Performance of the new Hidden Valley A-Series varieties in Regional Variety Trial Series 3

David Bell, Hidden Valley Plantations, 2020

In 2008 the Regional Varietal Trial Series 3 (RVT3) was planted as part of the industry's varietal improvement program. The trials have been funded with grower levies, boosted by Hort Innovation Australia & QDAF contributions.

The trials tested thirty genotypes, consisting of five industry standard varieties; twenty elite selections from the Australian Industry breeding program; and five selections from the Hidden Valley breeding program. At time of writing the industry program has released four of theirs as new varieties and Hidden Valley will be releasing three. This paper provides a summary of the trial results and how the new A-Series have performed in comparison to the standard varieties.

The RVT3 data is the best information we have on all of these new varieties, however some cautions are required regarding the following tables.

- A cursory look at the tables reveals large differences in the overall performance at different sites, even when they are relatively close to one another.
- Further, it can also be seen that rankings of individual genotypes varies considerably between sites.
- It is clear that Environment & Management play a major role in determining NIS yield and thus Gross Revenue, though Kernel Recovery is relatively stable.
- At this stage there is no long-term data on the new varieties.
- The Gross Revenue figures in the tables below cannot be interpreted as absolute predictions of economic performance under arbitrary conditions and/or management. Rather, they are measures of relative performance observed under the specific trial conditions only.

Thus, growers must draw their own conclusions from the data keeping these cautions in mind. As a general principle is best to look for consistent trends rather than outstanding individuals at particular sites. If planning a new orchard, consider planting groups of four or more varieties with a mixture of old and new to spread the risk.

Given those caveats, the new A-Series have performed very well in the trials. When viewed as a 'stable' of varieties, they warrant serious consideration when planting new orchards or replanting old orchards. Compared to the group of standards, averaged across all sites, the Gross Revenue of the Hidden Valley group was approximately $770/Ha/Yr ahead.

This was the average across years 4 to 9, so the total gain for the new A-Series compared to the standard varieties across all sites was approximately $770 x 6yrs = $4620/Ha ahead by year nine. This compares very favourably with a one-off royalty for the new varieties of ~$1500/Ha.

Comparison Measures & Data Tables

The tables below use the following measures to compare varieties

- **Yield NIS**. These figures are summarised from the RVT3 project results. The RVT3 Kg/Tree values are converted to tonne/Ha.

Unless noted otherwise, throughout this paper and in the data tables, the average of Years 4 thru 9 is used for this measure. Thus, the values given need to be multiplied by six (6) to get the cumulative yield up to year nine of the trial.

- **Kernel Recovery (KR)**. These figures come directly from the RVT3 project results, no modifications.
- **Gross Revenue per Ha**. These are calculated from two the values above –
    - KR is converted to $/Kg from a base price of $5/kg @ 33%KR, adjusted linearly for kernel recovery.
    - The price is multiplied by the average yield and converted to per-Ha per-Year
    - As noted with the Yield NIS, these are averages and need to be multiplied by six (6) to calculate total revenue to year nine.

    Non-discounted Gross Revenue was chosen in preference to Profit because the latter is too dependent on the different cost structures found among enterprises. Costs per Ha typically range in the $6000 to $8000/Ha in the industry, thus it can be seen in the tables below some of the genotypes & sites are well into positive cashflow while others are just turning that corner.

The Sites

There are nine RVT3 sites, but currently there are only six trial sites that have enough data to be useful.

