

What's so important about nitrogen?

Nitrogen availability limits the productivity of most ecosystems in the US, whether agricultural, forested, coastal, or other. For instance, consider the familiar case of two corn fields, pictured to the right. Which one has sufficient N? Which one is N deficient?



Yes! The pale yellow leaves at the top and many dead leaves below indicate that the supply of N is short of the crop's demand for N.

N Deficiency and Excess

N deficiency in crops

When N is deficient in plants, we often see a reduction in new growth and yield, yellowing (chlorosis) of older leaves, and earlier leaf drop in the fall. New growth may have a red to red-brown color and the plant will have a lower crude protein content. The photo on the right shows a corn stand with symptoms of N deficiency.



What do we see with excess N?

An abundance of N exists on some dairy farms. With too much N in the farm system, we often see crops with very dark leaves and stems as in the bottom photo (e.g. for corn, from soil to tassel). An abundance of N can cause excessive vegetative growth, at the expense of grain or fruit yield. Excess N can also lead to increased lodging (i.e. stalks bending and breaking) and delayed maturity, resulting in lower yielding and lower quality crops at harvest.

What else could happen if excessive N is available to the crop? Nitrogen that isn't taken up by the crop is more susceptible to losses to the air, groundwater, streams, etc. When N is lost from the root zone and out of reach of the crop's roots, it often represents a financial loss. The investment in additional fertilizer and/or manure applications will only give a return if it results in a significant improvement in crop yield and quality.



Applying the right amount of N for a crop

The goal is to make the most efficient use of the investment in nitrogen, which means not shorting the crop, but also not applying N in excess. To develop a plan for efficient N use, consider a few factors about each field.

- First, estimate the crop's need for N, i.e. a gross N requirement.
- Next, N can become available to crops from many sources, including soil organic matter, plowed or killed sods (e.g. hayfields), and past and current applications of manure. Factoring the contribution of N from these sources will help make the most efficient use of supplemental fertilizer.
- Then factor how efficiently the crop will use the N, based on the soil type.
- Finally, the need for supplemental N is determined by crediting the N available from all sources against the gross N requirement.

The basic concepts behind this approach are found in the N cycle. Continue to the next page for a tour through the N cycle.