

Farmers Share Experiences and Challenges Adopting Healthy Soils Practices

A Report from the Northeast Organic Farming Association on Two Years of Collaborative Work



By Caroline Roszell

Executive Summary

The movement for healthy soils in the US is deeply farmer-driven. To accelerate the adoption of healthy soils practices for climate resilience in the Northeast, it is critical that programs and measures by governments and not-for-profits center the voices and needs of farmers from small and mid-sized farms. In 2019 - 2020, the seven NOFA Chapters collaborated on a series of Soil Health Field Days together with farmers who are leaders and innovators in soil health practices. This report summarizes the findings from the “Organizing for Soil Health” initiative, a regional soil health project, and makes recommendations for further work to build upon farmer practices and innovations, and to create a culture of soil care in our region.

2019 events were in person and on-farm, but 2020 events were virtual. NOFA staff facilitated roundtable discussions among organic farmers on the soil health practices they use and the barriers and challenges faced, and also administered surveys to provide data on participating farmers. In 2019, 192 farmers participated in the on-farm field days and discussions, representing an estimated 3,800 acres. In 2020 field days were online and discussion took the form of a widely distributed online survey with 83 responses from farmers in six states, representing 2,172 production acres.

Summary of Recommendations

This is a summary of the recommendations to policy makers and farm service providers to help accelerate the adoption of healthy soils practices on farms in the Northeast:

- 1. Support experienced farmers to provide education and technical support to beginning farmers and those who are newly transitioning to healthy soils practices:**
 - Farmers learn best from the successful examples of other farmers through farm visits, demonstrations, consultations and mentorship from experienced farmers, and access to case studies of working farms;
 - Incentive programs must be designed to compensate innovators, pioneers and long-term practitioners and not be based solely on proof of “additionality”;
 - Experienced farmers make the best mentors and should be compensated fairly for their time;
- 2. Provide financial assistance and technical assistance options (such as farmer mentor support) to support transition costs to healthy soils practices adoption for farmers:**
 - Adopting a new healthy soils practice involves uncertainty, risk and a learning curve. Farmers need financial assistance as well as mentorship and technical support for a minimum of two years and up to four years during adoption of new practices;
 - More research and case studies are needed that provide roadmaps for transition challenges
 - Administrative costs and acreage-based payment structures leave out smaller-scale farmers: policymakers and funders should evaluate the administrative task load for existing and proposed financial assistance programs and consider minimum base payments that level the playing field and encourage participation from small-acreage producers;
 - Farmers want and need more support in understanding how to access existing financial assistance;
 - Direct-to-producer grants and microgrants are a useful tool to help farmers of all scales access equipment, education, and transition-related increases to input costs.

- 3. Farmers value knowledge about their soils and want both training in field indicators for soil health as well as more access to soil testing:**
 - Policymakers and funders should invest in upgrading regional soil testing lab infrastructure to make sure that Extension labs are able to provide affordable soil health assessment long-term;
 - Farmers consider soil testing to be a significant expense and want support paying for soil testing;
 - Farmers want training to help them learn soil health field assessment methods.

- 4. Sustainable revenue streams are needed to build and expand access to technical support, mentoring, and education:**
 - Most farmers we surveyed are open to raising fertilizer fees as a source of funding for soil health programs;

- 5. The long-term solution to expanding the use of healthy soils practice across the Northeast is creating a culture of soil care shared by farmers, the public and policy makers.**

Guidance by the NOFA Interstate Policy Council:

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Funded by Farm Aid and the Clif Bar Family Foundation





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◀ Photo Credit: Caro Roszell at Massaro Community Farm

Introduction

The seven chapters of the Northeast Organic Farming Association (NOFA) are grassroots, farmer-run organizations serving as the hub for the peer-to-peer, mutual sharing, and community-building activities of the Northeast organic and natural farming community.

There is not yet a significant body of research on challenges and barriers to adoption that farmers experience in implementing healthy soils practices in agriculture, and in the Northeast in particular the wide diversity of crops and enterprises makes mapping those challenges more difficult.

Yet it is important to recognize how deeply farmer-driven the U.S. healthy soils movement is; and, given the fact that independence and self-determination are so greatly valued by farmers on small- to mid-sized operations, centering their voices and needs is critical to accelerating the adoption of healthy soils practices for climate resilience in the Northeast.

Thanks to funding from Farm Aid (2019-2021) and Clif Bar Family Foundation (2020-2021), the seven independent state Chapters of the Northeast Organic Farming Association (NOFA) collaborated to conduct a regional “Organizing for Soil Health” initiative.



*Soil Health Field Day at Gaining Ground (Concord, MA)
Photo: Fan Watkinson, Gaining Ground*

The three-pronged approach first featured policy-oriented coalition building outreach via NOFA’s New York, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island and New Jersey Chapters, focused on drafting language and influencing their state’s policy-makers to generate effective soil health legislation. This work was accomplished through regular meetings of chapter policy staff and through a broad range of grassroots advocacy activities in each state.

Healthy Soils legislation has been drafted in NY, CT and NH. NOFA-VT and the Vermont Health Soils Coalition successfully advocated for the passage in 2019 of two separate bills relating to healthy soil management: “An act relating to agricultural development,” and “An act relating to miscellaneous agricultural subjects,” which supported the creation of the Vermont

Environmental Stewardship Program (VESP). Also notably, in January 2021, the Massachusetts legislature passed “An Act to Promote Healthy Soils” as part of an economic development package, which established a Massachusetts Healthy Soils Program and Fund. The development of this program will be informed by the soon-to-be released Mass. Healthy Soils Action Plan, for which NOFA/Mass staff members served as advisors.

Second, the project constructed a farmer soil health peer education and discovery program based on soil health and carbon restoration methodologies for climate adaptation and mitigation. This multi-state program was designed to engage, instruct, create discussion and receive feedback from a wide range of organic and conventional family farmers in the northeast via a series of:

- NOFA Chapter and Summer Conference workshops
- On-farm and virtual soil health field days
- Farmer roundtables
- A digital farmer survey

The third prong of our approach is the subject of this paper: an effort to listen to farmers, record their responses and, in turn, inform policymakers, farm service providers, and farmer assistance organizations on what constitutes effective agency and legislative policy supports for farmers’ key healthy soils practices and learning venues.

In contrast to current top-down industry and governmental policy approaches directed at shifting farmer practices, grassroots-up models that include facilitating peer education among farmers, gathering their input on what actually works in the field and documenting their policy needs not only effectively enlists their participation but also engenders their trust in the farmer-derived outcomes.

