2019 HIGHLIGHTS
The Tasmanian Institute of Agriculture (TIA) is a research institute at the University of Tasmania focusing on research, development, extension (RD&E) and education in the field of agriculture.

TIA was established in 1997 as a joint venture between the University of Tasmania and the Tasmanian Government, and has the objective of supporting prosperous, innovative and sustainable agriculture and food sectors in Tasmania.

Our researchers work closely with private sector partners across the agriculture and food value chain at a local, national and international level, ensuring that TIA’s research and education priorities are responsive to industry needs and contemporary agricultural sector challenges.

The joint venture has successfully enabled TIA to deliver nationally and globally-recognised research excellence and the highest possible Australian Research Council engagement and impact rankings.
CONTENTS

ABOUT TIA

MESSAGE FROM TIA’S INTERIM DIRECTOR 04

MESSAGE FROM THE MINISTER 06

TIA ADVISORY BOARD MESSAGE 07

HORTICULTURE CENTRE 08

DAIRY, GRAINS AND GRAZING CENTRE 14

AGRICULTURAL SYSTEMS CENTRE 20

FOOD SAFETY AND INNOVATION CENTRE 24

GLOBAL IMPACT 29

LEARNING AND TEACHING 30

FINANCIAL REPORT 35

2019 PROJECTS 36

2019 PUBLICATIONS 44
MESSAGE FROM TIA’S INTERIM DIRECTOR

The Tasmanian Institute of Agriculture (TIA) continues to work closely with Tasmania’s agriculture and food sectors to ensure they are profitable, safe and sustainable into the future.

A renewed five-year Joint Venture Agreement (JVA) was finalised between the University of Tasmania and the Tasmanian State Government during 2019. This agreement will ensure TIA continues to deliver research, development, extension and education to support the growth of the agriculture sector in Tasmania, with national and international impact.

The core of the agreement formalises TIA’s ongoing commitment to support the objectives set out in the Tasmanian Government’s White Paper to grow the value of Tasmanian agriculture to $10 billion by 2050.

During 2019 we bid farewell to TIA Director Professor Holger Meinke, who accepted a role as the University of Tasmania’s inaugural Strategic Research Professor for Global Food Sustainability.

Since joining the organisation in 2011, Professor Meinke made a tremendous contribution toward TIA’s impact on agriculture in Tasmania and beyond. His vision helped deliver significant impact to industry and society and prepared a new generation of students to tackle agricultural challenges. We wish Professor Meinke well in his future endeavours.

Some highlights during 2019 include:

• Engagement with the Tasmanian Government’s new Agricultural Innovation Fund, which provides an additional $3 million for strategic RD&E projects. The first project supported by this aims to expand treatments for blueberry rust for Tasmanian growers.
• Signing a partnership with the National Administration of Traditional Chinese Medicine, supporting research and development into growing Chinese Traditional Medicines in Tasmania for export.
• A new research agreement between TIA and Essential Oils of Tasmania to support Tasmania’s growing essential oils and plant extracts sector.
• A research partnership with SeedForce to develop a new variety of barley that will withstand extreme wet conditions with no negative impacts on its yield and quality.
• Concluding the ARC Training Centre for Innovative Horticultural Products, which successfully worked with industry to train food scientists who will contribute to the development of the fresh produce sector.
• Launching a mid-year intake for the popular Masterclass in Horticulture Business in response to industry demand.
• Awarding $224,000 worth of community and industry-funded scholarships to support students studying agriculture at the University of Tasmania.
Supporting sustainable agriculture and food sectors through high-impact research, development, extension and education.
MESSAGE FROM
THE MINISTER

Through the Tasmanian Institute of Agriculture (TIA), the Government is working with farmers, researchers and agribusiness to set an exciting direction in agricultural research in Tasmania.

TIA, established through a Joint Venture between the Tasmanian Government and the University of Tasmania, is unique in Australia. With the University of Tasmania’s state-wide focus and global connections, TIA offers our agricultural sector unparalleled opportunities to engage in RD&E and to adopt the best available technologies on-farm. I am pleased to say that in 2019 the Tasmanian Government signed a new agreement with the University to continue this valuable partnership.

Tasmania’s agricultural sector is firmly on track to reach the Government’s target to grow the farm gate value to $10 billion by 2050. Staying on track requires that we continue to innovate and take agricultural productivity to new levels through world-class agricultural RD&E.

The White Paper: Growing Tasmanian Agriculture – Research, Development and Extension for 2050 sets out the Government’s direction for agricultural RD&E. In 2019, with TIA as a key partner, we have continued to deliver on its objectives and are investing in agricultural RD&E that delivers that even greater on-farm impact for Tasmanian producers. We are providing more funding for industry-led, time-critical research through the $3 million Agricultural Innovation Fund, from which TIA was awarded the first grant of $300 000 for RD&E to better equip farmers to combat Blueberry Rust.

I would like to acknowledge and thank Professor Holger Meinke, for his contribution as TIA Director since 2011 and Dr John Whittington, for his work as Chair of the TIA Advisory Board over the past six years. I wish them the very best as they both take up new roles. I welcome Professor Mike Rose as Interim Director and thank the team of researchers, technical and professional staff at TIA for their commitment to supporting prosperous, innovative and sustainable agriculture industries in Tasmania.

THE HON. GUY BARNETT MP
MINISTER FOR PRIMARY INDUSTRIES AND WATER
The TIA Advisory Board includes representatives from the University of Tasmania, the State Government and Tasmania’s agricultural industries. The Board provides input on the strategic direction of research that is undertaken by the Joint Venture, to support prosperous, innovative and sustainable agriculture and food sectors in Tasmania.

Over the last 12 months the Board has worked with TIA to continue delivering on the recommendations in the Government’s White Paper - Growing Tasmanian Agriculture - Research, Development and Extension for 2050. The recommendations seek to harness TIA’s research excellence to deliver on farm impacts, increase productivity and promote innovation, competitiveness and sustainability in Tasmania’s agriculture and food industries.

Achievements in 2019 include implementing the Government’s RD&E Principles and Investment Strategy and launching Extension Accelerator, a program developed with industry and coordinated by TIA to build Tasmanian agricultural extension capability by providing professional development for graduates working in the sector.

I acknowledge the work of TIA staff and the members of the Advisory Board, including my predecessor, Dr John Whittington, who has Chaired the Board since 2014. The Board is central to TIA’s governance structure and the Joint Venture Agreement signed in June 2019 reinforces its role in maintaining the three-way partnership of industry, Government and University that underlies TIA’s ongoing success and recognition.

I trust that the Board will continue to work to ensure TIA remains at the forefront of agricultural research, in partnership with industry and Government.

TIM BAKER
CHAIR, TASMANIAN INSTITUTE OF AGRICULTURE ADVISORY BOARD
ACTING SECRETARY, DPIPWE
Innovation award for TIA wine research

Research Fellow Dr Rocco Longo is taking the guesswork out of creating beautiful sparkling wines. He is working with sparkling wine makers to develop a new piece of equipment that will increase the precision of grape pressing techniques using a method called spectroscopy. “Currently, wine makers have to taste the juice at regular intervals to determine when to stop pressing – a sensory process that is extremely difficult,” Dr Longo said.

His ground-breaking work has been recognised with a major award from Wine Australia, presented at Australia’s 2019 Science and Innovation Awards.

New yield forecasting tool on horizon for vineyard managers

In a world first, TIA researchers have developed a way of using existing infrared technology (Near Infrared Reflectance) to rapidly predict grape yield in the field. The hand-held technology has the potential to replace the time consuming and costly operation of manual grape bud dissection currently used to forecast yield.

