ENVIRO-BRIEFS

No. 6

Nutrient Use and Beneficial Soil Organisms

Soil organisms are essential to crop production. In addition to their role in soil-forming processes, they are important recyclers of soil nutrients. A major benefit is to break down organic materials in crop residues and release the nutrients they contain in the inorganic form so crop plants can use them.

Common microorganisms include bacteria, fungi, and algae. All are present in the soil in large numbers. For example, a single gram of soil—a 28th of an ounce—might contain 3 billion or more bacteria, a million fungi, and a quarter of a million or more algae.

Certain bacteria living in a symbiotic relationship on plant roots convert (fix) atmospheric nitrogen (N) into a form legumes such as alfalfa and soybeans can use. They play an important role in crop production by helping to supply much of the N needs of legumes and the crops that follow them. The amount of N these bacteria can fix depends on several factors—legume crop being grown, overall plant health as determined by management, soil pH, temperature, etc. The average is in the range of 75 to 100 pounds per acre per year, but can be as high as 300 pounds.

The presence of the more highly developed organisms such as earthworms is generally indicative of a high quality soil with good structure and low in salt content. Earthworms are also excellent nutrient recyclers. Unfortunately, other higher organisms such as nematodes and insects have a detrimental effect on crop growth…even though they play a role in nutrient cycling.

Since most of these organisms have such a vital role in crop growth, one of the measures of soil quality and sustainable production is their abundance in the soil. Does the use of fertilizer nutrients—from inorganic and organic sources—have an impact on these organisms? The answer is yes.

Research has shown that indiscriminate use of both mineral fertilizers and animal manures can result in a decline in the numbers of beneficial organisms in the soil. However, when properly applied and used, the overall impact of fertilizer nutrients is a positive one. Generally, those management decisions that optimize the efficiency of nutrient use also impact beneficial soil organisms in a positive way.

Historically, the primary reason for applying fertilizer nutrients to the soil has been to increase crop yields and improve quality. During the past few decades, however, the impact of nutrient use on environmental quality has received its share of attention as well—and rightly so. Nutrients do affect the quality of both soil and water. The good news is that when proper nutrient management is practiced, crop yields and soil and water quality are enhanced. This includes the impact of nutrients on beneficial soil organisms. EB

Crop fertilization produces high yield, high quality crops while enhancing the impact of beneficial soil organisms on plant growth.

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