

Progress with the Phase-II Avocado Evaluation Programme and its Value to the Industry

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ABSTRACT

Phase-II scion and rootstock avocado trials planted during 1993 at the Levubu research station produced their first crop in the 1994/95 season. It is still far too early to draw any conclusions on the merits of different cultivars. A few observations should however be kept in mind in analyzing data in future seasons and in other trials:

- Early growth of scion cultivars seem to be more lush on Thomas rootstock. Fast growth was uniformly recorded on Duke 7 rootstock.
- Fruit yield of Pinkerton and Ryan in their first production season seem to be better than with the other lines.

INTRODUCTION

Two of the most valued ingredients for successful Phase-II evaluation are time and patience. Time is required because of the lengthy process from initial planning until results start accumulating. Patience is required to forestall hasty conclusions drawn on insufficient data. The rewards for time and patience could however, be huge.

Problems stated by Knight & Winters (1971) and Terblanche (1988) regarding the importance of improving the local scion and rootstock cultivars include the low production potential, alternate bearing and small fruit sizes, excessive growth vigour and susceptibility to pests and diseases.

Ben-Ya'Acov (1987) emphasized the advantages of having an effective Phase II programme by stating that:

- Rootstock type can affect productivity of the scions. An instance was recorded where Fuerte production was increased by 120 percent with the correct rootstock.
- The rootstock scion combination is important in itself and in some cases a certain combination can be nonproductive, whereas the rootstock or scion of this combination is productive with another partner.
- In Israel the productivity as influenced by rootstock scion combination was consistent over several years.
- Rootstocks affect tree size and consequently also productivity per unit area.

The first ITSC Phase-II avocado trials were established in March 1993. Early data on growth and yield will be discussed. Later additions to the scion and rootstock trials will be omitted from this discussion.

MATERIALS AND METHODS

The aims, methods and materials of the ITSC's Phase-II avocado evaluation project were discussed by Sippel, Bijzet, Snijder and Du Plooy (1994). Only brief overviews of the March 1993 plantings are therefore repeated. Ten scion cultivars were included in the scion Phase-II trial:

- Four vegetative Fuerte selections
- Hass
- Pinkerton
- Ryan
- Gwen
- 87-7-1 (Wurtz selection)
- 87-17-1 (Edranol selection)

Two trees per scion cultivar per rootstock were established. Rootstocks used are Duke 7, Thomas and Barr Duke. The trial was planted at Burgershall and Levubu research stations.

Later additions to the trial, excluded from this discussion, include newly imported cultivars and an increase in the number of trees planted per cultivar per rootstock. In the rootstock Phase-II trial, Fuerte, Hass, Pinkerton and Ryan cultivars were grafted on Duke 7, G6, Thomas, Duke 9 and Martin Grande rootstocks. Once again two trees per rootstock were established at Burgershall and Levubu research stations.

RESULTS

Only data from the Levubu trials will be discussed as these trees already produced their first crop. The trees at Burgershall did not perform as well as those at Levubu, and no crop was recorded at this site for the past season.

Scion evaluation programme

Tree height (Levubu)

Table 1 summarizes tree height data taken at the Levubu trial. Scions on Thomas seem to have grown somewhat better than on Duke 7 and on Barr Duke. The typical compact size of Ryan is noticeable from the data. The two selections, 87-7-1 and 87-17-1 grew particularly well on both Thomas and Barr Duke. Barr Duke shows promise as a possible dwarfing rootstock.

Table 1 Avocado tree height data from the scion Phase-II trial at Levubu. <i>TREE HEIGHT (m)</i> Levubu Avocado Phase-II Scion Evaluations Date planted: March 1993 Date measured: 13/02/95 <i>Rootstocks</i> <i>Duke 7 Thomas Barr Mean</i> <i>Duke</i>				
Fuerte	1,87	1,98	1,92	1,92
Hass	1,93	1,75	1,40	1,69
Pinkerton	1,75	1,53	1,95	1,74
Ryan	1,38	1,50	1,18	1,35
Gwen	1,73	1,80	1,33	1,62
87-7-1	1,93	2,15	2,30	2,13
87-17-1	1,80	2,15	2,38	2,11
Mean	1,77	1,84	1,78	

Stem diameter (Levubu)

Stem diameter data (Table 2) shows trends very similar to tree height.

