Content

Welcome 1
Strategic Investment Advisory Panel 2
Strategic Investment Plan 2017-2021 3
R&D project list 2016/17 6
R&D report 8
Marketing report 14
Financial summary 18
Minor use permits 19

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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.
Welcome

What a year! As the macadamia industry’s Relationship Manager at Hort Innovation, I’m pleased to be able to share with you all of the insights on your levy in the Macadamia Fund Annual Report for 2016/17.

The 2016/17 financial year was a busy one, with Hort Innovation continuing to invest the macadamia levy and Australian Government contributions into initiatives to help growers be as productive and profitable as possible.

During the period, more than $2.19 million was invested into R&D for the macadamia industry, including into 16 new projects.

From a strong new integrated pest management program and fresh work to improve nut harvesting, to the ongoing development of new varieties and research into disease management, you can see the full list of projects for 2016/17 on page 6. You can then read more, including what the projects mean for you, in the R&D report from page 8.

In marketing, Hort Innovation invested more than $2.52 million during 2016/17 into activities to build consumer awareness and consumption of Australian macadamias both domestically and overseas. Read all about this on page 14.

As the Relationship Manager for the macadamia industry, it’s my job to form one of the bridges between these strategic levy investments and you – the growers and other macadamia stakeholders. That’s why it was great getting to talk to you throughout the year about everything going on in the Hort Innovation Macadamia Fund – and of course to hear directly from you – at various Mac Groups, the industry’s conference in Caloundra in October 2016, the Australian Nut Conference, and via phone and email.

During the year there was also a chance for many of us to talk one-on-one as part of consultation around the Macadamia Strategic Investment Plan (SIP). The final SIP was released in August 2017, and will serve as a guiding document for the industry’s Strategic Investment Advisory Panel (SIAP) when providing advice to Hort Innovation on all future investments in the Macadamia Fund. Find a quick overview on page 3.

If you have an idea for a project you think aligns well with the SIP, I encourage you to submit it to Hort Innovation through the online form at www.bit.ly/2eTpOxA. You can also learn more about how the collection of ideas works in the video available at www.bit.ly/2hTROUQ.

Here’s to another great year of investments and connection in 2017/18,

Corrine Jasper
Macadamia Relationship Manager, Hort Innovation
(m) 0439 433 885 (e) corrine.jasper@horticulture.com.au
Strategic Investment Advisory Panel

Hort Innovation has industry-specific Strategic Investment Advisory Panels (SIAPs) that have an important role in helping ensure levy investment decisions are balanced and prioritised by the current needs of their industry.

What is the macadamia SIAP?
The macadamia SIAP’s key function is to provide advice to Hort Innovation on potential levy investments – helping guide the way the industry levy and Australian Government contributions are put to use in the Hort Innovation Macadamia Fund.

The SIAP’s new guiding document is the industry’s Strategic Investment Plan (SIP), which was created through close consultation with industry and was finalised in August 2017. Information on the SIP can be found on page 3, and you can download the full document from Hort Innovation’s Macadamia Fund page at www.horticulture.com.au/macadamia.

How do ideas get to the SIAP?
All growers and industry stakeholders are welcome and encouraged to submit ideas for potential industry projects. To submit an idea, use Hort Innovation’s Concept Proposal Form at www.bit.ly/2eTpOxA.

Macadamia SIAP panellists
The macadamia SIAP is made up of panellists from the macadamia industry, plus a chair. Most panellists are levy-paying growers, with appointments made based on skills criteria and considering geographic and sectorial diversity.

<table>
<thead>
<tr>
<th>NAME</th>
<th>ORGANISATION</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Pearce</td>
<td>Macadamias Direct</td>
<td>QLD</td>
</tr>
<tr>
<td>Graeme Fleming</td>
<td>Graeme Fleming Family Trust</td>
<td>NSW</td>
</tr>
<tr>
<td>Kim Wilson</td>
<td>Eureka Macadamia Management</td>
<td>NSW</td>
</tr>
<tr>
<td>Chris Searle</td>
<td>Stahmann Farms and Searle Consulting</td>
<td>QLD</td>
</tr>
<tr>
<td>Lindsay Bryen</td>
<td>LJ and EP Bryen</td>
<td>NSW</td>
</tr>
<tr>
<td>Trevor Steinhardt</td>
<td>Macadamias Australia</td>
<td>QLD</td>
</tr>
<tr>
<td>Steven Lee</td>
<td>Macadamia Processing Company</td>
<td>NSW</td>
</tr>
<tr>
<td>Andrew Starkey</td>
<td>Macs Network</td>
<td>NSW</td>
</tr>
<tr>
<td>Scott Allcott</td>
<td>Macadamia Farm Management</td>
<td>NSW/QLD</td>
</tr>
<tr>
<td>Stephen McLean</td>
<td>Macadamia Allsorts</td>
<td>NSW</td>
</tr>
<tr>
<td>Paul O’Hare</td>
<td>Queensland Department of Agriculture and Fisheries</td>
<td>QLD</td>
</tr>
</tbody>
</table>

Chair: Claude Gauchat

SIAP meetings
During 2016/17, the macadamia SIAP convened three times to discuss and provide advice on concept proposals and investment areas in R&D and marketing. Summary notes from all SIAP meetings, including before and after this financial period, are always available on Hort Innovation’s Macadamia Fund page at www.horticulture.com.au/macadamia.
Strategic Investment Plan 2017-2021

The Strategic Investment Plan will be used to guide Hort Innovation’s strategic investment of the industry levy, ensuring investment decisions align with industry priorities. This at-a-glance version provides a top-level overview of the plan.

