

## BMPs for high risk P loss sites:

Monitor fields for P loss using the Ohio P risk index and field scale hydrologic and water quality models. For sites with predicted high P losses, consider one or more of the following water management practices based on fitness and cost effectiveness for field site:

- Production practices that increase soil organic matter to retain water on site
- Drainage Water Management (NRCS 554)
- Nutrient removal wetlands (NRCS 656)
- P Precipitating Filter
- Saturated Buffer (NRCS 604)
- · In-field water storage or detention basins

For more detailed descriptions and supporting data for these recommendations, visit agbmps.osu.edu.

Find answers to agronomic fertilizer questions at agcrops.osu.edu.

### **AUTHORS**

Steve Culman, PhD, Assistant Professor and State Specialist in Soil Fertility, School of Environment and Natural Resources, The Ohio State University

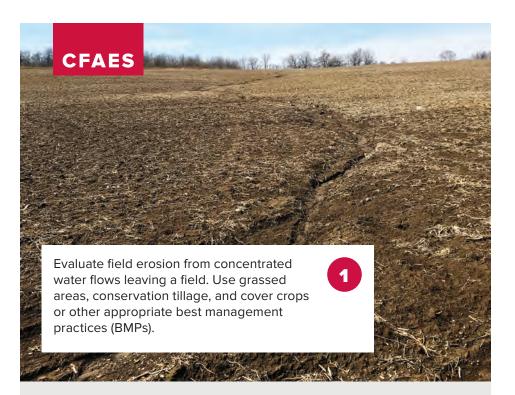
Sam Custer, Extension Educator, Agriculture and Natural Resources, OSU Extension Kevin King, PhD, Research Leader and Agricultural Engineer, U.S. Department of Agriculture (USDA), Agricultural Research Service

Greg LaBarge, Field Specialist, Agronomic Systems, OSU Extension Rory Lewendowski, Extension Educator, Agriculture and Natural Resources, OSU Extension

Eric Richer, Extension Educator, Agriculture and Natural Resources, OSU Extension

Photos by Greg LaBarge, OSU Extension unless otherwise noted.





### **OHIO STATE UNIVERSITY EXTENSION**

# Phosphorus Nutrient Management for Yield and Reduced P Loss at Edge of Field

Eight steps to maximize returns to phosphorus in row crop production while reducing downstream contributions to streams and lakes



Replace surface tile connections with designed structures (i.e., blind inlets) to reduce soil and nutrient losses.



No application of P containing fertilizer or organic (i.e., manure, biosolids, compost) nutrient sources to frozen or snow-covered soil unless applied to a growing cover crop.

Take a representative soil sample, testing for a minimum of pH, buffer pH, phosphorus-Mehlich III, and potassium for all fields where crops are harvested.



Use soil test results to monitor soil pH (for corn, soybeans, and wheat, desired pH is 6.5-6.8) and follow next step for soil test phosphorus (STP) value in Mehlich III.

If STP is **40 PPM** or less, ao to step 6.

If STP is above 40 PPM, go to step 7.

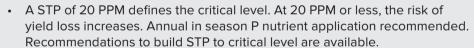






# STP value of 40 PPM Mehlich III or less:

**CROP YIELD**—Reduce risk of crop yield losses with nutrient application.

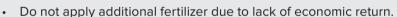


• The maintenance STP range is 20–40 PPM. Recommended rate of P is equal to P removed in harvested crop. Annual application is not required. Risk of yield loss is low with flexibility to delay application one (or more) growing seasons, if needed.

**WATER QUALITY—**The greatest risk for event P losses occur when nutrient application is followed by runoff-producing rainfall. Use the following steps to reduce P loss risk at application:

- Use an agronomic rate of no more than two years' worth crop removal as recommended in the Tri-State Fertilizer Recommendations.
- Time fertilizer applications so predicted rainfall 12 hours after application is less than a 50 percent chance of more than 1 inch of rainfall.
- Time organic nutrient applications so predicted rainfall 24 hours after application is less than a 50 percent chance of more than 0.5 inches of rainfall.
- Subsurface placement reduces losses over surface application.

**CROP YIELD**—Response to fertilizer with STP greater than 40 PPM is highly unlikely.



- Organic applications should be determined using P content from testing the organic source and not exceed P crop removal rate for the next two (and no more than three) crops in the rotation.
- Consider in-crop application to a nitrogen-using crop to reduce purchased N, maximizing economic return to organic application.
- Where in-crop application is not used, incorporate organic nutrients.

**WATER QUALITY—**The risk of P loss increases with STP values over 40 PPM. with greater risk after 150 PPM.

- Do not apply additional fertilizer due to lack of economic return.
- Do not make organic applications when STP is greater than 150 PPM. Follow NRCS 590 site and rate criteria between 40 to 150 PPM.
- Time organic applications so predicted rainfall 24 hours after application is less than a 50 percent chance of more than 0.5 inches of rainfall.
- Use the Ohio P risk index, field scale hydrology/water quality models, or monitoring to evaluate site risk for P losses and need for further site BMPs. See step 8.



