

# Extraction of polyphenols from olive leaves and hydrolysis of oleuropein for the production of 3-hydroxytyrosol

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## Abstract

Phenolic compounds, known as “polyphenols”, have attracted the attention of research community due to their beneficial action in human health. Polyphenols are secondary metabolites whose physical role is to provide protection in plants against pathogens, predators or/and stress caused by abiotic factors such as hydric deficiency, salinity, low fertilization and climatic conditions. Color and sensory characteristics of the plant’s tissues or fruits, are also correlated with the phenolic profile (Talhaoui et al., 2015). These molecules have been recognized for their anti-carcinogenic, anti-inflammatory, and antimicrobial actions. In 2012, EU Committee established a list of permitted health claims made on foods, based on scientific research made by EFSA (European Food Safety Authority (EFSA) Panel on Dietetic Products Nutrition and Allergies (NDA), 2011). According to this, olive oil polyphenols contribute to the protection of blood lipids from oxidative stress. Polyphenols are already used in medicine, cosmetics, and pharmaceutical industry. Recent research extends in more potential uses such as the production of food packaging materials (Moudache et al., 2016) and their usage as biological fungicides (Daglia, 2012).

Olive leaves are the most abundant agricultural waste source which is rich in these molecules. The potential supply of olive leaves is high and in continuous expansion, since they may be collected in two different points. Either as remains of pruning since, with an estimated quantity of 25 kg/year of leaves per olive tree or/and as residual by-products of olive oil extraction process, where their average quantity is 4-6% of olive mill waste biomass. The main phenolic compound in olive leaves are oleuropein and hydroxytyrosol. Due to their numerous health benefits, the interest in recovering polyphenols from olive leaves has increased in the scientific community over the last decade. Recent studies have focused on improved extraction techniques and processing methods.

The recovery of phenolic compounds from olive leaves is an important challenge for food and pharmaceutical industrial applications. Oleuropein is the major phenolic compound in olive leaves, and large amounts of hydroxytyrosol can be obtained using hydrolysis of oleuropein (Rahmanian et al., 2015). Hydroxytyrosol which is a strong antioxidant, and easily oxidizing compound, is synthesized very difficultly and expensively, The antioxidant capacity of oleuropein is not very high as it hydrolyzes to produce hydroxytyrosol (Souilem et al., 2017).

Our ongoing research, has two main targets, the development of a feasible process in the extraction of phenolics from olive leaves and the production of hydroxytyrosol through the hydrolysis of oleuropein. The main parameters that we have examined are the type of solvent, conductivity, pH, temperature, solid to liquid ratio and duration of extraction. Our primary results are well promising and show that acidification has a determining role as a primary step. The presence of salts can accelerate the process.

## References

- Daglia, M., 2012. Polyphenols as antimicrobial agents. *Curr. Opin. Biotechnol.* 23, 174–181.
- European Food Safety Authority (EFSA) Panel on Dietetic Products Nutrition and Allergies (NDA), 2011. Scientific Opinion on the substantiation of health claims related to polyphenols in olive and protection of LDL particles from oxidative damage. *EFSA J.* 9, 1–25.
- Moudache, M., Colon, M., Nerín, C., Zaidi, F., 2016. Phenolic content and antioxidant activity of olive by-products and antioxidant film containing olive leaf extract. *Food Chem.* 212, 521–527.
- Rahmanian, N., Jafari, S.M., Wani, T.A., 2015. Bioactive profile, dehydration, extraction and application of the bioactive components of olive leaves. *Trends Food Sci. Technol.* 42, 150–172.
- Souilem, S., Fki, I., Kobayashi, I., Khalid, N., Neves, M.A., Isoda, H., Sayadi, S., Nakajima, M., 2017. Emerging Technologies for Recovery of Value-Added Components from Olive Leaves and Their Applications in Food/Feed Industries. *Food Bioprocess Technol.* 10, 229–248.
- Talhaoui, N., Taamalli, A., Gómez-Caravaca, A.M., Fernández-Gutiérrez, A., Segura-Carretero, A., 2015. Phenolic compounds in olive leaves: Analytical determination, biotic and abiotic influence, and health benefits. *Food Res. Int.* 77, 92–108.