

EFFECT OF N SOURCE SELECTION ON CROP PERFORMANCE AND WEED MANAGEMENT DECISIONS

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Weeds can accumulate N rapidly in the growing season which can contribute to early season interference and subsequent yield loss. Therefore, early weed control may reduce yield loss associated with early season interference. The availability of N to the crop or weed may depend on the N source selection. Polymer coated urea is a slow release N source that may limit early weed growth. Similarly, anhydrous ammonia is banded 6 to 8 inches below the soil surface. Root growth is necessary to access this N source. No research has evaluated the interaction between N source selection on weed management systems. We hypothesized that the growth rate of weeds would differ depending on the N source which would affect weed management decisions regarding PRE followed by POST, total POST, and total PRE programs. The objective of this research was to determine the impact weed management systems and preplant N source selection on no-till corn grain yield and weed control.

A field trial with three replications in 2006 and four replications in 2007 was established at the Greenley Research Center in 10 by 35 ft plots. This research was arranged as a split-plot design with N source as the main plot and weed management system as the sub-plot. All N sources (anhydrous ammonia, urea, ESN, ammonium nitrate) were applied preplant at 150 lbs N/acre. Weed management systems included a non-treated weedy check, weed-free, Lumax at 3 qt/acre plus NIS at 2 pt/100 gal to weeds 2-4 inches tall, GuardsmanMAX at 3.6 pt/acre applied to weeds 1-2 inches tall, atrazine at 2 qt/acre applied preemergence followed by Roundup WeatherMAX at 22 oz/acre applied to 4 inch tall weeds, and GuardsmanMAX at 3.6 pt/acre plus Roundup WeatherMAX at 22 oz/acre applied to weeds 2-4 inches tall. Early postemergence applications of residual herbicides are common in this region to provide extended weed control. 'DK C60-18' was no-till planted at 30,000 seeds/acre on 28 April 2006 and 23 April 2007. Weeds were harvested near physiological maturity (late-August) to evaluate season long weed control.

Variability in weed control with early postemergence treatments of residual herbicides may be expected depending on the N source due to early weed growth, soil disturbance, or aggressive weed growth that may result from readily available N sources. Crop and weed growth rates were determined to help farmers predict herbicide application timings for N sources that may differ in crop or weed availability. Urea release from ESN was initially slow and was rapid once the corn was 8 to 12 in. tall (Figure 1). This should help reduce risk associated with delayed sidedress application timings due to rainfall. We hypothesized that a slow release N source would affect weed growth rates when compared to faster release N sources such as ammonium nitrate and non-coated urea. However, giant foxtail height in 2006 (Figure 2), common waterhemp height in 2006 (Figures 3 and 4), and giant foxtail height in 2007 (Figures 5 and 6) were similar or greater with ESN compared to other N sources in the weedy check. There was no interaction between weed management systems and N sources on weed control or corn yield. Weed biomass was affected by N source and was greatest with anhydrous ammonia and polymer coated urea treatments (Figure 7). Tillage and slow release N sources may result in greater weed biomasses (giant foxtail, common lambsquarters, and common waterhemp) at harvest; however, limited

effects on grain yield were observed (Figure 8). Grain yield was similar among polymer coated urea, ammonium nitrate, and anhydrous ammonia N sources (Figure 8). There was no difference in weed control among preemergence, early postemergence, and postemergence herbicide treatments in 2006, and slight yield differences were observed when compared to the weed-free control (data not presented). Differences in weed control were observed in 2007, but yields were similar to the weed-free control (data not presented). In a medium and high yield environment, recommendations for weed management systems should not vary based on the preplant N source selection.

