# Industry-specific impact assessment program: table grape

## Impact assessment report for project *Communicating with the Australian table grape industry* (TG11000)

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MT18009

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# Executive Summary


### What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *TG11000: Communicating with the Australian table grape industry.* The project was funded by Hort Innovation over the period October 2011 to May 2016.

### 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 2017/18 dollar terms and were discounted to the year 2018/19 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

The investment in TG11000 has contributed to increasing the productivity and profitability of the Australian table grape industry by increasing the rate of adoption of new technologies and best management practices by growers. It is noted that a majority of improvements in table grape productivity are due to other investments by Hort Innovation, with support from the Australian Table Grape Association (ATGA), private sector participants, researchers and government agencies involved in research and development, biosecurity and trade. However, the investment in the TG11000 Communication Project clearly provided coordinated communication outputs for the whole industry. This has increased awareness across the industry of new technologies and practices and improved capacity of growers to adopt them; increasing farm productivity and enhancing the management of biosecurity threats and food safety issues.

Additional unquantified benefits are also expected. Social benefits from the project's outputs include improved communications to support grower engagement in industry issues and progress with a sense of industry unity. As well, the communications activities and outputs support positive engagement between growers, value chain participants, researchers and government agencies. Further social benefits arise from spillovers to local communities from having more sustainable and profitable table grape growers. Environmental benefits may be realised by supporting communication and extension of best management practices in relation to chemical use for pest management and food safety.

### Investment Criteria

Total funding from all sources for the project was $1.10 million (present value terms). All project funding was provided by Hort Innovation. The investment produced estimated total expected benefits of $3.10 million (present value terms). This gave a net present value of $2.00 million, an estimated benefit-cost ratio of 2.8 to 1, an internal rate of return of 47% and a MIRR of 10%.

### Conclusions

Three social and environmental impacts were not valued. When inability to value all impacts is combined with conservative assumptions for the principal economic impact valued, it is reasonable to conclude that the valuation may be an underestimate of the actual performance of the investment.



# Keywords

Impact assessment, cost-benefit analysis, TG11000, table grape, communication, productivity, adoption, cost savings.

# Introduction

All research and development (R&D) and marketing levy investments undertaken by Horticulture Innovation Australia Limited (Hort Innovation) are guided and aligned to specific investment outcomes, defined through a Strategic Investment Plan (SIP). The SIP guides investment of the levy to achieve each industry's vision. The current industry SIPs apply for the financial years 2016/17 – 2020/21.

In accordance with the Organisational Evaluation Framework, Hort innovation has the obligation to evaluate the performance of its investment undertaken on behalf of industry.

This impact assessment program addresses this requirement through conducting a series of industry-specific ex-post independent impact assessments of the apple & pear (AP), avocado (AV), mushroom (MU) and table grape (TG) RD&E investment funds.

Twenty-seven RD&E investments (projects) were selected through a stratified, random sampling process. The industry samples were as follows:

- Nine AP projects were chosen worth $15.46 million (nominal Hort Innovation investment) from an overall population of 19 projects worth an estimated $33.31 million,
- Seven AV projects worth $1.91 million (nominal Hort Innovation investment) from an overall population of 27 projects worth approximately $9.97 million,
- Five MU projects worth $1.75 million (nominal Hort Innovation investment) from a total population of 20 projects worth $7.94 million, and
- Six TG projects worth $2.84 million (nominal Hort Innovation investment) from an overall population of 11 projects worth $5.0 million.

The project population for each industry included projects where a final deliverable had been submitted in the five-year period from 1 July 2013 to 30 June 2018.

The projects for each industry sample were chosen such that the investments represented (1) at least 10% of the total Hort Innovation RD&E investment expenditure for each industry, and (2) the SIP outcomes (proportionally) for each industry.

Project *TG11000: Communicating with the Australian table grape industry* was randomly selected as one of the 22 unique MT18009 investments 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 table grape industry consists of approximately 1,000 growers producing 175,900 tonnes of fresh table grapes per year (3 year average 2016 to 2018). Major varieties include white Menindee and Thompson, red Crimson, Flame and Globe and black Sugrathirteen and Autumn Royal and Pione. Table grapes are harvested December to May and imports, mainly from the United States (US), are available July to November (Hort Innovation, 2018).

