

“Healthy Soils are Full of Life”

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When I was in elementary school, I went through a phase where I thought that I wanted to be a chef. I would help the women in my family in the kitchen. I trailed at my grandmother's side when she made her famous dishes, and one day, I was granted permission to make a cake. By myself. This was, what I thought, a monumental moment in my life. It was going to be the best cake that anyone in my family had ever eaten. I had mixed all of the wet ingredients together in a bowl, I had preheated the oven, and now it was time to mix in the dry ingredients. With the blender in one hand, and the bowl of a flour based concoction in the other I began to slowly stir in the contents of the bowl with the blender.

I had, however, made a rookie mistake. As I focused hard on blending the ingredients together, I began to lean in further and further. And in a blink of an eye the blender had caught my hair and I now had a beater attached to my scalp. My hair was coated in sticky, chocolate cake batter. The problem wasn't only the pain radiating from my scalp, but that the cake mix was no longer salvageable. While I had gotten most of the ingredients mixed in, I hadn't gotten all of the dry ingredients mixed in before my hair got the rest of it. The cake was no good because it was lacking crucial ingredients. Cake, like soil, requires a delicate balance. A good cake is full of important elements that make it desirable. In the same way, for soil to be healthy and desirable, it has to have some important elements.

Regardless of what flavor of cake you are making, even though chocolate is hands down the superior flavor, there is one crucial ingredient to all cakes. That ingredient is sugar. Without sugar, a cake is not viable. The same thing can be said about earthworms and soil. No matter what kind of soil you have, or what you want to be done with that soil, earthworms are a critical component to healthy soil. Without them the soil is no good.

Earthworms do three important tasks for the soil. First, they increase the amount of water and air that gets to the soil (“Can’t Live Without Me” 1) . By simply tunneling through the ground, they create essential channels for water and air to be able to work through. Secondly, they break down organic matter such as leaves, grass, and manure. This is probably the most well known job that the earthworm does because of how popular compost piles have become. When worms eat organic matter, they excrete highly nutritious fertilizer for plants.

The third task that worms do for the soil goes hand and hand with the second. Earthworms increase the nutrient availability in the soil. Nutrients like phosphorous and nitrogen become more readily available to plants after digestion and excretion by earthworms (“Earthworms’ role in the Ecosystem” 1). Just like dumping a stick of butter into a bowl with cake ingredients isn’t very desirable, large amounts of unprocessed nutrients aren’t very useful to the soil. Not only does the earthworm essentially unlock these nutrients to a useable form, but they also carry the nutrients through different layers of soil with them. The more worms, or the more life, in the soil the healthier it becomes.

In a cake, the small ingredients play just as big of a role as large ones. Leave out a few teaspoons of baking soda or baking powder and the cake will not rise; the cake is no longer balanced. Leave small bacteria out of the soil, and suddenly the soil is not balanced. Small, but mighty, bacteria is essential to soil. If you have ever had pneumonia, then you have personally felt the difference, or havoc in this example, that bacteria can cause.

Nitrogen-fixing bacteria are very important to the soil. Nitrogen is often the limiting growth factor for plants in otherwise suitable growing conditions (Deacon 2). While there is an abundant supply of nitrogen in the atmosphere, it’s unusable for organisms because there is a

triple bond between the two nitrogen atoms. To become useable, it must be “fixed” into the form of ammonium. Healthy soils are full of small bacteria that can convert nitrogen into ammonium by the process of nitrogen fixation.

Nitrogen Fixation occurs when nitrogen-fixing bacteria invade hairs of host plants. Here they multiply and stimulate the formation of root nodules. Or, in simpler terms, the bacteria causes the cells to swell. Here in the cells the bacteria then converts the free nitrogen to ammonia, which the host plant then uses.

My favorite part about eating cake is the icing. The top layer is what really makes the cake. We can think of soil as the cake, and what grows on top as the icing. Afterall, a reflection of healthy soil is the healthy plants that grow on top. It’s no secret that the better the soil, the better plants grow on top of it. Healthy soil is full of healthy roots.

When my grandpa evaluates his land that he is about to put crops on, he introduces that soil to everything he can that will make it better. He introduces it to nutrients and fertilizer that may be lacking. Also, almost just as importantly, he introduces it to the roots of a cover crop. Cover crops not only help prevent erosion of the soil, but they also introduce nutrients into the soil. Marianne Sarrantonio, associate professor of sustainable agriculture at the University of Maine said “A combination of cover crops and compost is an excellent choice for building long-term organic matter and providing sufficient seasonal nutrients.” (Jensen 2).

A healthy soil is full of diverse, healthy life. As far as how healthy my hair was after that accident is another story. In case you were wondering, it took a lot of conditioner and a very long shower to detangle the chocolate covered rat’s nest that my hair was in. Just like cake, soil is a combination of many essential elements that make it “good.” Healthy soil is full of earthworms,

bacteria, and healthy roots. When a soil has a good balance of all of these, I guess you could say it's pretty "sweet."

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I certify that this manuscript is the result of Carolyn's own efforts.

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