Soil Properties

Carolina Medina

Soil & Water Science Dept.

University of Florida

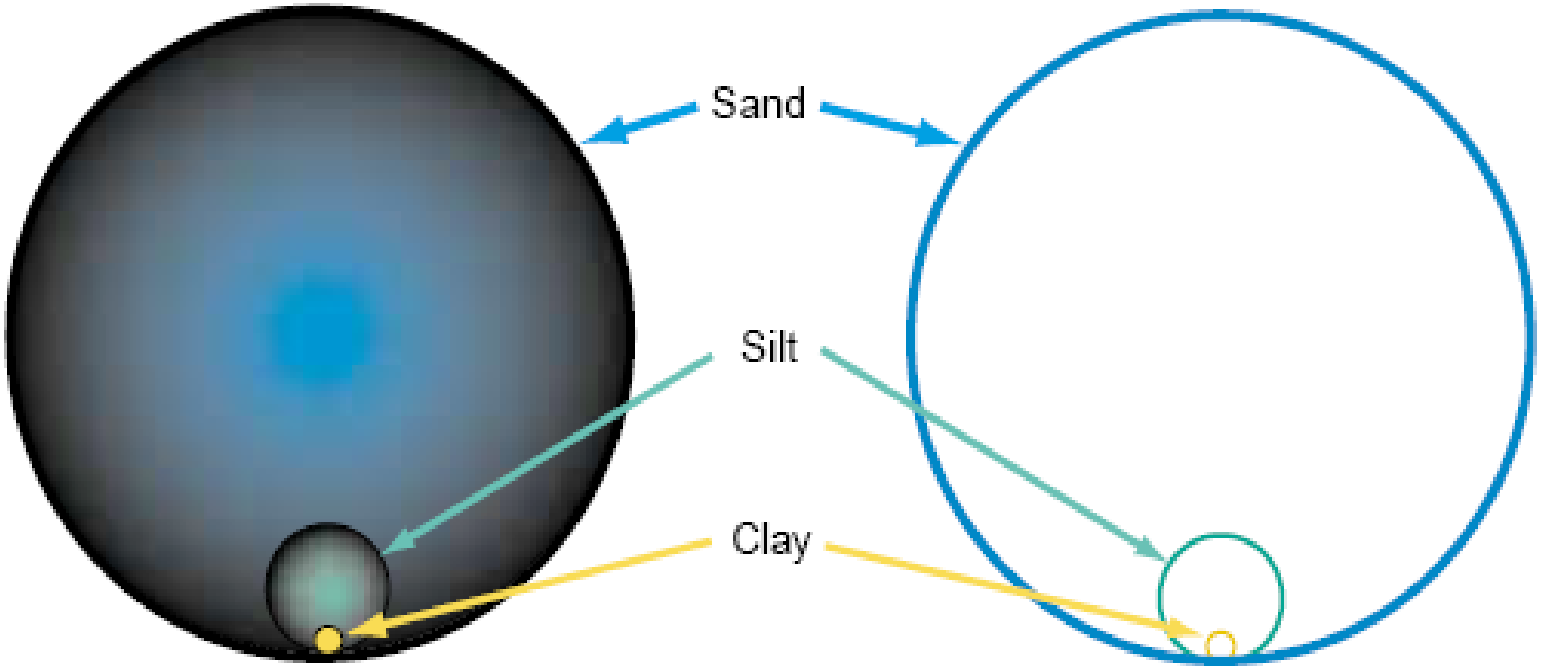
What is soil tilth?

Physical condition of soil in relation to its suitability for growing a crop.

