ECP 2025 Conference
The 4th International Electronic Conference on Processes
20–22 October 2025 | Online
MDPI

Valorisation of Cassava Peel as Agro-Industrial Waste for the Development of Eco-Friendly Biocomposites

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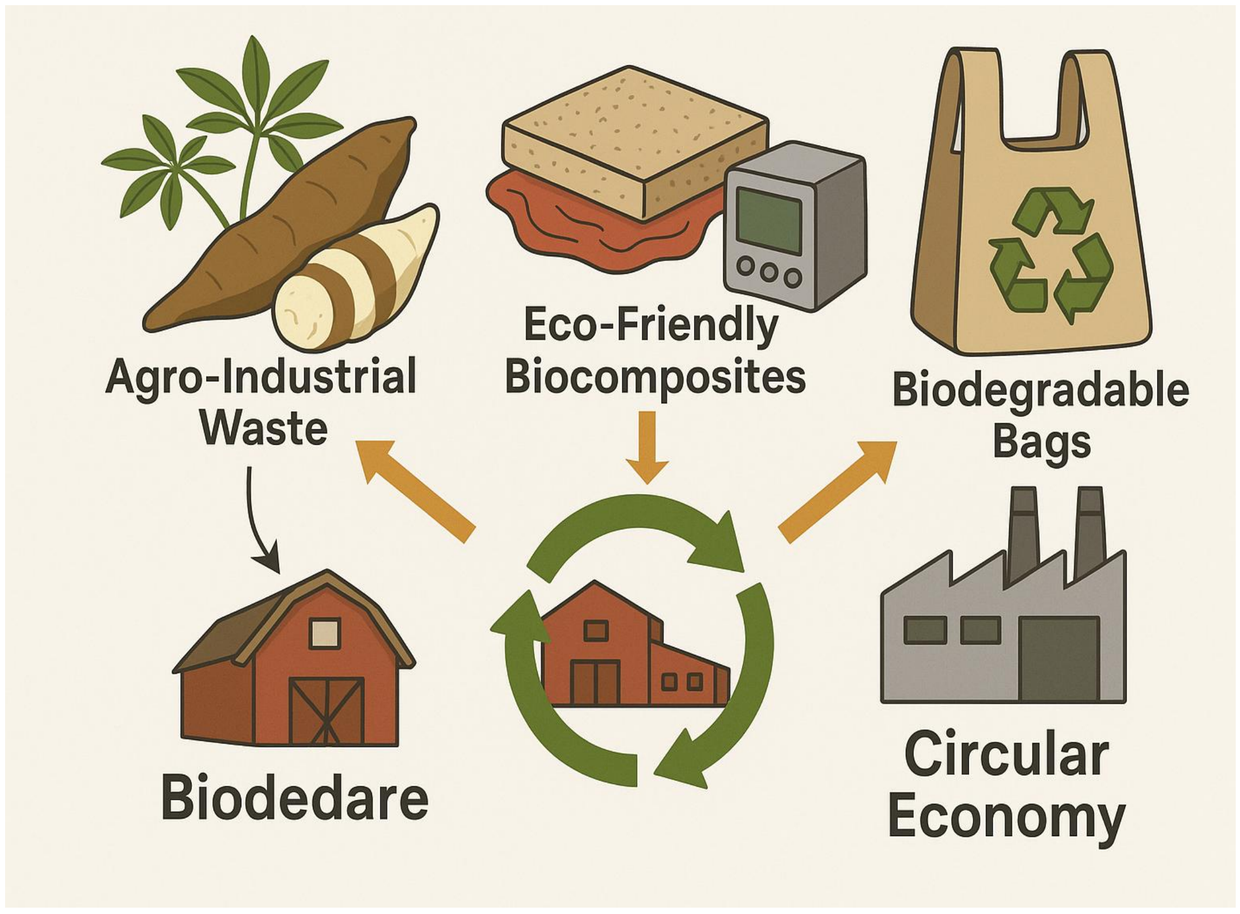
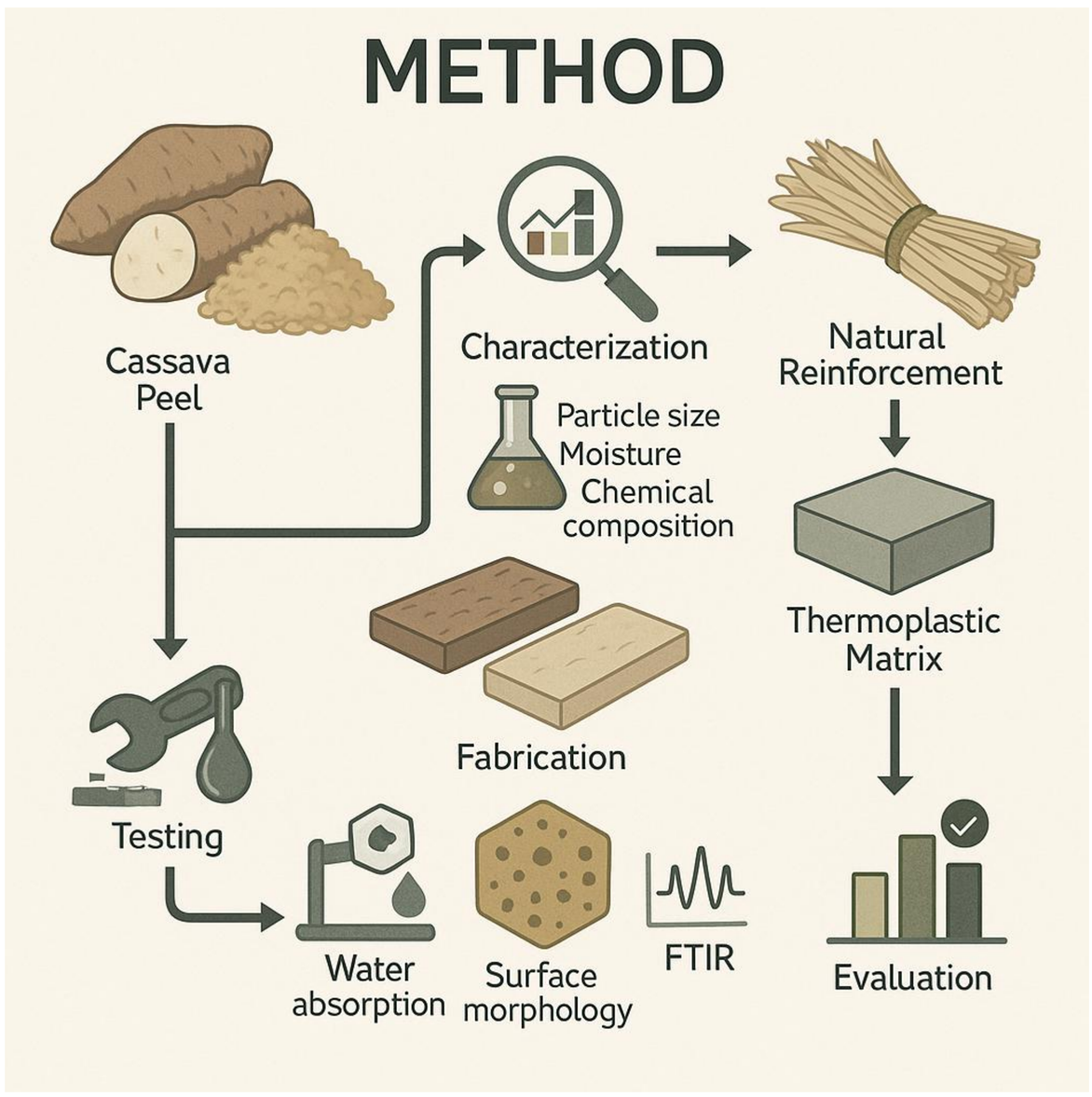
INTRODUCTION & AIM



