tia
TASMANIAN
INSTITUTE OF
AGRICULTURE

2019 HIGHLIGHTS

UNIVERSITY of TASMANIA | Tasmanian Government

TIA is a joint venture of the University of Tasmania and the Tasmanian Government

ABOUT TIA

The Tasmanian Institute of Agriculture (TIA) is a research institute at the University of Tasmania focussing 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.

130+
SCIENTISTS AND TECHNICAL EXPERTS

TOP 50
UNIVERSITY FOR AGRICULTURAL SCIENCE (ARWU 2019)

100+
POSTGRADUATE RESEARCH CANDIDATES

HIGHEST
POSSIBLE RANKINGS FOR ENGAGEMENT AND IMPACT (ARC ENGAGEMENT AND IMPACT ASSESSMENT 2018-19)

TOP 100
UNIVERSITY FOR AGRICULTURE (QS RANKINGS 2019)

Front page image: TIA Plant Physiologist Professor Sergey Shabala was named "leading researcher in the world in the field of botany" for his work to make sure we have enough food in the future.

CONTENTS

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.

PROFESSOR MICHAEL ROSE
INTERIM DIRECTOR, TASMANIAN INSTITUTE OF AGRICULTURE

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

MESSAGE FROM TIA'S ADVISORY BOARD

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

HORTICULTURE CENTRE

Innovation award for TIA wine research

Project: A new tool for in-line and real-time grape juice assessments

Funding body: Australian Department of Agriculture and Water Resources

Research team: Longo R; Kerslake FL; Dambergs R

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

Project: Taking grapevine yield forecasting into the digital age

Funding body: Australian Department of Agriculture and Water Resources

Industry partners: Shaw-Smith Vineyard, Lastek

Research team: Jones, JE; Rodemann, T; Close, DC; Dambergs, RG

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

Project: Integrated Pest Management of Redberry Mite on Blackberries

Funding body: Hort Innovation

Industry partners: Tasmanian Department of Primary Industries, Parks, Water & Environment; IPM Technologies; Raspberries & Blackberries Australia

Research team: Quarrell, SR; Allen, GR; Buntain, M; Davies, J; Horne, P; Eccles, J

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.

Two predatory mites were released on commercial farms (open field and polytunnel). *Typhlodromalus lailae* had a positive impact on reducing redberry mite numbers.

It was confirmed that Redberry Mite is directly associated with redberry disease symptoms in wild blackberries.

Targeted nitrogen for cherries

Project: Optimising nutrient management for improved productivity and fruit quality in cherries

Funding body: Department of Agriculture, Water & the Environment, Hort Innovation

Industry partners: Cherry Growers Australia, Reid Fruits, Wandin Valley Orchards

Research team: Swarts ND; Quin, P; Macha, N

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

Project: Expanding crop protection options for control of blueberry rust

Funding body: Tasmanian Government “Agricultural Innovation Fund”

Industry partners: Staphyt Australasia, NSW Dept. of Primary Industry

Research team: Barry, KM; Evans, KJ; Buntain, M

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

Project: Precision seeding benefits for processing pea productions

Funding body: Hort Innovation

Industry partners: Simplot Australia

Research team: Gracie, AJ; Hardman, P; Ives, SW; Hingston, LH; Hinton, SJ; Boersma, M; Tubb, J

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

Project: Field and laboratory trials for understanding disease risk in potatoes

Funding body: Hort Innovation

Industry partners: South Australian Research and Development Institute

Research team: Wilson, CR; Rettke, M; Tegg, RS; Beveridge, PW

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

Project: Essential Oils of Kunzea Ecotypes

Funding body: Essential Oils of Tasmania

Industry partners: Essential Oils of Tasmania

Research team: Garland, SM (PhD candidate Chanjoo Park)

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

Project: Developing a risk management system for systemic downy mildew of poppy

Funding body: ARC Linkage Project

Industry partners: Tasmanian Alkaloids, SunPharma, Department of Primary Industries, Water & Environment, Poppy Growers Tasmania

Research team: Scott, JB; Wilson, CR; Thangavel, T (PhD candidates Dharushana Thanabalasingam and Krithika Krishnamoorthy)

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.

