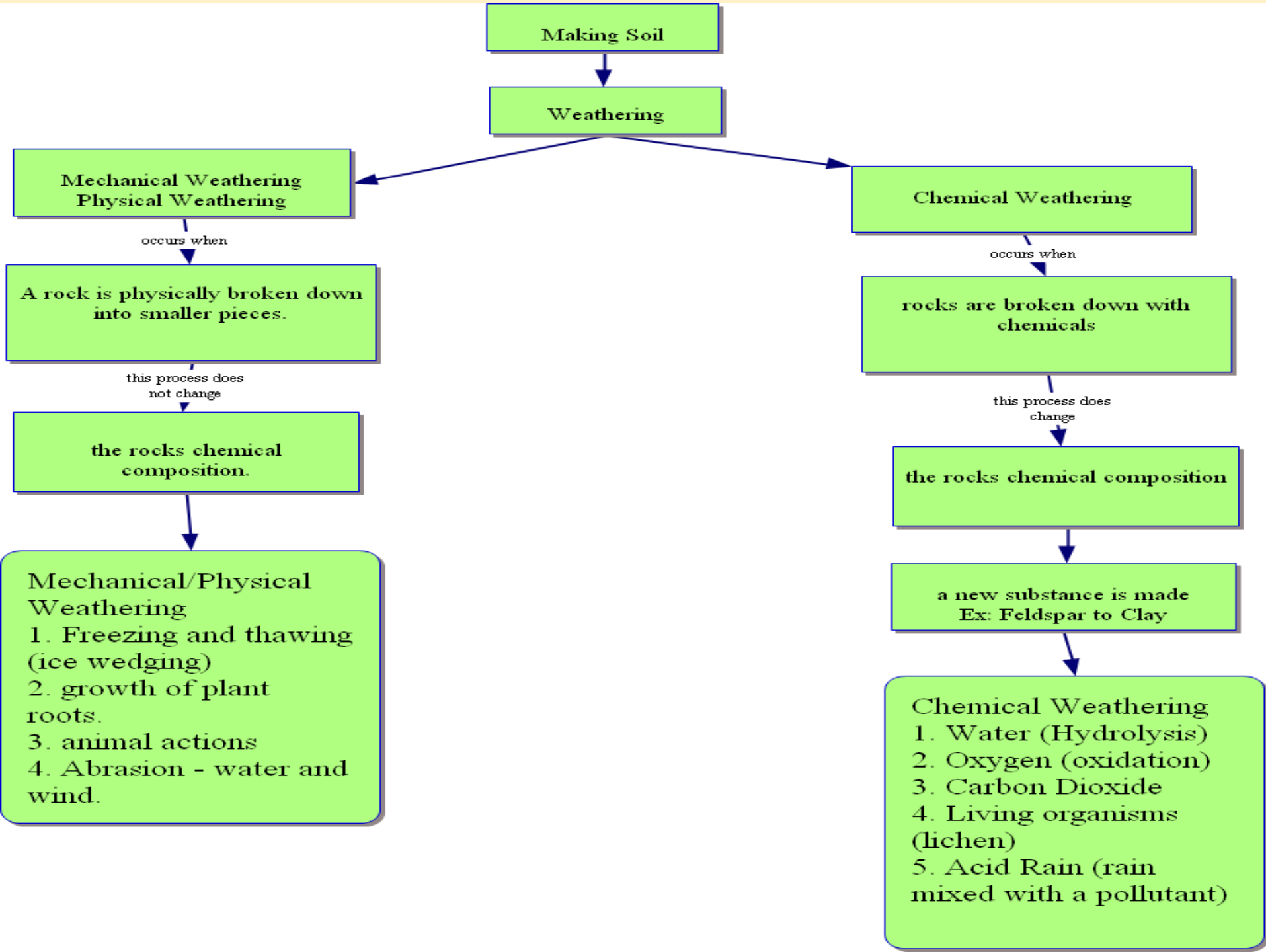
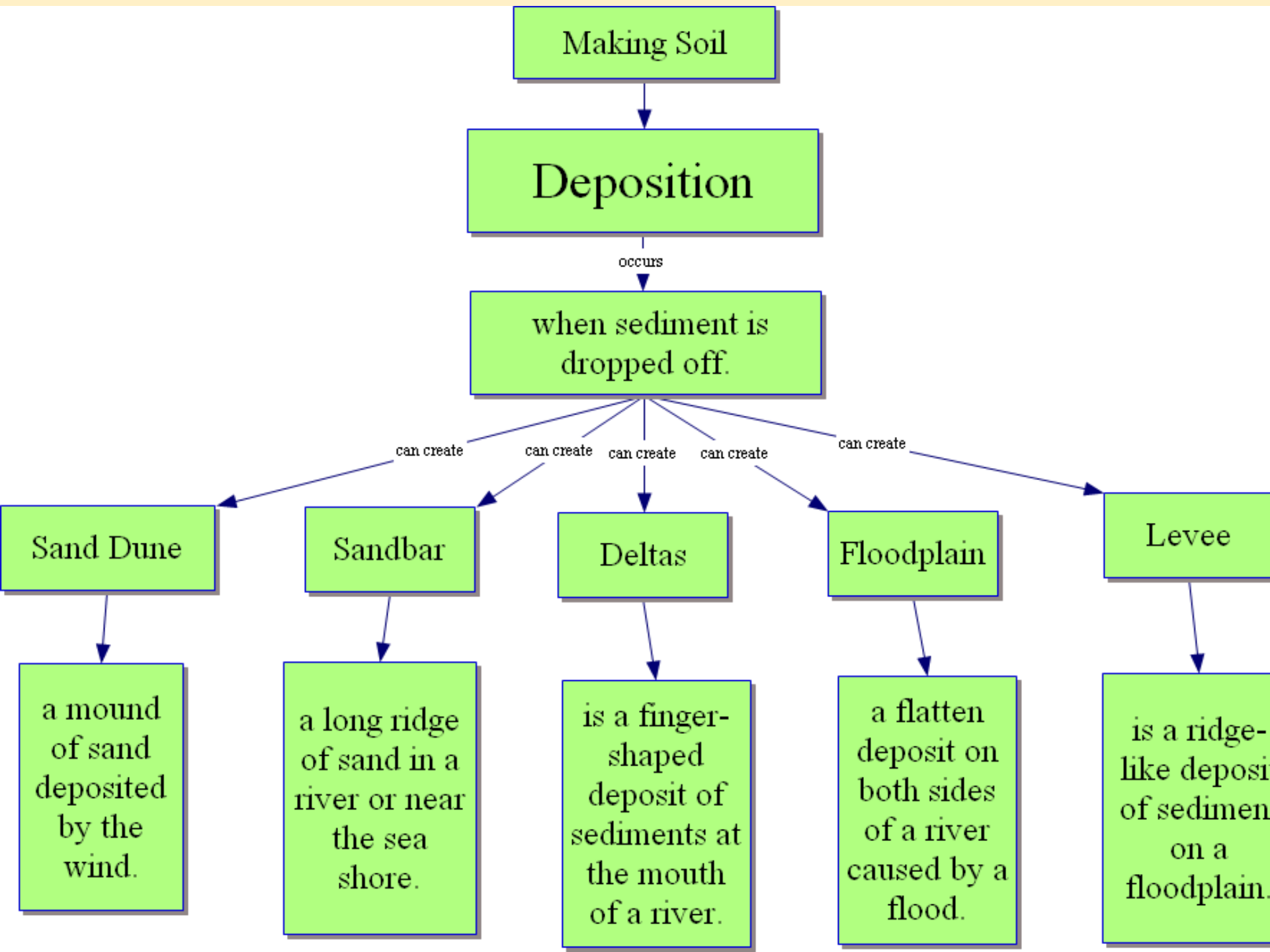