The Australian Table Grape Association (ATGA) represents growers nationally. ATGA provides a platform for industry members to collectively respond to industry wide issues, deliver research and marketing information, share knowledge, and interact with government and other stakeholders (ATGA, 2019).

Growers pay a levy of one cent per kilogram for table grapes produced in Australia. The levy is managed by Hort Innovation which directs funds to table grape R&D (50% of collected levies) and marketing programs (50% of collected levies). Typically the levy raises $1.8 million per annum. Funds allocated to R&D are matched by the Australian Government.

## Rationale

The Australian table grape industry is geographically widespread with clusters of growers situated across most Australian states and the Northern Territory. The table grape industry in Australia is made up of many family operated businesses operating properties of about 20 hectares in size, with some consolidation in the last five years, there are only a few larger farms in excess of 100ha (Austrade 2018). Further, growers also have varied cultural (and language) backgrounds, and this diversity of farms and farmer characteristics results in a varying ability and willingness on the part of growers to adopt new technologies and practices, and engage in industry activities.

At the same time, the industry faces substantial challenges and opportunities. For example, the need to maintain and improve profitability, as well as industry sustainability by continuing to address critical issues such as productivity, water management and biosecurity and food safety. Industry opportunities include increasing table grape exports and the ongoing improvements in product quality, further enhancing demand by consumers (Hort Innovation, 2017).

These opportunities and challenges are best addressed at a collective level either regionally or industry-wide through targeted research and development, the coordination of industry programs and various government agency activities. This necessitates effective industry communication across a diverse industry, a need to develop unity amongst growers, and along with strong networks with industry stakeholders including value chain participants, researchers, and government regulatory and biosecurity agencies.

Concurrently state departments of primary industries, historically providers of extension services, have continued to decrease investment in these activities, reducing communication and coordination of extension programs for growers.

Given this context, the table grape industry and its (former) Industry Advisory Committee identified the need for improved industry communications. Therefore, the ATGA with support from Hort Innovation developed an industry communications project *Communicating with the Australian table grape industry* (TG 11000) to follow on from the previous communications project TG08001. The salience of TG11000 was further reinforced with the Table Grape Industry Strategic Investment Plan 2012-17 highlighting the need for communications within the Australian table grape industry that would provide timely information for growers and industry stakeholders. Specifically, the Table Grape Strategic Investment Plan 2012-2017 Objective 4 was to “Provide an enabling operating environment (skills and communication)”. TG 11000 is also consistent with the current Table Grape Strategic Investment Plan 2017-2021, Outcome 4, Strategy 2 “Ensure growers and other members of the value chain are fully aware of industry developments”.

# Project Details

## Summary

Project Code: TG11000

Title: *Communicating with the Australian table grape industry*

Research Organisation: ATGA

Principal Investigator: Jeff Scott

Period of Funding: October 2011 to May 2016

## Objectives

TG11000's principle objective was to: "Maintain and improve communication to all sectors of the Australian Table Grape industry" which was derived from the Table Grape Industry Strategic Investment Plan 2012-17 Objective 4, "Provide an enabling operating environment (skills and communication)" (Scott, 2015). The targeted audience included all growers, along with stakeholders involved in the value chain such as processors and marketers and agribusinesses typically supplying inputs including financial institutions, as well as government departments and agencies representing research, extension, and regulation and export supporting roles for the table grape industry.

Principles of the Communication Project included:

- That a multifaceted communication strategy incorporates a diverse range of different communication modes (literature, email and online along with field days and demonstrations and conferences) that reflect grower preferences and supports different learning styles amongst growers and industry stakeholders.
- Growers have equal access to research findings, timely availability of critical information for biosecurity and market information.
- Facilitates two-way communication between growers and the peak industry body.
- Recognition of the link to agribusinesses who can add value to ATGA research outcomes and support communication and extension of research projects' outcomes to growers.

## Logical Framework

Table 1 provides a description of TG11000, communications activities, in a logical framework.

