Industry-specific impact assessment program: Almond

Impact assessment report for project *Development of high-status mother plantings for new Australian almond varieties* (AL16004)

Impact analyst:

Michael Clarke

Delivery partner:

AgEconPlus and Agtrans Research

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Level 7
141 Walker Street
North Sydney NSW 2060

Telephone: (02) 8295 2300

www.horticulture.com.au

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What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *AL16004: Development of High Health Status Mother Plantings for New Australian Almond Varieties.* The project was funded by Hort Innovation over the period February 2017 to December 2018.

Methodology

The investment was first analysed qualitatively within a logical framework that included activities and outputs, outcomes, and impacts. Actual and/or potential impacts then were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation in monetary terms (quantitative assessment). Past and future cash flows were expressed in 2019/20 dollar terms and were discounted to the year 2019/20 using a discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

Results/key findings

Investment in this research project has led to the establishment of high health status mother plantings for new Australian almond varieties ensuring that the new varieties are available to growers sooner and increasing grower confidence that new varieties are true to type and virus free.

Investment Criteria

Total funding from all sources for the project was $0.12 million (present value terms). The investment produced estimated total expected benefits of $0.21 million (present value terms). This gave a net present value of $0.09 million, an estimated benefit-cost ratio of 1.69 to 1, an internal rate of return of 9.2% and a MIRR of 6.7%.

Conclusions

The Hort Innovation investment in Project AL16004 has sped access to new varieties and increased grower confidence in their use (less risk of virus and variation from type). In turn, growers will realise additional profit from adoption of new varieties sooner than would have occurred under the counterfactual. Several social impacts identified were not valued as the impacts were considered uncertain and difficult to value with credible assumptions. Hence, investment criteria provided by the valuation may be underestimates of the actual performance of the investment.

Keywords

Impact assessment, cost-benefit analysis, almond production, new Australian varieties, mother blocks, high health budwood, Carina, Capella, Maxima, Mira, Rhea, Vela, true to type

Introduction

Horticulture Innovation Australia Limited (Hort Innovation) required a series of impact assessments to be carried out annually on a number of investments in the Hort Innovation research, development and extension (RD&E) portfolio. The assessments were required to meet the following Hort Innovation evaluation reporting requirements:

- Reporting against the Hort Innovation's current Strategic Plan and the Evaluation Framework associated with Hort Innovation's Statutory Funding Agreement with the Commonwealth Government.
- Annual Reporting to Hort Innovation stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

Under impact assessment program MT18011, the first series of impact assessments were conducted in 2019 and included 15 randomly selected Hort Innovation RD&E investments (projects). The second series of impact assessments (current series), undertaken in 2020, also included 15 randomly selected projects worth a total of approximately $7.11 million (nominal Hort Innovation investment). The second series of projects were selected from an overall population of 85 Hort Innovation investments worth an estimated $44.64 million (nominal Hort Innovation investment) where a final deliverable had been submitted in the 2018/19 financial year.

The 15 investments were selected through a stratified, random sampling process such that investments chosen represented at least 10% of the total Hort Innovation RD&E investment in the overall population (in nominal terms) and was representative of the Hort Innovation investment across six, pre-defined project size classes.

Project *AL16004: Development of High Health Status Mother Plantings for New Australian Almond Varieties* was randomly selected as one of the 15 investments under MT18011 and was analysed in this report.

General Method

The impact assessment follows general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses cost-benefit analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

Background & Rationale

Background

The Australian almond industry is a significant horticultural sector with a five year estimated production value of $626.2 million and a production volume of 78,033 tonnes kernel weight equivalent – Table 1.

Table 1: Almond Industry Performance 2014-2018

Year Ended 30 June	Production – Kernel Weight Equivalent (t)	Gross Value of Production ($m)	Farmgate Value of Production ($m)	Export Value ($m)
2014	65,060	465.6	442.3	463.1
2015	82,509	707.5	672.1	521.8
2016	82,333	854.1	811.4	616.2
2017	80,800	553.6	525.9	461.2
2018	79,461	550.1	522.6	440.3
Average	78,033	626.2	594.9	500.5

Source: Australian Horticulture Statistics Handbook 2014/15 and 2017/18 (farmgate value estimated by AgEconPlus)

