

No-till at Many Hands Organic Farm in Barre, MA

Many Hands Organic Farm is located on 55 acres of land in Barre, Massachusetts. Many Hands is run by farm master Julie Rawson and her husband Jack. Julie is also the executive director of the Northeast Organic Farming Association (NOFA). Many Hands is a certified Organic CSA farm with vegetable, fruit, and animal product production. Farming began at Many Hands in 1984, four years after Julie and her husband moved to the property. They started selling produce to The Living Earth natural food store in Worcester, MA and to the Insight Meditation Society in 1985 and began their CSA in 1992. There is one full time employee aside from Julie and Jack, two part time staff, and four laborers in the growing season.

Many Hands offers a diverse array of vegetables grown on three acres of their property, while the remainder is dedicated to orchards, haying, animal pasture, and woods. They have been certified organic since 1987, and no-till production began in 2014.

Julie decided to switch the farm over to no-till after learning the implications in terms of carbon sequestration. After a NOFA event, she learned that farmers will need to be the ones to work towards carbon sequestration through the no-tilling process. Julie pointed out that the no-till practice has been going on for many years in conventional farming, but the use of chemicals adds a more negative environmental impact.

The Process

At Many Hands, the growing season starts as early as February in the hoop houses and the CSA is run through the end of October, and begin another for the next four weeks, until the end of November.

Many Hands has taken several approaches to the no-till process thus far, and they are constantly working to reform and try new practices. Julie has seen the biggest differences in the practice when it comes to bed preparation. This year, Julie and her crew hoed the beds to prep them rather than tilling, but Julie says this process may be harder on the soil than tilling at some points. She attributes this to the necessity of “getting the system in place” when transitioning a normally tilled plot to no-till. They maintain four-foot wide beds with a 20-inch wide pathway in between.

Pathways

The philosophy behind maintaining pathways comes from Dr. Christine Jones at amazingcarbon.com who was the first to articulate the importance of liquid carbon pathways. Pathways are maintained to help keep the soil in place and allow carbon deep in the soil. The 20-inch pathway is the perfect size to maintain with a hand lawnmower. Julie contrasts this practice with that of applying compost, she says that when one adds compost, it is putting a lot of great carbon at the top of the soil, but not as much deep in the root system. This practice allows perennial plants to form deep root systems that make carbon more useful while simultaneously improving sequestration. Maintaining pathways also helps hold the soil in place, an important aspect in no-till production. Holding the soil in place and keeping it undisturbed allows mycorrhizal fungi to thrive,

which ultimately helps both cover crops and annual plants. It is important to ensure that the fungi stay alive, particularly over winter, because it takes a lot of effort and time building it back up. If fungi are always able to function, cover crops will grow faster and be healthier. The process of tilling burns up pathways, perennial plant habitat, and the fungal networks that hold it together.

Cover crops

The biggest thing about no-till, according to Julie, is how to prepare the beds in springtime; especially if they were in rye. Julie normally uses winterkill cover crops like winter rye and a little “creativity”. Winter rye is good for the soil and has deep roots, however, she has noticed that it makes for a rough spring and things often get too wet. She noticed this one season when her kale was not growing as well as it normally does. To solve this problem, she began using clover. Clover is a nitrogen-fixing plant that allows crops to get a better nitrogen feed. Julie uses crimson clover in particular because it has deeper roots and better potential for carbon sequestration. Clover is particularly well paired with brassicas because they are heavy feeders and clover can provide food for them. And generally, brassicas are tall enough that they can dominate the clover, but Julie sometimes will cut the clover and use it as mulch. Since doing this, there has been an improvement in the quality of the kale, and it will now continue to grow until October.

Many Hands has also been doing “cover crop cocktails” for a while now. These include a mix of clover, peas, vetch, barley, wheat, oats, rye, buckwheat, sunflower, daikon radish, and mustards. The daikon radish is good for deep rooting, and the mustards are good for fumigating the soil. Julie normally relies on winterkill for terminating her cover crops. The brassicas are also left attached in the soil over winter because they provide a lot of microbial food and an opportunity for mycorrhizal fungi to live in the roots.