Table 2 Avocado stem diameter data from the scion Phase-II trial at Levubu. <i>STEM DIAMETER (mm)</i> Levubu Avocado Phase II Scion Evaluations Date planted: March 1993 Date measured: 13/02/95 <i>Rootstocks</i> <i>Duke 7 Thomas Barr Mean</i> <i>Duke</i>				
Fuerte	69,4	70,0	68,2	69,2
Hass	75,0	79,3	71,8	75,4
Pinkerton	54,0	59,7	69,7	61,1
Ryan	58,7	62,3	38,5	53,2
Gwen	55,3	61,8	44,5	53,9
87-7-1	57,1	83,8	75,9	72,3
87-17-1	54,4	70,4	77,7	67,5
Mean	60,6	69,6	63,8	

Number of fruit (Levubu)

Cultivars in this trial produced their first crop in the past season. All yield data must therefore be regarded as very circumstantial. It is however interesting to note (Table 3) that scions on Duke 7 performed best, and that Pinkerton and Ryan seem to be earlier producers than the rest.

Table 3 Avocado on tree yield data from the scion Phase-II trial at Levubu. <i>AVERAGE NUMBER OF FRUIT</i> <i>Levubu Avocado Phase II Scion Evaluations</i> <i>Date planted: March 1993</i> <i>Date counted: 13/02/95</i> <i>Rootstocks</i> <div> <i>Duke</i> <i>Thomas</i> <i>Barr</i> <i>MEAN</i> <i>7</i> <i>Duke</i> </div>				
Fuerte	1,4	1,1	2,4	1,6
Hass	18,0	6,0	7,5	10,5
Pinkerton	23,5	14,0	14,0	17,2
Ryan	27,0	12,0	8,5	15,8
Gwen	3,0	1,5	5,0	3,2
87-7-1	0,5	0,0	1,5	0,7
87-17-1	0,0	1,0	0,0	0,3
MEAN	10,5	5,1	5,6	

% Increase in tree height (scion rootstock combinations)

Scion/rootstock comparisons of Fuerte and Hass are illustrated in Table 4. It is only at Burgershall with Fuerte on Thomas where the Duke 7 rootstock was outperformed. The Barr Duke rootstock did not grow as vigorously as the rest.

Table 4
Percentage increase in height over one year of Hass and Fuerte avocado trees in Phase-II scion trials.

% INCREASE IN TREE HEIGHT
Date planted: March 1993
Dates measured: January 1994 & February 1995

	<i>Burgershall</i>	<i>Levubu</i>
Fuerte/Duke 7	31,9	18,7
Fuerte/Thomas	33,1	11,1
Fuerte/Barr Duke	22,1	18,7
Hass/Duke 7	37,8	18,7
Hass/Thomas	31,3	13,3
Hass/Barr Duke	-	16,7

Rootstock evaluation programme

Tree Height (Levubu)

Data on tree height are reported in Table 5. Scions on Duke 7 were very similar in height than those on Martin Grande, with scions on Thomas, G6 and Duke 9 rootstocks being on average larger. Ryan scions tended to be very compact.

Table 5
Avocado tree height data from the rootstock Phase-II trial at Levubu.

