RAINFOREST ALLIANCE

ENVIRONMENTAL CURRICULUM
AGES 16-18

LESSON 2: THE HISTORY OF FARMING AND ITS FUTURE

Lesson plan overview

In this lesson, students trace the journey of farming from traditional Indigenous practices to industrial agriculture, and regenerative models. They will explore how methods have changed over time, the impacts these systems have had on people and the environment, and what lessons can guide the future of farming. By building a timeline, analyzing impacts, and creating art or math-based projects, students will reflect on how agriculture shapes our world—and how it can move toward sustainability.

Educational materials

- **Video**: 'Indigenous Farming Techniques'; 'Industrial Agriculture'; Regenerative Models'
- **Worksheet**: Timeline activity
- **Math tie-in:** Soil carbon and crop yields (analyze patterns using graphs)
- **Art tie-in:** Farming time machine collage
- **Quiz**: Short answer and multiple choice
- **Classroom discussion questions:**
  - How have farming practices changed over time?
  - What can we learn from traditional methods?

WORKSHEET: Farming Through the Ages

Name: _____ Date: _____

Part A: Timeline activity

Instructions: Fill in the timeline with key details about each farming system. Add one strength and one weakness for each.

Farming system	Approx. time period	Key features	Strength	Weakness
Indigenous / Traditional	Before colonization	Solar calendars, crop diversity, soil care		
Industrial agriculture	1900s–Present	Machines, chemicals, monocultures, high yields		
Regenerative agriculture	2000s–Present	Soil restoration, crop rotations, biodiversity		

Part B: Compare and contrast

Instructions: Circle the farming system(s) that best fit the description. Some may have more than one correct answer.

Used solar calendars and ecological knowledge to guide planting.

Traditional / Industrial / Regenerative

Relies on machinery and chemical fertilizers to increase yields.

Traditional / Industrial / Regenerative

Restores soil carbon and biodiversity through cover crops and rotations.

Traditional / Industrial / Regenerative

Part C: Reflection questions

Instructions: Answer in 2–3 complete sentences.

What can we learn from traditional farming methods that is still valuable today?

What are the environmental impacts of modern industrial farming?

In your opinion, why is regenerative agriculture considered a model for the future?

Extension (optional challenge)

Design a mini poster that shows the “future of farming.” Include at least one historical lesson from Indigenous traditions and one principle of regenerative agriculture.

Suggested rubric (20 points total)

Part A: Timeline activity (8 points)
2 points per correctly completed row (time period, features, strength, weakness).
Partial credit for partial responses.

Part B: Compare and contrast (4 points)
1 point per correct circle.

Part C: Reflection (6 points)
2 points per thoughtful, complete answer (clear reasoning, at least 2–3 sentences).
1 point for minimal or incomplete reasoning.

Overall presentation (2 points)
Clear handwriting/organization, logical flow of ideas, effort shown.

WORKSHEET: ANSWER KEY

Farming System	Approx. Time Period	Key Features	Strength	Weakness
Indigenous / Traditional	Before colonization	Solar calendars, crop diversity, soil care	Sustainable, preserved biodiversity, maintained soil health	Smaller scale yields; limited by labor and tools
Industrial agriculture	1900s–Present	Machines, chemicals, monocultures, high yields	High yields, efficiency, feeds large populations	Soil degradation, chemical pollution, biodiversity decline
Regenerative agriculture	2000s–Present	Soil restoration, crop rotations, biodiversity	Restores soil carbon, promotes biodiversity, climate resilience	Requires knowledge and training; can be slower transition from industrial systems

WORKSHEET: ANSWER KEY

Part B: Compare and contrast (circle answers)

Traditional (guided by natural cycles and solar calendars).
Industrial (machines, fertilizers, large-scale production).
Regenerative (restores soil carbon and biodiversity).

Part C: Reflection (sample answers)

What can we learn from traditional farming methods?
→ Knowledge of planting calendars, intercropping, and respect for ecosystems helps maintain biodiversity and soil health.

What are the environmental impacts of modern industrial farming?
→ Soil degradation, chemical pollution, biodiversity loss.

Why is regenerative agriculture considered a model for the future?
→ It addresses climate change, restores soil, and increases biodiversity while still producing food. It combines modern science with traditional lessons.

