Lesson Plan
2 of 5

Factors Affecting Soil Health

Created: 07/2025 by the National FFA Organization

Description of Lesson: In this lesson, students explore the key physical, chemical, biological and human influences on soil health. Students will investigate how elements like soil texture, pH, organic matter and land use practices affect the soil's ability to support plant growth and ecological functions. They will then apply their understanding by diagnosing soil problems and recommending evidence-based solutions.

Thank you to our current partners in sustainability:

Student Learning Objectives:

After completing these activities, students will …

1. Identify and explain major physical, chemical, biological and human factors that influence soil health.
2. Evaluate how different factors interact to support or degrade healthy soil.
3. Analyze real-world examples of practices that promote or harm soil health.

Suggested Grade Level:

Grades 9 and 10 (This lesson is written so instructors can scale up or down based on class needs.)

Suggested Time:

60-70 minutes (*Time requirements may vary based upon student understanding and class schedule.)

Resources/References:

1. Website: USDA Natural Resources Conservation Service (NRCS), Soil Health, https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health
2. Website: USDA NRCS, Soil Health Key Points, https://www.nrcs.usda.gov/sites/default/files/2022-12/soil-health-key-points.pdf
3. Website: Soil Health Institute, Resources Page, https://soilhealthinstitute.org/resources/
4. Website: Farmers.gov, Soil Health, https://www.farmers.gov/conservation/soil-health

Related Resources:

1. AgExplorer Sustainability Systems Focus Area, AgExplorer.FFA.org/focus/sustainability-systems/

2. Introduction to Sustainability Lesson Series, https://FFA.box.com/v/introtosustainability
3. Darling Ingredients Educational Resources, https://FFA.box.com/s/3ko8e9w6zygohv1ewfsnc8byobjzeuxa
4. Valent — Sustainability in Agriculture Lesson Series, https://FFA.box.com/v/sustainabilityinagriculture

Equipment and Supplies Needed:

1. A copy of the "Factors Affecting Soil Health" student activity sheet for each student
2. A copy of the "Soil Doctor: Diagnose and Recommend" student activity sheet for each student
3. A set of the "Soil Health Sort Cards" (Appendix 1) for each group of three or four students
4. A set of the "Soil Health Situation Cards" (Appendix 2) for each group of three or four students
5. Student devices with internet access

Vocabulary:

1. Biodiversity
2. Compactions
3. Microorganisms
4. Nutrient
5. Organic Matter
6. pH
7. Salinity
8. Soil Texture
9. Tillage

Cross-Curricular Connections:

English/Language Arts
• Write recommendations for how to improve soil health. • Have collaborative discussions surrounding soil health.

SAE and FFA Connections:

1. Agronomy CDE, FFA.org/participate/cdes/agronomy/
2. Environmental and Natural Resources CDE, FFA.org/participate/cdes/environmental-and-natural-resources/
3. Proficiency Areas: Environmental Science and Natural Resources Management, FFA.org/participate/awards/proficiencies/
4. Foundational SAE Connections: Agricultural Literacy

Student Activity Sheets:

Direct access to student activity sheets without lesson plan or answer key for easy upload to a learning management system or printing for classwork.

https://ffa.box.com/s/t3hlclo1opa69kq5z0v5wyfj20ry6f3c (Word)
https://ffa.box.com/s/9u0h2bdhiutmhfh0isbx2ibcbyigni7v (PDF)
https://docs.google.com/document/d/1MBqpCwqqF3ZeM3a3ysr0LNqe3Wf2srpWCOpU_tNSTmI/copy (Google)

These Activities Are Aligned to the Following Standards:

AFNR Performance Element

- CS.03. Examine and summarize the importance of health, safety and environmental management systems in AFNR workplaces.
- CS.04. Demonstrate stewardship of natural resources in AFNR activities.
- CS.06. Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources.
- NRS.02. Analyze the interrelationships between natural resources and humans.
- NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.

- FFA.PL-B.Relationship: Build relationships, work as a team player and appreciate the talents of others.
- FFA.CS-M.Communication: Effectively interact with others in personal and professional settings.
- FFA.CS-N.Decision Making: Analyze a situation and execute an appropriate course of action.

