
Sweet Cherry Cultivars

*for the
Fresh Market*



Sweet Cherry Cultivars for the Fresh Market

L.E. Long, M. Whiting, and R. Nuñez-Elisea

In recent years, the number of fresh-market sweet cherry cultivars (varieties) produced in the Pacific Northwest (PNW) has grown from a few, dominated by one (Bing), to a dozen or more. Lapins was among the first new cultivars to gain significance in the mid-1990s, followed by Sweetheart, Chelan, Tieton, and others. Some of these early selections have lost favor with growers as production problems have become apparent and breeding programs release superior alternatives.

Advantages to cultivar diversification

Even with the inevitable struggles and growing pains of an industry rapidly adopting new, largely untested cultivars, the potential benefits are significant. With multiple varieties, bloom times are staggered, reducing the risk that the entire crop will be affected by poor weather during pollination. In addition, producing early- and late-ripening cultivars lengthens the growing season, potentially providing greater early- and late-season financial returns when supplies are limited. An extended harvest season also reduces labor demand as fewer pickers are needed over a longer period of time.

Cultivar diversification helps improve cropping consistency and reduces the risk of rain cracking, as many of the newer cultivars are more resistant to rain than Bing. Finally, there is inherent protection in a longer growing season, as some cultivars may escape damage due to their being less mature at the time of a rain event. (Fruit usually are more susceptible to rain cracking as maturity advances.)

Rootstock/training system interactions

It is important to choose the right cultivar, but it is just as important to match it to the right rootstock and training system. For example, productive cultivars such as Sweetheart and Lapins may grow poorly and overset if combined with a productive rootstock, such as those of the Gisela series. On the other hand, less productive cultivars such as Regina and Tieton may be profitable only when grown on a productive rootstock. Training less productive cultivars to a spindle or other precocious system can potentially increase profitability.

Important attributes for fresh-market sweet cherries

In a sparsely populated region such as the Pacific Northwest, storability and the potential to ship to distant markets are among the most important attributes. The characteristic most often associated with storability is flesh firmness. Bing stands out in this respect, and firmness is one of the reasons it has remained popular for so long. In recent years, we have learned, however,



Prepared by Lynn E. Long, Extension horticulturist and professor, Wasco County, Oregon State University; Matthew Whiting, assistant horticulturist and professor, Washington State University; and Roberto Nuñez-Elisea, FrutaInova LLC. All photos (except page 2) are by Corianne Daman.

that firmness does not always directly relate to shelf life. Sweetheart, for example, can be very firm, but shows a tendency toward pitting (a storage deformity causing small indentations in the skin, which often is caused by impact to the fruit).

Once at the market, large cherries have an advantage. With the introduction of very large-fruited cultivars, our definition of large has changed. In a recent study, 10½-row (25.5 mm) cherries, once considered large, were preferred by only 25 percent of consumers, while 9-row (30 mm) cherries were chosen by 70 percent of participants (Turner, et al.).

In addition, fresh-market cherries need to be attractive, with blemish-free, glossy skin. In the same study, mahogany and dark mahogany skin color were preferred over light mahogany, perhaps due to a perception of ripeness.

Finally, consumers look at stem color to determine freshness. Cultivars that have thick stems, such as Tieton, tend to retain stem moisture and color longer; they maintain a fresh appearance longer than cultivars with long, thin stems such as Regina.

While appearance will cause consumers to make an initial purchase, it is flavor that compels them to return. In other consumer studies (Long and Marin), Bing, Benton, and Sweetheart received high flavor ratings by consumers, and all were rated very high for sweetness as well as tartness. Cultivars that received lower overall

ratings for taste were ranked high for either sweetness or tartness, but not for both. Thus, it seems that consumers favor cherries that have a distinct sweet/tart balance.

The bane of all cherry growers is rain, which causes fruit cracking. Unfortunately, Bing has little resistance to this malady. Many of the newer cultivars, such as Chelan, Benton, and Lapins, exhibit some resistance. Others, such as Attika and Regina, show considerable resistance to rain-induced cracking.

