

Environmental Phosphorus Index Supports High-Yield Agronomy

NORCROSS, Ga.—High-yield cropping systems depend on productive soils. One of the most important resources for building productive soils is livestock manure. Many crop yields have been set on soils with a history of manure use. Manure contributes nutrients, builds soil organic matter, and improves soil tilth. If manure applications can be targeted to low-risk areas for erosion and runoff, these areas can become focal points for high-yield crop management.

Manure builds soil productivity. But it can also pollute air, water and the soil. Manure must be applied with careful management, and this has led to the development of increasingly sophisticated nutrient management plans.

Most nutrient management plans emphasize a balance between nutrient supply and crop removal. While a balance is ideal, it is not realistic for many situations. In regions where livestock production is concentrated, the farm land base is not sufficient. Traditionally, most manures have been applied at rates that supply more phosphorus than the crop removes. This has not harmed the crop, as soil phosphorus levels

several times higher than optimal do not reduce yields. Also, soil chemical processes gradually make applied phosphorus less and less available. Continued additions of fresh soluble phosphorus contribute to the health of the crop.

The buildup of soil phosphorus is a risk for the environment in hydrologically active areas—that is, parts of the landscape where surface runoff or erosion are likely. The risk of phosphorus loss to surface water depends on both source and transport factors. Areas at risk are where high soil phosphorus or high application rates coincide with zones of active surface runoff or erosion.

An environmental phosphorus index ranks vulnerability to phosphorus loss. The index incorporates transport factors affecting runoff and erosion—such as slope gradient, slope length, and distance to watercourse—and source factors including soil test phosphorus and rate and method of application of manure and fertilizer phosphorus. The phosphorus index often identifies a critical area comprising 2 to 15 percent of a field from which 90 percent or more of the phosphorus loss occurs.

The phosphorus index targets the

low-risk areas for manure application to build soil productivity. The soils in these areas safely absorb the applied phosphorus and benefit from the other constituents of the manure. These are the areas where efforts need to be targeted at improving crop performance by supplying optimal combinations of manure and fertilizer nutrients to raise potential crop yields.

The phosphorus index is not a finished product. The index is an approximation of risk rather than a model of process, but its current form can effectively direct limits on manure applications and nutrient budgets to hydrologically active zones. However, more scientific work is needed, both to validate its accuracy and to improve the estimation of its component source and transport factors.

Soil tests that identify sorption capacity should be an essential component of an environmental phosphorus index. Some soils can adsorb

up to 17,000 pounds of P_2O_5 per acre. Some calcareous soils have a phosphorus retention ability with no practical limit. On the other hand, some soils do become saturated with phosphorus to the point where both surface runoff and subsurface drainage water carry off excessive amounts.

The phosphorus index is site-specific. Appropriate application of the phosphorus index may demand the most intensive site-specificity that modern precision agriculture technologies can provide.

Working with an environmental phosphorus index, you can use manures and fertilizers to build soil productivity, resulting in high-yield cropping systems compatible with water quality.

For more information, contact Dr. Tom Bruulsema, Eastern Canada and Northeast U.S. Director, PPI, 18 Maplewood Drive, Guelph, Ontario N1G 1L8, Canada, (519) 821-5519, e-mail: bruulsem@ppi-far.org

PASTURE PONDERINGS

(Continued from Page 15)

time. I hope this conversation on the GL/FCC has helped you understand that there is a unified effort for grazing in Pennsylvania.

Remember that if you or your organization is interested in learning more about the coalition or want to work with them on an education - alevent, contact them at their new address.

If you need some additional information on the GL/FCC or other grazing topics, give me a call at (717) 237-2221 or write to me at

NRCS, One Credit Union Place, Suite 340, Harrisburg, PA 17110-2993.

Even better than that I will be at the Pennsylvania Grazing and Forage Conference at Grantville on March 1-2 and you can approach me there with your requests.

Until next time, happy grazing!

PFGC Schedules Annual Meeting, Awards Reception

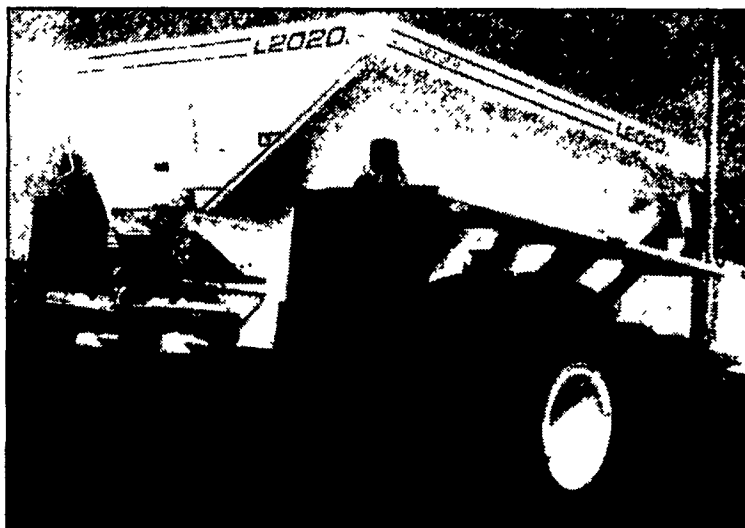
The PFGC has set the evening of March 1, during the Pennsylvania Forage and Grazing Conference, for its annual meeting and awards program.

This year PFGC is planning an evening dinner with time to talk and mingle with others before a brief

PFGC meeting and the presentation of this year's PFGC Awards.

You can register for the awards reception when you register for the Forage and Grazing Conference. Note that it is not required that you attend the grazing conference to attend the evening reception.

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