

Remanufacturing Mycelium Biocomposites

Student: Cecilia Cintra Costa

Project/Research Group: MycEoLA, Biobased Construction

Contact information: c.cintracosta@student.avans.nl

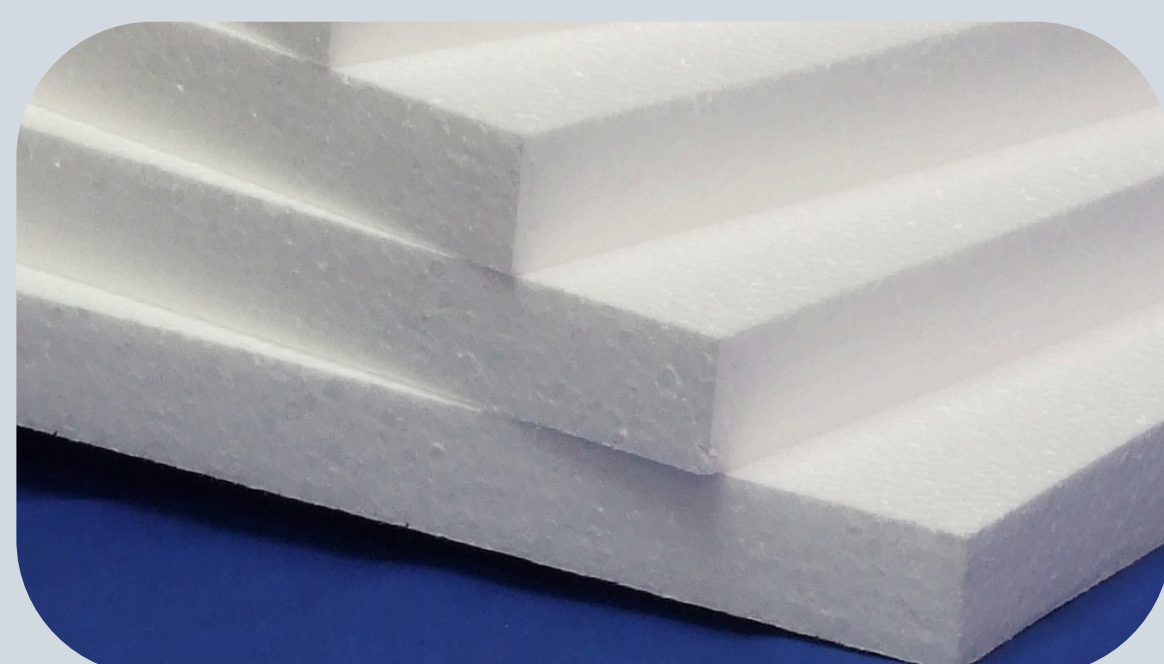
Date: January 2025

Introduction

The construction industry has considerable environmental and social effects. Typically, Expanded Polystyrene (EPS), is the material chosen for thermal insulation in buildings. However, a more sustainable alternative is Mycelium Biocomposite (MBC).

EPS

Expanded Polystyrene



Koolfoam, "Expanded Polystyrene EPS", 2024

- Based on fossil fuels [1];
- It isn't biodegradable [2];
- Weak market for remanufacturing process [1].

MBC

Mycelium Biocomposites



MNEXT, "Mythic" 2024

- Based on agricultural waste [3];
- It is biodegradable [3];
- **It can possibly be remanufactured.**

The present research aims to assess the characterization and technical feasibility of remanufactured mycelium biocomposites.

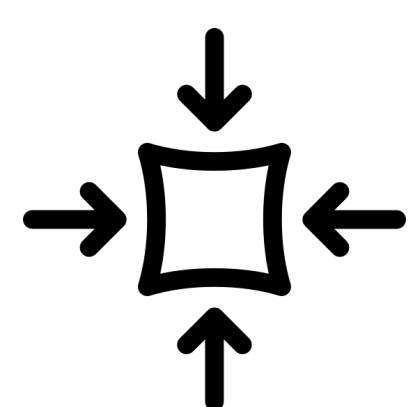
Methodology

Research questions

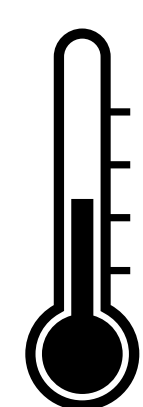
- How do the properties, such as mechanical and thermal of mycelium foams change after recycling compared to new ones?
- How many times can mycelium foams be recycled without compromising the properties?

Properties to test

Compression



Thermal conductivity



Samples

- Strain: *Ganoderma lucidum*;
- Substrate: Rapeseed straw;
- Nutrient: Glucose or flour.

