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Effect of addition of glucose syrup on biochemical properties during the processing of black tea

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The illegal adulteration of tea (*Camellia* species) with sucrose, glucose syrup and carbohydrate derivatives is a serious problem occurring in Sri Lanka and may lead to quality deterioration of tea. The present study aimed to investigate the effect of glucose syrup concentration (3, 6 and 10%) on biochemical properties such as total polyphenol content (TPC), antioxidant activity, moisture content and colour (L^* , a^* , b^*) of black tea. Tea leaves in the fermented stage from low, mid and upcountry were purposely adulterated with glucose syrup at a ratio of 3, 6 and 10% and non-adulterated samples were used as a control. Adulterated samples were dried at inlet temperature 120 °C and outlet temperature 80 °C using the dehydrator for 20 minutes and the hot water extractions were analyzed. The total polyphenol content and the antioxidant activity of black tea were significantly affected ($p < 0.05$) by the glucose syrup concentrations. The highest polyphenol content was obtained from up grown control sample and it was 48.40 ± 0.15 mg GAE/100 ml and lowest was obtained from 10% glucose syrup added mid-grown tea sample and it was 25.75 ± 0.15 mg GAE/100 ml. The antioxidant concentration of glucose syrup added low, mid and upcountry tea samples that wanted to scavenge 50% of DPPH were varied in the range of 2.26-3.00 mg/ml, 2.26-2.96 mg/ml and 0.50-1.92 mg/ml, respectively. The highest antioxidant activity was given by the control tea samples and the lowest was given by the 10% glucose syrup added tea samples. When increasing the glucose syrup concentration, both total polyphenol content and antioxidant activity were significantly ($p < 0.05$) decreased. The moisture contents of dried tea samples were in the range of 4.8-6.6%. The moisture content of dried tea samples was not significantly affected ($p > 0.05$) by the glucose syrup concentration. The increase of glucose syrup concentration significantly decreases the L^* value indicating the increment of the darkness of tea infusion. Glucose syrup content did not significantly affect ($p > 0.05$) the a^* and b^* values which are responsible for the redness and yellowness of tea infusion. Adulteration of black tea with glucose syrup affected the total polyphenol content, antioxidant activity and brightness of the black tea but did not affect the moisture content.

Keywords: Glucose syrup, polyphenol, DPPH scavenging activity

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