for the Gardener

Center for Agroecology & Sustainable Food Systems, UC Santa Cruz

Choosing and Growing Stone Fruits

Prunus is a large, diverse genus in the Rosaceae family, commonly referred to as stone fruits. Principal commercial crops in this genus include peaches, nectarines, plums, prunes, pluots, apriums, apricots, cherries and almonds –

Prunus persica	Peach
Prunus persica var. *nectarina*	Nectarine
Prunus domestica	European or Prune Plum
Prunus salicina	Japanese Plum
Prunus insititia	Damons Plums
Prunus italica	Green Gage Plums
Prunus avium	Cherry (sweet)
Prunus cerasus	Sour Cherry
Prunus armeniaca	Apricot
Prunus amygdalus	Almond
Prunus salicina x *armeniaca*	Pluot and Aprium

The name stone fruit refers to the stone-like pit encasing the seed. It is the soft, flavorful, juicy, aromatic (at full ripeness), mouthwatering combination of sugars and acids in fleeting succession that intrigues us as gardeners. The true "raison d'etre" for these swollen ovary walls is merely to attract animals to eat them and disperse the seed to perpetuate the species. After much field testing and reflection, I would say of this evolutionary strategy — Well done, well done indeed!

The stone fruits are nonclimacteric fruits. *Climacteric* derives from the Greek root meaning "critical point," or literally, "rung of a ladder." It is therefore a major turning point or critical stage — in this case, pre-senescence or death. Climacteric fruits such as apples and pears, bananas, kiwis, and avocados can be picked mature but green, held under refrigeration, and will ripen and color on their own, or with the introduction of ethylene gas. These fruits store their sugars in the form of starches that are converted back to sugars by enzymes and by warm (65°–75° F) temperatures off the tree.

Nonclimacteric stone fruits don't produce or respond to ethylene gas. They ripen gradually, and don't store sugar as starch, but instead depend on their continued connection—via the conductive vascular tissue of the stem—to the parent (i.e., the tree) for continued sweetening. They get no sweeter off the tree, though enzymes may promote their softening. Thus the quality of the fruit is dependent on the ripening that takes place on the tree. In fact, cold storage (< 50°F) retards natural pectin breakdown, causing stone fruits to become dry and mealy.

PEACHES AND NECTARINES

Prunus persica* and *Prunus persica* variety *nectarina

Peaches and nectarines hail from northwestern China (Xian—also home to the exquisite garlic variety of the same name). The specific name *persica* is a misnomer, probably attributed to its spread via trade caravans from China into Iraq and Iran and eventually to Europe. The fruit came to the Americas (Mexico and Florida) with the Spanish explorers in the 16th century on their conquering expeditions. It was then spread across the U.S. by Native Americans. The nectarine is genetically identical to the peach but with a recessive gene for pubescence (or as on-the-ground gardeners say, it lacks the fuzz gene). The nectarine is as old as the peach, with records of cultivation dating back to 2,000 BC. It is either a chance seedling or a whole tree mutation (bud sport).

Commercially, peaches and nectarines are grown at latitudes between 25°–45° North and South of the equator. Major peach growing regions include Chile, China, Northern Italy, Spain, Turkey, California, Southeastern U.S., New York, Pennsylvania, and Michigan. They can be grown closer to the equator than any other species of temperate zone deciduous fruits because of their tolerance for heat and humidity, and their low chill requirements for breaking dormancy.

The peach, often referred to in old pomology texts as the "Queen of Fruits," ranks only behind the apple in worldwide production and economic worth. Their sweet flavor, aroma, and nectar set the bar very high (along with apricots) for sun-warmed tree-ripe perfection that evokes the essence of summer.

Peaches are the shortest-lived of all deciduous fruit trees, with an average life expectancy of only 20–40 years (apples and pears live > 80–100 years). Because the genetics of the peach are much less variable than any other fruit, the trees of almost every seedling bear edible fruit. There are also more cultivars (varieties) of peaches than any other fruit owing to the ease of obtaining quality seedlings from peach crosses.

