NUTRIENT DYNAMICS IN DRAINAGE DITCHES AND IMPLICATIONS FOR IMPROVING WATER QUALITY

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Goals:
1. Quantify long-term nutrient dynamics in Indiana tile-fed drainage ditches
2. Evaluate the effects of drainage tile discharge on benthic sediment-water interactions
3. Characterize the magnitude and transport of ditch nutrients through modeling
4. Use results to develop watershed management plans to minimize nutrient delivery to receiving water bodies

Statement of Problem:
In the Midwestern region of the United States, crops are commonly grown on lands subject to drainage which uses drain tiles as water pathways. Drainage tiles discharge regularly to receiving ditches and the discharge from these tiles could adversely impact the physical, chemical and biological quality of receiving ditches. Little information to examine the effects of consistent tile discharge on nutrient concentration and behavior in the ditch water column is currently available. Therefore, the role of biotic and abiotic processes governing nutrient dynamics at the sediment-water interface in tile drained drainage systems remains a challenge. There is a critical need to examine the impacts of long-term nutrient injections from drain tiles and resulting nutrient dynamics in drainage ditches.

Current Activities:
Water samples are being collected in four Indiana drainage ditches: J.B. Foltz and Robinsons ditches in Reynolds, IN; and Box and Marshall ditches in West Lafayette, IN. Sediment samples are also being collected and extracted in the same ditches. Water samples are being analyzed to assess the quality of water in agricultural drainage ditches.

The data collected from this study will enable a better understanding of spatial and temporal magnitude and behavior of nutrients in agricultural drainage ditches. The results will be useful in the development of better algorithms and models to use in drainage water management at the watershed level and to reduce nutrient discharge. By scaling the results from the field to the watershed level, this study will assist producers in adopting BMPs that will not only optimize production practices, but also minimize nutrient loads in tiles. The results of this research will be used to develop outreach materials and a website to educate rural communities throughout the Midwest.