Mycelium Boards: a heat press and reinforcement study

SIA RAAK project KIEM HBO – consortium: Recell Group BV, Fungalogic, V8 Architects

Introduction

The project KIEM HBO *Mycelium Boards: a heat press and reinforcement study* aims at increasing the bending strength of myco-plates. This is achieved by studying the heat-press process and by mixing different fibres to form a natural reinforcement material. Mycelium is the 'root-network' of a mushroom, which is used as an inherent binder to link fibrous biomass such as straw. By growing the mycelium through fibres, a composite material is obtained. The composite is then heat-pressed to create board-like materials. These materials have the potential to replace conventional toxic board materials, such as MDF.

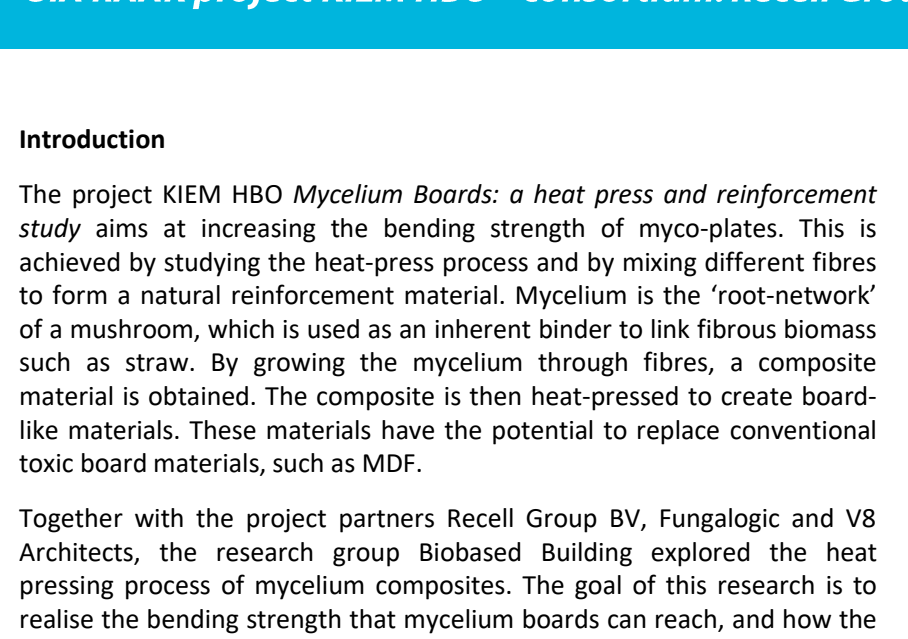
Together with the project partners Recell Group BV, Fungalogic and V8 Architects, the research group Biobased Building explored the heat pressing process of mycelium composites. The goal of this research is to realise the bending strength that mycelium boards can reach, and how the process parameters, such as temperature, pressure and time influence this property.

Project

Literature review: the initial heat pressing process and main parameters (temperature, pressure and time) are defined.

Thermogravimetric analyses (TGA): the maximum temperature above which the substrate materials start to thermally degrade is defined. Rapeseed straw and processed cellulose (Recell®) are used. Straw is selected because of its strengthening characteristic, while Recell® is known to be a booster for fungal growth.

Minor students project: a team of minor students did explorative research into the combinations of the different parameters and defined the combinations of temperature, pressure and time that resulted in samples with the highest bending strength. Following their conclusions, more substantiated research was done. A pressure of 2,8 MPa and temperature of 150°C were selected. Moreover, the influence of variations of the substrate content percentage, different growth times of the mycelium and different pressing times were studied.



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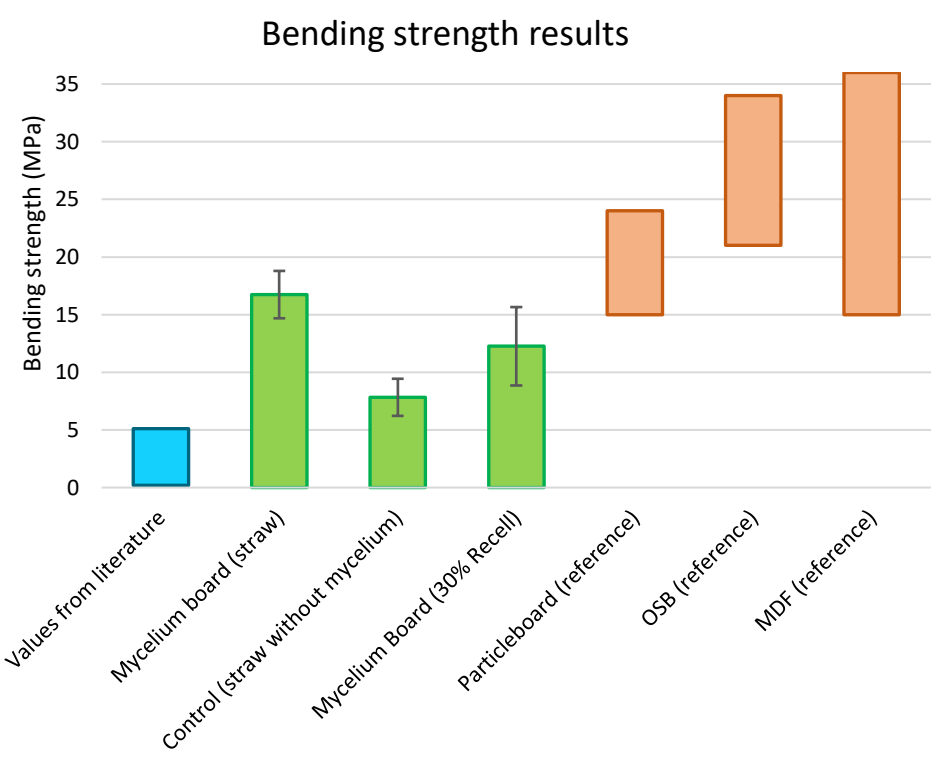

Conclusions

After statistical analysis of the results, the following conclusions are drawn:

- The produced mycelium composites show better properties than existing literature
- There is a high variance between replicates
- The heat press process does determine the mechanical properties of the board
- The pressing time makes a difference in the mechanical properties of the boards
- Having a combination of mycelium and substrate results in stronger board materials than without mycelium (there is significant difference);
- Recell ® speeds up growth, but does not increase the material properties
- The bending strength is within the range of two of the reference materials.

Future steps

The next steps will enlarge the study of mycelium boards by further defining the material's mechanical properties, investigating the heat press process on a larger scale and considering a potential business case

For more information about this research or the next steps, contact:

Project manager: Ilaria La Bianca i.labianca1@avans.nl

Lectorate: Biobased Building

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