Almonds are Australia's most valuable horticultural export crop accounting for 20% of the value of fresh horticulture exports. Almonds are grown in the south of Australia, with the majority of production occurring along the Murray River. Key production areas include the North Adelaide Plains (South Australia), Riverland (South Australia), Sunraysia (Victoria) and the Riverina (NSW). Together these four areas account for 97% of production. Australia's almond growing season commences with the almond blossom in July and August each year. Beekeepers are paid by almond growers to bring their hives to the blossom to pollinate the crop at this time. Harvest takes place in February and March, with produce ready for the market in April and May. Newly planted almond trees take three years to bear a crop and seven years to reach mature production levels. Over 90% of almonds consumed in Australia are grown and produced by Australian farmers.

Almond peak industry body, the Almond Board of Australia (ABA) maintains mother plantings of high health status, overseas developed, varietal trees as the source of budwood for nurseries supplying the Australian almond industry. These mother plantings are located at Monash, South Australia and Colbinabbin, Victoria. Almond research and development (R&D) activity is guided by the Almond industry's Strategic Investment Plan (SIP). The activities are funded by levies payable on almonds produced in Australia; and the R&D levy funds are managed by Hort Innovation.

The current SIP has been driven by levy payers and addresses the Australian Almond industry's needs from 2017 to 2021. Strategies and priorities in the Plan have been driven by a set of five desired outcomes (Hort Innovation, 2017):

1. Pest and disease damage to almonds has been reduced through enhanced integrated pest management and integrated disease management.
2. A major productivity gain in almond pollination by 2022 through a 25% reduction in honey bee stocking rate with no loss in pollination efficiency (nut set).
3. Improvements in the crop production system have lifted average industry kernel yield from 3 to 4 t/ha, 4ML of irrigation water generates a tonne of almond kernel yield and proven 'shake and catch' harvesting / processing technology is in place.
4. Australian almonds are an informed industry that adopts R&D outcomes and has the capacity to support current and future industry needs.
5. Increased domestic almond consumption up from 16,000 t in 2016 to 27,500 t in 2022. Increased export sales up from 64,000 t in 2016 to 110,000 t in 2022.

Rationale

Australian almond varieties have been developed by the University of Adelaide with funding support from Hort Innovation. The ABA has been appointed as the commercialisation agent for the new varieties. To maximise the uptake of the new varieties, action was required to establish high health status mother plantings. Mother plantings were to meet the industry's need for greenfield expansion and to replace old almond orchards that have reached the end of their commercial life. Estimated almond planting was 14,000ha between 2016 and 2019 with a further 6,000ha planned between 2019 and 2020. The ABA forecast growth in industry output from 80,000 tonnes in 2016 to 150,000 tonnes by 2025. New mother plantings were to also support nursery requirements for more buds in late November/December for early grafting and a longer growing period before dormancy. Nursery trees grown under these conditions would have adequate size to sell in winter rather than needing 18 months to mature.

Project success was built on a base case that included past almond breeding and evaluation projects as well as AL12015 'Australian Almond Variety Evaluation and Commercialisation Program'. The new Australian almond varieties were evaluated through AL12015 and were found to offer beneficial production characteristics such as improved yields, self-fertility (reduced dependence on paid honey bee pollination), desirable visual and eating qualities, and closed shells. Closed shells minimise almond pest damage and bacterial contamination. New Australian almond varieties will help address industry risks such as pollination surety and the need for the Australian industry to compete alongside California, the dominant global player.

With successful commercialisation, the new Australian almond varieties will earn royalties for their intellectual property (IP) owners – the University of Adelaide and Hort Innovation. Royalties are a stream of revenue that recognises Plant Breeder Rights (PBR) for IP owners. However, in economic terms royalties are a transfer of economic surplus (profit) from growers to IP owners rather than the creation of a new or additional impact.

Project Details

Summary

Project Code: AL16004

Title: *Development of High Health Status Mother Plantings for New Australian Almond Varieties*

Research Organisation: Almond Board of Australia (ABA)

Project Leader: Ross Skinner

Period of Funding: February 2017 to December 2018

Objectives

The specific objective of project AL16004 was to help Hort Innovation:

- To develop high health status mother plantings of the five (5) new University of Adelaide (UA) and Hort Innovation varieties, commercialised through the ABA on two sites (Monash and Loxton, South Australia).

Logical Framework

Table 2 provides a detailed description of the project in a logical framework.

