

The Impact of Agronomic Inputs on Selected Physicochemical Features and Their Relationships with Heavy Metals Levels in Surface Sediment and Water in Sugarcane Farms in Nzoia, Kenya.

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Abstract

Sugarcane farming is the most important cash crop cultivation activity in the Lake Victoria basin of Kenya practiced in an area covering approximately 114,000 Ha in total. For better yields, various agronomic inputs including fertilizers and herbicides have been used intensively in the farms, causing serious concerns about their potential impacts on the aquatic ecosystems within the lake basin. In this study, the physicochemical features of surface sediment and water including pH, total organic carbon contents and heavy metal (Cd, Cu, Zn, Pb and Cr) loads in River Kuywa and in runoff canals in sugarcane farms in Nzoia nucleus estate within the lake basin were determined to assess the effects of agronomic activities including agronomic inputs in the form of nitrogenous fertilizers [urea and diammonium phosphate (DAP)], herbicides and sewage sludge used in farming on their levels. The results indicated significant differences ($p \leq 0.05$) in the heavy metal levels in sediment and water samples taken before and after the farms, respectively, indicating a positive impact on the concentration levels. The canal water and sediment samples' heavy metal levels were also significantly higher than those of the river samples showing that the influent sugarcane farm canal waters transfer these contaminants into River Kuywa. Although the levels of these parameters were significantly higher in the canals than in the controls obtained from outside the sugarcane farms, the heavy metal levels in soil samples from within the farms with similar agronomic activities did not differ significantly among the various plots. The turbidity, electrical conductivity, temperature, water and soil pH and total organic carbon values in samples obtained within the sugarcane farms showed significant seasonal variations and differed significantly from the values in the controls showing a significant negative impact of agronomic inputs on water quality.

Keywords: Lake Victoria catchment Sugarcane farming River Kuywa Heavy metals Agronomic inputs Kenya.

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