

ARKANSAS CORN AND GRAIN SORGHUM PROMOTION BOARD  
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OPTIMIZING FERTILITY REQUIREMENTS OF CORN

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**Nitrogen Rates Study**

Research plots were established at the Northeast Research and Extension Center (NEREC, Sharkey-Steele complex) at Keiser, and at the Southeast Research and Extension Center (SEREC). Treatments consisted of N rates equivalent to 0, 50, 100, 150, 200, 250, 300, and 350 lb N/acre. The intended plant population was 32,000 plants under irrigated conditions. Two corn hybrids were planted at each location. At Keiser, corn was planted in rotation with cotton and with soybeans At Rohwer, corn was planted after rice.

Each plot contained four 38-inch wide and 25-ft long rows with treatments arranged in a randomized complete block design and replicated five times. Nitrogen rates were applied in a 2-way split, with 50% of the total-N rate applied at emergence and the remaining N applied before the V6 stage, for treatments 0, 50, 100, and 150 lb N/acre. For treatments 200, 250, 300, and 350 lb N per acre, nitrogen was applied as described before, but included an additional application equivalent to 45 lb N per acre before tassel emergence.

At each location, the two middle rows were harvested with a plot combine equipped with a weigh-system and grain moisture meter. Yields were adjusted to 15.5% moisture content for statistical analysis.

**Results**

Figure 1 shows the yields of corn in rotation with rice at Rohwer. Yields under this system were maximized at 200 lb N/acre. No significant yield differences were observed between

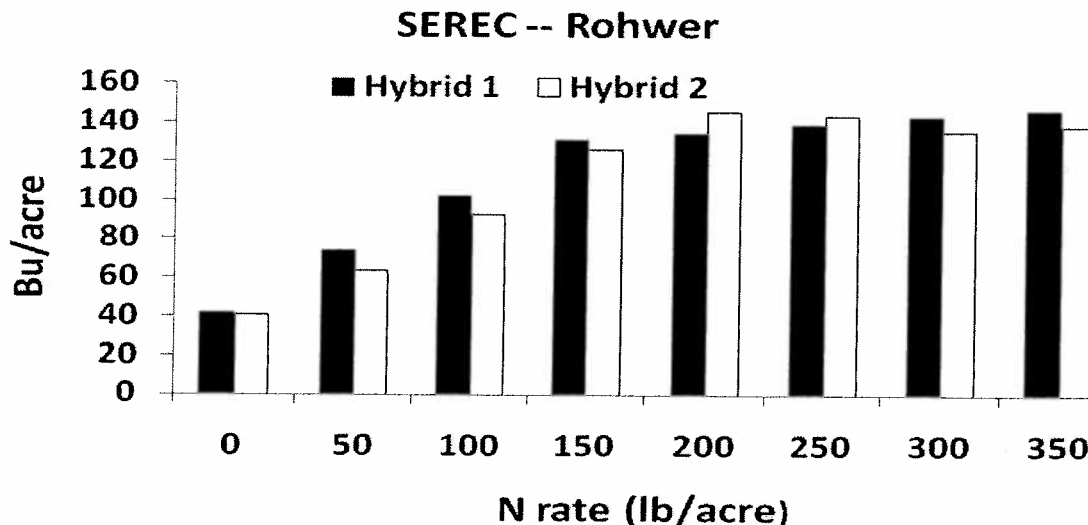
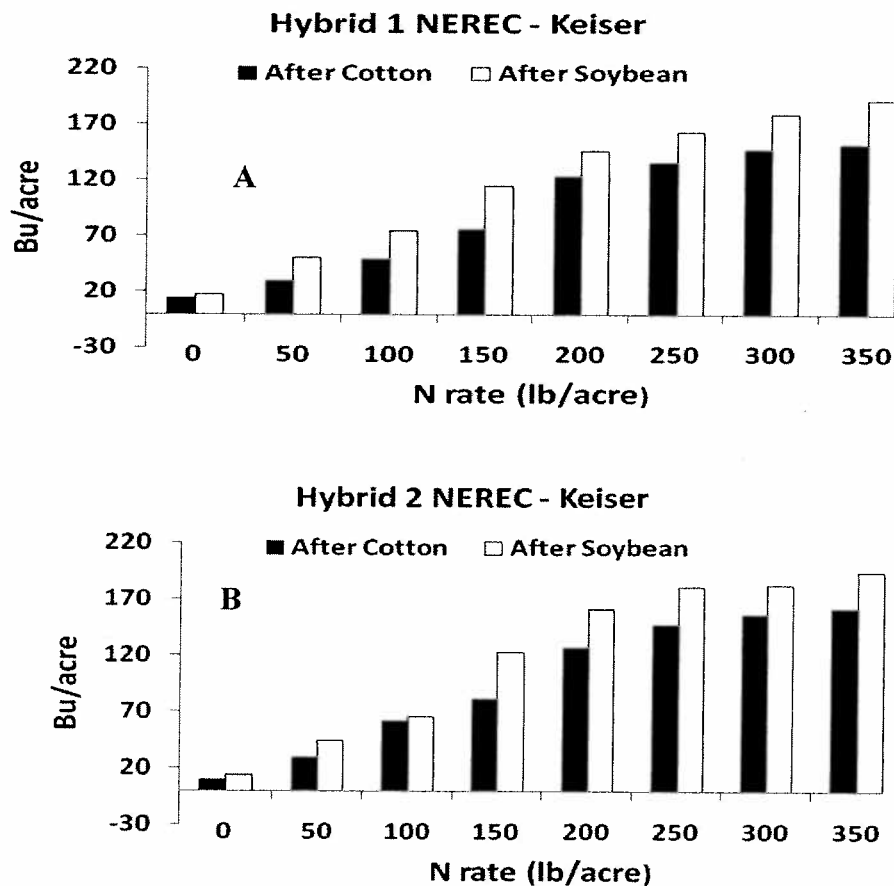


Figure 1. Average yield of two corn hybrids to varying N rates in rotation with rice (Rohwer).

the two hybrids. Factors other than nitrogen fertility, could limit the yield potential.



