

Cultivar and Selection Performance in the Avocado Phase II Evaluation Programme: 1997

A.D. Sippel, B. Snijder, C.W. Matsha & Z. Bijzet.

ARC-Institute for Tropical and Subtropical Crops, Private Bag X11208, Nelspruit 1200

ABSTRACT

The purpose of a Phase II evaluation programme is to gather information on current commercial cultivars, as well as on new imported and local selections with regard to their horticultural performance and scion/rootstock interactions. Data from orchards established at Levubu and Burgershall are reported on. In the commercial cultivar evaluation trial at Levubu, the Pinkerton was overall the best producer with nearly 50 kg fruit per tree on average. Gwen on Duke 7 was found to be a solid performer with a cumulative yield over three years of 58.3 kg/tree. This cultivar could fill a local late season market niche. Of the new imported selections at both Levubu and Burgershall, I 373, #86, BL 135 and TX 531 performed very well and should be further evaluated, with OA 184 and H 222 as strong contenders for a place in the market. Only one local selection, namely Eksteen, has possibilities.

UITTREKSEL

Die doel van 'n Fase II evaluasie program is om inligting in te samel aangaande die tuinboukundige prestasie en die bostam/onderstam interaksie van ou kultivars sowel as van nuwe ingevoerde en lokale seleksies. Data van boorde gevestig by beide Levubu en Burgershall word weergegee. In die boord met kommersieele kultivars, gevestig by Levubu, was Pinkerton die beste presteerder gedurende die afgelope jaar met gemiddeld 50 kg vrugte per boom. Daar is gevind dat Gwen 'n goeie, stabiele presteerder is met 'n kummulatiewe opbrengs van 58.3 kg/boom oor drie jaar. Die kultivar kan 'n lokale laat seisoen mark nis vul. Van die nuwe ingevoerde seleksies wat by beide Levubu en Burgershall aangeplant is, het I 373, #86, BL 135 en TX 531 goed gedoen en behoort hulle verder ge-evalueer te word. OA 184 en H 222 behoort ook dopgehou te word aangesien hulle ook goed presteer het. Siegs een lokale seleksie, naamlik Eksteen, toon tans belofte.

INTRODUCTION

Avocado Phase II evaluations are being done to gather information on current commercial cultivars, as well as on new selections with regard to their horticultural performance and scion/rootstock interaction. These evaluations are done in two production areas in order to select the best scion-rootstock combination for the given region.

MATERIALS AND METHODS

Details of the different plantings were presented during the 1997 research symposium and are fully described in the latest yearbook (Sippel *et al.* 1997).

RESULTS & DISCUSSION

Levubu: Orchard A2:

Various of the main cultivars, comprising of four Fuerte selections, Hass, Pinkerton and Ryan have been planted in this orchard. Gwen was also added for evaluation as a possible green fruit replacement for Hass, whilst two selections made at Burgershall Research Station are also being evaluated.

Table 1 presents the yield data per tree for the years 1995, 1996 and 1997. It is evident from the data presented that the Pinkerton cultivar on all three rootstocks performed the best during the last season with consistent high yields of around 49.8 kg (or 12.4 cartons) per tree. No differentiation can be made between the yield of this cultivar on the different rootstocks. The average Pinkerton fruit size was 302 g/fruit.

Hass was the second best producer during the past year with an average of 44.9 kg (or 11.2 cartons) per tree for the group. After three years of production it is now evident that Hass on Duke 7 performs better than Hass on either Thomas or Barr Duke. The Hass on Duke 7 is also the overall leader in production with a cumulative yield over three years of 77.2 kg/ tree, 8.4 kg better than Pinkerton on Duke 7. However, the Pinkerton trees on Thomas and Barr Duke outperformed the Hass trees on these same rootstocks. Average fruit size in the Hass group is below standard, being 141 g/fruit.

Table 1: Yield per tree of avocado cultivars as recorded in 1995, 1996 and 1997 for the trial planted in block A2 at Levubu

	Yield per tree 1995 (kg)	Yield per tree 1996 (kg)	Yield per tree 1997 (kg)	Cummulative yield per tree
Fuerte/Duke 7	0.0	3.8	20.1	23.9
Fuerte/Thomas	0.0	3.7	15.5	19.2
Fuerte/Barr Duke	0.0	3.4	16.3	19.7
Hass/Duke 7	6.6	19.7	50.9	77.2
Hass/Thomas	2.3	13.2	36.8	52.3
Hass/Barr Duke	1.5	10.6	47.1	59.2
Pinkerton/Duke 7	4.0	16.4	48.4	68.8
Pinkerton/Thomas	1.3	12.9	50.1	64.3
Pinkerton/Barr Duke	0.0	14.6	50.8	65.4
Ryan/Duke 7	9.7	2.3	8	20.0
Ryan/Thomas	5.7	17.3	14.3	37.3
Ryan/Barr Duke	3.3	8.7	5.8	17.8
Gwen/Duke 7	2.4	12.1	43.8	58.3
Gen/Thomas	1.0	13.2	25.8	40.0
Gwen/Barr Duke	2.6	7.3	17.9	27.8
87-7-1/Duke 7	0.4	2.0	9.5	11.9
87-7-1/Thomas	0.0	3.0	9.6	12.6
87-7-1/Barr Duke	0.0	9.1	14.9	24.0
87-17-1/Duke 7	0.0	10.4	7.6	18.0
87-17-1/Thomas	0.0	3.7	6.8	10.5
87-17-1/Barr Duke	0.0	24.8	18.3	43.1