- **Alstonville (AL)**. This site is on the NSW Ag experimental station and well run. The site is sloping and the trees are large. There were some problems with pest control in the early years but these have since been resolved.
  The new A-Series did very well at this site, taken as a group they returned approximately $1570/Ha/Yr more than the standards.
- **'DeCortez' & 'Booyan' (B1 & B2)**. These are two very well run sites in the Bundaberg region. The new A-Series performed well at these sites, with the group returning an additional $550/Ha/Yr and $290/Ha/Yr compared to the standards for B1 & B2 respectively.
- **Bundaberg Sugar (B3)**. This site has had some problems with salt and other matters but is now well established.
  The new A-Series performed well here too, and returned and additional $900/Ha/Yr compared to the standards.
- **Childers (CH7)**. This was the best performing site by a considerable margin but was unfortunately destroyed by a cyclone in Year 7. While there is two years less data than the other sites I have included it because its gross returns are still comparable to the other sites. The new A-Series did well here, returning an additional $870/Ha/Yr compared to the standards.
- **Wirra Willa (WW)**. This site was planted in an AVG susceptible area in Bundaberg to trial all the new varieties against the disorder. At this stage it is too early make any conclusions regarding AVG. Unfortunately this site has also been hit by a storm and its future is uncertain.
  This was the only site where the new A-Series did not outperform the standards, they were approximately $2160/Ha/Yr *behind* the standards. The reason for this inconsistency is not clear.

The other three sites at Emerald, Mackay & Macksville are still a bit behind.

The new A-Series

We will be releasing three of our selections

Hidden Valley A376

This selection performed consistently well. It was ahead of the standards at all sites except Wirra Willa and on average it was $1040/Ha/Yr ahead of the standards.
It has high kernel recovery, but we have not seen much insect damage in it at Hidden Valley.

Tree Size:	Medium
Precocity:	Medium
Harvest Period:	Mid-season
	Responds to Ethrel
Kernel Recovery:	~46%
Kernel size:	~2.8g

Hidden Valley A447

This selection was ahead of the standards at Alstonville, DeCortez & Childers, on average it was $430/Ha/Yr ahead of the standards.
A447 is a small tree, the smallest in the trials in fact and around 30% smaller than a HAES 246, which may indicate higher potential for long term yield. Canopy is a bit dense.

Tree Size:	Small
Precocity:	Medium
Harvest Period:	Late, clean drop
	Moderate response to Ethrel
Kernel Recovery:	~42%
Kernel size:	~3.3g

Hidden Valley A538

This selection was ahead of the standards at Alstonville, DeCortez & Childers, it was not planted at Bundy Sugar. On average it was $850/Ha/Yr ahead of the standards, but this was mostly due to a very strong performance at Alstonville.
A538 is precocious, quite similar to A4 with a smaller kernel and smaller tree size.

Tree Size:	Small
Precocity:	High
Harvest Period:	Mid-season
	Responds to Ethrel
Kernel Recovery:	~45%
Kernel size:	~2.5g

For completeness I have included information on our other two selections. At this stage we do not intend to release them but if there is demand for them in the future that decision can be reviewed.

- **A403**. This selection was ahead of the standards at all sites except Childers & Wirra Willa, on average it was $880/Ha/Yr ahead of the standards.
  Kernel size is ~3.0gr. A403 is a larger tree with a late season drop pattern and low response to Ethrel.
- **A422.** This selection has yielded well at Hidden Valley but did not really perform so well in the trials. It was only ahead of the standards at Childers and overall.
  Kernel size is ~3.1g. A422 is a medium size tree with a late season drop and low response to Ethrel.

Descriptions & discussion of the other varieties in the tables are available in the RVT3 project outputs.

Availability of the new A-Series

The new varieties will become available in 2020, we are currently going through the PBR process and cannot take orders for them until that is wrapped up. They will only be available through licensed nurseries. For updates on the release process and a list of licensed nurseries details see our website at www.hvp-macadamis.com.

Initially the scion-wood will be very limited but that should be resolved over time.

Acknowledgements

This paper relies on data collected by the industry Regional Variety Trials Series 3, funded by Queensland DAF, Hort Innovation and of course grower levies. I would like to thank QDAF, in particular Dougal Russel and Bruce Topp, for making the data available to me.

Hidden Valley Breeding Program & Royalties

I would also like to thank the growers and nurseries who have supported our program via their payment of levies. Royalties are the only source of funding for our breeding program and other research activities; we do not receive any industry levy funds, government grants or subsidies.

