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The Ditch Project: Soils, Phosphorus and The Ooze

The Ditch Project is a collaborative effort to better understand and manage ditches in order to reduce negative water quality impacts of ditch-drained agroecosystems and to ensure agricultural profitability. Drainage ditches are an integral component of many agroecosystems, functioning to improve field drainage for crop production but also serving as key pathways of nutrient export. In this on-going study, we are monitoring ditch water export and quality and ditch soil and water chemistry in the Manokin Branch watershed in Somerset County, Maryland. An intensive study, which includes subsurface and surface water quality monitoring, is being conducted at the University of Maryland Eastern Shore (UMES) Research Farm in Princess Anne, Maryland. Pedogenic processes operating in these ditch soils include organic matter accumulation, structure formation, iron oxidation and reduction, sulfuricization, sulfidization, diffusion, and bioturbation. At the UMES Research Farm, monosulfidic black oozes were observed on ditch soil surfaces and sulfidic materials were observed at depth; sulfides may release iron-bound P upon formation and acidity upon oxidation. Ditch soils had a mean oxalate-extractable P concentration in the 0-5 cm depth of 700 mg kg^{-1}. The distribution of ditch soil P was dependent on farm structure and pedogenic processes. Within ditch pedons, soil P distributions were dependent on soil parent material, texture, and gleization. Phosphorus concentrations have been observed in the shallow groundwater as high as 1.5 mg L^{-1} between 90 and 130 cm and 0.2 mg L^{-1} below 130 cm. Preliminary results indicate that subsurface flow pathways are the dominant mechanism of P transport in these landscapes. In 2006 we will install and monitor two ditch management practices – water-control structures and ditch clean-outs.

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