ECONOMIC COMPARISONS OF CONSERVATION TILLAGE SYSTEMS ACROSS THE BELT, AL, AR, CA, GA, LA, MS, SC, & TX

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Abstract

In 1998 Monsanto initiated a three to five year study to investigate and study Conservation Tillage cotton systems at numerous locations across the Belt. Centers of Excellence (COE') were established in areas with low adaptation of conservation tillage systems. The COE's were established on cooperator farms to compare agronomic systems, to maintain or increase yields, lower production costs, and incorporate new technologies, specifically, Roundup Ready, Bollgard Cotton and no-till farming techniques. Basic comparisons included three tillage systems: no-till, conservation tillage, and conventional tillage. Each of these tillage comparisons had three herbicide or weed control systems: Roundup Ultra only (no residuals), Roundup Ultra plus a limited residual, and Roundup Ultra with a full residual package.

Complete records were recorded and maintained by a third party university extension person or an independent consultant. All production costs were recorded including seed, land rent, pesticide and growth regulators, fertilizers and lime, plus operation costs. Yields were collected on all treatments.

There were no significant differences in weed control between any of the treatments at any of the locations. Average cost of weed control treatments ranged from $30/A for Roundup Ultra only to $50/A for Roundup Ready plus the full residuals. Tillage cost ranged from $0/A to $35/A. No-Till (1998) and Conservation tillage (1999) yields were the highest across locations.

When comparing the cost of tillage herbicide treatments, herbicide applications, and time savings across the COE sites in all three tillage systems, the Roundup Ready system (non-residual), no-tillage had the lowest cost. Conservation tillage was $20.68/A more expensive than the no-till system. Conventional tillage was $45.08/A more expensive than the no-till system.

This data also revealed that cotton growers incur the greatest expenses on pesticides and growth regulators, followed by operation costs (tillage, fuel, equipment, labor), followed by land rent, and then by seed cost and fertilizer and lime.

The economic benefits from no-till and conservation tillage linked with Roundup Ready systems with no or limited residuals should be compelling to cotton growers; offering a chance to convert to new systems without reducing yield. Labor was reduced by .5 hours per acre, giving the operation opportunity to utilize that time elsewhere.

Introduction

In the most recent cotton production seasons (1998 & 1999) growers have experienced low or flat prices and flat production levels (yield). Growers have little control over production costs such as seed, fertilizer, fungicides, insecticides, fuel, labor, parts, and equipment. If you reduce tillage, you have a reducing effect on fuel, labor, maintenance, and the size of the equipment.

More and more cotton growers are converting their production systems to no-till and conservation tillage. Last year (1999) conservation tillage acres grew by 10% in the Southeast. A recent survey conducted by Monsanto revealed that 34% of the cotton in the Southern Region of the US was produced under the umbrella term of conservation tillage (a reduced tillage system of cotton production where 30% of the residue or cover crop is left on the soil surface after planting.) This includes 15% no-till, 8% stale seed bed, and 11% strip-till. In 1992, there was less than 2% no-till cotton.

There are still identifiable barriers preventing growers from converting to conservation tillage systems. These include perceived lower yields, soil type considerations, too new, lack of appropriate equipment, weed control issues, higher costs and lack of local expertise.

In 1998 Monsanto launched a program to address these barriers by setting up Conservation Tillage Centers of Excellence (COE). The objective of the COE's are to develop and/or fine-tune viable (economically and agronomically) conservation tillage systems at a local level by utilizing large scale (farmer size) research and demonstration plots. The COE's were strategically located in areas with a low percentage of adaptation to conservation tillage (see map and list of COE cooperators).

Growers selected were new to conservation tillage, but were eager to try and learn to reduce production cost. Extension agents/specialists or independent consultants collected all data, including basic plot data, evaluations, economic inputs and analysis, soil sampling and analysis, and soil quality information.

