

# Mandarin Selection Trials in Arizona – 2006-07<sup>1</sup>

Glenn C. Wright

Department of Plant Sciences, U. of A., Yuma Mesa Agriculture Center, Yuma, AZ

## Abstract

*Third year yield and packout data from a trial containing 'Fina', 'Fina Sodea', 'Sidi Aissa', 'Oroval', 'W. Murcott Afourer', 'Fremont', and 'Gold Nugget' selections were collected in 2006-07. For the year, 'Fina Sodea' had the greatest yield, and average fruit size, while 'Gold Nugget' had the smallest yield, and 'Fremont' had the smallest fruit size.*

## Introduction

Mandarins are becoming increasingly important to the US citrus industry. Mandarins are seen by the consumer as good to eat and convenient, because of their flavor, seedlessness and ease of peeling. All three of these characteristics must be exhibited by a successful mandarin cultivar. The clementine is the cultivar that has been most popular because of these characteristics. Spanish imported Clementines that used to appear on grocery shelves are being replaced by California-grown fruit. The objective of this study is to test the adaptability of Clementines and other mandarins to the Arizona conditions.

## Materials and Methods

This trial was established in March 2003 in Block 21 of the Citrus Agricultural Center, near Waddell, Arizona. Trees were planted on a 24-ft x 24-ft spacing. Mandarin selections in the trial include:

- 'Fina' – The original clementine cultivar imported from Algeria into Spain in 1925. Reportedly late, with small fruit
- 'Fina Sodea' – A mutation of Fina clementine discovered in Morocco.
- 'Fremont' – A variety developed at the USDA station at Indio, CA. This variety is a clementine x Ponkan mandarin hybrid and is mid-season and sweet.
- 'Gold Nugget' - A seedless mid- to late-season mandarin developed at the University of California, Riverside. 'Gold Nugget' is a hybrid of 'Wilking' x 'Kincy' parentage.
- 'Oroval' – A spontaneous mutation of Fina, discovered in 1950.
- 'Sidi Aissa' – Another mutation of Fina clementine discovered in Morocco. Valued there because of its large fruit size and durable peel.
- 'W. Murcott Afourer' – An easy peeling mandarin that originated as an open-pollinated seedling in Morocco. Seedless when grown in isolated blocks.

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The original plan was for there to be 15 trees of each variety. However due to mistakes while the trees were propagated and subsequent tree death, there range between 10 and 21 trees of each variety, except for 'W. Murcott Afourer' with 6 trees, and 'Gold' Nugget' with 4. All trees are on Carrizo citrange rootstock.

Irrigation is border flood, and normal cultural practices are used. Yield data is collected during the winter, and 2004-05 was the first harvest year for this trial. For 2006-07, trees were strip-picked on 12-8-06, except the 'W. Murcott Afourer' which was picked on 1-12-07. There was little yield for 'Gold Nugget' in 2006-07. For each harvest date, the entire quantity of harvested fruit from each tree was passed through an automated electronic eye sorter (Autoline, Inc., Reedley, CA), which provides weight, color, exterior quality and size data for each fruit. Fruit packout data is reported on a percentage basis. Ten fruit per tree were selected for fruit quality analysis. This analysis included % juice, juice pH, total solids, total acids, total solid to total acid ratio, peel thickness, and granulation.

All data was analyzed using SPSS 11.0 for Windows (SPSS Inc., Chicago, Illinois).

## **Results and Discussion**

Second year yield for the trial is shown in Figure 1. There was little difference between the selections, with the exception of 'Gold Nugget' that had a yield about  $\frac{1}{4}$  the size of the others. All other selections ranged from 70 to 100 lbs. per tree. It is interesting to note that of the 'Clementines', the two cultivars from Morocco (Fina Sodea at 103 lbs. per tree, and Sidi Aissa at 92 lbs. per tree) had the greatest yield. This may suggest that these cultivars are more adaptable to the Arizona desert climate. Packout of the cultivars is shown in Figure 2. Trees of 'Oroval' had the largest fruit, while those of 'Fremont' had the smallest. 'W. Murcott Afourer' had rather small fruit as well. 'Fina' fruit appear to be slightly larger than 'Fina Sodea' and 'Sidi Aissa' fruit, but 'Oroval' fruit are the largest of the four 'Clementine' selections in the trial. More yield and packout data need to be taken to confirm these trends.