An accurate yield forecast provides financially powerful information for the vineyard manager and winery, impacting all subsequent operations, ranging from pruning decisions to tank space allocation in the winery.

After three years of laboratory and field validation in both Chardonnay and Pinot Noir the bud scanner is now nearing commercial readiness with development of a ‘grower friendly’ app by software developer Indicium Dynamics.
Commercial trials to combat Redberry Mite

TIA researchers are working closely with commercial blackberry producers to find out how integrated pest management strategies can combat redberry mite.

Redberry mite is linked to redberry disease which causes incomplete, delayed or uneven ripening of blackberry drupelets.

More than 2,000 berries were sampled at different stages of ripeness, with low numbers of redberry mite observed in both Tasmanian and Victorian crops.

Targeted nitrogen for cherries

TIA researchers are challenging widely accepted fertiliser practices in commercial cherry orchards. The new nitrogen application strategies developed by TIA offer benefits to both growers and the environment.

“We found that cherry trees take up most nitrogen from the soil in late spring and early summer, contrary to long held views that promoted both early spring and post-harvest application,” TIA project leader Dr Nigel Swarts said.

“The amount of nitrogen needed to produce premium export quality cherries was half that of typical commercial practice.”

Cherry growers can use this more targeted nitrogen application strategy to soften their impact on the environment through reduced nitrogen leaching and greenhouse gas emissions.

Support for Tasmanian blueberry growers

The Tasmanian Government announced the first RD&E project to be supported by the Agricultural Innovation Fund. The research will expand the treatments available to Tasmanian blueberry growers to manage rust, including our organic producers. The project will be led by TIA with support from industry.
Increasing yield for Tasmanian pea industry

TIA partnered with Simplot Australia on a three-year project (2016-2019) to improve the productivity and profitability of processing peas in Tasmania.

The project focussed on the establishment factors of plant spacing and density in commercial settings and the findings will support growers to achieve the industry goal of 8 tonnes per hectare by 2020.

Research trials were conducted on commercial properties around Tasmania and at TIA’s Forthside Research Facility. The findings show that a target density of 110 plants per square metre can improve gross returns, and that narrow rows of 125mm improve plant health and vigour. Research also found that consistent intra-row spacing improves gross return and maximises the use of seed.

Understanding pink rot disease in potatoes

TIA is working with the South Australian Research and Development Institute (SARDI) to determine how growers can best detect the soil-borne pathogens that cause pink rot of potatoes in field soils before they are planted.

The project aims to confirm how much pathogen is needed for an outbreak to occur and how many tests are necessary to give a paddock the all clear.

During 2018-19, TIA conducted field trials at 25 commercial farms around Tasmania and at TIA’s Forthside Vegetable Research Facility. Early testing could reveal potentially dangerous concentrations of disease-causing pathogens prior to planting, giving growers advance notice to treat their soil or seed, change varieties or even avoid potatoes and plant an alternative crop.
Partnership to boost essential oils research

A new research agreement between TIA and Essential Oils of Tasmania (EOT) will provide a boost for Tasmania’s growing essential oils and plant extracts sector.

TIA’s research will help the industry understand how to sustainably increase yield and quality from native plants and well-established broadacre crops that are already grown in Tasmania.

As part of this research agreement, TIA PhD candidate Chanjoo Park is investigating the growing techniques that might encourage *Kunzea ambigua*, a unique Tasmanian native plant, to produce more of its special oils with even higher quality.

Poppy downy mildew tackled at its source

This project is investigating factors that promote outbreaks of systemic downy mildew (SDM) in Tasmanian poppy crops. The disease was first observed in Tasmania in 2013 and threatened the ongoing viability of the industry.

An analysis of historical poppy SDM outbreaks in Tasmania revealed that outbreaks were driven primarily by early season infections.

This suggests that soil or seed inoculum in combination with infected regrowth poppies has the largest impact on disease spread.

TIA’s research of seed inoculum found that transmission of both systemic and non-systemic powdery mildew could be dramatically reduced by a highly effective seed wash in either acidified electrolysed water or a two per cent sodium hypochlorite solution. These methods are now recommended as best practice for the Tasmanian poppy industry.
TIA’s horticultural researchers work closely with established and emerging industries.
Preparing farms for a hot future

PhD candidate Janine Chang-Fung-Martel is finalising a three-year project on the impact of extreme weather events on Australia’s dairy industry. “Australia is already seeing the impacts of extreme weather events on our agricultural industries, and dairy farmers are losing up to 20 per cent of their production during extreme heat events,” Ms Chang-Fung-Martel said.

“TIA is helping identify what we can do immediately and in the future to help farmers. Short-term solutions may be as simple as better anticipating when to move cows to a cooler paddock, and long-term solutions could be as complex as developing new breeds that handle stress better.”

Watch a short video about the project here.

Tasmanian Dairy Farm Monitor Project

The fifth year of the Dairy Farm Monitor Project in Tasmania (2017-18) included 32 dairy farms across the state participating in the free benchmarking program. Data gathered during this program was used to determine finalists of the 2019 Tasmanian Dairy Business of the Year Award.

Finalists were selected based on their 2017-18 financial and physical information such as costs (per cow, per ha and per kg of milk solids), milk and feed production, and efficiency of labour and pasture use.

“Feedback shows our benchmarking service helps Tasmania’s dairy businesses to make confident and sound farm management decisions that benefit them, and the wider industry, into the future,” TIA Dairy Extension Team Leader Lesley Irvine said.

The 2019 finalists and winners are listed here. Read the full Tasmanian Dairy Farm Monitor Project report here.
Dairy HIGH

**Project:** Dairy HIGH - High Integrity Grass-fed Herds  
**Funding body:** Dairy Australia  
**Research team:** Rawnsley, RP; Hills, JL; Raedts, PJM; Irvine, LD; Turner, LR; Langworthy, A; Verdon, M; Snare, T; Jones, S; Flight, S; Gee, CM; Hall, AF (AI); Cuin, TA (AI); McLaren, D (AI)

A new project launched in 2019 – Dairy HIGH – is focused on supporting sustainable and profitable growth in Tasmania’s pasture based dairy industry. It follows on from the three-year Dairy on PAR project. The project combines the accessible and emerging technologies and practices that are driving productivity and efficiency improvements, along with a focus on the industry’s desire to address consumer expectations relating to environmental management and animal welfare.

The five key themes of the project include:

1. Nitrogen efficiency in highly productive systems
2. Novel grazing practices in large grass-fed dairy systems
3. Addressing and preparing for changing social values with respect to animal welfare
4. Regional people and skills shortages
5. Building capacity in the Tasmanian dairy industry

Virtual fencing

**Project:** Enhancing the profitability and productivity of livestock farming through virtual herding technology  
**Funding body:** Australian Government through its Rural R&D for Profit program  
**Industry partners:** Dairy Australia, MLA, AWI, APL  
**Research team:** Rawnsley R; Verdon M; Langworthy A; Hills JL

A four-year project examining the application of virtual fencing to improve pasture utilisation in intensive livestock grazing systems will conclude in November 2020. TIA has investigated the potential ways that virtual fencing technology can be applied to better control grazing management and increase pasture utilisation, including:

- Providing fresh pasture in more frequent allocations
- Cell grazing, particularly in beef production
- Increasing pasture dry matter intake by providing fresh pasture to livestock when they are more likely to graze
- Ensuring equitable opportunities to graze by providing fresh pasture as dairy cows at the end of the milking order return from the dairy

TIA has also examined factors that affect how cattle learn to interact with the technology, and the effects of the technology on welfare and productivity.
A new research partnership between TIA and Seed Force – announced in 2019 – aims to improve commercial barley varieties to better tolerate waterlogging with no negative impacts on yield or quality.

