

COST COMPARISON OF TILLAGE SYSTEMS IN SOUTHERN ALABAMA

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Abstract

In 1998 the Monsanto Loxley Agronomy Center initiated a long term study to research conservation tillage cotton practices, as a part of Dr. John Bradley's beltwide Center of Excellence Study. This study was designed to assess agronomic systems with regard to production costs, yield, and biotechnology. Three tillage systems were compared: no-till, strip till, and conventional tillage. Each of these comparisons contained three weed control systems: Roundup Ultra alone, Roundup Ultra with a DNA pre-emergence, and a local standard treatment.

Production input records were kept by the study director. Input costs were recorded including seed, land rent, chemical, fertilizer and operational. Yields were collected on all plots to compare profit/loss.

Slight differences in weed control occurred by the third year, as perennial grasses became a problem in the conventional tillage/local standard herbicide treatment. A gramminicide was needed to overcome this weed shift.

Highest production costs occurred in the conventional tillage system primarily due to higher production costs, regardless of the herbicide treatment used. The lowest production cost occurred in the no-tillage/non-residual system.

Introduction

As prices and yield remain flat, growers and researchers look for ways to optimize profit. Having no control over production costs such as seed, fertilizer, chemicals, fuel, labor, parts and equipment, reducing these inputs through less tillage could be the most viable way of increasing profit.

Barriers to the adoption of reduced tillage systems include perceived lower yield, possible increase in herbicide costs, lack of equipment, compaction concerns, and lack of expertise. This study is designed to address these barriers at the local level using large scale demonstration plots.

Materials and Methods

Beginning in 1998, a long term cotton study was initiated at the Monsanto Agronomy Center in Loxley, Alabama. The experimental design was a replicated strip/split plot design. Three replications were used, and plot length was 300 ft. Each tillage treatment contained 48 rows, with each herbicide treatment within the tillage treatment having

16 rows. Row width was 38 inches. All treatments received the same quantity of seed, fertilizer, insecticide, growth regulator, and management. Data from all three years, 1998, 1999 and 2000 were included.

The three tillage treatments included:

1. No-till, with no tillage since fall of 1997 and no in season cultivation.
2. Strip-till, with a four row Brown Harden unit and no in season cultivation.
3. Conventional tillage, disk harrowed, field cultivated, ripper-hipped and prepared prior to planting, and mechanically cultivated three times during the growing season.

The three herbicide systems treatments applied to each tillage treatment included:

1. Non residual, with Roundup Ultra only, over the top prior to 5th leaf, post direct and lay by if needed. Layby was not utilized in 1999.
2. Limited residual, with Prowl pre-emergence, Roundup Ultra over the top prior to 5th leaf, and post directed.
3. Residual, with Prowl + Cotoran pre-emergence, early post-direct Cotoran + MSMA, lay by Diuron + MSMA.

Yields were taken by harvesting the center 2 rows for one complete pass, and seed cotton was weighed and recorded. Lint yields were then obtained by gin turnout.