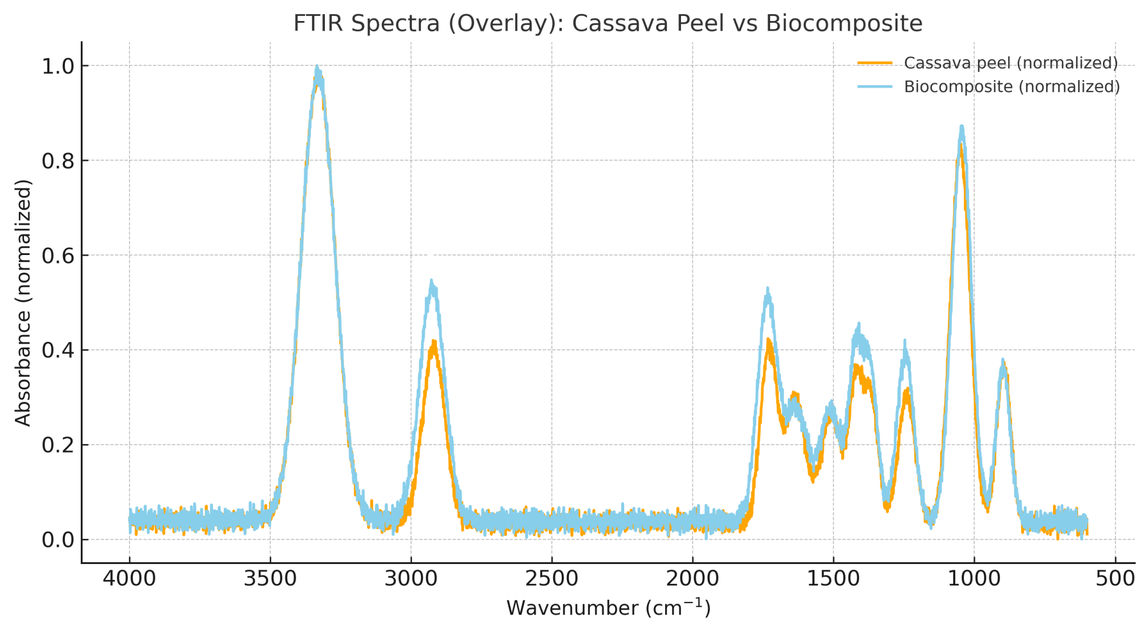
METHOD

Cassava peel was collected, dried, and characterized by particle size, moisture, and chemical composition. It was mixed with a thermoplastic matrix to fabricate biocomposites with varying reinforcement ratios. Specimens were tested for tensile strength, water absorption, and FTIR analysis.