“Waterlogging is a significant issue in high-rainfall zones around Australia and yield losses in barley crops can be up to 50 per cent. By developing a variety that is more tolerant to wet conditions we can help farmers increase their productivity and profitability,” TIA Professor Meixue Zhou said.

The gene will be introduced to commercial variety RGT Planet barley through a breeding progress known as introgression. The process requires several backcrosses assisted with genomic selection to ensure the background of the commercial variety is preserved while the waterlogging tolerance gene is added.

Building better barley

- **Project:** Barley waterlogging tolerance improvement program
- **Funding body:** Seed Force Pty Ltd
- **Industry partners:** Seed Force Pty Ltd
- **Research team:** Zhou M; Lovell R

The Australian's Research Magazine named TIA Professor Sergey Shabala as the “leading researcher in the world in the field of botany” for his work to make sure we have enough food in the future.

Professor Shabala told Research Magazine there was a pressing need to make plants used in agriculture more robust in responding to stresses and extremes in climate.

“We are losing about three hectares of farmable land to salinity every minute. But it is all too hidden and passes unnoticed, despite huge penalties to crop production,” Professor Shabala said.

“Our future will rely on quinoa and other halophytes (salt-tolerant plants). Investigating their potential is critical so that we have enough food a couple of decades from now.”

Read more about Professor Shabala's world class research [here](#).
Pasture for productive wethers

TIA Honours student, Lauren Rowlands, is conducting research in Tasmania’s Southern Midlands to determine the best pasture species for productive wethers.

“Farmers want to know if wethers (castrated Merino male lambs) produce better meat or wool, and what they should be fed to optimise their productivity. I’m testing this out through two different pasture diets,” Miss Rowlands said.

The trial includes a total of 100 wethers – 50 on irrigated pasture (Lucerne and Clover) and 50 on dryland pasture, supplemented with Faba bean. Miss Rowlands will gather a range of data including liveweight measurements, faecal samples to check gastrointestinal health and fleece weight.

Pastures in schools

Teachers from 15 high schools across Tasmania attended two professional development training workshops delivered by TIA pasture experts during 2019.

The sessions demonstrated practical hands-on exercises that teachers can run in their classrooms to teach pasture science to their students. The training materials have been added to the ‘Engaging students in STEM using Agriculture – Teacher Resource Book’, developed by TIA.

“Highlighting where science plays a key role in the decision-making processes of farmers and providing hands-on activities will hopefully inspire students into following a career in agricultural science,” TIA Research Fellow Dr Rowan Smith said.

“Importantly, it will also show students that there is a practical application for the basic maths and science they are learning in the classroom.”
TIA’s Centre for Dairy, Grains and Grazing brings together interrelated research themes to enhance innovation, productivity and sustainability for livestock industries.
The future of agriculture and food in Tasmania

Project: Aspirations, Attitudes & Capacity - Tasmanian Agrifood System (TasAgFuture)
Funding body: University of Tasmania (TIA)
Research team: Leith, PB; Warman, R; Garcia Imhof, C; Adhikari, RP; Evans, KJ

Hundreds of Tasmanian farmers, growers and food manufacturers participated in a social research project (TasAgFuture) to determine RD&E priorities that could support the sector into the future.

TIA researchers captured insights through in-depth interviews conducted with 100 people around the state and an online survey that was completed by 630 people. The aim was to determine how people working within the Tasmanian agriculture and food sectors view the future, and what motivates, constrains and enables them to achieve their goals.

In mid-2019, the research team led by TIA Research Fellow Dr Peat Leith released a comprehensive report outlining the project’s key findings.

“We now better understand the perspectives of people working in Tasmania’s food and farming businesses. We can use this knowledge to help Tasmania’s food producing industries to thrive,” Dr Leith said.

A key message of the report is that industry, government, regional communities, consumers and researchers need to work in partnership to convert opportunities into impact, and to address some of the complex challenges that we face.

Download the full report from the TIA website utas.edu.au/tia/tasagfuture.

WHAT SUPPORT DOES TASMANIA’S AGRIFOOD SECTOR NEED?

Understanding Tasmania’s agrifood sector is vital for our future. It is vital for the sustainability of the sector, and Tasmania’s economic growth.

We can only significantly develop the agrifood sector together. Different agrifood industries need different types of research and development.

The key is collaboration – between industry, regional communities, government and research.

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<thead>
<tr>
<th>Recommendations</th>
<th>Key</th>
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<tr>
<td>Regional and sectoral development</td>
<td>Industry</td>
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<tr>
<td>Long-term programs between industry, regional organisations, government and the University of Tasmania/TIA</td>
<td>Industry</td>
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<tr>
<td>Partnerships and funding from public and private sectors</td>
<td>Industry</td>
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<tr>
<td>Skills development and education</td>
<td>Government</td>
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<td>Leadership development for managers</td>
<td>Government</td>
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<tr>
<td>Industry-focussed training scholarships and travel bursaries</td>
<td>Government</td>
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<td>Flexible, short courses, especially addressing technical and technological needs</td>
<td>Government</td>
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<tr>
<td>Sustainability and community perception</td>
<td>Community</td>
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<tr>
<td>The social, economic and environmental aspects of food production need to be:</td>
<td>Community</td>
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<tr>
<td>• considered together</td>
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<tr>
<td>• underpinned by credible research</td>
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<td>• based on strong connections with consumers and the Tasmanian public</td>
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<td>Support for innovation</td>
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<td>An initiative to encourage experimentation</td>
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<td>Develop working groups to:</td>
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<tr>
<td>• recognise bottom-up innovation</td>
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<td>• promote collaborative innovation</td>
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<td>• identify priorities</td>
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<tr>
<td>Future-focussed research to inform policy</td>
<td>Research</td>
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<tr>
<td>Up-to-date analysis of the food production sector</td>
<td>Research</td>
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<tr>
<td>Collaboration to help learning</td>
<td>Community</td>
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<tr>
<td>Improve knowledge exchange between TIA and private providers through projects and forums. Eg. Joint projects</td>
<td>Community</td>
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Acknowledgment: This table of recommendations is an extract from the TasAgFuture summary report, which is available on TIA’s website.
Assisting drought affected farmers

<table>
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<tr>
<th>Project: Drought Recovery</th>
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<tbody>
<tr>
<td>Funding body: Tasmanian Government</td>
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<tr>
<td>Research team: Field, B; Ball, P; Hinton, S; Harrison, M</td>
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</table>

In September 2019, the Tasmanian Government announced targeted support programs for Tasmanian farmers and rural communities in drought affected areas. This included $150,000 for TIA to assist drought affected farmers with in-drought grazing, pasture and livestock management strategies, and farm planning and practical tools for post-drought rebuilding of farm productivity in a changing climate.

“We reached out to producers on Tasmania’s East Coast to find out what they needed most from this project. From these conversations the main priorities emerged as the development of skills and knowledge to build resilience and help farmers to effectively plan for and manage future climate challenges,” Project lead Mr Brian Field said.

“Priorities included understanding localised climate forecasting, strategies for re-stocking, future pastures, water management efficiencies and diversification opportunities.”

CRC for High Performance Soils

<table>
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<tr>
<th>Project: Cooperative Research Centre for High Performance Soils (Soil CRC)</th>
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<tr>
<td>Participants: The Soil CRC brings together an elite group of industry partners, with 40 Participants contributing $19.1 million cash and $107.7 million in-kind contributions, in addition to the Australian Government contributions of $39.5 million cash.</td>
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The Cooperative Research Centre for High Performance Soils (Soil CRC) is bringing together scientists, industry and farmers to find practical solutions to extremely complex soil management issues.

