

New York's Food and Life Sciences Bulletin

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SWEET AND TART CHERRY VARIETIES: DESCRIPTIONS AND CULTURAL RECOMMENDATIONS

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SWEET CHERRIES (*Prunus avium* L.)

The 1985 Orchard and Vineyard Survey by the New York State Department of Agriculture and Markets listed 257 sweet cherry orchards in New York State with total acreage estimated at 1,073 acres. Cultivars being grown include 'Bing', 'Chinook', 'Compact Lambert', 'Corum', 'Emperor Francis', 'Gold', 'Hedelfingen', 'Hudson', 'Lambert', 'Napoleon', 'Rainier', 'Sam', 'Schmidt', 'Stella', 'Ulster', 'Van', 'Vista', and 'Windsor'. 'Emperor Francis' is the leading sweet cherry variety in New York comprising 20 percent of the total trees, with 'Hedelfingen' (16%) and 'Schmidt' (15%) also of importance.

The major cultivars currently being grown in New York State are listed below in alphabetical order under their primary category of use. Trees of most of these varieties are sold by commercial nurseries. The ripening date presented is the average ripening date at Geneva. This date will be affected by location, tree age, crop, and environmental conditions, but the relative order should remain the same.

White or yellow fleshed varieties

Most of these varieties are only used for the brining industry, but some ('Rainier', 'Emperor Francis', and 'Napoleon') are used for fresh fruit. The flesh of these varieties is light yellow, with a skin color ranging from 100 percent light yellow to 100 percent red. Fruit of brining varieties is processed into maraschino cherries. While there has been a decrease in the brining industry in New York State during recent years, its past importance is reflected in the large number of brining varieties that remain in commercial orchards. Greater emphasis is now being placed on growing dark sweet cherry varieties for the fresh market, but in certain areas of the country (Michigan, Oregon) brining is still a viable industry.

'Corum'—July 8 ripening date. Only semi-firm, but productive and hardy. Pollen source for 'Napoleon'.

'Emperor Francis'—July 10 ripening date. The major cultivar being used in the East for brining. It is firm, attractive, of good quality, moderately hardy and productive. Used for both brining and fresh consumption.

'Gold'—July 15 ripening date. Easily bleached for brining as it has no red pigment. Trees are hardy and productive. Blossom buds will come through a cold winter at the time fruit buds of most other varieties are killed. 'Gold' fruit are small, but for certain markets and with mechanical harvesting this is not a problem. 'Gold' is in a unique pollination group so that it is able to serve as a pollinizer for many other brining varieties.

'Napoleon'—(known as 'Royal Ann' on the West Coast) July 11 ripening date. Yellow with a red blush, firm, and of good quality, but its severe rain cracking and below average hardness restrict its desirability for our area.

'Rainier'—July 8 ripening date. Of increasing interest for the fresh market trade due to its outstanding fruit quality. Large, firm, extremely hardy and very productive. Unfortunately,

moderate rain cracking susceptibility could result in large crop losses some years. Bruise susceptibility may require field packing to minimize loss.

Dark sweet cherries

'**Bing**'—July 10 ripening date. This is the cherry most often seen on the market. It is shipped in large quantities from the West Coast. 'Bing' is often viewed as a standard for quality because it is firm, sweet and large. However, its susceptibility to canker, severe fruit splitting, and sensitivity to our cold climate does not make it an ideal variety for our region. Other lesser known varieties are recommended in all but the most ideal locations.

'**Chinook**'—July 5 ripening date. Nearly black fruit, 1 inch in size. Medium in hardiness and productivity. Under our conditions fruit cracking is severe, often approaching 100 percent crop loss. This cultivar is not recommended for the East.

'**Compact Lambert**'—July 18 ripening date. Fruit are the same as 'Lambert' (described below). While this is supposed to be a tree of reduced size, there has been a problem with both the stability and the virus status of the compact types released. Until these issues are resolved, the use of size-reducing rootstocks would be preferred to the use of these "compact" types.

'**Hedelfingen**'—July 17 ripening date. Trees are early bearing and very productive. Does not crack readily in our area, but severe cracking has been reported with 'Hedelfingen' under western conditions. If 'Hedelfingen' is not picked at the proper stage of maturity, fruit quality may be low due to very soft fruit with a tendency for high juice loss.

