

Avocado Rootstock and Cultivar Evaluation at Merensky Technological Services: A Progress Report

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ABSTRACT

The avocado clonal rootstock D9 compares favourably with Duke 7 for Hass under Westfalia conditions. In their first cropping season, Hass on the Westfalia rootstock selections Dusa (3,8 t/ha) and Latas (2,5 t/ha) out-yielded Hass/Duke 7 (1,5 t/ha). Another locally selected rootstock, Wilg (0,9 t/ha), has resulted in lower vigour Hass trees but decreased yields compared to Duke 7 (3,0 t/ha). Colin V33 interstocks between Hass and Duke 7 have similar production and vigour to Hass on Duke 7. A new avocado gene block incorporating 30 cultivars is expected to produce its first crop in 1998.

COMMERCIAL EVALUATION OF IMPORTED AND LOCALLY SELECTED ROOTSTOCKS FOR HASS

The avocado rootstocks Thomas, Barr Duke and D9 with Hass as the scion, have been compared to Hass on Duke 7, on a semi-commercial scale at Westfalia Estate since 1989 at the farm Fowey (100 trees per rootstock), since 1991 at Evenrond Farm (100 trees per rootstock) and Westfalia Farm (20 trees per rootstock).

In the past none of the new rootstocks were found to be superior to Duke 7 for the cv. Hass (Roe *et al.*, 1995; Roe & Köhne, 1996) but during the 1996 season, the second high-rainfall year since the drought, D9 out-yielded Duke 7 at two out of three sites (table 1).

Hass on Thomas has produced good yields at only one site (table 1) and therefore this rootstock still cannot be recommended for our conditions. The lower vigour imparted to Hass by D9 and Barr Duke is desirable from a high density planting point of view.

Trees of Hass on the two locally selected rootstocks Latas and Dusa were planted in 1993 for semi-commercial evaluation against Hass on Duke 7. The first crop was harvested in 1996 (figure 1). A Hass yield on both of the local selections was greater than on Duke 7 rootstock, but no conclusions can be drawn from a single season's data.

From the above results, Duke 7 is still the recommended rootstock for Hass, but D9 appears to be a possible alternative under good growing conditions. Thomas seems sensitive to its environment and probably needs optimal management.

HASS TREE SIZE CONTROL BY LOW VIGOUR ROOTSTOCKS AND INTERSTOCKS

In order to become more efficient in our orchards, tree size control is becoming of paramount importance in the deep red, well drained soils of the South African summer rainfall areas. The ultimate long-term solution is to have genetic low vigour. Ryan, a low vigour fruiting cultivar. Colin V-33, a Mexican low vigour selection which has been used successfully as a dwarfing interstock of Fuerte trees in Mexico (Barrientes Priego, 1987), and Wilg, a Westfalia escape tree selection, are being tested as low vigour rootstocks for Hass, compared to Duke 7. Colin V-33 is also being evaluated as an interstock between Duke 7 and Hass, and is being compared to Hass on Duke 7.

Wilg has exhibited the greatest dwarfing effect thus far (figure 2). It has also proven to be precocious, with some fruit being borne during the first year. However, production during its second year of growth was practically non-existent, probably due to alternate cropping resulting from the overload caused by its initial precocity. During 1996, the third growth seasons, Hass/Wilg produced a 69% smaller crop than Hass/Duke 7. However this is only the first crop and the next few crops will be noted with interest.

Ryan and Colin V-33 rootstocks have had little dwarfing effect on Hass and results have been variable so far. Hass yields have been poor on these rootstocks.

Colin V-33 as an interstock also produced fruit during its first year in the field (Roe *et al*, 1995). The second year of growth was a drought year and therefore no crop was set. Cropping of Colin V-33 interstocked trees in 1996 was similar to Hass/Duke 7, as was the tree vigour (figure 3). A semi-commercial planting of Hass/Colin V-33/Duke 7 has been established in 1995 for more extensive evaluation, and the first crop is expected during 1998.

