UNIVERSITY of TASMANIA

TIA

Tasmanian Institute of Agriculture

2022 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 specialised institute at the University of Tasmania with the mandate to progress the agricultural industry through the provision of industry relevant research and development, encouraging the industry adoption of findings, and through agricultural education.

TIA was established in 1997 as a joint venture between the University of Tasmania and the Tasmanian Government. Our vision is to enable Tasmanian food producers and processors to accelerate primary sector productivity while maintaining and improving Tasmania's land and water quality for future generations.

Our researchers, educators, technical and professional staff work closely with partners across the agriculture and food value chain at a local, national, and international level. This ensures that TIA's research and education priorities are responsive to industry needs, contemporary challenges, and future opportunities.

TIA is home to the University of Tasmania's agricultural teaching discipline and has responsibility for undergraduate education and the training of higher degree research candidates who are vital to the industry's future prosperity.

◂ Cover: TIA staff with irrigation equipment. Photo: Peter W Allen

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Message From TIA's Director

It is my very great pleasure to write the foreword for the 2022 edition of the TIA Highlights.

During 2022 we worked in partnership with industry to progress established projects and embark upon many significant new endeavours under our three key themes of research, industry development and education.

All these activities aim to support TIA's mission of enabling the productivity of Tasmania's agriculture and food sectors while maintaining and improving our land and water quality for future generations.

A particular highlight for me was officially opening the new 50–bay rotary dairy at TIA's Dairy Research Facility in July 2022 – which was specifically designed to enable research. This was part of a $7.8 million joint–investment from the Tasmanian Government and the University of Tasmania to support the future success of TIA's research farms in the state's North–West.

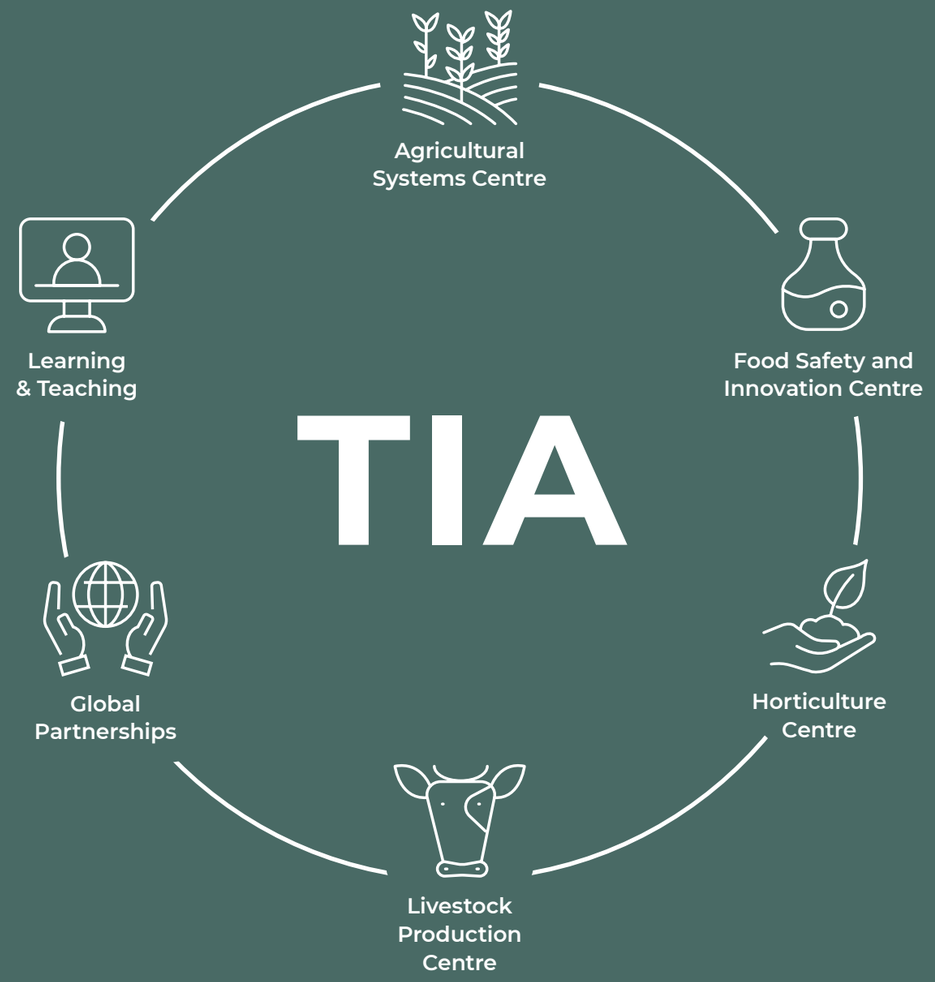
Other highlights include:

1. ***Creating sustainable economic benefit for the agri–food industry of Tasmania:*** TIA's activities support the Tasmanian Government's AgriVision 2050 target for growing the Tasmanian agricultural industry to $10 billion by 2050. As an example, in 2022 we began a $6.4 million research partnership with Horticulture Innovation Australia and industry partners, to enable the growth of cool climate horticulture in Tasmania by 20 per cent over the next five years. Another project will investigate expanding crop protection options for the control of blueberry rust. Separately, our post farm–gate food researchers are investigating novel approaches for shelf–life extension of vacuum–packed chilled sheep meats.
2. ***Building resilience to climate change and limiting emissions from agriculture and food production***: Climate change is with us, and it is likely that we will see more severe and more frequent extreme climate events in the future. Amongst many projects that will build resilience and mitigation for Tasmania, we are investigating the on–farm adoption of low emissions feed technologies for improved profitability of the livestock sector. In addition, we are working to beat smoke taint with sparkling wine, while our researchers are developing decision support systems for the management of potato diseases in a climate changed world.
3. ***Exciting young people about the opportunities of a career in agriculture and food:*** in 2021, TIA hosted the Agriculture Training and Education for the Future Forum which recommended the establishment of the Tasmanian Agricultural Education and Training Partnership. This Partnership was launched in 2022 with representatives from the education and agricultural industry sectors of Tasmania. The Partnership is considering ways in which we can increase the number of young people considering a career in agriculture.
4. ***Enhancing the experience of students:*** Students studying agricultural science at the University of Tasmania are fortunate to be supported by up to $250,000 worth of scholarships that have been donated by benefactors across Tasmania – and I was thrilled to award scholarships to 11 students in 2022. TIA held the annual Feed Your Mind, Feed the World three–day camp in December for students wanting to learn more about the agricultural industry. It included visits to a range of farming enterprises as well as to TIA's research farms.
5. ***Partnerships that leverage and complement our research and teaching strengths:*** One example of the partnerships we have is with the Australian Pastures Genebank – the first national pasture and forage genetic resource centre. The Genebank acquires, conserves, and distributes plant genetic material as the basis for enhanced agricultural productivity and environmental preservation across Australia.
6. ***Better connecting with Industry:*** Last year saw an extension of the research agreement with Dairy Australia, Dairy HIGH 2 (High Intensity Grass Fed Herds) to evaluate the impacts of pasture type and synthetic nitrogen fertilisation application rates on the productivity of irrigated grazing–based dairy farming systems. This is a great example of how we have developed our research programs in partnership with the farming industry to ensure that findings are relevant and are ready for adoption.

I hope that you enjoy reading about the highlights for TIA in 2022, and we look forward to working with our partners to build on these successes for 2023 and beyond.

TIA Director
Professor Michael Rose

Organisational structure



Message from the Minister

It has been another successful year for Tasmania's agriculture sector and our state continues to punch above its weight.

We are forging ahead towards our ambitious target to grow the annual farmgate value of the agricultural sector to $10 billion by 2050. The latest Tasmanian Agri–Food ScoreCard shows that we are making excellent progress towards this goal, with a 9 per cent increase in value to $2.34 billion in 2020 – 2021.

Fostering world–leading cool climate agricultural research, development and extension (RD&E) is critical to the success of this growth strategy.

Our ongoing partnership with the Tasmanian Institute of Agriculture (TIA) is at the heart of our agricultural RD&E approach. Since this partnership was established in 1997 as a Joint Venture between the Tasmanian Government and the University of Tasmania, TIA has delivered world–class agricultural RD&E and education that helps to improve on–farm productivity and ensure the long–term sustainability of the industry in the state.

It has been a privilege as the Minister for Primary Industries and Water to see the upgrades to TIA's research farms at Elliott and Forthside which have been a particularly exciting aspect of our partnership with TIA during 2022. These improvements are part of the Tasmanian Government's Accelerating Agriculture $7 million investment to upgrade research farms and will help establish the north west of Tasmania as a region of excellence for applied agricultural research and demonstration to industry.

We were able to launch the TIA Joint Venture Biosecurity Operational Plan during the 2022 Agfest. For many years, TIA has made an important contribution to Tasmania's biosecurity system which has helped protect our primary industries and environment. This Plan formalises how TIA and the Government will work cooperatively to prepare for and manage biosecurity threats.

Innovation is vital to the competitiveness of our agricultural sector – whether it is technology–adoption across the value chain, identifying creative solutions to problems, value–adding, or promoting new and sustainable processes, practices, and systems.

Our partnership with TIA is complemented by our targeted agricultural RD&E grant programs including the Agricultural Development Fund and Agricultural Innovation Fund. So far, we have invested $3.8 million in exciting RD&E projects through these funds, including $1.9 million towards projects being delivered by TIA.

I would like to thank Professor Mike Rose for his leadership in 2022 as Director of TIA, and recognise the work of all researchers, technical staff and professional staff who contribute to the important work of TIA. The TIA team is to be commended for their outstanding achievements, research strengths and commitment to industry partnership. The work is evidence of the capacity we have right here in Tasmania for world–class RD&E.

Hon Jo Palmer MLC
Minister for Primary Industries and Water

Message from TIA's Advisory Board

It was my pleasure to serve as the Board's Acting Chair during 2022 and to work with members to provide advice on the strategic direction of agricultural research, development and extension activities undertaken by TIA.

With implementation of the actions identified in the Growing Tasmanian Agriculture: Research, Development and Extension for 2050 White Paper well underway, the Board has been considering new strategies to broaden TIA's research impact and engagement with industry, and the role of TIA in informing government policy to support evidence–based decision making.

The Board's four industry members continued to act in liaison roles with TIA Centre Leaders over the past 12 months, providing an avenue for industry input and strengthening TIA's industry relationship across the agriculture and food value chain.

Industry members have also served on the assessment panel for two rounds of the Tasmanian Government's Agricultural Innovation Fund and Agricultural Development Fund, and I would like to acknowledge the additional work this has involved.

