WHOLE FARM PROFITABILITY AS IMPACTED BY TILLAGE, COTTON-CORN ROTATION, AND ACREAGE MIX

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ABSTRACT

Six reduced tillage systems in 30-inch rows were evaluated in continuous cotton and a cotton-corn rotation to determine their yield, production cost, net returns, and crop (cotton/corn) acreage mix effect on whole farm net returns for a simulated 8-row Northeast Mississippi farm and a 12-row Mississippi Delta farm. Yield, gross returns, and total production cost (did not include land, management, and general farm overhead cost) for ridge-till followed by (Fb) a row conditioner at planting, fall terratill-bed-roller, and conventional tillage (fall disk + chisel + bed Fb spring field cultivator + bed Fb a row conditioner at planting and 2 cultivations during the growing season) systems were similar. These treatments had lower yield, gross returns and total production cost than the four fall stale seedbed tillage systems (disk + bed-roller, disk + terratill-bed-roller, coulter-chisel-harrow + terratill-bed-roller, and terratill-bed-roller) Fb a row conditioner at planting. However, net returns were not affected by tillage systems. Whole farm analysis indicated the 12-row system with an additional 600 acres of cropland (total 1800 acres) for a Delta farm resulted in $39/A lower total production cost and $40/A greater net return than the 8-row system 1200 acre Northeast farm. Rotation provided greater whole farm net returns than monocropped cotton and corn acreage mixes. All reduced tillage systems in a cotton-corn annual rotation provided greater whole farm net returns than conventional tillage. Ridge-till and the fall disk + terratill-bed-roller systems in a 50% cotton-corn annual rotation provided the highest whole farm net returns and were 40 and 28% greater than conventional tillage for the Mississippi Northeast and Delta farms, respectively.

SUMMARY

A reduced tillage study was conducted on a Marietta silt loam soil for four consecutive years (1999-2002) to evaluate the effect corn rotation in combination with reduced tillage systems had on 1) cotton lint yield; 2) cost and returns; and 3) the appropriate cotton and corn acreage mix for maximum whole farm net return. Reduced tillage systems were evaluated in continuous cotton, and cotton following ridge-till corn in a rotation. The corn production system across all cotton tillage systems was planted no-till with one ridge-till cultivation during the growing season. A continuous ridge-till corn system was also included in the study.

The seed cotton from each cotton plot was ginned with a mini-gin to determine the percent gin turnout and lint yield. The mini-gin was a state of the art small scale cotton gin equivalent to a commercial gin. Treatment gross returns were based on gin turnout, lint yield, and the 2001 USDA National Commodity Credit Corporation base loan price of 52.91¢/lb with adjustments for treatment fiber quality (staple length, grade, micronaire, fiber color, strength, and uniformity), as determined by high volume instrumentation (HVI) analysis. The cottonseed gross return was derived from the lint yield/A x 1.54 (cottonseed yield to lint yield ratio) x $0.05/lb (cottonseed price). Corn gross

returns were based on treatment yield and the 2001 National Commodity Credit Corporation state loan rate of $1.99/bu.

Eight-row and 12-row equipment complement budgets for each tillage system also were used to simulate a Northeast Mississippi (1200 acres) and a Mississippi Delta (1800 acres) farm for a whole farm maximum net return analysis, respectively. The Mississippi State University Agricultural Economics Department Budget Generator was used to develop annual and 3-yr (2000-2002) average cost and return budgets for each ridge-till corn and cotton tillage system. The cost and return budgets were based on yield, gross returns, inputs used, and operations performed on each treatment. These data were used to determine the appropriate tillage system and cotton-corn acreage mix for maximum whole farm net returns. The net returns were above the total operating and capital recovery costs. The annual recovery cost was determined by using the manufacturer retail equipment purchase price minus 10%, a 5% annual interest rate, and the useful life of the equipment (Mississippi State University Agricultural Economics Department, December 2002). The useful life did not account for any extended life for reduced tillage systems. The estimated annual equipment capital recovery cost required over time would need to be covered in the long run in order to maintain the complement of equipment.

The designated harvesting capacity for the Northeast farm was 800 acres for each crop and 1200 acres of each crop for the Delta farm. If the specified acreage of a crop was less than its capacity (800 or 1200 acres), it was assumed that the excess capacity was used to custom harvest a neighboring farm, and thus generate some additional net revenue. Treatment means of all data except capital recovery and whole farm net returns were separated using Fisher's Protected Least Significant Difference (LSD) at the 5% significance level.

Costs and returns were affected by equipment size and tillage system. The 12-row system (averaged over tillage system, rotation, and years) showed 8% ($39/A) lower total production cost and 46% ($40/A) greater net returns than the 8-row system. Conventional tillage and ridge-till had similar total cost and were $11 to $32/A less than all other tillage systems. However, lint yield for these treatments was also 55 to 77 lb/A lower than all other systems. This resulted in no difference in net returns for all tillage systems. Rotation interacted with year for lint yield, gross return, total production cost and net returns above total production cost. Although 2003 was the only year rotation had greater lint yield, gross return, total production cost and net returns, the 3-yr average rotation increased lint yield by 100 lb/A and net returns by $57/A.

The annual capital recovery charge ranged from $86,000 to $91,600 for the Northeast farm and $105,300 to $111,800 for the Delta farm. Conventional tillage had the highest cost while ridge-till had the lowest annual recovery cost. Whole farm net returns were maximized with 50% corn acreage and 50% cotton acreage in an annual rotation. This was related to the rotation influence of 100 lb/A lint and 14 bu/A corn yield increase. All reduced tillage systems, except ridge-till, showed greater whole farm net returns than conventional tillage in all monocropped cotton and corn acreage mixes. In the annual cotton-corn rotation, all reduced tillage systems had higher net returns than conventional tillage. In the 50% cotton-corn annual rotation, the ridge-till and fall disk + terratill-bed-roller showed the highest whole farm net returns and were at least 40 and 28% greater than conventional tillage for the Northeast and Delta farms, respectively.