

# Impact Bruising of Sweet Cherries Related to Temperature and Fruit Ripeness<sup>1</sup>

H. Melvin Couey and Theodore R. Wright<sup>2</sup>  
U. S. Department of Agriculture, Wenatchee, Washington

**Abstract.** Warm fruit of *Prunus avium* L. cv. Lambert were less susceptible to impact bruising than cold fruit. Mahogany-colored cherries were less susceptible to impact bruising than red-colored cherries.

As part of a study of cooling and handling practices for fresh sweet cherries in the Northwest we determined the effect of ripeness, fruit temperature, cooling method, and location of the impact on susceptibility of cherries to impact bruising.

In the first experiment a sample of carefully picked 'Lambert' cherries were divided by color into 2 groups, red and mahogany. Three samples of 15 cherries each were bruised while still warm (25°C), or after cooling in ice water for 10 minutes (2 to 5°), or after cooling in a room at -1° for 3 hr (2 to 5°). One of the 3 samples was bruised on the tip, one on the suture side and one on the cheek. These treatments were repeated on the following day on identical samples held overnight at room temp.

Cherries were bruised by the impact of a rounded metal surface 20 mm in diam weighted to 100 g dropped in a guide tube a distance of 10 cm against hand-held, individual cherries.

In the second experiment, cherries from 3 'Lambert' trees, differing in fruit maturity were treated as in the first experiment except that the delayed treatment was omitted and 20-cherry samples were used. The trees were treated as replications and because the fruit from each tree was very uniform the cherries were not sorted into color groups. To better characterize the cherries we determined firmness with a Shore Instrument Company durometer 00<sup>3</sup>, relative anthocyanin content with a 3-filter reflectance meter, and weight of individual cherries.

After bruising, cherries from both experiments were stored at -1°C for several days before examination (Tables

1 and 2). Bruise damage was assessed by visual rating of the fresh cherries (Table 1). To determine more precisely the extent of damage, the same cherries were bleached in brining solution which removed the anthocyanin pigments but did not affect the brown discoloration in the bruised area (3).

Temp and cherry maturity influenced susceptibility to impact bruising. Warm cherries were less susceptible to impact damage than cold cherries. Mahogany cherries were less susceptible to impact damage than the red, less ripe cherries (Tables 1 and 2). The cooling method was important in

Table 1. Bruise rating of 'Lambert' cherries evaluated after 11 days at -1°C.

Variable	Bruise rating	
	After <sup>y</sup> storage	After <sup>x</sup> bleaching
Temperature		
Warm	2.2 a <sup>z</sup>	2.1 a
Water-cooled	2.8 b	2.6 b
Air-cooled	2.9 b	2.5 b
Color		
Mahogany	2.0 a	2.1 a
Red	3.3 b	2.7 b

<sup>z</sup>Mean separation within each variable and measurement, by Duncan's multiple range test, 5%.

<sup>y</sup>Rating based on visual symptoms: 1 = no visible damage, 2 = slightly flattened area, 3 = obviously flattened area, 4 = discolored bruise.

<sup>x</sup>Rating based on visual symptoms of same cherries after bleaching in brining solution: 1 = no visible damage, 2 to 4 = slight-to-obvious discoloration.

Table 2. Color, anthocyanin reading, firmness, weight, and bruise rating of 'Lambert' cherries evaluated after 7 days at -1°C<sup>z</sup>.

Variable	Anthocyanin (Units)	Firmness (Units)	Weight (g)	Bruise rating	
				After <sup>y</sup> storage	After <sup>x</sup> bleaching
Temperature					
Warm	45 a	72 a	6.8 a	2.6 a	2.4 a
Water-cooled	43 a	74 a	6.6 a	3.4 b	3.0 b
Air-cooled	45 a	72 a	6.8 a	2.9 a	2.7 ab
Tree and color					
1 Mahogany	54 a	64 a	6.5 a	2.5 a	2.3 a
2 Red	40 b	77 b	7.4 b	3.4 b	2.9 b
3 Red	39 b	76 b	6.3 a	3.0 b	2.8 b

<sup>z</sup>Mean separation within each variable and measurement, by Duncan's multiple range test, 5%.

<sup>y</sup>Rating based on visual symptoms: 1 = no visible damage, 2 = slightly flattened area, 3 = obviously flattened area, 4 = discolored bruise.

<sup>x</sup>Rating based on visual symptoms of same cherries after bleaching in brining solution: 1 = no visible damage, 2 to 4 = slight-to-obvious discoloration.

that water-cooled cherries were more consistently susceptible to impact injury than air-cooled cherries. Weight, location of impact, and a delay of 24 hr after harvest had no effect on bruising response.

The effect of temp also has been found in some peaches, plums, and apricots (2). In air-cooled California cherries, Ogawa and coworkers (1) found no temp response because their air-cooled cherries responded as erratically as ours (Tables 1 and 2).

Packing practices vary widely within the fresh cherry industry. Most packers place the cherries in a precooling room immediately upon delivery from the orchard; some leave cherries in the precooler overnight before packing; others pack on the day of delivery before much cooling has occurred; a few hydrocool the cherries before they are placed in the precool room and pack on the day of delivery. Although less impact bruising would occur if cherries were packed while still warm, this fact must be considered in relation to the need for rapid cooling, the difficulty in cooling cherries after packing, and the need for an orderly packing procedure. Our data suggest that if cold cherries are packed, greater care should be taken to avoid bruising than if the fruit is warm and more care is needed for partially ripe than for ripe cherries.

## Literature Cited

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<sup>2</sup>Plant Physiologist and Agricultural Research Technician, Agricultural Research Service.

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