Table 2: Logical Framework for Project AL16004

Activities	• Activities associated with establishment of new variety mother plantings included: • Cutting of budwood and propagation of each new variety from original UA created trees. • Testing of mother trees for viruses to ensure the plant material is of high health status. Viruses tested included Apple chlorotic leaf spot virus, Apple mosaic virus, Apple stem grooving virus, Apple stem pitting virus, Ilarvirus, Plum bark necrosis stem pitting associated virus, Prune dwarf virus, and Prunus necrotic ringspot virus. Virus testing was a major project investment. • Site preparation at the Loxton Research Centre and Monash including soil amendments, installation of fencing, irrigation, and fertigation systems. • Tree planting and the installation of stakes and tree guards in August 2017. • Tree management after planting including irrigation, fertilisation, spraying for pests and diseases, pruning and training to shape through to December 2018. • Trees were monitored by ABA technical staff on a twice weekly basis throughout the mother block establishment project.
Outputs	The important outputs of the project were: • Mother trees produced for six new UA/Hort Innovation varieties – Carina, Capella, Mira, Maxima, Rhea and Vela as well as smaller numbers of ten 'promising' varieties from the same breeding program. • Two mother planting blocks established to supply high health status, true to type budwood to nurseries. Two sites were required for risk mitigation. Risks to be mitigated included loss of buds due to virus infection and damage to trees due to extreme weather events (e.g. strong winds or hail). • Productive mother trees that are one source of foundation nursery stock for new and replacement almond orchards. • Grower access to new improved quality, higher yielding and reduced operating cost varieties. Operating cost savings will be associated with lower honey bee pollination fees and reduced pest and disease management costs. • Grower confidence in planting material knowing that it is virus free and true to type.

	• While initial sales of budwood for the new varieties were positive, some slowing has occurred as growers express concern about susceptibility to bacterial spot and wait to see how kernels from new varieties are received in the market (Skinner, 2019).
Outcomes	The outcomes driven by the project included: • Almond growers with plantings of improved yielding, self-fertility, closed shell varieties with desirable visual and eating qualities sooner than would otherwise have occurred. • Almond growers experiencing less risk when they choose new varieties – new varieties are virus free and true to type.
Impacts	• Economic – more profitable and lower risk almond orchards sooner (increased quality and yield with reduced operating costs) than would have occurred in the absence of mother plantings. • Capacity – additional ABA skills in the creation and management of mother blocks. • Social - contribution to improved regional community wellbeing from spill-over benefits as a result of increased crop quality, yield and grower income.

Project Investment

Nominal Investment

Table 3 shows the annual investment made in Project AL16004 by Hort Innovation. There were no other investors in the project.

Table 3: Annual Investment in Project AL16004 (nominal $)

Year ended 30 June	HORT INNOVATION ($)	TOTAL ($)
2017	73,638	73,638
2018	0	0
2019	18,409	18,409
Total	**92,047**	**92,047**

Source: AL16004 Executed Research Agreement

Program Management Costs

For the Hort Innovation investment the cost of managing the Hort Innovation funding was added to the Hort Innovation contribution for the project via a management cost multiplier (1.162). This multiplier was estimated based on the share of 'payments to suppliers and employees' in total Hort Innovation expenditure (3-year average) reported in the Hort Innovation's Statement of Cash Flows (Hort Innovation Annual Report, various years). This multiplier was then applied to the nominal investment by Hort Innovation shown in Table 3.

Real Investment and Extension Costs

For purposes of the investment analysis, the investment costs of all parties were expressed in 2019/20 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2020). The ABA is in routine contact with the nursery sector and no additional extension costs were incurred.

Impacts

Table 4 provides a summary of the principal types of impacts delivered by the project, based on the logical framework. Impacts have been categorised into economic, environmental and social impacts.

Table 4: Triple Bottom Line Categories of Principal Impacts from Project AL16004

Economic	• Economic – more profitable and lower risk almond orchards sooner (increased quality and yield with reduced operating costs) than would have occurred in the absence of mother plantings.
Environmental	• Nil.
Social	• Capacity – additional ABA skills in the creation and management of mother blocks. • Social - contribution to improved regional community wellbeing from spill-over benefits as a result of increased crop quality, yield and grower income.