Potential impact of the plan

$74.5 million

Based on an estimated investment of $24.2 million over the next five years

Major opportunities

» Scope to increase average yields
» An increase in global consumption of macadamias
» Ability to supply consistently
» Achieving a critical mass
» International collaboration
» Technological know-how
» Product innovation
» Demand outstrips supply

Major challenges

» High cost of production
» Geographic concentration and resulting climatic and pest incursion vulnerability
» Shortage of production
» Producing in per-urban areas
» Concentration of global macadamia consumption in six key markets
» World production increasing, especially in low-cost countries
» Avoiding the ‘commoditisation trap’

<table>
<thead>
<tr>
<th>OUTCOMES</th>
<th>STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased productivity and grower returns through an average yield increase to five tonnes nut-in-shell per hectare by 2021 (equivalent to approximately 1.6 tonnes kernel per hectare – based on a SKR of 32%)</td>
<td>Reduce unsound kernel and nut-in-shell by further enhancing the industry’s integrated pest management (IPM)</td>
</tr>
<tr>
<td></td>
<td>Reduce unsound kernel and nut-in-shell by further enhancing the industry’s integrated disease management (IDM)</td>
</tr>
<tr>
<td></td>
<td>Complement IPM and IDM with a program of investment in chemical registration and renewal to ensure an appropriate suite of control measures</td>
</tr>
<tr>
<td></td>
<td>Increase grower adoption of IPM and IDM</td>
</tr>
<tr>
<td></td>
<td>Commit to long-term research to improve the understanding of the physiology of the macadamia, an Australian native with a relatively short history of domestication</td>
</tr>
<tr>
<td></td>
<td>Improve harvest efficiency, and resultant nut capture</td>
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<tr>
<td></td>
<td>Reduce harvest time to free up farm resources that improve farm productivity</td>
</tr>
<tr>
<td></td>
<td>Reduce nut loss along the value chain</td>
</tr>
<tr>
<td></td>
<td>Develop, agree and report objective measures of environmental sustainability</td>
</tr>
<tr>
<td>Improved production systems covering plant breeding, intensive orchards and novel technologies</td>
<td>Leverage past investment and continue to commit to a long-term effort to deliver a radically improved production system</td>
</tr>
<tr>
<td></td>
<td>Develop novel technologies that facilitate improved production systems</td>
</tr>
<tr>
<td></td>
<td>Incubate grower-inspired innovation for wider application in the macadamia industry</td>
</tr>
<tr>
<td></td>
<td>Scan opportunities for novel technologies deployed in other tree crops, agricultural and non-agricultural sectors</td>
</tr>
</tbody>
</table>
Outcomes

### Improved capacity to lead and support current and future industry needs

- Continue to support adoption of R&D outputs by effective extension
- Deliver meaningful data on production, planting, environmental performance, international supply and demand in a timely manner
- Ensure industry stakeholders remain engaged through an effective communications program
- Enhance skills and capacity to support current and future industry needs

### Market demand for Australian macadamias has increased and expanded

- Develop a five-year marketing plan supported by annual operating plans with clear reporting criteria that meet Hort Innovation monitoring and evaluation requirements
- Develop a more complete world macadamia production forecast

Outcomes

### Market demand for Australian macadamias has increased and expanded

- Continue to curate, analyse and publish relevant market information and statistics through existing communication channels to support industry and commercial marketer decision making
- Develop and publish a compelling suite of information for food manufacturers that promotes the use of macadamias as an ingredient
- Actively promote and distribute compelling information on the use of macadamias as an ingredient to food manufacturers in key target markets
- Create a culture of innovation by demonstrating new ways to use macadamias
- Support food manufacturers with cost-effective, visible consumer promotion
- Utilise and further build the Australian macadamia brand to deliver all communications
- Facilitate and support connections and engagement with overseas macadamia industries and other nut industries

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**Industry size and production distribution**

<table>
<thead>
<tr>
<th>Year</th>
<th>Growers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/16</td>
<td>Approx. 750 growers</td>
</tr>
</tbody>
</table>

- NSW 52%
- QLD 48%

**Macadamia supply chain and value 2014/15**

- **Production**: 45,908 tonnes (IS)
- **$215 million**
- **Supply (KWE)**: 2,487 tonnes; 25%
- **Export (KWE)**: 7,310 tonnes; 75%
- **Export (IS)**: 10,758 tonnes; 24%
- **Cracking (IS)**: 34,300 tonnes; 76%
- **Fresh Supply (IS)**: 850 tonnes; 1%

*IS = in-shell weight, KWE = kernel weigh equivalent

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Any views contained in this abbreviated Strategic Investment Plan (SIP) do not necessarily represent the views of Horticulture Innovation Australia Limited (Hort Innovation) or its commitment to a particular course of action or a guarantee of specific outcomes. The ability to deliver on all the articulated strategies (and investments) will be determined by the ability of the statutory levy to provide the resources to do so. For more information on Hort Innovation’s obligations, rights and responsibilities and a full disclaimer statement, refer to the full version of this SIP that is available on Hort Innovation’s website at www.horticulture.com.au.
## R&D project list 2016/17

