IMPROVING SUSTAINABILITY: PROGRAM TO DEMONSTRATE IMPLEMENTATION AND BENEFITS OF THE U.S. COTTON TRUST PROTOCOL AND BETTER COTTON INITIATIVE BETTER COTTON PROGRAM

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Abstract

Cotton produced in the United States is highly prized by the global textile industry for its quality. While American cotton farmers use advanced production methods, they still face sustainability challenges. In response to the documented sustainability demand from retailers and suppliers, Better Cotton Initiative (BCI) launched a Better Cotton program in the United States in 2014. Recently, the U.S. Cotton Industry initiated the U.S. Cotton Trust Protocol (Trust Protocol), a program designed to drive continuous improvement and increase awareness of the benefits of implementing best practices. A field study was established to show standard production practices (conventional tillage without the use of cover crops) compared to a management strategy utilizing cover crops and greatly reduced tillage in an effort to improve soil health and sustainability and to enroll fields into both the Trust Protocol and BCI programs. Enrolling farms into either program is not a difficult task and should not be a deterrent for producers interested in participating in either of these programs. While no statistical yield differences in the first year were observed in this study, differences in sustainability metrics and improvements in soil health are clear.

Introduction

The United States is the third-largest cotton producing country in the world, and its cotton quality is highly prized by the global textile industry. While U.S. cotton producers use advanced production methods, they still face sustainability challenges.

In response to demand from retailers, suppliers and interested farmer groups, Better Cotton Initiative (BCI) launched a Better Cotton program in the United States in 2014. The BCI program operates a global standard system for sustainable cotton production. To help U.S. farms meet program requirements and set targeted goals for continuous improvement, BCI developed a resource planning template for its seven principles of sustainability. The template emphasizes multi-year objective setting for continuous improvement of production and management systems that farmers can use to evaluate their progress.

Recently, the U.S. Cotton Industry initiated the U.S. Cotton Trust Protocol (Trust Protocol), a program designed to confirm and increase awareness of the fact that most U.S. cotton producers are farming responsibly and striving for continuous improvement. The Trust Protocol was developed to help the U.S. cotton production sector reduce its

environmental footprint via specific sustainability goals targeted for 2025: 1) a 13% increase in productivity (i.e. reduced land use per pound of fiber); 2) an 18% increase in irrigation efficiency; 3) a 39% reduction in greenhouse gas emissions; 4) a 15% reduction in energy expenditures; 5) a 50% reduction in soil loss; and 6) a 30% increase in soil carbon.

Both programs have similar goals in supporting U.S. farmers in addressing these and other sustainability challenges and improving their performance. This project will help provide data to support "substantial equivalency" between the two programs and would simplify adoption of both programs for the supply chain. The major limitation currently is scaling up awareness and adoption of the sustainability initiatives. Increasing working knowledge of sustainability efforts with Extension and consultants has a great potential to improve adoption.

Objectives

1. Establish demonstration fields which show standard production practices (conventional tillage without the use of cover crops) compared to a management strategy utilizing cover crops and greatly reduced tillage in an effort to improve soil health and sustainability and to enroll fields into both Trust Protocol and BCI programs

2. Evaluate changes in operating expenses and profitability and compare to changes in environmental footprint as calculated using the Field to Market Fieldprint Platform.

Materials and Methods

An on-farm study site of 30 acres was selected at the Agricenter International in Memphis, TN. The Agricenter provides multiple opportunities to share educational opportunities for the various segments of the supply chain. The site in 2019 was a conventional-tilled, dryland Waverly Silt Loam field. In 2020, a three-year study was initiated by splitting the field in half with one side planted into cover crops with no-tillage (improved soil health and sustainability field) and the other side using conventional tillage without the use of cover crops (standard practice field). The cover crop blend consisting of 25 lb./A cereal rye, 25 lb./A black-seeded oats, and 2 lb./A hairy vetch was broadcasted on the soil surface immediately after harvest on December 5, 2019. All production practices were recorded to facilitate creation of a budget. Soil health was evaluated using several measurements including soil samples (standard fertility and Haney for soil health), bulk density, water infiltration rates, and Watermark Soil Moisture Sensors (6, 12, 18 and 30"). In season pest management, nutrient management and harvest preparation were identical for both fields. Field information and inputs were entered into the Field to Market Fieldprint Platform. The study was harvested with an onboard moduling cotton picker. Grab samples were collected for lint fraction and fiber quality was determined through HVI analysis.