FROM BEDROCK TO SOIL

✘ Soil and Soil Conservation





WHAT IS SOIL?

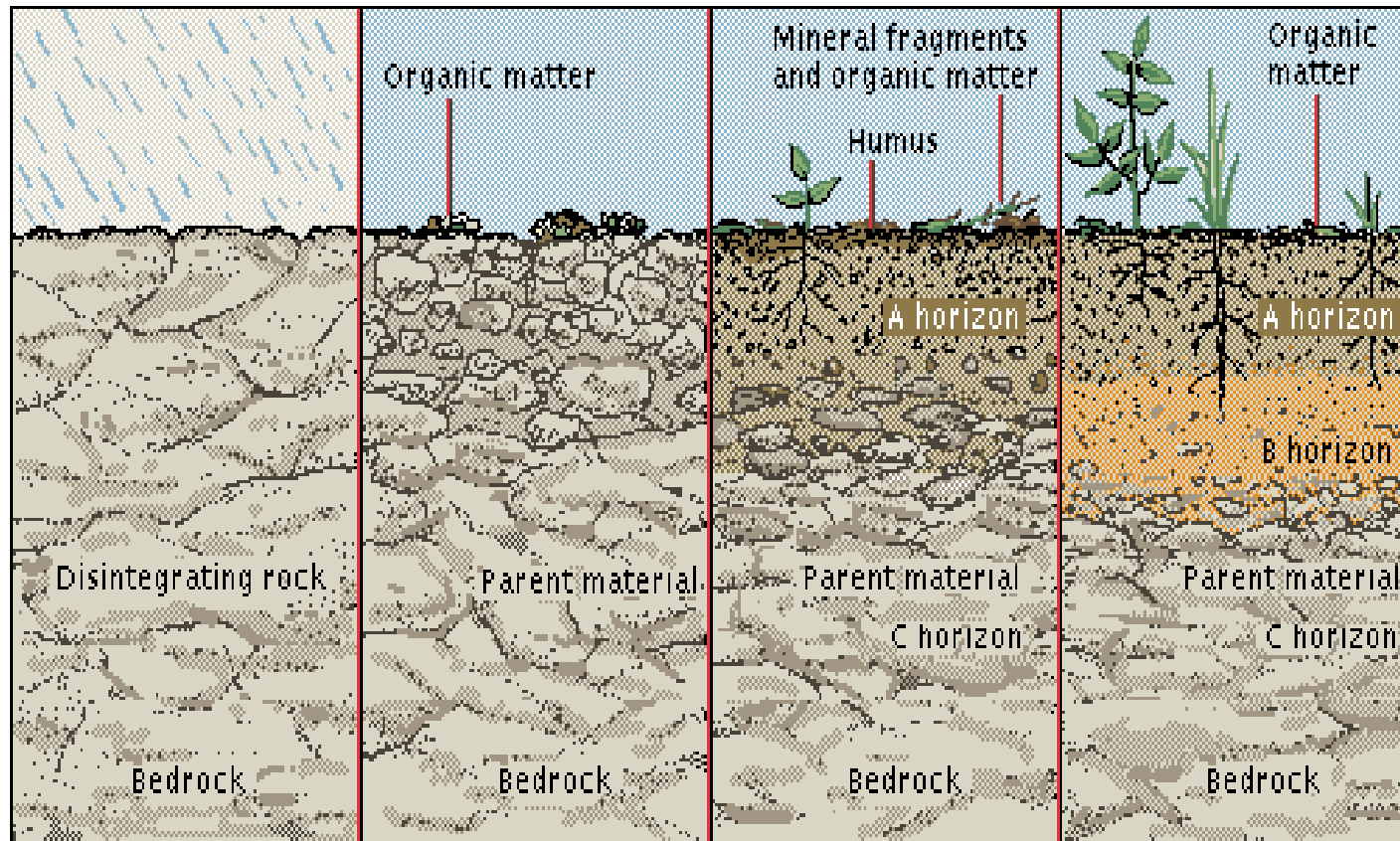
✘ Soil is made up of weathered rock and decayed parts of plants and animals (organic material), mineral fragments, water, and air that can support the growth of vegetation.

