

# 'TDE4' Mandarin Hybrid – Yosemite Gold<sup>®</sup> Mandarin

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Yosemite Gold<sup>®</sup> (patented by the University of California under the 'TDE4' name, PP 16,289) is a mid-late season (late-January to mid February) maturing mandarin hybrid that combines large fruit size, an attractive very deep orange rind color, rich fruit flavor and the virtual absence of seeds even in mixed plantings. No other mandarin currently available combines this set of characteristics. It may be successful in a marketing window that currently has few low-seeded cultivars. The pedigree of Yosemite Gold<sup>®</sup> is ('Temple' tangor x 4n 'Dancy' mandarin) x 'Encore' mandarin hybrid. The female parent was tetraploid. The variety is triploid and will be marketed under the trademarked name Yosemite Gold<sup>®</sup>.

**Fruit Characteristics:** Yosemite Gold<sup>®</sup> fruit are oblate (moderately flat) in shape (Figure 1), with little or no neck. The fruit base (stem end) is slightly concave while the apex (blossom end) is truncate with a slight depression and a small (2 mm, 1/8 in.), usually closed, styler scar. The average fruit size is large for a mandarin (classed as Mammoth by California state standards) with a mean width of 75mm (2.95 in.) and a height of 58 mm (2.30 in.), giving a height to width aspect ratio of 0.78, and a mean weight per fruit of 175 grams (6 oz.-heavy for the fruit size). Rind color is very deep orange for fruit harvested at Riverside, Ventura and the San Joaquin Valley in mid-February. The rind texture is somewhat variable, depending on tree age and crop. For older trees with a moderate to heavy crop, rind texture is smooth, with conspicuous oil glands. The rind of fruit from trees with very light crops is sometimes excessively rough or bumpy. The rind is quite easy to peel when fruit are mature, but can be more adherent early in the season. The fruit is moderately juicy averaging 42% juice content. Flesh is deep orange in color with a medium texture.

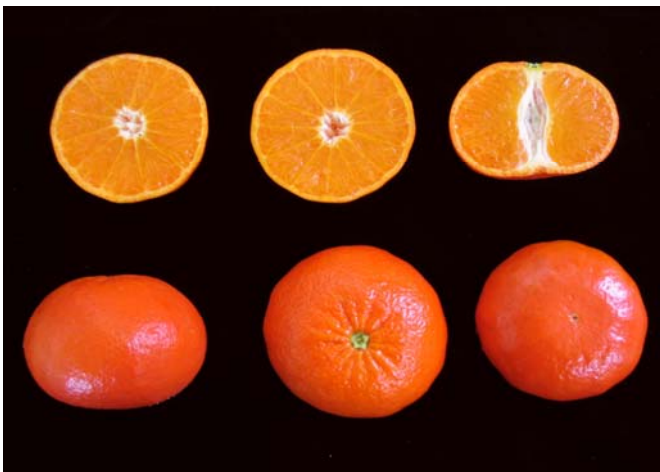


Figure 1: Fruit of Yosemite Gold<sup>®</sup> from Riverside



Figure 2: Yosemite Gold<sup>®</sup> tree on Carrizo at Riverside

**Tree Characteristics:** Tree shape (Figure 2) is approximately spheroid, rather similar to that of orange trees. Leaves are on the large size for a mandarin with leaf shape more orange than mandarin-like. Canopy density is good with many fruit born inside the canopy, which serves to limit sunburn and help maintain the very distinct rind color. Fruit exposed to excessive sun will lose significant color on the exposed surface. Overall trees are vigorous, more so than most mandarins. In comparison with most old-line citrus cultivars, trees of 'Yosemite Gold' are slightly thorny, with normal branches having short length (4 mm, 1/8-1/4 in.) thorns at about 13% of the nodes, with vigorous sprouts having short (4 mm) thorns at about 3% of nodes. Thorniness will probably decrease as the cultivar ages. To reduce thorniness, budwood should be selected from thornless, upper canopy branches.

