

Title Pulsed Electric Field Assisted Pressing of Sugar Beet Slices: towards a Novel Process of Cold Juice Extraction

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Abstract

The use of pulsed electric fields (PEF) as an intermediate treatment for the cold juice extraction from sugar beet 'cossettes' (*i.e.* long grated particles) has been investigated using a pilot scale multi-plate and frame pressing equipment (pressure of 5–15 bar; particles filling of 4.5–15 kg) and a pulse generator (1000 V–1000 A). It has been possible to validate laboratory-scale results (40 g of particles) by studying the feasibility and advantages of a PEF-assisted cold pressing of sugar beet cossettes on a much larger scale (4.5–15 kg). A best scheme scenario for an adequate PEF-assisted cold pressing of sugar beet cossettes consists of two initial pressing steps with an intermediate PEF treatment, followed by one or more washing steps and a final pulp pressing. A yield of about 80% in juice per initial mass of cossettes has been achieved before washing. By performing some washing and final pressing operations, losses of sugar in pulp could be significantly reduced to about 3% of the initial sugar content. The purity of pressed juices was systematically higher following PEF treatment compared to that of juices prior to PEF treatment (96–98% and 90–93%, respectively). Spectrophotometric colour measurements, reflecting impurities and fine suspended particles contents in juices, showed that purified PEF juices had colour values three to four times lower than those of purified factory juices, a difference confirmed by the colour of sugar crystals obtained from both types of juices. In addition, significant amounts of potassium, sodium and α -amino nitrogen were found to remain in PEF-treated particles, which explains why better purity juices are obtained following PEF treatment.