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DEEP EUTECTIC SOLVENT PRETREATMENT OF OLIVE TREE BIOMASS

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Introduction

- Olive tree pruning biomass is generated yearly in olive tree cultivation.
- 1 hectare of olive orchard → 3 tons olive-pruning debris
- Olive-pruning debris is either ploughed into the soil or left on the land to be incinerated.

HEALTH | SAFETY | ENVIRONMENTAL ISSUES

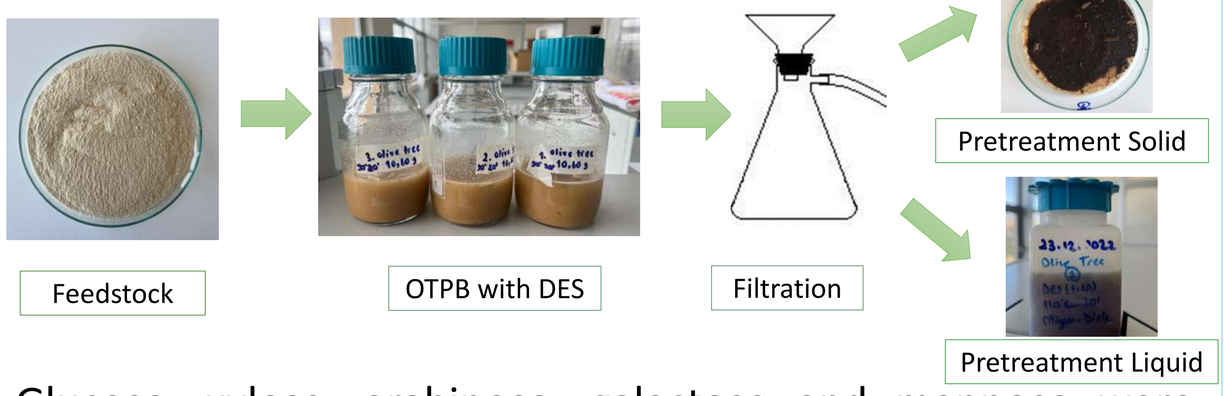
- Deep Etectic Solvents (DES) are a new generation of green solvents.
- They are obtained by mixing the hydrogen bond donor and hydrogen bond acceptor in a certain molar ratio.

Low Toxicity | Low Melting Points | High Thermal Stability | Low Volatility | Non-flammability | High Air Stability

- The main **objective** of this study was to investigate the effect of DES pretreatment on olive tree pruning biomass (OTPB).

Materials and Methods

- 10 g milled OTPB samples were treated with choline chloride: formic acid at 1:2 mole ratio, at different temperatures (90, 110, and 130°C) and time (20, 40, and 60 min).



- Glucose, xylose, arabinose, galactose and mannose were analyzed using a Dionex ICS-6000 system with pulsed amperometric detection (HPAEC–PAD).

- The total phenolic content (TPC) of the liquid fraction was determined by Folin-Ciocalteu method.
- $Solid\ Recovery\ \% = \frac{Amount\ of solid\ after\ pretreatment\ (g)}{Amount\ of\ solid\ initialy\ (g)}$ x100

Result and Discussion

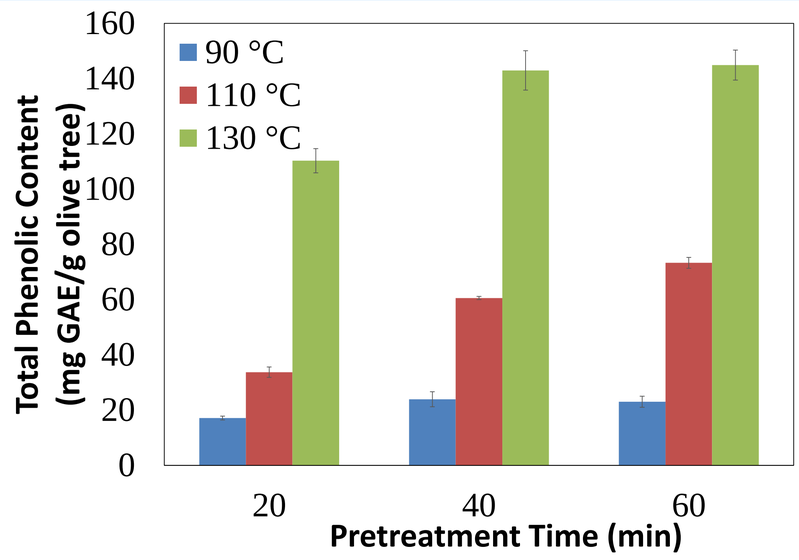


Fig 1. Effect of pretreatment conditions on total phenolic content

The amount of phenolic content was increased in liquid fraction depending on pre-treatment temperature.

