Cyanofertilization: A Comparative Analysis of Biological and Environmental Impacts

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With increasing populations and rising global temperatures, the need for a new agricultural revolution is imperative. The objective of this project was to find a sustainable and economical alternative to conventional agricultural techniques while simultaneously combating the effects of climate change. We compared the biological and environmental impacts of different methods of application of commercial chemical and organic fertilizers against a novel biofertilizer that utilized the photosynthetic properties of a non-toxic, non-pathogenic strain of cyanobacteria. Over the course of the experiment, over 2,000 data points were collected and the results were analyzed using a chi-squared test which revealed that the biofertilizer was just as effective biologically as the chemical fertilizer. However, unlike chemical fertilizer, the cyanofertilizer had the best environmental impacts in that it was able to maintain the water and soil composition, and reduce atmospheric CO_2 by 142 ppm relative to the baseline (+287 ppm). In addition, since a controlled cyanobacterial algal bloom can be cultured at low cost, it makes for an inexpensive and bio-degradable option for farmers. The applications of cyanofertilization could have major benefits on a global scale, aligning our agricultural needs with the needs of our planet.

Awards Won:
Third Award of $1,000