

February 5, 2020

Joint Legislative Roundtable on Soil Health
New York State Capitol
Room 124

Dear Senator Jen Metzger and Assemblymembers Donna Lupardo and Steve Englebright,

Thank you for holding this roundtable on soil health and providing an opportunity for me to submit the following comments.

In December 2019, I closed on 12 acres of agriculturally zoned land in Java under threat of residential development 35 minutes outside of the city of Buffalo, NY. Since then, I have been developing a holistic business plan and design for my and the farm's inextricably intertwined future. Being the nexus of agricultural and food systems ecological and economic viability, it is inevitable that stewarding and healing of soil is built into the bedrock of the business plan.

After over 5 years of working on and managing commercial and non-profit diversified, organic vegetable, herb, fruit and livestock operation, as well as learning through mentors, farm peers, self-education, an online Certificate of Applied Agroecology course through the Multinational Exchange for Sustainable Agriculture (MESA), and Northeast Sustainable Agriculture Research and Education (NE SARE) grant reviews, I have direct experience implementing what have been deemed as soil health best management practices. Specifically, I have implemented practices including compost, green manure, reduced tillage, cover crops, intercropping, crop rotations, fertigation and foliar sprays with indigenous microorganism teas, remineralization, covered culture, and multi-species rotational grazing of livestock. Indeed, while implementing such practices, Frost Valley's farm experienced a 56% increase in yields from 2018 while increasing soil organic matter this season. Relatedly, many farmers in the state and region have suffered from inability to get into their fields or grave crop losses due to extraordinarily wet conditions late summer and fall in 2018 and spring in 2019 that proliferated flooding, pest, disease and weed issues, the soil and vegetation on our farm was able to meet the rains with resilience.

Concurrently, I am perennially humbled and motivated by the immensity of information left to learn. In particular, I often ponder the awe-inspiring, life-giving complex ocean of micro and macro beings; their interactions with each other, the abiotic, and plants; and their decay. Indeed, there is a tremendous amount of information for farmers and service providers to explore and digest. There is both knowledge that remains disregarded by occidental, "modern" science to the detriment of all, as well as knowledge wholly unascertained by humans. As an eager student of Mother Earth, ruminating on this world of which we know so little yet is the foundation of our very existence is a topic of fascination.

At the same time, as a young, new-entry farmer who is tasked with choosing how to invest limited capital in a small business fragile with infancy on the basis of under-developed information is frightening.

You see, I am a person whose mind is driven by a thirst for painstaking rationality. I am also a person raised in a household driven by financial prudence. As such, part of my business plan includes the continual honing of knowledge and skills, as well as gaining of social and financial capital, by managing the farm in the Catskills where I have a stable salary and working numerous side hustles, from grant review to catering and prep cook gigs, in order to invest incrementally in the Java farm. Currently, the Java farm is in hay and is without a building, deer fence, electricity or a well. While this fact has made

that land more affordable, it also means that getting the farm production-ready is going to be capital intensive.

This summer, I will be battling my innately logical wiring and thrifty upbringing by relying on deficient data to inform a ~\$25,000.00 investment to build ~1.5 acres of no-till raised beds in the most respectful, healing way in relation to the soil that I am aware of.

Rather than tilling and disturbing the soil to establish the beds, cardboard, compost and wood chips will be used to smother the sod and perennial weeds in a way that simultaneously augments soil health. By reducing tillage and not inverting soil layers, a compaction pan will be prevented from developing and soil aggregates will remain structurally intact while creating space for air and water pockets for soil fauna and roots. Soil pores will store water in times of drought, as well as increase future water storing capacity in times of intense rains. Relatedly, raised beds allow for improved drainage. The availability of air will prevent anaerobic conditions under which disease-causing bacteria, fungi, and nematodes thrive and proliferate from transpiring.

The beds will be built from leaf-based compost and wood chips, preferably ramial chips. The pathways will not be bare; rather, they will consist of wood chips inoculated with Wine Cap mushroom spawn that will protect soil from compaction and erosion. Leaf-based compost is darker and more slowly releases nutrients compared to livestock-based composts. While I am a proponent of composts composed of both organically-sourced livestock manure and food-scrap, such material is not available in the region for affordable, bulk purchase. Similar to compost, wood chips are high in organic matter and maintain soil moisture. Ramial chips are from the tips of spring tree branches where nutrients and energy are shunted.

As such, it is believed that they are the most optimal form of wood chip to utilize in a garden. Wood chips also promote greater fungal diversity that will aid in aggregate stability, nutrient cycling and accumulation of carbon-dense humus in the soil. This is important because soil samples have shown that the soil is acidic. Soil acidity points to a bacterial dominance in the soil. The ratio of bacteria to fungi in the soil determines what plants will thrive. Specifically, on one end of the spectrum, weeds and pioneer species thrive in soils with bacteria present and fungi absent. Given the Java farm has been in hay for years, this makes sense. On the other stands an old growth forest which may have the same concentration of bacteria but a markedly higher presence of fungi. Row crops are successful when there is a nearly equal ratio of bacteria to fungi. Thus, rather than applying mined lime to balance the pH and increase the health of the soil for vegetable production, I will use local, renewable resources and to do so.