### NEW INVESTMENTS IN 2016/17

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC15014</td>
<td>An IPM program for the Australian macadamia industry*</td>
</tr>
<tr>
<td>MC16000</td>
<td>Innovative rootstocks for the future Australian macadamia orchards</td>
</tr>
<tr>
<td>MC16001</td>
<td>Macadamia harvest improvement review</td>
</tr>
<tr>
<td>MC16002</td>
<td>Macadamia industry minor use program (NB: established, but no spend incurred during 2016/17)</td>
</tr>
<tr>
<td>MC16003</td>
<td>Coordinator for the IPM program for the Australian macadamia industry*</td>
</tr>
<tr>
<td>MC16004</td>
<td>IPM program for the macadamia industry – NSW DPI*</td>
</tr>
<tr>
<td>MC16005</td>
<td>IPM program for the macadamia industry – DAF* (NB: established, but no spend incurred during 2016/17)</td>
</tr>
<tr>
<td>MC16006</td>
<td>IPM program for the macadamia industry – IPM Technologies*</td>
</tr>
<tr>
<td>MC16007</td>
<td>IPM program for the macadamia industry – SCU*</td>
</tr>
<tr>
<td>MC16008</td>
<td>IPM program for the macadamia industry – BioResources*</td>
</tr>
<tr>
<td>MC16013</td>
<td>Macadamia industry gross value of production data collection</td>
</tr>
<tr>
<td>MC16700</td>
<td>Contribution to the 2nd International Macadamia Research Symposium 2017</td>
</tr>
<tr>
<td>MT16005</td>
<td>Enhanced National Bee Pest Surveillance Program 2016–2021</td>
</tr>
<tr>
<td>MT16006</td>
<td>Update of the Hi-Link model of Australian horticultural industries</td>
</tr>
<tr>
<td>MT16010</td>
<td>Horticultural trade data 2017-2019</td>
</tr>
<tr>
<td>ST16006</td>
<td>2016 generation of data in horticulture crops</td>
</tr>
</tbody>
</table>

* Together these individual investments represent the industry’s new integrated pest management program.

### ONGOING INVESTMENTS IN 2016/17

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Project Description</th>
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</thead>
<tbody>
<tr>
<td>MC11001</td>
<td>Macadamia regional variety trials series 3 phase 2</td>
</tr>
<tr>
<td>MC12007</td>
<td>Disease management in macadamia Industry</td>
</tr>
<tr>
<td>MC12008</td>
<td>Biological husk spot research</td>
</tr>
<tr>
<td>MC12016</td>
<td>Commercialisation of mini-grafting of macadamia*</td>
</tr>
<tr>
<td>MC13008</td>
<td>Biology, species and genetic diversity of macadamia lace bugs</td>
</tr>
<tr>
<td>MC13014</td>
<td>Macadamia – propagation and precocity*</td>
</tr>
<tr>
<td>MC14000</td>
<td>Macadamia second generation breeding and conservation</td>
</tr>
<tr>
<td>MC15003</td>
<td>National macadamia grower communications program</td>
</tr>
<tr>
<td>MC15004</td>
<td>Australian macadamia industry innovation and adoption program</td>
</tr>
<tr>
<td>MC15005</td>
<td>Benchmarking the macadamia industry 2015–2018</td>
</tr>
<tr>
<td>MC15007</td>
<td>Still wild about macadamias – conserving a national icon*</td>
</tr>
<tr>
<td>MC15008</td>
<td>Establishing an open-source platform for unravelling the genetics of macadamia: integration of linkage and genome maps*</td>
</tr>
<tr>
<td>MC15009</td>
<td>Macadamia crop forecasting 2015–2018</td>
</tr>
<tr>
<td>MC15010</td>
<td>Ecology and management of Sigastus weevil in macadamias</td>
</tr>
<tr>
<td>MC15011</td>
<td>Determining the extent and causes of abnormal vertical growth</td>
</tr>
<tr>
<td>MC15013</td>
<td>Consultancy services for crop forecasting project MC15009</td>
</tr>
</tbody>
</table>
## ONGOING INVESTMENTS IN 2016/17 (continued)

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Project Description</th>
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<tbody>
<tr>
<td>MT13061</td>
<td>Understanding the purchase behaviour of fresh produce consumers</td>
</tr>
<tr>
<td>MT14006</td>
<td>Export-import market intelligence project 2014–2016</td>
</tr>
<tr>
<td>MT14055</td>
<td>Driving collaboration in Australian horticultural research</td>
</tr>
<tr>
<td>MT15032</td>
<td>Monitoring and evaluation framework for the industry Strategic Investment Plan</td>
</tr>
<tr>
<td>MT15033</td>
<td>Strategic Investment Plan</td>
</tr>
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</table>

## FINAL REPORTS ISSUED

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC12011</td>
<td>Time of flowering and pollination relevant to orchard weather conditions in Northern NSW – a growers’ trial group</td>
</tr>
<tr>
<td>MC13009</td>
<td>Total non-structural carbohydrate testing in macadamias*</td>
</tr>
<tr>
<td>MC14007</td>
<td>Development and publication of the macadamia industry Integrated Orchard Management booklet</td>
</tr>
<tr>
<td>MC15012</td>
<td>Review of macadamia orchard nutrition</td>
</tr>
<tr>
<td>MT13060</td>
<td>Optimising pollination of macadamia and avocado in Australia*</td>
</tr>
</tbody>
</table>

* 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).

During the 2016/17 financial year, all Australian levy paying horticulture industries also contributed to across-industry projects addressing issues that affect horticulture as a whole. Visit [www.horticulture.com.au/across-horticulture](http://www.horticulture.com.au/across-horticulture) for financial documents and information on this program.
Development and publication of the macadamia industry Integrated Orchard Management booklet (MC14007) – NOW COMPLETE

Key research provider: NSW Department of Primary Industries

This project produced a series of resources to support Australian macadamia growers in maintaining high-productivity orchards and in recovering orchards in decline, through the implementation of integrated orchard management strategies. The resources are available on Hort Innovation’s Macadamia Fund page at www.horticulture.com.au/macadamia and include:

» The Macadamia integrated orchard management practice guide 2016

» A companion booklet featuring grower case studies

» The Macadamia of integrated orchard management drainage 2017 guide.

Determining the extent and causes of abnormal vertical growth (MC15011) – NOW COMPLETE

Key research provider: The University of Queensland

Beginning in March 2016, this one-year project looked at the current impact of abnormal vertical growth (AVG) on the macadamia industry, as well as potential causes of the development and spread of the disorder.

