

Michigan Farm Bureau Ag in the Classroom - Connections to Michigan Content Standards

5th GRADE LESSON – “Soil...It’s More Than Just Dirt” *Michigan Farm Bureau Promotion and Education Committee*

This lesson meets the following science content standards for the elementary level:

Content Standard 1: Construct New Scientific and Personal Knowledge

- 1-1: Generate reasonable questions about the world based on observation.
- 1-2: Develop solutions to unfamiliar problems through reasoning, observation and/or experiment.
- 1-6: Construct charts and graphs and prepare summaries of observations.

Content Standard 2: Reflect on the Nature, Adequacy and Connections Across Scientific Knowledge

- 1-1: Develop an awareness of the need for evidence in making decisions scientifically.
- 1-3: Describe ways in which technology is used in everyday life.
- 1-4: Develop an awareness of sensitivity to the natural world.

Content Standard 3: Use Scientific Knowledge from the Life Sciences in Real-World Contexts

- 5-4: Design systems that encourage growing of particular plants or animals.
- 5-5: Describe positive and negative effects of humans on the environment.

Content Standard 4: Use Scientific Knowledge from the Physical Sciences in Real-World Contexts

- 1-1: Classify common objects and substances according to observable attributes; color, size, shape, smell, hardness, texture, flexibility, length, weight, buoyancy, states of matter, or magnetic properties.
- 2-1: Describe common physical changes in matter - size, shape, melting, freezing, dissolving.

Content Standard 5: Use Scientific Knowledge from the Earth and Space Sciences in Real-World Contexts.

- 1-2: Recognize and describe different types of earth materials.
- 1-4: Describe natural changes in the earth's surface.
- 2-1: Describe how water exists on earth in three states.
- 2-2: Trace the path that rain water follows after it falls.

**OUTLINE FOR GRAND TRAVERSE PUBLIC SCHOOLS
5TH GRADE LESSON**

"Soil...It's More Than Just Dirt"

Presented by

Members of Michigan Farm Bureau

Materials/Actions

Time Allotted

Students cover desks
with newspaper

2 mins.

I. Introduce yourselves and show where you are from (map or hand)

10 mins.

II. Ask questions of students:

1. What is soil?
2. What color is it?
3. Are there different kinds of soil?
4. How do the kinds of soil differ?
5. Why do plants need soil

Sand, topsoil, clay,
eyedropper, pass out 1
teaspoon of sand,
topsoil, clay, and lab
sheet

10 mins.

III. Pass out various soil particles – sand, topsoil and clay.

Students make observations of each type using their senses (see lab sheet). Use eyedropper to wet the soil as instructed to each student. Place on towel or newspaper. Observe soils dry, then assistant moves around room to wet soils with an eyedropper of water.

Questions to ask:

1. How do the soils differ in color?
2. Do they feel different when they are dry?
3. What other materials do they feel like? (sugar, flour, powder, etc)
4. Can you make a ball with the soil when it is wet?
5. Which soils hold together best?

10 mins.

Pore space diagram,
colored water, clear
bottles with sand, clay,
gravel
(8 ½" x 11" pore
diagram is included – a
larger diagram is
available upon request)

Soil composition
diagram
(8 ½" x 11" is included
– a larger diagram is
available upon request)

IV. Leader sets up column containers of different soils and has a cup to measure colored water for each container.

After brief explanation (see below) of soil density and particle size, show pore space diagram and pore-spaces, students predict speed and ranking of water flowing through the soil (see lab sheet). Define permeability (ability of a liquid to move through a solid). One at a time, pour water into soil columns and time the distance traveled to bottom. Students observe results and record observations. Explain why water moved so slowly through clay, i.e. pore space. What does this mean for crops? Discuss glaciers role in soil formation.

EXPLANATION:

Soils are made up of many things. The soil you handled earlier contain organic matter (living and once-living materials), minerals, water, and air. The more closely the particles can be packed together, the denser the material is. Smaller particles pack closer to each other and allow less space for air and water. Glaciers melted leaving rocks and soil particles behind. The lighter particles were left on top leaving a well-drained soil.

V. Soil Composition Diagram

Discuss the makeup of the soil atmosphere. Plants need air, water, and soil for growth.

The ideal soil contains ½ mineral and organic particles, ¼ air and ¼ water. More or less of any of these limits the growth of the plants.

