



# The Dirt on Soil



# The Dirt on dirt

- Dirt is soil that is out of place in the human world.
  - Dust on the floor
  - Mud on your shoes
- Soil is a naturally occurring mixture of organic matter, water, air and minerals that form on the surface of the land.



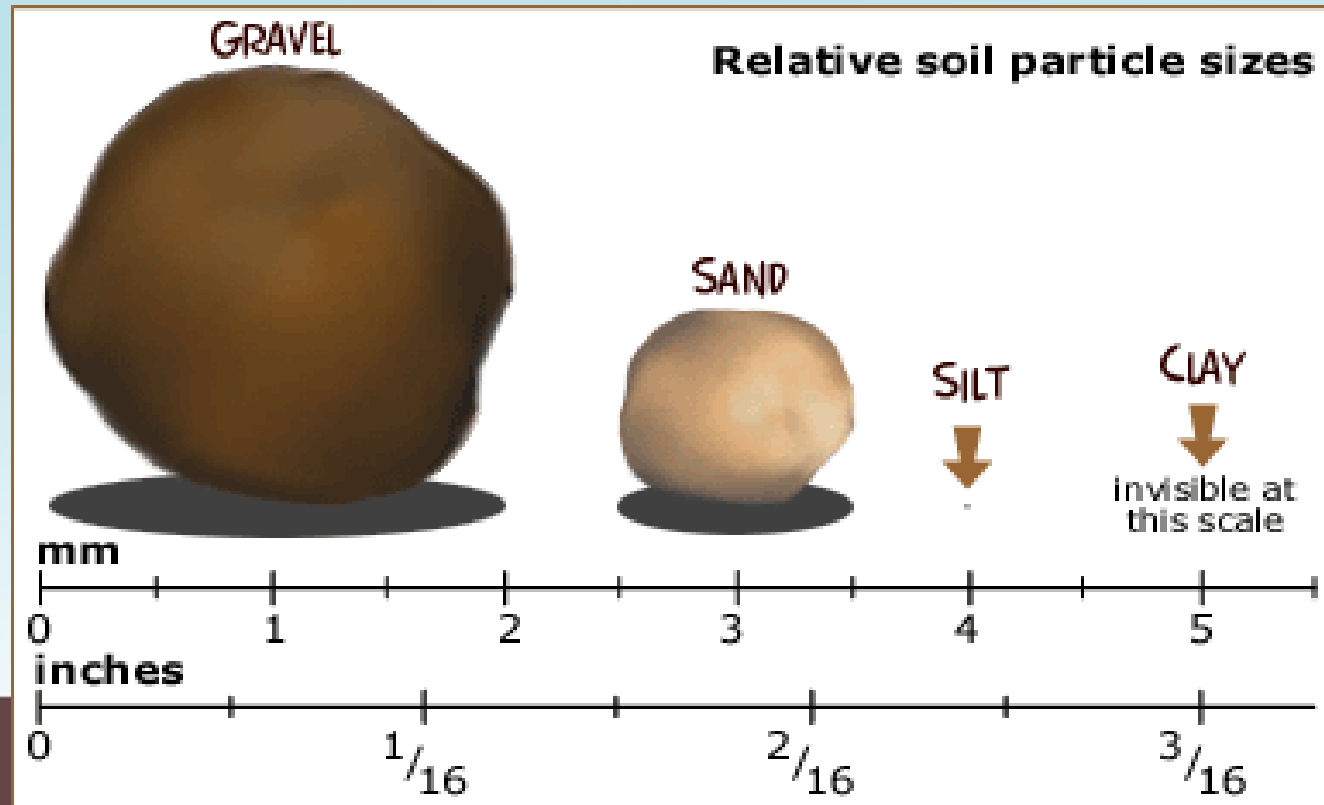
# The Dirt on Soil

- Soil is a:
  - useful substance in which our food grows
  - The outermost solid surface of earth that supports our towns and homes
  - The medium that contains minerals for plant and animal life
  - The thin layer that means prosperity or poverty (even life and death)



# The dirt on Soil

- There are 3 main components of soil:
  - Clay, sand and silt
  - Gravel can be a 4<sup>th</sup> component as well.



# 3 Components of Soil

## 1) Clay:

- Very small grains – smallest particle size by diameter (  $< .002$  mm)
- Sticky when wet
- Hard clumps when dry
- Clayey soils are fine
- Holds a lot of water



# 3 components of soil

## 2) Silt

- Small grains found in the bottoms of waters
- Smooth like flour
- Crumble when wet
- Diameters of .002 - .005 mm