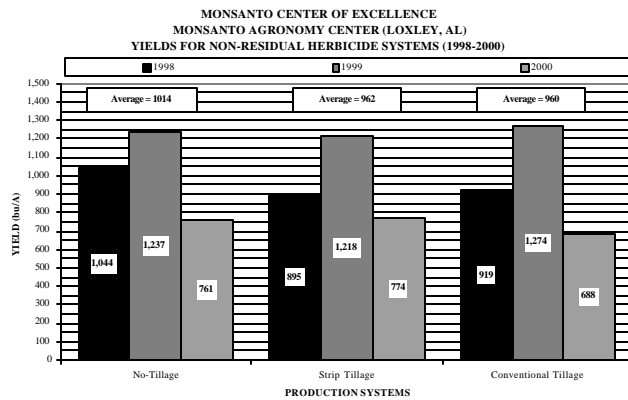
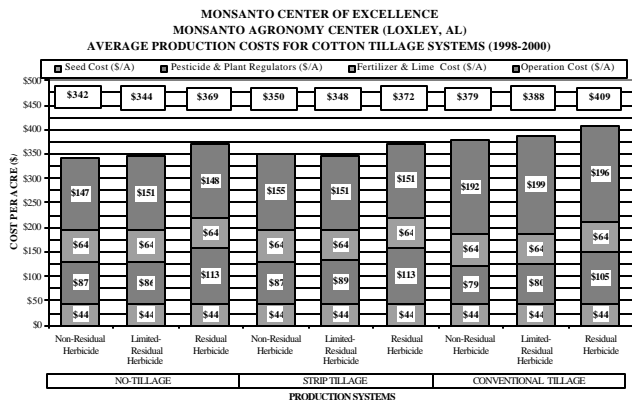
Inputs of time, fuel, labor, equipment, irrigation, etc. were compiled from actual grower records. Data was analyzed by Robert Buman of Agren, Inc. Interest on loans, irrigation and land rent/payments were not considered in making these calculations.

Results

The results of the three years of on farm demonstrations are broken down by year, herbicide cost, yield, tillage cost and overall profit. Profit was defined as the amount of dollars remaining after all expenses were subtracted from the gross price of sold cotton. Expenses are seed, tech fees, fertilizer and lime, and operations (including tillage and application of pesticides and growth regulators, harvest, and ginning).

Production Cost

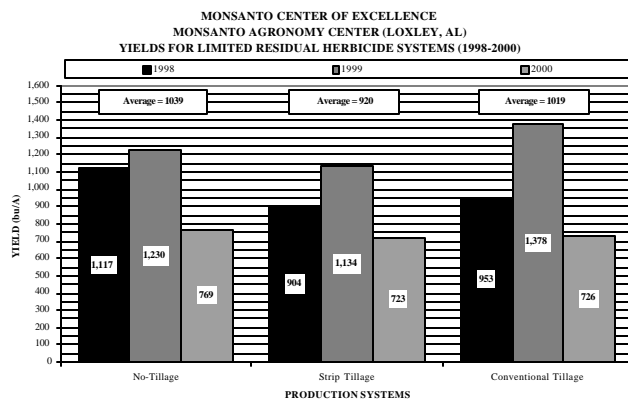
The production costs for cotton were averaged across 1998, 1999, and 2000. Averaged across years, the no-tillage/ non-residual herbicide system had the lowest average production costs (\$342 / A) of all the systems. The no-tillage/limited residual herbicide (\$344 / A) and the strip tillage/limited residual herbicide (\$348 / A) systems had the next lowest average production cost. The strip tillage/non-residual herbicide (\$350 / A), no-tillage/residual (\$369 / A), and strip tillage/residual (\$372 / A) systems had the next lowest average production cost. The conventional tillage/non-residual herbicide (\$379 / A), conventional tillage/limited residual (\$388 / A), and conventional tillage/ residual (\$409 / A) systems had the next lowest average production cost.