It should be noted that there is a dearth of research corroborating pertinent information regarding the direct comparison of composts of varied contents and composting methods, including long-term impacts on soils and vegetable crops of composts containing inputs from conventional livestock that have been fed antibiotics and have been fed GMO corn or soy or bedded with straw sprayed with persistent herbicides. Likewise, there is a lack of long-term, comprehensive research on varied tillage systems. In fact, scientists have only identified a sliver of the species of bacteria, fungi, protozoa, nematodes, and arthropods that are essential for soil health. Thus, rather than having an assurance of what practices make the greatest positive impact on the ecological and economic sustainability of a farm and how, the basics of what is currently known about soil must be extrapolated to loosely guide farmers.

For reference, 900 cubic yards of compost at \$20.00/cubic yard and 600 cubic yards of wood chips at \$3.00/cubic yard with a shipping rate of \$3.00/cubic yard brings the material and shipping costs total \$24,300.00. This does not include costs of labor or the costs of tools, such as wheelbarrows and shovels, that will be required to build the no-till raised beds. Additionally, it does not include the cost of the fungi inoculant for the pathways.

Moreover this cost does not include the several hundred dollar price tag of cover crop that will be subsequently sewn to increase the biological, physical and chemical properties of the soil to provide habitat for and feed soil organisms. Specifically, the cover crop will prevent soil erosion and compaction, increase soil tilth, increase soil moisture, reduce compaction, sequester carbon, as well as provide habitat and root exudate forage for soil bacteria and fungi that will store nutrients to be released to plants in a related, bioavailable form once the bacteria and fungi are consumed by arthropods, nematodes, and protozoa.

Further, this cost does not include perennials to be planted between the bed blocks, which can cost up to \$25.00/plant. Among numerous other ecological benefits, having flowering hedgerows with native, perennial nitrogen fixing shrubs and mineral-mining ground covers will support soil life by sheltering soil from erosive winds, creating microclimates that will stabilize soil temperatures, and send dense roots into the depths of the soil to increase the abundance of soil organism habitat and food that will, in turn, increase the bioavailability of nutrients for crops.

Again, there is a lack of extensive information pertaining to Northeast cover crop varieties and their impacts, as well as the impacts of several varieties of cold-hardy, perennial shelterbelts or groundcovers in vegetable production. While there is anecdotal and traditional evidence pointing to the benefits of these practices, there is no empirical quantification of causal impact.

Due to the cost of the inputs, I will not be able to invest in deer fencing until next year and most likely will not be able to invest in a well and irrigation until the year after. Even though this means that I will not be able to generate cash flow from the farm for a few years, I am employing these practices out of intrinsic regard for Mother Earth and soil, as well as the under-researched rationale that this investment will show an economic return by reducing weed, pest and disease pressure while increasing long-term crop vigor, resilience, yields, thus significantly contributing to the profitability of the farm business. Farming is already subject to intense volatility, from weather to markets; however, providing more stability to farmers in the form of informational capital with regard to soil health, would be incredibly impactful.

In addition to lack of data and cost of implementation, other obstacles to implementing soil health best management practices include the need for greater support to and professional developments for service providers in delivering this information to farmers. For example, I feel extraordinarily fortunate to be connected to CCE Sullivan as there are a diversity of small farms committed to soil health in the county and service providers are prepared to engage in these conversations with and offer informational support to farmers.

On the other hand, Wyoming County, where my small farm business is located, consists mainly of large-scale dairy, feed and row crop farms. Relatedly, when engaging with Wyoming County service providers, including those from CCE, FSA and NRCS, it feels as though I am constantly taking service providers by surprise and, while they are eager to help, they do not have the resources at hand to the same extent as their Sullivan County counterparts do. Accordingly, it is difficult to pin down what opportunities for training or funding are available for me and the farm. This is especially true given the unique, incremental- albeit economically prudent- timeline of establishing the farm.

I understand that a business cannot be built grant-funding and organizations like NRCS want to ensure reciprocity by investing in established farms; however, it often feels as though I am coerced to choose between paying more to implement best management practices from the outset where they will have the

greatest benefit or putting off implementation of best management practices and getting the farm started in order to receive grant funding to retrofit these practices into the operation. Plus, many of these programs are not accessible to smaller farms as the time consumed in filling out a long, complicated application can exceed the benefits. For example, on a 1.5 acre farm, cover cropping a quarter acre represents a substantial limitation on income and cash-flow for the farmers but, based on the meager economic incentive for implementing this practice, is regarded as a drop in the ocean for NRCS. This clear bias for larger farmers inhibits adoption of soil health best management practices. In addition, the reimbursement model of grant programs precipitates further inquiry in agriculture by making access to these programs inaccessible to farmers who do not have sufficient liquid capital or access to lines of credit.

Solutions to such obstacles include increased allocation and appropriation of funding to farm research and education organizations, such as NE SARE; increased economic and professional development resources for service providers; and greater advertising of and reforms to existing grant programs that uproot bias against new-entry farmers, smaller farms, and socially disadvantaged farmers.

Sincerely,

Bari Zeiger
President, Greater Catskills Young Farmers Coalition