Peaches and nectarines can be grouped into two basic flesh types—clingstone and freestone. Clingstones exhibit a firm-textured flesh that cannot be pulled off the stone (pit) and must be cut away with a knife. Because they hold their shape when cut or sliced, they are the logical candidates for canning, drying, or being used fresh, halved, or sliced. Freestones are softer-fleshed varieties with higher juice content, and separate easily from the pit. They lend themselves to fresh eating.

Additionally, peach tastes can be linked to flesh color and "old school" vs. "new school" varieties. Old school varieties don't color evenly or have as bright a sheen to their skin. They have a more balanced sugar/acid ratio contributing to a fuller old-timey peach flavor. They have a very limited shelf life, must be tree ripened to have full flavor, and bruise easily, giving rise to that old farmers' market adage, "Real peaches don't stack."

These "old school" varieties include Suncrest, Elberta, Babcock, J.H. Hale, Red Haven, Le Grand, Rio Oso, Sun Grand, and Baby Crawford (see varietal descriptions, page 18). Because they are more difficult to grow they're considered all but obsolete in today's produce world. And because the fruit deteriorates rapidly (becomes mealy) in cold storage, the older varieties are a mere remembrance fading in the rear view mirror—a tribute to a time when there was a fierce loyalty to varietal brand names.

New school peach and nectarine varieties are all sugar and sweetness with very little acid. They have a rich pink/red hue to their skin, are firm fleshed, larger on average than the old varieties, and continue to ripen off the tree under refrigeration. They have a sublime, delicate flavor that is less peachy and more sugary. New school varieties include Arctic Supreme, Arctic Glo, White Lady, Sugar Lady, Snow Giant, and Arctic Jay (see page 5).

In general (old school or new school), white-fleshed varieties are sweeter than the more sugar/acid balanced, aromatic, yellow-fleshed varieties.

A separate category of peaches, including Peento, Donut, Saturn or Bagel peaches (see page 18), are synonyms for the smallest, sweetest, melting-fleshed peaches native to China. They are flat, small (2-3" across, 1" thick), and shaped like their name implies. They have a very short season and bruise more easily than any other type of peach.

Cultivation and Growing Tips

The peach is a vigorous (5–8 feet of extension growth) upright grower in the early years after planting. As it matures the tree's habit morphs to a more naturally spreading form with moderate to weak vigor. Peach leaves cast dense shade, so it is important to train trees to allow sunlight to penetrate into the center of the tree. Remember, sunlight translates to color and emphatically to high sugar content.

The largest, best-quality peaches are produced on lateral one-year-old branches that hang on young, actively growing main scaffold branches (3–5 years old). With peaches, what you grew last year is what you're eating this year. That is to say that a lateral branch will grow one year and simultaneously produce and express fruit buds. In year two these branches bear fruit. They should be shortened to 12–18 inches long and fruit should be thinned to 6–8 inches apart. Because peach fruit buds contain only a solitary flower, they set a single fruit and unlike apples don't need cluster thinning.

Proper thinning equals proper size and is especially critical on small-fruited varieties like Saturn types, Baby Crawford, and all nectarines (which tend to be smaller than peaches). In the third year, the lateral shoot will die out (or start to) and not bear any fruit. Or it will grow new wood that bears the following year, but is too far away from the main branch for either good mechanical support or continued flow of nutrients for size and taste.

In any given winter pruning session, approximately one-half the laterals should be stubbed to 1–3 buds or 1–3 inches to renew growth and bear the following year. Similarly, after laterals have fruited they should be stubbed back to renew the cycle. Since new growth is prioritized on peaches and nectarines, primary branches are pruned hard annually in the winter to encourage good extension growth and the induction of laterals. As a result, it is not unusual to prune 40–60% of the previous year's total growth off a peach or nectarine (in contrast, pome fruits are pruned by 20–25% annually). Additionally the primary scaffold branches on an (open center) peach are completely renewed by stubbing them to their base every 5–7 years. This re-scaffolding is best achieved incrementally over a 3–5 year period. More markedly than with pome fruits, peaches slow down and lose vegetative vigor with age.