DAIRY, GRAINS AND GRAZING CENTRE

Preparing farms for a hot future

Project: The Effects of Extreme Climatic Events on the Productivity and Profitability of Dairy Farms

Funding body: This PhD project is funded by Dairy Australia, the Australian Sustainable Agriculture Scholarship and the Australian Department of Agriculture, Fisheries and Forestry as part of the Carbon Farming Futures Filling the Research Gap Program.

Research team: TIA PhD candidate Janine Chang-Fung-Martel

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

Project: Tasmanian Dairy Farm Monitor Project

Funding body: Dairy Australia

Research team: Irvine, LD; Flight, S; Jones, S; Hall, AF

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 focussed 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.

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

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.

TIA research among best in the world

"Leading researcher in the world in the field of botany".

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

Project: Comparison of commercial dryland and irrigated sheep production systems for the effective management of weaned Merino wethers

Funding body: This project is supported by a scholarship from the Australian Wool Education Trust (Woolwise), and the University of Tasmania.

Industry partners: Stockman Stud

Research team: TIA Honours student, Lauren Rowlands. Supervised by Dr Joanna Jones and Mr Andrew Bailey (TIA). Industry advice from Dr Bruce Jackson (consultant veterinarian) and Mr Andrew McShane (Stockman Stud) and Dr Andrew Nicholson (Montrose Vets).

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

Project: Pastures in Schools

Funding body: University of Tasmania Regional Incentives Grant

Industry partners: Department of Education, Tasmanian Agricultural Education Network

Research team: Smith, R; Rawnsley, R; Irvine, L; Martin, G

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.

AGRICULTURAL
SYSTEMS CENTRE

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.

Recommendations

Key: Industry, Research, Government, Community

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

Acknowledgment: This table of recommendations is an extract from the TasAgFuture summary report, which is available on TIA's website.

Assisting drought affected farmers

Project: Drought Recovery

Funding body: Tasmanian Government

Research team: Field, B; Ball, P; Hinton, S; Harrison, M

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

Project: Cooperative Research Centre for High Performance Soils (Soil CRC)

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.

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:

- Smelling Soil – led by TIA's Dr Shane Powell with collaborations from Birchip Cropping Group, FarmLink, Southern Farming Systems and Soils for Life.
- 'Smart' soil sensors – led by TIA's Dr Marcus Hardie 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

ARC Training Centre for Innovative Horticultural Products

Project: ARC Training Centre for Innovative Horticultural Products

Funding body: Australian Research Council (ARC) Industrial Transformation Research Program

Industry Partners: Woolworths

Research team: Ross T; Stanley RA; Close DC; Tamplin ML; Meinke HB; O'Cass AG; Gracie AJ; Fei J; Wilson CR

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.

Extending shelf life of cherries

Project: Extending shelf life of cherries

Funding body: Australian Research Council (ARC) Industrial Transformation Research Program, Woolworths & University of Tasmania

Industry Partners: Hansen Orchards, NSW Department of Primary Industries

Research team: PhD project by Claire McCrory

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

Project: Reducing potato greening

Funding body: Australian Research Council (ARC) Industrial Transformation Research Program, Woolworths & University of Tasmania

Industry Partners: Daly Gourmet Potatoes & Zerella Fresh

Research team: PhD project by Sabine Tanios

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

Project: Greenhouse horticultural production

Funding body: Australian Research Council (ARC) Industrial Transformation Research Program, Woolworths & University of Tasmania

Industry Partners: Wageningen University (Netherlands)

Research team: PhD project by Dianfan Zhou

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.

