



USDA-CSREES 2007 National Water Quality Conference

Comparison of Water Quantity and Quality Between Subsurface Tile and Edge-of-Field Runoff

Two years (Nov. 04 – Oct. 06) of discharge and water-quality data were collected from two subsurface tile and surface-water sites within two small (13.2 and 20.5 acres) basins on a private Northeastern Wisconsin dairy. Discharge was monitored continuously and composite water samples for precipitation and snowmelt-induced runoff events were collected and analyzed for nutrients and sediment. Tiles flowed for most of the study period – even when ground was frozen. Comparison of hydrograph responses to precipitation or snowmelt events indicated rapid, preferential flow from surface water to tiles. Tiles accounted for up to 85 percent of annual runoff from each basin, but only 14-32 percent of sediment losses. Tiles accounted for less than 45 percent of total phosphorus losses, but up to 90 percent of annual total nitrogen losses. Dissolved phosphorus comprised 45-67 percent of the total phosphorus lost from the tiles. In the first year of monitoring, nitrates contributed 20-58 percent of the total nitrogen losses from tiles. In the second year of monitoring, nitrate contributions increased to over 95 percent of the total nitrogen lost from tiles. A majority of the total nitrogen lost was nitrates. In the first year of monitoring, average concentrations of nitrate in tile and surface water runoff ranged between 5.4-16.7 mg/L and 1.1-2.8 mg/L, respectively. During the second year of monitoring, average concentrations of nitrate in tile and surface water runoff ranged between 31.8-50.7 mg/L and 10.8-22.0 mg/L. Application of liquid dairy manure to each basin likely caused the increase in nitrate concentrations in tile and surface water runoff during the second year of monitoring.

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