



Crop Advisor Approaches to Soil Health Advising and Opportunities for Improvement

Peggy Petrzelka, Jessica D. Ulrich-Schad, Matt Yost, Jenae Dean, Earl Creech, Linda Schott, Tony Richards, and Kristy Davis

Introduction

Soil health is defined by the United States Department of Agriculture (USDA) as “the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans” (Natural Resources Conservation Service, n.d.). Thus, soil health is important for crop production but is also increasingly recognized as important for societal and ecosystem crop services (Lehmann et al., 2020). Agricultural producers can often improve soil health by adopting conservation practices such as cover crops, conservation tillage, or integrated crop and livestock on the land they manage.

Recent research examined motivations for Utah ranchers and farmers to participate in a soil health trial and their challenges in implementing soil health conservation practices on their land (Petrzelka et al., 2023). This research found that these producers understand the importance of soil health and desire more information about soil health practices relevant to their region (U.S. Intermountain West [IMW]), given that much research focuses on the U.S. Midwest. Agricultural advisors can play an important role in providing this information to producers, thus aiding in their decision-making about conservation practices (Arbuckle et al., 2015; Prokopy et al., 2015).

In this report, we use data from a 2023 online survey of crop advisors in Utah and Idaho to examine how they are working with their clients on soil health and where opportunities for improvement exist.

Highlights

- Many crop advisors in Utah and Idaho are addressing soil health and are willing to do so, even if it may cause uncomfortable conversations with clients.
- There is disagreement about which soil health indicators and biological soil tests to recommend to growers—and how often.
- There is a need for greater validation and agreement of soil tests in the Intermountain West.
- The Natural Resources Conservation Service is the most likely to (1) provide soil health recommendations, both soil nutrient and additional soil testing with some frequency, and (2) agree they have the information and answers for farmers on soil health.

Online Survey of Utah and Idaho Crop Advisors

A survey of crop advisors in Utah and Idaho was conducted during winter 2023. A team of Utah State University (USU) social scientists, agronomists, and conservation planners who are part of the [Utah Soil Health Network On-Farm Soil Health Demonstration Project](#) developed the survey. In February and March 2023, three announcements were emailed

via USU Extension and crop advisor listservs, reaching 270 crop advisors. We invited potential respondents to take the 10-minute, 32-question survey online via Qualtrics and confirm at the beginning whether they were currently providing advice to Utah or Idaho crop producers in either a formal or informal way. Data were subsequently cleaned to only include those currently providing advice and who completed more than half of the survey questions. Of respondents, 125 met these criteria (46% of those reached). Questions on the survey included the following topics: advisor and clientele characteristics, perspectives on soil health, soil health recommendations made, advice provided to clients relative to soil health, and information sources used.¹ We begin by presenting some overall results of crop advisors' personal and business characteristics.

Characteristics of Crop Advisors in Utah and Idaho²

Age and Education

Respondents' average age was 45, ranging from 23 to 69 years old. The majority were men (83%) and had higher levels of education, with 54% holding a 4-year degree and 37% a graduate/professional degree. Of respondents, 74% were full-time crop advisors. The American Society of Agronomy certified 24% as a Certified Crop Advisor.

Years Served as a Crop Advisor

- More than 20 years: 26%.
- Six to 10 years: 25%.
- Less than 5 years: 25%.

Numbers Advised, Frequency, and Acreage

Regarding the number of agricultural producers the advisors work with annually, the greatest percentage (38%) reported six to 25 clients. The producers' acreage was relatively dispersed; the highest percentage (20%) worked with producers farming between 501–1,000 acres.

- Advisors met with their clients 3 to 5 times annually: 50%.
- Advisors met fewer than 2 times per year: 23%.

Top 3 Crops Advised

- Alfalfa: 95%.
- Small grains: 86%.
- Other hay (not alfalfa): 78%.

Top 3 Types of Advice

- Agronomic: 76%.
- Daily management: 64%.
- Conservation programs: 58%.

Advisor Affiliations

For the remainder of this report, we examined the responses from crop advisors affiliated with the largest four groups indicated in the survey (Table 1).

- Private industry: 26% of the sample.
- Natural Resources Conservation Service (NRCS): 28%.
- Utah Department of Agriculture and Food or Idaho State Department of Agriculture: 22%.
- Extension: 24%.

