

AN ABSTRACT OF A THESIS

THE DETERMINATION OF THE PREFERRED ELECTRON ACCEPTOR FOR THE HERBICIDES, SIMAZINE AND METOLACHLOR, IN A CONSTRUCTED SUB-SURFACE FLOW WETLAND

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A laboratory scale study was conducted to determine the statistical significance of the presence or absence of *Scirpus validus*, high or low levels of nitrate, high or low levels of sulfate, and high or low levels of carbon in the form of methanol on the removal of simazine (2-chloro-4,6-bis (ethyl amino)-s-triazine) and metolachlor (2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl-acetamide)) in microcosms designed to simulate a constructed sub-surface flow wetland.

Vegetation significantly ($\alpha = 0.05$) increased the percent of simazine removed from the system. The addition of plants increased the removal from 20% without plants to 64% with plants. While both denitrification and sulfate reduction were occurring in the system, changing the levels of neither nitrate nor sulfate significantly ($\alpha = 0.05$) affected the removal of simazine. Varying the levels of organic carbon in the system did not significantly ($\alpha = 0.05$) affect the removal of simazine.

The addition of organic carbon in the form of methanol significantly ($\alpha = 0.05$) increased the percent of metolachlor removed from the system. Vegetation did not significantly ($\alpha = 0.05$) affect the removal of metolachlor. However with $\alpha = 0.09$ the effect due to plants cannot be ignored. The removal percentage increased from 49% without plants to 61% with plants. While both denitrification and sulfate reduction were occurring in the system, changing the levels of neither nitrate nor sulfate significantly ($\alpha = 0.05$) affected the removal of metolachlor.