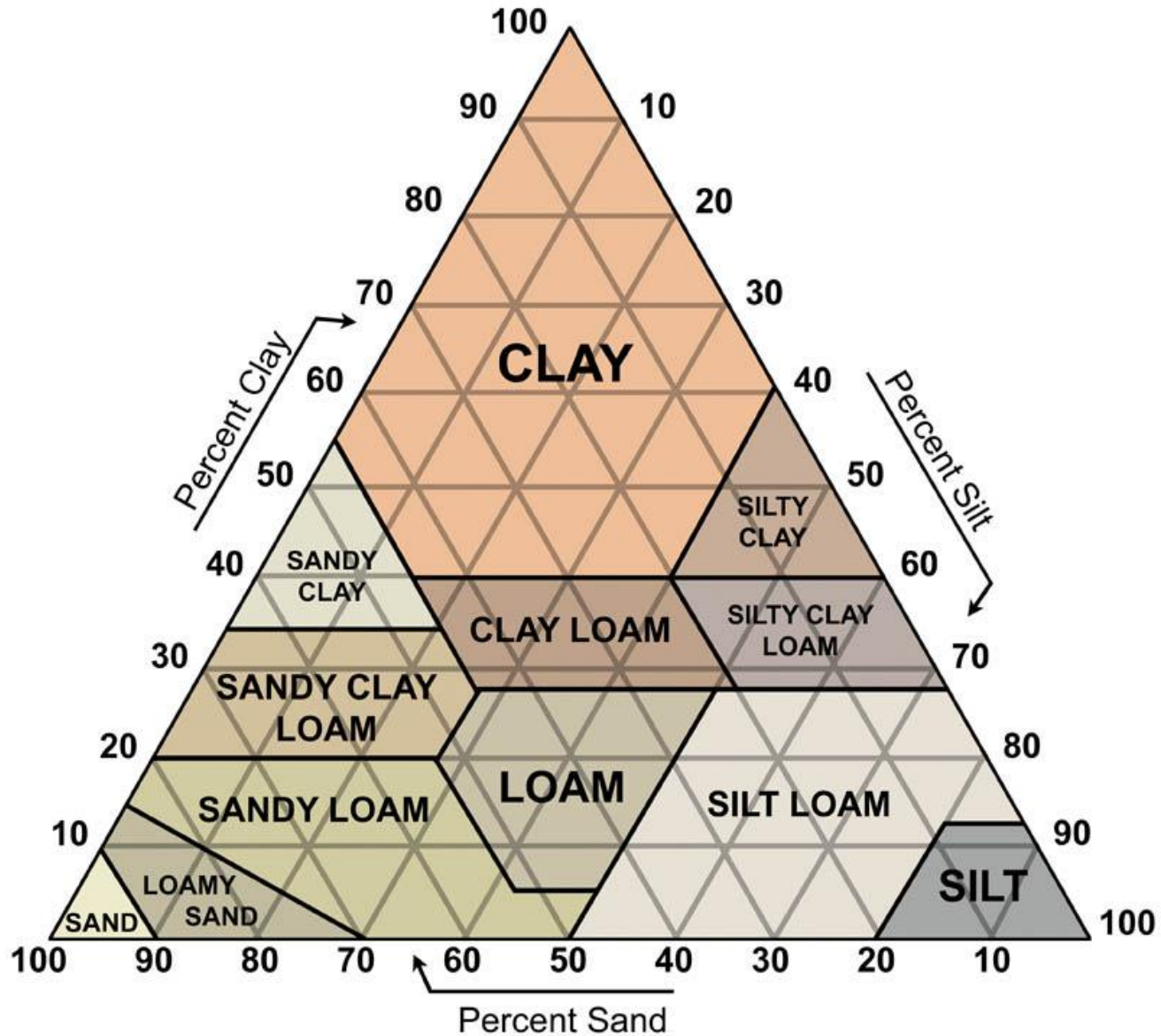
# 3 Components of soil

## 3) Sand

- Grains that have large spaces between them
- Diameters of .05 -2.0
- Largest of the particles
- Its texture is gritty

