



# Soils

## Soils

Characteristics

Texture

Soil Profile

Soil Types

Threats to Soil



# Soil Characteristics

3 characteristics of soil that affect its value for farming and growing vegetation are:

- 1. Organic Content**
- 2. Mineral Content**
- 3. Soil Texture**

# Soil Characteristics

## 1. Organic Content

A soil's fertility is determined as a ratio of the organic content (dead and decomposing material) to the content of ground bed rock.

# Soil Characteristics

## 2. Mineral Content

- Ex. Potassium, calcium, phosphorous, nitrates etc.
- Varies with precipitation!
- Ex. Heavy rains tend to **leach soils** removing minerals from the root region of soil.

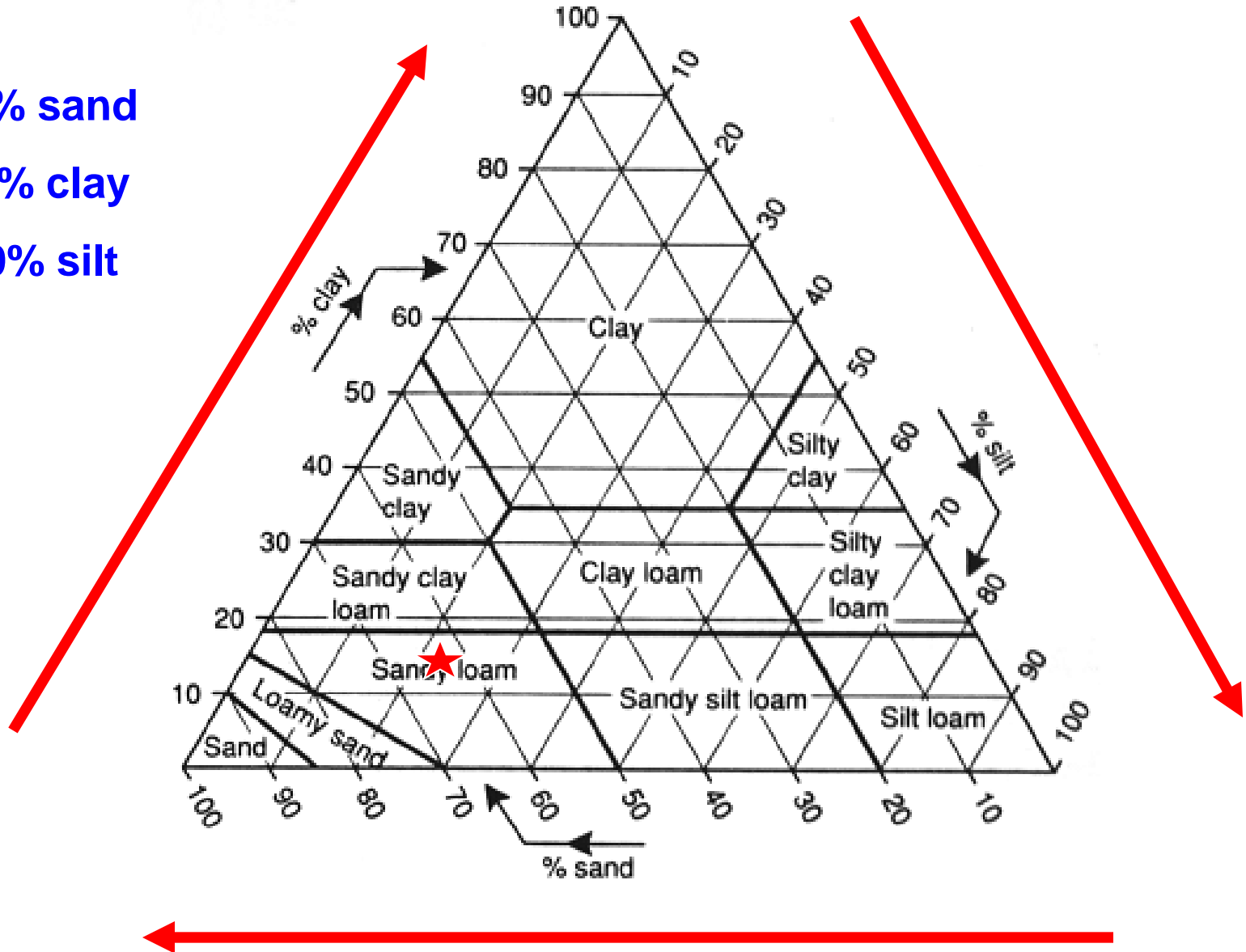
# Soil Characteristics

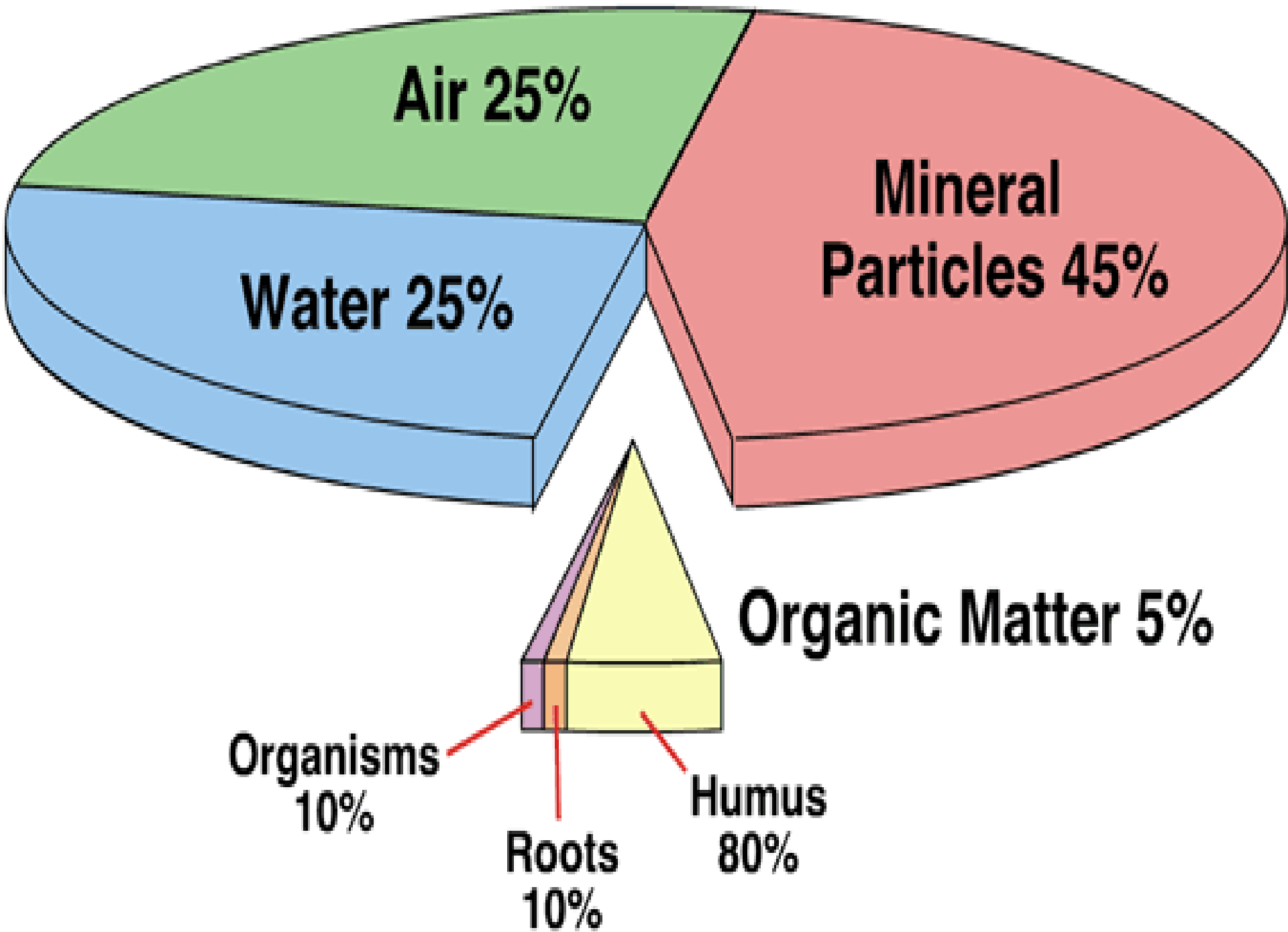
## 3. Soil Texture (pg. 138)

- refers to the mixture of **fine particles** (sand), **very fine particles** (silt) and **extra fine particles** (clay).
