Soil Carbon Sequestration: A Realistic Compromise to Climate Change

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Oklahoma FFA

2021

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I love *Law and Order*. Whether it's the classic cases with Sam Waterston or SVU with Ice-T, I can guarantee you that I've watched every episode at least once. I can recite the intros by heart, I can remember some of the most famous lines, and I can even describe the plot of every episode. As you can probably tell, it's my favorite show. Although Dick Wolf probably won't ask any time soon, I do have one critique: in about every other episode, the plot follows a pretty similar pattern. Officers will identify the victim, conduct interviews around the area, and then lock on to a very blatantly suspicious suspect. For that whole episode, you just know it has to be that guy; everyone has an alibi, and there's no way anyone else could have done it. That is, until the very same suspect ends up *helping* the police, and the real criminal is caught.

It's this pattern that irks me every time; I can't stand it. After watching all of those episodes, I still fall into the trap. Now, you're probably wondering why I'm talking about this show for so long. It's because it teaches us a valuable lesson: sometimes, we're a little too quick to place blame on someone, especially when that *someone* might be able to help us. The very same problem is happening in our own economy. For over a decade, agriculturists have been blamed for a problem that *agriculturists* can help solve. The divide visible between Americans today is striking, especially when it comes to their opinions on climate change—a rather touchy subject. Rising sea levels, melting ice caps, extinct species, and tougher weather patterns for everyday farmers are all immediate consequences of this issue ("The Effects" 1-7). Those who live in urban areas are quick to blame rural ranchers' livestock, and those who live in rural areas are quick to blame city-dwellers' automobiles. Wherever you sit on this divide, know that agriculturists have a new way to lessen this disparity, called soil carbon sequestration.

As many agriculturists know, it all starts out on the field. With an atmosphere polluted by excess greenhouse gases, something is needed to draw in those gases in order to reduce rising temperatures and extreme climates. With carbon sequestration, the goal is to keep the normal carbon cycle running, except we try to keep a net-positive carbon level in the soil. This results in using the soil as a sort of "carbon vault," or a method of storing those high-carbon gases. Crops such as wheat or cotton start out by gathering the abundant carbon gases in the atmosphere and then beginning a process called carbon fixation, which means that they convert those gases into biological units that they can then use along with microbes in the soil (*Georgia Tech* 2-4). As oxygen is expended and CO_2 turns into O_2, the hope is that we can keep that carbon atom in the soil as deep as possible for as long as possible.

To see how effective this process is, I did a little "digging" myself. For my agriscience fair project this year, I set out to determine if certain 'regenerative' agricultural practices were more effective on soil carbon levels than the typical commercial wheat operation. My partner and I found that all three practices we tested—no-till, crop rotation, and grazing—led to significantly higher levels of carbon sequestered in the soil. Since higher carbon levels are typically associated with higher crop yields (Oldfield, et al.), I was not surprised to hear that many local farmers had noticed a difference in their fields as well. When interviewing them, I found it apparent that after making these changes to their operations, they had seen significantly higher levels of production than they were used to. Not to mention, their fields were also having an impact on the environment.

The impact that soil has on the environment is astounding. Researchers estimate, "[s]oil carbon is the largest pool of carbon near the Earth's surface, about as large as the atmosphere, biosphere, and surface ocean combined" (Lehmann, Kleber). An environmental group with

Princeton even found that an annual 0.2% increase in soil carbon content would be enough to "effectively balance global CO_2 sources and sinks as required by the Paris Agreement" (Bourg). The National Academy of Sciences cites dozens of scholars' works that, "[n]early 10,000 years of cultivated agriculture has reduced global soil carbon by 116 Gt, an amount equivalent to more than a decade of the present rates of industrial emissions" (Amundson, Biardeau). The USDA's Natural Resources Conservation Service even has a tool for farmers to use that tells them exactly how much of an impact that practices like multi-story cropping and range planting can have on the environment ("GHG and Carbon"). It's clear that agriculture can have a tremendous impact on the environment, so why has the transition to more regenerative practices taken so long?

The reason for this stagnation in farming is that any major change requires an evolution in our philosophy behind agriculture. In a country where only three-quarters of the population believes in climate change—one of the lowest levels in the world—it's no surprise that people previously counted typically-conservative agriculturists out of the picture when it came to solving this problem. Now, however, farmers don't even need to believe in climate change to make substantial efforts that have an impact on it. The USDA now states that it might even be more economically sound to change up some of their practices. They put it like this: "[l]et's assume an average … fuel price of $2.05 per gallon. If a farmer farming 1,000 acres of crops switches from continuous conventional till to continuous no-till, he or she saves 4,160 gallons of diesel fuel – more than $8,500 worth – each year" (Creech). Those funds can even go to offset costs like pesticide and herbicide expenditures. The crops produced from those regenerative fields could even prompt some consumers to be willing to spend slightly more on products that have an impact on the environment. It's not a matter of whether or not you believe in climate change. It's a matter of showing the public how much potential agriculture has.

We've all heard the headlines claiming "Cows are Killing the Planet," and many have been hasty to point the finger at agriculture. Before we look across that ideological divide with contempt and skepticism, let's realize that there is probably a way for us to help one another; in this case, it's soil carbon sequestration. We have to recognize the important role and the potential that agriculture has in our environment and day-to-day lives. If *Law and Order* has taught me anything, it's that we can't be too quick to lock on to a suspect. You're the detective. You're sitting across from both suspects—a rural farmer from Oklahoma and an urban businessman from New York—and you just know it has got to be one of them. But, what if I told you that neither one of them is to blame in the first place? And, what if I said that the rural farmer just might be about to crack the case?

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