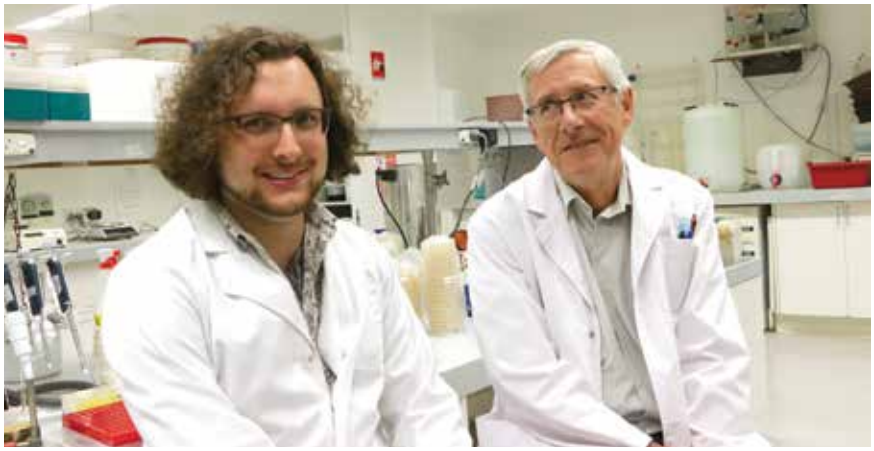
Ideal temperature for life

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.

GLOBAL IMPACT

Research Hub for Traditional Chinese Herbs

Project: Research Hub for Traditional Chinese Herbs

Funding body: W & E Health Pty Ltd (owned and managed by AEMG)

Research team: Close DC; Boersma M; Garland SM

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 pilosla* (Poor Man's Ginseng), *Astralagus 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."

LEARNING AND TEACHING

Masterclass in Horticultural Business

Project: Global masterclass in horticulture

Funding body: Hort Innovation

Partners: The Masterclass was developed with expertise from the University of Tasmania, Wageningen Academy in the Netherlands and New Zealand's Lincoln University.

Research team: Gracie AJ; Close DC; Boersma M; Acuna TL; Bigsby H

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."

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.

Hands-on experiences for students

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.

FINANCIAL REPORT

TASMANIAN INSTITUTE OF AGRICULTURE (TIA)

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.

Michael Rose

Professor Michael Rose
Interim Director
Tasmanian Institute of Agriculture

16 April 2020

30/04/20.

Jo Wilsmore
Chief Financial Officer,
Financial Services
University of Tasmania

2019 TIA RESEARCH PROJECTS

Funding Body	Industry Partners	Research Team	Title of Project
Horticulture Centre			
Sony Imaging Products and Solutions Inc		Boersma, M; Harwin, SJ	Sony Proof of Concept II
InSense Pty Ltd	Wandin Valley Farms	Bound, SA; Close, DC	Cherry cracking study
Horticulture Innovation Australia	Fruit Growers Tasmania Inc, Biosecurity Tasmania, Lenswood Cold Stores Cooperative Society Limited, SA SA Department of Primary Industries and Regions (SARDI), Biosecurity Plant Division, DAWR	Bound, SA; Buntain, M; Cover, I; Tarbath, M; Westmore, G; Crisp, P; James, P	Pilot Sterile Codling Moth Releases for the Apple industry
Horticulture Innovation Australia		Gill, WM; Close, DC	Mushroom pest and disease management and research services
Horticulture Innovation Australia	Applied Horticultural Research Pty Ltd; Queensland Department of Agriculture & Fisheries	Wilson, CR; Tegg, RS; Montagu, K; Duff, J	Optimising cover crops for the Australian vegetable industry
Horticulture Innovation Australia	Simplot Australia	Gracie, AJ; Hardman, P; Ives, SW; Hingston, LH; Hinton, SJ; Boersma, M; Tubb, J	Precision seeding benefits for processing pea production
Horticulture Innovation Australia	South Australian Research and Development Institute	Wilson, CR; Rettke, M; Tegg, RS; Beveridge, PW	Field and laboratory trials for understanding disease risk in potatoes
Horticulture Innovation Australia	South Pacific Seeds, Hansen Orchards, Fruit Growers Tasmania, Hansen Orchards, Reid Fruits, Metcalf Biocontrol	Close, DC; Gracie, AJ; Boersma, M, Barry, K; Glen, M; McPhee, J; Doyle, R; Bound, S; Allen, G; Quarrell, S	National PhD Program: Horticulture
Horticulture Innovation Australia	AgVictoria (DEDJTR), Fruit Growers Tas, JC Evans Orchards	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	An integrated pest, disease and weed management program for the Australian apple and pear industry
Horticulture Innovation Australia	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	Wilson, CR; Gambley, C; Constable, F; Tran Nguyen, L; Coutts, B	Area-wide management of vegetable diseases: viruses and bacteria
Department of Primary Industries, Parks, Water & Environment		Tegg, RS; Wilson, CR; Powell, S; Doyle, RB	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

