December 13, 2022

Professor Jeff Calkins
Tacoma Community College
Building F1-21
6501 S Mildred Street
Tacoma, WA 98466

Dear Professor Calkins:

This letter is written in response to our previous discussions addressing the importance of healthy, fertile soil and its potential impact on the creation of a successful garden in the Pacific Northwest. Such an effort might be achieved through the creation of a public advocacy campaign. I have enclosed a report detailing methods that have proven to be widely successful.

I begin this discussion with the requisite background information to offer the proper context to the reader. This report speaks to soil structure, soil quality, and highlights specific techniques utilized by experts in this area. I included several graphics to show the desired results.

As we had discussed, my topic is somewhat nuanced in nature. Therefore, I relied not only on documentaries, videos, and scientific journals, but on my personal experience as a Master Gardener, as an Organic Gardener for the last twelve years, and as Manager of the TCC Sustainability Garden.

It is my hope that this report will elevate discussion on this topic, and inform behavior. Given the amount of research conducted, the graphics incorporated, and that I satisfied the formatting requirements for this assignment, I feel strongly that I'm deserving of an A on my final project.

In health and wellness,

Kathy Wright

A Public Advocacy Campaign for Creating Healthy, Fertile Soil In the Pacific Northwest

To: Professor Jeff Calkins
From: Kathy Wright
December 13, 2022

Abstract

Since our forced sequester during the COVID 19 pandemic of 2020, we witnessed a heightened awareness of gardening, and a correlation to sustainable agriculture. Regardless of how lofty one's intentions may appear, lacking the knowledge and pertinent techniques may result in a futile effort. Learning the methods for creating healthy soil could potentially improve our chances of achieving a successful garden, in addition to increasing our health as well. A valuable takeaway is "Eat food, not too much, mostly plants" (Pollan, 2006, p1).

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A Public Advocacy Campaign for Creating Healthy, Fertile Soil in the Pacific Northwest

This discussion begins by offering some context from a global perspective. As a result of extensive research, scientific experts have offered startling statistics on the threats to biodiversity and the balance of our ecosystems. Their findings show a strong correlation to the increased pressure on our planet.

From a global perspective, substantial declines continue in the ocean populations of mammals, reptiles, birds, fish, and amphibians. This decline has occurred at a rate of 68% since the seventies. Our land-based environment has been altered significantly as well as our oceans (Sokolov 2018, p18). Stressors of this magnitude on our environment provoke a worsening of climate change. If we can reduce pressure on our ecosystem, we can increase the resilience of our biodiversity. Soil plays a critical role with respect to biodiversity, simply defined as the living organisms within our soil. Activity is generated through the interactions of these organisms with plants. Experts unequivocally agree that soil remains the most biologically diverse part of the earth (Tickell 2020).
Most experts readily acknowledge the importance of soil, not only to our gardens, but to plant health, and our own health as well. Soil creates the foundation from which all else follows. This paper aims to highlight proven methods for creating fertile, healthy soil, and seeks to inform behavior in the pursuit of achieving similar results.

Lively microbes contribute significantly to the health of soil. They feed on organic matter. These microbes engage in microbial feasting which enables the natural breakdown of this material and results in the formation of humus. Humus allows for the retention of moisture and nutrients in the soil and contains significant amounts of carbon (Tickell 2020).

Here in the Pacific Northwest, our soil reflects our proximity to the Cascades, the coastal ranges, and the saltwater shoreline. Our significant rainfall, glacial melts, and to a lesser extent, volcanic eruptions, mirror the profile of our soil which is rich in nitrogen, sorely lacking in phosphorus and potassium, and mostly acidic.

In understanding the importance of soil, it would be equally beneficial to understand how soil works. Both of these topics will be explored in the discussions on soil structure. Building healthy soil is not achieved quickly or without effort. However, the end results often outweigh the time and energy required.

Healthy soil:

- Prevents disease
- Attracts beneficials
- Feeds plants
- Extends water to plants

- Breaks down organic matter
- Strengthens plants growth
- Provides resilience

Methods of Creating Healthy Soil

Soil testing provides insight to the composition of the soil. This knowledge enables one to determine the amendments required. Prior to the COVID 19 pandemic, some local colleges and universities tested soil for minimum or no charge, and their services were easily accessible. The Master Gardeners also offered soil testing. Unfortunately, these services are no longer available.

Soil testing kits can be acquired at most of the local hardware stores, nurseries, farm stores, Home Depot, and Loew's for a reasonable price. The results would not be as conclusive as those from the schools. However, they provide a good indication of what the soil may be lacking.

Kits are also available to test for the pH level of the soil which speaks to acidity.

Soil Structure allows for the conversion from bad soil to good soil. It determines if your soil is clay or sandy. If your soil is sandy, it drains well, and consequently, washes away the nutrients needed for plants, particularly for the heavy bottom feeders like tomatoes and peppers. Clay soil is too compacted and creates poor drainage which promotes the pooling of water. Plants require oxygen to thrive which does not occur when they are sitting in water. Soil depth plays a critical role in healthy soil.

