A Novel Biodegradable Device To Combat and Prevent Water Eutrophication

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Eutrophication, an excess of nitrates and phosphates in water primarily caused by fertilizer runoff, is the leading cause of cyanobacteria epidemics and marine life deaths. Previous studies have used chemical flocculants and coagulants to combat eutrophication; however, these chemicals are harmful to marine life. Therefore, this study aims to repurpose agricultural waste to lower eutrophication levels. Banana (Musa acuminata ‘Giant Cavendish’) peel powder was tested in sachet form as a nitrate and phosphate remover using scientifically generated eutrophicated water and scientific compound tests. The sachet successfully treated the eutrophicated water, lowering nitrate levels from 80 mg/L to 1 mg/L and phosphate levels from 2 ppm to 0.15 ppm; both levels dropped below the EPA’s eutrophication standard. To further prevent eutrophication, the sachet is subsequently repurposed as a fertilizer. Most commercial fertilizers either contain high levels of compounds or are too expensive and ineffective; however, this study repurposed the used sachet into a concentrated potassium-nitrate non-synthetic fertilizer. The plants in the repurposed sachet group averaged 34.62 cm outperforming the commercial fertilizer plant group which averaged 24.59 cm and the control no fertilizer plant group which averaged 19.40 cm. This study shows that large-scale manufacturing of these sachets is an environmentally and economically viable option as it employs agricultural waste, and its costs will be offset by fertilizer sale. Thus, this study has the potential to save marine life as it successfully honed upon currently available options to prevent and eradicate eutrophication by utilizing agricultural waste.

Awards Won:
Fourth Award of $500