**Rootstocks and Tree Performance:** Several different rootstocks were used in Yosemite Gold<sup>®</sup> evaluations including Carrizo citrange, C-35 citrange, Rich 16-6 trifoliolate, Cleopatra mandarin, and Schaub rough lemon. Overall trees performed well on all rootstocks with no indications of rootstock-scion incompatibility although trial trees are still relatively young. Tree vigor varies greatly by location. At the southern desert location (Coachella Valley) canopy volumes of 7-year-old trees averaged 23.0 m<sup>3</sup> (812 ft<sup>3</sup>). Trees in the desert locations have never produced fruit, perhaps contributing to greater vegetative growth. In contrast, at the cooler Santa Paula and Ojai (Ventura County) locations, 7-year-old trees averaged 4.3 and 5.6 m<sup>3</sup>. 7-year-old trees at Lindcove and Orange Cove (San Joaquin Valley) averaged 9.9 and 7.3 m<sup>3</sup>. Trees have performed best in locations with more moderate climates such as the coastal and inland valleys of southern California and the San Joaquin Valley with rootstocks affecting tree size at some locations. At Lindcove and Orange Cove, trees on Carrizo were the largest, followed by C-35, and then Cleo and trifoliolate which were similar. At Ojai, the largest trees were on C-35, followed by Schaub rough lemon and Carrizo. At CVARS, trees on Carrizo, C-35 and Cleo were similar in size. Tree spacing in field plantings will depend on vigor of the rootstock. For Carrizo citrange rootstocks, a recommended tree density would be 150 (15' x 20') to 200 (11'x20') trees per acre. Higher densities are possible but will require more frequent pruning or hedging. In comparison with Carrizo, C-35 rootstock reduces the final size of sweet orange trees, but does not appear to

have a similar effect on Yosemite Gold® trees. Care of young trees should be similar to that used for other mandarins or oranges. Flowering occurs from early April into May at all locations except the desert where it is earlier. The normal flowering overlaps with many mandarin varieties including Clementinas. It is not known whether Yosemite Gold® trees require cross-pollination for fruit set since all experimental trees were grown in mixed plantings. Therefore, we do not recommend establishing large plantings without provision for cross-pollination. Trees should be grown with pollinizer cultivars such as Minneola, Valencia orange, or other mandarins that produce viable pollen until the requirement for cross-pollination is better understood. Trees that were screened to exclude bees during flowering produced very few fruit for two consecutive years, but it is possible that Yosemite Gold® is self-fertile but requires pollination for fruit set. Pollen viability is low (about 8%), suggesting that Yosemite Gold® will have little effect on seediness of Clementines or other cultivars, but direct experimental evidence to confirm this is not yet available. Optimal pruning practices have not yet been developed, but in many locations trees will perform well with relatively little pruning. If fruit set is very heavy, then trees should be pruned to reduce the crop in order to reduce future alternate bearing. The trees have not been noted as particularly susceptible to any diseases and, based on a freeze in 1999, appear only slightly more cold-hardy than oranges of similar age.

