

FINAL REPORT

Project No. 1886

Title: Optimizing fruit quality and modified atmosphere packaging of cherries

Year Initiated: 1994 **Current Year:** 1999 **Terminating Year:** 1999

Personnel: Eugene M. Kupferman, WSU TFREC; Wenatchee

Cooperator: Peter Sanderson, WTFRC; Wenatchee

Justification:

Cherries are susceptible to rapid loss of quality after harvest and have a relatively short shelf life. Washington sweet cherry growing districts are distant from their most profitable export markets (Europe and Asia) and involve either expensive air freight or long distance sea transport. Therefore, it is critical to optimize quality and extend shipping and shelf life.

Objectives:

1. Determine the quality of cherries from orchards and packers with different management practices following storage in currently available MA packaging material.
2. Improve MA handling by testing new films and determining the contribution of ethylene absorbent systems.
3. Improve our knowledge about the effect of different pre- and postharvest practices on Bing stem and fruit quality.
4. Understand the effect of postharvest commercial practices and develop handling guidelines for Lapin cherries.

Accomplishments:

The information obtained in the 1999 cherry season will be presented to the Commissioners at the funding session in verbal and written form. The information presented below summarizes activities undertaken in 1999. Conclusions presented here are subject to review and modification.

1. Modified atmosphere (MA) packaging has become widely promoted in the cherry industry during the last seven years. In 1999, we examined the performance of MA films on fruit stored in six different films and held for 29 days at 34°F or 21 days at 45°F. Atmospheres (O₂, CO₂ and ethylene) were evaluated on a regular basis. Films included heat sealed, taped and not sealed types. Fruit evaluations showed that acidity was strongly affected by film type at 45°F, and soluble solids was affected by film type at 34°F. Other factors such as firmness, pitting, fruit or stem color were not affected to a statistically significant extent.

In a separate trial in which a single modified atmosphere film was compared to the standard liner at both 34°F and 40°F, none of the quality factors was affected by film type at either temperature at a statistically significant level. This includes firmness, soluble solids, fruit or stem color.

2. In a cooperative project with Peter Sanderson, fruits inoculated with several different fungi were stored in MA or standard liners at either 34°F or 40°F. Both temperature and type of liner affected both percent total decay and percent decay in inoculated fruit. Fruits in the MA liner had less decay than those stored in standard poly. As expected, fruits stored at 34°F had less decay than those stored at 40°F.
3. Insertion of an ethylene scrubbing chemical in conjunction with MA films reduced stem browning significantly in preliminary trials in 1998. In 1999, stem quality was again affected by the addition of large amounts of pelletized potassium permanganate. In these experiments the amount of chemical used was not low enough to be commercially viable, and further work is needed.
4. Edible coatings are used on California cherries but not on those packed in Washington or Oregon. In a trial, five edible coatings were applied by drenching to cherries from four growers. Fruit was held in an MA or a standard liner at 34°F for 29 days and evaluated. The type of liner did not affect fruit quality at either temperature. The coating affected only luster and stem "L" values, not pitting, acidity, soluble solids, acidity or firmness.
5. Lapin cherries were examined in several different experiments.
 - a. To understand the sensitivity to temperature at time of impact, both Lapin and Bing fruits were chilled to either 34°F or 45°F, then dropped from a height of 10" onto a rubber dimple belt. The fruits were then stored at 40°F for 10 days and evaluated. Lapin cherries had more pitting at 34°F than at 45°F. At 34°F, Lapin cherries had more pitting than Bing. The reverse was true at 45°F. This was exploratory work and not analyzable statistically; further work is needed in order to develop an understanding of the sensitivity of Lapin to impact forces at different temperatures.
 - b. To determine the quality of Lapin cherries upon arrival at the packinghouse, 15 different grower lots were sampled from 9–20 July. The fruits were examined both the same day and after six days storage at 34°F followed by 24 hours at 70°F. These fruits were compared with 28 lots of Bing cherries sampled upon arrival at the packinghouse. The samples of the two varieties differed in both appearance (fruit and stems) and quality (firmness, soluble solids and acidity). Firmness was higher in Lapin, while soluble solids and acidity were higher in Bing.

- c. The response of Lapin cherries to two MA liners and the standard liner was studied using fruit commercially packed on July 20. Fruit was held at 45°F for 16 days followed by three days at 40°F and one day at 70°F. Pitting, firmness, stem color and acidity were affected by the MA treatment. Soluble solids and fruit color were not affected. Acidity and firmness were higher in the liner, while pitting was less in either of the MA bags.
6. How growers treat cherries immediately after harvest has a strong influence on the quality of the fruit. A series of experiments was performed in which fruit was held in sun and shade in cherry lugs covered with various materials. The lowest fruit temperatures were in lugs covered with wet foam pads. Wet pads were far more effective than dry pads. Once the pads dried out, temperatures rose. A new material developed in British Columbia was tested and found to be much superior to other dry materials. Covering the lugs provided cooler temperatures than leaving the lugs uncovered.

Plans for 2000 Crop:

The 2000 cherry season will be used for evaluation of information obtained thus far, publishing this information and designing new directions for further research for the 2001 crop.

Anticipated Benefits and Information Transfer:

Information transfer will occur through written form—reports to packinghouses, *Good Fruit Grower*, through individual and group meetings with packinghouse decision makers as well as through the Washington Tree Fruit Postharvest Conference. Information will be published on the new postharvest web site (<http://www.postharvest.tfrec.wsu.edu>).

Budget:

No funds requested at this time.

CURRENT AND PENDING SUPPORT

Name	Supporting Agency & Project Number	Total \$ Amount	Effective and Expiration Dates	% of time Committed	Title of Project
Eugene M. Kupferman	Current: WTFRC - New	24,180	July 99-00	25	DPA
Eugene M. Kupferman	Winter Pear - 1901	15,764	Sept 99-00	20	Pear storage