Re-Evaluate Your Fall Nitrogen Application Program

CHAMPAIGN, ILL.

During the past several seasons, a number of farmers completed harvest early and then proceeded with the fall application of anhydrous ammonia. In some cases, a nitrogen stabilizer was not used and application was done before the soil had cooled to the recommended soil temperature of 50 degrees Fahrenheit. Bob Frazee, University of Illinois Natural Resources Educator, reports that a significant amount of fall-applied nitrogen was lost in saturated soils this season through denitrification and leaching through drainage tiles. As a result, many Illinois cornfields exhibited symptoms of nitrogen deficiency by midsummer.

This waste of nitrogen is not only very costly to producers, but is contributing to environmental problems in lakes and rivers throughout Illinois and in the Gulf of Mexico. The Gulf Hypoxia Zone is a 'dead zone' near the mouth of the Mississippi River where the dissolved oxygen level is below 2 ppm and most aquatic life is severely limited. During 2009, the Gulf Hypoxia Zone was 3,000 square miles in size, which is larger than the land area of the state of Delaware.

More research is needed, but many hydrologists feel that Mid-west agriculture is at least partially to blame for this 'dead zone' due to high levels of sediment, nitrogen, and phosphate in surface water runoff flowing into the Mississippi River. This summer, new research from the United States Geologic Survey documented that Illinois now has the dubious distinction of being the state which is contributing the greatest amount of nitrogen and phosphorus to the Gulf of Mexico.

With high anhydrous ammonia costs predicted for this fall coupled with increased environmental concern, many farmers have been asking the question "How and when should I apply my nitrogen to maximize yield and minimize loss?"

To enhance nitrogen efficiency and avoid environmental problems, Frazee encourages producers to examine the form of nitrogen being used, when it is applied, how it being applied, using nitrification inhibitors, and taking credit for other nitrogen sources.

If producers still choose to fall apply their nitrogen, Frazee offers the following recommendations. Producers should wait until the third week of October or until the soil temperature at 4 inches is below 50 degrees Fahrenheit (F) to apply ammonium nitrogen, unless they plan to use a nitrification inhibitor. At 50 degrees F. most of the nitrogen won't convert to nitrate or be lost to leaching or denitrification. According to Frazee, fall applications with an inhibitor can be made when soil temperatures are no higher than 60 degrees F.

The Illinois State Water Survey and the Illinois Department of Agriculture are operating an excellent website, which shows on a daily basis, the 4-inch bare soil temperatures across the state at selected Illinois Climate Network sites. Check out http://www.sws.uiuc.edu/warm/soiltemp.asp These data are intended to assist Illinois farmers with timing of post-harvest nitrogen (N) fertilizer application and are specifically representative of the actual locations where soil temperature observations are made. Elsewhere, these data should be viewed as a guide to general soil temperatures within a given region, and as indicative of current temperature trends progressing across the state. Farmers and applicators should monitor the soil temperature of each field before fall application of N fertilizer.

University of Illinois research suggests that ammonium fertilizers are the best form of nitrogen for fall applications. They give added protection against leaching from heavy rains in the fall and winter, if they are applied when temperatures are cool enough to prevent the ammonium from converting to nitrate.

Research throughout the Midwest has shown that when inhibitors were applied in years of excessive rainfall, increases in corn yield ranged from 10 to 30 bushels per acres. However, when moisture conditions were not as conducive to denitrification or leaching, inhibitors produced no increase.

University of Illinois research shows that the following soils will probably benefit the most from nitrification inhibitors: poorly drained soils, sand and coarse-textured soils, and even moderately well-drained soils that undergo frequent periods of 3 or more days of flooding in the spring.

With agriculture being identified by the Illinois EPA as the major source of surface water pollution, it is essential that farmers take steps to minimize the runoff of sediment, nutrients, and pesticides. If farmers do not exert caution with their fall nitrogen applications, Frazee is concerned that state and federal water quality regulations may be enacted which would have an adverse impact on Illinois agriculture. Δ