1 lab sheet/2 students
Pie plates (1/child), soil,
newspaper or towel,
pebbles, large cup for
presenter

5 mins.

Hold up pie pans – then
pass out

Pass out soil to each
group

Pass out stones and
towels

Pour water on “fields”

Hold up pie pans and
show runoff from
plain/control, contour
plowing, terracing, and
conservation tillage

VI. Soil Conservation “Pie”

Question: How do soils leave field? Through erosion, wind and water.

Farmers need the top layer of soil (topsoil) to grow crops. This layer has the most organic materials and nutrients (food for plants). There are many ways that farmers can help keep the soil in their fields. Today, we will have you model one way this happens. You and your partner will each have a field and a pond. We are only small farmers so they aren't very big. This (potpie) pan is your field and this one is your pond. It has been dry so your pond has no water.

Today we will compare three different methods of keeping soil in the fields. They are contour plowing, terracing and conservation tillage. We will also leave some fields plain; this is our “control” – what we compare the others to.

As I walk around I will tell you which method to use. If I say plain – simply pat the soil into the pan and leave it smooth.

If I say contour plowing – make a ditch across your field with your finger.

If I say terracing – build a wall with stones across your field.

If I say conservation tillage – tear paper towel into strips and lay on top of the soil.

Now, predict what will happen – use your lab sheet.

Now it will rain on your field. We will come around with water and pour it on the top of your hill (tip the pie pan up with the bottom edge at your pond). Collect the “runoff” in your pond. When everyone is done, compare your water with everyone else. What method kept the most soil in the field? Which pan absorbed the most water? What do these results mean to us? (If we keep material on our fields or slow down the water as it moves across, we lose less soil).

Crop examples

3 mins.

VII. Describe how different plants need different soils to grow well.

Give examples (i.e. cherries need well-drained, sandy soils; grass grows best on dark soils, crops such as corn and beans need to hold moisture during dry periods, etc.). Show examples if available. (commodity list attached)

VIII. Explain. Because certain crops can grow only on specific kinds of soil, it is important to keep good agricultural soils available for farming.

This can lead to conflicts with developers or homeowners. When there are limited amounts of any resource or material, there are often conflicts about how it is used. Land can usually be used for only one purpose. If we cover it with concrete, we can't grow crops on it. Also, lots of people like to live in the country and so more and more houses are built on farmland. We don't want to stop everyone from building on all farmland, but we want you to understand that it is a limited resource. This demonstration will help you understand.

Apple, knife
Land use script

5 mins.

IX. Apple – Land Use Demonstration (attached)

Procedure:

1. Cut a large apple into four equal parts. Three-fourths of the apple represents the oceans that cover our planet. The remaining quarter piece represents the land area.
2. Next cut the land section in half lengthwise, making two 1/8 sections. One represents the deserts, swamps, mountains, Arctic and Antarctic regions. The remaining 1/8 section of apple symbolizes the land where people can live and may be able to grow food.
3. Cut the remaining 1/8 section into four pieces. Three of those pieces represent land that is too rocky, too wet, or too hot to grow food or that has been developed by people.
4. Finally, peel the last small piece of apple – 1/32 of the world. This tiny peel represents the soil, which we all depend on for food production.

Question: Is land a resource to be managed, or a commodity to be bought and sold?

2 mins.

X. Summarize what was done and emphasize how soil is more than just dirt.

Today we have shown you several different types of soils and how they differ. We have watched water move through different soils and practiced protecting soil from erosion. We've also demonstrated how little useable soil we have. We hope that you now have a better understanding of soils and why they are important to all of us. Thank you for letting us spend this time with you.

(Thank them for their attention and if you have additional handout materials, explain how this will be handled (given out now or at the end of the day – depending on teacher's discretion)).

SOIL...IT'S MORE THAN JUST DIRT!