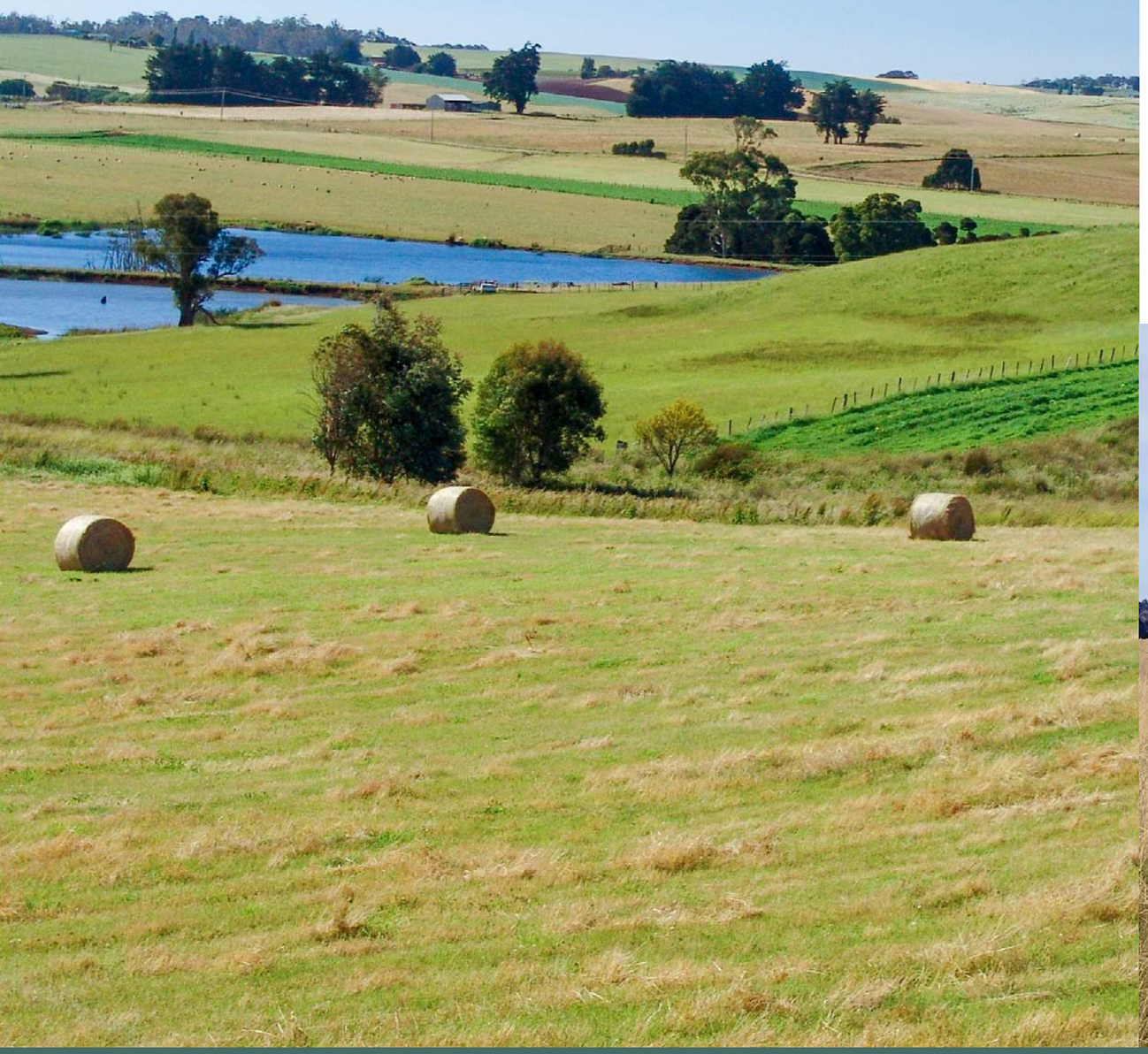
As TIA navigates the transition to the new Tasmanian Agricultural Precinct in Newnham, I thank Professor Michael Rose for his leadership, acknowledge the excellent research, development and extension outcomes that staff continue to deliver, and look forward to the opportunities ahead for TIA.

I am confident that the Board will continue to work to ensure the ongoing success of this three –way partnership between the University, industry, and government.

Jason Jacobi
Acting Chair, Tasmanian Institute of Agriculture Advisory Board Secretary, Natural Resources and Environment Tasmania (NRE Tas)

The Tasmanian Institute of Agriculture (TIA) will enable Tasmanian food producers and processors to accelerate primary sector productivity while maintaining and improving Tasmania's land and water quality for future generations.

Agricultural Systems Centre



Research and industry unite for impact

Project: **NEXUS project part 2: involve and partner activities**

Funding body: Meat and Livestock Australia Ltd

Industry partners: Meat and Livestock Australia Ltd; University of Tasmania

Research team: Harrison MT; Barnes NR; Christie–Whitehead KM; Turner LR

The Nexus project is a key part of the Livestock Productivity Partnership, funded by Meat and Livestock Australia and delivered by TIA. The project explored profitable, sustainable livestock businesses in an increasingly variable climate.

Work during 2022 focussed on extension and engagement activities with industry stakeholders including three on–farm workshops held in Tasmania. This involved the translation of modelling to end user adoption and impact.

Adaptation discussion groups were formed to provide consistent interaction between peers and researchers to support learning, relationship building and working through the practicalities of implementing research outcomes in a real farm context.

TIA Social Research Fellow, Dr Nicoli Barnes, presented at the workshops alongside Associate Professor Matthew Harrison. She is exploring the social issues that arise around climate change and livestock production in Tasmania.

“One of the most valuable things we are doing is working closely with our Tassie farmers,” Dr Barnes said.

> “While we can provide them with information, it is their working knowledge that allows us to move forward with what we know.

TAS Farm Innovation Hub

Project: Drought Resilience Tasmania – Actionable Knowledge and Solutions for Sustainable Prosperity

Funding body: Department of Agriculture Forestry and Fisheries

Industry partners: Beanstalk Agtech Pty Ltd; Biosecurity Tasmania; Bush Heritage Australia; Cape Herbert Pty. Ltd.; Definium Technologies Pty Ltd; Highland Conservation Pty Ltd; Horticulture Innovation Australia; Hydro Tasmania; NRM Cradle Coast; NRM North; NRM South; Private Forests Tasmania; Rural Business Tasmania Inc; Soils for Life Trust; Southern Cross University; Tasmanian Agricultural Productivity Group; Tasmanian Institute of Agriculture; Tasmanian Irrigation; Tasmanian Land Conservancy; Tasmanian Farmers &Graziers Association; Tasmanian Women in Agriculture Inc; TasWater; The Derwent Catchment Project

Research team: Research team: Evans KJ; Mohammed CL; Kumar S; Field B; Harris R; Jones ME; Anders RJ; Higgins VJ; Bryant M; Harrison MT; Gracie AJ; Wilson MD; Jordan GJ; O'Reilly-Wapstra JM; Barmuta LA; Remenyi TA; Kang BH; Amin M; Maiti A; Fraser SP; Kilpatrick SI; Barnes NR; Beasy KM; Coleman BJ; Stoeckl NE; D'Alessandro SP; Tian J; Chuah S; Norris K; Ferguson SG; Auckland SRJ

The Tasmanian Drought Resilience Adoption and Innovation Hub – known as the TAS Farm Innovation Hub – is one of eight established nationally by the Australian Government's Future Drought Fund.

The hubs are designed to build climate resilience into communities, economies and environments at all scales. The Tas Farm Innovation Hub helps Tasmanian farmers, and those who support them, to build valuable relationships and access critical information. It brings together researchers, farmers, industry, natural resource managers and traditional owners to co-design and implement relevant and innovative solutions.

The past year has seen the realisation of several key milestones for the hub to enhance operations and communications and strengthen collaboration.

In late 2022, Sandra Knowles was appointed as Director of the hub and is building on the solid foundation created by the former Director, Associate Professor Kathy Evans, and the skilled hub team in collaboration with the Industry Advisory Board.

"I'm proud of the team's achievements this year including the development of a new strategic plan and operational plans, a new logo and branding, and the creation of various communication platforms including a dedicated new website, social media channels and monthly newsletters," Ms Knowles said.

> "I cannot emphasise enough the value our partners, and their collaboration with us, bring towards positive change for Tasmanian agriculture.

"The hub also has a new name which more accurately reflects its work and mission. It will help the hub achieve state-wide recognition across the agricultural sector and in turn allow for better engagement and support for the people and organisations that make up the sector."

The hub also opened a new shopfront in Launceston in collaboration with Rural Business Tasmania. The shopfront presence in York Street will help increase engagement with the community and partners.

The hub establishment phase is now over and projects are starting to yield results.

"Over the past year, our skilled staff worked with our hub partners and Industry Advisory Board to establish some exciting projects to build the resilience of farmers and rural communities to drought and other extreme events.

"Our focus now is progressing those projects on the ground and connecting with our partners to discuss common goals and ways to enhance our existing relationships.

▾ View of Forthside Vegetable Research Facility.

High hopes for pivot boost

Project: Evaluating the feasibility of developing a Y–span centre pivot irrigator

Funding body: Department of Agriculture Water and the Environment

Industry partners: Tasmanian Agricultural Productivity Group

Research team: Hardie MA; McPhee JE

TIA and the Tasmanian Agricultural Productivity Group (TAPG) are working together to investigate improvements to centre pivot irrigation application. This project continues a history of the two organisations partnering on projects of importance to Tasmanian agriculture.

The project will evaluate the opportunity and capacity to retrofit existing centre pivot irrigators to improve their effectiveness, efficiency, and resilience during drought.

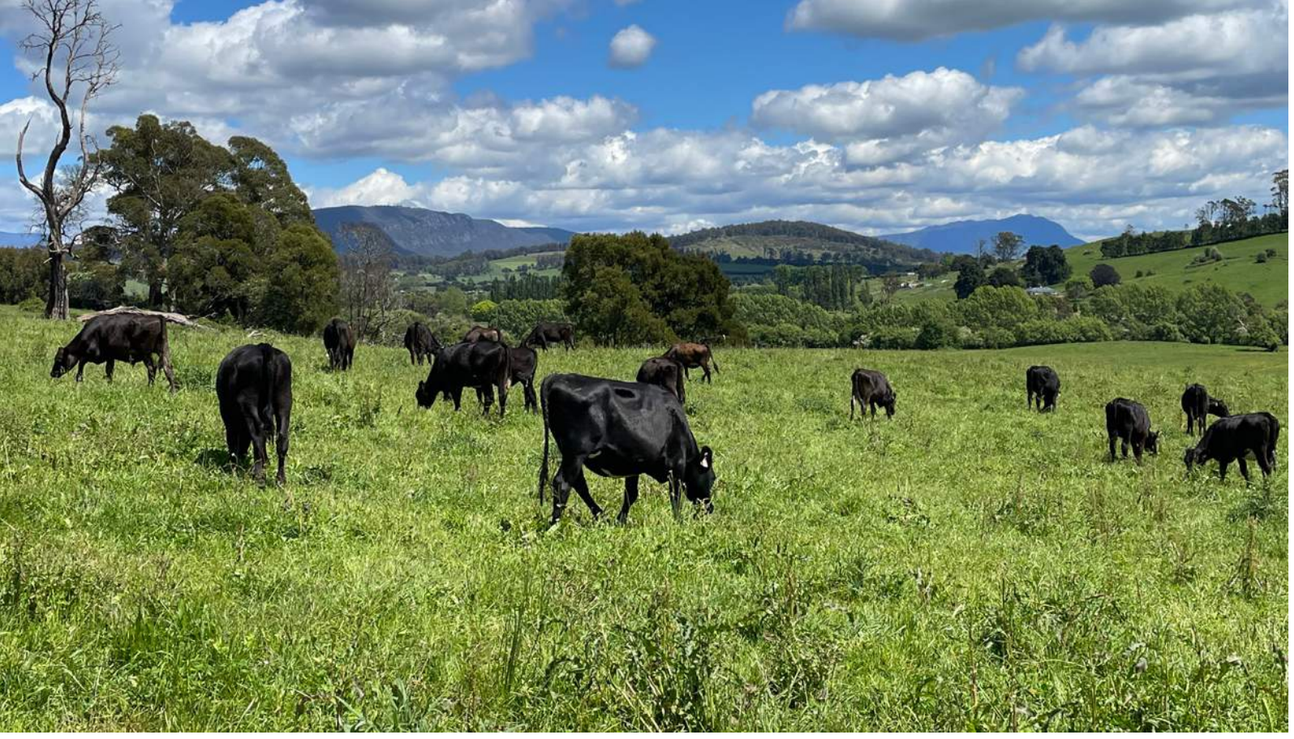
Centre pivot irrigation is the most common form of irrigation in Australia, and the fastest growing type of irrigation globally. However, centre pivot irrigators are not well suited to soils with low infiltration rates.