Almost all peach/nectarine varieties are self fruitful, that is they accept pollen from their own flowers and do not need pollen from another variety to set fruit. Notable exceptions are Elberta types and Hale cultivars.

Peach leaf curl (*Taphrina deformans*) is a leaf fungus that afflicts almost all peach and nectarine varieties in almost all growing regions. It is especially devastating in cool, coastal climates where trees can be completely defoliated in June during a bad year. Peach leaf curl infects the leaves and young shoots. It causes distorted, reddened, puckererd foliage and when severe can radically reduce annual production and deinvigorate the tree over the long term.

As with most pest and disease populations, the aim in controlling peach leaf curl is to aggressively prevent high spore pressure. It is difficult to work backward from high pressure to good control organically. The prescription for peach leaf curl is three annual sprays with copper or sulfur products. An easy-to-remember schedule aligns with three big American holidays: Thanksgiving (leaf drop), Christmas (full dormancy) and of course the Super Bowl (Feb. 1 – bud swell). Resistant peach varieties (and they are effectively resistant) include Frost, Avalon Pride, Mary Jane, and Q1-8. Extremely susceptible but great tasting varieties include Babcock, Elberta, and the Saturn types.

Rootstocks

Compared to pome fruits, rootstock options are more limited with stone fruits. There are no truly dwarf (size controlling) stocks—the only choices are full-size and semi-dwarf. The principle attributes imparted to fruit trees via rootstocks are size control, disease/pest resistance, and fruiting efficiency.

Size Control – Full-size or standard stocks produce vigorous vegetative growth (especially in the early years). Trees on

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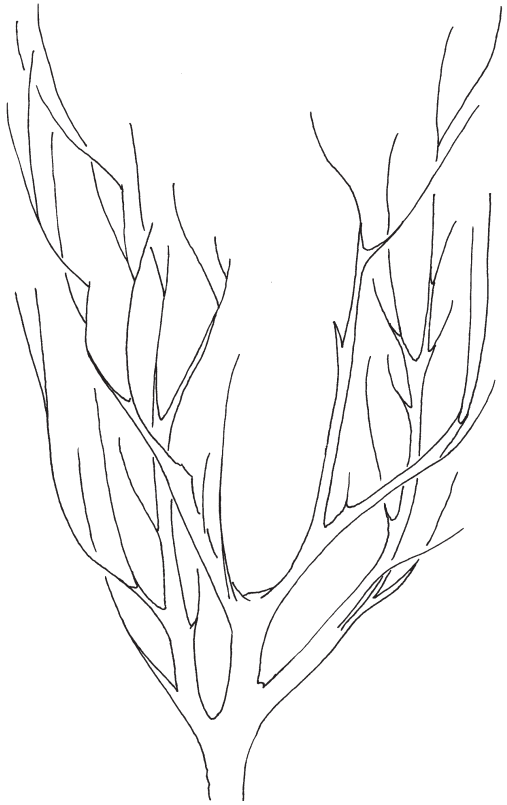


Open center tree form for stone fruit

these stocks will top out at 20–30 feet tall. Semi-dwarfing stocks reduce tree size (15–20 feet).

Pest, Disease Resistance – The main issue with stone fruits is root susceptibility to nematodes (*Pratylenchus* spp.), which are multicellular, microscopic non-segmented roundworms. Nematodes sap tree roots of nutrients, reduce vigor, and lower fruit productivity. The rootstocks Nemaguard and Nemared impart resistance, especially with peaches and nectarines.

Fruiting Efficiency – Although not as dramatic as with pome fruits, stone fruit dwarfing rootstocks promote greater fruit production per area of tree canopy. The mechanisms for this are not fully understood, but the result is demonstrable.

PLUMS/PRUNES

While nearly all the land masses of the northern temperate zones (25°–45° N Latitude) have native species of plums, the cultivated plums can be divided into four species –

European or Domestica Plums – *Prunus domestica*

These are the plums of choice throughout Europe, more widely planted than apples and pears. In the Slavic countries Domestica plums exceed 50% of all acreage planted to fruit trees. There is evidence of Domestica plums being grown in Europe prior to 2,000 years ago.