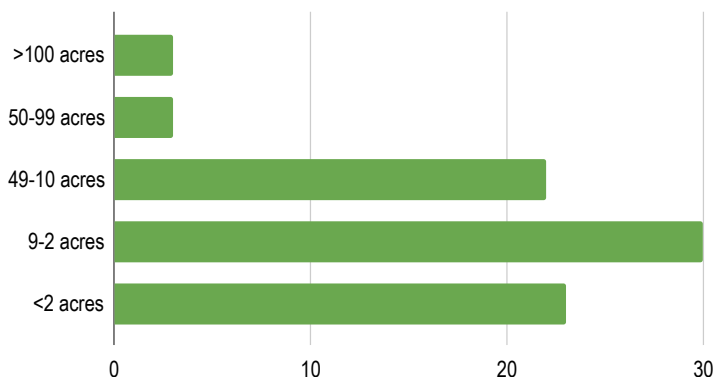
This White Paper presents farmer-driven responses derived from the NOFA Chapter events and from survey work, made possible by funding from Farm Aid and Clif Bar Family Foundation. With potential agricultural solutions now firmly on the climate change remediation agenda and top-down industry initiatives such as carbon credits taking the spotlight, the farmer voice is more important than ever.

Project Background, Methodology & Demographics

In 2019 and 2020, the NOFA state chapters held a series of Soil Health Field Days in collaboration with farmers who are leaders and innovators on soil health practices. In 2019, our events were in person and on-farm, but in 2020 our events moved online.

At each of our 2019 events, NOFA staff facilitated roundtable discussions with attending growers to explore the soil health practices being adopted by participating farmers and to identify barriers and challenges faced in the process. Farmers were asked about what kinds of incentives or support would help them implement further healthy soils practices. All sessions used identical prompts developed by the NOFA Interstate Policy Committee, and each event had one facilitator and one note-taker. Designated notetakers recorded 64 specific challenges, needs and/or suggestions for solutions mentioned by farmers in the roundtable discussions. Recorded challenges, needs and suggestions were analyzed and categorized.

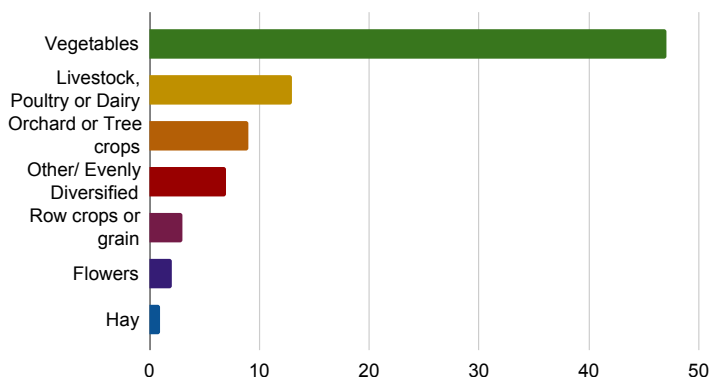
Acres in Cultivation



Accompanying surveys helped us to understand the size and experience level of the participating farmers. 192 farmers participated in the on-farm field days and discussions in 2019, representing an estimated 3800 acres (based on averages from participant returned surveys). Of those who handed in paper surveys at the events, the average years of experience farming was 12.4. The average cultivated acreage for this group was 20.25.

It is important to note that, for the roundtable discussions, the farmers involved were at that time attending a NOFA chapter educational event so there was a built-in selection for organic-oriented farmers who value on-farm and peer-to-peer education.

Primary Enterprise



In 2020, due to the coronavirus pandemic, we moved our Soil Health Field Days online and revised our 'roundtable' discussion prompts into an online survey which was distributed through all NOFA chapters as well as through farmer listserves and partner institutions. We received 83 responses representing 2172 production acres, with 66% of responses from Massachusetts growers, 18% from New York and the remainder coming from Connecticut, New Jersey, New Hampshire, Rhode Island, and a few retired or relocated farmers ("other").

We had a relatively experienced respondent pool, reporting an average of 16.5 years of experience.

The respondents' average acres in production was 26.5. We received responses from three farms with over 100 acres in production (the largest being an 800- acre organic grain farm), three farms with 50-99 acres in production, 22 farms with 10-49 acres in production, and 53 farms with fewer than 10 acres in production. Of those 53, 23 farms have fewer than two acres in cultivation.

Most respondents named vegetables as their primary enterprise. There were fewer than 10 each of row crops, grain, hay and flower producers. Respondents who described highly diversified operations or listed a very niche crop like medicinal plants or mushrooms were given the category "other/ evenly diversified."

While we did not ask respondents about organic / conventional status, we assume most respondents are either certified organic or follow organic practices, due to primary distribution through NOFA chapter events and mailing lists.

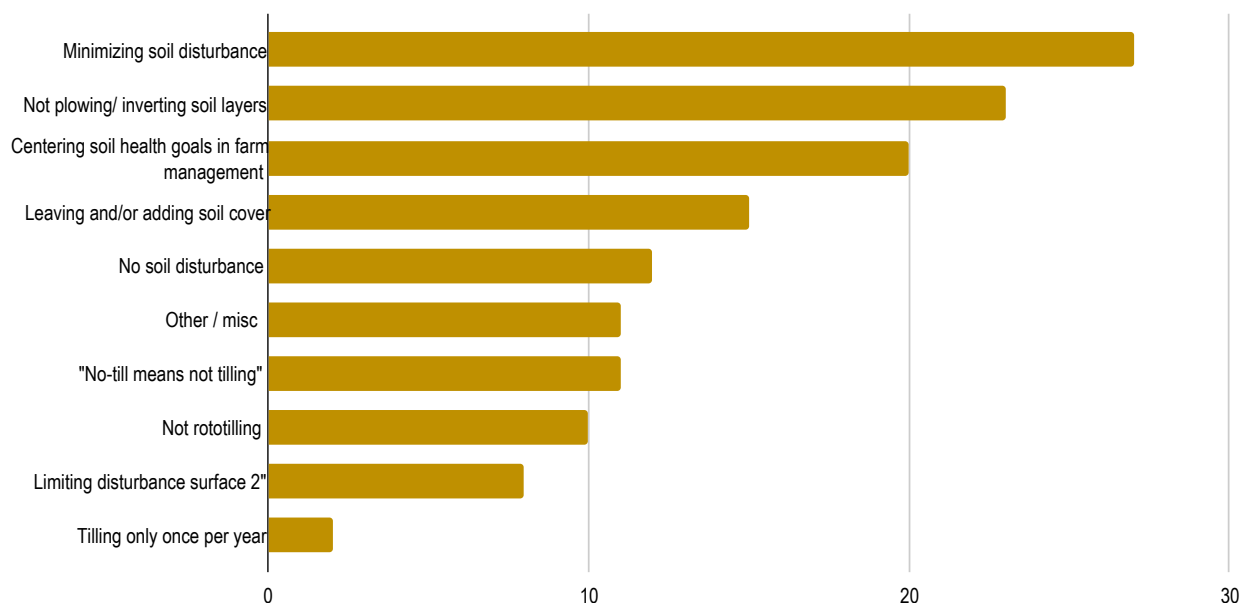
What follows is a discussion of what we learned, and what recommendations we offer to policy makers and farm service providers to help accelerate the adoption of healthy soils practices on farms in the Northeast.

