Exploring Algal Applications to the Aerobic and Anaerobic Bioremediation of Wastewater and Developing a Low-Cost Biofertilizer To Enhance Plant Growth

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Approximately 80 percent of wastewater worldwide returns to the ecosystem without treatment, meaning 1.8 billion people use a contaminated source of drinking water. The purpose of this experiment is to develop an effective method to treat wastewater and create an alternative to chemical fertilizers that produce harmful runoff. I hypothesize that algaes Mougeotia and Anabaena can be used to aid the removal of contaminants within wastewater. I predict they will promote a greater rate of plant growth in comparison to seeds supplemented with fertilizer. My experimental procedure encompassed the creation of bioreactors that stored the aqueous solutions, the bioremediation of these solutions, and the observation of plant growth from four different pots: Mougeotia, Anabaena, Control, and Fertilizer. The results and observations from my wastewater samples and plants support my hypothesis. A significant portion of the ending quantitative and qualitative values of the wastewater samples aligned with that of a pure water sample. Anaerobic solutions do not perform as well as aerobic solutions which is likely due to the fact that algae requires oxygen to perform several metabolic functions such as photosynthesis. The decline in the contaminant level of my aerobic flasks permit me to infer that chemical supplements and oxygen greatly accelerate the rate of degradation. Under proper conditions, Anabaena and Mougeotia can be used to aid the removal of contaminants in wastewater and have the potential to improve the quality of a wastewater sample; bioremediation has significant societal implications and can be used to effectively combat the wastewater crisis.

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