Common Career Technical Core

- AG3 Examine and summarize the importance of health, safety, and environmental management systems in AFNR businesses.
- AG4 Demonstrate stewardship of natural resources in AFNR activities.
- AG6 Analyze the interaction among AFNR systems in the production, processing, and management of food, fiber, and fuel and the sustainable use of natural resources.
- AG-NR2 Analyze the interrelationships between natural resources and humans.
- AG-NR4 Demonstrate responsible management procedures and techniques to protect or maintain natural resources.

Common Core – Speaking and Listening

- CCSS.ELA-Literacy.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

Common Core – Science & Technical Subjects

- CCSS.ELA-Literacy.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Next Generation Science

- HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Green/Sustainability Knowledge and Skill Statements

- AFNR Career Cluster, Statement 1 - Apply understanding of ecosystems and systems thinking to the management of natural resources to maximize the health and productivity of the environment, agriculture, communities, and society.
- AFNR Career Cluster, Statement 3 - Communicate the impact of green and sustainability principles on agriculture, food and natural resource systems.
- AFNR Career Cluster, Statement 7 - Demonstrate an understanding of green and sustainability trends that are impacting processes and markets in AFNR.

AFNR Career Ready Practices

- CRP.02. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive.
- CRP.04. Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.
- CRP.05. Consider the environmental, social and economic impact of decisions. Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organizations and the environment.

Partnership for 21st Century Skills

- Communication
- Environmental Literacy
- Global Awareness
- Information, Communications, and Technology Literacy
- Think Creatively

Lesson Plan:

1. **Bell Ringer:** In 60 seconds, list as many things as you can that affect soil health. Be ready to share with a partner.

2. **Introduction:** After a minute of individual brainstorming, have students briefly compare lists with a partner and circle anything both students wrote, then have students write in a different color any items their partner recorded that they didn't. Solicit some answers of common themes to be shared with the class.

3. **Activity:** *(15-20 Minutes)* Each student needs a copy of the student activity sheet "Factors Affecting Soil Health."
    a. **Part 1:** Split students into groups of three or four. Each group will receive a copy of the "Soil Health Sort Cards" cut apart and mixed up. In their groups, students will sort the factors into four categories: physical factors, chemical factors, biological factors and human factors. (You may choose to do this as a competitive activity if you wish.) Once they have done so, they will call the teacher over to check their work and ensure they have correctly sorted each of the factors before recording them and their descriptions on their student activity sheets.
    b. **Part 2:** In their same groups, students will now receive a set of the "Soil Health Situation Cards" cut apart and mixed up. Their task is to match each situation to the factor(s) it is most closely related to (i.e., "Roots struggle to grow in dense soil" matched to "Compaction"). A situation may have more than one "correct" match and in those cases, students may either choose the one they think is most closely matched or place the card between those two factors when sorting. Once again, they will call the teacher over to check their answers before completing their student activity sheets. On their student activity sheets, they will select one situation per category and write an explanation for why the situation is good or bad for soil health. They will then answer the reflection questions on their student activity sheets.

4. **Activity:** *(20-25 minutes)* Each student needs a copy of the student activity sheet "Soil Doctor: Diagnose and Recommend." Still in their small groups, students will read the scenarios on their student activity sheets and discuss what they believe the problem is and how they would recommend improving soil health in each situation. Students may need to use outside resources to help them research what to do in each scenario. As allowed by the teacher, they may use the internet, textbooks or any other resources they have available to help them diagnose and treat the soil issue. Discuss each scenario as a class afterward.

5. **Follow-up:** *(10-15 minutes)* Hold a class discussion with students about soil health factors. Throughout the discussion, pose any or all of the following questions to your students to consider.
    a. How do human activities interact with physical and biological soil components?
    b. Why might improving soil pH or adding organic matter help restore unhealthy soil?
    c. How do factors like climate or land shape (topography) complicate soil management?
    d. In what ways can individuals (even those who aren't farmers) help protect soil health?
    e. Which soil health factor do you think is most challenging to manage? Why?
    f. How does healthy soil support both people and the planet?

6. **Exit Ticket:** If you were managing your own garden, what would be your top priorities for soil care? Why?