The Gwen cultivar, being evaluated as a possible green fruit replacement in the Hass season, performed reasonably well on Duke 7 with a yield of 43.8 kg/tree during the past season. Unfortunately Gwen on Thomas and on Barr Duke did not perform very well with yields well below that of Hass in general. The average fruit size of the group, at 232 g/fruit, is however far better than that of Hass.

Ryan did not perform well at all and the cumulative yields of all three combinations are even below that of Fuerte. Ryan on Thomas seems to be performing better than the other two combinations.

The two Burgershall selections did not perform as expected. The 87-7-1 selection on Barr Duke and 87-17-1 on Duke 7's cumulative yield for the three years are very similar to the performance of Fuerte in general. It should be noted that the cumulative yield of 87-17-1 on Barr Duke is about double that of Fuerte.

Levubu: Orchard A1

In this orchard eleven imported selections and one local selection are being evaluated with Edranol as standard.

From the yields of 1997 four of these selections performed better than Edranol, having an average of 34.5 kg fruit /tree (table 2). These were Eksteen, I 373, H 222 and #86. However, based on fruit counts made and expected fruit size, none of the selections are expected to outperform Edranol during the coming season. BL 135 and H 222 do have the potential to produce at the same level, as could TX 531. However, small fruit sizes could lower the yield of TX 531.

Table 2.Yield per tree (1997 season) for imported and local selections planted in the avocado Phase II evaluation orchard A1 at Levubu.

Cultivar/ Selections	Yield 1997 (Kg)	Number of fruit Feb. 1998	Expected yield 1998 (Kg)
BL149	0.9	11.4	4.97
OA 184	12.96	6.3	1.54
BL135	16.02	73.2	25.18
Hayes	4.94	11.7	2.94
Eksteen	42.07	3.2	1.69
I 373	43.57	1.2	0.5
Edranol	34.5	98.5	30.14
NA 37	3.15	26.2	12.71
H 222	47.59	105	24.36
TX531	21.02	101.7	14.95
Reed	26.92	22	6.73
#86	36.03	30.7	9.88
NA 526	15.83	18.5	4.50

Table 3 presents the average fruit sizes, showing the fruit sizes of the different imported and locally selected selections. The small size of TX 531, namely 147 g/fruit, comparable to that of Hass, is clearly a problem for this selection.

Based on performance history of these trees, with number of fruit per tree as indicator, the best performance came from H 222 and TX 531, closely followed by Edranol (Table 4). The I 373 selection also performed well at an average of 51.4 fruit/tree over the 3 years, but it is showing a strong alternate yield pattern.

Burgershall B3

The Burgershall B3 orchard contains the same selections as those at Levubu A1 with the exception of H 222, being replaced by Colin-V-33. Unfortunately a fire destroyed a portion of the control trees, with only 3 trees instead of 15 being left for comparison purposes.

Above-mentioned fact in mind, it was found that only two selections, namely I 373 and Eksteen performed better than Edranol during the past season, with an average yield of 29.3 kg/tree and 22.7 kg/tree respectively (table 5).

Based on mid-season fruit counts and average fruit sizes, it seems as if none of the selections will perform better than Edranol during the coming season. However, indications are that NA 526, OA 184, TX 531 and Colin-V-33 will give reasonable yields.

Table 3. Average fruit mass (g) of imported and local selections planted in the avocado Phase II evaluation orchard A1 at Levubu

Selections/ Cultivar	Barr Duke	Thomas	Duke 7	Average
BL 149	400	472	-	436
OA 184	242	220	275	245
BL 135	336	337	360	344
Hayes	303	218	234	251
Eksteen	532	532	524	529
I 373	385	370	495	416
Edranol	310	302	306	306
NA 37	490	526	439	485
H 222	239	235	224	232
TX 531	145	135	163	147
Reed	350	283	286	306
# 86	303	307	356	322
NA 526	235	235	260	243

Table 4. Performance history, based on number of fruit per tree, of imported and local selections planted in the avocado Phase II evaluation orchard A1