The solution is to increase the wetted footprint from the sprinklers, or increase the time that water is applied at any point around the pivot so sprinkler output can be reduced.

"Many of Tasmania's agricultural soils have low surface infiltration rates, due to a combination of inherent properties, carbon loss, water repellence, crusting and surface compaction," TIA Research Fellow Dr Marcus Hardie said.

"The likelihood of success for this project is quite high. The basic problem is known – instantaneous application rates under centre pivots are higher than soil infiltration rates, leading to increased runoff and poor irrigation efficacy.

"Not only does this waste water and energy, but also results in further soil damage, and sub–optimal crop production, leading to low water–use efficiency in what should be highly productive irrigation enterprises."



New practices, tech, and skills key to greenhouse gas emissions reduction

Project: **Sustainable pathways to carbon neutrality by 2030**

Funding body: Meat and Livestock Australia

Industry partners: Western Sydney University; Zhejiang University; Nantong Ruihua Bioengineering; Flux Advance Scientific; Seed Force Pty Ltd

Research team: Harrison MT; Christie–Whitehead KM; Hovenden MJ

A team of scientists and researchers are attempting to solve one of the most important issues facing humanity in the 21st century: reducing global greenhouse gas (GHG) emissions in a sustainable way.

This is one of seven projects under the Carbon Storage Partnership – an initiative of Meat & Livestock Australia (MLA) that aims to build the capability and capacity of Australia's livestock sector to become carbon neutral by 2030 (CN30).

The Carbon Storage Partnership is led by TIA's Systems Modelling Team Leader, Associate Professor Matthew Harrison, who also leads the TIA project. The five–year project is focussing on enabling research, development, and adoption of multiple GHG mitigation interventions.

The project will:

1. Review the literature on GHG emissions mitigation options including grazing systems and management in terms of soil carbon sequestration, animal welfare, pasture types and persistence, and profitability.
2. Develop 60 practical, cost–effective farm–level GHG accounts for a range of farming systems across 10 diverse agro–ecological zones, driving farmer participation in the CN30 Initiative,
3. Quantify the benefits of biodiversity, natural capital and environmental stewardship for enhancing grazing land management and for diversification of income streams,
4. Quantify economic, environmental and social effects of multiple GHG emissions whole–farm abatement options.

The CN30 project's monitoring and evaluation indicates that more than 12,300 people have directly engaged with staff within the Carbon Storage Partnership to date (February 2023).

"This project has already had beneficial impact on the community through improved environmental stewardship, improved understanding of carbon emissions and markets, and empowered end–users who are more likely to action changes that reduce their greenhouse gas emissions in a profitable, sustainable way, without impacting on productivity and food security," Associate Professor Harrison said.

ARC funding boost for cultivating new crops

Project: **Reducing environmental footprint by improving phosphorous use efficiency**

Funding body: Australian Research Council

Industry partners: Western Sydney University; Zhejiang University; Nantong Ruihua Bioengineering; Flux Advance Scientific; Seed Force

Research team: Shabala SN; Zhou M; Shabala L; Chen ZH; Zhang G; Tang J; Huo Z; Zeng F; Leah D

TIA received more than $380,000 to undertake research that aims to breed a new variety of barley with enhanced phosphorous use efficiency.

The project is led by TIA Professor Sergey Shabala and includes internationally renowned researchers in the fields of plant physiology, cell biology, genetics, agronomy, and breeding. The project will also support six higher–degree research positions including four PhD and two masters' students.

"Modern agriculture relies heavily on the use of phosphorous fertilizers however the average efficiency rate is just 25 per cent. Runoff from fertilisers poses a significant environmental challenge through the contamination of waterways," Professor Shabala said.

"The overall aim of this research is to reduce the environmental footprint of modern agricultural practices on terrestrial and aquatic ecosystems.

"We have an opportunity to study a unique collection of Tibetan wild barley genotypes that we know possess a unique pool of genes not found in cultivated barley varieties. Our aim is to reveal the key traits for superior phosphorus acquisition and internal use efficiency in wild barley and develop a method to effectively incorporate these traits into commercial barley cultivars – we believe this is the most effective way to resolve the challenge."

Professor Shabala said the Australian agriculture sector uses more than 450 kilotons of phosphorus each year, and that a 25 per cent increase in phosphorous use efficiency in major agricultural crops could save farmers more than $10 million each year.

> "The overall aim of this research is to reduce the environmental footprint of modern agricultural practices on terrestrial and aquatic ecosystems.

Food Safety and Innovation Centre

Climate change adaptation for the Tasmanian wine industry

Project: **Beating smoke taint with sparkling wine**

Funding body: Department of Natural Resources and Environment Tasmania

Industry partners: Wine Tasmania

Research team: Sawyer S; Close DC; Swarts ND

The project will investigate producing sparkling wine from smoke–affected wine grapes. The outputs will provide winemakers with the knowledge to help them develop risk management strategies against the impacts of climate change.

“Smoke–affected fruit leads to negative sensory outcomes which manifests during wine making and ageing. This means significant financial outlay has already been invested with little chance for return, as smoke–affected wines will be destroyed and unable to be sold,” TIA Research Fellow in Food Science, Dr Sam Sawyer said.

Smoke–affected fruit is a significant cost to the wine grape sector. This could also include years of sunk investment into ageing of fine wines. It is a risk that deters investors and future expansion.

“The primary focus of this project is on climate–responsive agriculture to reduce financial and reputational risks. It has been designed to help the Tasmanian wine sector adapt and prepare for the increasing risk of bushfire events leading to smoke taint,” Dr Sawyer said.

“Tasmanian businesses are best placed to adopt and demonstrate the knowledge which would be gained from this project. There is also the potential for international impact as more regions globally become impacted by smoke taint from bushfires because of climate change.”

Wine Tasmania has identified smoke mitigation as a high priority R&D and proposes that this be investigated in relation to sparkling wine production. Wine Tasmania CEO Sheralee Davies highlighted the importance of this research.

“Vineyards are particularly susceptible to damage from smoke, a major risk in Tasmania’s heavily forested landscape and with a changing climate. This research will help to investigate opportunities to minimise the impacts of smoke through sparkling wine production,” Ms Davis said.

“We’re pleased to again partner with the Tasmanian Institute of Agriculture on this priority research project and thank the Tasmanian Government for its support.”

Food safety, storage, shelf life and transport the focus of globally connected project

Project: **Development of complementary preservatives for Australian meat products**

Funding body: Department of Industry, Science and Resources; Chemital

Industry partners: Chemital; George Weston Foods; Mantiss Pty Ltd

Research team: Ross T; Kocharunchitt C; Mellefont L

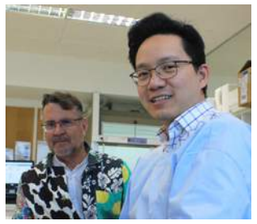
A research project, led by Tom Ross, TIA Professor in Food Microbiology, is being praised for its potential to reduce food waste and increase food safety and security.

It is hoped the project will open the door to several preservation methods for processed meats, improve food safety in manufacturing, shipping, and storage while strengthening global ties.

“Having newer preservation methods will open the door for developing newer, healthier, and more convenient products that, nonetheless, give the same enjoyment that are safe, and have more dependable shelf life,” Professor Ross said.

“The project aims to assess the efficacy and reliability of natural products intended as additives to extend the shelf life and improve the safety of foods. Longer shelf life also increases the opportunity to reach more distant export markets and can reduce food waste.”

The collaborative project will see a family of preservatives evaluated and modified for Australian conditions to provide the local processed meat industry with substantial improvements in food safety and cold chain resilience, for both domestic and export purposes.



Award for young food microbiologist

TIA PhD student, Dipon Sarkar, was awarded the 2022 Australian Institute of Food Science and Technology (AIFST) John Christian Young Food Microbiologist award.

The award recognised Dipon’s study: WHERE IS THE FORK? The missing link in Farm–To–Fork food safety strategies.

The John Christian Young Food Microbiologist award is given in honour of John Hinton Bassett Christian AO. The award was created as a means of encouraging and supporting the development of young food microbiologists.

TIA PhD candidate Elerin Toomik was a finalist in the AIFST Young Food Microbiologist Award.

▲ Dipon Sarkar with TIA’s Centre Leader, Food Safety, and Innovation John Bowman.

Horticulture Centre

$6.4 million boost for cool climate horticulture growers

Project: **Sustainably growing horticulture value in cool climate Australia**

Funding body: Horticulture Innovation Australia

Industry partners: Bejo Australia, Potatoes NZ; Simplot; Premium Fresh; Scottish Society for Crop Research; Botanical Resources Australia; Reid Fruits; Hansen Orchards; Costa Group; Driscoll's Australia; South Pacific Seeds and Fruit Growers Tasmania and contributions from the Australian Government

Research team: Swarts ND; Close DC; Scott JB; Wilson CR; Gracie AJ; Buntain M; Tegg RS

TIA is leading a new project that aims to grow Australia's cool climate horticulture production by 20 per cent.

Trial sites are being established in Tasmania as part of the $6.4M five–year project. The research team will design experiments to be relevant across cool climate regions such as south–west Western Australia, the Adelaide Hills, South–East Victoria and high–altitude areas of New South Wales and South–East Queensland.

◂ Horticulture Centre Leader, Dr Nigel Swarts, and Entomologist Dr Stephen Quarrell.

