



Macadamia Fund

Annual Report 2018/19

Content



The year at a glance	2
Welcome	3
Additional value in the year	4
Making investments in 2018/19	5
R&D project list 2018/19	7
R&D report	9
Minor use permits	17
Marketing report	19
Financial statement	25

Horticulture Innovation Australia Limited (Hort Innovation) makes no representations and expressly disclaims all warranties (to the extent permitted by law) about the accuracy, completeness, or currency of information in the *Macadamia Fund Annual Report 2018/19*. Reliance on any information provided by Hort Innovation is entirely at your own risk. Hort Innovation is not responsible for, and will not be liable for, any loss, damage, claim, expense, cost (including legal costs) or other liability arising in any way, including from any Hort Innovation or other person's negligence or otherwise from your use or non-use of the *Macadamia Fund Annual Report 2018/19*, or from reliance on information contained in the material or that Hort Innovation provides to you by any other means.

© 2019 Horticulture Innovation Australia Limited.

The projects in this report have been funded by Hort Innovation using sources including the macadamia levy, Australian Government contributions and, in some instances, co-contributions from a variety of sources.



Just some of the things your fund delivered in 2018/19:

- ✓ **The industry communication and extension programs**, delivering the *Australian Macadamia Society News Bulletin* magazine, industry e-newsletters, all kinds of industry meetings and events, the industry website (www.australianmacadamias.org) and more
- ✓ **The macadamia Harvest to Home dashboard** providing regular consumer behavioural data and insight reporting, at www.harvesttohome.net.au
- ✓ An industry **benchmarking initiative** that saw close to 80 per cent of surveyed participants changing or planning to change their practices for improved productivity (p10)
- ✓ The conclusion of work that delivered **four new macadamia varieties**, and the establishment of a new project to continue variety evaluations (p9)
- ✓ Highly visible and multi-pronged **marketing activities both here and overseas** (from p19)
- ✓ New **final research reports and grower resources**, with 55+ now available from www.horticulture.com.au/macadamia

2018/19 SNAPSHOT

\$2.58
MILLION

INVESTED
IN R&D

\$3.11
MILLION

INVESTED IN
MARKETING

35+

ACTIVE R&D
INVESTMENTS

Welcome

Hort Innovation is the grower-owned, not-for-profit research and development corporation (RDC) for Australia's horticulture sector. It's our job to work with industry to invest the macadamia R&D and marketing levies, as well as Australian Government contributions, into key initiatives for growers.

The 2018/19 financial year was another great year of growing better, together – with strong investments, closer connections and critical collaborations being forged.

There was close to \$2.58 million invested into R&D through the Hort Innovation Macadamia Fund across the year, to support the industry in being as productive and profitable as possible. This included the establishment of eight new investments and a host of ongoing projects, including work allowing the macadamia industry to join forces with other horticulture industries for maximum efficiency and impact across shared issues and opportunities.

Meanwhile in marketing, the Hort Innovation Macadamia Fund saw more than \$3.11 million invested in 2018/19 into a range of activities to raise the profile and consumption of Australian macadamias, both domestically and overseas.

Read on to learn more about all of this work. And remember to take advantage of the Hort Innovation website at www.horticulture.com.au/macadamia, where you can search and find information relating to investments, past and present, at any time. The new site and its Macadamia Fund section were launched in 2018/19.

Finally, during the year there were many opportunities for Hort Innovation to connect with you, the growers. A big thank you in particular to everyone who came to our early-2019 regional roadshows to feed into the development of the new Hort Innovation Strategy 2019-2023 (read more at www.horticulture.com.au/strategy-2019-2023).

You can reach out to us at any time to learn more about our work, to submit ideas for investments, or to simply have a chat about your industry. You'll find details of specific staff at www.horticulture.com.au/get-in-touch, or can otherwise email communications@horticulture.com.au or call our general line on 02 8295 2300.



Additional value in the year

During 2018/19, Hort Innovation was proud to deliver extra value to the macadamia industry, outside of levy-funded initiatives within the Macadamia Fund. Here's a quick look at just some examples.



The new Hort Innovation website, with dedicated Macadamia Fund section

You can now visit www.horticulture.com.au/macadamia to quickly search and find macadamia investment information and updates, project resources, and growing tips and advice from Hort Innovation's R&D work. You can also download full final research reports direct from the site, access key contact information, share your ideas and feedback, and so much more.



The Australian Horticulture Statistics Handbook

Each year Hort Innovation delivers an *Australian Horticulture Statistics Handbook* packed with horticulture statistical information and analysis for use by specific industries and the wider sector. The handbook combines all available data on production, international trade, processing volumes and fresh market distribution for some 75 categories. The 2017/18 edition, released in early 2019, is available from www.horticulture.com.au/horticulture-statistics-handbook.



Hort Frontiers projects

With seven investment areas, Hort Innovation's Hort Frontiers strategic partnership initiative is about collaborative, cross-industry work to address longer-term, complex issues and opportunities identified as critical for the future of Australian horticulture. While industry levies can be invested into Hort Frontiers projects upon the advice of the relevant Strategic Investment Advisory Panels, the bulk of funding comes from broad-reaching funding relationships that are secured by Hort Innovation, plus support from the Australian Government. Learn about all of the projects and what they're delivering for you at www.horticulture.com.au/hort-frontiers.



Grant funding

In 2018/19, Hort Innovation delivered \$6.7 million worth of investments involving grant funding across the horticulture sector. To do so, we applied for and secured a range of competitive grants on behalf of industry, including through the Australian Government's Rural R&D for Profit program, Improved Access to AgVet Chemicals initiative, and Agricultural Competitiveness White Paper. With projects across everything from biosecurity to pollination, there's plenty in there to directly and indirectly benefit the macadamia industry.

Making investments in 2018/19

Hort Innovation is dedicated to making the right investments at the right time and in the right areas, in line with identified priorities for the industry.

Where the funding comes from

The macadamia industry's grower-raised statutory R&D and marketing levies are collected by the Australian Government and entrusted to Hort Innovation as the RDC for Australian horticulture. It's then our responsibility to work with the industry to invest these levies – together with Australian Government contributions in the case of R&D – into strategic initiatives for the benefit of growers.