Funding Body	Industry Partners	Research Team	Title of Project
Horticulture Innovation Australia	Plant and Food Research, New Zealand	Wilson, CR; Tegg, RS; Eyles, A; Baldwin, S	Mechanisms and manipulation of resistance to powdery scab in potato roots
Horticulture Innovation Australia	Lincoln University, Wageningen University	Gracie, AJ; Close, DC; Boersma, M; Acuna, TL; Bigsby, H	Global master class in horticulture
Department of Agriculture	Cotton Research and Development Corporation; Horticulture Innovation Australia, Reid Fruits, Wandin Valley Farms	Swarts, ND	Optimising nutrient management for improved productivity and fruit quality in cherries
Horticulture Innovation Australia	Reid Fruits, Lucaston Park Orchards	Swarts, ND; Close, DC; Hardie, MA	Improved productivity and profitability for the Australian apple and pear industry
Horticulture Innovation Australia	Department of Primary Industries, Parks, Water & Environment; IPM Technologies; Raspberries & Blackberries Australia, Costa Group, Driscoll's Aust, YV Fresh, Blue Hills Berry Farm, Fairview Hill Berry Farm	Quarrell, SR; Allen, GR; Buntain, M; Daveis, J; Horne, P; Eccles, J	Integrated Pest Management of redberry mite, Acalitus essigi, on blackberries
Horticulture Innovation Australia	Costa Group	Close, DC; Measham, PF	Druplet Disorder in Rubus
Horticulture Innovation Australia	Botanical Resources Australia Pty Ltd	Scott, JB; Pearce, T	Integrated disease management in pyrethrum
Westpac Banking Corporation		Jones, JE; Swarts, ND	Mapping Australian cider uniqueness for the production of high quality and consistent craft cider
Wine Australia	Hill-Smith Family Vineyards, and numerous Australian Pinot Noir producers.	Kerslake, FL; Lewis, GK; Close, DC; Merry, AM; Dambergs, R; Doyle, RB; Mirowski, LT; Turner, P; Rose, L; Wadewitz, A; Sharpe, S; Smith, P	Pinot Noir provenance: Australian benchmarking to support growing, making, perception of quality, and marketing to add value to the Pinot Noir supply chain
Wine Australia	Australian Wine Research Institute, Hill-Smith Family Vineyards, University of Adelaide, Josef Chromy Wines, Apogee Tasmania	Kerslake, FL; Close, DC; Dambergs, R; Merry, AM; Wilkinson, K; Smith, P; Goemann, K; Rodemann, T	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
Wine Australia	Hill-Smith Family Vineyards	Jones, JE; Swarts, ND; Kerslake, FL	Improving grapevine quality and yield through improved vine nutrition and pruning
Wine Australia	Wine Australia, Lastek, Shaw and Smith, Hill-Smith Family Vineyards	Kerslake, FL; Close, DC	Novel approaches to autolysis manipulation and improving efficiencies in sparkling wine production
Department of Agriculture	Hill-Smith Family Vineyards, Wine Australia, Lastek, Shaw + Smith	Jones, JE; Rodemann, T; Close, DC; Dambergs, RG	Taking grapevine yield forecasting into the digital age

