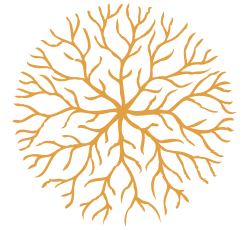




THE UNIVERSITY
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Annual Report 2018

WAITE RESEARCH INSTITUTE

adelaide.edu.au/wri

The Peter Waite Legacy and Vision

Peter Waite was a visionary. The son of a Scottish farmer, he immigrated to Australia in 1859 and prospered in the fledging colony of South Australia. Throughout his journey from the pastoral lands of the mid-north of South Australia to the boardroom of the “General and Commission Agent Company”, later to become Elders Smith & Co Ltd, Peter Waite embraced and developed innovative and contemporary farming practices.

Peter Waite gifted his homestead, Urrbrae House, and the surrounding property of 299 acres (121 ha) to The University of Adelaide in 1923 for education and research purposes. The Waite Agricultural Research Institute commenced operations on the site in 1924.



In explaining his gift, Peter Waite wrote:

“I have been much influenced by the wonderful work our agriculturalists and pastoralists have accomplished hitherto in the face of the very great odds they have had to meet. With comparatively little scientific training they have placed our wheat, wool and fruit in the highest estimation of the world: our sheep have been bought to such perfection that they

are sought after not only by all our sister states, but South Africa. Our agriculture machinery has been found good enough even for Americans to copy; and our farming methods have been accepted by other states as the most up-to date and practical for Australian conditions. We have now reached a point when it behoves us to call science to our aid to a greater extent than hitherto has been done, otherwise we cannot hope to keep in the forefront.”





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The Waite at a glance

The Waite is Australia's most recognised and respected agricultural research and teaching brand

The Waite Campus is the largest concentration of agricultural research and teaching expertise in the Southern Hemisphere. Located in the south-eastern suburbs of Adelaide, South Australia, the precinct hosts:

- > The University of Adelaide's School of Agriculture, Food and Wine (AFW)
- > CSIRO (Agriculture & Food, Land & Water, and Mineral Resources)
- > South Australian Research and Development Institute (SARDI)
- > Australian Wine Research Institute (AWRI)
- > Australian Genome Research Facility (AGRF)
- > Arris Pty Ltd
- > Fight Food Waste Cooperative Research Centre
- > Food SA
- > Pland & Food Research (Australia)
- > Urrbrae House Historic Precinct, including the Waite Arboretum

In addition, the Waite hosts the following specialist research centres and breeding programs of national significance:

- > Australian Plant Phenomics Facility (The Plant Accelerator)
- > ARC Centre of Excellence in Plant Energy Biology (node)
- > ARC Industrial Transformation Training Centre for Innovative Wine Production
- > ARC Industrial Transformation Research Hub for Wheat in a Hot, Dry Climate
- > Wine Innovation Cluster (WIC)
- > The University of Adelaide/Shanghai Jiao Tong University Joint Lab for Plant Science and Breeding
- > The Fertiliser Technology Research Centre
- > National breeding programs for almonds, oats, durum wheat, and faba beans.



Over the last 90+ years, the Waite Campus has developed through the pursuit of excellence in agricultural science and collaboration between the co-located organisations to become:

- > Australia's most recognised and respected agricultural research and teaching brand
- > A global leader in agriculture, food, wine and natural resources science, exploring and informing critical national and global issues and challenges such as Australian agriculture industry competitiveness, food security, sustainable intensification of agricultural production, advanced agricultural systems, and adaptation to climate variability and change
- > An international model of research, development, industry application and teaching through the co-location of institutional partners, with capability in whole of value chain approaches from gene discovery to consumer needs
- > Renowned for high-quality education and training in agriculture, food and wine through undergraduate and postgraduate coursework and research degree programs
- > A leading centre of research capability for grains, plant breeding, soil and wine science and natural resource management within Australia.

15 world-class research organisations and centres

1500 research and technical staff

450+ undergraduate students

180+ postgraduate students

\$120+ million research income/ expenditure per annum

\$270 million research and teaching infrastructure

A consistent high-impact publication record

Internationally recognised for delivering transformational and high impact agricultural technologies and systems



The WRI aims to contribute solutions to the emerging challenges of global food security and agricultural sustainability by stimulating and supporting internationally-competitive research.

Where does the WRI fit in?

The Waite Research Institute (WRI) was established in 2009/10 to reinvigorate the vision and legacy of Peter Waite and support The University of Adelaide's commitment to agricultural research, development and teaching, which is primarily embodied in the School of Agriculture, Food & Wine (AFW), and to the Waite precinct.

The Waite brand carries an iconic status world-wide that the University wants to ensure remains synonymous with research of the highest quality, focused on innovative solutions for improving agricultural systems.

The co-location of several complementary non-University research organisations such as CSIRO, the Australian Wine Research Institute (AWRI), the South Australian Research and Development Institute (SARDI) and companies including AGRF and Plant & Food Research (Australia) is a unique aspect and strength of the Waite precinct. There are strong collaborative links between these

organisations and much of the Campus infrastructure results from co-investment by these partners.

The WRI supports the University in developing and funding strategically important initiatives and by building research capacity and performance through investment in people and infrastructure.

The WRI has resourced and coordinated support for both new research initiatives, and existing areas of strength. The intention is to drive research activity in new and exciting areas that have national and international appeal.

In pursuing these aims, the WRI has invested in research leadership and ECR professional development, equipment purchases, small and large projects of strategic value, salary support for key research staff at various stages, large grant and Centre of Excellence bids and grant-writing support.

The WRI also supports the Waite precinct and the internationally-recognised Waite brand by providing a valuable 'front door' service and central coordination point for communications, and by supporting and resourcing a range of initiatives that include shared events, a precinct website, and facilitation of workshops, symposia and meetings that enhance multidisciplinary collaboration.

Increases in the Waite's competitive research grant funding and industry collaborations, publication numbers and HDR completions have all occurred on the WRI's watch, and the Excellence in Research Australia (ERA) rankings for all Waite-based disciplines remain above (4*) or well above (5*) world-class.



2018 Highlights

Awards, Grants and Publications

WRI members won more than \$36m (approximately a fifth of the University's and more than half the Faculty of Science's total) external research grant income for the 2018 calendar year, and produced 420 peer-reviewed publications. The record level of HERDC income included further funding for The Plant Accelerator, royalties from plant breeders rights, the highest-ever level of industry contract research and a significant increase in Category 1 grants.

The WRI initiated and supported Eureka Prize, SA Science Excellence, Young Tall Poppy and Faculty Research award nominations for AFW researchers and supported the cost of grant writing assistance for several applications. Big winners in 2018 included Dr Caitlyn Byrt (ASPS Peter Goldacre Award and an ARC Future Fellowship), Dr Phil Brewer (ARC Future Fellowship), Dr Michelle Wirthensohn (awarded a further \$1.5m from Horticultural Innovation Australia for the National Almond Breeding and Evaluation Program she leads) and Dr Glenn McDonald (leading a \$2m optimising crop establishment project for the GRDC).

The Waite year finished strongly, with two of the University's four Adelaide Enterprise Accelerator Awards announced in early December won by WRI members, Professor Rachel Burton and A/ Professor Cassandra Collins.

Highly Cited Researchers

One quarter (3 of 12) of The University of Adelaide's researchers appearing on the global Highly Cited Researchers list for 2018 were WRI members. Professors Peter Langridge, Sally Smith and Andrew Smith were identified as researchers whose work has been most influential and most extensively cited by others over the past decade.

Waite Tours and Visits

The WRI coordinated, hosted and supported Waite campus tours and meetings for more than 250 visitors in 2018, including farmers groups, diplomats and ambassadors, alumni, secondary school students, private companies, government ministers, university managers and international research and business delegations.

Communications and Engagement

Managed and resourced by the WRI, the Waite precinct website (thewaite.org), is a valuable and heavily-used portal that is enhancing interaction and communication across the Waite and with external stakeholders. Averaging 3,600 visitor sessions and listing 20 events/seminars from across the precinct each month, the site has 680+ subscribers to the weekly update and features high-quality agriculture, food and wine content that is regularly drawn on by UA communications and external media outlets.

Other WRI communications and engagement highlights in 2018 included:

- > Winning a National Science Week grant for *Conversations with Women of Waite*, held on 16 August at Lirra Lirra; this event achieved excellent engagement and very positive feedback from the 140-strong public audience.
- > Support for events such as the national AgEd Symposium at Waite, AFW Research Day and the launch of the ARC Industrial Transformation Training Centre for Innovative Wine Production.
- > The Adelaide Convention Bureau's second Agriculture, Food & Wine Showcase in July brought sector influencers from across the country together to highlight Adelaide's innovation credentials and infrastructure with a site visit to Waite and a program of talks.
- > A 'Future Food' episode of *Catalyst* featuring a number of WRI researchers aired on ABCTV on 21 August. The WRI

facilitated and coordinated the filming of these segments, and the Waite precinct was strongly and positively promoted in the course of the program.

- > In conjunction with the University's AgriFood & Wine Industry Engagement Priority (AFW IEP), a one-day AgTech workshop held on 17 October at the National Wine Centre, attended by 80 researchers, influencers, funders, and end users.
- > *Waite in the Spotlight*, a large public engagement event with short TEDx-style talks on a range of agriculture, food and wine science topics, and speakers drawn from across the Waite Campus partners, was held on 1 November.

Strategic and Business Development Activities

The WRI supported the University's Agrifood and Wine IEP throughout 2018, providing \$230K and 0.6FTE in-kind support to help kick-start food innovation initiatives for the University.

A further 12 months WRI funding was approved late in the year, pending decisions to be made around the University's research strategy and support structures, including investment in (and the precise scope and remit of) Themes/IEPs.

The WRI continued its ongoing support of the Waite precinct partnerships, strategic investments in key projects and individuals, professional development and mentoring for early and mid-career researchers, and engaged in business development activities with several companies, including the Australian Genome Research Facility, Jurlique, Orlar Pty Ltd, Lumigrow and Bickfords.

The WRI also supported the University's ERA submission for agricultural science, a 'Big Ideas' proposal around a National Precinct for Transformational Agriculture' for SA, and ECMS/AFW engagement efforts.