According to Yost, the depth of soil is often used as a salient benchmark that determines rooting, moisture, nutrient storage, mineral reserve, and anchorage. It would tend to follow that soil depth also affects plant growth. Plant roots are found in the top one meter of soil, others somewhat deeper. Deep plant roots provide direct and indirect support to fauna and microbial communities. These deep roots also perform soil water extraction through the reduction of nutrient loss and soil carbon sequestration. Understanding the aspects of soil, engenders a clearer understanding of the relationship of soil to the wider environment (p 5). The following slide should offer some insight as to the composition and relationship within the soil. It displays the rhizosphere, the soil around the plant roots, and exudes the secretion of plants. Soil can be built from top down or bottom up.

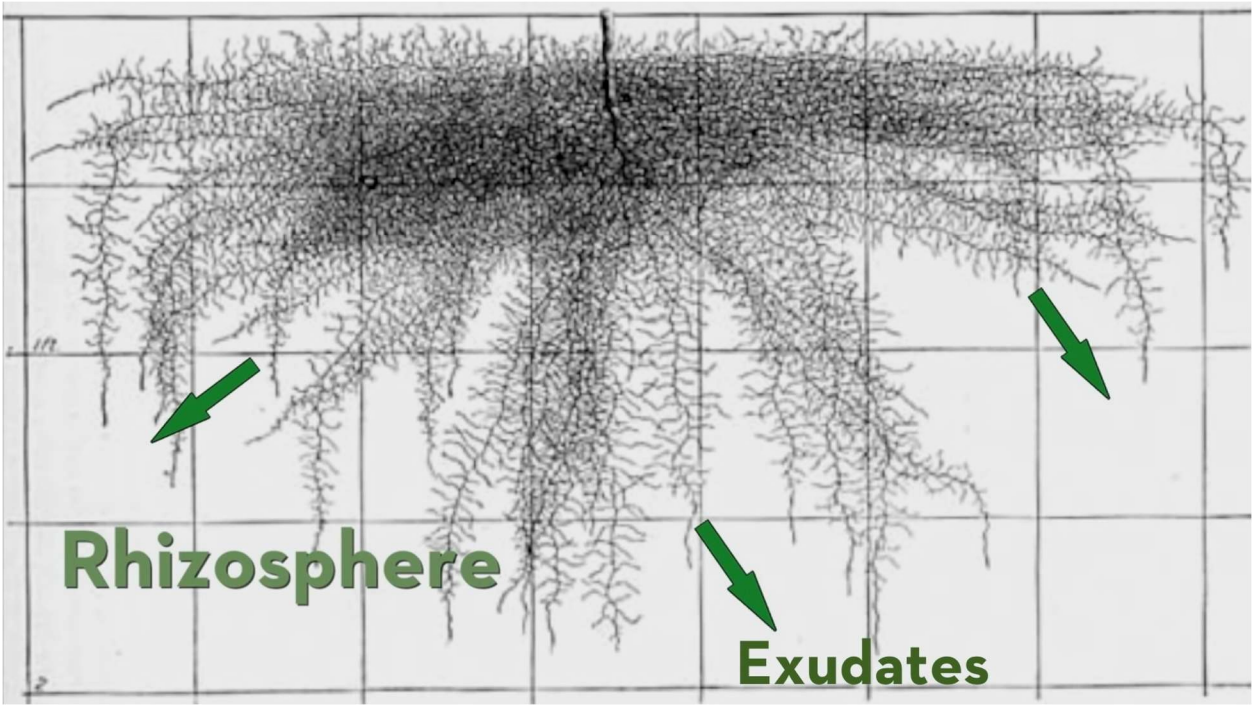

Figure F-2. Grow Food Well. (Feb 23 ,2021). Create Living Soil, Good Compost, and Intensive Growth in Your Garden [Video]. YouTube. https://www.youtube.com/watch?v=ohjK6gqYBNc

Cover Crops

Cool season cover crops are significant to those with year-round gardens in the Pacific Northwest. The goal for the garden beds is to reduce empty spaces. Living organisms should be constantly present in the soil to provide nutrients. The garden beds can remain covered by sowing cover crops.

The process for sowing cover crops begins with raking the surface of the garden bed with a rake or hand tool. Scatter crops (seeds) at a ½ inch depth and water sufficiently.

Fall cover crops germinate more slowly, and help to put on root growth. The month of October in the Pacific Northwest tends to be warmest, therefore would afford more benefit as germination and growth are quickened with higher temperatures. After the cover crop flowers but before it reseeds, till the leaves, stems, roots, and flowers into the garden to incorporate the organic matter. Wait 2-3 weeks to rake and plant.