Table 1 Logical Framework for Project TG11000

| | |
|---|---|
| Activities and Outputs | • Design and publication of industry magazine *The Vine* published quarterly distributed to all grower/levy payers, and table grape industry stakeholders including marketers, exporters, distributors, wholesalers, retailers, investors, research providers and relevant government departments and agencies (circulation of 800 in 2015; and identified from annual grower meeting feedback as a key source of industry information).<br>• Developed and maintained a comprehensive, client database for the majority of industry participants enabling communication of relevant and time critical information to growers and industry stakeholders effectively and efficiently.<br>• Management and delivery of E-newsletter and email notifications, providing rapid and timely communications for regional or industry wide seasonal and market notifications, production management information, and also potentially support industry crisis management.<br>• Industry website development and maintenance of the ATGA website www.australiangrapes.com.au which is the online platform for the table grape industry and consumers. The website:<br>  ○ extends Hort Innovation research information and completed projects, ATGA promotional activities and market access achievements. |

| | |
|---|---|
| | ○ provides access to research outcomes and growers access to management tools such as a Maximum Residual Limits search tool, information on chemical permits and biosecurity updates.<br>○ provides a grower entry portal for the Export Registration system, and market data and InnoGrape technical information.<br>• Development and management of social media for ATGA (Facebook and Twitter) as alternate communication pathways to growers and industry stakeholders.<br>• Media interviews and information including:<br>○ production of media releases, coordination of interviews and promoting key research findings, statistics and events.<br>○ media monitoring of newspapers and radio for articles relevant to the industry which are reported to the ATGA and growers where relevant.<br>• Industry representation through the ATGA to stakeholder networks such as Agriculture Victoria's Horticultural Industry Network (HIN) and the Sunraysia Horticultural Extension Network.<br>• Publication and distribution of industry Strategic R&D Investment Plan<br>• Communication and coordination support of workshops, field days and conferences. For example, the 7th International Table Grape Symposium in Mildura (November 2014), GrapeConnect meetings for growers and annual levy payer meetings (for the 9 major growing regions).<br>• Promotion of opportunities for learning from study tours, national and global table grape conferences and leadership and professional development programs. |
| Outcomes | • Increased credibility and salience of the Australian Table Grape Association as the communication hub for the Australian table grape industry.<br>• Increased engagement and networks amongst table grape growers and between growers and supply chain participants, relevant government departments involved in research and regulation, research institutions, Hort Innovation and Plant Health Australia.<br>• Increased networking and information sharing between the Australian table grape industry and other horticultural and rural and regional stakeholders.<br>• Increased transparency of levy expenditure through Hort Innovation investments and ATGA supported priority R&D projects for industry.<br>• Increased potential for management practice changes that increase efficiency and productivity reducing the unit cost of output within the table grape industry, from increased awareness amongst producers through strategic communication of research outcomes and best management practices. Examples of industry issues and best management practices and technologies extended through the Communications Project relate to:<br>○ climate variability, water management, production cost management, succession planning, biosecurity and food safety, grape quality and exports and markets.<br>• Agribusinesses with greater awareness of research and best management practices for the Australian industry who also contribute to extension efforts to growers.<br>• Improved communication amongst industry stakeholders (growers, wholesalers, government, researchers) of biosecurity and food safety threats or incidents enabling greater timeliness and effectiveness of coordinated responses at farm, regional and industry level.<br>• Support of developing table grape export markets (through hosting of the portal to lodge applications for supply of export grapes) and increased awareness amongst growers and supply chain participants of complementary quality and phytosanitary requirements to meet export market conditions (addressed in a parallel benefit-cost analysis for project TG14000 - *Export Market Access, Biosecurity and Developing Export Markets for the Australian Table Grape Industry*).<br>• Growers found the ATGA communications to be important sources of information for technical information on production and biosecurity and food safety issues. |

| | |
|---|---|
| Impacts | • Economic – cost savings due to increased adoption rate of improved production practices and new technologies that increase productivity and reduce yield loss with improved pest and disease control and enhanced responses to biosecurity incidents from the provision of timely information.<br>• Environmental – Reduced chemical use for pest management and food safety threats by growers applying best management practices.<br>• Capacity – industry communication and extension skills developed.<br>• Social – increased unity and grower engagement within the table grape industry and improved networks between growers and industry stakeholders including value chain participants, researchers and supporting government agencies for biosecurity and exports.<br>• Social - increased income in regional Australia associated with a more profitable and sustainable table grape industry (spillover benefit). |

# Project Investment

### Nominal Investment

Table 2 shows the annual investment (cash and in-kind) in project TG11000 by Hort Innovation. There were no 'other' investors in this project.