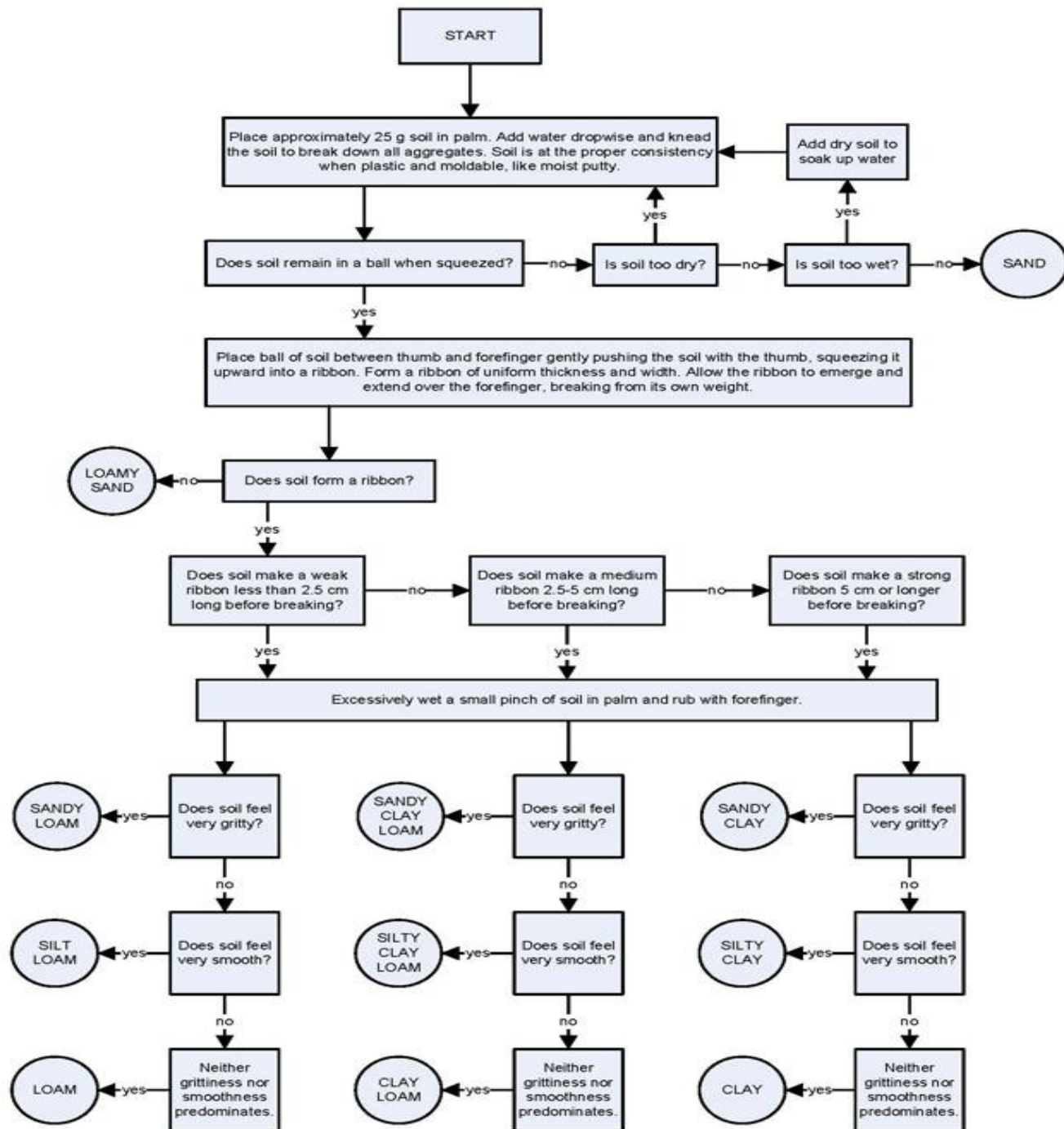


# Soil Triangle



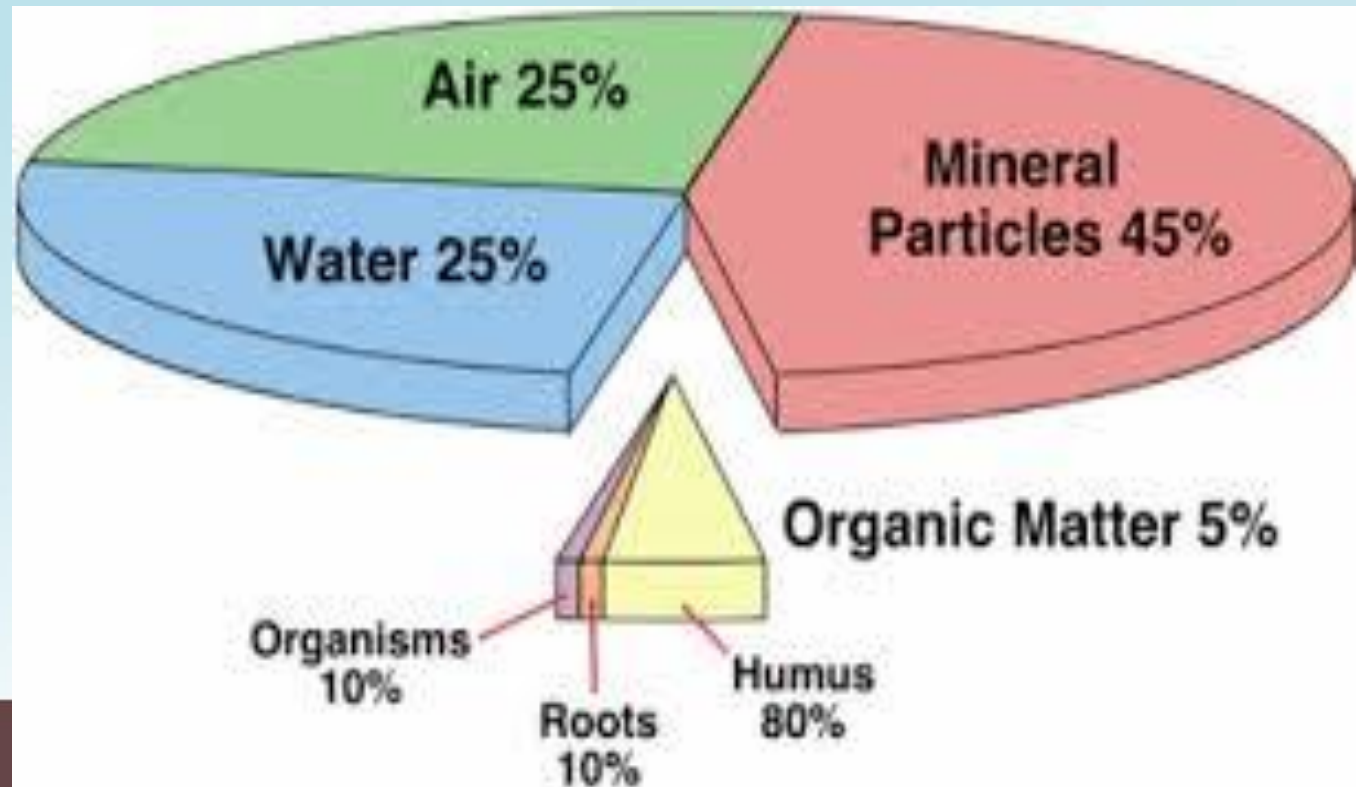


# Soil Texture chart



# Soil composition

- Soil is composed of air, water, organic matter and minerals.



# Nitrogen Cycle

- When plants and animals die and decompose, they add nitrogen to the soil.
- Bacteria in the soil convert the nitrogen into compounds that plants can use.
- Plants take in these nitrogen-containing compounds through their roots and use them to grow.

