

## HORTICULTURAL PERFORMANCE OF IMPORTED CULTIVARS AND ROOTSTOCKS IN THE NORTH-EASTERN TRANSVAAL

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### ABSTRACT

*The performance of Hass on five imported rootstocks, viz: Thomas, D9, Barr Duke, Duke 7 & G755, was reported on. In their first year of bearing. Hass on Thomas had the best yield. D9 and Barr Duke showed the poorest yield and poorest internal fruit quality. Even at this early stage the vigour of Hass on G755 was evident.*

*Evaluation of 14 imported cultivars was then discussed. Gwen & T142 showed the most potential and these were discussed.*

*Imported rootstock and cultivar material was evaluated on Westfalia Estate in the north-eastern Transvaal for their horticultural performance.*

### ROOTSTOCKS INTRODUCTION

It is known that the yield, quality and vigour of a cultivar is markedly affected by the rootstock (Ben-Ya'acov, 1987; Arpaia, Bender & Whitney, 1990; Köhne, 1991) and therefore the influence of a number of imported rootstocks on cultivar 'Hass' was evaluated.

### MATERIALS AND METHODS

The following rootstocks were used with 'Hass' as the scion:

1. Thomas
2. D9
3. Barr Duke
4. Duke 7
5. G755

Duke 7 was considered as the control and G755 included to confirm previous findings using this rootstock (Köhne, 1991).

Trees were planted at a 5 x 5 m spacing in January of 1990. One hundred (100) trees per rootstock were used to evaluate stem circumference and yield in 1992. A sample of fruit in the size range 266 350g was taken from each rootstock scion combination and stored for four weeks at 5°C. There after the temperature was increased to 18°C to

induce ripening and soft fruit were evaluated for internal and external quality. Fruit internally clean of the physiological disorders pulp spot, grey pulp and vascular browning were referred to as clean fruit.

## RESULT AND DISCUSSION

There was a significant difference in tree size (determined by stem circumference) between the different rootstocks (Table 1).

**TABLE 1** Stem circumference (cm) of five different rootstocks with cultivar 'Hass'

Rootstock	Stem circumference	(cm) <sup>1</sup>
G755	37,2	a
Duke 7	32,9	b
Thomas	31,8	b
Barr Duke	28,8	c
D9	27,9	c

<sup>1</sup> Mean separation by Duncans' multiple range test at the 5% level

**TABLE 2** Yield of 2½ year old 'Hass' on five different rootstocks

Rootstock	Kg/100 trees
Thomas	92,68
Duke 7	62,05
G755	12,05
D9	7,37
Barr Duke	3,13

**TABLE 3** 'Hass' internal fruit quality expressed as the percentage fruit clean of pulp spot, grey pulp and vascular discoloration

Rootstock	% Clean fruit
Duke 7	100
G755	100
Thomas	96,2
Barr Duke	70
D9	64,3

As expected, the G755/Hass combination was significantly larger than all others with D9 and Barr Duke being significantly smaller than the other combinations.

On such young trees, yield was obviously very low and it was therefore decided to express the yield as kilograms per 100 trees. Results are shown in Table 2. Fruit quality results are shown in Table 3.

Preliminary results have therefore shown that Thomas outperformed the Duke 7 'control' in terms of yield and compared favourably in terms of internal quality. 'Hass' has a history of excellent internal fruit quality and the quality results of Barr Duke and D9 were therefore surprising, but could perhaps be associated with the very low yield.

Obviously discussions on rootstocks/scion combinations are not based on one years' data and results will have to be accumulated over at least a four year period of normal bearing. However, it is evident that even at this early stage the known vigour and poor yield of G755 compared to Duke 7 is evident.

## **CULTIVARS INTRODUCTION**

Over and above yield, flavour and time of harvest the following three points are just a few problem areas that we can attempt to alleviate by cultivar selection.

- 1. Fruit size:** 'Hass' has a small fruit size problem (Köhne & Schutte, 1991) and therefore selection of a larger black skin is important.
- 2. Quality:** In the case of selection of a green skin this is an important area to consider.
- 3. Growth habit and form:** Control of tree size and vigour is a problem in the north-eastern Transvaal and therefore selection of a more erect, compact cultivar should be borne in mind.