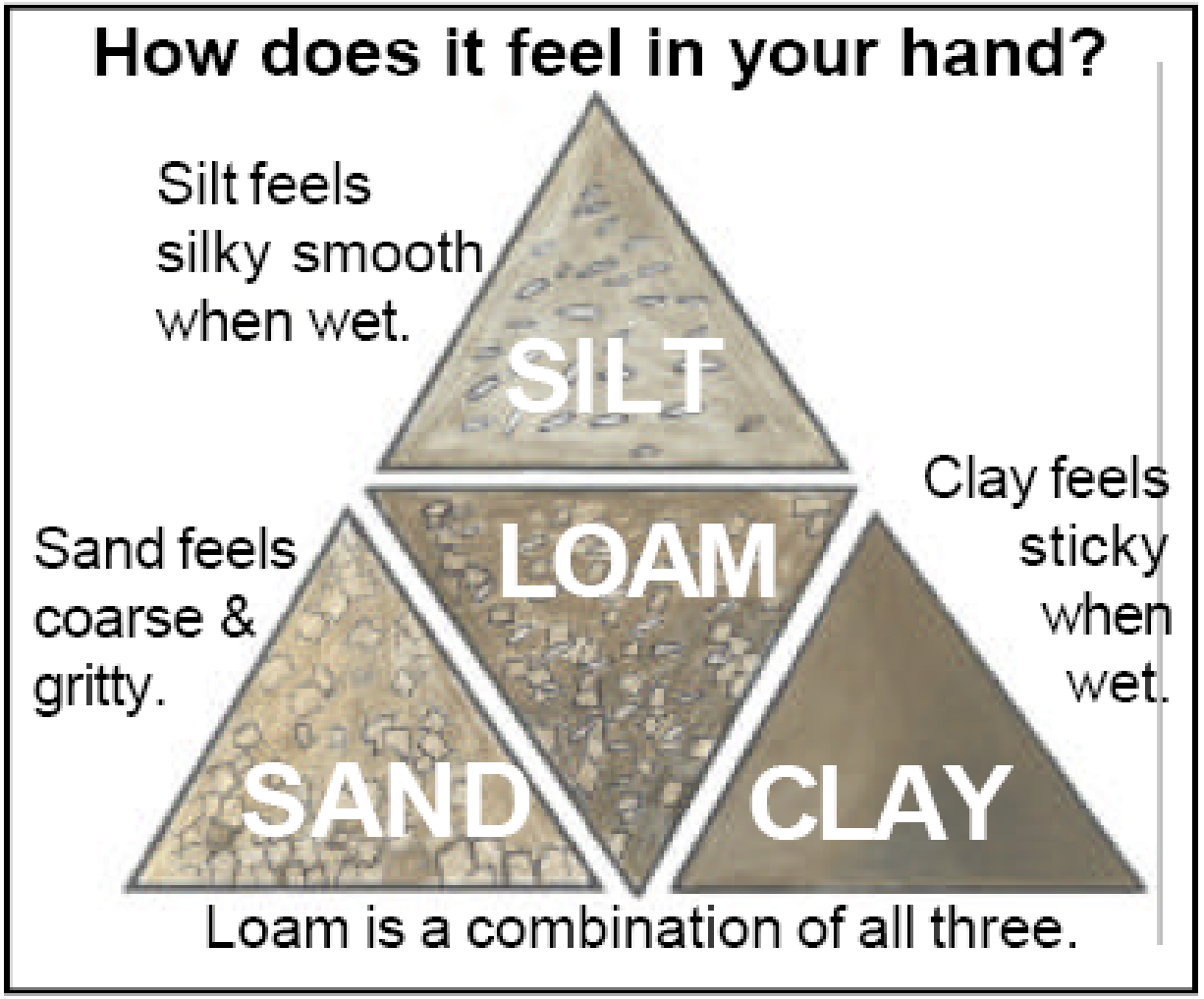
Factors that determine soil tilth:

- Moisture Content
- Degree of aeration
- Rate of water infiltration
- Humus Content

