

Sweet Cherry Cultivars for Brining, Freezing, and Canning in Oregon

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Terms and Definitions

Brix. A unit of measure that represents the percentage by weight of sugar in solution.

Cross-compatible. The pollen produced by either cultivar of a combination is able to function in the styles and fertilize the ovules of the other cultivar.

Cross-incompatible. Two cultivars are unfruitful when pollinated by each other because the pollen, although viable, dies before the pollination process is completed. Either cultivar may be an effective pollinizer for other cultivars.

Cross-pollination. The transfer of pollen from the male anthers of a flower of one cultivar to the female stigma of a flower of a different cultivar.

Fertilization. The union of the male germ cell, contained in the pollen tube, with the female germ cell, or egg.

Self-fertile (self-compatible). A cultivar that is able to set and mature fruit with its own pollen.

Self-sterile (self-incompatible). A cultivar that is unable to set and mature fruit with its own pollen.

Pedicle-fruit retention force. The amount of force needed to separate the stem (pedicel) of the cherry from the fruit.

Pitting. Small indentations in the skin of a cherry caused by impact during harvesting or processing that appear after a few days in cold storage.

Pollination. The transfer of pollen to the female stigma.

Pollinator. The agent of pollen transfer, usually bees.

Pollinizer. The plant cultivar used as a source of pollen.

Processing Cherry Production in Oregon

History

Oregon has historically been one of the nation's leading producers of processing cherries. Through most of the 20th century, most cherries produced in Oregon were for the processing industry. In Wasco County, the largest cherry production area in the state, two-thirds of cherries grown between 1986 and 1991 were for processing. In the Willamette Valley, the other large production area, nearly 100% of cherries grown are for processing.

By 2000, brine cherries in Wasco County were returning less than \$0.30 per pound, and growers quickly shifted production to more profitable fresh-market cultivars. This shift did not happen in the Willamette Valley, which receives more rain, because many fresh-market cultivars are susceptible to rain-induced cracking. However, Willamette Valley growers were under the same price constraints, and overall cherry acreage in the Willamette Valley declined.

Cultivars and Markets

In Oregon, processing cherries are sold as freezers, canners, or briners. Freezers are used in ice cream and yogurt. Briners are made into maraschino, glace, or ingredient cherries.

Pollinizer cultivars such as Van and Black Republican are typically harvested for the freezer market. Freezer cherries must be high in sugar, so they are left on the tree until sugar levels increase to 21 °Brix.

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Bing, Rainier, and other fresh-market cultivars are sold as canners when fruit size is less than ideal or other market conditions favor processing. The canning market has declined significantly in the last few decades as consumer preferences have changed to favor fresh fruit.

For most of the 20th century, cultivars such as Royal Ann were grown exclusively for the brine market. Royal Ann is still the most desirable processing cultivar for brining, but fewer Royal Ann cherries are being produced. Now, sort-outs from the higher fresh-market production in Pacific Coast states and inexpensive imports from Chile and other countries are helping meet the needs of the brine market.

Recent Changes

In recent years, processing cherry growers have survived only by reducing inputs and increasing per-acre yields. For example, mature Royal Ann on Mazzard rootstock needs very little pruning. In fact, severe pruning substantially reduces yield. Also, because Royal Ann is harvested early in the season, it doesn't require as much protection from pests and diseases such as cherry fruit fly, spotted winged drosophila, and powdery mildew.

Productive rootstocks can also increase profitability. Sweetheart on Gisela 6 rootstock is very productive and can yield 10 tons per acre or more, which helps offset the lower returns for processing cherries.

Processing Cherry Cultivars for Oregon

Most sweet cherry cultivars listed in this publication are self-sterile and require cross-pollination for satisfactory yields (table 1). There are some self-fertile exceptions, namely Benton, Lapins, Skeena, and Sweetheart.