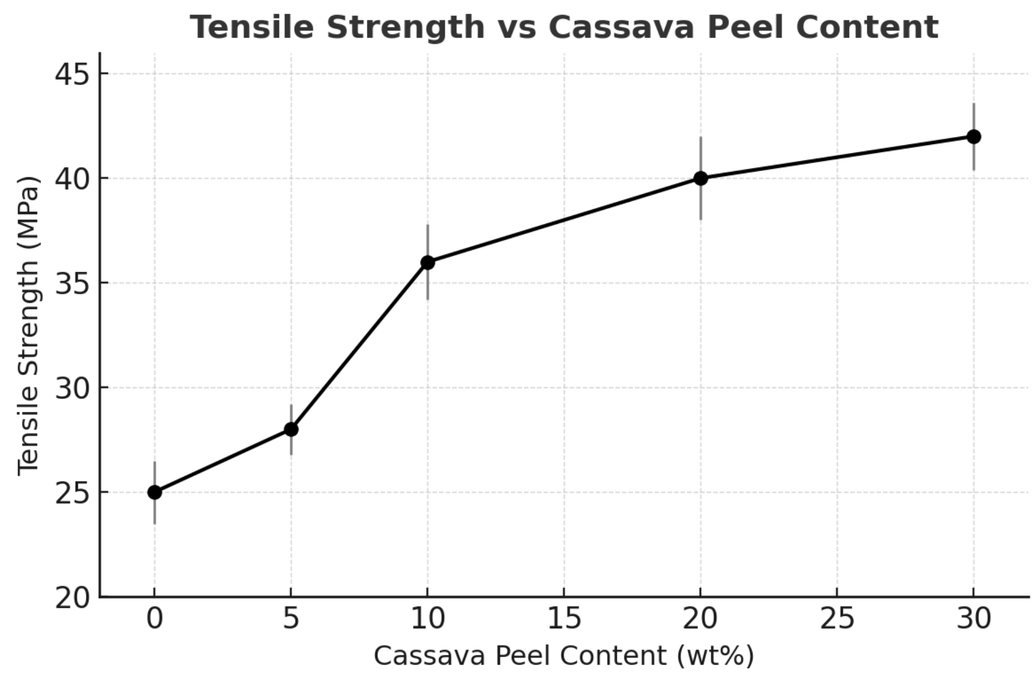


RESULTS & DISCUSSION

The FTIR spectra revealed characteristic peaks of cellulose, hemicellulose, and lignin (3330, 2920, 1730, 1050 cm^{-1}), confirming the organic composition of cassava peel.In the biocomposite, slight peak shifts and increased intensity around 1050 cm^{-1} indicated improved interfacial bonding between the cassava fibres and the thermoplastic matrix.



The tensile strength increased progressively with cassava peel content, reaching a maximum improvement of about 40 MPa at 30 wt%, indicating enhanced load transfer and reinforcement efficiency.This mechanical enhancement demonstrates good fibre–matrix adhesion and suggests the cassava peel biocomposite as a viable, sustainable alternative for biodegradable packaging materials.



CONCLUSION

Cassava peel, an abundant agro-industrial residue, was successfully valorised as a natural reinforcement in thermoplastic biocomposites, demonstrating its potential for sustainable material development. The resulting biocomposites exhibited reduced environmental impact and promising properties for biodegradable packaging applications, supporting circular-economy principles.This research provides a feasible pathway for waste recovery and cleaner production, encouraging the use of bio-based reinforcements in eco-friendly industrial materials.

FUTURE WORK / REFERENCES

Singh, P., Verma, A., & Kumar, R. (2025). Natural fiber-reinforced composites in engineering. SN Applied Sciences, 7(2), 7266. https://doi.org/10.1007/s42452-025-07266-wNatarajan, R., & Suresh, G. (2024). Eco-friendly composites: Exploring the potential of natural fiber composites. SN Applied Sciences, 6(11), 6981. https://doi.org/10.1007/s42452-025-06981-8Patel, M. J., Banerjee, S., & Gupta, D. (2024). Synergistic advances in natural fibre composites. RSC Advances, 14(8), 1498–1512. https://doi.org/10.1039/d4ra00149dSouza, L. A., Costa, P. R., & Andrade, R. L. (2025). Biocomposites of starch industry residues from cassava (Manihot esculenta) with PHBV matrix. Processes, 13(3), 719.