# Effect of a Slow-Release N Fertilizer on Corn Yield

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## Introduction

We continue to look for technology that will enable us to manage nitrogen (N) fertilizer efficiently. Past research has studied the effect of nitrification inhibitors, sulfur coating, and time of application on N-use efficiency. Recently a polymer-coated urea material (ESN) has become available. Evaluation of the material in terms of efficiency of use by corn is necessary to help crop producers decide if the extra cost of ESN can be recovered either by applying less material or by producing higher yields at current rates. The objective of this study was to evaluate the effect of applying ESN on the efficiency of fall-applied urea.

## Materials and Methods

Both ESN and urea were hand applied in late fall at rates of 0, 40, 80, 120, 150, and 180 lb N/acre in 2002 and 2003. A set of urea-only treatments was applied in late April 2003 and 2004 for comparison. The previous crop was soybean both years. The crops were planted in May both years and were machine harvested in October both years. Plot yields were weighed in the field and a subsample was retained in order to determine moisture content. Yields on a per acre basis were adjusted to a moisture content of 15.5%.

## Results and Discussion

Corn grain yields in 2003 are shown in Figure 1. Average grain yield increased from about 130 bushels/acre to nearly 200 bushels/acre as the rate of applied N increased ($p>F=<0.01$). Averaged over N rates, fall ESN treatments yielded 177 bushels/acre; spring urea treatments yielded 172 bushels/acre; and fall urea treatments yielded 166 bushels/acre. The difference in yield between fall ESN and spring urea treatments is not statistically significant, but the difference between these two treatments and the fall urea treatments was significant at the $p>F=0.06$ level. The interaction between the main effects was not significant ($p>F=0.73$) suggesting that the fall ESN and spring urea treatments yielded higher at all rates of N.

Corn grain yield response to treatments in 2004 is shown in Figure 2. Average grain yield increased from about 140 bushels/acre to about 200 bushels/acre as the rate of applied N increased ($p>F=<0.01$). Averaged over N rates, fall ESN treatments yielded 178 bushels/acre; spring urea treatments yielded 183 bushels/acre; and fall urea treatments yielded 178 bushels/acre. Differences in yield due to the fertilizer material are not statistically significant ($p>F=0.22$). The fall urea and the fall ESN treatments had the same average yield. This may have been due to a failure of the coating on the ESN. We will investigate this in a laboratory study. The interaction between the main effects was not significant ($p>F=0.88$).

## Preliminary Conclusions

We believe that the ESN nitrogen fertilizer shows promise as a fall-applied material. If it can be shown that increases in yield, compared with urea, pay for the increased cost of the ESN, then Iowa farmers will have an alternative to fall-applied anhydrous ammonia.

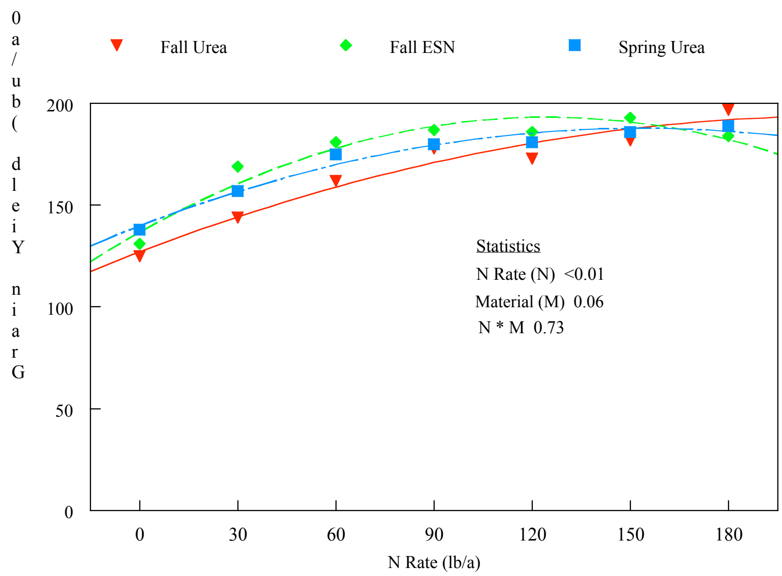


Figure 1. Corn grain response to N material and N rate at Kanawha, 2003

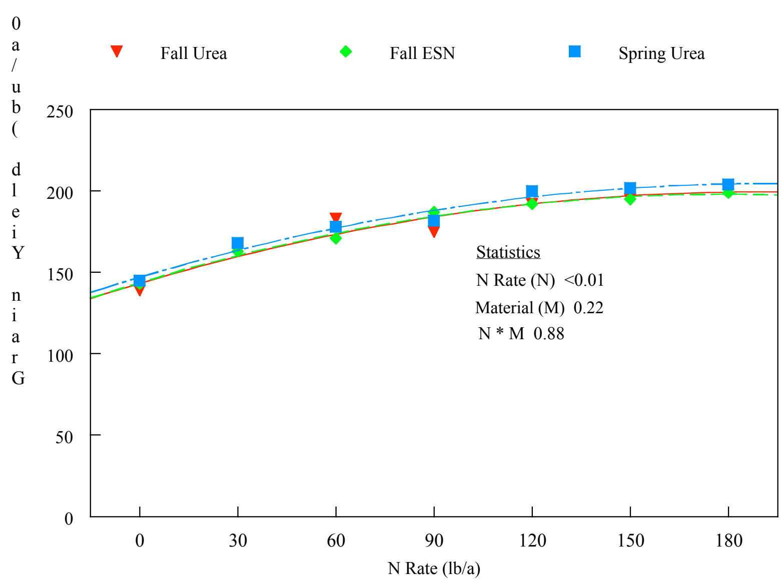


Figure 2. Corn grain response to N material and N rate at Kanawha, 2004