Engineering an Invasive Algae and Taro Based Bioplastic

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Regularly used petroleum based plastics are the cause of many prevalent and urgent environmental issues, two of which being global warming and plastic pollution. Bioplastics, recognized by Forbes as the “future of plastics,” are biodegradable plastics made from renewable resources such as agar and starch. This study focuses on the extraction of agar from invasive algae, Gracilaria salicornia, and taro starch from taro for bioplastic usage. Gracilaria salicornia, or more commonly known as Gorilla Ogo, are damaging coral reefs around Hawaii with their extremely quick growth and spread rates. Lastly, by using taro, this bioplastic could support Hawaii farmers and boost our local economy. After conducting two pilot tests and four successful trials, a 16-day method was adapted to successfully extract agar from Gorilla Ogo. Taro starch was also extracted from taro corm using a centrifuge technique to accelerate the process. The extracted agar and taro starch were then dissolved into vinegar and glycerin, creating the invasive algae and taro based bioplastic. Biodegradability was tested in a garden, and this bioplastic has an average mass loss of 67.814% over four days and completely degrades within one week. Using spreadsheets, the cost per square inch was also calculated ($0.000328), giving this bioplastic the potential to be competitive against other plastics. Naturally biodegradable plastics, such as this invasive algae and taro starch based bioplastic, are very promising with their ability to not only improve many global environmental issues but support our local environment and economy as well.

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