

## Winter Wheat Response to Four Different Nitrogen Sources

This project was conducted at the Research and Education Center near Georgetown, DE during the 2002 growing season. The study area received 0.5 tons/acre of lime on October 1, 2001, and 12 gal/acre of 30-0-0 on October 10, 2001. The winter wheat variety SS518 was planted October 23, 2001 at a rate of 110 lb/acre. The spring fertilizer treatments were broadcast on March 8, 2002; the winter wheat reached Growth Stage 25 (i.e., "green-up") about February 26, 2002. The spring fertilizer treatments consisted of four nitrogen sources: Urea Ammonium Nitrate {(UAN); 30-0-0}, Urea (46-0-0), Ammonium Sulfate {(AS); 21-0-0}, and a polymer-coated urea (CRU) fertilizer (44-0-0). Harmony Extra (0.6 oz/ac) was applied on March 15. The study area was irrigated once at about 0.5 inches on May 30, and the plots were harvested on June 24.

The first rainfall event following application of the fertilizer fell on the night of March 12 and early morning of March 13 (Figure 1). The total amount of rain received from this event was 0.5 inches. Because there was no difference in yield among the fertilizer N sources (Figure 2), this would suggest that there was no significant volatilization from the Urea or the UAN fertilizers. Visual observations of the winter wheat during the month of March and into early April suggested that the winter wheat in CRU treatments was not getting as much N as

the other N sources, because the CRU treatments were a lighter green than the other treatments. This visual observation would suggest that the CRU treatments were not releasing N quickly enough to meet the N demands of the crop. The yield data, however, indicate that the CRU treatments eventually supplied enough N to the crop because there was no difference in observed yields among any of the N sources. In fact, the grain N concentrations show that the CRU treatment had as much N as the other N sources, as there was no significant difference among the N sources (Figure 2). The yield data indicate that there was no response to S from the ammonium sulfate fertilizer.

Rate of N had a significant effect on grain yield and grain N concentration (i.e., protein; Figure 3). In fact, the yield and grain N responses indicate that more than 80 lb N/acre may have been needed to optimize yield and grain protein levels. There was no significant interaction between N source and N rate on grain yield or grain N concentrations. Therefore, the data were summarized by presenting the average of each N rate and the average of each N source. Overall, these results show that at least 80 lb N/ac was needed to optimize grain yields, and there were no significant differences among the four N fertilizer sources evaluated in this study.

