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Avocado Clonal Rootstock Production Trial

M. L. Arpaia, G. S. Bender, and G. W. Witney
Department of Botany and Plant Sciences, University of California, Riverside

The 'Hass' clonal rootstock trial at the UC South Coast Research and Extension Center in Irvine, California, was established in 1986 and contains seven clonal rootstocks replicated 20 times. 'Hass' on Topa Topa rootstock was also included as a control treatment. Two additional rootstocks, G1033 and Thomas, were planted within the original planting design in 1987. The yield data collected over the last six years are reported in Table 1. The trends observed during the previous five years still were evident in the sixth year. Cumulative yield data through 1993 indicate that 'Hass' on either Duke 7 or Borchard consistently produce the greatest amount of fruit per tree *(Table 1, Figure 1).* The amount of fruit harvested in April 1993 from the entire trial was equivalent to approximately 25,000 pounds per acre. As observed in previous years, the three G755 rootstocks did not yield as well as the remaining five rootstocks that were planted in 1986. In fact, with the exception of the G755A, the average yield from these trees was less than that of 'Hass' on the Thomas rootstock that were planted in 1987.

Table 1. *Yield (kg/tree) for 'Hass' avocado on selected clonal rootstocks. Trees are harvested in April of each year.*

	Years from Planting					
Rootstock	2	3	4	5	6	7
Planted 1986						
G755A	254	253	218	171 a	164 c	223 ab
G755B	-	232	214	144 abc	160 c	220 ab
G755C	-	249	240	159 ab	153 c	205 c
Duke 7	276	275	263	151 ab	217 ab	219 ab
Borchard	250	271	288	156 ab	209 ab	225 a
D9	267	288	281	171 a	220 ab	220 ab
Toro Canyon	293	276	265	121 c	194 b	211 be
Topa Topa	263	262	263	138 be	230 a	212 abc
Significance[z]	*NS*	*NS*	*NS*	*0.01*	*0.01*	0.05
Planted 1987						
Thomas	250	252	166	168	213	.
G1033	250	290	170	157	223	.
Significance	*NS*	*NS*	*NS*	*NS*	*NS*	

[z] NS = not significant. Mean separation using LSD.

It is virtually impossible to compare directly the performance of the Thomas and G1033 rootstocks to the remainder of the trial since they were planted one year later. Except in year 4, no significant difference in yield between the two rootstocks has been observed. The cumulative yield for these two rootstocks is significantly different, however, at the

5% level. This can be explained by the lower yields observed with the G1033 rootstock in years 4 and 6.

Table 2. *Average fruit size (g) for 'Hass' avocado on selected clonal rootstocks. Trees harvested in April of each year.*

Rootstock	Canopy volume (m^3)	Yield Efficiency (kg/m^3)	Yield Efficiency (kg/m^3)	Canopy Volume (m^3)	Yield efficiency (kg/m^3)	Yield efficiency (kg/m^3)
Planted 1986	*4.5 years*	4 years	5 years	*6.5 years*	6 years	7 years
G755A	25.9	0.11 d	1.57 ab	56.2 ab	0.32 ab	1.56 b
G755B	28.0	0.05 d	0.64 b	51.4 be	0.41 a	1.37 b
G755C	32.3	0.03 d	0.79 b	44.7 be	0.11 bed	1.08 b
Duke7	28.6	1.10 a	2.55 a	53.2abc	0.22 abcd	2.49 a
Borchard	30.9	0.67 be	2.47 a	63.2 a	0.28 abc	2.24 a
D9	26.2	0.35 cd	2.38 a	49.1 be	0.1 9 abcd	2.38 a
Toro Canyon	29.4	0.60 be	2.19 a	43.9 c	0.10 cd	2.66 a
Topa Topa	29.1	0.72 b	2.88 a	52.5 abc	0.01 d	2.34 a
Significance[2]	*NS*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*
Planted 1987	*3.5 years*			*5.5 years*		
Thomas	28.5	1.26 a	-	39.67	2.00	-
G1033	24.1	0.75 b	.	35.92	1.68	.
Significance	*NS*	*NS*		*NS*	*NS*	

[z] NS = not significant. Mean separation using LSD.