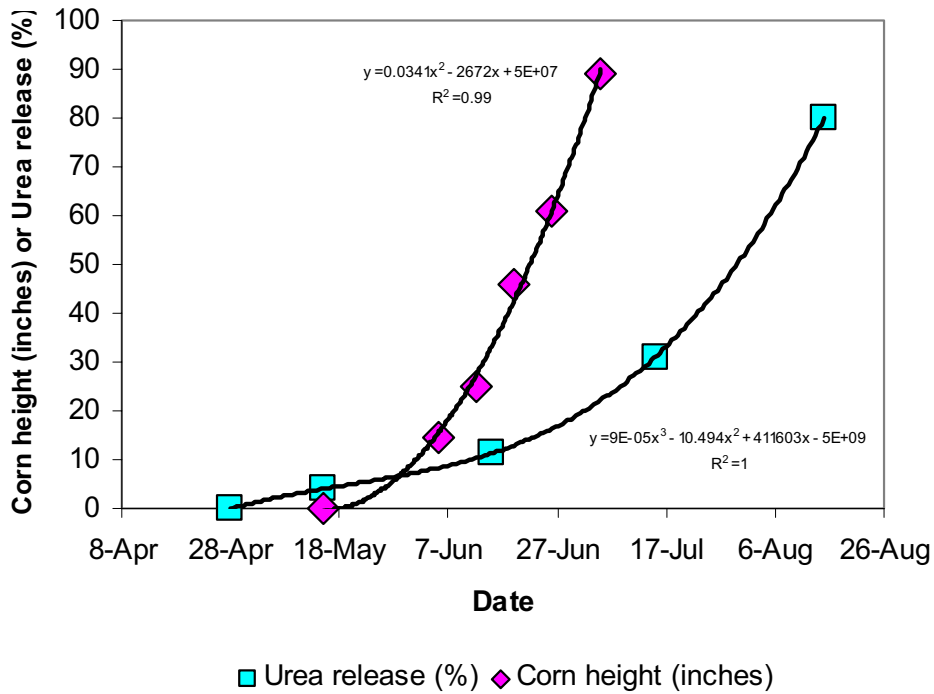


Figure 1. Urea released from surface placed bags in no-till corn and corn height in Northeast Missouri for 2006 and 2007.

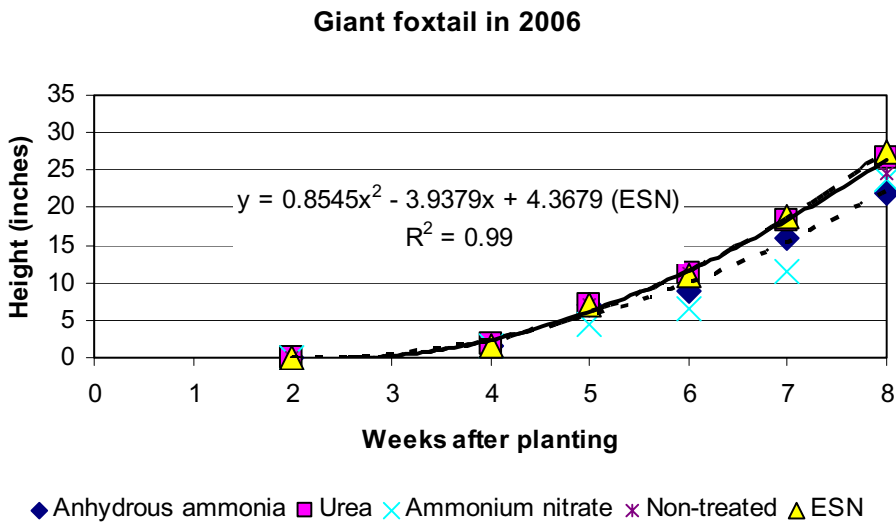


Figure 2. Giant foxtail height in the weedy check treated with different N sources 0 to 8 weeks after planting in 2006.

