



Welcome to Ground Work

Understanding Soil Tilth

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Soil tilth refers to the **structure** and state of **aggregation** of a soil.

Soil aggregates are conglomerates of silt, clay, and sand particles that are held together by laws of physics, chemistry, and biology. A soil having "good tilth" can be translated as a soil having "good granular crumb structure". Often, a soil with good crumb structure has the appearance of coffee grounds, as shown in the picture below.



According to the Rodale Institute, "tilth refers to the physical condition of your soil, such as its texture and relative ability to hold moisture and circulate oxygen." So, what "good tilth" really boils down to is:

- Sufficient pore space
- Plenty of organic matter
- Lots of soil microbes

Soil porosity is maintained by soils having a good crumb structure (crumbs are soil aggregates that allow free movement of water, air, plant roots, soil animals, and microbes throughout the soil). Soils with lots of pore space and a balanced distribution of both small and large pores:

- Have good water-holding capacity
- Have good water infiltration rates
- Are conducive to root growth
- Support large and diverse microbial populations

High numbers of microbes in your soil will improve your soil aggregation and tilth. How?

- Soil **aggregation** is initiated when soil microbes and plant roots produce filaments, mucilage, and polysaccharides that combine with clays to form organic matter-mineral complexes.
- Soil **structure** is created when physical forces (drying, shrinking/swelling, freezing/thawing, root growth, soil animal movement, compaction, and microbial activity) mold the soil into aggregates.
- It is critical to have enough beneficial soil microbes out in your soil which contribute to the **stabilization** of soil aggregates by secreting polysaccharides, those wonderful sticky compounds which help soil particles cling together.

Good soil tilth also means the soil works easily. Individual soil crumbs and aggregates retain their shape under the stresses of tillage, yet the soil is still friable. Oregon State University Extension Service defines **friable** soils as soils with good granular structure in which the crumbs/aggregates easily break apart from each other.

Bulk density, which is the weight per unit volume of dry soil, is a way of measuring soil tilth. Lower bulk density means higher soil porosity and better tilth.

Knowing your soil type will make it easier for you to improve soil tilth.

- Since **clay soils** are tighter with less pore space, building good tilth in these soils means increasing the pore space and reducing compaction.
- **Sandy soils** often have plenty of pore space so in these soils, the way to improve tilth is to increase the water holding capacity by adding water absorbing materials.
- **In general**, adding organic matter will improve soil tilth in most soil types.

There are many variables which affect soil tilth: soil type, tillage practices, crop rotation, crop residue management, fertility, and microbial activity. By keeping these variables in balance and encouraging biological activity, you will improve your soil tilth and increase your yields later this year.