All locations have three tillage treatments, including:

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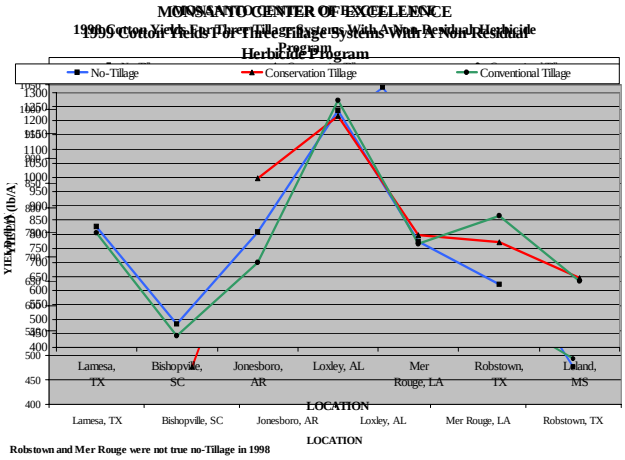
1. No-till, cotton planted with no-tillage since the harvest of the previous crop, no in-season cultivation
2. Conservation tillage or con-till, planted into minimum tilled, re-worked in fall or early spring, no in-season cultivation
3. Conventional tillage, totally plowed, ripped, re-bedded and prepared at planting, mechanically cultivated three times during growing season

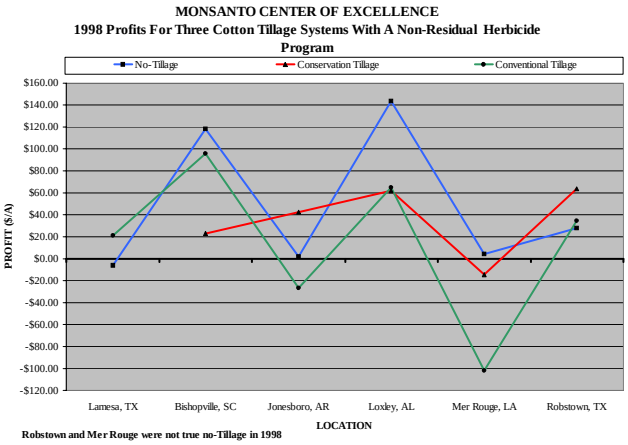
All locations have three basic herbicide systems treatments applied to each tillage treatment, including:

1. Roundup Ultra only, burndown, overtop (before 5 leaf), post direct/hoods, lay-by if needed
2. Roundup Ultra with one pre-emergence, burndown, pre-emergence (Prowl), overtop (before 5 leaf) and post direct/hoods
3. Roundup Ultra with full pre-emergence residual, pre-emergence residuals, early post direct residuals, lay-by residuals

The results below are from locations reporting two years of the study; first year (1999) COE's are not included.



