Received: 22 April 2024 | Accepted: 1 July 2024

DOI: 10.1002/ael2.20142

Agricultural & Environmental Letters OPEN ACCESS

COMMENTARY

Crop advisors in the intermountain west and the challenges of soil health

Peggy Petrzelka[1] | **Jessica D. Ulrich-Schad**[1,2] | **Matt Yost**[3] | **Matthew J. Barnett**[4]

[1]Department of Sociology & Anthropology, Utah State University, Logan, Utah, USA

[2]Community & Natural Resources Institute, Utah State University, Logan, Utah, USA

[3]Department of Plant, Soils, & Climate, Utah State University, Logan, Utah, USA

[4]School of Engineering Design and Innovation, The Pennsylvania State University, University Park, Pennsylvania, USA

Correspondence
Jessica D. Ulrich-Schad, Department of Sociology & Anthropology, Community & Natural Resources Institute, 0730 Old Main Hill, Logan, UT 84322, USA.
Email: jessica.schad@usu.edu

Funding information
Utah Agricultural Experiment Station, Grant/Award Number: 9805

Abstract

Both agricultural lands and the role of crop advisors remain comparatively understudied in the Intermountain West (IMW) when it comes to the topic of soil health. Data from a survey of crop advisors in Utah is used to understand current and future soil health work in the region. Not all crop advisors engage in soil health work, but more are discussing it with clients than in the past. Respondents noted that information and costs are key barriers for farmers to managing soil health. Advisors also do not always feel they have the information and answers about soil health practices that farmers need. While crop advisors are one option for promoting producer understanding about soil health in the IMW, work is needed to better prepare them, and farmers will need other options and support to be successful in managing soil health.

1 | INTRODUCTION

While model soil health programs across the United States are being touted (e.g., Honeycutt et al., 2020), agricultural production systems in the Intermountain West (IMW) remain comparatively understudied when it comes to soil health. The western US is primarily dominated by range and pastureland, yet, as Odom et al. (2017, p.2) noted, "despite the valuable resources that rangelands and pasturelands represent, and the ecosystem services they provide, they have not featured prominently in the national discussion and efforts to improve soil health."

The Utah Soil Health Partnership (USHP) was developed to begin to address these issues and promote the adoption of soil health practices in Utah. The USHP developed a 5-year Utah Soil Health Network On-Farm Soil Health Demonstration Project that aims to increase understanding of how best to implement soil health practices into Utah's diverse farming systems. Agricultural/crop (hereafter crop) advisors in Utah were surveyed to gain a better understanding of their perspectives on and approaches to soil health management. Given that these advisors are "considered to play an important role" in agricultural conservation (Krafft et al., 2021, p. 185), this commentary provides an important viewpoint to better understand soil health work in the IMW, using Utah to represent the region. The paper focuses on three main questions: (1) What are crop advisors' views on soil health as they relate to their

Abbreviations: IMW, Intermountain West; NRCS, Natural Resources Conservation Service; USHP, Utah Soil Health Partnership; USU, Utah State University.

clientele? (2) What barriers do crop advisors see for both producers and themselves in soil health work? (3) What roles do various information sources on soil health play for producers and crop advisors?

2 | BRIEF REVIEW

While there is a large and growing body of interdisciplinary research on agricultural conservation, very few pieces focus specifically on soil health in the IMW (Thompson et al., 2022; York et al., 2019). To illustrate, in a review of quantitative literature on farmers' usage of best management practices in agriculture, only four out of 102 peer-reviewed papers used in the analysis specifically included states in the IMW, and only three of these mentioned soil quality (Prokopy et al., 2019). A similar pattern was found in a review of qualitative literature (Ranjan et al., 2019).

The few publications of social science research on soil health in the IMW that do exist suggest there is a desire among producers in the region to improve soil health. For example, survey research on ecosystem services used by producers in the Great Basin found that 75% of respondents reported they manage for soil health, 16% indicated they would like to manage for soil health but do not know which practices to use, and only 6% said protecting soil health was not important to their operation (York et al., 2019). A survey of Utah farmers and ranchers found factors affecting producers' management decisions included reducing soil erosion (Cook & Ma, 2014). In addition, "improved soil quality and organic matter" had a mean score of 3.35 out of 4 on a scale measuring the importance of various potential benefits of participating in a carbon sequestration program.

