



GREAT BASIN SAGEBRUSH PROJECT



Working to bring science and nature education opportunities into prisons. We provide unique and meaningful activities to incarcerated men and women with the goal of helping our natural environment.



Institute
for
Applied
Ecology

Great Basin Sagebrush Project is part of the greater Sustainability in Prisons Project. It is an environmental partnership between the Institute for Applied Ecology, Department of Corrections, and the Bureau of Land Management. For more info, visit www.appliedeco.org

**GREAT BASIN
SAGEBRUSH PROJECT**



Institute for
Applied Ecology

Soil

of the Sagebrush Steppe



What is Soil?

- “The unconsolidated mineral matter on the surface of the Earth that has been subjected to and influenced by genetic and environmental factors of parent material, climate, macro- and microorganisms, and topography, all acting over a period of time and producing a product...”



What Does it Do?



Water Regulation



Sustains Life!



Filter

Organic & Inorganic materials



soil

Filters

Detoxifies

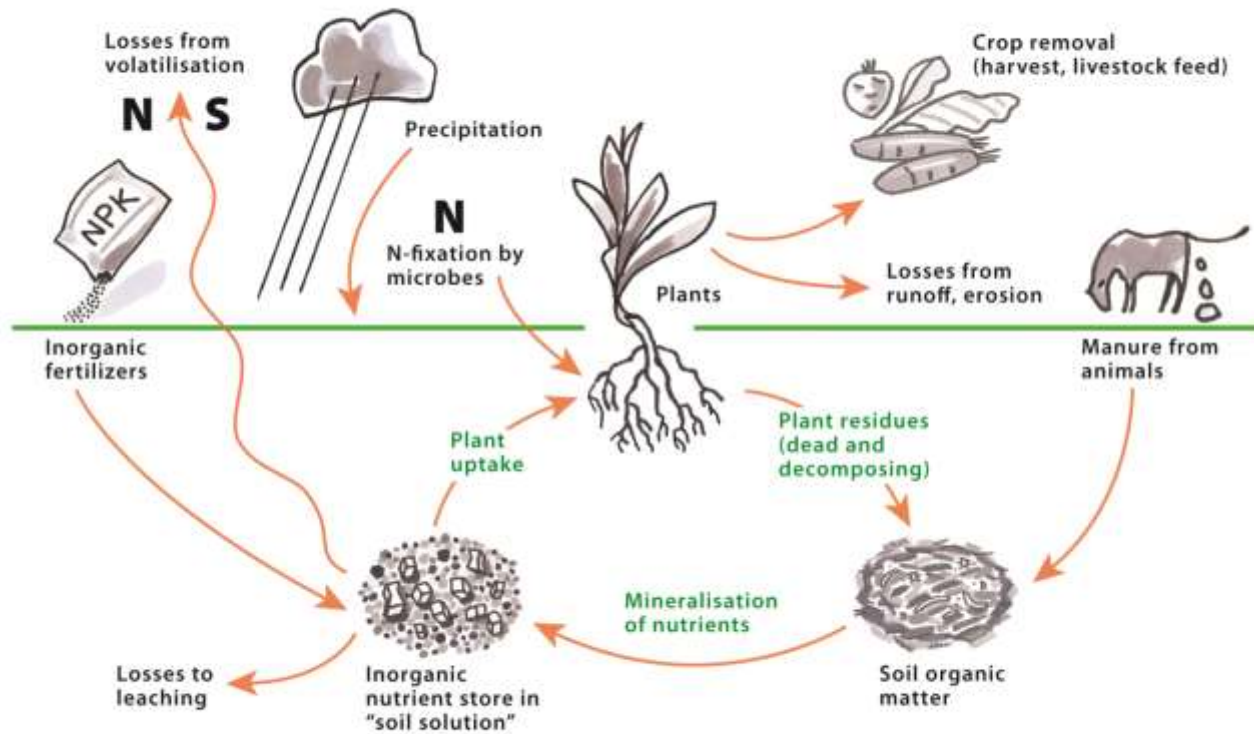
Buffers

Degrades

Immobilizes

watertable

SOIL NUTRIENT CYCLE



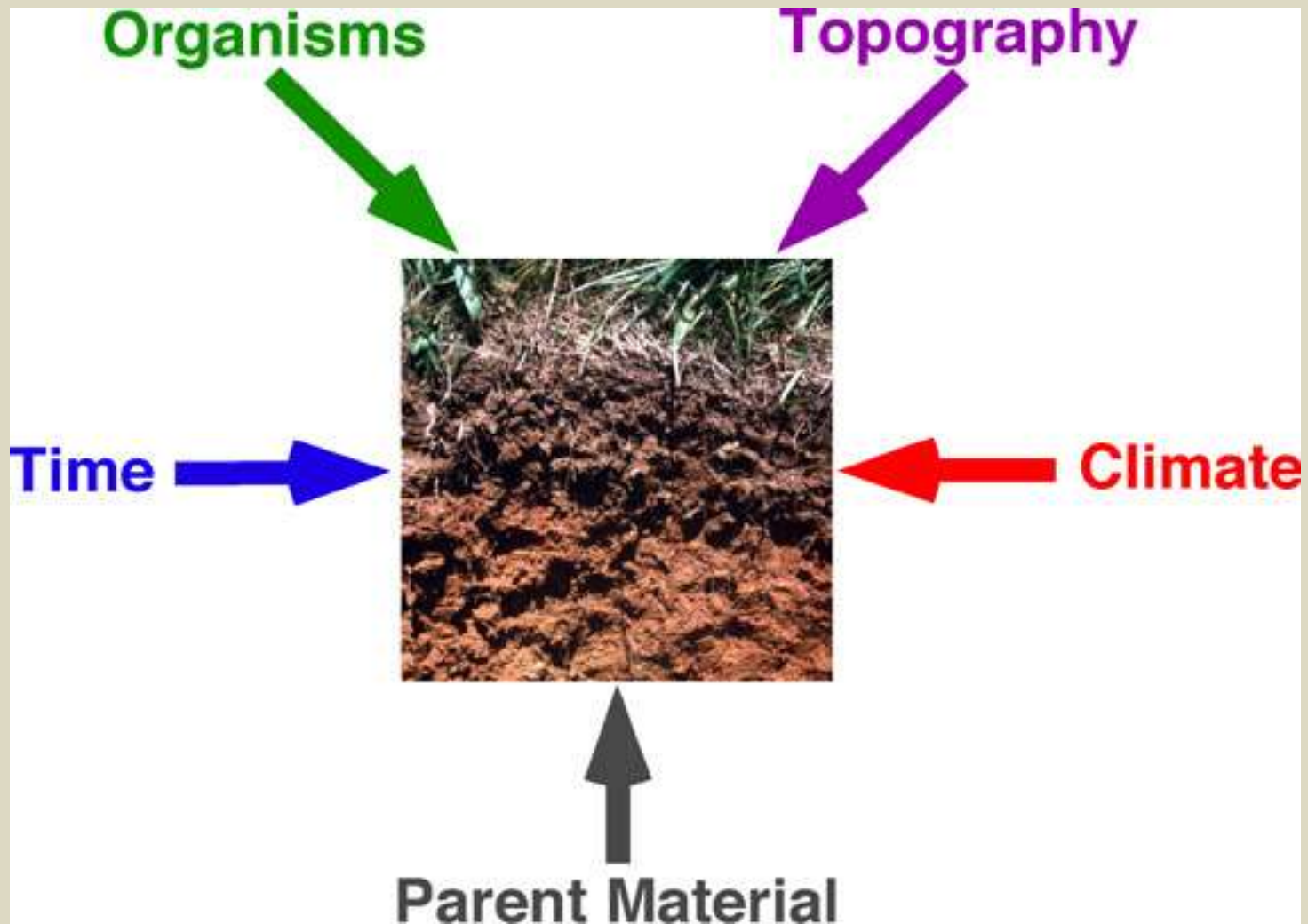
Support



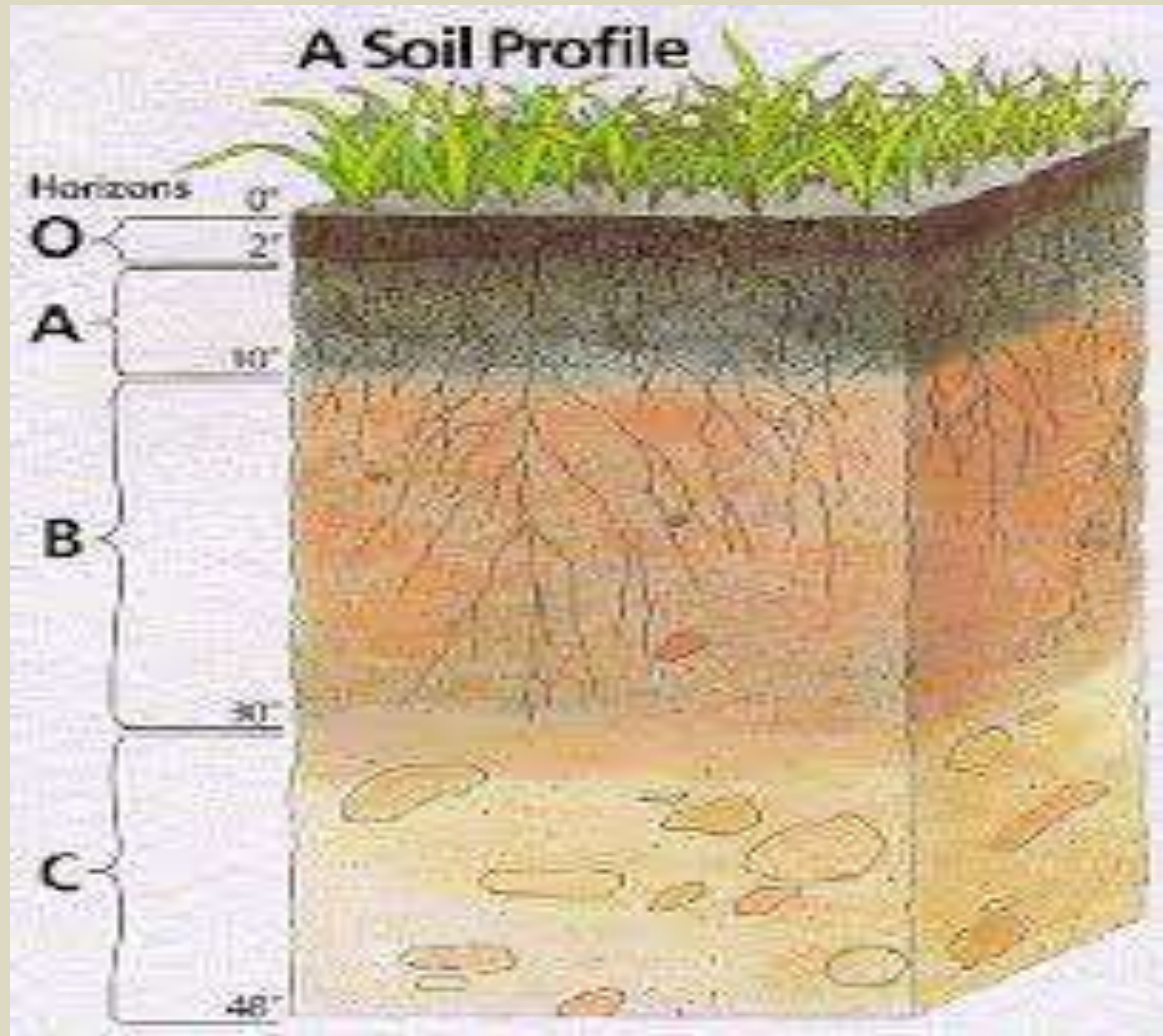