Common waterhemp in 2006

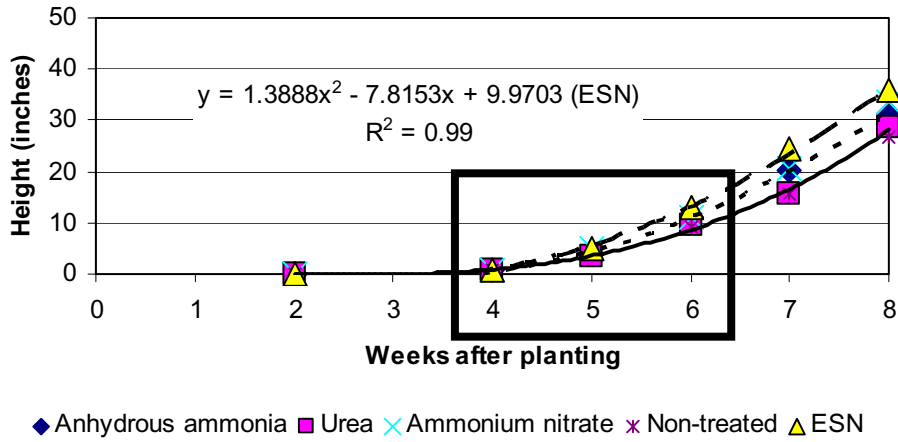


Figure 3. Common waterhemp height with different N sources in the weedy check 0 to 8 weeks after planting in 2006.

Common waterhemp in 2006

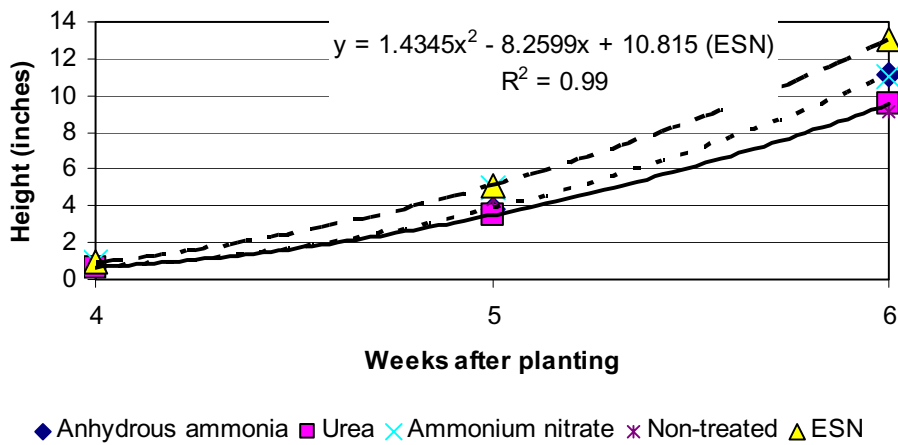


Figure 4. Common waterhemp height closeup of the grey box in Figure 3 of the weedy check 4 to 6 weeks after planting in 2006.