TREE HEIGHT (m)

Levubu Avocado Phase II Rootstock Evaluations
Date planted: March 1993
Date measured: 13/02/95

	<i>Rootstocks</i>					
	<i>Duke 7</i>	<i>Thomas</i>	<i>G6</i>	<i>Duke 9</i>	<i>MG</i>	<i>MEAN</i>
Fuerte	1,83	2,08	2,05	1,95	1,88	1,96
Hass	1,88	2,23	2,08	2,08	1,95	2,04
Pinkerton	1,98	2,20	1,98	2,03	1,95	2,03
Ryan	1,44	1,51	1,56	1,44	1,40	1,47
MEAN	1,78	2,01	1,92	1,88	1,80	

MG = Martin Grande

Stem diameter (Levubu)

Duke 7 and Thomas rootstocks were very similar, whilst the G6 rootstock produced more sturdy plants with Hass and Ryan as scions. Duke 9 and Martin Grande

rootstocks had overall the thinnest stems (Table 6).

Table 6
Avocado stem diameter data from the rootstock Phase-II trial at Levubu.

STEM DIAMETER (mm)
Levubu Avocado Phase II Rootstock Evaluations
Date planted: March 1993
Date measured: 13/02/95

	<i>Rootstocks</i>					
	<i>Duke 7</i>	<i>Thomas</i>	<i>G6</i>	<i>Duke 9</i>	<i>MG</i>	<i>MEAN</i>
Fuerte	81,7	88,4	86,1	78,9	77,0	82,4
Hass	80,5	77,1	85,6	78,0	79,8	80,2
Pinkerton	72,3	81,9	79,6	67,9	74,0	75,1
Ryan	69,3	58,4	76,7	56,5	54,2	63,0
MEAN	75,9	76,5	82,0	70,3	71,3	

MG = Martin Grande

Number of fruit (Levubu)

Fuerte produced true to form at the lower end, followed by Hass and Ryan, with Pinkerton being the best producer (Table 7). The Pinkerton cultivar did exceptionally well on Thomas and Duke 7 rootstocks. Ryan on the other hand did better on Martin Grande, whilst Hass did the best on Duke 9.

Table 7
Avocado on tree yield data from the rootstock Phase-II trial at Levubu.

AVERAGE NUMBER OF FRUIT
Levubu Avocado Phase II Rootstock Evaluations
Date planted: March 1993
Date counted: 13/02/95

	<i>Rootstocks</i>					
	<i>Duke 7</i>	<i>Thomas</i>	<i>G6</i>	<i>Duke 9</i>	<i>MG</i>	<i>MEAN</i>
Fuerte	1,0	0,0	3,5	0,0	0,0	0,9
Hass	16,0	5,0	15,5	18,0	7,7	12,4
Pinkerton	41,5	42,5	21,5	8,5	27,0	28,2
Ryan	22,0	20,0	15,5	14,5	23,0	19,0
MEAN	20,1	16,9	14,0	10,3	14,4	

MG = Martin Grande

SUMMARY

Phase-II scion and rootstock avocado trials planted during 1993 at the Levubu research

station produced their first crop in the 1994/95 season. It is still far too early to draw any conclusions on the merits of different cultivars. A few observations should however be kept in mind in analyzing data in future seasons and in other trials:

- Early growths of scion cultivars seem to be lush on Thomas rootstock. Fast growth was uniformly recorded on Duke 7 rootstock.
- The typical compact growth habit of Ryan was confirmed, albeit only at this early stage, in all trials.
- Fruit yield of Pinkerton and Ryan in their first production season seem to be better than with the other lines.

CONCLUSION

The value of this programme to the industry is various. The dwarfing effect of Barr Duke should be noticed, especially for Hass, Ryan and Gwen. If small yield differences at this stage could also carry through to future years, Barr Duke should be used as a possible rootstock for Gwen.

If the industry is to benefit from a Phase-II evaluation programme, adequate time should be allowed for in-depth studies. This would ensure that mistakes such as Rinton and Martin Grande to a lesser extent would not reoccur. A new scion should only be introduced if it has a better quality than the current cultivars and if there exists a market window for it. Only after these two requirements are fulfilled, should yield become an important parameter. With the rootstocks the industry has currently a very good performer in Duke 7. However, to rely on the few rootstocks currently available could be disastrous to the industry and more high-yielding rootstocks, preferably with dwarfing abilities, should be found soon.

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