Robstown and Mer Rouge were not true no-Tillage in 1998



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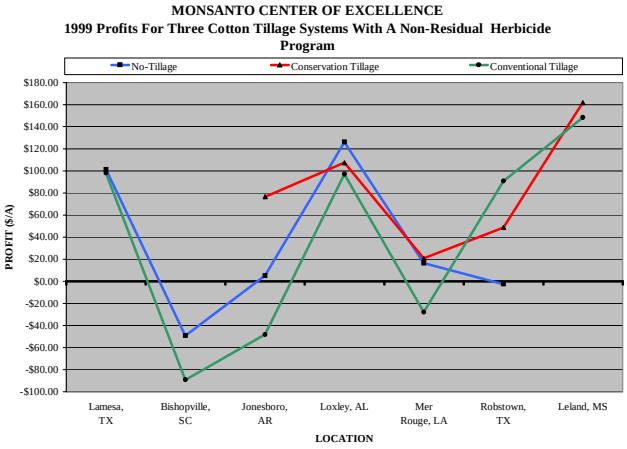
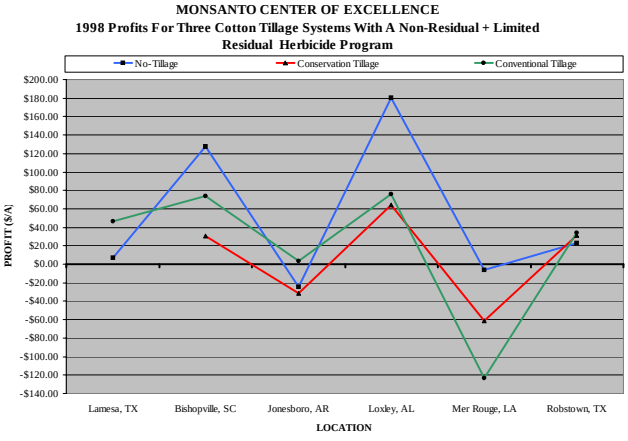
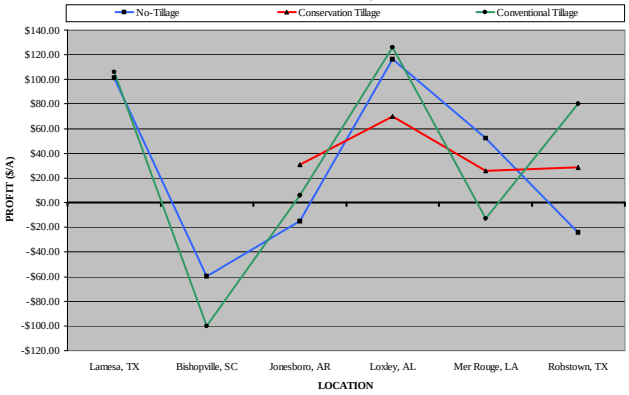
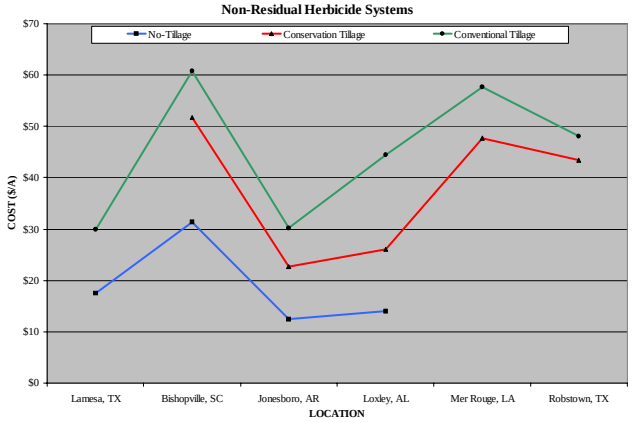




MONSANTO CENTER OF EXCELLENCE
1999 Profits For Three Cotton Tillage Systems With A Non-Residual + Limited Residual Herbicide Program



MONSANTO CENTERS OF EXCELLENCE
1998 Tillage Plus Herbicide Application Cost for Three Tillage Systems Non-Residual Herbicide Systems



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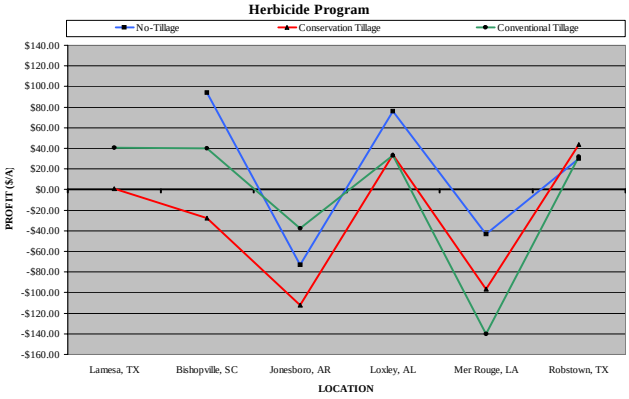
1998 Profits For Three Cotton Tillage Systems With A Non-Residual + Residual Herbicide Program