The highest TPC (143 mg GAE / g dry OTPB) was observed at 130 °C-40 min.

Temperature had a negative impact on solid recovery.

The solid recovery was found in the range of 40.6 – 87.33%.

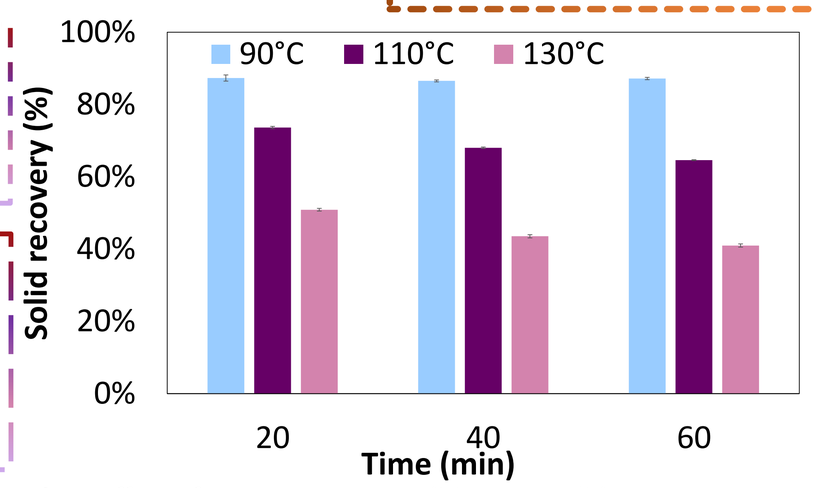


Fig 2. Effect of pretreatment conditions on solid recovery

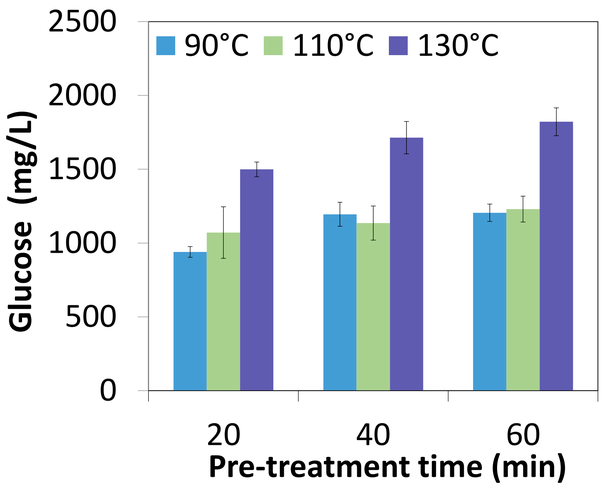


Fig 3. Glucose concentrations in the liquid fraction

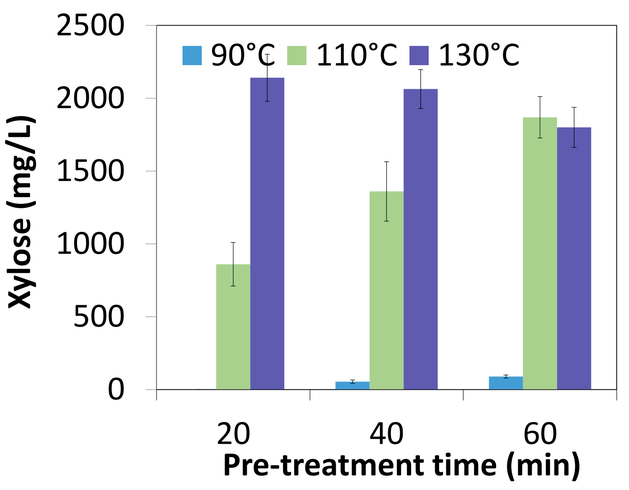


Fig 4. Xylose concentrations in the liquid fraction

As the temperature increased, the glucose solubility increased.

Maximum glucose concentration (1800 mg/L) was obtained at 130°C 60'.

Xylose had low solubility at 90 °C using DES.

Longer pretreatment times at high temperatures had an adverse impact on xylose concentrations.

Conclusion

- The highest total phenolic content (143 mg GAE / g dry OTPB) was observed at 130 °C-40 min.
- Solid recovery was decreased significantly as the temperature and pretreatment time was increased.
- The sugar concentration in the liquid fraction was increased as the severity of the pretreatment was elevated.
- It can be concluded that DES treatment was an effective green technology to destruct the structure of OTPB.

Referances:
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PRIMA PROJECT web site: https://remediationproject.com/