



Welcome to Ground Work

How Long Does it Take to Build Soil Organic Matter?

12/8/12

How long does it take to build soil organic matter? There are several things to consider when answering this question. We will start by recognizing that there is a difference in soil formation that occurs traveling east to west across the United States.

In the east, hardwood forests dominated the landscape and the deciduous trees left large amounts of leaf litter on the soil surface. The hardwood tree tap roots are high in lignin and the roots do not break down quickly, so organic matter levels in the subsoil are fairly low. In these forest soils, most of the soil organic matter is distributed in the top few inches.

As you move west, tall grassland prairies dominated the landscape and the topsoil was formed from deep fibrous grass root systems. Fifty percent of grass roots die and are replaced every year. Grass roots are lower in lignin and higher in sugars and proteins which break down quickly. So soils that formed under tall grass prairies are high in soil organic matter throughout the soil profile.

The prime soils are highly productive because they (1) have a higher percentage of soil organic matter, especially active carbon; (2) hold more nutrients; (3) contain more microbes; and (4) have better soil structure due to larger fungal populations.

Also consider that soil organic matter can be broken down into component parts. One hundred pounds of dead plant material yields about:

- 60-80 lbs of carbon dioxide, which is released into the atmosphere
- 20-40 lbs of energy and nutrients which is decomposed and turned into about:
 - o 3-8 lbs of microorganisms (the living)
 - o 3-8 lbs of non humic compounds (the dead)
 - o 10-30 lbs of humus (the very dead matter, resistant to decomposition)

It's also helpful to realize that the molecular structure of soil organic matter is mainly carbon and oxygen, with some hydrogen and nitrogen, and small amounts of phosphorus and sulfur. Soil organic matter is a by-product of the carbon and nitrogen cycles and microorganisms.

Before we tackle the question of *how long* it takes to build soil organic matter, let's just think about *how* we build it. Our efforts must focus on wise residue management and should include previous crop residue, cover crops, manures and compost in conjunction with products such as **Residue™**, one of AgriEnergy Resources' live microbial products.

What can we expect from our efforts?

- **Faster Warm-Ups** – *Less raw residue allows faster soil warm-up for earlier planting*
- **Easier Tillage** – *Soils that are active require less horse-power and fewer tillage trips*
- **Easier Planting** – *Decomposing residue means less hair-pinning and less risk of plugging*
- **Biosanitation** – *Manage microorganisms to "clean up" residues*
- **Increased Numbers and Diversity of Soil Microbes** – *Properly managed soil has more microbes/acre, therefore more fertility/acre*
- **Increased Water Holding Capacity** – *Better tilth and more organic matter mean more stored water for those non-rainy days*
- **Improved Tilth** – *A "coffee grounds" structure at the surface provides beneficial mulch*
- **Improved Gas Exchange** – *Improved tilth means keeping soil air pore space more like atmospheric air*
- **Recycling** – *Recycling nutrients in residue reduces costly purchased inputs*
- **Nutrient Sequestering** – *By building organic matter we are anchoring nutrients to our farm – 1,000# of nitrogen/acre plus 100's of pounds of other nutrients*

Why do we include **Residue™** in our wise residue management programs? Microbes need regular supplies of active soil organic matter in the soil to survive. A majority of the microbes in the soil exist under starvation conditions and thus they tend to be in a dormant state. The inclusion of **Residue™** will insure that we have the diversity of active, residue-digesting microbes to speed the digestion of carbons.

So let's go back to our original question: *How long does it take to build soil organic matter?*

The answer is: *It takes time and effort, but the benefits are many. Fortunately nature has given us an example to follow!*