Defining No-Till

As understanding has spread of the importance of reducing disturbance of soil to its good functioning and health, interest in no-till has expanded among organic farmers. However, we have noticed that there is a wide range of meaning attached to the idea of "no-till" in the Northeast farming community. The preponderance of diversified farms and wide range of enterprises in the region means that there is no standard set of practices commonly associated with the term "no-till."

In the paper surveys delivered in-person and in our online survey, we asked participating farmers to define "no-till" in their own words. We collected 116 responses from the combined paper and online surveys. We created 10 categories based on themes in the short-answer responses and then counted responses that fit into each theme. Some responses mentioned more than one theme (such as limiting disturbance to the top two inches of soil *and* keeping the soil covered in residues and mulch). In those cases, the response was counted in both categories.

What does no-till mean to you?



Responses ranged widely. At one pole, twelve respondents described no-till as essentially eliminating all soil disturbance (except, in some descriptions, for planting). At the other end of the spectrum, two respondents said that “no-till” meant limiting tillage to a single annual event.

The largest group of respondents (27) described no-till farming as minimizing (not eliminating) soil disturbance and 23 farmers defined no-till specifically as not plowing, as eliminating moldboard plowing, or as not inverting soil layers. Twenty respondents described an approach to farming that centers soil health goals in management decisions, such as “a more conscientious way of managing vegetables, fields and biology.”

Eight answers were specific about limiting disturbance to the top two inches of soil. Other responses (10) specifically named rototilling as the form of tillage to eliminate in no-till systems. Some (15) specifically mentioned the practice of keeping the soil covered by leaving residues and/or adding mulches like compost, leaves, straw and and/or plastic soil covers like tarps. Eleven responses fell into an “other” category (one farmer simply wrote, “Complicated”) and another eleven respondents simply stated some variation of “no till means not tilling.”

Farmer Roundtable Discussions

Discussion Notes and Analysis

Education and technical support was by far the biggest need/ challenge cited by the farmers who participated in the roundtable discussions, with 27 recorded mentions. The most frequently mentioned preferred format for learning was **farmer-to-farmer education**, with farmers specifically identifying **farm visits, demonstrations, consultations** with experienced farmers, and **learning from case studies of real farms**.

The most often-mentioned **specific education need** was **efficiency within healthy soils practices**. Related topics that came up were **transition** from a more tillage-based system and **scaling up** healthy soils practices. Other topics mentioned include **cover crop termination, carbon cycling, links / correlations between healthy soils and healthy foods, “unlearning conventional practices,”** and the **financials / return on investment** of healthy soils practices. Types of technical support topics mentioned include support for **soil testing, water quality testing**, and ongoing monitoring of both.

Incentives for healthy soils practices adoption were the second most-discussed topic. Recorded commentary shows a preference for **payment for practice**, while a smaller number of farmers suggested that payments should be **outcome-based**. Farmers also discussed the need for **more investment in local food systems** and **in smaller-scale farms** broadly.

Farmers were interested in grants to fund new **equipment** needed for healthy soils practices and to subsidize the lower profitability **transition phase** (from conventional tillage to reduced/ minimum tillage), and for experimenting with new practices. Farmers were also specifically interested in funding to help pay for cover cropping and installation of perennial buffer strips / windbreaks.

Related to incentives, the **cost of implementation** as a specific barrier was the third most-discussed topic, followed by access to equipment. The most-mentioned implementation cost was the **increased labor costs** associated with healthy soils practice (which are often reported to be temporary and associated with the transition phase after adoption of no-till systems). Other problems specifically identified included the cost of **investing in new tools** and implements and the **market pressure to put all land into production** (to avoid losing potential revenue by fallowing land or shortening the cropping season to fit in a spring or fall cover crop). Other barriers mentioned by farmers included **land access**, the burden of **student loan debt**, and a **shortage of time for learning and experimentation**.

NOFA Farmers Healthy Soils Survey

Responses and Analysis

The NOFA Interstate Policy Committee was interested in understanding barriers to adoption of healthy soils practices as well as what kinds of experiences and supports were considered to be the most desirable and motivating to farmers in our networks.

To explore these questions, we asked farmers to rate a variety of educational opportunities and incentives on a 1-5 scale (see average response ratings below)

Results show that the farmers who responded to this survey rated **peer-to-peer education and consults more highly than farm visits from technicians**, with “Educational workshops/webinars on healthy soils practices from authorities/experts like NRCS, Extension or an agronomist with your Conservation District” receiving an average rating of 3.89 compared to “Farmer to Farmer educational workshops/webinars on healthy soils practices organized by farmer networks like NOFA, Young Farmers Network or CRAFT, ” which received an average rating of 4.3. Technical services in our respondent pool were just slightly more highly valued from farmer network organizations (4.25) and experienced farmers (4.20) than “from NRCS, Extension or your local state Department of Agriculture” at (4.01). It is important to note, however, that as our survey was sent out primarily by farmer network organizations, our respondent pool may be biased towards farmer network organizations.

We also asked farmers a series of questions to compare and evaluate their interest in existing proposed incentives schemes, compared to a compelling on-farm experience. Farmers were asked to evaluate these incentives and experiences on a 1-5 scale with 1 being “Less motivated to participate / adopt healthy soils practices ” and 5 being “More motivated to participate / adopt healthy soils practices.”

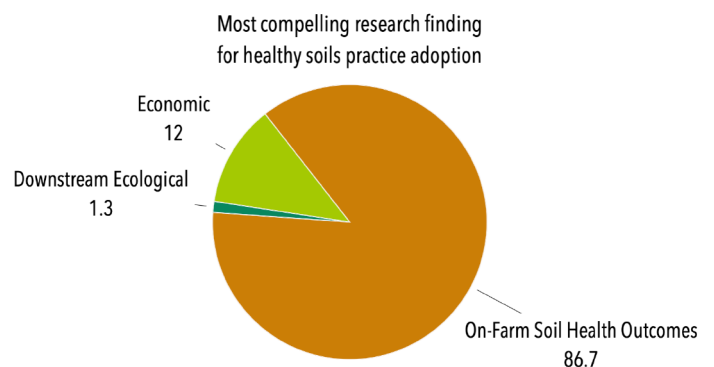
On average, responders to this question saw themselves as **significantly more motivated by seeing a practice have a successful outcome on a working farm** (based on observable physical characteristics) (4.39) than they would be by practice-based cost shares aimed at offsetting 1/4 of the cost of implementation (3.82). Farmers were significantly less motivated to participate in a cost-share program if they perceived that the funding came from carbon offset programs (2.88, or just above neutral) compared to a scenario in which the funding originated from a private foundation (3.33). However, several respondents said in the comments section of our survey that they would be much more motivated to participate in cost share programs if the programs would pay for their soil tests (see discussion of Soil Testing, page 11).

