

Evaluating the 4R Nutrient Stewardship Concept and Certification Program in the Western Lake Erie Basin

How is 4R working in Ohio?

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Collaborators: Ohio State University: Greg LaBarge, Robyn Wilson, Brian Roe. The National Center for Water Quality Research at Heidelberg University: Laura Johnson and Rem Confesor. Carrie Vollmer-Sanders, The Nature Conservancy. Tom Bruulsema, International Plant Nutrition Institute. USDA-Agricultural Research Service: Mark Williams, Stan Livingston, Doug Smith. Limno-Tech: Todd Redder, Joe DePinto. The producers who gave access to their lands, management records



PROJECT GOALS

SOURCE	Different solubility sources of P and still to be determined for N
RATE	Monitor tile drainage discharges of N and P when rates are varied
TIME	How do changes in the application timing of N and P affects loads and concentrations in drainage discharge
PLACE	Compare how application placement influences N and P concentration and loads in tile drainage discharge

PROJECT RESULTS

The concentration on N and P in tile drainage discharge is higher during the growing season, while nutrient load is greater in the non-growing season. There is no time of the year that tile drainage discharge has no N or P.

SOURCE	Solubility of P fertilizer applied will influence P loss to tile drainage; however, this will differ by soil type and rate.
RATE	Rates and soil tests less than or at recommended levels are associated with lower P losses from tile drains.
TIME	Losses of dissolved reactive phosphorus are greater with late fall, winter and early spring applications than with applications made in August and September.
PLACE	Subsurface P placement decreases loss of dissolved phosphorus to tile drainage.

MORE PROJECT RESULTS ▼

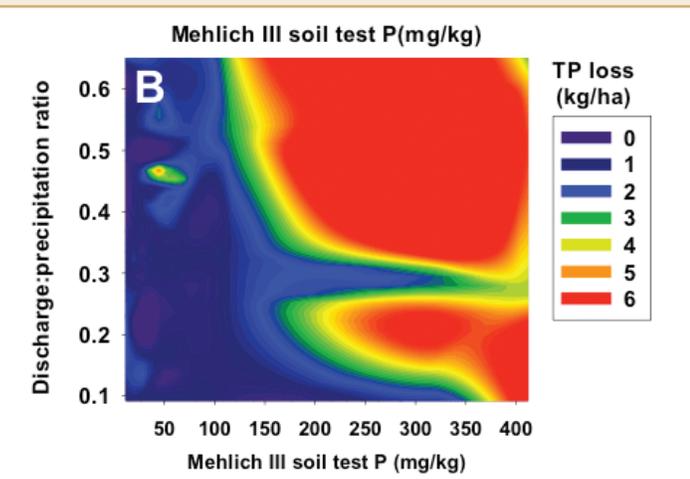


Figure 1. Total P Loss Potential in relationship to soil test P and water leaving the field as surface runoff or subsurface drainage. As more water leaves the field, total P loss increases across soil test P values.



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MEET KEVIN

"Water quality problems in Ohio are vast, none more so that the algal bloom issues in Lake Erie. While agriculture is the primary focus, we must also understand that it is the American farmer that has been burdened with the task of helping to feed 9.7 billion people by 2050. That charge will not be possible without fertilizers and advancements in management. Crop production agriculture is a "leaky" system. The 4Rs of nutrient stewardship offer the opportunity to balance productivity with the environmental footprint rather than focusing on just one or the other."

Kevin personally enjoys spending time with his wife and six children hiking in nature, boating and fishing, and gardening and cooking.

PUBLISHED REPORTS

King, K.W., M.R. Williams, and N.R. Fausey. Effect of crop type and season on nutrient leaching to tile drains under a corn-soybean rotation. *J. Soil and Water Conservation* 71:56-68. 2016.

Williams, M.R., K.W. King, W.I. Ford, and N.R. Fausey. Edge-of-field research to quantify the impacts of agricultural practices on water quality in Ohio. *J. Soil and Water Conservation* 71:9A-12A. 2016.

Williams, M.R., K.W. King, W.I. Ford, A.R. Buda, and C.D. Kennedy. Effect of tillage on macropore flow and phosphorus transport to tile drains. *Water Resources Research* (revisions submitted in November 2015).

Vollmer-Sanders, C., A. Allman, D. Busdeker, L. B. Moody, and W. G. Stanley. Building partnerships to scale up conservation: 4R Nutrient Stewardship Certification Program in the Lake Erie watershed. *J. Great Lakes Research*. 2016.

2 Papers currently in review

WHAT DO WE DO NEXT?

- Continue to collect data and evaluate the results of the field studies underway and examine other 4R management.
- Track changes in water quality at other sites to determine the larger impact of implementing 4R practices.