**Yields:** Yield evaluations of Yosemite Gold® indicate that alternate bearing is common in this cultivar, similar to most mandarins, although at some sites tested the 'off' year crops were reasonably good. Using a rating scale ranging from 0 (no crop) to 5 (very heavy crop), a crop rating of 2.5 is considered to be commercially acceptable yield while a crop rating of 5 cannot be sustained over many years by most mandarins. Trees planted at Lindcove in 1994 showed ratings of 2.94, 1.88, 1.50, and 2.90 from 1998/99 to 2001/02 respectively. Crops at Ojai were fairly good, being 2-3.3 during the last three of the four years evaluated. At Santa Paula, crop ratings indicated moderate alternate bearing, with average values of 0.50, 2.60, 0.88, and 2.90 from 1998/99 to 2001/02 respectively. At Orange Cove, trees showed rather severe alternate bearing with crop ratings of 1.88, 4.00, 0.06, and 1.60. These trees were, however, more affected by the 1999 freeze than other trees in the trials. Mean yield across all rootstocks at Lindcove in 2000 and 2001 was 29 and 14 kg (64 and 31 lbs.) per tree, while at Orange Cove it was 66 and 0 kg (145 and 0 lbs.) per tree. Trees on Rich 16-6 trifoliolate (six-years-old) have consistently had the highest yields (70-90 kg in 'on' years, 154-198 lbs.) followed by C-35 (40-70 kg, 88-154 lbs.), Carrizo (40-60 kg, 88-132 lbs.) and lastly Cleo (40-58 kg, 88-128 lbs.).

**Fruit Maturity:** An important determinant of maturity date for citrus fruit is the solids:acid ratio. The estimated dates on which fruit reached an 8:1 solids:acid ratio were January 2 for Ojai, January 15 for Orange Cove, January 16 for Lindcove, and January 27 for Santa Paula. In California, state standards specify a solids:acid ratio of 6.5 for tangerines and mandarins. The 8:1 ratio is used for oranges. We believe that 'Yosemite Gold' should not be marketed until fruit reach a solids:acid ratio of at least 10:1. Taste panel evaluations support this recommendation. This would delay maturity by about 3 weeks compared with the dates above and would result in a much better tasting and easier to peel fruit. Yosemite Gold® fruit hold quite well on the tree for an extended period. They maintain their marketable fruit qualities through April at most locations. Fruit from trees on Schaub rough lemon generally have slightly lower solids and acid than those from trees on Carrizo citrange, C-35 citrange, or Rich 16-6 trifoliolate orange, but this effect is less noticeable than with oranges and does not preclude the use of Schaub (and most probably Volk) as a rootstock with trees used for fresh fruit marketing.

**Fruit Storage:** Limited data indicate that fruit of Yosemite Gold® store very well after harvest. Trials of fruit taken from late-February and late-March harvests at Lindcove and Orange Cove (San Joaquin Valley) trial sites, run over the packline at the University of California Lindcove Research and Extension Center and waxed were evaluated by a taste panel prior to and after storage at three different temperatures, 11 days at 68° F (20.5° C), 12 days at 37° F (3.4° C) followed by 7 days at 55° F (13.3° C), or 12 days at 41° F (5.6° C) followed by 7 days at 55° F (13.3° C). These samples would represent peak maturity fruit of Yosemite Gold®. Fruit quality ratings were very good for all traits before storage and were little changed or improved (peelability) by both cold storage treatments. Storage at a continuous 68° F (20.5° C) reduced the scores for visual appeal and peelability. Waxed fruit were similar to unwaxed for nearly all traits in all temperature regimes.

Yosemite Gold® is being released along with two sister siblings, Shasta Gold® ('TDE2') and Tahoe Gold® ('TDE3'). In comparison with its siblings, fruit of Yosemite Gold® is similar in size, shape and rind texture to Shasta Gold® but has a deeper orange rind color, while it is larger and flatter than Tahoe Gold® and without a neck but with similar rind color. Fruit of Yosemite Gold® mature later than Tahoe Gold® at all locations and holds on the tree past maturity much longer. In comparison with Shasta Gold®, both mature at approximately the same time (somewhat location dependent) but Shasta Gold® holds longer past maturity than Yosemite Gold® (both hold quite well). Yosemite Gold® has a somewhat coarser flesh texture and is less juicy than either Tahoe Gold® or Shasta Gold®. Yosemite Gold® peels easier than Tahoe Gold® and similar, at maturity, to Shasta Gold®. All three varieties are heavy for their size. Overall Yosemite Gold® has yielded about the same as Shasta Gold® and Tahoe Gold®. Alternate bearing habits are similar for all three varieties

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