- The best texture for agriculture is an even mixture of each (loam).
- **LOAM** is a mixture of these particles that provide **sufficient space** to allow:
  - root penetration,
  - aeration (air flow),
  - nutrient flow and
  - drainage / water retention.

# Triangular graph of Soil Texture

65% sand  
15% clay  
20% silt



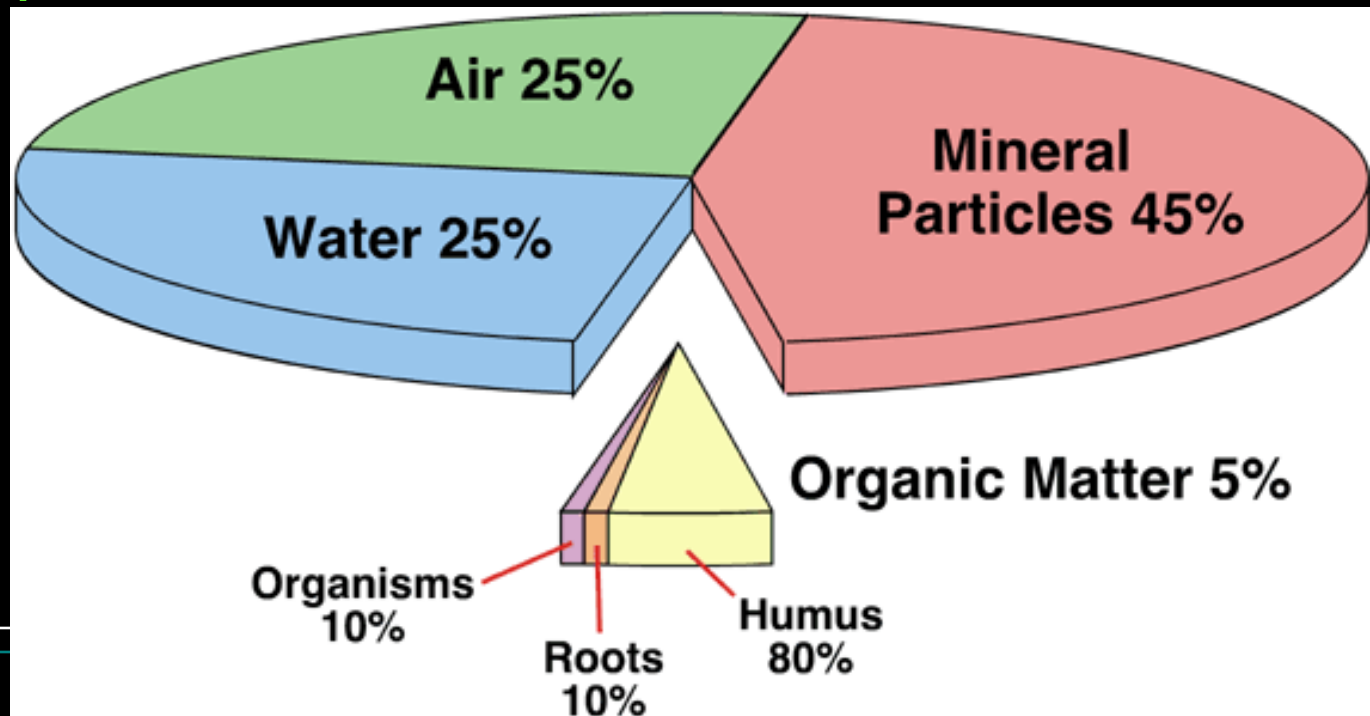




# Soil Characteristics

Most soils contain four basic components:

- Organic matter
- Mineral particles
- Water
- Air



# Soil Characteristics - *Organic Content:*

- Plants and animals aid in the development of a soil through the addition of organic matter (ie. When they die!).
- Fungi and bacteria decompose this organic matter
- Also known as humus. A source of nutrients for plant growth.
- Makes up the upper layer of the soil .
- Colored dark brown to black.