Additional funding streams can also come into play, such as co-investment dollars from sources including project partners, and grant funding that Hort Innovation secures on behalf of industry.

How decisions are made

Investment decisions in the Hort Innovation Macadamia Fund are guided by the industry's Strategic Investment Plan (SIP). This document was developed through close consultation with growers and other industry stakeholders, and outlines specific investment priorities, strategies and themes. An at-a-glance version can be found at www.bit.ly/macadamia-plan, or find the full version at www.horticulture.com.au/macadamia.

The SIP is currently used like a 'roadmap' by the macadamia Strategic Investment Advisory Panel (SIAP) – a panel made up of growers and other industry representatives that's tasked with providing advice to Hort Innovation on potential levy investments.

Turning ideas into investments

Great investments start with great ideas, and Hort Innovation encourages all growers and other industry participants to share their thoughts and suggestions for the work they want to see. Ideas can be submitted any time via Hort Innovation's investment idea form at www.bit.ly/concept-form.

Ideas that are selected for investment are worked into project proposals by Hort Innovation. These are then made public for potential delivery partners to submit responses. Current opportunities are always listed at www.horticulture.com.au/delivery-partners.

Responses are assessed, often with the assistance of industry, and the best delivery partner for the work is chosen. A contract is then issued and the work begins.

Keeping track of investments

All investments in the Hort Innovation Macadamia Fund are detailed on the 'Your investments' page at www.horticulture.com.au/macadamia. We also send news and alerts to Hort Innovation members and contacts – if you haven't already, you can sign up for free at www.horticulture.com.au/sign-up.

Importantly, the industry's levy-funded communications program is tasked with providing growers with regular information on levy-related activity. See p10 for more.



New investment analysis

You can now clearly see how investments in the Hort Innovation Macadamia Fund align to the industry's SIP, with new and interactive investment analysis information available from www.bit.ly/macadamia-investment. The analysis currently shows the allocation of funding against each of the macadamia SIP outcomes from the start of the SIP (2016/17) to the end of 2018/19, and gives an indication of the projects that are aligned to each outcome.



Signing a Statement of Commitment

To ensure a strong, cooperative and clear working relationship, in May 2019, Hort Innovation came together with the Australian Macadamia Society to sign a Statement of Commitment. The purpose of this document is to mutually define, acknowledge and cement our agreed roles, responsibilities, shared objectives and engagement expectations – all so we can work effectively in the best interests of growers and the wider industry. Learn more and see the signed document at www.horticulture.com.au/statements-of-commitment.

R&D project list 2018/19

NEW INVESTMENTS IN 2018/19

MC17005	The effect of macadamia nuts on cardiometabolic risk factors and adiposity: a randomised intervention study
MC17006	Macadamia regional variety trials series 4
MC17007	Generation of pesticide data – Sigastus weevil
MC18000	Australian macadamia communication program
MC18001	Reconnaissance and recommendations for mistletoe management in macadamia orchards*
MC18002	Benchmarking the macadamia industry 2019-2021
MC18003	Macadamia crop forecasting 2020-2022
MT18011	Ex-post impact assessment [^]

* This flagged project both began and ended in 2018/19

[^] This multi-industry project was a key monitoring and evaluation investment during 2018/19 – we encourage you to find the full details at www.horticulture.com.au/mt18011

ONGOING INVESTMENTS IN 2018/19

MC14000	Macadamia second generation breeding and conservation
MC15004	Australian macadamia industry innovation and adoption program
MC15007	Still wild about macadamias – conserving a national icon [†]
MC15008	Establishing an open-source platform for unravelling the genetics of macadamia: integration of linkage and genome maps [†]
MC16000	Innovative rootstocks for the Australian macadamia industry
MC16002	Macadamia industry minor use program

ONGOING INVESTMENTS IN 2018/19 (continued)

MC16003	Coordinator for the IPM program for the Australian macadamia industry
MC16004	IPM program for the Australian macadamia industry – NSW DPI
MC16005	IPM program for the Australian macadamia industry – DAF
MC16006	IPM program for the Australian macadamia industry – IPM Technologies
MC16007	IPM program for the Australian macadamia industry – University of Sunshine Coast
MC16008	IPM program for the Australian macadamia industry – BioResources
MC16018	Macadamia integrated disease management
MT16005	Enhanced National Bee Pest Surveillance Program
MT16010	Horticultural trade data 2017-19
MT17005	Improving the biosecurity preparedness of Australian horticulture for the exotic spotted wing drosophila (<i>Drosophila suzukii</i>)
MT17015	Consumer behavioural and retail data for fresh produce
ST16006	Generation of residue, efficacy and crop safety data for pesticide applications in horticulture crops 2017
ST16008	AgVet collaborative forum

[†] These flagged projects did not involve the industry levy, and were instead funded by Hort Innovation using voluntary contributions and Australian Government funding. They were carried over from the original Horticulture Australia Limited (HAL).

INVESTMENTS COMPLETED IN 2018/19

MC11001	Macadamia Regional Variety Trials – series 3 phase 2
MC13008	Biology, species and genetic diversity of macadamia lace bugs
MC13014	Macadamia – propagation and precocity†
MC15003	National macadamia grower communications program
MC15005	Benchmarking the macadamia industry 2015-2018
MC15009	Macadamia crop forecasting 2015-2018
MC16001	Macadamia harvest improvement review‡
MC15013	Consultancy services for crop forecasting in MC15009
MC16012	Evaluation of a biocontrol for husk spot of macadamia
MC17001	Developing a macadamia industry tree stock standard
MC17004	Independent mid-term evaluation of MC15004

† This flagged project did not involve the industry levy, and was instead funded by Hort Innovation using voluntary contributions and Australian Government funding. It was carried over from the original Horticulture Australia Limited (HAL).

‡ MC16001 drew to an early close during 2018/19, as agreed upon by Hort Innovation, the project reference group and the macadamia industry's Strategic Investment Advisory Panel.

During the 2018/19 financial year, all levy paying horticulture industries also contributed to a small selection of across-industry projects addressing issues that affect horticulture as a whole. Details of all investments that Hort Innovation manages can be found at www.horticulture.com.au.



