

Understanding Mandarins

by Roger Smith

Mandarins can be a confusing group of citrus because there are so many different varieties. They have names like Tangerines, Tangelos, Tangors, Satsumas, and Clementines. Breeding of the group has been extensive and following the many crosses and back crosses can be mind numbing. To keep “the big picture” in mind requires a simple plan to organize this diverse group.

The name Tangerine will be ignored since it's a marketing name and creates confusion. In addition, the botanical classifications like Tangor or Tangelo will be dropped as a means to classify the varieties since most of these look like Mandarins. This leads to the following practical definition of a mandarin, “any citrus that is bigger than a kumquat and smaller than an orange is a Mandarin.” To make this large group of varieties easier to discuss, they will be broken down into four smaller groups that make sense from a marketing and a horticultural perspective:

- **Satsumas Mandarins**
- **Clementines Mandarins**
- **Other Seedless Mandarins**
- **Other Mandarins**

SATSUMA MANDARINS (SATS)

OVERVIEW: Sats prefer colder winters and the tree can handle temperatures below freezing rather well. They are parthenocarpic like navel oranges and rarely have seeds. Bearing habit is fairly consistent but trees are smaller and slower growing than orange trees. The Satsuma originated in Japan and is called Unshiu. Generally, the best quality fruit comes from poor quality soils and older trees. The Japanese regard fruit from trees that are less than 10 years old as inferior which explains why there's a lot of variation in California Satsuma fruit quality which is due to young and old trees producing the state's crop. There are two ‘types’

of Satsuma, the ‘Wase type’ and the ‘Owari type.’ Most of the commercial cultivars of Satsuma have been developed in Japan and only 3 have any significant production in California: Owari, Dobashi Beni, and Okitsu Wase.

The Owari is a ‘type’ of Satsuma but is also the most common cultivar in California. It is the preferred Satsuma by packinghouses and has been in production since the 1960's. The Dobashi Beni is similar to Owari, but has a redder rind and was introduced in the late 1980's. The color difference has become a problem for packers since they don't like to mix the lighter colored Owaris with the less prevalent Dobashis. Okitsu Wase is different than Owari and is larger and earlier. It is a major cultivar in Japan, but has had mixed success in California due to its poor flavor when compared with Owari. It's much earlier and is the first citrus of the season that is harvested. Satsumas from China, Korea, and Japan, compete with California Sats, especially in Canada, and nearly all California production is currently sold west of the Rocky Mountains. The Spanish Clementines have displaced Sats in the eastern U.S.

COMMENTS:

- Additional acreage of Owari, Dobashi Beni, and Okitsu Wase is not suggested.
- There is a market for a superior cultivar that either harvests earlier than Okitsu Wase or eats better. Miho Wase has been released, but there is no indication as yet that it will be superior.
- There is a small need for a later holding cultivar that will help carry Satsumas to Chinese New Year. The new variety Kawano Wase has shown the ability to hold into August in New Zealand (same as February in CA), but has been untested in this capacity in California. Aoshima Wase is another candidate.

Available Satsuma Cultivars in California

Owari (EM)	Okitsu Wase (VE)	Miro Wase (VE)
Dobashi Beni (EM)	Kawano Wase (M)	Kuro Wase (M)
Silverhill (M)	Aoshima Wase (M)	
Armstrong (M)		
VE very early E early EM early to mid season M mid season		

CLEMENTINE MANDARINS

OVERVIEW: The most important group of mandarin cultivars in the world, the Clementine is becoming an important fruit for California. The fruit is a red-orange with pronounced oil glands that makes it slightly pebbly in appearance. Generally they have rich flavor, tender flesh, peel easily, and are seedless when isolated from other seeded citrus. Most of the new



Fina Sodea

varieties in California have their origin in Spain or Morocco. Spain has more than 200,000 acres of Clementines planted and their fruit hits U.S. markets from November to January. The fruit is often sold in 5 pound cartons or open, stackable cartons. They have successfully displaced Satsumas in many markets and have reduced demand for oranges when available in sufficient quantities to supply the Supermarkets.

They are much more difficult to farm than Satsumas. They require annual pruning, auxin treatments, and even girdling to insure crop set. Excess set causes small fruit size and limb breakage and alternate bearing is a constant worry. Even in isolation, fruit will often have seeds for the first few crops. Harvest periods are rather short and fruit will granulate if harvest is delayed too long. Their rind is tougher than Satsumas, but they require special handling when compared with equipment designed to pack oranges. It is estimated that annual production costs in California could be as high as \$2,000.00 per acre.

The main varieties currently planted in California are Clemenules, Fina Sodea, Marisol, Sidi Aissa, and Caffin. Clemenules is the most important Clementine in the world and accounts for 65% of Spain's production and has also been planted in South Africa, Argentina, Uruguay and Chile. Its performance in California is hard to evaluate since the commercial acreage is only 3-4 years old, but around the world the fruit is of higher quality than all other Clementines. It has a longer harvest period because it has a protracted bloom that spawns fruit of different levels of maturity that leads to multiple picks. Marisol and Caffin are early varieties of poor quality when compared to Clemenules, but can hit the markets first. Fina Sodea was released in California prior to Clemenules, but struggles with crop set and fruit size and is no longer planted. Existing Fina



Dobashi Beni

Sodea trees have been the primary supply of California Clementines and are often harvested in the first weeks of December.