While our average response showed that farmers would be motivated by cost share incentives, the lower interest in incentives compared to education may reflect the fact that smaller-scale farmers (who are more heavily represented in this survey) are often left out of USDA incentives programs because of farm size.

► Research

We asked farmers, “When deciding whether to adopt a new soil health / soil management practice on your farm, which of the following types of research findings is most compelling?” Participants were allowed to select just one of three options:

- On-farm data that demonstrate that the practice results in improved physical characteristics such as improved soil structure, microbiological diversity, infiltration or drainage, or root penetration
- Economic data that demonstrate improved farm finances as a result of the practice
- Downstream ecological data that demonstrate improved water quality or air quality as a result of this practice



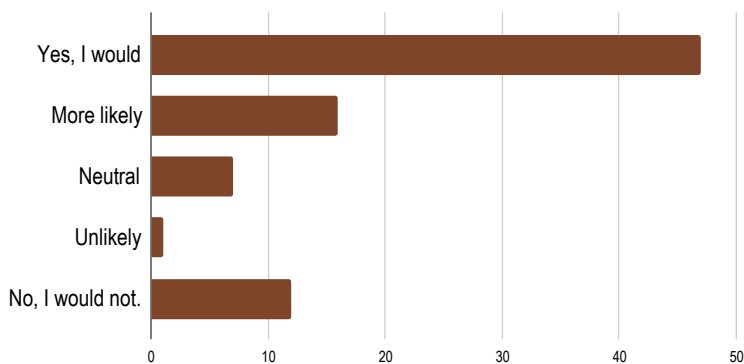
Although farmers in the NOFA network tend to be motivated by environmental concerns, just 1.3% of respondents said that they were most interested in research on downstream ecological data. The majority, at 86.7%, were most interested in on-farm data demonstrating clear soil health outcomes. Economic data was of greatest interest to 12% of those surveyed.

Given the rise of popular messaging about the connection between soil health and environmental benefits like soil carbon sequestration, improved water holding capacity, improved water quality (via reduced runoff and leaching), it would be interesting to know if most respondents believe that improving soil health outcomes always improves downstream ecological data. More research on this topic is needed.

► Compost

We were curious to hear if farmers would apply more compost if it were cheaper and/or if they were offered cost share funding, as we often hear anecdotally from farmers that they would like to use more compost, but that the cost is a significant barrier. Compost is often recommended as a primary strategy for soil and crop health on small-scale, bio-intensive no-till farms and many market gardeners and small-scale farmers apply several inches of compost when establishing new planting areas and then top up beds with compost at each planting cycle. The cost of compost, if purchased from off-farm, can be one of the largest input costs for small farms. Our survey showed that most of the farmers surveyed (63) would definitely apply more compost or would be more likely to apply more compost if it cost them less. Seven respondents were neutral, one was unlikely and 12 would not.

If compost were cheaper or you received a cost share, would you use more on your farm?



We asked farmers, if they responded neutral or no, to explain (short answer) why they would *not* apply more compost. **Fifteen responded with concerns about compost quality**, with some expressing that the source would have to be certified organic. Seven other respondents who were among the less to not likely to apply compost shared that they didn't have enough labor or the correct equipment to apply the compost (3), they already had either high enough organic matter or enough compost (3), or they leased many fields on non-contiguous land, making it logistically challenging and cost-intensive to spread bulk materials.

The high level of concern expressed in comments about compost quality points to a need for more access to information about compost quality and perhaps more oversight / regulation in municipal and commercial composting to improve baseline quality and consumer confidence.

► Fertilizer Fees

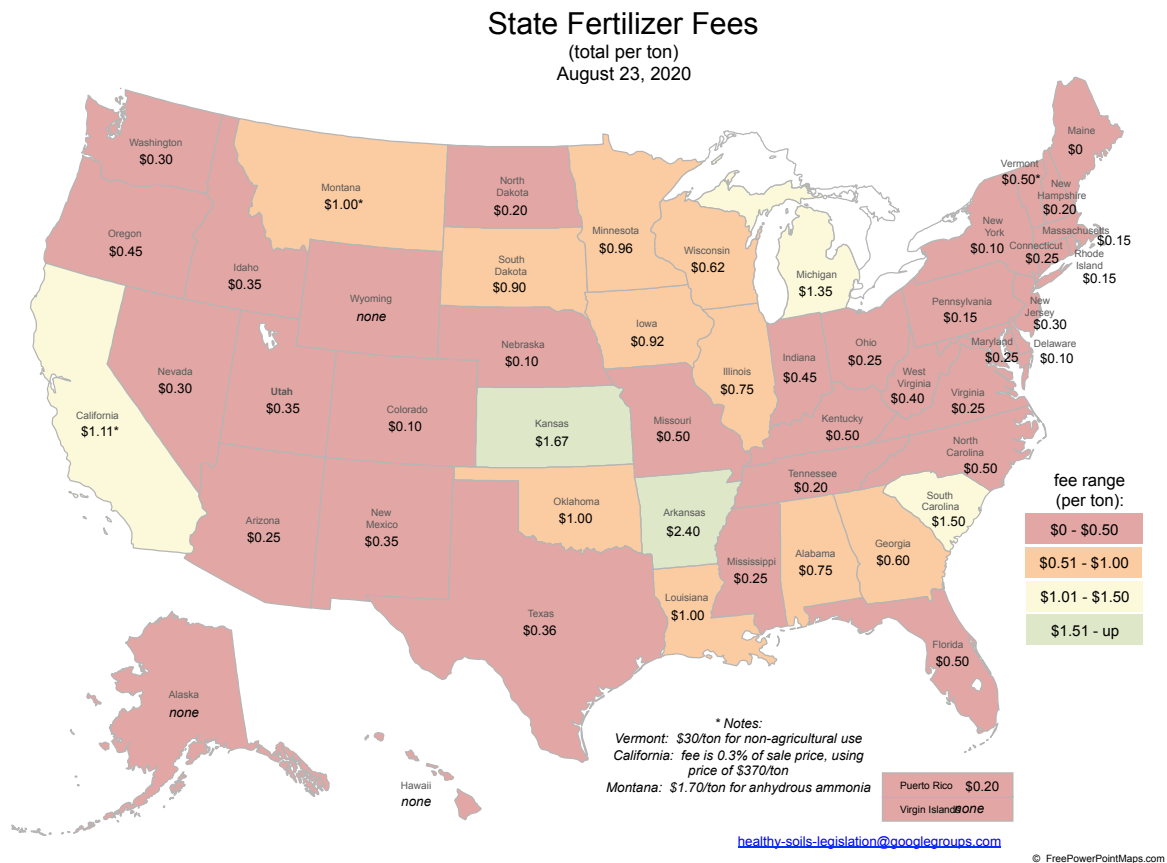
Finally, we asked respondents, "Would you support measures to internalize the cost of synthetic fertilizer use on soil health? For example, the state of Illinois has a \$0.50 per ton fertilizer fee (paid by fertilizer dealers) that supports their Nutrient Research Education Council. Other state fees range from \$0.10 to \$1.00 per ton. Such a program in your state could fund healthy soils education and incentives while also disincentivizing synthetic fertilizer use."