Table 2: Annual Investment in the Project TG11000 (nominal $)

| Year ended 30 June | Hort Innovation ($) | Other ($) | Total ($) |
|---|---|---|---|
| 2012 | 135,000 | 0 | 135,000 |
| 2013 | 135,000 | 0 | 135,000 |
| 2014 | 126,000 | 0 | 126,000 |
| 2015 | 152,888 | 0 | 152,888 |
| 2016 | 159,926 | 0 | 159,926 |
| **Totals** | 708,814 | 0 | 708,814 |

### 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 2.

### Real Investment and Extension Costs

For the purposes of the investment analysis, investment costs of all parties were expressed in 2017/18 dollar terms using the GDP deflator index. Since awareness and extension activities are core to the Communication Project these are part of the project costs.

# Impacts

Table 3 provides a summary of the principal types of impacts delivered by the project. Impacts have been categorised into economic, environmental and social impacts.

Table 3: Triple Bottom Line Categories of Principal Impacts from Project TG11000

| | |
|---|---|
| Economic | • Increased cost savings from adoption of management practices and technologies that increase productivity and reduce yield loss from pests and diseases through the provision of timely information. |
| Environmental | • Reduced chemical use for pest management and food safety threats by growers applying best management practices. |
| Social | • Increased industry unity and engagement of growers within the table grape industry, positive engagement of growers with researchers and government agencies and industry stakeholders and agribusinesses.<br>• Increased industry communication and extension skills developed.<br>• Spillover benefits to local communities from sustainable and profitable table grape growers. |

### Public versus Private Impacts

Impacts identified in this evaluation are mostly private in nature. Private benefits will be realised by table grape growers via additional profit achieved from earlier adoption of new technologies and improved management practices. This earlier adoption is a result of increased grower awareness of technologies and associated information and training programs communicated strategically through the Communications Project TG11000. Public benefits will include increased grower unity and engagement in the table grape industry, as well as increased income in regional Australia associated with a more profitable and sustainable industry. Further, earlier awareness and adoption of best management practices regarding chemical use will have positive environmental benefits and strengthen the industry's sustainability.

### Distribution of Private Impacts

The impacts on the table grape industry from investment in this project will be shared along the supply chain with growers, packers, transporters, wholesalers and retailers all sharing impacts produced by the project.

### Impacts on Other Australian Industries

Impacts on industries other than the table grape industry and its associated sectors may include potential gains in other industries via spillovers from improved biosecurity outcomes and technology and management practices, applicable to other vineyard enterprises producing dried fruit or wine. While the avoidance, management or eradication of plant pests or diseases from earlier adoption of best management practices may impact positively on other crops such as fruits or vegetables.

### Impacts Overseas

Apart from possible increased volume and quality of Australian table grapes available for export there are not likely to be other overseas impacts from the project.

### Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 4. The project findings and related impacts will contribute to Rural RD&E Priorities 1, 2, 3 and 4, and to Science and Research Priority 1.

Table 4: Australian Government Research Priorities

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

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

### Alignment with the Table Grape Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the table grape industry are outlined in the Table Grape Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2016). Project TG11000 addressed Table Grape SIP Outcome 4, Strategy 4.2.

## 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.

A single impact type was valued – increased variable cost savings for growers, a consequence of an increased rate of adoption of new technologies or best management practices at the farm level extended by TG11000 project communication activities.

### Impacts Not Valued

Not all of the impacts identified in Table 3 could be valued in the assessment. Three social impacts and an environmental impact were hard to value due to a lack of data on adoption of more sustainable on-farm management practices and difficulty in quantifying the causal relationship and pathway between TG11000 and the social impacts. Also assigning monetary values to the social impacts are very complex.