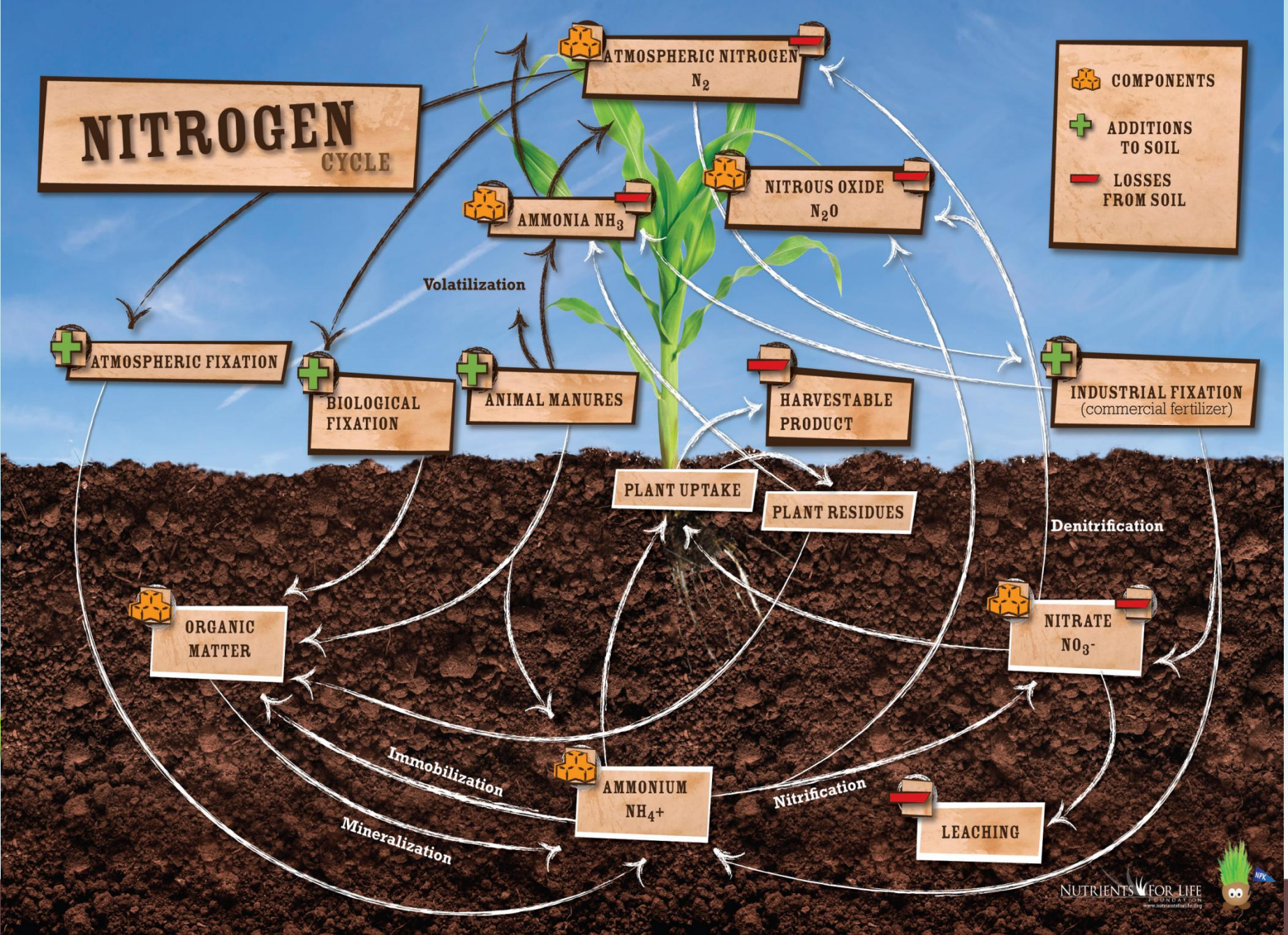


Animals eat the plants, use the nitrogen, and return it to the soil when they die and decompose.

# NITROGEN CYCLE

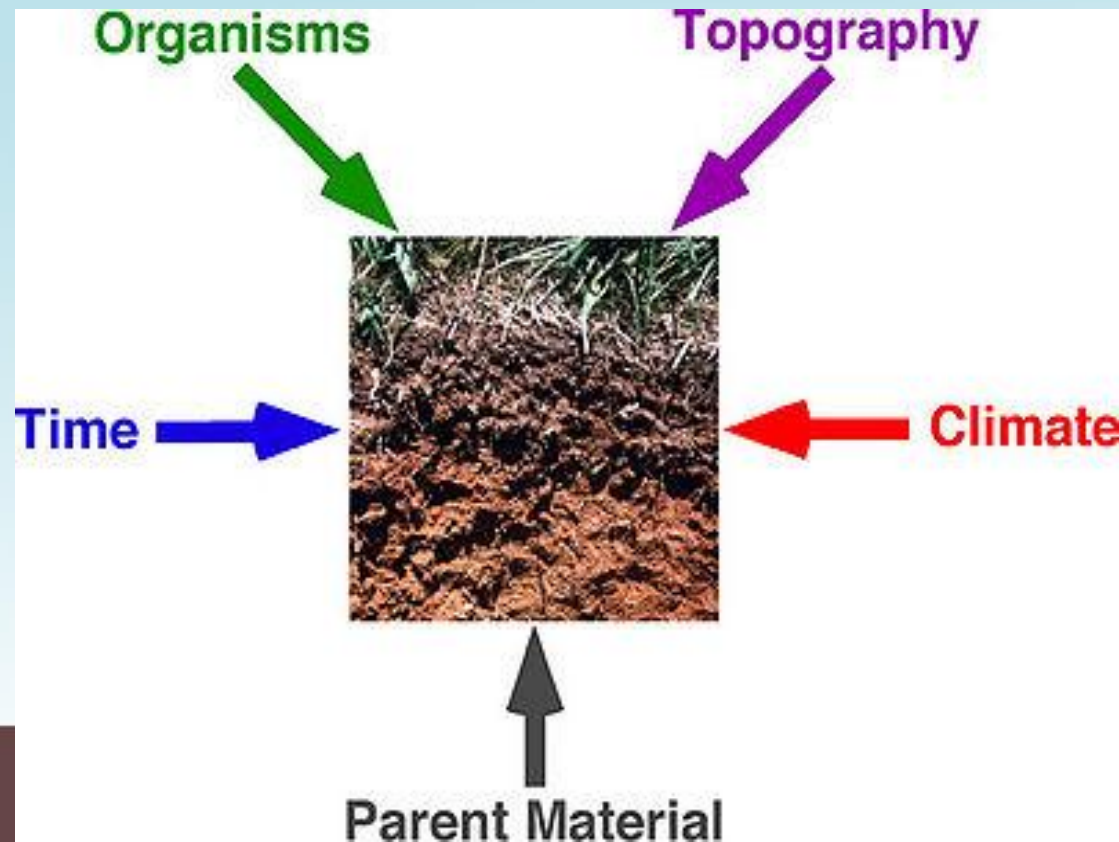
**COMPONENTS**

- COMPONENTS
- ADDITIONS TO SOIL
- LOSSES FROM SOIL



# Soil Formation

- Scientists recognize 5 main factors that influence soil formation.
  - Parent material
  - Climate
  - Living Organisms
  - Topography
  - Time



# 5 Factors for soil formation

## 1) Parent Material

- Parent material refers to both the organic and mineral material in which soil formation takes place.
- Mineral can include weathered rock, ash from volcanoes, and sediments deposited by wind and water.
- Soil formation will happen more quickly in materials that are more permeable to water.

