



Soil Separation Experiment

What: Soil Separation

Level: 3 to 12

Time: 8-10 minutes

Learning about soil does not have to be boring! This quick and easy soil separation experiment will keep your students engaged in your science lessons. The Soil Separation Activity is a part of the *Nourishing the Planet in the 21st Century* curriculum, Lesson 2: Properties of Soil.

As part of the second lesson, Properties of Soil, students learn that different soils have different characteristics by examining soil types that have been mixed with water to settle. Observing how some soils separate in the water, and how some do not, allows students to identify the differences between different soil types.

Materials needed for the experiment:

- 3 clear, 12-oz. plastic bottles
- 10 oz. each of potting soil, local soil, and sand
- Water
- Funnel (optional)

Fill about two-thirds of each 12-oz plastic bottle full of soil. Place potting soil, local soil and sand in separate bottles. (A funnel or a paper cone may make it easier to get the soil in the bottles.) Add water to near the top of each bottle. Place caps in the bottles, shake the contents well, and place the bottles in a location where they will not be disturbed. Prepare at least one day before making observations.

During the class time activity, keep the identity of each of the soils in the bottles a secret. Allow students to record their own observations and make hypotheses. This is what they should observe:

- The potting soil will show a thick layer of dark material on the bottom, a thick layer of cloudy water, and a thinner layer of material on the top.
- Local soils may differ, but a typical soil will show layering similar to potting soil, though there may be less material floating on the surface.
- Most of the sand will form a very thick layer on the bottom of the container. There will be a thick layer of clear water and a very thin layer of material on the surface.

Soil Test Report

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SAMPLE HISTORY

Sample ID	Field ID	LAST CROP		LAST LIME APPLICATION		SOIL INFORMATION				
		Name	Yield	Months Prev.	Tons/Acre	SMU-1 %	SMU-2 %	SMU-3 %	Yield Estimate	Productivity Group
					None applied.					

LAB TEST RESULTS (see Note 1)

Analysis	P (lb/A)	K (lb/A)	Ca (lb/A)	Mg (lb/A)	Zn (ppm)	Mn (ppm)	Cu (ppm)	Fe (ppm)	B (ppm)	S.Salts (ppm)
Result	202	97	2728	259	66.1	14.0	0.9	19.3	0.3	
Rating	VH	M-	VH	VH	SUFF	SUFF	SUFF	SUFF	SUFF	

Analysis	Soil pH	Buffer Index	Est.-CEC (meq/100g)	Acidity (%)	Base Sat. (%)	Ca Sat. (%)	Mg Sat. (%)	K Sat. (%)	Organic Matter (%)
Result	5.5	6.11	9.7	17.7	82.3	70.0	11.0	1.3	

FERTILIZER AND LIMESTONE RECOMMENDATIONS

Crop: LAWN MAINTENANCE - BERMUDA, ZOYSIA (204)

612. LIME RECOMMENDATIONS: Apply 100 pounds of agricultural limestone (ground, pulverized or pelletized) per 1000 square feet in several small applications of up to 50 lbs each, at intervals of 1 to 6 months, until the full amount is applied.

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208. FERTILIZER RECOMMENDATIONS: Use any complete "turf-type" fertilizer according to the instructions in the enclosed note on lawn fertilization. (A "turf-type" fertilizer is typically high in nitrogen, and low in phosphorus and potassium, e.g., 25-3-7.)



Soil Testing

A quality soil sample is essential for optimum plant health and growth. Whether on a large scale farming operation or a backyard garden, these tests can give you valuable information about the land and help you keep plants healthy and harvests bountiful. Soil tests provide information on nutrients in your soil from Aluminum to Zinc, not to mention providing measurements of organic matter, soil pH, microbial activity, and even nematodes present in your soil. Why is there such an emphasis on these tests? Master Gardner's Professor-in-Charge at Iowa State University, Cindy Haynes states, "It is important to do a soil test before starting a garden, because it tells you what you need and just as important what you don't need. Taking soil samples are always recommended." Many plants are capable of growing in different areas of the country; however, they thrive in areas where their basic growth requirements are met. Soil and climate weather are the two main determiners of plant's success. Although we cannot control the weather, we can improve our soil. Furthermore, an accurate soil sample is essential for responsible and effective fertilizer application. A plant will show signs of stress when they are deficient in nutrients. Some plants will have yellow leaves, or produce few blooms and fruit. It is best practice to have soil tests done before starting a new garden, but is also a great way to get answers to existing problems. The sample results will let you know what type of fertilizer best fits the needs of your garden and lawn.

Determine the sample area dependent on soil types and topography. Smaller gardens without much variance only require a sample of soil from one area. Larger gardens or lawn or an area with significant differences should have multiple samples from different points of the area. Depending on the size of the area, a soil probe or any other device you can extract a shallow core sample from the ground, such as a shovel, will allow a 10 – 15 shallow (6" deep) soil core samples throughout your test area(s). Put each sample into a paper sack and mix with the previous samples from that area. It is a best practice to perform a soil test on a yearly basis. Keep track of the approximate area where the cores were harvested so you can in the future and track significant changes from a consistent area. Next, send the sample to a testing lab. Many

local universities, state commissions, local extension agronomist, farmers' co-ops and possibly your local feed store can provide a helpful analysis.

At first glance, the result from a soil test can look overwhelming. Luckily, most soil tests arrive with specific recommendations and general directions for which fertilizer to apply to bring your soil to optimal standards. Iowa State University Regional Field Agronomist, Mark Carlton adds "With input cost continuing to increase, no fertilizer decision should be made without a good current soil test." The information from the soil test allows you to make these decisions easily. The results will come in the number form of ppm (parts per million), or some nutrients will be shown as percent base saturation. If the results of the soil test show that Nitrogen (N) is only at 12 the recommendation would state that N should be applied and at what rate. Sufficient N for most plants would be over 40. Keep in mind not all plants thrive in the general optimal standards, for instance, azalea bushes prefer slightly more acidic soil (between 4.5 and 6.0). The hydrangea plant is unique and will show what is in the soil through the color of its bloom. If the pH level is 6.0-6.2 the plant will bloom pink. The hydrangea will have a blue bloom when the pH is level is 5.0-5.2. The intensity of the color would depend on where the pH level is. It is a good idea to research the plants in your garden and familiarize yourself with their soil requirements. Knowing your soil and your plants will give you optimal results. Once again, if you have any questions with this process contact your local garden store or local extension agronomist for assistance.

A soil test is a valuable tool, especially when used on a yearly basis. Get the most out of your garden by making informed decisions about fertilizer application. Finally, do not wait until a visual sign of stress in your garden before seeking a solution. Do your soil a favor and get a soil test to guarantee the best success in 2012 and beyond!