Soil physical properties affect the behavior of soil and the functional processes required to meet environmental and human needs...

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texture</td>
<td>Proportion of sand, silt and clay which determines the type of soil (e.g. loam, clay loam, sandy loam) and its natural limitations</td>
</tr>
<tr>
<td>Aggregation</td>
<td>Arrangement of primary soil particles (sand, silt, clay) around soil organic matter and through particle associations. Aggregate stability is a good indicator of soil health.</td>
</tr>
<tr>
<td>Structure and Porosity</td>
<td>Structure reflects the arrangement of soil aggregates and primary soil particles (sand, silt, clay). It influences water and air movement in the soil.</td>
</tr>
<tr>
<td>Bulk Density</td>
<td>Indicates level of compaction and is a measure of the dry weight of soil within a given volume.</td>
</tr>
</tbody>
</table>

Which soil physical properties affect soil health? Many properties affect soil health; however, two of the most important are soil aggregation and structure. Both properties can be maintained or enhanced through various management strategies.

How can soil physical properties affect crops? Soil texture, aggregation and structure are all inter-related and greatly influence root development, water and air movement in soil. Managing your soils for physical soil properties along with other management strategies can result in uniform crop establishment and sustainability.

Strength from the soil

Department of Soil Science  
Fargo, ND  58108  
701.231.8881

Carrington Research Extension Center  
Hettinger Research Extension Center  
Langdon Research Extension Center  
North Central Research Extension Center
Soil structure and aggregation promote:

- Water infiltration/internal drainage and water retention
- Soil aeration
- Resistance to erosion
- Organic matter accumulation
- Soil-seed contact, germination, rooting and crop uniformity

Poor aggregation and compaction lead to:

- Reduced circulation of air and water in soil
- Shallow and lateral rood development (leading to poor plant growth)
- Reduced ground coverage and enhanced erosion
- Poor crop yields

Causes of Compaction:

- Heavy traffic (from farm implements), especially on wet fields
- Continuous disking or plowing to the same depth
- Limited changes in crop rotations
- Removal of crop residues or burning
- Overgrazing by cattle

Can I change the texture of my field?  Soil texture is a product of geologic material weathering over thousands of years, making it a permanent characteristic of any given field. Though you cannot change soil texture, you can utilize management practices suited for soils of varying textures.

Using cover cropping and crop rotations to improve soil conditions:

Cover cropping reduces soil erosion by providing additional cover for a longer period of time

Both reduce soil compaction through root systems of varying depths and structure

Both increase organic matter and recycle soil nutrients, which improves aggregation

Both improve aggregate stability via root entanglement around soil particles and root secretion, which act as glues to hold soil particles together

Both improve water infiltration by creating root channels and improved soil structure

Root development, water and air movement within the soil are reduced when soils are compacted