ECONOMIC COMPARISON OF FOUR WINTER COVERS FOR NO-TILL COTTON CROPPING ROTATIONS UNDER RISK

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SUMMARY

Cotton producers are continually searching for ways to increase the profitability of their farm enterprise. Two potential strategies include adjustments to cropping rotations and the use of winter cover crops. Previous research indicates that alternating the sequence of crop rotations may increase cotton yields. Likewise, winter cover crops can substitute for nitrogen fertilizer and help conserve soil. While data on net returns is commonly reported among crop rotation research findings, few studies assess the relative risk exposure. Information on how winter cover systems may interact with different cotton crop rotations and also influence both net returns and economics risks is indeed even more limited. The objective of this research was to assess the relative profitability and risk exposure of five cotton crop rotations under four alternative winter cover systems.

The ranking of cotton crop rotations and winter cover systems by expected net return and risk depends on producers' risk preferences. Risk neutral producers will select the crop rotation and winter cover system that maximizes net returns relative to other options, even if a possibility for low or negative net return outcomes exists. By contrast, risk averse producers will select a crop rotation and winter cover system that provides a utility-maximizing tradeoff between net returns and risk of low or negative returns. Due to a lack of information about the risk preferences of Tennessee cotton producers, alternative crop rotations and winter cover systems were ranked using stochastic dominance efficiency criteria. First degree stochastic dominance (FSD) ranks alternatives by assuming producers are risk neutral. Second degree stochastic (SSD) ranks alternatives by assuming producers are risk averse.

Data are from a 2002 to 2009 no-till crop rotation and winter cover experiment in Milan, TN. Main plots consisted of thirteen 4-yr crop rotation sequences for cotton, corn, and soybeans. Subplots consisted of four winter cover systems including hairy vetch, winter wheat, poultry litter, and fallow. In this analysis, we consider only those rotations with cotton planted in two or more years of a single 4-yr rotation. The rotations considered included continuous cotton, cotton-soybeans-cotton-corn, cotton-corn-cotton-soybeans, cotton-soybeans-corn-cotton, and cotton-corn-cotton-corn. All plots were established according to The University of Tennessee Extension crop production guidelines. Budgets were constructed for crop production and the establishment and burndown of winter cover systems. Fertilizer credits were assigned to each winter cover system based on the amount of soil available N, P, and K provided. The economic value assigned to the fertilizer credits equaled the level of cost savings provided. Finally, yield and production cost data were combined to determine net returns for each row crop and winter cover combination in each year of the experiment.

Currently, findings are preliminary. Before firm recommendations can be made additional rotation data must be incorporated into the analysis and sensitivity analysis on market prices must be conducted. Ranking of the cotton crop rotations and winter cover systems by net returns and risk using stochastic dominance criteria resulted in two major observations. First, under a fallow cover, we found that continuous cotton tended to be risk inefficient under both FSD and SSD as compared to rotations that alternate cotton with soybeans or corn on an annual basis. By contrast, continuous cotton under fallow was risk efficient for both FSD and SSD as compared to the cotton-corn-cotton-corn and cotton-soy-corn-cotton rotations. These results imply that producers who alternate cotton production with corn and soybean on an annual basis may reduce their net return risk exposure. Second, among winter covers for continuous cotton, SSD results suggest that poultry litter and fallow were the most risk efficient. One implication of this result may be that legume winter cover crops are risk inefficient as compared to nitrogen from poultry litter or commercial sources.