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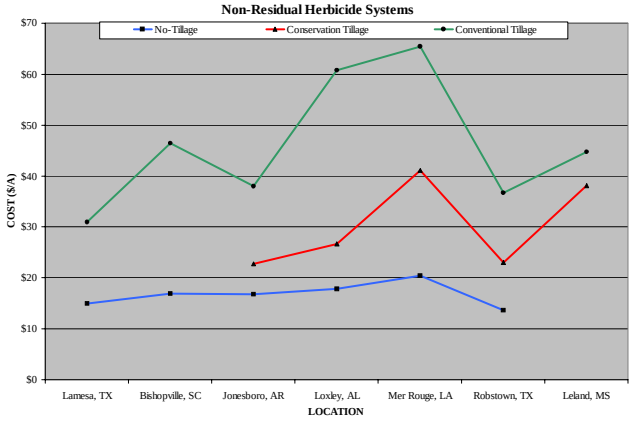

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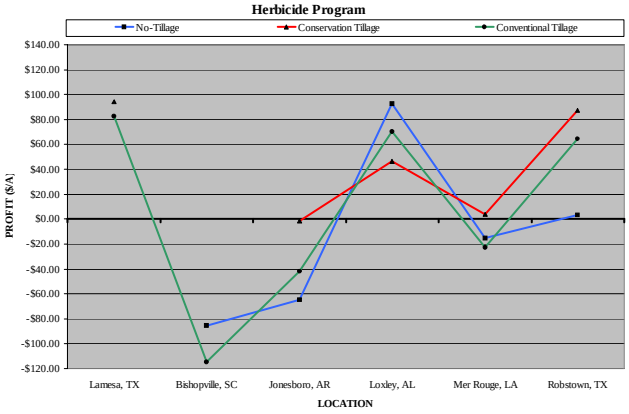

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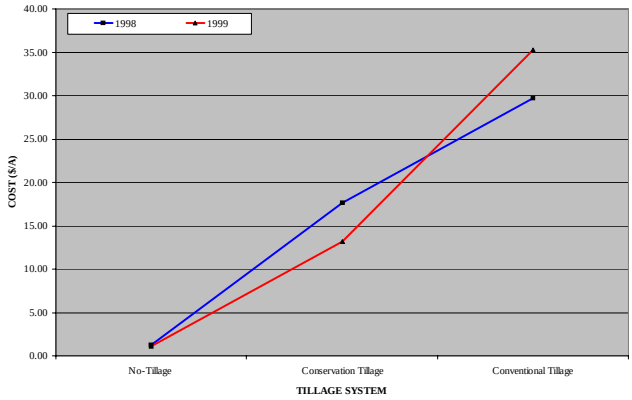
AVERAGE TILLAGE COST FOR THREE TILLAGE SYSTEMS



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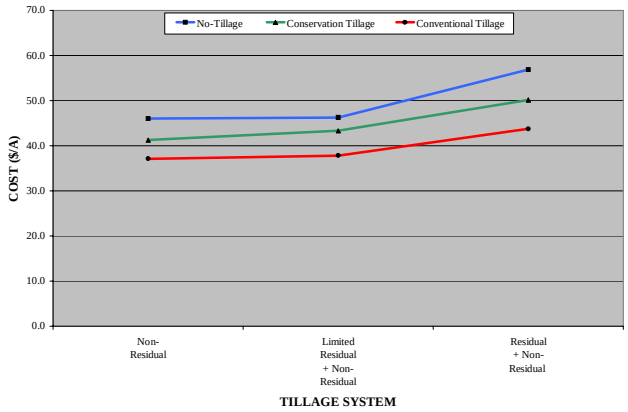
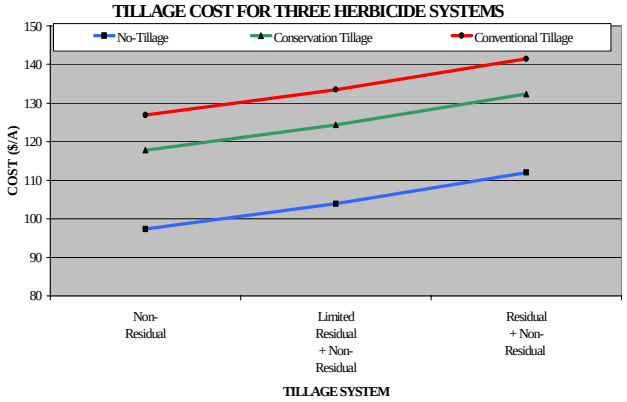
1998 AVERAGE HERBICIDE COST FOR THREE HERBICIDE SYSTEMS