'**Hudson**'—The July 25 ripening date greatly extends the season. It is the latest ripening commercially available sweet cherry. Very firm, very good quality, low field susceptibility to fruit cracking. Tree medium in hardiness and productivity. Fruit may be harvested over an extended period of time because of its firmness. Also good for refrigerated storage of fruit.

'**Lambert**'—July 18 ripening date. Purplish red, 7/8 inch, firm fruit. Very susceptible to rain cracking. Buds hardy, but trees only medium hardy. Productive.

'**Sam**'—July 6 ripening date. Good rain crackresistance, but this may be due to the soft texture of the fruit. Hardy, but only moderately productive. Late blooming. Some trees have a bitter aftertaste in the fruit. Black fruit, 3/4-7/8 inch in size. Often listed as bacterial canker resistant, but it is susceptible to certain strains of this disease.

'**Schmidt**'—July 10 ripening date. A large, firm, attractive, good quality black cherry. Trees are slow coming into bearing and unreliable in cropping. The effective pollination period is very short so that unless conditions are ideal for pollination and fertilization, light fruit set can be a problem. The tree is winter tender. 2

'**Stella**'—July 13 ripening date. Its outstanding feature is its self-fertility. Very dark red, 1 inch size, only semi-firm. Moderately susceptible to rain induced fruit cracking. Trees are productive but tender to winter cold. It is only medium in hardiness.

'**Ulster**'—July 14 ripening date. Nearly black fruit color, 3/4 to 7/8 inch in size. Medium hardy. Productive. Good tree performance and health have been noted in many growing regions. Gaining in commercial importance. Firm fruit of good quality. Resembles 'Schmidt' but more productive. Moderate resistance to rain cracking in most years.

'**Van**'—July 15 ripening date. Very hardy and productive. Nearly black, 3/4 to 7/8 inch fruit. Short stem. 'Van' is fine for the home market, but surface pitting (bruising) is such a problem that 'Van' is no longer recommended for fresh fruit marketing channels. Fruit develop in clusters so that brown rot control can be a problem.

'**Vista**'—Ripens July 3. Nearly black, 7/8 inch size, semi-firm fruit. Medium in hardiness and productivity. Cracking is often a serious problem, especially in young plantings with light crops (2).

'**Windsor**'—July 16 ripening date. This variety was also used for brining, but the fruits are small and they had to be harvested immature, before the red pigment developed around the pit. While 'Windsor' is productive, it has lost favor in recent years and is no longer recommended for the fresh market.

OTHER VARIETIES OF IMPORTANCE

White varieties

'**Bada**'—California Agricultural Experiment Station release (1964). Resistant to fruit doubling. Ripens four days before 'Napoleon' (approximately July 7). Blooms relatively late but overlaps with 'Bing' and 'Napoleon', supplying good cross-pollination for these varieties.

'**Sweet Ann**'—White fleshed cherry, tolerant to X-disease.

'**Vega**'—Introduced in 1967 by the Horticultural Research Institute of Ontario, Vineland. Very large and attractive fruit. It has a small, easily removable pit. It is larger, firmer, and earlier than most white cultivars, but it remains tart until it is very ripe. Requires a careful spray program for the control of brown rot.

Dark Sweet Cherries

'**Black Republican**'—Fruit medium sized, good quality, very darkred turning black when fully ripe. Not a commercial cultivar for the fresh market. Primarily used as a pollinizer for other sweet cherries.

'**Black Tartarian**'—Fruit small-medium in size and purplish

black. Early ripening and early bearing. An excellent pollenizer for most varieties but the small, soft fruit of relatively poor quality are not commercially desirable.

'Cavalier'—Of interest because of its early ripening (approximately June 20 at Geneva). Possible limitations include short stems, long time coming into bearing, destruction by birds, and limited information on its cross compatibility with other varieties. It is of high quality, but it is rain crack susceptible under our conditions.

'Early Burlat'—Large, moderately firm fruit. Harvest date is approximately two weeks before 'Bing'. We have not yet evaluated this at Geneva.

'Hardy Giant'—Fruit large, dark red, good flavor, resembles 'Bing'. A good pollenizer for other sweet cherries, especially 'Lambert'. In some areas out West it is grown as a commercial variety. This cultivar has been virus infected, so request only virus indexed trees.