This national research centre has a focus on increasing the sustainability of Australian agriculture. Being part of the Soil CRC enables TIA to share ideas with other universities and build larger networks that will create benefit for farmers in Tasmania.

TIA researchers are leading the following projects:

- ’Smart’ soil sensors – led by TIA’s Dr Marcus Hardie with collaborations from Birchip Cropping Group, FarmLink, Southern Farming Systems and Soils for Life.
- Smelling Soil – led by TIA’s Dr Shane Powell with collaborations from University of Southern Queensland.
TIA’s Agricultural Systems Centre is helping to make sense of complex interactions within agricultural and food systems.
FOOD SAFETY AND INNOVATION CENTRE
The ARC Training Centre for Innovative Horticultural Products was established to train innovative, industry-savvy food scientists who will contribute to the development of Australia's fresh produce sector through new products with improved shelf life and quality.

The Training Centre, led by TIA Professor Tom Ross, was launched in December 2015 and concluded in September 2019. At the end of 2019, several students had submitted their PhDs with others close to being finalised, and three post-doctoral fellows had secured full-time jobs that will enable them to continue their contributions to the food industry through the application of relevant science.

An application has been submitted for another Training Centre to be based at TIA at the University of Tasmania: the ARC Training Centre in Sustainable Healthy Produce.

Claire McCrory is a PhD candidate in the ARC Training Centre for Innovative Horticultural Products. She is investigating ways to extend the shelf life of sweet cherries by looking at how the supply chain, including temperature and logistics processes, affects cherry quality.

"Preliminary work suggests we can use technology to store fruit and retain good quality for up to 80 days. That would mean Tasmanian cherries are still available nationally in mid-April," Ms McCrory said.

"Tonnes of cherries are wasted each year. So, if we can extend their shelf life, we could significantly reduce waste, that's a great result for farmers, consumers and the environment."
Reducing potato greening

Sabine Tanios, within the ARC Training Centre for Innovative Horticultural Products, spent her PhD uncovering the major risk factors that affect greening in potatoes, and figuring out how to reduce greening in the field and in supermarkets.

Her research uncovered insights into genetic resistance to greening, the influence of fertilisers in potato production, and the risks associated with lighting systems in supermarkets.

"Have you ever wondered why potatoes turn green or how can we stop greening? My research identified risk factors affecting greening from the field to supermarket and I have found ways to make potatoes more resistant to greening. This can help reduce the occurrence of green potatoes and ensure fresher and healthier potatoes make their way onto our plate.”

Dr Tanios said.

Dr Tanios was recently awarded her PhD and has had three papers published, with a further two under review.

Pros and cons of greenhouses

Dianfan Zhou, within the ARC Training Centre for Innovative Horticultural Products, is finding out how much it costs to build, maintain and run a greenhouse growing operation.

Her research will help the fruit and vegetable industry weigh up the pros and cons of greenhouse growing.

During 2019, Miss Zhou relocated to Wageningen University in the Netherlands to continue her greenhouse studies with the Horticulture and Product Physiology Group.

She will use their simulation program to model greenhouse resources and environmental footprint, including greenhouse gas emissions.
Ideal temperature for life

TIA researchers discovered the ideal temperature for all life to thrive, adding another layer to Darwin’s ‘Survival of the Fittest’ theory.

Lead researcher Dr Ross Corkrey has named this ideal individual temperature ‘Umes’.

“Umes tells us the ideal temperatures for microorganisms – the world’s smallest life forms – to thrive,” Dr Corkrey said.

“We found that as the temperature increases, natural selection is more likely to favour microorganisms that grow at faster rates. Microorganisms can’t control their own temperature, so the conditions they live in are vital for their survival and growth.”

Umes could have massive implications for the future of agriculture, food and much more. It could help researchers breed tougher vegetable plants to survive climate change, develop food that stays fresher for longer or break down food packaging.

Read the paper here.

World-leading food innovation happening in Tasmania

Ground-breaking research taking place in regional Tasmania could create a new generation of high quality ready-to-use foods that do not need refrigeration.

The research is being conducted through the Centre for Food Innovation (CFI) and is focusing on applying MATS (Microwave Assisted Thermal Sterilisation) to make a variety of concept demonstrator meals. This innovative research is meeting the needs of Defence and of regional economic development for post-farmgate, value-added food products.

“This increases the resilience and sustainability of the food supply system by eliminating the need for cold chain logistics. It also enables the potential for foods to be marketed using online commerce platforms and exported directly to consumers prepared to pay for the provenance values of our produce,” TIA Professor Roger Stanley said.

Feedback from Defence field trials has led to a focus on developing larger volume food service products to supplement fresh feeding or as reserve/emergency packs.

Commercial collaboration has opened the way to planning for a production plant to be developed in Tasmania.

*The Centre for Food Innovation (CFI) is a collaboration between the University of Tasmania (through TIA), the Commonwealth Government’s Defence Science and Technology Organisation (DSTO) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO).*
TIA’s Food Safety and Innovation Centre provides industry and government with access to cutting-edge research and knowledge.
A joint investment by the Australian Education Management Group and the University of Tasmania (TIA) will see a joint research hub for traditional Chinese herbs established in Tasmania. Trials at TIA’s Forthside Research Farm on Tasmania’s north-west coast will initially focus on high-value varieties suited for export, including Angelica sinensis (Female Ginseng), Codonopsis pilosula (Poor Man’s Ginseng), Astragalus membranaceus (Mongolian Milkvetch) and Platycodon grandiflorus (Chinese Bell Flower).

“This is an exciting opportunity to develop a potential new export sector and further diversify Tasmania’s agricultural sector,” TIA Associate Head of Global Professor Dugald Close said.

“Our two main objectives are to identify herb crops of interest to Chinese markets that match Tasmania’s growing conditions, and to develop agronomic production systems and post-harvest processing approaches and techniques for product development.”
In response to industry needs, TIA launched a new mid-year intake and part-time study options for its highly regarded Masterclass in Horticultural Business. The Masterclass is the only course of its kind in Australia and provides practical business and leadership skills for horticulture managers across the country. Through this course, TIA is helping to develop the leaders required for the industry to grow and innovate into the future.

“Since the course started in 2017, we have continued to receive strong, positive feedback from graduates with tangible benefits to participants, companies and the wider horticulture sector,” TIA Acting Associate Director for Teaching and Learning, Professor Alistair Gracie said. “Adding mid-year intakes and part-time study options will ensure our course is accessible to as many people as possible. This will enable us to train more people each year and provide flexibility to meet their personal and professional needs.”

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Agriculture for international development

Two University of Tasmania agriculture students were among 22 students around Australia awarded scholarships from the Crawford Fund in 2019, supporting them to visit a developing country to gain valuable international agricultural research experience and expertise.

Anna Mackintosh and Oliver Gales visited Timor-Leste, where they were exposed to the malnutrition epidemic by working on projects to improve maternal and child nutrition and provide fresh produce to the commercial market.

“I spoke directly with farmers to understand the productivity of their farms and the major challenges they face. I thoroughly enjoyed learning about how important livestock is to Timorese people in terms of both their nutrition and cultural practices,” Miss Mackintosh said.
Scholarships support students pursue career in agriculture

A total of $224,000 worth of scholarships were awarded to fifteen agriculture students at a special event held at Agfest in 2019.

