OFFICIAL ABSTRACT and CERTIFICATION

Utilizing EGCG to Mitigate Heavy Metal Stress Induced Chlorella vulgaris

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The utilization of fossil fuels has led to detrimental effects in the environment as a result of its subsequent stressors. These include heavy metal stress and oxidative stress, such that the latter can develop after exposure to the former. Environmental shifts as a result of heavy metal stress include increased occurrences of acid rain and a reduction in the pH of the soil to 5, which leads to Aluminum exposure. These two instances can lead to increased Aluminum exposure from the soil, which develops the presence of Reactive Oxygen Species (ROS). The antioxidant utilized, epigallocatechin gallate (EGCG), can be found in green tea extract as a method of alleviating the damage induced on Chlorella vulgaris. The effects of the EGCG alone, Aluminum alone, and both together were tested in each of the experimental groups and the alleviating effects of EGCG against Aluminum exposure were observed. The population density of the algal cells was quantified through spectrophotometry via transmittance between the wavelengths of 350-650nm to observe the effectiveness of EGCG. These transmittances were then utilized to calculate regressions in population growth through an ANOVA with a significant p-value <0.05. Each of the calculated regressions had a statistical significance of 0.000 with the largest and smallest slopes belonging to the EGCG group and the Aluminum group respectively. Expectedly, the EGCG was able to mitigate the effects of the Aluminum as the slope of the group containing both solutes had population growth between the Control group and the EGCG group.

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