In recent years I think our program has proven its value to the industry – it allows alternate lines of breeding to be followed, is the only program with any track record on AVG tolerance and our released varieties are being widely adopted.

Contrary to advice from some quarters, we are still collecting royalties on **A203, A268 & A29**. If as a grower you like the outputs of our program - that is, our varieties - please ensure that you pay the royalties that allow the program to continue.

Details of the royalty status of our varieties and a list of nurseries licensed by us to collect them are available on our web site at www.hvp-macadamias.com. If you have already purchased our varieties without paying royalties it is never too late to catch up by contacting us directly.

All Tables colour code: Top 5 | Top 10 | Mid 15 | Bottom 10 | *Filled Value*

Table 1: Yield NIS tonne/Ha, Average of Years 4 to 9

New A-Series	Alston-ville	B1 DeCortez	B2 Booyan	B3 Bundy Sug	Childers (to yr 7)	W. Willa (AVG)	Average
A376	1.48	1.24	1.88	1.24	2.37	1.35	1.59
A447	1.93	1.32	1.71	1.21	2.35	1.39	1.65
A538	1.88	1.23	1.46	*1.15*	2.35	1.22	1.55
A403*	1.86	1.64	1.74	1.29	2.40	1.57	1.75
A422*	1.53	1.13	1.66	1.00	2.40	1.31	1.50
Average All	**1.74**	**1.31**	**1.69**	**1.18**	**2.37**	**1.37**	**1.61**

Standards	AL	B1	B2	B3	CH(7)	WW	Average
246	1.83	1.53	1.92	1.31	2.36	*1.63*	1.76
344	1.69	1.45	1.84	1.23	*2.36*	1.42	1.67
741	1.37	1.14	1.97	1.11	2.34	*1.63*	1.59
A16	1.45	1.40	1.68	1.16	2.37	2.04	1.68
816*	1.96	1.06	1.73	1.09	2.51	1.73	1.68
Average	**1.58**	**1.38**	**1.85**	**1.21**	**2.36**	**1.68**	**1.68**

Aust Elites	AL	B1	B2	B3	CH(7)	WW	Average
G	2.05	1.31	2.04	1.09	2.39	1.87	1.79
J	1.62	1.29	1.79	1.49	2.32	1.56	1.68
P	1.94	1.55	1.88	1.17	2.31	2.09	1.82
R	2.15	1.21	1.76	1.17	2.36	1.53	1.70
Average	**1.94**	**1.34**	**1.87**	**1.23**	**2.34**	**1.76**	**1.75**

Table 2: Kernel Recovery(%)

Standards	Alston-ville	B1 DeCortez	B2 Booyan	B3 Bundy Sug	Childers (to yr 7)	W. Willa (AVG)	Average
A376	44.8%	46.1%	46.1%	50.0%	45.4%	45.4%	46.3%
A447	41.8%	41.1%	41.1%	41.1%	43.2%	43.4%	41.9%
A538	42.8%	45.8%	45.8%	*44.6%*	43.8%	44.6%	44.6%
A403*	43.2%	42.9%	42.9%	41.7%	37.7%	41.5%	41.6%
A422*	39.5%	40.7%	40.7%	42.8%	38.8%	42.6%	40.9%
Average All	**42.4%**	**43.3%**	**43.3%**	**44.0%**	**41.8%**	**43.5%**	**43.1%**

246	39.0%	39.2%	39.2%	40.6%	38.9%	*39.4%*	39.4%
344	34.0%	35.1%	35.1%	38.9%	*35.4%*	34.2%	35.4%
741	36.4%	38.3%	38.3%	44.0%	36.8%	*38.8%*	38.8%
A16	40.1%	42.0%	42.0%	41.5%	41.8%	45.0%	42.1%
816*	46.1%	44.8%	44.8%	46.9%	46.1%	45.7%	45.7%
Average	**37.4%**	**38.7%**	**38.7%**	**41.2%**	**38.2%**	**39.3%**	**38.9%**

