South African Avocado Growers' Association Yearbook 1994. 17:78-79

HORTICULTURAL PERFORMANCE OF FUERTE AVOCADO ON DUKE 7 AND G6 ROOTSTOCKS

Sylvie Kremer-Köhne and J S Köhne
Merensky Technological Services, P O Box 14, Duivelskloof 0835, RSA

ABSTRACT

Yield and internal fruit quality of cv Fuerte grown on Duke 7 and G6 rootstocks were evaluated. Cumulative yields for the first six years after planting were 30.0 t/ha and 38.6 t/ha for trees on Duke 7 and G6 rootstocks respectively. However, Fuerte trees on Duke 7 rootstock grew less vigorously and had higher yield efficiency than those on the G6 rootstock. Internal fruit quality differed considerably between years, with both rootstocks having similar quality within each year.

INTRODUCTION

This report is an update on a previous paper dealing with the horticultural performance of Fuerte trees on Duke 7 and G6 rootstocks (Kremer-Köhne & Könne, 1992).

MATERIALS AND METHODS

Fuerte trees on Duke 7 and G6 rootstocks were planted in alternate rows at the Danroc farm (Kiepersol) in 1987 at a spacing of 7,0 by 7,0 m. In April 1990, 1991 and 1992, average yields were recorded for 287 trees on each rootstock. In April 1993, 25 uniform data trees on each rootstock were used for comparing their horticultural performance, based on individual tree yields. In addition, canopy silhouette area of these trees was determined as an indication of tree size. Canopy silhouette area was calculated according to winter (1977) by multiplying canopy height and canopy width.

To monitor fruit quality, 140 Fuerte fruit (mass range 266-305 g) grown on each of the rootstocks were sampled at harvest in 1991 and 1992. In 1993, a sample of 14 fruit was picked from each of the data trees. The fruit were stored for four weeks at 5°C to simulate shipment to Europe. After cold storage the temperature was increased to 18°C to induce ripening. Soft-ripe fruit were cut open and inspected for the physiological disorders pulp spot, grey pulp and vascular browning (Swarts, 1984). Results on fruit quality are presented as percentage of fruit free of the abovementioned disorders.

Fuerte fruit grown on the different clonal rootstocks were sampled at harvest in 1991 through 1993 and analysed for their K, Mg and Ca content by Outspan Laboratories (Verwoerdburg). In 1991 and 1992, each sample consisted of 14 fruit and there were five replicates per rootstock. In 1993, 14 fruit were sampled per data tree

RESULTS AND DISCUSSION

Individual tree yields during years one to six after planting are shown in Table 1. During

the first three years after planting, no yield difference could be detected between the Duke 7 and the G6 rootstock. In year four, trees on Duke 7 rootstock produced higher average yields than did those on G6 rootstock. However, in years five and six, this was reversed with trees on G6 rootstock producing higher yields than those on Duke 7 rootstock. In terms of cumulative production (t/ha) during the first six years from planting, trees on G6 rootstock were clearly more productive than those on Duke 7 rootstock.

TABLE 1
Mean yield (kg/tree) and cumulative yield (t/ha) of Fuerte trees as influenced by different rootstocks during the first six years after planting.

	Yield (kg/tree)						
	Years after planting						Cumulative yield
Rootstock	1	2	3	4	5	6	(t/ha)
Duke 7	-	-	2	15	30	03	30.0
G6	-	-	2	9	46	136	38.6

Data on tree size and yield efficiency are presented in Table 2. Trees on G6 rootstock grew approximately 50% more vigorously than those on Duke 7 rootstock. Hypothetically, in a Fuerte orchard on G6 rootstock planted at a density of 200 trees per hectare, alternate trees would have had to be removed at the end of year five. This would have resulted in half the original number of trees per hectare and hence a lower cumulative yield over a six year period when compared to a Fuerte orchard on Duke 7 rootstock, which would only need to be thinned after year seven.

Taking yield and canopy area into consideration, yield efficiency of trees on Duke 7 rootstock was about 14% higher than that of trees on G6 rootstock (Table 2).

TABLE 2
Yield, canopy silhouette area and yield efficiency of Fuerte trees as influenced by different rootstocks (1993). Data are the means of 25 trees ±S.E.

	Yield	Canopy area	Yield Efficiency
Rootstock	(kg/tree)	(m^2)	(kg/m^2)
Duke 7	102.84 ± 4.02	21.89 ± 0.93	4.80 ± 0.20
G6	136.25 ± 4.85	32.36 ± 0.76	4.23 ± 0.15

Data on fruit quality after simulated sea voyage are presented in Table 3. The percentage of fruit free of physiological disorders differed markedly between the years, with both rootstocks following the same general pattern. In 1991 and 1992, fruit grown on G6 rootstock were of better quality than those grown on Duke 7 rootstock, and in 1993 this was reversed. Furthermore, the K, Mg and Ca content of Fuerte fruit varied between years (Table 3). The K content in Fuerte fruit grown on Duke 7 rootstock was always higher than that in fruit grown on the G6 rootstock.

TABLE 3
Percentage of fruit free of physiological disorders (clean fruit) and K, Mg and Ca content of Fuerte fruit as influenced by different rootstocks for 1991 through 1993.

Rootstock	Clean		ppm in dry mass		
	Year	fruit (%)	K	Mg	Ca
Duke 7	1991	48	14980	1180	440
	1992	75	14975	825	175
	1993	98	13400	1000	300
G6	1991	59	14140	1260	460
	1992	85	13950	825	150
	1993	94	11700	1000	400

CONCLUSIONS

Fuerte trees on Duke 7 rootstock, currently the industry's standard, grow less vigorously and have higher yield efficiency than those on the G6 rootstock. In a Fuerte orchard on Duke 7 rootstock, removal of alternate trees to avoid crowding is postponed by two years when compared to Fuerte trees on G6 rootstock. However, it was observed that Fuerte trees on G6 appeared to be in better condition than the trees on Duke 7 rootstock, and this deserves further investigation.

ACKNOWLEDGEMENT

The authors thank R and D Hearne of Danroc for their cooperation and for kindly providing the fruit used in this study.

REFERENCES

KREMER-KÖHNE, S. & KÖHNE, J.S. 1992. Yield and fruit quality of Fuerte and Hass on clonal rootstocks. *South African Avocado Growers' Association Yearbook 15:* 69.

SWARTS, D.H. 1984. Post harvest problems of avocados- let's talk the same language. *South African Avocado Growers' Association Yearbook 7:*15-19.

WINTER, F. 1977. Ertragsprognosen bei Kernobst nach der 'Bavendoríer Methode'. *Obstbau 2: 28-32.*