Name: _____

Aligned to the following standards:
CS.03; CS.04; CS.06; NRS.02; NRS.04; FFA.PL-A; FFA.PL-B; FFA.CS-M; FFA.CS-N; AG3; AG4; AG6; AG-NR2; AG-NR4; CCSS.ELA.SL.9-10.1; CCSS.ELA.RST.9-10.3; HS-LS2-7; HS-ESS3-4; CRP.02; CRP.04; CRP.05

Factors Affecting Soil Health

Part 1:

Directions:

After properly sorting the Soil Health Sort Cards, complete the table below. Be sure to record all the factors and their descriptions underneath each category.

PHYSICAL FACTORS	CHEMICAL FACTORS
BIOLOGICAL FACTORS	**HUMAN ACTIVITY FACTORS**

1. Which soil health factor do you think is most challenging to manage? Why?

Name: _____

Part 2:

Directions:

In the table below, choose one soil health situation per category from the sort cards and write a two- or three-sentence explanation for why that situation is good or bad for overall soil health. Then answer the reflection questions.

PHYSICAL FACTORS	CHEMICAL FACTORS
BIOLOGICAL FACTORS	**HUMAN ACTIVITY FACTORS**

Reflection Questions:

1. Can improving one part of soil health (like adding nutrients) harm another part (like biological life)? How do you think we balance those needs?

2. What are two ways that the physical, chemical and biological aspects of soil interact with one another?
   a.

   b.

3. What might happen to our food systems if soil health continues to decline globally?

Name: _____

Aligned to the following standards:
CS.03; CS.04; CS.06; NRS.02; NRS.04; FFA.PL-A; FFA.PL-B; FFA.CS-M; FFA.CS-N; AG3; AG4; AG6; AG-NR2; AG-NR4; CCSS.ELA.SL.9-10.1; CCSS.ELA.RST.9-10.3; HS-LS2-7; HS-ESS3-4; CRP.02; CRP.04; CRP.05

Soil Doctor: Diagnose and Recommend

Directions:

Read over each of the scenarios below and discuss with your group what the problem is and how you would go about solving it. You may need to use additional research and resources to diagnose and make recommendations. Below are a few options you may consider (but are not limited to). Be ready to share your research and solutions in a class discussion.

- USDA Natural Resources Conservation Service (NRCS), Soil Health: https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health
- USDA NRCS, Soil Health Key Points: https://www.nrcs.usda.gov/sites/default/files/2022-12/soil-health-key-points.pdf
- Soil Health Institute, Resources Page: https://soilhealthinstitute.org/resources/
- Farmers.gov Soil Health Page: https://www.farmers.gov/conservation/soil-health

Scenario 1: Compacted Cornfield

A cornfield has been driven over repeatedly by heavy tractors after rainfall, compacting the topsoil. The farmer notices that water tends to pool on the surface after irrigation or rain, and crop roots are not growing very deep. Yields have dropped, and the plants appear stunted.

1. What is the main issue and the factors involved?

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

Scenario 2: Over-Acidified Soil

A small vegetable farm has used ammonium-based synthetic fertilizers for many seasons. Soil tests now show that the pH has dropped below 5.5, and the farmer is beginning to see poor plant performance, especially in leafy greens. Some nutrients appear to be “locked up” and unavailable to plants.

1. What is the main issue and the factors involved?

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

Name: _____

Scenario 3: Depleted Organic Matter

A field used for hay has not had any organic inputs (like compost or cover crops) added in several years. The soil is visibly dry and crumbly, and the farmer notices fewer earthworms than before. Crops seem to require more watering than in the past.

1. What is the main issue and the factors involved?

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

Scenario 4: Overgrazed Pasture

A livestock pasture has been overgrazed during dry months, with very little grass left in many spots. The soil is bare in areas, and rainfall tends to run off quickly, taking topsoil with it.

1. What is the main issue and the factors involved?

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

Scenario 5: Salinity Buildup in Greenhouse Beds

In a high tunnel greenhouse, beds are irrigated frequently due to high temperatures. Over time, white crusts have appeared on the soil surface, and salt-sensitive crops are underperforming.