The University of Tasmania has more scholarships on offer in agriculture than any other discipline, thanks to the generosity and foresight of the Tasmanian community, local industry, the Tasmanian Government and the University.

Oliver Gales received a $5,000 Fruit Growers Tasmania Honours Scholarship to support his honours research, working alongside industry to look at ways of improving raspberry production in Tasmania.

“My project is looking at ways that infra-red technology can be used to instantly measure Anthocyanins in raspberries, which contribute to their bright red colour as well as their health properties, such as anti-oxidants and anti-carcinogens,” Mr Gales said. The scholarships recipients for 2019 are listed here.

Agricultural camp inspires students

Year 11 and 12 students from around Tasmania and interstate attended the free ‘Feed your Mind, Feed the World’ experience in December 2019.

Over three days, attendees had the opportunity to experience the inner workings of successful agricultural businesses, including a robotic dairy, commercial flower producer, cider orchard and vegetable processor.

After attending in 2018, Katie Zarb was so impressed with what she saw that she enrolled in a Bachelor of Agricultural Science at the University of Tasmania.

“I didn’t know that I wanted to study agriculture until I did the camp. Attending really opened my eyes to the agriculture industry and made me realise there is so much diversity,” Miss Zarb said.

“When young people think about a career in agriculture, they often picture traditional farming enterprises like shearing sheep, milking cows or growing crops. We are showing that it can be so much more,” TIA Student Outreach Coordinator Dr Steve Quarrell said.
Meat Judging Competition
For the first time ever, TIA sent a Tasmanian team of nine students and two TIA researchers to compete in the Australian Intercollegiate Meat Judging Competition, held at Charles Sturt university in Wagga Wagga.

Lauren Rowlands was awarded the Integrity Systems Company (ISC) Scholarship after competing at the ICMJ event, including a fully-funded trip to the red meat industry’s flagship event, Red Meat 2019.

“I haven’t been to a Red Meat event before, so it’s been amazing to be at the event and learn more about red meat production on a large scale and to meet more industry innovators and leaders, thanks to the scholarship provided to me through the Integrity Systems Company,” Miss Rowlands said.

The meat judging competition is designed to attract graduates into the red meat industry and is a great way for students to get some practical skills and network with agricultural industry contacts from around Australia.

National Merino Challenge
Nine agricultural students represented Tasmania in the National Merino Challenge held in Sydney during 2019. This was the second year that TIA has entered the competition, which scores students on categories including ram and ewe selection, wool judging and valuing and condition scoring of sheep.

While TIA’s team didn’t record back-to-back wins after taking out the competition in 2018, the event was a fantastic opportunity for students to learn more about the merino sector and network with industry professionals from around Australia. University of Tasmania student Matilda Scott was an invited guest speaker at the event.
Tasmania is an agriculture powerhouse, containing a broad and dynamic industry that provides opportunities from paddock to plate.
NOTES TO ACCOMPANY FINANCIAL DETAILS

The financial details reported here relate to TIA activities for 2019. The detail was prepared by TIA and checked by Financial Services, University of Tasmania.

Specific contributions from each funding source are as follows:-

1. **University of Tasmania**
   - 2019 Operating Grant Funds to TIA/School of Agricultural Science $5,694,612
   - 2019 University Research Scholarships to PhD students studying in areas related to TIA activities $1,015,646
   
   **TOTAL University of Tasmania contribution** $6,710,258

2. **Department of Primary Industries, Parks, Water & Environment (DPIPWE)**
   - CRF funds granted to TIA for the 1 January 2019 to 31 December 2019 financial year under the TIA Joint Venture Agreement $5,665,500
   
   **TOTAL DPIPWE contribution** $5,665,500

3. **Industry - including private industry and National Competitive Research grants**
   - 2019 Industry research grants held by the University for TIA activities $6,737,180
   
   **TOTAL Industry contributions** $6,737,180

CERTIFICATION OF FINANCIAL DETAIL

We certify that the financial detail contained in the 2019 Tasmanian Institute of Agriculture Research Annual Report has been prepared in accordance with detail held in the University of Tasmania’s Financial Management Information System, and detail provided by TIA.

