

**Until Next Time,  
Soil Scientists!**

# My Soil Safari Guidebook



**NAME:** \_\_\_\_\_

**DATE:** \_\_\_\_\_



# Soil Field Tests

No matter where you go, soil is made of three crucial ingredients:

- Clay, which strengthens the structure of the soil.
- Sand, which makes the soil porous so that water drains easily.
- Silt, a mineral which helps the soil to hold nutrients more easily.

Every soil on Earth has these three ingredients in different quantities, and the best soils for growing plants have a good balance of clay, sand, and silt—sandy loam is great for holding onto a good combination of water and nutrients. But how can we figure out how much of each is present in our soil? For that, we need to turn to a soil ID chart.

### The Activity

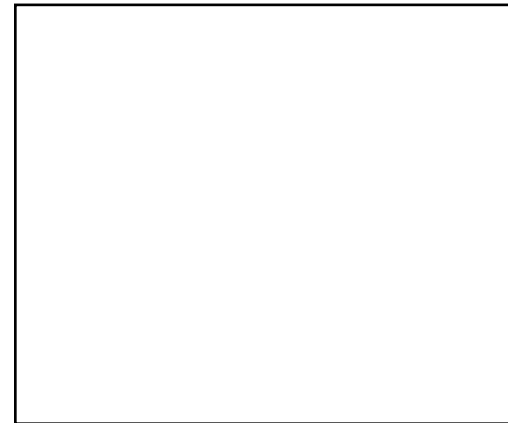
At this first stop in our safari, there are four different containers holding four different types of soil. It is your job to sample each of the four soils with your team and use the chart on the next page to identify the type. Good luck, young soil scientist!

	My Results	Actual Soil Type
Soil 1:		
Soil 2:		
Soil 3:		
Soil 4:		



# A More Diverse Community

In this activity, you'll learn about two different ways that farmers plant their crops. Starting out, use the space below to sketch out what comes to mind when you think of a farm. Ignore the bullet points for now.



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- 
- 

What type of farm is this? \_\_\_\_\_

Use the space below to sketch out what a farm *should* look like in order to keep the soil healthy. In the space next to **both pictures**, write a couple bullets about the positives/negatives for these types of farming.



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- 
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What type of farm is this? \_\_\_\_\_



# We Just Don't Have Chemistry

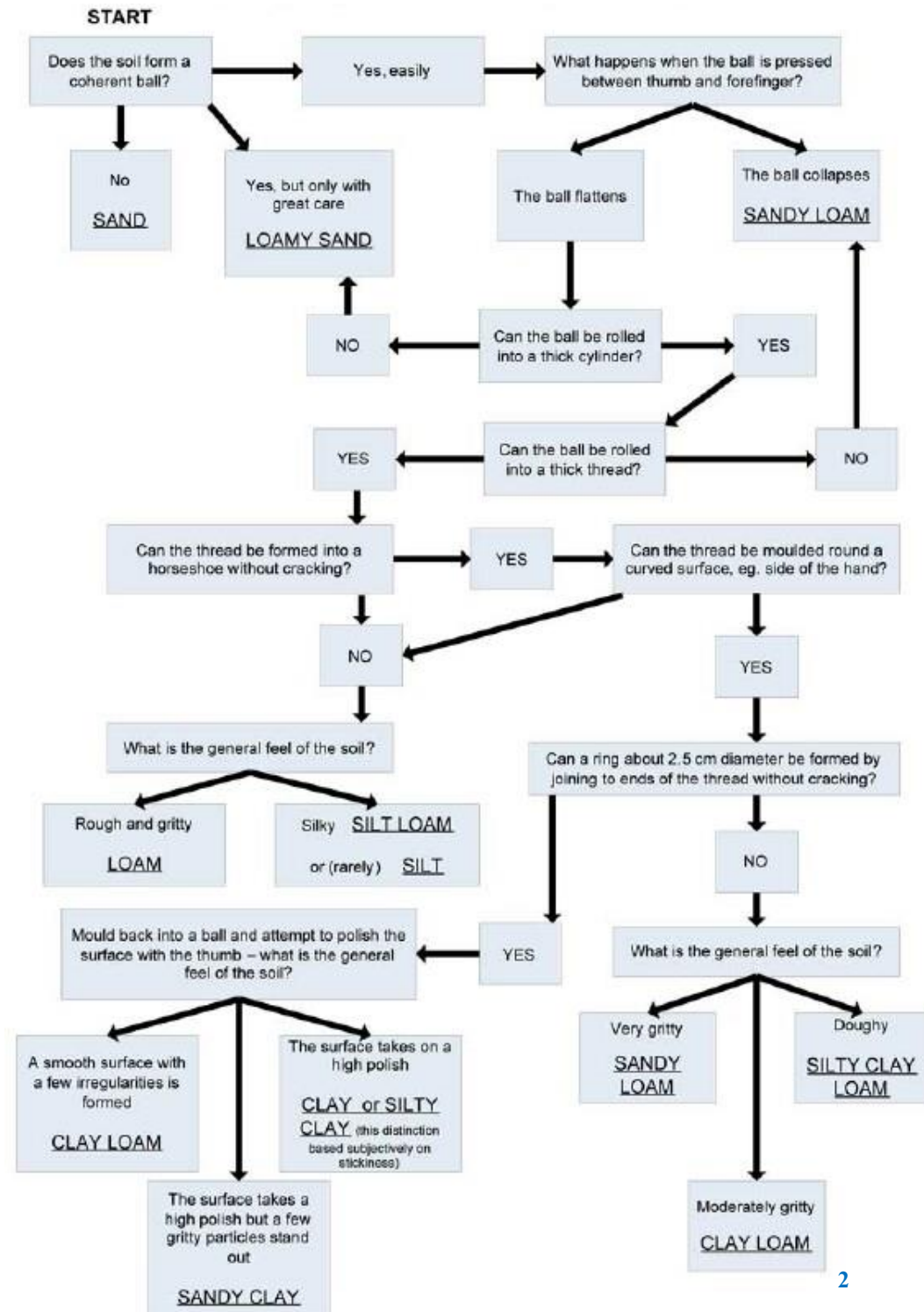
Unfortunately, water, wind, and tractor treads aren't the only things that can do away with nutrient-rich topsoil; chemicals can do it just as effectively. We can easily damage soil with harmful herbicides like glyphosate, which hurt the root systems of plants before moving onto the water table and eventually polluting freshwater lakes and rivers all throughout the area.

