



Pulsed electric field assisted extraction of olive oil on a continuous system implemented in a pilot scale

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Abstract: Emerging extraction techniques, including pulsed electric field (PEF), as nonthermal treatment, are attracting considerable interest on olive oil in terms of extraction yield, malaxation time and chemical and sensory quality. The aim of this study was to investigate the effect of the application of a PEF treatment (2.0 kV/cm; 8.5 kJ/kg; monopolar pulses of 40 μ s; 100 Hz) in the olive paste before malaxation operation. Portuguese Galega cultivar olive was used as raw material and the main legal quality parameters of extra virgin olive oil were performed. The olive oil production was carried out at pilot scale (350 kg/h). PEF treatment (2.0 kV/cm; 8.5 kJ/kg; monopolar pulses of 40 μ s; 100 Hz) was conducted in continuous mode (flow rate of 2242 kg/h), during 30 min. In parallel, olive oil was produced by traditional process, as a control, with 45 minutes of malaxation. The temperature of both processes was 32.0 ± 0.7 °C. Olive oil extraction yields, acidity, peroxide value, K232, K268, K270, Δ K, oxidative stability, total polyphenols, tocopherols and tocotrienols content and sensorial analyses were performed. The results of this study show that PEF treatment maintained the same extraction yield (around 90%) while reducing the malaxation time by 33% resulting in lower acidity and K232 values, 0.2 % and 1.4 respectively, compared to the control sample. Both, PEF and control, olive oils were classified as extra-virgin olive oil (EVOO). However, PEF samples showed lower oxidative stability at 100 °C. In conclusion, PEF can be applied in the production of EVOO from Galega cultivar, with a positive production capacity impact.

Keywords: Pulsed Electric Field; EVOO; Galega cultivar; olive oil quality