INTEGRATING RYE COVER CROP AND REDUCED TILLAGE TO IMPROVE SOIL HEALTH

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Abstract

As costs continue to increase, the key to remaining profitable is to continuously improve efficiency. Cotton producers utilize many different production practices to improve efficiency and profitability. Utilizing no-till with cover crops is one strategy to improve efficiency and soil health. Producers are often skeptical about converting to no-till with cover, having concern about irrigation efficiency and costs associated with adopting new technology. An unique opportunity exists in Arkansas to evaluate this issue. The University of Arkansas, Division of Agriculture has conducted the Cotton Research Verification Program since 1980 with the objective of demonstrating the profitability of university production recommendations. The University of Arkansas Cotton Research Verification/Sustainability Program was able to partner with the Discovery Farms in Southeast Arkansas. Discovery Farms primary focus is monitoring edge of field water quality. Each field is composed of two irrigation sets allowing for evaluation of farmer standard practices to that of a modified production system and compare how each impacted edge of field water quality and ultimately profitability of each system. Two Discovery Farm fields were used in this project. Two systems were studied in each field, the farmer standard tillage, stale seedbed, with no cover and no-till with cover. The fields in this project averaged approximately 30 acres in size with each practice comprised of half the field. Throughout the study all producers' inputs were recorded providing the information needed to calculate both fixed and variable costs. Field information was entered into the Fieldprint Calculator and summaries were evaluated for each field. Land use, irrigation water use, energy use, and greenhouse gas index were the metrics used to assess impact of different production systems on the environmental footprint of the study fields. Plots were machine harvested. Field footprint improved or became smaller when changing from till / no cover to no-till / cover (figure 1 and Table1). Production costs per acre were slightly higher in no-till with cover in ShopCot field mainly due to seed costs of cover crop, as applications of herbicides and insecticides were basically the same. Weaver till no cover had one additional application of an herbicide which made till no cover slightly more expensive per acre. No-till with cover produced a higher vield in both fields. The operating cost per pound lint was less with no-till / cover. In this two-year study lint production in no-till / cover was six cents a pound cheaper to produce than the standard practice of till / no cover. More research is needed to further evaluate how profitability, size of environmental footprint, soil health, and continuous improvement are related.



Figure 1. Effect of till /no cover and no-till / cover on the footprint as calculated by the Field to Market Fieldprint Calculator.

	Table 1.	Sustainability	Measures co	omparing	no-till	Cover	to th	e farmer sta	ndard.
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Sustainability Metric	Improvement
Land Use	11.17%
Soil Conservation	68.01%
Irrigation Water Use	18.58%
Energy Use	12.06%
Greenhouse Gas Emissions	11.33%