Effects of Thermal and Non-thermal Processing on Phenolic Compounds, Antioxidant Activity and Sensory Attributes of Chokanan Mango (*Mangifera indica* L.) Juice

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Received: 10 November 2014 / Accepted: 3 August 2015

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Abstract The increasing demand for shelf-like food products has spurred the development of non-thermal processing such as sonication and ultraviolet-C (UV-C) light treatment. In this study, freshly squeezed Chokanan mango juice was subjected to thermal treatment (at 90 °C for 30 and 60 s), sonication (for 15, 30 and 60 min at 25 °C, 40-kHz frequency) and UV-C treatment (for 15, 30 and 60 min at 25 °C). In addition, combination of sonication and UV-C treatment in a hurdle concept was also conducted. The effects of thermal and non-thermal treatments on phenolic compounds, antioxidant activity and sensory attributes were evaluated and compared with untreated juice (control) for 5 weeks under refrigerated storage (4 ± 1 °C). The results showed better retention of individual phenolic compounds in non-thermal-treated juice, when compared to the control and thermally treated juice. A significant enhancement in antioxidant activities were observed after non-thermal treatment. The sensory evaluation verified that non-thermal-treated juice was preferred more than thermally treated juice. The results obtained support the use of non-thermal treatments (ultrasound and UV-C) for better retention of quality and prolonged shelf life in Chokanan mango juice processing.

Keywords Sonication, Ultraviolet treatment, Thermal treatment, Chokanan mango, Juice

Introduction

*Mango* (*Mangifera indica* L.) is a tropical fruit grown in 85 countries, ranking fifth in global production among other major fruit crops including bananas, citrus, grapes and apples. According to the Statistics Division of the Food and Agriculture Organisation of the United Nations, FAOSTAT (2014), about 72 % of worldwide mango production is concentrated mainly in Asia, thus contributing approximately 30.2 million metric tonnes to the international market. In Malaysia, commercialization of domestic mango cultivars especially Chokanan has reached Singapore, Brunei and Hong Kong (Agri-food Business Development Centre 2010). The market for value-added mango products such as juice, puree and nectar has progressively grown due to its perishable nature and limited shelf life (Liu et al. 2014). Recently, fruit juices have the highest acceptability among other beverages, generally due to their natural taste, as well as to the nutritional value associated with them (Rivera and Cabornida 2008). The presence of various phytochemicals in fruit juice is related to various health-promoting properties such as protection against several chronic human diseases such as cancer, cardiovascular diseases and diabetes (Oms-Oliu et al. 2012). The number of outbreaks and cases of illness caused by consumption of contaminated juices, especially