



Issue 412: November 2018

Denitrification

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The southeast South Dakota area has had abnormally high amounts of rainfall over the 2018 growing season. Because of this we have seen a lot of variance in our corn yields this fall. One of the biggest causes of lower yielding fields is denitrification in our fine textured soils. Denitrification often gets misdiagnosed as leaching in our area - it is important to know the difference.

Once nitrification has occurred, your nitrogen is now at risk of both leaching and denitrification. Leaching occurs most often in course textured soil during times of heavy rainfall. Since nitrogen and soils are both negatively charged, nitrogen is not able to bond to soil particles. Therefore, as rainfall increases and water infiltration speeds up through the soil, so does the rate of nitrogen leaching. Fine textured soils do not see as high of rate of leaching as course textured soils because water moves through it at a much slower pace. The best way to manage leaching is to split apply your nitrogen and apply the majority closest to when the plant will be using large amounts of nitrogen.

Denitrification is a much larger problem than leaching in southeastern South Dakota. This is due to a larger percentage of heavy fine textured soils. Denitrification happens during times of heavy moisture that cause soils to be waterlogged. During these periods, oxygen is sealed off in the soil due to waterlogged soils. Soil bacteria need oxygen to live, so they start to utilize the oxygen from plant available nitrate NO_3^- , leaving the leftover nitrogen in an unusable form for corn.

Denitrification can start to occur at 60-70% soil saturation and as soon as 15-30 minutes after saturation. As microbial activity increases along with an increase in soil temperature so does denitrification. Rates of denitrification will vary due to soil temp, percent waterlogged, percent organic matter, etc.; but you can roughly figure that it will happen at a rate of 3-5% per day.

Management of denitrification is mostly out of our hands, but a few things that can help include improving drainage, split applying nitrogen, and slowing down the nitrification process. Each of these are an option, but are still just one large rainfall event away from suffering loss from denitrification. Although leaching is a very real problem, it can be more predictable and easier to manage. Talk with any of your TTA's to learn how to better manage your nitrogen for the 2019 growing season.

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