



11 - 13 NOVEMBER 2019

BRISBANE CONVENTION & EXHIBITION CENTRE



SHAPING THE SCIENCE OF TOMORROW

tropagconference.org

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CONFERENCE SECRETARIAT



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TROPAG CONTACTS



THE UNIVERSITY
OF QUEENSLAND
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QAAFI
Queensland Alliance for
Agriculture and Food Innovation



Queensland
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WELCOME

IT IS MY PLEASURE TO WELCOME YOU ALL HERE TO BRISBANE FOR TROPAG2019

Your work is a critical component to ensuring food and nutrition security in the tropics – home to the world's fastest growing population, and frontline for the impacts of climate change.

By 2050, some 50 per cent of the world's population, and close to 60 per cent of the world's children, are expected to reside in the tropics.

As the world's premier conference in tropical and subtropical agriculture and food production, TropAg provides an important platform for researchers, growers, investors, industry, policy makers and agribusiness leaders to achieve a critical mass of thinking and chart a strategic direction, to meet the potential food crisis we face.

TropAg represents an important opportunity to develop synergistic impacts across crop, horticulture, plant and food production sectors and disciplines to help broaden our thinking in terms of outcomes for developed and developing countries.

We are dealing with a crux of issues – including population growth, an increase in per capita food consumption that comes with growing affluence, scarcity of resources, nutrition impacts and the challenge of climate and environmental disruptions.

Over the next few days, you will hear from global leaders in agriculture and food research on a range of topics relating to sustainably feeding the world's growing population – which is estimated to reach 10 billion by 2050.

Crop yield increases of 50 per cent are needed by 2035 to meet the growing demand. However, the genetic basis for

incremental yield gains in these crops is already largely exhausted.

The crisis is especially dire with regards to cereals – bread wheat, rice and maize – the crops that supply half the calories consumed globally.

If we continue to rely on conventional agriculture, even in 20 years' time, we won't be capable of producing the amount of food the world needs.

Adding to this conundrum is the impact of drought and more variable rainfall patterns resulting from climate change, and the increasing scarcity of arable land, soil fertility and water.

Researchers from the nearly 50 countries represented this year at TropAg each have very different drivers and challenges facing their country's populations and industries, and I hope the range of speakers and depth of content covered in the symposia will be of interest to all.

Thank you for your participation. I look forward to seeing you at TropAg.



Professor Robert Henry
TropAg Conference Chair

Director, Queensland Alliance for Agriculture and Food Innovation

*Professor of Innovation,
The University of Queensland*

A MESSAGE FROM THE MINISTER

Queensland has a well-deserved reputation for premium, high-quality agricultural products.

Geographically, Queensland is Australia's second largest state, covering more than 173 million hectares—more than twice the size of Texas, four times that of Japan and seven times that of Great Britain.

Agriculture and food is regularly highlighted as one of Queensland's strengths.

However, the agribusiness and food sector in Queensland—and globally—faces change at an unprecedented scale and pace.

In the tropics and subtropics, agriculture and food producers must continue to meet growing demand while facing the challenges of sustainable resource use, ongoing drought, more variable rainfall patterns, increasing global trade competitiveness, and changing consumer preferences.

Meeting these challenges requires new ways of thinking and the TropAg conference represents a key opportunity for the world's leading agricultural and food scientists to help identify solutions to sustainably grow food production and benefit the agribusiness and food sector.

The Queensland Government is proud to present AgFutures2019 as an integral part of the TropAg2019 program. AgFutures2019 provides the opportunity for delegates to gain an appreciation of the innovation and investment in agriculture that is happening right here in Queensland.

For the agriculture and food sector to continue to thrive, change is inevitable and events like TropAg are a great opportunity to share knowledge and develop important connections to help grow global food production.

It is with great pleasure that I welcome you to TropAg and Queensland.



Honourable Mark Turner MP
Queensland Minister for
Agriculture Industry Development
and Fisheries

SCIENTIFIC PROGRAM COMMITTEE



► **Gavin Ash**
*The University of
Southern Queensland*



► **Iain Gordon**
James Cook University



► **Stephen Moore**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Frikkie Botha**
*Sugar Research
Australia*



► **Wayne Hall**
*Department of
Agriculture and
Fisheries, Queensland
Government*



► **Sagadevan Mundree**
*Queensland University
of Technology*



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*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Graeme Hammer**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Daniel Rodriguez**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Mary Fletcher**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Roger Hellens**
*Institute for Future
Environments,
Queensland University
of Technology*



► **Heather Smyth**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Rebecca Ford**
Griffith University



► **Corrine Jasper**
Hort Innovation



► **Yasmina Sultanbawa**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Glen Fox**
*University of California,
Davis*



► **Neal Menzies**
*The University of
Queensland, School of
Agriculture and Food
Sciences*



► **Lynne Turner**
*Department of
Agriculture and
Fisheries, Queensland
Government*



► **Mike Gidley**
*The University of
Queensland, Queensland
Alliance for Agriculture
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► **Osman Mewett**
*Australian Seed
Federation*



► **Dan Walker**
*Australian Centre for
International Agricultural
Research*



► **Ian Godwin**
*The University of
Queensland,
Queensland Alliance
for Agriculture and
Food Innovation*



► **Neena Mitter**
*The University of
Queensland, Queensland
Alliance for Agriculture
and Food Innovation*



► **Gene Wijffels**
*Commonwealth Scientific
and Industrial Research
Organisation (CSIRO)*

EXECUTIVE ORGANISING COMMITTEE



► **Robert Henry**
Director
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Ben Hayes**
Centre Leader - Animal Science, Centre for Animal Science
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Neena Mitter**
Centre Director – Horticultural Science
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Mike Gidley**
Centre Director – Nutrition and Food Sciences
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Jackie Kyte**
Project Manager – Events
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Luis Prada e Silva**
Senior Research Fellow, Centre for Animal Science
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Ian Godwin**
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Carolyn Martin**
Marketing and Communications Manager
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation



► **Stephen Williams**
Deputy Director
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation

INTERNATIONAL ADVISORY COMMITTEE

► **Robert Henry**
Director
The University of Queensland, Queensland Alliance for Agriculture and Food Innovation

► **Barbara Burlingame**
Professor, Nutrition and Food Systems
College of Health, Massey University

► **Kenneth Cassman**
Emeritus Professor of Agronomy
Department of Agronomy and Horticulture, University of Nebraska-Lincoln

► **Angélique D'Hont**
Postdoctoral Researcher
Agricultural Research for Development (CIRAD)

► **Dahlan Dahlanuddin**
Livestock Production Systems
Faculty of Animal Science, University of Mataram

► **Henry Daniell**
Professor and Director of Translational Research
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► **Ian Darnton-Hill AO**
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Faculty of Medicine and Health, University of Sydney

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Professor of Professional Practice, Director, MPA in Development Practice
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College of Agricultural and Life Sciences, Texas A&M University

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Department of Genetics and Genome Biology
University of Leicester

► **Hailing Jin**
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Department of Microbiology & Plant Pathology, Centre for Plant Cell Biology, Institute for Integrative Genome Biology, University of California

► **Judith Kinywé**
Associate Professor, Department of Foods, Nutrition and Dietetics, School of Applied Human Sciences Complex
Kenyatta University

► **Qiaoquan Liu**
Professor of Crop Genetics and Breeding, Director, Office of Science and Technology
Yangzhou University

► **P. V. Vara Prasad**
Director, Sustainable Intensification Innovation Lab= University Distinguished Professor, Crop Ecophysiology, Kansas State University

► **Anete Pereira de Souza**
Professor, Department of Plant Biology
Centre for Molecular Biology and Genetic Engineering, State University of Campinas

► **Ian Proudfoot**
Global Head of Agribusiness
KPMG

► **Joao (Joe) Mauricio Bueno Vendramini**
Forage Specialist
University of Florida

► **Rajeev Varshney**
JC Bose National Fellow and Shanti Swarup Bhatnagar Laureate (Government of India), Research Program Director, Genetic Gains, Director, Centre of Excellence in Genomics and Systems Biology
International Crops Research Institute for the Semi-Arid Tropics

AgFutures 2019

A showcase of innovation and
investment in Queensland agriculture



A proud partner of TropAg 2019

Connect with us to share in our vision

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daf.qld.gov.au



@QldAgriculture

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Kurilpa Tribe, the traditional custodians of the land upon which we meet. We respectfully acknowledge the past and present traditional owners of this land and the contributions of Aboriginal Australians and non-Aboriginal Australians to the education of all children and people in this country we all live in and share together – Australia.

TROPAG2019 ABSTRACTS - OPEN ACCESS



TropAg2019 is pleased to advise that we are working with Proceedings (ISSN 2504-3900) – an open access journal published by MDPI – to have all author approved TropAg2019 abstracts published by this Journal. All published items will be individually indexed, citable via a digital object identifier (DOI), and freely available under an open access license.

For more information:

[https://www.mdpi.com/journal/proceedings.](https://www.mdpi.com/journal/proceedings)

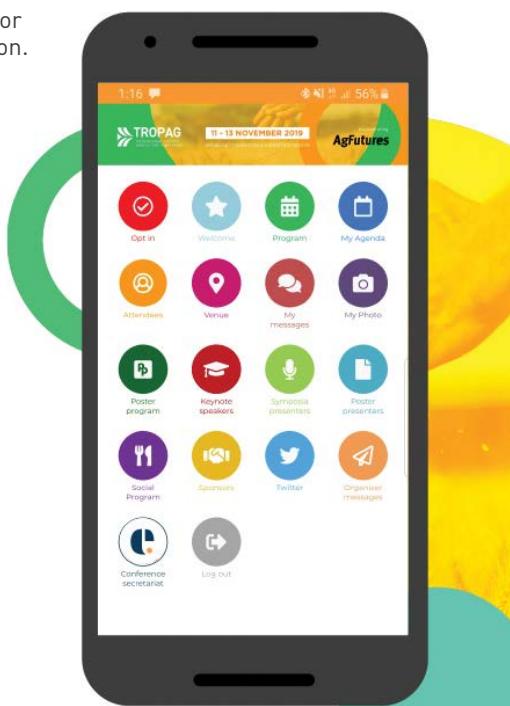
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Please be aware that by attending the conference, you consent to your voice, name and/or likeness being used, without compensation, in films and tapes for use in any form of media, whether now known or hereafter devised, for future use, and you further release UQ and TropAg associates, its successors, assigns and licenses from any and all liability whatsoever.

If you do not wish to be filmed or photographed, please make yourself known to the photographer.

We thank you for
your cooperation.



DOWNLOAD THE TROPAG2019 CONFERENCE APP

The Event App by EventsAIR includes everything you need to know about the TropAg conference including the conference program, symposia, speakers, abstracts, social program and venue. Use the app to build your own conference agenda and contact other delegates via the app.

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The first time you open the app, you will need to enter this code: tropag2019

Then, log in using either your account email address and the password you created OR the PIN emailed to you.

Please opt in when you download the app so that you are able to use all of the interactive features and send messages to other delegates.

TropAg2019 conference app menu



Opt in

Select Opt in to use the interactive app, appear in the attendee list and message other delegates.



Program

Select the Program icon to view the conference plenary, symposia and poster presenters and abstracts.



Browse the program, tap the star icon to select plenary and symposia sessions you want to attend and click Add To My Agenda for each session.



My Agenda

Select My Agenda to view plenary and symposia sessions you have chosen to attend. In my agenda you can easily navigate sessions throughout the conference, without having to scroll through the whole program.



Select Venue for conference floorplan and car parking.



Conference secretariat

If you have any problems downloading and accessing the app, please see the staff at the registration desk or one of the UQ QAAFI volunteers.



Last year Hort Innovation worked with our delivery partners and the wider research community on \$122 million worth of projects across research and development, extension and communication, marketing, trade and more

Who is Hort Innovation?

We're part of Australia's network of 15 Rural Research and Development Corporations and currently look after 37 horticulture industries that have statutory or voluntary levies to invest. Hort Innovation also has the whole-of-horticulture Hort Frontiers strategic partnership initiative, focused on collaborative, cross-industry work to address longer-term, complex issues and opportunities identified as critical for the future of Australian horticulture.

Become involved

To find out how you can become involved, to see our current partnership opportunities, and to sign up for alerts on upcoming opportunities, visit www.horticulture.com.au/delivery-partners.

Say hello today

Find us here today at TropAg at stand 7.

www.horticulture.com.au

**Hort
Innovation**

SOCIAL PROGRAM

Welcome reception

Join your fellow colleagues, friends and associates for networking drinks and canapés among the trade exhibition booths to celebrate the commencement of TropAg2019.

Date: Monday 11 November 2019

Time: 18:00 – 20:00

Venue: Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane

Cost: Inclusive of full registration. Tickets for guests can be purchased for AUD50.

Please see staff at the registration desk if you would like to purchase additional tickets.

Conference dinner

The conference dinner will celebrate the Queensland Government's #eatQld initiative. The conference dinner will feature a three course meal showcasing Queensland's finest and freshest produce. Chef, David Pugh, will provide an entertaining presentation around the meal he prepared. A fun night with a live band that will have you on the dance floor.

Date: Tuesday 12 November 2019

Time: 19:00 – 23:00

Venue: Plaza Ballroom, Plaza level, Brisbane Convention & Exhibition Centre

Dress: Cocktail

Cost: Inclusive of Full registration. Tickets for Partial registration, Student registration, Day registration and guests are AUD125 per ticket.

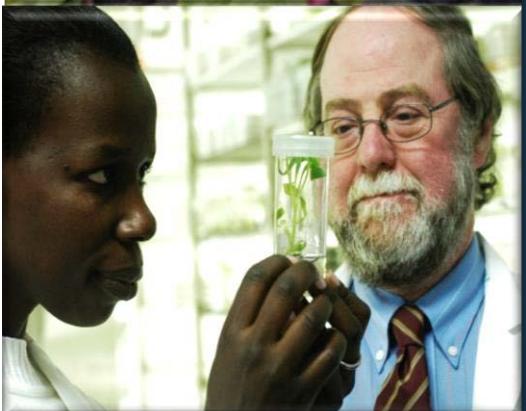
If you wish to attend the conference dinner and have not booked a ticket, please enquire with the registration desk.

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Accelerating plant and animal genomic breakthroughs together

Join us at the TropAg Booth 10 on 11-13 November 2019





Discover our strengths in tropical agriculture research

QUT's Centre for Tropical Crops and Biocommodities is a world leader in tropical agriculture, research and development.

Our research helps feed the world through innovative approaches in plant biotechnology and genomics, and grows the bioeconomy by developing technologies to transform waste into biofuels and bioproducts.

Our crop specialisations include bananas, chickpeas, mungbeans and sugarcane.

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www.qut.edu.au/research/ctcb

ALIGNED EVENTS

YOU ARE WELCOME TO REGISTER AND ATTEND THE FOLLOWING EVENTS WHICH ARE BEING HELD AROUND TROPAG2019.

Bris Science

Date: Monday 11 November 2019
Time: 6.30 – 7.30pm (doors open at 6.00pm)
Venue: The Edge, State Library of Queensland, Cultural Precinct, Stanley Place, Southbank
Cost: Free

To register:

<https://www.eventbrite.com.au/e/brisscience-a-sensory-experience-of-australian-flavour-tickets-76859303245>

Contact: science.events@uq.edu.au

Topics and speaker:

Australians love their food. But how do we get the rest of the world to fall in love with Aussie cuisine?

The sensory experience of food and wine flavour has an important influence on consumer acceptance or rejection. A flavour's signature is impacted by the environment in which the food was grown and harvested. Understanding how place-of-origin influences food quality allows Australian companies to brand their products and produce with a point-of-difference, based on flavour, that inextricably ties the food to provenance.

Join us to learn how Dr Heather Smyth is researching the human sensory experience of Australian foods, finding new pathways for adding distinctive Australian qualities to our home-grown food and beverage products.

Nitrogen recycling and feed efficiency in tropically adapted cattle

Date: Thursday 14 November 2019
Time: 9.30am – 4.30pm
Venue: QAAFI Centre for Animal Science, The University of Queensland, Queensland Bioscience Precinct Building 80, 306 Carmody Rod, St Lucia
Cost: Free

To register, contact:

Luis Prada e Silva.
E: l.pradaesilva@uq.edu.au | T: 0421 833 376

Topics and speakers:

- Luis Prada e Silva: The UQ N-recycling project: an overview
- Diogo Costa: Forensic predictions of feed efficiency
- Tryon Wickersham: N-recycling in low protein diets
- Anastasia Fanning: The cattle selection program of ABBA
- Maree Bowen: Rumen efficiency in cattle grazing tropical pastures
- Catriona Millen: Developing breeding objectives
- Mick Sullivan: Getting the message out there
- John Nolan: Modelling growth responses in low protein diets

Plant Cryobiotechnology workshop

Date: Thursday 14 – 15 November 2019
Time: 9.30am – 4.30pm
Venue: The University of Queensland, Queensland Bioscience Precinct Building 80, 306 Carmody Rod, St Lucia
Cost: Free

To register: bit.ly/Plant-Cryo-workshop

Contact:

Alice Hayward
E: a.hayward@uq.edu.au | T: +61 7 334 62295

Topics and speakers:

Day 1: 14 November – Workshop presentations

Chris O'Brien: Introduction to ex-situ conservation of plant genetic resources

Steve Adkins (Julianne Biddle): Tissue culture as a method to preserve plants

Raquel Folgado: Cryobiotechnology as a strategy for the long-term preservation of plant biodiversity

Potentials and challenges of the cryobiotechnology applied to plant conservation:

Day 2: 15 November – Laboratory workshop

Spend a day in a world-class tissue culture facility, learning hands-on techniques and tricks for different stages of the cryopreservation process, using both dicot and monocot plant species.

Practical demonstrations:

- Shoot tips dissection - Banana and Avocado
- Cryopreservation of shoot-tips using vitrification and encapsulation-based techniques
- Cryopreservation of somatic embryos



Creating change in agriculture innovation

The University of Queensland (UQ) is the world's top-ranked tropical agriculture university. Our world-leading research addresses complex international concerns about food security and sustainable agricultural production.

Balancing how to feed a growing world population against rising affluence in developing countries, diminishing natural resources, and the need to

improve productivity while minimising environmental impact our primary focus.

Our unique geographical location, multidisciplinary and collaborative nature, and stellar track record of innovation and research translation make us global leaders in tropical and sub-tropical agricultural systems research.

Partner with us

agriculture.uq.edu.au

qaafi.uq.edu.au



THE UNIVERSITY
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AUSTRALIA

CREATE CHANGE

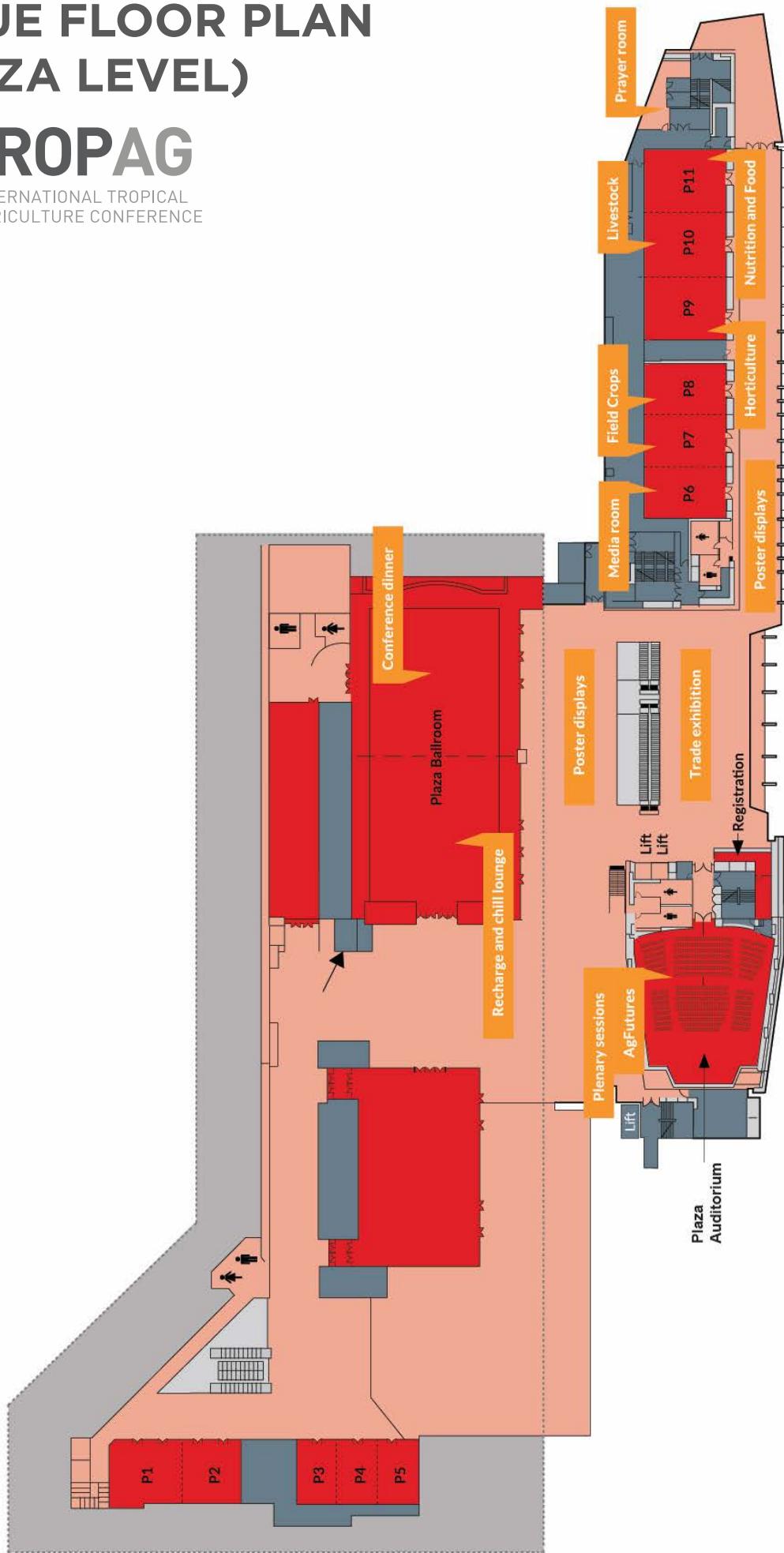
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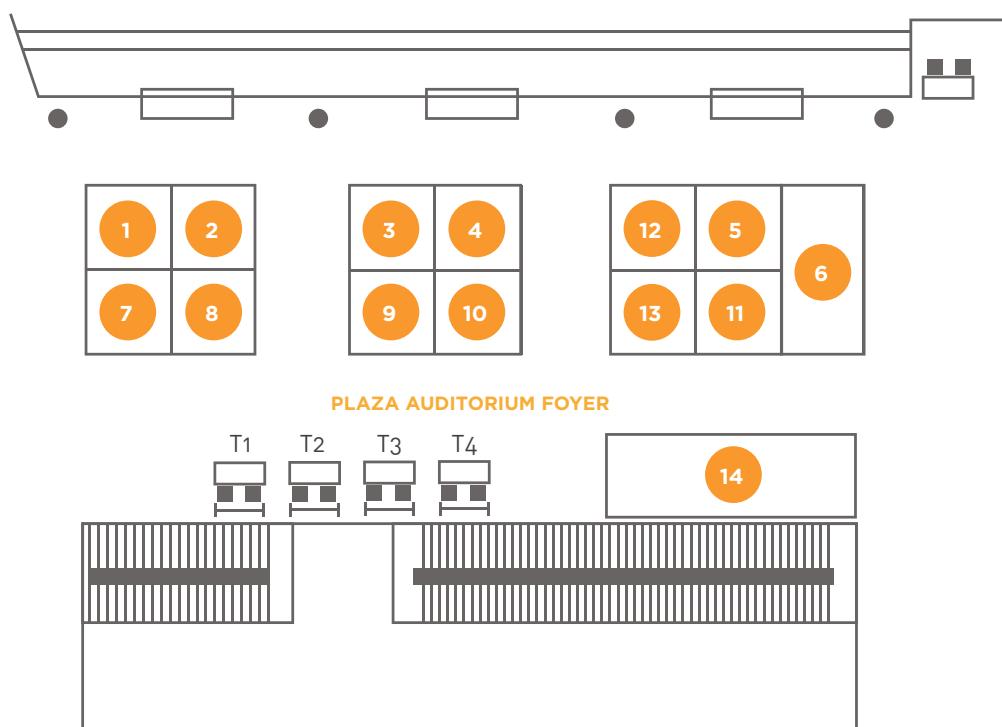
VENUE FLOOR PLAN (PLAZA LEVEL)



INTERNATIONAL TROPICAL
AGRICULTURE CONFERENCE



EXHIBITOR LISTING AND FLOOR PLAN



Table/Booth Organisation

1	Southern Cross University
2	Agrifutures Australia
3	Growth Agriculture & Innovative Agriculture
4	LI-COR Biosciences
5	CSIRO Publishing
6	Department of Agriculture and Fisheries
7	Hort Innovation
8	Queensland University of Technology
9	Macrogen Oceania
10	Illumina Australia Pty Ltd
11	Neogen Australasia
12	Australian Genome Research Facility
13	Horticultural Industries in Northern Australia
14	The University of Queensland, Queensland Alliance for Agriculture and Food Innovation
T1	CRC for Developing Northern Australia
T2	ARC Centre of Excellence for Translational Photosynthesis
T3	Australian Plant Phenomics Facility
T4	University of Southern Queensland



PROGRAM*

*Program may be subject to change. Current at time of printing.

MONDAY 11 NOVEMBER 2019

► **Lawrence Haddad**, Executive Director
Global Alliance for Improved Nutrition (GAIN)

Dr Lawrence Haddad is a South African-born British economist. He was appointed the Executive Director of the Global Alliance for Improved Nutrition (GAIN) in October 2016. Working with partners around the world, GAIN aims to make healthier food choices more affordable, more available, and more desirable. GAIN's purpose is to improve nutrition outcomes by increasing the consumption of nutritious and safe food for all people, especially the most vulnerable.

Prior to this, Dr Haddad was the founding co-chair and lead author of the Global Nutrition Report and was the Director of the Institute of Development Studies (IDS), the world's leading development studies institute. Before joining IDS in 2004, he was Director of the Food Consumption and Nutrition Division at the International Food Policy Research Institute and was a UK representative on the Steering Committee of the High Level Panel of Experts of the UN's Committee on World Food Security.

In 2018, the World Food Prize awarded the World Food Prize to Dr Haddad and Dr David Nabarro, former Special adviser to the UN Secretary General. They received the award for their individual and complementary global leadership in elevating maternal and child undernutrition to a central issue within the food security and development dialogue at national and international levels.

Why animal-source foods need to be part of the global food security and nutrition agenda

A number of recent reports on diets and food systems have generated a great deal of divisive debate about the role of animal source foods in the human diet. The media have latched on to these debates and have, in some cases, accentuated the divides. This presentation will emphasise not division, but inequality. It is the inequality in what people eat that needs to be addressed. Many people eat far too much animal sourced food: too much for their health and too much for the planet's environmental health. But many also eat too little animal sourced food—these foods are rich sources of micronutrients that are essential for young infant and child growth and are not available in other affordable foods for these populations who tend to be low income. So a nuanced approach to animal sourced foods is needed. Those who eat too much for their good health and who put unnecessary stress on the planet's environmental resources should eat less and those who are undernourished with very monotonous diets would benefit from eating more. This presentation explores this contested terrain and aims to improve clarity in the policy space surrounding animal source foods.



► **Usha Zehr**, Director and Chief Technology Officer

Maharashtra Hybrid Seeds Company Private Limited (Mahyco)

Dr. Usha Barwale Zehr is the Director and Chief Technology Officer at Maharashtra Hybrid Seeds Company Private Limited (MAHYCO) in India. She received her PhD from the University of Illinois at Urbana-Champaign.

For the past 20 years, she has been utilising new technologies and tools including biotechnology for improving the quality and productivity of seeds and agriculture. In addition, Dr. Zehr serves as Director of the Barwale Foundation, a non-profit research foundation. She also serves on the Board of the Donald Danforth Plant Science Center and Alliance for

Green Revolution in Africa.

Mahyco focuses on research and development, production, processing, and marketing of seeds for Indian farmers. Founded in 1964, Mahyco is the pioneer of high-quality hybrid and open pollinated seeds, through the use of cutting-edge technology and intensive research activities.

Dr. Zehr served as a geneticist at Purdue University, studying sorghum and millet and focusing on the application of plant biotechnology for improving agricultural production. During her graduate and post-graduate studies, she worked in the area of tissue culture and transformation. Her group at the University of Illinois was the first to develop a system for soybean regeneration. As a result of her work at Purdue University, the first transgenic sorghum plant was produced. Her work in plant biotechnology is aimed toward implementing emerging technologies in the developing world.

Small holder farmers and science of tomorrow

Small Holder farmers in India have benefited from the scientific advances be it the high yielding varieties of Green revolution or the most recent revolution with the use of Bt cotton leading to livelihood improvement. The small holder farmers in India will continue to feed the nation and more under several environmental constraints which require rededicated effort in agricultural sciences. Application of new science to agriculture is critical be it New Breeding Technologies, greater focus on soil health, water use efficiency and more. Farmers are also constrained by what they have access to, where their inputs come from and where they will go to market their harvest. Indian farmers are using mobile phones in large numbers, from basic to smart phones and with relatively cheap access to data, are using these devices to share information. Digital platforms which provide information on weather, soil health, carbon status, predict yield, financial transactions or market opportunities in addition to the genetic improvements are being delivered to farmers in local languages and impacting their decision making and improving lives. Policies around new innovation must be clear to deliver the benefits of these advances to the farmers. These innovations are shaping the future of science for small holder farmers and may even entice the youth to continue to farm.

07:00-20:00 ► Registration desk open ► Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane

08:00 Conference welcome ► The University of Queensland

Conference opening ► Queensland Government

08:45-10:00 Plenary session 1

Room Plaza Auditorium

Chair

► Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI)

Keynote speaker ► Lawrence Haddad, Executive Director, Global Alliance for Improved Nutrition (GAIN), Switzerland

Keynote speaker ► Dr Usha Zehr, Director and Chief Technology Officer, Maharashtra Hybrid Seeds Company Private Limited (MAHYCO), India