1. What is the main issue and the factors involved?

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

Name: _____

KEY: Factors Affecting Soil Health

Aligned to the following standards:
CS.03; CS.04; CS.06; NRS.02; NRS.04; FFA.PL-A; FFA.PL-B; FFA.CS-M; FFA.CS-N; AG3; AG4; AG6; AG-NR2; AG-NR4; CCSS.ELA.SL.9-10.1; CCSS.ELA.RST.9-10.3; HS-LS2-7; HS-ESS3-4; CRP.02; CRP.04; CRP.05

Part 1:

Directions:

After properly sorting the Soil Health Sort Cards, complete the table below. Be sure to record all the factors and their descriptions underneath each category.

PHYSICAL FACTORS	CHEMICAL FACTORS

• Soil Texture:
  ○ Ratio of sand, silt and clay
  ○ Affects how water moves and nutrients are stored
• Compaction:
  ○ Caused by heavy machinery or animals
  ○ Reduces pore space, air flow and root growth
• Water Retention:
  ○ Influenced by texture and organic matter
  ○ Too little = drought stress, too much = root rot
	• pH:
	  ○ Ideal range is 6.5–7.5
	  ○ Outside that range, nutrients become unavailable.
	• Nutrient Availability:
	  ○ Soil must provide nitrogen, phosphorus, potassium and micronutrients.
	• Salinity:
	  ○ High salt levels reduce water uptake by plants.

BIOLOGICAL FACTORS	**HUMAN ACTIVITY FACTORS**

• Organic Matter:
  ○ Improves structure
  ○ Holds water
  ○ Provides nutrients
• Microorganisms:
  ○ Bacteria and fungi break down organic matter and help plants get nutrients.
• Soil Biodiversity:
  ○ More living organisms = more resilient soil
	• Tillage:
	  ○ Breaks up soil but can lead to erosion
	• Fertilizer Use:
	  ○ Helps crops grow, but overuse harms microbes
	• Land Use:
	  ○ Deforestation and development remove protective cover

1. Which soil health factor do you think is most challenging to manage? Why?

   Answers will vary.

Name: _____

Part 2:

Directions:

In the table below, choose one soil health situation per category from the sort cards and write a two- or three-sentence explanation for why that situation is good or bad for overall soil health. Then answer the reflection questions.

PHYSICAL FACTORS	**CHEMICAL FACTORS**
Answers will vary.	Answers will vary.
BIOLOGICAL FACTORS	**HUMAN ACTIVITY FACTORS**
Answers will vary.	Answers will vary.

Reflection Questions:

1. Can improving one part of soil health (like adding nutrients) harm another part (like biological life)? How do you think we balance those needs?

   Answers will vary.

2. What are two ways that the physical, chemical and biological aspects of soil interact with one another?
   a. Answers will vary.

   b. Answers will vary.

3. What might happen to our food systems if soil health continues to decline globally?

   Answers will vary.

Name: _____

Aligned to the following standards:
CS.03; CS.04; CS.06; NRS.02; NRS.04; FFA.PL-A; FFA.PL-B; FFA.CS-M; FFA.CS-N; AG3; AG4; AG6; AG-NR2; AG-NR4; CCSS.ELA.SL.9-10.1; CCSS.ELA.RST.9-10.3; HS-LS2-7; HS-ESS3-4; CRP.02; CRP.04; CRP.05

KEY: Soil Doctor: Diagnose and Recommend

Directions:

Read over each of the scenarios below and discuss with your group what the problem is and how you would go about solving it. You may need to use additional research and resources to diagnose and make recommendations. Below are a few options you may consider (but are not limited to). Be ready to share your research and solutions in a class discussion.

- USDA Natural Resources Conservation Service (NRCS), Soil Health: https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health
- USDA NRCS, Soil Health Key Points: https://www.nrcs.usda.gov/sites/default/files/2022-12/soil-health-key-points.pdf
- Soil Health Institute, Resources Page: https://soilhealthinstitute.org/resources/
- Farmers.gov Soil Health Page: https://www.farmers.gov/conservation/soil-health

Scenario 1: Compacted Cornfield

A cornfield has been driven over repeatedly by heavy tractors after rainfall, compacting the topsoil. The farmer notices that water tends to pool on the surface after irrigation or rain, and crop roots are not growing very deep. Yields have dropped, and the plants appear stunted.

1. What is the main issue and the factors involved?
   Physical; compaction from heavy machinery; poor water infiltration and root growth

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

   Answers will vary.
   Potential solutions:
   - Reduce or eliminate tillage to prevent further compaction.
   - Use controlled traffic patterns or lighter equipment.
   - Plant cover crops (e.g., radish or rye) with deep roots to naturally break up compacted layers.
   - Add organic matter to improve soil structure over time.