# Soil Characteristics - *Mineral content*

- Originally **part of rocks**
- Broken down by **weathering** of rock
- **Different particle sizes** (sand, silt and clay)
- Some minerals are **nutrients** needed by plants for growth. (Calcium, potassium, phosphorous)

# Soil Characteristics – *Water & Air*

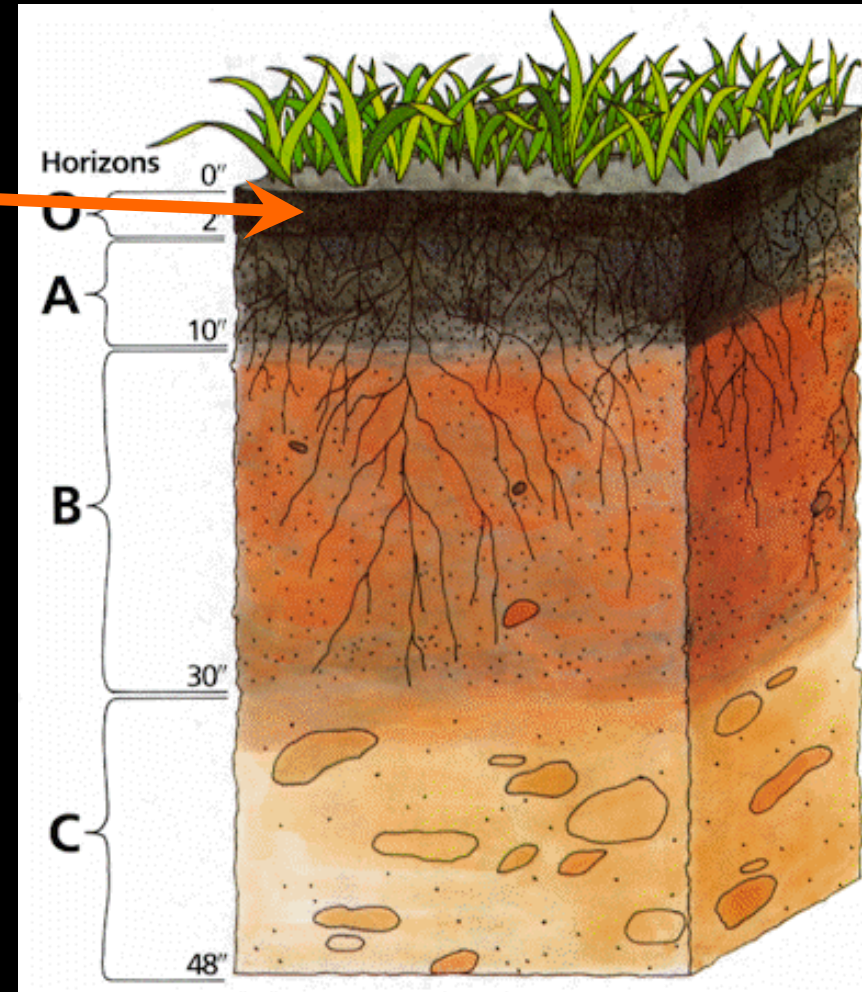
- About half of the total mass of soil is made of up vast **interconnecting cavities or holes**.
- Usually caused by **worms, insects and small animals** that **tunnel** through the soil.
- These holes are filled with **both air and water**.
- The amount of air and the amount of water filling these spaces **varies** dramatically **throughout the year**, and from **location to location**.
- BUT averages about **half each**.

# Soil Characteristics – *Water & Air*

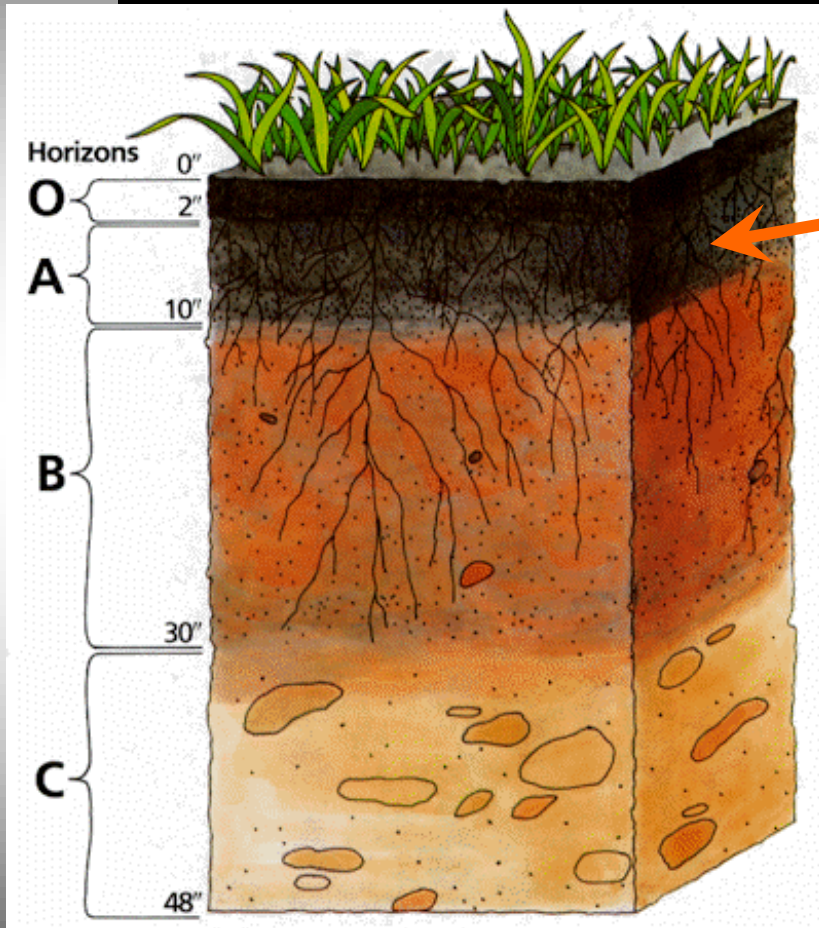
- Plants need air around their roots in order to properly obtain nutrients required for growth.
- Plants need water to grow.
- Water enables physical and chemical weathering to create the various components of the soil.
- Water dissolves and carries minerals and nutrients required by plants to grow.

# Soil Profile

- **O Horizon – “Organic”**
- **HUMUS:** detritus, leaf litter and other organic material **lying on the surface.**
- **dark** because of the **decomposition.**
- decompose into **nutrients** that enrich the soils.