Morning tea



10:30-12:30 Concurrent symposia session 1

FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	LIVESTOCK Room ▶ P10	NUTRITION AND FOOD Room ▶ P11	AGFUTURES Room ▶ Plaza Auditorium
1.1 ▶ Agricultural systems research: A transformative approach to the sustainable intensification of agriculture Chair ▶ Prof John Dixon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	1.2 ▶ Tissue culture for propagation, conservation and crop improvement Chair ▶ Prof Neena Mitter, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	1.3 ▶ Sustainable, healthy diets for all: Tomorrow's livestock science Chair ▶ Prof Lindsay Harvey, International Livestock Research Institute (ILRI), Kenya; The University of Melbourne, Australia	1.4 ▶ Market-led breeding for value chains: Africa-Australia nexus for innovation Chair ▶ Dr Vivienne Anthony Syngenta Foundation for Sustainable Agriculture, Switzerland	1.5 ▶ Strategic issues facing agricultural development in northern Australia Chair ▶ Ms Sheridan Morris, CRC for Developing Northern Australia, Australia
Agricultural systems research: A transformative approach to sustainable intensification - 104 ► Prof Daniel Rodriguez, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	In vitro approaches for papaya crop improvement - 108 ► Dr Puttiyaparambil Josekutty, Skybury Coffee Pty Ltd, Australia	Let them eat meat? A solution or a problem for a sustainable healthy future? - 114 ► Dr Lawrence Haddad, Global Alliance for Improved Nutrition (GAIN), Switzerland	Australia-Africa Universities Network: Providing sustainable solutions to challenges jointly facing Australia and Africa - 120 ► Prof Kadambot Siddique, University of Western Australia, Australia	Successfully facilitating agricultural investment in northern Australian landscapes - 126 ► Dr Allan Dale, CRC for Developing Northern Australia; James Cook University, Australia
Food systems failure: Can we avert future crises? - 106 ► Dr Kiah Smith, The University of Queensland, Australia	The use of cryobiotechnology to conserve plant genetic resources: Opportunities and challenges - 109 ► Dr Raquel Folgado, The Huntington Botanical Gardens, USA	The quest for policy and public expenditure opportunities to support implementation of sustainable smallholder livestock and aquaculture interventions - 115 ► Dr Robyn Alders, Centre for Global Health Security, Australia	Delivering market requirements: Product profiling with market foresight for bean value chains in East Africa - 121 ► Dr Jean Claude Rubyo, International Centre for Tropical Agriculture (CIAT); Pan Africa Bean Research Alliance (PABRA), Tanzania	A situational analysis for developing a rice industry in northern Australia - 127 ► Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
Farming systems analysis for problem-solving in the R&D context - 107 ► Dr Sarina Macfadyen, Australian Centre for International Agricultural Research, Australia	Tissue culture for the collection, conservation and multiplication of elite coconut germplasm - 110 ► Prof Steve Adkins, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Tissue culture for the collection, conservation and multiplication of elite coconut germplasm - 110 ► Prof Steve Adkins, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Public-private breeding transition in sorghum in Australia and lessons for sub-Saharan Africa - 122 ► Prof David Jordan, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Northern beef industry emerging market, supply chain gap analysis & sector capacity baseline study - 128 ► Dr Chris Chilcott, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
Transformational adaptation in agriculture under climate change - 102 ► Prof Mark Howden, Australian National University, Australia	Developments in banana tissue culture in Australia - 111 ► Ms Sharon Hamill, Department of Agriculture and Fisheries, Queensland Government, Australia	Success example: The potential for livestock methane mitigation - 117 ► Prof Richard Eckard, The University of Melbourne, Australia	Introducing market-led approaches into postgraduate plant-breeding education programs in Africa - 123 ► Prof Shimeles Hussein, Africa Centre for Crop Improvement (ACCI), South Africa	Preparing the way for growth in aquaculture in northern Australia: Industry priorities and vision 2028 - 129 ► Prof Dean Jerry, Centre for Sustainable Tropical Fisheries and Aquaculture; ARC Research Hub for Advanced Prawn Breeding, James Cook University, Australia
Transforming agricultural biosecurity - 103 ► Assoc Prof Grant Hamilton, Queensland University of Technology, Australia	Micropropagation of recalcitrant <i>Persea Americana</i> rootstock cultivars - 112 ► Dr Jayeni Hiti-Bandaralage, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Productivity - intensification - animal welfare: Synergies or trade-offs? - 118 ► Dr Rebecca Doyle, The University of Melbourne, Australia	Africa's plant breeders and their variety portfolio for farmers and markets: Opportunities and challenges - 124 ► Dr Nasser Yao, International Livestock Research Institute (ILRI), Kenya	Northern Australia forestry situational analysis project - 130 ► Mr Mick Stephens, Timber Queensland, Australia
Transforming landscapes through irrigation - 105 ► Dr Matthew Harrison, Tasmanian Institute of Agriculture (TIA), Australia	Enhancing product development by use of double haploid - 113 ► Dr Usha Zehr, Maharashtra Hybrid Seeds Company Private Limited (MAHYCO), India	Demand led breeding - 125 ► Prof Gabriele Persley, The University of Queensland, Australia	Business on country: Land use diversification on the Indigenous estate - 131 ► Mr Ricky Archer, North Australian Indigenous Land and Sea Management Alliance Ltd, Australia	
				

12:30 **Lunch and poster presentations**
 Poster themes: Livestock and AgFutures

13:30-15:30 **Concurrent symposia session 2**

FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	LIVESTOCK Room ▶ P10	NUTRITION AND FOOD Room ▶ Plaza Auditorium
<p>2.1 ▶ Climate-smart wheat Chair ▶ Dr Karine Chenou, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia</p> <p>Transformational wheat agronomy: Success from system synergy - 132 ► Dr John Kirkegaard, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia</p>	<p>2.2 ▶ Beyond pretty pictures: Horticulture tree crop mapping, from individual fruit to a national database Chair ▶ Dr Anthony Kachenko, Hort Innovation, Australia</p> <p>Matching technology with need - 138 ► Mr Chad Simpson, E.E. Muir & Sons Pty Ltd, Australia</p>	<p>2.3 ▶ Nutrition strategies to mitigate high environmental temperatures in cattle, pigs, and chickens Chairs ▶ Assoc Prof Eugeni Roura and Assoc Prof John Gaughan, The University of Queensland, Australia</p> <p>Management of cattle exposed to high environmental temperatures - 144 ► Prof Terry Mader, University of Nebraska, USA</p>	<p>2.4 ▶ Creating an Australian cuisine through traditional Australian foods Chair ▶ Assoc Prof Yasmina Sultanbawa, ARC Training Centre for Uniquely Australian Foods, Australia</p> <p>Wastes to profits – delivering advanced agriproduct technologies for agriculture - 156 ► Mr Doug McNicholl, Meat and Livestock Australia, Australia</p>
<p>Delivering traits for improved adaptation to future climates - 133 ► Dr Greg Rebetzke, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia</p>	<p>Forward estimation of mango crop load and harvest timing based on in-field machine vision and handheld spectroscopy - 139 ► Prof Kerry Walsh, Central Queensland University, Australia</p>	<p>Nutritional strategies to mitigate effects of high environmental temperature - 145 ► Assoc Prof John Gaughan, The University of Queensland, Australia</p>	<p>Energy and feed products from waste: Applying the circular economy to agricultural industries - 157 ► Dr Paul Jensen, Advanced Water Management Centre, The University of Queensland, Australia</p>
<p>Combining trait physiology, crop modelling and molecular genetics to improve wheat adaptation to terminal water-stress by targeting stay-green and root traits - 134 ► Dr Jack Christopher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia</p>	<p>Efficient and detailed orchard maps: Flowers, fruit, ripeness, canopy light interception and yield - 140 ► Dr James Underwood, The University of Sydney, Australia</p>	<p>Metabolism and endocrinology of cattle in high environmental temperatures - 146 ► Dr Gene Wijffels, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia</p>	<p>Low cost and flexible production of biofuels and biochemicals - 158 ► Dr Darryn Rackemann, Queensland University of Technology, Australia</p>
<p>Increasing heat tolerance in wheat to counteract recent and projected increases in heat stress - 135 ► Dr Najeeb Ullah, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia</p>	<p>The appropriate use of UAVs and Lidar for mapping tree crop canopy structure and health - 141 ► Ms Dan Wu, The University of Queensland, Australia</p>	<p>Physiological adaptations of pigs under high environmental temperatures - 147 ► Dr Jeremy Cottrell, The University of Melbourne, Australia</p>	<p>How synthetic biology will transform the Australian biotechnology industry - 159 ► Dr Darren Rackemann, Queensland University of Technology, Australia</p>
<p>Tracking a major gene increasing wheat biomass and yield in hot environments - 136 ► Dr Penny Tricker, The University of Adelaide, Australia</p>	<p>Exploring the potential of high resolution satellite imagery for yield prediction of Avocado and Mango crops - 142 ► Dr Moshin Rahman, Applied Agriculture Research Centre (AARC), University of New England, Australia</p>	<p>Nutritional strategies to mitigate heat stress in pigs - 148 ► Prof Frank Dunshea, The University of Melbourne, Australia</p>	<p>Mapping biomass resources in Queensland - 160 ► Ms Kelly Bryant, Department of Environment and Science, Queensland Government, Australia</p>
<p>New advances in phenotyping technologies - 137 ► Dr Xavier Sirault, Australian Plant Phenomics Facility, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia</p>	<p>National scale mapping of horticulture tree crops in Australia - 143 ► Mr Craig Sheppard, The University of New England, Australia</p>	<p>Nutritional strategies to mitigate heat stress in chickens - 149 ► Assoc Prof Eugeni Roura and Assoc Prof Chiara Palmieri, The University of Queensland, Australia</p>	<p>Lignocellulosic biomass as a bioeconomy platform – industry perspectives - 161 ► Dr Alex Baker, Leaf Resources Ltd, Australia</p>



TUESDAY 12 NOVEMBER 2019

► **Alfred de Vries**, Senior Program Officer for Animal Production
Bill & Melinda Gates Foundation

Alfred de Vries works at the Bill & Melinda Gates Foundation as Senior Program Officer for Animal Production. He leads the Foundation's efforts in R&D for Animal Production (genetics, reproduction, feed) aimed at increasing livestock productivity in Sub-Saharan Africa and South-East Asia. Alfred has extensive experience in animal breeding across many geographies from his time at international breeding companies (CRV, Topigs Norsvin and PIC). He had management positions in R&D, technical service and operations. He obtained his MSc and PhD degrees in Animal Sciences from Wageningen University and holds a Global Certificate in Management from INSEAD.

Tropical livestock for wealth in developing countries

The Agriculture Development program at the Gates Foundation strives to empower smallholder farmers with the tools and technologies they need to boost productivity, farm income and food quality. We partner with governments, local NGOs and businesses to give farmers better access to the markets, distribution networks, and the inputs they need.

Our investments in livestock started in 2012. The reasons for including livestock in the program were:

- 60% of people in extreme poverty own livestock
- livestock is often their most important asset
- 30-40% of Agricultural GDP
- important source for high quality nutrition
- opportunity to empower women
- enormous potential for yield improvement

Most animals in developing countries have health challenges and very low yields (~10 times lower compared to other countries), resulting in low farmer income, poor resource efficiency, high GHG emission intensity and high consumer prices.

The major constraints for higher productivity are in animal health, genetics and feed quality. To address these constraints, we have made investments in new technologies, products and delivery systems. Examples in genetics are genomic selection, sex sorted semen and artificial insemination for dairy cows and buffaloes. Important investments in poultry genetics are in the delivery of locally adapted chicken with 5-10 times more egg production. Other promising investments are in digital platforms that link farmers to the formal market as well as to financial services.

These technologies help to overcome barriers for successful farming in tropical countries, but much more innovation and investments are needed to give every farmer the chance of healthy and productive livestock.



► **Pamela Ronald**, Founding Director of the Institute for Food and Agricultural Literacy
University of California, Davis

Pamela Ronald, is a Distinguished Professor, in the Dept. of Plant Pathology and the Genome Center, and Founding Director of the Institute for Food and Agricultural Literacy at the University of California, Davis. She also serves as a Key Scientist at the Joint Bioenergy Institute in Emeryville, CA.

Pamela studies rice genes that control resistance to disease and tolerance to environmental stress. Pamela and colleagues received the 2008 USDA National Research Initiative Discovery Award and the 2012 Tech Award for innovative use of technology to benefit humanity. In 2011, she was selected as one of the 100 most creative people in business by Fast Company Magazine. She is the recipient of the 2012 Louis Malassis International Scientific Prize for Agriculture and Food, a Guggenheim Fellowship, the National Association of Science Writers Science in Society Journalism Award, and the Tocqueville Distinguished Chair Award.

In 2014 she was named one of the world's most influential scientific minds by Thomson Reuters, in 2015 was selected by Scientific American as one of the world's 100 most influential people in biotechnology and in 2016 was named one of the 50 innovators and visionaries who will lead us toward a more sustainable future by Grist magazine. She is co-author, with her husband, Raoul Adamchak, an organic farmer, of Tomorrow's Table: Organic Farming, Genetics, and the Future of Food. Bill Gates calls the book "a fantastic piece of work" and "important for anyone that wants to learn about the science of seeds and challenges faced by farmers. In 2012, Tomorrow's Table was selected by The New Earth Archive as one of the 25 most powerful and influential books with the power to inspire college readers to change the world. Her 2015 TED talk has been viewed by more than 1.7 million people and translated into 26 languages.

Engineering crops for resistance to disease and tolerance to environmental stress

A major goal for food and agricultural research is to increase the resiliency of agricultural systems to adapt to rapid changes and extreme conditions. Prof. Ronald will describe how genetic approaches are being used to generate the next generation of crops that will help farmers thrive in these challenging conditions.

Her laboratory at UC Davis studies genes that control resistance to disease and tolerance of environmental stress. Together with her collaborators, she has engineered rice for resistance to disease and tolerance to flooding. Ronald will describe isolation of a rice immune receptor, its similarity to animal immune receptors and the microbial molecule that binds to and activates the rice immune receptor. She will describe isolation of the *SubIA* gene and the development of a flood tolerant rice variety (known as 'Sub1' rice) produced by the International Rice Research Institute that was cultivated by over six million farmers in India and Bangladesh in 2017. Under submerged conditions, these 'Sub1' varieties have enhanced yield and can prevent total crop failure.

07:30-18:00 Registration desk open ► Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane

08:30-10:00 Plenary session 2

Room Plaza Auditorium

Chair

► Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI)

Keynote speaker

► Mr Alfred de Vries, Senior Program Officer for Animal Production, Bill & Melinda Gates Foundation, USA

Keynote speaker

► Engineering crops for resistance to disease and tolerance to environmental stress 201

Morning tea

10:00



10:30-12:30 Concurrent symposia session 4

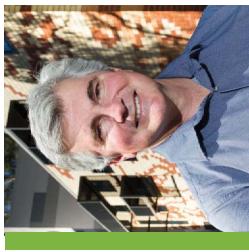
FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	LIVESTOCK Room ▶ P10	NUTRITION AND FOOD Room ▶ P11	AGFUTURES Room ▶ Plaza Auditorium
4.1 ▶ From enzymes and cells to entire crops: Integrative approaches to redesigning photosynthesis for better yields ▲ Chair ▶ Dr Robert Sharwood, ARC Centre of Excellence for Translational Photosynthesis, Australian National University, Australia Recent advances in predicting stomatal behaviour - 202 ▲ Prof Belinda Medlyn, Western Sydney University, Australia	4.2 ▶ Digital horticulture ▲ Chair ▶ Assoc Prof Jim Hanan, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia Modelling orchard light environment - 208 ▲ Dr Neil White, Department of Agriculture and Fisheries, Queensland Government, Australia	4.3 ▶ Understanding livestock microbacteria for health, welfare, and sustainability ▲ Chair ▶ Assoc Prof Mary Fletcher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia Breeding low-emitting ruminants: Predicting methane from microbes - 214 ▲ Dr Suzanne Rowe, AgResearch, New Zealand	4.4 ▶ Wild crop relatives: The next frontier for crop improvement ▲ Chairs ▶ Prof Wallace Cowling, The University of Western Australia ▶ Prof Ros Gleadow, Monash University, Australia Diversity breeding program on common bean (<i>Phaseolus vulgaris L.</i>) targeting rapid cooking and iron and zinc biofortification - 220 ▲ Dr Clare Mukankusi, International Center for Tropical Agriculture (CIAT), Uganda	4.5 ▶ Insect protein: Reducing waste and feeding the future ▲ Chair ▶ Dr Peter James, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia Black soldier flies for waste recycling and protein: Livestock for livestock - 226 ▲ Dr Peter James, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
 Leaf 3D imaging and modelling to increase crop photosynthesis and water-use efficiency - 203 ▲ Prof Margaret Barbour, The University of Sydney, Australia Improving light use efficiency in C₄ plants by increasing electron transport rate - 204 ▲ Dr Maria Ermakova, Australian National University, Australia	 Using virtual plants to understand how fruit trees grow - 209 ▲ Dr Inigo Auzmendi, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia Robotic sensing and acting in protected cropping systems - 210 ▲ Dr Chris Lehnert, Queensland University of Technology, Australia	 Identifying plants that reduce methane production using an in vitro system - helping the challenge to become C neutral - 215 ▲ Prof Phil Vercoe, University of Western Australia, Australia A novel method to predict high-value traits, including methane emissions and feed efficiency, from rumen microbiome profiles - 216 ▲ Dr Elizabeth Ross, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	 The diverse functions of prussic acid in Australia's native sorghums: Lessons for domestication - 222 ▲ Prof Hans Daetwyler, Agriculture Victoria, Australia	 Insect farming is here, but are we ready for it? - 227 ▲ Ms Olympia Yarger, GoTerra, Australia
 High-throughput phenotyping tools to test whether leaf-level photosynthesis traits are measurable at the crop level - 205 ▲ Dr Barbara Geoghegan-Jaeggli, ARC Centre of Excellence for Translational Photosynthesis, Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland, Australia	 Simulating bee pollination for horticultural applications - 211 ▲ Assoc Prof Alan Dorin, Monash University, Australia	 Moving from clouds to the microbiome - an animal health perspective - 217 ▲ Assoc Prof Pat Blackall and Dr Lida Omaleki, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	 Potential use of Australian crop wild relatives in agriculture and food production - 223 ▲ Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	 Nutritional value of black soldier fly from abattoir waste - 229 ▲ Dr Elsje Pieterse, Stellenbosch University, South Africa
 New tools can easily detect photosynthetic diversity in wheat - 206 ▲ Dr Gonzalo Estavillo, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	 From real-time precision mapping to robotic actuation - examples from vegetable and tree crops - 212 ▲ Prof Salah Sukkarieh, University of Sydney, Australia	 The genetics of rumen phage populations - 218 ▲ Dr Rosalind Gilbert, Department of Agriculture and Fisheries, Queensland Government, Australia	 The impact of insect larvae on meat quality - 230 ▲ Dr Louwrens Hoffman, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	 Enzymatic fractionation of protein, fat and chitin from <i>Hermetia illucens</i> (L.) (Diptera: Stratiomyidae) - 231 ▲ Mr Michael J Woods, Stellenbosch University, South Africa
 Integrative leaf photosynthesis-to-crop yield modelling to help accelerate yield improvement - 207 ▲ Dr Alex Wu, ARC Centre of Excellence for Translational Photosynthesis, Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland, Australia	 The relevance of dominance to genomic selection in breeding clonally propagated plant species - 213 ▲ Dr Christian Werner, The University of Edinburgh, UK	 Innate variability in animal performance and rumen microbiota across seasonal changes in a northern Australian grazing system - 219 ▲ Dr Stuart Denman, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	 Challenges of collecting and preserving crop wild relatives - 225 ▲ Dr Sally Norton, Australian Grains Genebank, Agriculture Victoria, Australia	 illumina

