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DEEP EUTECTIC SOLVENT-MEDIATED AGRIFOOD WASTE BIOMASSES FRACTIONATION

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SPOKE, WP E TASK DI APPARTENENZA

Spoke 8, WP1 - Producing new products to upgrade waste value

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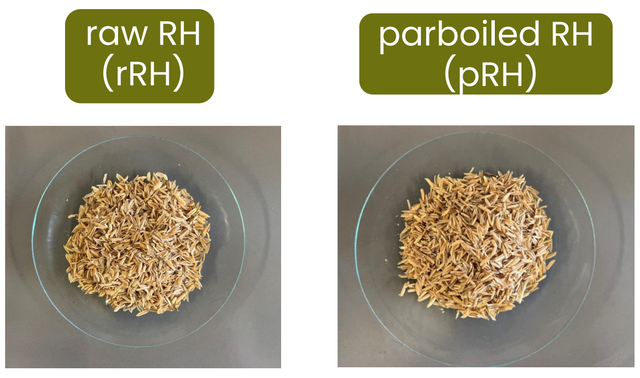
ABSTRACT

A new multistep green process has been studied to fractionate and valorize two abundant agrifood wastes in Italy:
brewers' spent grain (BSG), raw and parboiled rich husks (rRH and pRH)

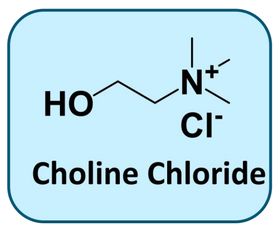


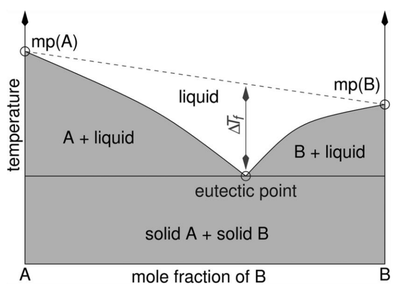
In detail, the biomasses underwent a first pretreatment with hot water in autoclave, which allowed the separation of a solution containing the soluble proteins and sugars. Regarding BSG, it accounted for 25% of the total starting biomass and was used as fermentation medium, while for RHs, only 2-8% was dissolved, even when cellulose-degrading fungi were utilized. Both the biomasses were then submitted to a lignocellulose deep eutectic solvent–mediated fractionation, which allowed the recovery of two important main fractions: cellulose and lignin. The lignin fractions have been deeply characterized, and a preliminary evaluation of their potentiality as precursors of cement water reducers gave encouraging results. This combination of treatments of the waste biomasses appeared to be a promising sustainable strategy for the reuse of these important by–products coming from brewery and rice industry, from a circular economy perspective.

MATERIAL AND METHODS

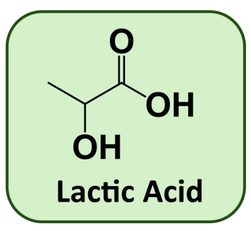
1. Deep eutectic solvents (DESs) preparation

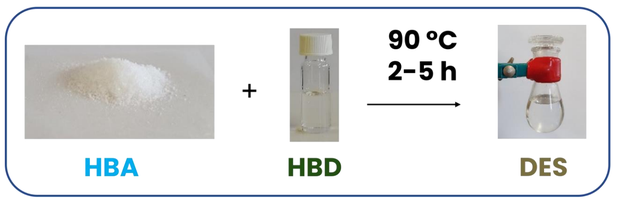
Hydrogen bond acceptor (HBA)