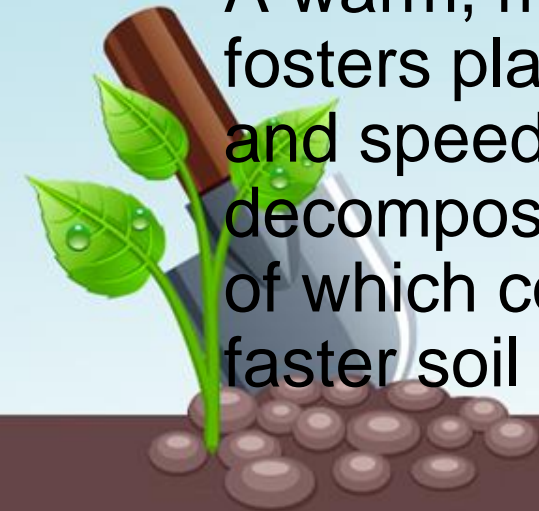
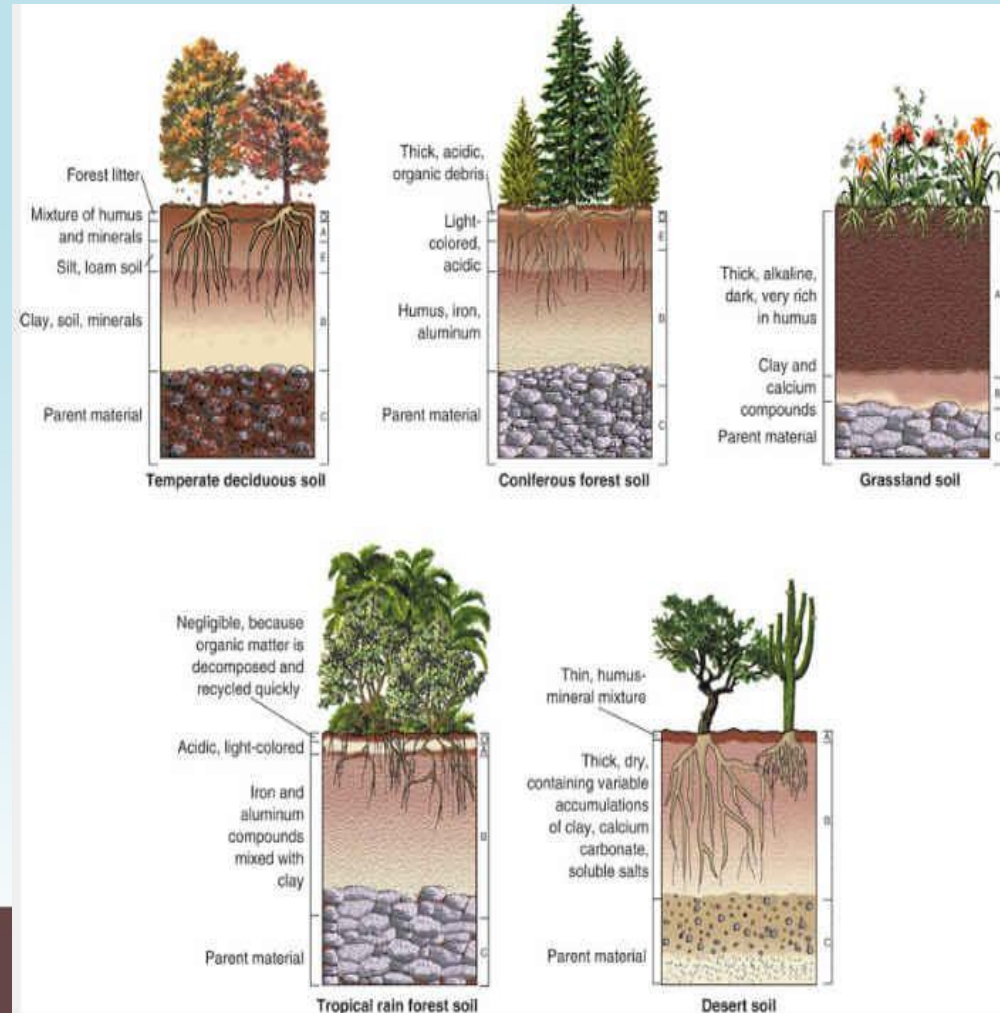


# 5 Factors for Soil Formation

## 2) Climate

– Climate influences the amount of water available for weathering the parent material and the temperature at which it occurs.

– A warm, moist climate fosters plant growth and speeds up decomposition, both of which contribute to faster soil formation.



# 5 Factors for Soil Formation

## 3) Living Organisms (Biological)

- Plants supply soil with organic material and help prevent erosion.
- Deep-rooted plants have a greater impact on soil formation than shallow-rooted plants because they create larger channels for water movement.
- Insects, earthworms, fungi, and bacteria are important because they help decompose organic material releasing plant nutrients.





# 5 Factors for Soil Formation

## 4) Topography

- The three dimensional shape of the land influences water movement and therefore the speed of soil formation.
- Since water flows downward due to gravity, soils on slopes are prone to erosion.
- Areas that are very wet or very dry may not be fertile and the resulting lack of plant growth can slow the rate of soil formation.



# 5 Factors for Soil Formation

## 5) Time

- The weathering of rock slowly produces soils. Constant exposure to wind and rain cause the rocky crust to break slowly down into smaller particles.
- It can take centuries to produce fertile topsoil.
- As rainwater seeps into cracks, temperature extremes cause the water to freeze.

- The rock expands, contracts, and fractures.

- Organisms that live on and in the soil help these weathering actions along.



# Soil Horizons

- Soils have different layers.
- The layers are based on:
  - Soil color
  - Texture
  - Structure
  - Amount of organic matter
  - Gravel present in the soil



Copy this graphic to your notes or find a picture equivalent and paste to your doc.



Soil Layers

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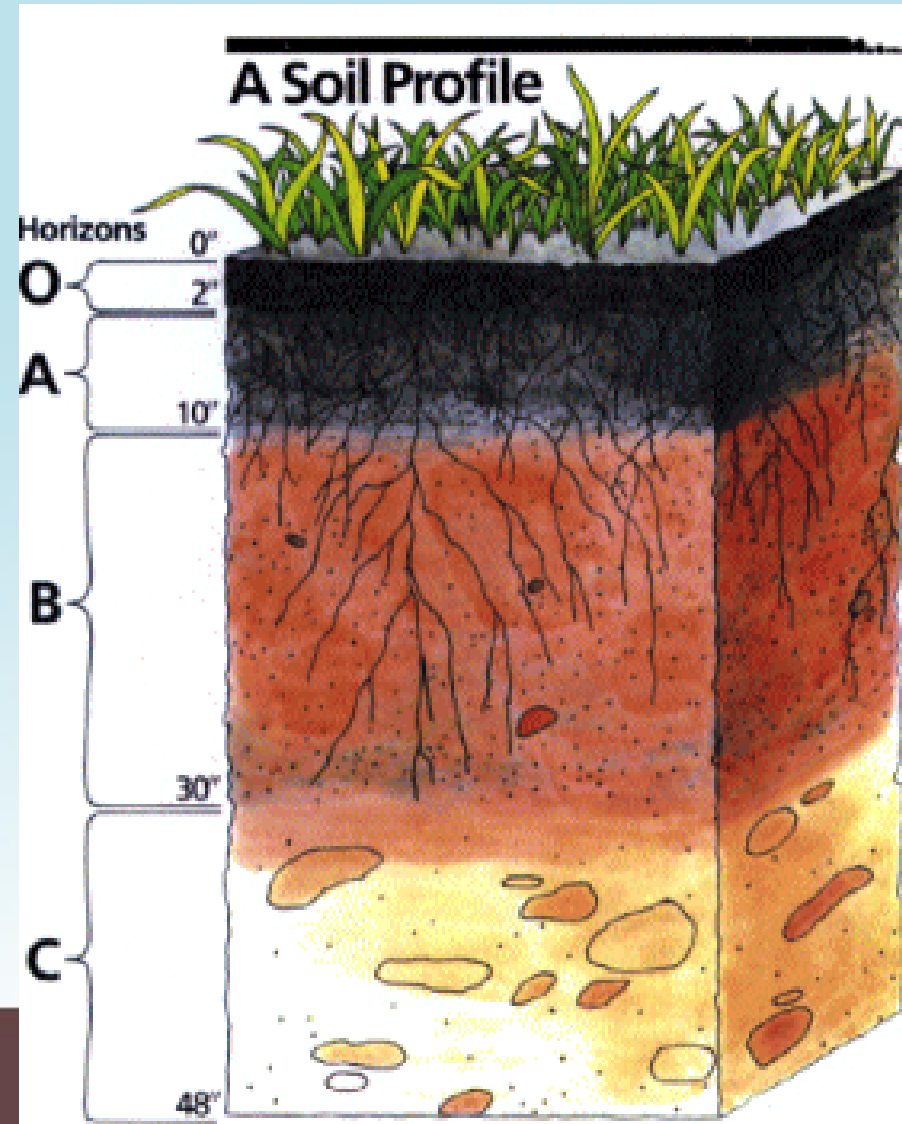
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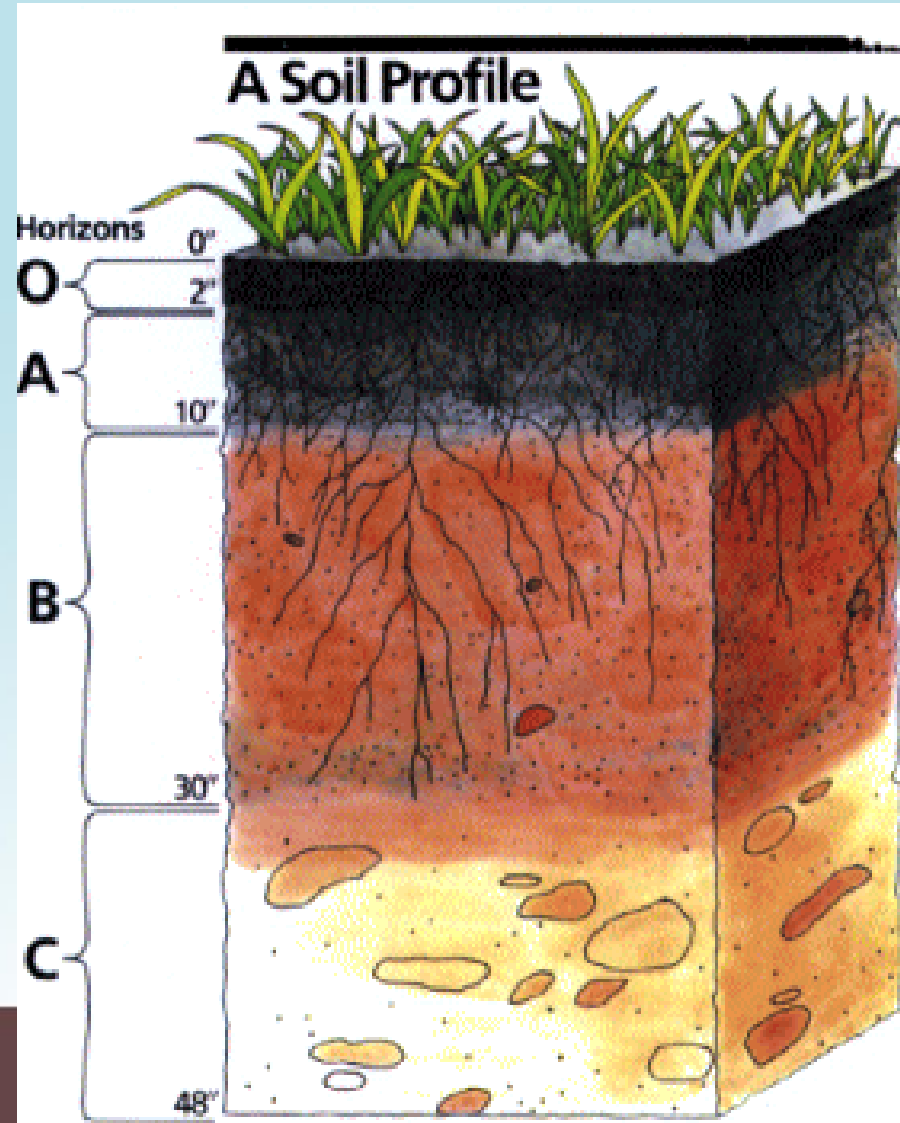
# O Horizon: Organic Layer

It consists of leaf litter and other organic material lying on the surface of the soil.



# A Horizon: Topsoil

This layer is usually loose and crumbly with varying amounts of organic matter.