Royal Ann

Known in other regions of the world as Napoleon, Royal Ann is the principal cultivar grown in Oregon for processing into maraschino cherries. The skin is thin and light yellow with a pink blush. The medium-long stem and moderately pointed fruit shape are associated with the highest quality cocktail-style cherry. Because the fruit has firm flesh, it has superior quality in brine.

Royal Ann is more susceptible to rain cracking than other cultivars. Harvesting early helps reduce this risk. The light-colored skin clearly shows brown discoloration from bruising, especially in hot weather.

Royal Ann is ideal for brining but can also be used for canning. To assure good pedicel-fruit retention force and appropriate firmness, cherries grown for brining are harvested prior to full maturity. If used for brining, the proper harvest window for Royal Ann is when total sugar levels reach 14 to 18 °Brix. If used for canning, the minimum sugar level at harvest is around 20 °Brix.

Royal Ann is relatively slow to come into production. This is especially true on Mazzard rootstock but also on some of the more precocious (early bearing) rootstocks such as Gisela 6. It is not unusual for Royal Ann to take 5 or 6 years to produce on Mazzard and up to 4 years on Gisela 6.

Royal Ann is a midseason bloomer, but fruit ripens early. It is typical to harvest Royal Ann for the brine market 10 to 12 days before harvesting Bing for the fresh market. Even when Royal Ann is used for canning, harvest is late midseason, before Lapins and other later-maturing fresh-market cultivars.

Royal Ann tends to have an upright growth habit with little branching. Trees are tall unless grafted onto dwarfing rootstocks or properly trained to a multi-leader system. Ladder harvest and a very strong pedicel-to-tree attachment force make hand harvest difficult and relatively slow.

The most common pollinizers for Royal Ann are Corum or Bada in the Willamette Valley and Black Republican or Van in eastern Oregon. Black Republican and Corum typically bloom just before Royal Ann, but the bloom periods overlap sufficiently for effective pollination.

Royal Ann is highly susceptible to infection caused by the bacterium *Pseudomonas syringae*, which can cause bacterial canker and dead bud diseases in cold, rainy weather. This is of particular concern in wetter parts of the state. In central and eastern Oregon, bacterial canker is rarely a problem on Royal Ann.

Bada

The University of California introduced this cultivar (pronounced bah-dah) in 1964. The skin is cream colored with a red blush. It is similar to Royal Ann in texture but more resistant to bruising and rain cracking. Compared with Royal Ann, the stem is slightly longer and thicker, the flesh is equally firm, and the fruit is indistinguishable in appearance but ripens a few days earlier.

Bada is not very vigorous. At maturity, it is only 50% to 60% as large as Royal Ann. Bada bears early, heavily, and consistently. It is more resistant to bacterial canker than Royal Ann and equally cold hardy.

Bing

Although only moderately large, Bing is one of the most popular fresh-market cultivars in the world. The firm flesh is able to withstand shipping to distant domestic and export markets. Bing fruit is nearly round, broader than long, and uniform. Its dark red flesh is firm, not very fibrous, juicy, sweet, and very good quality. The stone is relatively small compared to the size of the fruit. Bing ripens 10 to 12 days after Royal Ann.

Bing is excellent for canning and can also be sold fresh. Sort-outs from the fresh packing lines are often used for the brine market, but Bing is inferior for brining unless harvested before fully ripe, between 16 and 18 °Brix. It is grown extensively in The Dalles and Milton-Freewater as a fresh cherry, but it is rarely grown commercially west of the Cascades because of its susceptibility to rain cracking. Bing is also very susceptible to bacterial canker.

Bing is cross-incompatible with Royal Ann but cross-compatible with Van, Black Republican, and Rainier. In some years, Black Republican blooms too early to be a completely effective pollinizer for Bing. The full-bloom periods of Van and Rainier coincide well with Bing, making them excellent pollinizers.

