2 Motivations and Barriers to Climate Smart and Conservation Practice Adoption

Introduction

Here at American Farmland Trust, we are committed to improving water quality, building healthy soils, and sequestering carbon by getting more acres of farmland enrolled in climate-smart practices that have both mitigation (e.g., reducing greenhouse gases) and adaptation benefits (e.g., reducing vulnerability to extreme weather events). These practices include things like no-till, cover crops, diversified rotations, and other practices. Yet adoption of many of these practices remains low across the United States, with only 3.9% of crop acres in cover crops and 21% of acres cultivated using continuous no-till.[11,29] To improve farmer engagement with and adoption of these practices, our team conducted a synthesis of research findings based on over fifty papers from the past decade (2012–2023) of U.S. agriculture.

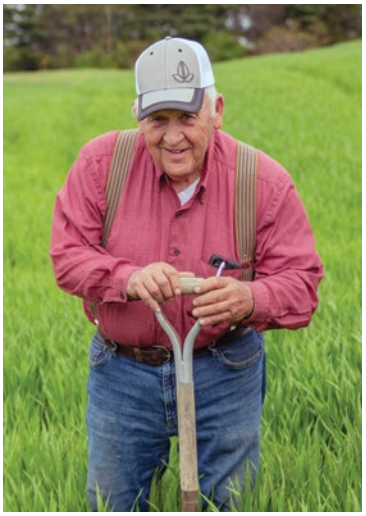
These resources will help service providers and agricultural organizations develop programming to support producers in mitigating barriers to the adoption of new practices. Research findings were largely based on surveys, interviews, and focus groups, representing the direct views of farmers. We do not differentiate findings based on the type of producer, crop, or approach to agriculture. However, it is critical to note that much of the research presented was focused on larger scale, often commodity-focused farms, and thus overly represents white male farmers more than other demographic groups and thus should not be generalized to all farming operations or farmers/ranchers.

Overview

There is extensive research on motivations and barriers to adopting climate-smart and conservation practices. By understanding what makes different groups more likely to adopt conservation practices, service providers can tailor communication and programming to greater effect.

Key Takeaways

- Cost and profit, though important, are not the only things guiding farmer decision-making on conservation and climate-smart practice adoption. Farmers' beliefs and access to technical assistance and networks, among other factors, also play a critical role.
- Farmer demographics and farm characteristics do not have a strong impact on predicting adoption, but structural barriers do.
- Engagement with trusted advisors/networks, a positive attitude toward a practice, and confidence in carrying out a practice are all positively linked to conservation/climate-smart practices.



- Conservation identity can be cultivated and is linked to improved conservation practice adoption.
- Focusing on the co-benefits of climate adaptation strategies rather than emphasizing mitigation can help farmers adopt practices regardless of their climate change beliefs.
- Supporting farmers in accessing new networks and providing additional technical assistance will support their conservation goals.

What Influences Adoption

- While **cost and profit** play a role in farmer decision-making,[18] cost is not the only reason farmers do/do not adopt a best management practice.[1,13,19] Farmers often emphasize yields as being more important than profits, which can sometimes prevent conservation practice adoption.[17]
- **Awareness of the environmental impacts of production practices is important** in helping farmers adopt new practices and choose practices that enable soil health improvements and other social and economic benefits.[18]
- Farmers who view conservation behavior as more **central to their identities** are more supportive of conservation practices, and experiences with conservation can help shape a farmer's identity.[2,22,25]
- **Time horizon** is important. Easily observable practices with shorter time horizons, such as the use of terraces, grassed waterways, and conservation tillage to reduce soil erosion, are sometimes preferred over less observable and longer-term practices like nutrient management, riparian buffers, and stream fencing.[13]

- **Farmers state that confidence in the ability to implement a practice and positive views** of those practices are important for adoption.[21, 26, 28]
- Farmers desire more **technical assistance**. Farmers would like more technical assistance and information on many topic areas, such as production, financial planning, and crisis counseling. This has been instrumental in farmer decisions and capacity to adopt cover crops or otherwise prepare for weather variability. [4, 13, 19, 24, 28]
- There is strong evidence in the literature regarding the importance of social values and beliefs and participation in **trusted agricultural networks** for widespread adaptive management to a changing climate.[5, 6, 14, 16]
- **Specific to climate change**, studies have found that climate mitigation activities (things that reduce or sequester greenhouse gases) were less favorable than climate adaptation strategies (things that help farmers adapt to a changing climate) based on whether farmers thought climate change was driven by human activities.[3, 6, 8, 9]
  - In general, when working with farmers, the research suggests that the focus should be on helping farmers **adapt to extreme weather**, fostering soil health, reducing pest and disease pressures, and minimizing risk rather than focusing exclusively on responding to climate change.[3, 6, 8, 10, 12, 14, 24, 27, 28]
  - Ultimately, decisions regarding mitigation of greenhouse gases and adapting to a changing climate may have little to do with farmers 'ability to implement changes to their practices since there are structural barriers that prevent farmers from making changes. **Structural barriers** like affordability and access to land, bias, and discrimination against historically underserved communities, and land-use intensification limit a farmer's ability to implement changes to their practices.[7, 22]
- When it comes to **farmer demographics**, there is little to no agreement on the effect of many variables, including farmer experience, income, education, age, and gender on Best Management Practice (BMP) adoption, climate change adaptation, or alternate cropping systems on farmer adoption of practices.[1, 6, 13, 15, 19, 20]
- The research does not show that **farm characteristics**, such as farm size, diversity of practices, or crops, are what drives adoption.[4, 6, 13]

