Year 2: A Novel Biodegradable Sorbent for Oil Spills

Patil, Mahie (School: Orlando Science Schools)

In response to the escalating environmental concerns of oil spills, this project investigates banana bark as a potential oil sorbent that can naturally degrade the absorbed oil. This study explores the potential of lipase-producing bacterial cultures isolated from banana bark as agents for oil degradation. The investigation involves controlled experiments that simulate freshwater and saltwater oil spills, with consistent inoculation densities across all cultures. Remarkably, all tested cultures exhibited substantial oil degradation within 24 hours, emphasizing the rapid efficacy of the banana bark's lipase-producing microbial flora regarding natural oil breakdown. The observed decrease in degradation rates beyond this point is likely due to nutrient limitations and the accumulation of metabolic by-products affecting the lipase enzyme's activity. Furthermore, distinct differences emerged in the response of these cultures to saltwater conditions, indicating that salt plays an inhibitory role on lipase activity. However, culture #6 demonstrated higher oil degradation abilities in saltwater and freshwater at equal rates, suggesting its potential as a versatile and effective resource for oil spill mitigation in diverse marine environments. Moreover, this study's innovative aspects lie in modeling the collective impact of lipase-producing microbial flora, predicting a relative complete degradation of absorbed oil within 2.6 days in freshwater and 5 days in saltwater. As we navigate the imperative shift toward sustainable environmental practices, these findings offer a promising foundation for developing eco-friendly oil spill response strategies, emphasizing the need for further exploration and validation in practical settings.

Awards Won:
NC State College of Engineering: Scholarship to attend NC State Engineering Summer Camp
Air Force Research Laboratory on behalf of the United States Air Force: Glass trophy and USAF medal for each recipient
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Regeneron ISEF Category,