ERA 5 well above world standard

Plant biology

Crop & pasture science

Horticultural production

Animal & veterinary science

ERA 4 above world standard

Soil science

2018 Excellence in Research Australia results

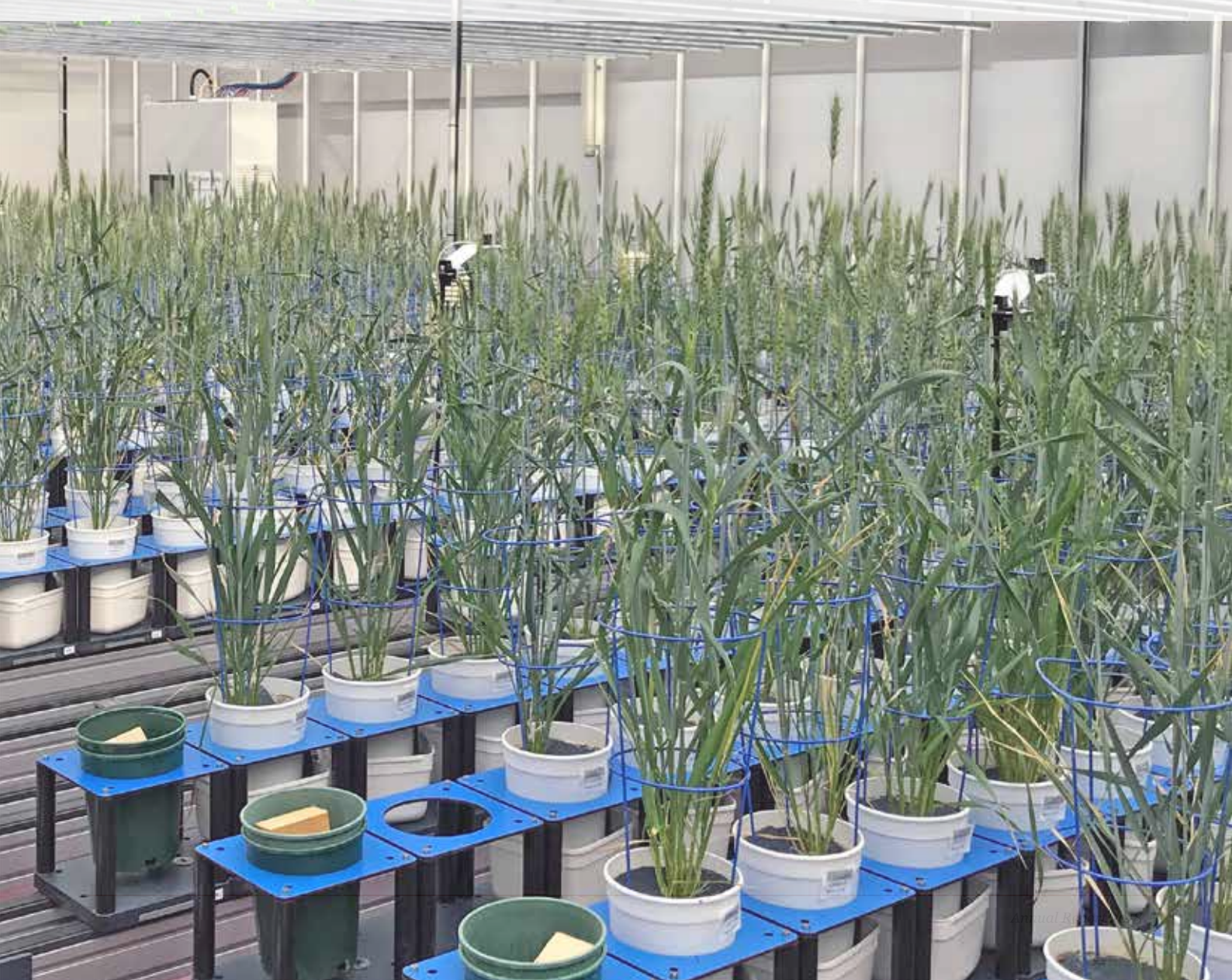
Announced in late March 2019, the results of the 2018 Excellence in Research Australia (ERA) benchmarking assessment of research quality and impact across universities were outstanding for the scientists at the Waite and Roseworthy campuses. For ERA purposes, agricultural and veterinary sciences are grouped together as a broad discipline area, including both plant and animal sciences.

The Waite-based disciplines of Plant Biology, Crop and Pasture Science and Horticultural Production (including Viticulture & Oenology) all achieved the maximum 5* ranking (well above world standard) and Soil Science

was ranked 4* (above world standard). At Roseworthy, Animal & Veterinary Science was also ranked 5*.

The WRI played a pivotal role in producing a joint animal and plant sciences statement for the new 'Engagement and Impact' part of the assessment, highlighting compelling examples of industry (and end user) engagement and societal impact from across several scientific disciplines and two campuses.

Outputs such as new cereal crop and almond varieties and more effective animal vaccines, as well as a cohesive presentation of the case, led to Agricultural & Veterinary Sciences achieving the maximum possible score of High across the three assessment criteria, one of only four UA discipline areas to do so.



WRI goals, structure and governance

WRI Goals

In 2018, the WRI's activities continued to be focussed on the broad goals of:

1. Growing the quality of Waite science
2. Enhancing the reputation of the Waite
3. Increasing collaboration across the Waite
4. Developing Waite people for the future

In 2018, the WRI's investment decisions and financial reporting were managed through the School of Agriculture, Food and Wine.

The Research Committee, convened by Professor Matt Gilliham, the School's Deputy Head (Research), met regularly to assess opportunities and review applications.

The WRI continues to seek, assess and support opportunities

- > for building research excellence and capacity in areas that align with existing and emerging strengths in agriculture, food and wine;

- > that have strategic value for the School of AFW, the Waite and the University;
- > that can demonstrate breadth of impact;
- > that offer value for money through leveraging co-investment;
- > that deliver tangible returns;
- > that foster multi-disciplinary efforts to address important problems.



WRI Staff

The WRI was supported by a small, multi-skilled team of two staff (1.9 FTE) in 2018, an interim year pending funding, remit and leadership decisions.



A/Prof Chris Ford
Interim Director



Prof Matt Gilliham
Deputy Director



Prof Andy Lowe
Deputy Director



Ms Carolyn Mitchell
Executive Officer



Mrs Keryn Lapidge
Communications Officer (0.9 FTE)

Investment in research that future-proofs and ensures profitable and productive agriculture in the face of limited natural resources, increased costs of energy and inputs, urbanisation and environmental degradation is critical for the planet and our growing population.

The agriculture, food and wine sector must meet these challenges against a background of serious climate change impacts such as seasonal instability, severe heat and storm events, warmer regions becoming marginal for some enterprises, and the need to reduce carbon emissions.

These complex and inter-dependent issues need the kinds of high quality, integrated and interdisciplinary research that the Waite can provide.

The WRI continues to perform a key enabling role, supporting investment in major and unique research infrastructure and services that attract leading researchers and enable research excellence.

Developing future leaders, investing in professional development, coaching and mentoring programs for the School's early to mid-career scientists has been a core building block in these efforts, with graduates of the WRI's flagship Research Leadership Development Program continuing to perform strongly across a range of measures.

In addition, the WRI supports the annual School of AFW Research Day and a range of ad hoc symposia, seminars and other events that further the development of the School's young researchers via opportunities

to present their work and network with peers and collaborators.

The WRI also provides strategic support for individuals, partnerships and Centres in key strength areas to maximise the opportunities for innovative and significant research at the Waite.

Salary support for Professor Dabing Zhang, who leads the UA-Shanghai Jiao Tong University Joint Laboratory in Plant Science and Breeding, is an example of how this is paying off for the University through high-impact publications, citations and external grant funding.

A selection of AFW projects funded in 2018

^ Applications that received WRI input/support/investment in development

* Graduates of the WRI's Research Leadership Development Program



Reflecting the breadth and diversity of the School of AFW's research and funding sources, the following list is a cross-section of projects/Centres/programs funded in 2018.

Horticulture Innovation Australia (HIA)

Project title: National almond breeding and evaluation program

Primary Investigator: Dr Michelle Wirthensohn*

Funding amount: \$3,385,290

Project summary: The University of Adelaide leads the national almond breeding and evaluation program. In 2016/17 six new varieties of almond were released commercially to the industry. In 2018 the program was again funded by Horticulture Innovation Australia for a further five years. This investment is continuing to run a targeted breeding program to develop new almond varieties with improved production characteristics, while progressing the evaluation of varieties from earlier iterations of the program and from overseas breeding programs. The aim is to ultimately provide industry access to new varieties that are high-yielding, with self-fertility, improved disease tolerance, closed shells and desirable visual and eating qualities. This program builds on HIA's earlier investment *Australian almond variety evaluation and commercialisation program*.

Grains Research & Development Corporation

Project title: Optimising plant establishment, density and spacings to maximise crop yield and profit in the southern and western regions

Primary Investigator: Associate Professor Glenn McDonald

Funding amount: \$1,997,000

Project summary: This project is led by the University of Adelaide and involves grower groups in Victoria, SA and WA and the University of SA. The purpose of the project is to understand the importance of crop establishment, density and row spacing to the yields of canola and pulse crops in the southern and western regions. The project will conduct a survey of crop establishment in commercial crops and establish a number of seeder demonstration and comparison trials. In addition, small plot field experiments will be conducted over three seasons exploring the opportunities for improved sowing techniques to reduce seed rates and costs, and increase crop uniformity, yield and profit. The concept of more precise seeding

will be tested in three crops with contrasting seed size, canopy development and growth patterns – canola, lentil and faba bean in the south and canola, wheat and lupin in the west.

State Government of South Australia and Consortium partners

Project title: Research Consortium – Agricultural Product Development[^]

Primary Investigator: Professor Vincent Bulone

Funding amount: \$10,900,000

Project summary: Increasing the value of agriculture waste and turning it into new products will be the outcome of a new research consortium led by The University of Adelaide. The Research Consortium – Agricultural Product Development – has been granted \$4 million over four years by the State Government through its Research Consortia Program. The University of Adelaide is contributing \$2.3 million (cash and in-kind) with the remaining support coming from a range of partners.

The Consortium will bring together a total of 18 partners to develop high-value products from agricultural waste: nine South Australian-based companies from the agriculture and food sector, and another nine national and international academic institutions and industry partners.

The Consortium partners are: The University of Adelaide, University of South Australia, CSIRO, KTH Royal Institute of Technology (Sweden), Filsell's Orchards Pty Ltd, Raw Nation Wholefoods Pty Ltd, AE Cranwell & Sons, Ashton Valley Fresh, JVJ Co Pty Ltd, Vanquish Technologies, SA Mushrooms, Coopers Brewery Ltd, Potatoes South Australia Inc, CarbOzide Pty Ltd, Agilent Technologies Australia Pty Ltd, Plant & Food Research, Ingredient Inc (USA), Carlsberg Group A/S (Denmark)

Australian Research Council

ARC Future Fellowship

Recipient: Dr Philip Brewer[^]

Project title: Targeting root architecture to improve plant production in sub-optimal soil

Funding amount: \$763,527

Project summary: This project aims to identify important missing links in the signalling pathways that connect major plant hormones in their control of root architecture, with a focus on the signalling system that helps plants cope with sub-optimal growing

conditions. New discoveries in plant hormones will be applied to crops to provide a deeper understanding of root growth responses under sub-optimal conditions, and to maximise plant efficiency. Expected outcomes include a better understanding of signal pathways in roots, improved knowledge about how crops respond to adverse conditions, new knowledge and potential genetic resources for plant industry, and novel ideas about how to improve crop productivity.

