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The Change in Contents of Vitamin C, Total Phenolic, Total Flavonoid and Antioxidant Activities of Selected Fruits Stored under Refrigeration

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Abstract

Epidemiological studies provide convincing evidence of the beneficial role of antioxidants present in fruits and vegetables for reducing the risk of non-communicable diseases. As many fruits are highly perishable, after harvesting, they are stored in cold conditions for many days before consumption. Therefore, understanding the changes in phytonutrient content during postharvest low-temperature storage is important for consumers, scientists and industrialists. This study aimed to evaluate the effect of cold storage, on contents of ascorbic acid (AA), total vitamin C (TVC), total phenolic (TPC), total flavonoid (TFC) and total antioxidant activities (TAA). AA was determined using AOAC method and TVC was determined using 2,4-DNP method. TPC and TFC were studied using Folin-Ciocalteu's reagent and AlCl₃ colourimetric method respectively. TAAs were determined using DPPH and FRAP assays. Seven selected fruit cultivars grown in Sri Lanka namely, mango (*Mangifera indica* 'Seeni'), banana (*Musa* sp. 'Sour'), papaw (*Carica papaya* 'Red lady'), rose apple (*Syzygium jambos* 'Malaysian'), cashew apple (*Anacardium occidentale*), santol (*Sandoricum koetjape*), yellow sapote (*Pouteria campechiana*) have been used for the study. The fruits were freshly harvested and AA, TVC, TPC, TFC and TAA were determined just after harvesting, at their edible maturity. Then AA, TVC, TPC, TFC and TAA were determined after storage of fruits at 4°C for 8 days. Among the studied 7 fruit cultivars, cashew apple showed the highest TVC (199.6 ± 1.2 mg/100g), AA (181.1 ± 1.2 mg/100g), TPC (153.8 ± 1.6 mg/100g), TFC (117.5 ± 0.6 mg/100g) and TAAs just after harvesting. After cold storage, although the contents were reduced, the highest TVC (149.8 ± 4.4 mg/100g), AA (74.8 ± 1.9 mg/100g), TFC (72.6 ± 0.5 mg/100g) and TAAs could be observed in cashew apple. A statistically significant (p<0.05) decrease in TVC and AA could be observed in both cashew apple and yellow sapote. After storage, a significant increase in TPC and TFC could be observed in rose apple, while cashew apple, yellow sapote, banana and mango showed a significant decrease in TPC. After storage TFC of yellow sapote, santol, cashew apple and mango decreased significantly. A significant increase in IC₅₀ in DPPH assay could be observed in yellow sapote, banana and rose apple and decrease in TAA measured by FRAP assay showed in yellow sapote, rose apple, mango and cashew apple after storage. TAA determined by FRAP assay showed statistically significant (p<0.01) strong positive correlations with TVC (r; 0.827), AA (r; 0.760), and TFC (r; 0.679). In yellow sapote and mango, the loss of



antioxidant properties after storage, was mainly due to the significant loss TPC and TFC. For banana, the loss of free radical scavenging ability is mainly because of the reduction of TPC after storage. In conclusion, cashew apple showed a significant loss in antioxidant activity after storage and the loss of all AA, TVC, TPC and TFC may have collectively affected this reduction. Results of the present study revealed that change in AA, TVC, TPC, TFC and TAA of fruits after storage at 4°C for 8 days, occurred in a species-dependent pattern. In most of fruits, the decrease in TPC and TFC could be observed after storage while AA and TVC remain unchanged.

Key words: Antioxidants, Fruits, Total flavonoid content, Total phenolic content

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