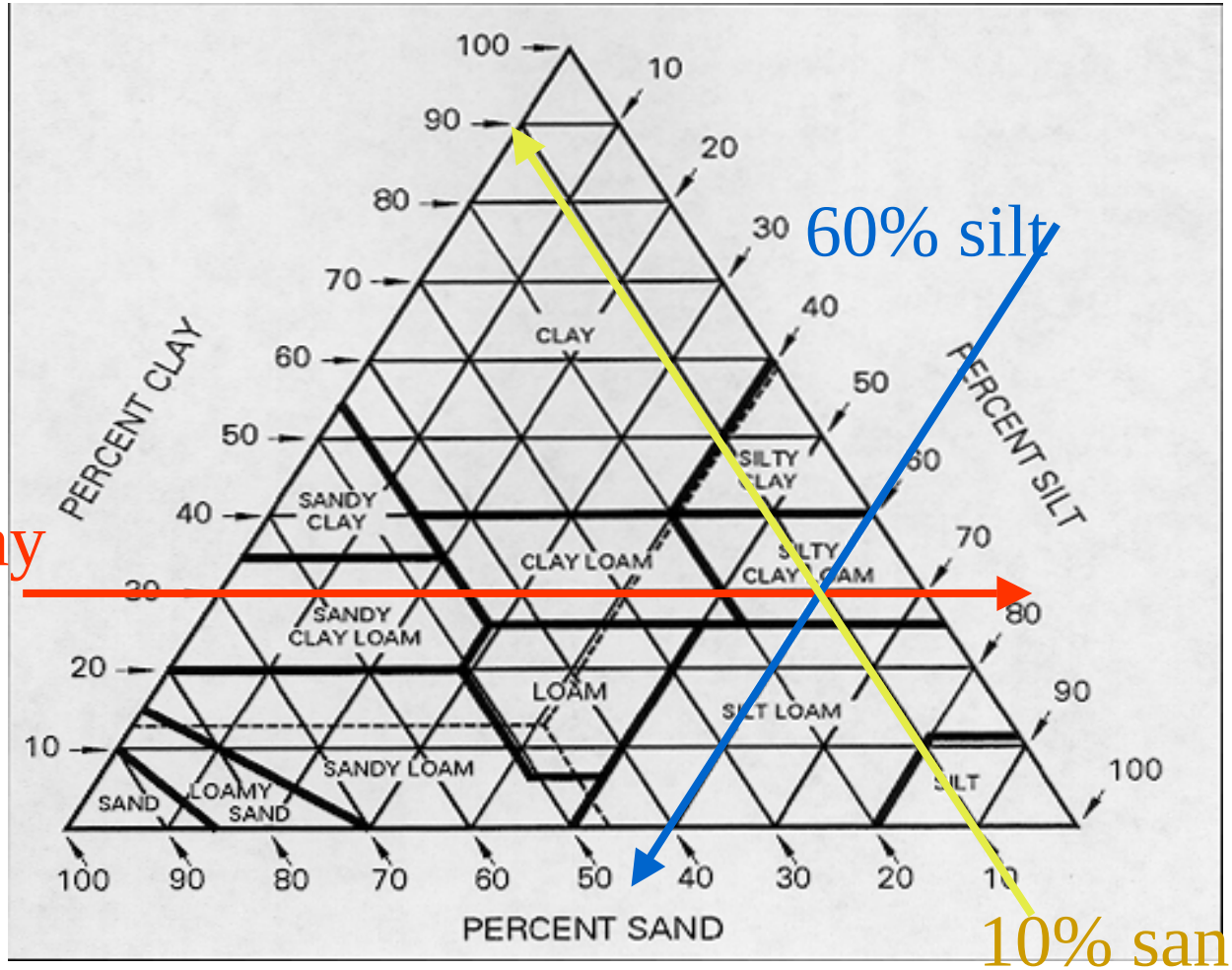
Particle Size: sand, silt and clay



Determination of Soil Texture



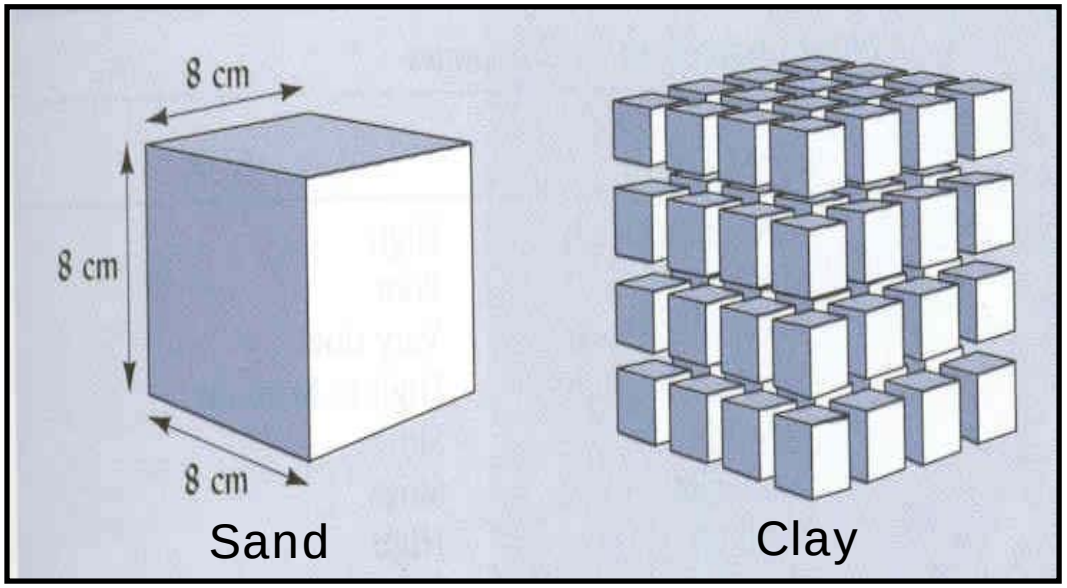
