

AGRI-BUSINESS STEWARDSHIP NEWSLETTER

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The objective of this document is to provide you with current and helpful information regarding water protection, and the Michigan Agriculture Environmental Assurance Program (MAEAP).

Strategically managing fall fertilizer application enhances tillage practices, protects water quality

Tillage practices have changed dramatically over the last few decades, bringing about many improvements in crop productivity, soil health, and farm profitability. These practices can have a large impact on nutrient dynamics, making a close examination of management practices an important consideration.

Tillage methods have moved from moldboard plows, to conservation tillage, and now are increasingly focused on rotational no-till and complete no-till. While these changes have played a big role in reducing sediment and particulate P losses, their potential to alter water movement and concentrate nutrients can complicate nutrient management. This is especially important as we learn more about controlling losses of dissolved reactive phosphorus (DRP), a contributor to water quality concerns that is just beginning to be fully understood. Managing fall fertilizer applications to limit P losses can be an important conservation tool.

It's common in minimal disturbance systems for soil test P levels in the top half inch of the soil to be two-three times the level in the top eight inches. These concentrated zones of P can lead to high losses as DRP is absorbed by water. Total runoff is typically reduced in low tillage systems, but in heavy rain events that overwhelm soil infiltration capacity, runoff can absorb high levels of DRP if nutrients are stratified in the field.

Increased losses of DRP through tile lines are similarly possible. The improved soil structure that can be developed in minimal till systems can lead to increased preferential water flow through macropores, and if water moves through zones of high soil P before hitting tile lines, high DRP levels can be found in tile drain water. Both of these mechanisms are complicated by the high intensity rainfall events that are increasingly common. Precipitation over one inch has been shown to overwhelm the soil's ability to retain P.

That's where management comes in. Shifting fall P application to the spring is the best way to minimize over-winter losses. For fall applications that do take place, tillage that incorporates fertilizer can prevent surface runoff, while eliminating zones of high P concentration. Planning fertilizer applications well in advance – moving them in the season or ensuring proper tillage – can make a big difference in limiting the impact of fertilizers on water quality.



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