References

1. Akkari, C., & Bryant, C. (2017). Toward Improved Adoption of Best Management Practices (BMPs) in the Lake Erie Basin: Perspectives from Resilience and Agricultural Innovation Literature. *Agriculture, 7*(54).
2. Arbuckle, J. (2013). Farmer support for extending Conservation Compliance beyond soil erosion: evidence from Iowa. *Journal of Soil and Water Conservation, 68*(2), 99–109.
3. Arbuckle, J. & Laws, L. (2014). Farmer Perspectives on Climate Change. *Resilient Agriculture*, August: 20–23.
4. Arbuckle, J. & Roesch-McNally, G. (2015). Cover crop adoption in Iowa: The role of perceived practice characteristics. *Journal of Soil and Water Conservation, 70*(6): 418–429.
5. Bagnall, D., McIntosh, W., Morgan, C., Woodward, R., Cisneros, M., Black, M., Kiella, E., & Ale, S. (2020). Farmers' insights on soil health indicators and adoption. *Agrosystems, Geosciences & Environment, 3*(1), e20066.
6. Brant, G. 2015, June. Social Considerations in Adaptation to Climate Variability. Natural Resources Conservation Service and East National Technology Support Center.
7. Calo, A. (2017). How knowledge deficit interventions fail to resolve beginning farmer challenges. *Agriculture and Human Values*.
8. Campbell, A., Becerra, T., Middendor, G., Tomlinson, P. (2018). Climate change beliefs, concerns, and attitudes of beef cattle producers in the Southern Great Plains.
9. Carolan, M. & Stuart, D. (2016). Get Real: Climate Change and All that 'It' Entails. *Sociologia Ruralis, 56*(1): 74–95.
10. Chatrchyan, A., Erlebacher, R., Chaopricha, N., Chan, J., Tobin, D., & Allred, S. (2017). United States agricultural stakeholder views and decisions on climate change *WIREs Climate Change*, e467.
11. Creech, E. (2017). Saving Money, Time and Soil: The Economics of No-Till Farming. *USDA*
12. Jemison, J., Hall, D., Welcomer, S., & Haskell, J. (2014). How to communicate with farmers about climate change: Farmers' perceptions and adaptations to increasingly variable weather patterns in Maine (USA). *Journal of Agriculture, Food Systems, and Community Development, 4*(4), 57–70.
13. Liu, T., Bruins, R., & Heberling, M. (2017). Factors Influencing Farmers' Adoption of Best Management Practices: A Review and Synthesis. *Sustainability*, 10: 432.
14. Mase, A., Gramig, B., & Prokopy, L. (2017). Climate change beliefs, risk perceptions, and adaptation behavior among Midwestern U.S. crop farmers. *Climate Risk Management, 15*: 8–18.
15. Mattia, C., Lovell, S., & Davis, A. (2016). Identifying barriers and motivators for adoption of multifunctional perennial cropping systems by landowners in the Upper Sangamon River Watershed, Illinois. *Agroforest Systems*.
16. Morton, L., Roesch-McNally, G., & Wilke, A. (2017). Upper Midwest farmer perceptions: Too much uncertainty about impacts of climate change to justify changing current agricultural practices. *Journal of Soil and Water Conservation, 72*(3): 215–226.
17. Ogieriakhi, M. & Woodward, R. (2022). Understanding why farmers adopt soil conservation tillage: A systematic review. Soil Security.
18. Pannell, D., Pardey, P., & Hurley, T. (2020). Private Incentives for Sustainable Agriculture: Principals and Evidence for Sustainable Agriculture Change. *Working Paper 2002,* University of West Alabama Department of Agricultural and Resource Economics.
19. Prokopy, L., Floress, K., Arbuckle, J., Church, S., Eanes, R., Gao, Y., Gramig, B., Ranjan, P., & Singh, A. (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.
20. Ranjan, P., Church, S., Floress, K., & Prokopy, L. (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.
21. Roesch-McNally G., Arbuckle J., Tyndall J. (2017) What would farmers do? adaptation intentions under a corn belt climate change scenario. *Agriculture and Human Values, 34*(2): 333–346.
22. Roesch-McNally, G., Arbuckle, J. G., & Tyndall, J. C. (2018a). Soil as social-ecological feedback: Examining the "ethic" of soil stewardship among Corn Belt farmers. *Rural Sociology, 83*(1): 145–173.
23. Roesch-McNally, G. E., Basche, A. D., Arbuckle, J. G., Tyndall, J. C., Miguez, F. E., Bowman, T., & Clay, R. (2018b). The trouble with cover crops: Farmers' experiences with overcoming barriers to adoption. *Renewable Agriculture and Food Systems, 33*(4), 322–333.
24. Schattman, R., Méndez, V., Merrill, S., & Zia, A. (2018) Mixed methods approach to understanding farmer and agricultural advisor perceptions of climate change and adaptation in Vermont, United States. *Agroecology and Sustainable Food Systems, 42*(2): 121–148.
25. Sulemana, I. & James, H. (2014). Farmer identity, ethical attitudes and environmental practices. *Ecological Economics, 98:* 49–61.
26. van Valkengoed, A. & Steg, L. (2019). Meta-analyses of factors motivating climate change adaptation behaviour. *Nature Climate Change, 9:* 158–163.
27. Wang, T, Jin, H, Kasu, B, Jacquet, J, & Kumar, S. (2019). Soil conservation practice adoption in the northern great plains: economic versus stewardship motivations. *Journal of Agricultural and Resource Economics, 44*(2): 404–421.
28. White, A., Faulkner, J., Sims, S., Tucker, P., & Weatherhogg, K. (2018). Report of the 2017-2018 New England Adaptation Survey for Vegetable and Fruit Growers. Department of Plant and Soil Science, University of Vermont. Burlington, VT.
29. Zulauf, C. & Brown, B. (2019). Tillage Practices, 2017 US Census of Agriculture. *farmdoc daily (9)*:136.

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