In some beds, the cover crop seeds (clover) are broadcasted right into the growing crop. Julie does this in her half-acre of vegetables that was prepared using cardboard. The hope is that the clover will germinate on top of the mulched hay, and the hay will breakdown to provide the soil with nitrogen.

The Cardboard method

Julie began no-tilling using the cardboard method on an experimental half-acre plot. The cardboard method involves laying cardboard across the area of all intended beds and weighing it down with hay, woodchips, or any other available organic material. Julie once used the abundance of oak leaves on the property for this purpose. After allowing the cardboard to breakdown and for the grasses and weeds below it to die, Julie transplants directly into the soil. The broken down cardboard is particularly conducive to worm populations, thus increasing microbial activity in the soil. Julie says it’s a good way to “take out a field if you don’t want to till it”, and if she had all the time in the world she would experiment more with this method.

Irrigation and Fertilization

Many Hands implements many fertilization practices to ensure the health of their soil. First, every fall, Julie puts down the base minerals the soil is lacking based on soil tests. She will often add a few more base minerals in the spring. At initial planting, she puts down a mixed crop fertilizer and add worm castings. Julie says of worms: “If the worms are happy, that makes all the difference for your soil fertility, because the worms drive the system. And every time they ooze themselves through the soil, they leave a nice string of fertilizer behind them. They’re basically doing your rototilling for you, and your fertilization... worm compost is one of the most valuable of all fertilizers, because they eat the soil essentially... and by the time they’ve done that, they’ve built up this incredible bacterial population that will have a positive impact in the soil, and they also predigest a lot of minerals so that they are more useful. That’s why worms are so great, they can single-wormedly improve your system.”

Before planting, Julie also runs the turkeys through the beds, moving cages over section-by-section. The Many Hands Organic Farm website says of this practice: “we run our livestock in our vegetable and fruit growing areas as often and as intensively as is possible while obeying the organic certification 90/120 rule regarding animal manure and subsequent crop harvest. With this practice you are assured to get e coli free produce and tree fruit that has benefited from the rich fertility resource of free-range animal manure.”

Other practices at Many Hands include using a gallon of spring blend when replanting a bed, which will typically occur three to four times throughout a season, adding potassium sulfate to help with fruiting, foliar feeding once a week, and adding alfalfa meal when they want to recharge the system. Many Hands has also practiced Korean farming methods by adding a fungal inoculant as a fertility product, however, as they are transitioning further into no-till, she finds they need it less and less. Finally, she has been thinking a lot about the levels of sugar and salt in the soil thanks to research by her son, Dan.

Sugar and salt

Many Hands primarily relies on drip irrigation in the no-till beds, but is taking advantage of irrigation as a form of delivering nutrients to the plants and soil, partially using a liquid fertility product, and partially by adding salt and sugar. According to Julie, salt helps to increase the electrical conductivity in the soil, which is important to keep soil microbes active. Electrical conductivity is the ability of something to hold an electric charge. Just as we have an electrical charge in our bodies, so does the soil, and salt is a major force in making sure we have that. In New England, we have weathered soils due to frequent precipitation and years and years of farming on soils that were meant to be forests. So, because of the amount of rain, there is lower conductivity in the soil. To remedy this, they use a solution of salty water when irrigating.

Sugar is added to help feed the microbes and provide energy. Microbes benefit from sugar because it’s basically carbon. To do this, Julie uses organic sugar or molasses and runs a little bit in the irrigation system to wake up the microbes.

Weeds and pests

Since transitioning to no-till, weeds at Many Hands have become a different story. The farm is not seeing nearly as many annual weeds as it once did, and attention has moved to managing perennial weeds and grasses. To keep the weeds at bay, Julie relies heavily on mulching. For perennial plants and orchard trees, mulching is done with woodchips while annual plants are mulched with hay. Perennial plants are more likely to be fungally dominant whereas annuals tend to be on the bacterial spectrum in terms of microbial relationships. For more fungally dominant plants, Julie suggests using rougher carbon in the form of woodchips.