Commonly dubbed prune plums in the U.S., European plums offer a more diverse spectrum of colors, shapes, sizes, tastes, and uses than any other fruit. The fruit is small and oval-oblong—almost egg shaped. Skin colors are in the blue-purple range for prune types to yellow, orange, and red for dessert types. They thrive in areas with moderate summers (75°–100°F), low humidity and moderate winter chill. Major production areas worldwide include Western U.S., New York state, Italy, Chile, Turkey, Romania, Yugoslavia, France, Austria, and Germany.

The trees of European plums are upright and vigorous when young (much like the peach) and develop a pendant-weeping form and weak vigor when established. At 50–80 years they are fairly long-lived. The fruit buds are the longest lived of the stone fruits (5–8 years), so minimal renewal pruning is necessary. They tend to be a shorter tree than Japanese plums (10–15 feet). European plums also have a higher chill requirement to bloom and set fruit (500-900 hours) and bloom later than their *P. salicina* counterparts, and in some years avoid the pollination problems caused by erratic spring weather and rain. They are self unfruitful and thus need pollen from another variety to set fruit. The varieties Santa Rosa and Wickson are universal pollinators.

European plums are smaller and firm textured, with less juice than Japanese plums. They are also free stone. Because of their high sugar content they dry readily as prune plums. Fresh off the tree, European plums are a high quality dessert fruit and because of their low juice content and freestone nature, are excellent candidates for cooking in tarts and other recipes.

Greengage plums – *Prunus italica*

This species, known as the gage plums, originated in Turkey and was brought to Mediterranean Europe by the Romans. They all but disappeared (as did much of intellectual and artistic value) during the Dark Ages of Medieval Europe and were rediscovered in France in the 1700s. Sir William Gage introduced the gages to England in the 1720s and subsequently both lost the varietal labels and (not so modestly) named them after himself. The trees are weak to moderate in vigor and extremely narrow and upright. At their tree-ripe perfection in late July and August, the gages feature a green, yellow, or golden skin and a sugary sweet taste with slight tangy undertones that is arguably the most intensely rich-tasting fruit on the planet. True green gage plums are hard to find but worth the search.

Damson plums – *Prunus insititia*

In the U.S. this species is largely associated with the Damson plums, small spreading trees with small, oval, blue-skinned fruits and amber flesh. While some texts describe the taste as acid spicy/tart, the reality of it is they are wickedly phenolic and acrid fresh. However when made into jam or preserves they sweeten measurably. Their high pectin content gives the jams a creamy, spreadable texture. These trees need little pruning and no thinning.

Japanese plums – *Prunus salicina*

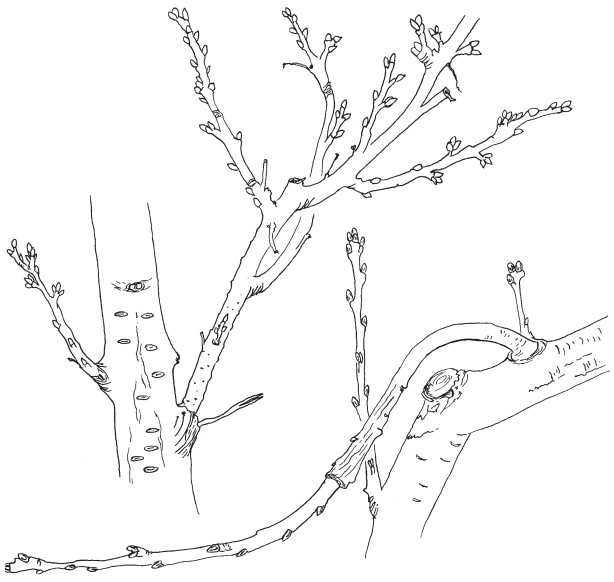
This species originated in China 2,000 years ago, was introduced to Japan in the 1600s, and subsequently brought to the U.S. by horticulturists John Kelsey and Luther Burbank.