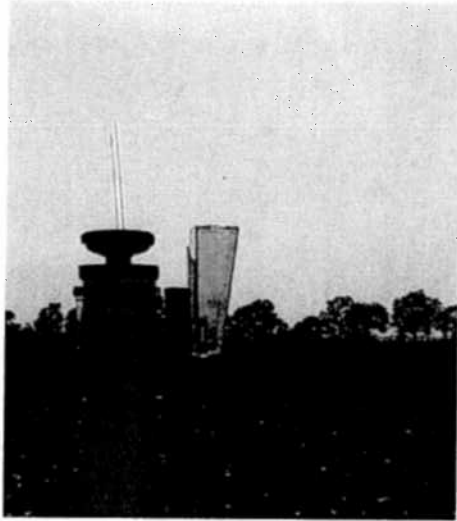
**Figure 2. Average yields of two corn hybrids to varying N rates in rotation with cotton and soybeans (Keiser).**

Figure 2 is the yield response observed at Keiser. The statistical analysis shows a significant effect of the rotational crop, with corn growing after soybean resulting in significant higher yields than when grown after cotton. These results are consistent with those of the 2009 season. During the 2009 season, yields of corn following soybean were higher than those following cotton. The plots were established in the same field but in different locations within the field.

Stalk samples were collected prior to harvesting and sent for analysis for nitrate content. This end of season test can be correlated to excessive or deficient nitrogen levels during the season. Results of this test did not show any evident trends.

### Other Activities

Assistance with irrigation scheduling was provided to corn growers in more than 3,000 acres in Lee County. The checkbook method was followed by farmers, with daily water demand being measured with atmometers (see picture below). 2



One of our objectives was to determine the optimum spacing of these devices. For such purpose, 10 atmometers were placed 2 miles apart each at one of our collaborating farmers. Results obtained during the 2010 season provide a preliminary idea of the required spacing of atmometers and rain gages. We found that the atmometers can be installed 5 miles apart, while rain gauges need to be installed at close as possible, but not more than 3 miles apart. Figure 4 shows how variable rainfall can be. The difference in rainfall, among some of the locations, and recorded by the rain gauges was as high as 100%. For such reason, a farmer needs to install as many rain gauges as feasible.

Figure 3. Picture of an atmometer with a rain gauge.

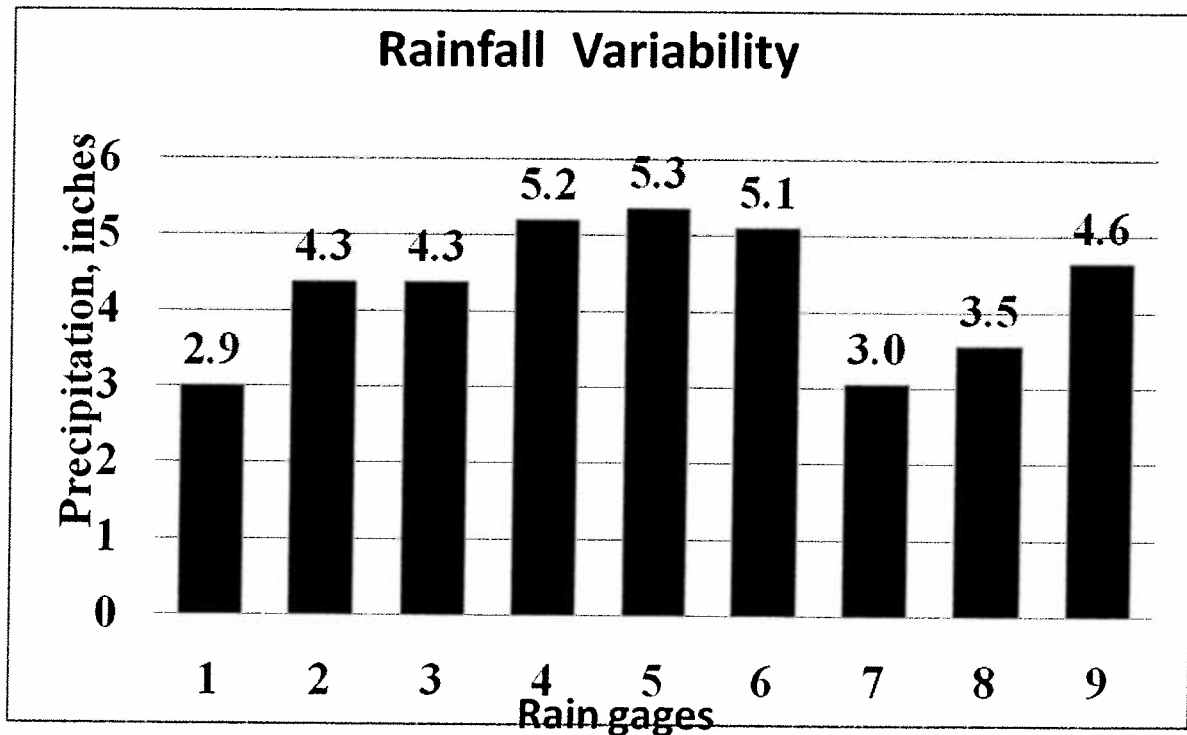


Figure 4. Rainfall variability observed in rain gauges installed with atmometers.