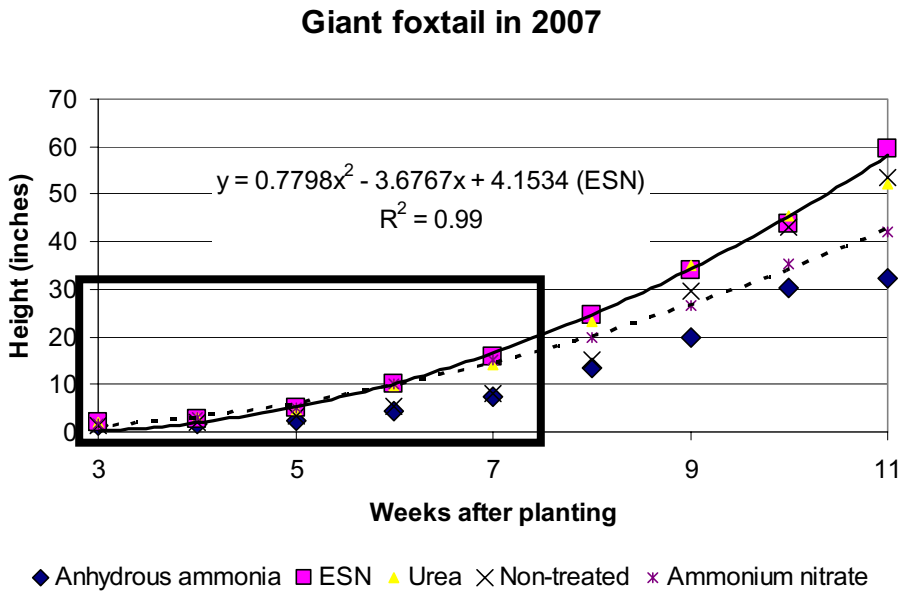


Figure 5. Giant foxtail height in the weedy check 3 to 11 weeks after planting in 2007.

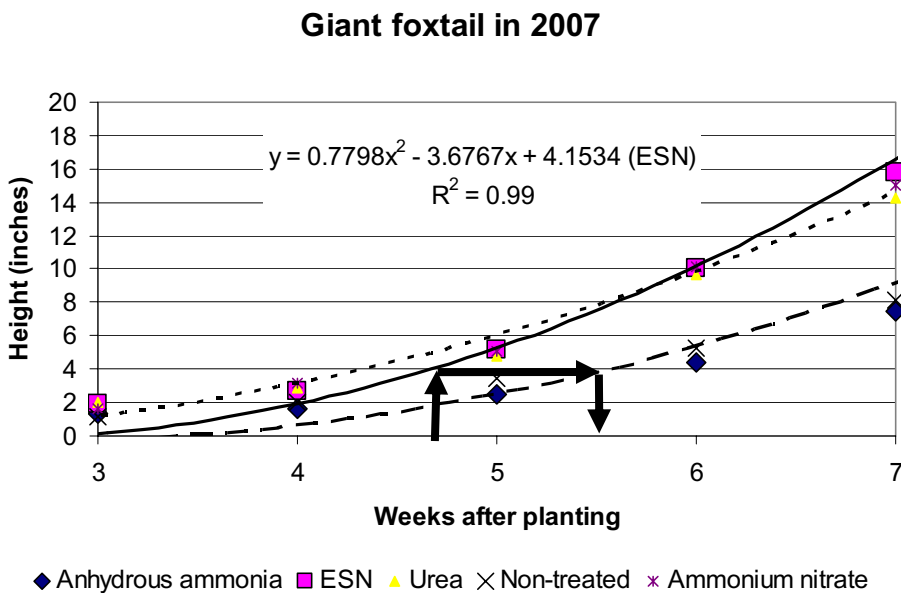


Figure 6. Giant foxtail height closeup of the grey box in Figure 5 of the weedy check 3 to 7 weeks after planting in 2007. Arrows indicate a growth rate delay of approximately 1 week for N treated compared to non-treated weeds.