But wait, there's more. To see what Hort Innovation delivered across the entire horticulture sector in 2018/19, download the full Hort Innovation Annual Report 2018/19 from www.horticulture.com.au/annual-report-portal.

R&D report

Take a closer look at some of the key investments in the Hort Innovation Macadamia Fund during 2018/19. Any resources from these and other levy-funded projects – such as fact sheets, guides and more – are published on your grower page at www.horticulture.com.au/macadamia as they become available.

Macadamia regional variety trials – series 3, phase 2 (MC11001)

NOW COMPLETE

Key research provider: The Queensland Department of Agriculture and Fisheries

This investment was tasked with continuing the evaluation of new macadamia varieties established in earlier industry breeding work. It maintained a number of trial sites in Queensland and New South Wales, collecting and analysing data annually to narrow down promising selections and work towards the release of new high-performing varieties for Australian macadamia growers.

Factors including yield, kernel quality and tree performance were measured, with more in-depth studies looked at tree susceptibility to insects and pathogens, abnormal vertical growth, kernel oil profiles and shelf life.

During 2017, the project released four new elite macadamia varieties:

- » 'Variety G' (MIV1-G) – a large, precocious tree with high yields and kernel recovery of 40 per cent plus, suitable for the Bundaberg and Northern Rivers regions.

- » 'Variety J' (MIV1-J) – a medium to large tree with large nuts and high kernel recovery of 44 per cent, more suited to the Bundaberg region.
- » 'Variety P' (MIV1-P) – a small to medium, precocious tree suitable for high-density plantings, with a kernel recovery in the high 30 per cent region. It's more suitable to Bundaberg, but also produces heavy crops in New South Wales.
- » 'Variety R' (MIV1-R) – a medium sized tree that crops well in northern New South Wales, with a kernel recovery of 37 per cent.

A further four promising varieties were also selected. At time of the investment wrapping up, they were awaiting commercialisation.

Throughout the project, information and updates were presented to growers during Regional Variety Trial field walks and through other levy-funded industry communication channels. Full details can be found in the project's final research report, which can be downloaded from www.bit.ly/mc11001.

Fact sheets on the four new varieties can also be accessed from this link.



Macadamia regional variety trials series 4 (MC17006)

NEW IN 2018/19

Key research provider: The Queensland Department of Agriculture and Fisheries

Carrying on from MC11001, described in the previous project description, this investment is continuing to evaluate the performance of new and emerging macadamia varieties, and will feed information on these varieties through to industry. The information it generates will ultimately help guide growers in making decisions about new varieties for orchard expansion, development and possible replanting in key growing regions. The varieties it helps commercialise will have benefits including higher and more consistent production of high-quality kernel, resulting in a more profitable and prosperous industry in Australia, based on internationally competitive exports.

Australian macadamia communication program (MC18000)

NEW IN 2018/19

Key research provider: The Australian Macadamia Society

Continuing on from the now-completed **National macadamia grower communication program (MC15003)**, this project shares R&D and marketing outcomes and other knowledge with macadamia growers and other industry stakeholders. The goal is to support growers in adopting new practices and technologies, increasing orchard productivity and profitability.

Like its predecessor, this investment produces and maintains a number of regular communication channels, including but not limited to:

- » The macadamia industry website, www.australianmacadamias.org
- » Quarterly *Australian Macadamia Society News Bulletin* magazines, containing key information and outcomes on levy-funded R&D and marketing outcomes, with issues available to download via www.australianmacadamias.org/industry/news
- » Fortnightly industry e-newsletters, which you can also download and sign up for from the link above
- » Video content for the Australian Macadamia Society YouTube channel
- » Fact sheets on macadamia R&D
- » Media releases.



Benchmarking the macadamia industry 2015-2018 (MC15005)

NOW COMPLETE

Key research provider: The Queensland Department of Agriculture and Fisheries

Running from 2015 into 2018, this investment continued the supply of on-farm benchmarking information for the macadamia industry. The collection of data on planting, production, costs, pest and weather problems and quality allowed analysis of trends across the industry, allowing growers and other stakeholders to make informed decisions that can improve farm productivity and profitability.

Industry reports were produced each season, including analysis of seasonal findings and long-term trends across the whole sample. They also included de-identified analysis of segments of the sample, such as top performing farms (sustained high yield per hectare over four or more years), percentiles and regions. Variation in seasonal productivity and quality was also analysed by farm size, tree age, region, use of irrigation, management structure and planting density.

Key findings from the project included:

- » There was high variability in productivity between farms, and between seasons for any given farm
- » Examples of sustained high orchard productivity were identified in all production regions, and across all farm size and tree age groups
- » Average long-term productivity per hectare was highest in the Central Queensland region
- » Average productivity for the top 25 per cent of farms (based on sustained productivity over four-plus years) was four times higher than the remainder of the sample
- » Insect damage was identified as the leading cause of factory reject, with highest average levels recorded in the New South Wales Mid-North Coast region

Continued >>

- » The incidence of insect damage among small farms (less than 10 hectares) was higher than all other farm size groups
- » Lack of available moisture caused high immaturity in some seasons, particularly in South East Queensland
- » Average internal discolouration rejects were higher in Bundaberg compared with other regions
- » Average production costs per hectare and per tonne increased over five seasons documented, particularly labour and crop nutrition costs
- » Average long-term saleable and reject kernel recovery was highest in the New South Wales Mid-North Coast region.

Importantly, more than three quarters of surveyed growers (77 per cent) reported changing or planning to change production practices as a result of the project and its resources.

As well as industry-wide benchmarking information, participating farms received confidential annual farm reports, which ranked the performance of their business against averages of comparable farms. The project also facilitated annual meetings to discuss seasonal findings and trends, and the researchers disseminated information through a range of industry channels. Six case study videos were also created to demonstrate compelling examples of high productivity or innovation.

Links to the project's benchmarking reports, videos and other resources, together with the investment's full final research report, can be accessed from www.bit.ly/mc15005.

