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# Crop Soil News

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"It is the crops  
that feed the  
cows that make  
the milk  
which creates  
the money."

## New Research to Prevent Nitrogen Losses From Early Spring Applications

With the shortage of forage, as I mentioned in the January newsletter, the earliest crops to refill the silos are cool season grasses or winter forages such as triticale, with nitrogen applied. It is an economical use of nitrogen and will give the most rapid return on investments. In research and on-farm results, nitrogen **TRIPLED the total yearly yields** on perennial grasses where it was applied. Crude protein jumped from 15% up to 21%. Triticale increased more than 50% in both yield /acre and crude protein.

*This is the first place to put your money this year especially if you are short on forage!*

### Three Major Cautions:

Some recent research by Dr. Richard Engel, Dr. Clain Jones, and Dr. Tom Jensen as reported in Better Crops/Vol. 96 (2012, No. 1) pp. 9 -11; has up-ended some long held misconceptions about urea applications and losses through volatilization. We used to think that as long as it was cold or even cool, there was not much loss from conversion of urea to a gas. They found that there are **major losses** even at temperatures **below 40F**. Losses were high when applied to cold or frozen surfaces, especially if they are high in water and/or have some snow on them.

In over 8 trials, the losses were from 8 to 22% in one week. Over the longer 8 -10 week trial the losses were **as high as 44%** with an average of 26.3%. Of the 8 trials, half had losses of >30%. Even with temperatures near freezing, the worse cases were frozen soils with a saturated surface (see last month's newsletter on frost tillage, how moisture is concentrated in the surface of frozen ground) and a light coat of snow. This is common in the Northeast where some of the farms are pushing the season for an economic return on their investment. Remember, you have to pay for the total fertilizer spread, not just the portion that gets into the plant.

The common factor for high loss is that if the soil was high water content (**frozen soils thawing; a layer of snow on the soil; or just wet soils**) when the urea was applied. The surface water dissolves the urea and then as the surface dries, a significant portion of the dissolved urea leaves as a gas instead of attaching to the soil. Most of the studies did not have significant rainfall after the nitrogen was spread. If you get rainfall or snow after application on non-frozen ground, the urea has much less loss. In their study when they had rain or snow with moisture of  $\frac{3}{4}$  of an inch after application, then losses were less than 10%.

**Adding an anti-volatilization agent kept losses under 10%**. Treated urea loss was 63% less than the untreated in the same field. On acid soils, the rate they used protected the urea for two weeks. After that the losses were equal to the untreated. On high pH soils

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where losses are often higher, the protection extended longer than two weeks. Losses from the treated urea the first week were 0 – 1.5%. For the 8 – 10 week trial the losses range from 1.7% to 18% (the rate was only designed to protect two weeks).

**Bottom Line:** Applying nitrogen to frozen ground and especially applying urea on snow is a prescription for major losses before the plant ever sees it. Applying urea to thawed soil just **before** a rain or some snow, will capture the major portion of your nitrogen investment for the crop to use. As weather prediction is an inexact science and the custom applicators can only be in 10 places at once, it is strongly suggested that an **anti-volatilization agent** be used. If moisture events are frequent in the weather prediction, you can save some cost by using the half rate.

### Caution #2, Sulfur

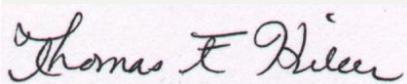
Recording data has shown that there has been a tremendous decrease of atmospheric precipitation of sulfur in the Northeast. Thus what we used to get for free we now have to buy. Available sulfur will not last long in a soil. It is very similar to nitrogen in that it can leach, volatilize as a gas (similar to denitrification) the loss of which increases the more tillage there is; or be tied up in organic matter. A deficiency is more likely to occur on acidic, sandy soils, soils with low organic matter levels and high nitrogen inputs, and soils that are cold and dry in the spring which decreases sulfur mineralization from soil organic matter. The latter effect is what we will often experience with early nitrogen applications on grass or winter grain forages. There is an excellent fact sheet at <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet34.pdf> that will give you a quick understanding of sulfur in the plants and in the soil. If the field has **not had manure the past year** it is highly suggested that sulfur be added. A suggested rate is to apply 1 lb. of sulfur for every 10 lbs. of nitrogen. Urea mixed with ammonium sulfate will produce a 40-0-0-4S mix. At the Cornell Valatie Research farm in winter triticale where we added 115 lbs. of N/acre as urea and on another plot 100 lbs. of N as ammonium sulfate; the higher N rate from urea produced 14% crude protein while the ammonium sulfate produced 17 – 18% crude protein. This holds true with all grasses, cool season or the winter forage grains such as triticale. For those applying 32% solution by stream bars, there are several sulfur fertilizers that can be added to the solution.

### Caution #3, Timing

Farmers need to make the delicate balance of getting the nitrogen on while the field is trafficable, vs. putting it on so early that most of the nitrogen is lost. For perennial sods, the established root system will get much of the nitrogen applied.

For winter grains it may not pay to rush the application until after green-up. For larger plants from early planting, pushing nitrogen in early March with this very warm weather we have, could accelerate the growth. Then when a cold snap hits in late April (anything is possible this crazy year) the plants (wheat, rye, triticale) could be killed or severely injured. For the smaller plants that were planted late, they have limited root system to absorb all that nitrogen and so will leave it in the soil where it is subject to losses. Our suggestion for the Albany, NY area is to wait until the end of March to apply your nitrogen to your winter grain forages.

Sincerely,



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