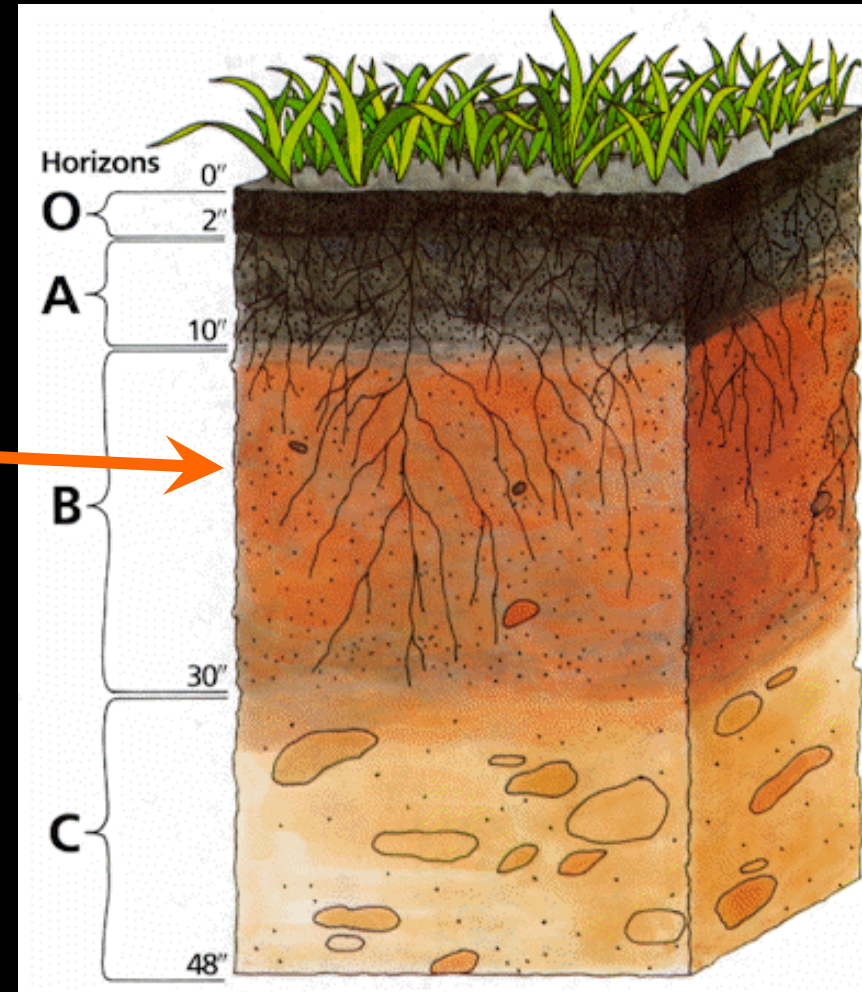
# Soil Profile



- **A Horizon – “Topsoil”**
- darker than the lower layers.
- loose and crumbly with varying amounts of organic matter.
- most productive layer of soil.

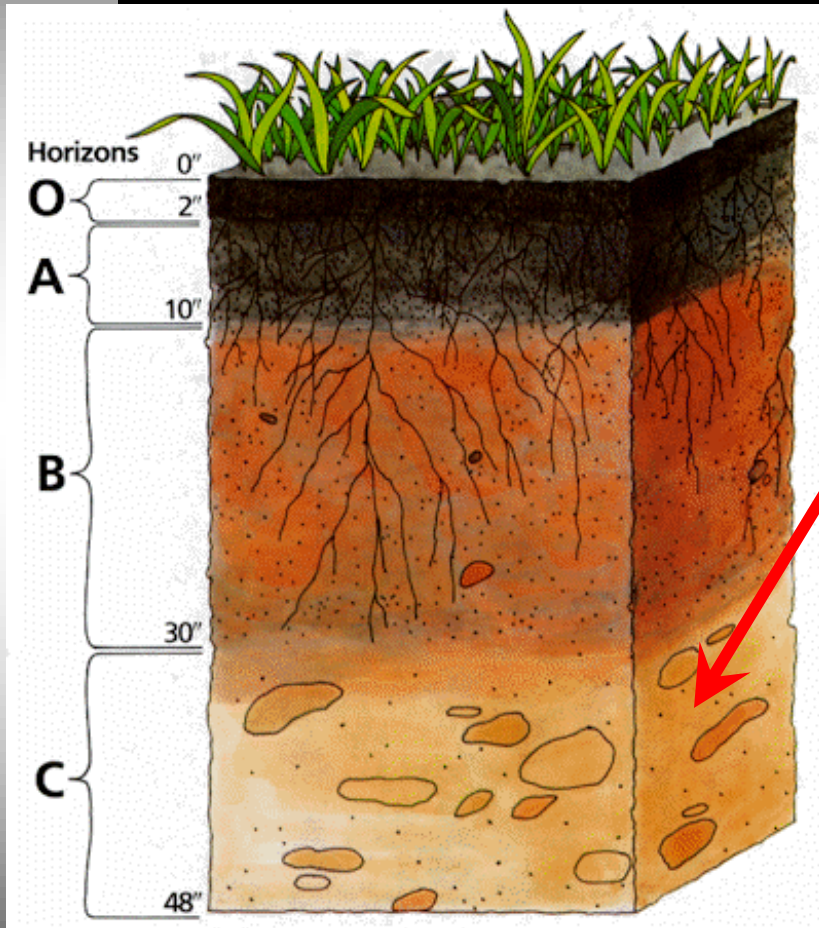
# Soil Profile

- **B Horizon – “Subsoil”**
- **Light colored, dense, and low in organic matter.**
- **materials leached and eluviated from the topsoil accumulate here.**