Scenario 2: Over-Acidified Soil

A small vegetable farm has used ammonium-based synthetic fertilizers for many seasons. Soil tests now show that the pH has dropped below 5.5, and the farmer is beginning to see poor plant performance, especially in leafy greens. Some nutrients appear to be “locked up” and unavailable to plants.

1. What is the main issue and the factors involved?
   Chemical; low pH from repeated ammonium-based fertilizer use; nutrient lock-up

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

   Answers will vary.
   Potential solutions:
   - Apply agricultural lime (calcium carbonate) to raise soil pH into a neutral range.
   - Switch to a balanced or organic fertilizer program with fewer acidifying effects.
   - Use regular soil testing to monitor pH and nutrient availability.
   - Incorporate organic matter (compost, manures) to help buffer pH and build soil health.

Name: _____

Scenario 3: Depleted Organic Matter

A field used for hay has not had any organic inputs (like compost or cover crops) added in several years. The soil is visibly dry and crumbly, and the farmer notices fewer earthworms than before. Crops seem to require more watering than in the past.

1. What is the main issue and the factors involved?
   Biological; Lack of organic inputs; dry, crumbly soil and fewer organisms

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

   Answers will vary.
   Potential solutions:
   - Apply compost, manure or plant residues to replenish organic matter.
   - Introduce cover crops to add biomass and protect soil when not in production.
   - Reduce tillage to prevent further breakdown of remaining organic material.
   - Rotate crops to include legumes or high-biomass species that feed soil life.

Scenario 4: Overgrazed Pasture

A livestock pasture has been overgrazed during dry months, with very little grass left in many spots. The soil is bare in areas, and rainfall tends to run off quickly, taking topsoil with it.

1. What is the main issue and the factors involved?
   Human activity; land use, bare patches, erosion and poor water infiltration due to overgrazing

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

   Answers will vary.
   Potential solutions:
   - Implement rotational or managed grazing to allow plant recovery.
   - Reduce herd size or grazing pressure during drought conditions.
   - Reseed bare areas with pasture grasses or native species.
   - Use temporary fencing to protect recovering zones.
   - Add mulch or cover to reduce erosion risk while vegetation regrows.

Scenario 5: Salinity Buildup in Greenhouse Beds

In a high tunnel greenhouse, beds are irrigated frequently due to high temperatures. Over time, white crusts have appeared on the soil surface, and salt-sensitive crops are underperforming.

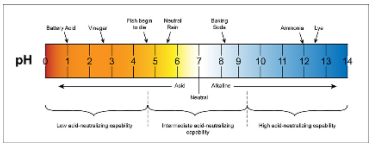
1. What is the main issue and the factors involved?
   Chemical, human activity; frequent irrigation leads to salt accumulation and stressed plants

2. What would be a realistic solution to improve soil health in this scenario? Be specific about actions or practices that could be implemented.

   Answers will vary.
   Potential solutions:
   - Leach salts from the root zone by applying deep, infrequent irrigation.
   - Improve drainage to allow salts to move away from roots.
   - Use filtered or lower-salinity water sources, if possible.
   - Apply organic matter to buffer salt effects and improve soil structure.
   - Consider switching to drip irrigation to reduce surface salt buildup.

Appendix 1: Soil Health Sort Cards

PHYSICAL FACTORS
CHEMICAL FACTORS
BIOLOGICAL FACTORS
HUMAN ACTIVITY FACTORS

Soil Texture • Ratio of sand, silt and clay • Affects how water moves and nutrients are stored 	**Soil Structure** • How particles group into aggregates • Better structure = better root growth and water movement 
Compaction • Caused by heavy machinery or animals • Reduces pore space, air flow and root growth 	**Water Retention** • Influenced by texture and organic matter • Too little = drought stress, too much = root rot 
pH • Ideal range is 6.5–7.5 • Outside that range, nutrients become unavailable. 	**Nutrient Availability** • Soil must provide nitrogen, phosphorus, potassium and micronutrients. 

Name: _____

Salinity

- High salt levels reduce water uptake by plants.