Funding Body	Industry Partners	Research Team	Title of Project
Australian Research Council		Wilson, CR; Nichols, DS	Manipulating plant root exudation for soil-borne disease control
Australian Research Council	Department of Primary Industries, Parks, Water & Environment; Poppy Growers Tasmania Inc; SunPharma Australia; Tasmanian Alkaloids Pty Ltd; United States Department of Agriculture	Scott, JB; Wilson, CR; Gent, D	Development of a risk management system for systemic downy mildew of poppy
Advanced Agricultural Systems Pty Ltd		Bound, SA	Developing Agri-tech solutions for the Australian apple Industry
Botanical Resources Australia Pty Ltd		Pearce, T; Pilkington, S; Scott, JB	Investigating the genetics of pyrethrum vernalisation
Botanical Resources Australia Pty Ltd		Garland, SM; Gracie, AJ; Close, DC	Accumulation of STLs in pyrethrum extract
Cooperative Research Centre for Honey Bee Products; Tasmanian Beekeepers	Blue Hills Honey	Garland, SM; Close, DC; O'Grady, Anthony	The bioactivity and stability of the honey from Leatherwood (Eucryphia lucida)
Fruit Growers Tasmania Inc		Barry, KM; Pearce, T; Oliver, GS	Resistance of Botrytis cinerea to selected fungicides
Diemen Pepper		Barry, KM; Wilson, MD; Brodribb, TJ; Cahill, D	Developing tools to screen native pepper for resistance to dieback and tolerance to drought
Department of Primary Industries, Parks, Water & Environment	Hill-Smith Family Vineyards, Brown Family Wine Group	Jones, JE; Kerslake, FL; Dambergs, RG; Close, DC; Swarts, ND; Merry, AM	Stabilising and increasing yield and quality in Tasmanian vineyards
Wine Australia	CSIRO, SARDI, numerous Australian wine producers	Harris, R; Hayman, P; Remenyi, TA; Kerslake, FL; O'Kane, TJ; Katzfey, J; Thomas, D; Petrie, P; Sadras, V; Krstic, M; Bindoff, NL; Close, DC; White, CJ; Corney, SP	Australia's wine future - adapting to short-term climate variability and long-term climate change
Wine Australia, CSIRO	Brown Family Wine Group, Penley Estate, See Saw Wines, NSW DPI	Evans KJ; Kumar S	Towards Differential Management to Supply More Fruit at Desired Price Point
Incitec Pivot Limited		Boersma M	Influence of nitrification inhibitors on processing potato yield
Department of Agriculture and Water Resources		Longo R; Kerslake FL; Dambergs R	A new tool for in-line and real-time grape juice assessments
W&E Health (AEMG)		Close DC; Boersma M; Garland SM	Research Hub for Traditional Chinese Herbs
Tasmanian Botanics	Tasmanian Botanics	Close, DC; Garland, SM	Developing Medicinal Cannabis Industry
Martha Jane Medical	Martha Jane Medical	Garland SM; Close DC	Developing the Horticulture of Medicinal Cannabis
Tasmanian Institute of Agriculture	Meadowbank Wines, Home Hill Wines, Jansz, Milton Wines, Gala Estate Wines	Jones, JE; Swarts, ND; Smith, J	Informing smoke taint decision support for the Tasmanian Wine Industry
Horticulture Innovation Australia	Department of Agriculture and Water Resources, Hansen Orchards, Reid Fruits, Seed Purity, South Pacific Seeds Pty Ltd	Gracie, AJ; Allen, GR; Close, DC; Quarrell, SR; Jones, JE	Novel technologies and practises for the optimisation of pollination within protected cropping environments
Australian Research Council: Grant-Linkage	Western Sydney University, Botanical Resources Australia Pty Ltd	Brodribb, TJ; Gracie, AJ; Groom, T; Choat, B	Finding damage thresholds in pyrethrum to optimise crop profitability