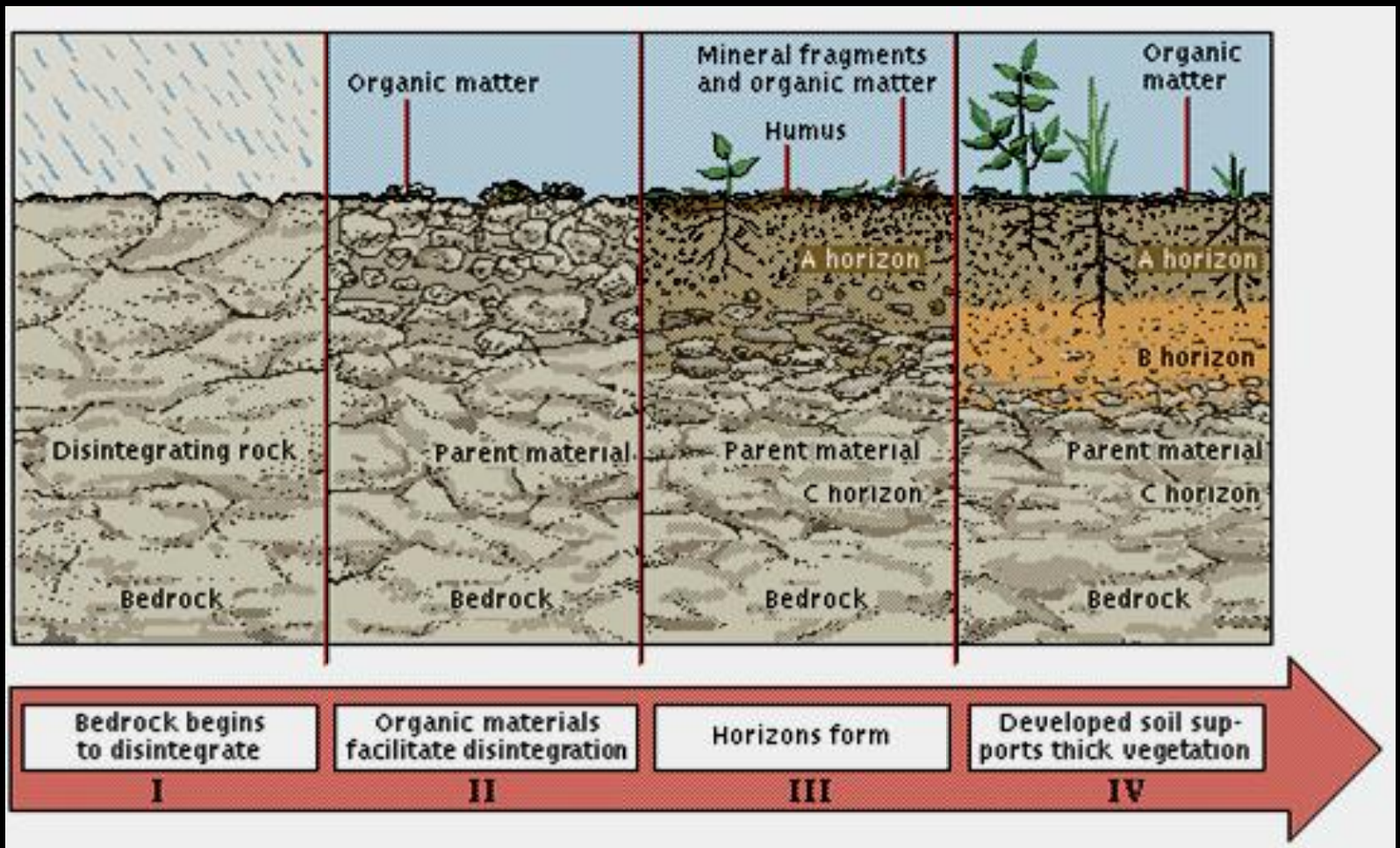


# Soil Profile



- **C Horizon – “Weathered Parent Material”**
- transition area between soil and parent material.
- Partially disintegrated parent material.
- mineral particles.
- less organic/living matter.

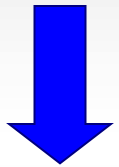
# Soil Advancement



## Differentiate among the terms accumulation of humus, leaching, eluviation and capillary action.



- **Humus** is the accumulation of dead and decayed plant and animal matter that makes up the organic nature of soil. Occurs where there is substantial **plant and animal** growth.



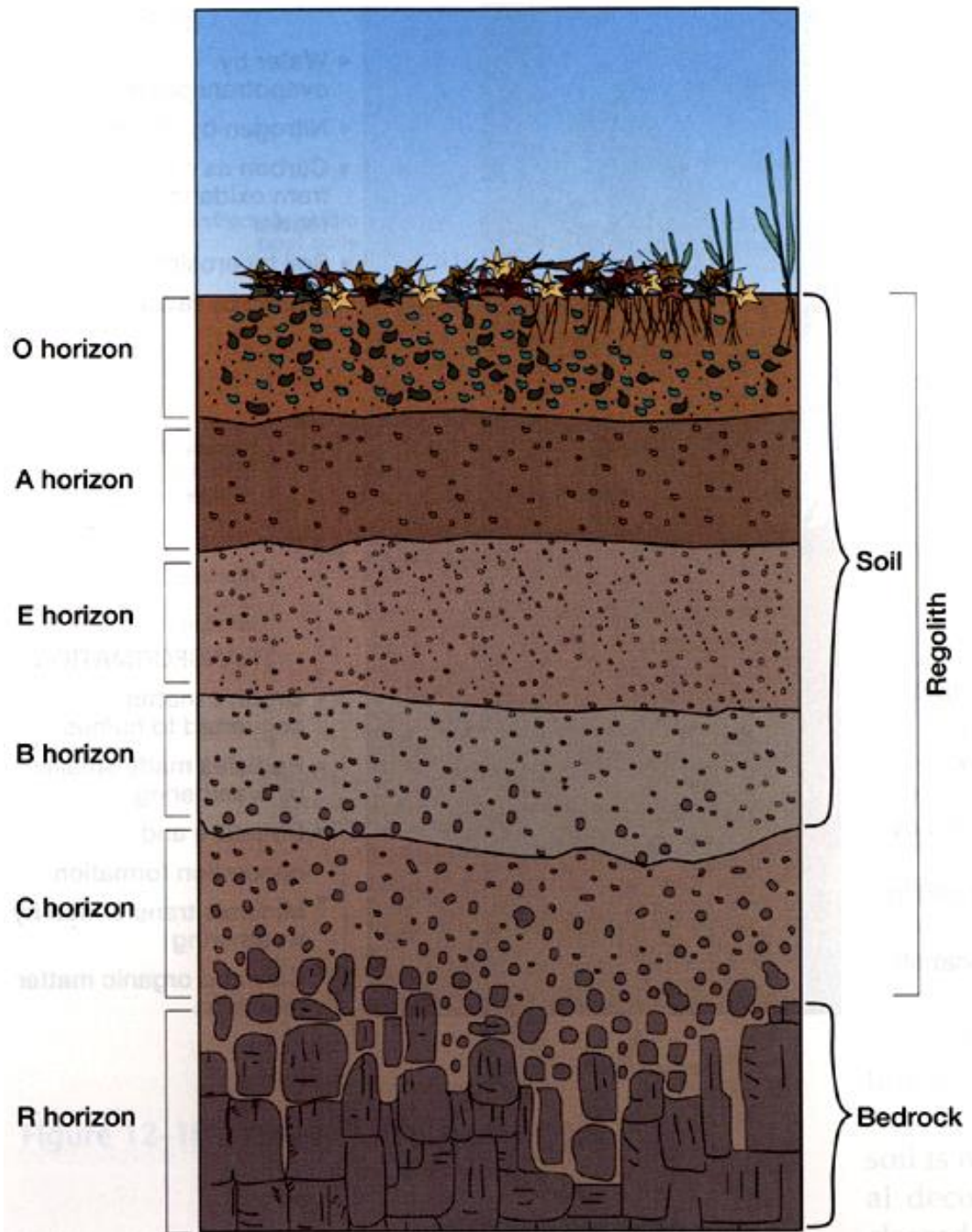
- **Leaching** is the process where nutrients are washed down through the soil with the **movement of liquids/water soluble minerals down** the soil profile. Occurs where there is substantial rainfall.