Burbank used this stock to breed the Satsuma, the Santa Rosa plum, and countless other varieties that founded the California plum industry. The fruit is large and heart-shaped to conical. The skin color can range from golden yellow, orange-red, or blood red to purple and black. Flesh color usually reflects a variation on the skin color. The taste is slightly acid over sweet. They are best eaten fresh. The flesh is juicy and unlike European plums they are not freestone, two notable exceptions being Satsuma and its improvement, Mariposa. These two varieties also feature less acidity and thus can be dried, a la prune plums.

Japanese plums bloom abundantly early in the season (late January through early March), and thus fruit earlier than European plums (late June through early August). They generally produce heavy crops; if even 1–2% of the blooms set fruit, thinning is required. They tolerate milder winters, that is to say they bloom and set fruit with less chill hours than European plums. The trees tend to be vigorous, rambunctious growers, often exceeding 10 feet a year on standard rootstocks. They are very upright growers with the exception of the Satsuma and Mariposa varieties, which again exhibit a prune plum-like growth habit. Their pollination needs are similar to European plums.

Cultivation and Growing Tips

Domestica plums should be pruned hard to stimulate continued vegetative growth throughout their life. As with peaches, when a plum branch (especially prune plums) goes flat it weakens and produces smaller and smaller fruit. Prune to an inward or upward facing bud to redirect flat growth upward.



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Plum fruit wood (laterals): left, short, brushy twigs; right, long shoots

Japanese plums should rarely be stimulated via heading cuts once established. Heading causes multiple (3–5) narrow-angled (mechanically weak), excessively vigorous regrowth. Pruning at maturation devolves to the occasional thinning cut and the renewal of the brushy lateral fruit-bearing growth. Japanese flower buds have a cluster of 3–5 blossoms that live for 3–5 years. In any given pruning session 20% (1 in 5) of these laterals should be stubbed back to 1–3 buds and regrown. They will fruit in the second year after renewal.

Thinning for Japanese and European plums should be one to a cluster every 4–6 inches. Oversetting results in a nutrient sink that inhibits bloom and fruiting the next year (alternate bearing). As with peaches they can and probably should be rescaffolded periodically (every 8–10 years).

The principal disease of plums (and all stone fruits) is brown rot, *Monilinia laxa* and *M. fructicola*. Airborne spores spread under warm (72°–82°F), humid and wet conditions. The parts of the tree affected by brown rot are –

Bloom—pollen abortion, browning, and withering

Twig—die back

Fruit—pre- and post-harvest, brown blotches, followed by buff gray-colored spores on the fruit surface, causing the fruit to soften and rot

Spores overwinter in the orchard on rotted fruit remaining on the tree ("mummies") and on fallen leaves on the ground. Good orchard hygiene and annual dormant sprays of either copper or sulfur products are essential and highly effective. Like peaches, plums are non-climacteric fruits and do not respond optimally under refrigeration.

VARIETAL DESCRIPTIONS

Peach Varieties

Older ("old school") peach varieties need to be carried to full maturation on the tree. They are ripe when the background color has no tinge of green and is expressing full yellow or white coloring. The foreground color of red and/or golden yellow may be more a function of varietal characteristics than ripeness. Tree-ripe peaches that have achieved full sweetness should be extremely, sublimely aromatic and yield slightly to the touch. Varieties of note (in order of ripening) –

Babcock and Giant Babcock—Medium and large fruit, skin mostly red. White flesh, sweet, juicy. Consistently heavy yields.

Avalon Pride—High flavor, yellow flesh, semi-freestone. Extremely resistant to peach-leaf curl.

Red Haven and Early Red Haven—The standard for assessing all early season varieties. Firm yellow flesh, pleasing smooth texture, red/golden skin. Good fresh eating and canning.

Saturn and Sweet Bagel—Shaped like a doughnut, melting sugary flesh, small fruit. Not particularly

resistant to plain leaf curl. Sweet Bagel fruit is bigger and yellow fleshed.

Loring—Large yellow fruit with a striking red blush. High flavor, good eating quality, also for canning.

Suncrest—The classic California peach as lauded in ***Epitaph for a Peach***, by David Masumoto. Large, round fruit, highly aromatic, flavorful balance between acid and sugar—"old timey" flavor. Skin is 2/3 red, 1/3 yellow, colors unevenly, bruises easily.