Soil Forming Factors

- **Parent material**- The underlying geological material in which soil horizons form (bedrock)
- **Topography**- Location on the landscape (hilltop, canyon bottom, side slope,...)
- **Climate**- The average patterns and conditions of weather at a specific location over a period of years.
- **Organisms**- Macro VS. Micro
- **Time**-.....

Soil Forming Factors



Soil Horizon Profile



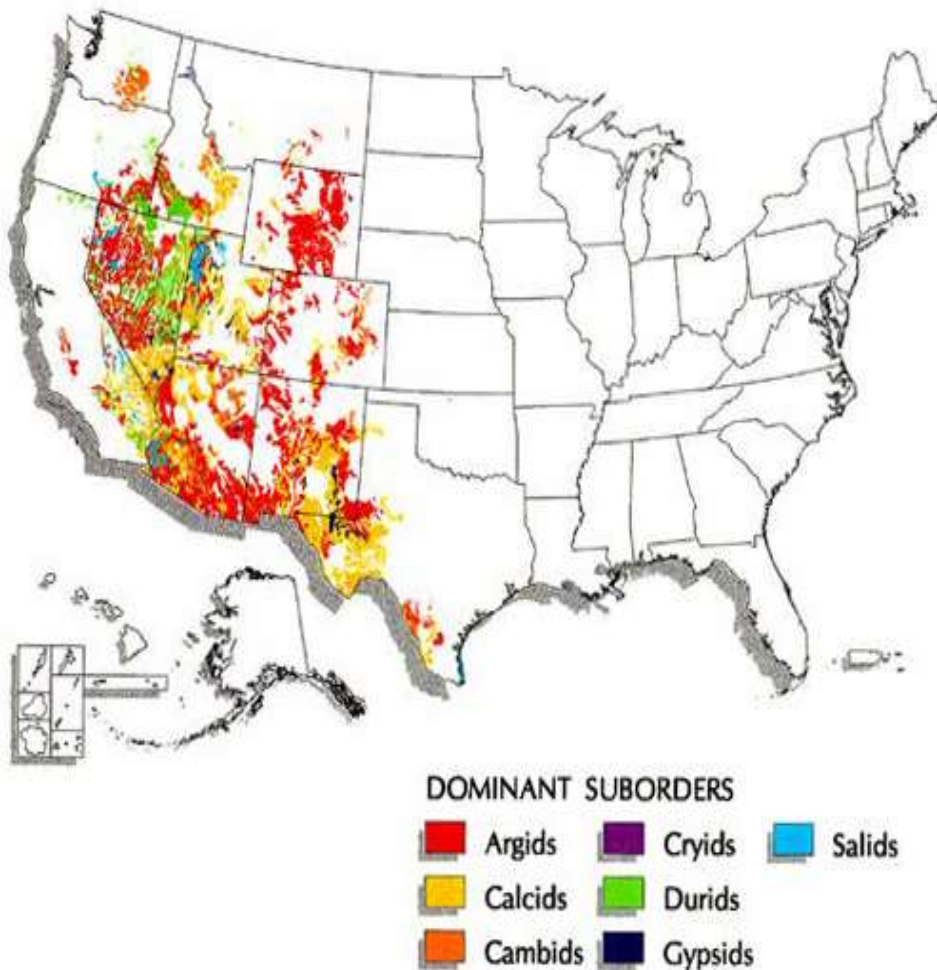


Major Soil Orders

- Alfisol
- Aridisol
- Entisol
- Histosol
- Inceptisol
- Mollisol
- Oxisol
- Spodosol
- Ultisol
- Vertisol
- Andisol
- Gelisol



Aridisols



<http://soils.usda.gov/technical/classification/orders/>

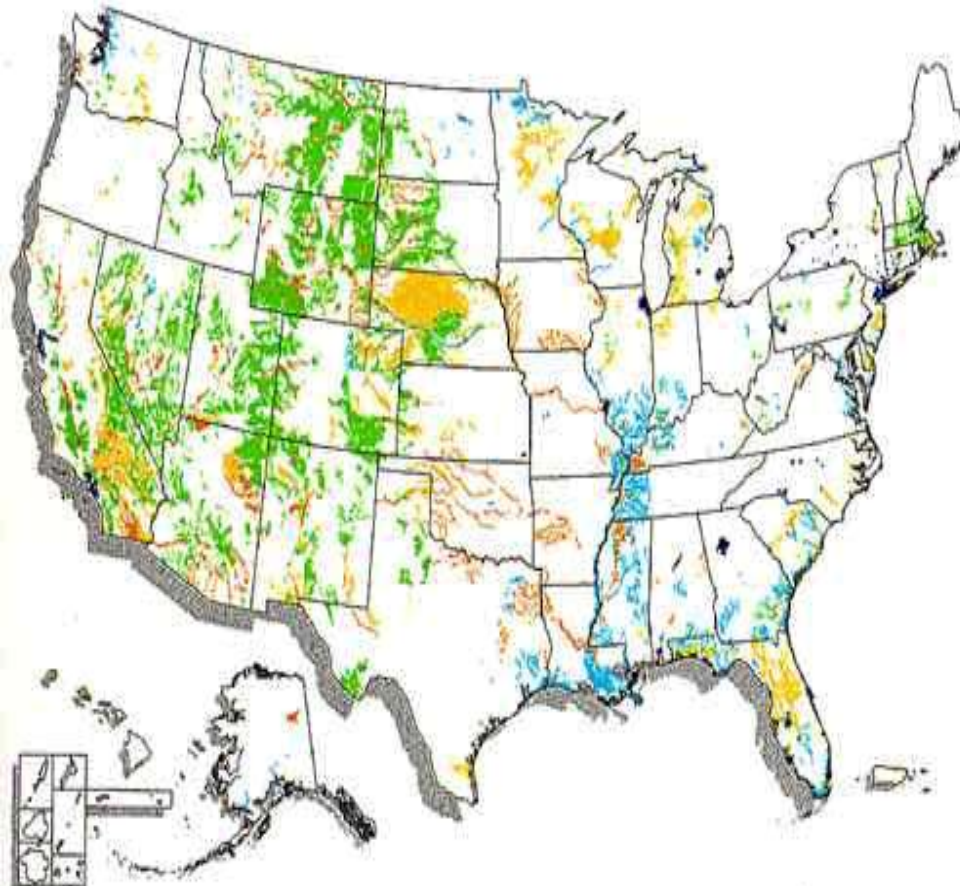


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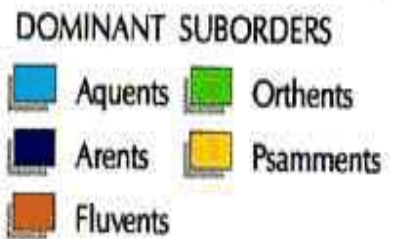
Aridisols

- PET >> Precipitation
- Desert soils
- Pale, light color near surface
- Long periods of soil moisture deficit
- Little if any organic matter
- High CEC
- Very fertile if add water
- Salinization is common
- Here the white color is from salts that have precipitated in the soil
- Largest soil order

Entisols



Entisols



1. Entisols

-recent

- No diagnostic subsurface horizons.
- Very recent or young soil
 - Little if any profile development
- Form on
 - resistant P.M.,
 - mine spoils,
 - steep slopes,
 - floodplains

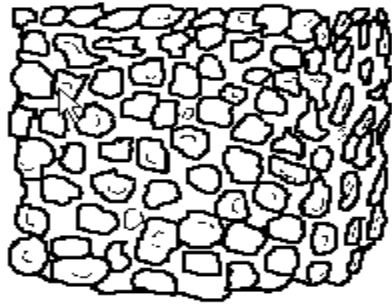


Soil Physical Properties: Soil Texture

Proportion of sand, silt, and clay



Soil Physical Properties: Soil Structure



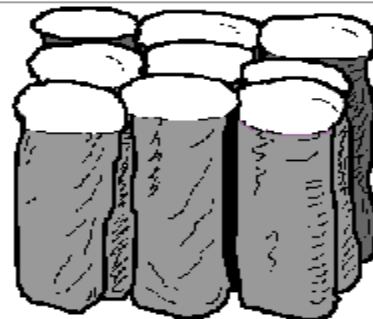
Granular: Resembles cookie crumbs and is usually less than 0.5 cm in diameter. Commonly found in surface horizons where roots have been growing.



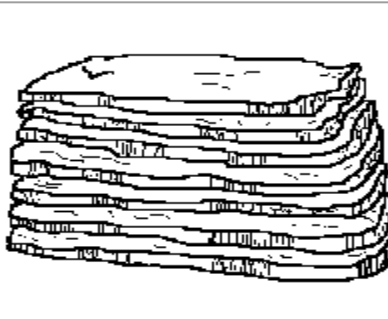
Blocky: Irregular blocks that are usually 1.5 - 5.0 cm in diameter.



Prismatic: Vertical columns of soil that might be a number of cm long. Usually found in lower horizons.



Columnar: Vertical columns of soil that have a salt "cap" at the top. Found in soils of arid climates.

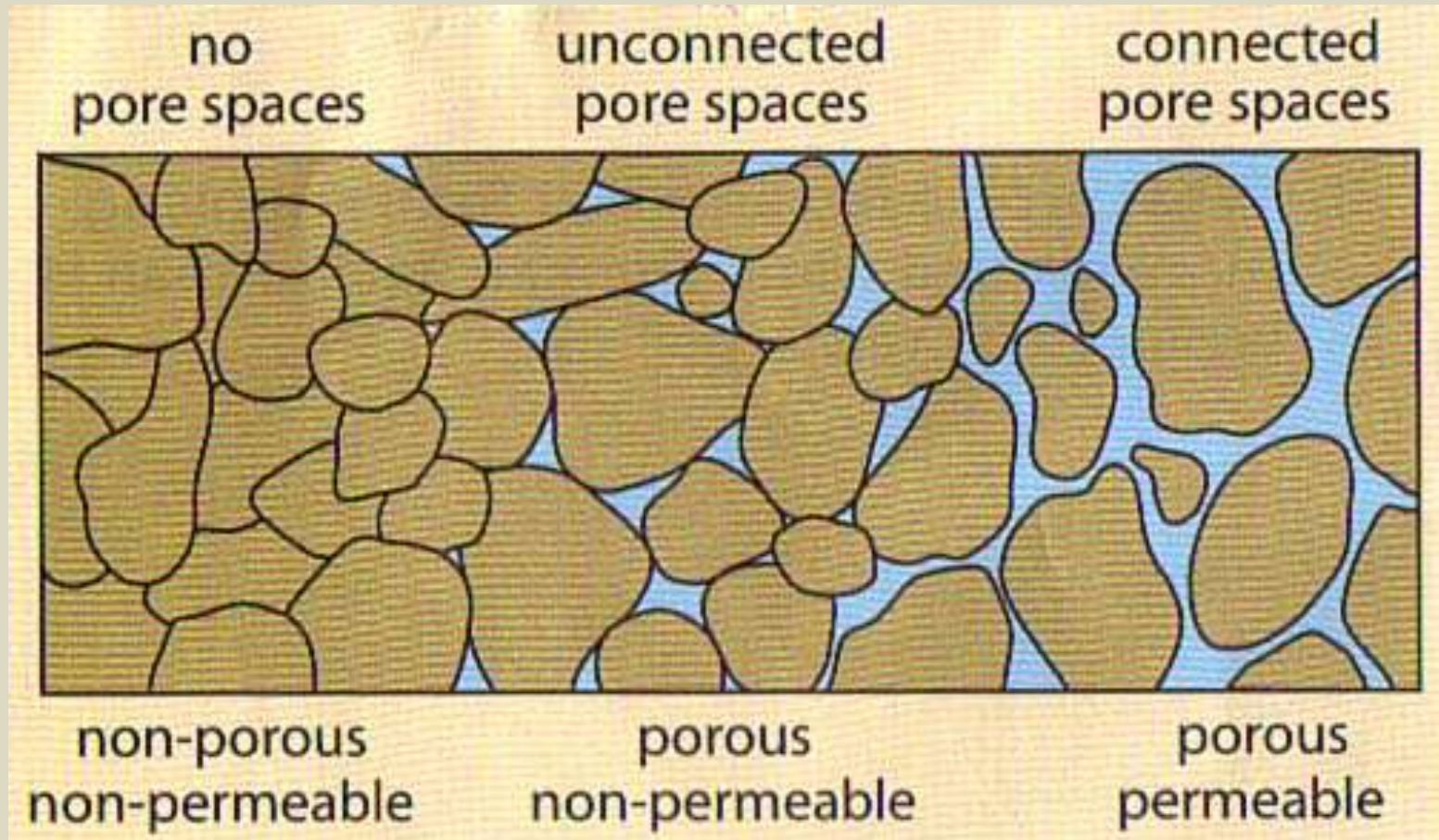


Platy: Thin, flat plates of soil that lie horizontally. Usually found in compacted soil.



Single Grained: Soil is broken into individual particles that do not stick together. Always accompanies a loose consistence. Commonly found in sandy soils.

Soil Physical Properties: Porosity and Permeability



Soil Chemical Properties

Chemical properties of soil

1. **Chemical composition:** consists both organic and inorganic compounds.

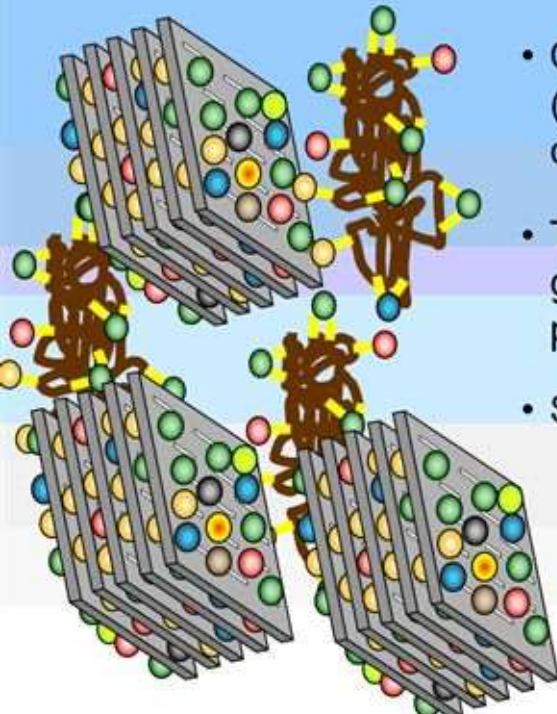
Inorganic: mainly Ca, Mg, Fe, Al, Si, Na, K and traces Mn, Zn, Co, I, Cu. It influences the pH of soil

Organic: proteins, amino acids, aromatic compounds, purine, pyrimidines, sugar, alcohol, fats, oils, resins, waxes and lignin. Organic matter and humus forms the organic compounds.

Chemical nature of soil greatly influences the plant growth and type of vegetation.

Soil Chemical Properties: Cation Exchange Capacity

Cation Exchange Capacity

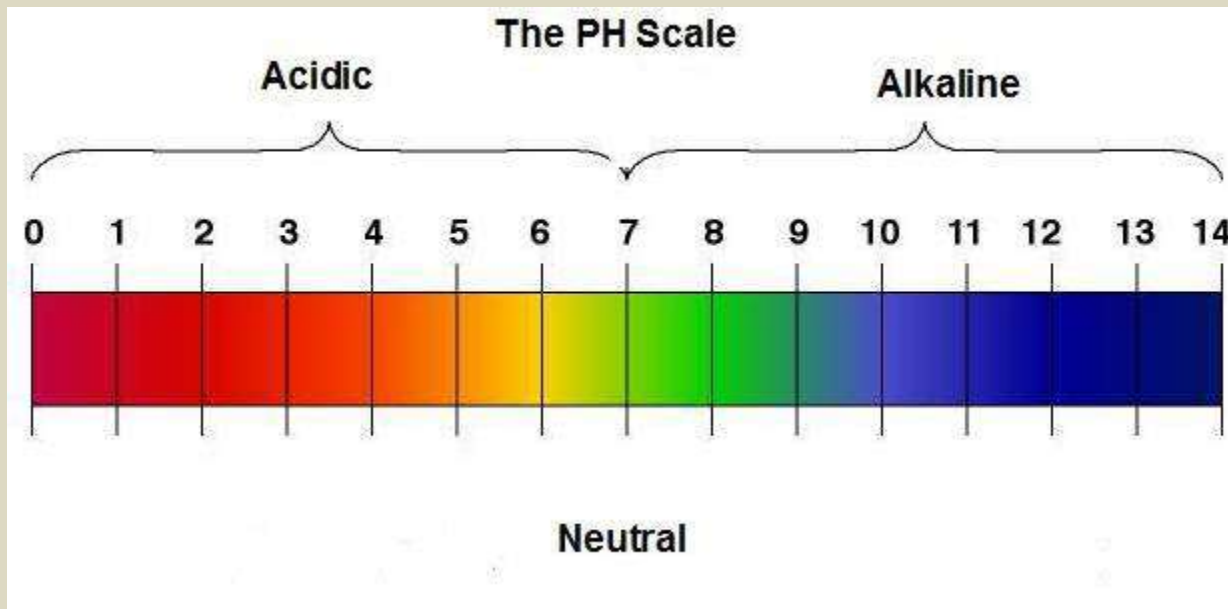


- Cation exchange capacity (CEC) is the total amount of cations that a soil can retain
- The higher the soil CEC the greater ability it has to store plant nutrients
- Soil CEC increases as
 - The amount of clay increases
 - The amount of organic matter increases
 - The soil pH increases

Table 2.3 Common Monatomic Cations and Anions

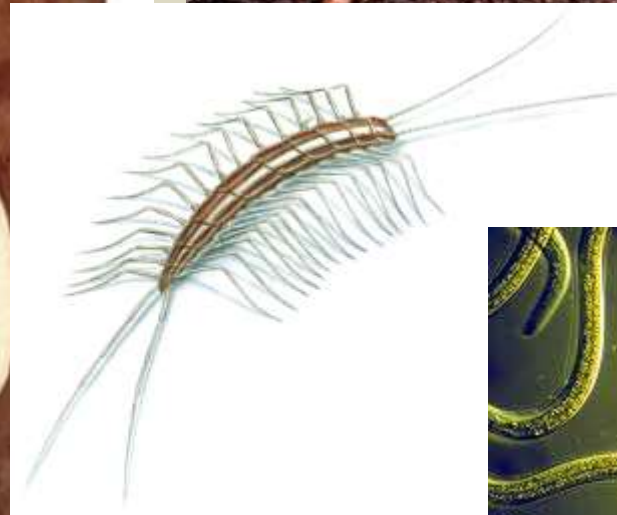
Cation	Name	Anion	Name
H ⁺	hydrogen	H ⁻	hydride
Li ⁺	lithium	F ⁻	fluoride
Na ⁺	sodium	Cl ⁻	chloride
K ⁺	potassium	Br ⁻	bromide
Cs ⁺	cesium	I ⁻	iodide
Be ²⁺	beryllium	O ²⁻	oxide
Mg ²⁺	magnesium	S ²⁻	sulfide
Ca ²⁺	calcium	N ³⁻	nitride
Ba ²⁺	barium	P ³⁻	phosphide
Al ³⁺	aluminum		
Ag ⁺	silver		
Zn ²⁺	zinc		

Soil Chemical Properties: pH



Soil Organisms: Animals

- Rodents, Worms, and Insects!