A recently published field report on soil health in Utah found great interest among the farmers and ranchers participating in on-farm trials in soil health on their agricultural land, which was motivated by two main factors, including gaining knowledge about soil health (93%) and increasing productivity on their farm/ranch (86%) (Petrzelka et al., 2024). All respondents noted challenges they have faced with implementation of soil health practices, either from lack of information/resources available (64%), and/or the information/resources that do exist are not transferable to Utah (43%), resulting in frustration by the producers in gaining locally relevant knowledge on soil health. Information sources used by the producers were minimal, with the top three sources used for soil health information including: Utah State University (USU) and USU Extension (43%); YouTube (36%); and Natural Resources Conservation Service (NRCS) (28%). While the trial size in this study was limited to only 14 participants, these producers represented diverse types of agricultural operations across the state.

Core Ideas

- Not all crop advisors in Utah do soil health work with clients, but more do than in the past.
- Advisors noted barriers to soil health practice adoption, including information and costs.
- Utah crop advisors feel they need more regional data to be able to better advise farmers.
- Crop advisors and farmers do not use all of the same information sources on soil health.

Just as research on soil health in the IMW is lacking, so are studies on the role of crop advisors in soil health in the region, despite their role as important providers of conservation information to producers (Padgitt et al., 2001). While the general literature on crop advisors does continue to grow, the group remains understudied particularly in relation to conservation practices (Church et al., 2018; Eanes et. al. 2017). More specifically, in their discussion on pasture and rangeland, Brown and Herrick (2016, p. 55A) stated, "ensuring that soil and ecosystem health are essential components of land use and management decision making remains a challenge." The role of crop advisors in addressing this challenge in the IMW is yet unknown. This commentary begins to assist in closing this gap.

3 | METHODS

A survey of crop advisors (private industry, Extension faculty and staff, and state department of agriculture advisors) in Utah was conducted in winter 2023. Three announcements were sent via Extension listservs and crop advisor lists, inviting potential respondents to take the survey online via Qualtrics. The listservs and email lists were compiled by USU Extension specialists who work extensively with crop advisors and producers in the region. While this method likely aided in reaching most of the crop advisors in the state, it is acknowledged that those advisors not connected to USU Extension may have been excluded. Requests were sent out three times over a 6-week span in early 2023, and respondents were asked to confirm at the beginning of the survey whether they were currently providing advice to Utah crop producers. Duplicate responses and those completely less than half of the survey questions were removed, for an N of 50, providing an estimated 33% response rate based on USU Extension specialists' knowledge of the number of crop advisors currently working in Utah. Questions on the survey included details of crop advisor work, advice to clients relative to soil health, and personal characteristics (see Supporting Information for full

TABLE 1 Views on soil health.

	Strongly disagree (%)	Disagree (%)	Neither agree/disagree (%)	Agree (%)	Strongly agree (%)
General views on soil health					
I provide farm/field specific recommendations regarding soil health practices. ($N = 50$)	2	2	26	48	22
It is a crop advisor's responsibility to bring up soil health management with their clients, regardless of how the client will react. ($N = 50$)	2	12	34	40	12
I discuss soil health practices more today than I have in the past. ($N = 50$)	0	4	12	56	28
Overall, my clients are doing a good job managing soil health. ($N = 50$)	0	14	40	42	4
Client barriers to soil health					
Farmers are going to have to change their mindset if they want to adapt and effectively manage soil health. ($N = 50$)	0	4	14	46	36
Clients feel it is too difficult to implement soil health practices. ($N = 50$)	0	20	42	32	6
Advisor barriers to soil health					
I have the information and answers about soil health practices that farmers will most likely need. ($N = 50$)	2	16	34	38	10
	Not at all	**Somewhat**	**A lot**		
Client constraints to soil health					
Cost ($N = 50$)	2	32	66		
Lack of knowledge ($N = 50$)	0	40	60		
Lack of equipment ($N = 50$)	12	46	42		

instrument). Notably, soil health was not explicitly defined in the questionnaire, meaning that respondents may have had different interpretations of what soil health entails.

4 | RESULTS

Survey respondents were mostly college educated (88%), men (83%), worked full-time (78%) as crop advisors, and were either affiliated with private industry (27%), NRCS (14%), Utah Department of Food and Agriculture (UDAF; 2%), Extension (29%), or multiple of the listed organizations (29%). Their years of experience as crop advisors and the number of clients they advised in a year were highly variable, while most (77%) worked with farms that were 500 acres or smaller. The top three types of advice respondents typically provided to their clients included agronomic (76%), conservation practices (62%), and daily management (60%). The top four crops respondents advised for included alfalfa (*Medicago sativa*) (97%), other hay (not alfalfa—90%), small grains (81%), and corn (*Zea mays* L.) (71%).