PIRSA Advanced Food Manufacturing (Major) grants

Project title: Nutrient dense foods for healthy ageing

Primary Investigator: Potatoes SA, in collaboration with Dr John Carragher[^], Test Kitchen Pty Ltd, Joyce Gibson (accredited dietician) and Thomas Farms Kitchen

Funding amount: \$320,000 (\$80,000 to UoA)

Project summary: Older people have higher requirements for protein than younger adults but they have diminished appetite and loss of taste sensitivity so it is often difficult for them to meet it.

This project aims to make tasty and nutritious foods specifically for the needs of older people, and so it is necessary to trial new high protein recipes for familiar foods to determine if the taste, flavor, texture and mouthfeel are acceptable for healthy older consumers. Using the expertise of accredited dieticians and food service professionals with experience in meeting the specific nutritional needs of an active ageing population, we have made a range of tasty breakfast items, biscuits, snacks, soups and desserts with additional protein. We are using a range of different animal (whey, meat, eggwhite) and plant (lentil, soy, pea, gluten flour) protein sources. We have set minimum threshold protein values for wet products (soup, ice cream) to be 10 g or protein per 100g of product, and 15g of protein per 100g for dry products (biscuits, cake). These products will meet thresholds that would allow claimable FSANZ content statements such as 'increased source of protein' and 'good source of protein' as applicable.

Strigolactone Inhibition of Auxin Transport in Roots

Phil Brewer was awarded a prestigious ARC Future Fellowship in 2018 and has joined the Centre for Plant Energy Biology at the University of Adelaide's Waite Research Institute. He completed his PhD at Monash University and gained postdoctoral experience at Tübingen University and the University of Queensland.

Phil's research interest involves the way plant hormones help plants to respond to changed growth conditions. His research has focused on strigolactone production and action, particularly how that relates to auxin and the transport of auxin. Strigolactones have risen to prominence as regulators of shoot branching, root architecture and plant-fungi symbiosis. They help plants cope with sub-optimal growth conditions, such as low nutrients, shading, cold, drought and salinity, and attack from pathogens or parasitic weeds.

Although strigolactones may function directly in responsive plant cells through regulating gene expression, they also display a distinctive non-transcriptional and non-cell autonomous inhibition of auxin transporters.

While Phil's immediate focus is to uncover the mechanism of strigolactone action on auxin transport in Arabidopsis, he also seeks to transfer knowledge about how this may affect root architecture and performance of barley to improve yield under sub-optimal growth conditions.



Dr Philip Brewer

A photograph of a wheat field inside a greenhouse. The wheat is golden-brown and appears to be in the late stages of growth. The greenhouse structure is visible in the background, with a curved metal frame and a translucent covering. A dark red rectangular box is overlaid on the left side of the image, containing white text.

WRI activities and outcomes in 2018

1 Growing the quality of Waite science

1.1 Collaborative and strategic partnerships

Through targeted co-funding support for initiatives and activities of strategic importance, and supporting the continuously available and well-utilised practical assistance of a professional grant application writer, the WRI continues to invest in and support a range of projects, events, individuals and groups from across the multiple research disciplines of the School of AFW.

Some of the key centres, groups and activities benefiting from WRI funds in 2018 are listed below.

ARC Industrial Transformation Research Hub for Wheat in a Hot, Dry Climate

Wheat is a major food for many regions around the world. It is the second most produced crop in the world, providing approximately 20% of the daily calories and protein for 4.5 billion people.

The Wheat Hub brings together university-based wheat researchers and Australia's three major wheat breeding companies to exploit global diversity for wheat and advanced genomic technologies for faster development of heat and drought tolerant varieties which make better use of nitrogen fertiliser.

Through the Wheat Hub, leading breeders gain access to the latest resources in genomics which are difficult to access, constituting a major step in enabling breeding programs to exploit genomics.

During 2018,

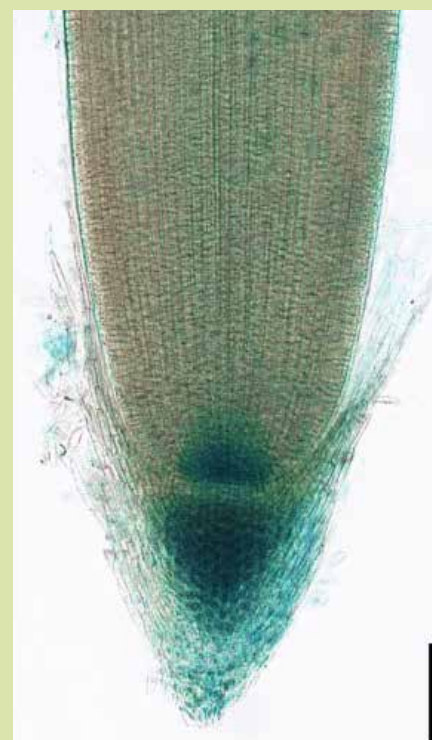
> The Diversity Among Wheat accessions (DAWN) genomics platform, which already included the genomic sequences of 16 Australian varieties, was upgraded. In addition to genomic sequences of another 62 varieties, it is now possible to visualise whole chromosomes, enabling differences between the sequences, linkage blocks and introgressions to be observed thus supporting breeding decisions.

Rice actin binding protein RMD controls crown root angle in response to external phosphate

Root angle has a major impact on acquisition of nutrients like phosphate that accumulate in top soil and in many species, low phosphate induces shallower root growth as an adaptive response. Identifying regulatory genes and mechanisms controlling root angle is therefore of paramount importance to plant breeding.

The actin-binding protein Rice Morphology Determinant (RMD) controls root growth angle in response to external phosphate via linking actin filaments and gravity-sensing organelles termed statoliths. RMD is up-regulated in response to low external phosphate and mutants lacking of RMD have steeper crown root growth angles that are unresponsive to phosphate levels. RMD protein localises to the surface of statoliths and RMD mutants exhibit faster gravitropic response owing to more rapid statoliths movement.

Adaptive changes to root angle in response to external phosphate availability are therefore RMD-dependent, providing a new target for breeders (Nat Commun. 2018, 9:2346. DOI: [10.1038/s41467-018-04710-x](https://doi.org/10.1038/s41467-018-04710-x)).



GUS staining of the primary root tips of the seedlings carrying proRMD::GUS. Bar, 200 μm

- > Steps in a drone imaging pipeline were developed to measure accurately plot size, quality, establishment, plant height and canopy greenness. A workshop was run to train breeders in planning and flying phenotyping missions. Coupled with genomics tools, this platform will increase the genetic gain of breeding programs by selecting the best plants faster and screening them more accurately.
- > New methods, such as x-ray c/t scanning of grain heads, screening for xylem cavitation in stems and the use of nanophotonics to measure antioxidants in wheat have been developed to phenotype new traits in drought and heat stressed plants, enabling the selection of plants with better tolerance to the stresses.

UA-SJTU Joint Lab in Plant Science and Breeding

Professor Dabing Zhang established the UA-Shanghai Jiao Tong University Joint Laboratory in Plant Science & Breeding at the Waite in January 2015 and has been co-supported by the WRI ever since.

Professor Zhang was a co-author of 10 high-impact publications during 2018, including papers in *Nature* (Genomic variation in 3,010 diverse accessions of Asian cultivated rice. *Nature*, 2018, 557(7703):43-49) and *Nature Communications*. He also had seven PhD students under his supervision and submitted three new fellowship, centre and project applications.

The 2018 year also saw Professor Zhang

make the list of Highly Cited Researchers in China and he was awarded the World Academy of Sciences Prize in Agricultural Sciences for 2018 (for the advancement of science in developing countries).

ARC Centre of Excellence in Plant Energy Biology

Research Highlights for the Plant Energy Biology Centre included work published by Dr Sunita Ramesh and co-authors in *The Plant Cell* titled 'Aluminium-activated malate transporters can facilitate GABA transport', which showed a relationship between GABA levels in plants and the activity of a wheat transport protein import in acid soil tolerance. The expression of the protein reduced GABA levels in the plant root cells within toxic soil by allowing GABA to move out of the cells. The process may allow the degree of stress to be communicated across cells.

Professor Rachel Burton and her team also published work in *The Plant Cell* and *Plant Physiology* on the discovery of two new polysaccharide in plants and a novel cellulose synthase-like gene family in dicots.

Dr Rakesh David and Professor Matthew Gilliam were awarded a University of Adelaide Interdisciplinary Research Grant to develop a proof-of-concept AI platform. The aim was to use advances in Natural Language Processing and deep learning to automate the curation process and keep biological databases updated. The project involved a partnership with Microsoft.

Dr Allison Pearson, whose research is part of the International Wheat Yield Partnership (IWYP) project in collaboration with other nodes of COE PEB, was awarded a 2018 South Australian Grains Industry Trust grant for phenotypic evaluation of a wheat RIL population for salinity tolerance. Allison was also awarded a 2018 Yitpi Foundation Crop Science Research Grant.



Dr Allison Pearson

ARC Industrial Transformation Training Centre for Innovative Wine Production

The second iteration of this ARC Industrial Transformation Training Centre, again co-supported by the WRI, commenced in February 2018. The Centre was officially launched by then Minister for Education and Training Senator Simon Birmingham at the Waite Campus on 6 June 2018.

As well as meetings of all Centre partners and a workshop, the 2018 year saw the recruitment and commencement of several PhD students and the start of a suite of new projects. These include a comprehensive study of the regional influences and distinctive sensory attributes found in Australian Cabernet Sauvignon wines, and an investigation of what happens to the microbial populations on different varieties of grapes over a vintage and from one

year to the next. Knowledge gained about yeast species present in the vineyard and on grapes that undergo un-inoculated fermentations will help winemakers better steer the microbes and fermentation to a desired outcome.

Administered by The University of Adelaide, the Training Centre for Innovative Wine Production collaborating partners include AGRF, AWRI, CSIRO, Charles Sturt University, the NSW Department of Primary Industries, Pernod Ricard Winemakers, VA Filtration (SA), Coonawarra Grape and Wine, Chalmers Wines Australia, E&J Gallo Winery, Wine Australia, Availer and Lallemand Australia.

The Waite node of Adelaide Microscopy

The Waite node of Adelaide Microscopy provides an invaluable local service to Waite researchers. The WRI co-funds the annual costs of Adelaide Microscopy at the Waite, which include a full-time technical officer/supervisor, and has supported the purchase of microscopes and ancillary equipment through past equipment rounds.

Adelaide Microscopy's Waite Facility provides microscopy instrumentation, expertise, technical advice and training in advanced microscopy. The facility provides a conduit to the North Terrace-based Adelaide Microscopy facility, and nationally to NCRIS-funded Australian Microscopy and Microanalysis Research Facilities.

Comprehensive use of the Waite Facility continued in 2018, with a focus on plants,

The second ARC Training Centre for Innovative Wine Production was officially launched at the Waite Campus on 6 June 2018



Prof Vladimir Jiranek, Senator Simon Birmingham, Nicolle Flint MP, Prof Sue Thomas and Prof Peter Rathjen at the ARC Training Centre for Innovative Wine Production launch.



Biometry Hub researchers Dr Andy Timmins, Peter Kasprzak and Lachlan Mitchell are part of the SAGI-STH project team.

insects, bacteria, yeast, soil, compost, environmental plastics, and manufactured materials. New additions provided by Adelaide Microscopy in 2018 included the Hitachi FlexSEM scanning electron microscope, a Leica FC7 cryo stage for UC6 ultra microtome and deconvolution software for Nikon A1R confocal.

Technical Officer, Dr Gwen Mayo, visited German colleagues to learn and develop plant cryotechniques for protein localisation, cryo-ultramicrotomy, suitable high pressure freezer (HPF) models for plants, HPF plant sample preparation and freeze substitution. These techniques will be integrated into the suite of plant microscopy services offered at Adelaide Microscopy's Waite Facility.

PhD candidate Kara Levin made good use of the Imaris workshop run at North Terrace, to analyse confocal images of nematode infested wheat roots, agarose embedded and vibratome sectioned. Kara's work contributes to understanding of the parasite, cereal cyst nematode, which causes devastating crop loss in cereal crops throughout Australia. Microscopy complements the genetic work on resistance genes, showing possible mechanisms of resistance.

1.2 Sponsored projects

The WRI operates at both local and national levels to facilitate, lead, broker, develop and enhance research activities and initiatives that underpin sustainable agricultural productivity and have the potential to deliver transformational changes to the diverse agriculture, food and wine sector.

Outcomes will continue to be geared to improved farming practices, new plant varieties better able to cope with climate change and disease with enhanced yield, greater food

security, more nutritious food, improved profitability for farmers, and a decreased environmental footprint for agriculture.

The following cross-section of research projects reflects both the diversity of the research undertaken by WRI members and the range of the WRI's support across multiple disciplines and sectors.

The AgriFood & Wine Industry Engagement Priority

The WRI contributed \$230,000 and 0.6 FTE in-kind support in 2018 towards the establishment of the University's AgriFood & Wine Industry Engagement Priority (AF&W IEP), formerly known as the Food Innovation Theme. The IEPs are now formally recognised in the University's strategic plan as key areas of research strength (aligned with industry importance in South Australia), and the WRI has supported the development of the AgriFood & Wine IEP across Faculties, campuses and disciplines. Through salary support for IEP Director (and WRI Deputy Director), Professor Andrew Lowe, Food Commercialisation Manager, Dr John Carragher, and the work of the WRI team, the AgriFood & Wine IEP is now leading the way in:

- > developing appropriate strategies and structures
- > facilitating cross-disciplinary efforts
- > supporting key partnerships and business development activities across the University, and
- > communicating widely with internal stakeholders.

John Carragher supports the AgriFood & Wine IEP in progressing discussions in the food innovation and horticulture areas with government and industry partners.

Opportunities include a joint UA/SARDI R&D facility in order to build capability, industry interface and applied food science projects for postgraduate students, and identifying where expertise from across the university may be able to help horticulture producers in the Northern Adelaide Plains, the largest protected cropping area in the country.

When not working in the AgriFood and Wine IEP, John continues to support and promote food science and technology outreach activities in the School of AFW. The soft-serve ice-cream made from potato puree has been a hit at various events, and was the successful outcome of an earlier project with Potatoes South Australia and an ambitious Honours project. The work highlights the University's expertise in food science, technology, the importance of minimising food waste and returning extra value to producers.

SAGI-STH: Statistics for the Australian Grains Industry - Southern region

The SAGI-STH project focusses on delivering the best value to growers in the region through enabling and promoting the use of efficient and ground-breaking statistical methodologies for data collection and analysis in field trials.

Led by Dr Olena Kravchuk, the project puts emphasis on the data analytics skills development in the industry through programs in training, research internship and collaborating on data solutions specific to research and consulting projects in the grains industry.

In 2017, Cloud and high-performance computing was introduced in application to statistical models of context-specific

The WRI supports research that is diverse and multi-disciplinary with applied outcomes and real-world impact

data, ranging from complex genetics and bioinformatics data to images from field trials. The initiative has grown during 2018 to host international, national and regional researchers during 4 - 6 weeks research internship visits in the Biometry Hub.

Examples of other activities include project-specific data solutions with Amazon Cloud that have been developed in consultation and collaboration with researchers in the University of Adelaide and SARDI in order to improve the accuracy of the data and thus the efficiency of statistical inferences. The SAGI-STH group is now promoting to GRDC research projects the option of developing efficient data capturing and data handling software solutions tailored to specific project needs.

The Biometry Hub organised and hosted the International Ranked Set Sampling Symposium in Adelaide in September 2018. Subsequently, they have implemented the use of visual information (drones) for field agronomic sampling and measurements.

Securing pollination reserves for agriculture through revegetation

This is a multi-faceted project led by Dr Katja Hogendoorn and Professor Andrew Lowe (across the Schools of AFW and Biological Sciences), and is part of the AgriFutures Australia Rural R&D for Profit program co-supported by the WRI.

The overall aim is to develop strategies to support crop pollination and revegetation (with both agricultural and environmental benefits), guidelines for effective pollinator management and to promote the adoption of these strategies among farmers of pollination-dependent crops.

The 2018 calendar year was productive, with the project well on track to deliver its outcomes. Progress included:

- > Identifying and quantifying the native bees that visit and pollinate lucerne, apple and canola, and measuring their effects on

crop production. The group's research has found that, in both lucerne and apple, the density and diversity of native bees increase with the proximity of native vegetation, and that this is reflected in an increased set. Preliminary data also shows that diversity in vegetation is crucially important for the abundance and diversity of bee species.

- > Three 1-ha demonstration plantings of tube-stock on farms (in Keith, Padthaway and Maitland), involving farmers and volunteers from local communities, were established. Planting advice for the different regions and crops has been developed for promotion among farmers by PIRSA. A hybrid capture method for molecular identification of 200 SA plant species is being tested for pollen mixes found on bee legs.
- > Extension activity has included promoting (and investigating the perceived value of) diverse plantings for biodiversity and bees, developing a web-based tool for farmers to design and cost pollinator habitat, and presenting the project through various fora/events and media outlets.

International Agroinformatics Alliance

The International Agroinformatics Alliance (IAA) is a coalition of public and private institutions that are cooperating to develop a platform for computationally advanced collaborative analysis of agricultural data. By combining large agricultural data sets with advanced analysis techniques, IAA seeks to catalyse agricultural research, leading to improved agricultural productivity and stability.

The IAA has constructed a platform that combines Jupyterhub web notebooks for interactive data analysis, relational databases for storage of crop genetic and geospatial data, and the Globus file transfer system for efficient data transfer and authentication. The platform uses a data permissions system that allows users to share data with collaborators.

The central platform is located at the Minnesota Supercomputing Institute, at the University of Minnesota, which allows access to the large storage and compute resources required for advanced agri-informatics analysis pipelines. In 2018, the WRI supported The University of Adelaide's involvement in this venture.

Fight Food Waste CRC

The Round 19 Fight Food Waste Cooperative Research Centre (FFW CRC) commenced on July 1, 2018.

The \$120 million, 10-year organisation is headquartered in the Wine Innovation Central Building on the Waite Campus, co-located with core participants The University of Adelaide, the South Australian Research and Development Institute (SARDI) and Food South Australia, and supporting participant Potatoes South Australia.

Throughout the second half of 2018 the FFW CRC focused on executing the Grant Agreement with the Commonwealth Government and the Core and Supporting Participants Agreements with its 60 participants. The FFW CRC was launched on 24 October 2018 at the University of Adelaide National Wine Centre.

As well as site of the FFW CRC headquarters, the Waite Campus will be a major research site for the CRC using the Adelaide Glycomics and SARDI facilities.

The WRI invested in this initiative as part of The University of Adelaide's significant overall contribution.



Business development and attracting investment

The WRI was engaged in both internal and external business development activity during 2018, partly through its substantial support of the AgriFood & Wine IEP, but also as a primary point of contact/support for the wide range of research activity across the Waite precinct.

From connecting the most appropriate researchers with various industry partners to facilitating meetings and site visits to deepen interaction and project support, the WRI worked on topics as diverse as sensory and chemistry work in beverage production to trials for a vertical farming substrate and fertiliser products.

Attendance at national conferences in the ag-tech area led to valuable knowledge building and industry contacts, some of which have outcomes still unfolding. Locally, the excellent annual Food SA Summit is a regular fixture for key WRI staff and members working in the food area.

Internally, the WRI (and AgriFood & Wine IEP) is working with counterparts and key contacts in a wide range of University business units to connect the dots and develop a more unified and coordinated University approach to engaging with external/industry partners.

The annual AFW Research Day organised and sponsored by the WRI always has an industry session, with invited guests along to see and hear more about the great agriculture, food and wine research being undertaken at the Waite and across the University.



A panel discussion featuring research-industry partnerships was a highlight at the 2018 AFW Research Day

2 Enhancing the reputation of the Waite

2.1 Communications and media

In 2018, the WRI's investment and activity in this area continued with support of the Waite Campus website (see below) and the publication via this site of approximately 170 stories on Waite research and achievements and nearly 100 events. Much of this content was shared across a range of channels - including social media, university research blogs, newsletters and partner organisations' communication networks - resulting in a broader reach and direct engagement with audiences across the Waite, wider University and beyond. Articles posted on the website are regularly picked up by other outlets, publications and news channels.

ABC Catalyst: *Feeding Australia* segment

The team from ABC Catalyst visited the Waite in April 2018 to film segments for a series of two programs on innovative food and agriculture to sustainably feed a growing population into the future.

This two-part series *Feeding Australia* launched Catalyst's new season during Science Week 2018, with the first episode broadcast on Tuesday 14 August on ABC

TV. Several Waite researchers, including Sue Bastian and Lukas Danner, John Carragher, Rachel Burton and Trevor Garnett (University of Adelaide), and Ian Dry (CSIRO), featured in part 2, originally broadcast on Tuesday 21 August 2018 at 8:30pm.

