

# Evaluation of Sweet Cherry Cultivars and Advanced Selections Adapted to the Pacific Northwest, USA

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## Abstract

The U.S. Pacific Northwest, consisting of the states of Oregon and Washington, is the most important sweet cherry (*Prunus avium* L.) production region in North America, however, as recently as the early 1990's fresh cherry production consisted primarily of one cultivar, 'Bing'. In recent years there has been increased interest in planting new cultivars by Northwest growers. Cultivars and advanced selections from around the world are currently being tested by Oregon State University at a cultivar trial located near The Dalles, Oregon. Selections are being evaluated for harvest timing, fruit size, productivity, firmness, rain crack resistance and flavor. The most promising cultivars/selections include 'Attika', 'Lapins', 'Skeena', 'Regina', 'Sweetheart', 'Staccato', and 13S-21-01. ([Table 1.](#))

## INTRODUCTION

'Bing' has been one of the most important sweet cherry cultivars (*Prunus avium* L.) grown in the Pacific Northwest, USA since its discovery in an Oregon orchard in 1875 (Fogle, et al., 1973). However, in recent years, sweet cherry growers in the Pacific Northwest have shown increased interest in cultivars other than 'Bing'. Larger fruit size and alternate harvest timing compared to 'Bing' provide a larger economic return to growers. In 2003 'Bing' returned less money than every other cultivar grown in Wasco County Oregon except 'Lambert' (Seavert, 2004).

Severe handling during harvest and processing and the lack of local markets, with cherries often in transit for up to three weeks, necessitates firm cherries. 'Bing' historically holds up well under these conditions and is one reason why it has been a popular variety among Pacific Northwest growers (Fogle, et al, 1973). Alternative cultivars must meet this same criterion. High susceptibility to rain cracking (Albertini, 1996) has limited the distribution of 'Bing' in many cherry production areas around the world. Cultivars with higher resistance to rain cracking are attractive to Pacific Northwest growers. Other important attributes considered include productivity and flavor.

## MATERIALS AND METHODS

All cultivars were grown on mazzard rootstock and planted in 1996 except 'Sweetheart' (1994), 'Regina' (1997), 'Santina' (1998) and 'Skeena' (1999). Trees were planted 4.5m x 5m and trained to a multiple leader system (steep leader). All trees were treated with 25 ppm gibberellic acid when 'Bing' fruit were at straw color. Fruit was

harvested from at least five trees on all cultivars except 'Attika' (one tree) when judged commercially mature. The average harvest date for 'Bing' (2001-2005) was 29 June. Fifty fruit were analyzed from each cultivar for fruit quality analysis and 100 fruit were examined for cracking. Tree yield and fruit flavor were estimated subjectively.

## **RESULTS AND DISCUSSION**

### **'Santina'**

'Santina' was bred at the Pacific Agri-Food Research Centre (PARC) Summerland, B.C. Canada and is the earliest maturing sweet cherry released from the program (Kappel, 2005), ripening 6 to 7 days before 'Bing' or 'Van'. 'Santina' is self-fertile (Kappel, 2005) and blooms mid-season about 1 to 2 days after 'Bing'. The first significant production was in the 6<sup>th</sup> leaf with light production in the 6<sup>th</sup> through 8<sup>th</sup> leaf. The size is very large (Table 1) and firmness excellent at 346 g/mm on a FirmTech 2 force displacement instrument (BioWorks, Stillwater, Oklahoma). A reading of 250 g/mm is considered a minimum for export quality fruit by at least one packinghouse in the Pacific Northwest (J. Morton, pers. commun.). In 2005 two rain events, 9 and 10 days prior to harvest totaling 8.9 mm, caused 90% of the cherries to crack. Skin color is mahogany, flesh light mahogany and SSC is less than 'Bing' when ripe (Table 1). Flavor is weak.

### **13S-3-13**

13S-3-13 is a selection from the PARC breeding program. The cherry blooms with 'Bing' and 'Van' but ripens with 'Santina' (Table 1). 13S-3-13 is mainly of interest due to its very large size ranging from 31.7 to 34.7 mm (Table 1). Productivity has been consistently low on mazzard rootstock. Firmness is marginal (Table 1). When ripe, skin color is mahogany, flesh is light mahogany and SSC is less than 'Bing' but in the acceptable range (Table 1). Flavor is strong and good. This selection has shown tolerance to rain over a number of years (subjective analysis) and in 2005 only 10% of the fruit cracked compared to Bing with 55% cracked.

### **'Cristalina'**

'Cristalina' is a self-sterile cultivar from the PARC breeding program (Kappel, 2005). Bloom time is two to three days after 'Bing' and ripening time in The Dalles is just before 'Bing' (Table 1). Fruit size is moderately large, although the tree is productive and if it oversets fruit size can be affected as in 2002 when only 32% were 29.8 mm and larger as compared to 2003 with 74%. Fruit flavor is very weak and SSC are less than that of standard cultivars (Table 1). After two weeks in storage fruit flavor practically disappears. When ripe, firmness is moderate, skin color is mahogany and flesh is light mahogany (Table 1). In 2005, 'Cristalina' showed good resistance to cracking with only 10% cracked fruit with rain occurring 12 and 13 days prior to harvest.