Soil Texture Classification



Surface Area

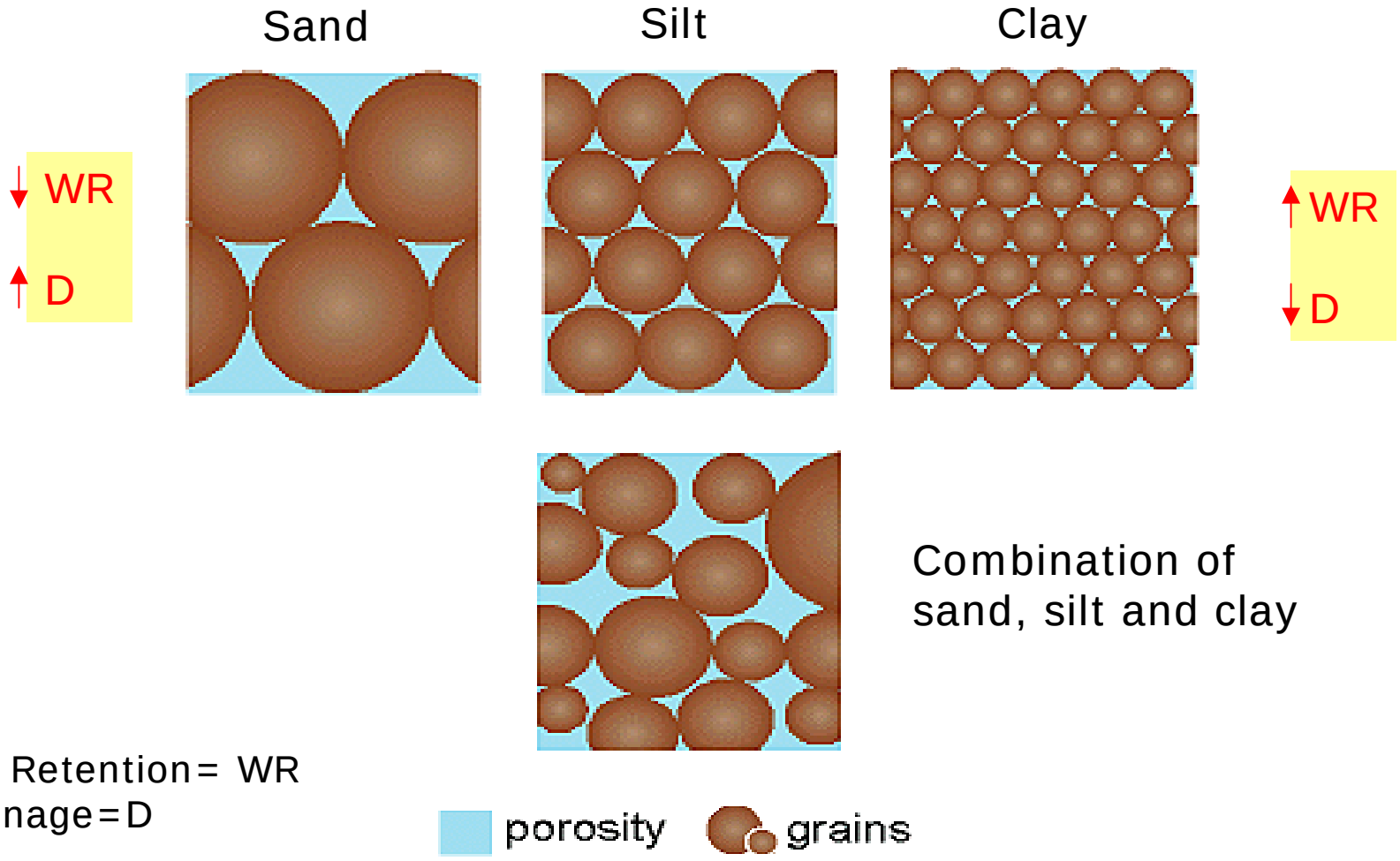
Surface area of a given mass increases as the particles become smaller

