The Effects of the Denitrifications Process Through Bioreactors, Avena sativa, Triticum, and Secale Cereal

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Nitrogen is one of two of the biggest contributing factors to the hypoxia zone in the Gulf of Mexico. These nutrients cause excessive algal growth which depletes the oxygen from the water ultimately killing the organisms that live there. This issue led me to the goal of reducing the amount of nitrogen from agricultural run-off water before it makes its way into the Gulf of Mexico. In order to do this, I chose to test a bioreactor and 3 different types of cover crops: oats, wheat, and rye to determine which would remove the highest concentration of nitrates from water. Furthermore, I hypothesized that the rye would remove the highest percentage of nitrates due to its large root system. I started by planting 12 plastic planter trays of each type of cover crop. Once planted, and grown to maturity, I collected runoff water from my family's farm and highly concentrated nitrate water from 2 local wells. This water was then misted over the top of the plants to allow the water to soak through the soil and then collected underneath for testing. I then took 600 grams of wood chips for my bioreactor, put them into a plastic tub, and covered them with water for 24 hours to activate the bacteria. After 24 hours, each water type would soak in the wood chips for 6 hours and then be collected for testing. After analyzing all data, it was concluded that oats reduced the greatest amounts of Nitrates in my water.

Awards Won:

Fourth Award of $500