### **'Sandra Rose'**

'Sandra Rose' is a self-fertile cultivar from the PARC breeding program (Kappel, 2005). Bloom time is 3 to 5 days after 'Bing' and ripening time is also 3 to 5 days after 'Bing'. There is some interest among Pacific Northwest growers in 'Sandra Rose' due to

its very large size (Table 1) and excellent flavor; however, the fruit is only marginally firm, with firmness under 260 g/mm<sup>3</sup> out of 4 years. Productivity is consistently light. 'Sandra Rose' showed some resistance to rain cracking in 2005 compared to 'Bing' (25% versus 55%). When ripe, skin color is mahogany, flesh is dark red and SSC is similar to standard cultivars (Table 1).

#### **'Sonata'**

'Sonata' is a self-fertile cultivar from the PARC breeding program (Kappel, 2005). Bloom timing is mid-season and harvest timing is mid-late season, ripening between 'Bing' and 'Lapins'. Due to its very large size, some Pacific Northwest growers have received an excellent price for this cultivar (T. Dahle, pers. commun.). Firmness is excellent (Table 1), however, one Pacific Northwest packinghouse has experienced rapid softening in shipment (K. Mathison, pers. commun.). 'Sonata' is productive on mazzard rootstock. In 2005 'Sonata' had 45% rain induced splits, but blossom end cracks can occur with this cultivar even in years without rain. When ripe the skin color is mahogany, while the flesh is dark red and SSC is 18 % brix.

#### **'Attika'**

'Attika' was discovered in 1963 as a chance seedling growing in Techlovice, Czech Republic (Webster and Looney, 1996). It is a self-sterile cultivar (Albertini and Strada, 2001) that blooms mid-late season and ripens just prior to Lapins (Table 1). 'Attika' is moderately large and firm (Table 1) with the potential to overset even on mazzard rootstock. Although a late blooming cherry (Table 1), 'Attika' has shown sensitivity to spring frosts (subjective analysis). Rain crack resistance, as observed over several years, is very high and in 2005 only 5% of the fruit were cracked. When ripe, both skin and flesh are a dark mahogany and SSC is similar to standard cultivars. Flavor is generally strong and excellent with a nice tang.

#### **'Lapins'**

'Lapins' is a self-fertile cultivar from the PARC breeding program (Kappel, 1996). Bloom time is mid-early and harvest timing is 10 to 15 days after 'Bing' (Table 1). Fruit is large and very firm (Table 1). The tree has a very upright growth habit and is very productive with fruit growing in tight clusters making late season fungicide coverage difficult and increasing the potential for fruit disease infection (subjective analysis). Fruit is sensitive to wind marking (subjective analysis), but tolerant to splitting (Table 1). Fruit is mahogany and flesh is red when ripe (Table 1), but the fruit colors early and is not a good indicator of ripeness. Its SSC when ripe is similar to 'Bing'.

#### **13S-42-49**

13S-42-49 is a selection from the PARC breeding program. It may be of interest to Pacific Northwest growers due to its poor stem retention properties that may make it a candidate for mechanical harvest. 13S-42-49 blooms mid-late season and ripens after 'Lapins' (Table 1). The fruit is large and very firm (Table 1). Productivity is moderate. When ripe, fruit easily falls from the tree when the branch is struck, however, it is not affected by wind. Skin and flesh are a dark mahogany color (Table 1) and the flavor is slightly acidic and mild. In 2005, rain that occurred 37 and 38 days before harvest caused

40% of the fruit to crack. Crop load in 2005 was very low, due to a light bloom potentially caused by a March freeze.

### **‘Skeena’**

‘Skeena’ is a self-fertile cultivar from the PARC breeding program (Kappel, 2005). Bloom time is mid-late and harvest timing is just after Lapins. Fruit size is large and very firm (Table 1), but productivity has been light on mazzard rootstock even in the 7<sup>th</sup> leaf. When ripe, skin and flesh color are dark mahogany and SSC is high (Table 1). In previous years rain crack resistance, based on subjective assessments has appeared good, however, in 2005, two rains that occurred approximately one month prior to harvest cracked 40% of the crop. The flavor is moderately strong with a nice acid/sugar balance.

