

Effects of Agricultural Land Use on the Sources and Composition of Dissolved Organic Matter (DOM) in Subtropical Streams

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Agricultural land use has been shown to change the amount and compositions of terrestrial organic matter flushed to streams and rivers, as well as altering the production and metabolism of aquatic organic matter. Previous studies have shown contradictory findings on how agricultural land use changes the compositions of DOM in lotic ecosystems. We assessed the spatiotemporal variation in DOM from the first- to fourth-order streams draining watersheds across percent agricultural lands (13% to 87%) in northern Alabama. Water samples were collected bimonthly for one year for the analysis of dissolved organic carbon (DOC) concentration and DOM absorbance and fluorescence property. We found that microbial humic-like DOM and protein-like DOM are the primary constituents, accounting for 45.4% and 37.3% of total fluorescence, respectively, whereas terrestrial, soil-derived humic-like DOM only comprised 17.3%. In streams draining higher percent agricultural lands, stream water showed higher DOC concentration and proportions of microbial DOM. This observation may reflect enhanced microbial reactivity due to higher nutrient inputs from agricultural watersheds. Seasonal effect is also evident where stream water showed highest DOC concentrations in summer, when high temperature and low flow collectively facilitate autochthonous DOM production and accumulation.