the food you would like to eat it with: scones, cornbread, pancakes, etc.

Equipment List

- 4 scrub brushes
- 1 burner
- 1 pot
- hot mitts
- 1 metal sheet pan
- 1 cup dry measuring cup
- 1 quart liquid measuring cup
- 1 wooden spoon
- 1 spatula
- 1 jar or other container for serving

Food Items

- ½ pound shagbark hickory bark
- water
- 4 cups organic cane sugar



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SHAGBARK HICKORY BARK SYRUP

Adapted from: Dave's Cupboard Blog

YIELD: Roughly one quart

Ingredients

- ½ pound of Shagbark Hickory Bark strips. Where possible, harvest bark that is on the ground.
- Water
- 4 cups of organic cane sugar

Directions

1. Preheat the oven to 350 F.
2. Scrub the bark strips well under running water with a stiff brush. Remove lichen, soil, insects, etc.
3. Break the strips of bark into pieces, roughly 8 inches long or so. Shake off any excess water, put the bark onto a baking sheet and slide into the oven to toast.
4. Toast the strips for around 20 minutes, until they are a gentle golden-brown color. Make sure that they do not begin to burn, as your syrup will have an unpleasant flavor.
5. Place the toasted bark pieces into a saucepan and cover with water. Bring the water to a boil and immediately turn it down to a simmer. Simmer gently for about 25 minutes, until the bark water is deep amber in color. Be sure that your water does not boil, as boiling water will release bitter tannins.
6. Remove and discard the bark (or save it for your barbecue grill).
7. Continue to simmer until the water is reduced in volume by about 25%.
8. Measure 2 cups of extract water, then return it to the pan. (Save the extra to drink as tea.)
9. Stir the sugar into the water. Continue to stir until the sugar is dissolved.
10. Once the sugar is dissolved, stop stirring and let the syrup thicken to the right consistency, around 25 minutes.
11. Use while warm, or cool to transfer into bottles for storage.



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JOHNNY CAKES WITH HONEY BUTTER

YIELD: about 12 cakes

TIME: 15 min.

Ingredients

- 1 cup cornmeal
- 1 Tbsp sugar
- $\frac{1}{4}$ tsp salt

Directions

1. Grease griddle with canola oil and turn on to preheat at 350 F.
2. In a bowl, combine the cornmeal, sugar and salt.
3. Scald the cornmeal mixture with one cup boiling water and stir. Continue adding boiling water and stirring until it's the texture of creamy mashed potatoes.
4. Spoon dollops of the mixture onto the griddle.
5. Cook for 5 minutes per side or until golden brown.
6. To make the butter, add the heavy cream to the stand mixer and whip on a medium speed. The butter will be done when it has separated into buttermilk and butter. Using a fine mesh sieve, separate the butter from the buttermilk.
7. In a small bowl, mix the honey into the butter adding more honey until at desired sweetness.
8. Serve Johnny Cakes warm with honey butter on top.