### **‘Regina’**

‘Regina’ is a self-sterile cultivar introduced in 1981 by the Jork Institute in Germany (Webster and Looney, 1996). Bloom timing is very late, making it difficult to find an adequate pollinizer (Table 1). In The Dalles, potential pollinizers ‘Attika’, ‘Sylvia’ and ‘Schneiders Späte Knorpel’ all reached first bloom 3 days prior to ‘Regina’ (2 year average). ‘Starks Gold’ bloomed 7 days prior to ‘Regina’ (2005), and ‘Hedelfinger’ (2 year average) and ‘Sam’ (2005) bloomed with ‘Regina’. Harvest timing is late, ripening just after ‘Lapins’ (Table 1). Fruit are very large and very firm (Table 1). Productivity on mazzard has been consistently light. However, 5<sup>th</sup> leaf trees on Gisela 5 yielded an average of 11.8 kg/tree (105 trees), Gisela 12, 23.3 kg/tree (130 trees), Gisela 6, 27.3 kg/tree (38 trees), and Weiroot 158, 27.0 kg/tree (4 trees). When ripe skin and flesh color are a dark mahogany and SSC is high (Table 1). The taste is mildly sweet, and pleasant. Rain crack resistance is very high.

### **‘Sweetheart’**

‘Sweetheart’ is a self-fertile cultivar released from the PARC breeding program in 1993 (Albertini and Strada, 2001). Bloom time is early and ripening time is very late (Table 1). The fruit is large and very firm (Table 1). The tree has an open growth habit that branches readily, is precocious and very productive with fruit growing in large clusters. When ripe, the skin is dark mahogany, flesh is red and the SSC is high (Table 1). ‘Sweetheart’ is moderately sensitive to rain cracking once it begins to color (subjective analysis), but early rains in 2005, nearly 5 weeks prior to harvest, split only 5% of the cherries. Both leaves and fruit are very sensitive to powdery mildew, *Podosphaera clandestina* (subjective analysis). The ripe cherries have a moderately strong flavor with a good balance of sugar and acid.

### **‘Staccato’**

‘Staccato’ is a self-fertile cultivar from the PARC breeding program (Kappel, 2005). Bloom timing is mid-season and ripening time is very late (Table 1). Fruit are large and very firm (Table 1). Cropping has been moderate with the exception of 2005 when bloom was very light; possibly due to a March freeze. Both leaves and fruit are very sensitive to powdery mildew, *Podosphaera clandestina* (subjective analysis). When ripe the skin color is a dark mahogany and the flesh is dark red, while the SSC is slightly higher than ‘Bing’. The flavor is somewhat mild with a nice tang and a pleasant flavor.

### **13S-21-01**

13S-21-01 is a selection from the PARC breeding program. It may be of interest to growers due to its very late ripening season and high quality fruit. Bloom timing is mid-season and ripening time is several days after 'Staccato' (Table 1). Fruit size is moderately large on a productive tree and fruit are moderately firm (Table 1). When ripe skin color is a dark mahogany, flesh color pink and SSC slightly higher than 'Bing' (Table 1). 13S-21-01 has a good flavor, stronger than 'Staccato' with a nice acid/sweet balance that is slightly acidic.

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Table 1. Fruit quality characteristics of various sweet cherry cultivars and selections, in comparison to 'Bing'.

Cultivar	Picking time + or – 'Bing' (days)	Average first bloom + or – 'Bing' (days)	Average fruit size (mm)	Average fruit firmness (g/mm)	Total soluble solids concentration (%)	Titrateable acid (g/100 ml) <sup>z</sup>	Ctfl skin color	Ctfl flesh color	Tree productivity <sup>y</sup>	2005 natural cracking <sup>x</sup> (%)
Santina	- 6 to 7	+2	30.6	314	16.5	0.48	5	4	2	90
13S-03-13	-5 to 7	+1	32.3	261	17.5	0.76	5	4	2	10
Cristalina	-1 to 4	+3	30.6	289	15.3	0.44	5	4	4	10
Bing	0	0	29.3	272	17.8	0.80	5	5	3	55
Sandra	+3 to 5	+3	32.8	278	18.8	0.68	5	3	1	25
Rose										
Sonata	+4 to 6	+1	32.3	335	18.7	0.84	5	3	3	45
Attika	+7 to 10	+6	29.1	292	18.0	0.64	6	6	3	5
Lapins	+10 to 15	-4	30.2	311	17.7	0.72	5	2	4	10
13S-42-49	+13 to 17	+5	31.3	363	18.1	0.72	6	6	3	40
Skeena	+14 to 17	-	31.9	318	20.9	0.68	6	6	2	40
Regina	+14 to 17	+9	31.0	314	21.5	0.60	6	6	1	5
Sweetheart	+20 to 22	-2	29.0	348	19.6	0.68	6	2	4	5
Staccato	+26 to 31	-1	31.4	343	18.6	0.64	6	3	3	10
13S-21-01	+35 to 38	+2	29.7	270	19.0	-	6	1	3	-

<sup>z</sup>g/100 ml malic acid

<sup>y</sup>Subjective assessment on a scale of 1-4, low to high respectively.

<sup>x</sup>Two rain events totaling 8.9 mm of precipitation occurred 12 and 13 days prior to 'Bing' harvest.