



Understanding Phosphorus Fertilizers

In recent years, phosphorus has become the ugly step-child of the turfgrass and agricultural industries. Theories abound: “Phosphorous is good. Phosphorous is bad. We have too much Phosphorus. We have too little Phosphorus.” To add to the confusion, regulations and restrictions are added and change daily. 3 Tier Technologies acknowledges the need for proper use and monitoring of phosphorus – but we also understand the science that’s missing from many phosphorous discussions.

The Basics

By definition, phosphorus is a vital component of DNA, the genetic “memory unit” of all living things. Phosphorus is essential for building proteins and other components necessary for proper plant structure, seed yield, and genetic transfer. It also regulates the breakdown of carbohydrates and energy transfer in cell division and multiplication. Phosphorus is the energy source for the enzyme and amino acids systems that are responsible for photosynthesis. Without phosphorus, the very basic plant growth functions suffer due to lack of energy required for cell division. Severe phosphorus deficiencies lead to plant stress, susceptibility to disease, insect attack, and weed infiltration.

Phosphorus increases cell performance and encourages the plant’s ability to move valuable nutrients, proteins, sugars, and amino acids. Properly maintained levels of phosphorus in plants and soils are essential for healthy and vigorous plants. Phosphorus improves cell division and storage, stimulates root development, strengthens stalks and stems, encourages early and uniform plant maturation, increases nitrogen fixing capability, improves crop quality and yields, increases disease resistance.

Phosphorus is commonly derived from hard rock phosphates that are acidified to produce four types of phosphates: triple-super, single-super, diammonium (DAP), and monoammonium (MAP). These types of phosphates, used for all granular fertilizers, are highly concentrated and very reactive, sometimes becoming chemically unavailable to plants in a matter of hours. These acid-derived inorganic phosphorus products (poly and mono) attain a mere 17% availability prior to being tied-up and unavailable. Since these phosphates are only partially absorbed by plants, they can potentially lead to water contamination through leaching or runoff.

A lesser known and more expensive type of phosphorus is known as colloidal rock phosphate (ortho), which is derived from soft rock phosphates. This non-chemically enhanced phosphate is a natural source of phosphorus that, when treated with organic acids, is rich in carbon, a key building block for biological soil strength. Colloidal rock phosphates provides a slow release form of phosphorus that can constantly be made available to plants through biological activity and mild acidic reactions near the root zone. Natural colloidal phosphates can achieve 60% efficiencies immediately and up to a 92% total efficiency. This natural form of phosphorus poses no environmental contamination threat, remains available to the plant, and is similar to the phosphorus we have in our bodies that promotes strong bones and teeth.

See Reverse Side For Additional Information

Soil Test Types and Interpretations

A primary area of confusion for turfgrass and agricultural operators is the proper interpretation of soil tests. There are currently seven accepted methods for determining phosphorus levels within the soil. Five of these methods use acid or chemical extractions (Acid/Chemical tests), while two use water extractions (Water tests).

Acid/Chemical tests involve adding acids and/or chemicals to the soil sample. These acids and chemicals react with the hard-rock phosphates and cause them to become active, thus often resulting in astronomically high phosphorus levels. It's important to note that these test readings represent *false* positives, since the acid and chemicals that were added freed previously tied-up nutrients and produced alarmingly misleading results. Water tests add no acids or chemicals, so the results reflect the total available phosphorus.

3 Tier Technologies strongly recommends using only Water Extraction testing methods when testing soil for phosphorus.

Too Much Phosphorus...Or Too Little?

Despite soil tests that frequently show excess phosphorus levels, phosphorus deficiencies in plants are common in the turf and Ag industry. While these facts may seem to be conflicting, they are not.

Hard-rock phosphates used in granular fertilizers sit unavailable in the soil and can potentially contaminate water sources because they can not be readily absorbed by plants and turf. Plants desperately need phosphorus, but cannot easily adapt the poly and mono phosphates used in granular fertilizers. Foliar-applied, liquid fertilizer formulations containing ortho phosphoric acid combined with humic and fulvic acids (as found in 3 Tier Technology's HumaSoil™) provide enriched soil carbon availability. These formulations keep the phosphorus in a more stable form, which is less likely to be tied up or made unavailable to the plants as is the case with poly and mono based phosphate products.

A long-term Kansas study demonstrated the importance of combining phosphorus with nitrogen on various plants and crops. The study showed increased efficiency of nitrogen and lower levels of Nitrates in the soils when phosphorus was applied with the nitrogen source. Over the 30-year period of the study, nitrate accumulation in the soil profile was greatly reduced, while nitrogen uptake and yields increased by an average of 20%, and nitrogen efficiency more than doubled.

Independent water-extraction phosphorus testing has shown that over 90% of soil and plants are deficient in phosphorus. Follow-up testing confirmed that, after consistent use of NBN products, the available soil phosphorus levels were adequately maintained, and nutrient levels increased to near optimum levels. NBN products provide a unique foliar delivery platform for nutrients and establish the natural balance required for active soils.

Summary

3 Tier's products are scientifically formulated with soft-rock (ortho) phosphorus to provide plants the stimulus and mechanism to increase nutrient assimilation while minimizing the threat of harmful phosphorus polluting our water sources.

Whether you maintain hybrid turfgrass, cultivate sod, or raise a harvestable crop, 3 Tier Technologies can recommend a cost effective program to achieve maximum results out of every nutrient dollar while improving your soils for long term sustainable results. Call 877-710-6953 to learn more today.