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THE AGRONOMY CORNER

PHOSPHORUS

Phosphorus is one of the big three essential nutrients in crop production.

It serves several vital functions in plants. Like nitrogen, it is a major part of the chemical chlorophyll which allows the plant to use sunlight to produce sugars through the process we call photosynthesis. These sugar compounds are used by the plant for food and growth.

Phosphorus also plays a key role in building blocks for cell structure as well as being a catalyst in the biochemical reactions of the life of a plant. Phosphorus is a vital part of the basic genetic materials, DNA and RNA, which determines what a plant becomes and is the connecting bonds for these two. Phosphorus is a major component of the "energy unit" of plants which forms during photosynthesis and is involved in the plants processes from seedling growth to final grain or fruit production.

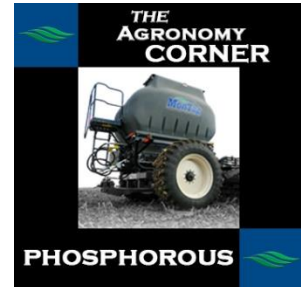
Some of the specific growth factors associated with phosphorous are stimulation of root growth and development, increased stem and stalk strength, flowering and seed production, earlier and consistent seed maturity and improving nitrogen fixation by legumes and disease resistance.

Thus phosphorus plays a critical role in crop growth and development. So how do we make certain that it is available to our crops?

Soil phosphorous, unless moved by erosion, tends to stay within an inch of where it is placed by fertilization or formed from breakdown of the base materials of the soil. In many locations, sandy soils have very low available phosphorus. However, high organic matter containing soils tend to have high concentration of phosphorus.

Most of the phosphorus in soils exists in low available forms as complexes of metal ions. Fertilization also quickly reacts to form these low available complexes. It is estimated that only about twenty percent of what is added in a year is available to the crops. It is the breakdown of these complexes that produce the available phosphorus forms which are available to the plant.

Soil pH is the main determining factor in the breakdown of low available phosphorus into more plant usable forms. A soil pH reading between 6 and 7 is best for this conversion. Thus we receive the recommendation to add lime to fields of low pH to improve the plant available phosphorus. The pH in the root area of plants can be changed by the addition of either base materials, like lime, or acid materials like ammonium sulfate.



Other factors that help determine soil available phosphorus are the type of clay in the soil, balanced crop nutrition, soil organic matter level, soil test level, application timing and soil temperature, aeration and moisture.

Certain clay type soils will fix more phosphorus and thus add it to the pool of low available phosphorus from which breakdown occurs. Balanced crop nutrition makes phosphorus more available. As mentioned earlier, organic matter can contain high levels of available phosphorus, low testing soils will respond better to the addition of fertilizer phosphorus but high testing soils will almost always have more readily available phosphorus. The longer the fertilizer phosphorus is in the soil, the more time it will have to be fixed into low available forms. Plant up take of readily available phosphorus is reduced with low temperature and poor soil aeration. Excessive soil moisture or soil compaction reduces the soil oxygen supply and decreases the ability of the plant roots to absorb soil phosphorus.

Tale aways for efficient phosphorus usage:

Phosphorus is vital and enough phosphorus to support healthy plant growth and development is essential.

The pH of the soil determines how much of the low available phosphorus is broken down into plant available phosphorus. Liming is very important.

The pool of low available phosphorus needs to be kept high to insure that phosphorus becomes plant available.

Since phosphorus does not move very far from where it is placed or broken down, banding is a very efficient method to make certain that phosphorus is available in sufficient quantities to the roots.

The plant needs lots of root mass so anything that either restricts root growth or reduces the number of roots affects uptake and thus plant development. Think compaction and mechanical root damage or insects

Many factors affect break down and thus the plant readily available phosphorus. Among these are timing of fertilizer application, a balanced nutrient program, amount of organic matter, aeration in the root zone and temperature of the soil.

Links to the sources for this discussion:

<http://www.cropnutrition.com/efu-phosphorus>

<http://eldoradochemical.com/fertiliz1.htm>