

## Economic evaluation of the macadamia breeding program

Comparison of new selections with standard industry varieties

### *Disclaimer*

Results presented in this report are based on yield and kernel recovery data from macadamia regional variety trials.

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### *Introduction*

The following sections compare the relative economic performance of recent releases from the macadamia breeding program and regional variety trials. These 20-year cash flow forecasts compare both annual net cash flow and cumulative cash flow for the four recent variety releases (G, J, P and R) and compares these with established industry varieties A16 and 741. Forecasts include performance in both the Bundaberg region and the Northern Rivers of NSW.

All scenarios model establishment of a new 100-hectare farm. Irrigation establishment and operating costs are included in all Bundaberg scenarios and excluded from all Northern Rivers scenarios.

The industry average planting density 312 trees per hectare (8x4m) is assumed for all varieties other than P, which is based on the higher density of 400 trees per hectare due to the relatively small size of these trees.

This analysis has been undertaken to evaluate elite selections from the B1.1 populations in regional variety trials.

### *Varieties and assumptions*

The following tables show yield, kernel recovery and planting densities for new varieties and industry standards from regional variety trials. Growth curves were developed for each variety using measured yield from years 1 to 8. Mature yield was estimated for each variety by extrapolating these growth models to full maturity.

Variety	G	J	P	R	A16	741
Estimated mature NIS yield (T/ha)	7.52	7.07	9.99	6.1	6.56	6.78
Saleable kernel recovery %	38.20	41.10	32.60	35.20	37.20	34.90
Trees / ha	312	312	400	312	312	312

Table 1: Performance of varieties from regional variety trials in Bundaberg

Variety	G	J	P	R	A16	741
Estimated mature NIS yield (T/Ha)	8.33	6.01	9.78	8.2	6.60	6.40
Saleable kernel recovery %	39.5	41.3	32.8	36.1	38.6	37.4
Trees / ha	312	312	400	312	312	312

Table 2: Performance of varieties from regional variety trials in Northern Rivers NSW

Assumptions	Bundaberg (irrigated)	Northern Rivers NSW (non-irrigated)
NIS price (10-year fixed average @33% KR)	\$3.80	\$3.80
Farm establishment costs	\$4,180,000	\$4,002,500
Non-bearing fixed costs per hectare*	\$2,715	\$1,657
Bearing costs per hectare*	\$7,798	\$6,693

Table 3: Assumptions for financial analysis scenarios. Price growth, inflation, depreciation, finance and taxation have been excluded to simplify analysis.\*Average cost data from benchmark cost of production sample 2013-2017.

## *Rates of return*

The following tables show the net present value (NPV) and internal rate of return (IRR) for selections in both Bundaberg and Northern Rivers NSW.

NPV is calculated by subtracting the present value of the capital outlays from the present value of the cash inflows. IRR is the rate of return, or discount rate at which the net present value (NPV) will be equal to zero.

New varieties P, J and G achieved a higher NPV and IRR than standard varieties 741 and A16 in Bundaberg. New variety R achieved the lowest NPV and IRR of the six varieties analysed for Bundaberg. NPV and IRR was highest for three new varieties (P, J and D) in Northern Rivers NSW, however variety J showed a lower NPV and IRR than standard variety A16.

All varieties (including standards) achieved a higher NPV and IRR in Northern Rivers NSW compared with Bundaberg. This may be explained by the lower farm establishment and production costs for non-irrigated farms in Northern Rivers NSW.

Variety	NPV	IRR
P (HD)	\$11,786,344	13.3%
J	\$10,269,956	12.7%
G	\$10,066,610	12.7%
741	\$7,355,470	11.0%
A16	\$6,578,898	10.3%
R	\$5,850,380	9.9%

Table 4 – NPV and IRR for new and standard varieties in Bundaberg

Variety	NPV	IRR
P (HD)	\$13,933,636	15.3%
G	\$13,766,906	15.3%
R	\$12,296,133	14.8%
A16	\$9,561,524	12.9%
J	\$9,130,651	12.6%
741	\$8,659,837	12.3%

Table 5 - NPV and IRR for new and standard varieties in Northern Rivers NSW

## Cash flows

The following figures show both annual net cash flow (NCF) and yearly cash balance (YCB) for varieties G, J, P and R compared with established industry varieties A16 and 741 in Bundaberg and Northern Rivers NSW.

NCF is the difference between annual cash inflows and outflows over the analysis period. In the following scenarios, this is the difference between annual income generated from nut production and costs incurred from various heads of expenditure. Yearly cash balance or YCB is the cumulative net cash flow over the analysis period.

In Bundaberg varieties P and J achieved positive cash flow sooner than standard varieties 741 and A16. Over the term of the analysis varieties P, J and G maintained higher NCF than the two standards. These results are reflected in the YCB for varieties in Bundaberg (Figure 3).

