**Quality stability and sensory attributes of apple juice processed by thermosonication, pulsed electric field and thermal processing**


ABSTRACT

Worldwide, apple juice is the second most popular juice, after orange juice. It is susceptible to enzymatic browning spoilage by polyphenoloxidase, an endogenous enzyme. In this study, Royal Gala apple juice was treated by thermosonication (TS: 1.3 W/mL, 58 °C, 10 min), pulsed electric field (PEF: 24.8 kV/cm, 60 pulses, 169 µs treatment time, 53.8 °C) and heat (75 °C, 20 min) and stored at 3.0 °C and 20.0 °C for 30 days. A sensory analysis was carried out after processing. The polyphenoloxidase activity, antioxidant activity and total color difference of the apple juice were determined before and after processing and during storage. The sensory analysis revealed that thermosonication and pulsed electric field juices tasted differently from the thermally treated juice. Apart from the pulsed electric field apple juice stored at room temperature, the processed juice was stable during storage, since the pH and soluble solids remained constant and fermentation was not observed. Polyphenoloxidase did not reactivate during storage. Along storage, the juices' antioxidant activity decreased and total color difference increased (up to 6.8). While the antioxidant activity increased from 86 to 103% with thermosonication and was retained after pulsed electric field, thermal processing reduced it to 67%. The processing increased the total color difference slightly. No differences in the total color difference of the juices processed by the three methods were registered after storage. Thermosonication and pulsed electric field could possibly be a better alternative to thermal preservation of apple juice, but refrigerated storage is recommended for pulsed electric field apple juice.



**Keyword:** Polyphenoloxidase; Antioxidant; Color; Storage; Beverages; Energy