**AN ECONOMIC ANALYSIS OF COTTON CROP
ROTATIONS IN NORTHEAST LOUISIANA
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Abstract

Ten years of experiment station crop rotation data were used to estimate crop yields and profitability for six cotton rotations. One rotation was found to be more profitable and two were of similar profitability as continuous cotton at the specified crop prices.

Introduction

The continuous year-to-year planting of a single commodity has been the primary cropping system used by farmers in Louisiana's Mississippi River delta region during most of this century. The provisions of the 1996 Farm Bill replaced a farm program payment system that was based on a farm's current crop and production history. Under the new provisions, farm program payments are no longer tied to current production, allowing flexibility in the crop selection decision.

Recent trends in cotton, corn and soybean acres in Louisiana show farmers' interest in profiting from alternative cropping strategies. Cotton acreage in Louisiana prior to the 1996 Farm Bill had increased from 879 thousand to 1.1 million acres. By 1999, however, cotton acreage had decreased to 576 thousand acres, a decline of almost 49 percent from the peak in 1995. During this same time period, corn and soybean acreage increased 53 and 23 percent respectively. This pronounced shift in production suggests farmers are becoming more responsive to market forces when making planting decisions. Given the increased interest in diversification through crop rotation, it is important to understand the production cost and yield effects of the annual crop selection decision. This article investigates the nature of production costs and returns for six cotton crop rotations in northeast Louisiana.

Discussion

Ten years of crop rotation data from the Louisiana State University Agricultural Center Northeast Research Station was used in this analysis. The research station is located in

the Mississippi River alluvial flood plain in Tensas Parish approximately 5 miles north of St. Joseph, Louisiana. The crop rotations examined include:

- Continuous Cotton
- Cotton-Corn
- Cotton-Soybean
- Cotton-Corn-Soybean
- Cotton-Cotton-Soybean
- Cotton-Cotton-Corn

Because of space limitations, individual crops in each rotation, with the exception of continuous cotton, were only planted in alternate years. For example, the cotton-corn rotation was not planted simultaneously with the corn-cotton rotation and simple means of each crop's yields were inadequate to determine the effect of the rotations on crop yield within each rotation. The missing years' crop yields were estimated using linear regression. The estimated crop yields are shown in Table 1. In all cases for all crops, the crop rotations resulted in higher crop yields than continuous cropping.

Increased crop yields are of importance to crop rotation selection but economic analysis is required to determine the most profitable rotation . To compare the profitability of the alternative rotations, the concept of a rotation acre is used. The rotation acre assumes each crop in the rotation sequence is produced in equal proportion each year or alternatively, each acre could be thought of as being composed of an equal proportion of each crop in the rotation. This allows the direct comparison of alternative rotations among single, two, and three year systems.

Production cost estimates were developed for each crop using the 1999 Louisiana Agricultural Experiment Station enterprise budgets for northeast Louisiana (Posey and Bechtel 1999). Primary cost savings in each rotation were the result of reduced nitrogen requirements for cotton following either corn or soybeans. Cost savings from pest management were more difficult to measure. Given this measurement difficulty, the cost calculations were based solely on the savings from reduced nitrogen application. Nitrogen fertilizer applications were reduced by 25 pounds N per acre for cotton following soybeans and 20 pounds per acre following corn.

Expected gross revenues for each rotation acre were calculated using the following prices:

- Cotton $0.524 per pound
- Soybeans $5.32   per bushel
- Corn $2.00   per bushel

Gross revenues and net returns over direct costs per rotation acre are shown in Table 2. Under the base price scenario, the

rotation having the highest return over direct costs was the cotton-cotton-soybean rotation at $294.58 per rotation acre. The returns to continuous cotton, cotton-cotton-corn, and cotton-soybean rotations were similar at $244.89, $243.31, and $237.88 per rotation acre respectively. This ranking is sensitive to the price relationships among the three commodities and an increase in the price of one or two commodities could change the relative profitability of each rotation.

Summary

Ten years of crop rotation data from Louisiana State University Agricultural Center Northeast Research Station were used to estimate mean rotation yields, gross revenues, and returns over direct production costs for six different crop rotations that included cotton. In all cases the rotations increased the yields of the included crops. Using the base crop price scenario and mean rotation yields, the cotton-cotton-soybean rotation provided the highest return over direct production costs. The cotton-cotton-corn and cotton-soybean rotations provided returns similar to continuous cotton production. The rotation profitability ranking is sensitive to the relative market prices of all three crops. A decision tool is being developed to assist producers in the crop rotation selection decision.

References

Posey, Fred R. and Amos I. Bechtel. "Projected Costs and Returns - Cotton, Soybeans, Corn, Milo and Wheat, Northeast Louisiana, 1999." A.E.A. Information Series No. 172. Department of Agricultural Economics and Agribusiness, Louisiana Agricultural Experiment Station, LSU Agricultural Center, Baton Rouge, January 1999.

Table 1. Crop Yields Under Alternative Rotations, Northeast Research Station.

	Crop yields		
Rotation	Cotton (lbs/ac)	Soybean (bu/ac)	Corn (bu/ac)
Continuous cotton	1169	na	na
Continuous corn	na	na	128
Continuous soybeans	na	44	na
Cotton-corn	1258	na	149
Cotton-soybean	1202	52	na
Cotton-corn-soybean	1311	54	154
Cotton-cotton-soybean (1)	1310	55	na
Cotton-cotton-corn (1)	1287	na	147

1. Cotton yields are the means of both years of cotton production in the three year rotations

Table 2. Production Costs and Returns per Rotation Acre for Alternative Rotations, Northeast Research Station.

Rotation	Direct costs ($/acre)	Gross revenue ($/acre)	Return over direct costs ($/acre)
Continuous cotton	452.41	697.30	244.89
Continuous corn	198.93	255.10	56.17
Continuous soybeans	73.39	235.57	162.18
Cotton-corn	323.47	523.95	200.48
Cotton-soybean	260.14	498.01	237.88
Cotton-corn-soybean	239.73	459.74	220.01
Cotton-cotton-soybean	324.23	618.81	294.58
Cotton-cotton-corn	366.45	609.76	243.31