Aust Elites	AL	B1	B2	B3	CH(7)	WW	Average
G	41.7%	43.1%	43.1%	43.9%	42.3%	41.4%	42.6%
J	42.3%	43.2%	43.2%	49.5%	44.0%	46.3%	44.8%
P	35.6%	39.9%	39.9%	40.1%	38.4%	41.5%	39.2%
R	37.8%	39.7%	39.7%	40.4%	39.3%	40.6%	39.6%
Average	**39.4%**	**41.5%**	**41.5%**	**43.5%**	**41.0%**	**42.5%**	**41.5%**

All Tables colour code:	Top 5	Top 10	Mid 15	Bottom 10	*Filled Value*

Table 3: Gross Income $/Ha, Average of Years 4 to 9, $5/kg base price

New A-Series	Alston-ville	B1 DeCortez	B2 Booyan	B3 Bundy Sug	Childers (to yr 7)	W. Willa (AVG)	Average
A376	$10,030	$8,654	$13,123	$9,383	$16,323	$9,309	$11,137
A447	$12,207	$8,214	$10,660	$7,554	$15,362	$9,163	$10,527
A538	$12,231	$8,500	$10,144	*$7,784*	$15,586	$8,271	$10,419
A403*	$12,159	$10,664	$11,333	$8,154	$13,679	$9,896	$10,981
A422*	$9,177	$6,953	$10,258	$6,476	$14,070	$8,439	$9,310
Average*	**$11,489**	**$8,456**	**$11,309**	**$8,240**	**$15,757**	**$8,914**	**$10,694**

* A403, A422 not included in average, not released

Standards	AL	B1	B2	B3	CH(7)	WW	Average
246	$10,816	$9,107	$11,426	$8,082	$13,885	*$9,749*	$10,511
344	$8,710	$7,735	$9,793	$7,257	*$12,653*	$7,331	$8,913
741	$7,560	$6,588	$11,438	$7,431	$13,074	*$9,590*	$9,280
A16	$8,806	$8,937	$10,685	$7,289	$15,034	$13,886	$10,773
816*	$13,716	$7,174	$11,746	$7,755	$17,560	$12,009	$11,660
Average*	**$8,973**	**$8,092**	**$10,836**	**$7,515**	**$13,662**	**$10,139**	**$9,869**

* 816 not included in average, no longer planted due to disease issues.

Aust Elites	AL	B1	B2	B3	CH(7)	WW	Average
G	$12,970	$8,572	$13,336	$7,263	$15,309	$11,721	$11,529
J	$10,365	$8,476	$11,724	$11,128	$15,499	$10,951	$11,357
P	$10,480	$9,382	$11,379	$7,093	$13,420	$13,135	$10,815
R	$12,328	$7,281	$10,603	$7,135	$14,064	$9,423	$10,139
Average	**$11,536**	**$8,428**	**$11,760**	**$8,155**	**$14,573**	**$11,308**	**$10,960**

Note: There were four gaps in the tables that were filled with averaged values.

Table 4: Other Traits

New A-Series	Tree Size	Precocity	Drop Pattern*	Response Ethrel#
A376	Medium	Medium	Mid	Good
A447	Small	Medium	Late, Clean	Moderate
A538	Small	High	Mid	Good
A403	Large	Medium	Late, Clean	Low
A422	Medium	Medium	Late, Remain	Low

Standards	Tree Size	Precocity	Drop Pattern*	Response Ethrel#
246	Large	Medium	Late, Clean	Good
344	Medium	Low	Mid	Good
741	Large	Medium	Early	n/a
A16	Small	High	Late, Remain	Moderate
816	Medium	High	Early	n/a

Aust Elites	Tree Size	Precocity	Drop Pattern*	Response Ethrel#
G	Medium	High	Late, Clean	Good
J	Large	Low	Late, Remain	?
P	Small	Low	Late, Remain	Good
R	Medium	High	Late, Remain	?

* Late, Clean = most dropped by final ground harvest.

* Late, Remain = significant crop in trees at final ground harvest, not necessarily sticktight.

Trees with Low response may work better with higher rate.