

Strategic cover crop/reduced tillage options for vegetables

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Soil health has been a keen interest of mine, especially the past decade that we have been researching the soils here at Cedar Meadow Farm. Penn State University, University of Maryland, and the NRCS have all been testing various soil parameters on our farm. To achieve all three of our objectives -- **higher profits, enhanced soil quality and less dependence on pesticides** – we depend on **no-till, cover crops and rotations**.

Soil is Meant to be Covered

One of the most influential parts of the success of my "Permanent Cover Cropping System", is the use of cover crops. Cover crops are gaining in popularity by others as well due to increased knowledge of the benefits of their use. Right now, most of my 225 acres have something growing in them. It is as important to me to get those covers in as it is to get a cash crop planted! In March, I've seen rye roots 40" deep, while the top was only 5" tall! The use of covers and not tilling the soil has increased organic matter levels from 2.0% 30 years ago, to 5.1% in 2014. Covers also can aid in weed control to varying degrees.

Mixtures and Cocktails

A cover crop mixture of hairy vetch and rye has proven most conducive at Cedar Meadow Farm, where tomatoes, pumpkins, and sweet corn have been the top cash crops. For the past decade I've added **Tillage Radish[®]** as a cover crop to aid in breaking up compaction. Planted in late summer through September, Tillage Radish[®] exhibits an aggressive rooting action in the fall, sending a 1 to 2-inch diameter tuber down 6-12" inches. But even more important is the 1/8th tap root which goes deep into the subsoil. I've dug out Tillage Radish[®] roots that measured 32" deep and we've dug soil pits where we found them 6 and a half feet deep! The plants winter-kill by Christmas, much like fall-planted spring oats. The tubers rot by early spring, leaving holes in the field much like an Aer-way soil aeration tool would do. The fast-growing root crop is of special interest to livestock farmers who spread manure – or crop farmers after dry summers when there may be excess fertility come fall – because the plants soak up left-over N during the final months of the year. Accumulated N is then released rapidly in the spring- just in time to be utilized by a spring planted crop such as corn. How much N that is released and available to the crop is still being studied but anecdotal evidence suggests nearly all of it. That is a distinct advantage over rye that doesn't release N back to the soil for up to a year depending on the stage of maturity when terminated. Tillage Radish[®] has good forage quality as well and has been successfully grazed. It is recommended to use a mix with no more than 3 lbs of Tillage Radish[®] per acre. *(Note: Recommended forage radish time of planting, winter kill, and N release varies farther north. ed. C. MacNeil, CCE Cornell Vegetable Program.)*

I feel the components of the cover crop mix complement each other through different rooting actions and biomass production. Rye has finer roots and its residue lasts longer into the season. Rye spreads out its release of N throughout the season. Hairy Vetch, which is very succulent, tends to decompose quickly and releases its nitrogen quickly. Tillage Radish[®] leaves virtually no

residue in the spring so I've mixed them with winter-annual legumes (vetch or crimson clover) for additional biomass to feed the soil and some residual nitrogen (N) for the succeeding crop. Targeted pairings at present are: radish/oats or radish/hairy vetch or crimson cover before sweet corn, and radish/rye-vetch before pumpkins. I recommend planting Sunn Hemp in July after wheat and like the fast growth and the fact that it can generate 50lbs of N in 6 weeks. Adding Tillage Radish[®] and sorghum sudan grass has been popular as a way to best increase organic matter. Sunn Hemp seed is now more available and reasonably priced compared to a few years ago. These are the covers I have found to be useful on our farm. There are many more options out there that might be better for your operation.

Broadcasting cover crop seeds is fast, but doesn't get the consistency I like. I'll even plant into slightly frozen ground as a way to avoid compaction on wet soils. But don't try this if you have wet spots!

Roll it Down

I use a rolling stalk chopper to knock down and crimp the cover crop before transplanting vegetables or direct seeding pumpkins and sweet corn. To finish off weeds, I'll apply a low rate of herbicide if a pollinating or mid-bloom cover crop proves stubborn and small weeds are present.

Erase Erosion

Erosion takes away your very best soil! It's your surface soil that has the highest fertility that goes "down the drain", during a rainstorm. If you farm land that is susceptible to erosion, controlling it should be your top priority. Soil erosion is the most detrimental aspect of agriculture. We can't turn our backs on soil erosion and call ourselves sustainable!

Practice Crop Rotation

Grow crops that have different rooting action and residue production. This helps in providing a habitat for diverse soil organisms and it has been well documented that rotation breaks up insect and disease cycles. The specifics of crop rotation are dependent on local conditions and markets but the more diverse you can be while remaining profitable is the goal.

Proper Fertilizer use

Use fertilizers that enhance the soil. A good approach is to feed the soil, rather than feed the plant. A good soil will grow healthy crops. Don't overdo it with fertility amendments as that is a waste and can be a pollutant.

Worms at Work

You've probably heard farmers talk about "listening to corn grow". We have our own version of that: we listen to nightcrawlers move crop residue. The first time this happened to me, I was driving my four wheeler on a warm, drizzly evening and noticed movement in the field close to the lane. The ground was covered with earthworms pulling pieces of residue, some pieces up to a half-foot long, down into their furrows. I drove over to my neighbor's tilled field and didn't see a

single worm. It's probably the most dramatic indication of what you can expect from no-till, cover crops, and rotation as it reflects the amazing things that are happening in the soil.

Leave the Soil alone

What it really boils down to is letting nature have its way. If you leave the soil alone, it will work for you. I didn't really understand that 30 years ago; I do now. The turmoil of tillage can be catastrophic. With our system, soil life is enhanced because we're not disturbing soil organisms. Nor are we compacting the soil. We've had people from NRCS test all over the farm with penetrometers and every report we get back confirms that we have no need for steel to till the soil. However, I do understand that certain vegetable crops may require some sort of tillage. That being said, using a good cover crop can help the soil be more resilient from tillage disturbance.

Telling our Story

I wrote a mission statement back in 1996 for Cedar Meadow Farm that reads, "I want to farm in such a way that produces a healthy food product, generates an income to live a comfortable lifestyle and leaves the soil in better condition than I found it." I probably should add another line about our desire to share our no-till experience. We commit a lot of time to field days, cooperative research with the University of Maryland, Penn State University, NRCS and others. Once the basic concept is understood and the correct equipment put to use, no-till and reduced tillage is the easiest, most profitable and most environmentally friendly way for farmers everywhere, no matter what they grow.

What is one thing you can do on your farm to increase soil health?