Funding Body	Industry Partners	Research Team	Title of Project
Royal Tasmanian Botanical Gardens		Swarts ND	DNA sequence analysis of mycorrhizal fungi
Tasmanian Institute of Agriculture		Swarts, ND; Jones, JE; Kerslake, FL; Adhikari, R	Developing consolidated strategy for cider apple research
Dairy, Grains and Grazing Centre			
Dairy Australia Limited		Christie, KM	Australian Dairy Carbon Calculator
Dairy Australia Limited		Hills, JL; McLaren, D; Flight, S; Rawnsley, RP	Beyond Water Smart: Advancing Dairy Irrigation System Performance
Dairy Australia Limited	AW Howard Memorial Trust Inc	Rawnsley, RP; Pembleton, KG; Irvine, LD; Hills, JL; Turner, LR; Freeman, MJ; Kilpatrick, SI	Dairy on PAR
Dairy Australia Limited		Irvine, LD; Flight, S; Jones, S; Hall, AF	Tasmanian Dairy Farm Monitor Project 2017-2019
Dairy Australia Limited		Rawnsley, RP; Hills, JL; Raedts, PJM; Irvine, LD; Turner, LR; Langworthy, A; Jones, S; Flight, S; Gee, CM; Hall, AF (AI); Cuin, TA (AI); McLaren, D (AI)	Dairy HIGH - High Integrity Grass-fed Herds
Department of Agriculture	Cotton Research and Development Corporation; Dairy Australia Limited; University of Southern Queensland	Hills, JL; McLaren, D; Flight, S; Rawnsley, RP; Jones, S; Hardie, MA; Langworthy, A	Smarter Irrigation for Profit - Phase 2
Department of Agriculture	Agersens Pty Ltd; Australian Pork Limited; Australian Wool Innovation Limited; CSIRO-Commonwealth Scientific & Industrial Research Organisation; Dairy Australia Limited; Meat and Livestock Australia; University of Melbourne; University of New England; University of Sydney	Tomkins, N; Swan, P; D'Souza, D; Henry, D; Rawnsley, RP; Hills, JL; Freeman, MJ; Verdon, MJ; Langworthy, A	Enhancing the profitability and productivity of livestock farming through virtual herding technology
Department of Agriculture	Cotton Research and Development Corporation; University of Melbourne	Rawnsley, RP; Christie, KM; Harrison, MT; Eckard, R	More Profit from Nitrogen: enhancing the nutrient use efficiency of intensive cropping and pasture systems
Meat and Livestock Australia: Livestock Productivity Partnership	University of Melbourne, CSIRO	Harrison MT; Turner LR; Christie KM; Ball P	NEXUS project: exploring profitable, sustainable livestock businesses in an increasingly variable climate
Grains Research & Development Corporation	Murdoch University	Harrison MT; Zhou, M; Johnson, PG	Manipulating barley phenology to maximise yield potential
Tasmanian Institute of Agriculture		Field B, Harrison MT, Irvine L, Hinton S	TIA Drought Recovery Project
Department of Primary Industries, Parks, Water & Environment		Turner, LR; Ball, PD; Snare, TA; Leith, PB	Pastures and Livestock Productivity Project - Phase Two
Southern Regional Natural Resource Management Association Inc		Smith, RW	Evaluation of perennial legume options for the East Coast of Tasmania
Grains Research & Development Corporation	Department of Economic Development, Jobs, Transport and Resources	Zhou, M; Johnson, PG	Effective control of barley yellow dwarf virus (BYDV) in wheat
PGG WRIGHTSON SEEDS (AUSTRALIA) PTY LTD		Smith, RW	Effectiveness of novel endophytes on persistence and production of perennial ryegrass

