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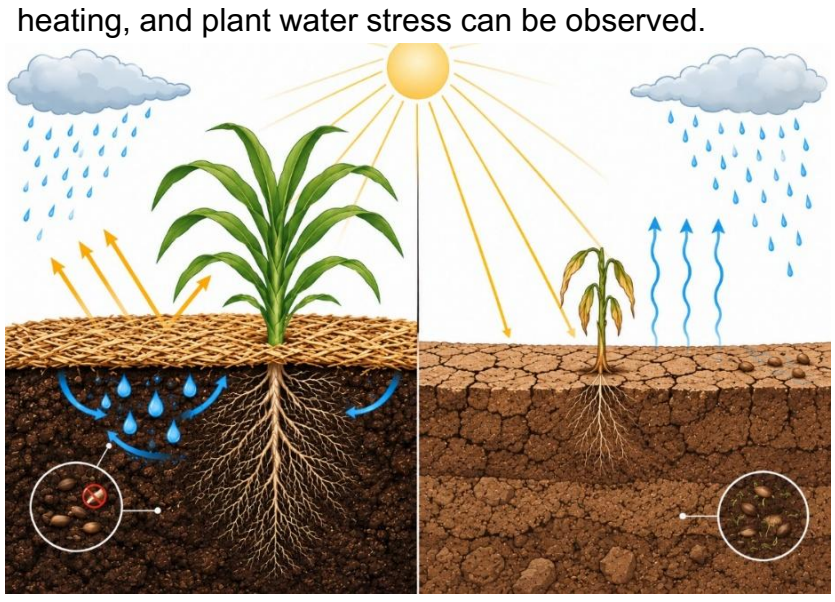
Study of the properties of sugarcane bagasse fiber and starch composites for soil mulching applications.

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Introduction

- Soil mulching contributes to moisture conservation, reduced water evaporation, weed suppression, and improved crop development.
- Bio-based mulch materials can release nutrients, contributing to plant nutrition.
- In the absence of mulch, greater water loss, increased soil heating, and plant water stress can be observed.

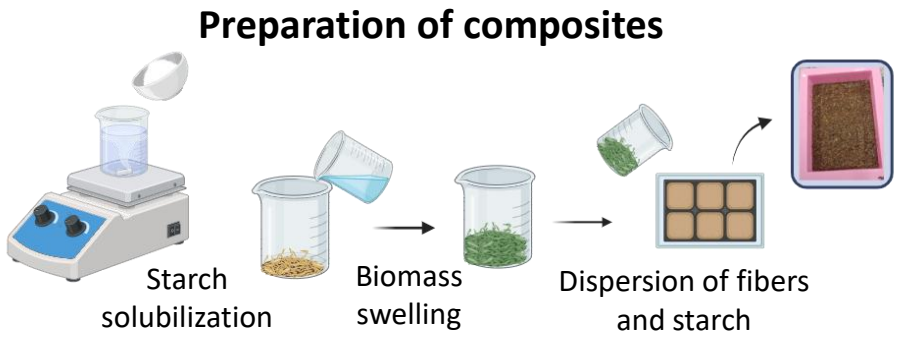


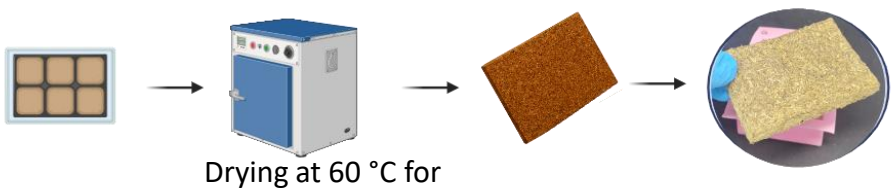
Objective

To develop and characterize renewable composites of sugarcane bagasse fibers (B) and soluble starch (S), and to assess the influence of starch content on their mechanical, thermal, and physical properties.