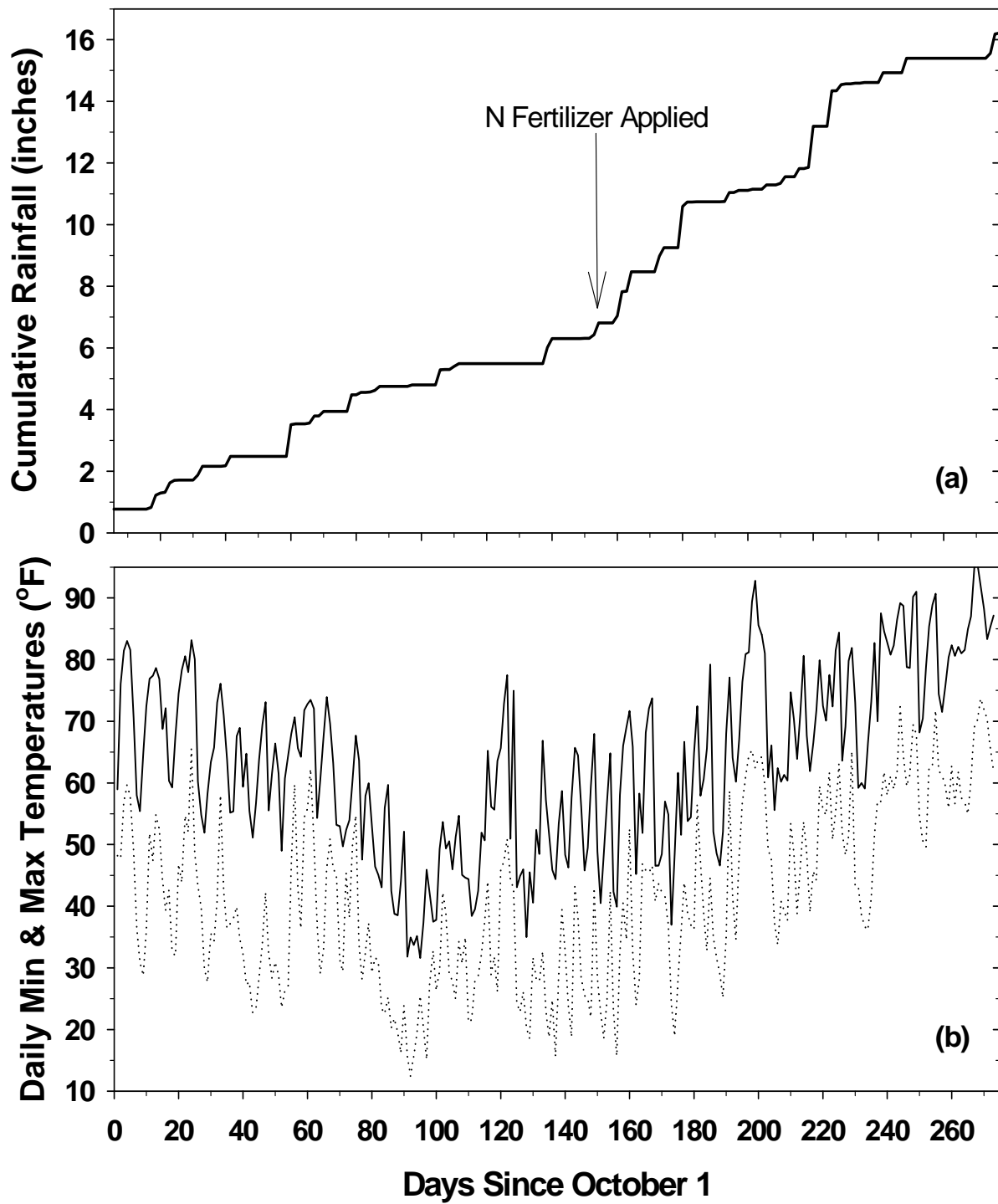
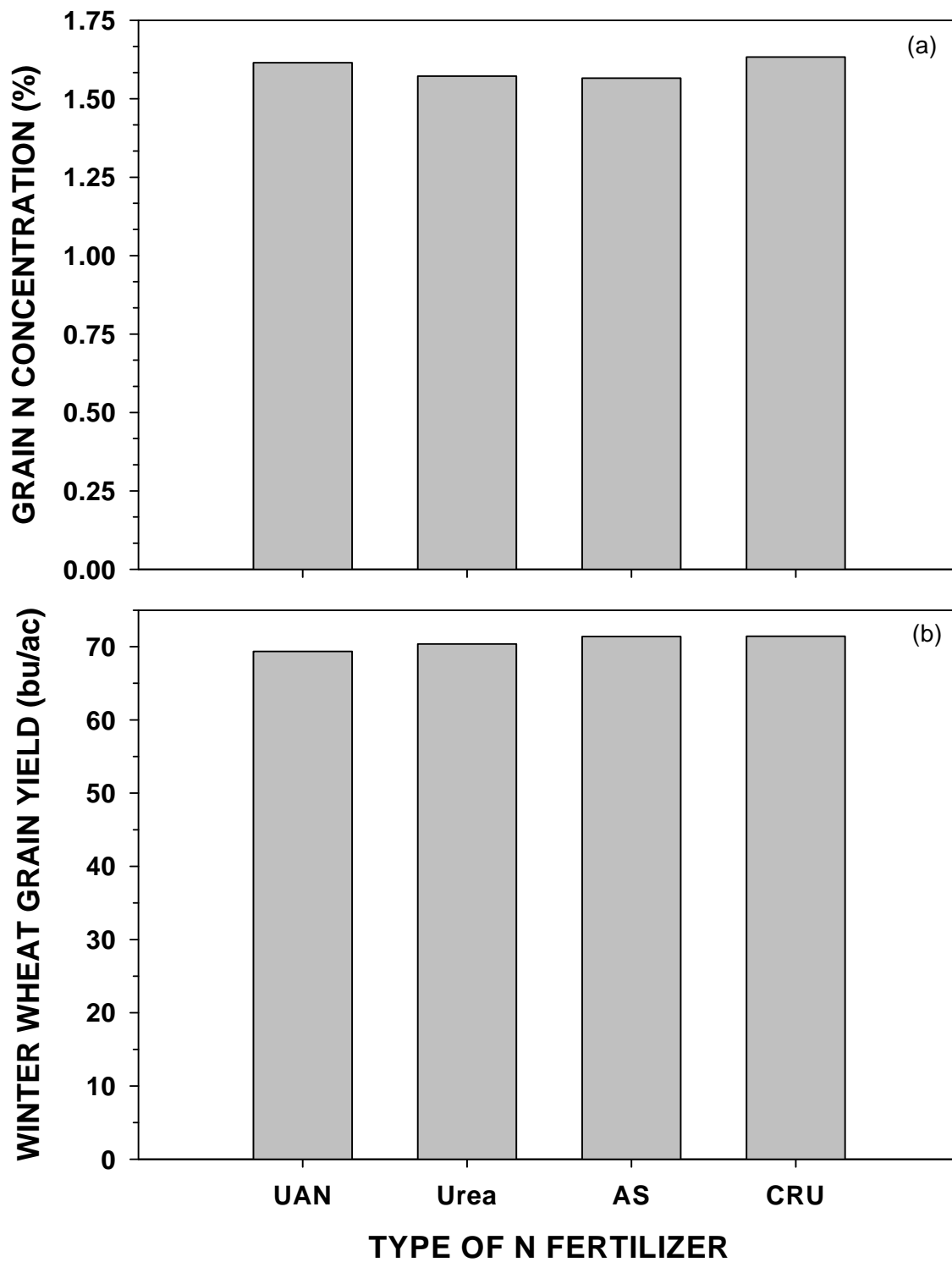


Figure 1. Cumulative rainfall (a) and daily minimum and maximum temperatures (b) since 1 Oct 2001.