Table 1. Breakdown of Each Affiliation by State (frequency and percentage of the full sample used here, N = 102)

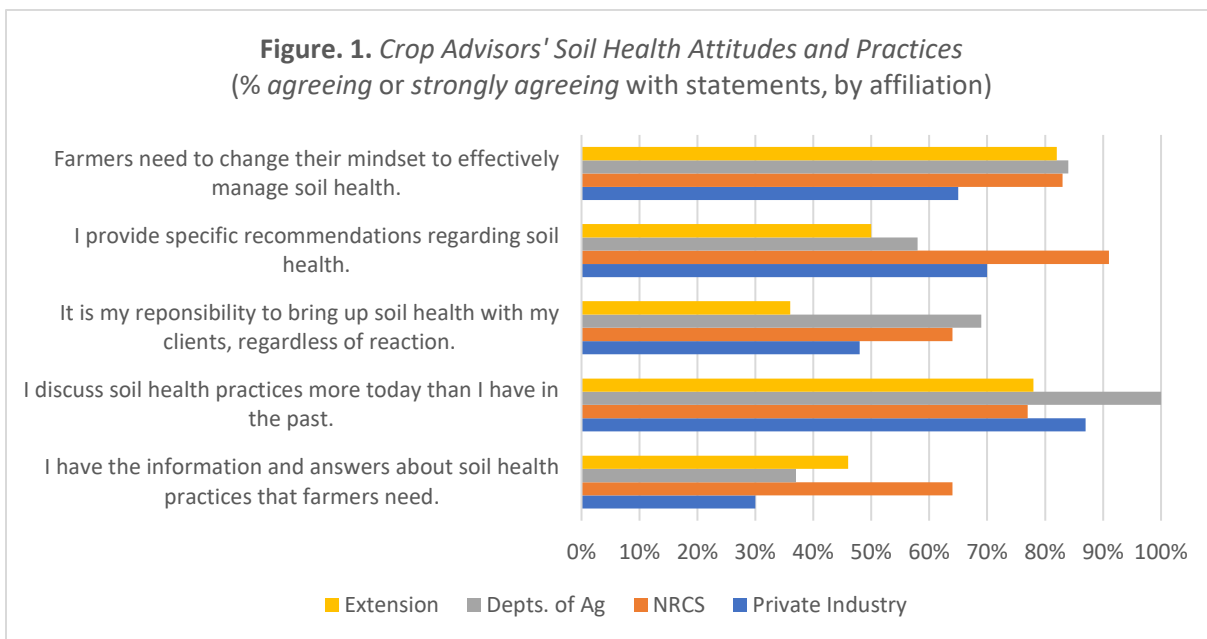
State	Private Industry	NRCS	State Departments of Agriculture	Extension
Utah	13 (13%)	7 (7%)	15 (15%)	14 (14%)
Idaho	14 (14%)	21 (20%)	8 (8%)	10 (10%)

We focused on how the crop advisors among the four affiliations compare when it comes to soil health attitudes and general practices, soil health recommendations made to clients, information sources used, and barriers to addressing soil health.

Soil Health Attitudes and Practices

Overall, Figure 1 shows that all four groups believed farmers needed to change their mindset to effectively manage soil health (at least 60% in all groups *agreed* or *strongly agreed*). At least 50% of advisors *agreed* or *strongly agreed* that they provide farm- or field-specific recommendations regarding soil health practices. Fewer, however, agreed that it is a crop advisor’s responsibility to bring up soil health management with their clients, regardless of how the client will react. In each group, 75% or more noted they are discussing soil health practices more today than they have in the past. The results also show that, for the most part, the advisors do not agree that they “have the information and answers about soil health practices that farmers need.”

Of the four groups, Extension was the least likely to provide specific recommendations regarding soil health and feel responsible for bringing up the soil health topic with their clients. NRCS advisors were the most likely to provide information and agree they had the information and answers to do so. Private industry was the second most likely group to provide specific soil health recommendations and the most likely to state they were lacking information and answers about soil health practices.