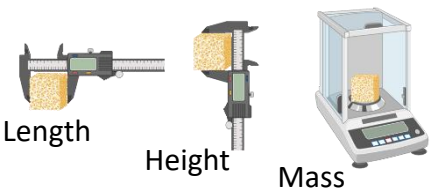
Methods

Preparation of composites

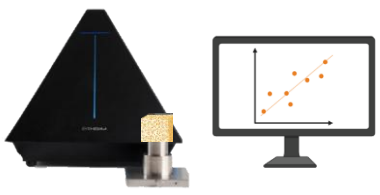




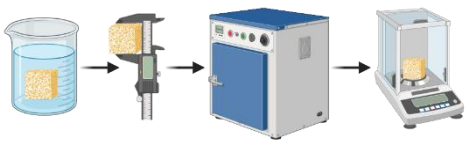
Density



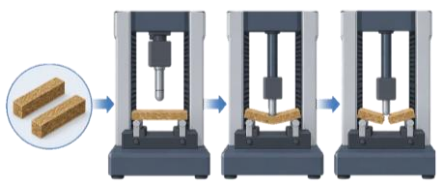
Thermal Conductivity



Water absorption test

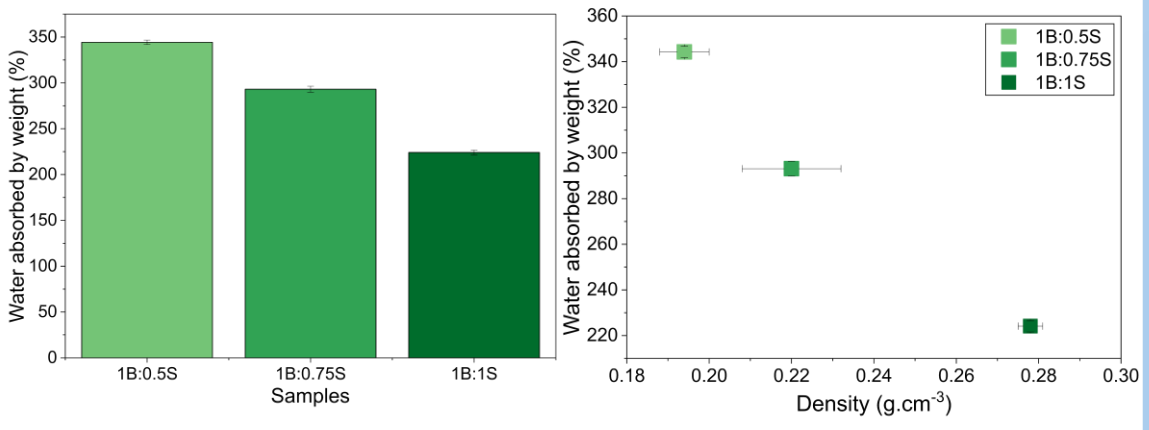


Flexural mechanical test



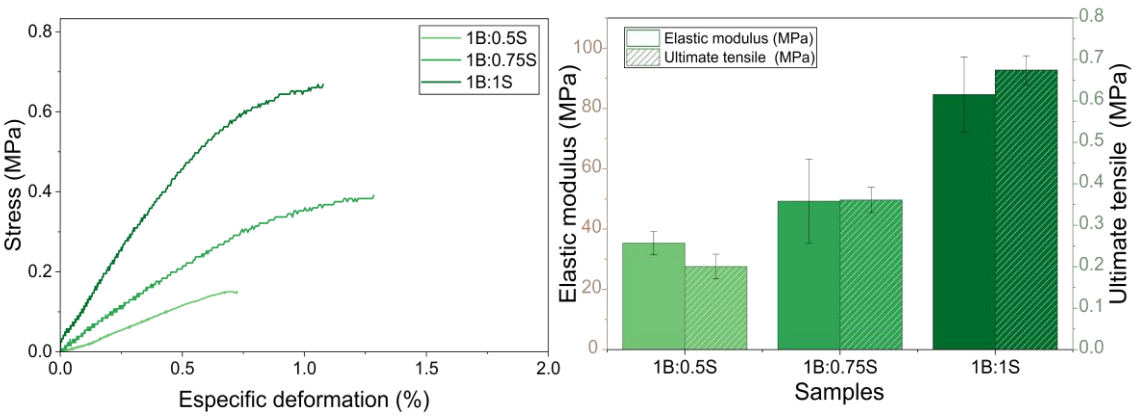
Results and Discussion

Water absorption test



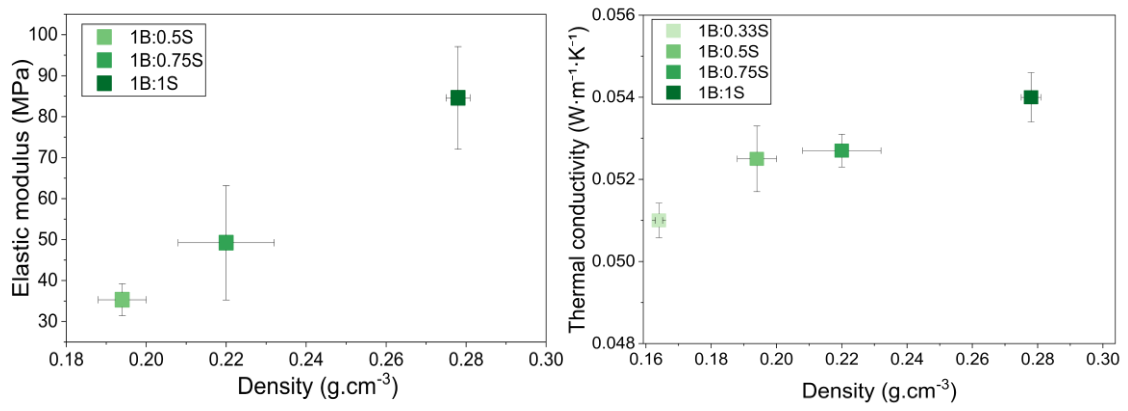
- Water absorption was inversely proportional to the density, indicating that water absorption occurred mainly in the pores.

Flexural mechanical test



- The structural integrity depended on the constituent ratio, with 1B:1S showing higher resistance.

Thermal Conductivity



- The composite exhibited low thermal conductivity, with values within the range of lightweight refined cellulose-based materials (0.013 - 0.075 W m⁻¹ K⁻¹).

Conclusion

- The renewable composites based on sugarcane bagasse fibers and starch showed low thermal conductivity and high water absorption capacity, desirable characteristics for agricultural applications.
- The structural integrity depended on the constituent ratio, with 1B:1A showing higher resistance.
- The composite properties could be controlled by adjusting density and the starch content.
- These results indicated the potential of the renewable composites as sustainable alternatives for mulching, contributing to the valorization of agro-industrial residues and to the reduction of environmental impacts.

References

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