

LEARNING ACTIVITY:

Soil, Plants, and the Energy Cycle

Grade Level: 9-12

Soils are critical for many aspects of our daily life. They provide food such as grains, vegetables, and animal feed. They provide fiber for clothing, as in cotton, flax-linen, and hemp. And they provide shelter materials like wood and brick. But did you realize that soils also are an important part of the energy cycle? Soils sequester carbon dioxide (CO₂) from energy used by plants. Plant materials—such as residues, oils, and grains—grown from soil can be used to produce ethanol or biodiesel for energy.

CO₂ sequestration is the removal of CO₂ from the atmosphere into plants as biomass and soils as organic and inorganic carbon. Sequestration can be maximized by land management practices (BMPs). There are BMPs that increase sequestration rate, increase carbon storage capacity, and minimize carbon loss from soil disturbance. Successful BMPs include grassland restoration, wetland restoration, and conservation tillage.

Conservation tillage lets cropland become a net carbon sink (the rate at which carbon is stored is higher than the rate at which it is released) with improved water and nutrient use. Soil tillage breaks down soil organic carbon (SOC), exposing it to oxygen and releasing stored SOC back to the atmosphere as CO₂.

Perennials, high-residue crops, and legumes sequester carbon. Perennial grasses and perennial forage legumes can be harvested multiple times and re-grow without being replanted. The root

system acts as a large carbon sink. Annual high-residue crops like corn and wheat also sequester carbon, as do grazing lands.

Plant materials can also be used to produce bio-fuel. Land needed to supply fuel depends on the soils and the fuel formulation.

Soil differences can be observed by recording the amount of plant biomass produced. If you walk across your lawn, are there spots where the grass is thick and other spots where it is thin and you can see bare soil?

Similar to lawns, there are fields of corn, wheat and pasture that have large spots (acres) where biomass is thick and other large spots (acres) where it is thin. The difference is usually due to differences in soil fertility (the relative ability of a soil to supply the nutrients essential to plant growth).

Materials

- Computer with Internet access
- Printer, paper
- Pen or pencil



Procedure

1. Find detailed instructions and the Land Bio-fuel spreadsheet needed to do calculations at www.soils.org/lessons.
2. Do the activity. As bio-fuel is one of the options we have for fuel, determine how much bio-fuel can be produced by different plants.
3. Discuss: What kind and how much bio-mass can be produced in an area around your city or town? How many gallons of fuel can be expected from one acre of crop land? How much carbon can be sequestered in the local area?



Soil Science Society
of America

Source: Soil Science Society of America.
Adapted with permission.

SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

			1	2	3 Happy Birthday! James Hutton, Scottish Geologist, "Father" of Modern Geology, Born 1726	4
5	6 June 6-11, 2011: Geoscience Event: Trilateral Meeting/47th Annual Meeting, Clay Minerals Society/Spanish Clay Society/Clay Science Society of Japan, Madrid and Seville, Spain	7	8	9	10	11
12 Did You Know? Big Bend National Park, Featuring Fossilized Skeleton of Quetzalcoatlus, Largest Winged Animal, Established 1944	13	14 Flag Day	15 Did You Know? The Philippines' Mount Pinatubo Erupts in Second-Largest Volcanic Eruption of 20th Century, 1991	16	17	18
19 Did You Know? U.S. Viking 1 Becomes First Spacecraft to Land Safely On Mars, 1976 Juneteenth Father's Day	20	21 Summer Solstice	22	23	24	25
26	27	28	29	30		