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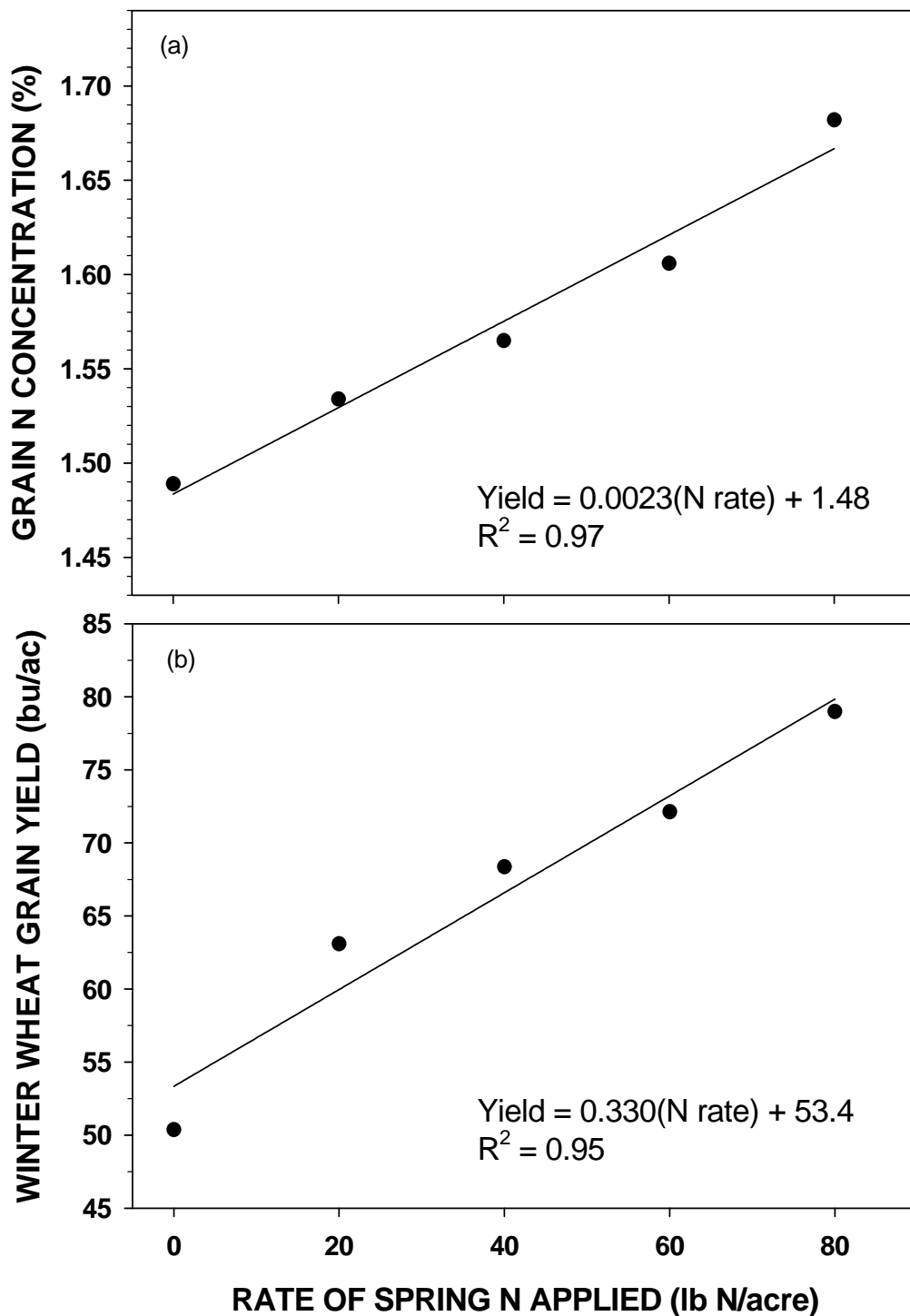
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**Figure 2.** Average grain yields (b) and grain N concentrations (a) for four different N sources (UAN=30-0-0, AS=21-0-0; and CRU=polymer-coated urea) averaged over four N rates (20, 40, 60, & 80 lb/ac).

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**Figure 3.** Average grain yield (b) and grain N concentration (a) for five different rates of spring-applied N fertilizer; these data were averaged across the four N sources.

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