# Soil Nitrogen

Soil nitrogen (N) is a vital nutrient for plant growth and soil health. It exists in various forms in soil and can be transformed from one form to another, which influences the availability of N to plants. Measuring N in soil can be very challenging and the most accurate results can only be obtained from properly conducted laboratory soil testing. Various methods are used to measure soil N levels, including chemical and biochemical assays. The choice of method depends on the specific goals and objectives of the soil test. There are five main forms of N in soil: organic N, nitrate ($NO_3^-$), ammonium ($NH_4^+$), nitrite ($NO_2^-$), and nitrogen gas ($N_2$).

Organic N is found in soil organic matter and is the largest pool of N in soil. However, this form of N is not readily available to plants, as it needs to be mineralized into forms that can be taken up by plants. This process is influenced by soil temperature, pH, and the presence of microorganisms. (Paul and Clark, 1996)

Nitrate and ammonium are the most common forms of inorganic N that plants can take up. Nitrate is the preferred form of N for many crops, but it can also be lost from soil through leaching. Ammonium, on the other hand, is prone to being immobilized by soil microorganisms and transformed into organic N, but it is less likely to be lost from soil. (Don, et al., 2002)

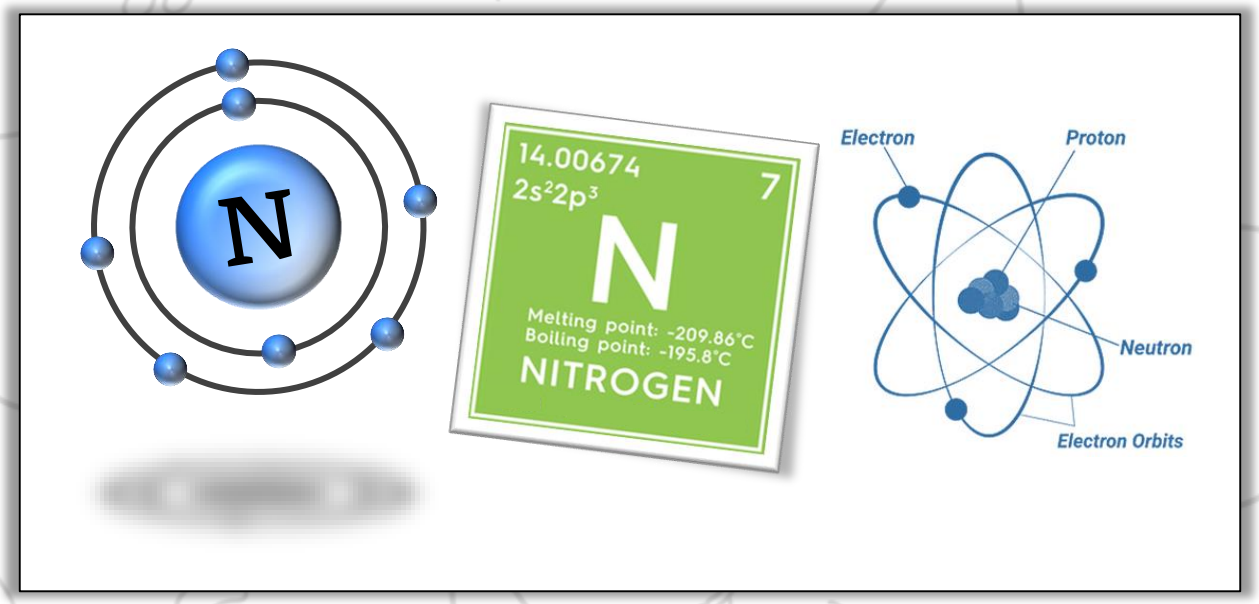
Nitrite is an intermediate form of N, which can be produced during nitrification and can be toxic to plants in high concentrations. Nitrogen gas ($N_2$) is the main form of N in the atmosphere and is an important source of N for leguminous plants that form symbiotic relationships with nitrogen-fixing bacteria. (Hassink, 2000)

Maintaining adequate soil N levels is essential for healthy plant growth and high crop yields. A shortage of N in soil can lead to stunted plant growth, reduced yields, and decreased plant quality. On the other hand, excess N in soil can result in the loss of N through leaching, increased nitrous oxide emissions, and decreased soil microbial diversity. (Lal, 2004)

Managing soil N levels involves balancing N inputs and outputs, such as fertilizer application and crop

removal. Additionally, utilizing best management practices such as conservation tillage, cover cropping, and intercropping can improve soil N cycling and reduce N losses. (Smith et al., 2003)

In conclusion, soil nitrogen is a critical component of soil health and plays a crucial role in plant growth and development. Understanding the forms and transformations of N in soil and managing soil N levels can improve soil fertility and plant productivity.

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