- **Eluviation** is the lateral or **downward movement of (solids / insoluble minerals) clay and other fine materials** in suspension. Occurs where there is substantial rainfall.



- **Capillary action** results when water molecules are attracted to clay particles and **drawn upward** through the soil profile. Occurs where it is substantially dry.



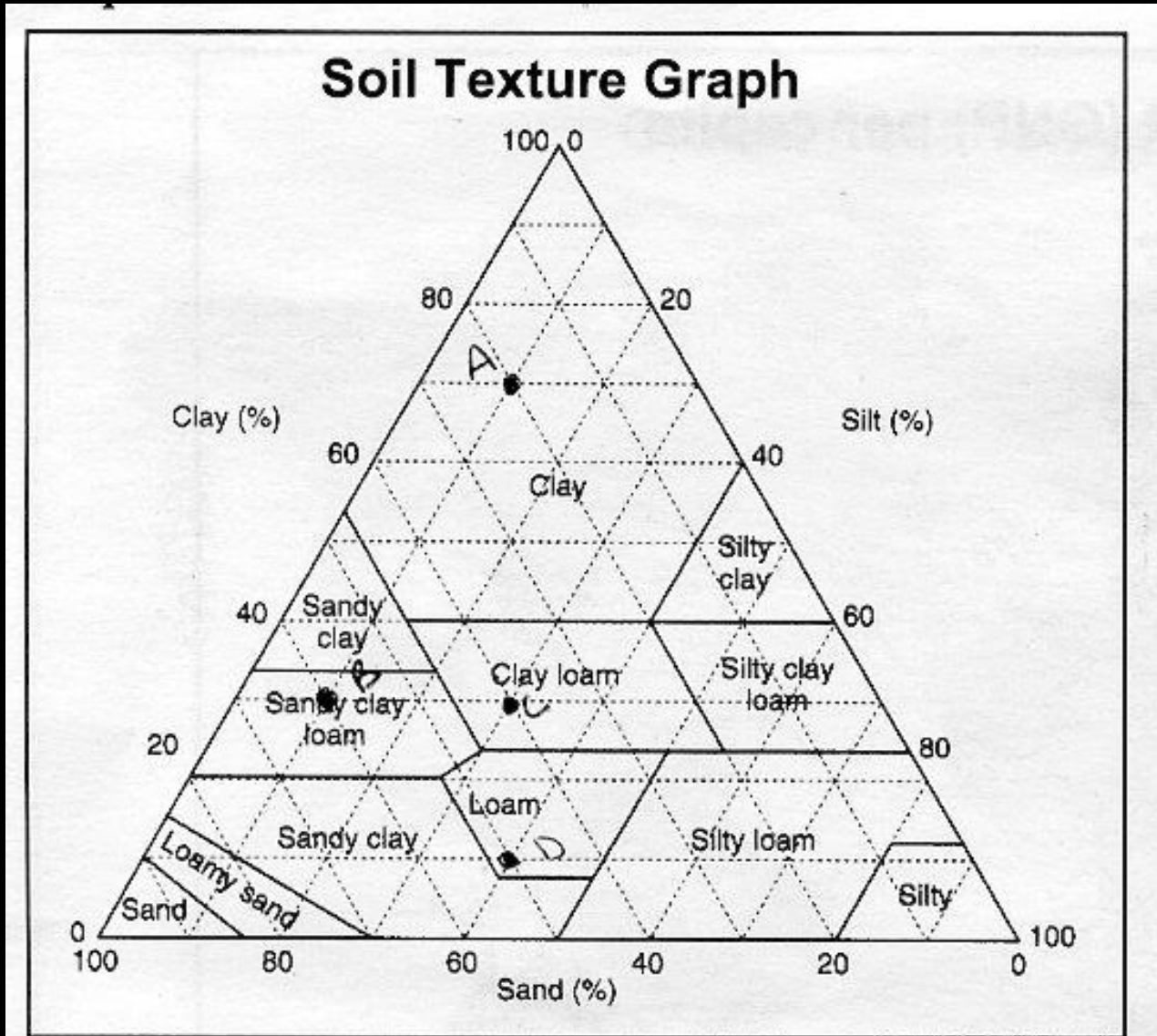
Using the triangular graph of soil texture, which combination would make the poorest soil?