The full program is available to watch on ABC iView at: <https://iview.abc.net.au/show/catalyst/series/19/video/SC1702H003S00>

Waite website, online and social media

The WRI, with support from Arris Pty Ltd, designed and developed the shared Waite website (www.thewaite.org), which since 2016 has provided a streamlined and comprehensive online portal to the Waite research precinct. The WRI continues to resource and maintain this website on behalf of the campus partners, and its high quality content has seen increasing use of the site as an agricultural science resource by media outlets, government agencies and the wider University community. *Weekly Alert* subscription numbers continued to grow in 2018, and the site has evolved to include new features, for example, an online interface for requests and bookings to the *Why Waite?* school outreach program.





ABC Catalyst promotional shot outside the Plant Accelerator

The site offers an overview of the Waite's history and key features, contact information and details for all the organisations and centres based at the Waite, a cross-institutional capability directory, a list of user-pays services and facilities and prospective student and visitor information. As well as providing a landing place for a wide range of external stakeholders, the site is also designed to be a useful resource to staff and students, with a news feed, campus notices, employment opportunities and a shared events calendar.

The WRI also manages a YouTube channel and active @waitereseach social media accounts on facebook, twitter, and instagram.

Waite Communicators group

The WRI convenes and facilitates the Waite Communicators Group, comprising media, communications and marketing personnel from all the Waite partner organisations. Members of this Group have contributed significantly to improvements during the last few years in the quality and flow of information between the organisations at the Waite. The Group has shared and overlapping interests in events, media liaison, high-profile visitors to the Campus, science communication, publications and display materials, and has made progress in the linking of various websites and the consistency of online content, as well as developing ideas for shared resourcing of activities.

In 2018, members of this Group engaged in:

- > *Waite in the Spotlight* event planning and development;
- > Waite website content and research story contributions;
- > Campus tours/activities/events updates and sharing of relevant information;
- > Opportunities to develop joint outreach offerings (such as a structured, shared work experience program) and marketing materials.

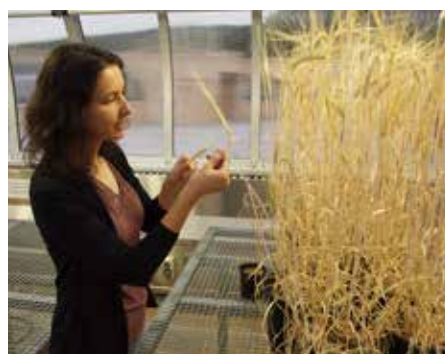
'The Waite' newsletter

To better reach the Waite's large range and number of external stakeholders, including alumni, staff of relevant organisations, government departments, funding bodies and primary producers, and keep them up to date with all things Waite, a quarterly School of AFW newsletter was established in early 2015. 'The Waite' newsletter incorporates news items from across the campus partners and captures the 'flavour' of the wider Waite precinct. The publication has been well received and its circulation (500 direct recipients, plus several hundred more staff and members of various associations and organisations) continues to grow. The newsletter is produced and disseminated by the WRI.

2.2 Awards and Honours

Awards and recognition of AFW researchers and academics in 2018 included the following:

**Graduates of the WRI's Research Leadership Development Program (see section 4.1).*



Dr Stephanie Watts-Williams

Dr Stephanie Watts-Williams*, a Ramsay Fellow, affiliated with CoE PEB, was awarded the University of Adelaide Women's Research Excellence Award and the Faculty of Sciences Edith Dornwell ECR Excellence Medal.

Dr Caitlin Byrt* was awarded The Australian Society of Plant Scientists (ASPS) prestigious 2018 Peter Goldacre Award. It is awarded based on the merit of original research in an area of plant science. Caitlin was also awarded an ARC Future Fellowship.

Professor Rachel Burton* CoE PEB Chief Investigator, was elected to the Board of Science and Technology Australia.



Professor Kerry Wilkinson

Following on from her promotion to Professor, **Kerry Wilkinson*** was named Best Wine Educator in the Wine Communicators of Australia awards, as well as becoming Deputy Editor of the Australian Journal of Grape & Wine Research. In June, Kerry was also recognised with the Australian University Excellence in Teaching Award for her development and contribution to online learning approaches.

Professor Rachel Burton* and **A/Prof Cassandra Collins*** won two of the four Adelaide Enterprise Accelerator Awards announced in early December.

Dr Ashlea Doolette*, won the Early Career award at the Australian University Agriculture Education Awards for Excellence in Teaching.

Professor Chris Preston won a GRDC Southern Region Recognising & Rewarding Excellence Award for 2018 for his weed science extension and communication work with farmers.

Dr Roberta De Bei* was announced as a 2019 Superstar of STEM (in the second intake for this national program recognising and developing female scientists and technologists) in December.



Dr Roberta De Bei

2.3 Campus tours, events and visits

Given the large number of organisations, centres and facilities co-located at the Waite precinct, and the critical mass in plant, wine, natural resource management and agricultural research they represent, the Waite receives hundreds of visitors each year, from secondary school students to diplomats and international researchers and business leaders.

The WRI continued to provide a ‘front door’ service to the Waite precinct in 2018, planning and hosting many tours of the unique facilities located here in collaboration with the Waite partner institutions. This activity supports the development of new collaborative relationships with national and international researchers and institutions.

During 2018, the WRI hosted, facilitated and/or coordinated Waite tours and meetings for around 250 visitors, including the following:

- > A GRDC Regional Cropping Solutions network group from WA
- > A FoodTech Innovation Mission (for DTTI State Government and Austrade)
- > The Ambassador and Consul of Italy
- > The Ambassador and Trade/Economic Affairs Advisor from The Netherlands
- > The Australian High Commissioner to Cyprus
- > Delegations from Brittany and Freiburg
- > Loxton Ag Bureau
- > A number of Chinese Universities and Academies with an agricultural focus

- > Tim Whetstone MP, Minister for Primary Industries and Regional Development
- > Nicolle Flint MP, Federal Member for Boothby
- > Dr Sue Thomas, CEO of the Australian Research Council
- > Visiting summer school students and faculty from CalPoly University, USA
- > Delegates from the International University Leaders Program
- > Representatives from Weatherbys Scientific, Univar Canada, Hummingbird Tech, and various other Australian and international companies and SMEs

Visits like these form a key part of the WRI’s outreach and engagement activity on behalf of the University and the Waite precinct partners.

Waite in the Spotlight

The largest public engagement event of the year was *Waite in the Spotlight*, which ran for the third time in November 2018. Featuring speakers from CSIRO Agriculture and Food, The Australian Wine Research Institute, Fight Food Waste CRC and The University of Adelaide, the presentations covered topics as diverse as why we should preserve trees in our cities; growing healthy crops in sandy soils; the role insects play in agriculture; choosing the right yeast in winemaking; and how we can help stop food waste.



Professor Mike Brooks and Professor Vladimir Jiranek show Minister Tim Whetstone around the Waite winery

Held at Lirra Lirra on Waite Road, the event attracted a capacity audience of 180 to hear the short talks, which were delivered in the TEDx style.

The resulting short videos were uploaded to the Waite website and to the WRI YouTube channel, giving the event a much longer and wider reach than most. The videos can be seen at: www.thewaite.org/waite-in-the-spotlight-2018/.



The speaker panel fielding questions at Waite in the Spotlight 2018

2.4 Sponsored events

Thriving Women 2018

The Waite Research Institute was a sapphire sponsor of Thriving Women 2018, a conference hosted by Women Together Learning (WoTL Ltd) to connect and advance women in agriculture Australia-wide. Major sponsors included Primary Industries and Regions SA, the Grains Research and Development Corporation, agricultural industries and natural resources management boards.

Professor Eileen Scott (Deputy Head, School of Agriculture, Food and Wine and Deputy Dean, Gender Equity and Diversity) attended and renewed contact with recent graduates and current students in the B Agricultural Sciences as well as PhD students. She also identified at least one industry representative to take part in the Women in STEM Careers program 2018 (led by the Faculty of Engineering, Computer and Mathematical Sciences with collaboration from the Faculty of Sciences).

Belinda Cay of AgCommunicators spoke about the Food and Fibre SA program which she has run to promote agricultural science in schools.

Roots and Rhizosphere Symposium

This inaugural event brought together around 90 root and soil biologists from across the Waite Campus including co-located partners and beyond. It provided a platform to share research, generate discussion and new ideas and facilitate the establishment of new collaborations.

AFW Research Day 2018

The WRI's annual Research Day was held in November providing an opportunity to celebrate the year's research successes and outputs, as well as showcase the impact, diversity and relevance of our work. Several industry partners and collaborators from across the University were in attendance, with interdisciplinary projects featuring heavily in the program.

The 2018 program also featured a session on science communication and engagement and the new SA Chief Scientist, Professor Caroline McMillen, joined us to speak about her vision for the future of scientific research and SA's place in it.

Agriculture, Food & Wine Showcase – Adelaide Convention Bureau

Approximately 30 delegates to the Adelaide Convention Bureau's South Australian Agriculture, Food and Wine Showcase visited the Waite in June 2018. They included executives of key national and international associations aligned with South Australia's primary industry focus areas, and South Australian industry representatives, researchers and influencers.

The objective of the Showcase is to promote the outstanding strengths of South Australia's agriculture, food and wine production and innovation credentials in order to position Adelaide as a destination of choice for global conventions from these sectors.

Crawford Fund Forum 2018

The WRI and the Centre for Global Food & Resources (Faculty of Professions) co-sponsored UA's presence at the 2018 annual Crawford Fund Conference. The theme was 'Reshaping Agriculture for Better Nutrition – The Agriculture, Food, Nutrition, Health Nexus'.

Forty-four young scholars were chosen from across Australia after a competitive selection process to attend the conference, which was held at Parliament House in Canberra from 13-15 August 2018. Professor Wendy Umberger and A/Professor Chris Ford attended, along with a number of UA students.

The group's Waite visit began with a lunch at Urrbrae House featuring quality South Australian produce from Epicure Catering. A tour of The Plant Accelerator and Waite winery followed, with the visit rounded out by a short program of presentations at the Plant Research Centre. Speakers included Professor Andrew Lowe, Professor Kerry Wilkinson and Dr Steve Lapidge (Fight Food Waste CRC).

These visits help the Adelaide Convention Bureau present an overview of the scope and diversity of the excellent Ag, Food and Wine research being undertaken across the Waite Research Precinct and South Australia.



3 Increasing collaboration

The WRI continued to play a key role in supporting the Waite precinct partnerships and enhancing collaboration during 2018



Trends and Futures in AgTech Forum hosted by the University's AF&W IEP and PIRSA/SARDI at the National Wine Centre in October

Providing a central coordination and communication point for the Waite partner organisations on a wide range of matters, the WRI has become an invaluable part of the fabric of the Waite precinct.

