

RELEASE OF ARSENIC AND COPPER FROM POULTRY LITTER APPLICATION IN AN AGRICULTURAL WATERSHED

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Arsenic contamination of water in agricultural watersheds is a recent concern, as poultry litter applied to croplands can release organoarsenic, as well as other poultry feed additives, including copper, to the environment. Arsenic and copper released from natural and anthropogenic sources are often assumed to adsorb to mineral surfaces and consequently remain immobile in soils. While some studies have shown that this does occur, recent data suggest that arsenic and copper adsorbed to mobile particulates can be transported from the litter-applied fields to soil water, groundwater and stream water. Previous studies have also shown that copper forms complexes with dissolved organic carbon in litter leachate, which can increase its mobility. My research aims to determine the extent of association of arsenic and copper with particulates or organic complexes in soil water underlying fields applied with poultry litter.

A small-scale field application of poultry litter was conducted at our research site in Rockingham Co. Virginia in early August 2006. Soilwater samples were collected from lysimeters before application to characterize background chemical compositions, and successive water samples were collected monthly for a total of five sampling periods. The water samples were then field filtered, with subsets of the filtered water retained for subsequent laboratory analysis. Ultrafiltration was also conducted to determine if the arsenic and copper seen in these waters is primarily dissolved, complexed with dissolved organic carbon, or adsorbed to particulates. Our preliminary data suggest that the arsenic and copper released from litter application can adsorb to mobile particulates in the subsurface. These particulates can then be transported from the litter-applied fields through soil water and subsequently into groundwater and stream water. Arsenic and copper can also complex with dissolved organic carbon, and be subsequently transported from the litter applied fields.