Soil Organisms: Plants

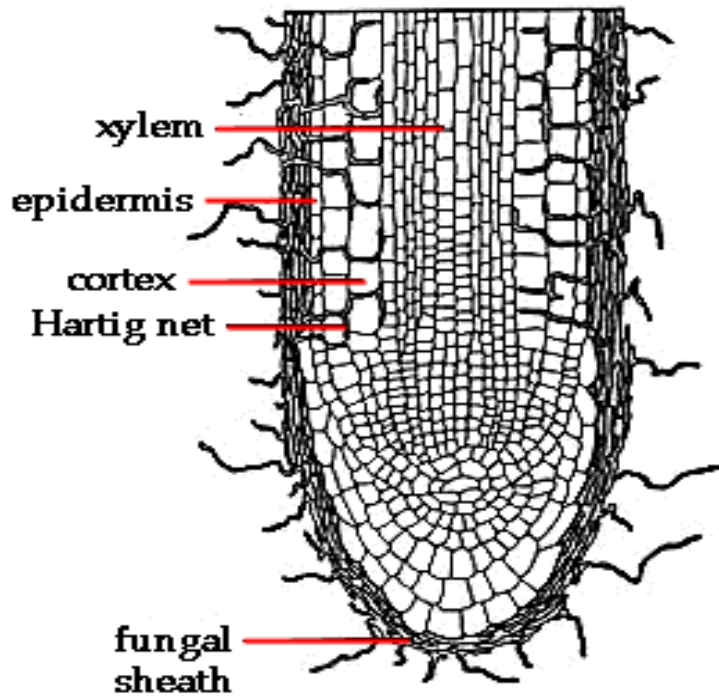


Soil Organisms: Fungi

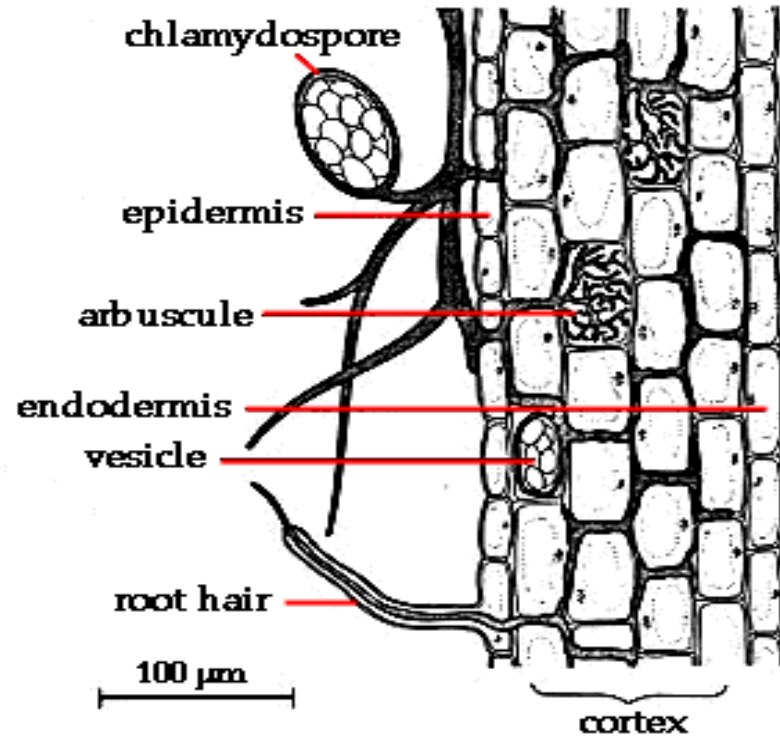


Endo Vs. Ecto

Ectomycorrhizae



Endomycorrhizae



Soil Organisms: Bacteria

Antidepressant Microbes In Soil
How Dirt Makes You Happy

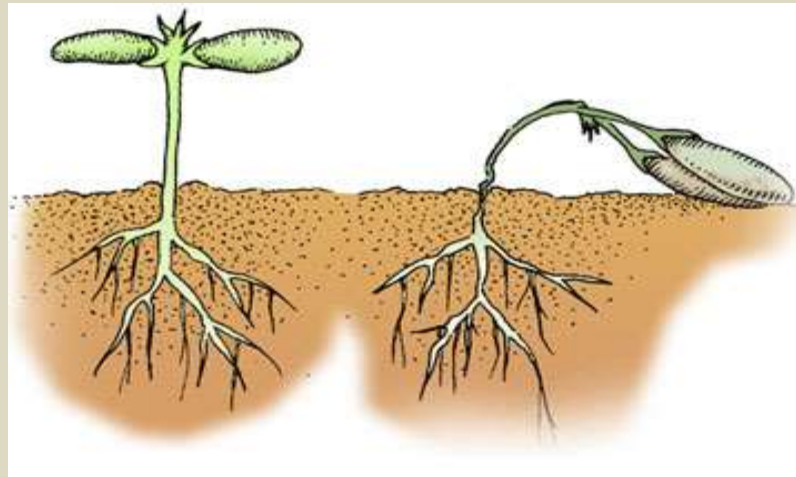


Biological Soil Crusts



Soil Organisms: The Not So Good

- Also harmful bacteria, fungi, and viruses in soil!