Black Republican

The purplish-black fruit of Black Republican is small, ranging from 5/8 to 3/4 inch in diameter. This cultivar is inferior for canning and brining but regularly harvested for the freezer market. Freezer cherries are harvested without stems, so even though the fruit is small, harvest is relatively fast because pickers can “milk” the cherries off of the tree. Black Republican harvest occurs after Bing harvest when sugar levels reach 21 °Brix.

Corum

Corum fruit is light colored with a pronounced red blush and ripens 4 to 5 days before Royal Ann. The stem is approximately the same length as Royal Ann, but the fruit itself is not pointed and the flesh is not quite as firm.

Compared with Royal Ann, Corum branches more freely and tends to spread more and bear at an earlier age. Though considerably less susceptible to bacterial canker, Corum is much more susceptible to damage from some viruses than Royal Ann and has fallen out of favor in recent years. Corum is not recommended for eastern Oregon because Van is more marketable there.



Rainier

Rainier fruit has a very attractive red blush over a yellow base. High sensitivity to rain cracking limits its potential in the Willamette Valley and, in some years, can cause significant losses even in central and eastern Oregon.

As a fresh cherry, Rainier often receives a premium price. When grown as a pollinizer for Bing, it frequently oversets, producing fruit that is too small for the fresh market. When used for processing, it is harvested before its normal ripening window for the brine market or when high in sugar for the canning market.

Sweetheart

Sweetheart is a self-fertile cultivar from British Columbia. The medium-red fruit is moderately large and very firm with a strong but agreeable flavor. Sweetheart ripens very late and can be brined or sold fresh.

The tree form is open, very precocious, and very productive. Without proper pruning, including heading all new shoots each year, Sweetheart can overset and produce small fruit. Because large fruit is not required for processing, such oversetting may not be a problem. Sweetheart makes a high-quality brine product if harvested before fully ripe, between 16 and 18 °Brix.

Van

In central and eastern Oregon, the full-bloom period of Van coincides well with Royal Ann and Bing, making it an excellent pollinizer for both cultivars. Because Van is very susceptible to bacterial canker, it is not suitable for the Willamette Valley.

Although Van has excellent flavor, it is prone to postharvest pitting and cannot be grown as a fresh cherry. When Van is grown as a pollinizer, the fruit set on mature trees is usually so great that fruits are smaller than Bing. This does not limit its use for the brine and canning markets. Fruit should be harvested for brining at 21 °Brix and for canning at around 20 °Brix.

Diverting Fresh-Market Cherries to the Processing Industry

There are many reasons growers might divert cherries originally intended for the fresh market to the processing industry.

When grown as pollinizers, Rainier and other cultivars often overset, producing smaller cherries of inferior quality that cannot be sold fresh but can be processed. In some years, entire blocks, portions of blocks, or individual trees in a fresh block overset. Also, fresh-market cherries with rain cracking damage may be considered low-grade brine fruit and processed as pieces. Finally, a congested fresh market may make processing more attractive than other options.

It is important to decide market direction early because brine cherries must be harvested at an early stage, between 16 and 18 °Brix.

Number and Placement of Pollinizers

The number and placement of pollinizers required for the most effective pollination is largely determined by foraging habits of honeybees that carry the pollen. Wind plays little or no part in sweet cherry pollination.

A system in which every third tree in every third row is a pollinizer places a pollinizer next to every tree of the main cultivar at least on the diagonal and allows for a minimum number of pollinizers.

