

High Quality Citrus Rootstock

Cleopatra Mandarin, Troyer Citrange rootstocks produce quick-decline tolerant trees bearing high-quality fruit

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Cleopatra mandarin and Troyer citrange are promising rootstocks for orange trees. They are resistant to damage from quick decline and they produce high quality fruit.

Until recently, approximately 95% of the rootstocks used for orange trees in California have consisted of sweet orange, sour orange, and Rough lemon. Quick decline made sour orange stock obsolete. The demand for Valencias for processing purposes made the Rough lemon rootstock obsolete as fruit produced on it is lower in juice content and soluble solids than that produced on sour and sweet orange rootstock.

Cleopatra Mandarin and Troyer citrange rootstocks are more resistant to gummosis than sweet orange stocks, and the Troyer is remarkably vigorous as a replant in old citrus orchard soil.

Cleopatra Mandarin

Experimental orchards using Cleopatra mandarin rootstock budded to Washington Navel orange, Valencia orange, Satsuma orange, Marsh grapefruit, Eureka lemon, and Lisbon lemon were planted at Riverside in 1927 and 1928. This rootstock proved to be better than average with all these tops.

Average fruit yields, size, and quality of fruit of trees propagated on Cleopatra mandarin, sweet orange, sour orange, or

Rough lemon rootstocks are compared in the bottom table on page 4.

Trees on Cleopatra mandarin rootstock produced essentially the same amount of fruit as those on the other rootstocks. The yield differences of 10% to 15% were within the realm of casual error of such field experiments. The only real difference may be the lower yield of Eureka lemon on sour orange roots. Trees on Cleopatra rootstock were usually smaller than those on sweet orange and a little later in coming into full bearing; thus at least 10% more trees could be planted per acre. This would probably make the yields per acre about the same, with such tops as Valencias, as those on sweet orange rootstocks. The higher yields of the Marsh grapefruit trees on Cleopatra roots were probably due to chance.

The trees on Cleopatra stock produced oranges, grapefruit, and lemons of as high quality as trees on sweet orange or sour orange roots. In all cases, the fruit was vastly superior to that produced by trees on Rough lemon.

One characteristic which makes Cleopatra desirable for oranges or grapefruit in California is its proved tolerance to the quick decline virus. It also has a greater resistance to gum disease than sweet orange or Rough lemon and is as resistant as some of the sour oranges. It is as valuable a rootstock for lemon trees as for oranges or grapefruit. Lemon



Fruit, seeds, and foliage of the Cleopatra mandarin.

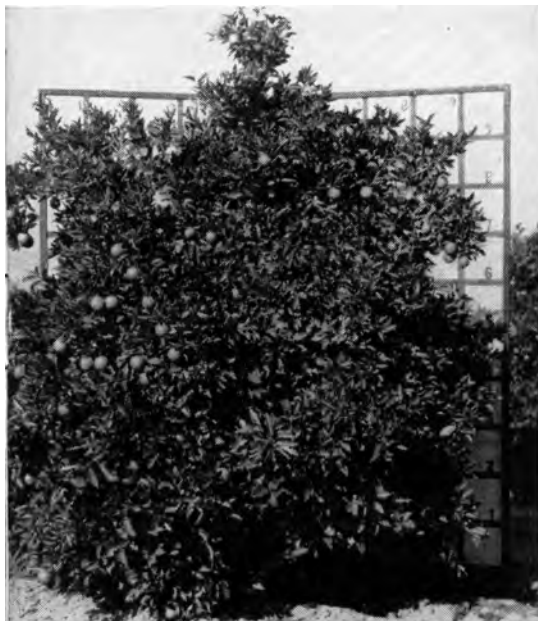
trees on this root have been longer-lived and more productive as mature trees than those on any other stock which is as resistant to gum disease.

Troyer Citrange

The Troyer citrange is a hybrid of a navel orange crossed with pollen of the trifoliate orange.

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Three seven-year old Valencia orange trees planted on old citrus land without soil fumigation. Left, on Troyer citrange rootstock; center, on sweet orange rootstock; right, on sour orange rootstock.



ROOTSTOCKS

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The first trees on this rootstock were planted at Riverside in 1944, on land not previously used for citrus. Campbell Valencia trees budded on Troyer and on the Seville variety of sour orange were planted for comparison. Trees on both these stocks budded to Washington Navel and to Lisbon and Eureka lemons were also planted at the same time.

In 1945, additional plantings were made on old orchard land with Campbell Valencia trees on Troyer citrange and Morton citrange. Other Valencias were planted on sour orange, sweet orange, grapefruit, Rough lemon, King mandarin, and Sampson tangelo rootstocks.