12:30	Lunch and poster presentations
13:30-15:30	Concurrent symposia session 5

FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	LIVESTOCK Room ▶ P10	NUTRITION AND FOOD Room ▶ P11	AGEFUTURES Room ▶ Plaza Auditorium
5.1 ▶ Science, technology and process innovation in identification and management of emerging pest and disease threats Chair ▶ Dr Harjeet Khamra, Sugar Research Australia	5.2 ▶ Using precision information systems for advanced decision making in vegetables Chair ▶ Dr Julie O'Halloran, Department of Agriculture and Fisheries, Queensland Government, Australia	5.3 ▶ Opportunities to improve efficiency of phosphorus in animal agriculture Chairs ▶ Assoc Prof Mary Fletcher and Assoc Prof Stephen Anderson, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	5.4 ▶ Provenance of meat for meat - 244 Chair ▶ Prof Lourens Hoffman, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	5.5 ▶ Innovative climate products for improving risk management for the red meat industry in the tropics and subtropics Chair ▶ Prof Roger Stone, University of Southern Queensland, Australia
The confluence of drivers of change on the emergence, re-emergence and geographic redistribution of pathogens and pests - 232 Dr James P Stack, Kansas State University, USA	Yield forecasting using remote sensing in vegetables - 238 Dr Angelica Suarez Cadavid, University of New England, Australia	Phosphorus in northern Australian soils supporting pastures or grain cropping - 245 Prof Michael Bell, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Provenance of meat in Europe - 251 Dr Sara Erasmus, Wageningen University, Netherlands	Queensland's investment in managing drought, climate variability and adapting to climate change - 256 Mr Vern Rudwick, Department of Agriculture and Fisheries, Queensland Government, Australia
Yellow Canopy Syndrome: A physiological disorder, not a disease - 233 Dr Frikkie Botha, Sugar Research Australia, Australia	Using precision information technologies to understand crop variability - 239 Ms Celia van Sprang, Department of Agriculture and Fisheries, Queensland Government, Australia	Phosphorus in the nutrition of poultry and pigs in intensive production systems - 246 Dr David Cadogan, Monogastric Technical Services, Feedworks, Australia	Provenance in sheep: The Karoo lamb story - 252 Prof Lourens Hoffman, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Prediction of northern Australian rainfall onset using the ACCESS-seasonal model - 258 Dr Tim Cowan, University of Southern Queensland; Bureau of Meteorology, Australia
Current understanding of grain legume disorders in eastern Australia, and association to phytoplasma infection - 234 Dr Murray Sharman, Department of Agriculture and Fisheries, Queensland Government, Australia	Application of precision agriculture techniques and variable rate technology in horticultural production in north Queensland - 240 Mr Chris Monsour, Prospect Agriculture, Australia	New-generation phytases for improved utilisation of diet phosphorus - 247 Assoc Prof Robert Speight, Queensland University of Technology, Australia	The effect of diet on meat provenance - 253 Dr J Jeannine Marais, University of Stellenbosch, South Africa	Mechanisms of multi-year wet/dry conditions over northern Australia - 259 Dr Sharmilla Sur, University of Southern Queensland; Bureau of Meteorology, Australia
Understanding of dieback in grass-pastures across Queensland - 235 Mr Stuart Buck, Department of Agriculture and Fisheries, Queensland Government, Australia	Adoption of precision information technologies: The grower's journey - 241 Speaker to be confirmed	Phosphorus nutrition in ruminants grazing tropical rangelands - 248 Dr Rob Dixon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	What provenance means to the consumer - 254 Ms Lisa Sharp, Meat and Livestock Australia	The value of the Australian Drought Monitor to the cattle industry - 260 Dr Christa Pudmenzky, University of Southern Queensland, Australia
Smart surveillance to support plant biosecurity - 236 Dr Brendan Rodoni, Agriculture Victoria, Australia	Drones for more vegetables - pathways to a commercial reality - 242 Mr Nathaniel Parker, Airborn Insight, Australia	Using digital soil mapping to estimate available soil phosphorus across Australian rangelands - 249 Mr Peter Zund, Department of Environment and Science, Queensland Government, Australia	Climate mates: Bridging the gap between scientists and producers - 261 Dr Chelsea Jarvis, University of Southern Queensland, Australia	UNIVERSITY OF QUEENSLAND 
From colony collapse to complex syndromes: Pollinator health and disease transmission management in agricultural landscapes - 237 Dr Vincent Doubilet, University of Ulm Institute of Evolutionary Ecology and Conservation Genomics, Germany	Challenges and opportunities for PA adoption in vegetables - 243 Dr Julie O'Halloran, Department of Agriculture and Fisheries, Queensland Government, Australia			

FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	LIVESTOCK Room ▶ P10	NUTRITION AND FOOD Room ▶ P11	AGFUTURES Room ▶ Plaza Auditorium
6.1 ▶ Stress physiology: Designing crops for a hotter and drier world - 262 Chair ▶ Prof Andrew Borrell, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia <p>Genotype and management adaptation of wheat to heat and drought in current and future climates - 262 ► Dr Karine Chenu, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia</p>	6.2 ▶ Horticultural tree genomics Chair ▶ Dr Craig Hardner, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia <p>Advances in macadamia genomics - 268 ► Dr Agnelo Furtado, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia</p>	6.3 ▶ Growing human capital for tropical animal industries Chair ▶ Dr Dianne Mayberry, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia <p>Challenges of breaking into industry from early career perspective - 274 ► Ms Rebecca Clapperton, Salisbury Plains Grazing, Australia</p>	6.4 ▶ Vertically integrated R&D platforms for underutilised and niche crops Chair ▶ Assoc Prof Sean Mayes, University of Nottingham, UK; Crops for the Future, Malaysia <p>Advanced technologies to increase profitability of the Australian tea tree industry - 280 ► Assoc Prof Tobias Kretzschmar, Southern Cross University, Australia</p>	6.5 ▶ Innovations in biosecurity Chair ▶ Mr Malcolm Letts, Department of Agriculture and Fisheries, Queensland Government, Australia <p>The RD&E response to Queensland's Panama disease TR4 incursion - 286 ► Mr Stewart Lindsay, Department of Agriculture and Fisheries, Queensland Government, Australia</p>
Modelling heat and drought adaptation in crops - 263 ► Dr Erik van Oosterom, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Breaking and flowering: The budding story of macadamia - 269 ► Dr Francois Barbier, The University of Queensland, Australia	Opportunity and investment in the next generation of livestock scientists - 275 ► Dr Shannon Landmark, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Australian native plant foods and their contribution to diet diversity - 281 ► Assoc Prof Yasmina Sultanbawa, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia	Start clean, stay clean - 288 ► Mr Mark Whattam, Department of Agriculture and Water Resources, Australian Government, Australia
How do crops balance water supply and demand when water is limiting? - 264 ► Prof Andrew Borrell, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	The avocado genome: An update - 270 ► Dr Alice Hayward, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Career mobility to grow human capital in the tropical animal industries - 276 ► Mr Peter Johnston, Department of Agriculture and Fisheries, Queensland Government, Australia	Genetic improvement and application of genomic tools for Bambara groundnut improvement in West Africa - 282 ► Dr Stephen Amoah, Crops Research Institute, Ghana	Future systems for traceability in the red meat supply chain - 289 ► Ms Jo Quigley, Integrity Systems Company, Meat & Livestock Australia, Australia
The role of hydraulics in crop water use under drought - 265 ► Dr Vincent Vadez, Institute for Development (IRD), France	CRISPR kiwifruit - new opportunities for cultivation, breeding and research - 271 ► Dr Erika Varkonyi-Gasic, The New Zealand Institute for Plant and Food Research Limited (PFR), New Zealand	International perspective of future career opportunities in animal science - 277 ► Dr Anna Okello, Australian Centre for International Agricultural Research (ACIAR), Australia	Knowledge representation and data management adding value to global niche crops - 283 ► Prof Graham King, Southern Cross University, Australia	New technologies for weed eradication - invasive plants have no place to hide when DNA is involved - 290 ► Dr Laura Simmons, Department of Agriculture and Fisheries, Queensland Government, Australia
Phenotyping the hidden half: Measuring roots from long hairs to deep cores - 266 ► Dr Anton Wasson, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	Mango genomics: Drafting Kensington Pride - 272 ► Dr David Innes, Department of Agriculture and Fisheries, Queensland Government, Australia	Mentoring and succession planning - talking from experience - 278 ► Emeritus Prof Alan Bell, (retired) Cornell University, Australia	Building beef industry capacity in northern Australia - 279 ► Mr Andrew Gatenby, Indigo Australia, Australia	Collaborative planning and shared decision making in biosecurity emergency management - 291 ► Dr Suzy Perry, Department of Agriculture and Fisheries, Queensland Government, Australia
Root responses of durum wheat ideotypes defined by contrasting root angles to localised phosphorus availability and dynamic soil profile moisture - 267 ► Dr Frederik van der Born, The University of Queensland, Australia	Genetics of almond - 273 ► Dr Shashi Goonetilleke, The University of Adelaide, Australia	Orange capiscums and chillies as a potential source of dietary zeaxanthin, an important macular carotenoid for eye health - 285 ► Ms Rimjhim Agarwal, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Centre for Nutrition and Food Sciences (CNAFS), Australia	AAAS AUSTRALIAN ASSOCIATION OF ANIMAL SCIENCES	Southern Cross University
				

WEDNESDAY 13 NOVEMBER 2019



► **Mark Howden**, Director of the Climate Change Institute
Australian National University

Professor Mark Howden is a Director of the Climate Change Institute at the Australian National University. He has been a major contributor to the Intergovernmental Panel on Climate Change (IPCC) since 1991, with roles in the Second, Third, Fourth, Fifth and now Sixth Assessment Reports, sharing the 2007 Nobel Peace Prize with other IPCC participants and Al Gore.

He is also an Honorary Professor at Melbourne University, a Vice Chair of the IPCC and a member of the Australian National Climate Science Advisory Committee. He is a former Chief Research Scientist at CSIRO Agriculture.

Professor Howden was on the US Federal Advisory Committee for the 3rd National Climate Assessment and contributes to several major national and international science and policy advisory bodies.

Professor Howden is an expert on how climate variability and climate change will impact on food production and food security and how to adapt to those impacts. He has also developed the national and international greenhouse gas inventories for the agricultural sector and assessed sustainable methods of reducing net greenhouse gas emissions from agriculture.

Professor Howden has worked on climate variability, climate change, innovation and adoption issues for more than 30 years in partnership with many industry, community and policy groups via both research and science-policy roles. Issues he has addressed include agriculture and food security, the natural resource base, ecosystems and biodiversity, energy, water and urban systems.

Professor Howden has authored more than 420 publications. The national and international greenhouse gas inventories he helped develop are a fundamental part of the Paris Agreement, helping inform sustainable ways to reduce emissions.

Climate change impacts, adaptation and mitigation for tropical agriculture

As climate change gains pace globally, many of the first and most severe impacts are falling on tropical regions. In particular these impacts are occurring in tropical agriculture and food systems with assessments of falling crop yields, decreases in the productivity of livestock and fisheries and increased climatic disruptions. This is likely to have already increased stresses in relation to food security and natural resource management, both on land and in the adjacent oceans. Unfortunately, increasingly negative changes appear to be likely, with projections of widespread and substantial negative future impacts of climate change on tropical agriculture. There are many potential adaptations to climate change, covering options ranging from incremental to transformational change each with different risk vs return profiles. Limits to adaptation and barriers to action are increasingly being seen as critical issues that will need a focus over the next decade. Similarly, integration of practices that reduce greenhouse gas emissions, enable effective adaptation to a variable and changing climate and enhance sustainable and stable agricultural production will likely become more important as climate change progresses. Furthermore, there will be a need to re-frame the science we do and the way we generate and deliver it. For example, science that is 1) demand-driven rather than supply driven, 2) that aligns with the values, needs or capability of users, 3) that is not presented as suitable for operational use when it is not. We can also better connect knowledge and action via co-learning that links closely the users and producers of climate information so as to address the correct time and spatial scales and climate variables and embed this information into the social and institutional processes through which decisions are made.



► **Derrick Thompson**, Senior Manager – Key Accounts & Business Development
Hitachi Australia Pty Ltd

Derrick Thompson is an internationally experienced manager with more than 25 years of global business success. His work at Hitachi Australia has seen the development and implementation of game-changing strategies and programs across the world.

Most recently those programs have involved introducing multiple Hitachi solutions and services into the Australian agribusiness sector. The solutions cover Internet of Things (IoT) deployment, innovative unmanned aerial vehicle (UAV) solutions for data capture, decision support systems and supply chain optimisation.

Derrick collaborates with organisations to develop strategies that succeed and position them for the next level of performance improvement.

Next Era Livestock Production

Data. Data. Data. Data is everywhere but producers are often overwhelmed by the sheer volume of raw data. What is needed is easily usable and valuable decision-making information. The ever-increasing range of digital tools to assist producers in the decision-making process with improved data based decision-making knowledge requires the use of numerous platforms that are not integrated, nor able to communicate with each other nor able to interpret and analyse information at a high level. This makes the use of such tools complicated, tedious and can at times be somewhat misleading, with the result of discouraging widespread adoption of data sourced technology. By integrating these tools, so that they are accessible through one Control Centre, such data driven digital transformation greatly improves the efficiency of using the available tools, results in increased adoption of data usage - all leading to increases in productivity and profitability, on farm and across the supply chain. Data is the next "Era in Livestock Production".

Hitachi's presentation will look at a few case studies that demonstrate the value of intelligent use of data in daily farm operations.

