

22nd Euro-Global Summit on

Food and Beverages

February 28-March 01, 2019 | London, UK

Effect of UV radiation on quality and shelf life of lychee juice during cold storage

Kitipong Assatarakul and Sumeth Visuthiwan
Chulalongkorn University, Bangkok, Thailand

The purposes of this research were to study the effect of ultraviolet or UV radiation (0.00, 2.34, 4.68, 9.36, 18.72, 37.44 and 74.88 J/cm²) on kinetic modeling of microbiological properties (total plate count and yeast and mold count) and antioxidant properties (total phenolics, total flavonoids and antioxidant activity by 2,2-diphenyl-1-picrylhydrazyl radical scavenging activity assay or DPPH and Ferric Reducing Antioxidant Power Assay or FRAP and study the sensory properties and shelf life of UV-treated (18.72 and 37.44 J/cm²) samples compared to untreated sample (control) and pasteurized (85°C, 15 seconds) sample during storage at 4°C. Results showed that the reduction in antioxidant and microbiological properties of lychee juice subjected to UV radiation followed first order kinetic model. Coefficient of determination (R²) and rate constant (k) of first-order kinetic model of microbiological properties ranged from 0.9759-0.9935 and 0.1042-0.1060, respectively while R² and k values of antioxidant properties ranged from 0.9781-0.9876 and 0.0008-0.0237, respectively. UV radiation significantly (p<0.05) affected on total phenolics and DPPH while total flavonoids and FRAP were not significantly affected by UV radiation. According to total plate count and yeast and mold count, control and UV-treated samples had approximately 7 and 14 days of shelf life at 4°C, respectively. UV treatment could extend shelf life of lychee juice approximately 7 days compared to control sample during storage at 4°C. When considering sensory properties of lychee juice, it was found that there were significant differences of color and flavor scores between treatments. However, UV did not significantly affect the taste score and overall liking score. Therefore, UV radiation could be an emerging technology to prevent microbial spoilage, preserve quality and enhance the shelf life of lychee juice during cold storage.

Biography

Kitipong Assatarakul is an Assistant Professor in the Department of Food Technology, Faculty of Science, Chulalongkorn University. He received his B.Sc. and M.Sc. in Food Technology from Chulalongkorn University, Thailand and earned his Ph.D. in Food Science and Technology at Cornell University, USA. He joined Chulalongkorn University as faculty member since 2012. His research focuses on beverage technology including thermal and non-thermal processing. He has researched on novel technologies such as UV radiation to control foodborne pathogen and spoilage microorganisms, thereby increasing the consumer's safety. In addition, he is also working on the development of healthy beverage using herbal extract from regional plant. These will improve the quality and safety of beverage products for health-conscious consumers.

Kitipong.A@chula.ac.th

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