

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