Fertilizer tonnage fees are used in many states to fund technical support services like soil testing, nutrient management planning, and other services (often through state university Extension). Currently the Northeast states have some of the lowest fertilizer fees in the country at \$0- \$0.50 per ton compared to states like California (\$1.11), Kansas (\$1.67) and Arkansas (\$2.40). Modest raises in fertilizer fees in the Northeast may be leveraged to fund soil testing, technical assistance and healthy soils education programming for farmers, which in turn helps to reduce inefficient use of fertilizers, increasing farmer

profitability by reducing input costs and decreasing water pollution and greenhouse gas emissions from farming (i.e. nitrous oxide emissions from soils) and from fertilizer manufacturing.

Participants were, on average, supportive of the idea of fertilizer fees at 3.87 average response on the scale of 1= No, that doesn't sound like a good idea to 5, Yes, I would support this.

The below map shows the fertilizer fees in each state (most state fertilizer fees are inspection fees):



Fertilizer prices are around \$375/ton, having dropped 30% in the past five years, or roughly \$100/ton ([https://www.nass.usda.gov/Charts and Maps/Agricultural Prices/prod1.php](https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/prod1.php)):

In Massachusetts, where the majority of respondents farm, one of the most significant improvements needed for farmer services is to upgrade the UMass Soil Testing Lab. The lab's CN Analyzer is almost 20 years old, and a replacement would not only be cheaper to operate but would be capable of measuring soil organic carbon. The lab also will soon need a new ICP spectrometer (inductively coupled plasma spectrometer) and a new information system to improve efficiency for lab operations. (More on soil testing below).

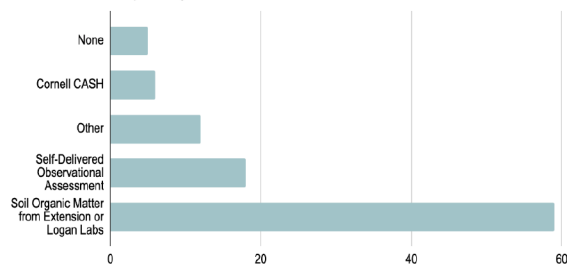
Given the support for a fertilizer tonnage fee among farmers surveyed, it seems like it would be worthwhile for Northeast states to consider implementing and/or raising these fees to improve farmer access to technical services and education across the region. Further research into the opinions of farmers in other farmer networks would help policymakers assess whether this level of support in our respondent pool is consistent with a broader range of farmers in the Northeast.

► Soil Testing & Assessment

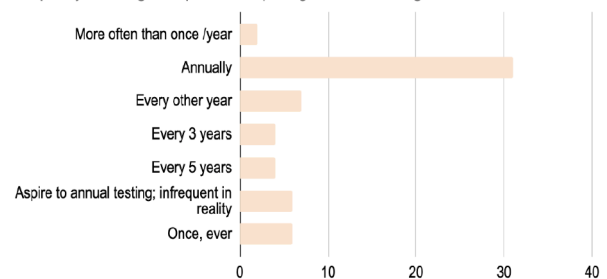
“I would do more with soil testing if it wasn’t so expensive. Offering no-cost or significantly reduced cost soil testing would be a valuable incentive.”

We asked farmers to tell us which soil tests they are doing, and how often. About one third of our roundtable, in-person participants reported that they sent in soil samples to a lab annually. We asked for more detail in our online survey in 2020, asking “Which soil health tests are you doing” and “how often?” Many respondents selected multiple tests. Of our online survey respondents, the majority (59) sent tests to either Extension or Logan Labs.

Which soil health tests are you doing?



Frequency of testing in respondents reporting use of lab testing



Of respondents who reported using lab tests, about a third (18) also reported doing another kind of testing in addition to using lab reports, such as observational, NOFA Carbon Proxy Testing, Real Food Campaign tests, CASH, or others. Of those using lab tests, the largest group reported sending in tests annually. Six respondents, however, commented that they intend or would like to send in annual tests, but don’t manage to do so in reality.

Soil Testing As Incentive

Interestingly, while we didn’t specifically ask about soil testing in a way that framed it as an incentive, participants brought up the cost of soil testing in both the roundtable and in the comments section of our survey as a valuable form of technical support.

We concluded our survey by asking if there was “anything else you want us to know?” Three farmers indicated that soil testing was a significant expense. One wrote that “I would do more with soil testing if it wasn’t so expensive. Offering no-cost or significantly reduced cost soil testing would be a valuable incentive.” Another grower shared that “My enthusiasm for [soil carbon incentive schemes] would mostly depend on who was paying for the soil tests. If the program paid for them, I would do it just to get free soil tests.” A third wrote, “The questions above regarding payments for increasing soil OM don’t specify if the soil tests would be paid for. Especially for small farms, that’s a huge decider, since the cost of the soil test could easily exceed the payment for a 1% increase on the acre... If the soil test was definitely paid for, then I would be more interested. If it was definitely not, I would have no interest.”

The majority of our survey respondents clearly use and rely on annual lab testing. Given the importance of understanding soil organic matter and nutrient levels to dial in nutrient management plans and to calculate N budget from SOM, our results and the comments that respondents took the time to write suggests that investment in more affordable or even free soil testing would be of great value to the farming community.

As was mentioned above in the **Fertilizer Fee** section of this report, UMass is an example of a land grant university in need of upgrades to its lab equipment and systems to improve access to soil testing. Leveraging a per-ton fee on fertilizers could help to raise the money needed to improve that access, alongside funding education and peer-to-peer information sharing.