As shown in Table 1, 70% of the crop advisors agreed (when noting agreement here and elsewhere, both those who agree and strongly agree are combined) that they "provide farm/field specific recommendations regarding soil health practices," while 52% 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." Eighty-four percent of the crop advisors agreed that they "discuss soil health practices more today than I have in the past," and 46% of the crop advisors agreed that overall, their "clients are doing a good job of managing soil health."

A large barrier to soil health that crop advisors noted is the need for farmers to "change their mindset if they want to effectively manage soil health" (82% agreed), while 38% agreed that "clients feel it is too difficult implement soil health practices" (Table 1). Crop advisors also noted a barrier related to their own ability to provide soil health recommendations, with only about half (48%) agreeing that they "have the information and answers about soil health practices that farmers will most likely need." Other constraints the crop advisors saw as impacting their clients' soil health management choices "a lot" included cost (66%), lack of knowledge (60%), and lack of equipment (42%).

The information constraints identified for both producers and crop advisors were also summed up in the following quote

from one crop advisor, when asked if there was anything left out of the survey that was important for researchers to know:

> You did not ask about my opinion of the availability or volume of credible research-based information on cover crops there is out there for crop advisors and growers that is specific to Utah or other states or areas with similar climatic, soils, and cropping conditions. Which is very low. Extension and ARS [Agricultural Research Service] in Utah and other surrounding states with somewhat similar growing conditions do not yet have enough multi-state, multi-location, multi-year replicated field research of how to increase and measure soil health, effect on soil fertility measurements, crop yields, soil biological activity, water use, and crop profitability of various cover crop and inter seeding scenarios.

Given these constraints, the study examined what sources advisors believed their clients use for soil health information. The top three sources of information that advisors thought their clients use included ("very" or "extremely important"): other producers (80%), themselves/crop advisors (70%), and University extension (56%). When asked about the importance of information sources on soil health for their own knowledge, the top three sources included: in-field experience (94%), customers (82%), and colleagues (82%).

DISCUSSION

Four important findings emerged from the data. First, not all crop advisors were involved in soil health work, with close to one-third indicating they did not provide soil health recommendations, and not all crop advisors surveyed wanted to be or feel they should be involved in soil health work, although many noted they were discussing soil health more today than in the past. While climate change is a more politically motivated and controversial topic than soil health, this finding is similar to that of Church et al. (2018), who found advisors' willingness to talk or not talk about climate change was in part due to their expertise, and that advice given by advisors reflects advisors' own "beliefs and expertise, as well as the belief and needs of the producer" (p. 10). Why some advisors in our study were not discussing soil health with their clients we cannot answer here, but the findings suggest that a deeper understanding of how crop advisors differ is a fruitful avenue to explore further.

Second, crop advisors perceived barriers to the implementation of soil health practices, including a need for producers to change their mindset if they want to adapt and effectively manage soil health, the perceived cost of implementing the practices, and lack of knowledge on how to do so. While cost was noted as a secondary barrier, lack of knowledge is consistent with what 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.

Third, 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, and the information they do have comes primarily from their own in-field experience. They also rely on their clients (i.e., producers) for soil health information, yet as already noted, those producers working on soil health are stating they do not have the needed information (Petrzelka et al., 2024). And even when/if more information does become available, producers will need the ability to process the new information between peers or other people such as advisors.

Fourth, there is a potential disconnect between information sources of crop advisors and growers. Crop advisors viewed clientele's top three information sources about soil health management to be other producers, themselves/crop advisors, and University extension. This differs somewhat from Utah farmers/ranchers mentioned previously (Petrzelka et al., 2024), who indicated their top three sources used 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/rancher uses a crop advisor, they are not viewing them as an information source for soil health. While the number of participants in the producer study is small, we also know these producers have been early adopters of soil health practices in Utah (Petrzelka et al., 2024)., Therefore, if soil health practices are going to be increasingly adopted by more producers in the IMW, this disconnect must be resolved.

Church et al. (2018) stated that "agricultural advisors are important intermediaries of agricultural information to producers." Results from our survey indicate that advisors addressing soil health are willing to do so, even if it may cause uncomfortable conversations with their clients. However, survey responses indicate some advisors are not discussing soil

health practices with their clients. Perhaps one solution is for a soil health specialist in the crop consulting community to specifically address soil health questions and challenges. This commentary should also help point to ways crop advisors could be assisted by organizations such as NRCS and state departments of agriculture if they are to be successful with addressing the challenge of encouraging soil health practices in the IMW.