Hort Innovation Chief Executive Officer Brett Fifield said the aim is to investigate what operational adjustments need to be made to farms in various regions to achieve maximum productivity in the face of unpredictable weather patterns.

"Researchers will look at fragile soil management, nutrient, and water use. High–yield plants that can be picked early to maximise returns, and establishing protected cropping environments that offer stable, pest and disease–controlled growing environments are further priorities," he said.

The program will span various sectors, including peas, potato, pyrethrum, vegetable seed, cherry, and berry production.

TIA Horticulture Centre Leader, Dr Nigel Swarts, said primary producers across the horticultural sector are partnering to address the critical issues and risks associated with climatic variability and extremes in temperature and rainfall.

"With climate change, we can expect heat stress causing irregular yields for peas and potatoes. For fruit crops like cherries, there is the threat of premature ripening and projected increases in pest populations. Nutritional quality in terms of sugars, acids, or antioxidant capacity will also shift, impacting fruit quality outcomes," he said.

▾ Ashlea Schott from Bejo Australia and TIA's Dr Nigel Swarts.

Pollination research

TIA researchers are conducting multiple projects to better understand how changes in agricultural practices, such as an increase in protected cropping systems, are impacting bee health and pollination.

“We want to safeguard against potential future threats, ensure resilient pollination systems, and explore opportunities to enhance pollination methods to increase the productivity of our agricultural industries,” TIA Entomologist Dr Stephen Quarrell.

Pollination research includes:

Powerful pollinators

Two planting guides will be developed help Tasmanian land holders select the most appropriate native plant species to encourage pollinators on farms. The ‘Powerful Pollinators’ program aims to increase the prevalence, health and diversity of pollinators in the landscape.

Research team: Quarrell SR

Funding: The Wheen Bee Foundation is supported by funding from the Federal Government’s Landcares Smart Farms initiative.

Honey library for Tasmania

The chemistry of Leatherwood and Tasmanian Manuka honey will be collated to input into the first-ever Australia-wide Honey Library coordinated through B-QUAL. This reference database will provide Tasmanian honey producers with proof of authenticity to support claims of uniqueness and provenance which are highly valued by consumers.

This project has created a traceability link between consumers and beekeepers via Q-coded honey labels in an effort to combat honey fraud.

Research team: Garland SM; Close D

Funding: Cooperative Research Centre for Honey Bee Products; Tasmanian Beekeepers Association

PhD project: Understanding pollination and honey bee health under protected and contained environments

Using an insect-deployed Radio Frequency Identification (RFID) system to detect subtle changes in hive health by monitoring individual bee activity in full strength beehives. This project aims to improve pollination and hive health under protected and contained cropping environments, including sweet cherry, and raspberry and in pollination intensive crops such as vegetable seeds.

PhD candidate: Ryan Warren

Funding: Horticulture Innovation Australia; PhD Leaders in Horticulture Program

PhD project: Understanding the impact of fungicide application on pollination on bee heath

Looking at the impact that fungicides used for plant disease in agricultural crops have on pollination including their impact on the viability of pollen carried by bees from flower-to-flower and how they affect bee behaviour and health. This includes bee gut health, which is linked to their ability to respond to many diseases.

PhD candidate: MengYong Lim

Industry partners: Seed Purity and South Pacific Seeds

Forthside Field Day

An annual Field Day at TIA’s Forthside Vegetable Research Facility was held in November 2022. The Field Day is a key event to connect growers and industry in horticulture and vegetables.

With a theme of innovation and sustainability, the event was attended by approximately 80 people who were interested in viewing the recent farm upgrades and on-farm trials, learning more about TIA’s current and future research projects, and speaking directly with researchers.

Forthside has had a long history of engagement with growers and industry partners. The field day is a valuable opportunity to transfer information and share project outcomes relating to innovation and sustainability.

▾ The 2022 Forthside Field Day.

▴ TIA's Professor Calum Wilson.

New tool to manage potato disease

Project: **Development of a decision support systems for management of potato diseases and estimating impact of changing climates**

Funding body: Department of Natural Resources and Environment Tasmania

Research team: Wilson CR; Scott JB; Gracie AJ; Leo A

This project will develop a tool that will allow the potato industry to predict and control disease more effectively.

The aim is to increase productivity and profitability of the potato industry, while decreasing food waste, pesticide use and environmental impacts. It will also provide a valuable tool for modelling the impact of future climate change.

Disease predictive tools enable growers to make informed decisions support allowing efficient use of pesticides and improved disease control tailored to individual fields and growers' management choices.

Prevention key to new blueberry rust research project

Project: **New on-farm strategies for the prevention and control of blueberry rust in Tasmania**

Funding body: Department of Natural Resources and Environment Tasmania

Industry partners: Fruit Growers Tasmania; Southern Cross University; Tasmanian Government

Research team: Barry KM; Horton BJ; Scott JB; Buntain M; Pearce T; Evans KJ

TIA is building on its current research into blueberry rust with new funding to develop on–farm strategies for the prevention and control of blueberry rust in Tasmania.

The three–year project is supported by almost $500,000 from the Tasmanian Government's Agricultural Innovation Fund. It will provide the blueberry industry with practical information and precision tools to manage blueberry rust through the evaluation of pathogen survival over winter and defoliation as a potential control measure.

When the new study begins in 2023, the research team, led by TIA Plant Pathologist Associate Professor Kara Barry, will focus on two key issues: managing rust on semi–evergreen and evergreen cultivars where infection persists on leaves over winter; and understanding what environmental conditions are optimal for blueberry rust survival and infection and relating these to both climatic conditions in Tasmania and the cultivars grown.

Additionally, the research will focus on defoliation studies, aimed at breaking the rust life cycle; rust survival and infection, which will assess the survival of blueberry rust spores (urediniospore) and mycelium (fungal filaments) under several environmental conditions; and rust survival models, which is intended to help growers identify when and where there is a risk of blueberry rust infection.

"Growers will be able to use the blueberry rust infection model with local weather data and weather forecasts to identify when there is a risk of blueberry rust infection," Associate Professor Kara Barry said.

"The rust survival model will help growers decide whether defoliation would be a useful strategy to prevent blueberry rust over–wintering in their orchard."

▾ TIA's Associate Professor Kara Barry.

Livestock Production Centre

Climate and hip pocket winners in seaweed research

Project: **On–farm adoption of low emissions feed technologies for improved profitability of the Tasmanian livestock sector**

Funding body: Department of Natural Resources and Environment Tasmania

Industry partners: Fonterra; Sea Forest

Research team: De Hayr BR; Harrison MT; Bowman JP; Hunt I; Rawnsley RP

This research project has the potential to realise the dual benefit of reduced methane emissions from livestock and increased returns for farmers using asparagopsis, a seaweed native to Tasmanian waters.

It is part of a broader program that TIA is developing around building capacity for research into reducing livestock greenhouse (GHG) emissions and improving commercial outcomes for Tasmanian livestock producers. The project also aligns to a key TIA strategy: building resilience to climate change and limiting GHG emissions from agriculture and food production.

A key aspect of this will be building the capacity within TIA to measure livestock GHG emissions and conduct trials under commercial conditions and scale.

▾ TIA's Richard Rawnsley with some of the team at Sea Forest.

◂ Livestock Productivity Centre Leader, Dr James Hills, inside the new TIA Research Dairy. Photo: Peter W Allen

Agriculture is facing increasing consumer and community pressure to reduce GHG emissions. Enteric methane accounts for 66 per cent of agricultural emissions and represents not only a significant GHG challenge but a significant opportunity as the energy lost by livestock as methane accounts for six to 10 per cent of gross energy intake.

“Tasmanian livestock emissions have changed little since the 1990s, signifying an urgent need for productive, profitable pathways for reducing GHG emissions,” TIA Associate Professor Richard Rawnsley said.

Along with TIA’s Dairy Research Facility at Elliott, three Tasmanian farms will be used as trial sites. Richard Gardner, Simon Foster, and Julian von Bibra separately own the properties, which will be accessed for their scale.

The consortium will enable commercial–scale robust feeding trials to assess effective adoption of the low–emission feed technology, alongside evaluation of the whole of system–level changes including profitability, social acceptability, and practical barriers to adoption.

Julian Von Bibra’s midlands property, Beaufront, runs beef cattle, prime lamb, and Merino sheep. Mr Von Bibra is keen to take part in research that has the potential to positively impact the livestock industry’s impact on the climate.

“We all need to support any initiatives that look at ways of reducing carbon emissions, no matter the industry,” Julian von Bibra said.

“Here is a project where we could end up with better production outcomes as well as reducing emissions; what a great result if we get better efficiencies in producing our beef, wool, and lamb, at the same time have less impact on the climate.”

Sowing the seeds for a sustainable dairy industry

Project: Evaluating the impacts of pasture type and synthetic nitrogen (N) fertilisation level on the productivity of irrigated temperate Australian grazing–based dairy farming systems

Funding body: Dairy Australia

Industry partners: Dairy Tasmania; Dairy NZ, Elders

Research team: Hills JL; Langworthy A; Raedts PJM; Millhouse BJ; Rawnsley R; Noble B; Radford O

TIA's Dairy Research Facility (TDRF) at Elliott in North–West Tasmania is home to a new research trial investigating the effects of different pasture species and fertiliser applications on above ground measurements such as milk and pasture production, as well as financial performance and viability.

It is a key project among a program of research supported by Dairy Australia. To support the trial, four famlets have been set-up at TDRF with eight paddocks of 0.92ha per farmlet.

'The farmlets have been established with a different mix of pastures including perennial ryegrass, white clover, plantain and other more diverse species.

"We are establishing the pastures that will form the basis for the whole farmlet experiment. In March–April 2022, we sowed in the different pasture species, and before that there was 18 months of pre–prep establishing all the soil conditions, so it was suitable for the species to flourish and be productive," TIA Research Fellow, Dr Adam Langworthy said.

The recent introduction of regulations of nitrogen use to Europe and New Zealand, along with industry concerns around high levels of synthetic nitrogen use were the catalyst for the research.

"The goal is to be ever enhancing the environmental sustainability of our industry," Dr Langworthy said.

Dairy Australia Managing Director, Dr David Nation, said the investment with TIA was an extension of a successful research partnership first commenced in 2012.

"The research is targeting significant sustainability gains in pasture production through efficient nitrogen fertiliser use and the reduction of a key input cost for dairy farms. It will directly benefit farmers in temperate pasture based dairy regions across Australia."

▾ Dr Adam Langworthy inspects pasture at TIA's Dairy Research Facility.

▴ Dr Megan Verdon at TIA's new Research Dairy. Photo: Peter W Allen

Grain–free research yields positive results for producers

Project: Effects of grain–free calf starter on crossbred dairy–beef calf feed intake, growth, weaning age and post–weaning performance

Funding body: Dairy Australia Limited; Greenham Tasmania Pty Ltd

Research team: Verdon MJ

This project assessed the growth and health of dairy–beef crossbred calves reared on a grain–free calf pellet (based on fava bean) in comparison to a traditional grain–based pellet.

