

2013 Healthy Soils Evaluation Report (Pre- and Post-Training Surveys)



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Introduction and Methods

In order to increase the pool of soil health educators, the Healthy Soils Initiative led by Kevin Erb and Ingrid West offered soil health trainings to natural resource professionals in August 2013 at five locations in Richland, Shawano, Washburn, and Wood counties. Classroom training sessions were held on August 1, 2013, and field sessions were provided later in August, 2013. A total of 61 individuals were trained (54 attended the classroom trainings, and 51 attended the field trainings).

Assessment of trainee progress and course efficacy consisted of two online surveys: an online pre-training survey sent via email two days prior to the classroom sessions (with paper surveys administered at the beginning of classroom sessions to those who indicated they had not responded to online pre-survey), and a post-training survey sent via email approximately one month following the field training sessions. Each survey was sent to all 61 trainees, and the pre-training survey yielded 58 responses (Response rate: 95%), while the post-training survey yielded 42 responses (Response rate: 69%). However, the number of individuals responding to both the pre-training and the post-training survey was 38.

This report presents findings based on the pre- and post-training surveys. As the goal of data analysis was to evaluate individual progress due to the trainings, the initial section (Knowledge and Skills) summarizes findings from the 38 individuals who responded to both the pre- and post-training surveys. The final section (“Next Steps” for the Training beginning on page 8) discusses results from questions unique to the post-training survey; therefore, the final section includes data from the 42 individuals who completed the post-training survey.

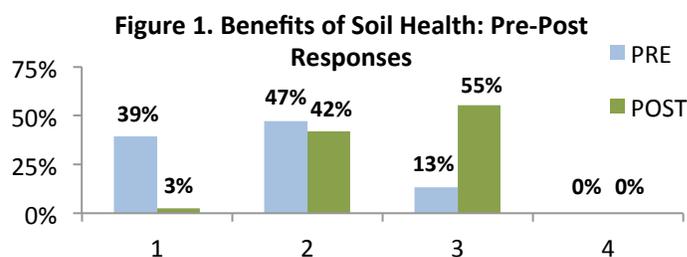
I. Knowledge and Skills

The present section summarizes findings regarding changes in knowledge and skills related to soil health between the pre- and post-training surveys. For each of the categories listed in this section, two types of data are presented and discussed: pre- and post-training responses, and individual change scores. Pre- and post-training responses demonstrate *sample-wide trends* by providing frequencies and percentages of individuals selecting each response option. In contrast, individual change scores measure *each respondent’s change* by comparing one individual’s responses on the pre-training survey with his/her responses on the post-training survey.

Understanding Benefits of Soil Health

Before and after the training, respondents were asked to rate their understanding of societal and agronomic benefits of soil health on the following scale, with higher ratings indicating greater understanding:

- 1) I can list and discuss a few or some of the societal and agronomic benefits of soil health.
- 2) I can list and discuss most of the societal and agronomic benefits of soil health.
- 3) I can list and demonstrate or explain a large majority of the societal and agronomic benefits of soil health.
- 4) None of the above (Please describe)



As Figure 1 shows, the percentage of respondents rating their understanding of soil health benefits as Response 3 (the highest level of understanding) increased substantially following the training. While 13% of respondents

selected Response 3 on the pre-training survey, 55% selected this response on the post-training survey. At the same time, the percentage of respondents rating their understanding as Response 1 (the lowest level of understanding) prior to the training (39%) decreased noticeably following the training (3%). On both the pre- and post-training surveys, no respondents (0%) selected “None of the above.”

Individual change scores indicate that most respondents’ (45%) understanding of the benefits of soil health increased by 1 point following the training (Table 1). The next most common scenario was no change in understanding following the training (34%), followed by a 2-point improvement following the training (18%). One respondent (3%) rated his/her understanding of soil health benefits 1 point lower on the post-survey.

Table 1. Benefits of Soil Health: Individual Change Scores							
Change Score	-3	-2	-1	0	+1	+2	+3
Freq. (%)	0 (0%)	0 (0%)	1 (3%)	13 (34%)	17 (45%)	7 (18%)	0 (0%)

Understanding Characteristics of Healthy Soils

Three questions measured respondents’ understanding of three aspects of healthy soils: physical characteristics, chemical characteristics, and biological characteristics. For each question, respondents rated their understanding of the topic on the following 4-point scale, with higher scores indicating increased understanding:

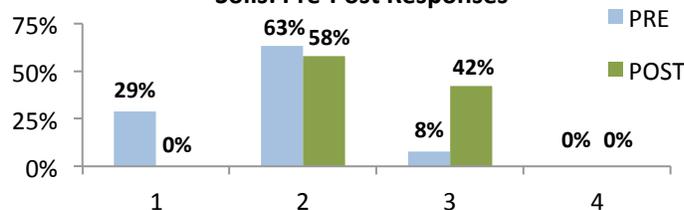
- 1) I can explain limited information about the _____ [e.g. chemical] aspects of soil health.
- 2) I can demonstrate some of the _____ aspects of soil health.
- 3) I can teach how the _____ aspects are integrated in soil health.
- 4) None of the above (Please describe)

Physical Characteristics of Healthy Soils. Figure 2A displays pre- and post-training responses regarding physical characteristics of healthy soils. The percentage of respondents rating their understanding at the highest level (Response 3) increased from 8% prior to the training to 42% after the training. The percentage rating their understanding at the lowest level (Response 1) decreased from 29% to 0%. No respondents (0%) selected “None of the above” on the pre-training or post-training survey.