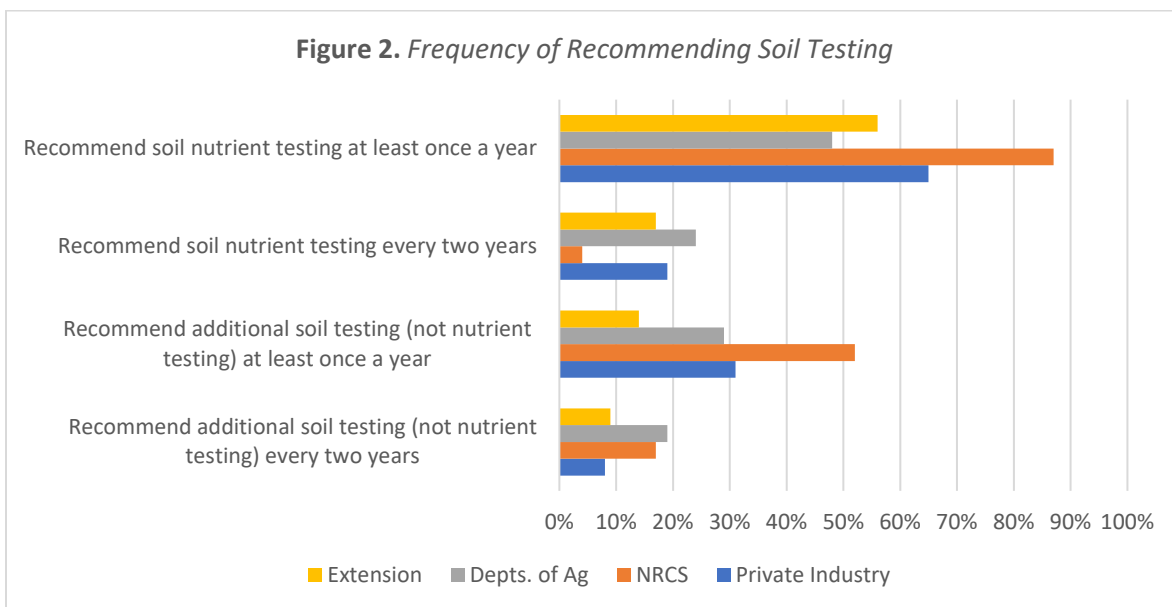


The findings show not all crop advisors are involved in soil health work and not all crop advisors surveyed want to be or feel they should be involved in soil health work, although many noted they are discussing soil health more today than in the past. This is likely related to variability in the job descriptions of each type of advisor. Private industry advisors must ensure their recommendations are profitable to remain in business. Federal government advisors (i.e., NRCS) and state departments of agriculture advisors are often directly involved in programs or initiatives that compensate farmers for implementing soil health practices or are involved in regulating fertilizer and managing manure. University Extension’s

role is to conduct and disseminate research on crop production practices, including soil health. Thus, the different directives, objectives, and business plans of each type of advisor may influence their soil health approach.

Soil Health Recommendations Made to Clients

We asked about recommendations the advisors made to their clients in terms of soil health practices. The four groups differed when it came to how often they recommended soil nutrient and additional soil testing to their clients (Figure 2). Of the NRCS advisors, 87% recommended testing at least once a year, compared to 48% of the state departments of agriculture advisors. Fewer advisors recommended soil health testing (not including nutrient testing). However, at least half of NRCS advisors were recommending this additional testing to their clients at least once a year. Of Extension advisors, 14% indicated they recommended this additional testing to their clients at least once per year. Some soil nutrients and other soil health properties are expensive to test and can take several years to change, even with intense soil management. These factors may cause advisors to recommend testing on a semi-annual basis rather than annually. We also asked advisors about whether they recommended testing every 2 years (Figure 2) or longer intervals (data not shown). The results showed that few advisors in all four categories recommended soil nutrient and soil health testing on a 2-year interval.



We also asked advisors how likely they were to recommend using various soil health indicators (Table 2). From a list of 24 possible indicators, the top three recommendations for each group are in bold (in case of a tie, all those in the top three are in bold). Phosphorous was the sole indicator in all four groups' top recommendations, and crop yield and nitrogen were the top recommendations for three of the four groups. Water stable aggregation had the lowest use as an indicator by private industry (57%) and Extension (32%).