Benchmarking the macadamia industry 2019-2021 (MC18002)

NEW IN 2018/19

Key research provider: The Queensland Department of Agriculture and Fisheries

Following the completion of MC15005, detailed in the previous description, this investment was established in 2018/19 to carry on the supply of on-farm benchmarking information for the macadamia industry. Like its predecessor, by collecting planting, production, quality and other data – and analysing trends across the industry and across seasons – its goal is to allow informed decision-making and to facilitate improved farm productivity and profitability for the industry.

The program is continuing to supply free and confidential individual benchmarking reports to participating farms, which under the new investment also includes confidential ranking of seasonal farm performance to help individual businesses understand and measure the relative impact of limiting conditions such as weather, pests and diseases and agronomic conditions.

Meanwhile, general benchmarking reports are released for the whole of the industry. As in MC15005, regional benchmarking groups and productivity case studies are also used as ways to share the information and help growers in adopting profitable and sustainable practices.

Macadamia crop forecasting 2020-2022 (MC18003)

NEW IN 2018/19

Key research provider: The Queensland Department of Agriculture and Fisheries

This investment follows on from previous investment **Macadamia crop forecasting 2015-2018 (MC15009)** and, like its predecessor, is responsible for producing climate-adjusted macadamia crop forecasts for the industry each year from 2020 through 2022, along with longer-term forecasts out to 10 years.

The latest forecasted figures are available from the Australian Macadamia Society at www.australianmacadamias.org/industry.

Both yearly and future-looking forecasts are intended to allow improved decision-making for macadamia businesses and the wider industry. The forecasting provides information needed to maintain market confidence and price stability, allows better scheduling of processing, and can inform infrastructure planning for future production increases and industry expansion.

The effect of macadamia nuts on cardiometabolic risk factors and adiposity: a randomised intervention study (MC17005)

NEW IN 2018/19

Key research provider: Loma Linda University

Beginning in August 2018, this investment is looking at the role of macadamia nuts in health, with the goal of adding to the scientific evidence base on the positive benefits of including macadamia nuts in the diet. The research is specifically looking at the effects of macadamia nuts on body weight, obesity ('adiposity') and risk factors related to 'cardiometabolic' diseases, such as insulin resistance, high cholesterol, and other markers of cardiovascular health.

Reconnaissance and recommendations for mistletoe management in macadamia orchards (MC18001)

NEW IN 2018/19 & NOW COMPLETE

Key research provider: Charles Sturt University

During late 2018, this short, one-month project summarised current knowledge among macadamia growers about mistletoe biology, ecology and what management strategies are used to reduce the impact of the pest plant. The researchers provided interim recommendations for macadamia growers on best practice mistletoe management and presented priorities for future research to address gaps in knowledge.

Mistletoe is an emerging pest in the macadamia industry that affects tree growth and nut yield, and interferes with orchard operations. It is becoming a major issue for growers

Continued >>



in northern New South Wales and Queensland, and it has been found that current approaches to orchard establishment and management are increasing the susceptibility of macadamias to mistletoe intrusion.

The research found that the most effective mistletoe control in macadamia orchards is to apply integrated pest management principles:

- » Monitor regularly to detect mistletoe growth and regrowth
- » Remove existing mistletoe through pruning
- » Minimise reinfection by encouraging more continuous canopies, as mistletoe is more likely to germinate and establish when exposed to light
- » Work with natural enemies to reduce mistletoe vigour.

The project team noted that further research was needed to establish best-practice detection and removal methods, estimate the effect of mistletoe infection on macadamia tree growth and yield, and explore cost-effective control strategies that align with existing orchard operations.

Full details can be found in the project's final research report, which can be downloaded from www.bit.ly/mc18001.

Biology, species and genetic diversity of macadamia lace bugs (MC13008)

NOW COMPLETE

Key research provider: The University of New South Wales

Macadamia lace bug has a significant impact on the macadamia industry, but the taxonomy, genetics and ecology of the pest is poorly understood. This study, which ran from 2014 to 2019, investigated key aspects of the pest including lifespan, food sources, where the bugs lay their eggs, and how far individual insects can disperse.

Researchers collected specimens from seven different growing areas and used both close examination and DNA profiling to precisely identify the problematic species. They found that several species of lace bugs in the genus *Ulonemia*, which are native to Australia, have become significant agricultural pests and are responsible for major economic losses within the macadamia industry. They feed on and damage macadamia flowers, and their populations can build up rapidly if left unchecked. Details on these bugs were compiled into a fact sheet for growers, which includes a clear identification guide – download it from the Hort Innovation website at www.bit.ly/macadamia-lace-bug.

Continued >>

Meanwhile, results from the testing showed that variation between different infestations is low, which indicates that lace bug can be spread across long distances, perhaps by wind or with movement of plant material, people, vehicles and equipment. This means that there is the potential for the pest to reinfest managed orchards from unmanaged source populations anywhere within the growing region.

The project team advised that while insecticides are effective at controlling the pest in orchards, optimal management of the species will require area-wide management.

Grower recommendations from the work:

- » Don't rely only on pesticides, since this can drive genetic selection towards resistance
- » Increase orchard hygiene to control the spread of lace bugs by 'hitchhiking' individuals
- » Coordinate pest management over a wide geographic area.

Full details can be found in the project's final research report, which can be downloaded from www.bit.ly/mc13008.

Macadamia – propagation and precocity (MC13014)

NOW COMPLETE

Key research provider: Plant & Food Research Australia

Increasing yields from young trees and reducing the time to first commercial harvest is a key target for growers establishing new macadamia orchards. Planting more trees per hectare in high-density plantings can increase early yields, but the additional cost of the extra trees can be a disincentive. Also, if trees planted at high density don't reach full production until after they've become crowded, then there's limited benefit in having more trees per hectare. So precocity (encouraging higher yields from young trees) is important.

This project, which ran from 2015 to 2019, investigated options to reduce the time to first commercial harvest for young macadamia trees. In addition to looking at reducing the purchase cost of trees and the cost of establishing trees, the project evaluated a range of management techniques to improve tree structure, and promote flowering and fruiting. Its work did not involve the macadamia R&D levy, but was instead funded through the Hort Innovation Macadamia Fund using contributions from Plant & Food Research Australia and the Australian Government.

