American Farmland Trust
Year One Project-Level Summary Report

(Reflecting data collected April 2021 to December 2021)

Executive Summary

(Supplement to the linked PowerPoint Presentation Report)

A USDA Natural Resources Conservation Service (NRCS)
Conservation Innovation Grant (CIG) Project by AFT:
Conquering Cover Crop Challenges Coast to Coast
Award ID Number: NR213A750013G009
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The Team

The Co-Principle Investigators of the project are Dr. Michelle Perez (Water Initiative Director and Economics Team Advisor) and Dr. Bianca Moebius-Clune (Climate Initiative Director and Soils Team Advisor). Dr. Gabrielle Roesch-McNally (Women for the Land Director) is our Social Team Lead. Dr. Rachel Seman-Varner (Senior Soil Health Biochar Scientist) is our Soils Team Lead working in collaboration with Aysha Tapp-Ross (Water and Soil Health Scientist) our Soils Team Manager; Ellen Yeatman (Water Scientist and Ag Economist) is our Economics Team Manager working in collaboration with June Grabemeyer (Consulting Economist). Aaron Ristow (NY Ag Stewardship Program Manager) is our New York (NY) State Lead; Scott Franklin (Southeast Regenerative Ag Program Manager) is our Kentucky (KY) State Lead; Caro Roszell (Soil Health Specialist) is our New England State Lead for Massachusetts (MA) and Connecticut (CT); Paul Lum (CA Ag Specialist) is our California (CA) State Lead.

This project was developed and initiated by Jennifer Moore (now at USDA Agricultural Research Service and Michelle Perez. Other former members of the project team that have left AFT include Shelby McClelland (Soils Manager), Emily Cole (MA & CT State Lead), Alli Fish (Soils Manager) and Krista Marshall (CA Conservation Technician). State consultants are listed in the PowerPoint Presentation Report.

The Project

We titled our project “Conquering Cover Crop Challenges from Coast to Coast” because we designed it to address regional and cropping system challenges like soil moisture management, planting and termination timing in crop rotations, termination methods, and cover crop mixtures. This 5-year soil health demonstration trial project is identifying, documenting, evaluating, supporting, and showcasing farmer-driven transitions to improving soil health through adoption of cover crops combined with other soil health practices, or adjustments to cover crop management. Our project includes 15 farms in three NRCS regions & five states (CA, KY, NY, MA, & CT), representing six cropping systems: almonds, wine grapes, vegetables, corn-soybean-wheat, corn silage, corn silage and diversified crops.

Social Results

The social indicator effort uses assessment surveys (in years 1, 3, and 5), exit surveys at dissemination events, and focus group discussions. The initial survey of past and current practices of our farmers identified the biggest innovations are in using multi-species cover crops and experimenting with cover crop seeding rates and termination. Motivations across all participating farmers focused on increasing productivity, improving resilience to drought, and sequestering carbon in the soil. However, motivations varied across states. For California, improving pollinator habitat was a number one motivator for practice adoption, while reducing erosion made it to the top three motivators in Kentucky. Saving on input costs was important in New England and for respondents in New York, boosting profitability and increasing resilience to extreme precipitation events were high priority. The top desired soil health outcomes across all regions were boosting soil organic matter, increasing plant available soil nutrients, improving habitat for soil organisms, reducing compaction, and improving soil structure.

Respondents enthusiastically agreed with all statements regarding the impact of farming practices on water quality, biodiversity, wildlife habitat, climate resilience. There was less agreement (i.e., higher percentage of respondents “disagreed,” or “neither agreed nor disagreed”) with statements associated with farming practices and worker satisfaction, climate change, and human health. Project participants identified concerns regarding which cover crop species were best for their needs, yield drag, adjustments to nutrient application rates, and added costs associated with production. Answers did vary based on state/region although no clear trends emerged. When asked what aspects of the project were most important, respondents ranked technical assistance the highest, financial support, then economic information. The least important aspect of the project identified by respondents was the net loss guarantee. Finally, most of the respondents reported being very likely to likely to continue implementing conservation practices when the project is over.

Soil Results

In-Field Soil Health Assessments were conducted on all 15 farms and the results suggest that penetration resistance was the most frequently observed indicator that did not meet assessment criteria (77%). Aggregate instability is the primary resource concern on 74% of the demo farms. The Comprehensive Assessment of Soil Health (CASH) indicated compaction was a concern on seven farms. Aggregate stability was also a concern with two-thirds of the farms scoring low to very low on the CASH. Soil Organic Matter (SOM) was variable across farms with seven farms scoring low to very low and five farms scoring high to very high. Soil samples on 10 farms had SOM content between 2 and 4%.

Eight farms scored very high on the CASH phosphorus content. Three of those farms had P concentrations above 20 ppm (the Cornell threshold for possible environmental concerns) and AFT staff is discussing with each farmer options to reduce these concerns. All three of those farms regularly apply manure. One California farm scored well above the threshold with mean P levels around 500 ppm. However, in consultation with California NRCS staff, the P index did not indicate a risk to surface water.

The results of the first year of soil health assessment illustrate that aggregate stability, compaction, and SOM are constraints on some of the demo farms. The results of the initial CASH test will provide a baseline to compare treatment effects over time.

Economic Results

The economic team collected data on crop production, including yield, acreage, field operations, machinery & material costs, and other operation expenses as applicable. For year 1, we calculated the cover crop establishment cost, which includes cover crop seed and planting expenses. For all the fields, except one control field in Kentucky[1], the cover crop establishment cost ranged from $24 to $98 per acre. Breaking down the establishment costs, the cover crop planting costs ranged from $7 to $36 per acre. Planting costs vary by the size and type of the planting machinery used. For example, broadcast seeding costs the least amount, at $7 per acre while no-till drill planting cost the most at $36 per acre because of the operation costs for the planters and tractors. Cover crop seed costs ranged from $13 to $55 acre, based on the species, type of mix, seeding rate, and if the seed is certified organic. The least cost cover crop seed was a single species cereal rye at $13 per acre and the most expensive was a multi-species clover mix at $55 per acre.

In addition to calculating differences in cover crop establishment costs across the 13 participating farms, we calculated the change in net income between the treatment and control fields (or plots). For all the farms except two farms in Kentucky, the change in net income ranged from negative $98 to positive $8 per acre. Seven of the farms had lower net incomes by $18 to $98 per acre which we would expect to see with the implementation of cover crops. Net income was unchanged on three of the farms because there were cover crops planted on both the control and treatment fields. One farm had an increase in net income because in addition to cover crops, they adopted no-till which reduced their tillage and planting costs.

Experimental design changes and cropping issues on two farms in Kentucky altered net income beyond what would have been expected. The design change on one farm caused additional costs which caused the change in net income to be negative $121 per acre. The other farm had a design change that altered field selection so that the control and treatment plots had different crops with different value of production and cropping costs in addition to poor crop yield and harvest timing issues which prevented the planting of the high biomass cover crop on the treatment plot. This resulted a change in net income of negative $262 per acre. We expect to see more issues that will impact costs, such as cover crop maturity issues associated with the timing of termination using roller crimpers, poor weather conditions, or operational changes. Continued economic evaluation will provide greater insight as the project progresses.

More details on this project are available in the PowerPoint Presentation Report.

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[1] The Kentucky outlier included a demonstration design change which created the need to terminate the treatment cover crop and replant a control cover crop for the part of the field that would be the new control area. The total cost to plant the first cover crop, terminate it, and replant a different cover crop was $444 per acre. The treatment cover crop cost was $323 per acre. The seed cost of $305 per acre is high because of the increased seeding rate, the mix of species selected, and the price of organic seed.