

Soil Composition

Mineral: 45%

Organic: 5%

Air: 25%

Water: 25%

Mineral Matter:

Stones, Sand, Silt and Clay

Broken down rock

Particle size : Parent material

Some are soluble -> Plant food

Organic Matter:

Plant litter

Micro-organisms

Worms, mites, slugs

Decay to form humus

Worms churn into soil

Air + Water:

In pores

Essential for plant growth

Important for organisms

Water contains dissolved minerals

Soil Characteristics

Texture

Sand/gritty > Silt/silky > Clay/sticky
Ability to retain water + Nutrients
Ease of root penetration

Structure

Clumps of peds
Crumb (+Drainage+Air)
Platy (-Impede roots-Hold up water)
Blocky (-Few pores)

pH

3 > 7 > 10
Effects what can grow in it

Humus

Dark brown/Black
Improve structure

Moisture

Plants receive nutrients through water
Water disperses nutrients
Texture + Structure influence moisture
Sandy > Dry
Clay + Silt > Wet + can become waterlogged
Loam > Well drained/moist/fertile
Bedrock > Permeable/Impermeable

Colour

Brown + Black > High humus
Grey > Leached + Infertile
Red > Iron oxide

Factors Effecting Soil Formation

Climate

Temperature

Precipitation

Hot > Deep soil (Weathering)

Cold > Angular particles (Freeze thaw)

Wet > Leaching / Water logging

Dry > Upward movement of groundwater (Salinisation/Calcification)

Parent Material

Sandstone > Sandy + Free draining

Shale > Clay + Badly drained

Limestone > Thin, dry + poorly developed

Igneous + Metamorphic > Weather slowly and tend to be acidic

Topography

Relief, Altitude and Aspect

Flat + Upland > Waterlogged/Leached

Upland > Cooler --> Builds up as peat instead of humus

South-Facing > Warmer + Dryer than south-facing

Soil Organisms

Bind soil particles

Break compacted soil

Time

400y/cm

Processes of Soil Formation

Weathering + Erosion

- Breaks down bedrock to form parent material
- Mechanical weathering: Freeze thaw + Exfoliation
- Carbonation
- Hydrolysis - Turns feldspar in granite to kaolin clay
- Oxidation

Humification

- Hot -> Temperate
- Fastest in warmer weather

Leaching

Podzolisation

- Extreme leaching
- Water going through the top layer of humus leads it to become acidic
- Erodes all mineral matter + deposits on the b horizon
- Forms hard pan

Laterisation

- Severe leaching (Tropical)
- Rapid Chemical weathering > Deep soil
- Latosol (Red) formation

Salinisation

- Accumulation of soluble salts close to the surface
- Hot climates
- High levels of evaporation leads salty groundwater to the surface where it leaves the layer of salt behind as a toxic crust
- Can also be caused by irrigation (by rising salts to surface)

Calcification

- Accumulation of calcium carbonate near the surface
- Grassland
- Evaporation > rainfall => calc. drawn upwards
- Capillary action
- Calc. Carbonate builds up in A horizon creating a soil which is rich in nutrients + ideal for grass growth