The impacts identified but not valued were:

- Improved environmental conditions from the application of best management practices in relation to chemical use for pest and disease management.
- Increased industry unity and sharing of information between table grape growers and between growers and industry stakeholders including those in the table grape value chain, researchers and relevant government agencies.
- Increased industry communication and extension skills developed.
- Increased income in regional Australia associated with a more profitable and sustainable table grape industry (spillover impact).

### Valuation of Impact: Increased rate of uptake of new technologies and best management practices

TG11000 built on a previous Hort Innovation funded table grape communications project and managed by the

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

ATGA. TG11000 activities were completed alongside other Hort Innovation projects supported by ATGA as well as state departments of primary industries, relevant federal government agencies and departments, research institutes and private sector organisations involved in providing services to the table grape industry. This project, managed by the ATGA, provided the primary hub and various media for strategically communicating to growers and industry stakeholders at individual, regional and industry levels. It was used to promote and extend outputs from other research and marketing investments to growers and industry stakeholders as well as facilitating industry feedback.

**Attribution**

For the analysis it is estimated that the increased adoption rate (beyond the counterfactual adoption rate described below) of the 3% reduction in gross margin costs, is fully attributable to the Communication Project TG11000 activities and outputs.

**Counterfactual**

In the absence of TG11000, there are still other government agencies, private sector service providers and input suppliers involved in extending new technologies and best management practices to growers, albeit in a less coordinated manner. Therefore, the adoption of the cost reducing technologies and best management practices by 3% would occur but at a slower rate. The maximum level of adoption will be the same as the with-project TG11000 scenario (30% of the total area grown for table grapes). The rate of adoption of technologies and practices would be slower with maximum adoption being delayed by 3 years beyond the 'with-project' investment scenario. That is, adoption will commence in the same year (as the 'with-project' scenario) however maximum adoption is achieved after 8 years (compared with 5 years to maximum adoption achieved with the Communication Project TG11000 investment).

### Summary of Assumptions

A summary of the key assumptions made for valuation of the impacts is shown in Table 5.

Table 5: Summary of Assumptions

| Variable | Assumption | Source/Comment |
|---|---|---|
| **Impact 1: Increased rate of uptake of new technologies and best management practices** | | |
| **WITH Investment in Project TG11000** | | |
| Attribution of cost saving practices | Cost savings of $600/ha, a 3% cost reduction in on-farm variable costs attributable to the project. | Consultant estimate. Variable costs per ha of $14,172 (Sinnett *et al.* 2012) were adjusted to 2017/18 dollar value. |
| Maximum adoption | 30% of total 10,532 ha. | Consultant estimate and drawn from ABS (2018), Argus and MacGregor (2014) and adjusted for dried fruit producing vine estimates from DFA (DFA, 2019). |
| Maintenance of benefits and dis-adoption | Benefits maintained for 10 years from initial adoption and then decline over the following 5 years to zero. | Consultant estimate. |
| Year of first impact | 2013-14 | Second full year after commencement of project, consultant estimate based on timing of project awareness and extension outputs - communication materials and grower meetings. |
| Annual adoption rate | 20% annual increase for 5 years (to maximum adoption). | Consultant estimate of adoption profile based upon other industry adoption rates and given the 30% maximum adoption area would likely cover a substantial proportion of large specialised producers. |

| WITHOUT Investment in Project TG11000 | | |
|---|---|---|
| Year of first impact | 2013-14 | Second full year after commencement of project, consultant estimate with information being made available in a less coordinated manner to producers. |
| Annual adoption rate | 12.5% annual increase for 8 years (to maximum adoption). | Consultant estimate of adoption profile based upon other industry adoption rates and given the 30% maximum adoption area would likely cover a substantial proportion of larger specialised producers. |
| Level of impact (cost savings) and maximum adoption | See 'with investment' assumptions above | |

# Results

All costs and benefits were discounted to 2018/19 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 (2015/16) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