5^h Grade

Lab Sheet

1. Obtain samples of the four types of soil. Using your senses, respond to the following questions and record your observations on the chart below:

	WHAT DOES IT LOOK LIKE?	WHAT DOES IT FEEL LIKE? (WHEN DRY)	WHAT DOES IT FEEL LIKE? (WHEN WET)
Sand			
Loam			
Clay			

2. For the soil permeability activity, record your data below.

MATERIAL	PREDICTED TIME	PREDICTED RANK	ACTUAL TIME	ACTUAL RANK

3. Why is soil texture/permeability important?



SOIL CONSERVATION PIE
5th Grade
Lab Sheet

1. Which option will keep the water the most clean and why?
(rank these in order with 1 being the cleanest)

- | | | |
|-------|-----------------------------------|------------|
| _____ | A. Bare soil | Why? _____ |
| _____ | B. Soil with pebbles/terraces | Why? _____ |
| _____ | C. Soil with contours | Why? _____ |
| _____ | D. Soil with a cropcover (towels) | Why? _____ |

2. Write one sentence explaining the results of your conservation pie.

3. Which pie had the least amount of soil and why?

APPLE LAND USE DEMONSTRATION

Procedure:

1. Cut a large apple into four equal parts. Three-fourths of the apple represents the oceans that cover our planet. The remaining quarter piece represents the land area.
2. Next, cut the land section in half lengthwise, making two $1/8$ sections. One represents the deserts, swamps, mountains, Arctic, and Antarctic regions. The remaining $1/8$ section of apple symbolizes the land where people can live and may be able to grow food.
3. Cut the remaining $1/8$ section into four pieces. Three of those pieces represent land that is too rocky, too wet, or too hot to grow food or that has been developed by people.
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LIST OF MICHIGAN GROWN COMMODITIES

This list is a partial representation of the more than 70 commercial agricultural products grown on Michigan farms. Most crops require well drained soils. Exceptions include blueberries, cranberries, and spearmint. All of which require organic soils and more moisture than other crops.

There is a minimal amount of waste in the processing of crops and livestock for consumption. Livestock is a good example of this. Bones and hooves from animals are used in piano keys, adhesive tape, collagen cold cream, bone china, photographic film and other products. Organs such as intestines are used for sausage casings, instrument strings, and surgical sutures. Unusable parts are composted and become organic matter that can be safely returned to the soil.

Fruits/Vegetables

snap beans	potatoes
sweet corn	asparagus
blueberries	carrots
cranberries	grapes
apples	tomatoes
cherries	mushrooms
plums	peppers
apricots	pears
broccoli	strawberries
cauliflower	onions
squash	cantaloupes
cucumbers	celery
raspberries/blackberries	

Field Crops

dry beans
soybeans
corn
wheat and grains
sugar beets
mint
hay
oats
rye
barley

Nursery/Floriculture

gladioli
all potted plants (geraniums, poinsettias, other)
bedding plants
hanging baskets
turf
trees and shrubs
cut flowers (roses, mums, other)
dried flowers

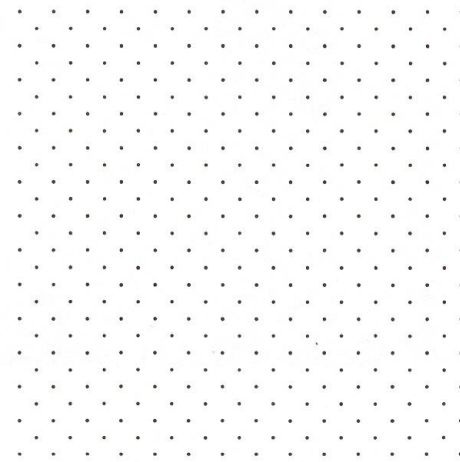
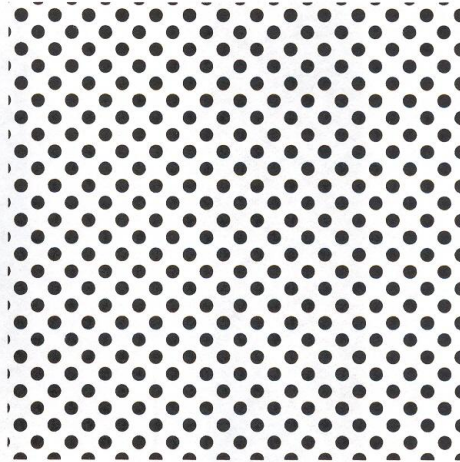
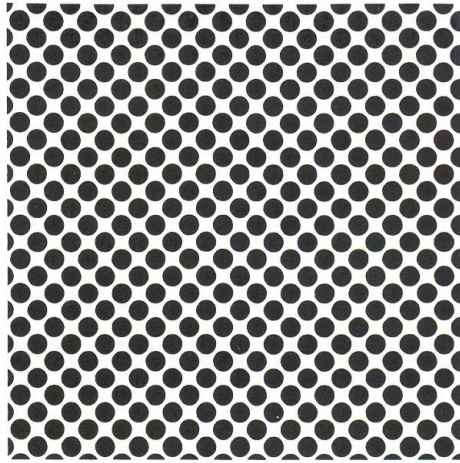
Trees

