

SUMMARY: In 2013 we received from the WSU Sweet Cherry Breeding Program (IAREC Prosser) scionwood of 11 sweet cherry cultivars that had not previously been tested in the cool maritime climate of western Washington (Table 1). The scionwood was grafted to Gisela 5 dwarfing cherry rootstock at Biringer Nursery, and three or four trees of each cultivar were planted at WSU Mount Vernon Northwestern Washington Research and Extension Center (WSU NWREC) in 2014. As of 2019, we had gathered three years of data on nine of the 11 trial cultivars, and two years of data on four commercial standards (Bing, Lapins, Rainier, and White Gold) for comparison. The trial has included dark red, red, and yellow with red blush-skinned fruit, and some of the cultivars are self-fertile while others need to be cross-pollinated. Given that skin color is an important harvest indicator for cherries, in 2019 additional quality data were collected on fruit chlorophyll content using a non-destructive hand-held meter.

METHODS

Harvest. Cherries were harvested by hand at fresh market maturity, that is, at least 16% soluble solids concentration (SSC; °Brix) and 54/64 inch (21.5 mm) diameter (a combination of California and Washington State standards). Due to significant bird predation, some cultivars were harvested earlier than desired. However, no damaged or decaying fruit were collected for data. From each single tree replicate per cultivar, 25 fruit were harvested from three to four different locations in the canopy and placed in a pre-labeled Ziploc bag. When less than 25 fruit were available per tree, the total number of fruit collected was recorded. Filled bags were not left in the sun for more than 30 minutes, and were placed in the shade and left open to minimize dehydration and sweating. Once harvest was complete, the bags were placed in cold storage and prepared for quality analysis the same day.

Diameter. Diameter is defined as the greatest dimension measured at right angles to a line from the stem to the blossom end of the cherry. Diameter of the 25 randomly selected fruit was first measured individually with a digital caliper (Digimatic, Mitutoyo, Japan), and average fruit diameter (mm) was calculated. Diameter of the 25 randomly selected fruit was then measured with a meter stick for comparison of methods. The 25 fruit were lined up along the meter scale with the main axis of the fruit perpendicular to the stick, and average fruit diameter (mm) was calculated by dividing the total diameter by number of fruit measured.

Skin color. The 25 randomly selected fruit were scanned with a DA-meter (53500, T.R. Turoni Srl, Italy), providing for Index of Absorbance Difference (I_{AD}) values. Pursuant to the instruments protocol, the DA-meter was first calibrated and then each fruit scanned. Two cheeks on each fruit, those comprising the greatest dimension measured at right angles to a line from the stem to the blossom end of the cherry, were measured to account for variability. When all fruit had been scanned, the instrument was connected to a PC and data uploaded to an Excel sheet.

Fruit Sweetness. All fruit per sample were hand squeezed into a 100 mL beaker. To avoid tissue contamination and a resultant over-estimation of SSC, the juice was squeezed directly into a funnel with a paper filter (No. 1 90 mm, Whatman, Kent, England), with the funnel placed in the 100 mL beaker. Three drops of juice were collected from the sample and placed onto the prism of the digital refractometer (Palm Abbe PA201, MISCO; Cleveland, OH) and the SSC value was recorded. Care was taken to avoid bubbles in the sampled juice as they interfere with the reading. The prism was then rinsed with deionized water and gently blotted dry. A second and third subsample of juice was measured and the average SSC (°Brix) per cultivar was calculated, variability in subsamples was ± 0.09 °Brix.

RESULTS

On average for 2017-2019, eight of the nine trial cultivars that yielded fruit were harvested on June 28, 5 days before Bing. The ninth cv. Glacier was harvested 2 days before Bing (Table 1).

‘Kansas Sweet’ had the smallest fruit diameter (21.8 mm) and ‘Early Robin’ had the largest fruit diameter (28.9 mm). Differences in diameter due to measurement method averaged $1.1\% \pm 1.0\%$, indicating that the meter stick is a suitable replacement for the digital caliper, which is relatively labor and time intensive.

The yellow with red blush-skinned cultivars had the lowest I_{AD} values (0.05) and the dark red-skinned cultivars the highest I_{AD} values (0.75). A higher I_{AD} value (i.e., chlorophyll content) indicated that the dark red-skinned cultivars were harvested less ripe, but this is unsupported by the diameter and SSC results. Use of the Cherry meter (53502, T.R. Turoni Srl, Italy), which measures anthocyanin content rather than chlorophyll content, is recommended.

