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Twelve-Year Evaluation of Citrus Tristeza Virus Tolerant Rootstocks Budded With Washington Navel Orange

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ABSTRACT. Four citrus tristeza virus tolerant rootstocks budded with Washington navel orange were evaluated in Aguirre, Carabobo State, Venezuela. Yield results of 12 yr and development and quality parameters are presented. Volkamer lemon and Taiwanica orange showed the best results, but Swingle citrumelo and Troyer citrange should be considered as alternatives under these conditions.

Index words. Yield, fruit quality, elevation.

Currently the Venezuelan citriculture is recuperating rapidly, from the great loss caused by the citrus tristeza virus (CTV). The need for CTV tolerant rootstocks made research on the behaviour of such rootstocks under our conditions necessary. Washington navel orange, is the second (most) important variety in Venezuela after Valencia orange. Navel orange represents approximately 15% of all citrus plants, in the country or approximately two million trees.

Since 1976, FUSAGRI has been evaluating the new rootstocks budded with the variety indicated for production behaviour, vegetative growth and fruit quality (1, 2, 3, 4, 5, 6).

Results are presented which show the most recent evaluations (7).

MATERIALS AND METHODS

Characteristics of the location and climatic conditions were described previously (7).

The plants were 12 yr old with a spacing of 7m x 7m in a triangular pattern. A randomized complete block design with 3 replications and 6 plants per replication was used.

RESULTS AND DISCUSSION

Table 1 shows the average fruit yield of Washington navel between 1980 and 1988 on different rootstocks. Volkamer lemon and Taiwanica orange showed the highest average

yield. However, Swingle citrumelo and Carrizo citrange had acceptable yields. These results were more evident based on number of fruits per plant in the last year. Taiwanica orange and Volkamer lemon induced the biggest canopy and they were the most efficient rootstocks. Assuming a price fruit of 1.25 Bs. (1 US\$ = 40.00 Bs.) the income range was between 85,000 and 170,000 Bs./ha/yr. The cost of production was around 40,000 Bs./ha/yr.

Plants on Swingle citrumelo and Carrizo citrange had the lowest canopy volume, which suggests the possibility of reducing their spacing in the field.

The fruit quality was good on all the evaluated rootstocks (Table 2), and best on Taiwanica orange and Carrizo citrange.

The external fruit quality and the fruit diameter was acceptable on Volkamer lemon and Taiwanica orange (Table 2), but the latter had the thickest peel.

Volkamer lemon produced the largest fruit yield per plant (Table 2). The value of the fruit yield per hectare was excellent on all the different rootstocks.

In conclusion, Volkamer lemon and Taiwanica orange, were the best rootstock relative to production. Swingle citrumelo and Troyer citrange could be planted in higher density to prove the productivity per area. The fruit quality was acceptable

TABLE 1
EVALUATION OF 12-YR-OLD WASHINGTON NAVEL ORANGES BUDDED TO
TRISTEZA-TOLERANT ROOTSTOCKS

Rootstocks	Fruit yield (kg/plant) ^z	No. of fruits/ plant ^y	Canopy volume (m ³) ^y	kg fruit/m ^{3y}
Volkamer lemon	113 a	800 a	37 bc	3 a
Taiwanica orange	93 ab	557 a	44 a	3 a
Swingle citrumelo	78 b	290 b	28 cd	2 a
Troyer citrange	71 b	292 b	23 d	3 a

^zAverage 1980-88 (235 plants/ha)

^yMeasured 1988

TABLE 2
FRUIT QUALITY EVALUATION^z OF WASHINGTON NAVEL ORANGES GRAFTED TO
TRISTEZA-TOLERANT ROOTSTOCKS

Rootstocks	Juice (%)	TSS ^y (%)	Fruit diameter (cm)	TSS ^y Acid
Taiwanica orange	50 a	10.0 a	7.9	14 a
Troyer citrange	51 a	10.0 a	7.7	14 a
Volkamer lemon	48 a	10.0 a	7.7	12 a
Swingle citrumelo	50 a	9.5 a	7.8	12 a

^z Samples taken in June 1988

^yTotal soluble solids

on all the rootstocks and can be planted under our conditions at elevations over 400 m.

We recommend the use of more than one rootstock per farm, according to the climatic conditions and soil characteristics.

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