ALTERNATIVE MANAGEMENT OPTIONS IN NORTHEAST MISSOURI CLAYPAN SOILS FOR INCREASING CORN PRODUCTION

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Poorly drained, claypan soils can intensify the importance of tillage and N management on high yielding corn production. During wet growing seasons, poorly drained soils can have conditions conducive for environmental N loss and poor plant growth which can lower grain yield potential. Over three years, this study evaluated whether slow release, polymer-coated urea or strip-till/deep banding of N could maintain or increase yields in wet growing seasons over three N application timings (fall, early preplant, and preplant), no-till/surface broadcasting of N, non-coated urea application, and regional high yield systems which utilize anhydrous ammonia injection into the soil [with and without N-serve(nitrapyrin)].

The 2010 growing season was extremely wet and resulted in lower plant populations in no-till/surface broadcast systems. In 2010 following soybean, plant population with no-till/surface broadcasting of N was 8440 plants acre^{-1} lower than strip-till/deep band placement (Fig. 1). These results were similar when corn followed red clover, except high plant populations were usually not maintained in strip-till/deep banding systems with fall N application/tillage. In fields following soybean, strip-till/deep banding had 25 to 86 bu acre^{-1} greater yields than no-till/surface broadcast system in combination with N application timing and fertilizer source (Fig. 2). When red clover was planted as a cover crop, strip-till maintained high yield production with N applications as early as Mar. (early preplant) which coincided with the higher plant populations compared to no-till. In a comparison to high yielding management using anhydrous ammonia with and without a nitrification inhibitor (nitrapyrin), strip-till had similar yields, excluding strip-till/deep banding of non-coated urea, which had 23 bu acre^{-1} lower yields compared to anhydrous ammonia with nitrapyrin when red clover was used as a cover crop (Fig.2 and 3).

Higher yields with strip-till/deep band placement compared to no-till/surface broadcast application in wet growing seasons was a function of improved seedbed conditions, plant populations, and improved N management through deep banding placement of N. In conclusion, strip-till/deep band placement of N was a consistent, high corn grain yielding system that was a viable management option in moderately wet to wet growing seasons in poorly drained soils that can allow farmers more flexibility in N management options.

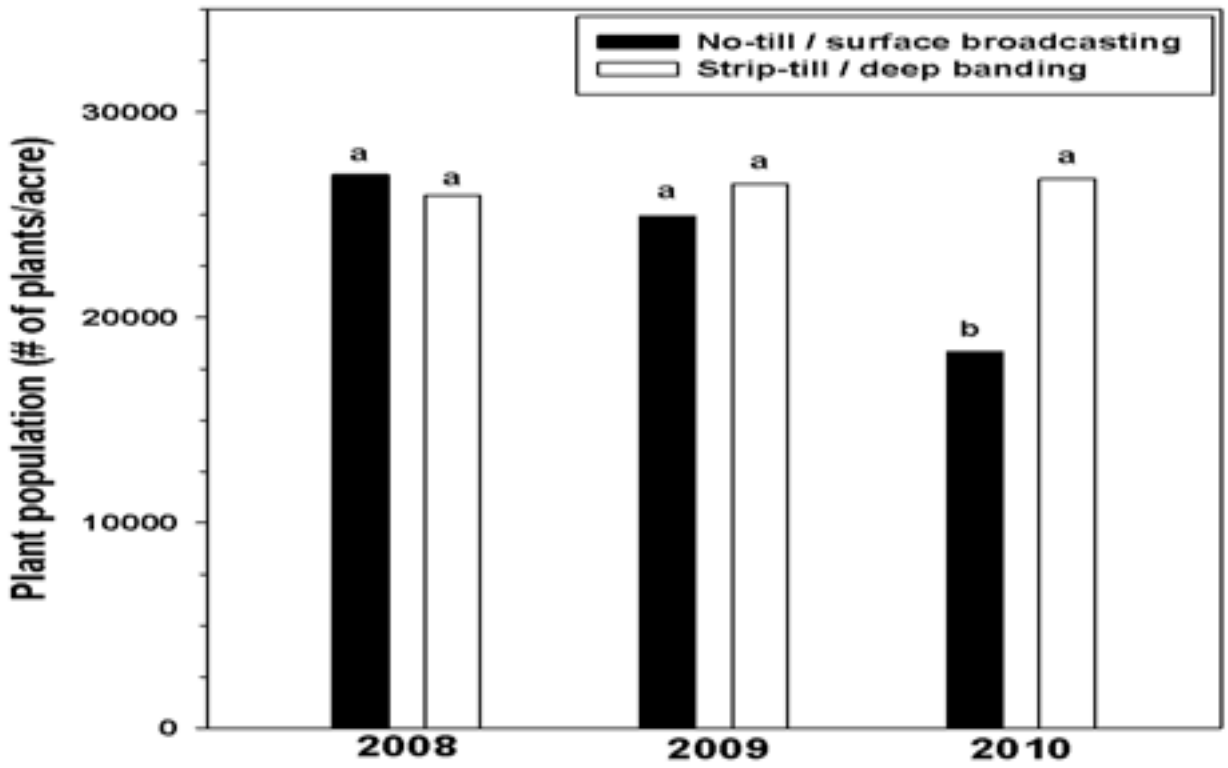

Figure 1. Corn plant population following soybean production due to tillage / N placement for 2008, 2009, and 2010. Letters over bars indicate differences among treatments within a given year using Fisher's Protected LSD ($P < 0.05$).