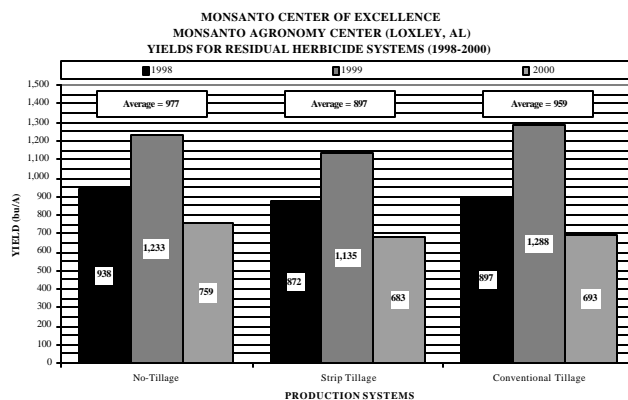
Yields

Non-Residual Herbicide System. The no-tillage system had the highest yield (1044 lb/A) in 1998 followed by the conventional tillage (919 lb/A) and the strip tillage (895 lb/A) systems. The conventional tillage system had the highest yield (1274 lb/A) in 1999 followed by the no-tillage (1237 lb/A) and the strip tillage (1218 lb/A) systems. The strip tillage system had the highest yield (774 lb/A) in 2000 followed by the no-tillage (761 lb/A) and the conventional tillage (688 lb/A) systems. The no-tillage system had the highest average yield (1014 lb/A) in the three-year period followed by the strip tillage (962 lb/A) and the conventional tillage (960 lb/A) systems.

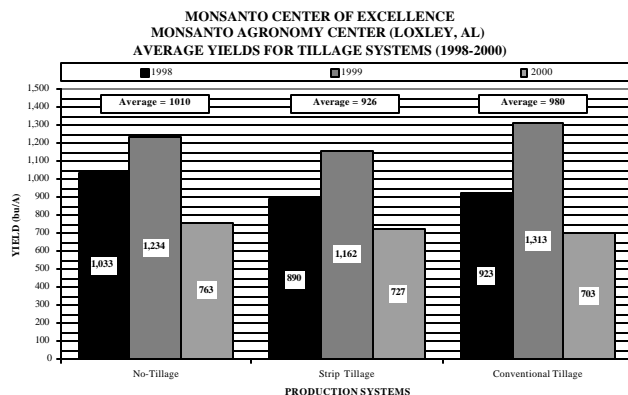
Limited Residual Herbicide System. The no-tillage system had the highest yield (1117 lb/A) in 1998 followed by the conventional tillage (953 lb/A) and the strip tillage (904 lb/A) systems. The conventional tillage system had the highest yield (1378 lb/A) in 1999 followed by the no-tillage (1230 lb/A) and the strip tillage (1134 lb/A) systems. The no-tillage system had the highest yield (769 lb/A) in 2000 followed by the conventional tillage (726 lb/A) and the strip tillage (723 lb/A) systems. The no-tillage system had the highest average yield (1039 lb/A) in the three-year period followed by the conventional tillage (1019 lb/A) and the strip tillage (920 lb/A) systems.



Residual Herbicide System. The no-tillage system had the highest yield (938 lb/A) in 1998 followed by the conventional tillage (897 lb/A) and the strip tillage (872 lb/A) systems. The conventional tillage system had the highest yield (1288 lb/A) in 1999 followed by the no-tillage (1233 lb/A) and the strip tillage (1135 lb/A) systems. The no-tillage system had the highest yield (759 lb/A) in 2000 followed by the conventional tillage (693 lb/A) and the strip tillage (683 lb/A) systems. The no-tillage system had the highest average yield (977 lb/A) in the three-year period followed by the conventional tillage (959 lb/A) and the strip tillage (897 lb/A) systems.



Yields Averaged Across Herbicide Systems. The no-tillage system had the highest yield (1033 lb/A) in 1998 followed by the conventional tillage (923 lb/A) and the strip tillage (890 lb/A) systems. The conventional tillage system had the highest yield (1313 lb/A) in 1999 followed by the no-tillage (1234 lb/A) and the strip tillage (1162 lb/A) systems. The no-tillage system had the highest yield (763 lb/A) in 2000 followed by the strip tillage (727 lb/A) and the conventional tillage (703 lb/A) systems. The no-tillage system had the highest average yield (1010 lb/A) in the three-year period followed by the conventional tillage (980 lb/A) and the strip tillage (926 lb/A) systems.



Profit

To calculate profit, the standard lint price was set at \$0.67 / lb.