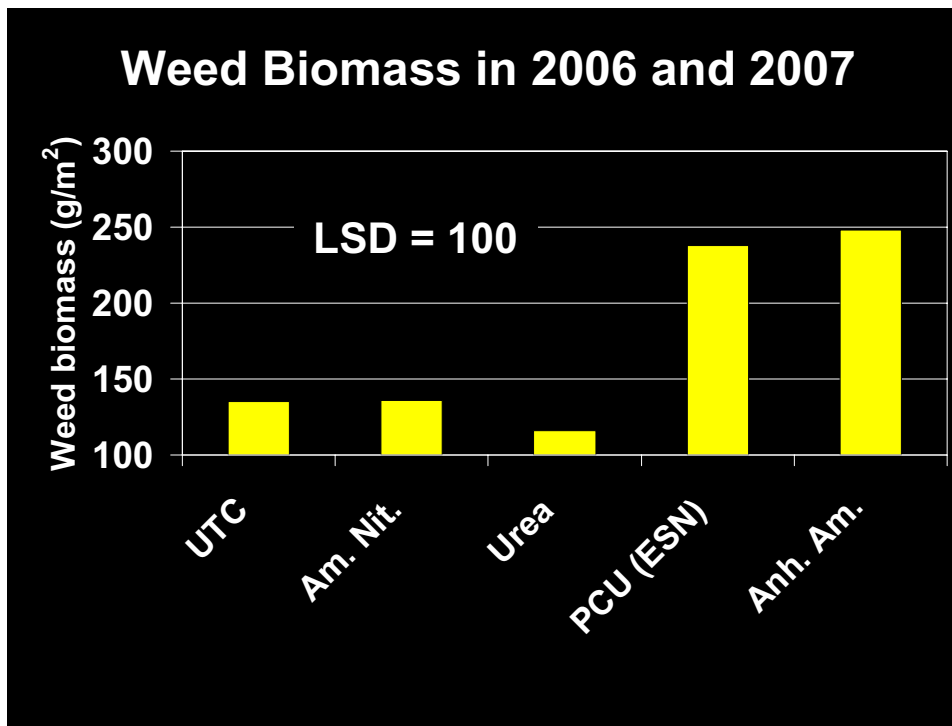


Figure 7. Weed biomass at physiological maturity for different N sources (UTC, non-treated control; Am. Nit., ammonium nitrate; urea; PCU (ESN), polymer coated urea; and Anh. Am., anhydrous ammonia) averaged over years (2006 and 2007) and herbicide management systems.

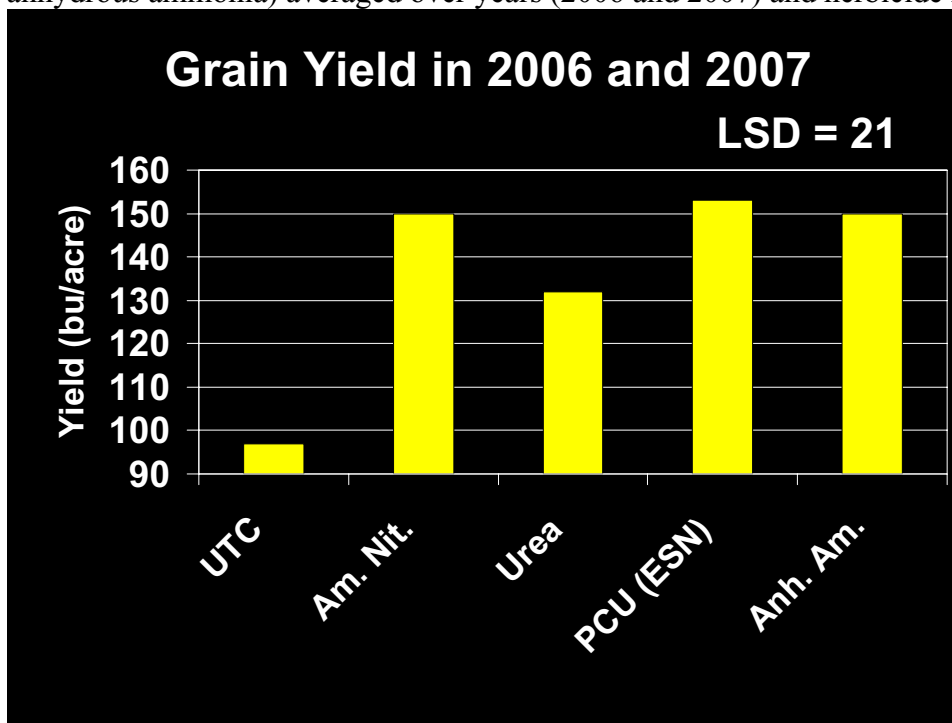


Figure 7. Corn grain yield of different N sources (UTC, non-treated control; Am. Nit., ammonium nitrate; urea; PCU (ESN), polymer coated urea; and Anh. Am., anhydrous ammonia) averaged over years (2006 and 2007) and herbicide management systems.