Some top-level findings of the research include that:

» AVG is responsible for the loss of over 2000 tonnes of in-shell production annually

» AVG has become more widespread – there has been a five-fold increase in the number of trees with symptoms since 2003, with approximately 200,000 trees/900 hectares having been affected

» Severe AVG symptoms have been observed in varieties previously thought to be tolerant or only moderately susceptible to the disorder, with varieties of Hawaiian origin more susceptible than those developed in Australia, and a higher incidence in trees planted in soils prone to severe moisture stress

» The extreme seasonal fluctuation in flowering that AVG causes results in yield losses of between 30 and 88 per cent, depending on tree variety

» Management of AVG in orchards can cost up to $2500 per hectare annually

» Estimates of return-on-investment suggest that if affected trees aren’t treated, it’s more cost-effective to remove and re-plant (though there is a risk of AVG reoccurring in young trees).

Regarding the development of AVG, though initial observations suggested a role of geminivirus in the progression of the disorder, molecular analysis revealed no clear evidence of an association between the two. There remains, however, scope for further work to understand the role of bacteria and fungi found in samples.

Ecology and management of Sigastus weevil in macadamias (MC15010)

NOW COMPLETE

Key research provider: NSW Department of Primary Industries

Sigastus weevil was first found infesting macadamia nuts on the Atherton Tablelands in Far North Queensland in 1994/95, but has recently become a significant pest in other production areas. Some estimates put crop losses at 15 per cent, equating to around $15 million per year. Sigastus weevil is long-lived and weevils that emerge in spring can easily live until the following winter. They are difficult to control by foliar insecticides as they spend most of their lifecycle hidden inside the developing nut.

This project investigated the biology and ecology of Sigastus weevil including its lifecycle and distribution, and reviewed literature that included the chemical, biological and cultural control of other important weevil pests.

Of particular note, the project found there are several promising bio-pesticides that may be successful in controlling weevils in macadamias. The most promising fungal option for control are entomopathogens, including the Beauveria bassiana strain, which has been used to successfully control other types of weevils overseas. Early research shows it produces high mortality in Sigastus in the laboratory when applied to feeding surfaces or as topical droplets.

Hort Innovation
The project also found:

- Commonalities in management of the major weevil pests
- Sigastus weevil specimens in Far North Queensland and New South Wales belong to the same species
- The insecticides sulfoxaflor and acetamiprid may be effective in controlling the weevil, but more need to be screened
- The removal or destruction of infected nuts on the ground is crucial for controlling the weevil, as is managing out-of-season nuts to break the lifecycle.

**Review of macadamia orchard nutrition (MC15012)**

**NOW COMPLETE**

**Key research provider:** The Queensland Department of Agriculture and Fisheries

Running from early 2016 to the end of the 2016/17 financial year, this project had a focus on improving the quality of soil and plant-nutrition advice for the industry, through the education of macadamia industry consultants and advisors. It involved the investigation of current literature on and approaches to soil health and macadamia nutrition, and the development of guidelines and protocols involving soil sampling, soil analysis, and nutrition timing, amounts and frequency.

This information was presented at the Annual Macadamia Consultants Workshop in Brisbane during 2016, and at a series of regional workshops that took place during April and May 2017, from Bundaberg in Queensland to Macksville in New South Wales.

The upskilling of consultants and advisors has provided...

- Greater understanding of soil nutrient variability
- Greater understanding of plant nutrient requirements as measured in foliar analyses versus perceived optimum nutrient balances in soils
- Options for more consistent and accurate sampling for soil and foliar analyses
- Anecdotal reports of greater nut set in response to the use of boron sprays at flowering to trees with low to marginal boron levels
- Realisation of differences between routine laboratory soil analyses and those required for low-pH soils.

For growers, the key message is to work with your consultant to put an effective integrated orchard nutrition program in place to increase production and profitability. A full list of industry consultants is available on the AMS website at [www.bit.ly/2ymuJ5](http://www.bit.ly/2ymuJ5).

**Time of flowering and pollination relevant to orchard weather conditions in Northern NSW – a growers’ trial group (MC12011)**

**NOW COMPLETE**

**Key research provider:** The Australian Macadamia Society

Climatic conditions during peak flowering have often been related to poor macadamia yields in the Northern Rivers region of New South Wales, without any specific information on what the climatic issues were – heat, rain or wind. This project was established to assist macadamia growers achieve a greater understanding of these issues through a ‘grower trials group’ set-up.

There were eight growers in the group, all of whom already had on-farm canopy management trials occurring. The growers were focused on canopy management as a key opportunity for improving pollination, and ultimately production. The project absorbed these trials and provided a structure for them to operate in.

The project ran over six seasons, from 2011 through to 2016, with participating growers collecting data in relation to commercial yields, timing of flowering and climatic conditions.

The data generated from the project, and the hosting of industry tours and field trips, assisted the industry in developing the integrated orchard management concept – ultimately extended through the project Development and publication of the macadamia industry Integrated Orchard Management booklet (MC14007) described earlier.

The project also helped highlight an opportunity for improved flower monitoring in orchards, finding that across a common variety the flower location in the canopy had a stronger influence on timing of flowering, more so than regional differences. As most Northern Rivers orchards are tall and mature, with the majority of the productive zone (where flowers turn into mature nuts) in the top two metres of the canopy, this project found that making timing decisions based on flowers lower in the canopy (that were visible from the ground) was flawed and risked missing key crop protection periods.
**Biological husk spot research (MC12008)**

**NOW COMPLETE**

**Key research provider:** Biocontrol Australia

This project identified three microbial species with promise for the management of husk spot in macadamia, and combined them into a single biofungicide formulation. Early in the 2017/18 financial year, a new project began to continue the work to deliver a biological control agent for husk spot. This new work will involve field trials to confirm the formulation’s efficacy under commercial conditions, and to generate data to satisfy registration requirements with the Australian Pesticides and Veterinary Medicines Authority (APVMA).