A) 20% sand, 70% clay, 10% silt \*

B) 60% sand, 30% clay, 10% silt

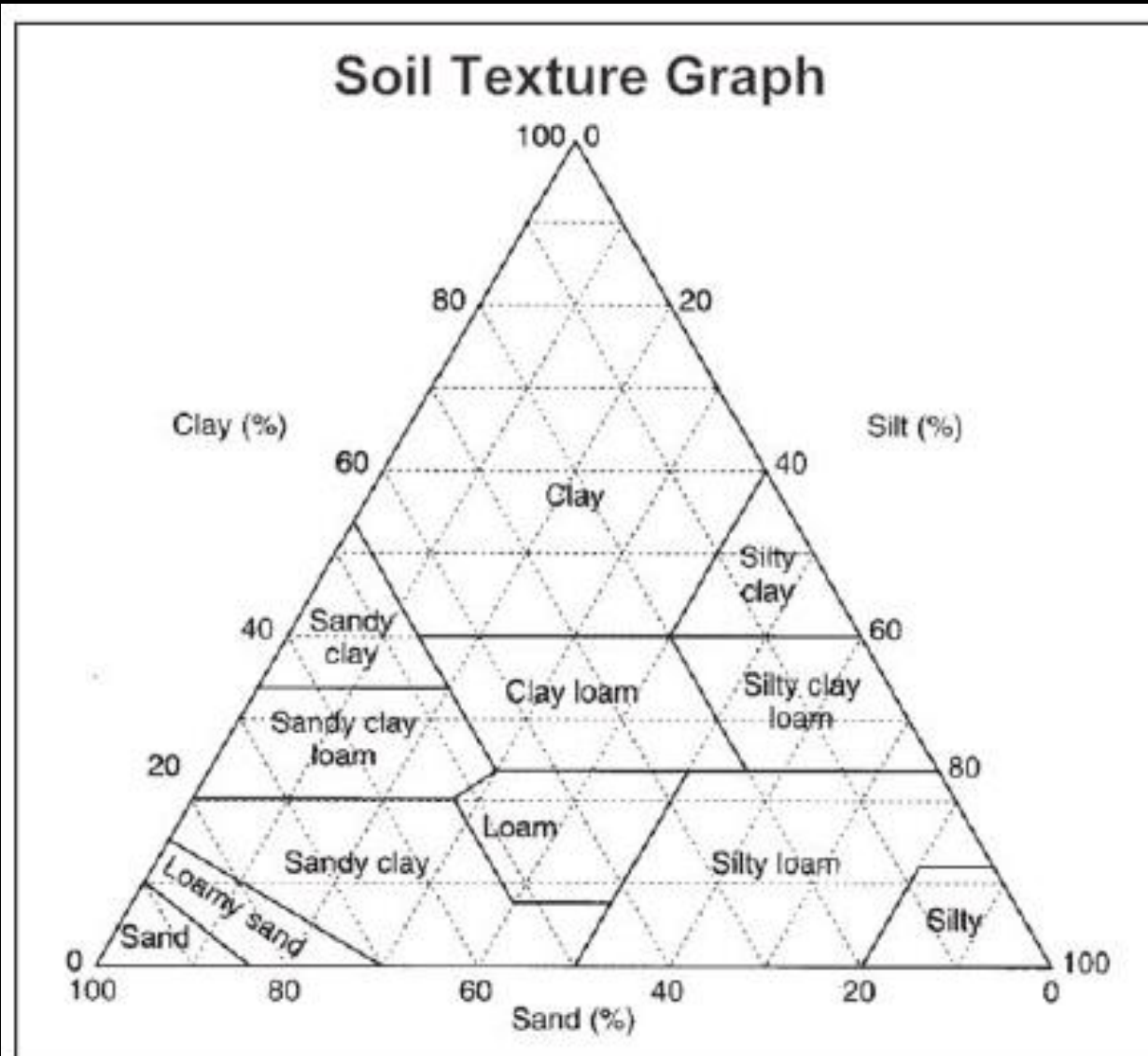
C) 40% sand, 30% clay, 30% silt

D) 50% sand, 10% clay, 40% silt



Using the triangular graph of soil texture, which condition would make the least favourable soil for farming?

- (A) 40% sand, 20% clay, 40% silt    (B) 30% sand, 10% clay, 60% silt  
(C) 25% sand, 60% clay, 15% silt    (D) ~~50%~~ 50% sand, 10% clay, 40% silt



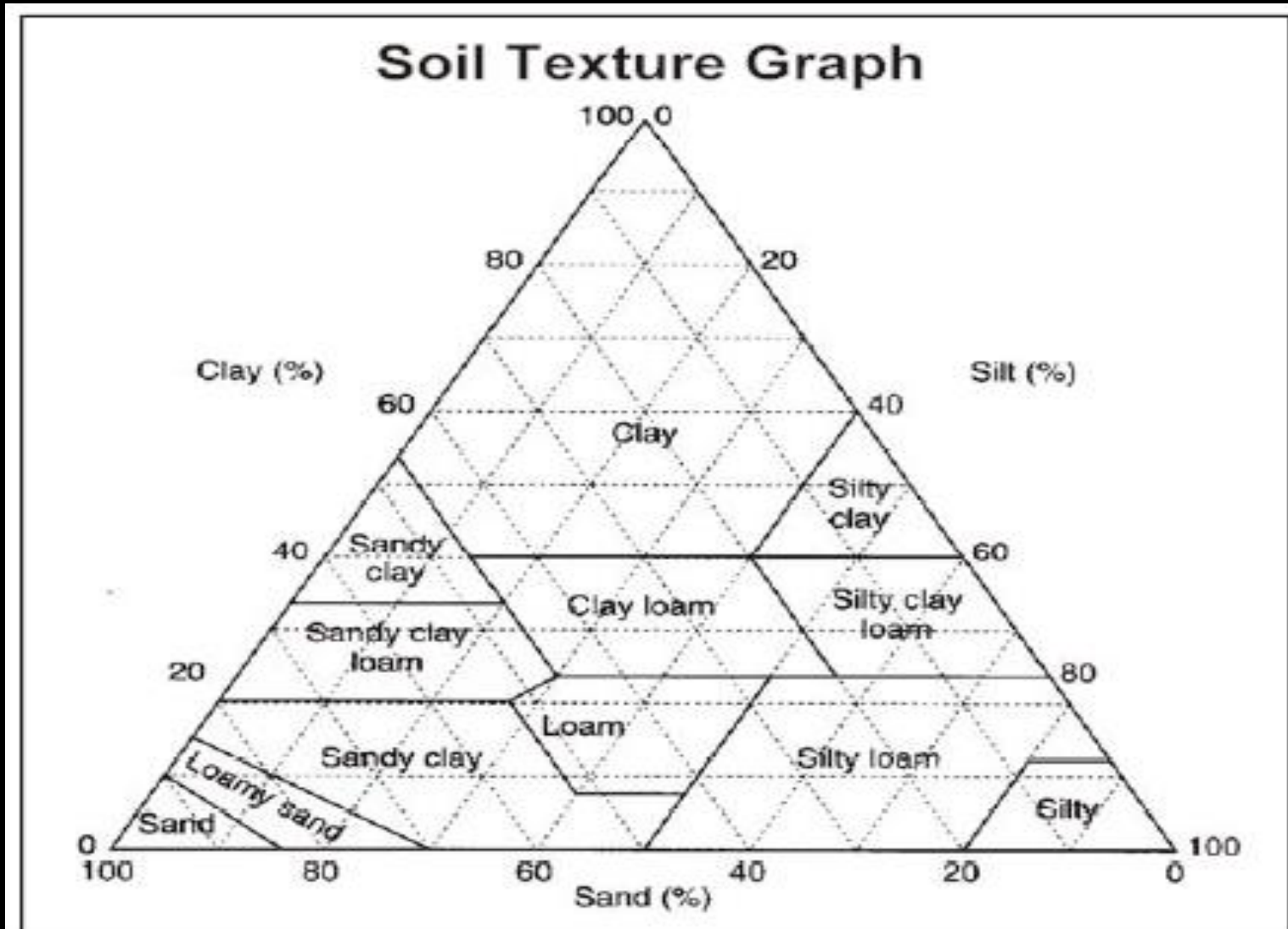
Using the triangular graph of soil texture, a soil texture combination of 20% sand, 10% clay and 70% silt would constitute which soil type?