08:00-17:00	Registration desk open	► Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane
08:30-10:00	Plenary session 3	Plaza Auditorium

Room	Chair	Speaker
Plaza Auditorium	Dr Beth Woods, Director-General, Department of Agriculture and Fisheries, Queensland Government	Climate change impacts, adaptation and mitigation for tropical agriculture - 300
Plaza Auditorium	Prof Mark Howden, Director of the Climate Change Institute, Australian National University, Australia	Next era livestock production - 301
Plaza Auditorium	Mr. Derrick Thompson, Senior Manager – Key Accounts & Business Development, Hitachi Australia Pty Ltd, Australia	Morning tea

10:30-12:30 Concurrent symposia session 7

FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	LIVESTOCK Room ▶ P10	NUTRITION AND FOOD Room ▶ P11
7.1 Modelling to improve crop adaptation in changing environments Chair ▶ Dr Peter Thorburn, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	7.2 ▶ Nano-containers to deliver plant genetic cargo Chair ▶ Prof Neena Mitter, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia ► Prof David Cahill, Deakin University, Australia	7.3 ▶ The highs and lows of maternal nutrition in beef cattle Chair ▶ Dr David McNeill, The University of Queensland, Australia	7.4 ▶ Research for innovative rice-based food systems and nutrition amid climate change Chair ▶ Antonio Costa de Oliveira, Federal University of Pelotas, Brazil
Cropping systems modelling: Past, present and future - 302 ► Dr Peter Torburn, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	Nanoplatforms for large and small molecule delivery to plant cells - 308 ► Prof David Cahill, Deakin University, Australia	Pregnancy nutrition affects calf survival in the tropics - 314 ► Dr Geoffrey Fordyce, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Genetics and metabolomics of aroma in rice - 320 ► Prof Melissa Fitzgerald, The University of Queensland, Australia
Integrating crop modelling, physiology, genetics and breeding to aid crop improvement for changing environments - 303 ► Dr Karine Chenu, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Nanomaterials enable delivery of genetic material without transgene integration in mature plants - 309 ► Asst Prof Markita Landry, University of California-Berkeley, USA	Maximising reproduction under extensive grazing conditions, regardless of rainfall - 315 ► Dr Kylie Schooley, The University of Queensland, Australia	SNPs linked to key traits in hybrids between African and Asian rice - 321 ► Ms Hayba Badro, The University of Queensland, Queenslands Alliance for Agriculture and Food Innovation (QAAFI), Australia
Drivers of phosphorus efficiency in tropical and subtropical cropping systems - 304 ► Ms Blanca Das, Commonwealth Scientific and Industrial Research Organisation (CSIRO); The University of Queensland, The School of Agriculture and Food Sciences, Australia	Novel nanoparticle platforms for chloroplast-targeted transgene delivery and expression across varied plant systems - 310 ► Assoc Prof Seonyeong Kwak, Seoul National University, South Korea	Nutritional programming of beef heifers - 316 ► Dr Tryon Wickersham, Texas A&M, USA	Introdunction of large grain size from Australian wild rice and its agronomical importance - 322 ► Mr Ryuuji Ishikawa, Hiroasaki University, Japan
Improving crop adaptation through improved phenology prediction: A case study with chickpea - 305 ► Dr Yash Chauhan, Department of Agriculture and Fisheries, Queensland Government, Australia	Encapsulation of heterologous nucleic acids in virus-like particles: The potential for plant protection - 311 ► Dr Frank Sainsbury, Griffith University, Australia	Prepartum supplementation to improve transfer of passive immunity and growth - 317 ► Dr Luis Prada e Silva, The University of Queensland, Queenslands Alliance for Agriculture and Food Innovation (QAAFI), Australia	Iron responsive genes in rice: The multiple roles of WRKY factors - 323 ► Prof Antonio Costa de Oliveira, Federal University of Pelotas, Brazil
Learning through modelling to help on farm decisions in North Queensland - 306 ► Dr Keith Pemberton, University of Southern Queensland, Australia	Clay nanoparticles facilitate delivery of antiviral RNA for crop protection - 312 ► Prof Zhiping (Gordon) Xu, The University of Queensland, Australian Institute for Bioengineering and Nanotechnology (AIBN), Australia	Risk factors for dystocia in cattle - 318 ► Assoc Prof Scott Norman, Charles Sturt University, Australia	Rice biofortification - progress and challenges in improving the nutritional value of rice - 324 ► Dr Russell Reinke, International Livestock Research Institute (ILRI), Philippines
From fields to farms: Informing the trade-offs across the multiple functions of agriculture - 307 ► Prof Daniel Rodriguez, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	A perspective on risks associated with RNA-based biopesticides - 313 ► Mr Stephen Fletcher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Strategic supplementation enhances rumen microbiome efficiency in pregnant tropical beef cows - 319 ► Dr Christopher S McSweeney, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	Meeting the consumer preference of high quality rice grown in a tropical environment - 325 ► Mr Russell Ford, SunRice, Australia
			FEEDWORKS "Bridging the Science of Tomorrow"

12:30 Lunch and poster presentations
 Poster themes: Horticulture and Nutrition and Food

13:30-15:30 Concurrent symposia session 8

FIELD CROPS Room ▶ P7-8	HORTICULTURE Room ▶ P9	AGFUTURES Room ▶ Plaza Auditorium
8.1 ▶ AgTech - feeding the future Chair ▶ Prof Sagadevan Mundree, Queensland University of Technology, Australia	8.2 ▶ Strengthening value chains in tropical Australia with protected cropping systems Chair ▶ Dr Elio Jovicich, Department of Agriculture and Fisheries, Queensland Government, Australia	8.3 ▶ Overcoming barriers to growth in horticulture Chairs ▶ Assoc Prof Andrew Geering and Assoc Prof Femi Akinsanmi, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
Expedited crop improvement through deep learning and editing - 332 ▶ Dr Tengfang Huang, Eto Life Systems, USA	Benefits and challenges for expanding protected cropping in the Australian tropics - 338 ▶ Dr Elio Jovicich, Department of Agriculture and Fisheries, Queensland Government, Australia	Overcoming barriers to growth in horticulture - 344 ▶ Ms Marie Piccone, Manbulloo Ltd, Australia
Harnessing asexual seed formation to preserve hybrid vigour and complex yield traits - 335 ▶ Prof Anna Koltunow, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Automated retractable greenhouses and cooling-houses in mild to hot climates - 339 ▶ Mr Bede Miller, Cravo Australia, Australia	The future of avocado - 345 ▶ Dr Antony Allen, The Avolution, Australia
Integrating gene editing techniques into modern cereal breeding - 336 ▶ Prof Ian Godwin, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia	Our experiences testing protected cropping where nobody uses it - 340 ▶ Josh, Chris and Ross Pirrone, Pirrone Brothers Produce, Australia	Deploying new technologies to secure the banana industry - 346 ▶ Dr Rosie Godwin, Australian Banana Growers' Council, Australia
In-plant insect-proofing by trans-kingdom RNAI - 337 ▶ Dr Julia Bally, Queensland University of Technology, Australia	How can protected cropping ensure an export supply of high quality melons in the tropics? - 341 ▶ Ms Heidi Wittl, Department of Agriculture and Fisheries, Queensland Government, Australia	Increasing macadamia production through thick and thin - 347 ▶ Mr Robbie Commens, 2 Tonnes Enterprise, Australia
Speaker to be confirmed	6 marketing steps to ensure profit - 342 ▶ Mr Mike Evans, Fresh Partners Marketing, Australia	Innovation in plant protection in the citrus industry - 348 ▶ Dr Andrew Miles, 2PH Farms, Australia
Speaker to be confirmed	Innovative control systems for protected cropping systems in the tropics - 343 ▶ Mr Odin Franssen, Powerplants Australia, Australia	Cross sectoral biosecurity RD&E to protect the Australian horticulture industry - 349 ▶ Dr Jo Luck, Hort Innovation, Australia
		What is needed to make the Circular Economy for Organics a reality? - 354 ▶ Mr Johannes Blaia, The University of Queensland, Centre for Recycling of Organic Waste and Nutrients, Australia
		AATLIS Precinct: Helping navigate pathways to sustainable solutions through digital technology adoption - 355 ▶ Mr Thomas Hall, FKG Group, Australia
		 Queensland Government

Afternoon tea

15:30



► **Birgitte Skadhaug**, Vice President, Adj. Prof.
Carlsberg Research Laboratory

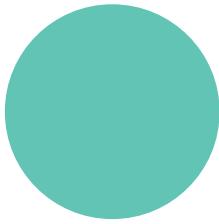
Birgitte Skadhaug completed her studies [M. Sc degree] at the Royal and Veterinary Agricultural University, Copenhagen in 1992. This was followed by a Ph.D. degree in biochemistry and genetics at the Carlsberg Laboratory in Copenhagen [1993-1996]. Since 2003 she has been responsible for Carlsberg Raw Material Research, and since 2011 Director for Applied Research activities in Carlsberg, including Raw materials, Yeast, Ingredients and Brewing Technology and sustainability in 2012 she was appointed Honorary Adjunct Professor at Aarhus University. Since 2014 she held the position as Vice President for Carlsberg Research Laboratory and Baltika Research and she is the Founder of Traitomics.

She is a member of several scientific advisory boards and committees, appointed member of e.g. 'Danish Science and Innovation Political Counsel' (Ministry for Science and Innovation); Danish Industry Committee for Research, Innovation and Education; Board Member for Danish Malting Group A/S; DMG [2008-2016], Denmark and DMG Poland [2008-2016]; Board member in Sejet Plant Breeding I/S, Board member in "Association for Danish Variety Owners"; Board member in Scandinavian Brewing School, Board member in Carlsberg's Bequest for Brewer J.C. Jacobsen, advisory board member at DTU, Bioengineering, Board member in Secobra Recherche [France].

Advancing brewing science

Cereals were some of the first crops to be domesticated by humans. Today, cereals represent the biggest starch source in the world and are the primary raw material for food and feed. Modern breeding techniques produced high yielding varieties, but were based on a limited genetic background, which resulted in significant loss of genetic diversity. This could potentially result in major challenges due to recent climate changes and altered growing conditions. It is estimated that an increased global temperature will lead to dramatic loss in plant productivity in many parts of the world.

The barley breeding effort of the Carlsberg Research Laboratory combines decades of expertise to provide new varieties with unique quality and sustainability traits such as e.g. drought tolerance. Combining traditional breeding, genome data and a new method for screening genetics variants, we have radically shortened the development time of varieties with new traits. This has already resulted in the identification of several hundred genetic variants related to climate, sustainability, productivity and brewing quality. This accelerated approach can easily be applied for the development of other crops in both developing and matured markets around the globe, and help securing a sustainable supply of food and other agricultural products.



15:50 - 17:00 Plenary session 4

Room	Chair	Speaker	Panel discussion	Facilitator	Panelists	Conference close
Plaza Auditorium	► Prof Glen Fox, UC Davis We invite you to share a beer whilst hearing about the science behind a good brew	► Advancing brewing science - 356 ► Ms Birgitte Skadhaug, Vice President, Carlsberg Research Laboratory, Carlsberg Group, Denmark ► Towards 2050: Shaping the science of tomorrow ► Mr Peter Lewis, Way with Words ► Prof Robert Henry, Dr Beth Woods, Prof Mike Gidley, Prof Ian Godwin, Prof Neena Mitter				
		► Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia				



SYMPOSIA OVERVIEW



FIELD CROPS

1.1 ▶ Agricultural systems research: A transformative approach to the sustainable intensification of agriculture

In this symposium, we propose that complex problems within our food-social-political systems require more transformational research approaches that simultaneously address multiple interlinked drivers (Garnett et al., 2013). We bring together a group of leaders on transformational systems research in agriculture to: [i] analyse and dissect the constraints on the development of more transformational research approaches across the dry, semi-arid, subtropical and tropical regions around the globe; [ii] identify optimum pathways in research for development that are more conducive to meeting the SDG targets; and [iii] develop a negotiated way forward and framework for developing and scaling innovative solutions to complex problems in agriculture through agricultural systems research (ASR). Here we define ASR as a framework for the application of component research (Drinkwater et al., 2016), having the overall aim to have impact across the multiple functions of agriculture and sustainable development goals. In contrast to incremental forms of adaptation, we propose a focus on the more transformational changes in structure, function, and intensity of agricultural systems [Frelat et al., 2016; Rodriguez et al., 2017; Rodriguez and Sadras, 2011].



HORTICULTURE

1.2 ▶ Tissue culture for propagation, conservation and crop improvement

Tissue culture has many applications, both in research and production sectors of horticulture. These include genetic rescue of recalcitrant seeds, genetic transformation of crops, cryo-preservation of plants, clonal propagation, mutational breeding, and haploid plant production. This area of science has been advancing over the last 50 years, greatly influencing plant propagation. In recent years, new technologies and mechanised systems have been developed to boost this conventional biotechnology stream. Other technologies linked to tissue culture, e.g. energy, light and aeration systems, have also stepped up in innovation. The application of tissue culture for conservation is also highly important, especially for recalcitrant plant species in seed conservation. Researchers have tried to preserve many crop wild relatives as cryobanks to eliminate practical and environmental limitations of conventional ex-situ conservation strategies. Mutational breeding for new varieties using tissue culture is another important application for crop improvement.

This symposium will highlight the innovations, importance and potential of research and development. We will also address the new support technologies developed for tissue culture in recent years.



LIVESTOCK

1.3 ▶ Sustainable, healthy diets for all: Tomorrow's livestock science

Was Malthus right? But centuries too early? When the 18th century philosopher and economist contrasted geometric population growth with arithmetic food provision growth, he predicted disaster. Thanks largely to the power of science to transform food production, which Malthus overlooked, we are still here today. But for how much longer? Recent research and mainstream media are proposing a radical rethinking of diets to avoid overstepping planetary boundaries, and focusing on a drastic reduction or exclusion of livestock-derived foods. Indeed, planetary, environmental and human health could all benefit if there was a reduction in consumption of milk, meat and eggs, by the over 30% of the global population who consume too much. But for the most vulnerable 35% of the population, most of whom live in tropical environments, a healthy diet can be achieved only by increasing their intake of such foods – and that means increasing sustainable livestock productivity across much of the world. This symposium will explore how smart application of tomorrow's livestock science can deliver healthy, equitable, sustainable diets that include sensible amounts of safe livestock-derived foods for every citizen. It will consider how to strengthen partnerships between advanced Australian institutes and CGIAR research centres to create transformative science for livestock production.



NUTRITION AND FOOD

1.4 ▶ Market-led breeding for value chains: Africa-Australia nexus for innovation

Australia and Africa are both major food-producing regions of the world, growing many common crops with value chains at different stages of maturity and development. Innovation is key for market and economic development, food security and agricultural sustainability. This symposium brings together leading Australian and African authorities on market-led approaches to drive innovation in crop improvement. Understanding changing market needs and close connectivity between researchers and value-chain players is vital for the development of successful varieties and to achieve returns on research investment. Presentations focus on sharing successes, experiences and lessons learned from both continents. Core topics include the following: exploring the collaboration landscape between sub-Saharan Africa and Australia; the challenges of designing varieties to better serve farmers and their value chains; the importance and changing roles of public and private breeders as markets develop; investment-based approaches to attract support and public-private partnerships; and integrating demand-led approaches into African postgraduate breeding education programs. The symposium also provides an opportunity to hear about the emerging community of African market-orientated breeders, their portfolio of varieties, and challenges delivering future supply and demand for food and nutrition. In this forum, we hope to create a focal point for new ideas, stimulate collaboration, and further strengthen the Africa-Australia nexus for innovation.



1.5 ▶ Strategic issues facing agricultural development in northern Australia

The future of agriculture across northern Australia is bright, and the opportunities are vast. To help identify and capitalise on these opportunities, the Cooperative Research Centre for Developing Northern Australia (CRCNA) has commissioned seven strategic situational analysis studies, focusing on the most significant northern agricultural industries: beef, rice, forestry, aquaculture, horticulture, broadacre cropping, and bushfoods. Each of the sectoral studies will explore past and current trends in the development of these sectors, identify barriers and challenges to further development, and propose strategic solutions and actions. The CRCNA expects these studies will provide a clear, strategic roadmap for effective agricultural growth across the north, and help the CRCNA identify synergies across and between these sectors, such as infrastructure, supply chains, land and resource use, and future research and development. In addition to these sectoral studies, the CRCNA has funded work with the North Australian Indigenous Land and Sea Management Alliance (NAILSMA), exploring business models and frameworks to support indigenous-led development and diversification on Country'. This symposium will bring together the lead researchers from these strategic projects to discuss their preliminary research findings, and how the research fits within the broader strategic intent of the developing northern Australia agenda and the CRCNA. The audience will gain an understanding of how the CRCNA works with its collaborators, and will gain an awareness of the core research currently being funded by the organisation.



2.1 ▶ Climate-smart wheat

Global food security relies on sustainable production of sufficient nutritious food for a growing world population, projected to exceed nine billion by 2050. Globally, wheat provides around 20% of calories, and is the most important source of protein for humans. However, yield improvement in crops such as wheat has slowed in major regions, e.g. Australia. In addition, climate change is projected to significantly affect crop growth and development, altering productivity, cropping systems and breeding requirements.

This symposium focuses on adaptation strategies to improve wheat productivity and sustainability in changing environments. It will present recent advances in developing integrated approaches, bringing together agronomists, engineers, physiologists, modellers, geneticists and breeders to tackle this important issue. Through a series of presentations, the symposium will show successful case studies for improving wheat adaptation, highlighting the importance of integrative approaches, and will present the latest developments in new technologies.



