A Novel Approach on Mitigating Ocean Acidification by Enhancing Photosynthesis Rate of Macroalgae Ulva lactuca

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Ocean acidification is the evil twin of global warming! When carbon dioxide is absorbed by the ocean, it shifts the pH of the water to neutral. This phenomenon leads to detrimental damage to coral reefs and other marine organisms. In order to address this issue, this project aimed at mitigating ocean acidification by enhancing the photosynthesis rate of Macroalgae Ulva lactuca. The methods of this research include the following: First, Ulva lactuca were supplied with 0.3g carotene, 1g phycobilin, and 0.1 coumarin. Secondly, phytotoxicity effects of the enhanced Ulva lactuca was assessed by exposing it to mangrove seedlings and by measuring the Chlorophyl levels. A pH monitoring system was engineered using DFrobot and Aduino uno. Next, the dissolved oxygen level were measured and recorded using Neulog Dissolved Oxygen sensor. Lastly, the pH level and oxygen level were measured weekly for a span of one month. The results showed that the treatments with enhanced Ulva lactuca had a higher average photosynthesis rate as compared to the control. The pH level of the water with the enhanced Ulva lactuca increased by an average of 2.7 (p value is less than 0.05 ANOVA Test). The pearson correlation value of 0.84 was calculated which indicated that there is a high correlation between the photosynthesis rate and pH level of the water. Lastly, the treatments with enhanced Ulva lactuca did not have any phytotoxic effects on the mangrove seedlings. A prototype was engineered using a 3D printer and was equipped with a GPS. Key words: enhanced Ulva lactuca, photosynthesis rate, pH level.

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