soilbiotics.com
SoilBiotics®

Breaking Down Nitrogen

Most everyone involved in production agriculture agrees that nitrogen (N) is one of the most essential components in crop growth programs, and one of the most misunderstood. It is the gold standard for applied nutrients, yet has also become the poster boy for overapplication and run-off caused fertilizer pollution. Nitrogen is critical for plant growth. Plants can absorb nitrogen **only** in certain forms, regardless of whether it is foliar or soil applied. Under natural conditions, **unhealthy** soils contain limited amounts of usable nitrogen, so plants cannot reach their full potential without the application of supplemental nitrogen fertilizer. To see where the future of N is going, you must first return to the roots (pun intended) of nitrogen.

The most prevalent forms of nitrogen used in production agriculture are:

1. nitrate (NO_3)
2. ammoniacal (NH_3-N)
3. urea.

These common fertilizers must undergo transformation as part of the Nitrogen Cycle before plants can use them. This process is known as ammonification and then nitrification, which happens over days and weeks. Because of the time needed before it can be absorbed by the plants as nitrate, much of the originally applied nitrogen can be lost to the atmosphere (volatilization) or carried away by water (leaching). Plus, ammonification creates ammonia gas, which can be toxic to many seeds and seedlings before the nitrification process changes it into nitrate. Nitrate forms of nitrogen can become unreliable in their conversions under cool conditions, potentially limiting their use early in the season. The use of ammoniacal forms of nitrogen becomes problematic during high temperature periods, so use is possibly limited for the latter half of the growing season.

Nitrogen in Living Things

A relatively new form of N for use in agriculture is organic nitrogen. Nitrogen is a component of amino acids. Amino acids are the building blocks of all proteins. Proteins make up the structural components, (tissue, enzymes and hormones) which are essential for the functioning of all living things. This is an organic form of nitrogen, hence the term "organic nitrogen" to describe a nitrogen compound that had its origin in living material rather than being synthetically produced. To take maximum advantage of the various forms of nitrogen, growers must weigh the pros and cons of each form of nitrogen and the many aspects of nitrogen use: input cost, yield advantage, environmental impact, and so on.

(815) 929-1752 | 2902 West State Route 17 | KANKAKEE, IL 60901

soilbiotics.com
SoilBiotics®

Primary Benefits of Using Organic Nitrogen:

- It is immediately available to the plant. There is no need for the bacterial conversion of the Nitrogen Cycle prior to absorption. The nitrogen is already in a larger molecular state. **(see image on PAGE 3).**
- It will not leach from your soils, decreasing concern about ground water contamination.
- It is not subject to volatilization, decreasing concern about atmospheric loss.
- Organic nitrogen has a consistent release curve, even under cool or warm conditions. This makes the expected response timeline much more predictable.

When fertilized with organic nitrogen, plants:

- Expend less energy transporting nutrients.
- Have more energy for larger yields, pest and disease resistance, and higher quality production.
- Have faster nutrient absorption vs. mineral nitrogen applications.

High-quality, organic fertilizers are relatively new to the market and are generally 12-15% nitrogen (compared to higher percentages in most forms of mineral nitrogen). This technology is 100% water soluble, acts as a chelator for ions, and will never burn a plant when it's applied at labeled rates. Incorporating an organic nitrogen, especially during high stress periods, is the safest way to help the crop achieve full yield potential.

Optimal use of organic nitrogen is a **foliar application** that delivers the nutrient directly to the leaves and stems. This does not mean that this form of nitrogen cannot be soil applied, as both mycorrhizal and non-mycorrhizal plants can acquire organic nitrogen as amino acids and peptides via root uptake. However, research has proven that foliar feeding can provide 95% efficiency of use, compared to only 10% efficiency of use from soil fertility applications. Small amounts of foliar-applied fertilizer can replace larger quantities of soil-applied fertilizer, **reducing the total input costs.**

(815) 929-1752 | 2902 West State Route 17 | KANKAKEE, IL 60901

soilbiotics.com
SoilBiotics®

This image shows the metabolism and transport of nitrogen within the plant root, root nodule and leaf. Application of organic nitrogen (as amino acids) bypasses much of this process and increases the speed and efficiency of nutrient uptake.