**Disease management in macadamia industry (MC12007)**

**NEARLY COMPLETE**

**Key research provider:** The University of Queensland

Established in 2012, this project has brought together a team with extensive knowledge and contacts to deliver improved, sustainable and efficient disease management strategies for the macadamia industry.

The project’s core activities wrapped up just inside the 2017/18 financial year, in July. Among its broad range of work, the project involved:

- Developing and communicating to industry a sustainable and integrated disease management strategies for husk spot, caused by the fungal pathogen *Pseudocercospora macadamiae*. This management system extended from risk assessment and cultural practices (including those to break an existing disease cycle) to the application of crop protection products and the use of resistant macadamia varieties. Information was communicated to growers at various MacGroup meetings.

- Developing and communicating to industry management strategies for phytophthora root rot – caused by soilborne pathogen *Phytophthora cinnamomica* – involving targeted application of crop protection products and an increased focus on soil health. During 2016, the industry reported increased and increasing adoption of integrated management approaches for Phytophthora diseases.

- Providing diagnostic services to the macadamia industry to identify and investigate new and emerging diseases of potential high risk to macadamia productivity.

- Developing a framework for integrated disease management throughout the production chain, to help make the industry resilient to the resurgence of old or occurrence of new pathogens.

**Integrated pest management program**

**SEVERAL NEW INVESTMENTS**

**Key research provider:** Various

With new projects established during 2016/17 and more coming on board in 2017/18, this multi-project program is responsible for developing, demonstrating and facilitating the adoption of integrated pest management (IPM) strategies for the Australian macadamia industry, to ultimately support growers in having pest-resilient farming systems.

Some of the key areas the interrelated projects are working on:

- Looking at how inter-row vegetation management can influence the presence of beneficial insects in macadamia orchards.

- Testing combinations of IPM tools across the orchard, with various trial sites in each of Australia’s key macadamia growing regions.

- Investigating 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, through field and lab studies on their basic lifecycle, ecology and biology. This will result in 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 – with the first work again taking place in relation to Sigastus.

- Working with local advisors, pest consultants and industry development officers to develop and deliver extension activities around the project, to be communicated in industry channels as the program progresses.

**Innovative rootstocks for the Australian macadamia industry (MC16000)**

**NEW INVESTMENT**

**Key research provider:** The Queensland Department of Agriculture and Fisheries

This new project 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 set to be assessed under commercial orchard management conditions, with productivity and quality assessments compared to those of current industry rootstocks Beaumont and H2.
Macadamia harvest improvement review (MC16001)

NEW INVESTMENT

Key research provider: Colere Group in partnership with others

This project is investigating opportunities for improving harvesting in the macadamia industry. Its work will include exploring new and existing technologies, practices and systems for nut collection, with the aim of reducing the macadamia harvest window by several weeks.

Macadamia gross value of production data (MC16013)

NEW INVESTMENT

Key research provider: Australian Bureau of Statistics

This is a short project set up with the Australian Bureau of Statistics to review the calculation of gross value of production (GVP) for the macadamia industry. It began early in the 2017 calendar year, being due for completion early in the 2017/18 financial period.

Contribution to the 2nd International Macadamia Research Symposium 2017 (MC16700)

NEW INVESTMENT

Key research provider: The University of Queensland

This project was contracted to support industry participation – including four student scholarships – at the International Macadamia Research Symposium, held in Hawaii on September 13 and 14, 2017, as well as the 2017 American Society of Horticultural Science Annual Conference, held in Hawaii shortly after. Bringing together the international research community, learnings were to be brought back for the benefit of the Australian macadamia industry.

Enhanced National Bee Pest Surveillance Program (MT16005)

NEW INVESTMENT

Key research provider: Plant Health Australia

This project 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 will 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 project’s work.

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

Key research provider: The University of New South Wales

Macadamia lace bug (MLB) has a significant impact on the macadamia industry, but the taxonomy, genetics and ecology of the insect remains poorly understood. Established in 2014, this ongoing project is investigating key aspects of MLB including lifespan, food sources, where they lay their eggs and the like. The project is looking at whether out-of-season flowering is driving outbreaks, and how far individual insects can disperse. It is also examining the genetics of the insect to determine whether there are ‘cryptic’ species infesting macadamias that may be overlooked.

Macadamia industry minor use program (MC16002)

NEW INVESTMENT

Key research provider: Hort Innovation

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

Find a list of minor use permits for the industry on page 19, current as of September 15, 2017.


The minor use program is also aided by work that generates the data needed to support a range of permit applications for a range of industries. This data-generation research uses grant funds from the Australian Government’s Agvet program, plus some levy contributions.
**Macadamia regional variety trials – series 3, phase 2 (MC11001)**

**Key research provider:** The Queensland Department of Agriculture and Fisheries

This ongoing project is involved in the evaluation of new macadamia varieties established in earlier industry work. 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 commercialises 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. During 2016/17, four new elite varieties were deemed suitable for commercial release out of the project – dubbed varieties G, J, P and R. The varieties were presented to growers in March 2017 at Regional Variety Trial field walks in Bundaberg, Queensland, and Alstonville, New South Wales. There was also a call for expressions of interest for early-adoption plantings of varieties G, J, P and R that was circulated in industry channels during March, including Hort Innovation’s Grower Intel alerts to macadamia-growing members.