2.2 ▶ Beyond pretty pictures: Horticulture tree crop mapping, from individual fruit to a national database

This symposium presents an overview of the multi-scale tree crop project funded by the Australian Government's Rural Research and Development for Profit scheme, and Horticulture Innovation. This project sets a strong example of how industry bodies, growers, researchers, and government agencies can work together to solve specific issues faced by the avocado, mango, macadamia, and banana industries. The audience will receive an initial overview of the specific industry needs that shaped the direction of this initiative, followed by presentations on the pros and cons of robotics, NIR, UAV, Light Detection and Ranging (LiDAR), and satellite remote-sensing technologies in response to those specific industry needs. The main outputs presented include the following: the national mapping of all orchards over 2 ha (goo.gl/rnqdkI); the development of 'fruit maps' in conjunction with NIR technologies for spatial monitoring of mango maturation; the accuracies of satellite, UAV, and ground-based imagery and associated analytics for measuring tree health, fruit yield and quality; the appropriate flying protocols and image pre-processing of imagery when used over tree crops; and the where to from now.



2.3 ▶ Nutrition strategies to mitigate high environmental temperatures in cattle, pigs, and chickens

In the context of global climate change, high environmental temperature events have increased in severity and frequency to become one of the main challenges of modern animal production systems in tropical and subtropical climates. Over recent years, nutritional and management expertise has been growing that may help animals cope with the stress, and help producers prevent production losses and high mortality rates. The symposium will cover recent advances in nutrition, digestive physiology and endocrinology to help manage heat stress in cattle, pigs and chickens.



2.4 ▶ Creating an Australian cuisine through traditional Australian foods

An important component in the creation of a truly Australian cuisine would be the incorporation of the foods consumed by Indigenous Australians over the past 65,000 years. The diet of the Australian Aboriginal and Torres Strait Islanders has included a broad diversity of flora, as well as fauna, combined with traditional knowledge of the function and properties of these foods. Australian cuisine has a unique opportunity to benefit from this knowledge, where marketing and branding of the meal experience links traditional foods to proven functional properties, story lines and culture. Indigenous Australian foods also fit well with sustainable production systems, which makes them inherently environmental friendly and future-focused. Importantly, a mainstream Australian cuisine would support the concept of developing traditional food enterprises that are owned and controlled by Indigenous Australians, and result in stronger communities throughout regional Australia. The theme of this symposium is 'Developing an Australian Cuisine', understanding the Indigenous perspective in developing such enterprises, integrating the science involved, and learning from global experience.



2.5 ▶ Value-adding opportunities for agriculture through Biofutures

Australian agriculture must continually adapt and innovate to remain competitive in an environment of rising production and compliance costs, climate variability, pests and diseases, and changing global patterns of production and consumption. Biorefining generates valuable bioproducts from agricultural primary products and waste byproducts. This increases profitability, productivity and sustainability for primary producers while reducing environmental impacts. The Queensland Government has a vision to create a \$1 billion sustainable and export-oriented industrial biotechnology and bioproducts sector in Queensland, attracting significant international investment, and creating regional, high-value and knowledge-intensive jobs. Through the Biofutures program, the government is working with Queensland's world-leading agriculture and waste industries and the research sector to grow the state's emerging industrial biotechnology and bioproducts sector. This session will explore projects underway in Queensland to develop technology and to realise commercial biofutures projects of benefit to tropical agriculture.



3.1 ▶ Farming system intensification for small-holders

Although a range of technologies can help farmers increase production from the same unit of land, the trade-offs associated with intensification can be complex. For small-holder farmers, issues to do with access to mechanisation, availability of seed for alternative crop types, crop rotations, weed and pest control, and access to markets can all constrain the options potentially available to them. In this symposium, we will explore how to understand these trade-offs and, in some cases, suggest ways that small-holder farmers can intensify production in a sustainable manner. These studies emphasise the importance of integration of technology into existing farming systems that are at different stages of intensification.



3.2 ▶ Future orchards: Advances in horticultural tree research

The rate of change in orchard genetics and design has varied greatly across crops. Fruits such as apple have increased production ten-fold with altered rootstocks, tree architecture, and orchard management. In contrast, macadamia genetics and tree form are still similar to wild ancestors. This symposium will focus on recent advances in tree fruit and nut research in a diverse range of fields. The diversity of R&D topics in this symposium will allow exploration of synergies from multiple disciplines.



3.3 ▶ Advancing animal productivity and welfare with genomics

The increasing demand for protein is placing demands on the livestock industry to increase productivity. However, consumers are also concerned with ensuring that production is undertaken in a manner that is sustainable and that animal welfare is a high priority. This symposium will examine, through examples, the use of genomics and gene editing to tackle animal welfare issues.



3.4 ▶ Biofortification of crops for human health

Biofortification is the process of increasing the phytonutrient or mineral concentration in the edible portions of plants while they are actively growing. Nutrient concentration can be increased through genetic improvement, agronomic manipulation, exposure to different environments, or a combination of these approaches. Although much research has been directed at improving the phytonutrient content of staple crops of developing countries and addressing the health issues of these regions, there is now more interest in biofortification of crops targeting the very different health issues of the urban middle class. Biofortified crops are often colourful, due to phytonutrients' common association with plant pigments, especially within the wide range of horticultural crops available.

This symposium addresses some of the fascinating crops that are currently undergoing biofortification, and the issues being overcome to achieve potential increases in dietary health environments.



3.5 ▶ Innovation in food safety and traceability

Traceability for food safety, provenance, and anti-fraud purposes is becoming increasingly important for market access to export and domestic markets for many products. At the same time, as supply chains globalise and become more complex, vulnerabilities increase. Efficient food safety and traceability systems are therefore increasingly important as a source of competitive advantage. This symposium will look at a range of innovations, including technological developments and innovations in supply chain organisations, in mechanisms to identify and manage vulnerabilities, and in regulatory environments.



**FIELD CROPS**
4.1 ▶ From enzymes and cells to entire crops: Integrative approaches to redesigning photosynthesis for better yields

As cereal yield advances from improved resource capture and harvest index approach their biological limits, next-generation research efforts are being directed to improve crop productivity by redesigning photosynthesis. Photosynthetic efficiency of plants grown in field crop production systems has not previously been a direct breeding target. Additionally, even the most efficient photosynthetic pathways have several major shortfalls, so improving photosynthesis is now seen as the next frontier in increasing crop yields. In this symposium, we will present speakers who report on recent advances in synthetic biology and phenotyping for redesigning plant photosynthesis at various levels of organisation. Most importantly, we will show that integrative modelling assessment is needed to accelerate translation of changes at the biochemical and cell level up to actual yield improvements at the field level. The symposium will be chaired by Dr Robert Sharwood, a Senior Lecturer in the ARC Centre of Excellence for Translational Photosynthesis. We will invite a list of international and national experts in this field.

**HORTICULTURE**
4.2 ▶ Digital horticulture

This symposium will provide a snapshot of how growers and researchers will be able to take advantage of innovative tools at all stages of the horticultural crop cycle, from variety selection through planting systems to post-harvest. It will cater for advances, such as data sensing and IoT, genomic and genetic research, modelling from cell to orchard systems, advances in weather and climate forecasting, automation from crop care to harvesting, and through the supply chain in the field and under-protected cropping.

Attendees will learn about new research and potential sources of information that will help the industry make better decisions to avoid crop loss, enhance market access and increase profitability.

**LIVESTOCK**
4.3 ▶ Understanding livestock microbiomes for health, welfare, and sustainability

There is increasing evidence that the commensal microbiomes that cattle, chickens, sheep, pigs and other livestock harbour affect their health and wellbeing, production performance, and for ruminants, the level of methane emissions an animal emits. This symposium will explore state-of-the-art methods to sequence, analyse, and modify livestock microbiomes, and to potentially improve health, welfare, production, and sustainability of livestock.

Pangenomics suggests that crop and wild relatives vary in genomic structure and presence/absence of a large numbers of genes. How can we best identify and use valuable wild alleles in modern crop improvement?

**NUTRITION AND FOOD**
4.4 ▶ Wild crop relatives: The next frontier for crop improvement

In the face of global environmental change, wild crop relatives are an important source of traits for improving their cultivated counterparts for the development of resilient crops. Analysis of diversity and evolution of wild relatives is providing new insights into how plants have adapted to environmental challenges across diverse environments. Methods for identifying and using these valuable alleles generate debate among crop breeders and pre-breeders.

Pangenomics suggests that crop and wild relatives vary in genomic structure and presence/absence of a large numbers of genes. How can we best identify and use valuable wild alleles in modern crop improvement?

4.5 ▶ Insect protein: Reducing waste and feeding the future

With a looming world protein deficit, there is rapidly increasing interest in insect farming to fill the supply gap for high-quality protein. A growing shortage of high-quality protein, in particular fish meal and soy protein, is causing a rapid global increase in the cost of aquaculture and livestock feed rations. With the need for alternative protein sources to support the \$500 billion world livestock feed industry, there is also growing interest in the more widespread use of insect protein for human consumption. In addition, dealing with food waste and waste from intensive livestock production is a huge worldwide issue. The UN's Food and Agriculture Organization estimated that one-third of the food produced globally is wasted (1.3 billion tonnes). An Australian Cooperative Research Centre, the Fight Food Waste CRC with UQ and the Queensland Government as Research Partners and UQ leading the Transforming Waste Resources program was recently established to address this issue. This symposium will bring world-leading experts together to discuss the current research, obstacles, and opportunities for transforming waste streams into high-quality animal feed and high-value products.



FIELD CROPS

5.1 ▶ Science, technology and process innovation in identification and management of emerging pest and disease threats

Emerging pests and diseases pose a threat for field crops, horticulture and livestock: we may know there is a problem (crops are dying), but not the causal agent. Alternatively, we might not yet have recognised a problem that is 'under the radar'.

Emerging pests and diseases may result from different unknown, and sometimes multiple factors, both biotic and abiotic, making it difficult to identify and manage undiagnosed 'syndromes'. This is a particular issue as tropical agriculture adapts to new crops, changing climate, and our changing ecosystems.

This symposium will address the 'threat of the unknown'. It will discuss the use of advanced technology and cross-disciplinary processes to identify and manage undiagnosed syndromes and emerging threats. It will include case studies on current and previous syndromes, with lessons learned for future detection, identification, and management of emerging pests and disease threats in tropical agriculture.



HORTICULTURE

5.2 ▶ Using precision information systems for advanced decision making in vegetables

This symposium will present on the current application and development of a range of precision information technologies in vegetable production systems. The information from these technologies facilitates opportunities for advanced management decisions and improved production.

Achieving maximum production efficiencies at the farm and field level requires an understanding of crop variability. Precision technologies have enabled the detection and management of significant spatial variability in crop performance for many vegetable crops.

This symposium will outline the way spatial-sensing technologies are providing a greater level of detail on soil resources and crop performance at the field level, and how the use of spatial information is supporting decision-making and management interventions. Topics include the prediction of yield from remotely sensed early season data, and the use of harvester-derived yield data, both of which provide opportunities for in-crop management interventions in underperforming areas. The implementation and adoption of drone technologies has been in advance of research and interpretation of the way they are being applied to intensive production systems. This symposium will discuss ways that agronomic service providers are using drone technologies in commercial vegetable businesses.



LIVESTOCK

5.3 ▶ Opportunities to improve efficiency of phosphorus in animal agriculture

Phosphorus is essential for plants and animals, but is often scarce in natural ecosystems. Global reserves of phosphorus are being rapidly depleted. Across tropical Australia, soil phosphorus is often low, with adverse consequences on production of grain crops and pastures. However, the concentrations and the nutritional availability of phosphorus in grains and forages could be improved by manipulating and managing soil and plants. Adverse (antinutritional) factors in grains might reduce the availability of P in the diets of monogastric animals, but nutrition technologies can mitigate the effects. Similarly, the efficiency of use of mineral sources of phosphorus (e.g. calcium phosphates) for livestock needs to be better defined and improved.

Ruminants grazing pastures growing on low soil-phosphorus soils are often deficient in phosphorus; removing this nutritional limitation often improves productivity significantly. New technologies – such as for mapping the available soil P in landscapes, treatment of antinutritional factors that reduce P digestion in animals, and better approaches to understanding the effects of P deficiencies on animal health – all contribute to better use of P as a nutrient in livestock. Progress in improving phosphorus efficiency will be discussed.



NUTRITION AND FOOD

5.4 ▶ Provenance of meat

Australia has an international reputation for consistently delivering high-quality meat, thanks largely to the work of Meat Standards Australia (MSA). In export markets, Australia has a safe, clean and green image. However, competition from other countries that can also claim a green image and high quality is increasing. So, what is the point of difference – for Australian meat? The answer – provenance (regional flavour).

Consumers are aware of the origin of food products and associated quality aspects. Consequently, the demand in food is shifting from quantity to quality. Food quality is linked to objective (i.e. must be safe and nutritious) and subjective (i.e. desirable aroma, flavour, texture, and colour) parameters. Subjective parameters can be measured using objective methods, such as analytical techniques. But subjective parameters are difficult to establish because they vary considerably, depending on the production method and various factors influencing it. Hence, for objective and subjective parameters, provenance can be defined as an objective parameter that is perceived subjectively. This refers to the aspects that make a product authentic, such as production method, specific ingredients and the food origin. Consumers who buy fresh meat are the most concerned about authenticity or quality reassurance.

5.5 ▶ Innovative climate products for improving risk management for the red meat industry in the tropics and subtropics

Tropical and subtropical areas in Australia have one of the most variable climates in the world, especially for rainfall. Variability significantly affects our agricultural and pastoral industries. Substantial work is currently underway to develop and improve climate products for northern Australia and to communicate these products to producers and end-users. In far north Queensland, the February 2019 floods caused significant cattle losses and infrastructure damage, which highlights the importance of continuing to develop innovative climate variability responses in tropical and subtropical regions. Moreover, better understanding and predictive capability of multi-year-to-decadal climate variations will also be crucial in providing reliable information and application-ready products for decision makers and planners to manage their risks and planning frameworks.

This session invited contributions on all aspects of applied climate science with a geographical focus on the tropics and subtropics, including presentations incorporating end-user needs for new products that describe flash-drought, multi-year drought, monsoon onset, breaks, and drought monitors. Contributors should link findings to meat and livestock production.



6.1 ▶ Stress physiology: Designing crops for a hotter and drier world

Crop grain yield can be defined as the product of resource capture, resource-use efficiency, and partitioning that resource into grain. The efficiency with which these resources (e.g. light, water and nitrogen) are captured and used to produce biomass, and the extent to which the biomass is ultimately partitioned into grain yield, is constrained by stresses such as heat and drought. Climate change is projected to affect Australian crops through higher temperatures, more CO₂, and more rainfall variability. This symposium will focus on three key areas of stress physiology research: drought, roots, and heat. To optimise performance under drought, crops must balance their supply and demand for water by modulating canopy development and root architecture. In the roots, three cellular processes control the root architecture – curving, elongating, and branching – which determine the extent to which crops can access water and nutrients. This raises another important issue: is there a trade-off between water and nutrient acquisition by roots? If so, can we define root ideotypes for specific contexts? Recent research has shown that heat, even more so than drought, is likely to constrain crop production in the coming decades. Strategies to combat both heat and drought will be discussed in this symposium, guided by the latest physiological research into stress adaptation.



HORTICULTURE

6.2 ▶ Horticultural tree genomics

Horticulture is a highly valuable industry within the Australian agricultural sector. Tree crops account for half of the horticulture industry's value, with mango, macadamia, avocado, almond, and citrus being the major Australian horticultural tree crops. Horticulture is also an important strategy for ensuring future global food security. Although it is currently profitable, continual improvement in management and breeding, including developing intensive production systems, is integral for maintaining profitability in a competitive and rapidly changing global market. A deeper understanding of the relationship between phenotype and the underlying genetic mechanisms has the potential to offer tools and opportunities to rapidly and more efficiently address current and future needs of the Australian horticulture industries. This symposium will highlight advances in avocado, macadamia, mango, citrus, and almond genomics, and the functional characterisation of flowering in tree crops.