HOW IS SOIL FORMED?

- ✘ The type of soil that forms depends on the type of rock that weathers.
- ✘ The parent rock is the rock formation that is the source of mineral fragments in the soil.
- ✘ Bedrock is the layer of rock beneath soil.

- ✘ Soil that remains above its parent rock is called residual soil.
- ✘ Soil can be blown or washed away from its parent rock. This soil is called transported soil.
- ✘ Both wind and the movement of glaciers are also responsible for transporting soil.

SOIL FORMATION



Bedrock begins to disintegrate

I

Organic materials facilitate disintegration

II

Horizons form

III

Developed soil supports thick vegetation

IV

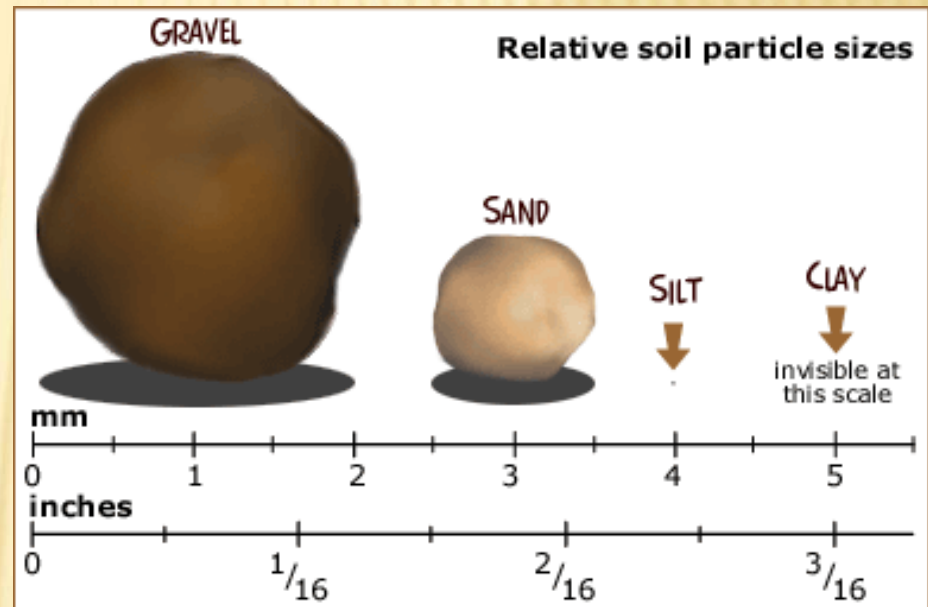
PROPERTIES OF SOIL

- ✘ Some soils are capable of supporting plant life, whereas other soils are not.

- ✘ There are three properties of soil:
 - + 1. Soil texture
 - + 2. Soil structure
 - + 3. Soil fertility

SOIL TEXTURE

- ✘ Soil is made of different sized particles.
- ✘ **Soil Texture** is the soil quality that is based on the proportions of soil particles such as sand, silt, clay, etc...

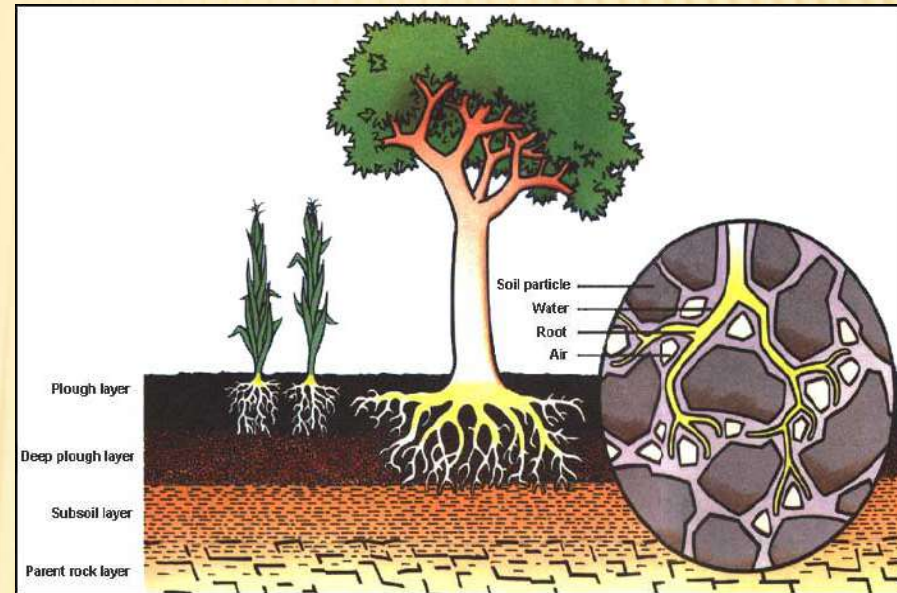


SOIL TEXTURE (CONTINUED)



- ✘ Soil texture affects the soil's consistency, or a soil's ability to be worked and broken up for farming (ex. a large amount of clay can be hard for farmers to break up).

- ✘ Soil texture influences the infiltration, or ability of water to move through soil.
- ✘ The rate at which water and air move through soil is called permeability/ porosity
- ✘ Soil should allow water to get to the plants' roots without causing the soil to be completely saturated.



SOIL STRUCTURE

- ✘ Water and air movement through soil is also influenced by soil structure.
- ✘ Soil structure is the arrangement of soil particles (clumps or evenly spread out particles).