384 cm^3



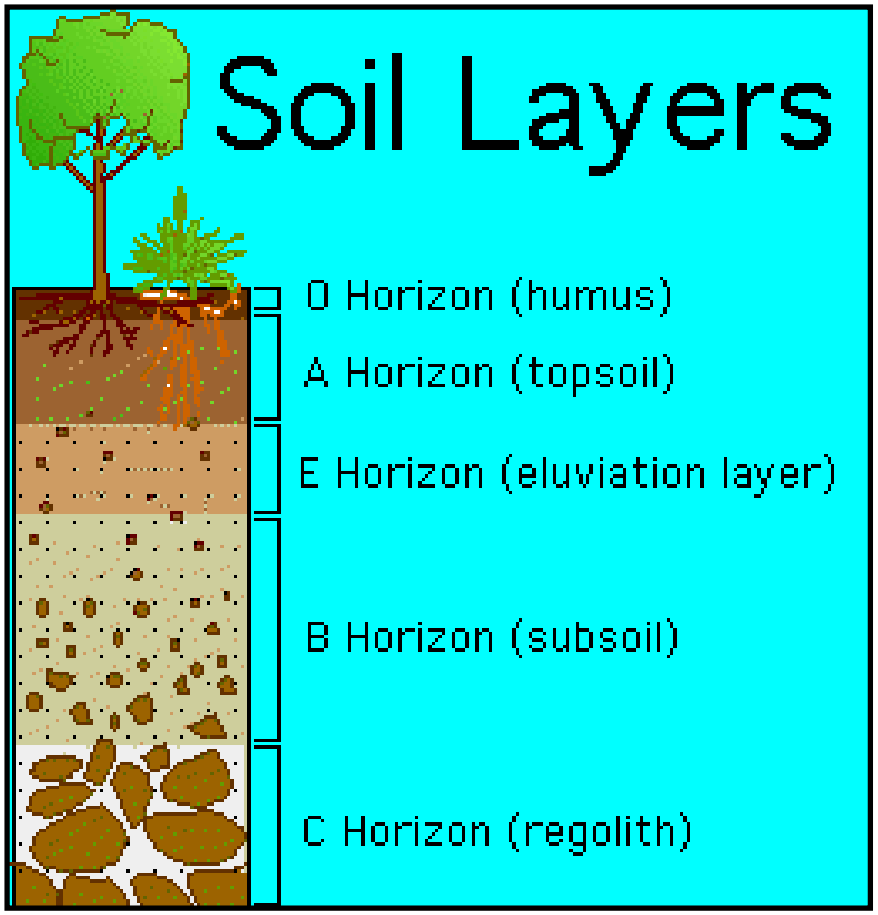
1536 cm^3

Porosity, Water Retention and Drainage



H_2O Retention = WR
Drainage = D

Soil Horizons

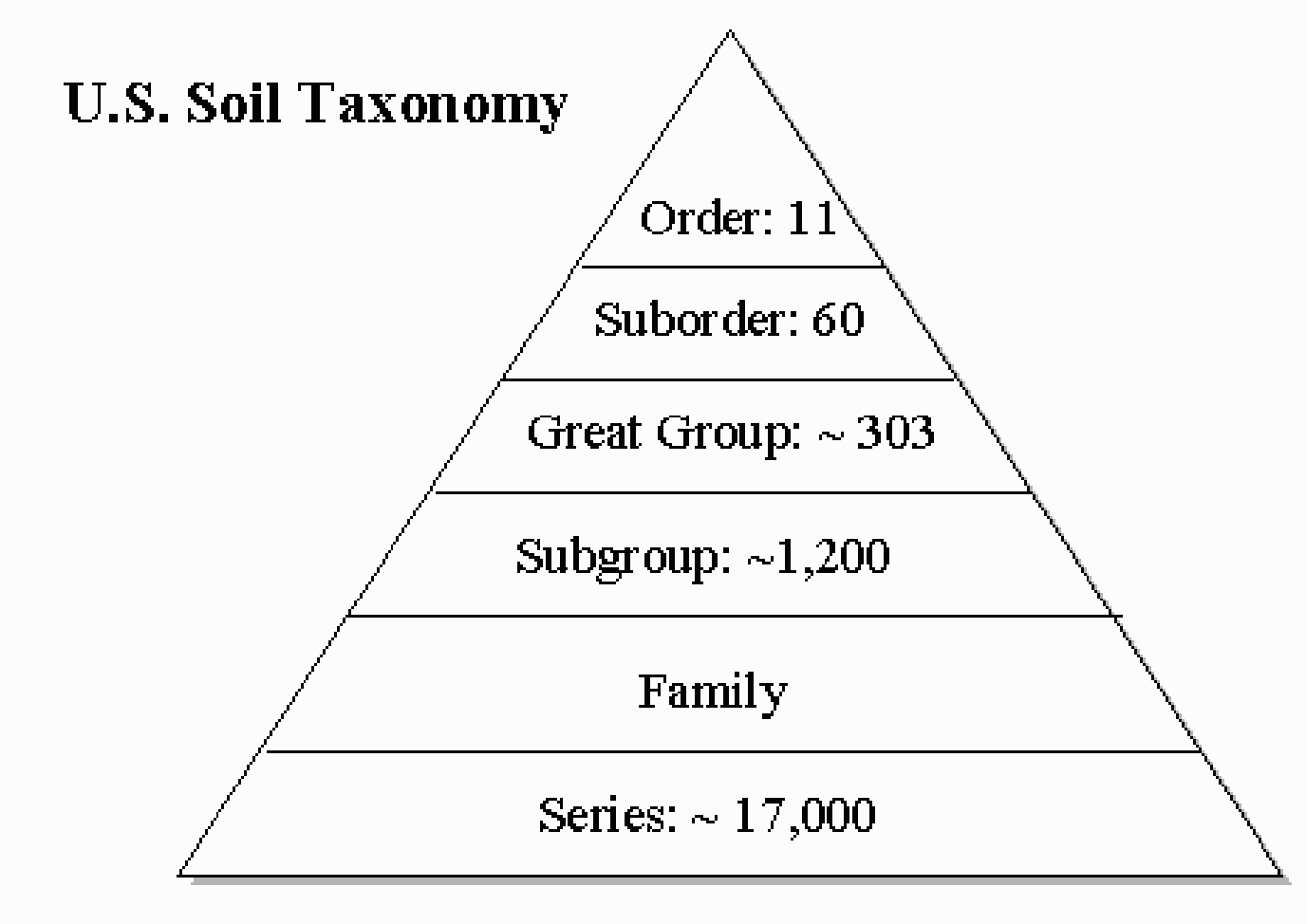


Click on graph for animation

Soil Horizons

- **O horizon**
  - formed from organic litter
- **A horizon**
  - often high in organic matter
- **E horizon**
  - zone of eluviation (leaching)
- **B horizon**
  - zone of illuviation (accumulation)
- **C horizon**
  - parent material

Soil Taxonomy



Soil Order

- Highest hierarchical level to classify a soil. Based on soil forming processes.

- Links for more information:

http://soils.ag.uidaho.edu/soilorders/