While still a key conduit between the University and other Waite entities and operating as a 'front door' for the precinct, the WRI was also involved in facilitating increased engagement between the Faculty of Engineering, Computer & Mathematical Sciences (ECMS) and the School of Agriculture, Food & Wine and provided significant resources and support to the University's Food Innovation Theme (now called the AgriFood & Wine Industry Engagement Priority) throughout the 2018 year. The latter has also entailed increased interaction with researchers in the Centre for Global Food & Resources (Faculty of Professions), as well as the Schools of Animal & Veterinary Sciences (Roseworthy) and Biological Sciences.

The WRI's remit and scope will be expanding in 2019 onwards to reflect this broader, cross-campus approach to agriculture, food and wine research, which has long been a key strength of The University of Adelaide.

The University's AgriFood & Wine Industry Engagement Priority (AF&W IEP) is led by WRI Deputy Director Professor Andy Lowe, and aims to connect and facilitate the University's agrifood and wine research

efforts in relation to external partners, providing a more streamlined and coordinated response and enabling the best interdisciplinary teams to be brought to any given project or partnership opportunity. The WRI team is central to these efforts, given the common ground shared by the WRI and the AF&W IEP.

In 2018, the AF&W IEP built on earlier capability mapping and strategic planning work to cement a committee structure, established networks across the University by connecting key people and progressed key projects with industry partners such as Elders, Kidman & Co, the Northern Adelaide Plains Food Cluster, Riverland Wine and others.

3.1 Shared investment, infrastructure and activities with Waite partners

One of the major benefits arising from the unique co-location of several complementary R&D organisations at the Waite is the ability to share resources and co-invest in infrastructure, people and technology to mutual benefit with reduced cost and duplication.

Some examples of shared initiatives and activities facilitated and supported by the WRI are:

- > The development of a business case to support a forthcoming bid for expansion and redevelopment of the Waite winery. The winery is the home of WIC winemaking services, a joint venture between the University and the Australian Wine Research Institute, and is heavily used by researchers from across the campus;
- > The resourcing and management of the Waite website, www.thewaite.org;
- > The annual *Waite in the Spotlight* event, which aims to showcase the breadth and quality of the research across the precinct for the widest possible audience, as well as communicate why agricultural science is important;
- > The coordination and hosting of regular tailored visits to the Waite by external stakeholders and VIPs; the WRI works closely with relevant staff at the Waite partner institutions' to incorporate their facilities and personnel in these tours for maximum exposure, impact and efficiency;
- > Co-investment in the Waite node of Adelaide Microscopy, which is available to all researchers across the campus;
- > Facilitating and supporting the Waite Strategic Leadership Group (see 3.2) and the Waite Communicators Group;
- > Sponsoring and organising a range of regular and ad hoc activities that are

of mutual benefit to the Waite partners or which build trust, communication, networking, a collegiate atmosphere and shared interests. Examples include the annual Peter Waite Day event (see 3.3) and seminars organised around eminent visiting scientists.

3.2 Waite Strategic Leadership Group

The Waite Strategic Leadership Group is a consultative and advisory group comprising the leaders of the Waite campus organisations. Meeting quarterly, it aims to foster a shared strategic direction for collaborative research activities at the Waite Campus. The Group's goal is to identify emerging opportunities and ensure that the Waite organisations are working together to deliver on them, whilst building capacity for step improvements in Australian agriculture.

The WRI continues to facilitate and support the activities of the Waite Strategic Leadership Group through the provision of secretariat services and the funding and coordination of shared campus initiatives such as the Waite website.

3.3 Peter Waite Day - Building the Campus Community

Peter Waite Day is an informal campus community-building and networking exercise that coincides with the anniversary of Peter Waite's birthday on 9 May each year. Peter Waite's generous bequest to The University of Adelaide for the purpose of agricultural research and education and the legacy of his foresight embodied in the Waite Campus today are celebrated and remembered on this occasion each year.

Held in picturesque locations around the Campus, this WRI-sponsored annual networking event has become a highlight of the Waite calendar, enjoyed by an average of 140 staff from across the Waite partner organisations and featuring a fiercely-contested knockout bocce tournament.

In 2018, Peter Waite Day was held in the Urrbrae House gardens, with 12 teams competing for the Peter Waite Bocce Trophy. The cup was won by the Fermtastic Four, from the wine microbiology lab. The best team name was The Ball Tamperers and the best team costume award went to The Waiters.

Joining us this year were Joslyn Fox, Mark Ward, Ian Reed and David Price from Urrbrae Agricultural High School (pictured). Peter Waite also bequeathed land to the State Government for the establishment of the school and they are very much a part of the Waite Community.



4 Developing researchers for the future

The WRI has invested heavily in the leadership training and mentoring of the School of AFW's early to mid-career researchers since 2011, and continues to make the area of people development a priority.

In addition to the flagship Research Leadership Development Program, developed by the WRI in conjunction with executive coach Karilyn Fazio of the Impetus Team, the WRI also periodically funds short professional development and mentoring workshops on a range of relevant topics, open to early and mid-career researchers from across the School and sometimes the precinct.

In-kind and sponsorship support is also regularly provided to various initiatives involving ECR networking, such as the Roots & Rhizosphere Symposium (see 2.4).

4.1 Targeted Support of Early to Mid-Career Researchers

In May 2018, the WRI organised and sponsored a well-attended session on media skills for Waite early and mid-career researchers, in conjunction with the Australian Science Media Centre. Promoted across the precinct, as with many of the events and opportunities supported by the WRI, this half-day workshop was an excellent networking opportunity for researchers from the Waite partner organisations.

The workshop explored how scientists can get the most out of working with the mainstream media, make tricky science accessible, avoid jargon, plan and prepare for media interviews, and communicate a scientific message to a broad lay audience.

The WRI's Research Leadership Development Program, which has been run six times since 2011, was designed to increase and foster the leadership skills, behaviours and personal ambitions of the participants. The full benefits of these investments in individuals often take time to be fully realised, but several members of the early cohorts to undertake this program



Associate Professor Tim Cavagnaro

demonstrated dramatic improvement and accelerated achievement across a range of areas within 12 months – and these benefits are still unfolding. The School of AFW and the University more broadly are reaping the rewards of investment in this younger generation of researchers.

Some of the career developments and highlights for graduates of the program in 2018 included:

- > **Dr Richard Muhlack** was promoted to Level C (Senior Lecturer), **Dr Matt Denton** to Level D (Associate Professor), and **A/Professor Kerry Wilkinson** to Level E (Professor) in December. Kerry also took out the Best Wine Educator title at the Wine Communicators of Australia 2018 Awards.
- > **Dr Caitlin Byrt** won The Australian Society of Plant Scientists' Peter Goldacre Award for 2018, as well as a prestigious ARC Future Fellowship.
- > **Professor Rachel Burton** was elected to the Board of Science & Technology Australia (the peak body representing 70,000 scientists and technologists across all disciplines), and became Head of the Department of Plant Science in the University's School of Agriculture, Food & Wine. She finished the year with an Adelaide Enterprise Accelerator Award.
- > **A/Professor Tim Cavagnaro** won an ARC Discovery grant worth \$450,000 over three years to investigate how much carbon plants need to invest below ground in return for water and nutrients. He also stepped up to the role of Deputy Head of School (Learning & Teaching).
- > **Dr Michelle Wirthensohn's** almond breeding program (funded by Horticulture Innovation Australia) went from strength to strength in 2018 with an Australian Government Priming Grant and the commercial release of six new varieties bred for Australian conditions. All out-yield the benchmark variety 'Nonpareil' by at least 10% and four are self-fertile, thus lessening the dependence on bees and pollinator varieties within the orchard.
- > **Dr Roberta De Bei** was named one of the 2018 intake of the national Superstars of STEM program.
- > **Dr Stephanie Watts-Williams** won both a University's Women's Research Excellence Award and the Faculty of Sciences Edith Dornwell ECR Excellence Medal for her Ramsay Fellowship project.
- > **A/Professor Cassandra Collins** won an Adelaide Enterprise Accelerator Grant and is leading a \$4m+ Wine Australia-funded research collaboration on understanding the drivers of terroir.

Associate Professor Cassandra Collins



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WRI and the Waite partnerships

The Waite Research Institute keeps alive the vision of Peter Waite by supporting the collective interests of the Waite Precinct organisations. The Waite is unique in the number of non-University research partners co-located there. These partners include Federal and State government agencies as well as national research centres and industry-funded organisations such as the Australian Wine Research Institute.

Some partners have been on the campus for many decades but, irrespective of their period of residency, all have added greatly to the richness of the research environment. They have co-invested in buildings and other infrastructure and have formed effective collaborative relationships with each other. The Wine Innovation Cluster is a recent example of the latter but there are also numerous bilateral links.

The co-location model that epitomises the Waite Precinct as been widely emulated and has helped maintain the reputation of the campus, and therefore the University, as the leading academic agricultural research institution in Australia.

University partners



THE UNIVERSITY
of **ADELAIDE**

The School of Agriculture, Food & Wine (AFW)

<https://sciences.adelaide.edu.au/agriculture-food-wine/>

*LOCATION: Ag, Food and Wine Building
Hartley Grove, Waite Campus, Urrbrae*

The School of Agriculture, Food & Wine (AFW) is one of four Schools within the Faculty of Sciences at The University of Adelaide. The School is a world-class concentration of scientific research, education and product-conferring capability, the centrepiece of the Southern Hemisphere's largest collection of expertise in plant genomics, crop improvement, sustainable agriculture, animal science, dry land farming, horticulture, viticulture, oenology, wine business and food and health.

The School comprises more than 220 research active staff, and several hundred postgraduate and undergraduate students move through the School's suite of degrees each year. The School is organised into three departments – Agricultural Science, Plant Science and Food & Wine Science - and incorporates several research groups including:

- > Farming Systems
- > Food & Nutrition
- > Plant Breeding & Genetics
- > Plant Protection
- > Plant Physiology, Viticulture & Horticulture
- > Soil Science
- > Wine Science
- > Biometry

The School of Agriculture, Food and Wine hosts a number of specialist research centres and entities:



Australian Plant Phenomics Facility (APPF) - The Plant Accelerator

www.plantphenomics.org.au

LOCATION: The Plant Accelerator, Hartley Grove, Waite Campus, Urrbrae



The Plant Accelerator, a national facility established under the Commonwealth National Collaborative Research Infrastructure Scheme (NCRIS), is a world-leading plant phenomics facility offering state-of-the-art plant growth environments and the latest technology in high throughput plant imaging for the repeated measurements of the physical attributes (phenotype) of plants automatically and non-destructively.