### Investment Criteria

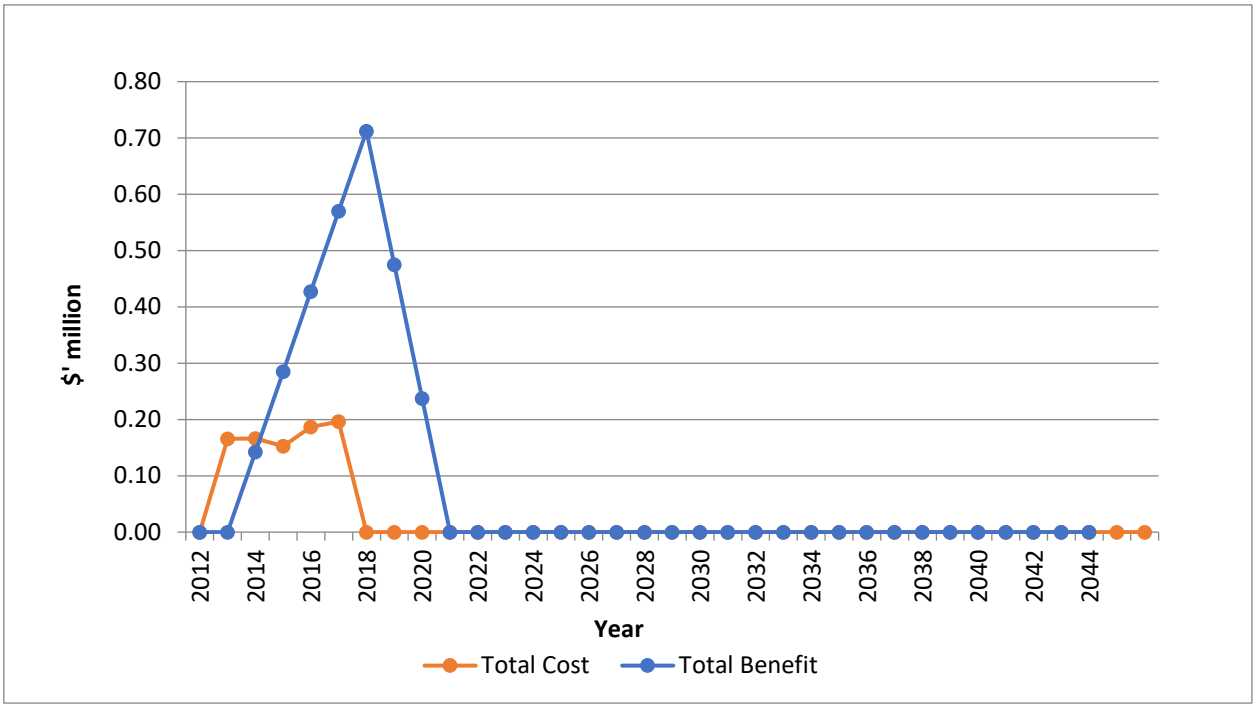
Table 6 shows the investment criteria estimated for different periods of benefit for the total investment. Hort Innovation was the only contributor to this project so there is no second set of analyses showing results for Hort Innovation.

Table 6: Investment Criteria for Total Investment in Project TG11000

| Investment Criteria | Years after Last Year of Investment | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Present Value of Benefits ($m) | 1.02 | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 |
| Present Value of Costs ($m) | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 |
| Net Present Value ($m) | - 0.08 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Benefit-Cost Ratio | 0.93 | 2.81 | 2.81 | 2.81 | 2.81 | 2.81 | 2.81 |
| Internal Rate of Return (%) | negative | 47.1 | 47.1 | 47.1 | 47.1 | 47.1 | 47.1 |
| MIRR (%) | negative | 26.7 | 17.9 | 14.1 | 12.1 | 10.8 | 9.9 |

The annual undiscounted benefit and cost cash flows for the total investment for the duration of TG11000 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 7 present the results. The results have a low sensitivity to the discount rate.

Table 7: Sensitivity to Discount Rate
(Total investment, 30 years)

| **Investment Criteria** | **Discount rate** | | |
|---|---|---|---|
| | **0%** | **5%** | **10%** |
| Present Value of Benefits ($m) | 2.85 | 3.10 | 3.38 |
| Present Value of Costs ($m) | 0.87 | 1.10 | 1.40 |
| Net Present Value ($m) | 1.98 | 2.00 | 1.98 |
| Benefit-cost ratio | 3.28 | 2.81 | 2.42 |

A sensitivity analysis was then undertaken for the assumed reduction in variable costs from adoption of new technologies and practices by TG11000. Even if the assumed attribution rate is a low 1.5%, the project produces a positive return on investment – Table 8.