The study led by TIA Senior Research Fellow Dr Megan Verdon found that there was no significant difference in growth rates or weaning weights between groups.

The results are positive for producers considering grassfed supply chain options for surplus dairy calves. The dairy industry is prioritising sustainable beef pathways and one option currently available to dairy farms is to raise surplus calves for grassfed beef markets. A challenge in achieving this is that to meet this raising claim, calves cannot be fed cereal grains or their by–products.

Prior to this study, limited work had been undertaken to investigate the effects of a grain–free diet on pre and post weaning growth and development of dairy beef calves.

Enhancing pastures to improve productivity and resilience

Project: **Growing red meat productivity through the selection and establishment of perennial legumes**

Funding body: Meat and Livestock Australia Donor Company

Industry partners: The Livestock Productivity Partnership (LPP) is a collaborative research and development partnership involving MLA Donor Company (MDC); TIA; NSW Department of Primary Industries; University of New England; University of Melbourne; and CSIRO, aimed at boosting livestock productivity and developing new R&D capacity

Research team: Smith R; Penrose B; Langworthy A; de Hayr B; Martin G; Talbot J

This $1.5 million research project aims to enhance the legume component of pastures, improving productivity and resilience for Tasmanian red meat producers.

The five–year project, led by TIA Research Fellow, Dr Rowan Smith, will help grow productivity in the red meat industry by identifying and establishing perennial legume species that can successfully persist to fill feed gaps and improve tolerance and productivity under waterlogging.

> “Increasing the legume component in our pastures will absolutely increase the productivity and profitability of our grazing business.”

The project will take a region–focused approach to improve the proportion of legumes in the high rainfall regions of the North–West Coast and low–medium rainfall region of the Tasmanian Midlands.

The current low proportion of legumes in Tasmania pastures are limiting the profitability and productivity of the Tasmanian red meat industry.

The project will trial different species and test how new sowing practices could advantage legumes during establishment.

The team will work closely with local red meat producers to ensure the findings are relevant and valuable.

Tasmanian producer Simon Foster owns Fosterville Pastoral, a mixed farming business west of Campbell Town, and said maintaining the legume component in his pastures was an ongoing challenge.

“We really need this research to give us practical and cost–effective ways to re–establish the legumes,” Mr Foster said.

“Increasing the legume component in our pastures will absolutely increase the productivity and profitability of our grazing business.”

Compare the pair: methods for top pasture establishment

Project: **Evaluation of strip tillage and direct drilling sowing methods for pasture renovation in low rainfall regions of Tasmania**

Funding body: Southern Regional Natural Resource Management Association Inc

Industry partners: NRM South; NRM North; AgriProve; Producer Groups; Host farmers

Research team: Smith R

TIA and NRM South are working together to investigate alternative pasture renovation techniques associated with conventional pasture renovation which can be risky and time consuming.

Renovating pastures in low–rainfall dryland environments presents challenges for land managers as successful establishment of perennial pastures relies heavily on preparation. This project seeks to evaluate the merits of direct drilling and the relatively novel method of strip tillage.

The key advantages of direct drilling over full cultivation are related to less soil disturbance, resulting in reduced risk of erosion, reduced evaporation, and less volunteer weed germination.

Strip tillage and no herbicide application prior to sowing has been promoted as techniques for maintaining healthy microbial activity, building soil carbon, and providing a low–risk method of renovating pastures.

Learning and Teaching

▲ Freer Farm Manager Adam Bracken, TIA's Dr James Hills, TasTAFE CEO Grant Dreher

Collaboration to enhance agricultural research and education in Northern Tasmania

The University of Tasmania and TasTAFE are working together to better serve agriculture in Tasmania, helping the industry create more jobs and more value for the State.

A Memorandum of Understanding signed in Burnie in mid–2022 will see the two organisations collaborate on agricultural education and training pathways, as well as sharing infrastructure, resources, knowledge, and data.

TIA Director Professor Michael Rose said the Agricultural Research and Training Partnership would support Tasmania's critical agricultural industry as it works to increase its farm gate value to $10 billion by 2050.

"We are absolutely focused on industry and making sure we are solving their challenges and helping them to succeed," Professor Rose said.

"That means working in partnership to meet the demand for agricultural skills in Tasmania and ensuring industry can easily access the data, knowledge, research and training they need to thrive."

Through the Partnership, TIA and TasTAFE will coordinate and align their strengths in North–West Tasmania. TIA's Dairy Research Facility at Elliott will focus on dairy and pasture research, TIA's Vegetable Research Facility at Forthside will focus on production horticulture, and TasTAFE's new Agricultural Training Centre of Excellence at Freer Farm will focus on beef and protected horticulture.

"This will improve access to real world, on–farm data for students and industry," Professor Rose said.

Scholarships support Tasmania's agriculture leaders of the future

Eleven students from across Tasmania were awarded scholarships totalling $110,000 to study Agricultural Science at the University of Tasmania, at an event in June 2022.

One of the scholarship recipients for 2022 is Lilia Jenkins, from Launceston, who received the Fruit Growers Tasmania Honours Scholarship. The scholarship is supporting her to undertake research looking at integrated pest management options for fruit growers, with a focus on a parasitoid wasp that naturally preys on codling moth.

The scholarships have relieved financial pressure and allowed Lilia to focus on her studies, make connections in the agriculture sector, and purchase her own vehicle.

> "The biggest benefit has probably been the connection it's given me to my sponsor and the industry, as I've been able to get my foot into the door and meet a lot of wonderful people. The industry is so keen to support students, and their help has been invaluable."
>
> **Lilia Jenkins**

◂ Lilia Jenkins at the Scholarship Presentation Event.

Ag education and industry bodies unite to deliver on recommendation

The primary recommendation arising from an agriculture education forum held in late–2021 has been realised with the formation of the Tasmanian Agricultural Education and Training Partnership (TAETP).

The TAETP will address and action solutions to topics, issues and opportunities for education and training in agriculture and food in Tasmania.

The TAEPT has representation from TasTAFE, the Department of Education, Catholic Education, the Tasmanian Farmers and Graziers Association (TFGA), the Tasmanian Agricultural Productivity Group (TAPG) as well as recent graduates from various programs.

The purpose of the TAETP is to provide strategic advice and leadership to key stakeholders involved in achieving several goals, including increasing the profile and importance of the agricultural and food industry and education to attract new entrants; raising aspirations and educational attainment in the Tasmanian agricultural community; and to facilitate increased and seamless pathways into education and training.

▾ TIA hosted its third Agricultural Education Forum in 2021.

▴ Ag Science graduates throwing caps into the air at Hobart graduation.

Agricultural science graduates in high demand

With six jobs to every agricultural science graduate in Australia, the 2022 graduating class from the University of Tasmania's Bachelor of Agricultural Science are spoilt for choice and taking their pick of exciting jobs around Australia.

Lilia Jenkins, of Launceston, graduated in December 2022 with a Bachelor of Agricultural Science with Honours. Like many of her peers, she has already accepted a job in her chosen field of entomology.

"I was offered positions both in private and public sectors, and I know a lot of my fellow graduates are jumping right into the industry into manager positions. I accepted a job with Cesar Australia as a graduate extension scientist where I'll be working in integrated pest management which was the subject of my honours project," Lilia said.

Dr Lizzy Lowe, Extension Team Lead at Cesar Australia, said it was harder to find applicants with good on–the–ground agricultural management experience.

"We think that time spent out on farms is one of the most important things for graduates, some real–life experience of what it is like to run a farm and to have to make a whole lot of different management decisions … it is also especially important for applicants to have really good communication skills and ability to translate complex scientific ideas," Dr Lowe said.

TIA Director, Professor Michael Rose, said a degree in agricultural science develops sought–after skills that could see graduates working in diverse roles including on farms, at board tables, in classrooms, in laboratories, or advising governments.

"TIA is training the future generation of agricultural leaders and innovators. We work closely with industry and government to develop a skilled agricultural workforce to meet current and future demands, and our students get to work alongside industry and make important connections throughout their degree," Professor Rose said.

Research Facilities

James Hills and Ben Noble inside milking carousel at Elliott Dairy. Photo: Peter W Allen

Million–dollar upgrades pave the way for nation–leading research

Project: **TIA Farms Upgrade Project**

Funding body: Dairy Australia; University of Tasmania; Tasmanian Institute of Agriculture

Project team: Hills J; Raedts P; Millhouse B; Radford O; Boon S; Langworthy A; Iten J

TIA's Dairy Research Facility at Elliott and Vegetable Research Facility at Forthside, both saw significant transformations in 2022.

The upgrades are the result of a $7.8 million joint–investment from the Tasmanian Government and the University of Tasmania to support future success of TIA's research farms in the north–west.

This investment aims to ensure that TIA's research farms can provide high–quality outcomes for the next decade, supporting the Tasmanian Government's goal to grow the value of Tasmania's agriculture sector to $10 billion a year by 2050.

Elliott Dairy Research Facility

The scale of the upgrades taking place at the TIA Dairy Research Faciltiy (TDRF) is significant and includes a new 50–bay rotary dairy, a new 12.5 megalitre effluent dam, increased irrigation water storage capacity in one of the dams from 24 to 115 megalitres, 11 kilometres of underground irrigation pipeline, and the conversion of 32 hectares of previously unirrigated land for farmlet trials.

The new dairy was officially opened by the Hon Jo Palmer, Minister for Primary Industries and Water in July 2022. The Minister was joined by TIA Director Professor Michael Rose, Executive Dean of the College of Sciences and Engineering Terry Bailey, and Dairy Australia Manager Technical and Innovation John Penry.

"TIA's new dairy facilities and unique research farmlet design will provide dairy farmers in Tasmania and other pasture–based regions in Australia with access to leading and valuable research that supports improvement of production efficiency and reduces risks associated with high reliance on synthetic nitrogen fertiliser for the production of home grown feedbase," TIA Livestock Production Centre Leader, Dr James Hills said.

"These are critical research areas that will support sustainable and long–term growth of pasture–based farming systems."

▲ Farm Manager Doug Clark, Farm Hand Anthony Maierhofler, and Seed Certification Officers Ann-Maree Donoghue and Kathryn Goulding.

Forthside Vegetable Research Facility

Upgrades to irrigation and farming equipment at Forthside will support precision agriculture, enhance safety, and ensure the best possible outcomes from the research that happens at Forthside.

Ageing machinery has been replaced with fit–for–purpose equipment including a 14–metre spray boom, Fendt 716 and 313 tractors, replacement hard hoses, and a liner irrigator expected to be installed in November.

Forthside has also undergone a digital transformation over the last 12 months, bringing the almost 60–year–old farm up to date with changing farming practices to deliver better outcomes for industry.

A range of Sustainable, Manageable, Accessible Rural Technology (SMART) Farm technologies have been installed (by FarmPulse) at Forthside over the past 12 months, creating a demonstration site for farmers to see and interact with new technologies that could be adopted on their own properties.

