

ARKANSAS CORN AND GRAIN SORGHUM BOARD
2005 Report

Title: Optimizing Soil Fertility Requirements for Corn

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1. To evaluate the benefits of a pre-tassel N application.

Two hybrids were seeded at 30,000 plants per acre. Hybrids were chosen based on typical growth habit and were planted at 3 sites. Site 1 was the NEREC, near Keiser on a soil classified as a Sharkey-Steele complex with total N rate being 300 lb N/acre. Site 2 was the SEREC near Rohwer on a soil classified as Hebert silt loam and site 3 was located at the Lonn Mann Cotton Branch Station (LMCBS) near Marianna on a soil classified as a Memphis silt loam.

Treatments consisted of the following

At LMCBS and SEREC;

- a. 2-way split ½ at planting and ½ at V6
- b. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at 1 week prior to tassel.
- c. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at V8
- d. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at tassel
- e. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at 1 week after to tassel
- f. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at 2 weeks after tassel

At NEREC Keiser;

- a. 2-way split ½ at planting and ½ at V6
- b. 3-way split 100 lb N/acre at planting/emergence, 150 lb/acre at V6 and 45 lb N/acre at V8.
- c. 3-way split 100 lb N/acre at planting/emergence, 150 lb/acre at V6 and 45 lb N/acre at V10
- d. 3-way split 100 lb N/acre at planting/emergence, 150 lb/acre at V6 and 45 lb N/acre at 1 week prior to tassel
- e. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at tassel
- f. 3-way split 100 lb N/acre at planting/emergence, 100 lb/acre at V6 and 45 lb N/acre at tassel

Before harvest, ten plants from 3 replications at each location were hand-harvested, ear length was measured and the weight of 100 kernels was collected.

Plots consisted of 4 rows wide by 25 ft long, treatments were replicated 4-5 times and were arranged in a randomized complete block design. A plot combine equipped with a weigh system was used to harvest the plots. Resultant yield was corrected at 15.5% moisture content and statistical significance was assessed at the 95% level with the LSD procedure of SAS.

NEREC (Keiser Sharkey-Steele complex)

Table 1 shows observed yields at this location. Hybrid 1 is commonly referred as a “workhorse” type that yields well across all environments and is considered a short season, while hybrid 2 is a “racehorse” hybrid with high yield potential when planted in the right environment.

A significant degree of variability among yields was observed in Hybrid 1, no significant yield differences were observed among the 2-way and the pre-tassel applications. Based on these yields, corn plants were able to more efficiently utilize nitrogen applied at the pre-tassel and tassel stage, when compared to the 3-way split with N applied at V10 and V8 stage.

Yields for hybrid 2 were significantly higher than those for hybrid 1. The pre-tassel application with 250 lb N/acre was significantly higher than the rest of the treatments. There is not a clear explanation of why yields for the pre-tassel application at the 300 lb N/acre rate were lower than those from the 250 lb N/acre. This situation was not evident for hybrid 1.

Kernel number and Ear length followed basically the same trends as those observed for yields. Generally, there were more kernels and ears were longer for those plots receiving a pre-tassel application of nitrogen.

In general, no significant yield differences were observed between the 250 and 300 lb N/acre yields, which is encouraging and open the possibility to decrease fertilizer rates for corn grown in heavy-textured soils with the pre-tassel application

Table 1. Yields, kernel number and ear length observed at NEREC . Number followed by the same letter are not statistically different at the 90% level

Treatment	Yield (bu/acre)	Kernel Number	Ear Length Inches
E + V6	176.7abc	36.9ab	8.7ab
E + V6 + V8	164.7bc	35.7b	8.4b
E + V6 + V10	161.2c	35.7b	8.3b
Pre Tassel (250 lb/a)	179.4ab	39.6a	9.2a
Pre Tassel (300 lb/a)	183.7a	35.9b	8.6b
LSD (0.1)	16.2	0.53	3.54

SEREC (Hebert silt loam)

A significant yield increase was observed when the third split was applied at tassel compared to earlier applications, including the pre-tassel one. This was a short season hybrid and may be more sensitive to the timing of application since yield tended to decrease as applications were done beyond the tassel stage (Fig. 1)

