Laboratory Exercise, Week 1

SELECTING A PROJECT SITE

Your Tasks (Due Tuesday, October 7).

1. Select a site and provide its location.
2. Mark the soil horizons you perceive within the profile (don’t go beyond 1 m in depth)
3. Return a photograph of the profile with horizon designations (you can email us an electronic image if that is easier).
GES175, Science of Soils

Physical Properties of Soils
Particle Size

* Physical properties are influenced by particle size

Size Classification (USDA):

Soil < 2 mm

Sand, 2 - 0.05 mm

Silt, 0.05 - 0.002 mm

Clay, <0.002 mm
Clayey Soil (fine textured)
Loamy/Silty Soils
(medium textured)
Sandy Soils (coarse textured)
## Impact of Physical Properties

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<thead>
<tr>
<th>Property</th>
<th>Sandy</th>
<th>Loamy</th>
<th>Clayey</th>
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<tbody>
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<td>Water Retention</td>
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<td>Aeration</td>
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<td>Drainage</td>
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<td>Compactability</td>
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<td>Erosiveness</td>
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<td>Shrink-swell</td>
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<td>Leachability</td>
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<td>N/C retention</td>
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Soil Structure

Cause and Effect
(description in laboratory)
Creating Structure
Surface Area

- aggregate of small particles

vs

- large grain
Creating Structure

- organic and inorganic ‘glues’
Stress Forces

(what breaks the ‘glue’)
Soil Structure:
Surface Horizons

Spheriodal

Granular
Poor Management

Granular

Massive
Compaction of Surface Horizons

- Platy Structure -
Impact on soil compaction?
Structure: Subsurface

---- Prizmatic ----

Increased length in vertical direction
- lateral stress > vertical stress
Blocky Structure:
(subsurface horizons)

- Increased (relative) age equates stress fractures
Bulk Densities

Organic soil

$D_b \approx 0.8 \text{ Mg/m}^3$
Bulk Densities

Organic soil

\[ D_b \approx 0.8 \text{ Mg/m}^3 \]

versus

Compacted Subsoil

\[ D_b \approx 1.7 \text{ Mg/m}^3 \]
Macroporosity

Well Sorted Sand

Clay Aggregates
Micropores

- Flocculation
- Aggregation
- Internal Porosity
Volcanic Ash Soil

Timber Harvest

Bulk Density in Mg m^{-3}

Depth in cm

undisturbed

harvested