Cover crops build healthy soil, reduce garden chores, attract beneficial insects, and provide shelter. Ground cover inhibits compaction from rain and suppresses weeds by blocking the light to the soil. It also helps with nitrogen management. As roots break down, nitrogen releases back into the soil and improves its' condition. Composting also serves as a soil conditioner.

Composting receives high marks for its benefits to gardeners and the soil. It can be put on flowers, trees, shrubs, vegetables, and as top dressing on the lawn in the winter. One of

composting's more significant benefits is the ability to break down organic matter. Composting is full of nutrients, and because of its slow release, plants absorb what they need.

Brown and Beecher (2019) conducted studies in the Seattle area describing the benefits gleaned from composting. Compost promotes soil conditioning and helps with the formation of new soil and lawn. As this study shows, it significantly impacts carbon sequestration. Carbon attributes to methane avoidance and soil carbon storage (p 227).

Gardeners use a variety of compost bins and methods for building compost. I follow simple arithmetic with 50% browns and 50% greens. Green material provides the nitrogen source. Good examples of this material would include green leafy yard material, grass clippings (make sure to identify the source of these clippings to avoid bringing any pesticides or herbicides into your garden), most plant-based material that would include apple cores, bananas, coffee grounds, and shrimp shells, and also plants from the garden after harvest. Brown material supplies the carbon and includes cardboard or newspapers, devoid of color or shiny material, and cut into strips. When the pile is being built, it is important to cut the material into 2-inch pieces to assist in the speed of the decomposition. If the materials being composted are thick and bulky, it greatly lengthens decomposition. Lastly, air and water are also required. It's important to avoid placing food scraps like dairy or meat in the bins as they tend to attract critters (GrowFoodWell, 2021).

Compost bins come in a variety of materials. It could be as simple as a wire wrapped around stakes of wood to enclose an appropriate space for your pile. It could be constructed of cinder blocks with an open area to build your pile. My best experiences have resulted from the use of three 4x4 feet wooden bins of untreated wood when creating my piles.

An important part of this process is layering the brown and green materials, 50/50, as you build, mix thoroughly, and add water. If your supply lacks one or the other materials, it could always be added later. The three bins become one that you build, one that is almost, and one that is done. Be mindful in your planning as you want the placement of your bins to be in partial sunshine, and the bins should be exposed to the ground to attract worms. Worms serve a special purpose in that they devour the organic matter which enables them to produce worm castings which are rich with nutrients.

The temperature within the bin should rise to 150 degrees and the pile should be turned until done, normally several weeks. As nitrogen breaks down, heat and air is released. The mixing should occur fairly regularly. The compost structure should be protected from the elements. Big burlap bags laid over the pile would suffice in this effort. Play close attention to the contents in the following slide to get a clearer indication of the balance of various materials and the varying stages of decomposition (GrowFoodWell, 2021).

Figure F-1. What is Composting? Source: Composting at Home (2022). https://www.epa.gov/recycle/composting-home

The Importance of Healthy, Fertile Soil

Throughout this paper, I have addressed the many benefits of creating healthy, fertile soil. Now, I wish to explore the lift given to our psychological and emotional wellbeing. From my own perspective, and that of my fellow gardeners, working in soil allows us to stay in balance with the earth as we become more grounded. The garden offers us beauty, tranquility, great food, and encourages our expressions of creativity. A garden along with the healthy soil creates a space for us to heal and renew. This thinking creates the framework for a public campaign, superficially:

- Enlisting the participation of those knowledgeable about soil management, i.e., gardeners, farmers, activists, students, educators, legislators, and influencers.
- Developing a clear message for engagement along with an appealing slogan.
- Creating appeals that speak to the targeted audiences' emotions and logic.
- Employing social media campaigns to reinforce the message and detail actions
- Developing collaborative partnerships.

Conclusion

The Tickells produced a documentary in 2020 entitled “Kiss the Ground”, and narrated by Woody Harrelson. The film spoke to a vast array of issues involving the soil and its importance. And, it spoke to the manner with which we deal with climate change and its correlation with soil. Soil has the ability to sequester carbon dioxide out of the atmosphere, which is a major component of greenhouse gas. We breathe out carbon dioxide, plants breathe in carbon, capture it and store it formally known as bio sequestration. Healthy soil absorbs carbon dioxide and water which in turn supports our ecosystem. As mentioned in the film, “healthy soil leads to healthy plants, healthy plants lead to healthy animals, healthy animals lead to healthy humans, healthy humans lead to healthy climate (Tickell, 2020).

I began this discussion in support of creating a public advocacy to elevate the conversation and inform behavior about the importance of creating healthy, fertile soil and the degree to which that knowledge could positively impact the creation of bountiful gardens in the Pacific Northwest. The specifics for this campaign were provided in the previous section. If we endeavor in a concerted effort to focus on creating healthy, fertile soil which in turn could potentially make our soil healthy as well as ourselves, I would liken this experience to herd immunity which would enable us to protect each other.

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