COMMENTS:

- Caution is advised. Many Clementine cultivars haven't been adequately tested in California conditions. Cultural practices are still in the experimental stages.
- There have been some very large plantings in Kern County and the future impact of this production is unknown.
- To be seedless, Clementines can't be planted near seeded citrus such as Afourers(W. Murcotts), Minneolas, Pummelos.
- The time of harvest coincides with Spanish Clementines, California navels, and Satsumas from China, Japan, and Korea.
- Consumer acceptance is good and since they are easy to eat, there is a possibility of high consumption rates per capita.
- Spanish Clementines have introduced the variety in U.S. markets, so demand has been already created. The question remains whether California fruit can compete.
- The Pacific Rim markets are prime opportunities if California Clementines are of high quality and can handle the boat ride.
- Until more information is available, Clemenules is the variety to plant. Clementine Nour may have potential due to its ability to hold up in cold storage.
- Marisol, Monreal, Caffin, and Algerian are not recommended.

AVAILABLE CULTIVARS IN CALIFORNIA

Monreal (E)	Good (EM)	Fira Sodea (M)
Caffin (VE)	Clemenules (EM)	Algerian (E)
Sol Asa (EM)	Fira (E)	Corsica #1 (E)
Marisol (VE)	Nur (M)	
VE: very early E: early M: midseason ML: mid to late L: late season		

OTHER SEEDLESS MANDARINS

OVERVIEW: A world-wide effort has been made to develop seedless mandarins that either compliment or are superior to Clementines and Satsumas. It takes decades to develop new varieties, but some releases in recent years show some promise. The most notable releases in California have been the Pixie, Gold Nugget, Shasta Gold, Tahoe Gold, Yosemite Gold, the Mor, and the Or. Most of these are too new to have any commercial reputation. The Mor and the Or are currently exclusive to Fruit World in the Reedley area.

As well as the releases from breeding programs, the search for existing seedless selections has continued and has yielded the Afourer (W. Murcott). This outstanding variety came from Morocco and is seedless when planted in isolation. It has a similar color of the Clementine, but is smoother and flatter with a rich flavor. It does not granulate quickly and could have an extended harvest season from



Yosemite Gold

February to May. Alternate bearing is not a big problem, but small fruit size is an issue. The fruit does puff, similar to a Minneola, as it ages, which may be the greatest influence on harvest period. Frost damage to the fruit is a big concern since harvest will always be after California's frost season. More than 300,000 Afourer trees will be planted in California in 2003.

COMMENTS:

- Gold Nugget, Shasta Gold, Tahoe Gold, and Yosemite Gold are high-risk varieties.
- Shasta, Tahoe and Yosemite have great potential with large fruit size, but little is known regarding cultural practices and planting them is a gamble. With any gamble, there could be reward, but there is a downside as well.
- Gold Nugget is light colored and holds very well on the tree. Alternate bearing must be managed. It isn't clear where this variety would fit into the market.
- Massive plantings of Afourer are planned for 2003. It is not clear how much fruit the markets can handle, but the hope of a healthy export market and an extended harvest season has many producers confident in the future. Overproduction of Afourer is not as much of a concern as to what the Afourer's impact will be on California navel consumption.
- To insure seedless fruit, W. Murcott and Nova cannot be planted near Clementines.

AVAILABLE CULTIVARS IN CALIFORNIA

Pixie (M)	Gold Nugget (L)	W. Murcott (L)
Mor (ML)	Or (M)	Nova (M)
Shasta Gold (TDE) (L)	Tahoe Gold (TDE) (M)	
Yosemite Gold (TDE) (L)	Seedless Kishu (novelty variety) (E)	
VE: very early E: early M: midseason ML: mid to late L: late season		

OTHER MANDARINS

OVERVIEW: This category of varieties has a vast array of characteristics. It includes new introductions into California and classic varieties that were of commercial value before seedless fruit became the standard of quality. No effort will be made to describe each cultivar that is available in California. Further information can be found at www.ccpp.ucr.edu or by purchasing "Citrus Varieties of the World" by James Saunt.

A few varieties in this group are of commercial importance in California. The Minneola Tangelo has achieved a market niche

for many years. Its necked shape, red-orange color, distinctive flavor, and nearly seedless fruit have made it a popular addition to supermarkets from January to April. The Fairchild 'Tangerine' and Temple 'Tangor' are fading in commercial importance, but are still important for the Coachella Valley. Murcott 'Tangors' from Florida also appear in California's supermarkets with the trade name 'Honey' Mandarin and often appear along with Florida's Sunburst 'Tangerines.' Although released in California, these selections are not of value outside of a tropical climate. One of the best tasting varieties with a low seed count is the Page Mandarin or Page 'Orange.' Its small fruit size and tightly adhering rind diminishes its commercial appeal, but it tastes great!

Of significant importance is the fact that these varieties will cause seediness in Clementine and Afourer (W. Murcott) plantings, so it's not advisable to plant them close to these mandarin developments. Isolated locations that are devoid of citrus or properties surrounded by seedless citrus such as Navels or Satsumas would be the best location for these specialized cultivars.

AVAILABLE CULTIVARS IN CALIFORNIA

Falga (VE)	Viking (M)	Willowleaf (ML)
California Honey (M)	Page (M)	Ercole (L)
Fairchild (E)	Lee (M)	Nova (M)
Fremont (E)	Porkan (M)	Sunburst (M)
Fortune (L)	Dany (M)	Robinson (VE)
Kirrow (L)	Michel (M)	Kara (L)
Orlando Tangelo (E)	Minneola Tangelo (ML)	Pearl Tangelo (E)
Valencia Tangelo (M)	Temple Tangor (M)	Clarique Tangor (L)
Selinda Tangor (M)	Dixie Tangor (?)	Kyoni Tangor (L)
Blendale Tangor (L)	Koster Tangor (ML)	
VE: very early E: early M: midseason ML: mid to late L: late season		



Honey Mandarin



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