Ozlem Tokusoglu, J Nutr Food Sci 2014, 4:5
http://dx.doi.org/10.4172/2155-9600.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference and Exhibition on
Nutrition & Food Sciences
September 23-25, 2014 Valencia Convention Centre, Spain

Ultrasound processing effects on nutritional quality of fruit juices and chocolate products

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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/cm2, 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 microorganisMS, 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 antioxidants, 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 astringency foundings in sensory analyses (y=3.456x +5.47; R2=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 Tokusoğlu has completed her PhD at Ege University Engineering Faculty, Dept of Food Engineering at 2001. She is currently working as Associate Professor Dr faculty member in Celal Bayar University Engineering Faculty Department of Food Engineering. She performed a visiting scholar at the Food Science and Nutrition Department /University of Florida, Gainesville-Florida-USA during 1999-2000 and as visiting professor at the School of Food Science, Washington State University, Pullman, Washington,USA during April-May 2010. She organized and directed as Conference Chair the International Congree entitled ANPFT2012 (Advanced Nonthermal Processing in Food Technology: Effects on Quality and Shelf-Life of Food and Beverages in May,2012 at Kusadasi-Aegean,Turkey . She served as organizing committee member at 2nd International Conference and Exhibition on Nutritional Science & Therapy Conference in July 2013 at Philedelphia-USA; and organizing committee member at 3rd International Conference and Exhibition on Food Processing & Technology, July 21-23, 2014, Las Vegas, USA.

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