'Kristin'—This was named due to its outstanding performance, yield and quality in Norway. Average ripening date of July 15. Fruit size averages 1 inch. Trees are precocious in bearing. Moderately productive. Good fruit quality, combining good flavor and high soluble solids. Moderate resistance to rain cracking.

'Summit'—July 6 ripening date. Outstanding for its large fruit size and quality, but susceptible to cold and to rain cracking of the fruit.

'Utah Giant'—Ripens with 'Bing'. Severe fruit cracking has been observed in our trials. Very short stem. Although it is large and of good quality, its cracking is too severe to be recommended in our area.

'Valera'—Ripens a few days before 'Bing'. Medium sized, semi-firm, good quality fruit. 1967 release from the Vineland, Ontario program. Tree is vigorous and early bearing. It has a darker color, richer flavor and more consistent cropping record than 'Venus' (another Vineland selection described below). Fruit are also less clustered, and not as susceptible to brown rot as 'Venus' (2).

'Venus'—July 6 ripening date. Dark red, 3/4-7/8 inch in size, semi-firm. Medium in hardness. Very productive. Large, attractive, good quality fruit. It has a tendency to overbear in some years, especially under conditions which favor good cross pollination. 'Valera' is suggested instead (2).

'Viscount'—Introduced in 1983 by the Horticultural Research Institute of Vineland, Ontario. Medium-large, firm, good quality, dark glossy red cherries which ripen with 'Bing'. Productive. Good resistance to cracking (2).

'Viva'—July 4 ripening date. Dark red, 3/4 inch size, semi-firm fruit. Good crack resistance but this may be due to its soft texture. Good quality (2).

'Vogue'—A large, shiny, dark red sweet cherry with a small pit. Introduced in 1974 by the Horticultural Research Institute at Vineland, Ontario. Ripens with Bing. Productive. In heavy crop years it sets in bunches so that careful spraying is required for brown rot control (2).

NEW YORK SELECTIONS

Advanced selections from the breeding program are available on a limited basis from the New York State Fruit Testing Association, NYSAES, Hedrick Hall, Geneva NY 14456 (3).

NY 6476—Outstanding for its firmness. It has also shown good field resistance to rain cracking. It could provide flexibility in harvesting because of its firmness. Average ripening date of July 14 in Geneva. Fruits are of good size (1") and attractive. Good quality with 18-20 percent soluble solids at harvest. **Not** compatible with 'Emperor Francis' or 'Kristin', but cross compatible with 'Van', NY 11390, NY 3308, NY 7679, and 'Rainier'.

NY 7679—Briner type, but suitable for the fresh market as well. It has a good history of performance. Average ripening date of July 7 at Geneva. The fruit are an attractive, glossy yellow, with 50-75 percent of the surface covered by a clear red blush. Fruits are large (1-1 1/4"), sweet (17% soluble solids) and firm. Cross compatible with 'Emperor Francis' and NY 6476.

NY 11390—One of the largest dark sweet cherries (averaging 1 1/8-1 1/4"). Attractive. Excellent quality (19% soluble solids). Cross compatible with 'Ulster', 'Emperor Francis', 'Kristin', 'Van', NY 3308, and NY 6476. Average ripening date July 10. Little rain cracking in most years, but it will crack if the conditions are severe.

NY 3308 - July 4 ripening date. Tremendous potential for annual cropping and productivity. This selection has come through with a crop during years when many other selections failed to set a crop. Ten year old trees are capable of producing 200 pounds of cherries. The one disadvantage is that the heavy cropping potential can cause a reduction of fruit size and sugar. Naturally good tree form. Unique pollination group allows it to be used as apollenizer for allcommercial varieties (except 'Gold'). It is also cross compatible with all New York sweet cherry selections.

Self fertile sweet cherries

Self fertile sweet cherries are particularly well suited to areas where poor weather during pollination limits bee flight and thus pollination and fruit set. However, there can be problems with over-setting, with a subsequent decrease in fruit size and quality. If fruit is clustered on the tree, brown rot control may also be a problem. Expect to see future self-fertile releases from our program at New York, and from the Canadian programs in Ontario and British Columbia.