New cultivars provide PNW cherry growers with many options, such as increased fruit size, rain cracking resistance, and harvest timing, that were not available with Bing alone. However, despite these positive characteristics, as growers have become more familiar with these cultivars, it has become clear that there is no perfect cherry. The key is to choose cultivars that will maximize returns under each grower's specific set of growing conditions and markets.

References

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Dark Red Sweet Cherries for the Pacific Northwest Fresh Market

(cultivars listed in order of ripening)

Chelan

Harvest timing: 10–12 days before Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Black Republican, Index, Lapins, Sweetheart
Suggested rootstocks: Mazzard, Gisela 6 or 12 on fertile soils with careful management. Incompatible with Mahaleb.

Chelan is the best truly early variety grown in the PNW. It is very firm, ships well, and has moderate rain-crack resistance and full resistance to powdery mildew. Tree vigor is moderate to low. Fruits are relatively small, averaging 10½ row but with a potential for 9½ row (25.4–28.17 mm). The flavor



is somewhat mild. Oversetting can be a problem on both productive and seedling rootstocks, so careful management is needed to prevent inferior fruit size. Chelan has been well accepted by commercial buyers and fills an early-season market niche.

• Dark Red Sweet Cherries for the Pacific Northwest Fresh Market •

Tieton

Harvest timing: 6–9 days before Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Bing, Rainier, Van, Black Republican, Lapins, Sweetheart
Suggested rootstocks: Productive rootstocks such as Gisela 6 or 12. On poor soils, Maxma 14. Incompatible with Mahaleb. Very light cropping on vigorous rootstocks such as Colt and Mazzard.

A glossy, mahogany red finish, thick stems, and very large fruit make this an eye-catching cherry. Negative traits include its propensity for doubling, susceptibility to rain cracking, low productivity, and bland flavor. Potential alternatives include Santina and PC 8007-2 from Washington State University. Trellis support or staking is recommended when using Gisela 6. A high density of pollinizers is suggested to improve productivity. Successful growers have utilized an alternating row system with Bing.



Santina

Harvest timing: 5–7 days before Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Self-fertile
Suggested rootstocks: Mazzard, Gisela 6 or 12

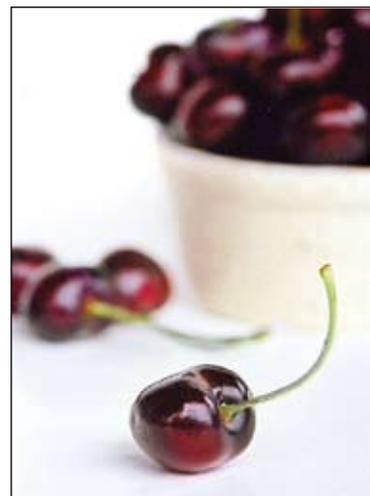
Santina has gained limited popularity in some early production areas in the southern hemisphere, but has yet to find its way into the planting scheme of most PNW growers. A bland, low-acid flavor and high cracking potential may be some reasons for indifferent interest. However, fruit is large and firm, and harvest is early.



Benton

Harvest timing: 2–3 days before Bing
Color when ripe: Mahogany
Suggested pollinizers: Self-fertile
Suggested rootstocks: Mazzard, Gisela 6 or 12

Competing head-on with Bing in the same harvest window may, at first, seem problematic for any new cherry. However, a number of attributes make Benton attractive to both growers and consumers. It blooms several days after Bing and therefore may be more likely to escape frost damage. The fruit is also more resistant to rain than that of Bing. Benton is firm and larger than Bing, and high soluble solids result in a flavor that has surpassed Bing in a number of consumer trials. Although self-fertile, moderate productivity allows this cultivar to be grown on a wide range of rootstocks.