Results and Discussion

Program Enrollment

All commercial cotton fields (50 acres) at the Agricenter were enrolled into both the Trust Protocol and the BCI programs. It took approximately one hour to complete the self-assessment forms for each program. Documentation regarding: 1) soil health, water management, and biodiversity composed primarily of conservation plans and contracts with NRCS, 2) nutrient management plan based on routine soil sampling and following nutrient application recommendations, 3) crop protection primarily including approve chemical storage, application records, scouting reports and pesticide recommendation, and 4) worker well-being as documented in the Agricenter employee handbook were reviewed and organized in preparation of a third-party verification.

The verifier was very knowledgeable of local farming practices, very organized and clear in his requests. The verifier was satisfied that the documentation needed to fulfill transparency requirements to satisfy the needs of the supply chain were in place and that the Agricenter was in compliance with both programs. The on-site verification for both programs took less than two hours to complete.

Soil Health and Environmental Footprint

In the first year of cotton production following a cover crop, differences were observed. Watermark soil moisture sensors detected water infiltration occurring at all four depths on the improved soil health side while only the two shallow sensors detected water infiltration on the standard practice side after individual rainfall events (Figure 1).

This difference is thought to be a direct result of improved soil health. Fieldprint Platform output results showed improved sustainability with the improved soil health field compared to the standard practice field shown on a spidergram with smaller values indicating less resource use (Figure 2).

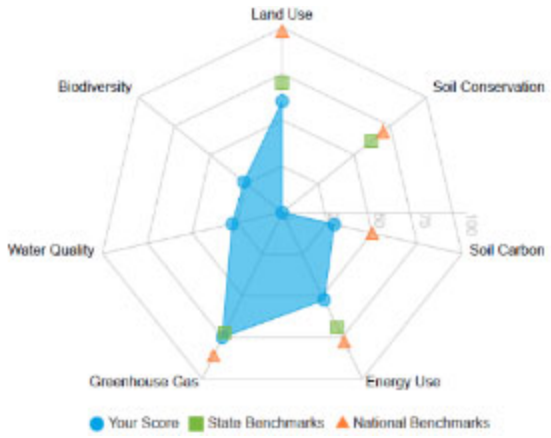
No significant yield differences were observed. However, a trend was observed for higher yield on the improved soil health field compared to the standard practice field. A summary of yield improvements and individual sustainability metrics documenting the initial steps toward continuous improvement are included in Table 1.

Table 1. Lint yield and metrics from the Fieldprint Calculator used to evaluate sustainability as affected by practices to improve soil health in the 2020 Agricenter International fields.

Parameters	Improved Soil Health Field	Standard Practice Field	% Change Improved vs. Standard
Yield (lb. lint /A)	962	905	6.30 %
Land Use (A/lb. lint)	0.0010	0.0011	- 9.09 %
Soil Conservation (Ton/acre/year)	1.2	2.3	- 47.83 %
Energy Use (BTU/lb. lint)	4904	5232	- 6.27 %
Greenhouse Gas Emissions (lb. CO_2eq/lb. lint)	1.6	1.7	- 5.88 %

Figure 1. Watermark soil moisture readings at four depths and rainfall events for both the improved soil health and standard practice fields. Soil moisture reading of 0 represent field capacity.

Improved Soil Health Field



Standard Practice Field

Figure 2. Comparison of Field to Market Fieldprint Platform output from improved soil health field compared to standard practice field. Fieldprint results are shown on the spidergram as relative indices on a scale of 1-100 that represent metric scores. The indices are calculated so that smaller values and a smaller shaded area on the spidergram indicate less resource use or environmental impact from your field.

Summary

While no statistical yield differences in the first year were observed in this study, differences in sustainability metrics and improvements in soil health are clear. Enrolling farms into either program is not a difficult task and should not be a deterrent for producers interested in participating in either of these programs. This is important to document our practices as brands and retailers look to source sustainably produced fibers.

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