QUIZ: Farming Through Time

Part A: Multiple choice (1 point each)

Which farming system used solar calendars and ecological knowledge to guide planting?

a) Industrial agriculture
b) Traditional farming
c) Regenerative farming

Which of the following is a feature of industrial agriculture?

a) Crop rotations and cover crops
b) Machines and synthetic fertilizers
c) Using solar calendars to guide planting

Which system focuses on restoring soil, capturing carbon, and promoting biodiversity?

a) Traditional farming
b) Industrial agriculture
c) Regenerative agriculture

QUIZ: Farming Through Time

Part B: Short answer (2–3 sentences each, 2 points each)

What are the characteristics of industrial agriculture?

What lessons from traditional farming could help solve today's agricultural challenges?

Why is regenerative agriculture often described as a model for the future?

QUIZ: ANSWER KEY

Part A: Multiple choice

b) Traditional farming: Indigenous peoples used solar calendars, nature's signs, and ecological knowledge.
b) Machines and synthetic fertilizers: A hallmark of industrial agriculture.
c) Regenerative agriculture: Designed to restore ecosystems and soils while producing food.

Part B: Short answer (sample answers)

Industrial agriculture uses machinery and chemicals (like pesticides and fertilizers) to ensure high yields in the short term, even though these approaches deplete soils in the long term.

Traditional farming teaches us to value diversity, plant multiple crops together, use natural cycles, and allow soils to rest, which all support long-term sustainability.

Regenerative agriculture is a model for the future because it restores soil health, captures carbon, increases biodiversity, and helps farmers adapt to climate change while producing food.

Suggested scoring:
Multiple choice: 4 points total
Short answer: 6 points total (2 points each)
Total = 10 points

MATH TIE-IN
Soil Carbon and Crop Yields

Objective

Students will compare soil carbon levels and crop yields in industrial vs. regenerative farming systems, then analyze patterns using graphs and calculations.

Step 1: Example data table

Farming system	Soil carbon (%)	Crop yield (tons/ha)	Water retention (mm)
Industrial farm A	1.2	8.5	50
Industrial farm B	1	9	45
Regenerative farm A	3	7.5	90
Regenerative farm B	2.8	8	85

Disclaimer: These numbers are fictional and are meant to be used solely for this educational activity.

MATH TIE-IN
Soil Carbon and Crop Yields

Step 2: Calculations

Mean and median:
Calculate the average soil carbon for each system (industrial vs. regenerative).

Compare: Which system stores more carbon?

Yield trade-off:
Compare the average crop yields. Which system produces more food?

Discuss: Why might slightly lower yields still be beneficial?

Water retention:
Create a bar graph comparing water retention between the two systems.

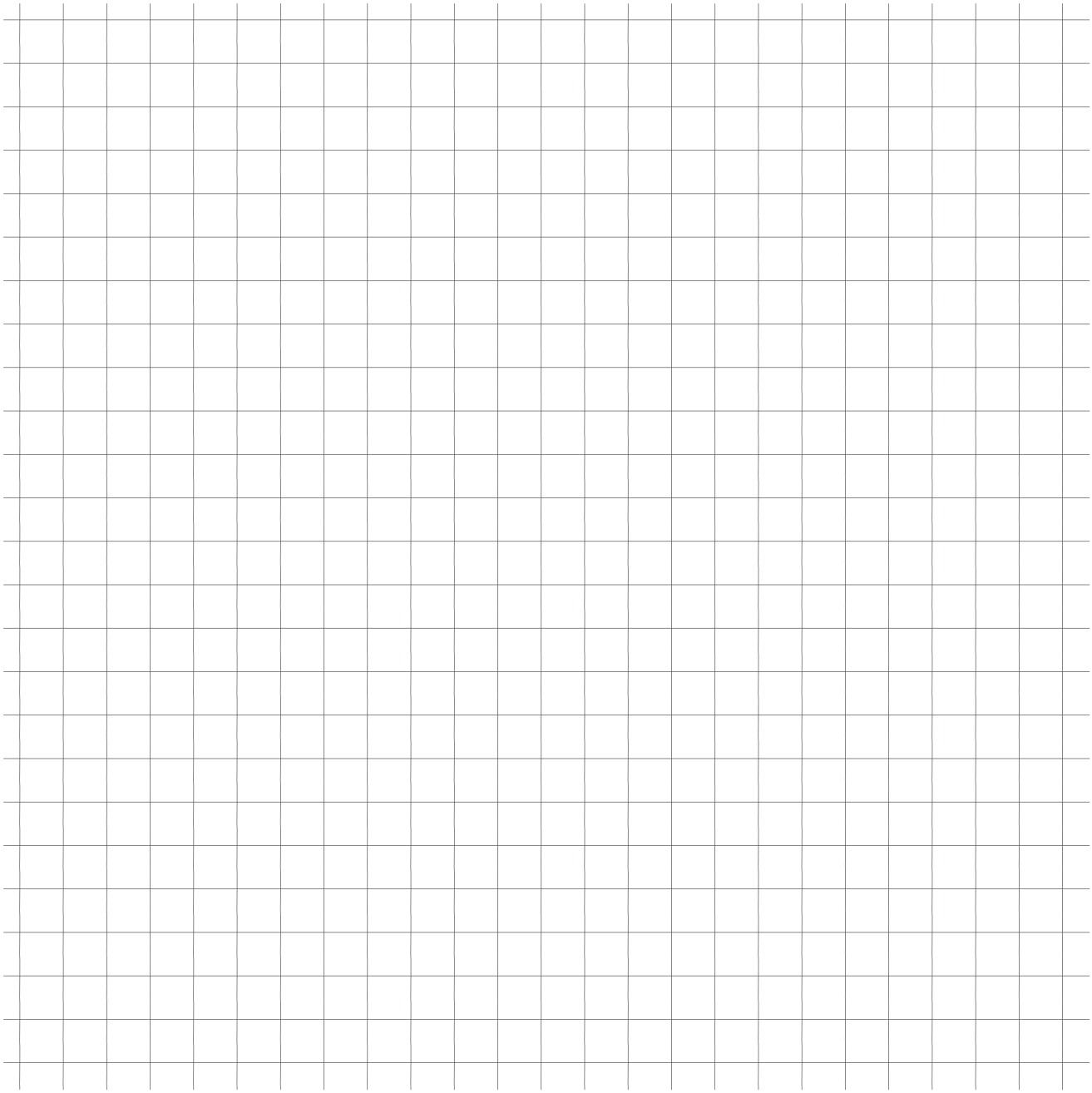
Which system is better at preventing drought and erosion?