Public versus Private Impacts

The impacts identified from the investment are predominantly private impacts accruing to almond growers. However, some public benefits also have been produced in the form of capacity built and spill-overs to regional communities from enhanced grower income.

Distribution of Private Impacts

The private impacts will have been distributed between growers, IP owners in the form of royalties, processor/packers, wholesalers, exporters and retailers. In most instances the share of impact realised by each link in the supply chain will depend on both short- and long-term supply and demand elasticities in the almond market. Royalties earned by IP owners will be fixed and paid to plant breeders when nursery trees are purchased by almond growers.

Impacts on Other Australian Industries

No impacts on other Australian industries were identified.

Impacts Overseas

New almond varieties developed in Australia may have relevance to other almond growing areas such as Spain and California.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 5. The project outcomes and related impacts will contribute to Rural RD&E Priority 4, and to Science and Research Priority 1.

Table 5: Australian Government Research Priorities

Australian Government	
Rural RD&E Priorities (est. 2015)	**Science and Research Priorities (est. 2015)**
1. Advanced technology 2. Biosecurity 3. Soil, water and managing natural resources 4. Adoption of R&D	1. Food 2. Soil and Water 3. Transport 4. Cybersecurity 5. Energy and Resources 6. Manufacturing 7. Environmental Change 8. Health

Sources: (DAWR, 2015) and (OCS, 2015)

Alignment with the Almond Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the almond industry are outlined in the Almond Industry's Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2017). Project AL16004 addressed four of the SIP's outcomes including Outcome 1 (reduced pest and disease damge), Outcome 2 (reduction in honey bee stocking rates), Outcome 3 (lift average industry yield) and Outcome 5 (increase almond consumption with visually appealing and better tasting almonds).

[1] For further information, see: https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/strategic-investment-plans/

Valuation of Impacts

Impacts Valued

Analyses were undertaken for total benefits that included future expected benefits. A degree of conservatism was used when finalising assumptions, particularly when some uncertainty was involved. Sensitivity analyses were undertaken for those variables where there was greatest uncertainty or for those that were identified as key drivers of the investment criteria.

The impact that was valued was more profitable and lower risk almond orchards sooner than would have occurred in the absence of mother plantings.

Impacts Not Valued

Not all of the impacts identified in Table 4 could be valued in the assessment. Those not valued included:

- Additional ABA skills in the creation and management of mother blocks.
- Contribution to improved regional community wellbeing from spill-over benefits as a result of increased crop quality, yield, and grower income.

These impacts were not valued due to lack of data to support credible assumptions.

Summary of Assumptions

A summary of the key assumptions made for valuation of early access to new Australian almond varieties is provided in Table 6.

Table 6: Summary of Assumptions for Impact Valuation

Variable	Assumption	Source/Comment
With project		
Year high heath status new varieties sourced from mother plantings first grown in a commercial orchard.	2020	Mother plantings established 2018, budwood sold to nurseries in 2019 and nursery trees planted by almond growers 2020.
Year first mature crop available from new varieties sourced via mother plantings.	2028	Newly planted almond trees can take up to three years to bear a crop and seven years to reach mature production levels (ABA, 2019).
Without project		
Year new varieties grown in a commercial orchard (NB: nursery trees less likely to be high health status).	2024	AgEconPlus assumption.
Year first mature crop available from new varieties in absence of mother plantings.	2032	Newly planted almond trees can take up to three years to bear a crop and seven years to reach mature production levels (ABA, 2019).
Common assumptions – with and without project		
Area of new varieties planted.	130 ha/year	AgEconPlus assumption using planting data sourced from Almond Insights (ABA, 2020). See Table 6a below.
Profit on almond production.	$11,360/ha	Gross receipts of $25,000/ha (Australian Nut Industry Council, undated) less production costs of $13,640 (adapted from Waycott, 2011).

Increase in profit from new varieties after PBR payments.	10%	AgEconPlus assumption tested using sensitivity analysis
Attribution of impacts to this project.	80%	Costs are incurred post this project to maintain mother plantings.
Probability of the project generating useful outputs.	100%	Mother plantings in place and budwood purchased by nurseries.
Probability of impact (assuming successful outcome)	50%	Some grower concern about susceptibility of new varieties to bacterial spot and whether market will be receptive to kernels from new varieties (Skinner, 2019)
Proportion of benefits estimated that would have been delivered without Project AL16004.	0%	Unlikely that researcher or industry would be prepared to invest and incur ongoing maintenance costs for mother trees – a not for profit activity.

