

AN ABSTRACT OF A THESIS

EVALUATION OF PEAT MOSS AS AN EFFECTIVE FILTER MEDIA IN  
THE REMOVAL OF HERBICIDE, SIMAZINE

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The hydraulics and adsorption capacity of three types of peat moss: commercial sphagnum peat moss unscreened (SP), sphagnum peat screenings which are used primarily for heavy metals removal at industrial sites (HMP), and screenings used primarily for household septic systems (STP) were studied in the removal of herbicide, simazine. The porosity and the hydraulic conductivity were determined for the three types of peat moss. HMP peat moss found to having a porosity of 51% had a hydraulic conductivity of 1.32 cm/s. The STP peat moss had a porosity of 31% and hydraulic conductivity of 0.24 $\pm$ 0.1 cm/sec. In the case of the SP peat moss, water did not flow through it easily and hence hydraulic studies were not performed on it. Significant adsorption of simazine was observed with the HMP and SP peat whereas the STP adsorbed no significant amounts of simazine. The solid-water simazine distribution ratio ( $K_d=0.026\text{L/g}$ ) and rate constant ( $k=0.046\text{L/g-hr}$ ) for the HMP peat were determined from batch isotherm and kinetic studies, respectively. From column studies, the break through curve of simazine was obtained. The solid-water simazine distribution ratio,  $K_d$  (0.017 L/g), was determined from the column study by proposing a linear equilibrium transport model. Microbial degradation rate of simazine was  $0.03\text{hr}^{-1}$  in column studies based on first order kinetics with hydraulic retention times of 4, 12 and 24 hours. Based on the sorption column studies, relationship was established between the hydraulic retention time and the useful life of the peat moss filter as a sorbent for simazine from which a preliminary design of a peat filter was derived.