The Campbell Valencia trees on Troyer citrange rootstock have consistently grown more vigorously than those on any other rootstock in both the 1944 and 1945 plantings. This rapid growth has also been correlated with greater production even as young trees.

In the 1944 planting, fruits from the trees on Troyer citrange are slightly larger than those from trees on sour orange rootstocks. A typical eight-year-old tree on Troyer is larger than a tree of the same age on sour orange.

The growth of the Monroe Lisbon lemon trees on Troyer citrange has been essentially equal or slightly larger than the sour orange rootstock trees.

The Troyer citrange is worthy of limited use as a rootstock for Lisbon lemon. This combination should be used in a limited way for trees to be planted on old citrus orchard land. More trials are required for the use of Eureka lemon trees on Troyer citrange.

Trees planted in 1945 on old citrus land followed, in most cases, the removal of trees killed by quick decline. The soil was not fumigated, and the replant trees were planted right where the old trees had been without any special precaution. It was evident that the average growth of the trees on Troyer citrange was more vigorous than any of the commonly used rootstocks tried, including Rough lemon, grapefruit, Sampson tangelo, sweet orange and others.

Valencia orange trees were planted in 1945 on sweet orange, sour orange, and Troyer citrange rootstocks in a Fillmore ranch, on land previously used for citrus trees. The trees on Troyer stock yielded more, larger, and slightly better quality fruit than trees budded on sweet orange and sour orange roots.

By the time the trees in this orchard were two years old, the growth and general vigor of those on Troyer citrange were greater than those of trees on several selections of sweet orange or sour orange rootstocks. In 1952, when the trees are

seven years old, the differences in size are still greater. The trees on Troyer citrange have considerably more fruit-bearing area and are already producing more oranges and larger fruit sizes than trees on sweet or sour orange rootstocks.

From these data and additional observations it is apparent that the Troyer citrange is worthy of commercial trial, especially as replants in old orchards or

for general replanting in old citrus soils. However, the seed supply of Troyer citrange is limited.

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Comparison of Fruit Yield, Size, and Quality of Valencia Orange on Sweet Orange, Sour Orange, and Troyer Citrange Rootstocks, Planted in 1945 on Land Previously Used for Citrus Trees.

No. trees	Rootstock	Average yield per tree (lbs.)		Percentage fruit size 200 or larger per packed box (1952)	Maturity: May, 1952	
		1951	1952		Per cent	
					Total soluble solids	Total acid
10	Indian orchard sweet orange.	60	92	32	10.22	1.17
10	Keen sour orange	70	105	28	10.47	1.21
10	Troyer citrange	120	130	58	10.65	1.17

Comparison of Fruit Yield, Size, and Quality of Valencia Orange on Seville Sour Orange, and Troyer Citrange Rootstocks, Planted on Virgin Land, 1944.

No. trees	Rootstock	Average annual yield per tree (pounds)			Percentage of fruit size 252 or larger per packed box			Fruit quality (maturity 5/8/52)	
		1950	1951	1952	1950 ¹	1951 ²	1952 ²	Total soluble solids (per cent)	Total acid (per cent)
20	Seville sour orange . .	34	28	66	81	94	35	11.20	1.44
17	Troyer citrange	46	58	87	87	98	30	11.20	1.39

¹ Large grab sample sized by hand.

² Entire merchantable crop sized in packing house.

Comparison of Fruit Yield, Size, and Quality of Four Citrus Varieties on Sweet Orange, Sour Orange, Rough Lemon, and Cleopatra Mandarin Rootstocks.

Rootstock	Average annual yield per tree (pounds)	Percentage of fruit size 252 or larger per packed box (three-year average)	Fruit quality ²	
			Total soluble solids (per cent)	Total acid (per cent)
WASHINGTON NAVEL ORANGE				
Koethen sweet orange	144	44	13.6	0.90
Brazilian sour orange	171	64	13.2	0.90
Rough lemon	164	51	11.8	0.70
Cleopatra mandarin	141	46	13.4	1.00
VALENCIA ORANGE				
Koethen sweet orange	205	38	13.5	0.85
Brazilian sour orange	191	50	13.1	0.85
Rough lemon	187	43	12.1	0.62
Cleopatra mandarin	184	45	13.8	0.86
MARSH GRAPEFRUIT				
362 sweet orange	239		11.3	1.89
Brazilian sour orange	250		11.2	1.87
Rough lemon	234		9.8	1.65
Cleopatra mandarin	264		10.5	1.83
EUREKA LEMON				
Bessie sweet orange	285		8.8	5.77
Rubidoux sour orange	222		8.8	5.64
Rough lemon	277		7.8	5.16
Cleopatra mandarin	258		8.5	5.71

¹ Twenty-year average for oranges and grapefruit; 18-year average for lemons.

² Quality data for oranges and grapefruit selected from typical data.