



Soil Formation, Composition and Water Capacity

Understanding the complex natural formations beneath our feet and their vital role in holding water.

What Shapes Our Soils?



Rock Types

Various rocks form the foundation of soil diversity.



Topography

Land shape influences soil development patterns.



Living Organisms

Plants and animals contribute to soil formation.



Climate

Weather conditions affect soil characteristics.



Farming Operations

Agricultural practices shape soil structure.



Age

Time allows soil material to mature and develop.

Examining the Soil Profile

How to Observe

Dig a trench down to parent rock or extract samples using a soil auger from various depths.

The profile reveals distinct layers called **horizons**, formed by rock breakdown over time.



The Three Horizons



Parent Rock

The unweathered lower layer forming the earth's surface foundation.



Subsoil

Layer beneath topsoil receiving materials washed down from above.



Topsoil

Upper few inches containing beneficial bacteria, worms, humus and most plant roots.

What Makes Up Soil?

Solids

Mineral matter (stones, silt, clay, sand) and organic matter (plant and animal remains).



Gases

Soil air filling spaces amongst particles along with water.

Liquids

Primarily soil water filling spaces between particles.

Living Organisms

Micro-organisms including earthworms, fungi, bacteria and small soil animals.

Three Key Factors

Understanding what determines a soil's capacity to hold water.



Factor 1: Pore Space

Sandy Soils

Large particles create **large spaces** between them, forming a network of channels.

Result: Less water retention due to larger pore space.

Clay Soils

Small particles create **small spaces** between them in the same volume.

Result: Greater water retention capacity.



Factor 2: Surface Area of Particles

Larger Particles

Water held as thin film around particles.

Weaker attractive forces holding the water.

Smaller Particles

Greater surface area per unit volume.

Stronger water retention capabilities.

Factor 3: Organic Matter



The Role of Humus

Organic matter remaining in soil significantly contributes to water-holding capacity.

Humus acts like a sponge, absorbing and retaining moisture for plant use.

Field Capacity Explained

The capacity of soil to hold water is known to farmers as the **field capacity** or **moisture-holding capacity**.

What It Depends On

Structure and texture of the soil determine its water-holding ability.

How It's Measured

Expressed in millimetres (e.g. clay soil may have field capacity of 4 mm/cm in depth).