MONSANTO CENTER OF EXCELLENCE
1998 AVERAGE HERBICIDE, HERBICIDE APPLICATION, AND TILLAGE COST FOR THREE HERBICIDE SYSTEMS



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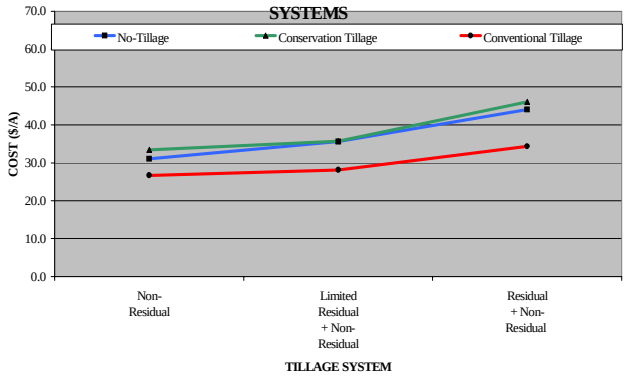

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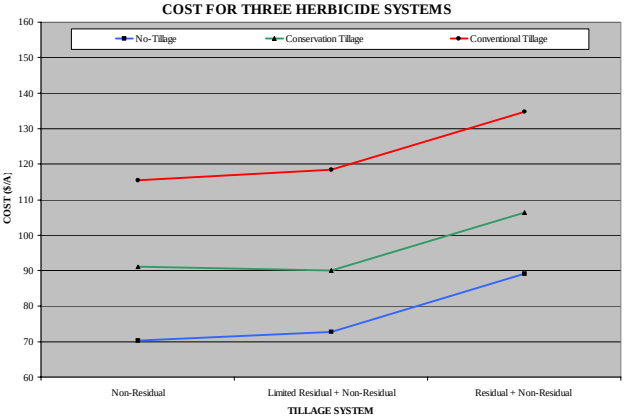

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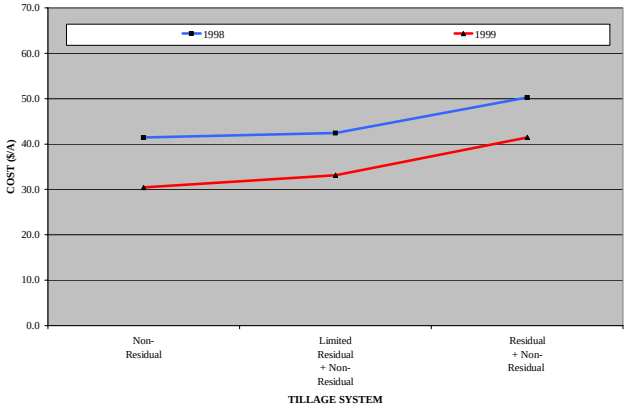
AVERAGE HERBICIDE COST ACROSS THREE HERBICIDE SYSTEMS