Some key areas of investigation and their findings are detailed below.

Using plant growth regulators

Young macadamia trees exhibit very strong apical dominance, with almost complete suppression of axillary shoot growth. This can make it difficult to produce trees with a strong fruiting framework and result in considerable work for growers to prune and train young trees. The researchers trialled plant growth regulators to overcome apical dominance in the nursery. One

regulator was found to stimulate already-dormant epicormic buds into becoming active and producing new shoot growth on bare sections of wood on larger trees. This might be useful when older trees need rejuvenating.

Another growth regulator product was found to reduce shoot extension growth on young trees, avoiding one or two rounds of pruning and training in the first two years of growth without compromising yield. In fact, there were indications that treatments which created a smaller, denser canopy increased flowering.

Mini-grafted trees

Working with a commercial grower near Maryborough in Queensland, the project also evaluated the growth and productivity of micro-grafted, mini-grafted, traditional-grafted and own-rooted cutting-grown trees. This work found that the less expensive mini-grafted trees were just as early to come into production as traditional grafted trees.

Trunk girdling

Trunk girdling three- and four-year-old macadamia trees was also evaluated, with four-year-old trees doubling the crop to over 2kg/tree, nut in shell. This advanced the timing of the first commercial harvest from these trees by one year, with potential to harvest by machine. More research is needed to confirm the findings in other cultivars.

Full details can be found in the project's final research report, which can be downloaded from www.bit.ly/mc13014.

Developing a macadamia industry tree stock standard (MC17001)

NOW COMPLETE

Key research provider: Nursery & Garden Industry Australia

This project, which ran from 2018 to 2019, developed Australian macadamia nursery production tree stock specifications to improve macadamia orchard productivity through improvements in nursery production and macadamia tree stock physiology and health.

The Nursery Industry Accreditation Scheme Australia (NIASA) is a tried and tested platform of nursery stock production, so the project team developed a specialist macadamia appendix to the NIASA Guidelines. This lists the specific criteria required for growing macadamia nursery stock to a standard that meets industry expectations, including aspects of form, graft, roots and trueness to type.

A critical review of Australian and international macadamia nursery production literature and best practice advice was undertaken to address macadamia specific areas and develop a modern best practice standard to support ongoing production of macadamia tree stock. Where gaps were found, modern best practice advice was sought, and guidance given to address those gaps.

Continued >>

The standard provides a foundation to continually improve and support on-farm non-commercial production of tree stock. It also allows for auditing and accreditation of a production nursery as meeting the NIASA Macadamia Nursery Stock Specifications standard, to give the macadamia industry a clear guide on sourcing planting stock.

The guidelines are reviewed annually, so governance and administration requirements have also been developed to establish an ongoing basis for the initiative.

At the time of writing, the standard had been completed for inclusion as part of the next edition of Nursery & Garden Industry Australia's NIASA Best Management Practice Guidelines.

Full details can be found in the project's final research report, which can be downloaded from www.bit.ly/mc17001.

Macadamia second generation breeding and conservation (MC14000)

Key research provider: The University of Queensland

This investment began in 2015 to progress genetic improvement for the Australia macadamia industry. It is working to produce new cultivars that will provide the industry an advantage over its international competitors. Specifically, the project is evaluating 3555 seedling progeny already established, and aims to increase the second generation population size by 10,000.

Other significant activities of the project relate to the genetic control of husk spot disease and abnormal vertical growth, evaluating alternative breeding strategies, screening rootstocks for tree size control and productivity, and determining suitable pollinisers for elite selections.

Innovative rootstocks for the Australian macadamia industry (MC16000)

Key research provider: The Queensland Department of Agriculture and Fisheries

This investment is analysing and identifying rootstock genotypes that offer the best prospects for productivity improvements in the Australian macadamia industry. Over 2000 mature trees utilising some 200 rootstocks are being assessed under commercial orchard management conditions, with productivity and quality assessments compared to those of current industry rootstocks Beaumont and H2.

Integrated pest management program for the Australian macadamia industry (various projects from MC16003 to MC16008)

Key research provider: Various

This program is responsible for developing, demonstrating and facilitating the adoption of integrated pest management (IPM) strategies, to ultimately support macadamia growers in having pest-resilient farming systems.



It is made up of multiple, interrelated sub-projects, with areas of work including:

- » How inter-row vegetation management can influence the presence of beneficial insects in macadamia orchards
- » Various field trials, testing combinations of IPM tools across the orchard, in each of Australia's macadamia growing regions
- » How insects respond to compounds and odours of interest, with an initial focus on *Sigastus* weevil (here, laboratory work will ensure that field trials ultimately involve compounds pests detect and are attracted to)
- » Growing knowledge of key macadamia pests, as well as beneficials, working towards the development of pest identification and management guides
- » Establishing and maintaining laboratory colonies of pests and biological control agents for use across the program's work, including behavioural studies investigating pest preferences in relation to food, shapes and colours
- » Working with local advisors, pest consultants and industry development officers to develop and deliver extension activities around the project.

Macadamia integrated disease management (MC16018)

Key research provider: The University of Queensland

Beginning in late 2017, this project is tasked with delivering a holistic integrated disease management program – which is compatible with integrated pest management – to increase the productivity and profitability of macadamia growers and the Australian macadamia industry at large.

Its work includes a combination of research, training and communication activities, to improve management approaches and diagnostic capabilities for a range of priority diseases for the industry, including husk spot, *Phomopsis* husk rot, flower bight complex, *Phytophthora* root rot, and branch dieback.

Australian macadamia industry innovation and adoption program (MC15004)

Key research provider: The Australian Macadamia Society

Beginning in 2016, this project aims to enhance the adoption of innovation and technology, and facilitate capacity building, in the Australian macadamia industry. It supports the role and activities of a dedicated macadamia industry productivity development manager (MIPDM).

Activities facilitated by the MIPDM and run through the project include:

- » MacGroup workshops
- » Regular grower meetings and annual consultants' meetings
- » Field days and trips
- » The production of communication materials such as videos and content for industry publications.