'Fina' fruit had the greatest juice content, but high acids, and thus a low TSS:TA ratio. 'Fina' also had the thinnest peel, the best color, and fewer seeds per fruit than all the other selections except 'Oroval'. 'Oroval' meanwhile had the lowest juice content and the greatest granulation. This selection also had low solids, but fairly high acids, leading to a low solid:acid ratio. 'Oroval' fruit was also the roundest but had poor color. 'Fina Sodea' and 'Sidi Aissa' fruit were similar, though 'Fina Sodea' fruit had higher juice content. Both had low sugars, but coupled with low acidity, led to a higher solid:acid ratio. 'W. Murcott Afourer' fruit had the greatest solid:acid ratio, and was the flattest. Fruit of 'Fremont' did not stand out when compared to the others.

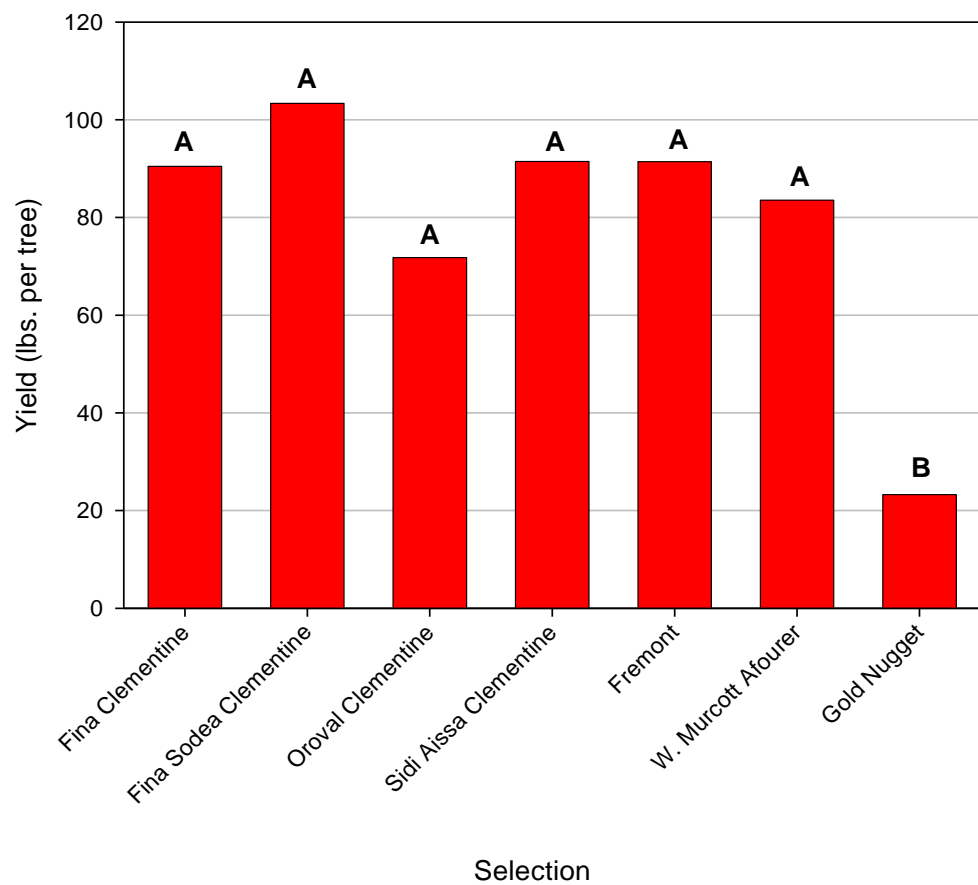


Figure 1. Yields of five mandarin selections on Carrizo citrange rootstock for 2005-06 season. Overall yield for the year can be compared using the uppercase letters above each stacked bar.