As Table 2 demonstrates, over half (55%) of respondents rated their understanding of the physical characteristics of healthy soils 1 point higher on the post-training survey than on the pre-training survey. Over one-third (37%) showed no change in their understanding of the physical characteristics of soil health. Two respondents (5%) rated their understanding 2 points higher following the training, and 1 respondent (3%) rated his/her understanding 1 point lower following the training.

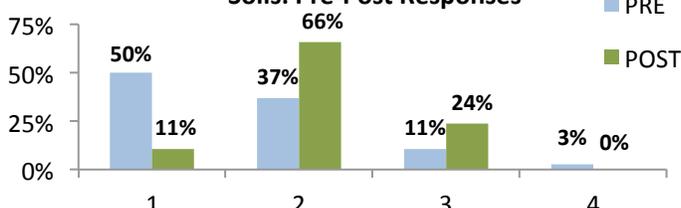
Chemical Characteristics of Healthy Soils. As Figure 2B illustrates, respondents’ self-ratings of their understanding of healthy soils’ chemical characteristics increased after the training. More respondents rated their understanding as Response 2 after the training (66%) than before the training (37%), and more individuals selected Response 3 after the training (24%) than before the training (11%). The

Figure 2A. Physical Characteristics of Healthy Soils: Pre-Post Responses



- 1) I can explain limited information about the physical aspects of soil health.
- 2) I can demonstrate some of the physical aspects of soil health.
- 3) I can teach how the physical aspects are integrated in soil health.
- 4) None of the above (Please describe)

Figure 2B. Chemical Characteristics of Healthy Soils: Pre-Post Responses



- 1) I can explain limited information about the chemical aspects of soil health.
- 2) I can demonstrate some of the chemical aspects of soil health.
- 3) I can teach how the chemical aspects are integrated in soil health.
- 4) None of the above (Please describe)

percentage of respondents rating their understanding at the lowest level decreased from 50% prior to the training to 11% after the training. One respondent (3%) selected “None of the above,” but did not provide a text response describing his/her understanding of this topic.

Individual change scores indicate that respondents most commonly displayed a 1-point increase (45%) in understanding of healthy soils’ chemical characteristics following the training (Table 2). A similar percentage of individuals (42%) showed no change in their understanding. Three respondents (8%) displayed a 1-point *decrease* in their understanding of this topic, and 2 individuals (5%) recorded a 2-point increase.

Biological Characteristics of Healthy Soils. Following the training, respondents’ understanding of the biological characteristics of healthy soils increased (Figure 2C). The percentage of respondents rating their understanding as Response 3 (highest level of understanding) increased from 8% before the training to 29% after the training. And a smaller percentage of respondents selected Response 1 (lowest level of understanding) after the training (3%) than before the training (30%). No respondents (0%) declared “None of the above” on either the pre- or post-training survey.

As Table 2 illustrates, individual change scores indicated that respondents most commonly showed no change in their understanding of the biological characteristics of healthy soils (53%). Approximately one-third (34%) of respondents displayed a 1-point increase in their understanding of this topic, four individuals (11%) displayed a 2-point increase, and one individual (3%) showed a 1-point *decrease*.

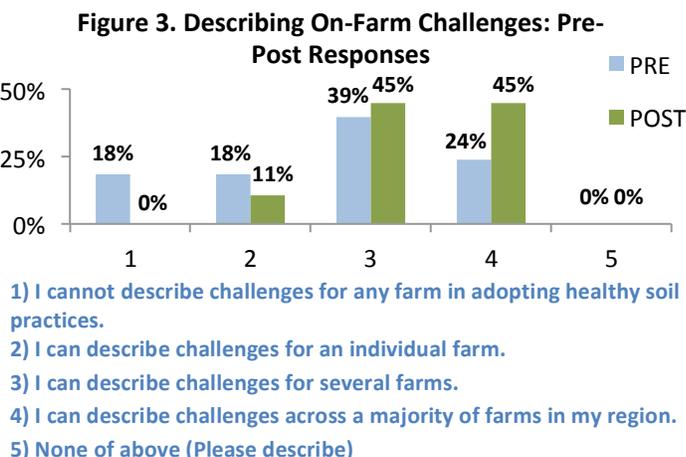
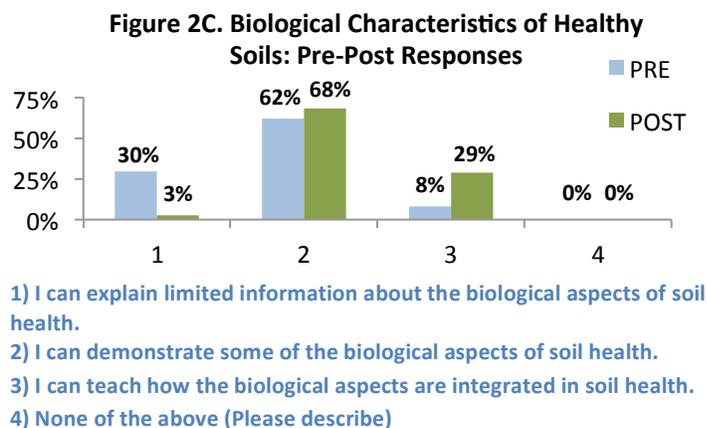
Table 2. Understanding Characteristics of Healthy Soils: Individual Change Scores							
Change Score	-3	-2	-1	0	+1	+2	+3
Physical Characteristics	0 (0%)	0 (0%)	1 (3%)	14 (37%)	21 (55%)	2 (5%)	0 (0%)
Chemical Characteristics	0 (0%)	0 (0%)	3 (8%)	16 (42%)	17 (45%)	2 (5%)	0 (0%)
Biological Characteristics	0 (0%)	0 (0%)	1 (3%)	20 (53%)	13 (34%)	4 (11%)	0 (0%)

