OLIVE STONES: AN ATTRACTIVE SOURCE OF BIOPOLYMERS (PECTIN, HEMICELLULOSE, AND CELLULOSE) FOR FOOD AND BIOMEDICAL APPLICATIONS

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Olive stones (OS), a major byproduct of the olive oil industry, are rich in lignocellulosic material, comprising approximately 32% cellulose, 26% lignin and 22% hemicellulose, making them a promising and sustainable source of valuable biopolymers [1,2]. These biopolymers offer significant potential for applications in food, pharmaceuticals, and biomaterials. This study focuses on the eco-friendly extraction, characterization, and functional assessment of cellulose, hemicellulose, and pectin from OS. Conventional (acid/base hydrolysis) and emerging green extraction techniques (hydrothermal, ultrasound and microwave-assisted methods) were compared to optimize the recovery of high-purity fractions (Figure 1). The extracted biopolymers were analyzed using Fourier-transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), and scanning electron microscopy (SEM) to assess their structural, thermal and morphological properties. The results revealed high purity and functionality, supporting their potential in biodegradable packaging, neutraceuticals, and biomedical applications. This study underscores the valorization of OS as a renewable resource, aligning with circular economy principles and sustainable development goals. By leveraging innovative extraction techniques, olive stones can be transformed from agricultural waste into high-value biopolymers, fostering eco-friendly alternatives for industrial applications.

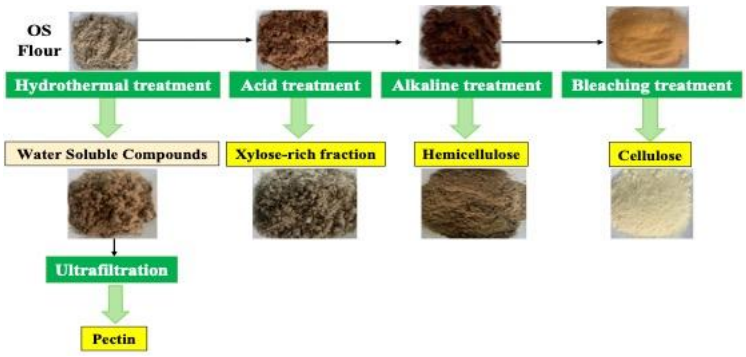

Figure 1: Biopolymers extraction procedure.

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References:

1. A. Mumcu, A. Deliboran, NAJFNR. **2025**, *9*, s1-s17.
2. G. Rodríguez, A. Lama, R. Rodríguez, A. Jiménez, R. Guillén, J. Fernández-Bolaños, Bioresour. Technol. **2008**, 99, 5261-5269.