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Improvement of the nutritional quality of citrus juices and valorization of citrus peels by pulsed electric field

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Citrus juices are perceived as healthy foods by consumers due to their richness in fibers, vitamins, minerals and especially antioxidants compounds, such as carotenoids, ascorbic acid (vitamin C), and phenolic compounds (flavonoids). Studies have shown that the total antioxidant capacity of citrus juices contributes to the prevention of degenerative diseases and cancer. The production of citrus juices leads to enormous amounts of residues such as peels, pulps, and seeds. Citrus peels are also a rich source of polyphenols and antioxidants. In our study, two objectives were targeted: the improvement of the nutritional quality of citrus juices and; the valorization of citrus peels obtained after juice extraction. An innovative technology pulsed electric field (PEF) was used. Whole citrus fruits (orange, pomelo, and lemon) were treated with PEF. After PEF treatment of the whole fruits, fruits were cut, pressed for 30 min at 4 bars and the obtained juices were analyzed. Citrus peels were also pre-treated with PEF followed by a diffusion process in 50 % ethanol-water for 1 hour at 50˚C. PEF is a non-thermal technology, based on the electroporation of cell membranes. Whole fruits or stack of peels were placed with water in a treatment chamber between two plane electrodes. The electric field strength was 3 kV/cm for PEF treatment of the whole fruit and 10 kV/cm for PEF treatment of peels. PEF treatment of whole fruits before pressing increased the total juice yields by 24% for orange, 35% for pomelo and 58% for lemon. The cellular membranes permeabilization during PEF treatment improved the release of polyphenols from the inner parts of the cells into the juice by 39% for orange, 66% for pomelo and 135% for lemon. PEF pretreatment of orange peels increased the yield of extracted polyphenols (22 mg/g DM) as compared to untreated orange peels (12 mg/g DM). The obtained results evidence the good perspectives for application of PEF treatment on different citrus fruits in the juice production industries, to improve the nutritional quality of the juices. PEF can also be used as an emerging technology for the management of citrus wastes.

Biography

Sally El Kantar is pursuing her PhD and working on the improvement of citrus juices yields and quality, and the valorization of citrus residues by the extraction of bioactive molecules with innovative technologies. She has participated in many congresses in France and Lebanon. Her research work has been valued by three articles that will be submitted to peer-reviewed journals. During Master studies, She did several internships in research laboratories. She has worked on the quantification of mycotoxins in apples and on the monitoring of the phenolic maturity of grapes and worked on the valorization of vine shoots by the extraction of polyphenols and on the delignification of rapeseed straw. She have also participated in a conference for raising awareness on dual-use concerns in Biotechnology organized by Middle East Scientific Institute for Security, Amman, Jordan.

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