http://soils.usda.gov/technical/soil_orders/

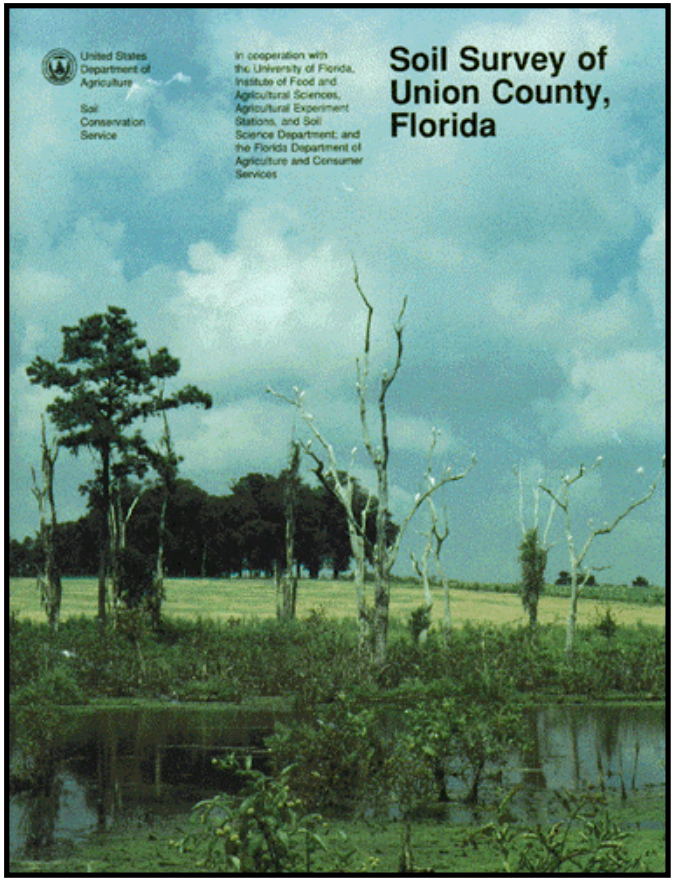
What is soil survey?

A soil survey:

- Examines the physical and chemical properties of the soils in a given area.
- Classifies the soils according to Soil Taxonomy.
- Plots the boundaries of the soils on a map.
- Makes predictions/interpretations about the behavior of soils.

Web Soil Survey (WSS)

- http://websoilsurvey.nrcs.usda.gov/app/

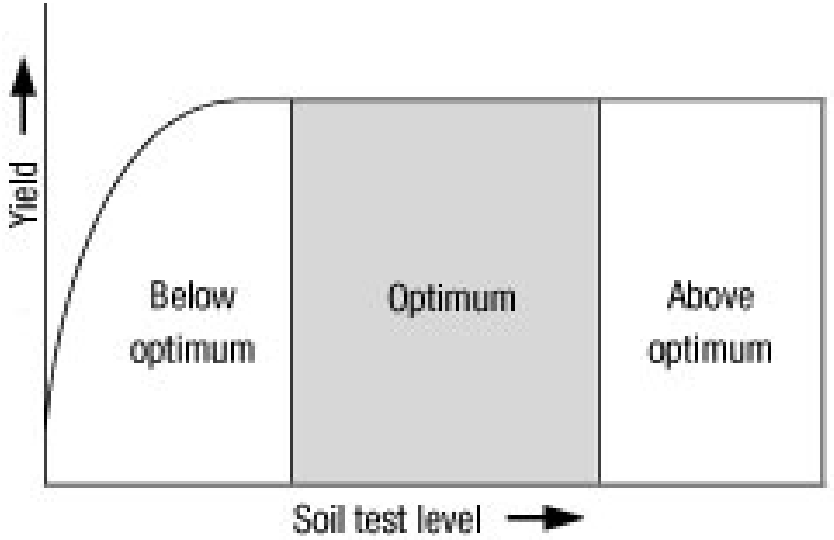


Soil Plant Nutrients

- Primary Macronutrients
  - N, P, K
- Secondary Macronutrients
  - Ca, Mg, S
- Micronutrients
  - Fe, Mn, Zn, B, Cu, Mo, Cl
- Non-mineral nutrients
  - C, O, H

What is soil test?