SOIL STRUCTURE

O-horizon: leaf litter, organic material

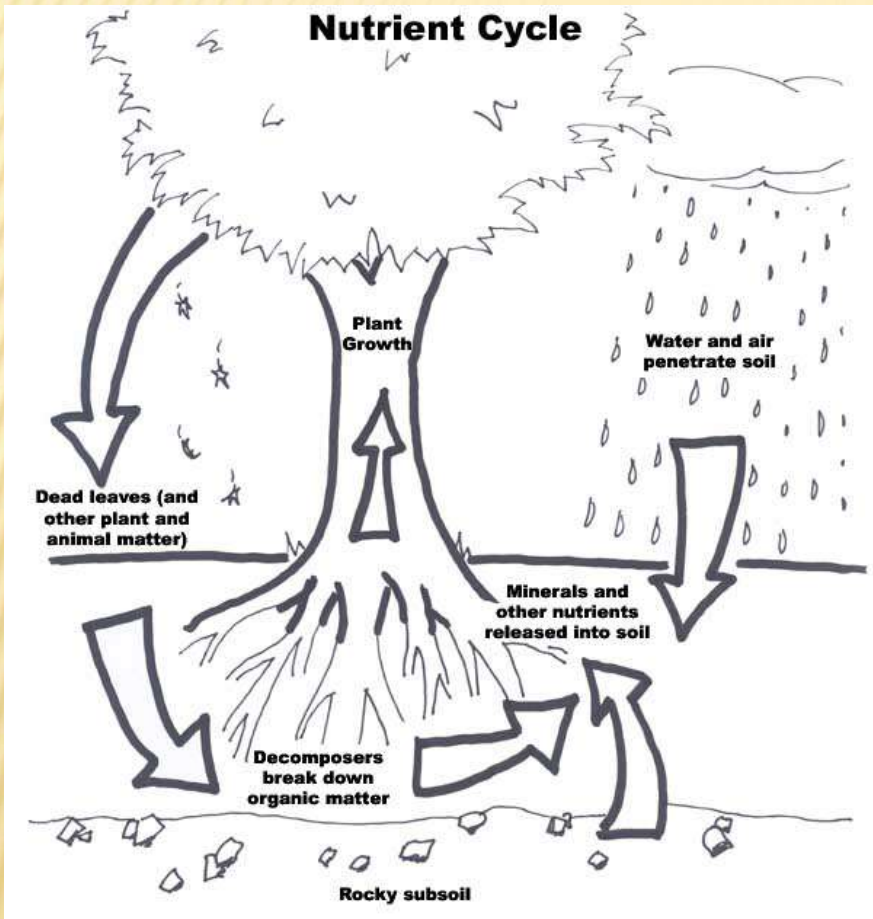
A-horizon: plough zone, rich in organic matter

B-horizon: zone of accumulation

C-horizon: weathering soil; little organic material or life

R-horizon: unweathered parent material

SOIL FERTILITY

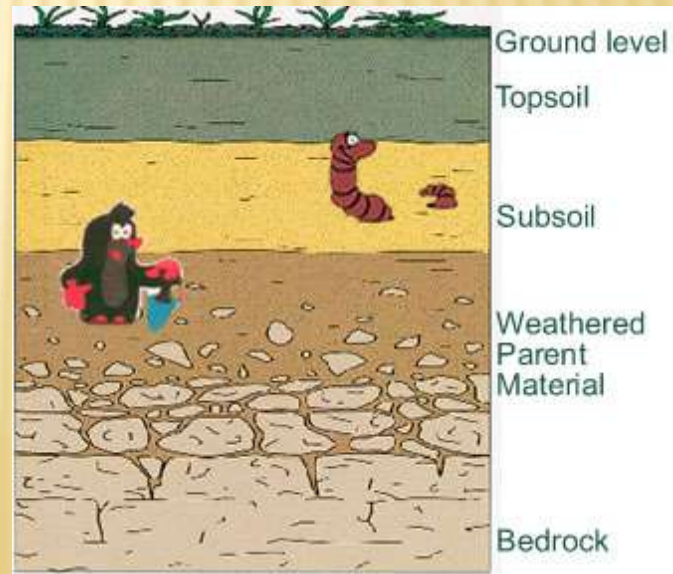


- ✘ Nutrients in soil are necessary for plants to grow. Some soils are rich in nutrients, but others may not be.
- ✘ A soil's ability to hold nutrients and to supply the nutrients to a plant is called soil fertility.

NUTRIENTS IN SOIL

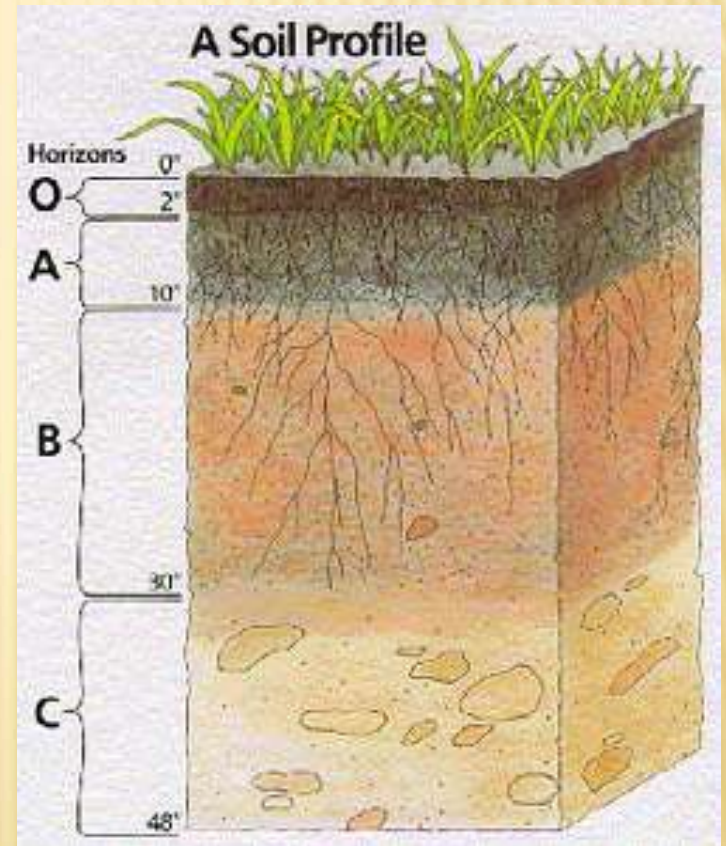
- ✘ Many nutrients in soil come from the parent rock.
- ✘ Other nutrients come from humus, which is the organic material formed in soil from the decayed remains of plants and animals.