Funding Body	Industry Partners	Research Team	Title of Project
Martha Jane Medical		Acuna, TL	Production and quality of industrial hemp (Cannabis sativa) in response to water regime
Qatar National Science Foundation	University of Qatar	Shabala, SN	Oxidative stress signalling in halophytes
Grains Research & Development Corporation		Riffkin, P; Acuna, TL; Merry, AM; Lovell, R; Howard, RC; Christy, B; Clough, A; Richards, R	Optimising the yield and economic potential of high input cropping systems in the HRZ
Grains Research & Development Corporation		Li, C; Zhou, M; Broughton, S; Zhang, X	Improved Adaptation of Barley to Acid Soils
Australian Research Council	University of Wuerzburg	Shabala, SN; Hedrich, Rainer	Stomata functioning in halophytes for improved plant stress tolerance
Department of Industry and Science		Shabala, SN; Meinke, HB; Zhou, M; Shabala, L; Chen, ZH	Developing Salt Tolerant Rice for Food Security in India and Australia
Department of State Growth (Tas)		Penrose, B; Parbhakar-Fox, AK; Carver, SS	Examining pollutant linkage chains at the Royal George Tailings, Tasmania
Seed Force Pty Ltd:		Zhou, M	Barley waterlogging tolerance improvement program
Grains Research & Development Corporation		Zhou, M; Johnson, P; Fan, Y	Introgressing waterlogging tolerance gene to commercial barley varieties
Agricultural Systems Centre			
Grains Research & Development Corporation	Department of Economic Development, Jobs, Transport and Resources	Armstrong, R; Wilhelm, N; Davenport, D; Sale, P; Tavakkoli, E; Dean, GJ; McPhee, JE; Hardie, MA	Understanding the amelioration processes of the subsoil application of amendments in the Southern Region
Australian Centre for International Agricultural Research	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	Ives, SW; Bonney, L; Eversole, R; Adhikari, RP; Nicetic, O; Cuong, VC; Huyen, LTT; Hung, PV; Quang, NH; Lan, DD; Xuan, CTT; Duteurtre, G	Intensification of beef cattle production in upland cropping systems in North West Vietnam
Australian Centre for International Agricultural Research	University of Southern Queensland	McPhee, JE; Melland, A; Douangsavanh, L; Boupha, BD; Southamavong, F	Integrating soil and water management in vegetable production in Lao PDR and Cambodia
Grains Research & Development Corporation		Dean, GJ	National Variety Trials (NVT)
Grains Research & Development Corporation	Queensland Department of Agriculture & Fisheries	Linde, C; Platz, G; Gupta, S; McLean, M; Milgate, A; Zhou, M; Johnson, PG; Daveis, J	National Barley Foliar Pathogen Variety Improvement Program (NBFPVIP)
Horticulture Innovation Australia	Department of Agriculture and Fisheries (QLD); Harvest Moon;Society of Precision Agriculture Australia; University of New England; vegetablesWA	Layden, I; O'Halloran, J; McPhee, JE; Robson, AJ; Shannon, J; Lancaster, R; McKay, A; Dimos, N; Wing, J; Johnston, B; Kienzle, M	Application of precision systems technology in vegetable production

Funding Body	Industry Partners	Research Team	Title of Project
Grains Research & Development Corporation		Harrison, MT; Ara, I; Phelan, DC	Optimising farm scale returns from irrigated grains: maximising dollar return per megalitre of water
University of Tasmania (TIA)		Leith, PB; Warman, R; Garcia Imhof, C; Adhikari, RP; Evans, KJ	Aspirations, Attitudes & Capacity - Tasmanian Agrifood System
Murray-Darling Basin Commission		Kumar, S	Membership of independent panel to assess the health of the Murray Darling Basin Authority's Sustainable Diversion Limits accounting frameworks
Landcare Research New Zealand Ltd		Leith, PB	Integration for Strategy 22 i3 and enhancing science impact
Department of Agriculture and Water Resources	Rockpool Land & Water Services Pty Ltd	Harrison, MT; Whitehead, J; Ara, I	Remote sensing informed sheep grazing of improved pastures, and integrated management, to assist Lowland Themeda Grassland and Woodland regeneration at Okehampton
CRC for High Performance Soils Ltd	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	Higgins, VJ; Leith, PB; Bryant, M; Allan, C; Cockfield, G	Understanding Adoptability of Techniques and Practices for Improved Soil Management
CRC for High Performance Soils Ltd	Federation University Australia; University of Southern Queensland	Hardie, MA; Cahoon, SC; Edwards, SJ; Gillespie, WJ; Manion, MJ; Kang, BH; Mohammed, CL	'Smart' soil sensors
Australian Centre for International Agricultural Research	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 & Paper, Sinar Mas Group, PT Arara Abadi, PT. Musi Hutan Persada	Mohammed, CL; Glen, M	Management strategies for Acacia plantation diseases in Indonesia and Vietnam
Bill & Melinda Gates Foundation	University of Edinburgh, CSIRO	Harrison, MT; Herrero, M; Christie, KM; Ara, I	LiveGAPS 2 Understanding livestock yield gaps for poverty alleviation, food security and sustainability

