

# Results of 'Fallglo' Trials for Citrus in Arizona - 2001<sup>1</sup>

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## *Abstract*

*A 'Fallglo' mandarin trial was established at the Yuma Mesa Agriculture Center in 1995. Results suggest that trees on C. volkameriana rootstock, rough lemon rootstock, and, in 2001-02, Gou Tou orange rootstock had the greatest yields. There was little effect of rootstock upon fruit size or juice quality.*

## **Introduction**

One of the hallmarks of a healthy citrus industry is a wide range of marketable cultivars. While the Arizona industry has never been dependent on a single cultivar, the range of profitable cultivars has shrunk in recent years. Declines in the profits from grapefruit have been precipitous in recent years. Navels remain profitable, but sweet oranges typically lose money. 'Minneola' tangelos typically are profitable, but other varieties of mandarin have not been as successful due to competition from easy-peeling, seedless 'Clementine' mandarins imported from Spain.

In order for a mandarin cultivar to be profitable for Arizona growers, it must not only be tasty and colorful, but also possess at least one of the following characteristics: large size, easy peelability, seedlessness, early ripening, or have a shape that distinguishes it from other mandarin cultivars in the marketplace. 'Minneola' is not particularly early, but it is generally profitable because its distinctive bell-shaped fruit is distinguishable in the market, it is typically seedless, and peels easily. Clementines are not always distinguishable in the market from any other cultivar, but their easy peelability and seedlessness make them favorites with the consumer.

'Fallglo' mandarin is a hybrid of 'Clementine' x 'Orlando' tangelo crossed with 'Temple' tangor that might be profitable for Arizona growers. Fruit from this cultivar is large (3 to 3¼ inches), early-ripening (October), and easily peelable. The fruit have quite a few seeds, typically 15 to 25 per fruit. The objective of this trial is to test this cultivar on nine rootstocks. Previous results from these trial have been reported in Wright and Peña (2000), and Wright and Peña (2001).

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## Materials and Methods

This trial was established in June 1995 in Block 26 of the Yuma Mesa Agricultural Center, near Yuma, AZ. The land was laser leveled and fumigated prior to planting. Trees were planted on a 10-m x 10-m spacing. There are nine blocks of nine scion-rootstock combinations. These include: *Citrus volkameriana*, Rough Lemon, 'Citremon 1449', 'Sunki' mandarin x 'Flying Dragon' trifoliolate orange, 'Carrizo' citrange, *Citrus taiwanica*, C-35 Citrange, 'African Shaddock' x 'Rubidoux' trifoliolate orange and 'Gou Tou' orange.

Yields are expressed as pounds fruit per tree. Yield data is collected during the fall, when trees are strip picked by commercial pickers. Harvested fruit for each tree is collected in wooden or plastic boxes and weighed. The entire harvest from each tree is passed through an automated electronic eye sorter (Autoline, Inc., Reedley, CA), which provides weight, color, exterior quality and size data (diameter) for each fruit. Fruit size data (packout) is reported on a percentage basis.

Twenty to twenty-five fruit were harvested as a sample from each tree for juice quality analysis. Not all combinations had sufficient fruit for analysis. Sample fruit are weighed then juiced using an Oranfresh ORM-5 countertop automatic citrus juicer (Oranfresh, S.r.l., Catania, Italy). Peel thickness data is collected, using digital calipers, from the spent peels that collect in the juicer. Juice is weighed, and volume of juice data is measured. Total soluble solids data is collected using an Atago PR-32 digital refractometer (Atago, Co., Ltd., Tokyo, Japan). Total acids are determined following titration with 0.3904 N NaOH using a Mettler-Toledo DL-12 automatic titralyzer (Mettler-Toledo GmbH, Greifensee, Switzerland). All data was analyzed using SPSS 8.0 for Windows (SPSS Inc., Chicago, Illinois).