- ✘ These remains are broken down into nutrients by decomposers, such as bacteria and fungi.



SOIL HORIZONS

- ✘ Soil often ends up in a series of layers because of the way it forms.
- ✘ Humus-rich soil is on top, with sediment below that, and bedrock on the bottom.
- ✘ Geologists call these layers horizons.



SOIL HORIZONS

Which layer would most humus be located?

Where would bedrock be located?

O horizon
(loose and partly decayed organic matter)

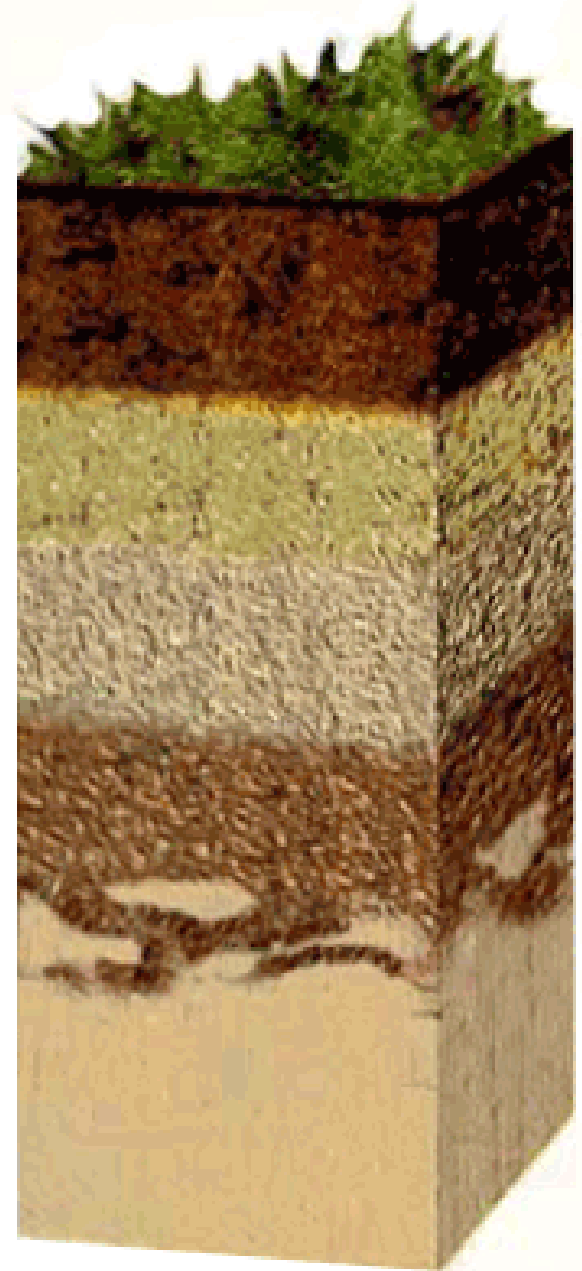
A horizon
(mineral matter mixed with some humus)

E horizon
(light colored zone of leaching)

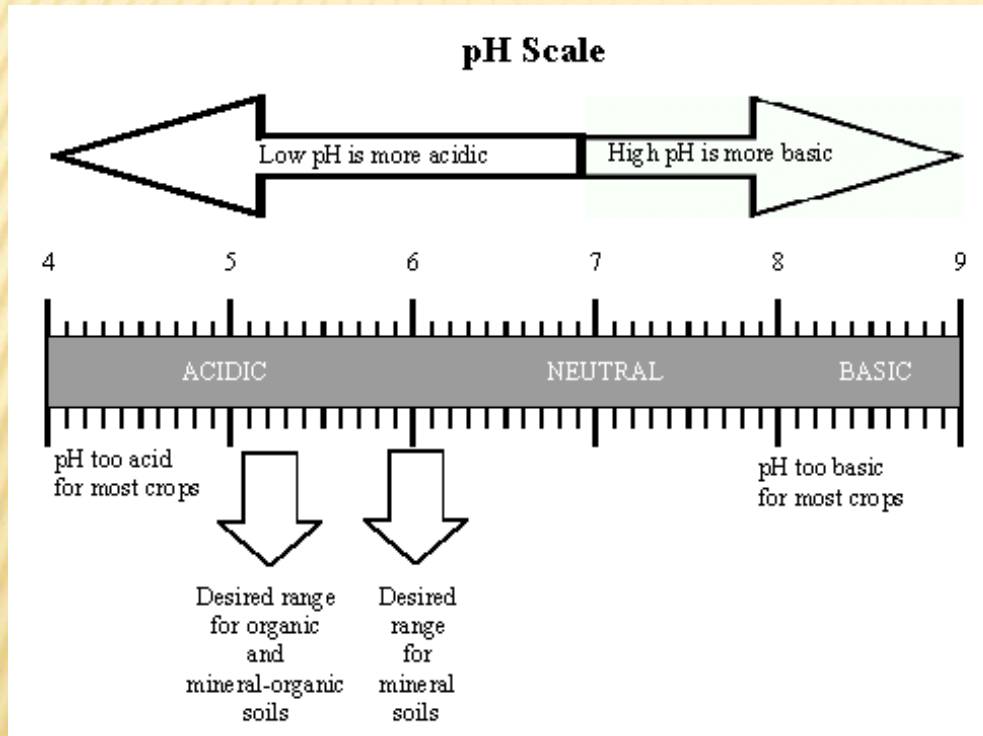
B horizon
(accumulation of clay from above)