Bing

Harvest timing: Midseason
Color when ripe: Light mahogany
Suggested pollinizers: Van, Rainier, Black Republican
Suggested rootstocks: Mazzard, Gisela 6 or 12

Bing has been the standard for PNW fresh cherry producers for more than a century. Firm texture, excellent flavor, and long-term storage capability that allows fruit to be shipped to distant markets have made Bing among the world's leading cherries. However, a midseason harvest window, moderate fruit size, and high rain cracking susceptibility have caused some growers to plant other cultivars in recent years.



• Dark Red Sweet Cherries for the Pacific Northwest Fresh Market •

Sandra Rose

Harvest timing: 3–4 days after Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Self-fertile
Suggested rootstocks: Gisela 6 or 12

Excellent flavor and very large fruit make this midseason cherry worth considering, especially as a pollinizer. Its self-fertility coupled with relatively late bloom (3 to 4 days after Bing), suggests potential as a pollinizer for Attika (Kordia) and other mid- or late-blooming cherries. Marginal firmness, even with a gibberellic acid application, has kept this cherry from being widely accepted in fresh markets. Although Sandra Rose is self-fertile, its productivity is low, and productive rootstocks such as Gisela 6 or 12 should be considered.

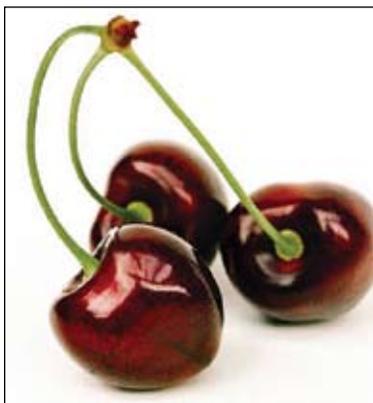


Attika (Kordia)

Harvest timing: 7–10 days after Bing
Color when ripe: Mahogany
Suggested pollinizers: Skeena, Regina, Benton, Sandra Rose, Schneiders, Stardust

Suggested rootstock: Mazzard, Gisela 6 or 12

Ripening between Bing and Lapins, Attika fills an important harvest window. More important, however, is its low rain-crack susceptibility and its ability to arrive in distant markets in excellent condition



due to its low susceptibility to impact damage. Fruit is large, the flesh is firm, and flavor is strong and pleasant. Although Attika blooms late, its flowers are susceptible to spring frosts. In addition, PNW growers have reported relatively high mortality rates of newly planted trees.

Selah

Harvest timing: 10–12 days after Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Self-fertile
Suggested rootstocks: Mazzard, Gisela 6 or 12

Selah is another cultivar that ripens between Bing and Lapins. The fruit is firm and very large. Although the tree is self-fertile, fruiting is moderate and occurs in loose clusters, a trait that should improve harvest efficiency and reduce disease incidence compared to other self-fertile varieties. Trees bloom early- to midseason and have a moderately spreading growth habit. Rain cracking susceptibility is similar to Bing.



Lapins

Harvest timing: 10–14 days after Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Self-fertile
Suggested rootstock: Mazzard

Although widely planted in the PNW, Lapins has fallen from favor due to its relatively low packout percentage and its propensity for pitting in transit. Some commercial buyers refuse to purchase Lapins due to its poor history of arrival at the market. Lapins crops heavily and tends to form tight fruit clusters that are difficult to harvest or penetrate with fungicides. To reduce this tendency, it is important to head all new shoots by one-third each year. In recent years, Lapins has been plagued by pitting problems. Careful handling during picking and packing help to reduce pitting. Research from Chile indicates that a balanced crop load (Zoffoli, et al.) and proper harvest timing (Zoffoli, Rodriguez, and Infante) are important to reduce pitting. Prune hard to avoid overcropping and harvest at the light mahogany stage.



