The Importance of Lime

Lime is one of the most important additives a producer can apply to a field or pasture. Lime is a soil conditioner that allows other nutrients to become more available through optimizing the soil pH. Taking a representative soil sample is imperative to receiving accurate soil test results and that is the first step in correcting soil pH.

Soil samples should be taken every 3-5 years. At least 10-20, 6 inch deep cores should be collected from every field. Producers should avoid sampling soon after fertilizing, liming or applying manure. Nutrient availability in soil can fluctuate with soil moisture. Sampling at the same time of year will provide more consistent soil test results. In pastures, avoid sampling within 150 feet of shade areas, watering points and field edges, where livestock may congregate and crop field’s end.

Lime is graded according to the effective neutralizing material (ENM). Most lime companies in southwest Missouri have an ENM ranging from 400-450. The finer the lime is ground, the higher the ENM; finer grinding of limestone improves breakdown and speeds reaction with the soil to change pH levels. Limestone is more effective when incorporated in soil because it is not very water soluble, therefore reacts slowly with soil.

Priority on a limited fertilizer budget should go to correcting soil pH through liming. Lime increases the efficiency of fertilizers like phosphorus and many micronutrients, by increasing their availability to the plant (see illustration). Soil structure, microbial activity, activity of soil incorporated herbicide applications and legume persistence are all improved with a proper soil pH. The illustration demonstrates nutrient availability to the plant according to pH level of the soil. The ideal pH range for cool-season grasses is 5.5-7.0; for legumes 6.0-7.5; for row crops 6.0-6.5.

Many common fertilizers acidify the soil but the impact on soil pH is relatively small. For example, nitrogen fertilizers have long been known to acidify the soil. According to John Lory, MU Plant Sciences, it takes about 180 pounds of calcium carbonate to neutralize 100 pounds of nitrogen added as anhydrous ammonia. At this rate, less than 1 ton/acre of pure lime is needed every 5 years, to offset an application of 200 pounds/acre/year of nitrogen. If producers have a corn-soybean rotation, only 1 ton/acre of lime is needed every 10 years to offset that same nitrogen application. Nitrogen fertilizers vary in their ability to acidify the soil. Ammonium sulfate is the most acidifying nitrogen fertilizer; the impact of urea will be similar to anhydrous ammonia.

Given the slow effects of fertilizers such as nitrogen on soil pH the best way to manage acidification by fertilizers is to monitor soil pH using soil testing. Sampling fields every three to five years will allow you to monitor trends in soil such as soil pH and identify fields where soil pH is close to dropping below optimum.