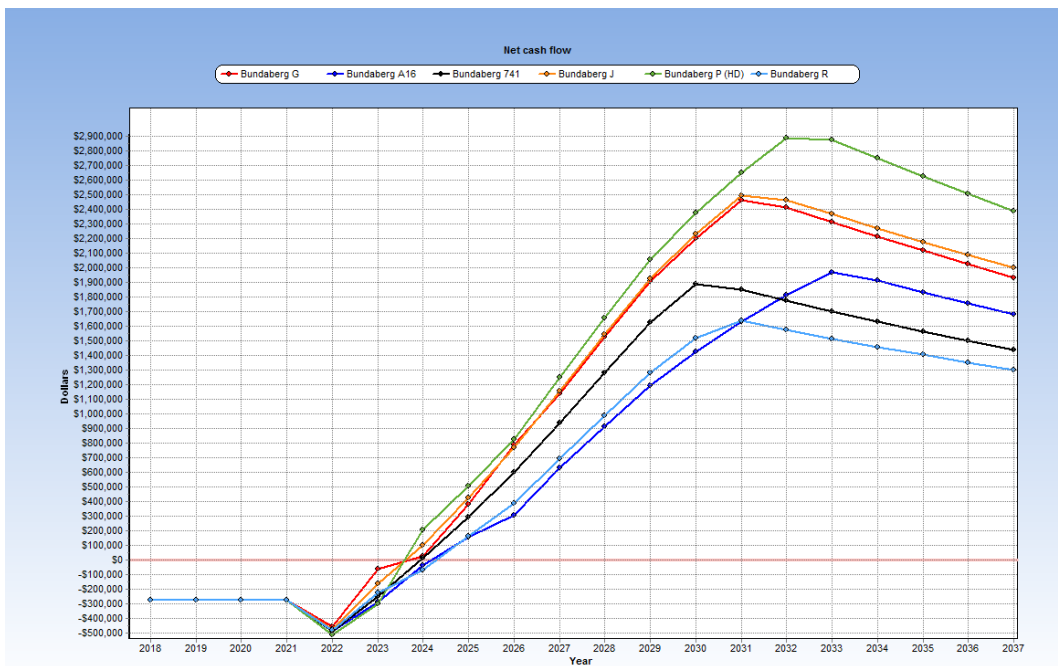


Figure 1: Net cash flow by variety for Bundaberg

In Northern Rivers NSW positive cash flows were realised earlier for varieties P, G and R when compared to standard varieties. NCF for variety J over the analysis term was very similar to standard varieties A16 and 741, while P, G and R remained higher. These cash flows are shown cumulatively in the yearly cash balance for varieties in Northern Rivers NSW (Figure 4).