Professor Michael Rose  
Interim Director  
Tasmanian Institute of Agriculture  
16 April 2020
<table>
<thead>
<tr>
<th>Funding Body</th>
<th>Industry Partners</th>
<th>Research Team</th>
<th>Title of Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horticulture Centre</td>
<td>Boersma, M; Harwin, SJ</td>
<td>Sony Proof of Concept II</td>
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<td>Sony Imaging Products and Solutions Inc</td>
<td>Wandin Valley Farms</td>
<td>Bound, SA; Close, DC</td>
<td>Cherry cracking study</td>
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<td>InSense Pty Ltd</td>
<td>Fruit Growers Tasmania Inc, Biosecurity Tasmania, Lenswood Cold Stores Cooperative Society Limited, SA Department of Primary Industries and Regions (SARDi), Biosecurity Plant Division, DAWR</td>
<td>Bound, SA; Buntain, M; Cover, I; Tarbath, M; Westmore, G; Crisp, P; James, P</td>
<td>Pilot Sterile Codling Moth Releases for the Apple industry</td>
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<td>Horticulture Innovation Australia</td>
<td>Applied Horticultural Research Pty Ltd; Queensland Department of Agriculture &amp; Fisheries</td>
<td>Gill, WM; Close, DC</td>
<td>Mushroom pest and disease management and research services</td>
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<td>Simplot Australia</td>
<td>Gracie, AJ; Hardman, P; Ives, SW; Hinston, LH; Mathews, A; Boersma, M; Tubb, J</td>
<td>Optimising cover crops for the Australian vegetable industry</td>
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<td>South Australian Research and Development Institute</td>
<td>Wilson, CR; Retlke, M; Tegg, RS; Beveridge, PW</td>
<td>Field and laboratory trials for understanding disease risk in potatoes</td>
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<td>South Pacific Seeds, Hansen Orchards, Fruit Growers Tasmania, Hansen Orchards, Reid Fruits, Metcalf Biocontrol</td>
<td>Close, DC; Gracie, AJ; Boersma, M; Barry, K; Glen, M; McPhee, J; Doyle, R; Bound, S; Allen, G; Quarrell, S</td>
<td>National PhD Program: Horticulture</td>
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<td>AgVictoria (DEDJTR), Fruit Growers Tas., JC Evans Orchards</td>
<td>Williams, David; Villalta, O; McCutcheon, A; Cunningham, P; Santhanam-Martin, M; Mathews, A; Murphy-White, S; Learmonth, S; Sutton, J; Lacey, K; Dodds, K; Coleman, A; Nimmo, P; McGrath, C; Quarrell, SR; van Helden, M; James, P</td>
<td>An integrated pest, disease and weed management program for the Australian apple and pear industry</td>
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<tr>
<td>Department of Agriculture and Fisheries (QLD); Department of Economic Development, Jobs, Transport and Resources; Department of Primary Industries and Fisheries, NT; Department of Primary Industry and Resources</td>
<td>Wilson, CR; Gambley, C; Constable, F; Tran Nguyen, L; Couotts, B</td>
<td>Area-wide management of vegetable diseases: viruses and bacteria</td>
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<tr>
<td>Department of Primary Industries, Parks, Water &amp; Environment</td>
<td>Tegg, RS; Wilson, CR; Powell, S; Doyle, RB</td>
<td>A scientific trial to measure the in-paddock and economic benefits of bio-fumigation on soil health, and on disease pest and weed levels on a range of annual crops under Tasmanian conditions</td>
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<td>Funding Body</td>
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<td>Wilson, CR; Tegg, RS; Eyles, A; Baldwin, S</td>
<td>Mechanisms and manipulation of resistance to powdery scab in potato roots</td>
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<td>Lincoln University, Wageningen University</td>
<td>Gracie, AJ; Close, DC; Boersma, M; Acuna, TL; Bigsby, H</td>
<td>Global master class in horticulture</td>
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<td>Department of Agriculture</td>
<td>Cotton Research and Development Corporation; Horticulture Innovation Australia, Reid Fruits, Wandin Valley Farms</td>
<td>Swarts, ND</td>
<td>Optimising nutrient management for improved productivity and fruit quality in cherries</td>
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<td>Reid Fruits, Lucaston Park Orchards</td>
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<td>Improved productivity and profitability for the Australian apple and pear industry</td>
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<td>Department of Primary Industries, Parks, Water &amp; Environment; IPM Technologies; Raspberries &amp; Blackberries Australia, Costa Group, Driscoll’s Aust, YV Fresh, Blue Hills Berry Farm, Fairview Hill Berry Farm</td>
<td>Quarrell, SR; Allen, GR; Bunlaiin, M; Daveis, J; Horne, P; Eccles, J</td>
<td>Integrated Pest Management of redberry mite, Acalitus essigi, on blackberries</td>
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<td>Close, DC; Measham, PF</td>
<td>Druplet Disorder in Rubus</td>
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<td>Botanical Resources Australia Pty Ltd</td>
<td>Scott, JB; Pearce, T</td>
<td>Integrated disease management in pyrethrum</td>
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<td>Westpac Banking Corporation</td>
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<td>Jones, JE; Swarts, ND</td>
<td>Mapping Australian cider uniqueness for the production of high quality and consistent craft cider</td>
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<td>Wine Australia</td>
<td>Hill-Smith Family Vineyards, and numerous Australian Pinot Noir producers.</td>
<td>Kerslake, FL; Lewis, GK; Close, DC; Merry, AM; Dambergs, R; Doyle, RB; Mirowski, LT; Turner, P; Rose, L; Wadewitz, A; Sharpe, S; Smith, P</td>
<td>Pinot Noir provenance: Australian benchmarking to support growing, making, perception of quality, and marketing to add value to the Pinot Noir supply chain</td>
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<td>Wine Australia</td>
<td>Australian Wine Research Institute, Hill-Smith Family Vineyards, University of Adelaide, Josef Chromy Wines, Apogee Tasmania</td>
<td>Kerslake, FL; Close, DC; Dambergs, R; Merry, AM; Wilkinson, K; Smith, P; Goemann, K; Rodemann, T</td>
<td>Building and measuring the quality of fine Australian sparkling wines, through identification of the impact compounds responsible for autolytic character in sparkling wine, and novel winemaking tech</td>
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<td>Wine Australia</td>
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<td>Jones, JE; Swarts, ND; Kerslake, FL</td>
<td>Improving grapevine quality and yield through improved vine nutrition and pruning</td>
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<td>Wine Australia</td>
<td>Wine Australia, Lastek, Shaw and Smith, Hill-Smith Family Vineyards</td>
<td>Kerslake, FL; Close, DC</td>
<td>Novel approaches to autolysis manipulation and improving efficiencies in sparkling wine production</td>
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<td>Department of Agriculture</td>
<td>Hill-Smith Family Vineyards, Wine Australia, Lastek, Shaw + Smith</td>
<td>Jones, JE; Rodemann, T; Close, DC; Dambergs, RG</td>
<td>Taking grapevine yield forecasting into the digital age</td>
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<td>Title of Project</td>
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<td>Wilson, CR; Nichols, DS</td>
<td>Manipulating plant root exudation for soil-borne disease control</td>
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<td>Australian Research Council</td>
<td>Department of Primary Industries, Parks, Water &amp; Environment; Poppy Growers Tasmania Inc; SunPharma Australia; Tasmanian Alkaloids Pty Ltd; United States Department of Agriculture</td>
<td>Scott, JB; Wilson, CR; Gent, D</td>
<td>Development of a risk management system for systemic downy mildew of poppy</td>
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<td>Advanced Agricultural Systems Pty Ltd</td>
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<td>Botanical Resources Australia Pty Ltd</td>
<td>Pearce, T; Pilkinson, S; Scott, JB</td>
<td>Investigating the genetics of pyrethrum vernalisation</td>
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<td>Garland, SM; Gracie, AJ; Close, DC</td>
<td>Accumulation of STLs in pyrethrum extract</td>
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<td>Cooperative Research Centre for Honey Bee Products; Tasmanian Beekeepers</td>
<td>Blue Hills Honey</td>
<td>The bioactivity and stability of the honey from Leatherwood (Eucahypha lucida)</td>
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<td>Fruit Growers Tasmania Inc</td>
<td>Barry, KM; Pearce, T; Oliver, GS</td>
<td>Resistance of Botrytis cinerea to selected fungicides</td>
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<td>Diemen Pepper</td>
<td>Barry, KM; Wilson, MD; Brodribb, TJ; Cahill, D</td>
<td>Developing tools to screen native pepper for resistance to dieback and tolerance to drought</td>
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<td>Department of Primary Industries, Parks, Water &amp; Environment</td>
<td>Hill-Smith Family Vineyards, Brown Family Wine Group</td>
<td>Stabilising and increasing yield and quality in Tasmanian vineyards</td>
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<td>Australia’s wine future - adapting to short-term climate variability and long-term climate change</td>
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<td>Wine Australia, CSIRO</td>
<td>Brown Family Wine Group, Penley Estate, See Saw Wines, NSW DPI</td>
<td>Towards Differential Management to Supply More Fruit at Desired Price Point</td>
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<td>Incitec Pivot Limited</td>
<td>Boersma M</td>
<td>Influence of nitrification inhibitors on processing potato yield</td>
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<td>Department of Agriculture and Water Resources</td>
<td>Longo R; Kerslake FL; Dambers R</td>
<td>A new tool for in-line and real-time grape juice assessments</td>
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<td>W&amp;E Health (AEMG)</td>
<td>Close DC; Boersma M; Garland SM</td>
<td>Research Hub for Traditional Chinese Herbs</td>
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<td>Tasmanian Botanics</td>
<td>Tasmanian Botanics</td>
<td>Developing Medicinal Cannabis Industry</td>
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<td>Martha Jane Medical</td>
<td>Martha Jane Medical</td>
<td>Developing the Horticulture of Medicinal Cannabis</td>
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<td>Tasmanian Institute of Agriculture</td>
<td>Meadowbank Wines, Home Hill Wines, Jansz, Milton Wines, Gala Estate Wines</td>
<td>Informing smoke taint decision support for the Tasmanian Wine Industry</td>
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<td>Department of Agriculture and Water Resources, Hansen Orchards, Reid Fruits, Seed Purity, South Pacific Seeds Pty Ltd</td>
<td>Novel technologies and practises for the optimisation of pollination within protected cropping environments</td>
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<td>Australian Research Council: Grant-Linkage</td>
<td>Western Sydney University, Botanical Resources Australia Pty Ltd</td>
<td>Finding damage thresholds in pyrethrum to optimise crop profitability</td>
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<td>Industry Partners</td>
<td>Research Team</td>
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<td>Royal Tasmanian Botanical Gardens</td>
<td>Swarts ND</td>
<td>DNA sequence analysis of mycorrhizal fungi</td>
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<td>Tasmanian Institute of Agriculture</td>
<td>Swarts, ND; Jones, JE; Kerslake, FL; Adhikari, R</td>
<td>Developing consolidated strategy for cider apple research</td>
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<td>Dairy Australia Limited</td>
<td>Christie, KM</td>
<td>Australian Dairy Carbon Calculator</td>
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<td>Dairy Australia Limited</td>
<td>Hills, JL; McLaren, D; Flight, S; Rawnsley, RP</td>
<td>Beyond Water Smart: Advancing Dairy Irrigation System Performance</td>
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<td>Dairy Australia Limited</td>
<td>AW Howard Memorial Trust Inc</td>
<td>Rawnsley, RP; Pemberton, KG; Irvine, LD; Hills, JL; Turner, LR; Freeman, MJ; Kilpatrick, SI</td>
<td>Dairy on PAR</td>
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<td>Dairy HIGH - High Integrity Grass-fed Herds</td>
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<td>Department of Agriculture</td>
<td>Cotton Research and Development Corporation; Dairy Australia Limited; University of Southern Queensland</td>
<td>Hills, JL; McLaren, D; Flight, S; Rawnsley, RP; Jones, S; Hardie, MA; Langworthy, A</td>
<td>Smarter Irrigation for Profit - Phase 2</td>
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<td>Department of Agriculture</td>
<td>Agersens Pty Ltd; Australian Pork Limited; Australian Wool Innovation Limited; CSIRO-Commonwealth Scientific &amp; Industrial Research Organisation; Dairy Australia Limited; Meat and Livestock Australia; University of Melbourne; University of New England; University of Sydney</td>
<td>Tomkins, N; Swan, P; D’Souza, D; Henry, D; Rawnsley, RP; Hills, JL; Freeman, MJ; Verdon, MJ; Langworthy, A</td>
<td>Enhancing the profitability and productivity of livestock farming through virtual herding technology</td>
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<td>Cotton Research and Development Corporation; University of Melbourne</td>
<td>Rawnsley, RP; Christie, KM; Harrison, MT; Eckard, R</td>
<td>More Profit from Nitrogen: enhancing the nutrient use efficiency of intensive cropping and pasture systems</td>
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<td>Meat and Livestock Australia: Livestock Productivity Partnership</td>
<td>University of Melbourne, CSIRO</td>
<td>Harrison MT; Turner LR; Christie KM; Ball P</td>
<td>NEXUS project: exploring profitable, sustainable livestock businesses in an increasingly variable climate</td>
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<td>Grains Research &amp; Development Corporation</td>
<td>Murdoch University</td>
<td>Harrison MT; Zhou, M; Johnson, PG</td>
<td>Manipulating barley phenology to maximise yield potential</td>
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<td>Field B, Harrison MT, Irvine L, Hinton S</td>
<td>TIA Drought Recovery Project</td>
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<td>Department of Primary Industries, Parks, Water &amp; Environment</td>
<td>Turner, LR; Ball, PD; Snare, TA; Leith, PB</td>
<td>Pastures and Livestock Productivity Project - Phase Two</td>
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<td>Smith, RW</td>
<td>Evaluation of perennial legume options for the East Coast of Tasmania</td>
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<td>Zhou, M; Johnson, PG</td>
<td>Effective control of barley yellow dwarf virus (BYDV) in wheat</td>
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<td>PGG WRIGHTSON SEEDS (AUSTRALIA) Pty Ltd</td>
<td>Smith, RW</td>
<td>Effectiveness of novel endophytes on persistence and production of perennial ryegrass</td>
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<td>Martha Jane Medical</td>
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<td>Acuna, TL</td>
<td>Production and quality of industrial hemp (Cannabis sativa) in response to water regime</td>
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<td>Qatar National Science Foundation</td>
<td>University of Qatar</td>
<td>Shabala, SN</td>
<td>Oxidative stress signalling in halophytes</td>
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<td>Riffkin, P; Acuna, TL; Merry, AM; Lovell, R; Howard, RC; Christy, B; Clough, A; Richards, R</td>
<td>Optimising the yield and economic potential of high input cropping systems in the HRZ</td>
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<td>Li, C; Zhou, M; Broughton, S; Zhang, X</td>
<td>Improved Adaptation of Barley to Acid Soils</td>
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<td>University of Wuerzburg</td>
<td>Shabala, SN; Hedrich, Rainer</td>
<td>Stomata functioning in halophytes for improved plant stress tolerance</td>
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<td>Department of Industry and Science</td>
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<td>Shabala, SN; Meinke, HB; Zhou, M; Shabala, L; Chen, ZH</td>
<td>Developing Salt Tolerant Rice for Food Security in India and Australia</td>
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<td>Department of State Growth (Tas)</td>
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<td>Penrose, B; Parbhakar-Fox, AK; Carver, SS</td>
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<td>Seed Force Pty Ltd:</td>
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<td>Zhou, M</td>
<td>Barley waterlogging tolerance improvement program</td>
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<td>Zhou, M; Johnson, P; Fan, Y</td>
<td>Introgressing waterlogging tolerance gene to commercial barley varieties</td>
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### Agricultural Systems Centre