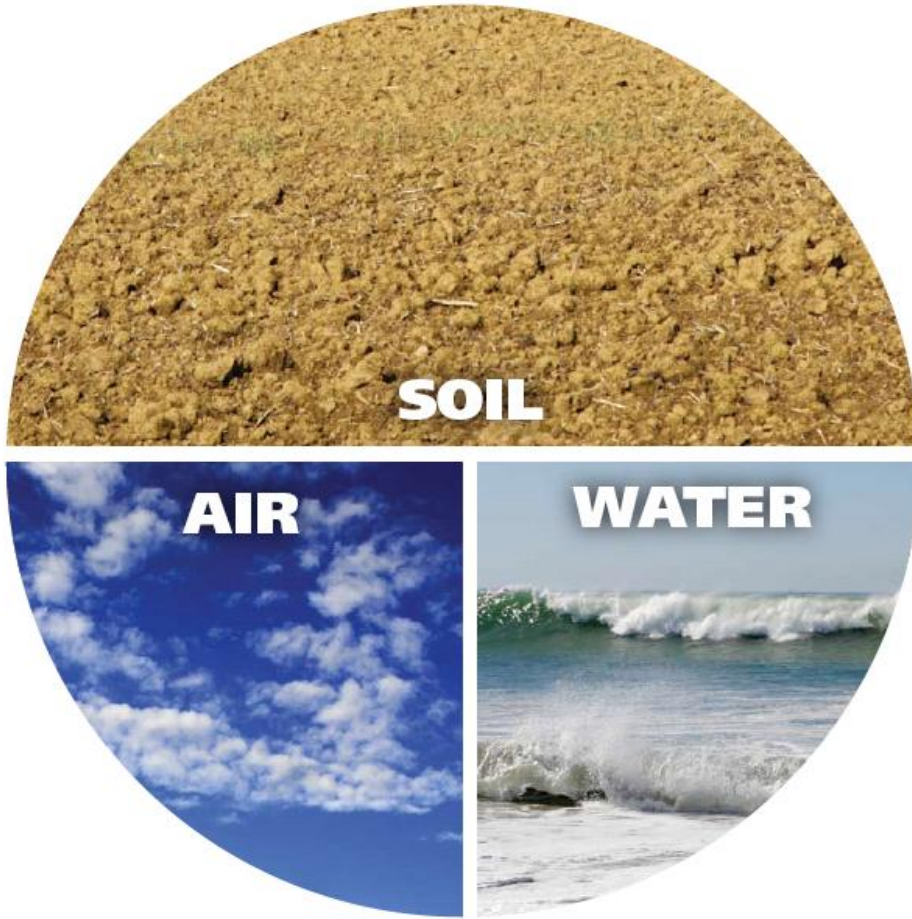
maple syrup
Christmas trees
forestry (paper, lumber, other)

Poultry/Livestock/Dairy/Fiber

hogs
sheep/lambs
beef cattle
dairy cows
poultry
aquaculture (fish)
mink
mohair
wool
milk and dairy products (butter, ice cream, etc.)
eggs
chicken/turkey
veal calves
llama
ostrich
emu







“Soil...It’s More Than Just Dirt” 5th Grade Kit Packing List

Based on 35 students per class

This list will complete a kit designed for conducting 2 presentations

- Michigan Map (outline included)
- 70 Small pie plates (1 per child)
- Mixed loam soil
- Water
- 18 Nut cups - 4 per group
- Sand
- Silt
- Clay
- Loam
- Graduated cylinders (you need clear column containers that stand up or have a base)
 Available to purchase from Lab Aids – call (516) 737-1133 or Fax (516) 737-1286
 Order: Clear profile tubes (4 tubes per set) catalog # FV-CFTX4
 Profile tube bases, plastic (4 tubes per set) catalog # FV-FTBX4
- Crop samples for section #VII (cherries, corn beans etc.)
- Soil
- 2 large apple - 1 per class
- Leaves or grass
- Newspaper
- Pebbles
- Measuring cup
- Sprinkling can
- 70 data sheets
- Sharp knife to cut apple
- Plastic cups for water
- 4-5 eyedroppers (to wet soil)