These technologies will also be used by TIA staff in the development of future research project proposals and teaching initiatives.

It has been a game–changer for Forthside's manager Doug Clark and his team, who now have a full dashboard both at the farm and on their phones to monitor and manage water and irrigation requirements.

Forthside is the site of diverse research trials and teaching that directly contribute to the sustainability and productivity of Tasmania's agriculture industry. The recent digital transformation of the farm has seen the implementation of precision agriculture and remote sensing technologies which are creating new opportunities for research, education, and engagement with industry.

2022 TIA Research Projects

Funding body	Industry partners	Research team	Title of project
AgriFutures		Field, B	AgriFutures Pastures Seeds Industry Advisory Panel
Australian Centre for International Agricultural Research	Sinar Mas; PT Musi Hutan Persada; APRIL Group (Riau Andalan Pulp and Paper); Centre for Forestry Instrument Standard Assessment, Indonesia; NSW Department of Primary Industries	Mohammed, CL; Glen, M; Harris, RM (Geography and Spatial Science); Turner, DJ (Geography and Spatial Science); Warman, R	Managing Risk in South East Asian Forest Biosecurity
Australian Centre for International Agricultural Research	Department of Agriculture, Laos; Forestry Administration, Cambodia; General Directorate of Agriculture, Cambodia; National Agricultural and Forestry Research Institute, Lao PDR; Queensland Dept of Agriculture & Fisheries; University of the Sunshine Coast	Warman, R; Lawson, S; Healey, M; Hayes, R; Beazley, H	Building effective forest health and biosecurity networks in SE Asia
Australian Centre for International Agricultural Research		Smith, R	Developing productive and profitable smallholder beef enterprises in Central Vietnam
Australian Centre for International Agricultural Research	Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement; Department of Agriculture and Rural Development; Dien Bien;Hanoi Agricultural University; National Institute of Animal Sciences; Swinburne University of Technology; Tay Bac University; Thai Nguyen University; University of Queensland; University of Tasmania; Vietnam National University of Agriculture	Ives, SW (Office of the University College); Bonney, L (Sense-T); Eversole, R (Institute for Regional Development); Adhikari, RP (TIA); Nicetic, O; Cuong, VC; Huyen, LTT; Hung, PV	Intensification of beef cattle production in upland cropping systems in North West Vietnam
Australian Nuclear Science & Technology Organisation	Murdoch Uni GRDC	Penrose, B; Wilson, Matthew; Bell, R; Sanchez-Palacios, T	Investigating environmental and management effects on iodine concentrations of Australian wheat for human health
Australian Pork Limited	Big River Pork, Northern Co-operative Meat Company	Kocharunchitt, C; Ross, T; Bowman, JP	Development of a predictive model for vacuum-packed pork
Australian Research Council	Biomar Global; University of California, Santa Barbara; the University of Sheffield, UK; Cermaq, Canada	Blanchard, JL (Ecology and Biodiversity); Cameron, D (Ecology and Biodiversity); Halpern, B; Carter, CG (Directorate); MacLeod, CK (Directorate); Adams, LR (Fisheries and Aquaculture); Leith, PB (TIA); Bowman, JP (TIA)	Optimising feeds to support ecosystem-based aquaculture
Australian Research Council		Breadmore, MC (Chemistry); Powell, S (Agriculture and Food Systems); Amuno, RM (Chemistry); Pantelic, L	Automated Sensors for a wetland in a box
Australian Research Council		Walker, J; Ng, B; Hills, JL	Towards an Active and Passive L- and P-band soil moisture satellite mission
Australian Research Council	Western Sydney University; Zhejiang University; Nantong Ruihua Bioengineering Co Ltd; Flux Advance Scientific Co., Ltd; Seed Force Pty Ltd	Shabala, SN; Zhou, Meixue; Shabala, SI; Chen, ZH; Zhang, GP; Tang, Jihua; Huo, Z; Zeng, Fanrong	Reducing environmental footprint by improving phosphorous use efficiency
Australian Wool Innovation Limited	CSIRO; University of Melbourne; Mullion Group; South Coast NRM	Harrison, MT; Christie, KM	BENEFITS: Biodiversity, Ecosystems, Net Emissions and Forestry ITemiSation of wool farms

Funding body	Industry partners	Research team	Title of project
Australian Wool Innovation Limited	CSIRO; University of Melbourne; Mullion Group; South Coast NRM	Harrison, MT; Christie, KM	BENEFITS: Biodiversity, Ecosystems, Net Emissions and Forestry ITemiSation of wool farms
Australian Wool Innovation Limited		Horton, BJ	Modelling management of sheep blowfly resistance to pesticides
Botanical Resources Australia Pty Ltd	Botanical Resources Australia	Gracie, AJ	Reproductive Biology, Seed Development and pyrethrin Accumulation in Pyrethrum
Botanical Resources Australia Pty Ltd	Botanical Resources Australia	Pearce, TL; Pilkington, S; Scott, JB	Investigating the genetics of pyrethrum vernalisation
Botanical Resources Australia Pty Ltd	Botanical Resources Australia	Scott, JB; Pearce, TL	Mechanisms and spread of fungicide resistance in pyrethrum fungal pathogens
Charles Darwin University		Stanley, RA; Md Saifullah; Zare, D	Northern Australia Food Technology Innovation (NAFTI) Grant
Charles Sturt University		Yousif, A; Blanchard, C; Waters, D	Expanding options for Sorghum - 1
CRC for High Performance Soils Ltd	Birchip Cropping Group; Riverine Plains Farming Group; Southern Farming Systems; Burdekin Productivity Services	Hardie, MA (TIA); Cahoon, SC (Maritime and Logistics Management); Edwards, SJ (TIA); Gillespie, WJ (Sense-T); Manion, MJ (Sense-T); Kang, BH (Information and Communication Technology); Mohammed, CL (TIA); Ballard, RWJ (TIA)	'Smart' soil sensors
CRC for High Performance Soils Ltd		Hardie, MA; Maya Alejandro, F (Chemistry); Gale, TJ (Engineering)	PhD project: Mobile soil water extraction for biological and chemical analysis
CRC for High Performance Soils Ltd	Soils for Life; Southern Farming Systems; Birchip Cropping Group	Powell, S; Mohammed, CL; Hardie, MA; Young, P (UTAS Holdings); Swarts, ND; Kang, BH (Information and Communication Technology); Cahoon, SC (Maritime and Logistics Management); Edwards, SJ	Smelling soil: eNose development (TIA led)
CRC for High Performance Soils Ltd		Hardie, MA	PhD project: Next Generation Below Ground Sensor Communication using Seismic Waves for Smart Soil Applications
CRC for Honey Bee Products		Garland, SM; Close, DC; O'Grady, AP (School of Natural Sciences)	The bioactivity and stability of the honey from Leatherwood (Eucryphia lucida)
CRC for Honey Bee Products		Garland, SM; Close, D (Centre for Ore Deposit Research - CODES CoE)	Honey Library for Tasmania
CSIRO-Commonwealth Scientific & Industrial Research Organisation	CSIRO	Mohammed, CL; Leith, PB; Waha, K	PhD project: The benefits and limits of diversity in agricultural systems
Dairy Australia Limited	Dairy Australia	Hills, JL; Langworthy, A; Raedts, PJM; Gee, CM; McLaren, D; Verdon, MJ; Snare, TA; Millhouse, BJ	Dairy High 2
Dairy Australia Limited		Christie, KM	Towards carbon neutrality for the Australian dairy industry
Dairy Australia Limited	Dairy Australia Greenham's	Verdon, MJ	Effects of grain-free calf starter on crossbred dairy-beef calf feed intake, growth, weaning age and post-weaning performance
Dairy Australia Limited	Dairy Australia	Irvine, LD; Jones, S; Flight, S	Tasmanian Dairy Farm Monitor Project 2020–2022
Department of Agriculture		Fei, J (Maritime and Logistics Management); Close, DC; Cahoon, SC (Maritime and Logistics Management); Bonney, L (Sense-T); Kumar, Saideepa	Enhancing horticultural supply chain traceability and digital promotion of Australian horticultural products in oversea markets
Department of Agriculture and Water Resources	Seed Purity; South Pacific Seeds Pty Ltd	Gracie AJ; Eyles A; Allen GR; Close DC; Quarrell SR; Jones JE; Barry KM	Novel technologies and practises for the optimisation of pollination within protected cropping environments
Department of Agriculture and Water Resources	Dairy Australia	Hills, JL; McLaren, D; Flight, S; Rawnsley, RP; Jones, S; Hardie, MA; Langworthy, A	Smarter Irrigation for Profit Phase 2
Department of Agriculture Water and the Environment	Wine Australia	Sawyer, S	Sniffing smoke taint- sensing phenols in the vineyard and the winery
Department of Agriculture Water and the Environment	Beanstalk Agtech Pty Ltd; Biosecurity Tasmania; Bush Heritage Australia; Cape Herbert Pty Ltd; Cradle Coast Authority; Definium Technologies; Derwent Catchment Group; Highland Conservation Pty Ltd; Horticulture Innovation; Hydro Tasmania; NRM North; NRM South; Private Forests Tasmania; Rural Business Tasmania; Soils for Life; Southern Cross University; Tasmanian Agricultural Productivity Group; Tasmanian Farmers and Graziers Association; Tasmanian Institute of Agriculture; Tasmanian Irrigation Pty Ltd; Tasmanian Land Conservancy; Tasmanian Women in Agriculture; TasWater	Knowles, SG; Mohammed, CL; Kumar, Saideepa; Field, B; Harris, RM (Geography and Spatial Science); Jones, Menna (Zoology); Anders, RJ (Geography and Spatial Science); Higgins, VJ (School of Social Sciences)	Drought Resilience Tasmania – Actionable Knowledge and Solutions for Sustainable Prosperity
Department of Agriculture Water and the Environment	NRM South	Knowles, SG; Mohammed, CL; Williams, L; Evans, KJ	The Building Landcare Community and Capacity program – Innovation Hub Regional Soils Coordinator