LIVESTOCK

6.3 ▶ Growing human capital for tropical animal industries

This symposium will bring together industry and emerging young guns, to address the challenges of establishing and driving a fulfilling career in animal science. It will also address what producers and industry see as potential gaps and emerging areas for future employment growth in tropical animal industries. Speakers are drawn from Future Livestock Consultants Group (MLA) and from industry, including large-scale producers and industry consultants. This symposium is sponsored by the Queensland Branch of the Australian Association of Animal Sciences (AAAS).



NUTRITION AND FOOD

6.4 ▶ Vertically integrated R&D platforms for underutilised and niche crops

Underutilised niche crops have potential to enhance food security within specific regions by delivering key components of dietary nutrition. Global niche crop products can provide small but highly profitable market shares that collectively make a significant contribution to export growth, regional employment, and prosperity. For both, there is a need to understand the constraints and bottlenecks for vertically integrated added-value supply chains, for example, how to optimise nutritionally enhanced functional foods or processed plant extracts for domestic or export markets. Such bottlenecks may include securing and characterising sufficiently broad genetic resources to underpin structured breeding programs, together with targeted phenotyping and data management tools that provide the systematic evidence required for market discrimination. There is ongoing scope for speculative screening of plants for novel chemicals, bio-actives, aroma and flavour, as well as the capacity to identify adapted cultivars for specific regions/environments.



AGFUTURES

6.5 ▶ Innovations in biosecurity

Queensland's biosecurity system is facing unparalleled challenges in its response to the increasing scale and scope of exotic pests and diseases. The Queensland Biosecurity Strategy 2018–2023 will guide us in protecting Queensland's ecosystems, our industries, and our way of life while maintaining our reputation for product safety and integrity, and ensuring ongoing market access for our commodities. This symposium will look at bright ideas and better ways to meet the biosecurity challenge, including genomics, robotics, remote sensing, imaging, big data, and blockchain.



FIELD CROPS

7.1 ▶ Modelling to improve crop adaptation in changing environments

Crop models are powerful tools for complex agricultural systems. Such models are becoming increasingly important to understand and improve crop adaptation to variable and changing environments. They are used for decision support to help agriculture extension and crop improvement programs. This support includes short and longer-term strategic decisions, such as adaptation to highly variable climates, new environments for prospective crops, and new climatic scenarios due to climate change. They help policy makers, farmers, physiologists, geneticists, and breeders to identify best options and strategies in the face of uncertainty and partial knowledge. Models are also continuously evolving in response to different needs.

This symposium will bring key researchers using crop models to present new developments and applications in these areas. Through a series of presentations that will act as case studies, this symposium will highlight the power and guidance that using models in decision making brings, and facilitate greater engagement between agricultural modellers and the research and industry communities at the forefront of tropical agriculture.



HORTICULTURE

7.2 ▶ Nano-containers to deliver plant genetic cargo

Are nanomaterials the future gene-delivery platform for plants? The need to improve plants to be resistant to climate change and to feed a growing world population has never been more urgent. The development of a GM crop resistant to a pathogen(s) takes 13 years of R&D and costs \$136 million. Conventional gene delivery in plants using bacteria or biolistic approaches has critical drawbacks, such as low efficiency, narrow species range, limited success, and tissue damage. The development of nanocarriers to deliver genetic cargoes to mammalian cells has progressed extensively, however, in plants, the cell wall poses a dominant physical barrier. Recent innovations in nano-delivery of biomolecules to plant cells include use of DNA nanostructures, DNA origami and carbon nanotubes for DNA delivery to nucleus and chloroplast. Genetic engineering of the chloroplast is an exciting prospect for high-yield production of protein products. The advent of genome editing can be a significant benefit, and might even eliminate conventional delivery bottlenecks. Nano-containers are also emerging as effective and commercially viable translational tools for topical RNA interference as a non-GM approach for crop protection. The current sentiment to transition to chemical pesticide-free agriculture is gaining momentum, with both GM and non-GM approaches poised to contribute significant benefits to food security and safety.



LIVESTOCK

7.3 ▶ The highs and lows of maternal nutrition in beef cattle

The long-term influence of maternal nutrition and stressors during foetal development on postnatal growth and efficiency in offspring is being increasingly recognised. Epigenetics, or nutritional genetics, is a growing science that aims to provide a mechanistic link between environment, nutrition, and disease. Epidemiological studies have shown that not only our genetic inheritance but perturbations during foetal life can have persistent consequences. Recent research has demonstrated that changes in the nutrition of calves during foetal development and during the first days of life can determine dystocia, calf mortality rates, health, growth, reproductive efficiency, and future performance during feedlot. This symposium will discuss how to minimise the detrimental effects of stress and poor nutrition during the prenatal period.



NUTRITION AND FOOD

7.4 ▶ Research for innovative rice-based food systems and nutrition amid climate change

A slow achievement of food, income, and nutrition security, especially in the developing world, has posed consequences for food safety and human health. Efforts to address these issues are made worse by unfavourable climatic conditions and a rapidly increasing population. While limited use of productivity-enhancing agricultural technologies is one of the most pressing issues, the incomplete linkages in the food value chain remain an area of contention. The ability to accommodate consumer preferences during breeding and production is limited. Substantial losses occur in the food system and, with poor post-harvest management, more concerns about health and food safety are raised. Incidences of malnutrition have been rising despite available technologies to curb the situation. Research needs to play an active role in the support system that integrates farmers and all value-chain players to embrace science and technology to resolve these problems. Breeding for consumer-preferred traits such as aroma contents, besides addressing new problems relating to better food systems is needed. This will require innovative linkages in the food value chain to close the gaps.



AGFUTURES

7.5 ▶ Future horticulture production systems

This symposium, drawing on the experiences and perspectives of a diverse set of speakers from the public and private sector, will explore and discuss innovations with the potential to transform horticulture production systems. Focusing on current and future scientific and technological advances, the symposium will explore interventions that will transform productivity, revolutionise horticulture management, and personalised quality in orchards of the future, by using the latest digital, breeding, and science technologies. The symposium format is a combination of experts' presentations as well as a Q&A panel discussion. A diverse set of speakers, including startups, scientists and industry leaders, present at the Future Horticulture Production Systems Symposium. Q&A panel discussion will provide the audience with an opportunity to interact with experts in their field.

**HORTICULTURE****8.1 ▶ AgTech - feeding the future**

Over the coming decades, droughts and other detrimental effects of climate change are predicted to occur more frequently globally. The International Water Management Institute predicts that by the year 2025, one-third of the world's population will live in regions that will experience severe water scarcity that will significantly affect crop production. Despite recent technological advances including improved varieties and irrigation systems, changing climatic conditions remain a dictating factor in agricultural productivity. In addition to errant climatic conditions, the ever increasing world-population is placing further pressure on global resources. As a result of food deficits, nearly 1 000 million people have insufficient food and over 400 million are chronically malnourished. Alternative strategies are required to assist current agricultural practices to meet increased global crop security and nutritional demands. It is imperative that we develop nutritionally rich crops that can survive future climates but continue to yield. Strategies involving a range of technologies will be discussed in this session.

**HORTICULTURE****8.2 ▶ Strengthening value chains in tropical Australia with protected cropping systems**

Horticulture farming near and north of the Tropic of Capricorn is conducted exclusively outdoors. Yield and quality consistency of vegetables, melons and berries remain a problem due to challenges farmers face in managing climatic conditions. Markets in Australia and overseas increasingly demand reliable high-quality vegetables. To address these challenges and opportunities, current and new growers would benefit from protected cropping agriculture, which cost-effectively mitigates risks linked to climate variability, and increased production that can be extended to year round. Although protected cropping in the tropics is incipient, there is emerging interest that has recently led to investments. Research organisations working in partnerships with industry can raise awareness and technical knowledge of protected cropping stakeholders. This is critical if adapted protected cropping technologies are to be more widely adopted, and to benefit farmers and communities. This symposium will present and discuss protected cropping in the tropics, highlighting a range of matters: its opportunities and challenges; recent research outcomes; available innovative technologies; and key value chain considerations. It will have industry representatives communicating their experiences using protected cropping in north-east Australia and overseas.

**HORTICULTURE****8.3 ▶ Overcoming barriers to growth in horticulture**

Continual innovation is necessary to overcome barriers to horticultural production and to stimulate growth in the businesses. In horticulture, innovation is shaped by a variety of motivations, such as reducing losses from weeds, pests and diseases, labour shortages, environmental regulations, increasing costs of fertilisers and agrochemicals, and water quality and availability. Considerable effort also needs to be put into supply-chain management, to ensure that the commodity reaches the market in good condition, and that demand is strong to ensure maximum return on investment. This symposium provides a platform for industry stakeholders to come together with growers, researchers, government agencies, and regulators to learn about how innovative research and development (R&D) approaches can help overcome the barriers that limit horticulture in Australia.

**AGFUTURES****8.5 ▶ Innovations in waste management and recycling in Queensland agriculture**

The symposium will bring together a range of speakers delivering innovative policies and projects delivering real advances in agricultural waste management, including waste recycling, reuse and the role of agricultural supply chains in the circular economy. The symposium will present information on the growing interest in the field, the policy initiatives providing a platform for innovation, as well as a number of case studies illustrating the commercial opportunities available to agribusinesses.

**AGFUTURES****8.2 ▶ Women in Agribusiness**

Understanding of successful supply chain from producers, exporters, intermediaries to consumers - what are key attributes to be successful in international markets?

**HORTICULTURE****8.3 ▶ Overcoming barriers to growth in horticulture**

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POSTER PROGRAM*



*Program may be subject to change. Current at time of printing.

POSTERS



FIELD CROPS

Presented on Tuesday 12 November 2019 from 12:30-13:25



POSTER NUMBER	PAPER TITLE
400	Recent trends in drought, heat and frost-induced yield losses across the Australian wheatbelt ► Behnam Ababaei, The University of Queensland, Australia
401	Fall armyworm invasion and impact in Africa ► Jerome Edem Abiemo, Australia Awards Africa, Australia
402	Transcriptomics analysis for the detection of novel drought tolerance genes in Jojoba (<i>Simmondsia chinensis</i>) ► Othman Al Dossary, The University of Queensland, Australia
403	Aflatoxin contamination of village grains in Central Tanzania: Risky food and agricultural practices and significance to village chicken productivity ► Robyn Alders, Centre for Global Health Security and Chatham House, Australia
404	The role of leadership and local ownership in Research 4 Development (R4D) projects ► Kim Alexander, James Cook University, Australia
405	Grain filling temperature reduces head rice yield through husk enlargement in long grain and grain breakage in medium grain cultivars ► Fawad Ali, Plant Science Institute, Southern Cross University, Australia
406	Impact of soil water stress at seed development stage on phenology, fecundity and seed dormancy of <i>Avena sterilis</i> ssp. <i>ludoviciana</i> ► Mohammad Ali, The University of Queensland, Australia
407	Genetic determination sex in Jojoba (<i>Simmondsia Chinensis</i>) ► Bader Alsubaie, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
408	Determination of phylogenetic relationships of the genus Sorghum using nuclear and chloroplast genome assembly ► Galaihalage Ananda, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
409	Relationships between Iraqi rice varieties at the nuclear and plastid genome levels ► Hayba Badro, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
410	Occurrence of phytoplasma in sugarcane with Yellow Canopy Syndrome (YCS) and phloem sap sucking insects in North Queensland, Australia ► Shiromi Basnayake, The University of Queensland, Australia
411	Single Tube Long Fragment Reads (stLFR): A simple and cost effective method for de novo whole genome sequencing ► Oliver Bonacorso, MGI Tech Co Ltd, China
412	Remobilisation and fate of sulphur in Indian mustard (<i>Brassica juncea</i>. L.) ► Priyakshi Borpatragohain, Southern Cross University, Australia
413	Land situation and sowing date effects growth and yield of crops in the rice-pulse based cropping systems of coastal India ► Koushik Brahmachari, Bidhan Chandra Krishi Viswavidyalaya, India
414	Foliar nutrient management on potato grown under zero tillage and mulching in Coastal Saline Soil of West Bengal, India ► Koushik Brahmachari, Bidhan Chandra Krishi Viswavidyalaya, India
415	System identification of linearized rice growth dynamic for precision irrigation ► John Audie Cabrera, University of The Philippines, Philippines
416	Evaluation of mungbean varieties for northwest Cambodian lowland rice systems ► Harry Campbell-Ross, Australian Centre for International Agricultural Research (ACIAR), Australia
417	Socio-economics analysis of food insecurity status in rural households in Central Dry Zone, Myanmar ► Thida Chaw Hlaing, Ministry of Agriculture, Myanmar
418	Single cross testers for CIMMYT Heterotic Group B maize germplasm adapted to Mid-Altitudes ► Arisede Chisaka, The University of Queensland, Australia
419	Differential gene expression among genotypes of the genus <i>Saccharum</i> contrasting in biomass production ► Fernando Henrique Correr, University of São Paulo, Brazil
420	Quantifying gas emissions and denitrifying genes in a salt-affected soil ► Duy-Minh Dang, Can Tho University, Vietnam

421	Utilisation of sludge from ditches to maintain soil nutrients and increase rice yield in rice-shrimp systems in Vietnam ► Duy-Minh Dang, Can Tho University, Vietnam
422	Effects of pesticides on nitrous oxide production from sugarcane cropping soils ► Shilpi Das, The University of Queensland, Australia
423	Assessment of soil structural properties in relation to land use change in South-East Asia ► Rachel de Lastic, The University of Queensland, Australia
424	Alternative legume crops for the southern region of Australia ► Audrey Delahunty, Agriculture Victoria, Australia
425	Simulation of mungbean productivity during the fallow phase on rainfed rice in Central Java, Indonesia ► Elsa Rakhami Dewi, Indonesian Agroclimate and Hydrology Research Institute, Indonesia
426	"Toto, I've a feeling we're not in Kansas anymore": Mungbean's journey from the Midwest to the Emerald City and beyond ► Col Douglas, Department of Agriculture and Fisheries, Queensland Government, Australia
427	The economic benefits of improvements in online licencing of the chemical use in Queensland crop industries ► Alisher Ergashev, Department of Agriculture and Fisheries, Queensland Government, Australia
428	Promoting social learning in soil water and nutrients management using farmer – friendly monitoring technology ► Isaac Rhinnexious Fandika, Department of Agricultural Research Services, Malawi
429	Developing climate resilient crops - Bambara groundnut (<i>Vigna subterranea (L.) Verdc</i>) as an exemplar crop ► Xiu Qing Gao, University of Nottingham, Malaysia
430	Genotypic variation in biomass produced is linked to differences in radiation acquisition in mungbean ► Geetika Geetika, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
431	Diversity of domestication loci in wild rice populations ► Sharmin Hasan, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
432	Mungbean pest identification mobile phone application development for Northwest Cambodia ► Isabel Hinchcliffe, The University of Sydney; Australian Centre for International Agricultural Research (ACIAR), Australia
433	Investigation of insect resistant components in wild pigeonpea <i>Cajanus scarabaeoides</i> ► Thi My Linh Hoang, Queensland University of Technology, Australia
434	Relationship between biomass composition and enzymatic hydrolysis efficiency in sugarcane ► Katrina Hodgson-kratky, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
435	Comparative analysis and evaluation of handheld X-ray fluorescence spectrometry to measure silicon in crop plants ► Daniel Howell, The University of Sydney, Australia
436	Investigating the effects of pollen and environment on palmitoleic acid and saturated fat content of macadamia nuts ► Wei Hu, The University of Queensland, Australia
438	The role of farmers' perception of salinity for ensuring food security: Evidence from coastal rice-growing areas of Bangladesh ► Md Aminul Islam, University of New England, Australia
439	Perspective of smallholder farmers on smart farming gadgets in Pakistan ► Nadia Jabeen, Pakistan Council of Research in Water Resources, Pakistan
440	Distribution and chemical speciation of nitrogen and inhibitors from banded enhanced efficiency fertilizers ► Chelsea Janke, The University of Queensland, Australia
441	A decade of tropical sweet corn breeding using conventional and molecular approaches in Malaysia ► Pedram Kashiani, Universiti Pendidikan Sultan Idris, Malaysia
442	A pod borer resistant cowpea is one step toward food and nutrition security in West Africa ► Thomas Joseph Higgins, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Agriculture and Food, Australia
443	Biological control of rice brown spot by <i>Bacillus spp.</i> in Thailand ► Wanporn Khemmuk, Ministry of Agriculture and Cooperatives, Thailand
444	Fusaristatin A production negatively affects the growth and aggressiveness of the wheat crown rot and head blight pathogen <i>Fusarium pseudograminearum</i> ► Mohammed Khudhair, Commonwealth Scientific and Industrial Research Organisation (CSIRO), The University of Queensland, Australia
445	Machinery and labour requirements as influenced by diversified farming systems in the Australian Northern grain production region ► Julius H Kotir, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

