Phase 1: Keep the Soil Covered

Small Farm, Big Ideas
Solar Fresh Produce is a 3 acre CSA farm in Buffalo, MN owned and operated by Sarah Lindblom since 2015. I (Sarah) was fortunate to connect with the Sustainable Farming Association early in my venture which provided some of the “how” behind the “why” of regenerative farming. My mission is to strengthen the local food community through the use of regenerative farming practices. I strive to be a steward of the environment and to delight customers with delicious and nutrient dense food. The soil health principles help me do just that. This report is possible because of a $2160 grant from the Mill City Farmers Market Next Stage Grant Program to implement soil health principles in a caterpillar tunnel.

Why Caterpillar Tunnel
Growing in a covered space seems to be a trend for many local vegetable growers and there is good reason in our northern climate. With increasingly unpredictable weather events that could damage yields, a high tunnel or caterpillar tunnel is a good way to hedge for this risk by protecting high value crops. The use of irrigation inside can help maintain optimal moisture levels, and eliminating splash up from the soil and heavy rains can reduce diseases that move onto foliage of plants. The extra heat provided by growing under cover also speeds up plant growth and can extend the season on both ends. (Cont. p. 2)
(Why Caterpillar Tunnel cont. from p 1) After growing in a 45 ft. x 18 ft. high tunnel for the last 4 seasons, I decided that this original structure would be better suited as a hybrid propagation greenhouse and raised bed growing space, but I wanted a solution for where to plant some high value crops that would usually occupy that real estate. Enter the Farmer’s Friend LLC Gothic style 100ft x 14 ft. caterpillar tunnel.

I chose this structure for several reasons. First of all, it is possible and easier to move the structure to allow for crop rotation of high value crops. It is a larger space that would allow for more planting diversity to meet the needs of my 40 member CSA. The kit provides everything from tek screws to plastic on one pallet and detailed photo instructions. I also liked the idea of creating a specific boundary for a garden that will work to implement the soil health principles as best as possible.

Covering the soil with a greenhouse isn’t exactly what the first soil health principle is getting at, but it does achieve some of the same desired outcomes. Additionally, the use of occultation in advance helped to keep the soil covered all winter and smother weeds. A winter cover crop might have been another good option if weed pressure wasn’t so high to begin with.

Building the Tunnel

Having a kit to build the tunnel along with the easy to follow instructions made setup easier than some Ikea furniture I’ve put together. I did need a neighbor to help unload the 850 pound and 8 ft long pallet with a skid steer and a handy friend or two for help with assembly. I like that the design uses standard parts and would be easy to customize or add features later.

(Building the Tunnel cont. from p. 1) I selected a site that had been occultated all winter and spring. I removed the silage tarp and did some field prep by broad forking to remove some perennial grasses. There were some weed stems still covering the soil and I left those to rake into walkways after prepping planting areas. It was nice to have some cover on the ground while building the tunnel to avoid damage to the soil.

After identifying this project as a logical next step for the CSA, I applied and was fortunate enough to receive a grant from the Mill City Farmer’s Market Next Stage Grant Program. It’s worth noting that this grant is very easy to apply for and prioritizes POC or historically marginalized groups. Because of delays getting the tunnel, I missed out on some spring project goals, but picked up right where I needed to be once the pallet delivery arrived on May 20th, 2020.

Site location and prep

The first step is to pound in rebar posts. The provided rebar was about 3 ft long. I pounded the posts until there was about 10 inches above ground (the instructions did not mention how deep to pound them so I did a little research and came up with the 10 inches) It is a little tricky getting it totally square, but the instruction video advised that it doesn’t need to be perfect for this structure. I was within about 6 inches of accuracy and it seems fine so far for assembly.

1 A technique of covering an area of soil with a light blocking tarp or other covering to force weed seeds to germinate and then die in the absence of light (Fortier, 2014)
Next I installed the center purlin. There were not enough cross connectors in the kit for every hoop, so I supplemented with some I already had from past projects. Using tek screws to connect the center purlin pipe and cross connectors to attach the purlin to the arches, working down the structure, you can try to make sure the hoops are perpendicular to the ground. Secure at each end with a hose strap and three tek screws.

After installing the center purlin, I added the wind bracing on each of the 4 corners, and screwed down the wiggle wire channel on both ends of the tunnel to secure the plastic.

The final step is to install the plastic. We had a perfect calm evening to install the plastic and did so easily with 3 people. It was helpful to have someone in the center with a ladder to direct it over, and we were able to pull it over with two people on each end. We secured it down using the wiggle wire on each end, and then the rope. The billow prevention rope was a little confusing at first to install but went quickly with two people once we had a system.

In the next phase, I will finish preparing the beds, set up drip irrigation, and plant vegetable and herb transplants with some direct seeded crops as well. I will provide some updates on temperature management and getting to know the structure. I will also take a deeper look at the slake test.
Soil Health Report Card Intro

To help measure the soil health both inside and outside of the caterpillar tunnel, I created a soil health report card using 4 easy soil health tests including the infiltration test, the slake test, the earthworm test, and a pH test. Look for a downloadable version coming soon. You will be able to follow along as I try to build up some data sets to monitor differences in soil across the farm and also throughout time. I will also show you how to collect samples and data, and how to do the different tests throughout the project.

Infiltration Test

The first soil health test I did is the infiltration test. This test helps determine how long it will take for 1 inch of water to be absorbed by the soil, and is a good measure of soil function—especially related to soil structure.

To complete this test you will need:

- A cylinder shaped tube (I use a soup can with both ends cut off, but you can also use a 6 inch PVC pipe. As long as you are consistent you can use whatever you have on hand).
- A measuring device (I use a Pyrex 1 cup measuring cup).
- A timer/stopwatch
- A board and mallet (to pound in the cylinder)
- Soil Health Report Card to record data

Method:

Figure out how much water you need to fill 1 inch of your cylinder. For my soup can, this is about 125 ml. To do this, find the area of the circle and then x1 for 1 inch of water. The important thing is to use the same vessel and amount of water each time.

Do the Math: volume of a cylinder = \( \pi \times \text{radius}^2 \times \text{height} \)

Choose your testing location. I choose 4 locations, one at each end of the caterpillar tunnel and just outside the caterpillar tunnel. Try to do the test on a day when the ground is not already saturated. It is helpful to make a soil test sample map so you can mark where each sample comes from.

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<tr>
<th>Date</th>
<th>Vessel and ml water</th>
<th>Location</th>
<th>first pour seconds</th>
<th>second pour seconds</th>
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<td>Soup can, 125 ml</td>
<td>SE cat tunnel</td>
<td>34</td>
<td>104</td>
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<tr>
<td></td>
<td>NE cat tunnel</td>
<td></td>
<td>80</td>
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<tr>
<td></td>
<td>NE outside cat tunnel, tillage + raised beds</td>
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<td>4</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>SE outside cat tunnel, tillage</td>
<td></td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

Slake Test Sample Collection

At the same time I did the infiltration test, I collected 4 samples for the slake test. Try to find 4 clods of similar size. I placed them in an empty vegetable 4 pack to get consistent sizes and to have somewhere to dry out. The sample should dry out for a couple weeks before doing the test. Make sure to label each sample number with any location information and date of collection.
References

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