Funding body	Industry partners	Research team	Title of project
Department of Agriculture Water and the Environment	Beanstalk Agtech Pty Ltd; Biosecurity Tasmania; Bush Heritage Australia; Cape Herbert Pty Ltd; Cradle Coast Authority; Definium Technologies; Derwent Catchment Group; Highland Conservation Pty Ltd; Horticulture Innovation; Hydro Tasmania; NRM North; NRM South; Private Forests Tasmania; Rural Business Tasmania; Soils for Life; Southern Cross University; Tasmanian Agricultural Productivity Group; Tasmanian Farmers and Graziers Association; Tasmanian Institute of Agriculture; Tasmanian Irrigation Pty Ltd; Tasmanian Land Conservancy; Tasmanian Women in Agriculture; TasWater	Knowles, SG; Mohammed, CL; Kumar, Saideepa; Field, B; Jones, Menna (Zoology); Anders, RJ (Geography and Spatial Science); Higgins, VJ (School of Social Sciences); Bryant, M (CoBE	Agricultural Innovation Hubs Program
Department of Agriculture Water and the Environment	Tasmanian Agricultural Productivity Group	Hardie, MA, John McPhee	Evaluating the feasibility of developing a Y-Span center pivot irrigator
Department of Education, Skills and Employment	University of Queensland; Forager Foods; Tas Pure Foods; Defence Science and Technology Group; Gilbert Street Kitchens	O'Reilly-Wapstra, JM (Biological Sciences); Stanley, RA; Sawyer, S; Md Saifullah; Zare, D (TIA); Nolan, G (Architecture and Design); Paull, B (Chemistry); Smith, Jason Alfred (Chemistry); Kefayati, G (Engineering); Tolooiyan, AS (Engineering); Shanks, JD (Engineering)	Boosting research capability to develop value-added products for the food and wood industries in regional areas
Department of Industry, Innovation and Science		Zhang, W; Johnson, CR; Hurd, CL; Bolch, CJS; MacLeod, C; Nowak, BF; Wright, JT; White, CA; Paull, B; Smith, SM; Thickett, SCV; Smith, JA; Quirino, JP; Swarts, ND; Newstead, T; Grimmer, EL; Nichols, RL; Rajaguru, R; Guven, N; Alexander, KA	Marine Bioproducts Cooperative Research Centre
Department of Industry, Science, Energy and Resources	BioAg	Quin, PR	Analysis of a proprietary liquid bio-stimulant - Phase 2
Department of Natural Resources and Environment Tasmania		Barry, KM; Evans, KJ; Buntain, M	Expanding crop protection options for control of blueberry rust
Department of Natural Resources and Environment Tasmania	True South	Keane, JP (Sustainable Marine Research Collaboration); Swarts, ND	Commercial upscaling of urchin fertiliser
Department of Natural Resources and Environment Tasmania	Simplot	Keane, JP (Sustainable Marine Research Collaboration); Swarts, ND	Commercial upscaling of urchin fertiliser
Department of Natural Resources and Environment Tasmania	Grigg Bros, Mountain Vale Berries	Barry, KM; Horton, BJ; Scott, JB; Buntain, M; Pearce, T; Evans, KJ	New On-farm Strategies for the Prevention and Control of Blueberry rust in Tasmania
Department of Natural Resources and Environment Tasmania	Wine Australia; Wine Tasmania	Sawyer, S; Close, DC; Swarts, ND	Beating smoke taint with sparkling wine: Climate Change Adaptation for the Tasmanian wine industry

Funding body	Industry partners	Research team	Title of project
Department of Natural Resources and Environment Tasmania	SeaForest; Fonterra; Dairy Australia; Mr Simon Foster; Mr Julian Von Bibra; Mr Richard Gardner	De Hayr, BR ; Harrison, MT; Bowman, JP; Hunt, I; Rawnsley, RP	On-farm adoption of low emissions feed technologies for improved profitability of the Tasmanian livestock sector
Department of Natural Resources and Environment Tasmania	NRET	Smith, Rowan; Martin, GI; Hunt, Ian	Tasmanian Pasture Resource Audit II - Botanical composition of Tasmanian pastures in 2022
Department of Natural Resources and Environment Tasmania	NRET	Kumar, Saideepa; Kilpatrick, SI (Education); Barnes, NR; Williams, L	Research-based monitoring, evaluation and learning to support the Farm Business Resilience Program in Tasmania
Diemen Pepper	Diemen Pepper	Barry, KM; Wilson, Matthew; Brodribb, TJ (Biological Sciences); Cahill, D	Developing tools to screen native pepper for resistance to dieback and tolerance to drought
Essential Oils of Tasmania	Essential Oils of Tasmania	Close, DC; Menary, RC; Claye, CJ	Boronia germplasm collection re-vitalisation
Fisheries Research & Development Corporation	True South	Swarts, ND; Keane, JP (Sustainable Marine Research Collaboration)	FRDC Sea Urchin Fertiliser Project
Future Drought Fund- Ideas Grant	DAFF	Barnes, Nicoli ; Kilpatrick, Sue (Education); Weichelt, Pattie	Roadmap for a Regional Agri-Food Knowledge Cluster in north-west Tasmania
Grains Research & Development Corporation	Seed Force Pty Ltd; Southern Farming Systems	Zhou, Meixue; Johnson, PG; Fan, Yun	Introgressing waterlogging tolerance gene to commercial barley varieties
Grains Research & Development Corporation	UQ; Southern Growers; Irrigated Cropping Council; Irrigation Research and Extension Committee (IREC); Southern Farming Systems	Harrison, MT; Ara, I; Phelan, DC	Optimising farm scale returns from irrigated grains: maximising dollar return per megalitre of water
Grains Research & Development Corporation	QDAF; SARDI; WA DPI; NSW DPI; Adelaide U; SQU; ANU	Zhou, Meixue; Johnson, PG	Minimising the impact of major barley foliar pathogens on yield and profit: Screening of elite breeder material transitioning to a fee for service model
Grains Research & Development Corporation	QDAF; SARDI; WA DPI; NSW DPI; Adelaide U; SQU; ANU	Zhou, Meixue	Minimising the impact of major barley foliar pathogens on yield and profit: Surveillance and monitoring of pathogen populations
Grains Research & Development Corporation	QDAF; SARDI; WA DPI; NSW DPI; Adelaide U; SQU, ANU	Zhou, Meixue; Johnson, PG	Minimising the impact of major barley foliar pathogens on yield and profit: Development of international pathogen / host diversity sets

Funding body	Industry partners	Research team	Title of project
Holsworth Wildlife Research Endowment		Barry, KM; Swarts, ND; Glen, M; Oliver, GS	Diversity and abundance of arbuscular mycorrhizal fungi in native and managed landscapes in Tasmania
Horticulture Innovation Australia		McPhee, JE; Monckton, DC	Wide Span farming: economic and logistics feasibility study
Horticulture Innovation Australia		Allen, GR; Quarrell, SR; Gracie, AJ	Honey bee health and pollination under protected and contained environments
Horticulture Innovation Australia	Hansen Orchards; Reid Fruits	Close, DC; Bound, SA	Protected cropping for high value horticultural production: effects of climate modification and growing systems using cherry as a case study
Horticulture Innovation Australia		Wilson, CR; Tegg, RS; Eyles, A; Baldwin, Samantha	Mechanisms and manipulation of resistance to powdery scab in potato roots
Horticulture Innovation Australia	Biosecurity Tasmania; SARDI; Lenswood Co-op SA; Fruit Growers Tasmania	Bound, SA; Buntain, M; Cover, I; Tarbath, M; Westmore, G; Crisp, P; James	Pilot Sterile Codling Moth Releases for the Apple industry
Horticulture Innovation Australia	Simplot; McCains, SARDI	Tegg, RS; Rettke, M; Cotching, Bill; Beveridge, PW; Wilson, Annabel; Wilson, CR	Investigating the soil pH and nutrition as possible factors influencing pink rot in potatoes - a pilot study
Horticulture Innovation Australia	DPIRD WA; Fruit Producers SA; Agriculture Victoria; DPI NSW	Swarts, ND; Bound, SA; Close, DC; Buntain, M; Hardie, MA; Glen, M	Improved Australian apple and pear orchards soil health and plant nutrition
Horticulture Innovation Australia	Agriculture Victoria	Lefoe, G; Quarrell, SR	Strengthening cultural and biological management of pests and diseases in apple and pear orchards
Horticulture Innovation Australia	Agriculture Victoria	Goodwin, Ian; Bound, SA	Developing smarter & sustainable pear orchards to maximise fruit quality, yield & labour efficiency (AP19005)
Horticulture Innovation Australia	Botanical Resources Australia	Scott, JB; Pearce, T; Weichelt, PE	Development of regional risk models for fungal diseases in pyrethrum
Horticulture Innovation Australia	Bejo Australia; Potatoes NZ; Simplot; Premium Fresh; Scottish Society for Crop Research; Botanical Resources Australia; Reid Fruits; Hansen Orchards; Costa Group; Driscoll's Australia; South Pacific Seeds and Fruit Growers Tasmania and contributions from the Australian Government	Swarts, ND; Close, DC; Scott, JB; Wilson, CR; Gracie, AJ; Buntain, M; Tegg, RS	Sustainably growing horticulture value in cool climate Australia

Funding body	Industry partners	Research team	Title of project
Horticulture Innovation Australia		Gill, WM ; Close, DC	MU21007 Pest and disease management for the Australian mushroom industry
Horticulture Innovation Australia		Quarrell, SR; Finch, J	Using pheromones and traps in the management of mirids and vegetable bugs
Horticulture Innovation Australia	Agriculture Victoria and DPI NSW	Quarrell, SR; Finch, J; Buntain, M; Hunt, I	Integrated pest management approaches to address pest challenges in raspberry and blackberry
Martha Jane Medical	Martha Jane Medical	Close, DC; Menary, RC; Garland, SM	Understanding and manipulating environmental factors for targeted cannabinoid production
Meat and Livestock Australia	10 farmers in Involve and Partner activities	Smith, Rowan; Martin, GI; Ball, PD; Penrose, B; Langworthy, A	Growing red meat productivity through the selection and establishment of perennial legumes
Meat and Livestock Australia	CSIRO and NSW DPI; Simon Foster; Merton Vale	Smith, Rowan; Martin, GI	Serradellas for new environments
Meat and Livestock Australia	Northern Co-operative Meat Company; JBS Australia; Tasmanian Quality Meats; Australian Country Choice; Ziggys; Vermey's Quality Meats Butcher; Freshline Tasmania	Kocharunchitt, C; Ross, T; Bowman, JP; Pagnon, JC (Medicine)	Development of shelf life models for beef, lamb and pork
Meat and Livestock Australia	Northern Co-operative Meat Company; JBS Australia; Tasmanian Quality Meats; Australian Country Choice; Ziggys; Vermey's Quality Meats Butcher; Freshline Tasmania	Kocharunchitt, C ; Ross, T; Bowman, JP; Pagnon, JC (Medicine); Mellefont, LA	Application of glucose as a novel approach for shelf-life extension of vacuum-packed chilled sheep meats
Meat and Livestock Australia	MLA Donor Company (MDC); NSW Department of Primary Industries; University of New England; University of Melbourne; CSIRO	Harrison, MT ; Turner, LR; Christie, KM; Ball, PD	NEXUS project: exploring profitable, sustainable livestock businesses in an increasingly variable climate
Meat and Livestock Australia	RMCG Consultants; Mullion Group Canberra; CSIRO; NSW DPI; South Coast NRM; Integrity Ag and Environment; University of Melbourne	Harrison, MT; Christie, KM; Hovenden, MJ (Biological Sciences)	Sustainable pathways to CN30
Seed Force Pty Ltd	Seed Force Pty Ltd	Zhou, Meixue; Lovell, Rebecca	Barley waterlogging tolerance improvement program
Scion New Zealand Forest Research Institute Limited		Allen, GR; Quarrell, SR	Host relationships of the proposed biocontrol agent for New Zealand, Eadya paropsidis
Simplot Australia	Simplot Australia	Wilson, CR; Wilson, Annabel; Tegg, RS	Germinate to Exterminate - Simplot
Simplot Australia	Simplot Australia	Tegg, RS; Wilson, CR	Lily the pink