Organic Matter

- Improves structure
- Holds water
- Provides nutrients

Microorganisms

- Bacteria and fungi break down organic matter and help plants get nutrients.

Soil Biodiversity

- More living organisms = more resilient soil

Tillage

- Breaks up soil but can lead to erosion

Fertilizer Use

- Helps crops grow, but overuse harms microbes

Land Use

- Deforestation and development remove protective cover

Name: _____

KEY: Appendix 1: Soil Health Sort Cards

Soil Texture

PHYSICAL

- Ratio of sand, silt and clay
- Affects how water moves and nutrients are stored

Soil Structure

PHYSICAL

- How particles group into aggregates
- Better structure = better root growth and water movement

Compaction

PHYSICAL

- Caused by heavy machinery or animals
- Reduces pore space, air flow and root growth

Water Retention

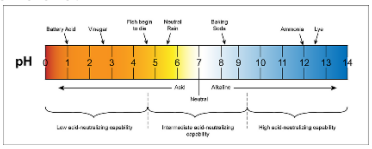
PHYSICAL

- Influenced by texture and organic matter
- Too little = drought stress, too much = root rot

pH

CHEMICAL

- Ideal range is 6.5–7.5
- Outside that range, nutrients become unavailable.



Nutrient Availability

CHEMICAL

- Soil must provide nitrogen, phosphorus, potassium and micronutrients.

Salinity

CHEMICAL

- High salt levels reduce water uptake by plants.

Organic Matter

BIOLOGICAL

- Improves structure
- Holds water
- Provides nutrients

Name: _____

Microorganisms

BIOLOGICAL

- Bacteria and fungi break down organic matter and help plants get nutrients.

Soil Biodiversity

BIOLOGICAL

- More living organisms = more resilient soil

Tillage

HUMAN ACTIVITY

- Breaks up soil but can lead to erosion

Fertilizer Use

HUMAN ACTIVITY

- Helps crops grow, but overuse harms microbes

Land Use

HUMAN ACTIVITY

- Deforestation and development remove protective cover

Name: _____

Appendix 2: Soil Health Situation Cards

Well-aggregated soil has lots of pore space.
Heavy clay holds water too long.
Tractor traffic makes soil hard.
Loamy soil allows easy drainage and root growth
Soil with more organic matter holds more water.
Plants can't absorb nutrients despite high fertilizer use.
White crust forms on soil surface, and plants wilt.
Over-fertilization harms soil microbes.
Adding compost boosted tomato growth.
Fungi helped roots absorb phosphorus.
Sterile soil lacks resilience during drought.
Soil smells earthy and is full of worms.
Soil is blowing away after plowing.
Runoff from lawns causes algae blooms.
Bare land after tree removal leads to flooding.
Switching to no-till increases organic matter.

Name: _____

KEY: Appendix 2: Soil Health Situation Cards

Well-aggregated soil has lots of pore space. PHYSICAL: SOIL STRUCTURE
Heavy clay holds water too long. PHYSICAL: TEXTURE, WATER RETENTION
Tractor traffic makes soil hard. PHYSICAL: COMPACTION
Loamy soil allows easy drainage and root growth PHYSICAL: TEXTURE, STRUCTURE
Soil with more organic matter holds more water. PHYSICAL: WATER RETENTION
Plants can't absorb nutrients despite high fertilizer use. CHEMICAL: pH
White crust forms on soil surface, and plants wilt. CHEMICAL: SALINITY
Over-fertilization harms soil microbes. CHEMICAL: NUTRIENT AVAILABILITY and BIOLOGICAL: MICROORGANISMS
Adding compost boosted tomato growth. BIOLOGICAL: ORGANIC MATTER
Fungi helped roots absorb phosphorus. BIOLOGICAL: MICROORGANISMS
Sterile soil lacks resilience during drought. BIOLOGICAL: BIODIVERSITY
Soil smells earthy and is full of worms. BIOLOGICAL: BIODIVERSITY
Soil is blowing away after plowing. HUMAN ACTIVITY: TILLAGE
Runoff from lawns causes algae blooms. HUMAN ACTIVITY: FERTILIZER USE
Bare land after tree removal leads to flooding. HUMAN ACTIVITY: LAND USE
Switching to no-till increases organic matter. HUMAN ACTIVITY: TILLAGE, LAND USE