Table 3. *Canopy volume and yield efficiency of Hass trees on selected clonal rootstocks. Trees are harvested in April of each year.*

	Years from Planting						
Rootstock	2	3	4	5	6	7	TOTAL
Planted 1986							
G755A	0.3 b	1.5 c	2.8 d	30.6 b	17.5 ab	83.8 be	136.7 c
G755B	0.0 b	1.7 c	1.1 d	16.7 b	23.1 a	68.9 cd	111.7 cd
G755C	0.0 b	0.8 c	0.9 d	24.6 b	5.6 be	49.6 d	81.6 d
Duke 7	0.6 b	6.7 ab	29.7 a	66.5 a	11.8 abc	129.4 a	244.7 a
Borchard	0.4 b	3.8 be	20.8 b	68.4 a	23.2 a	127.7 a	244.0 a
D9	1.1 b	1.3 c	9.3 cd	57.9 a	10.0 abc	110.3 ab	190.4 b
Toro Canyon	3.8 a	2.9 c	17.0 be	61.1 a	4.0 be	115.1 a	204.0 ab
Topa Topa	0.2 b	7.5 a	17.7 be	64.0 a	0.5 c	112.4 a	202.1 b
Significance [z]	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*
Planted 1987							
Thomas	0.8	3.0	35.2	16.1	71.7	.	120.8
G1033	0.2	4.1	19.3	17.1	58.4	.	98.7
Significance	*NS*	*NS*	*0.01*	*NS*	*NS*		*0.05*

[z] NS = not significant. Mean separation using LSD.

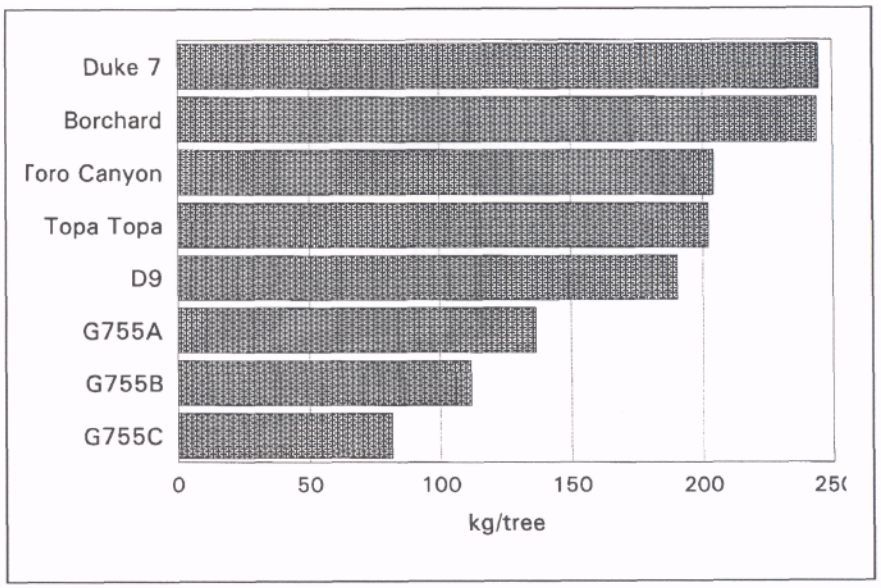

Figure 1. 'Hass' avocado cumulative yield on selected clonal rootstocks (two through seven years after planting). The trees were planted in 1986 at the UC - South Coast Research and Extension Center in Irvine, California.