Describing On-Farm Challenges to Adopting Healthy Soil Practices

Respondents indicated the extent to which they could describe on-farm challenges to adopting healthy soil practices on the following scale, with higher scores signifying greater abilities to describe these challenges:

- 1) I cannot describe challenges for any farm in adopting healthy soil practices.
- 2) I can describe challenges for an individual farm.
- 3) I can describe challenges for several farms.
- 4) I can describe challenges across a majority of farms in my region.
- 5) None of the above (Please describe)

Figure 3 shows that respondents’ reported ability to describe on-farm challenges to adopting healthy soil practices improved after attending the training. The percentage of individuals reporting, “I can describe challenges across a majority of farms in my region,” increased from 24% prior to the



training to 45% after the training. Simultaneously, the percentage of individuals declaring, “I cannot describe challenges for any farm in adopting healthy soil practices,” decreased from 18% before the training to 0% after the training, and the percentage only capable of describing challenges “for an individual farm” decreased from 18% to 11%. No respondents (0%) indicated “None of the above.”

As Table 3 displays, just over half of respondents (51%) increased by at least 1 point in their ability to describe on-farm challenges to adopting healthy soil practices. Roughly one-third (32%) of respondents showed a 1-point increase, 16% showed a 2-point increase, and 3% showed a 3-point increase. Most of the remainder (45%) displayed no change in their abilities, and 2 individuals (5%) recorded a 2-point *decrease*.

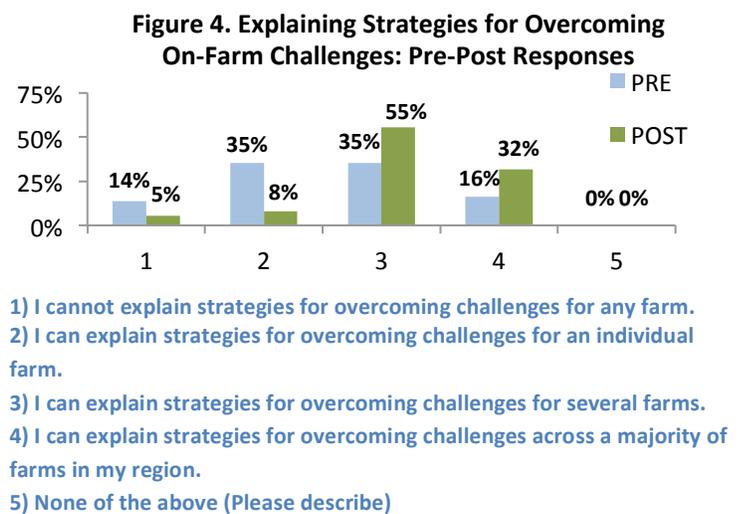
Change Score	-3	-2	-1	0	+1	+2	+3
Freq. (%)	0 (0%)	0 (0%)	2 (5%)	17 (45%)	12 (32%)	6 (16%)	1 (3%)

Explaining Strategies for Overcoming On-Farm Challenges to Adopting Healthy Soil Practices

To indicate the extent to which they could explain strategies for overcoming on-farm challenges to adopting healthy soil practices, respondents used the following scale, with higher numbers corresponding to increased ability to explain these challenges:

- 1) I cannot explain strategies for overcoming challenges for any farm.
- 2) I can explain strategies for overcoming challenges for an individual farm.
- 3) I can explain strategies for overcoming challenges for several farms.
- 4) I can explain strategies for overcoming challenges across a majority of farms in my region.
- 5) None of the above (Please describe)

Respondents’ self-reported ability to explain strategies for overcoming on-farm challenges to adopting healthy soil practices increased following the training (Figure 4). The percentage of individuals capable of explaining strategies for “several farms” increased from 35% to 55% after the training, and the percentage capable of explaining strategies for overcoming challenges “across a majority of farms in my region” increased from 16% to 32%. At the same time, the percentage of individuals capable of explaining strategies only for “an individual farm” decreased sharply from 35% to 8%, and the percentage unable to explain strategies for any farm decreased from 14% to 5% after the training. No respondents (0%) selected “None of the above” before or after the training.



Over half of respondents (55%) increased by at least 1 point in their ability to explain strategies for overcoming on-farm challenges following the training (Table 4). Thirty-nine percent (39%) increased by 1 point, 13% increased by 2 points, and 3% increased by 3 points. Thirty-seven percent (37%) showed no change in their ability to explain strategies for overcoming on-farm challenges, and 3 individuals (8%) displayed a 1-point *decrease* in their ability to explain such strategies.

Change Score	-3	-2	-1	0	+1	+2	+3
Freq. (%)	0 (0%)	0 (0%)	3 (8%)	14 (37%)	15 (39%)	5 (13%)	1 (3%)

Forming Management Strategies that Promote Soil Health

Respondents reported their ability to formulate management strategies that promote a higher level of soil health using the following scale, with higher scores indicating a greater ability to formulate strategies:

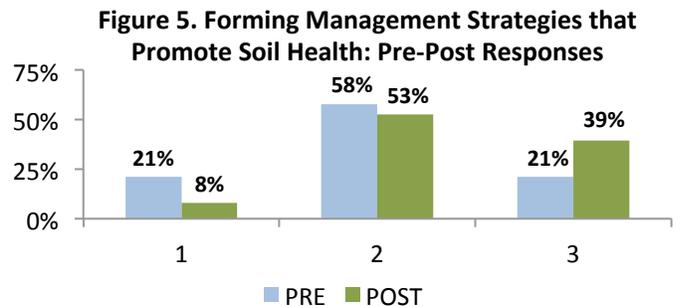
- 1) With assistance, I can formulate a management strategy that promotes a higher level of soil health.
- 2) I can formulate a basic management strategy that promotes a higher level of soil health.
- 3) I can formulate multiple management strategies that promote a higher level of soil health.

