Applications of the Engineered Novel Solid and Liquid Bioplastics From Invasive Algae and Waste Corncobs

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Plastics in the market are produced from a fossil source. However, these are harming our environment, making plastic pollution one of the most urgent issues in our world. Thus, there is considerable interest in biodegradable plastics. Current biodegradable plastics, such as polylactic acid and oxo-degradable plastics, require a special composting facility to degrade, which are largely inaccessible to individuals. The objective of this project is to produce a biodegradable plastic through the utilization of invasive algae and waste corncobs – both of which are environmental concerns. In the production process, I extracted starch from waste corn cobs and synthesized sodium alginate from Undaria pinnatifida through the addition of acetic acid and sodium carbonate to the alginate. I then added distilled water, vinegar, and glycerine into the as-made starch and sodium alginate to form a mixture. After heating to promote polymerization, liquid biopolymer solutions were prepared. Further drying the solution, I obtained the engineered bioplastic. Next, I tried various formulas to get the best quality for the spoon and straw. The novel bioplastic exhibited superior performance in several aspects. After comparing the engineered bioplastic with the conventional plastic, my bioplastic was proven to biodegrade at a faster rate than the oxo-biodegradable plastic. Next, after analyzing the bioplastic using the Image J program, the results showed that my liquid biopolymer was able to radicate almost all the bacteria with 80 ml. The bioplastic was also shown to be stronger and had a better melting point.

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