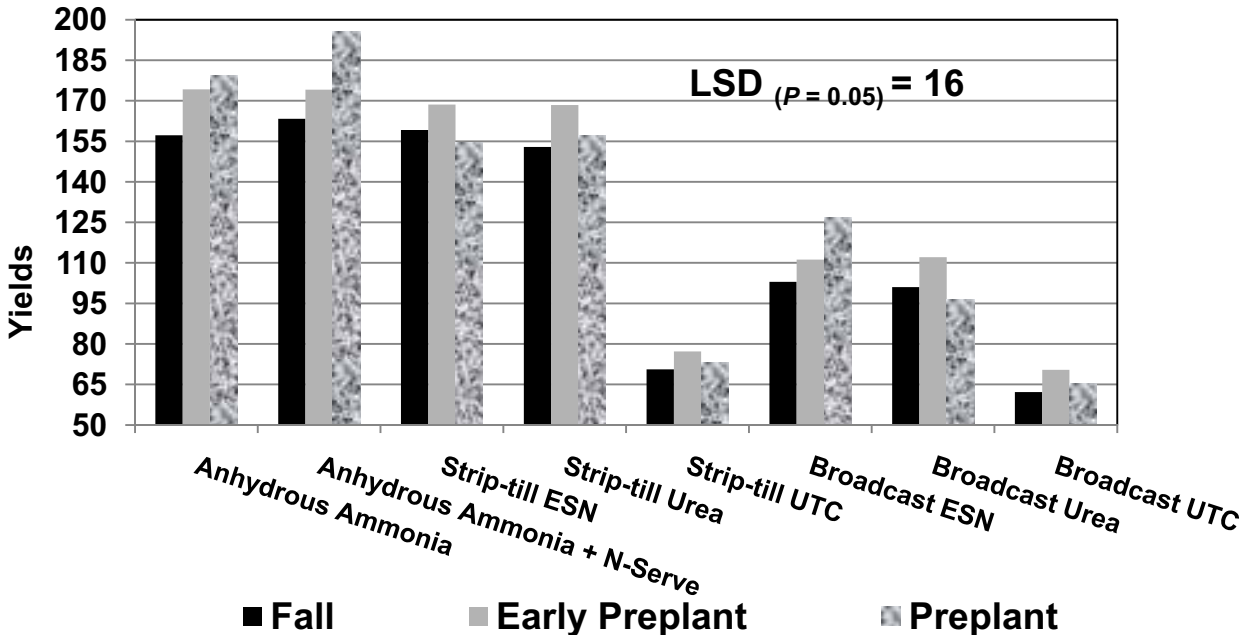

Figure 2. Corn grain yields following soybean stubble due to the combination of N source and tillage/N placement. Yields were averaged over the 2008, 2009, and 2010 growing season.

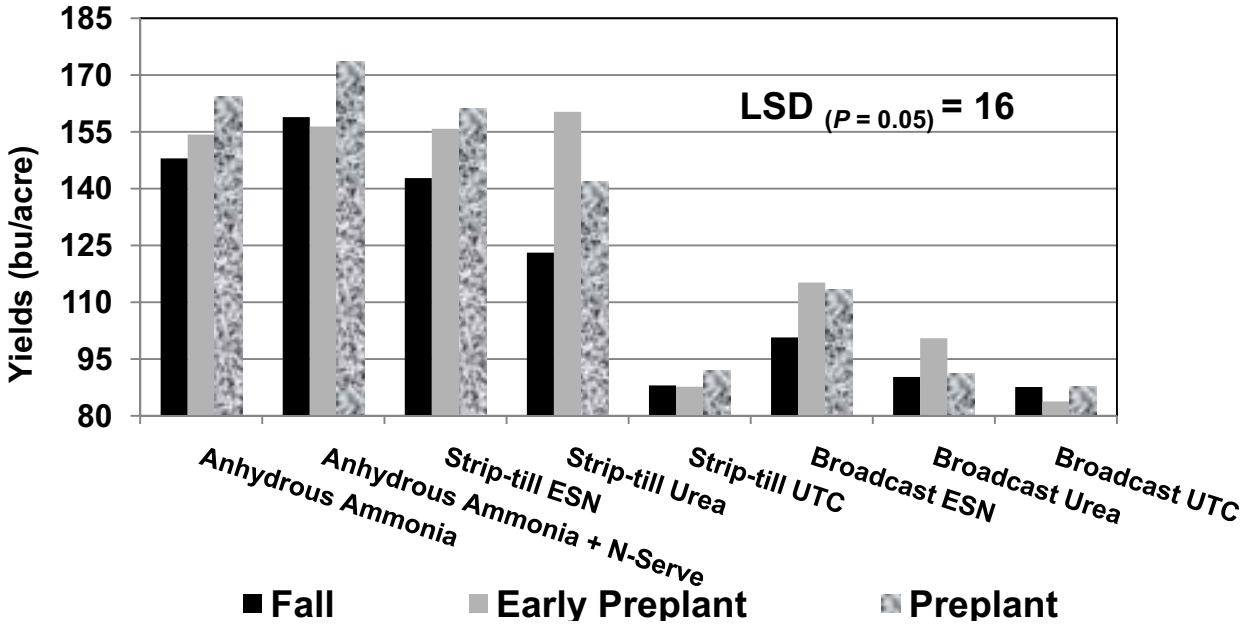

Figure 3. Corn grain yields following a clover cover crop due to the combination of N source and tillage/N placement. Yields were averaged over the 2008, 2009, and 2010 growing season.