Table 2. Recommendations for Soil Health Indicators
(% indicating *somewhat* or *extremely likely*)

Indicator	Private Industry (n = 27)	NRCS (n = 28)	Depts. of Ag (n = 23)	Extension (n = 24)
Crop yield	92%	87%	95%	91%
Soil texture	81%	73%	90%	78%
Penetration resistance	88%	86%	84%	57%
Nitrogen	85%	96%	90%	86%
Phosphorous	88%	96%	90%	91%
Potassium	84%	77%	85%	86%
Water stable aggregation	56%	73%	90%	32%
Water holding capacity	68%	79%	95%	76%
Infiltration rate	59%	91%	90%	71%

The results showed that most crop advisors in this survey do not go beyond recommending basic soil health testing, even though this is a source of frustration to the producers involved in the Utah Soil Health Network (USHN) On-Farm Trial (Petrzelka & Ulrich-Schad, 2022). They also showed that there is disagreement about which soil health indicators should be recommended. Nearly all agreed that chemical properties like phosphorus and nitrogen are important, but there was disagreement among which and how often biological soil tests are recommended to growers. This highlights the need for greater validation and agreement of soil tests in the IMW that are most reflective of how soil management affects soil health.

Advisors were then asked about soil health practices they recommended to their clients. From a list of 10 practices, the top three practices recommended by each group on an “often” or “always” basis are contained in Table 3, with the top three recommendations for each group in bold. One practice was recommended by at least 50% of advisors in each group: diversified crop rotation. The departments of agriculture advisors in each of the states were the most likely to recommend various practices, whereas Extension advisors were the least likely to recommend various practices.

Table 3. Various Soil Health Practices Recommended
(% indicating *often* or *always*)

Indicator	Private Industry (n = 27)	NRCS (n = 28)	Depts. of Ag (n = 23)	Extension (n = 24)
Cover crops	38%	78%	62%	32%
Diversified crop rotation	58%	78%	81%	59%
Conservation tillage	42%	91%	76%	46%
Organic soil amendments	62%	17%	95%	54%
Chemical soil amendments	65%	65%	38%	14%
Soil or water pH management	65%	39%	57%	18%
Salinity management	69%	22%	71%	26%

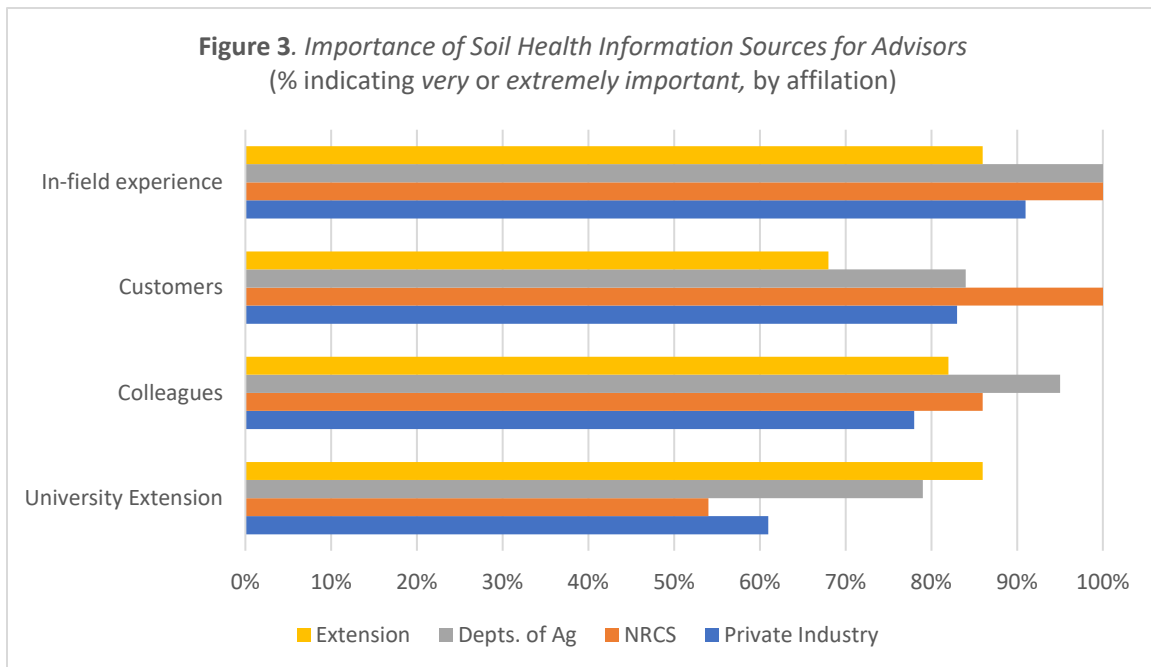
The findings revealed diversity among soil health practices recommended by advisors, depending upon their affiliation. This diversity may be a result of there not being agreement among advisors (and affiliations) on what soil health practices are best in the IMW, which may stem from disagreement on how much field or scientific data is needed to promote soil health testing or practices, how to relate soil health properties to concrete management decisions, and how different regions and cropping systems dictate what practices are feasible, effective, and profitable.