Elberta, Fay Elberta, Late Elberta—Firm yellow fruit with golden hue and red blush. Sweet and holds reasonably well off the tree.

Rio Oso Gem—Heavy bearer of large, firm freestone fruit. Red skin, great taste, late maturation. Small tree. One of the best tasting varieties ever.

"New school" peach varieties all equal or surpass the superlatives good, better, best. These varieties break almost all the rules—they ripen before background color comes up, can be picked firm and will have high sugar content, and can be refrigerated and shipped long distances.

Arctic Supreme—White flesh, low fuzz, light sweet flavor even when firm. Red over creamy white skin, freestone.

Starfire Freestone—Staggered ripening over 2–3 weeks. Rich flavor, yellow flesh. Good in cool summer areas.

White Lady—Low acid, high sugar, melting flesh (white). Medium to large red-skinned, firm flesh, freestone.

European or Prune Plum Varieties

Italian Prune—Large, purple, heavy setting prune plum with a sweet freestone fruit with yellow-green flesh. Ripens in August.

Schoolhouse—Large oval yellow prune plum, ripens in mid August. A found seedling from Port Townsend, Washington.

Seneca—Large, sweet, red-skinned fruit with yellow flesh. An upright vigorous tree. Ripens in September.

Early Laxton—Pink-orange oblong freestone plum with yellow, firm flesh. Great for cooking. Introduced in England in 1916.

Kirke's Blue—Large, round, dark-blue freestone fruit. Juicy yellow flesh with high flavor. Introduced in London in 1930.

Valor—Similar to Italian prune but with much larger fruit. Fruit has purple skin, yellow flesh, and is sweet with great flavor.

Coe's Golden Drop—Oblong-shaped, golden-green fruit with golden flesh. Sweet and flavorful with an almost apricot-like taste. Ripens in October.

Japanese Plum Varieties

*Santa Rosa—Fruity bouquet aroma (on the tree!). Complex set of flavors — tart near skin, sweet with an intense almost overpowering scent/perfume in the center and slightly tart again at the pit. Early season ripener (late June–July). Rapidly fading as California's leading cultivar—40% of crop in 1960s, 4% now. Has been lamentably superceded by firm (almost rubbery) black-skinned varieties more suited to the racquet ball or squash court.

*Satsuma and Mariposa (an improved Satsuma)—Late season ripener (August) with meaty, firm flesh. Blood red, low juice content, almost freestone. One of the only Japanese types that can be halved and dried. Moderate vigor tree. Small pit.

**Both varieties bred by Luther Burbank.*

Laroda—Dark purple-skinned fruit with rich, juicy flavor and a red-amber flesh. Extended harvest, lasting 5-6 weeks after Santa Rosa plums.

Shiro—Mid-size, yellow fruit with a sweet, mild flavor. Harvest from late June – early July. Self fruitful.

Beauty—Beauty is better adapted and more productive in cool, wet, rainy springs than Santa Rosa. The flesh is red streaked and the skin red over yellow. Sweet and full of flavor.

Catalina—Large, black-skinned fruit with sweet, firm flesh that is a treat when eaten out of hand. Harvest from late July – early August.

Elephant Heart—Old-time favorite with a big, heart-shaped fruit. The sweet, rich flesh is firm textured and dark red in color. Harvest in September.

Hiromi Red—Relatively new variety bred by Floyd Zaiger. Purple red skin and flesh, sweet juicy flavor.

Emerald Beauty—Intensely sweet, strikingly green-yellow flesh, freestone. Ripens from late August through late September, fruit hangs and sweetens on the tree. Crisp and crunchy too.

– Orin Martin

References

Good Fruit Grower Magazine, 105 South 18th Street, Suite 217, Yakima, WA 98901. 800.487-9946. www. goodfruit.com

Masumoto, David Mas. Epitaph for a Peach: Four Seasons on My Family Farm. San Francisco: Harper Collins, 1995.

The ATTRA web site, www.attra.ncat.org, lists a number of organic growing guides for specific fruit crops. A current publications list is also available by calling 800.346-9140.

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