'Stella'—See description in previous section.

'Lapins'—Released from the Agriculture Canada Research Station, Summerland British Columbia in 1983. It is a late maturing dark sweet cherry with commercial possibilities. Reported to have resistance to rain induced fruit splitting, though this was not found to be the case in our trials. Large fruit size, high yield, and good taste. Tree structure is reported to be outstanding.

'Sunburst'—was also released from the Agriculture Canada Research Station at Summerland British Columbia in 1983. It has not yet been tested at Geneva. It is a mid-season dark sweet cherry, reported to be outstanding for fruit size, high yield, and self-fertility. It is more resistant to rain splitting than many commercial cultivars. It is not as firm as present commercial cultivars, so it is not recommended for sales to distant markets where long term storage is required (7).

'Starkrimson'—Only for the home market in areas where rain cracking is not a problem. It is productive, firm, and of good quality, but it is extremely susceptible to rain induced fruit cracking. Sets in clusters so that brown rot control can be difficult. It is not suitable for commercial production.

FACTORS TO CONSIDER IN CHERRY PRODUCTION

Determining optimum harvest date for sweet cherries

While fruit color and size are often used to gauge commercial harvest date, the use of a hand held refractometer to measure the level of soluble solids (or sugar) is strongly recommended. Cherries harvested before they reach 14 percent soluble solids will be judged unacceptable by 50 percent of the consumers who sample them. The higher the soluble solids, the greater the perception of quality.

For efficient mechanical harvesting of sweet cherries, the fruit removal force (the force required to pull the fruit from the stem) must be lower than 300 grams. Fruit removal force can be measured by the use of a mechanical force gauge (Ametek, Inc., Hatfield.PA).

Hardiness

Varietal cold hardiness must be considered when planting an orchard. Commercial growing of sweet cherries should not be attempted where the temperature drops below -25° F. Trees of tart cherries are somewhat hardier than sweet cherries. Critical temperatures for fruit (in degrees Fahrenheit) are 21° for cherries at the green tip stage, 25° for 1/2 green, 28° at tight cluster through bloom, and 30° through petal fall and fruit set. These temperatures reflect a crop loss of 10 percent, but 90 percent kill will occur with temperatures 3-5 degrees less.

To prevent southwest winter trunk injury (sunscald), paint the trunk with white paint containing no oils. This treatment can help to prevent tree damage and loss by reducing the wide fluctuations in temperature caused by the sun heating the trunk. These fluctuations, especially prevalent when a warm day is followed by a freeze, can cause the bark to split. Injury due to bark splitting causes ideal sites for infection by cytospora canker. Interior paints have been suggested for use but exterior paints work as well. Apply paint in the fall when temperatures are mild (60-70 degrees) and conditions are favorable for drying. Paint should be applied to the trunk, crotches, and lower main scaffolds. On older trees only the southwest side needs to be painted. Young trees should be painted the first fall after they are set out. Paint can be applied by brush, paint mit, or sprayer. Paint can be thinned for ease in application, but sunscald protection is enhanced by limiting the amount of water added.

Rain Cracking

Rain induced fruit cracking of sweet cherries is not a problem in dry seasons, but in many growing regions rains occur just before harvest and as much as 90 percent of the crop can be rendered unmarketable due to cracking. Cracking is caused by absorption of rain water or dew through the skin, until a point is reached that the fruits burst open. It is primarily an osmotic phenomenon and not due to massive influx of water through the roots as is commonly believed. Even minor cracking can present problems because the wound allows the brown rot organism to proliferate. Cracking is most severe on young and lightly cropped trees. Varieties with soft fruit tend to be less susceptible to damage.

Birds

Bird damage can substantially reduce yields, with a lower percentage of loss in larger orchards than smaller orchards. In home orchards the loss can approach 100 percent due to the small number of trees. Dark sweets are more susceptible to damage than white sweets, and tart cherries are less affected than sweets. The two extremes of the ripening season, early and late, represent the time periods when damage is most severe. No completely effective control method is available. Tree netting is effective but impractical for large commercial plantings. Dwarfing rootstocks may make this technique more practical. Cherry orchards should not be planted near woods that harbor birds. Destroying nests, trapping, hanging reflective pans, hawk kites, use of electronic noisemakers, repellent chemicals, and exploding devices have all been tried with varying degrees of success.