Information Sources Used

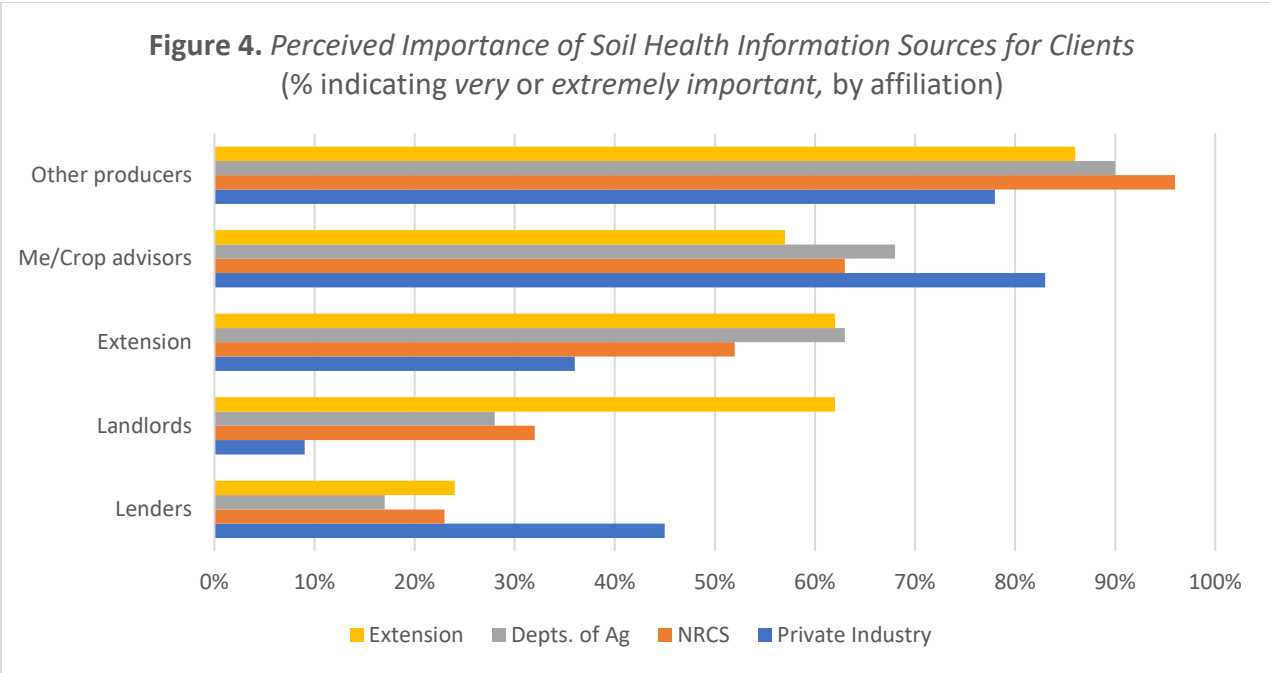
As shown in Figure 1, many advisors did not feel they had the information and answers about soil health practices that farmers need. Other than NCRS advisors, less than half of the crop advisors felt that they had the information and answers about soil health practices that farmers will most likely need.

Advisors were asked about what information sources they use (Figure 3). Results were fairly consistent among the groups. For Extension advisors, their top three sources of information included in-field experience and University Extension (86% indicated both sources *very or extremely important*), with colleagues as the third most important source of information (82% indicated *very or extremely important*). For state departments of agriculture advisors, 100% indicated in-field experience was an important source of information, 95% indicated colleagues, and 84% indicated customers. For NCRS advisors, 100% indicated both in-field experience and customers were *very or extremely important* sources of information, and 86% indicated colleagues. Finally, for private industry advisors, their top three sources of information included in-field experience (91% indicated *very or extremely important*), customers (83%), and colleagues (78%).

Reliance on in-field experience may be because very little research exists on soil health in the IMW. While the importance of soil health has been widely documented in certain areas of the U.S., such as the Midwest and Great Plains for the commodity crop and ranching industries (e.g., Karlen et al., 2019; Wilmer et al., 2019), other agricultural lands and producers remain largely understudied when it comes to soil health, including those in the IMW. The high reliance upon customers (i.e., producers) for soil health information is also interesting, given producers in the IMW working on soil health have stated they do *not* have the needed information (Petrzelka et al., 2024).