AUTHOR CONTRIBUTIONS

Peggy Petrzelka: Conceptualization; formal analysis; methodology; writing—original draft; writing—review and editing. **Jessica D. Ulrich-Schad**: Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; software; supervision; validation; writing—original draft; writing—review and editing. **Matt Yost**: Conceptualization; data curation; funding acquisition; project administration; resources; writing—original draft. **Matthew J. Barnett**: Conceptualization; data curation; investigation; writing—original draft.

ACKNOWLEDGMENTS

We appreciate the time that all crop advisors took to take our survey. This research was supported by the Utah Agricultural Experiment Station, Utah State University and approved as journal paper number 9805.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

ORCID

Peggy Petrzelka https://orcid.org/0000-0002-4276-0054
Jessica D. Ulrich-Schad https://orcid.org/0000-0002-2437-5419
Matt Yost https://orcid.org/0000-0001-5012-8481
Matthew J. Barnett https://orcid.org/0000-0003-3453-9664

REFERENCES

Brown, J. R., & Herrick, J. E. (2016). Making soil health a part of rangeland management. *Journal of Soil and Water Conservation*, *71*(3), 55A–60A. https://doi.org/10.2489/jswc.71.3.55A

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. https://doi.org/10.1007/s10460-017-9827-3

Cook, S. L., & Ma, Z. (2014). Carbon sequestration and private rangelands: Insights from Utah landowners and implications for policy development. *Land Use Policy*, *36*, 522–532. https://doi.org/10.1016/j.landusepol.2013.09.021

Eanes, F. R., Singh, A. S., Bulla, B. R., Ranjan, P., Prokopy, L. S., Fales, M., Wickerham, B., & Doran, P. J. (2017). Midwestern US farmers perceive crop advisers as conduits of information on agricultural conservation practices. *Environmental Management*, *60*, 974–988. https://doi.org/10.1007/s00267-017-0927-z

Honeycutt, C. W., Morgan, C. L. S., Elias, P., Doane, M., Mesko, J., Myers, R., Odom, L., Moebius-Clune, B., & Nichols, R. (2020). Soil health: Model programs in the USA. *Frontiers of Agricultural Science and Engineering*, *7*(3), 356–361. https://doi.org/10.15302/J-FASE-2020340

Krafft, J., Höckert, J., Ljung, M., Lundberg, S., & Kolstrup, C. L. (2021). Delivering too much, too little or off target—Possible consequences of differences in perceptions on agricultural advisory services. *Agriculture and Human Values*, *39*, 185–199.

Odom, L., Mazcko, K., Derner, J., Dell, C., Carey, R. M. C., Kucera, J., Franzluebbers, A., Knaebel, D., & Manter, D. (2017). *Assessing and managing for soil health on rangelands and pasture lands*. The Foundation for Food and Agriculture Research. https://foundationfar.org/wp-content/uploads/2021/03/Rangeland-Soil-Health-White-Paper-6.6.18.pdf

Padgitt, S., Petrzelka, P., Wintersteen, W., & Imerman, E. (2001). Integrated crop management: The other precision agriculture. *American Journal of Alternative Agriculture*, *16*(1), 16–22. https://doi.org/10.1017/S088918930000881X

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. https://doi.org/10.1007/s10460-023-10467-x

Prokopy, L. S., Floress, K., Arbuckle, J. G., Church, S. P., Eanes, F. R., Gao, Y., Gramig, B. M., Ranjan, P., & Singh, A. S. (2019). Adoption of agricultural conservation practices in the United States: Evidence from 35 years of quantitative literature. *Journal of Soil and Water Conservation*, *74*(5), 520–534. https://doi.org/10.2489/jswc.74.5.520

Ranjan, P., Church, S. P., Floress, K., & Prokopy, L. S. (2019). Synthesizing conservation motivations and barriers: what have we learned from qualitative studies of farmers' behaviors in the United States? *Society & Natural Resources*, *32*(11), 1171–1199.

Thompson, C. D., Severe, E., Norris, A. J., Gudmundsen, J., Lewis, M., Currit, E., Newbold, N., & Abbott, B. W. (2022). Improving sustainable agriculture promotion: an explorative analysis of NRCS assistance programs and farmer perspectives. *International Journal of Agricultural Sustainability*, *20*(6), 1079–1099. https://doi.org/10.1080/14735903.2022.2056997

York, E. C., Brunson, M. W., & Hulvey, K. B. (2019). Influence of ecosystem services on management decisions by public land ranchers in the intermountain west, United States. *Rangeland Ecology & Management*, *72*(4), 721–728.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: 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*, e20142. https://doi.org/10.1002/ael2.20142