Tree Training and Pruning

See other extension bulletins on this topic (5). Any spring pruning to remove damaged limbs should be carried out by May to allow rapid callusing of wounds, and reduce the likelihood of canker infection. The spacing of laterals can be achieved by shoot manipulation during the summer months. Winter pruning

of cherries should be avoided. Disease infection arising from this practice can lead to disastrous results from canker infection. Pruning should be done in the late spring.

Deer

Deer cause problems by eating young growth and ruining tree training. There is a loss of fruiting wood, and trees may be permanently stunted. Hanging small (1/2 oz) bars of perfumed soap (with the wrapper left on) will aid in deterring feeding activity. Soap must be in place prior to leafing out because once feeding habits are established they are difficult to break. There are also commercially available repellants that can be sprayed on.

Insects

Cherry fruit fly, black cherry aphid, plum curculio, European red mite, peach tree borer, two spotted mite, and in some areas the apple maggot, are some of the pests which can affect cherries. Cherry fruit fly damage is evident from puncture type holes in the fruit and internal white maggots. Black cherry aphid can cause severe leaf curling on new growth. Commercial control measures are discussed in Cornell's Chemical Recommendations for Commercial Tree-Fruit Production, published annually by Cornell University (10). Recommendations for commercial growers and home owners living in other geographic areas may also be found in local extension bulletins. A listing of extension bulletins may be obtained by contacting your area's Cooperative Extension Service.

DISEASES

Brown rot (*Monilinia fructicola*)

This disease is caused by a fungus that attacks both the blossoms and fruit during warm, rainy weather. It is one of the most common diseases of cherries. Infected blossoms wither and turn brown, and may become covered with a gray moldy growth during wet or humid weather. Fruit rot starts as dark spots, which spread to encompass the entire fruit; gray to buff colored fungus spores often develop upon these rotten zones, resulting in a fuzzy appearance. Fruits may mummify and remain on the tree, providing a source of infection for the following season. The fungus can also spread to the twigs and cause twig dieback and sunken brown cankers on small branches (4,10). The disease is controlled by sanitation (removal of mummified fruit and cankered twigs before budbreak) and fungicide sprays when weather conditions favor disease development.

Powdery mildew (*Podosphaera oxycanthae*)

Grayish white powdery spots develop on the under surface of the leaves. When infection is severe, leaves yellow and become distorted. This may be controlled by fungicides (4,10), although specific control measures usually are not required.

Leaf Spot (*Coccomyces hiemalis*)

This is an important fungal disease in wet years. Unprotected cherries can become defoliated by mid-summer often resulting in subsequent winter damage. Symptoms usually first appear in late June, and are evident as yellowed leaves dotted with small circular purple spots. White spore masses in the center of the spots can often be found on the lower surface of the leaf. Since the initial source of infection is last year's fallen leaves, where practical this disease can often be controlled by raking and removing all leaves from the planting before bloom. Chemical control may also be required particularly in years with frequent rainfall during late May or June (4).

Cytospora Canker (*Valsa* Canker)

This disease is also caused by a fungus. Infection is evident as depressed areas on the bark of main leaders and branches. Canker margins are sharp and distinct with the wood discolored. Cankers are often perennial, with young cankers producing gum at the margin. *Cytospora* is a wound invader with winter injuries being the most common entry point, and the second most common avenue through pruning wounds, particularly branch stubs. There is presently no cure for this disease but prevention and sanitation can go a long way towards control. Tree painting to prevent southwest injury, removal and burning of infected wood, delaying pruning until late winter or early spring, maintaining trees in good health, and a practice of avoiding the creation of branch stubs when pruning are all recommended (4).

Bacterial Canker (*Pseudomonas*)

This disease can infect branches, twigs, and leaves. Varieties differ widely in their susceptibility. Published reports of resistance can not be relied upon because there are now different strains, and new interactions with fungal diseases, that have infected previously resistant varieties. Symptoms include elongated cankers on the trunk or scaffold limbs that are most conspicuous during the late winter or early spring. The canker surface is sunken and dark purple in color. The inner tissue of the canker is orange to brown, and narrow brown streaks extend into the healthy tissue both above and below the canker. Gum is usually produced at the canker margin. Cankers may eventually girdle the entire tree. Dormant or semi-dormant buds may blast or wither causing infected trees to have a light bloom. Copper sprays are used in some areas during the dormant season as a control measure. Leaf infections are most severe in prolonged periods of wet, cool weather after bloom. Infected leaves develop dead areas which drop out leaving a tattered appearance (4,10).