Threats to Soil

- Over-farming/Over-grazing



Threats to Soil

- Erosion



Threats to Soil

- Pollution



Threats to soil



Questions?

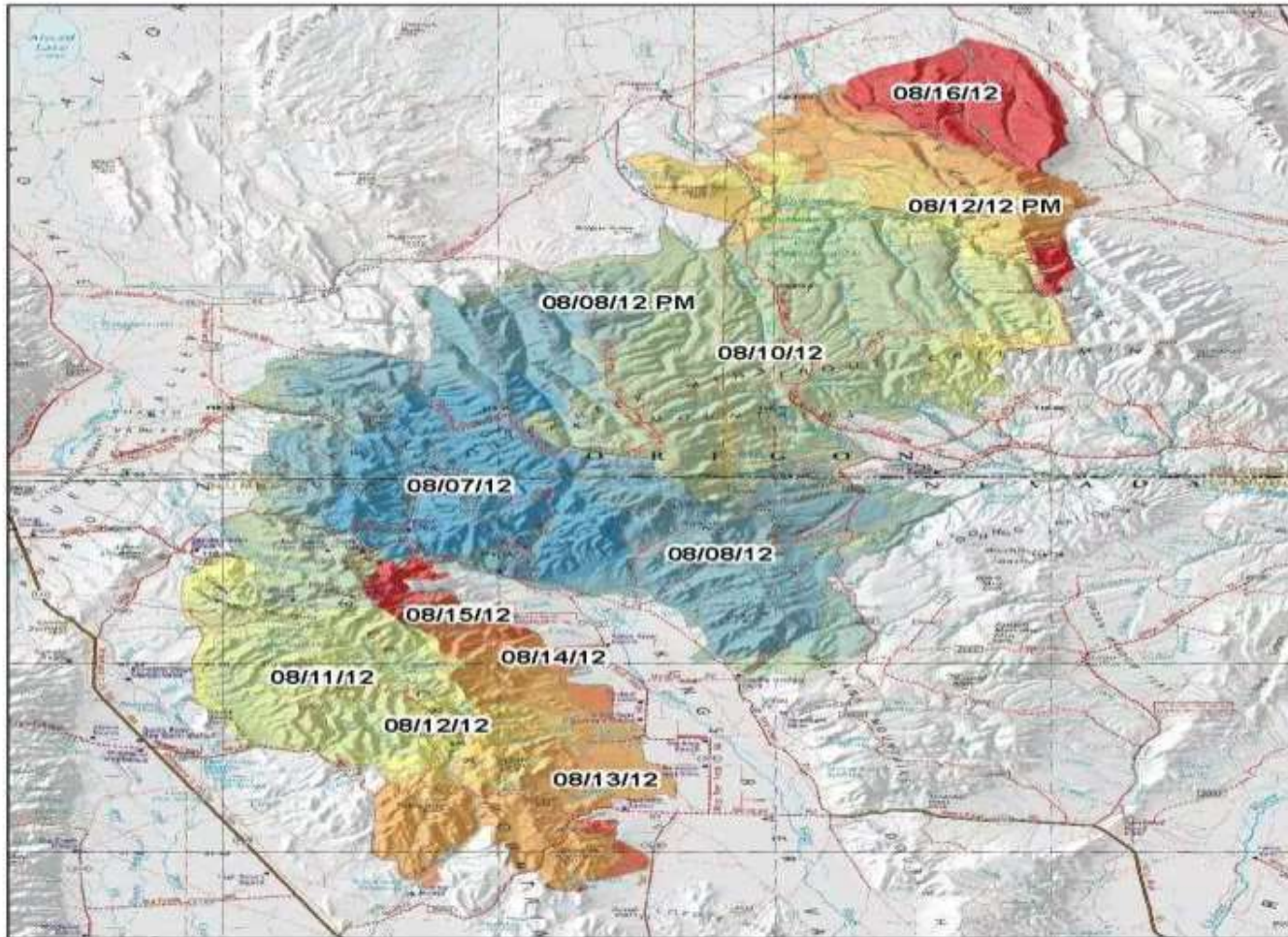
Damping Off.....

- Damping-off is caused by fungi that remain in the soil for long periods of time. Seeds may be rotted and seedlings may be infected and fail to emerge from the soil. Emerged seedlings are also attacked, causing them to wilt and topple over. Water-soaked or brownish lesions are often visible on the stem at the soil line. Plants become more resistant to attack as they mature. Damping-off fungi are more of a problem in cold soils with poor drainage, and in conjunction with overwatering.



Who and Where

- 35,000 sagebrush seedlings for Winnemucca BLM office
- 20' x 20' spacing (110/acre)
- 2,135 acres of restoration on Holloway and Long Canyon Fires



**Holloway Fire
Progression Map
August 16, 2012**



46,370	08/07/12
75,157	08/08/12
20,315	08/09/12 PM
807,563	08/10/12
59,142	08/11/12
17,684	08/12/12
30,619	08/12/12 PM
51,387	08/13/12
13,074	08/14/12
5,328	08/15/12