► Education

“We have so much still to learn.”

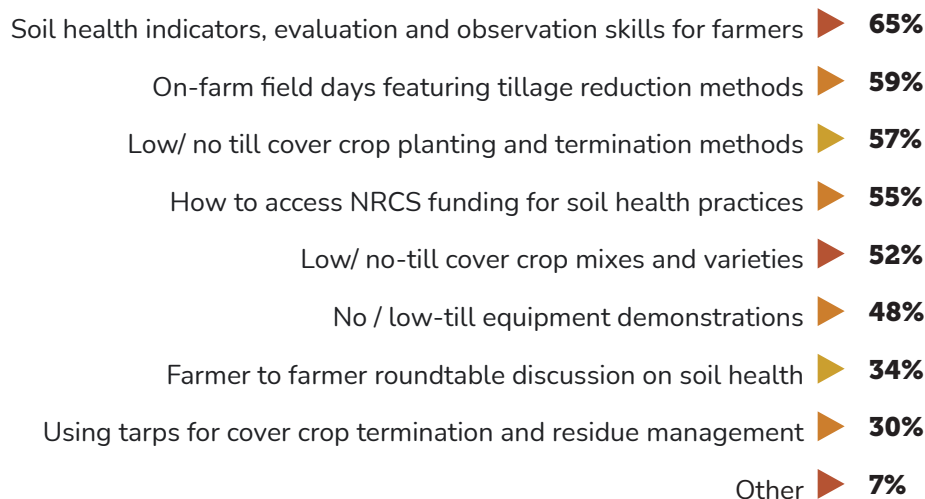
As has already been established, for both roundtables and survey respondents, education is the most valued and requested resource, with our respondents expressing a preference for farmer-to-farmer education in the form of farm visits, demonstrations, consultations / mentorship from experienced farmers, and access to case studies of real farms.

While the majority of farmers specifically cited on-farm peer learning, respondents were not unanimous. One requested “education on obtaining grants,” another, “a detailed ‘how-to’ guide.” Another participant was, “very motivated to do no-till right,” but “could definitely use more assistance/education.” She had attended various NOFA programs but pointed out that “farmers are great at farming but not all farmers are great at teaching or presenting. I’m still looking for more educational materials about no-till but not sure where to get help.”

Farmers especially want help during the early stages of adoption of a new practice or system. “Mentoring by farmers that have successfully developed good soil health and reaped the benefits,” commented one survey respondent, “would take much of the risk out of the transition.” Another said that “classes on transitioning and maintaining no-till systems, and how these practices look on different size farms” would be particularly helpful.

In our survey, we asked farmers to indicate, from a list, which topics would be of the greatest interest to them. Most respondents chose multiple options. 65% indicated that they would be interested in education on soil health indicators, evaluation techniques, and observation skills for farmers. 59% were interested in on-farm soil health field days featuring tillage reduction methods. 57% were interested cover crop planting and termination methods for low and no-till farms, and 52% on cover crop mixes and varieties for low and no-till contexts. 55% wanted education on how to access NRCS funding for soil health practices, and 48% were interested in low/ no-till equipment demonstrations. Just 34% selected open-ended farmer roundtable discussions on soil health and 30% on using tarps for cover crop and residue management.

The significant difference in the on-farm field day interest and the roundtable interest (59% compared to 34%) suggests that farmers are more interested in visiting and touring other farms and having a structured agenda than they are in open-ended and off-farm peer-to-peer learning (which often occurs in conference settings).



► Labor, Transition and Input Costs

“We can’t rely on over stretched farmers to make investments up front on soil health. We don’t have the time or the money. It has to come from outside support.”

Fueling the desire for education, farmers are concerned about uncertainty around increased costs, effectiveness of different practices, and risk.

In roundtable discussions, the question of labor efficiency came up repeatedly— farmers understand the broad outlines of practices that promote soil health— disturbance reduction, increased days in living cover, keeping soil covered and maximizing diversity— but especially for the natural and organic farming community labor is a limiting factor in implementation. In the farming community, innovations in efficiency occasionally come from a product or tool innovation but most often come from other farmers.

This is, to a large degree, why farmers are turning to other farmers in search of solutions, leading one farmer to share in a roundtable that agencies should “increase the number of farmers in education and outreach positions to assist with on farm management.”

Transition Costs

One of the most common experiences discussed in no-till / healthy soils circles is the ‘transition phase.’ After ceasing mechanical aeration and cultivation of soils, but before soil organic matter is built up enough to create natural tilth and weed seed banks are buried below layers of residues, farmers usually experience a 3-4 year period of hard, erosion-prone soils and a 1-2 year period of more challenging weed pressure. For most farmers, this transition phase involves increased labor costs, increased crop failure, higher risk, and may also involve higher input costs.

Farmers brought up the transition phase in roundtable discussions and expressed the increased need for support during this phase. To help defray transition costs, farmers suggested equipment grants for no-till upgrades and direct farmer financial supports. In one roundtable discussion, one farmer said that society “should be paying farmers like contractors to rebuild soil like we paid contractors to construct the golden gate bridge.”

Current Incentives Programs Fail Smaller Farmers

While it can be argued that there are already many cost shares and financial incentives available from NRCS and USDA programs, soil conservation programs are underutilized in the U.S., and existing programs often leave certain farmers out. (See Appendix B, Woven Roots Farm Case Study) Historically-rooted distrust of Extension and USDA farm service providers is still present for many farmers, leading to “the feeling that service providers are there to punish and not assist farmers,” as one participant expressed.

In our discussions, many farmers pointed out that smaller farmers are often left out of existing incentives programs that are acreage-based. As one respondent put it:

“ I would be more motivated by incentive programs that were more nuanced than simply being based on acres/scale...1.5 acre farm may be doing wonderful soil improvement and supporting ecosystem services beyond the boundaries of their farm while actually feeding folks, but it wouldn't be worth the paper work due to the payment per acre model. Perhaps basing it on percentage of operation would be more equitable (ie: for mid and small-scale farmers who apply a practice such as cover cropping to 20% of their land in cultivation could receive a payment comparable to a large-scale farmer employing these practices). The bias and disadvantage baked into our ag system that favors big ag turns many smaller farmers away.

Another farmer said, “I think there needs to be a different pay scale for small farmers. Per acre works well for large farms but is never enough to make it worth their while to apply for smaller farms. There needs to be a flat fee payment plus per acre fee to incentivize smaller farmers. “

Another commenter shared, “I find that many of the Federal programs are onerous to apply for, geared toward large farms, and thus unappealing given the priority of tasks at hand... Financial assistance has to be worth the effort for the cost to the farm as well as time for documentation... While I find a cost per acre approach makes sense, for small farms this method doesn’t necessarily make a difference.”