Virus

Growers should insist on purchasing only certified trees from virus tested sources. Growers will benefit greatly from starting with healthy trees because of better growth and yields. Necrotic ring spot and cherry yellows are the two most prevalent virus

diseases; both can be transmitted in pollen by bees. Sour cherry yellows symptoms include leaves which develop pale green to yellow areas three to four weeks after petal fall. Later, entire leaves turn yellow, but remain green along the veins. Leaves will drop, growth is willowy, and fruit number is reduced. In sweet cherry yellows, rings, mottling or shotholes may be evident. Warm days and cool nights are required for the symptoms to develop. Control measures include establishing new orchards with virus free trees in areas isolated from older orchards and rouging out trees below 10 years of age that display symptoms. Yields of sour cherry trees infected while young are reduced 40-50 percent (4).

X-disease

Caused by a mycoplasma (similar to a bacterium), this disease can be devastating when it occurs. Symptoms are dependent on the rootstock. On mazzard rootstocks, the scion symptoms include delayed bloom, dull leaf color, poor growth, and failure of some of the fruit to mature. Immature fruit are light in color, poor in taste, somewhat triangular, and with little flesh. On mahaleb rootstock, fruit symptoms rarely develop. In June or later, infected trees suddenly wilt and may die by the end of the season, while other infected trees decline slowly without any specific symptoms. The most important control measure is eradication of wild chokecherry, a major reservoir for the mycoplasma that causes this disease, from fence rows or woodlots adjoining the orchard. Leafhoppers are the vector of transmission so sprays to control leafhopper are also helpful (4,10). This disease is more common in the Hudson Valley region than in western and central New York.

Phytophthora crown and root rot

Initial symptoms resemble those of mechanical girdling or winter injury. Trees exhibit little or no terminal growth, and the leaves are frequently small and yellow. Trees may be delayed in leafing out, and they may blossom profusely before collapsing suddenly. Trees may wilt and die during the first year that symptoms appear, or they may decline steadily for several years. If the bark is removed several inches below the soil line, a zone of red-brown discoloration may be evident. This disease is caused by a group of soil-borne fungi that thrive in wet soils, therefore selection of a well-drained planting site is critical for control. Mahaleb rootstock is highly susceptible, and should be avoided where soil drainage is questionable (4,10).

Site selection

Proper site selection is crucial to the success of cherry culture. Adequate shelter from wind and freedom from frost are vital. Windbreaks should be planted well in advance of the orchard. Cherries need less water than apple trees and so are adapted to the coarser textured soils. Good drainage is essential and lighter loams are generally more suitable than heavier soils. They cannot tolerate inadequate drainage. 6

ROOTSTOCKS

Mazzard—(*Prunus avium*) rootstocks produce a larger tree that is considerably longer lived than on Mahaleb. It develops a more shallow, more spreading root system.

Mahaleb—(*P. mahaleb*) produces a 2/3 - 3/4 size tree, and develops a deeper root system that is less tolerant of wet soil. Mahaleb is very deep rooting and requires excellent drainage. Highly susceptible to *Phytophthora* so it should be avoided in locations where this fungus is a problem. Some varieties, such as 'Van', are not compatible with Mahaleb.

Prunus cerasus—Limited usage. Seedlings of sour cherry are highly variable, but two clonal selections of *P. cerasus*, 'Stockton Morello' and 'Kentish', have been used commercially as rootstocks. Generally they are more cold hardy and perform better in wet and heavy soils than either mazzard or mahaleb (8).

'Colt'—this rootstock was developed at the East Mailing Station in England. Vegetatively propagated to ensure uniformity. Size reduction may not be evident. Drought susceptibility. 'Colt' was especially tender in artificial freezing trials and in orchard performance at Geneva (1).