Three trial cultivars (Cashmere, Cowiche and Early Robin) had SSC levels (20.2 °Brix) similar to the commercial standards (19.0 °Brix). As expected, the tart cherry had the lowest SSC (12.9 °Brix).

In comparing these preliminary results to performance data compiled in “Sweet Cherry Cultivars for the Fresh Market (PNW604)”, Benton and Selah had different fruit quality values, perhaps due to the growing region. However, it is important to note that the orchard as a whole experienced significant bird predation, and harvest of Benton and Selah was earlier than desired.

Overall, after three seasons of observation, the cultivars Index, Selah and Tieton did not perform favorably in this region. These trees in this study exhibited stunted vegetative growth and poor yield since 2017. The cultivars Cowiche, Early Robin and Glacier in contrast performed best. ‘Cowiche’ and ‘Glacier’ produced dark red, relatively large-sized and sweet fruit, with no cracking. ‘Glacier’ is advantageous to ‘Cowiche’ in that it is self-fertile, an important factor in a region with few cherry trees overall. ‘Early Robin’ produced a similar if not better yellow with red blush fruit than ‘Rainier’, with slightly sweeter fruit that are less prone to cracking. Although not observed in our study, in eastern Washington, ‘Early Robin’ has low fruit set and can produce ‘double fruit’, limiting its marketability.

Table 1. Skin color, market category (MC), self-fertility (SF), mean harvest date (absolute and relative to ‘Bing’), mean diameter, mean soluble solids concentration (SSC), and I_{AD} value of 15 cherry cultivars planted at WSU NWREC.

Name ^z	Skin color	MC	SF (Yes/No)	Harvest date (day/month)	Diameter (mm) ^y	SSC (°Brix)	I _{AD} value	Field Notes
Benton	Red	Sweet	Yes	06/28 -5 days	23.4	16.2	0.29	
Bing	Red	Sweet	No	07/03 0 days	25.9	20.1	0.70	
Cashmere	Dark red	Sweet	Yes	06/28 -5 days	25.8	20.1	1.08	Some cracking observed
Chelan	Dark red	Sweet	No	06/27 -6 days	24.6	18.3	- - -	Some cracking observed
Cowiche	Dark red	Sweet	No	06/28 -5 days	26.6	21.3	0.99	
Early Robin	Blush	Sweet	No	06/28 -5 days	28.9	19.3	0.03	Some cracking observed
Glacier	Dark red	Sweet	Yes	07/01 -2 days	27.9	18.1	0.80	
Index	Red	Sweet	Yes	- - - ^x	- - -	- - -	- - -	Little to no fruit set 2017-2019
Kansas Sweet	Pink	Tart	Yes	06/28 -5 days	21.8	16.0	0.01	Translucent, pit strongly attached to peduncle
Kiona	Red	Sweet	Yes	06/28 -5 days	28.6	17.3	0.35	Cracking observed, very firm to the touch
Lapins	Dark red	Sweet	Yes	07/03 0 days	26.1	17.1	0.14	
Rainier	Blush	Sweet	No	07/03 0 days	26.1	19.3	0.05	Significant fruit rotting and cracking observed
Selah	Dark red	Sweet	Yes	06/27 -6 days	23.9	15.3	- - -	Picked early due to bird pressure, Brix underestimated
Tieton	Dark red	Sweet	No	- - -	- - -	- - -	- - -	Little to no fruit set 2017-2019
White Gold	Blush	Sweet	Yes	07/02 -1 days	26.6	19.5	0.06	

^z Information on commercial standard cultivars (shaded rows) grown in the same orchard block is provided for comparison.

^y As measured by digital caliper.

^x ‘- - -’ indicates insufficient marketable fruit harvested for reporting of data due to predation and/or low yield.

Figure 1. Photographs of the randomly selected fruit from 13 cherry cultivars harvested at WSU NWREC in 2018 (top) and 2019 (bottom), lined up along a ruler for visualization of relative fruit diameter (mm) and color.



Benton (PC 7146-8, PP 15847)



Cashmere (PC 7144-3)



Cowiche (PC7903-2, PP21073)



Glacier (PC7144-7, PP8051)



Bing (Introduced 1875)



Chelan (PC 7146-23, PP8545)
- No photo in 2019 as no fruit



Early Robin (USP #13,951)



Kansas Sweet (AKA Hansen)





Kiona (PC8007-2, PP20526)



Rainier (Introduced 1960)



White Gold (PP18892)



Lapins (Introduced 1984)



Selah (PC7064-3, PP16135)
- No photo for 2019 as no fruit

