The Chem Gro Crop Watch, **Issue #3, 5/3/13**

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How much fall applied nitrogen have we lost? This has been the burning question in everyone's mind the last few weeks as we look at our fields that have received 6-8" of rain during the month of April. Many of our fields have reached the saturation point several times over and the tile lines were flowing at full force. It is easy to speculate that all is lost and feel like doom and gloom has taken over you when looking at fields in the picture at the right. However, nitrogen is a very complex nutrient. It is somewhat like a chameleon; it can change it's appearance depending on the environment that it is in. That is why there is never an easy Yes or No type answer when someone asks the question "how much nitrogen have we lost?" There is a lot of agronomy science behind the scenes that determines how nitrogen interacts in the soil. My attempt is to give you some agronomy 101 lessons on nitrogen interactions in the soil, give you my OPINION to answer the initial question above, and hopefully not leave dazed and confused on the issue.

Agronomy Lesson #1. Your soil has a negative (-) electrical charge. Because of this negative charge, it has the ability to hold onto positive charge (+) nutrients. This is referred to as the cation exchange capacity or CEC. The more organic matter and clay the soil has the higher the CEC value.

At some point in your life you probably played with magnets. When you put a negative and positive side of two magnets together, they attracted each other. However, when you tried to put two positives together or two negatives together, they repelled each other. Your soil reacts much in the same way that it will attract positive charged nutrients and repel negative charged nutrients.

Agronomy Lesson #2. Nitrogen likes to change it's electrical charge. When we apply anhydrous ammonia (NH_3), it has a neutral charge. However, when NH_3 comes into contact with water, it steals a hydrogen molecule from water and then becomes ammonium (NH_4+). It now has a (+) charge, and it is attracted to the (-) charge of your soil and it is considered safe and secure from heavy rains like the picture above.

However, this good tiding eventually comes to an end. When soil temperature is greater than 50 degrees, there are two naturally occurring types of bacteria that convert the NH_4+ to nitrate (NO_3-) and nitrite (NO_2-). The warmer the soils, the faster the conversion. The colder the soils, the slower the conversion. Since nitrate and nitrite both have a negative charge, we refer to these forms of nitrogen being water leachable since they are no longer attracted to the soil's CEC. If your field looked like the picture above and the nitrogen was in the (-) charge form, substantial amounts of nitrogen can be lost.

Agronomy Lesson #3. N-Serve is a product that is added into anhydrous ammonia during application. N-Serve is bactericide that kills the two pesky forms of bacteria in the soil that convert NH_4+ to NO_3-. This can give you up to 4-6 weeks of protection of this conversion (depending on soil

temperature and organic matter levels). However, eventually the bacteria build back up in populations and the process continues. The protection that N-Serve can give in a wet spring can be huge in a year like this.

Now, back to the original question, "how much nitrogen have we lost?" Although I don't like to give hard numbers to a question like this (I will let the universities provide the hard data by the research they do); I will give you my thoughts based on my observations.

1. We have had a very cold March and April. In the month of April, we only had a few rare days when soil temperatures maintained above 50 degrees at the 4" depth at 10:00 am as measured on this website: http://www.isws.illinois.edu/warm/soiltemp.asp. As you remember, cold soils delay the conversion of NH_4+ to NO_3-. While our cold spring has been miserable for planting our crops, it has been a huge advantage in preserving our nitrogen in the NH_4+ form in the soil.
2. I estimate that about 90% of our customers at Chem Gro Inc. use N-Serve in their fall applied anhydrous ammonia nitrogen. Again, by reducing the "bad" bacteria populations, the longer the nitrogen will be in the NH4+ form.
3. After custom applying 1200 acres of NH_3 this spring I have learned two things:
    a. If you get the chance to drive a John Deere 8360R with the front suspension, active seat, and IVT transmission…..and get to listen to Amy Lee of Evanescence sing to *me* all day on an awesome speaker system…..Wow!! I told my boss Mike Pollock that he just lost a salesman and gained an applicator. He then threatened that he would put me in a sprayer since it has been a challenging spring to get spraying done. That is where I draw the line, but it would be my luck he would put me in a "big rig" like this one ☺

    b. Most importantly, I noticed from being in the fields this spring that our soils never stunk like a swamp. In years of high nitrogen loss, our soils will smell like a fishy/swampy odor. This is a result of NO_3- and Sulfate Sulfur (SO_4-) converting to a gas form and leaving the soils to the atmosphere. Not only is the smell offensive to our nose, but to our pocket books as well!

To sum it all up, if you applied NH_3 last fall, and used N-Serve; I feel that nitrogen loss this spring was minimal. I believe our cold soils this spring was a blessing for all the rainfall that we are accumulating to correct our drought conditions from last year. However, I will leave you with two more things to consider:

- If you were planning on some of the left over nitrogen being available from last year's poor crop (example if you are corn on corn), I would consider that nitrogen to be swept out of the tile lines or just too deep in the soil profile to be usable. All of last year's nitrogen would have been fully converted into nitrate nitrogen, NO_3-, and subjected to all this rain.
- I still believe side-dressing additional nitrogen this year will pay. I know that sounds contradictory to everything that I just said, but this winter I attended a seed/agronomy meeting with DeKalb. One of the messages that I walked away from the meeting was that many of these new corn genetics have a hunger for some late season nitrogen for grain fill. Side-dressing more nitrogen is a great way to feed that need. Last year, in our drought conditions, a customer of ours had a 17 bushel corn yield increase comparing 140# N fall applied plus 50# N side-dress versus 180# N fall applied (side by side).

That's my 2 cents worth…..the choice and decision is always yours. Lonne