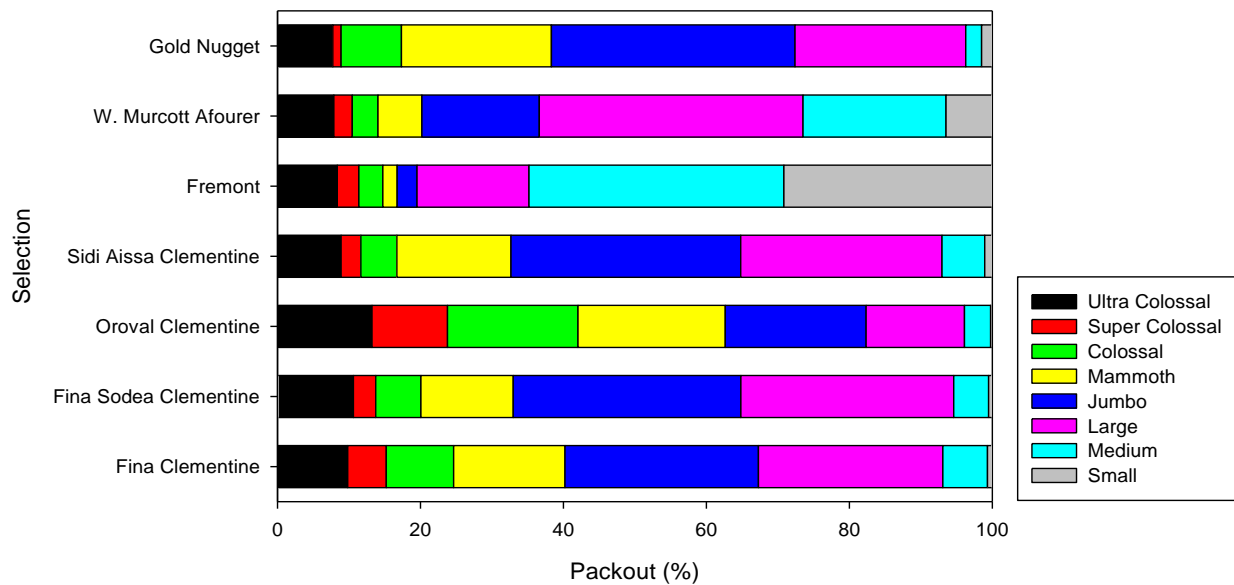


Figure 2. Packout of five mandarin selections on Carrizo citrange rootstock for 2006-07 season.

Table 1. 2006-07 Fruit quality of six mandarin cultivars budded to Carrizo rootstock.

Cultivar	Juice Content (%)	pH	TSS (%)	Total Acids (%)	TSS:TA
Fremont	37.8 bc	3.33 ab	12.00 bc	1.04 b	11.65 a
Fina	52.8 a	2.99 c	12.64 ab	1.42 a	8.93 c
Fina Sodea	46.1 ab	3.32 ab	11.97 c	1.02 b	11.69 a
Oroval	31.8 c	3.21 b	11.57 c	1.11 b	10.47 b
Sidi Aissa	35.0 c	3.38 a	12.07 bc	1.03 b	11.72 a
'W. Murcott Afourer'	38.5 bc	3.37 a	12.87 a	1.06 b	12.21 a

<sup>z</sup> Means separation in columns by Duncan's Multiple Range Test, 5% level.

Table 2. 2006-07 Additional fruit quality parameters of six mandarin cultivars budded to Carrizo rootstock.

Cultivar	Peel Thickness (mm)	Granulation <sup>y</sup> (%)	Fruit Shape <sup>x</sup>	R/G <sup>w</sup>	Seeds per fruit
Fremont	2.78 a	4.21 ab	0.911 a	2.63 b	6.91 ab
Fina	1.80 b	0.20 b	0.890 bc	2.79 a	5.27 b
Fina Sodea	2.71 a	2.21 ab	0.895 abc	2.69 ab	7.56 a
Oroval	2.86 a	10.14 a	0.916 a	2.42 c	5.06 b
Sidi Aissa	2.87 a	7.67 ab	0.904 ab	2.70 ab	6.62 ab
'W. Murcott Afourer'	2.52 a	0.00 b	0.880 c	2.48 c	7.60 a

<sup>z</sup> Means separation in columns by Duncan's Multiple Range Test, 5% level.

<sup>y</sup> Granulation values are taken from 10 fruit per tree. Values represent the percentage of fruit in the entire fruit sample with more than 20% granulation

<sup>x</sup> A value of 1.00 signifies a completely round fruit.

<sup>w</sup> Signifies the red to green intensity ratio of the fruit. A greater value signifies more orange or red color.