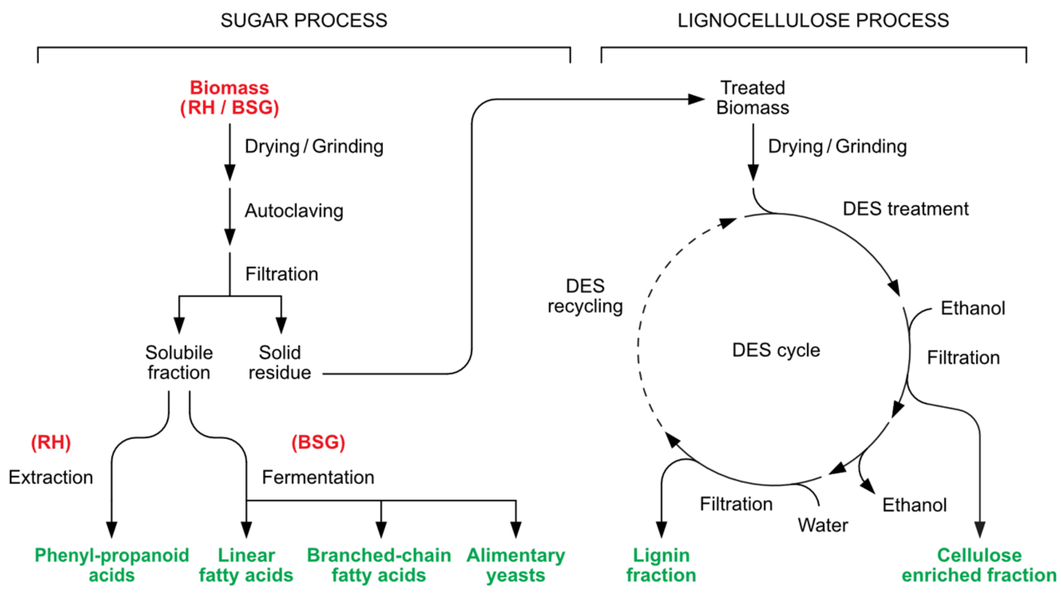


Hydrogen bond donor (HBD)



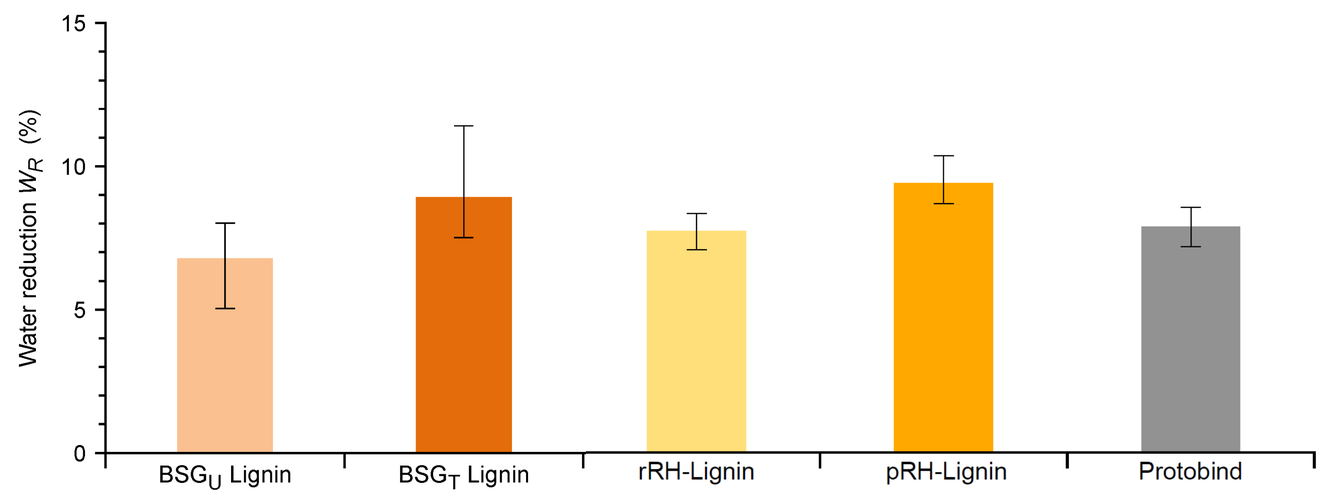


2. Multistep process set-up



RESULTS

Measurement of water reduction capability for cement pastes containing 0.2% extracted lignins. Extracted lignins showed interesting performances in terms of water reduction capability for cement pastes, comparable to that of a technical lignin (Protobind 1000).



- ✓ **The DES-mediated fractionation processes of BSG and RHs have been successfully set up**
- ✓ **The recovered lignins have been fully characterized**
- ✓ **The recovered lignins have been tested as potential precursors of cement water reducers**
- ✓ **The proposed processes could enhance the perspective of agri-food waste biomass recyclability**

REFERENCES

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