

AGROTAIN WITH UREA ON WHEAT

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Objective:

The objective of this study is to determine if the volatilization of nitrogen applied as urea is a serious problem for wheat applied as a surface broadcast in the spring.

Introduction:

Urea fertilizer has characteristics that can cause it to become unstable under certain conditions and become an ammonia gas and escape into the atmosphere when applied on the soil surface. The amount of volatilization loss depends on soil temperature, soil moisture, surface residue, soil pH and length of time before a rain. We usually do not get much volatilization loss before May 1 in Kentucky due to our cooler temperatures and frequent rains. However, there have been questions and a few indications that volatilization losses of nitrogen from surface broadcast urea might be a problem with March applications of urea on wheat. In order to look at this possibility, Ammonium nitrate (which will not volatilize), urea and urea plus agrotain (an urease inhibitor that reduces the volatilization risk) were compared on wheat at a reduced nitrogen rate. The lower nitrogen rate should allow the yield to be a good indicator of nitrogen available to the plant.

Method:

This experiment was carried out on a Pembroke soil at the UKREC at Princeton, Kentucky. The wheat was no-tilled into corn residue harvested in September. The

area was fertilized (P, K and lime) according to a fall soil test and UK recommendations. A fall contact herbicide was applied at planting and an insecticide about 30 days after planting. A herbicide and insecticide were applied in late March and a fungicide at initial heading.

The nitrogen treatments were broadcast on the soil surface by hand and the Agrotain was mixed with the urea at the rate of 5 qts./ton of urea. The nitrogen was applied at the rate of 60 lbs. of N/ac. There were 4 replications of each treatment.

Results:

The table shows the yields of the wheat with the 3 different treatments applied at the 3 different times.

The yields with Ammonium nitrate were numerically higher than those with urea. The differences were small and not statistically different so the two fertilizer sources were probably equal in effectiveness. The urea with agrotain treatment was also equally effective in 2 of the 3 dates of application. This treatment yield was statistically lower on the March 17 application.

Rains or soil incorporation will move the urea fertilizer into soil where any ammonia gas produced will not be lost. The application date with the most days before a rain was March 14. There were no differences in nitrogen sources on that date.

The other 2 application dates only had 3 days before a rain. It would be expected that volatilization loss usually occurs in the first 2 days after application. There was little or no difference between the urea and the ammonium nitrate which indicates the ammonia volatilization was not a problem.

The agrotain coated urea yielded less with the March 17 application. Past research has indicated that urea and urea with agrotain usually yield the same if volatilization is not a problem. An agrotain treatment can result in higher yields if volatilization losses occur. One possible explanation for the lower yield with the use of agrotain is the delay of the urea fertilizer's conversion to ammonium and then to nitrate with the use of agrotain. This delay could have reduced the availability of available nitrogen to the

little volatilization loss would occur with only a 3 day window, since little or no wheat crop at a time when rapid uptake of nitrogen was needed.

Conclusions:

The information gained from this trial indicates that the surface application of urea to wheat in March in Kentucky is a good source of fertilizer and the potential loss of nitrogen due to volatilization would be none or small except in very unusual situations. The information gained also raises a possible question for the use of agrotain coated urea on wheat when applied near jointing or after jointing. The delayed availability of the nitrogen to the crop at time when high amounts of nitrogen are needed may cause a yield reduction.

Effect of Agrotain and Nitrogen Source on the Yield of Wheat				
Treatment*	Date N Applied	Yield (bu/ac)	Days Before Rain	Avg. High Temperature before Rain (F°)
Am. Nitrate	Mar. 14	77.1 A**	6	62
Urea	Mar. 14	70.7 A	6	62
Urea/Agrotain	Mar. 14	73.1 A	6	62
Am. Nitrate	Mar. 17	77.8 A	3	58
Urea	Mar. 17	75.8 A	3	58
Urea/Agrotain	Mar. 17	67.9 B	3	58
Am. Nitrate	Apr. 3	80.3 A	3	67
Urea	Apr. 3	77.9 A	3	67
Urea/Agrotain	Apr. 3	71.6 A	3	67
<p>* All nitrogen treatments applied at 60 lb/ac of N. ** Different letters at same date indicate a statistical difference in yield.</p>				