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Herbicide residue dissipation dynamics and residual effects on soil physicochemical parameters of a pilot maize farm

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Herbicide application to control the growth of weeds in farming has its attendant effect on the ecosystem. The rate of reduction of applied herbicides concentration (pre-plant: glyphosate, pre-emergence: atrazine, and post-emergence: 2,4 D amine) was studied on a pilot maize farm and the impacts on the soil physicochemical parameters using standard methods. Glyphosate and atrazine followed a linear regression equation while 2,4 D followed a quadratic regression equation. The regression equations were fit for the predictions of the residues by having high R2 values (0.82-0.98) and their ANOVA p-value was less than 0.05. Regression Model prediction of half-life for glyphosate, atrazine, and 2,4 D were 80 days, 63 days and 10 days respectively whereas first order equation prediction of half-life for glyphosate, atrazine, and 2,4 D were 16 days, 37 days and 10 days respectively. There is a convergence of prediction on 2,4 D half-life. This is as a result of a high decomposition rate of 2,4 D in the environment. These are within the range of literature. Soil pH was slightly increased by glyphosate and atrazine application whereas 2,4 D application reduced the soil pH. Soil fertility index and cation exchange capacity of the farmland were slightly improved whereas organic carbon content and percentage base saturation showed no significant difference with herbicide application. Herbicide applications have a slight impact on the ecosystem but could be significant if application persists over a long period of time.

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