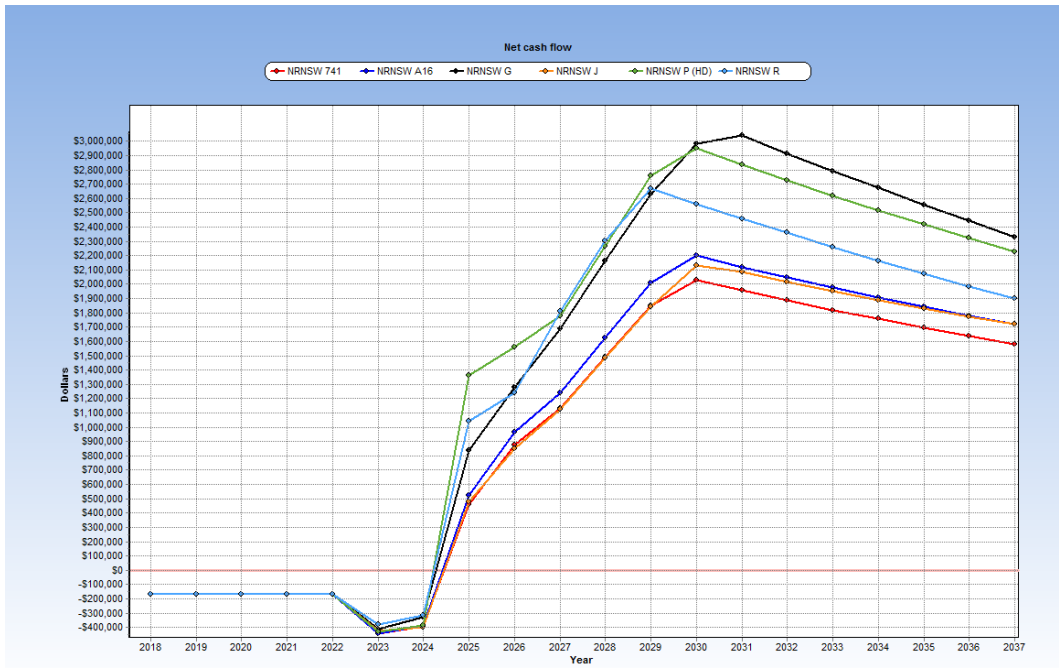


Figure 2: Net cash flow by variety for Northern Rivers NSW

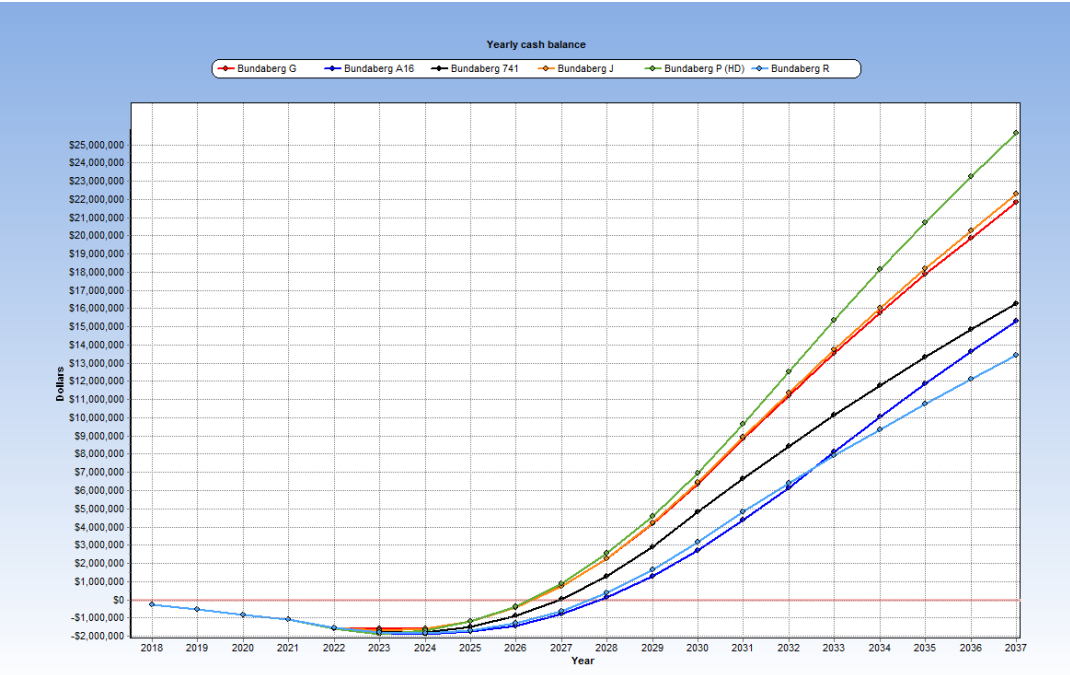


Figure 3: Cumulative cash balance by variety for Bundaberg

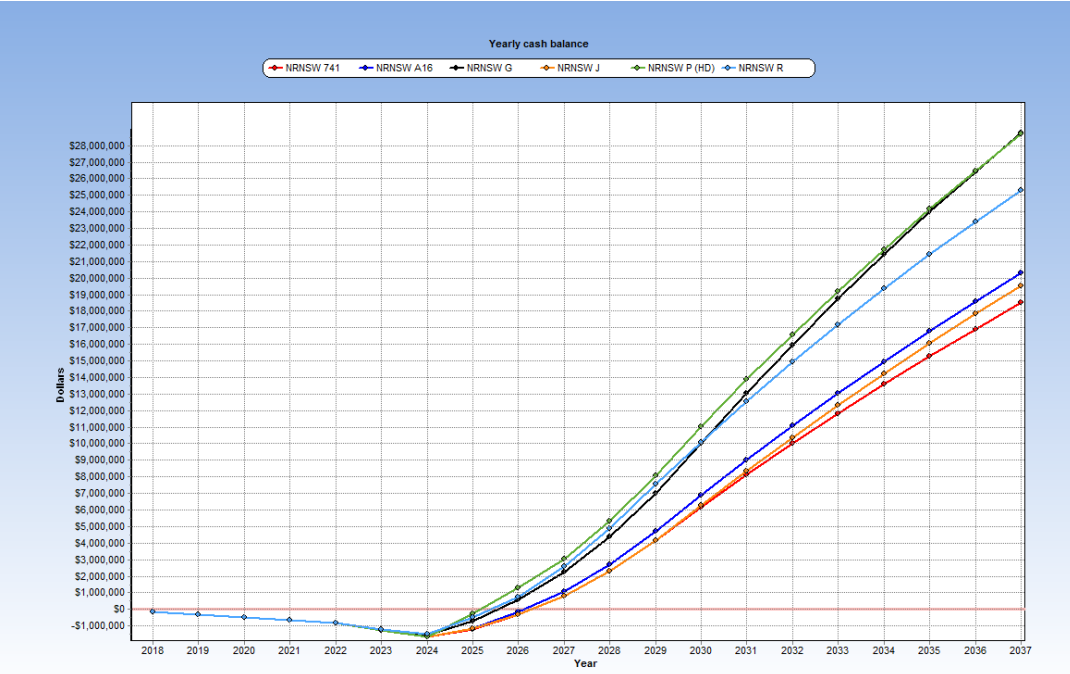


Figure 4: Cumulative cash balance by variety for Northern Rivers NSW

## *Summary*

Based on available yield and kernel recovery data to date, analysis of the four newly released varieties has identified their long-term economic potential compared with industry standard varieties.

While it is apparent that varieties perform differently in different production regions, these analyses show that increasing yield and kernel recovery can result in significant long-term economic gains and farm business viability.