**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.

**Benchmarking the macadamia industry 2015-18 (MC15005)**

**Key research provider:** The Queensland Department of Agriculture and Fisheries

This project supplies on-farm benchmarking information for the macadamia industry. By collecting planting, production, quality and other data and analysing trends across the industry, its goal is to allow informed decision-making and help facilitate improved farm productivity and profitability for macadamia growers and other stakeholders. Benchmarking reports are available from the ‘Resources and downloads’ section of Hort Innovation’s Macadamia Fund page at www.horticulture.com.au/macadamia.

**Macadamia crop forecasting 2015-18 (MC15009)**

**Key research provider:** The Queensland Department of Agriculture and Fisheries

This ongoing project is responsible for producing macadamia crop forecasts each year, designed to be accurate to within 10 per cent of the actual final crop. It provides a tool for improved decision-making for macadamia businesses and the wider industry, and maintains an informed, viable and sustainable industry. Long-term forecasts will also allow planning for adequate infrastructure and industry marketing well in advance.

**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 involves the work of a macadamia industry productivity development manager (MIPDM), Robbie Commens, who is responsible for a range of activities including:

- Regular grower meetings and annual consultants’ meetings
- MacGroup workshops
- Field days
- 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 opportunities for new orchard territory and expansion.
National macadamia grower communication program (MC15003)

Key research provider: The Australian Macadamia Society

Beginning in 2016, this project shares R&D and marketing outcomes and other knowledge with growers and other industry stakeholders. The ultimate goal is to support growers in adopting new practices and technologies, increasing orchard productivity and profitability.

The project works in conjunction with the Australian macadamia industry innovation and adoption program (MC15004), described earlier, to form an integrated communications program for the industry.

A number of regular communication channels continue to be produced and maintained by MC15003, including but not limited to:

» The macadamia industry website, www.australian-macadamias.org/industry

» Quarterly Australian Macadamia Society news bulletins, containing key information and outcomes on levy-funded R&D and marketing outcomes

» Monthly industry e-newsletters

» A variety of ‘e-blasts’ (short emails) on a range of topics, such as regional updates, MacGroup invites and other urgent information

» Hard copy mail-outs as required, including event invitations

» Production and distribution of media releases promoting industry events and activities

» Biennial Australian Macadamia Industry Conferences, with the next event to be held in the 2018 calendar year.

Full details of all completed research can be found in project final reports, which are available to order at www.horticulture.com.au/final-report-order-form (final reports are free to Australian horticulture levy payers, registered Hort Innovation members and industry representative bodies).
Marketing report

Hort Innovation is responsible for investing the macadamia marketing levy into a range of activities to drive awareness and consumption of the nut, under the Hort Innovation Macadamia Fund. These activities are managed by our partner team at the Australian Macadamia Society, and below is a snapshot of just some of the initiatives from the 2016/17 program.

International consumer campaigns

Videos for the Chinese market

The China consumer campaign for Australian Macadamias kicked off for 2017 with the launch of a three-minute online video starring Chinese beauty influencer Vivian Xu. Featured on the Australian Macadamias Chinese campaign website and social media channels, the video brought the campaign’s core messaging to life, with Vivian showing how macadamias nourish her from the inside out as a convenient snack and a potent skincare ingredient. The beauty narrative was overlaid with the Australian macadamia growing story, attracting excellent engagement and putting the campaign firmly on the path to achieving its target of 15 million impressions. The video also featured on Vivian’s Weibo and WeChat channels, exposing macadamia messaging to a wider audience and driving additional reach.

In June 2017 a further video was released to showcase the natural health and beauty benefits of macadamias, overlaid with the growing and harvesting story. Filmed at a macadamia farm in the Northern Rivers and featuring a prominent Chinese parenting and lifestyle influencer, the video was promoted to health-conscious Chinese mothers on China’s leading parenting platform, BabyTree, and Chinese social media channels. The video achieved almost 500,000 impressions.

A trade media campaign was also launched to coincide with this video’s release, generating articles on macadamias in more than 100 online media outlets, reaching millions of people, and highlighting the significant Chinese media interest in Australia’s macadamia industry.

Chinese New Year activity

Chinese New Year (January 28, 2017) was an important cultural holiday and was used to engage fans in China and Taiwan – with activity designed to make Australian macadamias part of the celebratory conversation. In Taiwan, consumers were engaged with Facebook activity that tapped into traditional Taiwanese Chinese New Year customs. This included a Facebook game that invited fans to choose their favourite New Year macadamia-fruit combination and send it as a greeting to friends for a chance to win a prize. A second game invited fans to choose a red envelope to reveal a New Year blessing that could be shared with a friend for the chance to win a prize. There was a collective reach of 182,500 Taiwanese consumers and more than 25,000 engagements on the posts. In China, there were beauty blog posts and display ads on mobile apps to help drive awareness throughout the holiday period.

Japanese ‘Macadamia Experience’ event

Held in in Tokyo in March 2017, this was a promotional event targeting health- and beauty-conscious Japanese women. The intimate gourmet-themed event was attended by 35 influential media, social media stars and personalities, including special guest Aoi Kinoshita, a popular Japanese nutritionist who led a hands-on cooking demonstration with Australian macadamias. Online exposure pre- and post-event across Australian Macadamias channels, plus channels of partnering websites, Aoi Kinoshita and event guests, saw macadamia messaging reach 770,000 people.