The MIPDM is also responsible for undertaking constant engagement with growers and the wider industry, management of emerging issues, and the identification and development of new opportunities for the industry.

Consumer behavioural and retail data for fresh produce (MT17015)

Key research provider: Nielsen

This multi-industry investment is tasked with providing regular consumer behaviour data and insight reporting to a range of industries, through the Harvest to Home platform (www.harvesttohome.net.au).

The platform has a dedicated dashboard for macadamias, making data and reporting easily accessible for industry participants. The information is intended to assist growers and supply chain partners in decision-making for their businesses and, for the wider industry, the data and insights are available to support strategic activities, as well as Hort Innovation Macadamia Fund marketing plans.



Improving the biosecurity preparedness of Australian horticulture for the exotic spotted wing drosophila (*Drosophila suzukii*) (MT17005)

Key research provider: Plant Health Australia

This multi-industry investment is tasked with improving industry awareness of the risks posed by spotted wing drosophila, which attacks a range of soft-skinned fruit, and also with increasing the capacity to detect and respond to any incursions of the pest.

Activities include building knowledge and capacity around appropriate surveillance and management tools and strategies within the growing industries, government and among other relevant stakeholders. Looking at options for meeting domestic and international quarantine requirements are also among the project's activities.

Enhanced National Bee Pest Surveillance Program (MT16005)

HORT FRONTIERS

Key research provider: Plant Health Australia

This investment is delivering a nationally coordinated bee-pest surveillance program to help safeguard honey-bee and pollinator-dependent industries in Australia. It builds upon the previous *National Bee Pest Surveillance Program* (MT12011), and includes upgrading sentinel hive arrays, strengthening relationships with surveillance operators, the introduction of new elements such as Asian hornet screening and more. The surveillance is designed to enable the early detection of high-priority pest incursions that can impact on honey bees, providing the best opportunity for successful pest eradication.

The macadamia industry is one of several contributors to the work, and the program is part of the Hort Frontiers Pollination Fund.

Macadamia industry minor use program (MC16002)

Key research provider: Hort Innovation

Through this project, levy funds and Australian Government contributions are used to submit renewals and applications for minor use permits for the macadamia industry as required. These submissions are prepared and submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

For more on minor use permits, including a list of permits, see p17.

All current minor use permits for the industry are searchable at portal.apvma.gov.au/permits. Permit updates are also circulated in Hort Innovation's *Growing Innovation* e-newsletter, which you can sign up for at www.horticulture.com.au/sign-up.

Data generation investments (ST16006 and MC17007)

NEW IN 2018/19 (MC17007)

Key research providers: Eurofins and Peracto

The generation of pesticide residue, efficacy and crop safety data is required to support label registration and minor use permit applications made to APVMA which, when approved, provide access to safe and effective chemicals for the management of pests, weeds and diseases.

The project **Generation of residue, efficacy and crop safety data for pesticide applications in horticulture crops 2017 (ST16006)** is responsible for producing the data required to support a range of registration and permit applications across a host of horticulture industries, including for the macadamia industry. Its work is supported by grant funding from the Australian Government's Access to Industry Uses of Agricultural and Veterinary (AgVet) Chemicals program, plus levy contributions.

In this space the macadamia industry also has a data generation project specifically looking at *Sigastus* controls, **Generation of pesticide data – *Sigastus weevil* (MC17007)**. Earlier research in the Hort Innovation Macadamia Fund looked at a number of insecticides for their effectiveness in controlling *Sigastus weevil*, leading to two effective formulations being singled out for potential use. Beginning in August 2018, MC17007 involves field trials with these products to produce the information required by the APVMA.



To keep up to date with the latest information on new, ongoing and recently completed R&D investments throughout the year – and to search and find resources and reports from these investments – visit www.horticulture.com.au/macadamia.

Minor use permits

The Hort Innovation Macadamia Fund supports the submission of applications for new and renewed minor use permits for the industry, as well as data generation activities to support chemical permits and registrations, and strategic agrichemical reviews.

Together these efforts provide industry access to safe, relevant and effective chemicals for the management of pests, weeds and diseases.

For full details on these activities and links to relevant information, visit www.bit.ly/minor-use-macadamia.

Permits in 2018/19

During the 2018/19 financial year, a successful new permit application for PER86827 and a successful renewal for PER14852 were prepared by Hort Innovation and submitted to the APVMA, facilitated through the *Macadamia industry minor use program* (MC16002).

Meanwhile, a successful renewed permit PER81162 (issued as PER87510) was also issued during 2018/19, with the application submitted through the industry minor use program in the previous financial year.

Details for these and all other permits can be found in the following table.



Current permits

Below is a list of minor use permits for the macadamia industry, current as of 19 September 2019.

PERMIT ID	DESCRIPTION	DATE ISSUED	EXPIRY DATE	PERMIT HOLDER
PER11462 Version 2	Ethephon / Macadamia / Promote nut fall	07-May-09	30-Jun-20	Australian Macadamia Society (AMS)
PER11635 Version 2	Petroleum oil / Macadamia / Macadamia felted coccid	01-Jul-10	30-Jun-20	AMS
PER12796 Version 2	Methomyl / Macadamia / Banana fruit caterpillar	22-Jul-11	30-Jun-21	AMS
PER13642 Version 2	Chlorpyrifos and Maldison / Tree nuts / Australian plague locust	01-Sep-12	30-Jun-25	Australian Nut Industry Council (ANIC) C/Hort Innovation
PER13689 Version 4	Trichlorfon / Macadamia nuts / Macadamia lace bug, fruit spotting bug, banana spotting bug, green vegetable bug (2-day WHP)	14-May-13	30-Sep-21	AMS C/Hort Innovation
PER14276 Version 2	Diazinon / Macadamia / Macadamia lace bug	01-Dec-13	30-Nov-20	AMS C/Hort Innovation
PER87510	Abamectin / Macadamia / Thrips, broad mites and flat mites	17-Jun-19	30-Jun-24	Hort Innovation
PER81463	Acephate / Macadamia / Sigastus weevil	24-Dec-15	31-Jan-21	AMS C/Hort Innovation
PER84766	Phosphorous acid (foliar and trunk applications) / Macadamia / Phytophthora root rot and trunk (stem) canker (14-day WHP) Please note: Use now covered by the Agri-Fos 600 Label with a 28-day WHP. Permit will be surrendered once WHP amended to 14 days on label.	30-Nov-17	30-Nov-22	AMS C/Hort Innovation
PER86827	Indoxacarb (Avatar insecticide) / Macadamia / Macadamia seed weevil (Sigastus)	13-Sep-18	30-Sep-21	Hort Innovation

All efforts have been made to provide the most current, complete and accurate information on these permits, however you should always confirm all details on the APVMA website at portal.apvma.gov.au/permits. Details of the conditions of use associated with these permits can also be found on the APVMA site.