Table 6a shows area of new varieties planted since their release in 2013.

Table 6a: New Variety Planting Data (hectares)

Variety	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capella	0.48	0	0	0	0	0	0
Carina	0.62	0	3.64	88.87	107.35	102.83	1.21
Maxima	0.62	0	0	45.00	3.47	16.30	0
Mira	0.53	0	0	5.26	3.00	22.64	0
Rhea	0.62	0	0	15.00	0	0	0
Vela	0	0	0	0	0	0	0
Total	2.87	0	3.64	154.13	113.82	141.77	1.21

Source: ABA 2020

Results

All costs and benefits were discounted to 2019/20 using a discount rate of 5%. A reinvestment rate of 5% was used for estimating the Modified Internal Rate of Return (MIRR). The base analysis used the best available estimates for each variable, notwithstanding a level of uncertainty for many of the estimates. All analyses ran for the length of the project investment period plus 30 years from the last year of investment (2018/19) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

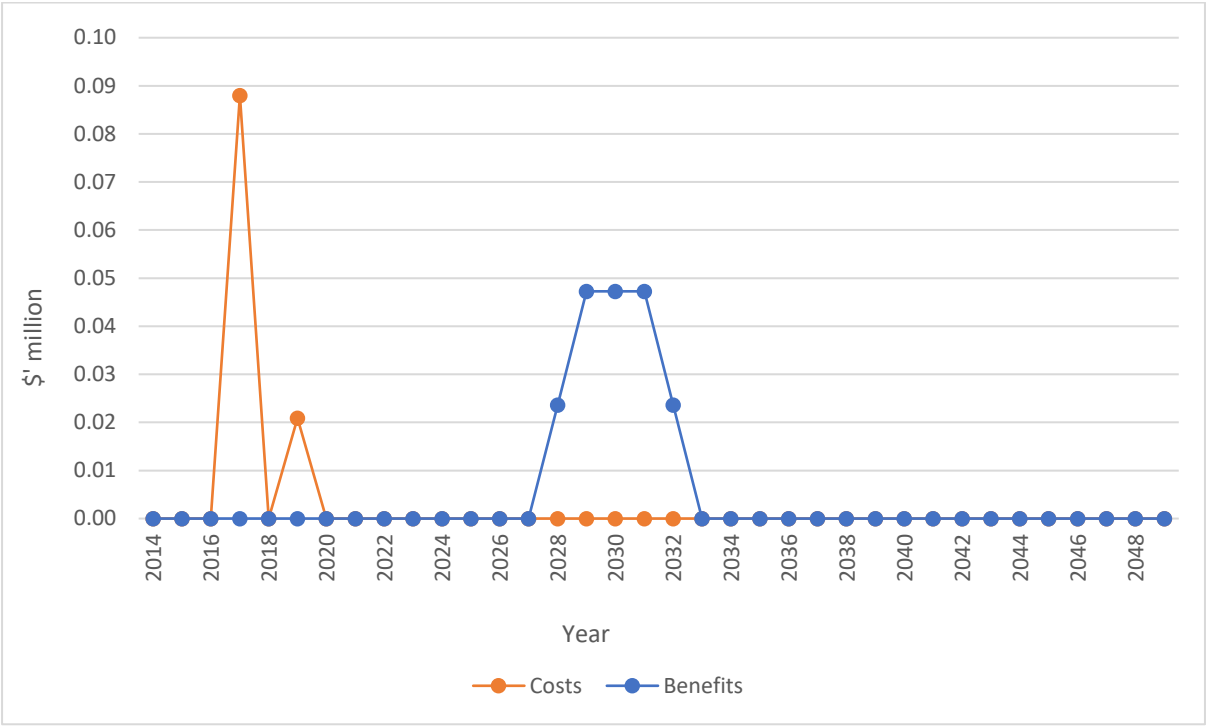
Table 7 shows the investment criteria estimated for different periods of benefits for the total investment. Hort Innovation was the only investor in the project.