The services enable academic and commercial plant scientists to better understand the factors controlling the performance of particular crops, including: the genetic make-up of the plants, the soil conditions, chemical and nutrient treatments, and environmental stresses. This facilitates an acceleration of crops improvement - generating crops that are more productive, disease tolerant and viable in marginal conditions. The APPF has two nodes; The Plant Accelerator involving the research institutions at the Waite and The High Resolution Plant Phenomics Centre involving CSIRO Plant Industry and the Australian National University in Canberra.

Plant Cell Walls

ARC Centre of Excellence



ARC Centre of Excellence in Plant Cell Walls (PCW)

www.plantcellwalls.org.au

LOCATION: Level 4, WIC Building, cnr Paratoo Road and Hartley Grove, Waite Campus, Urrbrae

The ARC Centre of Excellence in Plant Cell Walls, established in 2011, was a seven-year collaboration between the Universities of Adelaide, Melbourne and Queensland in partnership with numerous domestic and international institutions. The Centre is hosted by the University of Adelaide at its Waite Campus and has nodes at both Melbourne and Queensland Universities.

The Centre's mission is to advance the fundamental scientific understanding of plant cell wall biology with particular focus on grasses and cereals. The overarching aim of the Centre is to understand how plants regulate the synthesis, assembly, re-modelling and degradation of their cell walls during normal development and in response to the environment. This fundamental knowledge, considered a 'holy grail' in Plant Sciences, is linked with socially, environmentally and commercially important applications in areas such as food security, human health, and biomass utilisation for renewable energy production.

The Centre activities are integrated in three interconnected programs underpinned by state-of-the-art platform technologies, implemented and made available across all three geographic nodes to maximise synergistic interactions and outputs not be possible through individual 'traditional' research groups.



plant energy biology
ARC CENTRE OF EXCELLENCE

ARC Centre of Excellence in Plant Energy Biology (Adelaide node)

www.plantenergy.edu.au

LOCATION: Plant Research Centre, 2b Hartley Grove, Waite Campus, Urrbrae



The University of Adelaide established a node of the ARC Centre of Excellence in Plant Energy Biology (PEB) in 2011. The current version of the centre began in 2014 with Professor Steve Tyerman and Professor Matthew Gilliham as Chief Investigators (CI). Professor Rachel Burton joined as CI in 2018.

The Centre comprises The University of Western Australia, Australian National University, The University of Adelaide and La Trobe University, ten Chief Investigators and over 130 internationally competitive staff and students. It is funded primarily through the Australian Research Council (\$26 million) and \$14 million from the partner universities to fund the Centre through to 2020.

The research focus of the Centre is to better understand the way in which plants capture, convert and use energy in response to environmental change. The long-term goal is to enhance energy efficiency to improve sustainable productivity of plants. At the Adelaide node the aim is to improve the efficiency of plant energy use by manipulating the transport properties of gatekeeper cells for water, carboxylates, phosphate and salt.



ARC TRAINING CENTRE FOR
**INNOVATIVE
WINE PRODUCTION**

ARC Industrial Transformation Training Centre in Innovative Wine Production

www.arcwinecentre.org.au/

LOCATION: Roseworthy-Hickinbotham Wine Science Laboratories, Hartley Grove, Waite Campus, Urrbrae

Based at The University of Adelaide's Waite Campus, research projects within the multi-partner ARC TC for Innovative Wine Production fall into two broad themes: Responding to Challenges and Increasing Profitability. Research spans the winemaking process investigating aspects of viticultural management, oenology including wine microbiology, wine chemistry and sensory science and winery process optimisation. Incorporating 13 partners, the Centre represents a unique and exciting training opportunity for PhD and postdoctoral researchers to work closely with leading research centres and Australian and international companies from the wine and food sector.



ARC Industrial Transformation Research Hub for Wheat in a Hot and Dry Climate

www.wheatHub.com.au/



The Australian Research Council Industrial Transformation Research Hub for Wheat in a Hot and Dry Climate marks a new era in wheat breeding and research in Australia. It brings together researchers and Australia's three major wheat breeding companies to exploit global diversity for wheat and advanced genomic technologies for faster development of heat and drought tolerant varieties which make better use of nitrogen fertiliser.

It is funded by the Australian Government through the ARC's Industrial Transformation Research Hubs scheme and the GRDC. Partners include breeding companies AGT LongReach Plant Breeders and Intergrain, the Universities of Adelaide, Sydney, South Australia and the ACPFG.

The Research Hub aims to enhance productivity and secure high grain quality of

wheat in the hot and dry Australian climate by:

- > Developing wheat with combined heat and drought tolerance by advancing existing knowledge and technologies and transferring wheat material and know-how to breeding programs
- > Elucidating mechanisms and molecular markers for combined heat and drought tolerance by exploring wheat genetic diversity
- > Identifying mechanisms and genetic diversity for high yielding wheat with efficient nitrogen recycling and high grain protein
- > Building human capacity in molecular breeding and providing breeders access to the latest scientific developments and technologies
- > Developing and testing high-throughput field phenotyping tools for Australian breeders

wineinnovationcluster.com
Synergy in grape & wine research

The Wine Innovation Cluster (WIC)

www.thewaite.org/waite-partners/wine-innovation-cluster/

LOCATION: Wine Innovation Central Building, Cnr Hartley Grove and Paratoo Road, Waite Campus, Urrbrae

The WIC is a virtual entity and partnership of four leading Australian grape and wine research agencies. Established in 2008 and based on the Waite Campus, the WIC strives to build collaboration and create synergies in research and development across the co-located partner organisations for the benefit of Australia's multi-billion dollar wine industry.

The WIC represents critical mass in terms of national wine R&D capability; almost 70 per cent of the total is located at the Waite Campus and incorporated in the WIC.

The WIC was established in recognition of the fact that enhanced coordination and integration of R&D is necessary to build the quality outcomes and effective delivery needed by the wine and grape growing industries to meet the challenges of the future.

Collectively, the WIC partners cover the entire grape and wine research, development and extension spectrum and the WIC is continuously exploring opportunities for collaborative research projects.

Non-University partners



Commonwealth Scientific and Industrial Research Organisation (CSIRO)

www.csiro.au

LOCATION: Prescott, Taylor, Cornish and WIC West buildings, Waite Campus, Urrbrae



CSIRO, the national research provider, innovates for tomorrow and offers solutions and technologies today – for its customers, all Australians and the world. CSIRO's research at the Waite Campus seeks to create value for its customers through innovation that delivers economic, environmental and social impact, with particular focus on Australia's agricultural, environment (land and water) and mineral resources sectors.

CSIRO's Waite-based agricultural research is focused on southern farming systems, wine grapes and horticulture, genomic science for crop performance, soil carbon and nutrient cycling and agricultural adaptation to and mitigation of global change.

CSIRO Land and Water's research focuses on environmental resilience, environmental toxicology, managing terrestrial and aquatic ecosystems, water in the resources sector, economics, productivity and sustainability. In the minerals sector, CSIRO's Waite-based research focuses on intelligent mining and resource management.

All of this work is conducted in partnership with a range of research, industry and commercial partners, including the other organisations based at the Waite. Further information is available at:

www.thewaite.org/waite-partners/csiro/



The Australian Wine Research Institute

Australian Wine Research Institute (AWRI)

www.awri.com.au

LOCATION: Levels 2 & 3, Wine Innovation Central Building, cnr Paratoo Road & Hartley Grove, Waite Campus, Urrbrae



The AWRI is the Australian grape and wine industry's research organisation. It supports a sustainable and successful grape and wine industry through world class research, practical solutions and knowledge transfer. Established in 1955, the AWRI is governed by an industry-led, skills-based Board and is a member of the WIC. The AWRI's activities are guided by its mission and values, an industry-endorsed research, development and extension plan and an internal business plan. AWRI Commercial Services is the commercial arm of the organisation and provides advanced analytical and consulting services on a fee-paying basis.

The AWRI supports grapegrowers and winemakers by:

- > Undertaking strategic and applied research based on the priorities of the Australian grape and wine industry
- > Providing a helpdesk service to answer queries from producers and conducting problem-solving investigations
- > Presenting roadshow workshops and seminars in Australian wine regions
- > Delivering technical information and producing publications
- > Conducting events including the triennial Australian Wine Industry Technical Conference, the Advanced Wine Assessment Course and Research to Practice modules
- > Providing NATA-accredited analysis and assistance with wine export
- > Supervising postgraduate students and providing lectures to undergraduate students.



South Australian Research and Development Institute (SARDI)

pir.sa.gov.au/research

LOCATION: : Plant Research Centre, 2b Hartley Grove, Waite Campus, Urrbrae



SARDI, a Division of the South Australian Department of Primary Industries and Regions (PIRSA), is the SA Government's principal research institute for primary industries creating opportunities to ensure the agriculture, food, aquatic and bioscience industries are internationally competitive and ecologically sustainable.

SARDI focuses on value-chain linkages, food security, natural resource and climate adaptation, product integrity requirements, innovation capability and enabling technologies, supplier competitiveness and biosecurity.

SARDI science programs are aquatic sciences, livestock and farming systems, and sustainable systems. SARDI has 350 scientific, technical and support staff working at 10 regional research centres in South Australia.



Fight Food Waste Cooperative Research Centre (FFW CRC)

<https://fightfoodwastecrc.com.au/>

LOCATION: Level 1, WIC Building, cnr Paratoo Road and Hartley Grove, Waite Campus, Urrbrae

The Fight Food Waste Cooperative Research Centre brings together industry, research and the community to capitalise on Australia's food waste opportunities.

Winning this fight will save Australia \$20 billion per annum in food waste through increased industry profitability and reduced food insecurity, as well as enhancing Australia's reputation as a sustainable and trusted producer of premium food products.

Through three research and development programs, the FFW CRC will REDUCE food waste across the supply chain, TRANSFORM unavoidable waste into innovative high-value co-products, and ENGAGE with industry and consumers to deliver behavioural change.



Plant and Food Research (Australia)

www.plantandfood.com.au/

LOCATION: Northern Barns, Building 4G Waite Road, Waite Campus, Urrbrae

Plant & Food Research is a science and innovation company. It is a subsidiary of Plant & Food Research New Zealand Ltd which is a Crown Research Institute.

At its core, Plant & Food Research aims to enhance the value and productivity of horticultural, arable, seafood and food and beverage industries to contribute to economic growth and the environmental and social prosperity of our clients and the communities they live in.

Already working with The University of Adelaide on agricultural product development, and almond orchard systems and harvest technologies, the Waite node will drive research collaborations aimed at enhancing production, sustainability and value-adding in the horticulture, food and agriculture industries.



Arris Pty Ltd

www.arris.com.au

LOCATION: Hartley Grove, Waite Campus, Urrbrae

Arris is an innovative Australian-owned consulting and communications company, providing services in two distinct areas: agricultural & environmental services, and marketing/communications. The Arris

team has a unique mix of qualifications and experience in science, agriculture, communications, event management, education and training, graphic design, web design and computer technologies and provides services for a diverse range of clients.