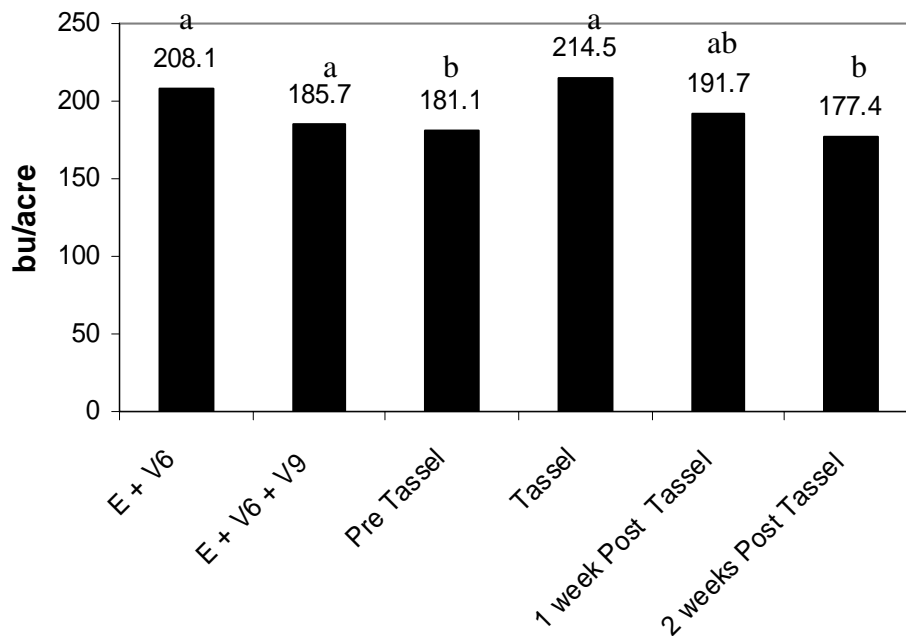


Fig. 1. Yield response of corn Hybrid 1 (workhorse type) to timing of nitrogen application. Yields followed by the same letter are not significant at the 90% probability level.

Observed yields for hybrid 2 (Figure 2) were not statistically different, but there was a trend for the pre-tassel application and applications beyond that time to be higher, compared to a 2-way split. This is consistent with our observations that these types of hybrids may have the ability to use fertilizers applied, later in the season, in a more efficient manner.

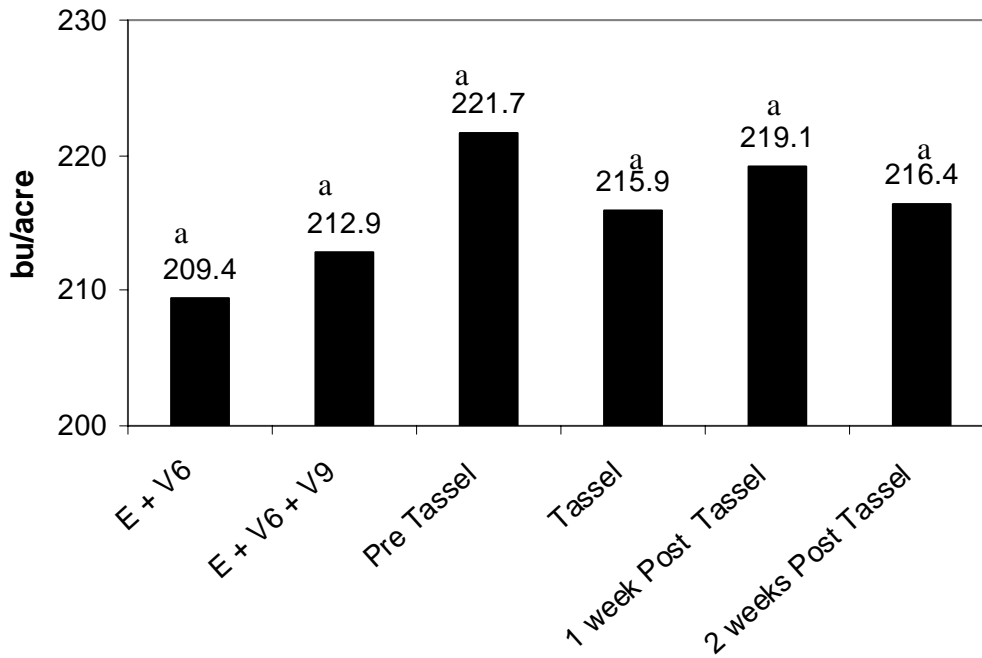


Fig. 2. Yield response of corn Hybrid 2 (racehorse type) to timing of nitrogen application. Yields followed by the same letter are not significant at the 90% probability level.