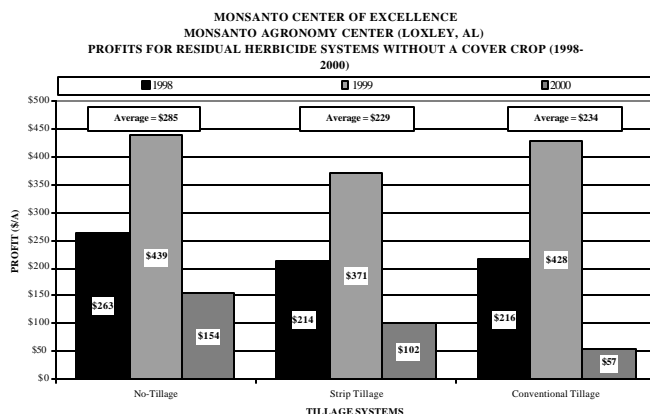
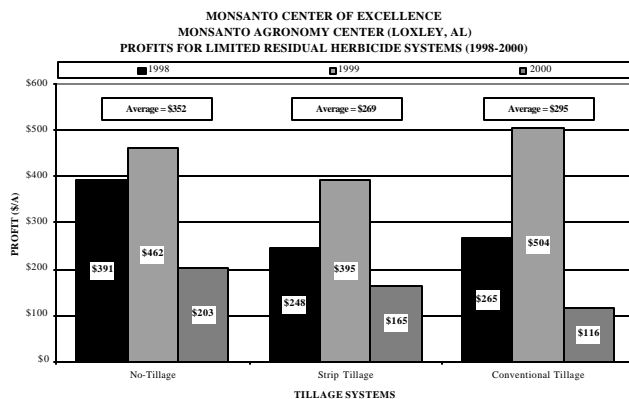
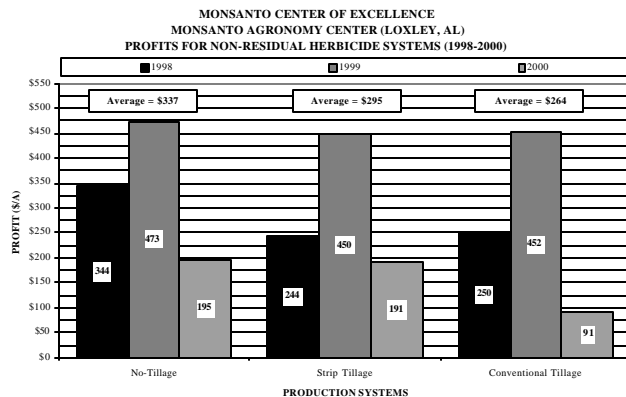
Non-Residual Herbicide System. The no-tillage system had the highest profit (\$344/A) in 1998 followed by the conventional tillage (\$250/A) and the strip tillage (\$244/A) systems. The no-tillage system had the highest profit (\$473/A) in 1999 followed by the conventional tillage (\$452/A) and the strip tillage (\$450/A) systems. The no-tillage system had the highest profit (\$195/A) in 2000 followed by the strip tillage (\$191/A) and the conventional tillage (\$91/A) systems. The no-tillage system had the highest average profit (\$337/A) in the three-year period followed by the strip tillage (\$295/A) and the conventional tillage (\$264/A) systems.

Limited Residual Herbicide System. The no-tillage system had the highest profit (\$391/A) in 1998 followed by the conventional tillage (\$216/A) and the strip tillage (\$248/A) systems. The conventional tillage system had the highest profit (\$504/A) in 1999 followed by the no-tillage (\$462/A) and the strip tillage (\$395/A) systems. The no-tillage system had the highest profit (\$203/A) in 2000 followed by the strip tillage (\$165/A) and the conventional tillage (\$116/A) systems. The no-tillage system had the highest average profit (\$352/A) in the three-year period followed by the conventional tillage (\$295/A) and the strip tillage (\$269/A) systems.

