

DELTA SCIENCE FELLOW 2017



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WHY THIS RESEARCH MATTERS

In the Sacramento-San Joaquin Delta, agriculture is the dominant land use. Improved soil and nutrient management practices implemented on farmland offers the potential to provide environmental benefits, such as the accumulation of soil organic matter which can support soil carbon sequestration and improved water quality and water retention. Both are important to building an agricultural system that is resilient to climate change. Understanding the factors influencing farmers' adoption of these soil and nutrient management practices is critical to building collaborative solutions to current and future climate and water challenges.

Managing agricultural soils for carbon and water benefits in the California Delta: Understanding influences on decision-making and practice adoption of in-Delta farmers



Delta Science Fellow Jessica Rudnick leads a focus group with farmers at a UC Cooperative Extension field day centered on nutrient management. *Courtesy photo*

PROJECT

This project investigated and analyzed the major factors contributing to decision-making and adoption of soil and nutrient management practices by farmers in the Sacramento-San Joaquin Delta and upstream watersheds in the Central Valley. In this project, Rudnick applied a mixed-methods approach to better understand what drives farmers' decisions. To collect these data, the fellow conducted semi-structured interviews with farmers and relevant agricultural stakeholders, attended and observed more than 20 public meetings and grower outreach events, including water quality coalition meetings, UC Cooperative Extension field demo days, and industry group conferences. Finally, Rudnick conducted a survey of nearly 5,000 farmers in the Delta and upstream watersheds.

RESULTS

The study found that for delta farmers, agronomic benefits such as crop yield, crop quality, soil fertility, and return on investment are some of the most important factors farmers consider in their decisions to adopt new soil and nutrient management practices. The most frequent barriers to adoption of new practices are uncertainties related to the impact on farming operations, costs, and regulations.

Farmers seek information from many different sources to inform their adoption decisions about soil and nutrient management practices, but the study found that private consultants known as Pesticide Control Advisors (PCAs), who can work independently or through agrochemical companies, are often the most important sources of information, after farmers' own past experiences and their close social networks.

Rudnick is now working to develop a more complex model that will allow researchers to understand how multiple farm operation characteristics, farmer demographics, and behavioral characteristics interact and predict adoption of soil and nutrient management practices.

MANAGEMENT APPLICATIONS

In this project, Rudnick has defined several key takeaways for policy makers, extension, and outreach, that have been communicated to stakeholders, community partners, and academic audiences through a variety of conferences and outreach events over the past year.

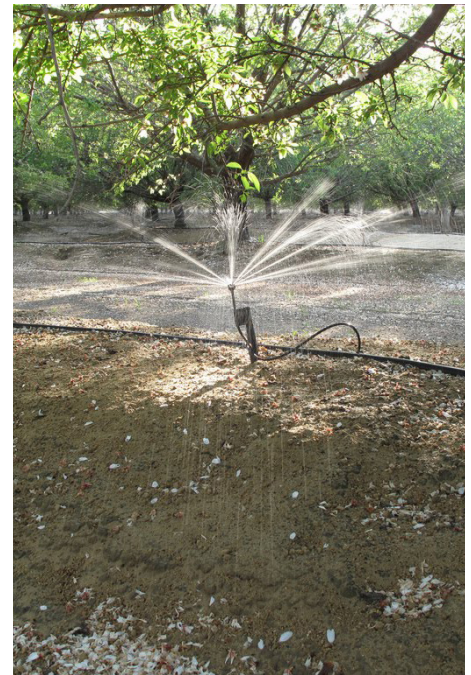
For example, she suggests that extension and outreach should evaluate how educational materials and workshops address areas where farmers identify uncertainty about best management practices, which include how practices may impact crop yields, the return on investment of a practice (including timeframe), and how effective the practice will be at delivering desired conservation outcomes (i.e. improved nitrogen management, soil carbon sequestration, water quality benefits). In addition, harnessing the wide reach and popularity of pesticide control advisors could provide leverage to communicate research on conservation practices to a larger farming population.

RESEARCH MENTOR

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COMMUNITY MENTOR

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& Contra Costa Resource Conservation District



Micro-sprinkler irrigation systems can improve irrigation efficiency in an orchard. *Sat Darshan Khalsa*

SELECT PUBLICATIONS AND PRESENTATIONS

Rudnick, J (2018). Barriers to adoption of improved management practices. *California Department of Food and Agriculture Fertilizer Research Education Program Annual Meeting*. Seaside, CA, October 2018.

Rudnick, J (2019). Understanding uncertainty in farmer decision-making in the context of climate change and nutrient management. *3rd Annual Agriculture and Climate Change Conference*. Budapest, Hungary. March 2019.

Lewis, J. and Rudnick, J. (2019) The Policy Enabling Environment for Climate Smart Agriculture: A Case Study of California. *Frontiers in Sustainable Food Systems*, 3: 31. <https://doi.org/10.3389/fsufs.2019.00031>

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