Funding Body	Industry Partners	Research Team	Title of Project
CSIRO-Commonwealth Scientific & Industrial Research Organisation		Ojeda, JJ; Leith, PB; Waha, K	PhD project: The benefits and limits of diversity in agricultural systems
CRC for High Performance Soils Ltd	Birchip Cropping Group; FarmLink Research Limited; Southern Farming Systems Ltd, Soils for Life	Powell, S; Mohammed, CL; Hardie, MA; Evans, KJ; Corkrey, SR; Bowman, JP	Smelling soil
CRC for High Performance Soils Ltd	University of Southern Queensland, Federation University, NSW DPI, Burdekin Productivity Services, West Midlands Group, Riverine Plains Inc	Ojeda JJ; Mohammed, CL	Improving the representation of soil productivity/constraints in existing DSS and modelling platforms
Australia-Germany Joint Research Co-operation Scheme, Universities Australia, German Academic Exchange Service (DAAD).	University of Göttingen, Leibniz Centre for Agricultural Landscape Research (ZALF)	Ojeda JJ; Mohammed, CL	Towards high water productivity in agriculture based on multi-scale modelling
Council on Australia Latin America Relations (COALAR) Department of Foreign Affairs and Trade, Australian Government.	University of Southern Queensland (Australia), University of Buenos Aires (Argentina), University of Entre Rios (Argentina), Instituto Nacional de Investigación Agropecuaria (Uruguay), Association of Regional Consortiums of Agricultural Experimentation (Argentina and Uruguay)	Ojeda JJ; Ara, I	Crop-livestock adaptation to climate change based on modelling and remote-sensing
Food Safety and Innovation Centre			
Horticulture Innovation Australia		Ross, T; Bowman, JP; Stanley, RA; Bartlett, Z; Danyluk, M; Frankish, E	Listeria monocytogenes on Australian Rockmelons: Evaluating Technologies to Minimise Consumer Risk
United States Department of Agriculture		Bowman, JP; Tamplin, ML	Agricultural research service support to ComBase
McCain Foods Limited		Stanley, RA; Hinton, SJ; Nation, T	Shelf stable vegetable production
Meat and Livestock Australia		Ross, T; Bowman, JP; Mellefont, LA; Kocharunchitt, C; Kaur, M	Principal research organisation in microbial ecology and physiology
Skretting Australia		Bowman, JP	Atlantic salmon gut flora assessment of animals exposed to high temperatures and fed different feeds
Driscolls USA		Kumar, S; Tamplin, ML; Corkrey, SR; Kerslake, FL	Identifying opportunities to improve fruit quality in Driscolls Tasmanian supply chains

Funding Body	Industry Partners	Research Team	Title of Project
Argyle Food Group		Kocharunchitt, C; Ross, T	Evaluation and predictive modelling of shelf life of frozen beef products in different packaging systems
Bioconservacion SA; DuPont; University of Newcastle		Wilson, MD; Stanley, RA; Wills, R	Ethylene absorption technology to extend the shelf-life of fresh horticultural produce
Defence Science and Technology Group		Nation, T; Hinton, SJ	CFI Agreement -Commercial Co-investment Establishment Program, Phase 1
CSIRO-Commonwealth Scientific & Industrial Research Organisation; Tassal Ltd		Bowman, JP; Powell, S	Investigating opportunities to influence gastrointestinal microbiota in farmed Atlantic salmon and potential microbiome associated practices to improve health and productivity
Dairy Food Safety Victoria		Ross, T; Bartlett, Z	Bacillus cereus risk studies in dairy products (Phase 2)
Australian Meat Processor Corporation Ltd		Breadmore MC; Powell S; Macka M; Guijt RM	Lab-on-a-chip system for microbial contamination
Australian Research Council Industrial Transformation Research Program	Woolworths	Ross T; Stanley RA; Close DC; Tamplin ML; Meinke HB; O'Cass AG; Gracie AJ; Fei J; Wilson CR	ARC Industrial Transformation Training Centre for Innovative Horticultural Products: Adding value to horticulture value
Australian Research Council: 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 & 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 & Food Research Limited; NSW Food Authority; One Harvest Pty Ltd; Pip Fruit New Zealand; University of California Davis; University of Sydney		AssocProf R McConchie; AssocProf D Carter; Dr T Bell; 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	ARC Training Centre for Food Safety in the Fresh Produce Industry

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** This author is not affiliated with the University of Tasmania.*

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TASMANIAN
INSTITUTE OF
AGRICULTURE

CONTACT US

+61 3 6226 6368

tia.enquiries@utas.edu.au

utas.edu.au/tia

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