Physicochemical, Nutritional, Microbial, and Sensory Analysis of Thermal and Non-Thermal Processed ‘Chokanan’ Mango (Mangifera indica L.) Juice

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Abstract
The increasing demand for high quality fruit juice along with safety standards have spurred the development of non-thermal processing such as sonication and UV-C treatment. In this study, freshly squeezed ‘Chokanan’ mango juice was subjected to sonication for 15 min at 25°C, 40 kHz frequency, UV-C treatment for 15 min at 25°C, and a combination of both methods. The effects of non-thermal treatment on quality characteristics (physicochemical, nutritional, microbial, and sensorial) were evaluated and compared with untreated (control) and thermally treated juice at 90°C for 60 s. No significant changes were observed in pH and total soluble solids. Non-thermal treated juice showed significant improvement in selected quality parameters. Overall, the combined effect of sonication and UV-C treatment exhibited the highest enhancement in extractability of carotenoids (11%), polyphenols (23%), and flavonoids (29%), when compared to the control. In addition, thermal and non-thermal treatment showed significant reduction in microbial load. Sensory attributes (colour, odour, taste, and overall acceptability) were evaluated by 30 panelists using a hedonic scale, and results showed that non-thermal treated juice was preferred more than thermally treated juice. The sensory evaluation verified that the combination of sonication and ultraviolet-c was the most acceptable treatment as an alternative to thermal treatment to produce safer and better quality mango juice.

INTRODUCTION
Commercialization of mango (Mangifera indica L.) in Malaysia, especially the ‘Chokanan’ cultivar known as ‘honey mango’ due to its succulent sweet taste, has reached worldwide market as they are exported to Singapore, Brunei and Hong Kong. According to a study conducted by Rivera and Cabornida (2008), fruit juices have the highest acceptability among other beverages, generally due to their natural taste and nutritional value. In fact, consumption of mango juice has been linked to prevention of cancer, owing to its antioxidant properties (Block et al., 1992). Currently, thermal pasteurization is the preferred technology used to achieve microbial inactivation and extend the shelf life of juices. However, studies have reported significant loss of quality in thermally treated juices such as orange and pineapple juice (Rawson et al., 2011). The growing interest for safe and minimally processed fruit juice with high quality attributes among consumers have encouraged the juice industry to explore innovative non-thermal processing such as sonication and ultraviolet-c (UV-C) light. These technologies have different modes of microbial inactivation, therefore being potential choices for a hurdle technology (combination of preservation techniques) (Leistner, 2000). The purpose of this study was to evaluate the effects of sonication and UV-C on quality characteristics (physicochemical, nutritional, microbial, and sensorial) of ‘Chokanan’ mango juice. Results were compared with untreated (control) and thermally pasteurized juice.