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<thead>
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<th>Funding Body</th>
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<td>Armstrong, R; Wilhelm, N; Davenport, D; Sale, P; Tavakkoli, E; Dean, GJ; McPhee, JE; Hardie, MA</td>
<td>Understanding the amelioration processes of the subsoil application of amendments in the Southern Region</td>
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<td>Australian Centre for International Agricultural Research</td>
<td>Centre for Agrarian Systems Research and Development; Centre for International Research Agronomic Development; National Institute of Animal Sciences; Northern Mountainous Agriculture and Forestry Science Institute; Tay Bac University; Thai Nguyen University of Agriculture and Forestry; University of Queensland; Vietnam National University of Agriculture</td>
<td>Ives, SW; Bonney, L; Eversole, R; Adhikari, RP; Nicetic, O; Cuong, VC; Huyen, LTT; Hung, PV; Quang, NH; Lan, DD; Xuan, CTT; Duteurtre, G</td>
<td>Intensification of beef cattle production in upland cropping systems in North West Vietnam</td>
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<td>Australian Centre for International Agricultural Research</td>
<td>University of Southern Queensland</td>
<td>McPhee, JE; Melland, A; Douangsavanh, L; Boupha, BD; Southamavong, F</td>
<td>Integrating soil and water management in vegetable production in Lao PDR and Cambodia</td>
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<td>Grains Research &amp; Development Corporation</td>
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<td>Linde, C; Platz, G; Gupta, S; McLean, M; Milgate, A; Zhou, M; Johnson, PG; Daveis, J</td>
<td>National Barley Foliar Pathogen Variety Improvement Program (NBFPVIP)</td>
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<td>Horticulture Innovation Australia</td>
<td>Department of Agriculture and Fisheries (QLD); Harvest Moon; Society of Precision Agriculture Australia; University of New England; vegetablesWA</td>
<td>Layden, I; O’Halloran, J; McPhee, JE; Robson, AJ; Shannon, J; Lancaster, R; McKay, A; Dimos, N; Wing, J; Johnston, B; Kienzle, M</td>
<td>Application of precision systems technology in vegetable production</td>
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<td>Grains Research &amp; Development Corporation</td>
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<td>Optimising farm scale returns from irrigated grains: maximising dollar return per megalitre of water</td>
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<td>University of Tasmania (TIA)</td>
<td>Leith, PB; Warman, R; Garcia Imhof, C; Adhikari, RP; Evans, KJ</td>
<td>Aspirations, Attitudes &amp; Capacity - Tasmanian Agrifood System</td>
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<td>Murray-Darling Basin Commission</td>
<td>Kumar, S</td>
<td>Membership of independent panel to assess the health of the Murray Darling Basin Authority’s Sustainable Diversion Limits accounting frameworks</td>
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<td>Landcare Research New Zealand Ltd</td>
<td>Leith, PB</td>
<td>Integration for Strategy 22 i3 and enhancing science impact</td>
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<td>Department of Agriculture and Water Resources</td>
<td>Rockpool Land &amp; Water Services Pty Ltd</td>
<td>Harrison, MT; Whitehead, J; Ara, I</td>
<td>Remote sensing informed sheep grazing of improved pastures, and integrated management, to assist Lowland Themeda Grassland and Woodland regeneration at Okehampton</td>
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<td>CRC for High Performance Soils Ltd</td>
<td>Charles Sturt University; University of Southern Queensland, University of Tasmania, Birchip Cropping Group, Central West Farming Systems, Charles Sturt University, Eyre Peninsula Agricultural Research Foundation, Mackillop Farm Management Group, Riverine Plains Inc., University of Southern Queensland, Western Australian No-Tillage Farmers Association</td>
<td>Higgins, VJ; Leith, PB; Bryant, M; Allan, C; Cockfield, G</td>
<td>Understanding Adoptability of Techniques and Practices for Improved Soil Management</td>
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<td>Federation University Australia; University of Southern Queensland</td>
<td>Hardie, MA; Cahoon, SC; Edwards, SJ; Gillespie, WJ; Manion, MJ; Kang, BH; Mohammed, CL</td>
<td>‘Smart’ soil sensors</td>
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<td>Australian Centre for International Agricultural Research</td>
<td>Centre for Forest Biotechnology and Tree Improvement, Forestry Research and Development Agency, Forestry and Agricultural Biotechnology Institute, Gadjah Mada University, Institute of Forest Tree Improvement and Biotechnology, NSW Department of Primary Industries, University of Sunshine Coast, Vietnam Academy of Forest Sciences, Vietnamese Academy of Forest Sciences, Riau Andalan Pulp &amp; Paper, Sinar Mas Group, PT Arara Abadi, PT. Musi Hutan Persada</td>
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<td>Management strategies for Acacia plantation diseases in Indonesia and Vietnam</td>
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<td>Bill &amp; Melinda Gates Foundation</td>
<td>University of Edinburgh, CSIRO</td>
<td>Harrison, MT; Herrero, M; Christie, KM; Ara, I</td>
<td>LiveGAPS 2 Understanding livestock yield gaps for poverty alleviation, food security and sustainability</td>
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<td>PhD project: The benefits and limits of diversity in agricultural systems</td>
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<td>Birchip Cropping Group; FarmLink Research Limited; Southern Farming Systems Ltd, Soils for Life</td>
<td>Powell, S; Mohammed, CL; Hardie, MA; Evans, KJ; Corkrey, SR; Bowman, JP</td>
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<td>University of Southern Queensland, Federation University, NSW DPI, Burdekin Productivity Services, West Midlands Group, Riverine Plains Inc</td>
<td>Ojeda JJ; Mohammed, CL</td>
<td>Improving the representation of soil productivity/constraints in existing DSS and modelling platforms</td>
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<td>Australia-Germany Joint Research Co-operation Scheme, Universities Australia, German Academic Exchange Service (DAAD).</td>
<td>University of Göttingen, Leibniz Centre for Agricultural Landscape Research (ZALF)</td>
<td>Ojeda JJ; Mohammed, CL</td>
<td>Towards high water productivity in agriculture based on multi-scale modelling</td>
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<td>Council on Australia Latin America Relations (COALAR) Department of Foreign Affairs and Trade, Australian Government.</td>
<td>University of Southern Queensland (Australia), University of Buenos Aires (Argentina), University of Entre Ríos (Argentina), Instituto Nacional de Investigación Agropecuaria (Uruguay), Association of Regional Consortia of Agricultural Experimentation (Argentina and Uruguay)</td>
<td>Ojeda JJ; Ara, I</td>
<td>Crop-livestock adaptation to climate change based on modelling and remote-sensing</td>
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### Food Safety and Innovation Centre

