

Fall Anhydrous Applications Carry Risks and Rewards

by Andy Luke, Regional Agronomy Specialist

As harvest winds down, many farmers in the area begin applications of anhydrous ammonia before the frozen ground forces them to park their tractors for the winter. While this is a wide spread practice, fall nitrogen (N) applications may not be the best source of N for next year's corn crop.

There are several reasons why producers may want to apply anhydrous in the fall. With more acres being no-tilled than in the past, labor and equipment that were typically used for fall tillage are now available for applying anhydrous ammonia. Mild temperatures in November and December also allow field work to be completed well after harvest has wrapped-up. Prices for anhydrous ammonia are generally lower in the fall than in the spring as well, making fall applications economically beneficial to producers. Finally, many farmers prefer having some N applied when spring arrives to ease the workload and prevent planter holdup when rainy weather or supply shortages prevent anhydrous from being applied.

Anhydrous ammonia is applied to the soil in a gaseous form. Upon reaching the soil, it interacts with clay particles, organic matter and soil water to form ammonium. The ammonium form of N is held to exchange sites and is not subject to loss in the soil. While ammonium is stable in the soil, it is often converted to nitrate through a microbial process called nitrification. Unfortunately, nitrogen in the nitrate form is subject to losses through leaching or denitrification. Leaching occurs when the nitrate form of N moves through the soil profile and out of the root zone with soil water. Denitrification occurs when nitrogen converts to a gaseous form and is lost to the atmosphere. This can include volatilization during application or through bacterial feeding on nitrate in the topsoil.

What makes fall applications of anhydrous ammonia risky are unknown weather conditions that may lead to N loss before spring. As I mentioned above, nitrification is a process driven by microbes in the soil. Therefore, when little microbial activity is occurring, N in the ammonium form is safe from losses. However, warm temperatures and moist soils increase nitrification and make it more likely that some applied N is lost before the corn crop has a chance to use it. Once soil temperatures drop below 40 F, microbial activity nearly stops and nitrification no longer occurs. Warm, wet spells during the winter and spring months can raise soil temperatures and lead to nitrification and N losses, though.

If applying anhydrous ammonia in the fall, there are a few steps you can take to lower the risk for next year's corn crop. First, only apply ammonia after soil temperatures have reached 50 F and are falling. Be sure to use a nitrification inhibitor as well. While nitrification inhibitors cannot eliminate nitrification, they can help keep it in the immobile ammonium form until it is ready to be used by the crop. Always make sure soil conditions are right and that N is not being lost to volatilization at application. This includes checking that the knife tracks are sealing and that the equipment is not compacting the soil. Lastly, do not apply all of the N that you are planning to use for next year's crop in the fall. Think of a fall application as insurance that nitrogen will be available early for 2018's corn, but plan to supplement additional N to meet your growing crops requirement.

For any additional information on anhydrous application risks, contact your local University of Missouri Extension agronomist, Andy Luke, at (660)-425-6434 or lukea@missouri.edu.