AGRI-BRIEFS
AGRONOMIC NEWS ITEMS

From Agronomists of the
Potash & Phosphate Institute (PPI)
655 Engineering Drive, Suite 110
Norcross, Georgia 30092-2843 USA
Phone (770) 447-0335

Spring 2006, No. 3

WHAT HAPPENED TO LAST YEAR'S FERTILIZER?

Everyone is looking to get the most value from everything they do. With the ever-tightening squeeze between farm inputs and crop prices, it makes good sense to reevaluate where the added fertilizer is going each year.

The purpose of adding nutrients to soil is to create an environment for healthy and profitable plant growth. It has long been known that well-nourished plants are better able to resist disease and insects, use water more efficiently, produce more abundant and higher quality yields, and offer a better economic return. It remains the goal to get as much of the applied nutrients into the plant where they can be as productive as possible. Nutrients become depleted when they are removed from the soil in every harvested crop, but there are also other things happening that cause nutrients to become less available to plants. An overview is presented here, and more details are available from your local crop adviser.

When potassium fertilizers are added to a field, they quickly dissolve in soil water and the potassium cation (K^+) is held on the negatively charged sites on clays and organic matter. Potassium is retained on these cation exchange sites until another cation comes along to replace it. Since potassium is not held as strongly as some other cations (such as calcium or magnesium), it can slowly move down in the soil, especially in very sandy soils and in high rainfall areas. In most soils, however, added potassium remains close to where it is applied and stays available for plant uptake year after year.

Phosphorus fertilizer generally has the greatest solubility and availability for plant uptake immediately after being added to soil. Soon after application, phosphorus fertilizers begin to react with the soil solution and soil minerals to form less soluble compounds. The chemistry of phosphorus in the soil governs these reactions and over time, less soluble and less available compounds are formed. All added phosphorus, whether commercial fertilizer or organic sources such as manure, eventually undergo these soil reactions. **Soil testing is the best technique for determining the nutrient value of these older phosphorus compounds and for predicting the need for any additional fertilizer required to meet the plants nutritional needs.** Application of phosphorus fertilizer in a concentrated zone or band is one simple technique that is useful in delaying these soil reactions and improving nutrient availability. New additives are being developed that may also prove beneficial. Special attention should be taken to avoid conditions where phosphorus can be lost in surface runoff.

Nitrogen is the most difficult to manage of the major plant nutrients. The primary goal is to get the added nitrogen into the plant, where it is essential for many metabolic processes, such as chlorophyll formation and protein synthesis. Unfortunately, a significant portion of the added nitrogen can be lost as a gas through ammonia volatilization from surface-applied fertilizer or through denitrification from wet soils. Nitrate moves easily in the soil solution and may be carried beyond the rootzone in water passing through the soil. A significant amount of added nitrogen fertilizer is used by the soil microbes in building soil organic matter. Special attention is needed for nitrogen fertilizer management because of its numerous pathways of loss, and the high plant requirement for vigorous growth. Plant tissue testing can provide an indication of the crop nutritional status and the need for mid-season additions.

Each of these nutrients is frequently viewed as a separate management issue…due to their diverse behavior and unique soil reactions…but it is essential that all three are managed as a package in order to provide balanced nutrition for the plant. When any one of these nutrients is in short supply, the other two will not be used efficiently and plant performance will suffer.

—RLM—

For more information, contact Dr. Robert L. Mikkelsen, West Director, PPI, 617 Oeste Drive, Davis, CA 95616. Phone: (530) 758-4237. E-mail: rmikkelsen@ppi-far.org.

Note: *Agri-Briefs* are available online at the PPI website: **www.ppi-ppic.org/agri-briefs**