COTTON PRESENTATIONS

Cropping Systems As Best Management Practices

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The traditional farming practice for cotton in the South for 200 years was to produce one summer crop per year following winter fallow. Because cotton residue provided scarce ground cover, this monoculture practice exposed the soil to long periods with little protection from the effects of winter and spring rainfall. Soil erosion was excessive and agricultural sediment became the primary pollutant of surface water causing the US EPA to declare many water bodies as impaired. Many cotton farmers now use conservation tillage and winter cover or grain crops to increase surface residue to reduce erosion and help improve surface water quality. Cover crops are good for water quality but are also good for soil quality and in the long term will be economic and beneficial, but in the short term, may not be.

Year-round systems with summer crops of cotton, corn, soybean or grain sorghum and winter crops of wheat, rye or vetch are considered BMPs for surface water quality protection, since they reduce soil and nutrient losses into water bodies. Winter crops stabilize the soil and then eventually increase soil productivity by increasing soil organic matter and soil biological activity. Vetch also provides a large percentage of the N needed by cotton. Use of no till is one of the fastest ways to build organic matter in southern soils and combined with residue from winter crops provides a system with unparalleled benefits for soil and water quality. No-till and cover crop residue also conserve soil water, which can improve yields of the following summer crops.

The year-round system of doublecropping wheat and soybean has been a common practice throughout the mid-South for 30 years. Acreage in doublecropping varies and is reliant on the perceived profitability and increased risk for the summer crop. In the case of cotton, the risk of doublecropping may be greater than with soybean because cotton is more reliant on early planting dates and longer growing seasons to maximize yield than soybean.

In attempting to achieve the positive effects of these conservation systems on water quality, economics has been a major concern of farmers because these systems may increase production costs, reduce productivity and may not provide short-term returns to justify increased expenses.

The LSU AgCenter has conducted research for many years on BMP cropping systems to evaluate the yield and economic benefits of these year-round diverse crop sequences. Some of these studies have evaluated irrigated systems that maintain ground cover through the use of crop residues, cover crops and no-till practices. The systems include winter wheat cover crop/cotton, doublecrop wheat/cotton, wheat/soybean, wheat/grain sorghum and doublecrop wheat/cotton rotated with corn, soybean or grain sorghum. Continuous monocropping/winter fallow of each of the summer crops was included for comparison purposes, though these are not considered BMPs.

Total commodity yield of the doublecrop systems was higher than any of the monocrop systems because of the added yield of wheat grain that averaged 65 bu/acre. Summer crop yields usually, but not always, sustained yield losses in double crop systems. For example, doublecrop cotton yield varied from a 3% yield increase to a 21% yield reduction and doublecrop soybean varied from a 12% increase to a 30% yield reduction. Sorghum yielded the same whether planted as a monocrop or doublecrop. Yields of soybean and corn were 10 to 16% higher in doublecrop rotational systems than in doublecrop systems without rotations, but cotton yields were the same with or without crop rotations. Compared with monocropping, doublecrop cotton yields lost an average 67 lb lint/ac each year and doublecrop soybean yields dropped an average of 5 bu/ac each year. Any yield reduction of the summer crop yields is a significant economic penalty because it represents a loss directly from the potential net returns.

Although BMP systems were proven in the AgCenter research to be productive, the economics of each system relied greatly on the commodity prices received in a given year. In our studies, using enterprise budgets based on the yields and inputs for each system and annual prices, some of the most profitable systems were BMP systems (Figure1). Doublecrop cotton/wheat produced annual net returns that ranged from $164.00 to $340.00 per acre from average yields of 65 bu wheat per acre and 1043 lb cotton lint per acre. The system of producing three crops in two years of corn-wheat-cotton averaged annual net returns that ranged from $86 to $221.00 per acre. In comparison, monocrop cotton averaged a net return of $112.00 to $167.00 per acre from average yields of 1110 lb lint per acre. The BMP systems of doublecrop cotton rotated with corn or grain sorghum produced annual net returns that ranged from $101.00 to $181.00 per acre -- approaching that of monocrop cotton but less than continuous doublecrop wheat/cotton. Continuous monocrop soybean, corn or sorghum yielded highly variable net returns that ranged from -$40.00 to $148.00 that were usually lower than monocrop cotton or BMP systems. Negative returns occurred in some years, usually with monocrop systems and seldom with multicrop systems. Production risk was no greater with the diversity of crops in the BMP systems than with monocropping because these were irrigated studies, which prevented soil water deficient, the primary risk factor for these types of cropping systems in Louisiana.

The BMP systems studied in the LSU AgCenter are highly productive and have potential to improve soil and water quality. Despite their value for environmental protection, farmers face limitations in fully implementing these systems because, with current inputs and variable commodity prices, not all systems will be economically competitive with monocrop cotton every year. Conservation programs that subsidize effective BMPs with public funding sources are needed for practices such as winter cover crops to promote implementation and attain their valuable environmental benefits, especially in combination with no till. These studies were conducted with no till, a viable economic practice because of the associated savings in fuel, equipment and labor costs.

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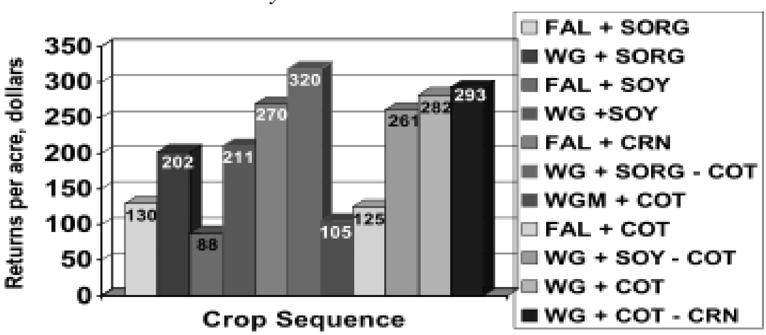

Figure 1. Annual net returns for cropping sequences in a BMP study – 2001-2006. *(FAL, winter fallow; CRN, corn; WG, wheat grain; WGM, wheat green manure; SORG, grain sorghum; SOY, soybean; COT, cotton)*