Cultivar Selections	Number of fruit 1996	Number of fruit 1997	Number of fruit 1998	Average over 3 years
OA 184	7.5	72.7	6.3	28.8
BL 135	9.5	42.7	73.2	41.8
Hayes	0	19.5	11.7	10.4
Eksteen	0.2	71.3	3.2	24.9
I 373	30.5	122.5	1.2	51.4
Edranol	33.5	95.7	98.5	75.9
NA 37	0.2	14	26.2	13.5
H 222	14.2	141	105	86.7
TX 531	38	108	101.7	82.6
Reed	8	59.7	22	29.9
NA 526	3.3	53	18.5	24.9

Table 5. Yield (kg) per tree (1997 season), number of fruit (Feb 1998) and expected yield (kg) of imported and local selections planted in the avocado Phase II evaluation orchard B3 at Burgershall.

Table 5. Yield (kg) per tree (1997 season), number of fruit (Feb 1998) and expected yield (kg) of imported and local selections planted in the avocado Phase II evaluation orchard B3 at Burgershall.

Cultivar Selections	Yield 1997 (Kg)	Number of fruit Feb 1998	Expected yield 1998(Kg)
Edranol	18.6*	52.3	26.3
BL 149	3.89	16.9	5.93
BL 135	14.24	37.3	8.13
NA 37	2.13	33.5	10.83
NA 526	9.72	53.1	11.95
OA 184	14.98	47.7	11.48
I 373	29.27	39.6	8.95
Hayes	5.21	27	6.73
Reed	14.51	36.4	10.24
Colin-V-33	0.28	27.1	11.02
Eksteen	22.74	18.7	8.57
# 86	18.04	31	8.09
TX 531	16.36	44.8	11.16

Table 6. Average yield record, based on number of fruit counted yearly in February, of imported and local avocado selections planted in the Phase II evaluation orchard B3 at Burgershall.

Cultivar Selections	Number of fruit 1996	Number of fruit 1997	Number of fruit 1998	Average over 3 years
Edranol	26.9	9.0	52.3	29.4
BL 149	4.9	7.1	16.9	9.6
BL 135	27.1	46.7	37.3	37.0
NA 37	0.5	4.98	33.5	13.0
NA 526	2.4	27.2	53.1	27.6
OA 184	8.3	50.6	47.7	35.5
I 373	24.5	92.0	39.6	52.0
Hayes	1.4	10.3	27	12.9
Reed	10.3	21.7	36.4	22.8
Colin-V-33	10.9	0	27.1	12.7
Eksteen	4.4	35.8	18.7	19.6
# 86	6.7	57.7	31.0	31.8
TX 531	1.6	83.3	44.8	43.2

Table 6 presents the performance history of the trees for the past three years. Based on past history, but with only mid-season number of fruit and average fruit size as indication, a number of selections show promise. Based on average number of fruit produced per tree during the past three seasons, I 373, TX 531, BL 135, OA 184 and #86 all had better figures than Edranol. If however, fruit size is brought into the equation and then Edranol moves into second place after I 373, followed by TX 531, Eksteen and OA 184. Thus the consistent performers are I 373, TX 531 and OA 184.

SUMMARY & CONCLUSION

Orchard: Levubu A2:

- Pinkerton is still the best producer on a mass basis with nearly 50 kg fruit per tree in the third year of production.
- Gwen, due to its solid performance, could be considered to fill a late season market niche.
- The Fuerte 3 selection, yielding 20% more fruit than the other Fuerte selections, should be used for budwood distribution
- The Wurtz and Edranol selections should undergo further evaluation. Based on 1998 yield expectations, there is hope for it. Tree size (excessive growth) however, might be a negative factor with these selections, but new pruning methods being tested at the ITSC could reduce the problem.
- More yield data are needed from this block to validate the three years' results obtained thus far. Data on leaf and soil analysis are also being processed to determine whether differences do exist in nutrient accumulation between different cultivars and between different rootstocks.

Orchards: Levubu A1 and Burgershall B3:

- At Levubu the best selections seems to be H 222, I 373 and #86 with BL 135 and TX 531 as strong contenders.
- At Burgershall the best performances came from the I 373, TX 531 and OA 184 selections, closely followed by the local selection Eksteen, as well as #86 and BL 135.
- Thus, overall it seems as if I 373, #86, BL 135 and TX 531 should be evaluated further, with OA 184 and H 222 as possibilities. Due to the various characteristics and the ripening seasons of these selections, there could be place in the market for some of them.
- Taste panel and cold storage trials will be done this coming season to further eliminate non-performers.

REFERENCES

- SIPPEL, A.D., SNIJDER, B., WERKSMAN, J. & BIJZET. 1997. Cultivar and selection performance in the avocado phase-II evaluation programme: 1996. *South African Avocado Growers' Association Yearbook* 20: 30 - 34.