We also asked advisors about important sources of information on soil health they believed their clients used. Across the four groups, there were some large differences in who the advisors perceived as information sources on soil health for their clients (Figure 4). Save for private industry, other producers were the top sources identified (private industry advisors believed they were the primary source used by their clients, followed by other producers). Extension advisors also believed landlords, or those producers leasing agricultural land, were a much more important source of information than the other three groups, whereas private industry advisors felt lenders were a more important source than the other three groups.



The finding that crop advisors viewed clientele’s top three information sources about soil health management to be other producers, themselves/crop advisors, and Extension differed somewhat from Utah farmers/ranchers (Petrzelka et al., 2024), who indicated their top three sources for soil health information were USU and USU Extension, YouTube, and NRCS, with only one specifically mentioning a crop advisor they seek out from a local farm store. This suggests that if the farmer or rancher uses a crop advisor, they are not viewing their crop advisors as an information source for soil health. While the number of participants in the producer study is small, we also know these producers are early adopters of soil health practices in Utah (Petrzelka et al., 2024). Therefore, if more producers are going to increasingly adopt soil health practices in the IMW, this disconnect must be resolved.

Barriers to Clients’ Soil Health Management

Lastly, advisors were asked what they see as barriers to their clients’ soil health management choices (the top three barriers identified by each group in bold in Table 4; if tied, all those in the top three are bolded). Cost was the number 1 barrier perceived by all four groups. All four groups also had “difficulty in managing” their top choices, though at much smaller percentages. Lack of knowledge about soil health was seen as the number 2 barrier by three of the groups, albeit at smaller percentages than cost.

Table 4. Perceived Client Barriers to Soil Health
(% indicating a lot)

Barrier	Private Industry (n = 27)	NRCS (n = 28)	Depts. of Ag (n = 23)	Extension (n = 24)
Cost	70%	70%	58%	71%
Lack of knowledge	48%	61%	42%	38%
Difficulty in managing	48%	48%	53%	38%
Lack of equipment	39%	48%	47%	29%
Mixed messaging	35%	48%	37%	33%
Lack of adequate information pertaining to soil health in UT/ID	30%	39%	47%	24%

While cost was noted as a secondary barrier, lack of knowledge is consistent with what Utah producers themselves have noted as their largest barrier to soil health (Petrzelka et al., 2024). Indeed, this crop advisor echoed almost verbatim what producers have said about soil health in Utah:

“Many of my clients have told me that they are interested in soil health practices, but they have a hard time finding studies and other information sources that are relevant to their operations (mostly alfalfa in slightly to moderately saline soils). What I’ve seen a lot is that someone is interested in cover crops, crop diversification, etc., but the only info they can find is from Idaho (at the closest) or Kansas (more likely). As a result, they’re very hesitant to try anything different from what they’ve been doing.”

Conclusion

The findings showed many advisors are addressing soil health and are willing to do so even if it may cause uncomfortable conversations with their clients, thus being important intermediaries of soil health information. However, the data also showed there were some advisors who did not discuss soil health practices with their clients.

Of the four groups, NRCS stood out in terms of being the most involved with soil health in a myriad of ways. The NRCS advisors were most likely to:

- Provide soil health recommendations.
- Recommend both soil nutrient and additional soil testing with some frequency.
- Agree they have the information and answers to provide to farmers on soil health.

For those crop advisors who feel providing soil health information is part of their job, seeking assistance from and collaboration with NRCS may help with addressing the challenges of encouraging soil health practices in the IMW.

Endnotes

¹ See this full report on the survey results: Petrzelka, P., & Ulrich-Schad, J. D. (2023, June). *Utah soil health network crop advisor survey results*. Utah State University Extension.

https://www.uacd.org/files/ugd/be28b5_7fef98166d534e439e635b238fdb9753.pdf.

Please note that the results presented here differ somewhat from the full report, given that here, we examine responses solely from specific crop advisor primary affiliations (private industry, NRCS, state departments of agriculture, and Extension).

² Differences between the two states were examined, with few statistically significant differences noted. These results are also located in the full report referenced in Endnote 1.

References

Arbuckle Jr., J. G., Morton, L. W., & Hobbs, J. (2015). Understanding farmer perspectives on climate change adaptation and mitigation: The roles of trust in sources of climate information, climate change beliefs, and perceived risk. *Environment and Behavior*, 47(2), 205–234.