Input Costs

“It’s so easy in theory, but I’ve found it so difficult in practice to implement better soil health practices. I always seem to be short on time and money.”

It can be difficult to separate input costs from the above topic of transition, as farms in transition to soil conservation often have both higher input costs and greater uncertainty about their success rate. However, some farmers specifically raised the cost of inputs like cover crop seed, compost and other inputs.

One farmer commented that they would appreciate the opportunity to apply for “Grants to continue to test and experiment [because] sometimes these innovations in no-till cover crop cocktails fail and cost farmers dearly.”

Another farmer would like to transition from synthetic to organic fertility sources, but cited both the cost of organic amendments and the increased tractor trips required to spread bulk material:

“ I’m an ecologically-motivated farm that uses carefully-administered synthetic fertilizer due to my acreage base and the relatively low return per acre of hay production. If I had a source of organic fertility that was somehow closer in cost to synthetic and a way to spread it that wouldn’t be a tenfold increase in tractor trips (ie carbon footprint), I would leap at it! ... I’m very interested in finding a way to incorporate organic fertility into standard hay production that doesn’t result in forage that is economically inaccessible to most customers.

► Farmer Concern: New Incentives Favor Late Adopters

Some farmers are concerned that new incentive structures may have the unintended consequence of rewarding only late adopters and punishing trailblazers.

“I employ as many tactics as possible to enhance my farm’s environmental responsibility, but I have done so at my own expense,” one farmer commented. Another said,

“ One big issue with offering carbon credits for “changing” farm practices is that it does nothing to “compensate” those of us already doing soil-enriching practices already. Our organic matter levels are already high, as are those of many other 100% grass fed dairy farmers who manage permanent perennial pastures of diversified plants that support pollinators, ground nesting birds, and other organisms as whole functioning ecosystems. That means there would be little room for improvement to be “rewarded” with the schemes you suggest (unlike what could be realized by poor soil managers). The NOFAs, PASA and other sustainable farming organizations need to focus on the innovators, pioneers and practitioners in their midst who are the proof of concept that farming can be (and is!) good for the environment and climate change abatement.

One way to support and honor farmers who have been leaders in healthy soils practices is suggested in the comments of farmers above: hire more farmers in outreach and technical support positions - people like our Case Study (Appendix B) subjects Jen and Pete Salinetti, who perfected a successful and productive no-till farming system long before the contemporary healthy soils movement. As a result, they are in high demand as mentors and as guides to other farmers. As full-time farmers, they can't afford to donate their time, but as full-time farmers they also know what farmers can and cannot afford to pay for consulting. A fair market rate for their time as experts in their field with over 20 years of experience would be a minimum of \$50 an hour.

There is a role that foundations, state agencies, and non-profits can play in recruiting as fairly-compensated consultants the most experienced farmers who were at the vanguard of healthy soils practices. A high enough consulting wage will allow experienced farmers to hire and retain more experienced labor, making it more manageable for them to spend time away from their farm businesses. More research and work is needed to determine reasonable consulting wages and to develop models for involving experienced farmers as consultants to on-farm service provider teams.

Conclusion

Based on participation rates alone, farmers in the Northeast sustainable/ organic farming community clearly have a strong interest in healthy soils practices, but also express a clear need and desire for education and technical support, for affordable soil tests, and for cost sharing on inputs like compost.

Based on roundtable conversations and survey results, programs, foundations and agencies interested in supporting this engaged sector of the regional farming community to advance healthy soils practices should consider the following actions:

- 1.** Prioritize on-farm, peer-to-peer education via grants to / partnerships with grassroots farmer network organizations
- 2.** Provide targeted grants with low administrative barriers to help small-scale farmers who are underserved by existing acreage-based incentives programs, including financial assistance for:
 - a.** Increased labor costs during their healthy soils transition phase
 - b.** Increased risk undertaken by farmers in transition phase
 - c.** Experimentation with innovative healthy soils practices
 - d.** Education micro loans to support education costs (ie, time and travel to conferences)
 - e.** Increased input costs for soil health acceleration like compost, landscape fabrics, and organic mulch
 - f.** Equipment grants for implements and tools to support no-till systems
- 3.** Invest in regional soil testing infrastructure to improve access to high quality lab results
- 4.** Hire farmers who are advanced in healthy soils practices as technical consultants (at a fair consulting wage) to provide direct support to farmers and/or to work collaboratively on farm service provider teams when the service providers are largely soil scientists, researchers, and other specialists who lack on-farm experience
- 5.** Advance policy solutions to create sustainable revenue streams to support the above activities, such as implementing a fertilizer fee.
- 6.** To ensure the long-term “permanence” of healthy soils, support the creation of a culture of soil care among all farmers, landworkers and land owners, the general public, government policy leaders and agency officials.

Appendix A:

Average Responses, Survey Questions

How can agencies and organizations help farmers accelerate adoption of healthy soils practices? Please assign a value to each of the following, according to how helpful you would find each of these incentives or actions.	Average response
Farmer-to-Farmer educational workshops/ webinars on healthy soils practices organized by farmer networks like NOFA, Young Farmers Network or CRAFT	4.34
Farm visit by a soil health technical advisor from a farmer network organization like PASA, NOFA or Young Farmers Network	4.25
Farm visit by a farmer experienced in tillage reduction or other healthy soils practices (hired as a consultant by a third-party organization)	4.20
Farm visit by a soil health technical advisor from NRCS, Extension or your local state department of agriculture	4.01
Educational workshops/webinars on healthy soils practices from authorities/experts like NRCS, Extension, or an agronomist with your Conservation District	3.89
Digital farmer-to-farmer soil health and management practice benchmarking (Ex: a service in which you can submit soil samples or lab results and your farm management practices, and then see your results mapped, semi-anonymously, against other participating farmers sorted by soil types, scales, enterprises or other features)	3.60
1 = Not very useful, 5 = Extremely useful	

How can agencies and organizations help farmers accelerate adoption of healthy soils practices?	Average response
You visit a farm where the farmer is doing a specific soil health practice that you haven't tried yet. They stick a spade in the soil, and lift it up: the soil is dark, crumbly, moist and loose and full of earthworms, and the crops on this field look fantastic. How much would this motivate you to adopt a new healthy soils practice?	4.39
Imagine you were offered payments for specific practices to help offset costs, at approximately 1/4 of the real cost of implementation (input + labor). For example: per-acre payments for practices like cover cropping, applying mulch or compost, and integrating livestock pasture crop rotations. Payments depend on 3 hours of desk work and a farm visit from a program staff person. How much would this motivate you to adopt a new healthy soils practice?	3.82
Imagine the above-mentioned payments came from a private family or corporate foundation seeking to compensate and incentivize farmers for their positive environmental impact. Would you be more or less motivated to participate knowing that this was the funding source?	3.33
Imagine the above-mentioned payments came from a carbon offset fund, which allowed greenhouse gas emitters to pay into a carbon market to incentivize you to offset their emissions. Would you be more or less motivated to participate knowing that this was the funding source?	2.88
1 = Less motivated, 5 = More motivated	