Minor use permit updates are circulated in Hort Innovation's e-newsletter, *Growing Innovation*. Don't yet receive it? Sign up for free at www.horticulture.com.au/sign-up.

Marketing report

Hort Innovation is responsible for investing the macadamia marketing levy into a range of activities to drive awareness and consumption, under the Hort Innovation Macadamia Fund. These activities are managed by our partner team at the Australian Macadamia Society, who have provided this quick summary of trade and consumer marketing highlights from 2018/19.

TRADE CAMPAIGN HIGHLIGHTS

2018/19 marked the second year of the industry's three-year international marketing strategy. The campaign was focused on activities that form the strategy's centrepiece, known as the 'Innovation Initiative'. Significant new global investment in macadamia growing will see more robust supply become available in coming years and this supply shift will create new opportunities for commercial product development. The Innovation Initiative is working to support food manufacturers who are eager to incorporate macadamias in their new product development plans.

'Macadamia Marketing Toolkit' refresh

Launched in 2017, the Marketing Toolkit has been helping the commercial sector convey a compelling story about macadamias and illustrate the many benefits to food manufacturers of including macadamias in their innovation pipelines. A host of new assets were

added to the kit in 2018/19, including two new rounds of consumer insight research focused on the snacking and ice-cream categories in Asian and Western markets, new consumer promotion highlights, and consumer insights and technical specifications for the top product concepts from the first 'Innovation Challenge' competition.

The consumer snacking research

In new consumer research, mood management was found to be an emerging motivation for snacking and fertile ground for new product development. The work revealed macadamias' distinctive and indulgent qualities deliver particularly well to the concepts of 'reward', 'excitement' and 'mood boost'.

The research identified seven key product innovation opportunities for macadamias in the snacking category:

- » *Fuel the day:* Consumers want nutritious snacks that help them power on, without feeling weighed down. Macadamias bring nutrient density, taste and texture.



- » *Relaxation:* Consumers look for rewarding and enjoyable snacks that won't induce guilt afterwards. Macadamias make indulgent snacks more permissible and create a sense of 'doing something good' while snacking.
- » *Social status:* Many consumers gravitate to products that reflect a cleaner and more sustainable way of eating. Macadamias bring status, sophistication and price justification.
- » *Adventure:* Snacks can bring excitement and discovery to the everyday. Macadamias' versatile taste make them an excellent flavour carrier and a safe and luxurious way of introducing new tastes to market.
- » *Healthy and tasty:* Consumers want to make better choices but not by compromising on taste. Macadamias bring both health and taste.
- » *Meal replacement:* Snacks offer an effective way of staying full without compromising a healthy diet. Macadamias offer satiety without over-eating.
- » *Sharing:* Snacks are seen as a 'social glue' that make a moment more connected. Macadamias are seen as premium and novel, making a snacking product more premium and luxurious.

The ice-cream consumer research

New research also revealed a unique alignment between macadamias and ice-cream, with consumers recognising a natural fit between the two. Macadamias complement the characteristics of ice-cream in a way that no other ingredient can, and consumers want to see manufacturers leveraging the macadamia/ice-cream alignment more often.

Six key product innovation opportunities for macadamias in the ice-cream category emerged:



- » *Ultimate decadence:* Consumers are seeking more elevated experiences of luxury. Macadamias can bring luxury, exclusivity and decadence.
- » *Artisanal gourmet:* The concepts of locality, tradition and handmade reinforce ice-cream as special. Macadamias can bring authenticity, flavour and premium cues.
- » *Pure and simple:* Consumers value the simplicity of good-quality ice-cream. Macadamias can bring interest, refinement and authenticity.
- » *Ingenious creations:* Consumers are seeking more foodie-like combinations to indulge the senses. Macadamias can bring interest, versatility and luxury.
- » *Better-for-you ice-cream:* Consumers desire healthier ways of enjoying treats. Macadamias can add a 'health halo'.
- » *Delightfully dairy free:* Texturally, macadamias are more aligned to ice-cream than other nut-based dairy alternatives. This could be captured through macadamia milk and paste.

Details of these opportunities are available to the industry's commercial sector via the Macadamia Marketing Toolkit, to provide snack product developers with evidence of the benefits that macadamias can bring to the category.

Macadamia Innovation Challenge

After a successful launch in 2017, the Macadamia Innovation Challenge was brought back for a second year in August 2018, increasing the scale of the program to invite participation from China and Japan as well as Australia. The world-first platform is aimed at generating new packaged food concepts that can inspire the food industry globally and drive new demand for macadamias around the world.

The Challenge invited professionals and students from the food technology field to submit creative concepts for new packaged food products using macadamias in the confectionery, snack, cereal and future foods categories with an Asian or Western flavour profile.



The winning concepts were Britty Macaddy Chikki (snack product), Purple Sesadamia Butter (future foods product), Soba and Macadamia Ration Cookie Bars (snack product) and Crispy Crunch Macadamia Karinto (confectionery product).

Finalists were invited to Byron Bay for the judging event, with macadamia growers, marketers and media also present for the winners' announcement. The best Challenge concepts will soon be available for trial by food manufacturers and product developers.

Trade e-news

The monthly trade e-newsletter, *The Macadamia Review*, continued to inform its international trade audience about the industry's marketing news and insights. Published in English, German, Chinese and Japanese, in 2018/19 content focused on innovation to align with the aims of the Innovation Initiative, with health, event news, and consumer promotion updates also featured in the content mix.

