

Are You Aware of The Essential Role of Soil?

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Many people think that the ground is just dirt, but in fact the soil under forests, meadows and farms is a rich living ecosystem unto itself. Scientists tell us that a pint of rich topsoil has as many living organisms as there are people on this earth, the majority of which are microscopic organisms such as bacteria and fungi. Dirt is lifeless particles that collect on our clothing and under our fingernails.

Soil is where geology meets biology. Soil has many values including:

1. serving as a medium for all sorts of plants;
2. modifying the atmosphere by emitting or adsorbing gases (carbon dioxide, methane, water vapor etc.);
3. providing habitat for animals that live in the soil and organisms such as bacteria, fungi and other microscopic organisms;
4. absorbing, holding, releasing, altering, and purifying most of the water in terrestrial systems;
5. processing recycled nutrients, including carbon so that living things can use them over and over again;
6. serving as media for construction of foundations, roadbeds, dams, and buildings;
7. acting as a living filter to clean water before it moves into an acquirer.¹

The most significant value for this essay is soil is vital to the survival of all life on earth and the richer the mix of organisms the better.

A great deal of recent scientific research has been focused on soil and its functions. Many practices that have been in existence for thousands of years and were thought to be essential to successful agriculture are now being challenged. There is growing evidence that plowing may not be the best way to prepare for planting new crops even though plowing has been a first step in agriculture for several millennia. Plowing breaks the soil surface and flips several inches of soil from below to the surface where it contacts the air. Exposing the soil to air allows various gases such as carbon dioxide and methane to evaporate into the air and contribute to climate change. It also allows moisture, which is vital to the health of the many soil organisms to evaporate and stress those organisms. Exposed soil is more prone to wind and water erosion leaching away vital assets and creating problems with siltation in streams and rivers.

¹ Soils Overview, Soil Science Society of America

These problems can be mitigated by practicing no till (no plowing) agriculture that reduces soil disturbance and retains soil covering vegetation. No till practices reduce off gassing and preserve vital soil moisture. If cover crops are carefully matched to soil analysis and planned crop needs, they can improve soil fertility and crop yields while reducing the need for artificial chemical fertilizers and perhaps reduce farm fuel use. Over time these no till and cover crop practices can improve the humus material in the soil allowing them to absorb more water and retain more moisture and therefore be more resilient to drought.

It seems amazing that a fundamental concept of agriculture such as plowing could be considered counterproductive but it is now being challenged widely. In a sense it is encouraging since it provides a method to improve the fertility of our soils, reduce climate change off gassing and improve the resilience of our food supply to lower moisture availability by making this one change. Agricultural research organizations have been testing these principles for several years now with encouraging results and many of our agricultural authorities are promoting greater use of these techniques, including our own Maryland Department of Agriculture.

While few of St. James' parishioners are engaged in commercial farming, many of us have homes and yards where we grow grass, flowers, trees, and bushes and many of us have kitchen gardens where we grow vegetables and herbs. The same principles that apply to soil enhancement for commercial agriculture will work on a smaller scale. Knowing that healthy soil requires an environment where all these various organisms can thrive requires that we practice good soil management. We can enhance our soils by minimizing disturbances, and keeping the surface covered, preferably with native ground cover plants or natural ground covers such as hardwood mulch.

A good chemical soil test is a great way to begin an effort to improve your soil and a good test requires that you take soil samples from several different places in the yard, mix the resulting samples in a container and then select a combined sample for chemical analysis. This gives a better composite sample. Where you plan to have gardens for special purposes such as a kitchen garden you may want a composite sample for that area alone. When you have results, you will know what nutrients and other chemicals are present, absent, or out of balance. This knowledge will provide the information you need to immediately improve your soil fertility. I recommend you consider an organic fertilizer if you can. Organic fertilizers are more likely to contain the microorganisms we described above and provide the conditions for them to thrive. If there is wider use of organic fertilizer there will be a higher value on farm waste products and an economic incentive to farmers to preserve natural substances and market them. In the Chesapeake watershed, nutrient runoff from poorly managed farm wastes are a major problem in improving water quality.

Additional information on this subject can be found in these two books: *The Hidden Half of Nature* by David R. Montgomery and Anne Bikle. And *Life in the Soil* by James B. Nardi.