

Are Multi-Cropping Systems Less Risky Than Mono-Cropping Systems

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Shrinking margins in farming during recent years have heightened the need for farmers to not only increase net returns, but to seek ways to minimize the variation in those returns. The LSU AgCenter has conducted a number of experiments that evaluate alternative production systems. These systems were designed to not only protect and enhance the environment, but also to potentially increase returns to the producer. The studies reported on here include an evaluation of various double-cropping combinations of cotton, corn, soybeans, and wheat along with mono-cropping of those crops. The basic objective of the study was to compare the performance of the various double-crop systems with mono-crop systems for the same crops. While previous studies have evaluated the average returns from the various experiments, this report evaluated how the systems perform from a perspective of risk.

Double-crop systems have some appeal because they offer an opportunity to obtain revenue from two crops during a single year. This may help spread risk because if one crop falters (either production or price) the other may help offset those losses. While the year-long double cropping system has been around for a long time, adoption has been modest. Recent changes in crop varieties and production technologies make double-cropping a more viable alternative. There are some drawbacks to double-cropping. Primary among these is the inability in some years to plant and harvest the main crop in a timely fashion. This, in turn, may result in decreased yield compared to the mono-crop system. One of the primary risk factors associated with double-cropping is the lack of moisture at planting time. Data for this analysis was obtained from an irrigated experiment. Therefore, the ability to irrigate is one critical assumption of this analysis. Double-cropping systems also offer some benefit to the environment because year-long cropping practices with winter cover or grain crops increase surface residue, reduce erosion, and help improve surface water quality. Combining these year-long cropping systems with no-till production practices helps build organic matter in southern soils.

The basic approach used here is to take results of the agronomic experiments and apply standardized budgeting techniques to generate a se-

ries of enterprise budgets representing each of the production systems. Commercial scale production technology is assumed in developing the budgets. Enterprise budgets provide the basic information for comparing the cropping systems within a risk framework. Gross margins from the enterprise budgets are analyzed using stochastic dominance techniques. This technique considers both the expected value and the variance in gross margins from each of the production systems. Data for the analysis includes results over the life of the experiment (2001-2009).

Data from the experiments were converted to rotational acre basis, so that this analysis is based on the productivity of an acre of land. For example, if we are considering a soybean and wheat double crop, each acre devoted to that cropping pattern would have costs and returns associated with those two crops. Alternatively, if we are considering a rotational cropping pattern, such as cotton one year and corn the next, each acre would be divided so that one half would be cotton and the other half corn with the associated costs and returns. This would represent a whole farm, half of which would be in cotton and the other half in corn annually. More complicated rotations are similarly represented.

The original experimental design for this experiment included 15 different cropping systems including double-crops, rotations, and mono-cropping. For purposes of this paper, only a subset of those experiments is included in the analysis. This sub-set is composed of those tests that had the highest average return per rotational acre over the life of the experiment. A set of double-cropping and/or rotational cropping systems are compared to the mono-crop alternatives.

Alternative cropping systems are compared within a framework that considers not only profitability but risk. This study utilizes stochastic dominance techniques to evaluate the alternative systems. Previous studies based on these experiments indicated that, for the data considered, the wheat-cotton double-cropping system was, on average, most profitable. The current study evaluated data over the life of the experiment within a stochastic dominance framework. Results of this analysis indicated that the wheat-cotton double-crop was also the preferred cropping system considering risk. Δ

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