C horizon
(partially altered parent material)

unweathered parent material



SOIL ACIDITY



- ✘ Soils can be acidic or basic. The pH scale is used to measure how acidic or basic a soil is and ranges from 0-14.
- ✘ Below 7 = acidic soil
- ✘ Above 7 = basic soil
- ✘ 7 = neutral

SOIL PH

- ✘ The pH of soil influences how nutrients dissolve in the soil.
- ✘ The right pH for a soil depends on the plants growing in it because different plants need different nutrients.



SOIL AND CLIMATE



- ✘ Soil types vary from place to place.
- ✘ One reason for this is the differences in climate.

TROPICAL RAIN FOREST CLIMATES

- ✘ In tropical rain forest climates, the air is very humid and the land receives a large amount of rain.
- ✘ Temperatures are warm and crops can be grown year-round. Rich humus is provided by dead plants and animals that easily decay in warm soil.



POOR NUTRIENTS IN TROPICAL CLIMATES



- ✘ The soil in tropical rain forests, though, is poor in nutrients because the rain leaches, or removes, nutrients from the topsoil into deeper layers of soil.
- ✘ Plants and trees also leach the nutrients due to the demand and abundance of vegetation.

DESERT CLIMATES



- ✘ Weathering occurs at a low rate in desert areas and means soil is created at a lower rate.
- ✘ The lack of rain causes low rates of chemical weathering and less ability to support plant life.

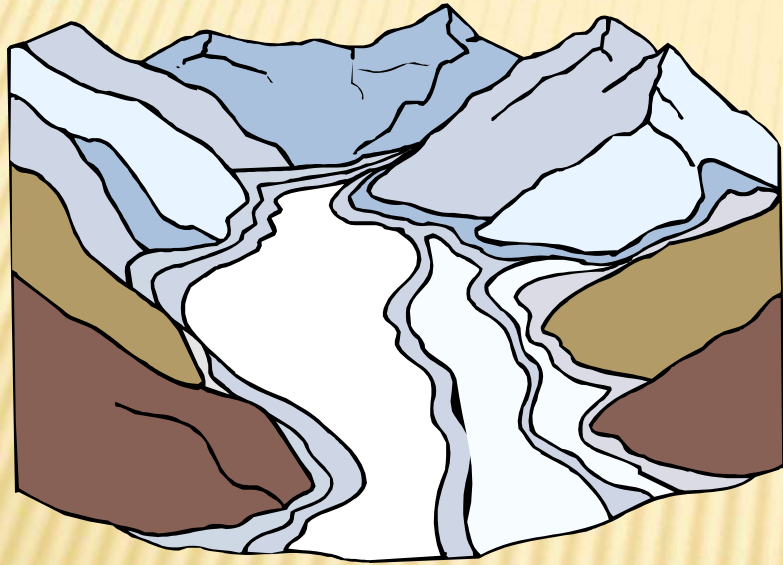
TEMPERATE FOREST AND GRASSLAND CLIMATES

Much of the continental U.S. has a temperate climate.

*Weathering occurs frequently and develops thick fertile soils.



ARCTIC CLIMATES



- ✘ Arctic areas have so little precipitation that they are like cold deserts.
- ✘ Chemical weathering occurs slowly, so soil formation also develops slowly.
- ✘ Soil temperatures are also low and limits the nutrients that are available for plant growth.

✘ Directions:

- ✘ Fold your paper in half. On the inside left you will draw a soil horizon. On the inside right, you will write information about each horizon.
- ✘ Underline and color code the key vocabulary with purpose.
- ✘ Include a title on the outside front cover.