- A soil test is a process by which elements are chemically removed from the soil and measured for their "plant available" content within the sample.

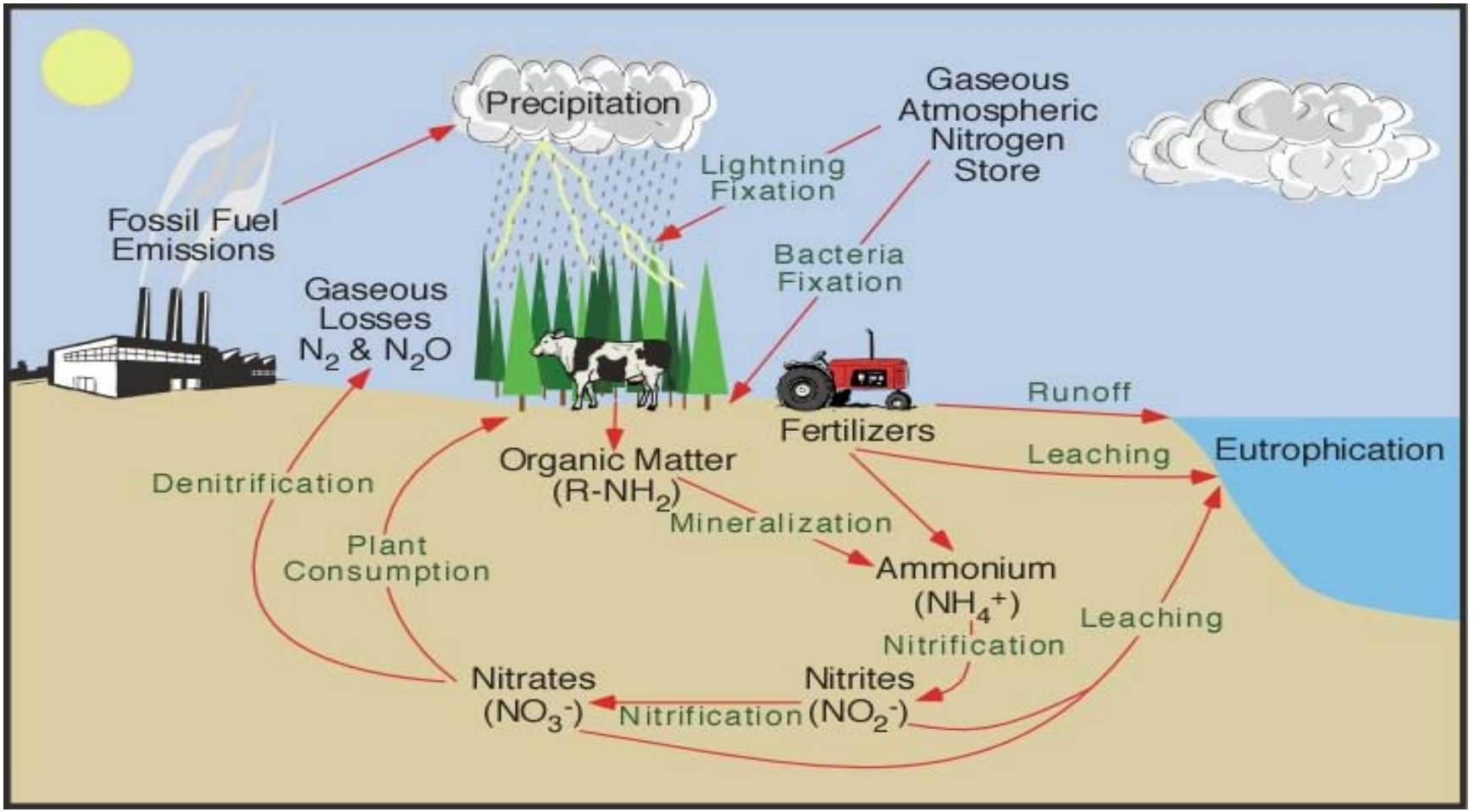


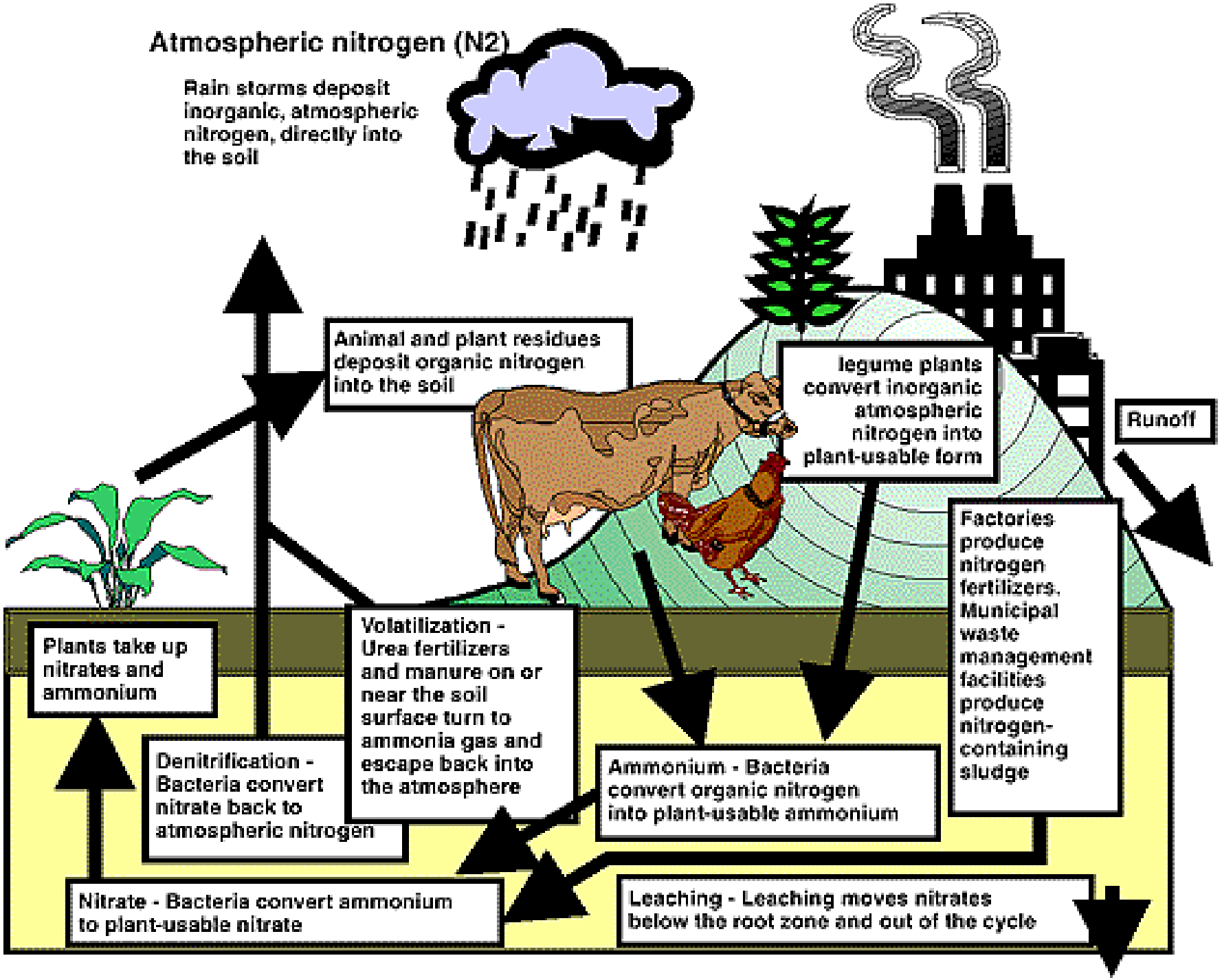
Why Soil Testing is important?

Nutrients from soil

Nutrients from fertilizer

The Nitrogen Cycle




Atmospheric nitrogen (N2)
Rain storms deposit inorganic, atmospheric nitrogen, directly into the soil
Animal and plant residues deposit organic nitrogen into the soil
legume plants convert inorganic atmospheric nitrogen into plant-usable form
Runoff
Factories produce nitrogen fertilizers. Municipal waste management facilities produce nitrogen-containing sludge
Plants take up nitrates and ammonium
Volatilization - Urea fertilizers and manure on or near the soil surface turn to ammonia gas and escape back into the atmosphere
Denitrification - Bacteria convert nitrate back to atmospheric nitrogen
Ammonium - Bacteria convert organic nitrogen into plant-usable ammonium
Nitrate - Bacteria convert ammonium to plant-usable nitrate
Leaching - Leaching moves nitrates below the root zone and out of the cycle