Table 1. Suitability of sweet cherry cultivars for brining

Cultivar	Suitability for brining	Potential pollinizers	Comments
Bada	Moderate	Royal Ann	Used for brining. Harvest between 16 and 18 °Brix. Susceptible to bacterial canker and rain cracking.
Benton	Moderate	Self-fertile	Useful for brining if 10½ row or smaller in size. Harvest below 16 °Brix.
Bing	Low, unless harvested between 16 and 18 °Brix	Van, Black Republican, Rainier	Useful for brining if overset and 10½ row or smaller in size. If rain cracked, made into low-grade brine as pieces and used in ice cream, yogurt, and baking. With high Brix, also used for canning.
Black Republican	Low	Bing	Too small for brine at proper brining stage. Normally marketed as a freezer.
Chelan	Low	Bing	Aborted cherries on tree tend not to drop until crop is fully mature. Pits in aborted cherries tend to shatter.
Corum	Moderate	Royal Ann	Harvest between 16 and 18 °Brix. Susceptible to bacterial canker and rain cracking. Normally harvested as a briner in western Oregon.
Lapins	Low	Self-fertile	When overset, fruit can be soft and cherries can exhibit low pedicel-fruit retention force.
Rainier	High	Bing	Useful for brining if overset and 10½ row or smaller in size. Also used for canning.
Regina	Moderate	Attika, Sam, Starks Gold	Useful for brining if 10½ row or smaller in size. Harvest between 16 and 18 °Brix.
Royal Ann	High	Bada, Corum, Van, Black Republican	Most common brining cherry grown in Oregon. Harvest between 14 and 18 °Brix. Susceptible to bacterial canker. Also used for canning.
Skeena	Moderate	Self-fertile	Useful for brining if overset and 10½ row or smaller in size. Harvest between 16 and 18 °Brix.
Sweetheart	High	Self-fertile	Harvest for brining between 16 and 18 °Brix.
Van	Moderate	Bing	Useful for brining if 10½ row or smaller in size. Normally marketed as a freezer.

Strategies for Profitability

Prices for processing fruit have historically been significantly lower than those for fresh fruit. However, processing is often a useful outlet for fruit that cannot be sold fresh (e.g., small fruit from overset pollinizers). Growers should carefully analyze all options before deciding to plant a block of cherries specifically for the processing market.

In central and eastern Oregon, planting processing cherries may allow growers to hire a workforce early in the season that will remain available for harvest of later-maturing fresh-market cultivars. In western Oregon, growers may find processing cherry production attractive if they can keep costs to a minimum. Some western Oregon growers mechanically harvest processing cherries to keep costs low; however, mechanically harvested cherries can have lower stem counts and, therefore, return less than hand-harvested cherries. In either situation, growers must carefully manage yield and production strategies to be profitable. Several approaches can reduce costs and increase the potential for profit.

Limit Inputs

It is often possible to limit the amount of inputs in a processing block. Depending on the cultivar and harvest timing, pruning, fertilizing, and pest and disease control may be minimal compared with a fresh block.

Harvest labor is always the highest cost in any orchard operation. Many Willamette Valley growers harvest cherries mechanically. Although this significantly reduces labor costs, mechanically harvested cherries are worth less than hand-harvested cherries because they often have fewer stems.

Establish a Pedestrian Orchard

Another method to reduce labor costs is to train trees to a pedestrian orchard system, such as a modified multi-leader system (e.g., Kym Green Bush; KGB). Pickers can increase their productivity by up to 70% when they harvest from the ground without using ladders.

For More Information

Sweet Cherry Cultivars for the Fresh Market. PNW 604. (Includes a compatibility and bloom timing chart.) <http://extension.oregonstate.edu/catalog>

Annual Wasco County Sweet Cherry Production Results. <http://extension.oregonstate.edu/wasco/orchard-economics-0>



Increase Precocity and Mature Yields

Using precocious, productive rootstocks such as Gisela 6 and Gisela 12 can provide early, high yields into maturity. Grafting such rootstocks to precocious, productive cultivars such as Sweetheart can provide very high yields. Training systems with little establishment pruning, such as the Vogel Central Leader, can also increase tree precocity.

Summary

Although the processing cherry industry has changed in recent years, it continues to be important for Oregon growers. The bringing, freezing, and canning markets provide an important outlet for pollinizers, sort-outs, and fruit raised specifically for processing. Keeping the processing cherry industry profitable so Oregon growers can continue to take advantage of these markets is a challenge today and for the future.

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