

## Modeling of biological clogging of soil-sawdust column experiments

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Whereas most previous studies of biological clogging and biomass growth were consider soil as porous media. The present study investigates how the sawdust material affects the biological clogging and the transport properties of porous media.

The decrease in porosity and permeability of a saturated porous media due to bacterial growth is commonly referred to as biological clogging. In this study one dimensional model for biological clogging was used to study the progress of biological clogging in soil-sawdust column experiments. A model was developed simulating solute transport in soil-sawdust experimental columns including biological clogging possesses. To simulate the biological clogging effects, the changes in porosity are calculated by converting biomass into volume, which directly reduces the porosity. The biomass growths are formulated using the Double Monod kinetic equation. Results from a laboratory soil-sawdust experiments were used as a data to verify the simulation results of the model.

The column experiment was carried out using glass columns of 45 cm height and 10 cm internal diameter. The first column was packed to height of 30 cm with soil and second column packed with mixtures of 50% soil and 50% sawdust. The secondary wastewater was constantly supplied at the top of the two columns for the duration of 56 days

The experimental results showed that the permeability in the columns decreased during the running time. Such decreases in the permeability are due to clogging of the soil pores as a result of bacteria growth. The experimental results also showed significant reduction in pollutants concentration and increase in permeability when sawdust was used as a carbon source to enhance microbial activity.

The results from this study showed that it was generally possible to simulate the laboratory experimental results with a mathematical numerical model. A detailed comparison between the experimental and the simulation results showed that good agreement was obtained. Also this study showed that the sawdust materials have proven to be promising materials for controlling and increasing the permeability and removal of pollutants from wastewater.