Watershed-scale phosphorus management

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Abstract
This article continues a series of articles in the 2001 ICM newsletter that provides information to help producers understand phosphorus (P) management and the complex economic and environmental issues involved in P management. This article discusses aspects of P management relevant to watersheds. Every year, producers make decisions about how to manage their operations. Increased production costs can lower profit margins. Profitable farming operations are a delicate balancing act. Decisions about equipment and seed selection, land acquisition and pest management, tillage practices, fertility, and nutrient management are all interrelated production decisions. Now, add a new concept--the environmental issues related to P management on a watershed scale.

Keywords
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Farm management of inputs

Responsibility for management of P application has traditionally resided with the producer. Overapplication of P and potential soil erosion, formerly considered a poor business practice that affected individual producers, is now considered to affect the water quality of an entire watershed.

Scale of production: who makes the decisions?

Compounding the issue are numerous structural changes in agriculture. Some producers decide what fertilizers are purchased and when they are applied. In other operations, a crop consultant, fertilizer sales manager, or local cooperative agronomist may make this decision. Absentee landlords also may make fertilization decisions, a confounding issue for producers who want to manage P by considering their farming business situation and potential water quality impacts. Thus, the decision-making process is complex: who has expertise, experience, and the up-to-date information? Who has the producer's interest in mind? Who has the more complex and far-reaching watershed's interest in mind?

Watershed-scale P management

Managing P on a watershed scale is a new concept. Producers must know what P levels in the watershed are acceptable, which are not, and why. Discussions about how to reduce P levels in surface waters could include changes in P management practices (such as rates and methods of P application) and conservation tillage practices. The recently developed Iowa P Index is a useful tool for identifying the most effective practices to reduce the risk of P
delivery from farm fields. See the Iowa Phosphorus Index [1] online.

**Best management practices**

Producers can use management practices that improve P use efficiency and profitability of crop production. Such practices are known as best management practices (BMPs). BMPs include collecting an appropriate set of soil samples, interpreting soil test results appropriately, using tillage practices that reduce erosion, and using manure or fertilizer application methods that reduce nutrient losses. Use of these practices can result in increased farm profitability from each field and improved water quality beyond field borders.

**Economics of nutrient management**

Although P is an essential crop nutrient, long-term field studies indicate that there is no net return to P application when soils test high or very high. Excessive P applications reduce profitability and can impact water quality. Use of BMPs increases profitability and reduces nutrient losses from fields.

Livestock operations, once diverse and spread across the landscape, are becoming concentrated in fewer and larger operations. Concentration of animals raises questions about environmentally sound management of manure and manure nutrients, especially P. With many animals produced in small areas, it becomes challenging to manage the amount of manure generated. Although manure could be a commodity that is brokered and hauled out of watersheds (that are already rich in P) to be applied elsewhere, the sheer volume and transportation costs are major problems. Recognition by producers of the value of manure as a source of nutrients for crops, and technological advances (for example, reductions in P levels in feed and the volume of manure for transport) may provide affordable solutions.

**Summary**

Making economic decisions about P application in most farm operations is difficult. Trying to put it in the perspective of an entire watershed becomes daunting. But it is an important step that you as producers (and those who work with you in making crop nutrient decisions) need to take. Phosphorus levels in water resources are the sum of all operations, both in agricultural and urban areas of a watershed, and everyone needs to look at the issue to make progress. One thing is certain: efforts are needed to reduce P levels in many Iowa watersheds and to avoid increasing P levels in others.

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