Title: Comparison Between Monopolar and Bipolar Microsecond Range Pulsed Electric Fields in Enhancement of Apple Juice Extraction

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Abstract: The effect of monopolar and bipolar shaped pulses in additional yield of apple juice extraction is evaluated. The applied electric field strength, pulsewidth, and number of pulses are assessed for both pulse types, and divergences are analyzed. Variation of electric field strength is ranged from 100 to 1300 V/cm, pulsewidth from 20 to 300 mu s, and the number of pulses from 10 to 200, at a frequency of 200 Hz. Two pulse trains separated by 1 s are applied to apple cubes. Results are plotted against reference untreated samples for all assays. Specific energy consumption is calculated for each experiment as well as qualitative indicators for apple juice of total soluble dry matter and absorbance at 390-nm wavelength. Bipolar pulses demonstrated higher efficiency, and specific energetic consumption has a threshold where higher inputs of energy do not result in higher juice extraction when electric field variation is applied. Total soluble dry matter and absorbance results do not illustrate significant differences between application of monopolar and bipolar pulses, but all values are inside the limits proposed for apple juice intended for human consumption.

Author Keywords: Bipolar Pulses; Juice Extraction; Monopolar Pulses; Pulsed Electric Fields (PEFs)

KeyWords Plus: Cell-Membrane Electropermeabilization; Rectangular Pulses; Liquid Foods; Electrochemotheraphy; Electroporation; Inactivation; Expression; Quality; Tissues

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