

Final Report

**Vitamin C Content in Blackberries During Storage**

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Category: Health Benefits Research

## VITAMIN C CONTENT IN BLACKBERRIES DURING STORAGE

### Rationale and Protocol

Vitamin C (ascorbic acid) has many functions for human health. It preserves nerve function, skin health, serves as a radical scavenger in the body, and may help immune function. Consumers are increasingly interested in purchasing fruits perceived to provide health values and vitamin C is well recognized as important to daily health.

If more than 20% of the recommended daily intake (RDI) for a vitamin is met with a serving, a fruit can be labelled as an excellent source of that vitamin. In blackberries, the USDA reported content of ascorbic acid (vitamin C) is 21 mg/100 g fresh weight (fwt) or 31 mg per cup of blackberries (154 g). This represents 47% of the RDI of vitamin C (based on 65 mg daily) in a serving, making blackberries a very rich source of vitamin C.

Blackberries were obtained locally held at 4 °C and 90% relative humidity (RH) for 0 to 7 days. We were unable to obtain more varieties and fruit shelf life was stopped at 7 days due to excess decay. Fruit free of decay or injury were frozen at -20 C and extracted with meta-phosphoric acid followed by high performance liquid chromatography using a photodiode array at 254 and 280 nm.

### Results

Total and free ascorbic acid varied slightly among the varieties. ‘Ouachita’ and ‘Von’ contained 22-27 mg/100g total ascorbic acid while ‘Apache’ was slightly higher (27-32 mg/100 g). Two to 18% of vitamin C was lost over a week of storage (Table 1).

Free ascorbic acid values are within levels reported for other erect type blackberries (‘Arapaho’ and ‘Cherokee’) and slightly higher than values reported for ‘Chester Thornless’ (Gundogdu et al, 2016; Jiao and Wang, 2000). An average value of 27 mg/100 g total ascorbic acid among the varieties at days 0 and 7 gives 60-64% of the recommended daily intake for vitamin C (70 or 65 mg daily) for a cup (154 g) of blackberries.

Organic acids other than ascorbic acid were also quantified to look for possible relationships. Only isocitric acid was correlated to ascorbic acid, with about a 40% fit. Isocitric acid is synthesized from citric acid as part of fruit respiration, so this relationship may reflect the slight losses of ascorbic acid over storage. Isocitric acid and its ester (isocitric lactone) were slightly higher than malic in ‘Ouachita’, ‘Von’, and ‘Apache’ (Figure 1).

### Impact

Erect-type blackberry fruit are an excellent source of vitamin C, providing 41% of recommended daily intake per 100 g serving.

## References

Gundogdu, M., T. Kan, I. Canan. 2016. Bioactive and antioxidant characteristics of blackberry cultivars from East Anatolia. *Turk. J. Agric. For.* 40:344-351.

Jiao, H. and S.Y. Wang. 2000. Correlation of antioxidant capacities to oxygen radical scavenging enzyme activities in blackberry. *J. Agric. Food Chem.* 48:5672-5676.

Table 1. Total ascorbic acid (vitamin C) in North Carolina blackberries.

Cultivar	Days storage at 39 F	
	0	7
Apache	32.1±1.8	26.6±3.6
Ouachita	29.1±5.4	28.2±4.1
Von	24.2±3.1	22.0±2.3

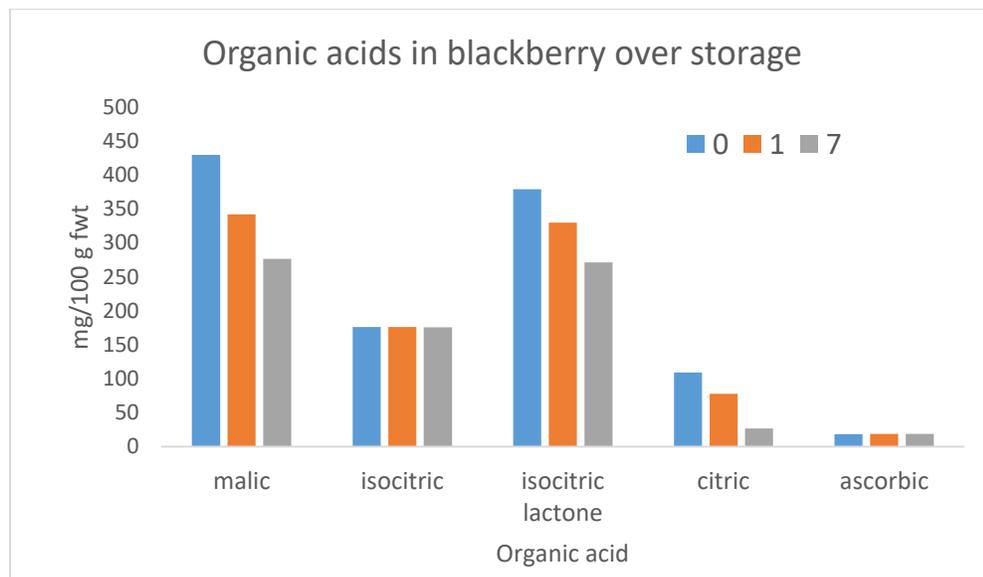


Figure 1. Changes in organic acid content (mg/100 g fresh weight) of 'Ouachita' blackberries after 0 or 7 days storage at 39 F or 1 day at room temperature.