Korean lifestyle collaboration

Strong results were achieved in Korea via a strategic collaboration with Seny’s Casa, a popular Korean lifestyle blog. Two educational macadamia posts were produced, the first sharing in-depth information on Australia as the origin of macadamias and the nutritional benefits of the nuts, and the second focused on macadamia beauty tips and macadamia oil for skin care. The beautifully presented content exposed core macadamia messaging to a new audience, and was also leveraged via the Australian Macadamias Korean Facebook page, reaching more than 16,000 people.
Vogue Picnic collaboration in Taiwan

In June 2017, a strategic collaboration with the Taiwan Vogue Picnic event enabled Australian Macadamias to tap into the picnic and outdoor entertaining trend that is very popular in Taiwan right now. The event exposed lifestyle-conscious Taiwanese consumers to macadamia messaging, positioning Australian-grown macadamias as a natural part of a fun and healthy everyday lifestyle. Exposure at the event and on social media reached 965,000 consumers.

Domestic consumer campaigns

Events

As part of a commitment to supporting food events in Australia’s macadamia growing regions, Australian Macadamias was a sponsor of Sample Food Festival – the Northern Rivers’ largest food event – in September 2016. Some 17,000 people attended the event, at which macadamias featured in cooking demonstrations (including how to make macadamia milk and macadamia chocolate spread), in a ‘mystery box challenge’ on the main stage, and in dishes served at the event’s ‘Friday formal’. The event involvement was leveraged extensively on social media, including on the Australia Macadamias Facebook page (www.bit.ly/2gB5K2h), with live content and pre- and post-event updates reaching almost 100,000 people. An #AusMacadamias ‘Instameet’ was also hosted at the event, bringing together local Instagrammers and guest chefs. In addition to driving social media activity, this generated coverage in local media and blogs.

Australian Macadamias also sponsored and were showcased at the Noosa Food & Wine event held in May, 2017. More than 60 kilograms of freshly harvested nuts were supplied, which were embraced by some of Australia’s top chefs and featured in over 20 food events throughout the festival. The event featured heavily on the industry’s social media channels, reaching 232,000 people in total – up 175 per cent on 2016.

Media tour

In March 2017, journalists from a range of Australia’s most popular food, lifestyle and news titles were hosted at a “media famil” in the Northern Rivers. The journalists experienced the many facets of the macadamia industry first-hand over two days, with on-farm experiences, grower interviews, a farmers’ market tour, a cooking demonstration, macadamia fine dining and beauty experiences. Articles appeared in high-profile publications including The Australian newspaper and in Nourish magazine.
Macadamia TV coverage

Throughout 2016/17 there was a range of media coverage on Australian macadamias and the industry, including two high-profile television appearances. In April 2017, a story on one on Landline explored the boom in global macadamia production and demand, and how Australia’s industry continues to grow as it sets its sights on the food-manufacturing segment. You can watch the piece at www.ab.co/2gBcP2M. In May, Sydney Weekender visited the Northern Rivers, where reporter Mike Whitney stopped by the Brookfarm macadamia orchard to learn about macadamia muesli and Brookie’s Byron Dry Gin. View the content at www.bit.ly/2yIjAus.

Macadamias on the menu: celebrity chef interviews

The Australian Macadamias marketing program has had a long-term focus on engaging with influencers such as leading chefs and foodies. This has led to the formation of valuable relationships with many of these people who are now passionate advocates for Aussie-grown macadamias.

To leverage these relationships further, a content series was launched in August 2016, consisting of exclusive interviews with leading chefs to not only discover some of the innovative ways they’re using macadamias, but also to introduce the trade and consumer audiences to the human story behind these celebrated chefs. Leveraged with the media, initial interviews were released with Giovanni Pilu of Pilu at Freshwater; Gavin Hughes of The Byron at Byron Restaurant; and celebrity chef and Gympie Regional Food Ambassador Matt Golinski.

Baby ‘Macadamia’

The first baby koala joey of the season born at Queensland’s Australia Zoo wildlife sanctuary was named ‘Macadamia’. Emerging from his mother’s pouch in June 2017, the koala’s debut was covered extensively on social and mainstream media – including on Nine Network’s Today Show.

Securing the naming rights to one of Australia’s iconic native animals was a perfect fit for the iconic Australian macadamia, and the total coverage reached more than 9.5 million people.

Medibank cross-promotion

A collaboration with Australian health fund Medibank exposed macadamia messaging to a new audience while adding nearly 1000 new subscribers to the Australian Macadamias consumer email database.

In November 2016, Medibank’s subscribers and social media fans were invited to submit a macadamia-themed poem for the chance to win a year’s supply of macadamia nuts. The offer reached more than 157,000 people on Medibank’s Facebook page, with additional reach achieved via Medibank’s e-newsletter, blog, Twitter and Instagram accounts.

Social and digital channels

New Australian Macadamias websites launch

During 2016/17, there was the launch of the new Australian Macadamias trade and consumer websites. The culmination of 12 months planning and development, the new sites were designed to deliver a more dynamic user experience, integrate better with social media channels and take the brand forward with a powerful new online look.

The centrepiece of the consumer site (www.australian-macadamias.org) is a new nut hub where fans can find recipes, discover foodie facts, grower stories, videos and the blog. The trade site, available in English, Japanese, Korean and Chinese, makes it easier to access the latest news and reports and also features a new marketing resources section. From the site (www.australian-macadamias.org/trade) users can also sign up for the Australian Macadamias trade newsletter, The Macadamia Review, which is distributed to global databases with a broad range of original content showcasing all facets of the industry.

Social media

The Australian Macadamias global Facebook communities have remained alive with conversation about macadamias, with pages in Australia, Germany, Japan, Taiwan, China and South Korea.

In early September 2016, Australian Macadamias hosted an inaugural ‘social media bootcamp’, bringing together marketing agency delegates from six countries for an intensive three-day ‘paddock-to-plate’ macadamia immersion.