## Results and Discussion

Fallglo Mandarin Trial. 'Fallglo' trees on *C. volkameriana* had the greatest yield in 1999-2000, although high tree variability insured that there were no significant differences among any of the rootstocks (Table 1). Yields ranged from 0.0 to ten pounds per tree. For 2000-01, yields increased for all rootstocks tested. Trees on *C. volkameriana* rootstock had significantly greater yield than trees on any of the other rootstocks tested. Yields of trees on *C. volkameriana* was about 30% greater than yield of trees on 'Carrizo' citrange, and about 44% greater than yield of trees on rough lemon, the second and third greatest yielding combinations, respectively. All the other combinations had from 3 to 5 pounds of fruit per tree for the 2000-01 harvest.

While trees on rough lemon, and *C. volkameriana* again had the greatest yield for 2001-02, and were significantly greater than the previous year, trees on Gou Tou orange also had the greatest yield for the season. Yields of trees on 'Carrizo' citrange dropped dramatically compared with 2000-01, yields for this rootstock decreased by 80%. Yields also dropped for trees on 'African Shaddock' x 'Rubidoux' trifoliolate orange, by about 80%.

Packout of the trees on *C. volkameriana*, Rough lemon and Gou Tou orange, the rootstocks that led to the greatest yields, are shown in Figure 1. There was little difference between the rootstocks, other than that fruit size on Gou Tou orange was slightly larger.

Juice quality data for 'Fallglo' trees on the same three rootstocks shown in Figure 1 is shown in Table 2. Gou Tou orange had a slightly lower percent juice than did trees on the other two rootstocks tested. Although there were significant differences, total soluble solids and total acids, and TSS:TA ratio was similar for all the rootstock/scion combinations tested.

## Conclusions

'Fallglo' may be a viable cultivar for Arizona growers. Further testing is needed. A seedless selection would be particularly valuable.

### Literature Cited

Wright, G.C. and M.A. Peña. 2001. Results of scion and rootstock trials for citrus in Arizona – 2000. 2001 Citrus Research Report. College of Agriculture Series P-129. Tucson, AZ.

Wright, G.C. and M.A. Peña. 2000. Results of scion and rootstock trials for citrus in Arizona – 1999. 2000 Citrus Research Report. College of Agriculture Series P-123. Tucson, AZ.

Table 13. 1999-2000 through 2001-02 Yield of Fallglo mandarin trees on eleven different rootstocks.

| Rootstock <sup>z</sup>                             | 1999-2000            | 2000-01              | 2001-02              |
|--|----------------------|----------------------|----------------------|
|  | Yield per tree (lb.) | Yield per tree (lb.) | Yield per tree (lb.) |
| <i>C. volkameriana</i>                             | 9.6 a <sup>y</sup>   | 14.6 a               | 22.9 ab              |
| Rough Lemon  | 8.6 a                | 8.2 ab               | 31.9 a               |
| Citremon 1449                                      | 6.6 a                | 4.3 b                | 5.8 bc               |
| Sunki Mandarin x Flying Dragon Trifoliolate Orange | 6.0 a                | 4.6 b                | 9.2 bc               |
| 'Carrizo' Citrange                                 | 4.0 a                | 10.1 ab              | 1.3 c                |
| Taiwanica Orange                                   | 1.7 a                | 4.0 b                | 4.9 bc               |
| C-35 Citrange                                      | 0.4 a                | 3.2 b                | 7.9 bc               |
| African Shaddock x Rubidoux Trifoliolate Orange    | 0.2 a                | 3.4 b                | 0.6 c                |
| Gou Tou Orange                                     | 0.0 a                | 5.3 b                | 22.8 abc             |

<sup>z</sup> Values are the means of 2 to 11 trees, harvested on 11-11-99, 11-15-00 and 12-17-01.

