The Biological Examination and Thermochemical Analysis of Sargassum Seaweed as a Renewable Insulation

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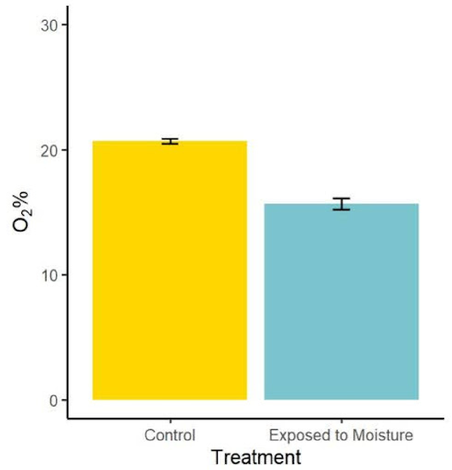
INTRODUCTION

Sargassum muticum is an invasive seaweed that has emerged over recent decades as a dominant component of nearshore ecosystems, replacing native kelp forests in the Pacific Ocean. It generates significant biomass annually that is thought to be of negligible value to nearshore ecosystems. The rapid propagation of *Sargassum* in urbanized marine environments can be attributed to a multitude of determinants. Prior studies suggest that *Sargassum* has several characteristics that may make it useful as a novel 'blue-green' building material, such as demonstrating flame-resistance and retaining inert configurations when dried. This study sought to evaluate the viability of an insulative material fabricated from *Sargassum.*

CONCLUSION

The process of collecting and assembling the insulation proved feasible and cost-effective. In flammability tests, Sargassum batt insulation was flame resistant and performed similarly to commercially treated cellulose insulation. However, measurable off-gassing of volatile organic compounds (VOCs), suggests risks posed by biodegradation of the seaweed that require further research. Our study highlighted the potential applicability, as well as the hurdles, of using Sargassum as an insulation material. This outcome creates a necessity for future research into treatments that could aid in minimizing off-gassing of Sargassum.

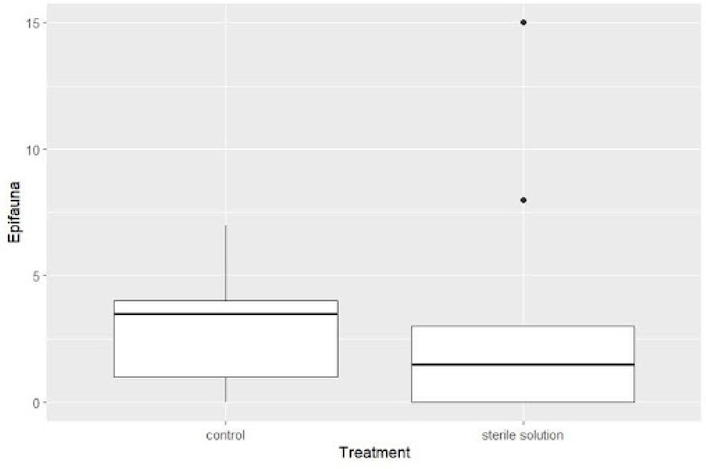
RESULTS



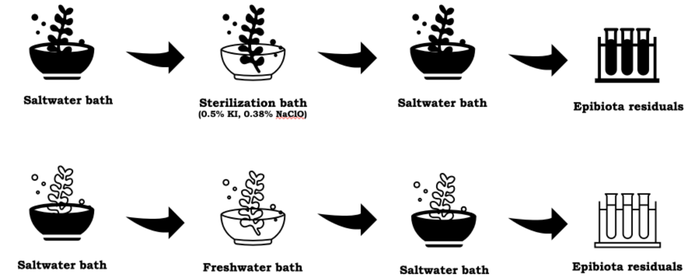
➢Epibiota treatment highlighted that the sterilizing treatment was more effective than the control, though the results yielded were not statistically significant.

➢Flame-testing showed that untreated sargassum was unable to light, but had the highest smoldering times among the materials tested.

➢In the decomposition trials, the control group had an O2 % closer to the ambient atmospheric O2 % of 20.9%. The group exposed to moisture had a lower O2 % with the average being 15.7%.



METHODS



➢Sargassum fronds were treated for epibiota in a sterilizing solution (0.5% KI and 0.38% NaClO) and a control solution (DI water) to ascertain the best removal of epibiota.

➢Pre-dried Sargassum batt insulation was treated to ignition trials among fiberglass and cellulose insulation. Measurements taken during ignition trials included: smoldering duration and the amount of mass loss.

➢Pre-dried Sargassum batt insulation was placed inside sealed 64 oz jars with 150 mL of sterilized sand. The control group jars had no water while the experimental jars contained 500 mL of water.

ACKNOWLEDGEMENTS