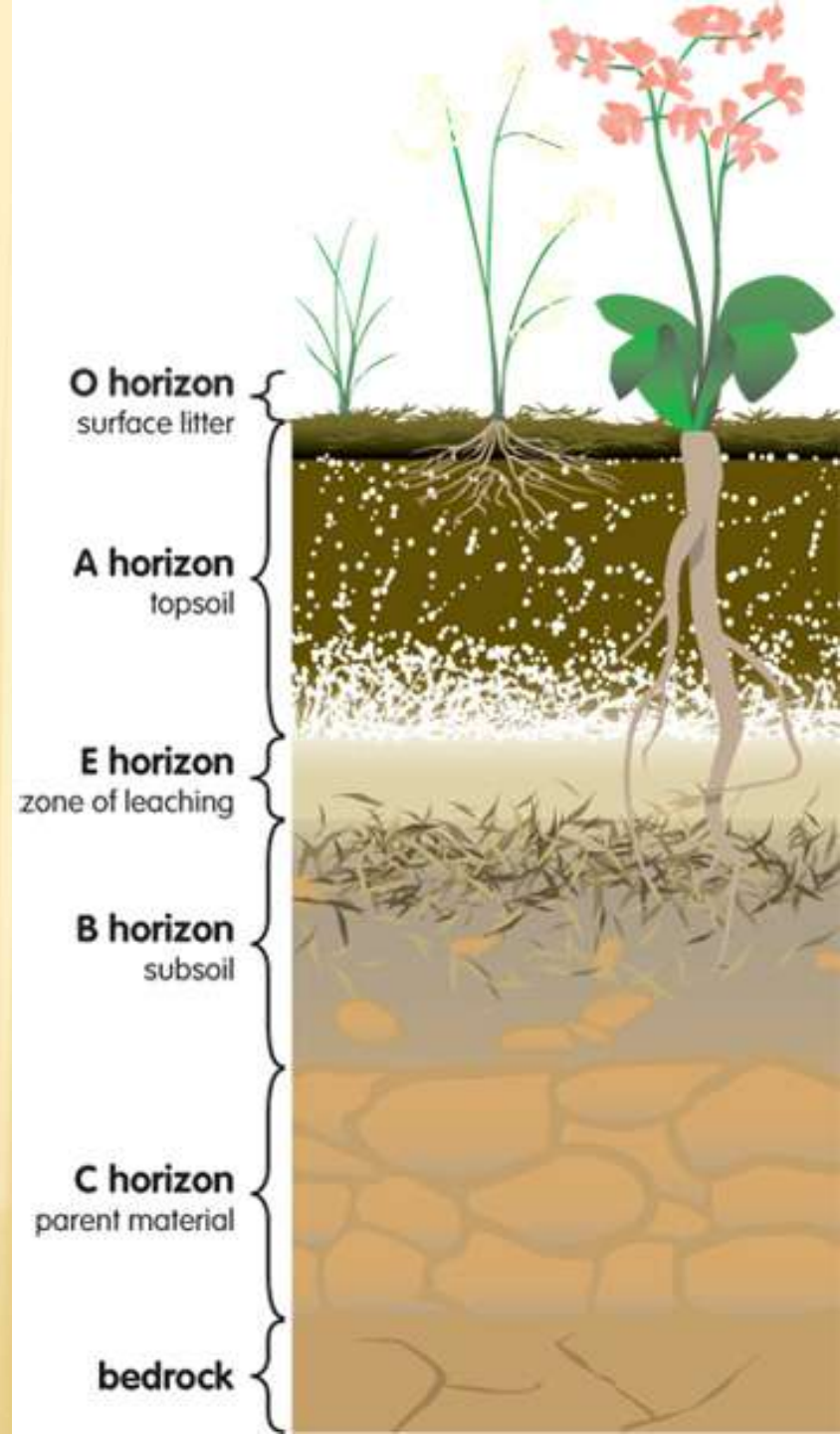
The top horizon or **A horizon**, is very rich in nutrients. (mineral matter mixed with humus-dark organic material formed from the decayed remains of plants and animals)

This horizon is also called topsoil. This is where the shallow roots of plants pick up nutrients and water. It is also where small organisms, such as soil insects and worms live.

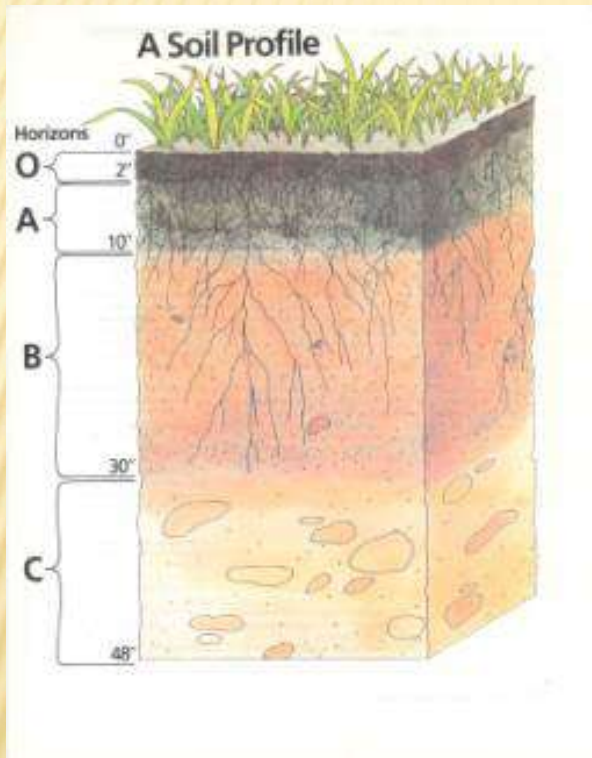
E horizon is the zone of leaching- the removal of substances that can be dissolved from rock, or layers of soil due to the passing of water.

The next layer is the **B horizon**, also known as the subsoil. This is where you would find clay and minerals washed down by water through the A horizon. Deep roots reach into this subsoil.

Under the subsoil, you will find the **C horizon**, which is made of weathered parent rock. Under this horizon you will find solid bedrock.



PART II: SOIL CONSERVATION



WHAT IS SOIL CONSERVATION?

- ✘ Soil is a resource that must be conserved!
- ✘ Soil conservation is a method to maintain the fertility of the soil by protecting the soil from erosion and nutrient loss.



THE IMPORTANCE OF SOIL



- ✘ Soil provides minerals and other nutrients for plants.
- ✘ All animals get their energy from plants by either eating them or by eating animals that have eaten them.
- ✘ Without soil, the world would have no food!

HOUSING

- ✘ Soil also provides a place for animals to live. Some of these animals include earthworms, grubs, spiders, ants, moles, and prairie dogs.
- ✘ The region where a plant or animal lives is called its habitat.