F12/1—This is a clonal rootstock that is very vigorous (more vigorous than on mazzard). It is compatible with a wide range of sweet and sour cherry varieties. It has been used in some regions for its good field resistance to *Pseudomonas*. Roots extremely susceptible to crown gall (*Agrobacterium tumefaciens*). Prone to rootsuckering. Also susceptible to *Phytophthora* and to specific replant disease of cherry (8).

Gembloux Rootstocks

The following rootstocks were developed in Belgium by R. Trefois. They have been released for testing and were included in the NC 140 trial at Geneva that was planted in the Spring of 1987. The information below is from published reports (1,8).

GM 9—Very susceptible to *Phytophthora*. Good cold resistance but not as good as GM 61/1 or GM79. Thrives on good soils. Produces a sweet cherry that is 2/3 to 3/4 the size of F12/1. Must prune to encourage growth. Staking is necessary.

GM 61/1—Moderately resistant to *Phytophthora*. Good compatibility with *Prunus avium*. Excellent cold resistance. Hardly any suckering. Good anchorage but requires staking the first few years in the orchard. Vigor one-half to two-thirds that of F12/1.

GM 79—Very susceptible to *Phytophthora*. No need for staking. Vigor one-third to one-half that of F12/1. Pruning requirements reduced.

M x M clones—Resulted from hybridizations of sweet x tart cherries (*Prunus avium* x *Prunus mahaleb*). It has been reported that none of the M x M clones are completely satisfactory due to

excessive suckering. M x M2,39,60, and 97 have been reported to have resistance to *Phytophthora* spp. (1,8).

Pollination Requirements

Sweetcherry varieties, with the exception of 'Stella', 'Starkrimson', 'Lapins', 'Sunburst', and several numbered selections from the Vineland, Summerland, and Geneva programs are self-incompatible. They require another source of pollen and cannot be planted in blocks of single varieties. In addition, cross incompatibility also exists. Eighteen incompatibility groups have been identified (Table 1). Varieties in the same group cannot be used to pollinate each other. The universal donor group will successfully pollinate varieties from all incompatibility groups provided they all flower at the same time. For the home garden, unless a tree is designated as self-fertile, two trees (each one from a different group) must be planted, or no fruit will be set. In our area sweet cherry varieties flower roughly at the same time and there is sufficient bloom overlap to ensure effective cross pollination among different compatible varieties. The average bloom date at Geneva is May 8.

To ensure effective cross pollination in commercial plantings, the use of at least three varieties is recommended. For placement of the main variety and the pollenizers, solid blocks are easiest for both cultural and harvesting operations, but this arrangement rarely ensures maximum cross pollination. Single variety rows are preferable from the management point of view. Four consecutive rows of any variety should not be planted as fruit set might be significantly reduced at the center of the single variety block. Plantings are therefore best restricted to not more than two to three rows of an individual variety, followed by at least one row of a compatible variety (the pollen source), with the main variety (or another compatible variety) repeated in the next rows. Another planting pattern that can be used is to plant every third tree in

Table 1. Pollen Compatibility Groups and Sterility Genes for Sweet Cherry Varieties (6,9)

I	(S1S2)	Black Tartarian, Early Rivers, Coe
II	(S1S3)	Van, Venus, Windsor, Jubilee, Schrecken
III	(S3S4)	Bing, Emperor Francis, Lambert, Vernon, Napoleon, NY 6476
IV	(S2S3)	Velvet, Victor, Viva, Vogue
VI	(S3S6)	Gold, NY 3308, Governor Wood
VII	(S4S5)	Hedelfingen, Black Republican
VIII	(S2S5)	Schmidt
IX	(S1S4)	Hudson, Chinook, Rainier, Viscount
XIII	(S2S4)	Ulster, Vic
XIV	(S S)	Valera
O*		Seneca, Vega, Vista (* Universal donors-Cross compatible)
Self fruitful		Stella, Lapins, Sunburst, Starkrimson

every third row to a pollenizer. This arrangement is effective because every tree is adjacent to a pollenizer in a diagonal planting. There would be one pollenizer for every nine trees of the primary variety. This plan provides the minimum number of pollenizers that can be used. There is also a plan that calls for a staggered arrangement of every other four trees in two rows.

While most tart cherry varieties are self fertile and do not require pollenizer cultivars, when testing new selections it would be best to plant another variety to ensure effective pollination.