As Figure 5 shows, the percentage of respondents indicating Response 3 (highest level of ability) increased from 21% prior to the training to 39% following the training. The percentage of respondents selecting Response 1 (lowest level of ability) decreased from 21% to 8% after the training.

Individual change scores show that most respondents (61%) indicated no change in their ability to formulate management strategies that promote a higher level of soil health (Table 5). Approximately one-third (32%) displayed a 1-point increase in their ability to formulate management strategies following the training, and one individuals (3%) displayed a 2-point increase. Two individuals (5%) rated their ability to formulate management strategies that promote soil health 1-point *lower* after attending the training.

Table 5. Forming Management Strategies that Promote Soil Health: Individual Change Scores

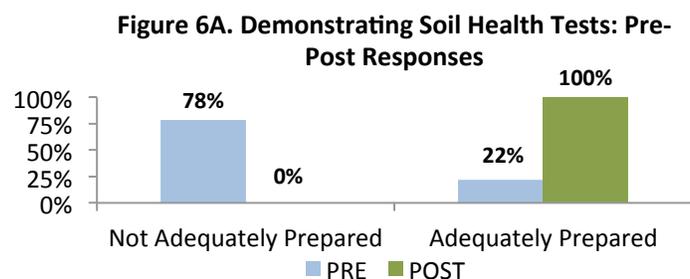
Change Score	-2	-1	0	+1	+2
Freq. (%)	0 (0%)	2 (5%)	23 (61%)	12 (32%)	1 (3%)



- 1) With assistance, I can formulate a management strategy that promotes a higher level of soil health.
- 2) I can formulate a basic management strategy that promotes a higher level of soil health.
- 3) I can formulate multiple strategies that promote a higher level of soil health.

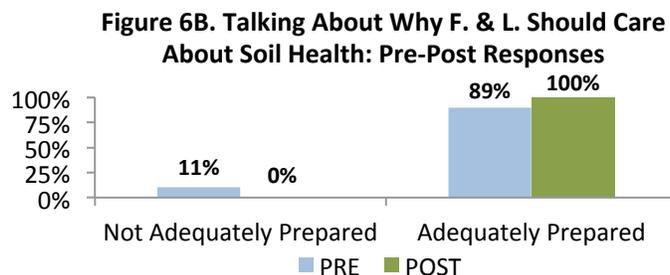
Feeling Adequately Prepared to do the Following Tasks:

A. Demonstrate soil health tests to farmers or landowners. As Figure 6A illustrates, only 22% of respondents felt adequately prepared to demonstrate soil health tests to farmers or landowners prior to attending training. After the training, however, 100% of respondents felt adequately prepared to demonstrate soil health tests to farmers or landowners

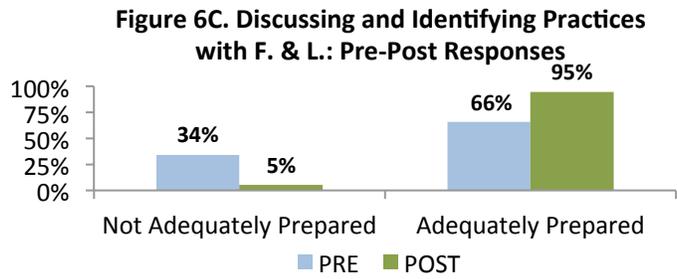


B. Talk to farmers or landowners about why they should care about soil health.

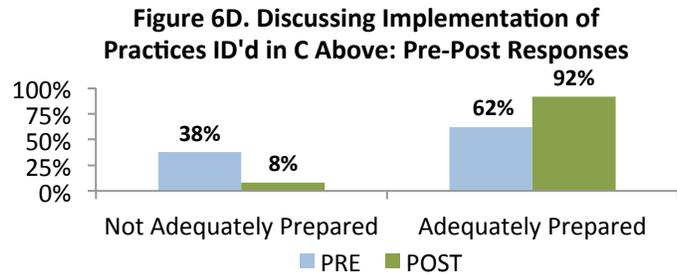
Prior to the training, a large percentage of respondents (89%) felt adequately prepared to talk to farmers or landowners about why they should care about soil health (Figure 6B). This percentage increased to 100% following the training.



C. Discuss practices with farmers or landowners and identify what practices they should consider to improve soil health. Approximately two-thirds (66%) of respondents felt adequately prepared prior to the training to discuss practices with farmers or landowners and identify what practices they should consider to improve soil health (Figure 6C). After the training, the percentage of respondents feeling adequately prepared to do these tasks increased to 95%.

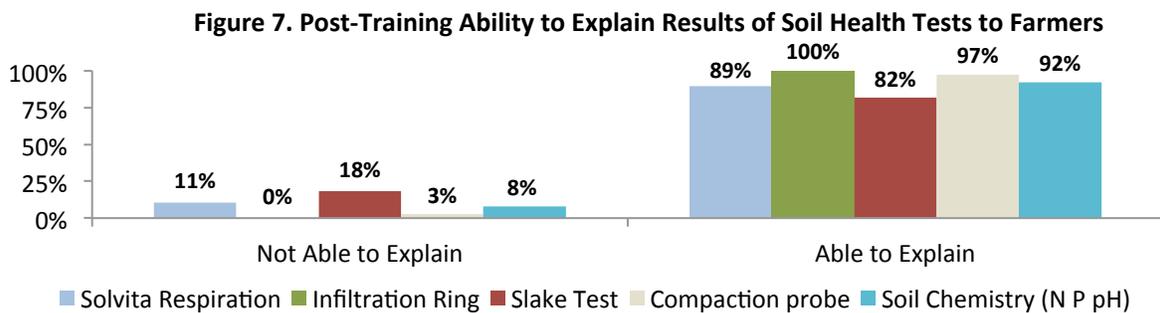


D. Discuss how to implement the practice(s) identified in C above. As Figure 6D shows, 62% of respondents felt adequately prepared to discuss how to implement the practices identified to improve soil health prior to the training. This percentage increased to 92% following the training.

