

# Extending Blackberry Fruit Shelf Life: Container Type and Modified Atmosphere Storage

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## Introduction

Blackberry fruits have a short shelf life, and some quality loss can occur under recommended refrigerated storage conditions. Blackberry growers in Kentucky have indicated some preference for fiber baskets over plastic clamshell containers for marketing the berries, although the latter type of container is most common in the major retail chains. Shelf life of blackberries in the fiber baskets has not been directly compared to that in the clamshell containers, although more water loss from berries in the open basket may be expected, which could affect their quality and appearance. Modified atmosphere (MA) storage, raising CO<sub>2</sub> and/or lowering O<sub>2</sub> from ambient levels, has become common postharvest practice for extending shelf life of many perishable crops such as blackberries, and simple, cost-effective techniques for MA use are commercially available regardless of the scale of production. Although blackberries grown on the west coast are commonly stored and shipped under MA conditions, the response of eastern thornless blackberries to MA storage has not been reported. The objective of this work was to study 1) the influence of storage container type on blackberry fresh weight during postharvest storage, and 2) the response of Chester thornless blackberry to MA conditions in refrigerated storage.

## Materials and Methods

Chester thornless blackberries were harvested once a week for four weeks from the thornless blackberry planting at the UK Horticulture Farm. Six fiber baskets and six plastic clamshell, each with 150 to 200 g of fruit, were prepared and weighed on each harvest date. The containers were placed in 2°C storage, and after a week were removed, weighed again, and set at room temperature. They were reweighed again after three days.

For MA studies, quality of a sub-sample of 12 to 15 berries was measured as described below on each harvest date, and 150-200 g of fruit were placed into plastic bags and weighed. The open bags were set into 1 L Mason jars. To incorporate a modified atmosphere into each jar, the lids were loosely placed on each jar, and a needle was inserted through a septum in the lid to inject the MA. Then, 20% CO<sub>2</sub> or 5% O<sub>2</sub>, with the other gases at ambient levels, was flushed through each bottle for approximately 30 seconds, following which the needle was removed and the lid was sealed. Controls jars of ambient air were sealed shut without flushing. The containers were stored at 2 °C. After 7 days, the jars were removed from cold storage, and the quality of the fruit in half the jars of each treatment was measured. The bags of fruit were removed from the remaining jars and were set open in clamshell containers at ambient temperature for three days, at which time fruit quality parameters were measured. There were at least three containers per MA treatment per harvest date analyzed at seven and 10 days after harvest.

Quality traits of individual fruit measured included color using a Minolta Chroma Meter Model CR-200 and firmness using a Chatillon Force Gauge. A harvest date and jar/container mean for color and firmness values were derived from the data. Data were analyzed by analysis of variance (ANOVA).

## **Results and Discussion**

In cold storage, the fruit in the fiber baskets lost significantly more fresh weight than those in the clamshell containers (8.5% versus 6.3%). During the post-cold storage three-day period at room temperature, berries in the fiber baskets also lost significantly more fresh weight (15.1% versus 10.6% in the clamshell containers). Thus, fiber baskets may work well for immediate marketing of blackberries, but they are inferior to clamshells if a period of cold storage precedes marketing.

Neither modified atmosphere treatment affected the postharvest quality of Chester blackberries during or after cold storage. Fruit firmness increased slightly, less than 10%, during cold storage, and decreased about 25% during the subsequent three days at room temperature. Fruit color somewhat intensified during post harvest storage. The blackberries tolerated the MA conditions with no obvious adverse effects even though they were in the upper range of conditions that are commercially used, but there was no obvious benefit to the use of MA. It remains to be determined if other eastern thornless blackberry cultivars will respond comparably.