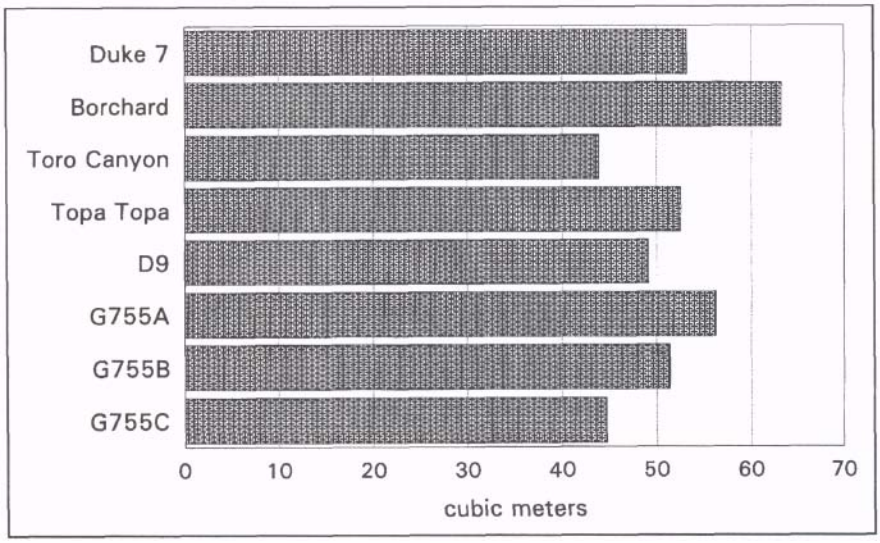

Figure 2. 'Hass' avocado canopy volume on selected clonal rootstocks 6.5 years after planting. The trees were planted in 1986 at the UC - South Coast Research and Extension Center in Irvine, California.

No significant differences due to rootstock were detected with regard to fruit size in years 2 through 4 *(Table 2).* Beginning in year 5, we have observed significant differences in fruit size related to rootstock. The differences related to rootstock,

however, are not consistent between years. It is interesting that there is no apparent difference in average fruit size when comparing the average fruit size for year 6 (an "off" year) to year 7 (an "on" year). No significant difference in fruit size between the Thomas and G1033 rootstocks has been observed.

Table 3 and *Figure 2* present the tree size information for the 'Hass' planting. Note that the Borchard rootstock has produced the largest tree (canopy volume at 4.5 years and 6.5 years) consistently through the trial. Note that in both years 5 and 7 (both "on" years) there were no significant differences detected in yield efficiency for the five highest producing rootstocks *(Table 3, Figure 3).* Also note that the yield efficiency for both these years is virtually the same, suggesting that an efficiency of approximately 2.2 kg per cubic meter of tree is the maximum production potential for 'Hass' avocado. No significant differences have been detected related to either canopy volume or yield efficiency between the Thomas and G1033 rootstocks.

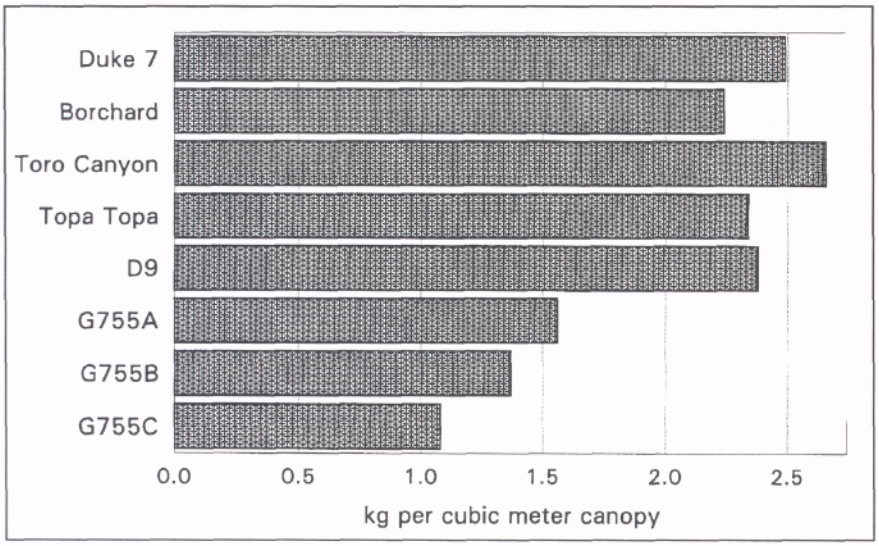

Figure 3. 'Hass' avocado yield efficiency on selected clonal rootstocks seven years after planting. The trees were planted in 1986 at the UC - South Coast Research and Extension Center in Irvine, California.

In May 1993, the second phase of the rootstock trial was planted. This was done in consultation with Dr. John Menge (Plant Pathology Department, UC, Riverside). The following eight rootstocks with 'Hass' as the scion are being compared: Duke 7, Thomas, D9, CR-180, UCR 2011, Dusa, Hibbard, and Queretero. The first three rootstocks are included as controls for the trial. In addition, we have included 20 trees of the 'BL-122' selection on Duke 7. These are included within the experimental design, so that as the trial progresses we can statistically compare 'Hass' to 'BL-122' on the Duke 7 rootstock.