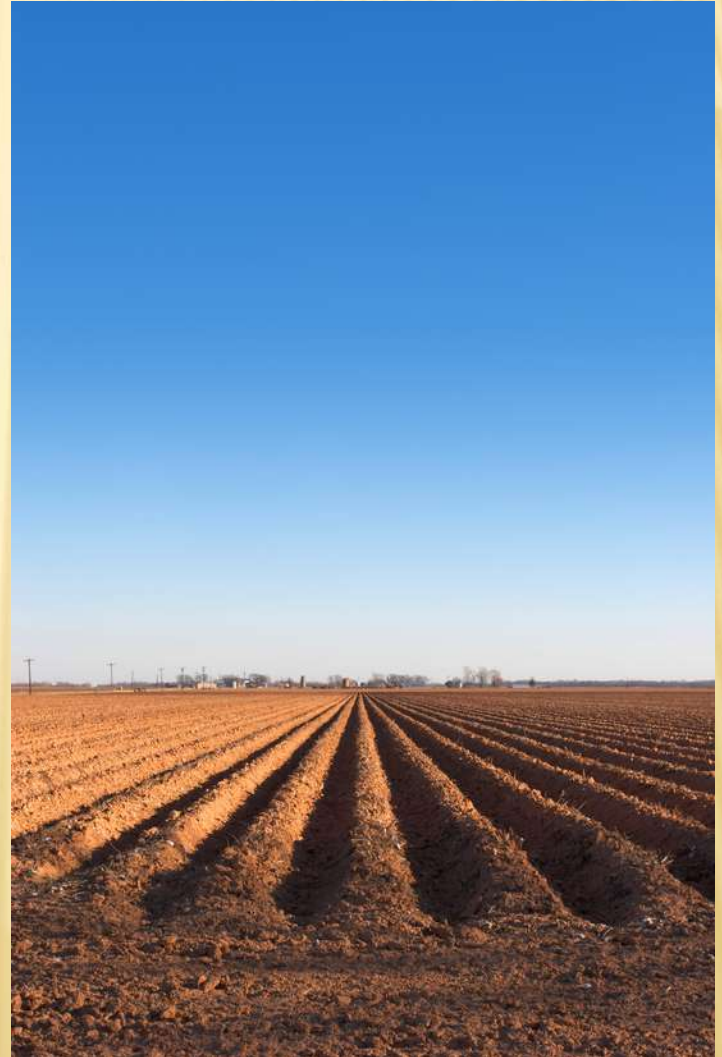
WATER STORAGE



- ✘ Soil is also important to plants for water storage.
- ✘ Soil holds water and allows plants to get the moisture and nutrients they need.
- ✘ Soil also keeps water from running off or flowing elsewhere (flooding).

SOIL DAMAGE AND LOSS

- ✘ Soil loss is a problem around the world and can be caused by soil damage from overuse by poor farming techniques or by overgrazing.
- ✘ Overused soil can lose nutrients, become infertile, and not allow plants to grow.



LAND DEGRADATION



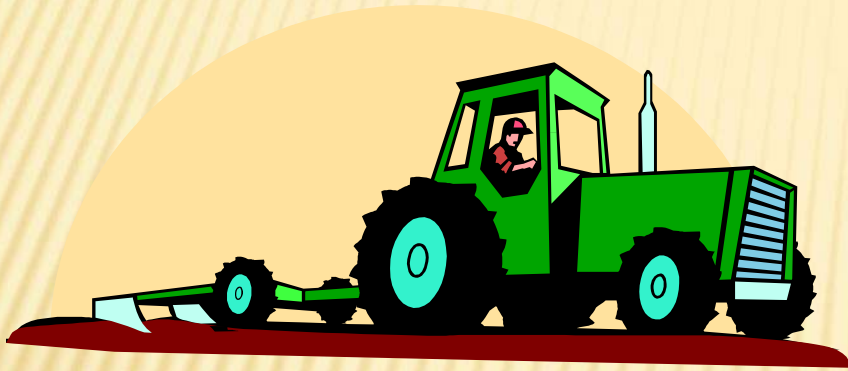
- ✘ Without plants to hold and help cycle water, the area can become a desert.
- ✘ This process is called land degradation.
- ✘ Without moisture and plants, the soil can be blown or washed away.

SOIL EROSION

- ✘ When soil is left unprotected, it can be exposed to erosion.
- ✘ Erosion is the process by which wind, water, or gravity transport soil and sediment from one location to another.



CONTOUR PLOWING



- ✘ To prevent soil erosion in hilly areas, farmers plow across the slopes of the hills.
- ✘ This is called contour plowing.
- ✘ The rows act as a series of dams instead of a series of rivers.

TERRACING

- ✘ If the hills are very steep, farmers can use terracing.
- ✘ Terracing changes one steep field into a series of smaller, flatter fields.



NO-TILL FARMING



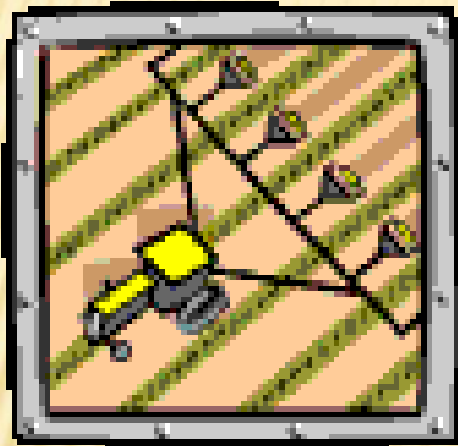
- ✘ No-till farming is a practice of leaving old stalks to provide cover from rain.
- ✘ The cover reduces water runoff and slows soil erosion.

COVER CROPS

- ✘ Cover crops are crops that are planted between harvests to replace certain nutrients and prevent erosion.
- ✘ They provide cover from wind and rain.
- ✘ Examples are soybean and peanut crops.



CROP ROTATION



- ✘ Another way to slow down nutrient depletion is through crop rotation.
- ✘ If the same crop is grown year after year in the same field, certain nutrients become depleted.

CROP ROTATION

- ✘ To slow this process, a farmer can plant different crops.
- ✘ A different crop will use up less nutrients or different nutrients from the soil.