• Dark Red Sweet Cherries for the Pacific Northwest Fresh Market •

Skeena

Harvest timing: 12–15 days after Bing
Color when ripe: Light mahogany to mahogany
Suggested pollinizers: Self-fertile
Suggested rootstock: Mazzard, Gisela 6 or 12

Skeena is a high-quality cherry with a ripening time similar to Lapins. The open, branching trees produce very large, firm fruit. In addition, several years of shipping and delivery success have given PNW growers confidence in this cherry. Although self-fertile, the tree is not precocious and only moderately productive; therefore, it can benefit from productive rootstocks. Developing fruit has shown sensitivity to temperatures above 100°F, particularly on young trees with open canopies. For this reason, a bush system may be preferred over central leader or more open systems. Weak stem attachment has been reported.



Regina

Harvest timing: 14–17 days after Bing
Color when ripe: Mahogany to dark mahogany
Suggested pollinizers: Sam, Schneiders, Attika, Starks Gold, Stardust, Hedelfingen
Suggested rootstocks: Gisela 6 or 12

Regina is a high-quality, late-season cherry that exhibits excellent rain-crack resistance. The fruit is very large and firm, with a mild, pleasant flavor. When ripe, this cherry is darker than most. For peak flavor, it is important to delay harvest until total soluble solids reach 20 to 22 percent. Reports on international deliveries indicate that



Regina is consistently one of the best shipping cherries produced by PNW growers. Although Regina is naturally low in productivity, this problem has been overcome with the use of productive rootstocks. It is also believed that planting multiple pollinizers in every row will improve pollination and fruit set. Regina is moderately resistant to powdery mildew.

Sweetheart

Harvest timing: 20–22 days after Bing
Color when ripe: Light mahogany
Suggested pollinizers: Self-fertile
Suggested rootstock: Mazzard

Sweetheart is the latest cherry grown by PNW growers and has been very profitable in late-season markets. The fruit is moderately large and very firm with a strong but agreeable flavor.

The tree form is open, very precocious, and very productive. Without proper pruning, including heading all new shoots each year, the tree can overset even on Mazzard rootstock. Pitting has been a problem upon arrival at distant

markets. To prevent this disorder, it is important to prevent trees from oversetting (Zoffoli, et al.) and to observe proper harvest timing (Zoffoli, Rodriguez, and Infante). Careful handling during picking and packing can also help reduce the incidence of pitting. Sweetheart is very susceptible to powdery mildew. Timely application of control measures throughout the season is critical for production of disease-free fruit.



Blush Sweet Cherries for the Pacific Northwest Fresh Market

(cultivars listed in order of ripening)

Early Robin

Harvest timing: 5–8 days before Bing
Color when ripe: Blush
Suggested pollinizers: Chelan, Tieton, Bing, Rainier
Suggested rootstocks: Mazzard, Gisela 6 or 12

Available for only a few years, there is limited commercial experience with Early Robin. In university trials, this cherry seems to have potential as an early-season Rainier-type cherry.



Early Robin is moderately large (9½ row or 28 mm) and firm, with an attractive red blush covering 50 percent or more of the fruit. The fruit has a very strong sweet flavor, but lacks the slight tart balance of Rainier.

Rainier

Harvest timing: 6–8 days after Bing
Color when ripe: Blush
Suggested pollinizers: Lapins, Sweetheart
Suggested rootstocks: Mazzard, Gisela 6 or 12

Rainier is the standard for blush cherries and commands a premium when compared with the dark red sweets. That premium, however, comes at a price. As with all blush cherries, careful handling at harvest and packing is required to prevent bruising and unsightly

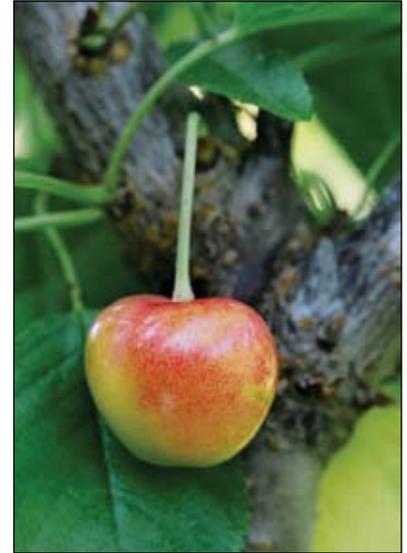


brown marks. In addition, Rainier is highly susceptible to powdery mildew and rain cracking. As with all blush cultivars, gibberellic acid should be applied at rates of 10 ppm or less. Standard rates (20 ppm) significantly reduce the red blush.

