Arkansas Corn and Sorghum Board
2004 Annual Report
Cropping Systems by Merle Anders

TITLE: Helping Arkansas rice farmers exploit market opportunities by improved use of soybean, wheat, and corn in rice rotations.

OBJECTIVES:

1. Provide a set of management guidelines that farmers can use to assist them in maintaining their profitability should they change their rotations.
2. Explore the potential of using short-duration rice, soybean, wheat, and corn varieties in a range of crop rotations.
3. Measure the effects of fertility levels and crop sequences on pest and disease incidence in existing and new rotations.
4. Explore the use of conservation tillage in a range of rotations.
5. Determine the feasibility of using corn in rice based cropping systems.
6. Test existing cropping systems models that include the crop species used in this study.

ACTIVITIES: Changes made in the 2004 plot design allowed for a comparison of corn following either rice or soybeans. As in some of the previous years there were problems with early rains and the no-till plots were replanted. All plots were harvested with the results discussed later.

RESULTS: Growth was acceptable throughout the season with indications that general plant growth was better in plots were corn was following soybeans vs. that following rice. Mean grain yield over all treatments was 112 bu a^{-1} with a range of yields from 38-159 bu a^{-1}. There was an average increase of 16 bu a^{-1} for corn grown after soybeans vs. that grown after rice. These results help explain earlier problems with achieving acceptable grain yields from plots previously planted into rice and suggest that if corn is used in a rice rotation it would be advisable to include a third crop in the rotation (soybeans) so that corn was not grown after rice. Our rice yields following corn are marginally less than rice following soybeans thus a desirably cropping sequence in a rice, corn, and soybean rotation would be rice-soybeans-corn.

As in all previous years, grain yields were 19 bu a^{-1} lower in the no-till plots compared to the conventional till plots. However this difference is less than in previous years and illustrates some changes taking place in the no-till plots. Measurements of soil resistance are showing reduced soil resistance in no-till plots compared to conventional-till plots. This reduced resistance results in better root penetration and water movement down in the soil thus less damage from water logging. We expect differences between conventional and no-till plots to decrease over time.

There were no significant differences in fertility treatments (N=200 lb a^{-1}, P_2O_5=60 lb a^{-1}, K_2O=100 lb a^{-1}, vs. N=300 lb a^{-1}, P_2O_5=80 lb a^{-1}, K_2O=150 lb a^{-1}). This has been the case for every year of this study thus we have lost money by increasing fertility levels. If this trend continues in 2005 we will adjust fertilizer levels.

Highest average grain yields (117 bu a^{-1}) were with the variety DKC61-25. This was the first year any variety yielded higher than P31B13. This will be the last year we use these varieties as there have been ongoing problems with weed control and we will switch to roundup varieties.

Soil quality and runoff measurements were taken in 2005. These results indicate that significant reductions in runoff volume can be achieved using a no-till approach. Runoff water from no-till plots contained significantly less particulate and less total phosphorus. These results indicate it will be possible to address future concerns on water quality through the use of corn in no-till production. Soil resistance measurements show that corn is not as aggressive as soybeans in reducing soil hard pans but is effective in taking advantage of soils that do not have a restrictive plow layer. These results assist us in determining cropping sequences. Rice production following corn was excellent and it would appear that this combination can work if soil compaction problems brought about in rice production can be reduced.