

New Satsuma Mandarin Strains

fruit of nucellar lines of mandarin-orange color earlier and have higher per cent of soluble solids than the parent line

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Long-time studies of Satsuma mandarin nucellar-seedling lines—derived mainly from a single seed-parent tree—indicate that both genetic change and nucellar embryony may be responsible for earlier fruit coloring, especially in heavy-crop years, and for a consistently higher per cent of soluble solids than in the old parent line.

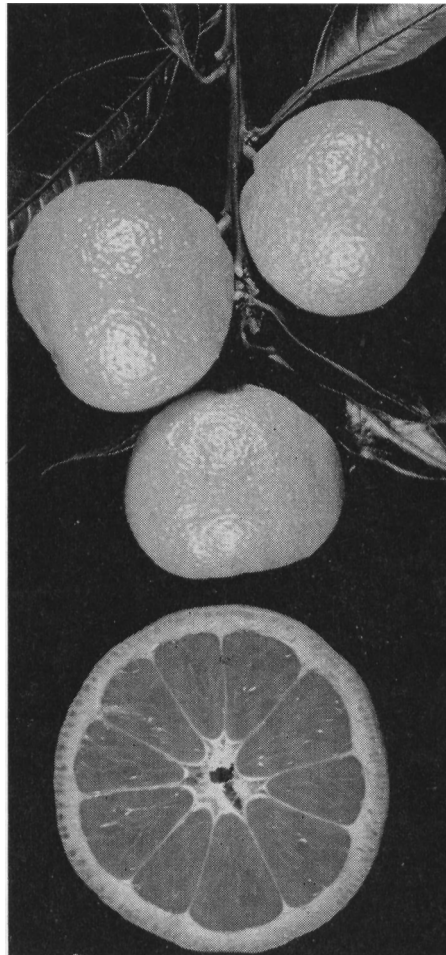
Because of its adaptability to a relatively cool climate, Satsuma—the principal citrus fruit of Japan—has had some commercial importance in several Gulf States of the United States, principally Alabama, but freezes have largely eliminated it.

In California the Satsuma has been grown in the Oroville area and in small plantings in the navel orange districts. It does not succeed under hot desert conditions. However, among the Satsuma seedling lines included in a series of long-term studies at Riverside, a nucellar strain—strain A—has been superior in over-all horticultural promise and should be useful in extension of the presently small acreage of Satsumas in California.

The parent tree—from which the nucellar Satsuma lines included in the study were derived—was obtained in about 1907. In 1920, trees of the first budded generation of several of the nucellar lines on trifoliolate rootstock were planted in the experimental orchard at Riverside. In 1932 a second budded generation of two of the nucellar lines—called young-line 1 and young-line 2—and budded trees of the old seed-parent line were planted in the orchard in two adjacent rows. These trees were on Cunningham citrange rootstock. Budded trees of two other nucellar Satsumas—young-line 3 and young-line 4—were planted nearby during this same period.

The trees of young-lines 1 and 2 and those of the budded seed-parent line bore their first fruits in 1936. At that time, leaf-blade length and width were significantly greater in both young lines. In addition, leaf size averaged slightly larger in young-line 1 than in young-line 2 in 1936 and again in 1956. The difference in leaf length was just short of significance in both years, but the difference in width was highly significant in 1956.

Trees of young-line 1 are more open and spreading than those of young-line



Fruits of the Satsuma mandarin, as grown at Riverside. Actual diameter of these fruits was about two inches.

2, and the leaves are slightly darker green. Trees of both of the young lines are conspicuously larger in top volume than those of the old line.

Records for the six years between 1939 and 1946 show that young-line 1 exceeded the old line in yield by 84%, and young-line 2 exceeded the old line by 72%. During the period of 1947–1955, yields were significantly different among all three lines: highest in young-line 1; intermediate in young-line 2; and lowest in the old line, as shown in the table on page 15.

In two years out of nine, low yields occurred in all three lines. Average fruit size—calculated by weight—was nearly identical in the old line and young-line

1, but a little smaller in young-line 2. Although there was a greater variation in fruit size in the young lines, the larger yields produced more marketable fruit than the old line.

Fruit Coloring

Time of coloring of the fruit has usually been earlier in the young lines than in the old line. For all years—averaged—the percentage of well-colored fruit at date of harvest was 60 for the old line, 93 for young-line 1 and 83 for young-line 2. There is considerable relationship between high yields per tree and per cent of fruits well colored at time of picking. In years of heavy crop—such as 1948—the fruit of young-line 1, in particular, approached 100% well colored when the old-line fruit was still poorly colored. However, in 1949, when young-line 1 had an unusually light crop, coloring was late and little different from that in the parent line. Young-line 2 has been less consistent; it was slow to color in years of light crop, but often colored less well than young-line 1 in years of heavy crop. Its heavy crops were not as great in pounds per tree as those of young-line 1 in the same years.

Tree size in both young lines is much greater than in the old line, which means that yield per unit volume of top is often no greater in the young lines than in the parent line. The earlier rind coloring occurs despite similar yields per unit volume. Only when yield per unit volume was much less in the young lines than in the old line, as in 1949, was the time of coloring about equal.

Fruit Shape

Differences in fruit shape between young-lines 1 and 2 were found in the first budded generation of the seedlings. The fruit of a tree of young-line 1 averaged somewhat flatter than that of young-line 2 in each of nine years. This difference has persisted although both young lines seem to be producing fruit that is less flat than the earlier fruit. The decrease in flatness is suggestive of a change in a juvenile condition, which originally favored flatter fruit. Fruit shape was also studied in one budded

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