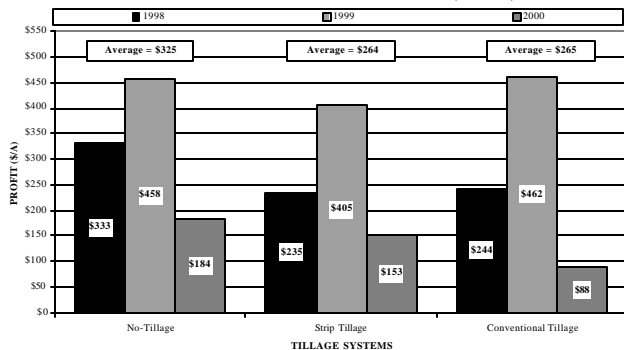
Residual Herbicide System. The no-tillage system had the highest profit (\$263/A) in 1998 followed by the conventional tillage (\$216/A) and the strip tillage (\$214/A) systems. The no-tillage system had the highest profit (\$439/A) in 1999 followed by the conventional tillage (\$428/A) and the strip tillage (\$371/A) systems. The no-tillage system had the highest profit (\$184/A) in 2000 followed by the strip tillage (\$153/A) and the conventional tillage (\$88/A) systems. The no-tillage system had the highest average profit (\$325/A) in the three-year period followed by the conventional tillage (\$265/A) and the strip tillage (\$229/A) systems.

Profits Averaged Across Herbicide Systems. The no-tillage system had the highest profit (\$333/A) in 1998 followed by the conventional tillage (\$244/A) and strip tillage (\$235/A) systems. The conventional tillage system had the highest profit (\$462/A) in 1999 followed by the no-tillage (\$458/A) and the strip tillage (\$405/A) systems. The no-tillage system had the highest profit (\$184/A) in 2000 followed by the strip tillage (\$153/A) and the conventional tillage (\$88/A) systems. The no-tillage system had the highest average profit (\$325/A) in the three-year period followed by the conventional tillage (\$265/A) and the strip tillage (\$229/A) systems.

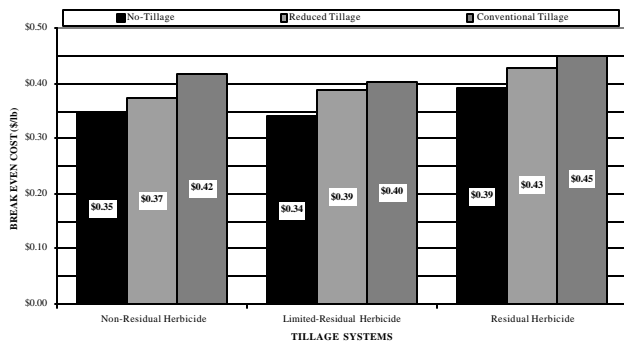
Break-Even Cost. The break-even cost is the price per pound of lint needed to pay all the expenses. The break-even price ranged from \$0.34 - \$0.45 per pound of lint. The average break-even price for the no-tillage systems was the lowest (\$0.36/lb) followed by the strip tillage (\$0.40/lb) and the conventional tillage (\$0.42/lb) systems. The average break-even price for the non-residual and limited residual herbicide systems was the lowest at \$0.38/lb followed by the residual herbicide system at \$0.42/lb.



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AVERAGE PROFITS FOR COTTON TILLAGE SYSTEMS (1998-2000)



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BREAK EVEN COST FOR COTTON TILLAGE/HERBICIDE SYSTEMS (1998-2000)



Summary

There were no significant differences in yield within years between production systems. Greatest expense came from field operations followed by herbicide systems. The no-tillage/non-residual system had the lowest average production costs (\$342/acre) of all the systems. The average break even price for the no-tillage systems was the lowest (\$0.36/lb) followed by the strip tillage (\$0.40) and the conventional tillage (\$0.42) systems. The average break even price for the non-residual and limited residual herbicide systems was the lowest at \$0.38/lb followed by the residual herbicide system at \$0.42/lb.

References

Bradley, J. F. 2000. Economic Comparisons of Conservation Tillage Systems Across the Belt, AL, AR, CA, GA, LA, MS, SC, & TX. 2000 Proceedings Beltwide Cotton Conferences.