Bioactive compounds extraction from olive leaves by subcritical water extraction

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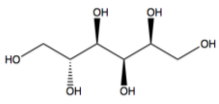
Olive leaves (OL) are one of the by-products generated during the pruning of olives tress and during separation process in olive processing. OL are lignocellulosic biomass with important amounts of extractives and lignin (Table 1). OL have a significant amount of phenolic compounds and other bioactive compounds such as mannitol. Mannitol is a sugar alcohol with reduced caloric value compared with other sugars with different applications in the food and pharmaceutical industries due to its functional properties. Mannitol production depends on the sorbitol market since is obtained as a by-product in the catalytic hydrogenation process of sorbitol production. Therefore, alternative process to obtain mannitol from natural sources avoiding the use of high temperatures would be advantageous to obtain this polyol.

Table 1. Chemical composition of OL "*Serrana de Espadán*" variety, weight percentage in a dry basis.

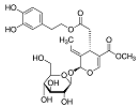
Extractives	Cellulose	Hemicellulose	Lignin insoluble	Lignin soluble	Ash	Proteins	Lipids
25 ± 2	17.5 ± 0.6	11.0 ± 0.5	10.8 ± 0.1	6.2 ± 3	5 ± 1	10.3 ± 0.2	2.3± 0.5

In this work, valorization of OL was performed by subcritical water extraction in a batch pilot plant with 20 L capacity where 3 kg of the dry OL were put in contact with subcritical water at a medium temperature of 181.1 ± 0.6 ^{o}C. Figures 1 and 2 show the extraction curves of mannitol and some of the main polyphenols compounds identified by HPLC/DAD.

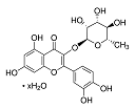
Olive leaves



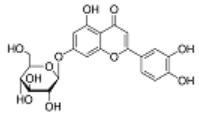
Mannitol (◇)



Oleuropein (△)



Verbascoside (□)



Luteolin-7-glucoside (◇)

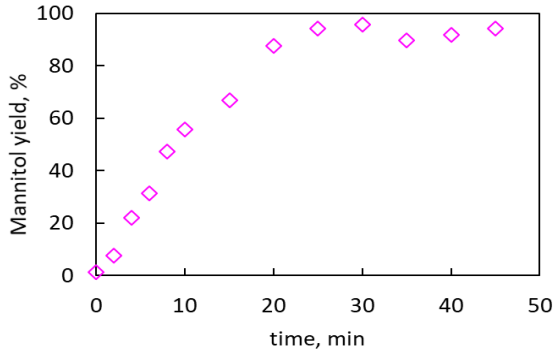


Figure 1. Mannitol extraction curve

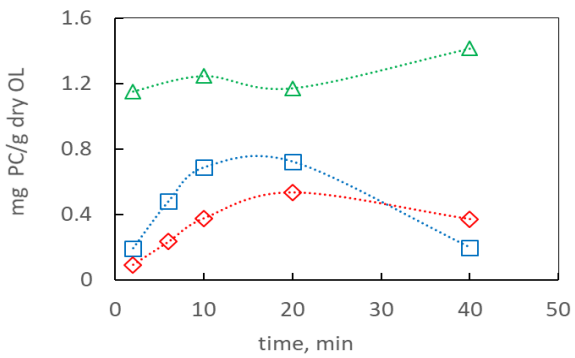


Figure 2. Individual PC extraction curve

By SW treatment, mannitol extraction yield was nearly 100 % after 20 min of extraction (OL has 99 ± 1 mg mannitol/ g dry OL). The main PC extracted by SW was oleuropein nearly 1.5 mg/g dry OL, but also verbascoside and luteolin-7-glucoside. TPC of SW extracts was 33 mg of gallic acid equivalent/g dry OL.

Acknowledgements

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