## The Activity

During this safari stop, you'll be running a soil erosion simulation of your own! Using vinegar (a weak acid sometimes used to kill weeds), you'll be observing how easily a chemical can make its way through multiple layers of materials and into the water table. Sketch out your observations below.

Draw what you observed happen when you put the vinegar onto the sugar cube.

Draw what this would look like with a strong herbicide in actual soil. Make sure to include the water table.





# Feeding Our Soil Right

There are two main types of fertilizer used to feed plants: organic and inorganic fertilizer. Use the blank Venn diagram provided to your group to sort the following items' letters into one of the three categories (organic, inorganic, or both). After we go over them as a class, rewrite the correctly sorted letters in your safari guide's personal Venn diagram on the next page.

- (A) Made of Manure, Leaves, and Compost
- (B) Delivers nutrients to plants all at once, giving them what they need much more quickly.
- (C) The Benefits:
  - Plants grow much more quickly
  - Plants don't need to wait for nutrients to arrive gradually
- (D) Encourages Plant Growth
- (E) More Expensive
- (F) Made of Natural Gas, Oil, and Minerals from Mines
- (G) Contains Nitrogen (N), Phosphorus (P), and Potassium (K)
- (H) Delivers nutrients to plants gradually, and only when the soil is warm and moist
- (I) The Costs:
  - Plants get their nutrients less quickly
  - Plants grow at a slower, more regular rate
- (J) The Costs:
  - More nutrients are in the soil than plants can use
  - Excess nutrients 'burn' plant roots
  - Groundwater, rivers, and lakes become polluted
  - The soil becomes more toxic and supports fewer living things
- (K) The Benefits:
  - Soil holds water more easily
  - Soil doesn't erode as much
  - Temperature in soil stays more constant
  - Increase in soil nutrients
- (L) Much Cheaper

## The Experiment

In front of you are five two-liter bottles, each cut in half and representing a different type of soil. Some have extra protections to keep the topsoil from eroding, while others are more likely to be washed away by rain. One by one, these soils will be tested to see how well they can stand up to the elements. In your teams, rank how well you think each soil bottle will fare. Then, record your observations based on how much actually washed away! Once you're done, return to the 'Real-World Stuff' section on the previous page and make a note of some of the ways that we prevent erosion in modern-day organic farms. How do they compare to your team's ideas?

	My Hypothesized Ranking	My Observed Ranking
Bottle 1		
Bottle 2		
Bottle 3		
Bottle 4		
Bottle 5		



## Save Our Soil!

One of the biggest threats to soil is erosion, when the nutrient-rich topsoil is taken away by wind, water, or artificial means (i.e. tractors). Luckily, you're here to do something about it!

### The Activity

You are a group of elite soil scientists, or pedologists. You've been hired to think of ways to prevent erosion in a brand-new organic farm. You have three minutes to brainstorm a list of ways to prevent erosion, taking notes in the space below. Afterward, you'll share ideas and hear those of your colleagues in other teams! Feel free to write their ideas down as well—after all, science is all about working together to learn more about the world around us. Leave the second section until later.

### Your Ideas

### Real-World Stuff