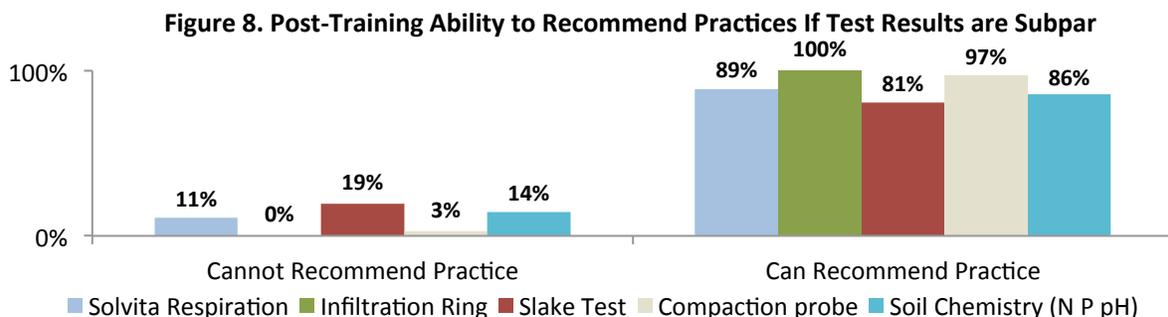


Explaining Results of Soil Health Tests to Farmers and Recommending Practices if Results are Subpar

The post-training survey asked respondents whether they could explain the results of five soil health tests: solvita respiration, infiltration ring, slake test, compaction probe, and soil chemistry (N P pH). For each of these soil health tests, over 80% of respondents were capable of explaining the results to farmers (Figure 7). The test for which the most respondents felt comfortable explaining the results was the infiltration ring (100% able to explain results), followed by compaction probe (97%), soil chemistry (N P pH) (92%), solvita respiration (89%), and slake test (82%). Three respondents listed other soil health tests which they could explain to a farmer; these tests included “soil textural analysis,” “how to keep the soil in place,” and “soil tilth.”



A second part to this questions asked whether respondents could recommend practices that would improve the soil condition if the results of the soil health test were subpar. As Figure 8 shows, responses to this



question closely mirrored the question above. For each of the five soil health test, over 80% could recommend practices to improve the soil condition if results of the test were subpar. Once again, the test for which the most respondents felt comfortable recommending practices was infiltration ring (100% able to recommend practices), followed by compaction probe (97%), solvita respiration (89%), soil chemistry (N P pH) (86%), and slake test (81%). The three individuals who listed other soil health tests which they could explain to a farmer (“soil textural analysis,” “how to keep the soil in place,” and “soil tilth”) also indicated that they could recommend practices to improve soil conditions if the results of these tests were subpar.

Tests Trainees Felt Comfortable Demonstrating Prior to Class

On the pre-training survey only, respondents were asked to provide the types of tests which they felt comfortable demonstrating at the time. Table 6 below displays the 9 written responses that were provided.

Table 6. Tests Trainees Felt Comfortable Demonstrating Prior to Class

Taking soil test results and formulate a plan to increase yields, look at soil types, slopes. What is the best management practice to use to protect ground and surface waters while permitting the farmer to produce a profitable crop.

pH, OM content, structure/texture, compaction

I had soil quality training 10 years ago with field tests.

Numerous

Penetrometer, infiltrometers, quick tests, slake test

Slake, Respiration, infiltration, soil pit observations

Soil Samples, stalk nitrates

590 Plan, soil test reports from lab

Slake Test, Potassium Permanganate Test, compaction, soil aggregation

Practices in Which Respondents Would Like More Training

On both the pre- and post-training survey, respondents provided practices related to soil health in which they would like more training. Table 7 presents these practices mentioned before and after training, matched by respondent. Two practices commonly listed on both the pre- and post-training survey were cover crops and no-till farming.

Table 7. Practices in Which Respondents Would Like More Training: Pre-Post Responses

Pre-Training Response	Post-Training Response
	The addition of different organic amendments to soils for raising crops.
Soil Chemistry	The rolls of cover crops and tillage in improving soil health.
Explaining ways to demonstrate soil health to farmers.	No till farming
	Cover crops, nitrogen inhibitors, tillage alternatives
The use of different implements and their effect on the residue and soil structure.	
Cover crops that contribute to soil health and provide forage.	Cover crop recommendations
	Cover Crops
Residue management pertaining to tillage choices	Cover crop and pest and disease control for soils with high residue, compatibility?
	compaction issues, tillage options
	Cover crops and "healthy soils" soil amendments, a.k.a. the right fertilizers to use when using no-till and cover crops

Table 7. Practices in Which Respondents Would Like More Training: Pre-Post Responses (Continued...)