(A) sandy clay

(B) sandy loam

(C) silty clay

(D) silty loam \*



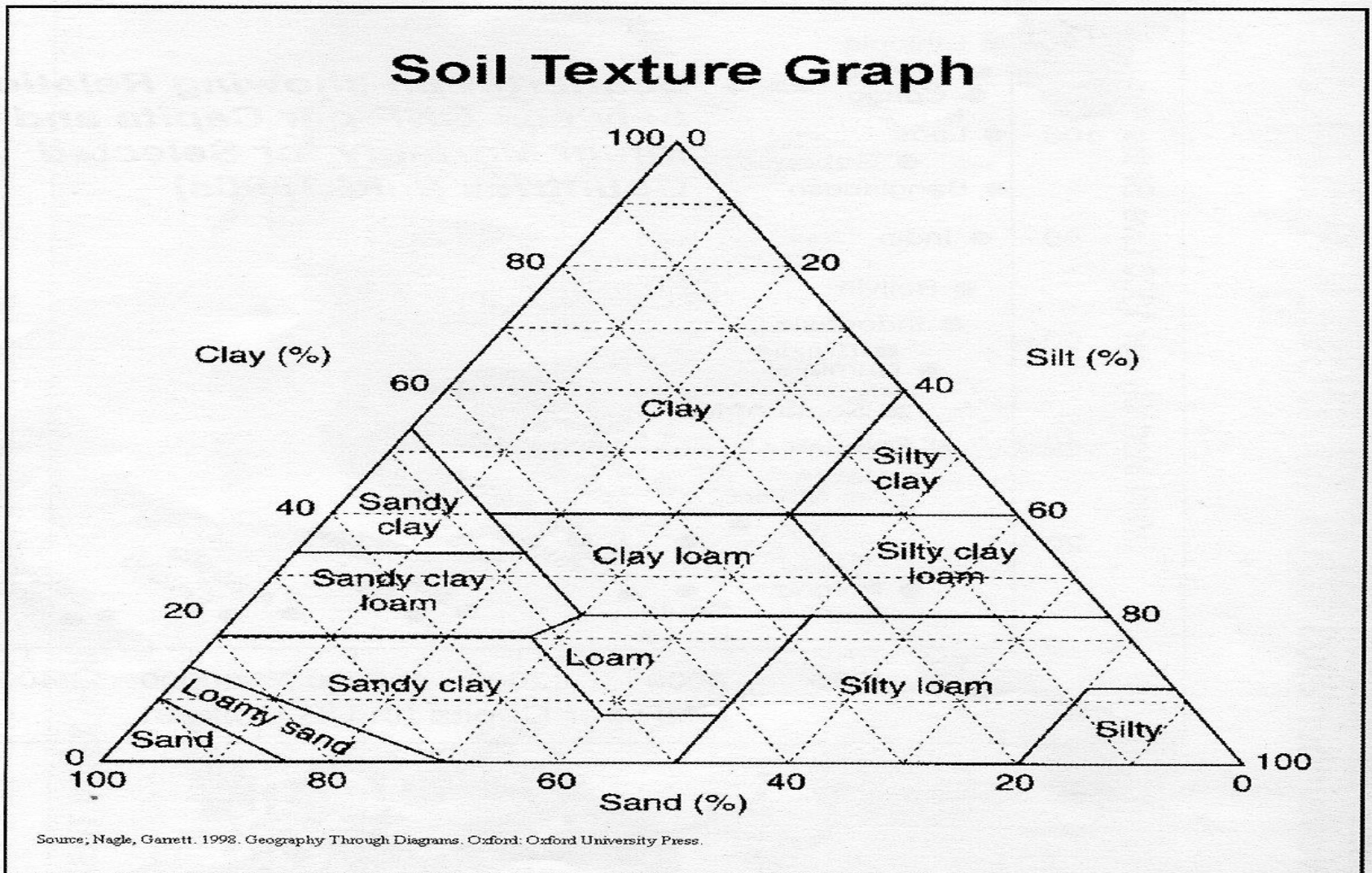
Using the triangular graph of soil texture below, which combination would make the most favourable soil for farming?

(A) 10% sand, 15% clay, 75% silt

(B) 15% sand, 55% clay, 30% silt

(C) 20% sand, 70% clay, 10% silt

(D) 50% sand, 20% clay, 30% silt \*





Which process transports soluble inorganic matter downward through the soil?

- A) accumulation of humus
- B) capillary action
- C) eluviation
- D) leaching




Which term refers to the process by which particles of insoluble inorganic matter are transported downward through the soil?


- (A) accumulation of humus
- (B) capillary action
- (C) eluviation
- (D) leaching



Which refers to the upward movement of soluble material through the soil by water?

- (A) capillary action 
- (B) eluviation
- (C) erosion
- (D) leaching

Which term refers to the process by which minerals and dissolved salts are transported upward through the soil?

- (A) accumulation of humus
- (B) capillary action 
- (C) eluviation
- (D) leaching