Module 5.3-2 Timing broadcast phosphorus fertilizer applications can help protect Lake Erie. Phosphorus (P) is an essential nutrient for growing crops. But excess concentration of P in streams, rivers and lakes can lead to algal blooms. In the Lake Erie watershed in and around the state of Ohio, USA, levels of dissolved P in rivers, and algal blooms in lakes, have been trending upward from 1995 to 2011. Fertilizers applied to the predominant corn-soybean cropping system are not the only cause, but are one of many probable causes, and time of application can have a large effect when P fertilizers are applied by broadcasting.

Broadcast application offers flexibility in timing and often the lowest application cost. In soils with optimum P levels, band and broadcast applications do not differ in terms of availability to the crop and crop response. But they do differ in risk of runoff loss. To minimize P losses from broadcast applications, it is important to apply when the risk of runoff is low. Runoff events are more frequent in late fall, winter and early spring. Ideally all P would be applied at planting, but limited storage capacity and equipment availability often make this impractical.

Even small losses of P in runoff can harm water quality. Producers are advised to pay close attention to the weather forecast, and avoid broadcasting P fertilizer when there is more than 50% chance of intense rain within the next few days. As indicated in **Figures 1 and 2**, levels of dissolved P in runoff decline considerably if the runoff event occurs more than 3 to 5 days after application. Broadcast application of P on frozen or snow-covered soil in the winter is never the right time, because these conditions generally end with spring runoff.

Tillage to incorporate a broadcast application reduces runoff loss of dissolved P, but may increase loss of total P through erosion. Choices for "right time" or "right place" should both be considered for their best fit to the crop production enterprise.

References

Owens, L.B. and M.J. Shipitalo. 2006. J. Environ. Qual. 35:1101–1109.

Smith, D.R., et al. 2007. Environ. Poll. 147:131-137.

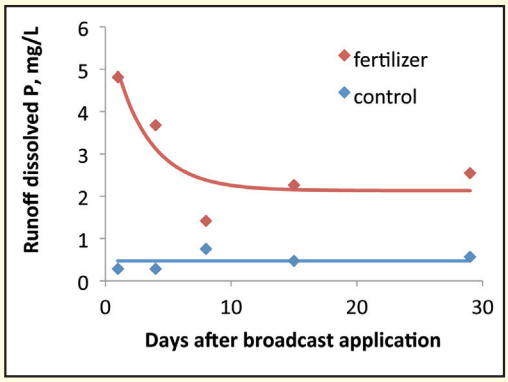

Figure 1. Concentration of dissolved P in surface runoff from plots cropped to tall fescue during rainfall simulations that occurred 1 to 29 days after broadcast application of triple superphosphate fertilizer (Smith et al., 2007). Silt loam soil near Lafayette, Indiana, USA.

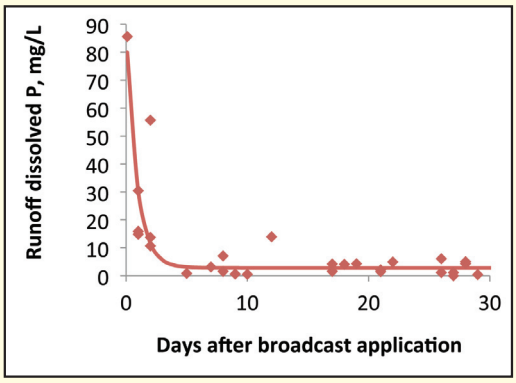

Figure 2. Concentration of dissolved P in surface runoff, sampled during natural rainfall events over a 14-year period, plotted against time after most recent application of superphosphate fertilizer, in grass and legume pastures near Coshocton, Ohio, USA (Owens and Shipitalo, 2006). Well-drained to moderately well-drained silt loam soils.

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