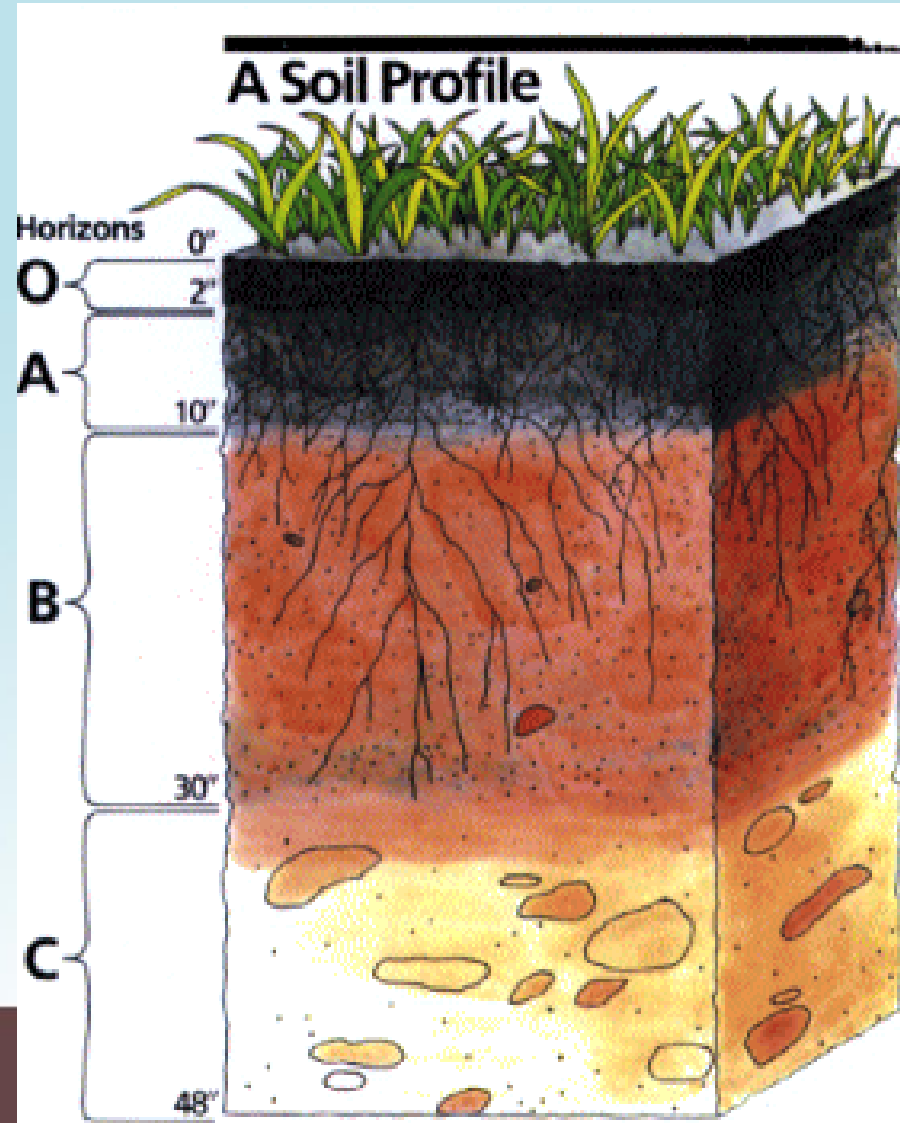


# A Horizon: Topsoil

This is generally the most productive layer of the soil.

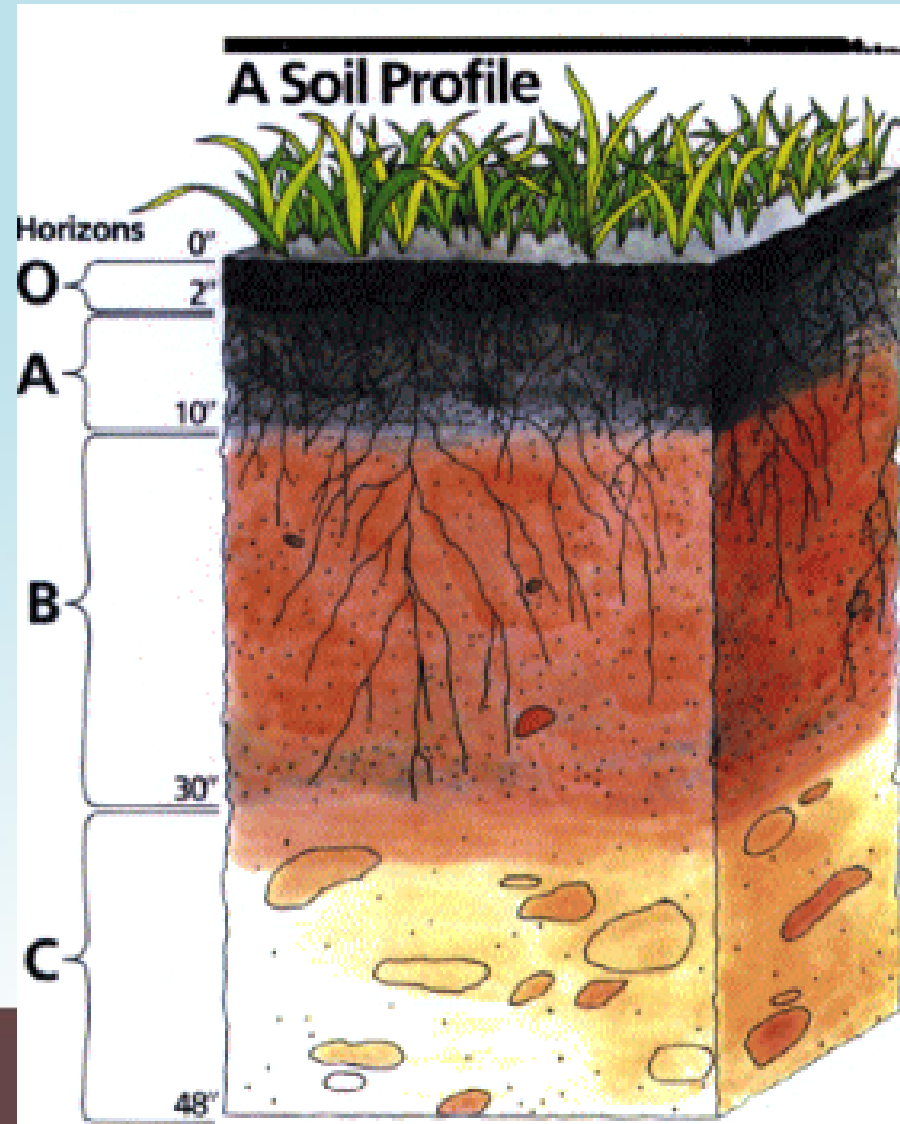
Most soil-dwelling animals are found here.

Conservation efforts are focused here!