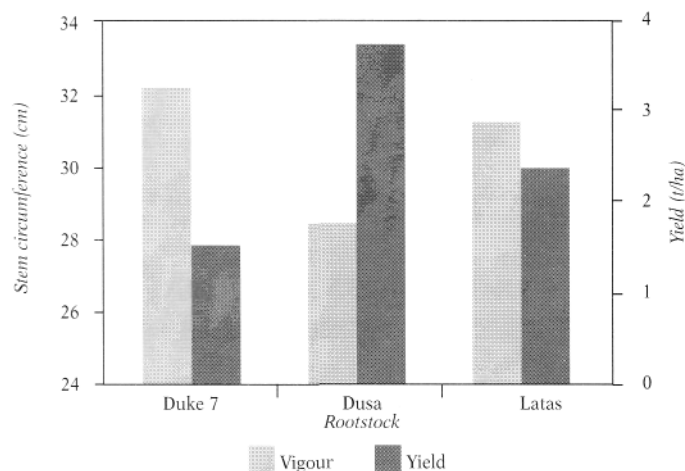
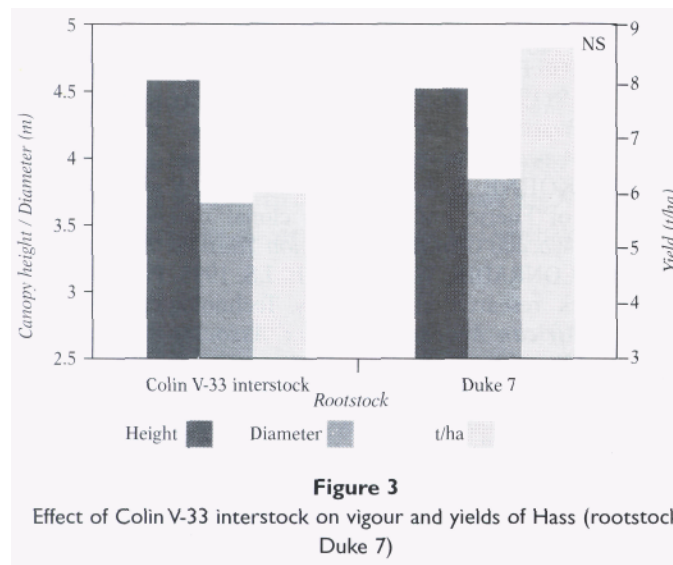
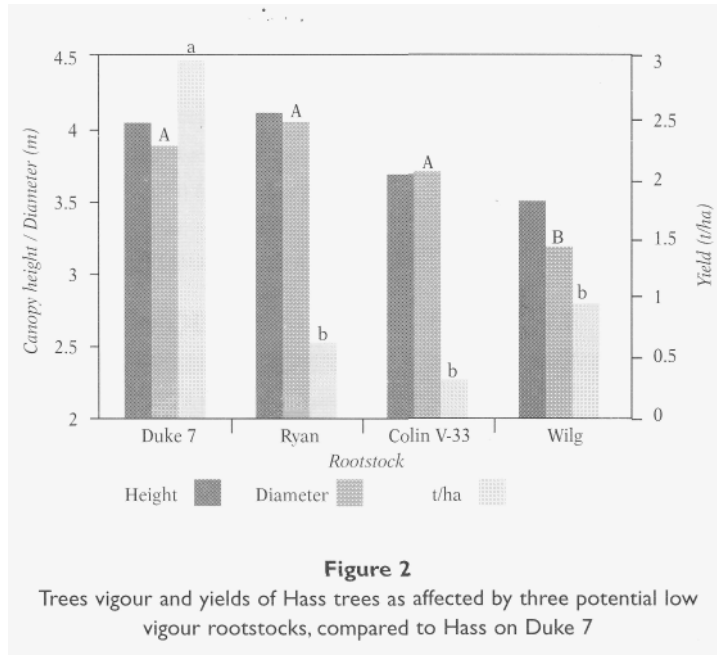


Figure 1

Hass yields and trees vigour on Westfalia rootstock selections compared to Duke 7. This is the first crop from trees planted 1993



EVALUATION OF SCION CULTIVARS

A new gene pool orchard was established in 1994. Thirty avocado cultivars have been top-worked onto Hass/Duke 7 trees. The orchard has been extended during 1996 to cater for new cultivar imports. The first crop from the top-worked trees is expected in 1998.