Australian Genome Research Facility (AGRF)

www.agrf.org.au

LOCATION: Plant Genomics Centre, Hartley Grove, Waite Campus

AGRF is a not-for-profit company, established in 1997 under the Commonwealth Major National Research Facility (MNRF) Program, and currently supported by NCRIS through BioPlatforms Australia. It is Australia's largest provider of genomics services and solutions. AGRF has laboratories in Adelaide, Brisbane, Melbourne, Perth and Sydney.

The Adelaide node provides a range of services to industry and academia, including illumina and Ion Torrent "Next Generation" sequencing, Sanger DNA sequencing, nucleic acid extraction, controlled environment growth rooms, and varietal identification services.

The Adelaide node provides a direct link to the specialist, large scale, and Bioinformatics

services provided by AGRF's national network, and is accredited by NATA to ISO17025:2005.



The WRI 2020 and beyond



Message from the Incoming Director

It is an exciting time to take on the Directorship of the WRI, which is in a vibrant state and began its current transition under the leadership of outgoing Director, Chris Ford. I would like to thank Chris for his vision and success in steering the WRI over the past 18 months.

In 2018, WRI investment and activity of recent years continued to pay off, resulting in substantial research income to the School of Agriculture, Food & Wine (\$36M). This represented a fifth of the University's total HERDC research income. We also played a leading role in the agriculture and veterinary sciences submission to the 2018 Excellence in Research Australia exercise. Announced early in 2019, The University of Adelaide achieved the highest possible scores for agriculture, crop sciences, horticulture (wine) & veterinary research, and top rankings in the newly assessed 'engagement and impact' measure.

During 2018, the WRI began to expand its focus beyond the plant, crop, food, soil and wine activities at the Waite precinct to support researchers involved in agriculture across the University's other campuses at North Terrace and Roseworthy. Our remit now includes animal science, agricultural economics and policy, and last year we helped to co-ordinate the expansion of collaboration between the Faculty of Engineering, Mathematical & Computer Sciences (ECMS) and Waite researchers. We are excited about how these new endeavours in applying AgTech, artificial intelligence, photonics and chemical engineering - amongst others - will transform agriculture, food and wine.

In early 2019, the new University strategic plan *Future Making* was released, recognising Agriculture, Food & Wine as a key research strength of The University of Adelaide. As such, it is now the subject of an Institute and one of the University's five designated Industry Engagement Priorities (IEPs). The WRI continues to provide investment and in-kind support to the activities of the AgriFood & Wine IEP, which also works across disciplines and business units on all three campuses to engage new industry partners. In this reach and diversity, the WRI is unique among the University's six Institutes.

Our future efforts will be directed towards stimulating new activity and leveraging external funding in the agrifood and wine space, supporting existing and emerging areas of strength and developing our people and infrastructure to fully realise the potential of The University of Adelaide's excellence in agricultural science. We look forward to working with our expanded membership and valued industry partners in 2019 and beyond.

Professor Matthew Gilliam
Director, Waite Research Institute (appointed July 2019)









Appendices

Appendix 1

WRI Members

(Active AFW researchers in 2018)

Able, Amanda	Culbert, Julie	Hanold, Dagmar
Able, Jason	Danner, Lukas	Hayes, Julie
Andelkovic, Ivan	David, Rakesh	Henderson, Sam
Arsego, Fabio	Davidson, Jennifer	Henschke, Paul
Asenstorfer, Robert	Davies, Kerrie	Herderich, Markus
Baldock, Jeffrey	De Bei, Roberta	Hettiarachchi, Ganga
Bartowsky, Eveline	Degryse, Fien	Hill, Kelly
Bastian, Susan	Delaporte, Kate	Hogendoorn, Katja
Baumann, Ute	Denton, Matthew	Hranilovic, Ana
Berger, Bettina	Derkx, Adinda	Hrmova, Maria
Betts, Natalie	Dolman, Fleur	Hsieh, Yves
Bianco-Miotto, Tina	Doolette, Ashlea	Huang, Chunyuan
Bose, Jayakumar	Dry, Peter	Islam, A
Boss, Paul	Dundas, Ian	Ismail, Ismail Ahmed
Boutsalis, Peter	Ferrante, Ariel	Jarrett, Richard
Box, Amanda	Fincher, Geoffrey	Jefferies, Stephen
Brien, Chris	Fleet, Benjamin	Jeffery, David
Buhl, Jerome	Fleury, Delphine	Jenner, Colin
Bulone, Vincent	Ford, Christopher	Jewell, Nathaniel
Burton, Rachel	Fox, Rebecca	Jiranek, Vladimir
Byrt, Caitlin	Franco Garcia, Alex	Jones, Graham
Cao, Shifeng	Fung, Elisabeth	Kabiri, Shervin
Cargill, Margaret	Garcia, Melissa	Kaiser, Brent
Cavagnaro, Timothy	Gardner, Jennifer	Kalenahalli, Yogendra
Chalmers, Kenneth	Garnett, Trevor	Keller, Michael
Churchman, Gordon	Genc, Yusuf	Khoo, Kelvin
Clarke, Stephen	Gibson, Robert	Koltunow, Anna
Coad, Bryan	Gill, Gurjeet	Kookana, Rai
Collins, Cassandra	Gilliam, Matthew	Koopman, Darren
Collins, Helen	Glatz, Richard	Kovalchuk, Nataliya
Collins, Nicholas	Gogel, Beverley	Kravchuk, Olena
Coqui da Silva, Rodrigo	Gong, Xue	Krishnan, Mahima
Coventry, David	Grant, Cameron	Kuchel, Haydn
Coventry, Stewart	Grbin, Paul	Langridge, Peter
Cozzolino, Daniel	Groom, Scott	Langridge-Reimold, Ursula
Croxford, Adam	Habili, Nuredin	Li, Gang
Cu, Suong	Haefele, Stephan	

Li, Yongle	Nuberg, Ian	Schilling, Rhiannon	Tricker, Penny	Watson, Tommaso	Xu, Bo
Lines, Thomas	Oakey, Helena	Schultz, Carolyn	Tucker, Matthew	Watson-Haigh, Nathan	Yazdani, Maryam
Little, Alan	Okada, Takashi	Schwerdt, Julian	Tyerman, Stephen	Watts-Williams, Stephanie	Zerner, Michael
Liu, Haipei	Okamoto, Mamoru	Scott, Eileen	Unkovich, Murray	Waugh, Robbie	Zhang, Dabing
Longbottom, Mardi	Oliver, Stephen	Shavrukov, Yuri	Vandeleur, Rebecca	Wege, Stefanie	Zhou, Jo
Loveys, Beth	Pagay, Vinay	Shelden, Megan	Vassos, Elysia	Whitford, Ryan	Zhou, Yi
Lyons, Graham	Paull, Jeffrey	Shi, Bu-Jun	Verbyla, Arunas	Wilkinson, Kerry	Zhu, Ying
Macdonald, Lynne	Pearson, Allison	Shirley, Neil	Walker, Michelle	Wirthensohn, Michelle	Zhu, Yongguan
Malone, Jenna	Petrie, Paul	Singh, Rohan	Walker, Robert	Wood, Katie	
March, Timothy	Petrovic, Tijana	Smernik, Ronald	Wallwork, Hugh		
Mares, Daryl	Philp, Joshua	Smith, Andrew			
Markovic, Marijana	Plett, Darren	Smith, Sally			
Marschner, Petra	Potumarthi, Ravichandra	Sornaraj, Pradeep			
Mason, Sean	Preston, Christopher	Sosnowski, Mark			
Mather, Diane	Qiu, Jiaen	Stewart, Sue			
Mayo, Gwenda	Qu, Yue (Julian)	Stockley, Creina			
McBeath, Therese	Ramesh, Sunita	Succhecki, Radoslaw			
McDonald, Glenn	Randles, John	Summy, Krista			
McLaren, Tim	Rengasamy, Pichu	Summers, David McCulloch			
McLaughlin, Michael	Riggs, Karina	Sundstrom, Joanna			
McNeill, Ann	Ristic, Renata	Sutton, Timothy			
Melino, Vanessa	Rodriguez Lopez, Carlos	Sznajder, Beata			
Mosley, Luke	Roy, Stuart	Tavakkoli, Ehsan			
Muhlack, Richard	Ryder, Maarten	Taylor, Julian			
Muhlhausler, Beverly	Sadras, Victor	Tester, Mark			
Navarro, Divina	Saucier, Cedric	Timmins, Andy			
Nielsen, Sharon					

Appendix 2

2018 Expenditure

	2018 Actual
WRI Areas of Activity	\$
Growing the quality of Waite science	359,654
Enhancing the Waite's reputation	12,823
Enhancing collaboration	78,306
Developing Waite people for the future	7,967
Subtotal	458,750
AF&W IEP Support	230,000
Staffing & Administration	243,451
Total Spend in 2018	\$932,201



Appendix 3

2018 Publications

To view or download the full list of AFW publications from the 2018 calendar year go to www.adelaide.edu.au/waite-research-institute/about#publications



Books & Book Chapters 12



Journal Articles 409



Conference Proceedings & Reports 18



Patents & Plant Breeders' Rights 3

Appendix 4

List of Relevant Acronyms

ACPFG	Australian Centre for Plant Functional Genomics	GRDC	Grains Research & Development Corporation	SJTU	Shanghai Jiao Tong University
AFW	The University of Adelaide's School of Agriculture, Food & Wine	HDR	Higher Degree by Research	TC-IWP	Training Centre for Innovative Wine Production
AF&W IEP	Agrifood and Wine Industry Engagement Priority	HIA	Horticulture Innovation Australia	UA	The University of Adelaide
AGRF	Australian Genome Research Facility	LIEF	Large Infrastructure & Equipment Funding	WA	Wine Australia
AGT	Australian Grain Technologies	NCRIS	National Collaborative Research Infrastructure Strategy	WIC	Wine Innovation Cluster
ARC	Australian Research Council	NRM	Natural Resource Management	WRI	Waite Research Institute
APPF	Australian Plant Phenomics Facility (The Plant Accelerator)	NWGIC	National Wine and Grape Industry Centre		
AWRI	Australian Wine Research Institute	PCW	ARC Centre of Excellence in Plant Cell Walls		
CSIRO	Commonwealth Scientific & Industrial Research Organisation	PEB	ARC Centre of Excellence in Plant Energy Biology		
DEWNR	Department of Environment, Water & Natural Resources (SA)	PIRSA	Department of Primary Industries & Regions South Australia		
DTTI	Department of Tourism, Trade & Investment (SA)	SAHMRI	South Australian Health and Medical Research Institute		
FFW CRC	Fight Food Waste Cooperative Research Centre	SARDI	South Australian Research & Development Institute		

For further enquiries

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