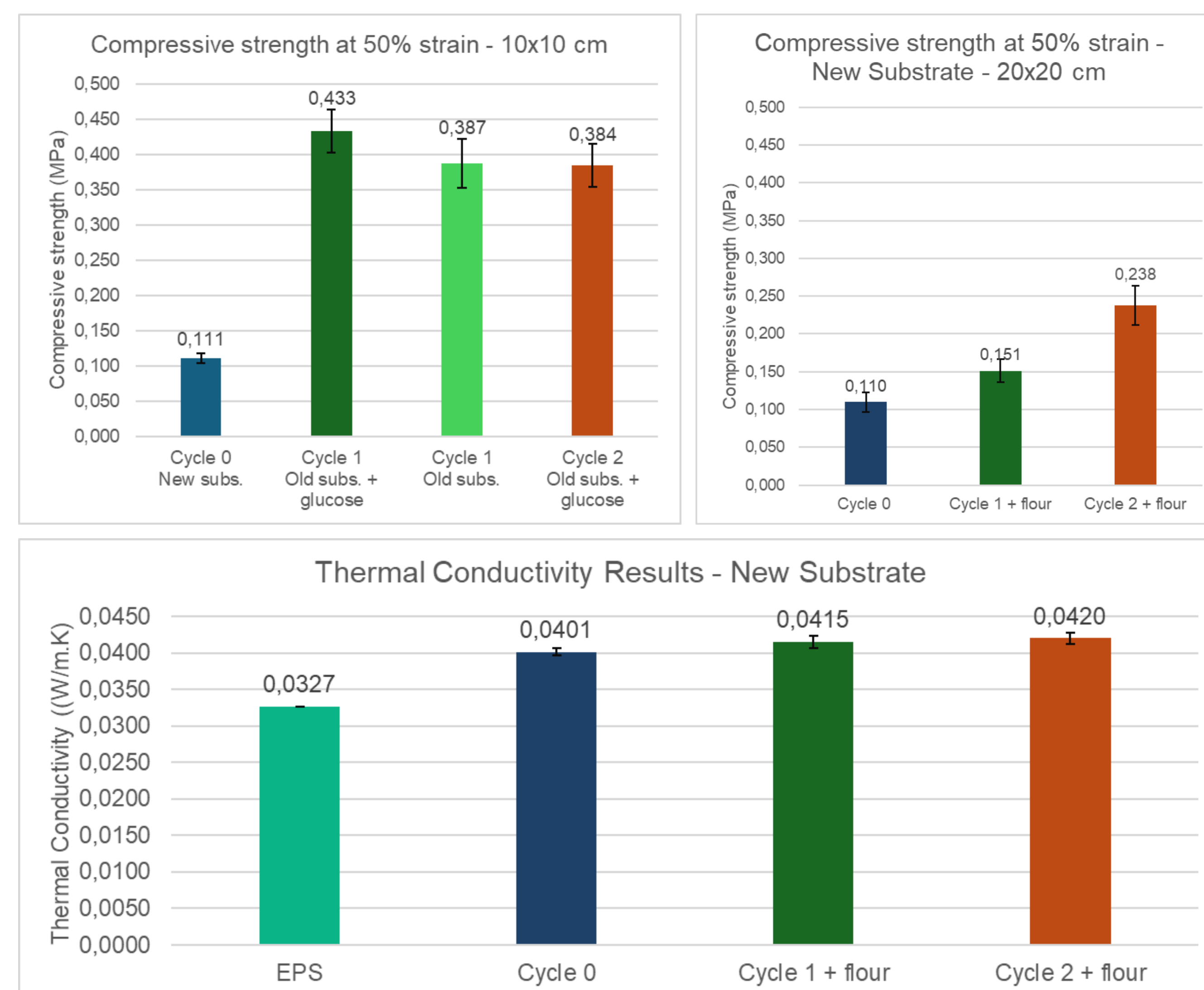
Old substrate samples

MBCs should be recycled regardless of the duration of their use. Some were added with glucose.

New substrate samples

Control group with samples produced with the same strain since the first time. They were added with flour.

Results



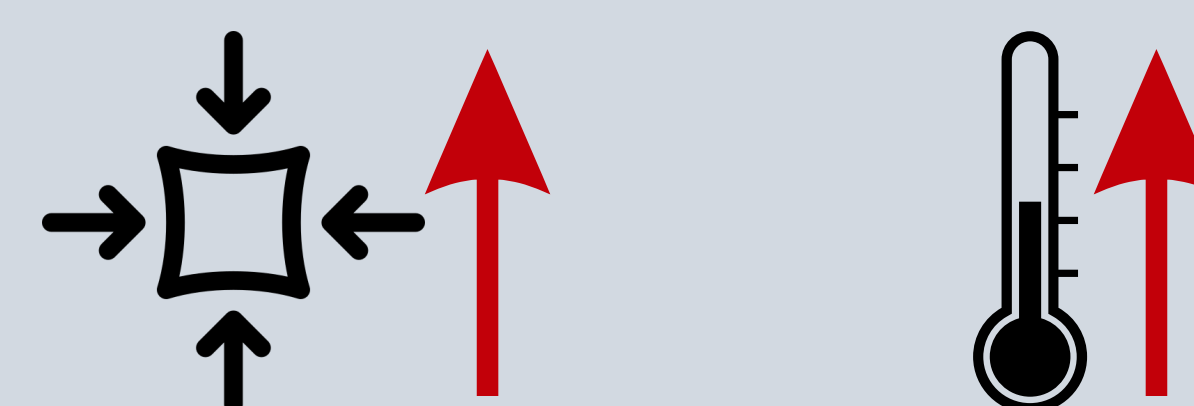
Discussion

Contamination

- **Higher contamination** rate in samples with **glucose**:
 - 50% of old substrate samples with glucose;
 - 30% of old substrate samples without any nutrient;
- Solutions:
 - Making a **ratio** between **new and old** substrate;
 - Add **more spawn**.

Properties change

- Compression strength increased with remanufacturing;
- Thermal conductivity increased with remanufacturing.



Times remanufacturing

- With the addition of **flour**, **more cycles** were reached with **less contamination**;
- It is **possible to remanufacture** MBCs at least 3 times without compromising the properties.

References

- [1] J. R. Zhao, R. Zheng, J. Tang, H. J. Sun, J. Wang, "A mini-review on building insulation materials from perspective of plastic pollution: Current issues and natural fibres as a possible solution", September 2022.
- [2] Nature Pack, Sustainable Packing, "Is EPS styrofoam biodegradable?", 2024.
- [3] M. Jones, A. Mautner, S. Luenco, A. Bismarck, S. Johna, "Engineered mycelium composite construction materials from fungal biorefineries: A critical review", February 2020.

To know more about the **MycEoLA** project:



To know more about the **MYTHIC** project:

