ARKANSAS CORN AND SORGHUM BOARD
2006 ANNUAL REPORT
Merle Anders

TITLE: Helping Arkansas 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.

RESULTS:

*Rotation study***:** Conventional and no-till plots in the long-term rotation study were planted into DKC 66-23 and Pioneer 31G96 on May 2, 2006. All plots were planted into 30 in rows at a plant population of 32,000 plants/acre. Cold wet weather following planting resulted in a poor plant stand in some of the no-till plots thus half the plots were replanted on May 11, 2006. Phosphorus and potassium fertilizers were applied prior to planting while nitrogen was applied in three split applications. Unlike previous years, growth was better in the no-till treatments; particularly in those replanted.

Grain yields across all treatments averaged 98 bu a^{-1} with a range of 22-200 bu a^{-1}. Grain yields were low across all treatments (74 bu a^{-1}) for the variety DKC 66-23. Of the two rotations tested (corn-rice, corn-soybeans-rice) grain yields were highest in the corn-soybeans-rice rotation. These results are consistent with our earlier findings that corn yields are reduced when rice is included in the rotation with lowest yields when corn is grown each alternate year. There was a slight increase in grain yield from the 'enhanced' fertility treatment over the 'standard' fertility treatment (Fig. 1). These results are not consistent with earlier findings when there were no differences between fertility treatments. A further economic analysis will determine if this difference is sufficient to result in increased profits from the higher fertilizer applications. On average, no-till plots yielded 7 bu a^{-1} more than conventional-till plots (Fig. 2). This is the first year that no-till has yielded more than conventional till. Highest grain yields were from no-till plots that were replanted and thus avoided waterlogging early in the season. These results suggest that when corn is grown in rice soils prone to flooding planting should be delayed to after heavy spring rains. To avoid these problems next season all corn plots will be ripped prior to planting.

*Fertilizer study***:** Three corn varieties (Stine 9309, Stine 9310, and Pioneer 31G96) were planted on April 28, 2006. These varieties represent early, mid, and late season varieties. All plots were sown on 20 in rows at a plant population of 58,000 plants/acre. Three urea sources (standard,

Agrotain, and controlled release) were applied as a single application at a rate of 250 lbs. N/acre when the plants were approximately at the 4 leaf growth stage. Immediately following the fertilizer applications the field was irrigated and has received weekly irrigations since. There was significant N burning in the urea and Agrotain treatments following fertilizer application but little damage in the plots receiving controlled release urea.

Grain yields averaged only 75 bu a^{-1} but ranged from 4 to 221 bu a^{-1}. Variety accounted for the biggest differences in yields with a trend of grain yields increasing as variety duration increased (Fig. 3). Average grain yield for the longest duration variety (Pioneer 31G96) was 126 bu a^{-1}). Of the three fertilizer sources used, Agrotain averaged 85 bu a^{-1} across all varieties while Urea and Slow-release averaged 74 and 65 bu a^{-1} respectively. Highest average overall grain yields (152 bu a^{-1}) resulted from using Pioneer 31G96 and Agrotain. Urea was the best fertilizer source for the shortest duration variety (Stine 9309) indicating an advantage of combining a short-duration variety and a N source that is quickly available. This work will be continued in 2007.

Figure 1: Grain yield (bu/a) for two corn varieties (DKC66-23, Pioneer 31G96) grown at either an 'enhanced' fertility level (300# N, 80# P_2O_5, 150# K_2O /a) or 'standard' fertility level (200# N, 60# P_2O_5, 100# K_2O /a).

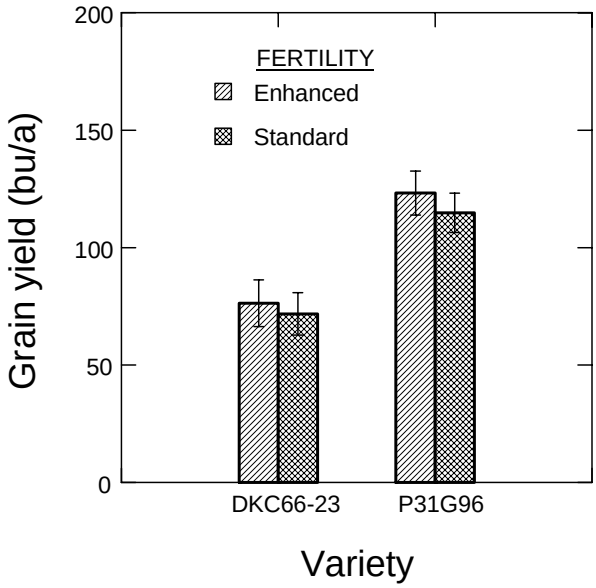

Figure 2: Grain yield (bu/a) for two corn varieties (DKC-23, Pioneer 31G96) grown under no-till or conventional-till management.

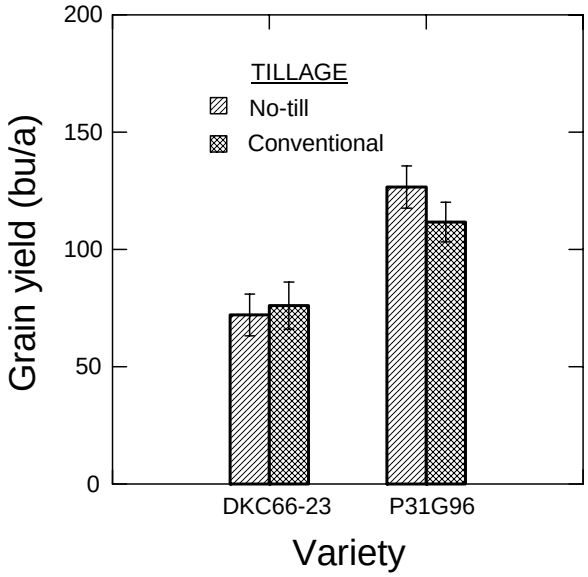

Figure 3: Grain yield (bu/a) for three corn varieties (Stine 9309, Stine 9310, DKC 66-23) receiving a single application of either Urea, Agrotain, or Slow-release fertilizer at a rate of 250# N a^{-1}.