Table 1
Tree size data and yields (t/ha-l) from commercial plantings of Hass avocado on different rootstocks at three localities

	Duke 7	D9	Rootstock Barr Duke	Thomas	G755	LSD	Level of Significance
Zedelingshoek farm (Planted 1989, affected by soil problems)							
<i>Stem circumference (cm)</i>							
1992	32,9b	27,9c	28,8c	31,8b	37,2a	1,21	0,01
1994	43,3a	39,6b	39,9b	42,8a	-	1,49	0,01
1995	50,4a	45,4c	45,4c	48,7b	-	1,66	0,01
1996	54,9a	50,1b	49,4b	53,5a	-	1,84	0,01
<i>Yield (t/ha)</i>							
1992	0,25	0,03	0,01	0,37	0,05	-	-
1996	2,9bc	10,0a	5,0b	1,1c	-	3,2	0,01
Cumulative	3,2bc	10,03a	5,01b	1,47c	-	3,3	0,01
Evenrond Farm (planted 1991, severely affected by drought)							
<i>Stem circumference (cm)</i>							
1993		20,8	21,3	21,4		NS	
1994		30,4b	31,6a	32,2a		1,12	0,01
1995		30,9	39,1	39,9		NS	
1996		45,3	44,7	45,6		NS	
<i>Yield (t/ha)</i>							
1994	(0,95)	2,81a	2,43b	2,69b		0,32	0,05
1995	(6,76)	5,24a	2,53b	0,04c		1,10	0,01
1996	(1,7)	4,5a	2,0b	0,6c		1,19	0,01
Cumulative	(9,41)	12,55a	6,96a	2,79c		1,25	0,01
Westfalia Farm (planted 1991, not severely affected by drought)							
<i>Stem circumference (cm)</i>							
1995	30,5a	24,3b	28,5a	30,0a		3,292	0,01
1996	40,9a	32,0c	36,8b	39,3ab		4,04	0,01
<i>Yield (t/ha)</i>							
1995	6,9a	2,9c	3,4c	4,9b		1,53	0,05
1996	4,5a	4,4a	4,4a	5,1a		1,62	0,05
Cumulative	11,4a	7,3b	7,8b	10,0ab		3,15	0,05

*Means in each row followed by the same letter are not significantly different according to two way ANOVA.

NS = Non-significant

Data in parenthesis are from 60 Hass/Duke 7 trees planted at the same time as, in similar soils as, and within 300 m of the rootstock trial at Evenrond Farm; no statistical comparison with Duke 7 was done.

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REFERENCES

- BARRIENTOS PRIEGO, A., LOPEZ JIMINEZ, A. & SANCHEZ COLIN, S. 1987. Effect of cv Colin V-33 as interstock on avocado (*Persea Americana* Mill) growth, cv Fuerte. *South African Avocado Growers' Association Yearbook* 10: 62 - 64.
- 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.
- ROE, D.J., CONRADIE, W. & KÖHNE, J.S. 1995. Progress with rootstock research at Merensky Technological Services. *South African Avocado Growers' Association*

Yearbook 18: 10 - 11.

ROE, D.J., KREMER-KÖHNE, S. & KÖHNE, J.S. 1996. A progress report of avocado rootstock research at Merensky Technological Services. *South African Avocado Growers Association Yearbook 19: 26 - 27.*