Led by the Australian marketing team, the program showed international agency staff every aspect of the macadamia industry in the Byron Bay growing region, in order to bolster the quality and consistency of messaging across all core markets (and ultimately deliver a more compelling story to consumers to drive awareness and demand for Australian-grown macadamias). The event also attracted media attention, with national TV coverage on Landline, plus ABC Radio coverage and multiple online news pieces.
## Financial summary

Financial operating statement 2016/17

<table>
<thead>
<tr>
<th></th>
<th>R&amp;D ($)</th>
<th>MARKETING ($)</th>
<th>TOTAL ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPENING BALANCE</strong></td>
<td>1,104,279</td>
<td>2,434,943</td>
<td>3,539,222</td>
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<td>Grower levies (net of collection costs)</td>
<td>1,343,624</td>
<td>2,510,249</td>
<td>3,853,873</td>
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<tr>
<td>Australian Government money</td>
<td>1,278,369</td>
<td>–</td>
<td>1,278,369</td>
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<tr>
<td>Other income*</td>
<td>29,922</td>
<td>54,771</td>
<td>84,693</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>2,651,915</td>
<td>2,565,020</td>
<td>5,216,935</td>
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<tr>
<td>Project investments</td>
<td>2,196,531</td>
<td>2,522,591</td>
<td>4,719,122</td>
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<tr>
<td>Grower consultation and advice</td>
<td>43,721</td>
<td>15,804</td>
<td>59,525</td>
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<tr>
<td>Service delivery – fund-specific</td>
<td>16,827</td>
<td>43,695</td>
<td>60,522</td>
</tr>
<tr>
<td>Service delivery – base</td>
<td>299,659</td>
<td>335,672</td>
<td>635,330</td>
</tr>
<tr>
<td><strong>SUB-TOTAL (LEVY + AUSTRALIAN GOVERNMENT CONTRIBUTION)</strong></td>
<td>2,556,738</td>
<td>2,917,761</td>
<td>5,474,499</td>
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<tr>
<td>Levy contribution to across-industry activity</td>
<td>56,998</td>
<td>–</td>
<td>56,998</td>
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<tr>
<td><strong>CLOSING BALANCE</strong></td>
<td>1,142,458</td>
<td>2,082,202</td>
<td>3,224,660</td>
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<tr>
<td>Levy collection costs</td>
<td>15,033</td>
<td>27,919</td>
<td>42,952</td>
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</tbody>
</table>

* Interest, royalties
Minor use permits

Pesticides are a valuable tool for the macadamia industry. While the use of pesticides is being modified through the increasing uptake of integrated pest management, there is still a need for the strategic use of specific chemicals.

Pesticide companies submit use patterns for registration to the Australian Pesticides and Veterinary Medicines Authority (APVMA) and the macadamia industry is generally provided with significant registrations because of its major crop status. However, minor use permits are required in the macadamia industry where the market size is considered too small to generate adequate commercial returns for the research and development investment by the pesticide companies.

Below is a list of minor use permits for the macadamia industry, as of September 15, 2017.

<table>
<thead>
<tr>
<th>Permit ID</th>
<th>Permit description (pesticide/crop/pest)</th>
<th>Date issued</th>
<th>Expiry date</th>
<th>Permit holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>PER11462 v2</td>
<td>Ethephon / Macadamias / Promote nut fall</td>
<td>07-May-09</td>
<td>30-Jun-20</td>
<td>Australian Macadamia Society (AMS)</td>
</tr>
<tr>
<td>PER11635 v2</td>
<td>Petroleum oil / Macadamia / Macadamia felted coccid</td>
<td>01-Jul-10</td>
<td>30-Jun-20</td>
<td>AMS</td>
</tr>
<tr>
<td>PER12796 v2</td>
<td>Methomyl / Macadamia / Banana fruit caterpillar</td>
<td>22-Jul-11</td>
<td>30-Jun-21</td>
<td>AMS</td>
</tr>
<tr>
<td>PER13642 v2</td>
<td>Chlorpyrifos and Maldison / Tree nuts / Australian plague locust</td>
<td>01-Sep-12</td>
<td>30-Jun-25</td>
<td>Australian Nut Industry Council (ANIC)</td>
</tr>
<tr>
<td>PER13689 v4</td>
<td>Trichlorfon / Macadamia nuts / Macadamia lace bug, fruit-spotting bug, banana-spotting bug, green vegetable bug, 2-day WHP</td>
<td>14-May-13</td>
<td>30-Sep-21</td>
<td>AMS</td>
</tr>
<tr>
<td>PER82949*</td>
<td>Phosphorous acid (foliar and trunk applications) / Macadamia / Phytophthora root rot and trunk (stem) canker</td>
<td>9-Jun-17</td>
<td>31-Mar-22</td>
<td>AMS</td>
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<tr>
<td>PER14276 v2</td>
<td>Diazinon / Macadamia / Macadamia lace bug</td>
<td>01-Dec-13</td>
<td>30-Nov-20</td>
<td>AMS</td>
</tr>
<tr>
<td>PER14852</td>
<td>Pyganic / Macadamia / Macadamia lace bug</td>
<td>21-Aug-14</td>
<td>31-Mar-19</td>
<td>AMS</td>
</tr>
<tr>
<td>PER81162</td>
<td>Abamectin / Macadamias / Thrips, broad mites and flat mites</td>
<td>28-Oct-15</td>
<td>31-Oct-18</td>
<td>AMS</td>
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<tr>
<td>PER81463</td>
<td>Acephate / Macadamia / Sigastus weevil</td>
<td>24-Dec-15</td>
<td>31-Jan-21</td>
<td>AMS</td>
</tr>
</tbody>
</table>

* During the 2016/17 financial year, an application for this flagged permit (replacing PER82949) was prepared by Hort Innovation and submitted to the APVMA.

All efforts have been made to provide the most current, complete and accurate information on these permits, however it's recommended that you 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, which levy-paying members receive monthly.