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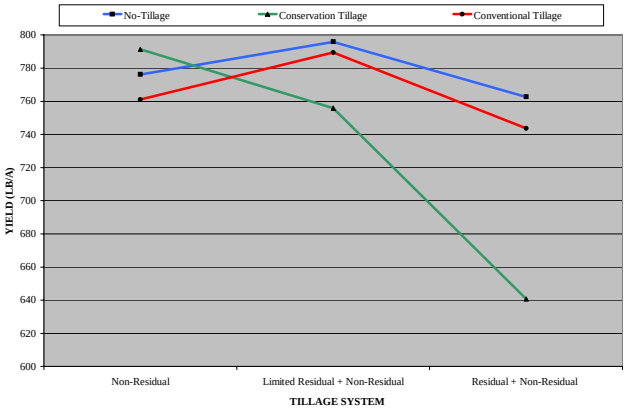
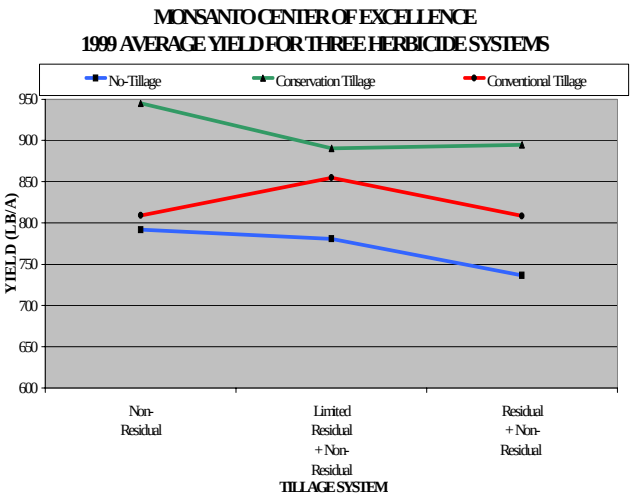
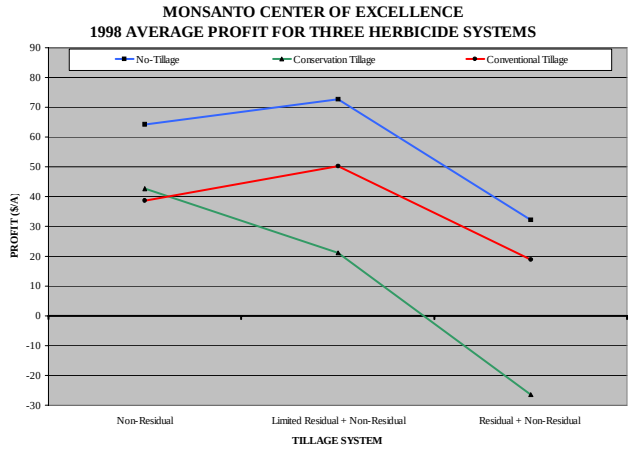
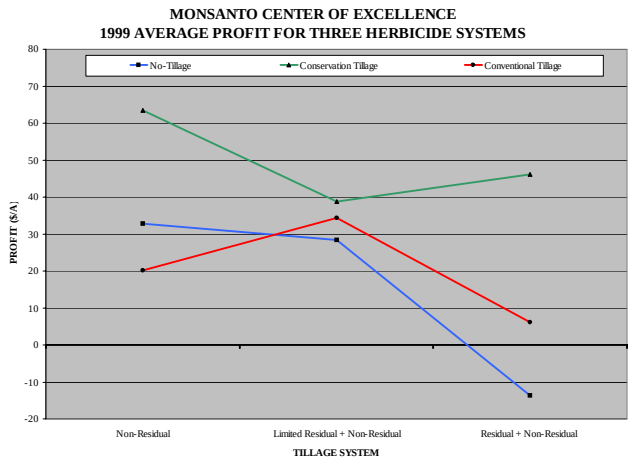
1998 AVERAGE YIELD FOR THREE HERBICIDE SYSTEMS

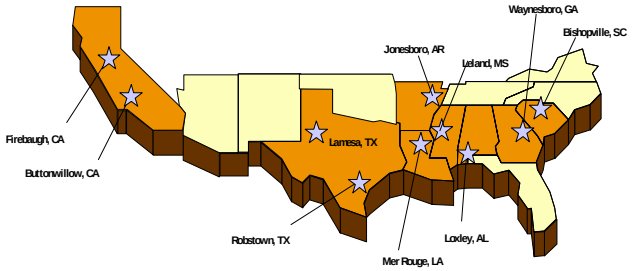








Centers of Excellence Locations



SITES AND COOPERATORS

LOCATION	FARMER COOPERATOR	CONSULTANT DATA COLLECTION
Lamesa, TX	Ag Cares Farm	Dr. Wayne Keeling Texas A & M - Lubbock
Bishopville, SC	E. B. (Buddy) Stuckey	Randy Cubbage Clemson Extension
Jonesboro, AR	Kevin Hoke	Scott May Consultant
Loxley, AL	Monsanto Agronomy Center	Kevin Atwell Agronomic Research Mgr.
Mer Rouge, LA	Dan & Barry Turner	Steve Crawford Consultant
Robstown, TX	Jimmy Dobson	Harvey Buehrig Shane Browning Texas A & M Extension