In terms of insects, the only problem Julie identified that came with the switch to no-till was an increase in slugs. She attributes this to the constant cover. She believes such problems will go away as the soil gets in better shape. For now, she uses wood ash and sometimes a little diatomaceous earth to keep slugs at bay. She has also identified issues with bean beetles, but after keeping closer attention on mulching, this problem has gone away.

Challenges in No-till

The biggest challenges of no-till production at Many Hands are all related to preparing and maintain beds. Cover cropping with rye has given the farm trouble, it does not break down as well over the winter and it will often come back up, making it difficult to manage. Other minor issues come with mulching. Folks working at Many Hands have found clearing woodchips off the beds without damaging crops has been a challenge. The other issue is having time to get down to mulching. The farm's no-till system is heavily reliant on mulching, and with the constant cycles of planting and replanting, mulching becomes more necessary. However, despite mulching creating more work, there is less work related to weeding, which would ultimately take more time.

Results

Aside from the few extra challenges, Many Hands has been seeing several positive results since transitioning to no-till. Overall, there are much less weeds and disease problems on the plants. The weeds that are present tend to be more perennials than annuals. As a result, Many Hands has had to put more effort towards understanding how to manage grasses and other perennials. Julie is noticing more cool perennials like thistle coming into the system, which she is learning to utilize medicinally and otherwise. Julie says they "just don't weed anymore...it's a miracle, really." The work that once went into weeding is now replaced with the work that goes into harvesting and selling, which is far more productive.

Many Hands has also begun to use the tractor less and less. Now, it is only used for haying, mowing, and delivering woodchips, the tractors don't go on the fields anymore. Hand tools like hoes and broadforks are sufficient enough to work the fields.

Though the progress is incremental, Julie is seeing more abundance, wellbeing, and quality of crops. They are now tasting better and lasting longer. In years past, Many Hands has had difficulty filling up their CSA but this year it was completely sold out.

There has been a change in standing water on the farm as the soil drains more quickly. Julie sees no-till production as a solution and resilience strategy against climate

change. As more rain events occur more intensely, tilled fields will have more standing water. Untilled soil has a water holding capacity that tilled soils do not. Julie says, “It’s a balance between water and carbon that’s important, the idea that, historically, the water would take several months to go from sky to land to ocean, but these days it goes very, very quickly, because we drain it all off... it runs off instead of going in.”

Things are still changing on the farm and the transition to no-till is still quite active, but Julie projects things will keep getting better every year. Ultimately, no-till has created less work and stress and Julie feels less exhaustion by the end of the season, instead of feeling like, “oh thank god I made it to the end, now I can rest”.

Advice and Important Information

When making the transition to no-till, Julie’s number one rule is to keep the soil covered. Her number two rule is to have green plants growing all the time. To do this, Julie is trying to get everything mulched so that the soil stays warm and in good condition for the next year. She suggests under-sowing cover crops around the end of August when possible.

Many Hands is still working to make sure their soil has enough trace nutrients. In a tilled system, one needs to maximize their trace nutrients because so much is being taken out, especially in an annual system. There may be nutrients in the soil, but they are generally inaccessible because the microbes are unable to function after tilling. According to Julie, if everything is going well and microbes are active, you shouldn’t need to add any fertilizers. To sustain microbe energy, leave roots in the ground for them to feed on.

Ultimately, Julie says you really have to pay a lot of attention to planning. IN a no-till system, you should always be thinking about what is going in the bed a year ahead of time.

Resources

Amazing Carbon – Christine Jones

www.amazingcarbon.com

The Natural Farmer, the Newspaper of the Northeast Organic Farming Association

thenaturalfarmer.org

Bionutrient Food Association

<http://bionutrient.org/site/>

Mycorrhizal Planet – Michael Philips

Phillips, M. (2017). *Mycorrhizal planet: how symbiotic fungi work with roots to support plant health and build soil fertility*. White River Junction, VT: Chelsea Green Publishing.

Water in Plain sight – Judith Schwartz

Schwartz, J. D. (2016). *Water in plain sight: hope for a thirsty world*. New York: St. Martins Press.

The Wild Wisdom of Weeds – Katrina Blair

Blair, K. (2014). *The wild wisdom of weeds: 13 essential plants for human survival*. White River Junction, VT: Chelsea Green Publishing.