Additional Questions	Average response
<p>Would you support measures to internalize the cost of synthetic fertilizer use on soil health? For example, the state of Illinois has a \$0.50 per ton fertilizer fee (paid by fertilizer dealers) that supports their Nutrient Research Education Council. Other state fees range from \$0.10 to \$1.00 per ton. Such a program in your state could fund healthy soils education and incentives while also disincentivising synthetic fertilizer use.</p>	3.87
<p>1 = No, that doesn't sound like a good idea, 5 = Yes, I would support this</p>	
<p>If compot from municipal facilities or private companies were cheaper OR if you received a cost share or subsidy to help offset the cost of purchasing the compost, would apply more compot to your fields?</p>	4.05
<p>1 = No, I would not, 5 = Yes, I would</p>	

Appendix B:

Case Study: Woven Roots Farm

Woven Roots Farm in Tyringham Massachusetts is a diversified organic vegetable CSA farm run by a small farm team managing 1.3 acres in cultivation (360 50' beds plus paths) on a 10 acre site, roughly 5 of which is owned and 5 of which is leased. The farm grows food for 204 households through their CSA program and also grows for 2 wholesale accounts. 80 of their CSA shares are distributed through community partnerships to provide healthy food for low-income households.

Viability: The farm grosses \$100,0000 in sales per acre. The farm employs six full-time growers and one part-time employee. The farm owners, Jen and Pete Salinetti, earn 80% of their income each year directly from farm sales, with another 20% of earnings from on-farm education programs.

Practices: The farm is largely hand-scale, using sheet mulching* a year ahead of first cropping as a sod/termination method when opening new ground. Permanent beds are established and a manual U-bar is used to aerate the soil without turning it. Perennial weeds that survive initial bed prep are removed with a garden fork. Cover crops, cash crops, and mulches are used to keep soil covered, and beds are often 'flipped' (i.e. harvested and then transitioned to a new crop via transplants or seeding) in the same season. In this way, multiple crops can be grown in the same bedspace, an important practice

Soil Health Indicators

Water: A primary indicator of soil health on the farm is the observed water - soil dynamics of their fields. The farm is on a slope, and according to Jen, newly established areas (first year out of sod and into crop production) do show some runoff after heavy rains. In the second year there is less and by the third year, in heavy rains, the farmers see "no soil movement." Pathways and beds accept water differently on all fields. "Where the water flows, the permanent beds accept the water, but we do see some water movement in the pathways where we walk. We don't experience erosion in the aisles due to foot traffic compaction." Correspondingly, the newer fields require some temporary irrigation, but by the third year of production a field receives only 10-20 minutes of drip irrigation when a crop is transplanted, but will not be watered again. Direct-seeded crops receive overhead water only until germination.

Soil Organic Matter: The farmers apply approximately 4 cubic feet of compost per 50 bed feet (30" wide beds) to the surface of their beds at each bed transition approximately 1-3 times per season. Combined with mulching, no-till and cover cropping, their practices build soil carbon steadily. They are now in year 8 farming on their current farm. When they began on this site, the SOM was at 5.7%. They find that areas

that have been longest in production are hitting an organic matter threshold of around 12% SOM which seems to be the limit beyond which they no longer see annual gains.

The quality and volume of crop production consistently improves over time. Utilizing strict crop rotation, a given area does not grow a crop in the same family for four successions. Areas that are new, need to have row covers kept on them for longer periods of time to protect against insects. By the time the same crop is planted in that area again, there is visibly less strain on the plants and noticeably higher and more beautiful yields. Soil and crop testing and nutrient balancing have recently become a more integral part of the farm's viability.

Incentives and Programs Utilized

Jen and Pete have not participated in any State or Federal programs related to soil health or farming practices. They have received funding for infrastructure— to help build greenhouses and a cooler. But their soil health work has been funded entirely within the farm's operating budget.

The reason they have not participated in available programs is due to farm size and experience. When they first started, they were on a much smaller land base and didn't qualify for existing programs. Even now, because they own only 5 of the 10 acres they farm, they are excluded from programs that require a minimum of 10 acres to qualify. In fact, they recently worked with their landowner to sign a land covenant that can serve to help them qualify for grants with a 10 acre minimum, but it has required extra assistance and a willingness of the grantor to work with them to qualify.

Jen and Pete's experience points to a drawback in using land base as an evaluation tool for impact instead of production volume or households served. "When you consider the number of people in each household we serve and the wholesale accounts, we are feeding an average 1,000 people / week on less than 1.5 acres," explained Jen. Many diversified organic vegetable farms in Massachusetts with that volume of production are cultivating 10 acres or more. Crop intensification can preserve land for other uses and can be more profitable than land-intensification, so designers of policies and programs should be careful not to disincentivize intensification innovation when determining qualification standards for programs.

While Jen and Pete are now in their 8th year on their current land, they are in their 20th year of farming, 15 of which they have farmed full time. They have been organic, no-till, and hand scale for almost the whole of their farming career. As a result, State and Federal programs that support beginning farmers are now closed to them. At the same time, they experience a high demand from beginning farmers for support and consulting.

"There are so many incentives for beginning and transition farmers [to healthy soils practices], but for the farmers who have already had these practices in place for many years, for the farmers who have done all this work without getting incentives, there is less support. It would be powerful for there to be incentives for farmers like us to offer consulting and technical support for new or transitioning farmers."

Focus groups and research confirm that farmers prefer to learn from other farmers, but affording private consulting fees that appropriately value the time and experience of farmers like Jen and Pete can be prohibitive. Jen and Pete are farmers who have learned and designed productive, profitable and ecologically protective farming methods and who could benefit from programs that would hire them to offer technical support to other growers.

Jen stressed the need for consulting programs around healthy soils practices to cover a two-year relationship. "The first two years are the hardest to get past when reducing tillage," she explained, because the weed pressure is typically quite high and farmers usually don't see a noticeable improvement in the soil health until the third or fourth year. With increased labor costs and increased challenges, it can be tempting to return to business as usual. "The doubt about whether to stick with it is the hardest thing."

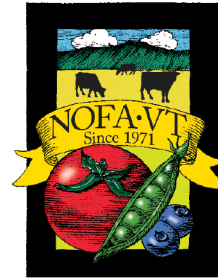
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