ABSTRACT

TITLE: Environmental fate and effects of atrazine, metolachlor, carbaryl and chlorothalonil in lotic ecosystems

STUDENT: Daniel Elias

DEGREE: Doctorate of Philosophy

COLLEGE: Sciences and Humanities

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Pesticides have the potential to affect receiving aquatic ecosystems. These effects are dependent on compound physicochemical characteristics, susceptibility of aquatic organisms, abundance in streams, and stream characteristics. Atrazine, metolachlor, carbaryl, and chlorothalonil have high usage rates in the U.S. and are detected in streams at concentrations that might have adverse effects on aquatic organisms. In this study, pesticide abundance and toxicity were quantified. Pesticide concentrations were differentially influenced by stream physicochemical parameters depending on the spatial scale. Further, pesticide concentration was influenced by compound octanol-water partition coefficient and solubility. Pesticides with higher affinity to water and specific modes of action (atrazine and carbaryl) did not affect sediment microbial nutrient uptake. In contrast, pesticides with higher affinity to sediments and broad modes of action (metolachlor and chlorothalonil) altered nutrient uptake. Pesticide effects were also measured on dominant grazing invertebrates, common freshwater snails. *Physa acuta* and *Helisoma anceps* egestion was lower with individual and combined pesticide exposure likely a result of narcosis and species-specific susceptibility. These data indicate that pesticide fate and abundance are influenced by compound characteristics and stream physicochemical properties and effects of pesticides on aquatic organisms are influenced by species characteristics.