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<tr>
<td>Horticulture Innovation Australia</td>
<td>Ross, T; Bowman, JP; Stanley, RA; Bartlett, Z; Danyluk, M; Frankish, E</td>
<td>Listeria monocytogenes on Australian Rockmelons: Evaluating Technologies to Minimise Consumer Risk</td>
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<td>United States Department of Agriculture</td>
<td>Bowman, JP; Tamplin, ML</td>
<td>Agricultural research service support to ComBase</td>
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<td>McCain Foods Limited</td>
<td>Stanley, RA; Hinton, SJ; Nation, T</td>
<td>Shelf stable vegetable production</td>
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<td>Meat and Livestock Australia</td>
<td>Ross, T; Bowman, JP; Mellefont, LA; Kocharunchitt, C; Kaur, M</td>
<td>Principal research organisation in microbial ecology and physiology</td>
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<td>Skretting Australia</td>
<td>Bowman, JP</td>
<td>Atlantic salmon gut flora assessment of animals exposed to high temperatures and fed different feeds</td>
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<td>Driscoll's USA</td>
<td>Kumar, S; Tamplin, ML; Corkrey, SR; Kerslake, FL</td>
<td>Identifying opportunities to improve fruit quality in Driscoll’s Tasmanian supply chains</td>
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<td>Argyle Food Group</td>
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<td>Bioconservacion SA; DuPont; University of Newcastle</td>
<td>Wilson, MD; Stanley, RA; Wills, R</td>
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<td>Defence Science and Technology Group</td>
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<td>CSIRO/Commonwealth Scientific &amp; Industrial Research Organisation; Tassal Ltd</td>
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<td>Investigating opportunities to influence gastrointestinal microbiota in farmed Atlantic salmon and potential microbiome associated practices to improve health and productivity</td>
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<td>Dairy Food Safety Victoria</td>
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<td>Bacillus cereus risk studies in</td>
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<td>Australian Meat Processor Corporation Ltd</td>
<td>Breadmore MC; Powell S; Macka M; Guijt RM</td>
<td>Lab-on-a-chip system for microbial</td>
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<td>Australian Research Council</td>
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<td>Grant-Industrial Transformation Training Centres; Apple and Pear Australia Ltd; Australian Melon Association Inc.; Center for Produce Safety USA; Coles Supermarkets Australia Pty Ltd; Compac New Zealand; CSIRO Food &amp; Nutrition Flagship; Fresh Produce Safety Centre Ltd; Fresh Select Australia Trust; Freshcare Limited; Freshmax Australia Pty Ltd; Golden State Foods Fresh Australia; Harris Farm Markets Pty Ltd; Middlebank Consulting Group; New South Wales Office of Science and Medical Research; New Zealand Institute for Plant &amp; Food Research Limited; NSW Food Authority; One Harvest Pty Ltd; Pip Fruit New Zealand; University of California Davis; University of Sydney</td>
<td>Dr B Jones; Dr F van Ogtrop; Dr R Deaker; Dr N Wilson; Dr B Evans; Dr KY Phan-Thien; Mr M Worthington; Dr M Cole; AssocProf JP Bowman; Mr R Bennett; Dr T Suslow; Mr A Win; Mr G Fletcher; Mrs C Moir; Mrs B Fernandez-Fenaroli; Ms D Fullelove; Mr M Crouch; Ms C Hamilton-Bate; Ms C Thomas; Mr D Bradfield; Mr R Gilbertson; Ms B Walker; Mr E Jansson; Mrs S Tarrant; Mr M Field; Mr N Soich; Ms A Farrow</td>
<td>in the Fresh Produce Industry</td>
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