NUTRIENT ATTENUATION UNDER NATURAL CONDITIONS IN AGRICULTURAL DRAINAGE DITCHES

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Goals:

1. Examine patterns in ambient nutrient concentrations and nutrient spiraling in drainage water during low and high flow conditions
2. Evaluate spatial and seasonal variations in sediment-water interactions
3. Characterize the magnitude and transport of tile added-nutrients and their retention in the drainage ditches

Statement of Problem:
In the Midwestern region of the United States, croplands are commonly subjected to surface and subsurface drainage systems. Subsurface drainage uses drain tiles as water pathways which discharge regularly to receiving ditches. Although it is generally recognized that high concentration of nutrients associated with tile drains can be easily transported to downstream surface waters, little consideration has been given to the effects of tile drain discharge on the concentration of ambient nutrients, their movement and transport, their interactions with benthic sediments and their retention in agricultural drainage ditches. Therefore, there is a critical need to examine the effects of nutrient discharge from tile drains and resulting nutrient dynamics in these managed ecosystems. A holistic watershed management approach requires an understanding of the impact of land and drainage management options on nutrient losses to drainage ditches and the role of various biotic and abiotic processes in mediating nutrient transport within ditch environments.

Current Activities:
Water samples are being collected in three northwest Indiana drainage ditches: J.B. Foltz ditch 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 the ditches and sediment extracted aliquots are being analyzed to evaluate nutrient retention efficiency of the drainage ditches.

The data collected from this study will enable a better understanding of spatial and temporal movement and transport 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 watershed level and to reduce nutrient losses in downstream waters. By scaling the results from the field to the watershed level, this study will in adopting BMPs that will not only optimize production practices, but also minimize nutrient loads in tile drains.