Table 8: Sensitivity to estimated variable cost savings from adoption of new technologies and best management practices (Total investment, 30 years)

| **Investment Criteria** | **Variable cost savings from adoption of new technologies and best management practices** | | |
|---|---|---|---|
| | **1.5%** | **3.0% (base)** | **5.0%** |
| Present Value of Benefits ($m) | 1.55 | 3.10 | 5.17 |
| Present Value of Costs ($m) | 1.10 | 1.10 | 1.10 |
| Net Present Value ($m) | 0.44 | 2.00 | 4.07 |
| Benefit-cost ratio | 1.40 | 2.81 | 4.68 |

A final sensitivity test examined the rate of adoption of cost saving best management practices and technologies extended to table grape growers through the project's communications activities. With a more modest assumed adoption rate of cost saving technologies and practices, 15% above the "without project" scenario adoption rate, the project continues to produces a positive return on investment -Table 9.

Table 9: Sensitivity to the increased rate of adoption of cost saving technologies (expressed as percentage increase in adoption rate above the without scenario)
(Total investment, 30 years)

| **Investment Criteria** | **Adoption rate by Table Grape Growers of cost saving technologies** | | |
|---|---|---|---|
| | **15%** | **30% (base)** | **60%** |
| Present Value of Benefits ($m) | 1.85 | 3.10 | 3.92 |
| Present Value of Costs ($m) | 1.10 | 1.10 | 1.10 |
| Net Present Value ($m) | 0.75 | 2.00 | 2.82 |
| Benefit-cost ratio | 1.68 | 2.81 | 3.55 |

### 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 10). 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 10: Confidence in Analysis of Project

| **Coverage of Benefits** | **Confidence in Assumptions** |
|---|---|
| Medium-high | Medium |

Coverage of benefits was assessed as medium-high – the major benefit, of increased rate of adoption of cost saving technologies and best management practices extended through TG11000 activities was quantified. However, social benefits including improved industry unity and networks between growers, and between growers and industry stakeholders including marketers, researchers and government agencies, and community spillovers were not quantified.

Confidence in assumptions was rated as medium. While data were drawn from Hort Innovation, Australian Bureau of Statistics and farm management literature, there is generally limited industry performance data including profitability available and that could be considered representative of growers.

## Conclusion

The investment in TG11000 has developed and maintained an industry communications hub, utilising various forms of media, that provided strategic communications and awareness activities responsive to growers needs in a timely manner. As such the project outputs have contributed to increasing the productivity and profitability of the Australian table grape industry by increasing the rate of adoption of new technologies and best management practices by growers. While it is acknowledged that a majority of improvements in table grape productivity are due to other investments by Hort Innovation and ATGA, private sector participants, researchers and government agencies involved in R&D, biosecurity and trade, TG11000 clearly provided coordinated communication outputs for the whole industry. This has increased awareness across the industry of new technologies and practices and improved capacity of growers to adopt them; increasing farm productivity and enhancing the management of biosecurity threats and food safety issues in a timelier manner.

Additional unquantified benefits are also expected. Social benefits from the project's outputs include improved communications to support grower engagement in industry issues and progress a sense of industry unity. As well, the communications activities and outputs support positive engagement between growers, value chain participants, researchers and government agencies. Further social benefits arise from spillovers to local communities from having more sustainable and profitable table grape growers. Environmental benefits may be realised by supporting communication and extension of best management practices in relation to chemical use for pest management and food safety.

When inability to value all impacts is combined with conservative assumptions for the principal economic impacts valued, it is reasonable to conclude that the valuation may be an underestimate of the actual performance of the investment.

## Glossary of Economic Terms

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| 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

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| ATGA | Australian Table Grape Association |
| CRRDC | Council of Research and Development Corporations |
| DAWR | Department of Agriculture and Water Resources (Australian Government) |
| IRR | Internal Rate of Return |
| MIRR | Modified Internal Rate of Return |
| OCS | Office of Chief Scientist Queensland |
| PHA | Plant Health Australia |
| PVB | Present Value of Benefits |
| RDC | Research and Development Corporation |
| R&D | Research and Development |