Church, S. P., Dunn, M., Babin, N., Mase, A. S., Haigh, T., & Prokopy, L. S. (2018). Do advisors perceive climate change as an agricultural risk? An in-depth examination of Midwestern US Ag advisors' views on drought, climate change, and risk management. *Agriculture and Human Values*, 35, 349–365.

Karlen, D. L., Veum, K. S., Sudduth, K. A., Obrycki, J. F., & Nunes, M. R. (2019). Soil health assessment: Past accomplishments, current activities, and future opportunities. *Soil and Tillage Research*, 195, 104365.

Lehmann, J., Bossio, D. A., Kögel-Knabner, I., & Rillig, M. C. (2020). The concept and future prospects of soil health. *Nature Reviews Earth & Environment*, 1(10), 544–553.

Natural Resources Conservation Service. (n.d.). *What is soil health?* U.S. Department of Agriculture. <https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health>

Petrzelka, P., Ulrich-Schad, J. D., Yost, M., & Barnett, M. J. (2024). Crop advisors in the Intermountain West and the challenges of soil health. *Agricultural & Environmental Letters*, 9(2), e20142.

Petrzelka, P., Ulrich-Schad, J., & Yost, M. (2024). “We’re very late to the party”: motivations and challenges with improving soil health in Utah. *Agriculture and Human Values*, 41(1), 381–386.

Petrzelka, P., & Ulrich-Schad, J. D. (2023, June). *Utah soil health network crop advisor survey results*. Utah State University Extension. https://www.uacd.org/files/ugd/be28b5_7fef98166d534e439e635b238fdb9753.pdf

Petrzelka, P. & Ulrich-Schad, J. D. (2022, November). *Utah soil health network on-farm trial participant report*. Utah State University Extension. https://ag.utah.gov/wp-content/uploads/2022/11/USHN-On-Farm-Trial-Participant-Report_2022.pdf

Prokopy, L. S., Carlton, J. S., Arbuckle, J. G., Haigh, T., Lemos, M. C., Mase, A. S., Babin, N., Dunn, M., Andresen, J., Angel, J., Hart, C., & Power, R. (2015). Extension’s role in disseminating information about climate change to agricultural stakeholders in the United States. *Climatic Change*, 130, 261–272.

Wilmer, H., Fernández-Giménez, M. E., Ghajar, S., Taylor, P. L., Souza, C., & Derner, J. D. (2020). Managing for the middle: Rancher care ethics under uncertainty on Western Great Plains rangelands. *Agriculture and Human Values*, 37(3), 699–718.

In its programs and activities, including in admissions and employment, Utah State University does not discriminate or tolerate [discrimination](#), including harassment, based on race, color, religion, sex, national origin, age, genetic information, sexual orientation, gender identity or expression, disability, status as a protected veteran, or any other status protected by University policy, Title IX, or any other federal, state, or local law. Utah State University is an equal opportunity employer and does not discriminate or tolerate discrimination including harassment in employment including in hiring, promotion, transfer, or termination based on race, color, religion, sex, national origin, age, genetic information, sexual orientation, gender identity or expression, disability, status as a protected veteran, or any other status protected by University policy or any other federal, state, or local law. Utah State University does not discriminate in its housing offerings and will treat all persons fairly and equally without regard to race, color, religion, sex, familial status, disability, national origin, source of income, sexual orientation, or gender identity. Additionally, the University endeavors to provide reasonable accommodations when necessary and to ensure equal access to qualified persons with disabilities. The following office has been designated to handle inquiries regarding the application of Title IX and its implementing regulations and/or USU’s non-discrimination policies: The Office of Equity in Distance Education, Room 400, Logan, Utah, titleix@usu.edu, 435-797-1266. For further information regarding non-discrimination, please visit equity.usu.edu, or contact: U.S. Department of Education, Office of Assistant Secretary for Civil Rights, 800-421-3481, ocr@ed.gov or U.S. Department of Education, Denver Regional Office, 303-844-5695 ocr.denver@ed.gov. Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Kenneth L. White, Vice President for Extension and Agriculture, Utah State University.

November 2024

Utah State University Extension



Suggested citation: Petrzelka, P., Ulrich-Schad, J. D., Yost, M., Dean, J., Creech, E., Schott, L, Richards, T., & Davis, K. (2024). *Crop advisor approaches to soil health advising and opportunities for improvement*. Utah State University Extension.