Stardust

Harvest timing: 11–14 days after Bing
Color when ripe: Blush
Suggested pollinizers: Self-fertile
Suggested rootstocks: Mazzard

It is unclear whether Stardust will become established as the Rainier-type cherry for the late-season market. The fruit is large with a nice blush and some tolerance to cracking. The flavor is mild but pleasing. Its late bloom and self-fertile allele may make Stardust a good choice as a pollinizer for Regina and Attika.



References

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Table 1. Dark red sweet cherry cultivars for the PNW fresh market.

Cultivar	First bloom relative to Bing ¹ (days)	Pollen compatibility group ²	Harvest date relative to Bing (days)	Skin color when ripe ^{3,4}	Flesh color when ripe ⁴	Total soluble solids (°Brix)	Fruit diameter (row size and mm)	Firmness ⁵	Cropping potential on Mazzard	Cracking potential
Chelan	-2 to -3	XVI (S ₃ S ₉)	-10 to -12	Light mahogany to mahogany	Light mahogany to mahogany	17–20	10½–9½ (25.4–28.17 mm)	Excellent	High	Low to Moderate
Tieton	0 to -2	XVI (S ₃ S ₉)	-6 to -9	Light mahogany to mahogany	Light mahogany to mahogany	15–17	9½–8½ (28.17–31.35 mm)	Good	Low	High
Santina	+3 to +4	Self-fertile	-5 to -7	Light mahogany to mahogany	Light mahogany to mahogany	16–17	9½–9 (28.17–29.76 mm)	Excellent	Moderate	High
Benton	+5 to +7	Self-fertile	-2 to -3	Mahogany	Mahogany	19–22	9½–9 (28.17–29.76 mm)	Excellent	Moderate to low	Moderate
Bing	—	III (S ₃ S ₄)	—	Light mahogany	Light mahogany	18–20	10½–9½ (25.4–28.17 mm)	Good	Moderate	High
Sandra Rose	+3 to +4	Self-fertile	+3 to +4	Light mahogany to mahogany	Light mahogany to mahogany	18–20	9½–8½ (28.17–31.35 mm)	Marginal	Low	Moderate
Attika (Kordia)	+5 to +6	VI (S ₃ S ₆)	+7 to +10	Mahogany	Mahogany	18–21	9½–9 (28.17–29.76 mm)	Good	Moderate	Low
Selah	0 to -2	Self-fertile	+10 to +12	Light mahogany to mahogany	Light mahogany to mahogany	18–20	9½–8½ (28.17–31.35 mm)	Good	Moderate	High
Lapins	-2 to -4	Self-fertile	+10 to +14	Light mahogany to mahogany	Light mahogany to mahogany	17–19	9½–9 (28.17–29.76 mm)	Good	High	Moderate
Skeena	+4 to +5	Self-fertile	+12 to +15	Light mahogany to mahogany	Light mahogany to mahogany	18–19	9½–8½ (28.17–31.35 mm)	Excellent	Moderate	High
Regina	+7 to +9	II (S ₁ S ₃)	+14 to +17	Mahogany to dark mahogany	Mahogany to dark mahogany	19–22	9½–9 (28.17–29.76 mm)	Excellent	Low	Low
Sweetheart	-2 to -3	Self-fertile	+20 to +22	Light mahogany	Light mahogany	20–22	10–9 (26.59–29.76 mm)	Excellent	High	Moderate

¹Relative bloom time may vary with location and year.

²See Table 3, page 9. Self-sterile cultivars require a pollinizer. The pollinizer must be from a different compatibility group and must bloom at the same time in order for pollination to take place. Self-fertile cultivars can be pollinated with their own pollen and consequently do not need a pollinizer cultivar.