Trade public relations (PR)

An international trade PR program was established for the first time this year to leverage the snacking and ice-cream consumer insights research, and the Innovation Challenge. Macadamia messaging appeared regularly in key trade media publications in Australia, Japan, China, South Korea and Taiwan, reaching an audience of more than one billion across three campaigns.

CONSUMER CAMPAIGN HIGHLIGHTS

Teams in key markets including Australia, Japan, China, Taiwan, South Korea and Germany focused on creating content positioning Australian Macadamias as a pure ingredient offering a pleasurable and guilt-free experience that can elevate food and life.

Collaborations

- » Macadamias featured in several episodes of SBS program *Food Lab* hosted by former *MasterChef Australia* contestant Ben Milbourne. Featuring four macadamia recipes and a macadamia science segment, this activity was amplified across *Food Lab's* and Ben Milbourne's social media channels.
- » An Australian PR and influencer campaign revealed the power of the macadamia beauty story to reach female consumers. The campaign shone the spotlight on macadamias as a premium nut focusing on provenance, health, beauty, and creativity, with coverage achieved in *The Land*, *Australian Good Food Guide* and *9kitchen*. Beauty benefits proved particularly popular, with content seen via Rescu, Girl.com.au and BEAUTYcrew. The campaign also featured collaborations with health and wellbeing influencers, the most

prominent being Ellie Bullen of *Elsa's Wholesome Life*, who was hosted on a visit to a macadamia farm in the Northern Rivers. Ellie created a plethora of engaging content from the experience that she shared with her 686,000 Instagram fans.

- » A South Korean Australian Macadamias Instagram account was launched this year, with Korean health and parenting influencer collaborations helping to grow the audience on this channel. This saw a wealth of engaging content created including recipes such as a Macadamia Tangerine Latte and Macadamia Banana Oatmeal Cookies.
- » Influencer marketing is particularly important in China, where influencers boast substantial followings with the ability to broaden a partnering brand's reach across a wide audience. Collaborations were established with lifestyle, fitness, creativity, fashion and beauty influencers, with campaigns executed on Weibo and WeChat under the theme 'Little things matter'. The idea underpinning this was that macadamias can play a meaningful role in daily life by providing small, yet wonderful moments. This generated a range of inspiring content, including a video of an influencer making a coaster from macadamia shells that generated more than 3.5 million Weibo views.
- » A successful partnership with German influencer Anja Auer of *Woman on the Grill* saw her creative recipe for Emperor's Mess with macadamias shared on social media as well as German online news outlets, with a combined monthly reach of 12 million. Anja also produced a YouTube video to demonstrate the recipe, in which she explained why Australian-grown macadamias are the finest.





Occasion-based content

- » For International Women’s Day the stories of five female Australian macadamia growers were shared across a number of mediums including blogs, video content, *The Land* and the Australian Macadamias consumer website and social media channels.
- » For Valentine’s Day a social media event was held via the Australian Macadamias’ Japanese Twitter account that encouraged fans to cook something sweet for their loved one using macadamias, and post a photo of their creation on Twitter with

the hashtag #MacadamiaValentine. In Korea, a special Valentine’s Day recipe created by influencer Hyoninii encouraged fans to create a home-made Valentine’s gift, and fans also had the chance to win a macadamia chocolate gift by leaving a Valentine’s Day comment for their loved one.

- » Chinese New Year is a key calendar event, and in 2019 Chinese fans on Weibo and WeChat were encouraged to make macadamias a healthy addition to their celebration menus. The activity was accompanied by a cute Chinese New Year character, and WeChat fans

had the chance to win a macadamia prize by sharing a New Year’s wish. A giveaway was also run on the Australian Macadamias Taiwanese Facebook page to engage macadamia fans in Taiwan.

- » A Facebook campaign in Taiwan encouraged fans to enjoy some screen-free time outdoors with loved ones during the warmer months. Several macadamia picnic recipes were shared, with fans encouraged to nominate their favourite. Suggestions for good picnic locations helped round out the activity.





Competitions

- » A campaign was created to take Japanese fans further along the macadamia journey and expand the repertoire of how they can be enjoyed. Fans were invited to share their favourite recipe from the Australian Macadamias collection on Twitter, using the hashtag #DiscoverMacadamias for the chance to win a macadamia prize. This was accompanied by a collaboration with a fresh salad bar in Tokyo where customers could upgrade their salad with a free roasted macadamia topping, to discover the taste and texture enhancement first hand.
- » A 'Celebrate Summer' competition was designed to attract more subscribers to the Australian Macadamias consumer e-newsletter. This activity invited people to sign up for a chance to win a macadamia Christmas hamper, and was one of the most successful competitions run in this campaign so far.

Financial statement

Financial operating statement 2018/19

	R&D (\$)	MARKETING (\$)	TOTAL (\$)
	2018/19 July – June	2018/19 July – June	2018/19 July – June
OPENING BALANCE	678,844	1,948,332	2,627,176
Levies from growers (net of collection costs)	1,190,681	2,224,362	3,415,043
Australian Government money	1,333,500	–	1,333,500
Other income*	20,857	130,574	151,431
TOTAL INCOME	2,545,038	2,354,936	4,899,973
Project funding	2,576,921	3,114,352	5,691,273
Consultation with and advice from growers	25,609	25,061	50,670
Service delivery – base	108,603	124,812	233,415
Service delivery – shared	179,971	206,831	386,802
Service delivery – fund specific	211,844	95,000	306,844
TOTAL EXPENDITURE	3,102,949	3,566,056	6,669,005
Levy contribution to across-industry activity	71,071	–	71,071
CLOSING BALANCE	49,862	737,211	787,073
Levy collection costs	6,253	11,684	17,937

* Interest, royalties



**Connect with
your levy!**

**Visit www.horticulture.com.au/sign-up
to sign up for free Hort Innovation communications,
including industry-specific alerts, opportunities
and general horticulture news**

Hort Innovation

Horticulture Innovation Australia Limited
ACN 602 100 149

Level 7, 141 Walker Street
North Sydney NSW 2060 Australia

Telephone 02 8295 2300
communications@horticulture.com.au

www.horticulture.com.au