LonMann Cotton Branch Station (Memphis silt loam)

Yields at this location followed similar patterns as those observed at the SEREC site. Yields for hybrid 1 (workhorse) were higher for the tassel application than 3-way splits done at 1-2 weeks pre-tassel, and would decrease as the nitrogen was applied beyond the tassel stage. Yields for hybrid 2 appeared to be less affected by the timing, but yields tended to decrease as applications were done beyond 1 week after tassel.

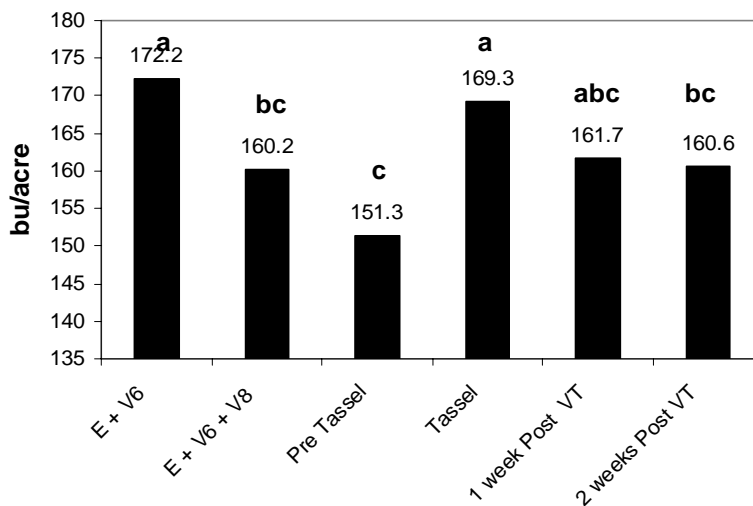


Fig. 3. Yield response of corn Hybrid 1 (workhorse type) to timing of nitrogen application. Yields followed by the same letter are not significant at the 90% probability level

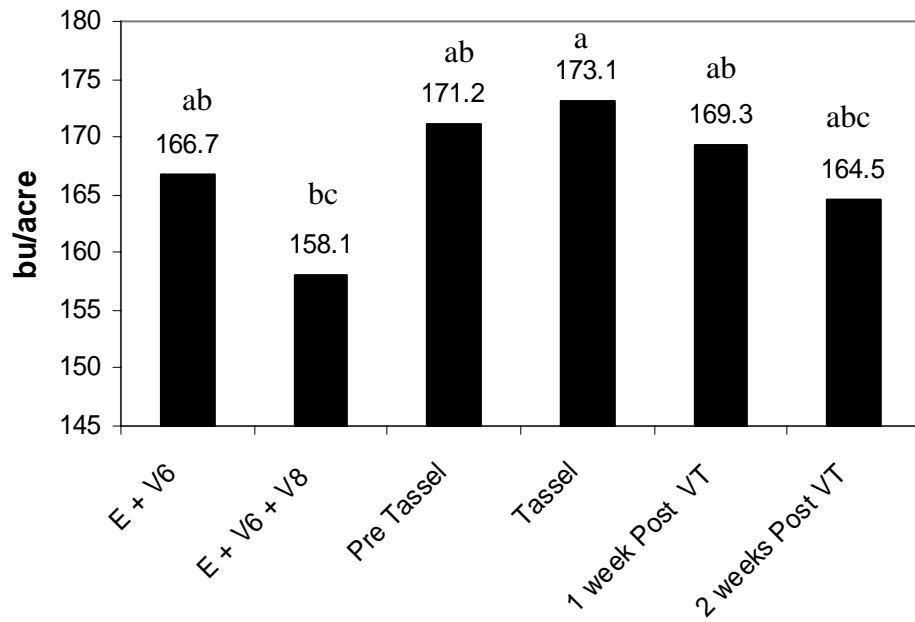


Fig. 4. Yield response of corn Hybrid 2 (racehorse type) to timing of nitrogen application. Yields followed by the same letter are not significant at the 90% probability level.