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**A LITTLE BIT COUNTRY
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Ammonia Loss With Urea Measured

When applying urea there is always concern about the amount of ammonia lost to volatilization if the urea is not incorporated into the soil or rainfall is not received soon after application. The loss of ammonia has been thought to be lower when applied at lower soil temperatures. While this may still be true, research using new ammonia measuring equipment shows substantial amounts of ammonia is lost even at temperatures near freezing.

Rich Engel at Montana State University has identified ammonia losses from surface applied urea, using urea treated with NBPT (Agrotain) and urea not treated with NBPT. His research involved the application of urea and urea treated with Agrotain applied on the surface in no-till winter wheat fields. This research was urea over an eight week time period starting at different weekly intervals. The environmental conditions where the highest N losses occurred were a moist soil surface and temperatures that averaged around 33-35 degrees F. with no significant rainfall for several weeks to move the dissolved urea into the soil.

The highest N losses occurred from a treatment made March 26 of 2009. This was a no-till winter wheat field and an application of 89 lbs N/acre. Nearly 40% of the urea was lost from the untreated urea and 18% from the Agrotain treated urea. In this situation, the soil surface was moist enough to dissolve the urea prills, but there was no rainfall to move the dissolved urea into the soil where ammonia losses would be minimized. In the first two weeks, almost 30% of the untreated urea was lost. The Agrotain treatment lasted about two weeks. After two weeks, the untreated urea and the Agrotain treated urea acted the same.

This is an ongoing research project and more years of data will be collected for evidence on how much N can be lost from surface applied urea under very cool conditions. Now that we know nitrogen losses from surface applied urea can be substantial, even under temperatures near freezing, what should growers do? Timing a urea application with a rainfall within 2-3 days will minimize losses, but that is hard to do, especially in Western North Dakota and Montana. Treating urea with a product like Agrotain will reduce ammonia losses from surface applied urea for about two weeks. If a rainfall even of 1/3" to 1/2" occurs during that two week period, losses will be minimal. If you apply urea and the soil surface is moist enough to dissolve the prills, but not enough to wash the urea into the soil, losses could be greater than 25% in two weeks. Losses like that will be much greater than the cost of the Agrotain or the lost income from not having enough N for good yield. The most important result would be a very unhappy grower who wants to know where his nitrogen went.

While this is only one year of data it does confirm some past situations when urea was surface applied under very cool conditions and losses were obviously more than expected. To review all of the data from this research project, go to <http://landresources.montana.edu/ureavolutilization/>.