

**Annual Report (Year 2)**  
**ARKANSAS CORN AND GRAIN SORGHUM BOARD PROPOSAL**

**Title:** Optimizing Soil Fertility Requirements for Corn

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Tests were established at the Cotton Branch Station and in collaboration with a producer in Prairie Co, to assess the response of corn to Zn fertilization (Table 2). No clear trends were observed, although yield responses may have been affected by initial conditions at each location. Zinc deficiencies and thus response to Zn fertilization could potentially occur under high P fertilization situations and under continuous irrigation with alkaline water.

**Table 1. Corn yield response to selected Zn treatments at two locations.**

| Rate (lb)                  | Cotton Branch | Prairie Co.                | Rate (lb) |
|----------------------------|---------------|----------------------------|-----------|
| 10 lb Zn                   | 218 a         | High seed Zn + 2 tons lime | 203 a     |
| Low seed Zn + 2 tons lime  | 214 a         | 10 lb/A + 2 tons lime      | 198 a     |
| UTC                        | 213 a         | UTC                        | 197 ab    |
| Low seed Zn                | 207 ab        | 1 lb/A + 2 tons lime       | 194 abcd  |
| High seed Zn + 2 tons lime | 206 ab        | Low sees Zn + 2 tons lime  | 194 abcd  |
| 2 tons lime                | 206 abc       | Low seed Zn                | 192 abcd  |
| 10 lb/A + 2 tons lime      | 201 abc       | 1 lb/A Zn                  | 188 abcd  |
| High seed Zn               | 192 bcd       | 2 tons lime                | 181 bcd   |
| 1 lb/A Zn                  | 188 cd        | High seed Zn               | 177 cd    |
| 1 lb/A + 2 tons lime       | 177 cd        | 10 lb/Zn                   | 174 d     |
|                            |               |                            |           |

The effect of selected rates and timing of nitrogen fertilizer applications were studied at the Pine Tree Station under a soybean-corn (S-C) and a rice-corn (R-C) rotation (Table 2). There was a trend for corn yields under the rice-corn rotation to increase with increasing N levels at the 6-leaf stage, which underscores the importance of splitting fertilizer applications. Corn plants did not appear to take advantage of the extra nitrogen supplied before tasseling. Corn yields observed under the soybean-corn rotation were consistently higher than corresponding yields under the R-C rotation. Under the S-C rotation corn plants apparently utilized the extra N applied before tasseling. Although pre-tasseling N applications have shown some promise, its potential application could be limited to soils with yield potentials higher than 150 bu/A, as observed in the present studies.

**Table 2. Corn yield response to nitrogen rates and timing under a soybean-corn and rice-corn rotation.**

| Treatment | Following soybeans | Following rice |
|-----------|--------------------|----------------|
| UTC       | 80c                | 74de           |
| 60-120-0  | 131ab              | 66e            |
| 90-90-0   | 107bc              | 114bc          |
| 60-60-60  | 156a               | 112bc          |
| 60-120-40 | 160a               | 83d            |
| 90-90-40  | 122abc             | 102c           |
| 60-160-0  | 152ab              | 129a           |
| 90-130-0  | 152ab              | 84d            |
| 0-180-0   | 120abc             | 121ab          |
| 0-220-0   | 142ab              | 120ab          |
| 0-180-40  | 114abc             | 113bc          |

A series of studies were established at several locations in Arkansas under different crop production systems. Table 3 shows the yield response of corn to increasing P levels at the Pine Tree Station (PTS). Observed yields were not statistically different, however a trend was observed for yields to increase up to the 90 lb P / A rate. Medium to high initial soil-P levels may have limited the potential effect of additional P fertilizer.

**Table 3. Corn yield response to P levels following grain sorghum at PTS.**

| Rate (lb) | Following grain sorghum |
|-----------|-------------------------|
| UTC       | 122a                    |
| 45        | 124a                    |
| 90        | 134a                    |
| 135       | 107a                    |
| 180       | 125a                    |
| 225       | 125a                    |