# B Horizon: Subsoils

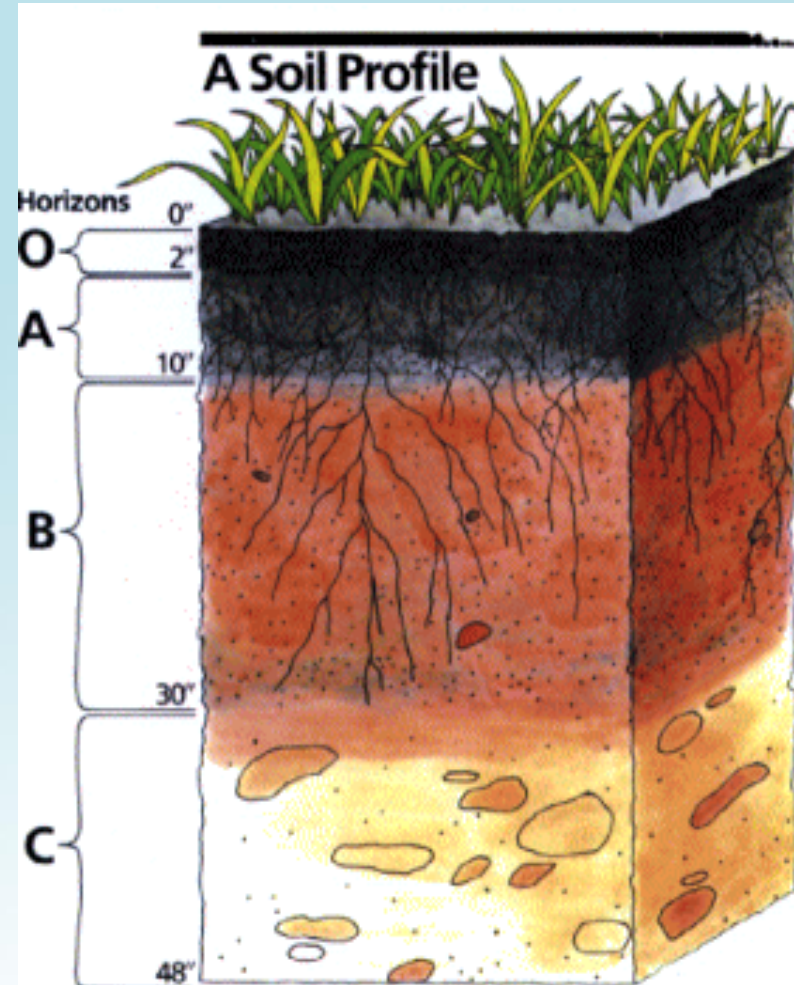
Subsoils are usually lighter in color, dense and low in organic matter.





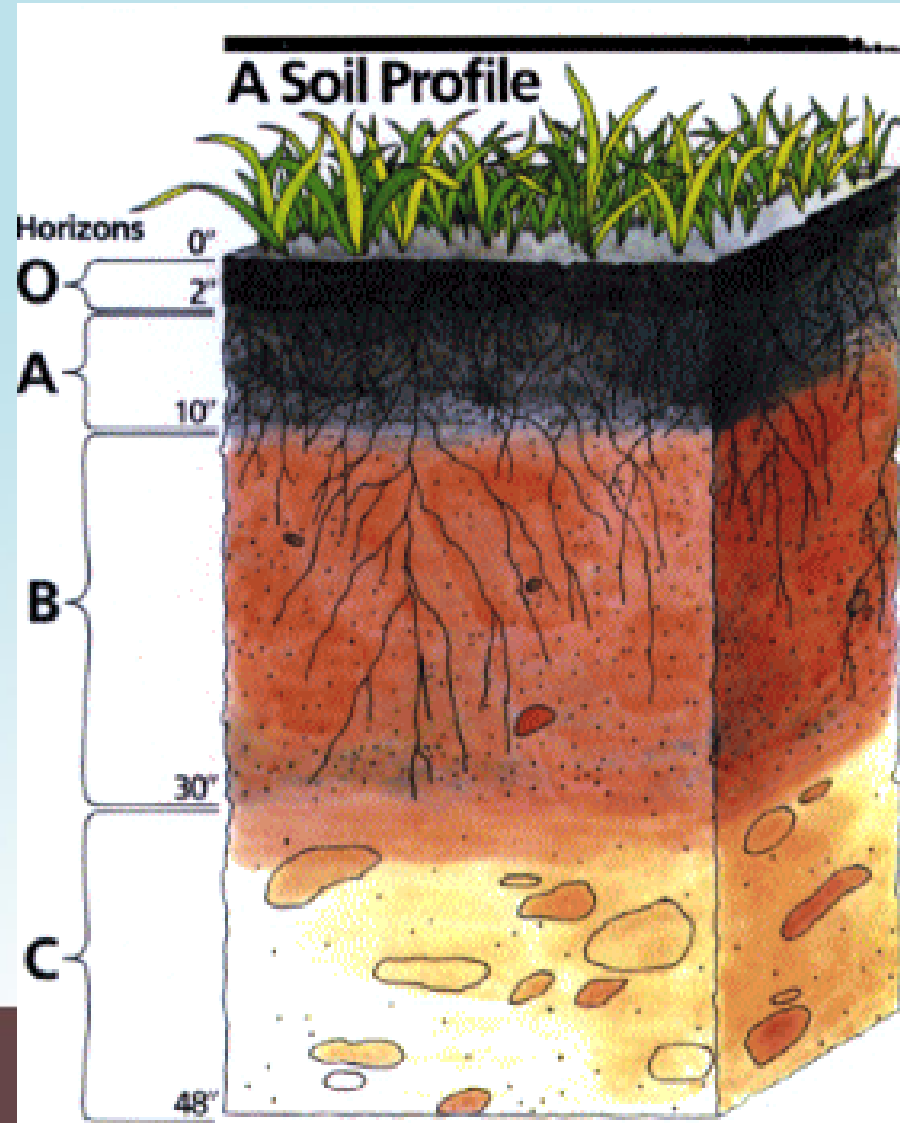
# C Horizon: Transition

This layer of transition is almost completely void of organic matter and is made up of partially weathered parent material.



# Bedrock

Below the C horizon the unweathered bedrock will be found.



# Use of the Land

- Our soil is in danger because of:
  - expanding cities
  - Deforestation
  - Agriculture
  - Unsustainable land use & management
  - Pollution
  - Overgrazing
  - Climate change



# Over Use

- When we over use soil we cause it to erode away
  - Overgrazing: When animals use a small plot of land over and over again the plant leave and soil erodes
  - Deforestation: When we clear trees there is nothing to hold the soil in place and the soil erodes away



# Land Use

- The current use and rate of degradation threatens to not be sustainable enough for future generations.
- We need soil to supply us with all our needs



# We depend on Soil

- We need healthy soil for healthy food production (farms and commercial)
- Soil supports biodiversity
- Soil plays a key role in the Carbon Cycle
- They are the foundation for vegetation
  - Vegetation is cultivated for feed, fuel and medicinal products



# We depend on soil



# We Depend on Soil

- It takes 500 years to create 1 inch of topsoil
- Soil is a resource
  - It is key for our sustainable future
- Soil stores water and filters water
  - This happens mostly in our wetlands

