Avoding P runoff and Using Lime

Culman, Dayton, King, and Labarge, Ohio State University specialists (CORN Newsletter, 2014-28) say "Current Ohio field research to minimize phosphorus losses at the edge of the field should start with the following recommendations to maximize productivity while minimizing environmental impacts on water quality.

Avoid overloading soils. Soil test and follow tri-state fertilizer recommendations. Where soil test levels are above 40 ppm Bray P1 or 58 ppm Mehlich III-ICP, do not apply additional phosphorus in the corn-soybean rotation. These soil test levels require no additional fertilizer, according to the Tri-State Fertilizer recommendations. Fertilizing soils testing above these levels increases risk of P in runoff and tile drainage.

Avoid winter application. Eliminate surface application of manure or fertilizer to frozen or snow-covered fields. Frozen ground is ground that is frozen to the degree that tillage is not possible. Surface applied manure or fertilizer is subject to runoff events that may occur before the ground thaws and allows nutrients to bind to soil.

Avoid surface application of fertilizer/manure. Surface applications of phosphorus are subject to higher loss if runoff producing rainfall events happen close to application. Placement of nutrient below the surface of the soil reduces loss. If tillage is planned in the crop rotation, P applications should be applied prior to the tillage and till before a rain event. Full width tillage has the potential to increased soil erosion and total phosphorus losses. New placement tools or strategies need to be implemented that place P below the surface with minimal soil disturbance. Until these tools become available, use banded application or the minimal amount of tillage to mix nutrient in the soil.

Minimize erosion. Appropriate conservation practices should be implemented to minimize erosion. Maintain 30% cover as crop residue/cover crop. Filter strips, grassed waterways and water diversion structures are appropriate tools.

Slow the movement of water. Surface water flows from fields directed to tile via standpipes should be converted to blind inlets. As risk loss potential increases for a field consideration should be given for edge of field treatments which control water movement or treat water as it is leaving the site. Drainage water management control structures, in ditch treatments such as two stage ditches and other stream practices can reduce loading.

Know your field's risk. Soil test P, field proximity to water and soil hydrologic class impacts edge of field losses of phosphorus. The NRCS Ohio P Risk index provides a risk of loss index and should be used as part of the development of a Nutrient Management Plan to assess the individual field risk.

Strive to build soil quality. Soil condition is a mitigating factor. Increasing the water infiltration by reducing compaction and improving soil structure increase water retention, nutrient cycling, crop rooting capacity and crop yield."

Ed Lentz (Corn Newsletter 2014-28) says "a soil analysis will tell whether a field needs lime to raise the soil pH. Lime recommendations are generally given as tons per acre. ODA evaluates all liming sources sold commercially in Ohio to determine its effectiveness to neutralize soil acidity and is reported as the Effective Neutralizing Power (ENP) expressed as pounds per ton. The ENP value incorporates all quality components of lime: purity (calcium and magnesium content), particle size, and water content. The ENP allows producers to compare different liming sources regardless of differences in purity, fineness of grind or water content between sources.

To determine the amount of lime needed with the ENP value use the following equation: **Tons of lime material = (Lime rate from soil test) * (2000/ENP)**

The actual cost of a lime source may also be used with ENP by the following equation: **Cost ($/acre) = (Lime rate from soil test/ (ENP/2000)) * ($/ton)**

Economics and the ability to evenly apply the material should be the primary factors in selecting a lime source. If the soil test magnesium levels are less than 50 ppm (100 lbs) then dolomitic lime should be use since it will cost considerably less than other magnesium sources. Hi cal (calcitic) lime should be used if the percentage of base saturation of calcium from the soil analysis is equal to or lower than the percentage of base saturation of magnesium.

Lime recommendations from soil testing laboratories assume a soil incorporation depth of eight inches. For no-till fields or lime left on the surface, assume 4 inch incorporation. Adjust your lime rate by the following equation: **Lime rates for < 8 inches incorporation = (Soil test lime rate/8) * lime incorporation depth"**