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

## Rootstock

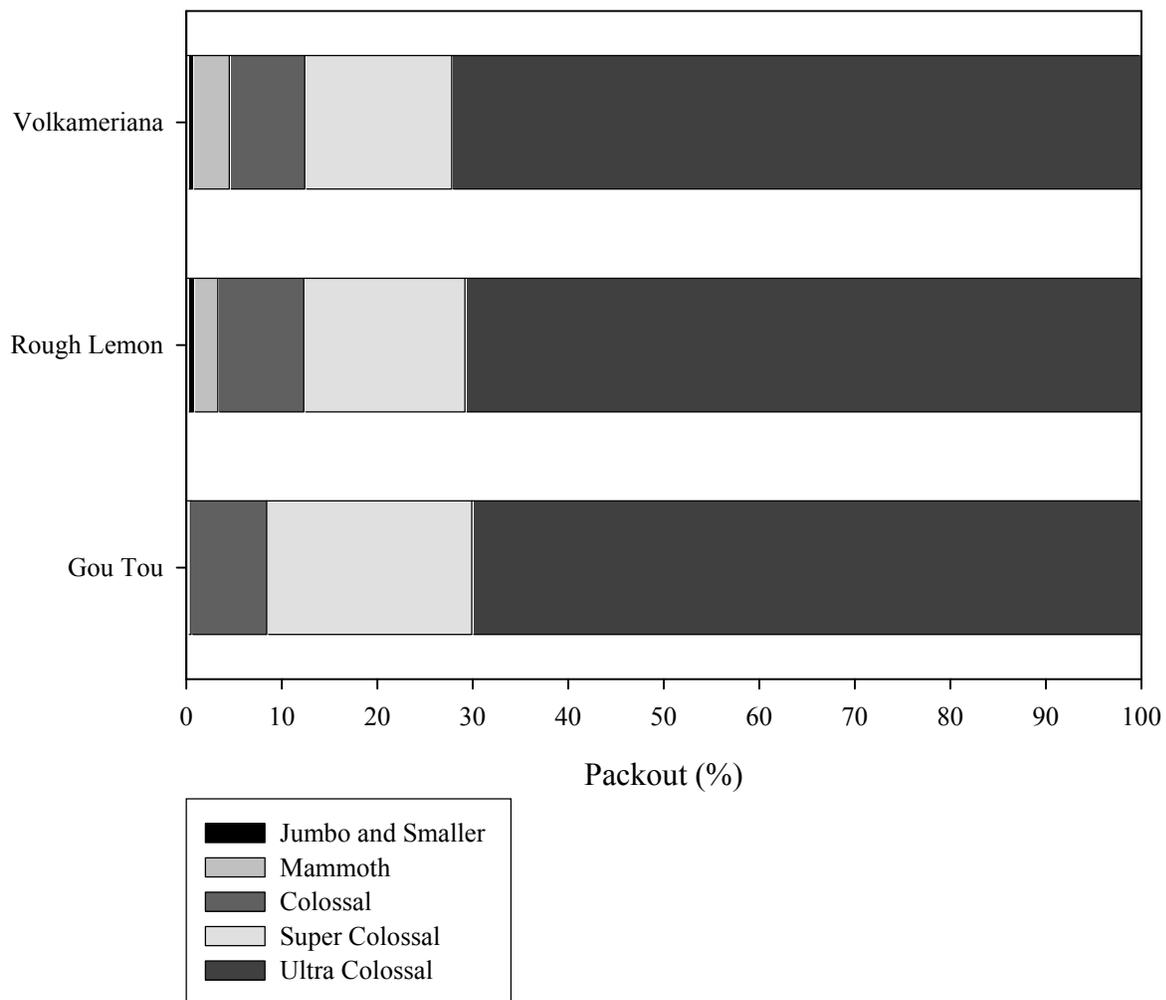


Figure 1. Packout of 'Fallglo' mandarin on three rootstocks for the 2001-02 harvest season.

Table 2. 2001-02 Fruit Quality of 'Fallglo' mandarin budded to three rootstocks harvested on 12/17/01.

| Scion <sup>z</sup> | Percent Juice (%) | TSS (%)  | TA (%) | TSS:TA  | Peel Thickness (mm) |
|--------------------|-------------------|----------|--------|---------|---------------------|
| Gou Tou            | 26.3 b            | 11.5 ab  | 0.82 a | 14.2 ab | 2.76 a              |
| Rough Lemon        | 31.2 a            | 10.5 c   | 0.68 b | 15.2 a  | 3.08 a              |
| Volkameriana       | 30.1 a            | 10.9 abc | 0.83 a | 13.2 b  | 2.79 a              |

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