Potential Nitrogen Loss in Spring 2017

John E. Sawyer
Iowa State University, jsawyer@iastate.edu

Follow this and additional works at: https://lib.dr.iastate.edu/cropnews
Part of the Agricultural Science Commons, and the Agriculture Commons

Recommended Citation
https://lib.dr.iastate.edu/cropnews/2447

The Iowa State University Digital Repository provides access to Integrated Crop Management News for historical purposes only. Users are hereby notified that the content may be inaccurate, out of date, incomplete and/or may not meet the needs and requirements of the user. Users should make their own assessment of the information and whether it is suitable for their intended purpose. For current information on integrated crop management from Iowa State University Extension and Outreach, please visit https://crops.extension.iastate.edu/.
Potential Nitrogen Loss in Spring 2017

Abstract
Lately it seems to be an annual question with no exception this spring – has there been nitrogen (N) loss from my applied N? That question should also include what has been the N loss from the soil N supply or residual nitrate-N. There is usually tile drainage every spring and sometimes but not usually in the late fall (remember a couple of years ago). Also, losses if soils become saturated (free water filling the soil pores, standing water, anaerobic conditions) and soils are warm then denitrification happens (biological conversion of nitrate to N gas). So some N loss from soils is typically occurring and can be small or large depending on many factors. Predictions of the effect on N supply, additional N fertilization need, etc. in wet periods is difficult. There are several approaches to take in making estimates of N status or loss.

Disciplines
Agricultural Science | Agriculture
Lately it seems to be an annual question with no exception this spring – has there been nitrogen (N) loss from my applied N? That question should also include what has been the N loss from the soil N supply or residual nitrate-N. There is usually tile drainage every spring and sometimes but not usually in the late fall (remember a couple of years ago). Also, losses if soils become saturated (free water filling the soil pores, standing water, anaerobic conditions) and soils are warm then denitrification happens (biological conversion of nitrate to N gas). So some N loss from soils is typically occurring and can be small or large depending on many factors. Predictions of the effect on N supply, additional N fertilization need, etc. in wet periods is difficult. There are several approaches to take in making estimates of N status or loss.

Remember that guidelines for N application rates for Iowa corn do take into account “normal” N losses as N rate research trials are conducted in the field and with good management. This is especially important as those N rate trials incorporate supply and loss of soil derived-N, not just applied N. This means that accumulation of N rate research trials builds in variation of soil N supply and climatic conditions.

**Approaches to estimating N loss**

Use the Late Spring Soil Nitrate Test (LSNT). Uses of the LSNT in Iowa corn production was recently described in a new ISU Extension and Outreach publication [CROP 3140](https://crops.extension.iastate.edu/cropnews/2017/05/potential-nitrogen-loss-spring-2017). The LSNT test for estimating plant available N before sidedressing has been around for many years.

Use modeling, which is relatively new for production ag. There are several currently in the marketplace, including the ISU Extension and Outreach [FACTS](https://crops.extension.iastate.edu/cropnews/2017/05/potential-nitrogen-loss-spring-2017) website that supplies information on nitrate-N in the soil profile. FACTS will soon be updated for 2017.
Estimate nitrate-N production and loss during periods of soil saturation. An example of this was discussed in a 2014 ICM News article, *Estimating Nitrogen Loss in Wet Corn Fields*. Important components are the estimation of how much nitrate-N has formed from applied N by the time of wet conditions and the length of soil saturation (which can vary greatly across fields, ex. ponded vs. not ponded areas and runoff vs. infiltration). When soils are warm, this loss pathway can be rapid and large, but slow when soils are cool or there is little nitrate present.

Use the springtime rainfall total. Details of this approach were covered last spring (June 6, 2016) in an ICM News article, *Precipitation and nitrogen this spring*. The amount of spring rainfall to trigger the potential for additional N application need was updated with research data from 2016. Those rainfall totals are now 17.8 inches from March 1 to June 30 for Southeast Iowa and 15.5 inches from April 1 to June 30 for the majority of Iowa. These rainfall totals have about a 76 percentage for estimating correctly (adequate N or deficit N) if N loss is sufficient enough to consider additional N application. One does not need to wait until the end of June to add up the total. That can be done on an on-going basis and if the total begins to approach those values, then be thinking about plans for applying additional N (according to precipitation maps, we have not reached those rainfall totals, but localized amounts could be different). A caveat to using the rainfall totals is if there are heavy, short duration, rainfall events. If water runs off the field, and does not get into the soil profile, then there should be a discounting off the total. Also, if the rainfall reaches those totals in the early spring, there should also be some discounting off the total due to less nitrate buildup and less denitrification with cool soils. For example, total rainfall amounts in just an individual month, like April or May, do not provide the same level of success as when June rainfall is included. The rainfall triggers are related to use of suggested economical N rates (MRTN) from the [Corn Nitrogen Rate Calculator](https://crops.extension.iastate.edu/cropnews/2017/05/potential-nitrogen-loss-spring-2017). If higher or lower N rates were applied to fields, then the odds of needing additional N go up or down.

**Resources for nitrogen rate decisions**

- *Use of the Late-Spring Soil Nitrate Test in Iowa Corn Production* (CROP 3140)
- [Corn Nitrogen Rate Calculator](https://crops.extension.iastate.edu/cropnews/2017/05/potential-nitrogen-loss-spring-2017)
- [ISU Extension and Outreach Soil Fertility Web Site](https://crops.extension.iastate.edu/cropnews/2017/05/potential-nitrogen-loss-spring-2017)
- *Nitrogen Use in Iowa Corn Production* (CROP 3073)
- *Concepts and Rationale for Regional Nitrogen Rate Guidelines for Corn* (PM 2015)
Accumulated Precipitation (in)
March 01, 2017 to May 23, 2017

(c) Midwestern Regional Climate Center

0.01  0.1  0.5  1  1.5  2  3  4  5  7.5  10  12.5  15

Links to this article are strongly encouraged, and this article may be republished without further permission if published as written and if credit is given to the author, Integrated Crop Management News, and Iowa State University Extension and Outreach. If this article is to be used in any other manner, permission from the author is required. This article was originally published on May 26, 2017. The information contained within may not be the most current and accurate depending on when it is accessed.

Category:  Soil Fertility
Crop:  Corn
Tags:  estimating nitrogen loss  Corn Nitrogen Fertilization

Author:
https://crops.extension.iastate.edu/cropnews/2017/05/potential-nitrogen-loss-spring-2017
Dr. John Sawyer is a professor of agronomy and extension specialist in soil fertility and nutrient management at Iowa State University. His extension program involves soil fertility management, efficient crop nutrient utilization, and environmentally sound fertilizer and manure systems. Dr. Sawye...