Critical thinking:
If one hectare of regenerative farmland stores 1.5% more carbon than an industrial hectare, how much more carbon would be stored across 1,000 hectares?

MATH TIE-IN
Soil Carbon and Crop Yields

Step 3: Extension / higher-level challenge

- Plot a scatter plot comparing soil carbon to crop yield.
- Analyze: Is there a trade-off between soil health and productivity, or can regenerative systems be competitive?



MATH TIE-IN (FOR TEACHERS)
Soil Carbon and Crop Yields

Soil carbon:
Industrial mean = (1.2 + 1.0) / 2 = 1.1%
Regenerative mean = (3.0 + 2.8) / 2 = 2.9%
→ Regenerative stores ~2.6x more carbon.

Yield:
Industrial mean = (8.5 + 9.0) / 2 = 8.75 tons/ha
Regenerative mean = (7.5 + 8.0) / 2 = 7.75 tons/ha
→ Industrial yields are slightly higher, but regenerative yields are close.

Water retention:
Industrial mean = (50 + 45) / 2 = 47.5 mm
Regenerative mean = (90 + 85) / 2 = 87.5 mm
→ Regenerative systems hold nearly double the water.

Carbon storage across 1,000 ha:
1.5% × 1,000 = 1,500% more relative to one hectare, or 15 units more carbon (if 1% = 10 units of storage, adjust scale to teacher's preference).

ART TIE-IN

Farming Time Machine Collage

Objective

Students will create a time-traveling farm collage that shows how farming has changed through history, while also imagining what the future could look like.

Instructions

Divide your page (or poster board):

- Make a big circle or spiral, divided into four sections:
  - Indigenous / traditional farming
  - Industrial agriculture
  - Regenerative farming (future)

Create each farm scene:

- Instead of just drawing, students can collage using old magazines, printed images, fabric scraps, or their own doodles.
- For example: cut out a tractor for industrial farming, or leaves and animal pictures for Indigenous systems.

Add creative elements:

- Use symbols (🌱, 🐄, ⚙️, 🌍) and colors (green for balance, gray for industrial, bright colors for the future).
- Add a "time travel clock" in the center, with arrows pointing to each era.

Fun twist—the future panel:

- The last section is the "Future Farm." Students can get imaginative here—drawing robots that restore soil, farms in harmony with forests, or even floating farms!

Caption bubbles:

- In each section, add one speech bubble or caption describing the farming system in their own words (e.g., "I grow many crops together" for Indigenous farming, "I rely on machines and chemicals" for industrial farming).

ART TIE-IN

Farming Time Machine Collage

Teacher notes

This project makes farming history visual, hands-on, and personal.
The collage format gives freedom to artistic and non-artistic students alike.
Works well as a gallery walk: students can display their collages and compare.