Pre-Training Response	Post-Training Response
	I believe it is important to provide updates and refresh our memories from time to time on soil health. If additional demonstrations are available it would be beneficial to include them in a training.
	Ideas on what cover crops (combinations to use, what works best in specific types of rotations) are a good fit in Western Wisconsin. Maybe different ways of planting and harvesting the cover crop, and different equipment that would be needed. We might need to think "outside of the box" when it comes to equipment to use for farmers (ex. in a corn-bean rotation that has no need for hay).
	updates on cover crops as more research becomes available
Organic farming and managing weeds-generally this means more tillage.	Ones that would help soil chemistry & improve solvita respiration.
cardboard farming especially for gardening	cover crops-what cover crop for which purpose
	1) No tilling on farms that have manure to deal with. 2) Planting cover crops in row crops before harvest.
	Soil types and tillage (NO-TILL)
	cover crops, grazing
I have a very basic soil training. So anything would be beneficial! I would be interested in relating this to farmers and helping on a county basis.	How to help direct farmers to cost share funding.
Slake test, evaluation of soil aggregation	No-till management in row crops
	A general overview of the latest tillage equipment.
	building the health of soil microorganisms
Practices to promote crop productivity.	
Cover Crops	cover crops
	Compaction reduction
	cover crop

Concisely Defining “Healthy Soils”

As a measure of understanding of the topic, a question on the pre- and post-training surveys asked respondents to concisely define “healthy soils.” A table displaying matched pre- and post-training responses can be found in Appendix A on page 12.

II. “Next Steps” for the Training

This section summarizes data several questions asked only on the post-training survey, concerning “next steps” for trainees and the Healthy Soils Initiative. Because the section includes data collected solely on the post-training survey, the following summary includes information provided by all 42 respondents to the post-training survey.

Likelihood to Use a Soil Health Test Kit in the Next Year

Respondents indicated whether they were likely or unlikely to use a soil health test kit on a farm or as part of a field day in the next year. Of the 40 respondents who provided this information, 26 (65%) individuals reported that they were likely to use a soil health test kit in the next year.

On a follow-up question, respondents indicated when and where they were most likely to use a soil health test kit in the next year. As Table 8 shows, spring or summer 2014 was the most common time selected, with 12 respondents (46% of those likely to use a soil health test kit) likely to use a kit in spring or summer on a farm next

year, and 12 respondents (46%) likely to use a kit in spring or summer during a field day next year. Seven respondents (27%) were likely to use a kit between the time of the survey and Nov. 30 on a farm, and 3 individuals (12%) were likely to use a kit between the time of the survey and Nov. 30 as part of a field day. Two individuals (8%) were likely to use a soil health test kit in a winter meeting (Nov. 30-March 15).

Time and Place	Frequency (%)
Between now and Nov. 30 on a farm	7 (27%)
Between now and Nov. 30 as part of a field day	3 (12%)
In a winter meeting (Nov. 30-March 15)	2 (8%)
In spring or summer on a farm (next year)	12 (46%)
In spring or summer during a field day (next year)	12 (46%)
Other (Please specify):	5 (19%)

**Percents are based on the 26 individuals who were likely to use a soil health test kit in the next year. Respondents were allowed to provide multiple answers indicating time and place of most likely use.*

The text responses provided by the 5 respondents who indicated they would be most likely to use a soil health test kit at a time and place other than those listed are provided below:

- I wouldn't mind using it now, but due to the lack of soil moisture, I don't want to damage any equipment. Maybe we can get some more rain yet this fall! 2 weeks ago one of our soil probes broke due to the lack of soil moisture.
- If a land owner is interested
- With Soils Class at Technical College
- When its needed in order to show the farmer the soil health condition
- Joint staff training, LCD, NRCS before Nov. 31

Maintaining Soil Health Test Kits

All post-training survey respondents were asked whether they were willing to maintain a soil health test kit (let people check out of office,

	Likely to Use Kit	Unlikely to Use Kit	Total
Would Maintain Kit	18	6	24 (60%)
Would Not Maintain Kit	1	2	3 (8%)
Not Sure	7	6	13 (33%)
Total	26 (65%)	14 (35%)	40 (100%)

inventory components upon return, mail user survey postcards and work with Conservation Professional Training Program to replenish supplies, etc.) if they were to receive one. As the cross-tab in Table 9 shows, 24 respondents (60%) would be willing to maintain a kit, including 18 of the 26 respondents likely to use a soil health test kit in the next year. Only 1 respondent was likely to use a kit but unwilling to maintain it.

Nine of the 13 individuals who were “not sure” whether they would maintain a soil health test kit provided elaborations on their response, which can be found in Table 10 below.

Yes, I am sure we can share it. I did not know anything about mailing surveys or how to replenish supplies, etc. As long as we have some money in the budget, I think supplies can be replenished. We already have a kit, and I assumed it was our property and not the property of the Conservation professional Training Program?
I might be able to do that.
If an inventory list is available, & post cards are ready to fill out upon return, and CPTP is easily accessible to contact about replenishing supplies.
currently have soil health kit
I think this is something the DC should be in charge of, not me
If this is permitted
I am an independent crop consultant but am interested in using the tools only if necessary
It wouldn't be necessary for me to have one

Questions Regarding “Next Steps” After Training

Six respondents had questions regarding “next steps” after the training (Table 11). A common question concerned the process of obtaining a soil health test kit.

Table 11. Questions Regarding “Next Steps” After Training

It would be nice to have a cost list of all items in the kit, so we know what it will cost to have them replaced. This would help with our (possible) budget for maintaining the kit. It would be good to have a list of contacts who have a kit, incase ours is already in use for the day. It may be nice to hear some success stories of how it has been used by others, to help spark ideas for future use in the area.

* For question 11 answered "No" due to the field office not having a soil health test kit! When will each NRCS field office be getting a kit?

Please post a listing of where soil tests kits will be available to borrow.