³Skin color generally is the best indicator of ripeness; however, this and other attributes may vary from year to year. Also take into consideration other traits, such as total soluble solids and firmness, when determining harvest date.

⁴Mahogany color is defined by Webster's dictionary as "a moderate brownish red." Color evaluation is based on Michigan State University Sweet Cherry Maturity Index: color chip 3 = light mahogany; 4 = mahogany; dark mahogany is between color chip 4 and 5. To order card, contact Farrall Hall, Michigan State University, East Lansing, MI 48824.

⁵All fruit treated with 20 ppm gibberellic acid. Readings based on Firmtech II instrument: < 250 g/mm = marginal; 250–300 g/mm = good; > 300 g/mm = excellent

Table 2. Blush sweet cherry cultivars for the PNW fresh market.

Cultivar	First bloom relative to Bing (days) ¹	Pollen compatibility group ²	Harvest date relative to Bing (days)	Total soluble solids (°Brix)	Fruit diameter (row size and mm)	Firmness ³	Cropping potential on Mazzard	Cracking potential
Early Robin	0	II (S ₁ S ₃)	-5 to -8	17–19	10–9 (26.59–29.76 mm)	Good	Moderate	Moderate
Rainier	0	IX (S ₁ S ₄)	+ 6 to +8	18–20	9½–9 (28.17–29.76 mm)	Excellent	Moderate	High
Stardust	+ 6 to +7	Self-fertile	+11 to +14	17–19	10–9 (26.59–29.76 mm)	Excellent	High	Moderate

¹Relative bloom time may vary with location and year.

²See Table 3. Self-sterile cultivars require a pollinizer. The pollinizer must be from a different compatibility group and must bloom at the same time in order for pollination to take place. Self-fertile cultivars can be pollinated with their own pollen and consequently do not need a pollinizer cultivar.

³All fruit treated with 20 ppm gibberellic acid (GA). Readings based on Firmtech II instrument: < 250 g/mm = marginal; 250–300 g/mm = good; > 300 g/mm = excellent. Use caution when applying GA to blush cherries as percentage blush may be reduced with treatment.

Table 3. Sweet cherry compatibility and bloom timing.

Compatibility Group*	Pollination period				
	I	II	III	IV	V
Group I (S ₁ S ₂)	Black Tartarian			Summit	
Group II (S ₁ S ₃)	Samba		Van Early Robin	Cristalina Olympus Sonnet	Regina
Group III (S ₃ S ₄)	Somerset		Bing Royal Anne (Napoleon) Emperor Francis	Lambert	
Group VI (S ₃ S ₆)				Attika (Kordia) Starks Gold	
Group VII (S ₃ S ₅)					Hedelfingen
Group IX (S ₁ S ₄)			Rainier Black Republican Bada	Sylvia	Hudson
Group XIII (S ₂ S ₄)			Royalton		Sam
Group XVI (S ₃ S ₉)		Chelan Burlat	Tieton		
Group XXII (S ₃ S ₁₂)					Schneiders 0900 Ziraat
Self-fertile with S ₄ ' allele (universal donors)		Lapins Sweetheart Index	Staccato Stella Symphony Selah Santina Celeste	Skeena Sandra Rose Sonata Cashmere Glacier White Gold Summit	Stardust Benton Black Gold

*Self-sterile cultivars require a pollinizer. The pollinizer must be from a different compatibility group and must bloom at the same time in order for pollination to take place. Self-fertile cultivars can be pollinated with their own pollen and consequently do not need a pollinizer cultivar.

Source: Iezzoni, A., R. Andersen, H. Schmidt, R. Tao, K. Tobutt, and P. Wiersma. 2005. Proceedings of the S-Allele Workshop at the 2001 International Cherry Symposium. Proceedings of the 4th International Cherry Symposium, Acta Hort. 667, ISHS 2005, pp. 25–35.

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