**TABLE 4** Summary of 1992 cultivar evaluation

Cultivar	H670	Lohneiss Hass	PT37	Reed	T142	TX531
Growth Habit	Hass type	Moderate, upright to spreading	Moderate, slightly spreading	Moderate, spreading to erect	Strong, slightly spreading	Strong, slightly spreading
Fruit Colour	Black	Semi-black	Green	Green	Black	Green
Fruit Weight (g)	187 - Count 21	198 - Count 20	319 - Count 13	316 - Count 13	405 - Count 10	289 - Count 14
Seed : Fruit Ratio	0,665	0,644	0,50	0,595	0,598	0,583
Skin Thickness (mm)	0,17	0,163	0,275	0,20	0,155	0,09
Taste	Excellent	Average	Average	Poor	Good	Excellent
Quality	Good	28% Vascular discolour	Poor. Lentidamage and 56% vascular discolour	Poor. 100% vascular discolour	Good	Average. Vascular discolour and grey pulp
Comments	Is Hass	High percentage of vascular discolour	Seed loose in cavity and flesh loose in skin. Only enough fruit for one evaluation	Seed cavity is black. Hard skin - difficult to determine when ripe	Sibling of Gwen. Even when black on tree it still stored well.	Good taste but poor yield and dubious quality

CULTIVAR	BALBOA ATKINS	ETTINGER	4TH GEN. HASS	GWEN	HAZZARD	H22	H287
Growth Habit	Moderate, slightly spreading (rounded)	Levubu Fruit	Slow, slightly spreading (rounded)	Moderate, upright	Slow, rounded	Strong, upright to spreading	Moderate, spreading
Fruit Colour	Black	Green	Green	Green	Green - Black	Green	Green - Black
Fruit Weight (g)	259 - Count 15	283 - Count 14	272 - Count 15	219 - Count 18	308 - Count 13	212 - Count 19	120 - Count 33
Seed : Fruit Ratio	0,658	0,617	0,667	0,590	0,635	0,635	0,588
Skin Thickness (mm)	0,08	0,05	0,08	0,17	0,18	0,11	0,18
Taste	Poor	Good	Poor	Very good	Poor	Good	Very good
Quality	Poor. Severe vascular discolouration	25,9% Vascular discolour 3,7% grey pulp	23% Vascular discolour.	Good but some vascular discolouration and grey pulp	Poor - High (68%) vascular discolour	Good until mid - August	Poor Vascular discolouration (89%)
Comments	Poor cultivar from all aspects of evaluation	Vascular browning rating was low on a per fruit basis	Poor taste and quality. Pedicel very large. Skin rough. Seed loose in cavity	Creasing around pedicel end was a problem. Pronounced vascular	Poor taste and quality	Mid season green skin. Small fruit	Very small fruit and severe vascular discolouration

## MATERIALS AND METHODS

Thirty eight cultivars are currently under evaluation of which 14 had sufficient fruit for evaluation during the 1992 season. Beginning in February, eight fruit per cultivar were sampled on a fortnightly basis and allowed to ripen at 18°C. Once it was apparent that a cultivar was approaching horticultural maturity, larger batches of fruit were then put through cold storage at 5°C for 28 days, allowed to ripen at 18°C and then evaluated for external and internal appearance and taste.

## RESULTS AND DISCUSSION

A full summary of the 1992 evaluation is shown in Table 4.

One cultivar not in Table 4 is 'Negra de la Cruz' (varieties Wolf, Schmidt & Puos) an early, smooth skinned black fruit. All varieties averaged 180 g (count 22) in size and has a very poor taste. Internally all varieties showed very severe vascular discolouration. It is possible that evaluation in February of this cultivar was already too late as some fruit were starting to blacken on the trees. It was therefore decided to evaluate this cultivar further.

Of the cultivars evaluated 'Gwen', 'T142' and 'TX531' showed the most potential although they are not without their problems. 'TX531' was very popular with the taste panel but did not appear to be a prolific bearer, shows vigorous growth and needs further evaluation from an internal quality aspect. 'T142' is a very large (count 10) black skin, with good taste and internal quality from July to September.

'Gwen' was popular with the taste panel although rated lower than 'Hass'. Fruit was ready to pick in May with some batches emerging from cold storage with vascular discolouration (17%) and others totally clean, that is, variable quality. Fruit hung till November was of excellent quality.

A consignment of 'Gwen' was sent to the SAAGA representative in France, Jerome Hardy, who evaluated fruit in conjunction with a panel of twelve French consumers. Fruit arrived in late July with a firmometer reading of 23.1 and were internally clean with 2,9% lentidamage externally. Consumers gave very favourable feedback and the fruit was received positively. Two potential problems of 'Gwen' may be firstly, lentidamage, due to its rough skin, and secondly 'creasing' around the pedicel end throughout the sampling period. Further evaluation is therefore required.

Unfortunately fruit set in the cultivar block for the 1993 evaluation has been very poor with the majority of cultivars not bearing at all.

## REFERENCES

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