How do we get a hold of the solvita test kits, or what is the best way.

Would like more training on the field tests. Better comparisons correlated to differences in management. It was part of field A with another part of field A with the same farmer. While the soil pits where good. It wasn't enough for me to evaluate and see the differences.

I have a few components for working with soil health, but do not actually have a kit. Where or how to I get a complete kit. I do not work for NRCS or extension.

Suggestions for Improvement of the Training

On the post-training survey, 21 respondents provided suggestions for improving the classroom and field portions of the training. These suggestions are collected in Table 12 below.

Table 12. Suggestions for Improvement of the Training

Compiled info about farms that have changed their practice and the positive/negative effects of those changes.

The classroom event was way too short. There wasn't enough time to let the information sink in to your mind. Also, there were technical difficulties during the working lunch interview with producers and it was near impossible to keep up with who was saying what, without a photo or video reference during the conversation. I was somewhat disappointed that much of the slide shows were from out of state universities, and not local to Wisconsin. It would be nice to have electronic access to those slide shows after the training, the photocopies of the presentations are tough to read at such a small scale. It would be nice to use some of those slides in future presentations with the soils kit. The field portion of the training went very well, except for the dry soil conditions, which there isn't much anyone can do about that (unless you have irrigation!).

The classroom session was not good, problems with the technology to connect with other classes failed and we were on our own, and if you want to have the class sit and watch one pre-recorded presentation after another, then you could send that out by e-mail with a link to go to and let everyone watch things at their own pace. I hope NRCS got a refund of their registration fees!

I think between this and the field day there was too much overlap on the soil test kit.

More time. In the classroom part, the schedule was hard to keep up to if there was any discussion.

Field Day training was very useful!

More interaction in the classroom. This was pretty dry. Have guys in who actually do the farming...not always people trying to tell everyone how to do it.

I thought that the field portion was very interesting. The soil pit showing the different tillage situations was very interesting.

The classroom and field day could easily be combined into one day, the classroom discussions revolving Francisco and the OSU individuals were excellent. Great soil pit in Omro! Let's get the guy from OSU into the state for a follow-up.

There was no reason to have two days of training. The field day and classroom could have been combined.

Training could have been combined into one day. Afternoon talk (lecture portion) was not needed

I was glad we had a farmer panel in the session I sat in on because the sound system was horrible, not working and we couldn't hear clearly that was coming through the computer. Not a good set up for training. Other than that I thought the information presented was very good, just the delivery system was not.

Table 12. Suggestions for Improvement of the Training (Continued...)

No webinar's - or blackboard collaborator anymore. It doesn't function well and distracts people from the message. The recordings worked good though.

I think it would have been great to attend all of the field days. I also think that UW-Extension should conduct long term yield, soil, organic matter and soil erosion tests on C and D slopes comparing conventional, minimum and no-till methods.

Above, more test pits with wider ranging soils and management.

Show the tests then explain or have us explain why they are important rather than Powerpoints. Possibly give us more examples of farmers using the practices and what has been successful for them. Use powerpoints to give us info we can read on our own.

The field site field day at Dodgeville-soil test results would be beneficial to know to evaluate crop systems as an additional comparison.

More personal experiences on farmers applying manure in no till situations.

Appendix A

Table A. Concise Definitions of “Healthy Soils”: Pre-Post Responses (n=38)

Definition Prior to Training	Definition After Training
Soils that can support a profitable crop, biological organisms with a minimum amount of commercial fertilizer.	A healthy soil is one that can support biological organisms in the soil.
Soil that has been protected from erosion and has biological activity. Organic matter levels are being increased.	
Healthy soils provide nutrition to plants, support biotic life within, do not erode, and retain; moisture, nutrients and structure.	Healthy soils are those that; are stable relative to the slope of the soil profile, are increasing in carbon and organic matter, and contain a high number of biotic living organisms.
Has high organic matter, granular soil structure, nutrients are balanced, and a huge amount living organisms in it.	
Proper portion of soil space (air), organic matter, biological organisms, moisture, and silt, sand and/or clay.	Healthy soils function best with the right components of physical, chemical, and biological organisms. Soils need to grow plants successfully by infiltrating water and cycling nutrients to grow healthy plants.
	Biologically alive, allows for sufficient nutrient cycling, is covered and allows for infiltration.
	Some of the many ways to define healthy soils include from the top down: / 1. Growing vegetation with a variety of grasses, legumes, and or planted crops with plant material that protects the soil surface. 2. Moisture present at the soil surface, with cooler temperatures than barren soil, presence of earthworm castings, no signs of erosion, along with a variety of above ground and surface insects beneficial to the ecosystem. 3. Presence of multiple root structures below the surface to aid in conserving soil with a symbiotic relationship to microbial life within the soil (including beneficial fungi and amoeba, rhizobium bacteria, earth worms, nematodes, etc). The soil is not compacted, but is able to retain moisture and harvest rainfall during a rain event, preventing runoff and erosion. The ecosystem of a healthy soil can provide adequate nutrients for plant and microbial life. There may also be a presence of manure to enhance organic material and nutrients. There is no "clean cut" or "precise" definition of healthy soils, though healthy soils are much different when compared to soils of poor health. One could also consider soils that have soil test in an optimum range for pH, organic matter, phosphorous and potassium may be healthier than a soil that is excessively high in phosphorous or has a low pH. the presence of residue, or dead plants also protect the soil surface and increase organic matter over time.
Permeability, porosity, non-compacted, contains organic matter over 2%, earthworms and soil microbial activity present, suitable pH for crop grown are some qualities of healthy soils.	
Soil with good structure, fertility, organic matter, and microbial activity.	Healthy soil is one with high organic matter, good structure, high microbial activity, good infiltration and has plants growing in it. It is dark in color, moist, porous, and crumples when broken apart. It has good aggregate stability as well.
Soils that have good structure that support biological life	soil with good structure that promote plants and other biological organisms while resisting erosion
Able to provide good plant growth by retaining nutrients and water.	Creating the habitat needed for microorganism to thrive to produce a soil that is at capacity for producing plant material.
physically, biologically & chemically active soil	The ability to function (biologically, chemically and physically) in a way to sustain agriculture or its current land use.
A soil that is being improved yearly for infiltration, organic matter, tilth and fertility.	A soil that continually accrues organic matter.
Based on texture, a healthy soil has the structure, OM and biotic component to support sustained plant and soil microbial growth, decomposition and recycling.	A healthy soil is one that supports a balanced plant and animal microbial population which aids in sustained maintenance and recycling of nutrients and organic matter over time and use.

