Soil Health | Land Management

FACT SHEET

Physical Soil Properties

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

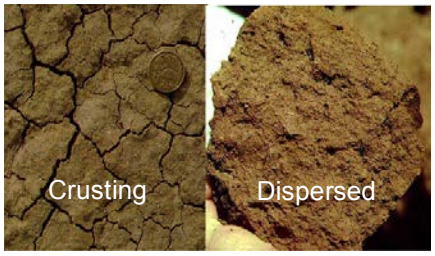
Texture	Proportion of sand, silt and clay which determines the type of soil (e.g. loam, clay loam, sandy loam) and its natural limitations
Aggregation	Arrangement of primary soil particles (sand, silt, clay) around soil organic matter and through particle associations. Aggregate stability is a good indicator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

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 though 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

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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:

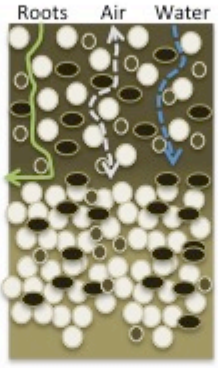
- Reduced circulation of air and water in soil
- Shallow and lateral rood development (leading to poor plant growth)
- Reduced ground coverage and enhanced erosion
- Poor crop yields

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

Highly Aggregated

Compacted Plow Layer



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

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.

How can I improve aggregation in my fields?

Use minimum (conservation) tillage or no-till to: reduce the breaking apart of aggregates, increase organic matter (via crop residue) which serves as a nucleus for aggregate formation, and enhance microbial populations important for aggregate formation, such as soil fungi.

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