Table 7: Investment Criteria for Total/Hort Innovation Investment in Project AL16004

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits ($m)	0.00	0.00	0.05	0.21	0.21	0.21	0.21
Present Value of Costs ($m)	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Net Present Value ($m)	-0.12	-0.12	-0.08	0.09	0.09	0.09	0.09
Benefit-Cost Ratio	0.00	0.00	0.38	1.69	1.69	1.69	1.69
Internal Rate of Return (%)	negative	negative	negative	9.2	9.2	9.2	9.2
MIRR (%)	negative	negative	negative	8.3	7.5	7.1	6.7

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the AL16004 investment plus 30 years from the last year of investment are shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Benefits and Total Investment Costs



Sensitivity Analyses

A sensitivity analysis was carried out on the discount rate. The analysis was performed for the total investment and with benefits taken over the life of the investment plus 30 years from the last year of investment. All other parameters were held at their base values. Table 8 presents the results. The results show that at a 10% discount rate project benefits fail to cover project costs.

Table 8: Sensitivity to Discount Rate (Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present Value of Benefits ($m)	0.35	0.21	0.13
Present Value of Costs ($m)	0.11	0.12	0.14
Net Present Value ($m)	0.25	0.09	-0.01
Benefit-cost ratio	3.26	1.69	0.91

A sensitivity analysis was then undertaken for the increase in profit that might be associated with growing the new varieties. Results are provided in Table 9. When assumed increase in profit is 5%, and all other factors remain unchanged, project benefits fail to cover project costs.

Table 9: Sensitivity to Increase in Profit Associated with New Varieties (Total investment, 30 years)

Investment Criteria	Increase in Profit with New Varieties		
	5%	10% (base)	20%
Present Value of Benefits ($m)	0.10	0.21	0.42
Present Value of Costs ($m)	0.12	0.12	0.12
Net Present Value ($m)	-0.02	0.09	0.30
Benefit-cost ratio	0.85	1.69	3.39

A final sensitivity analysis tested the lag in adoption of new varieties in the absence of mother plantings. The results (Table 10) show that if the adoption lag closed by the establishment of mother plantings is only two years, then project costs will exceed project benefits.

Table 10: Sensitivity to New Variety Adoption Lag in Absence of AL16004 (Total investment, 30 years)

Investment Criteria	Adoption Lag without Mother Plantings		
	2 years	4 years (base)	6 years
Present Value of Benefits ($m)	0.12	0.21	0.32
Present Value of Costs ($m)	0.12	0.12	0.12
Net Present Value ($m)	-0.01	0.09	0.19
Benefit-cost ratio	0.94	1.69	2.56

Confidence Rating

The results produced are highly dependent on the assumptions made, some of which are uncertain. There are two factors that warrant recognition. The first factor is the coverage of benefits. Where there are multiple types of benefits it is often not possible to quantify all the benefits that may be linked to the investment. The second factor involves uncertainty regarding the assumptions made, including the linkage between the research and the assumed outcomes.

A confidence rating based on these two factors has been given to the results of the investment analysis (Table 11). The rating categories used are High, Medium, and Low, where:

High: denotes a good coverage of benefits or reasonable confidence in the assumptions made

Medium: denotes only a reasonable coverage of benefits or some uncertainties in assumptions made

Low: denotes a poor coverage of benefits or many uncertainties in assumptions made

Table 11: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
High	Medium-Low

Coverage of benefits valued was assessed as High as the key impact, making new varieties available to growers sooner, was valued. Confidence in assumptions was rated as Medium-Low, key data was estimated by the analyst.

Conclusion

The investment in AL16004 has led to the establishment of high health status mother plantings for new Australian almond varieties ensuring they are available sooner to almond growers.

Total funding from all sources for the project was $0.12 million (present value terms). The investment produced estimated total expected benefits of $0.21 million (present value terms). This gave a net present value of $0.09 million, an estimated benefit-cost ratio of 1.69 to 1, an internal rate of return of 9.2% and a modified internal rate of return of 6.7%.

As several social impacts identified were not valued, the investment criteria estimated by the evaluation may be underestimates of the actual performance of the investment.

Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of investment costs.

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Abbreviations

ABA	Almond Board of Australia
CRRDC	Council of Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Australian Government)
GDP	Gross Domestic Product
GVP	Gross Value of Production
IP	Intellectual Property
IRR	Internal Rate of Return
MIRR	Modified Internal Rate of Return
OCS	Office of Chief Scientist Queensland
PBR	Plant Breeder Rights
PVB	Present Value of Benefits
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan
UA	University of Adelaide