Table A. Concise Definitions of “Healthy Soils”: Pre-Post Responses (Continued...)

Definition Prior to Training	Definition After Training
Soils that maximize productivity, have active biota, and have adequate organic matter & water holding capacity	Soils that function in a natural state and are "alive" with biologic activity, are productive, and are resilient to the negative effects of drought and floods.
A stable soil with adequate structure and nutrients to support plant and microbiology life.	Managing soils to maintain or improve the physical structure, biological activity, and available nutrients to sustain plant growth. A healthy soil is an important aspect of a sustainable agriculture business.
Healthy soils are soils with good soil structure, ratios of water and air, and active soil organisms.	Healthy soils are soils that have good physical, chemical and biological properties.
Healthy soils are productive soils for designated use consisting of organic matter, microbes, structure, water/air capacity, and biological activity	Soils that have good physical, chemical, and biological properties allowing for improved crop production while maintaining environmental benefits.
Has a good level of organic matter, living matter, and is well aggregated.	"the capacity of a specific kind of soil to function"
A soil that is able to properly function as an ecosystem within its given environment.	Soils that are able to serve as a viable and productive ecosystem
Soils that are highly productive because of little or no disturbance and a lot of added organic matter	Healthy soils are soils that have something growing as much of the time as possible. They are high in organic matter and are tilled as little as possible.
A healthy soil consists of a wide variety of fungi, bacteria, microbial health (without microbial health all crops suffer). Monocultured soils do not produce well.	A healthy soil is where microbial life, Organic Matter, Minerals and the elements all come together. A healthy soil cannot flourish without these components. The soil is in balance limits compaction, improves infiltration, resists drought, and is teaming with microbial life.
A soil that provides for plants, soil microbes, and insects through a good mix of soil particles, air, water, and organic matter, these soils are not compacted, eroded, or are lacking nutrients.	A soil that can sustain productivity for what it is used for, this soil has a good balance of mineral particles, air, water, and organic matter so it can absorb water and cycle nutrients without negative effects to the environment.
The interaction of soil, plant, animal, and water in an ecological balanced manner that builds or sustains the functionality of the soil.	it is the capacity of a soil to function.
Uncontaminated, un-compacted, good soil structure, chemical, and biological make-up.	In my opinion soils that show an increase in the percentage of organic matter over a given period of time can be considered healthy soils. The practices selected by a producer affect the rate of organic matter increases.
Soil that is able to support and sustain productivity	Healthy soils are soils that can perform and produce and maintain quality and integrity
Healthy soils have adequate moisture and nutrients to provide the proper growing environment for plants and crops.	
Good air, water characteristics to promote soil life that relates to sustainable crop production and maintaining the soil resource for generations to come.	A healthy soil has a natural relationship between air, water, mineral and organic matter in its composition that supports soil life, and has physical properties that promote plant growth and sustains the soil for repeated use.
A soil with a balance of chemical, physical and biological properties working together for a successful crop.	A soil which has proper physical, chemical and biological makeup to grow a sustaining crop for feed and food production.
	the ability of soil to meet its ecosystem functions in relation to its environment
Healthy soils are not eroded away and are capable of producing crops if farmed sustainably. they also support microbial and worm life so they are not cooked to death by chemicals.	Healthy soils are soils that are farmed with minimal disturbance in a sustainable manner - no excessive erosion. Soils that have not been "cooked" to death with chemicals and have microbial life and earthworms.
Physical, biological & chemical characteristics that the soil can provide to maintain & sustain the vegetative growth, biological sustainability & provide the nutrients needed for them.	Combination of physical, chemical and biological characteristic of the soil that the soil has the capacity to function

Table A. Concise Definitions of “Healthy Soils”: Pre-Post Responses (Continued...)

Definition Prior to Training	Definition After Training
A farmers ability to harvest what they need from the soil, without limiting the next generation from being able to do the same.	Producing what you need while not endangering the next generations chance to do the same.
	Soils with high organic matter, high biodiversity, good tilth, good infiltration, and fertility
Soil health is its capability to be productive, provide an environment to support plant and animal life, filter water, ameliorate pollutants and provide a media for geotechnical purposes.	Soils capable to function within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation.
Able to grow a productive crop in the soil, correct texture structure and nutrients	Productive, nice color, good organic matter,
Healthy soils have a high ability to infiltrate water and cycle nutrients to grow healthy plants	
Healthy soils sustain productive biological life (animal and plant).	Healthy soils are soils that can support a variety of animal and plant life sustainably and function to infiltrate water and cycle nutrients.
Healthy soils are soils that are have adequate organic matter, ph levels, and nutrient levels to provide adequate crop production.	A productive soil that has biological activity and doesn't move.