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Introduction to innovative food technologies: Improving fruit juice and chocolate quality and shelf life stability with novel ultrasound processing

Food Ultrasound (US) is an emerging technology and it is stated that US improve the quality of food and beverages and preserve the overall quality of foods such as improvement in microbial inactivation, mass transfer, inactivation or acceleration of enzymatic activity to enhance shelf life, assistance of thermal treatments in texture quality in facilitating the extraction of various foods/plants and enhancing of bioactive components of foods. Power US uses a lower frequency range of 20 to 100 kHz and a higher sound intensity of 10 to 1000 W/cm^2 that are disruptive and induce effects on the chemical-biochemical, physical or mechanical properties of foods and can be used in preservation and safety and are applying to food enzymes in microbial inactivation in ultrasound assisted extraction. Also, US can be used for improved sensory, texture and color quality and microbial stability of plant food resources including fruit and vegetables, fruit juices, cereals, oil-based products. US can be applied for homogenization at fruit juice manufacturing. The using of an ultrasound processing during the mixing step of fruit juice manufacturing may lead to better quality juices. The utilization of high power ultrasound in the juice industry has been widely studied. To meet the FDA requirement of a 5-log reduction of micro organisms, a sonication combination with mild heat treatment and or pressure is essential. It was concluded that total mesophilic aerobes in orange juices was inhibited as 3.7 log at 485 kHz/200 W/20 min; no ultrasound-related detrimental problems was found on color properties of orange juices. The total phenolic anti oxidants, naringenin flavanone were 186.22±8.3 mg/L, 74.82±2.6 mg/L respectively by domestic squeezing whereas those were 242.30±11.4 mg/L and 97.05±5.2 mg/L by ultrasound processing at above-mentioned conditions. In current study, the non-pathogen bacteria *Alicyclobacillus acidoterrestris* in apple and tomato fruit juices was inhibited as important levels without color problem of juices. The chocolate quality is highly dependent on tempering stage of the manufacturing process owing to tempering is critical for reducing processing failures and ensuring a quality end product. US application for cacao mix at 150 kHz/100 W/5 min gave the pleasant texture, good mold stability, stable shelf-life and good resistance to fat bloom. From the nutritional perspective, the theobromine is the primary stimulant in chocolate, and caffeine being secondary. By applying ultrasound in prepared cacao formulation, theobromine level was found as 27.54±3.65 at the same conditions and it was found the good correlation between TB level and a stringency founding's in sensory analyses (y=3.456x+5.47; R^2=0.998). The approach of ultrasound applying to assist food preparation could be of great interest to fruit juice and chocolate manufacturers for the innovative and safe food products.

Biography

Ozlem Tokusoglu has completed her PhD at Ege University Engineering Faculty, Department of Food Engineering at 2001. She worked as a research fellow/doctor assistant/assistant professor/associate professor at Ege University and Celal Bayar University during 1993 to now. She is currently working as Associate Professor, faculty member in Celal Bayar University Engineering Faculty Department of Food Engineering. She has published many papers in peer reviewed journals and serving as an Editorial Board Member of *International Journal of Food Science and Technology* by Wiley Publisher, USA and *Polish Journal of Food and Nutrition Sciences (PJFNS)* in Thomson Reuters. She published the scientific edited two book entitled *Fruit and Cereal Bio-actives: Chemistry, Sources and Applications* by CRC Press, Taylor & Francis, USA Publisher and entitled *Improved Food Quality with Novel Food Processing* by CRC Press, third book *Food By-Product Based Functional Food Powders* is also in progress.

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