Funding body	Industry partners	Research team	Title of project
South Australian Research and Development Institute	SARDI; MLA, Dairy Australia; AgriFutures; AWI; State Departments of Agriculture	Smith, Rowan; Martin, GI	Australian Pastures Genebank – Temperate Regeneration and Characterisation Program
South Australian Research and Development Institute	SARDI	Barry, KM; Sosnowski, MR	Management and diagnosis of grapevine trunk disease in vineyards and nurseries
Southern Regional Natural Resource Management Association	NRM South	Harrison, MT; Barnes, NR; Horton, B	Farming Forecaster: Co-developing and improving digital tools for increased drought resilience with and for Tasmanian Farmers
Theo Murphy Initiative 2022/2023 Flagship Grant		Kumar, Saideepa; Evans, J (Health and Medicine); Barnes, NR; Polina, A (Nulungu Research Institute)	Empowering cross-cultural women's knowledge on Water and River Country and wellbeing)
W & E Health Pty Ltd		Close, DC; Eyles, A; Garland, SM	Research Hub for Traditional Chinese Herbs
Wheen Bee Foundation		Quarrell, SR	Powerful Pollinators 2022
Wine Australia		Swarts, ND; Jones, JE	Science to inform decision making between synthetic and alternative nitrogen sources in vineyards: Top-up scholarship and operating

2022 TIA Publications

Journal Article

Adnan, M* and Fahad, S* and Saleem, MH* and Ali, B* and Mussart, M* and Ullah, R* and Amanullah Jr, A* and Arif, M* and Ahmad, M* and Shah, WA* and Romman, M* and Wahid, F* and Wang, D* and Saud, S* and Liu, K and Harrison, MT and Wu, C* and Danish, S* and Datta, R* and Muresan, CC* and Marc, RA*, "Comparative efficacy of phosphorous supplements with phosphate solubilizing bacteria for optimizing wheat yield in calcareous soils", ***Scientific Reports***, 12 (1) Article 11997. ISSN 2045–2322 (2022) (IF=4.379) [Refereed Article]

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Harrison, MT, "Farms sought for greenhouse gas study", Stock and Land, Australian Community Media, Australia, 17 February 2022 (2022) [Media Interview]

Harrison, MT, "Finalist for the Fonterra Australia Agriculture Award" (2022) [Award]

Harrison, MT, "Interview with ABC Southwest Victoria radio on WaterCan", Western Victoria, Mildura Swan Hill and Central Victoria Rural Report, ABC South West Victoria, Victoria, Australia (2022) [Media Interview]

Harrison, MT, "Invitation to attend LETS 2022 Expert Focus Group on Livestock Feed Supplements", Office of the Special Adviser on Low Emissions Technology, Australia (2022) [Award]

Harrison, MT, "Invitation to be grant assessment panel member for AgriFutures open funding application 'Building Capacity On–Farm to Reduce Emissions and Support Environmental Stewardship RFQ'", AgriFutures, p. 1. (2022) [Award]

Harrison, MT, "Invitation to join international soil carbon modelling intercomparison group based on quality of past research in this field", Environmental Defense Fund, pp. 1–2. (2022) [Award]

Harrison, MT, "Invitation to participate in Dairy Australia's work on reducing methane emissions as a committee member", Dairy Australia, pp. 1–2. (2022) [Award]

Harrison, MT, "Invitation to review large–scale funding proposal for FAPESP, the Sao Paulo Research Foundation, to establish Sustainable Livestock Research, Innovation and Dissemination Centre", Sao Paulo Research Foundation (2022) [Government or Industry Research]

Harrison, MT, "Invitation to review scientific aspects of online climate information resource for Limestone Coast Landscape Board SA", Limestone Coast Landscape Board, Mount Gambier, South Australia, 6 July 2022 (2022) [Award]

Harrison, MT, "Invitation to sit on national grants assessment committee for AgriFutures", AgriFutures, pp. 1–2. (2022) [Award]

Harrison, MT and Muleke, A and Monjardino, M* and Eisner, R, "Key Learnings: Irrigation and climate change – Yields, sowing periods, flowering times", Irrigated Cropping Council/Grain Research & Development Corporation, Australia, 30 May 2022 (2022) [Government or Industry Research]

Harrison, MT, "MLA and partners seeking answers to red meat carbon neutrality", Stock and Land, Australian Community Media, Australia, 19 February 2022 (2022) [Newspaper Article]

Harrison, MT, "New study proves soil carbon sequestration to plummet by 2050", The Weekly Times, Tasmania, 8 March 2022 (2022) [Media Interview]

Harrison, MT, "Recognition of 'Finalist for the Fonterra Australia Agriculture Award by Elise Archer MP" (2022) [Award]

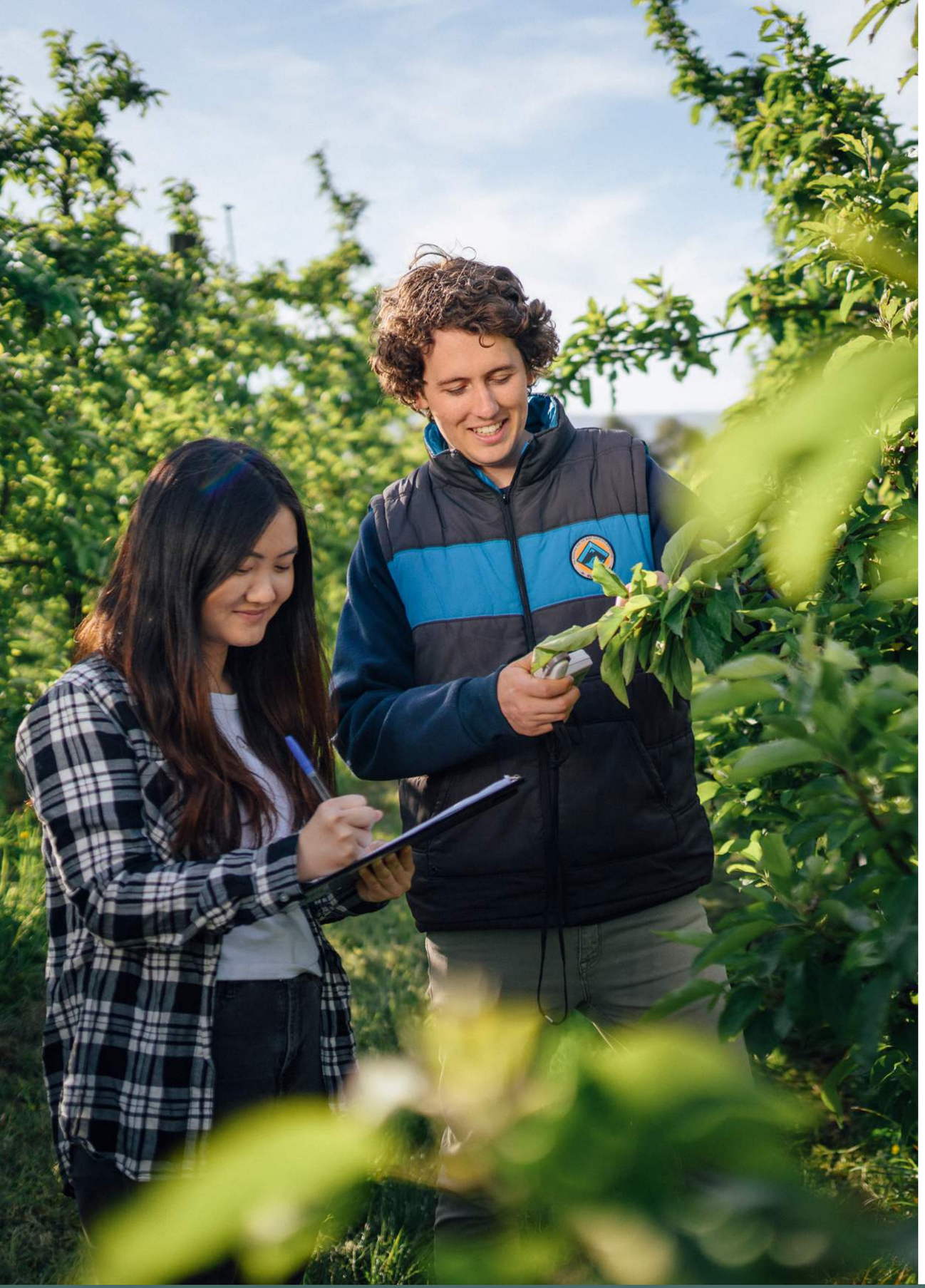
Harrison, MT, "Soil carbon markets: science or snake oil? Matthew Harrison, Tasmanian Institute of Agriculture", Australian rural and regional news, Online, 23 November 2022 (2022) [Media Interview]

Muleke, A and Monjardino, M* and Eisner, R and Harrison, MT, "Key learnings from the Optimising Irrigated Grains Economics Team", Grain Research & Development Corporation, Australia (2022) [Internal Newsletter]

Zhou, M and Shabala, SN and Harrison, MT and Shabala, L, "2022 College Research Excellence Award" (2022) [Award]

Zhou, Meixue and Shabala, SI and Harrison, M and Shabala, S, TIA Crop Improvement Team, "2022 College Research excellence Award", University of Tasmania, Hobart, Tasmania, 13 September 2022 (2022) [Award]

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



Financial Report

TASMANIAN INSTITUTE OF AGRICULTURE (TIA)

NOTES TO ACCOMPANY FINANCIAL DETAILS

The financial details reported here relate to TIA activities for 2022. 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**	
	2022 Operating Grant Funds to TIA/School of Agricultural Science	$4,500,000
	2022 University Research Scholarships to PhD students studying in areas related to TIA activities	$1,217,336
	TOTAL University of Tasmania contribution	**$5,717,336**
2.	**Department of Primary Industries, Parks, Water & Environment (DPIPWE)**	
	CRF funds granted to TIA for the 1 January 2022 to 31 December 2022 financial year under the TIA Joint Venture Agreement	$5,829,322
	TOTAL DPIPWE contribution	**$5,829,322**
3.	**Industry - including private industry and National Competitive Research grants**	
	2022 Industry research grants held by the University for TIA activities	$14,593,218
	TOTAL Industry contributions	**$14,593,218**

CERTIFICATION OF FINANCIAL DETAIL

We certify that the financial detail contained in the 2022 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.

.....24 / 03 / 2023
Professor Michael Rose
Director TIA

..... 29 / 03 / 2023
Ben Rose
Chief Financial Officer,
Financial Services
University of Tasmania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