One strong colony of bees per acre of mature trees is the minimum recommended for orchard pollination. Up to four colonies of bees per acre have been used with good effect. Hives should be moved into the orchard after the first blossoms have opened to reduce the possibility of bees being attracted to other flowers in the locality.

TART (SOOR) CHERRIES

Otherwise known as pie cherries, tart cherries are primarily used for pie fillings and toppings. For tart cherry production, 'Montmorency' accounts for 96 percent of the total trees with the remaining 4 percent being grouped in the category "morello" or tart cherries with colored juice. In New York State there are 347 growers with 99 percent of the tart cherries being grown in western New York. Commercially, the trees are mechanically harvested. Tart cherries may fruit the second year after being planted. Early production is not desirable because it may stunt the tree. Gibberelin sprays may be used to remove the fruit the first few years in the orchard.

Amarelle varieties (Clear juiced tart cherries)

'Montmorency'—July 21 ripening date. The standard of the tart cherry industry. Productive, but the flower buds are susceptible to late spring frosts.

'Meteor'—Introduced by the University of Minnesota in 1952. July 29 ripening date. Medium sized, semi-firm, good quality fruit. Trees are medium sized, with a spur type growth habit. 'Meteor' is very productive, self- fruitful, hardy, and it may have some resistance to leaf spot. The football shaped pit has prevented 'Meteor' from being commercially accepted because the pit can shatter during processing, but for home use this would not be a problem.

Morello Varieties (dark red juice)

'Northstar'—July 26 ripening date. Introduced by the University of Minnesota in 1950. A dark juiced cherry with mahogany red fruit, medium in size. Trees are small, self-fruitful, and very hardy. 'Northstar' may have some resistance to leaf spot. For best fruit quality, the fruit should be left on the tree until a deep color develops. The longer the harvest is delayed, the more

sugars accumulate. This is a good tree for the home owner because of the small tree size that facilitates netting.

'Schattenmorelle'—July 30 ripening date. Extensively grown in Europe. Fruit and tree larger than 'English Morello'.

'**English Morello**'—July 25 ripening date. Dark colored juice. Excellent for pies. Very old tart cherry variety. Medium sized fruit, dark, reddish black, semi-firm. Trees are very spreading, but productive and hardy. Special market potential for juice or dyes for cosmetics.

New York Tart Cherry Selections

The breeding program at Geneva was initiated in 1955 by Dr. Way. Greater winter hardiness, extension of the season and enhanced fruit quality are some of the objectives of the program. Improved morello types (with naturally red flesh and juice) were emphasized. The external fruit color of many of our selections is very similar to 'Montmorency'.

NY 13272—Average ripening date of July 14 at Geneva. It is an attractive red color with pink juice. Fruit size is large, and soluble solids are high. There is a good balance of sugar/acid. NY 13272 may not be self-fertile so it is recommended that it be planted next to 'Montmorency'. It is cross compatible with 'Montmorency'. It processes well, both frozen and canned. Soluble solids have averaged 2 degrees higher Brix than 'Montmorency'.

NY 11812—'Meteor' seedling. Outstanding for its fruit size, which is double the size of 'Montmorency' fruit (8 grams versus 4.5). High soluble solids (15-18%). Attractive, bright red fruit. Possible potential for the fresh market or pick-your-own operations.

Determining optimum harvest date for tart cherries

For hand or machine harvest, any fruit that leaves the pit attached to the stem when it is pulled is not ready for harvest. Fruit removal force should be below 300 grams for efficient mechanical harvesting.

DUKE CHERRY (*Prunus gondouini*)

These cherries are a result of hybridization between sweet (*Prunus avium*) and tart cherries (*Prunus cerasus*). They are intermediate in many tree and fruit characteristics. 'Krassa Severa', 'Royal Duke', and 'May Duke' are some of the commer-

cially available duke cherries. Consumers would probably be better off choosing either sweet or tart cherries to suite their particular needs.

The Nanking or Hansen Bush Cherry (*Prunus tomentosa Thunb*)—is adapted to areas too cold and arid for sweet or sour cherries. It is used as a windbreak and hedge in the Great Plains. Its principal use is as an ornamental shrub. Descriptions that emphasize its value for fresh fruit for the home gardener are exaggerated.

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