Material and Methods

Fields were selected based on uniformity with regard to topography, soil type, drainage, fertility, and representation of the general area. Field sizes ranged from 30 acres to 240 acres. The experimental design was a replicated (3) strip/split plot design. Plot/treatment size were a minimum of one complete round or pass using farmer size equipment common to the area. Each location and all treatments were planted with an adapted Roundup Ready - Bollgard variety on the same day. All treatments received the same quantity of seed, fertilizer, insecticides, fungicides, growth regulators, and management. All treatments were applied in a timely manner as soil and weather conditions allowed. All analyses of time, fuel, labor, equipment, irrigation, etc. were conducted using actual costs of inputs by the grower.

Harvest was performed by grower's pickers (2 or 4 row) and raw cotton yields were weighed and recorded. Lint yields were obtained from gin turnout. Extension agent/specialists or consultants collected and recorded all data.

Results

The results of two years of on-farm demonstrations are broken by year (1998 & 1999), herbicide cost, yield, tillage

cost and overall profit (profit defined as the amount of dollars remaining after all expenses have been subtracted from the gross price of sold cotton). Expenses are all seed, tech fees, fertilizer and lime, land rent, operation (including tillage & application of pesticides and growth regulators, harvest, and ginning). All income and expenses are actual, as reported by cooperating growers. Income and expenses vary from location to location.

Herbicide systems cost across COE sites in 1998: The non-residual system, plus a limited residual was $0.90/A more expensive than an non-residual herbicide system. The non-residual system plus residuals was $8.60/A more expensive than a non-residual herbicide system. In 1999, the non-residual plus a limited residual was $2.90/A more than a non-residual herbicide system. The non-residual system plus a residuals was $9.90/A more expensive than a non-residual herbicide system.

The average yields across COE locations in 1998: Averaged across herbicide systems no-till had a 49 LB/A higher yield than conservation tillage. When averaged across herbicide treatments, no-till had a 14 LB/A higher yield than conventional tillage, and when averaged across herbicide treatments, conventional tillage had a 35 LB/A higher yield than conservation tillage. In 1999, averaged across herbicide treatments, conservation tillage had a 140 LB/A higher yield than no-till. Averaged across herbicide treatments, conservation tillage had an 86 LB/acre higher yield than conventional tillage. Averaged across herbicide treatments, conventional tillage had a 54 LB/A higher yield than no-till.

When cost of tillage, herbicide systems, and application costs across COE's were considered, the following results were obtained: In 1998, across all three tillage systems, the non-residual system had the lowest cost, followed by the limited residual and full residual. Conservation tillage was $20.39/A more expensive than the no-till system. Conventional tillage was $29.50/A more expensive than the no-till system. In 1999, the non-residual had the lowest cost, followed by the limited residual and full residual. Conservation tillage was $20.68/A more expensive than the no-till system and conventional tillage was $45.08/A more expensive than the no-till system.

In 1998, the average profit across COE locations was as follows: Averaged across herbicide treatments no-till had a $44.00/A higher profit than conservation tillage. Across tillage treatments, conventional tillage had a $23.00/A higher profit than the conservation tillage and the no-till had a $21.00/A higher profit than conventional tillage. In 1999, the average profits across COE locations are as follows: Averaged across herbicide treatments, conservation tillage had a $33.00/A higher profit than no-till. Conservation tillage had a $29.00/A higher profit than conventional tillage and conventional tillage had a $13.00/A higher profit than no-till.

No government payment or programs were considered in determining profit or loss.

No-till and conservation tillage along with non-residual herbicide systems are viable cropping systems that lower production costs, increase profits, and reduce labor (time) involved in operations.

References

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