446	Quantifying forfeited wheat yield due to soil sodicity in the northern grain-growing region of Australia ► Yunru Lai, The University of Queensland, Australia
447	Unique genetic resource in perennial wild rice <i>Oryza rufipogon Griff.</i>, in the Mekong Delta ► Dinh Thi Lam, UGAS, Iwate University, Japan
448	Auto-encoding genetic markers to predict the value of ecophysiological model parameters - proof of concept using a sorghum diversity panel ► Florian Larue, Cirad, France
449	Background genotypic effects in soybean (<i>Glycine max (L.) Merrill</i>) in the presence of Sulfonylurea Herbicides ► Catherine Lawn, The University of Queensland, Australia
450	Sorghum (<i>Sorghum bicolor L.</i>) germination dynamics at extreme temperatures ► Mengwei Li, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
451	Nanotechnology promotes R&D of micronutrient foliar fertilizers ► Peng Li, The University of Queensland, Australian Institute for Bioengineering and Nanotechnology (AIBN), Australia
452	Unique secreted in xylem genes in banana-infecting endophytic <i>Fusarium oxysporum</i> ► Rebecca Lyons, The University of Queensland, Australia
453	Lying down on the job: A multivariate mixed model approach helps detect important traits underpinning lodging ► Bethany Macdonald, Department of Agriculture and Fisheries, Queensland Government, Australia
455	Rescheduling of wet season (<i>T. Aman</i>) rice planting for cropping intensification in coastal Bangladesh ► Mohammed Maniruzzaman, Bangladesh Rice Research Institute, Bangladesh
456	Assessing the use efficiency of Enhanced Efficiency Nitrogen Fertilisers (EENFs) in irrigated maize ► Cristina Martinez, The University of Queensland, School of Agriculture and Food Sciences, Australia
457	Morphological characterization of root trait variability in bambara groundnut (<i>Vigna subterranea (L. Verdc)</i> landraces – implication for drought adaptation ► Kumbirai Ivyne Mateva, University of Nottingham, Malaysia
458	The relationship between bulb yield and allicin concentration in garlic varieties ► Binh Nguyen, The University of Queensland, School of Agriculture and Food Sciences, Australia
459	Ecophysiology of Sorghum bicolor's Australian wild relatives ► Harry Myrans, Monash University, Australia
460	Impact of agroforestry practice on soil conservation- Initial assessment in Northwest Vietnam ► La Nguyen, ICRAF, Vietnam
461	Heterobeltiosis in banana and genetic gains through crossbreeding ► Rodomiro Ortiz, Swedish University of Agricultural Sciences, Sweden
462	Participatory variety selection for enhanced promotion and adoption of improved finger millet varieties: A case for Central Tanzania ► Daniel Otwani, University of Western Australia, Australia
463	Hedging your bets: The importance of flowering time and agronomic practise in the search for the ideal Australian hempseed cultivar ► Rafael Julian Panerio, Southern Cross University, Australia
464	Sustainable carbon alternatives from agriculture for a better tomorrow ► Adhini Pazhany, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
465	Understanding sclerotinia risks associated with growing peanuts in the South Burnett area ► Claire-Marie Pepper, CQUniversity, Australia
466	Analysis of differences in gene expression associated with variation in biomass composition in sugarcane ► Virginie Perlo, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
467	Host plant resistance to <i>Helicoverpa armigera</i> has been observed in Australian wild <i>Cajanus (Pigeonpea)</i> species ► Vanambathina Prameela Rani, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
468	Genotypes with deep roots are associated with high yield in aerobic rice production ► Christopher Proud, The University of Queensland, Australia
469	Going underground: Root and stool architecture traits to improve sugarcane productivity ► Anne Rae, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
470	Geographic Information System (GIS) techniques to tackle unsustainable agriculture practices in Madagascar ► Percy Yvon Rakoto, Royal Melbourne Institute of Technology, Australia
471	Utilization of forgoing coastal rice fallow lands of Bangladesh with zero tillage potato cultivation using different rates of residues ► Md. Harunor Rashid, Bangladesh Agricultural Research Institute, Bangladesh

472	Technology package for sustainable productivity and resiliency to climate variability: The proof from SIMLESA studies in Tanzania ► Dr John Sariah, Tari Maruku, Tanzania
473	Pedigree data analysis of a wheat population ► Sepideh Rouholamin, The University of Queensland, Australia
474	Unravelling the complex genetic architecture of spot blotch resistance in barley ► Dipika Roy, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
475	Integrated high-throughput phenotyping with high resolution multispectral, hyperspectral and 3D point cloud techniques for screening wheat genotypes under sodic soils ► Malini Roy Choudhury, The University of Queensland, Australia
476	Analyzing the climate change impact and farmer's adaptability strategies in Khyber Pakhtunkhwa, Pakistan ► Khuram Nawaz Sadozai, The University of Agriculture Peshawar, Pakistan
477	Does pulses cultivation uplift the farmer's livelihood in Khyber Pakhtunkhwa Province, Pakistan? ► Khuram Nawaz Sadozai, The University of Agriculture Peshawar, Pakistan
478	Economic analysis of cotton crop production in District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan ► Khuram Nawaz Sadozai, The University of Agriculture Peshawar, Pakistan
479	Cropping system intensification for increasing crop productivity in salt-affected coastal zones of Bangladesh ► Rina Rani Saha, Bangladesh Agricultural Research Institute, Bangladesh
480	Zero tilled-paddy straw mulched potato (<i>Solanum tuberosum</i>) cultivation in the coastal saline soils reduce soil salinity, increase yield and profitability ► Sukanta Kumar Sarangi, ICAR-Central Soil Salinity Research Institute, India
481	Modelling yield and seasonal soil salinity dynamics in Rice-Grasspea cropping system for the Coastal Saline Zone of West Bengal, India ► Sukamal Sarkar, Bidhan Chandra Krishi Viswavidyalaya, India
482	Performance of garlic (<i>Allium sativum</i>) varieties under zero tillage mulch condition in southern coastal region of Bangladesh ► Khokan Kumer Sarker, Bangladesh Agricultural Research Institute, Bangladesh
483	Effect of straw mulch and irrigation on sunflower and maize cultivation in no tillage systems of coastal heavy soils ► Khokan Kumer Sarker, Bangladesh Agricultural Research Institute, Bangladesh
484	Effects of fresh and saline water irrigation for maize in coastal areas of Bangladesh ► Khokan Kumer Sarker, Bangladesh Agricultural Research Institute, Bangladesh
485	Yield response of sunflower to sowing dates and NPK rates under zero tillage in wet soil of southwestern coastal Bangladesh ► Bidhan Chandro Sarker, Khulna University, Bangladesh
486	Prototype tool kit to identify yellow canopy syndrome in the field ► Gerard Scalia, Sugar Research Australia, Australia
487	Understanding how PHOTOPERIOD1 and FLOWERING LOCUS T2 regulate flowering time and spike development in wheat ► Lindsay Shaw, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
488	Characterizing genetic variation in late, deep wheat root architecture to improve yield and yield stability under terminal water stress ► Kanwal Shazadi, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
489	Building climate resilience and reducing yields gaps in the wheat belt of South Asia: Can it be achieved at scale? ► Balwinder Singh, International Maize and Wheat Improvement Center, India
490	Response of mungbean root system architecture to phosphorus application methods ► Vijaya Singh, The University of Queensland, Australia
491	Low cost protective structures providing suitable growing conditions for vegetable crops year-round in the tropics ► Thongkhoun Sisaphaithong, Ministry of Agriculture, Lao People's Democratic Republic
492	Genetic elucidation of glucosinolates in a diverse collection of Indian mustard (<i>Brassica juncea</i> L.) ► Erwin Tandayu, Southern Cross University, Australia
493	Affordable, Accessible, Asian (AAA) Drought Tolerant Maize specifically developed for poor-resource smallholders: A collaborative program between CIMMYT and SYNGENTA ► Herve Thieblemont, Syngenta Foundation for Sustainable Agriculture, Thailand
494	Control of sugar and fibre: Insights from sugarcane transcriptome analyses ► Prathima Thirugnanasambandam, ICAR - Sugarcane Breeding Institute, India

495	Isolation and characterization of full-length phenylalanine ammonium lyase and cinnamyl alcohol dehydrogenase genes involved in lignin biosynthesis of <i>Erianthus arundinaceus</i> ► Prathima Thirugnanasambandam, ICAR - Sugarcane Breeding Institute, India
496	Building farming resilience to climate change: Upland crop production in Northwest Cambodia ► Van Touch, The University of Sydney, Australia
497	Agroforestry suitability mapping for the northwest provinces of Vietnam ► Quyet Vu, Soils and Fertilizers Research Institute, Vietnam
498	Large scale genome-wide association study reveals drought induced lodging in grain sorghum is mainly driven by remobilisation and plant height ► Xuemin Wang, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
499	Adopting and adapting the principles of participatory guarantee systems for local quality assurance systems in conventional agriculture ► Salote Waqairatu-Waqainabete, Pacific Island Farmers Organisation Network; Pacific Agribusiness Research in Development Initiative 2 (PARDI2), Fiji
500	A novel biomarker test for sugarcane yellow canopy syndrome ► Kate Wathen-Dunn, Sugar Research Australia, Australia
501	Plant and seed mortality of fireweed <i>senecio madagascariensis</i> following herbicide application ► Kusinara Wijayabandara, The University of Queensland, Australia
502	Developing pigeonpea as a sustainable new field crop for Australia ► Rex Williams, Department of Agriculture and Fisheries, Queensland Government, Australia
503	Estimating soil organic carbon under different land-use types in Australia's Northern Grains Region using mid-infrared spectroscopy ► Alwyn Williams, The University of Queensland, Australia
504	Grain oats - an alternative winter cereal for the Australian sub-tropics? ► Bruce Winter, Department of Agriculture and Fisheries, Queensland Government, Australia
505	NT native rice - commercial use, regulation and benefit sharing ► Penny Wurm, Charles Darwin University, Australia
506	Commercial use of native species by Indigenous enterprises - a case study of native rice in the NT ► Penny Wurm, Charles Darwin University, Australia
507	Novel source of biotic stress resistance identified from brassica species and its wild relatives ► Rashmi Yadav, ICAR National Bureau of Plant Genetics Resources, India
508	Wxlv, the ancestral allele of rice Waxy gene ► Changquan Zhang, Yangzhou University, China
509	Is broadcasting mung bean into rice crops a useful practice in Timor-Leste? ► Robert Williams, University of Western Australia, Australia
510	National level economic and environmental benefits of rice hull biochar in Timor-Leste ► Robert Williams, University of Western Australia, Australia
511	Physiological response of 20 Bambara groundnut (<i>Vigna subterranea L. Verdc</i>) to intermittent periods of water stress during different growth stages ► Kennedy Agyeman, CSIR-Crops Research Institute, Ghana
512	Assessment of genetic diversity of Bambara groundnut (<i>Vigna subterranea (L) Verdc.</i>) accessions for the development of drought tolerance lines ► Faloye Benjamin Busuyi, International Institute of Tropical Agriculture (IITA), Nigeria
513	Demand driven common bean variety development and promotion for enhanced productivity and production ► Berhanu Amsalu Fenta, Ethiopian Institute of Agricultural Research, Ethiopia
514	Response of grain legume species to terminal drought in Timor-Leste ► Robert Williams, University of Western Australia, Australia
515	Jatropha curcas development as intervention potential to tackling land, energy and food challenges of rural communities in dryland sub-Saharan Africa ► Kirchhof Gunnar, The University of Queensland, Australia
516	Suitability evaluation of underutilized crops under future climate change using ecocrop model: A case of bambara groundnut in Nigeria ► Ezinwanne Ezekannaghha, University of Cape Town, South Africa
517	Developing plantain for resistance to banana aphids by RNA interference ► Temitope Jekayinoluwa, University of Nairobi, Kenya



HORTICULTURE

Presented on Wednesday 13 November 2019 from 12:30-13:25

POSTER NUMBER	PAPER TITLE
518	Performance of zero tillage potato cultivation with different mulch materials in the South-Western Saline area of Bangladesh ► M.Akkas Ali, Bangladesh Agricultural Research Institute, On-Farm Research Division, Bangladesh
519	Effect of mulch materials and nitrogen source on the performance of tomato in the South-Western Coastal area of Bangladesh ► M.Akkas Ali, Bangladesh Agricultural Research Institute, On-Farm Research Division, Bangladesh
520	The effect of water stress combined with a heatwave on reproduction and yield of Roma-VF tomatoes ► Felix Amuji, Macquarie University, Australia
521	Challenges to increasing production and standardizing fruit quality of Calamansi (<i>x Citrofortunella microcarpa</i>) towards geographic branding in Mindoro Island, Philippines ► Bryan Apacionado, Institute of Crop Science, College of Agriculture and Food Science, University of the Philippines Los Baños, Philippines
522	Four new macadamia varieties for the Australian industry ► Grant Bignell, Department of Agriculture and Fisheries, Queensland Government, Australia
523	Global scale GxE for Eucalyptus dunnii growth traits ► Michael Bird, The University of Queensland, Australia
524	Secreted-in-xylem genes as targets for the diagnostics of different races of <i>Fusarium oxysporum f. sp. cubense</i> infecting bananas ► Lilia Costa Carvalhais, The University of Queensland, Australia
525	Aligning Pacific cocoa genetics to productivity and quality for the craft speciality chocolate market ► Natalie Dillon, Department of Agriculture and Fisheries, Queensland Government, Australia
526	Horticulture innovation ► Alina Djanie, The University of Queensland, Australia
527	The effect of heat treatments and drip line placements on the yield and quality of garlic ► Alina Djanie, The University of Queensland, Australia
528	Analysis of gross margins in Queensland tomatoes ► Alisher Ergashev, Department of Agriculture and Fisheries, Queensland Government, Australia
529	Solanaceous plants respond to tospovirus infection by accumulation of small interfering RNAs homologous to both viral sequences and endogenous transcripts ► Stephen Fletcher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Centre for Horticultural Science, Australia
530	Insight into the role of FT in macadamia ► YE Gong, The University of Queensland, Australia
531	Lime and fertiliser applications increase yield of leafy vegetable crops in Cambodia ► Sarith Hin, Cambodian Agricultural Research and Development Institute, Cambodia
532	Light relation in intensive mango orchards ► Paula Ibell, Department of Agriculture and Fisheries, Queensland Government, Australia
533	RNAi-mediated management of whitefly <i>Bemisia tabaci</i> by oral delivery of double-stranded RNAs ► Ritesh Jain, The University of Queensland, Australia
534	Variations in macadamia varietal susceptibility to <i>Phytophthora multivora</i> and <i>P. cinnamomi</i> ► Olumide Jeff-Ego, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
535	Dependence on cross-pollination in macadamia and challenges for orchard management ► Wiebke Kamper, University of the Sunshine Coast, Australia
536	Shoot borer <i>Earias vittella</i> – a threat to the indigenous vegetable Pele <i>Abelmoschus manihot</i> in the Pacific ► Rashmi Kant, The New Zealand Institute for Plant and Food Research, New Zealand
537	Performance and genetic diversity among a collection of <i>Stevia rebaudiana Bertoni</i> accessions using microsatellite markers in Malaysia ► Pedram Kashiani, Universiti Pendidikan Sultan Idris, Malaysia
538	Introducing new improved variety of mangoes into the market: A preliminary consumer study at a shopping mall in Bogor, Indonesia ► Adhitya Marendra Kiloes, The University of Queensland, School of Agriculture and Food Sciences, Australia
539	The effect of medium type and subculture frequency on the induction of friable embryogenic callus for coconut cell suspension culture ► Eveline Kong, The University of Queensland, Australia
540	Macadamia genetics: Linkage mapping and genome anchoring ► Kirsty Langdon, Southern Cross Plant Science, Australia

541	Genetic tolerance in <i>capsicum chinense</i> to low pH constraints on root growth ► Minguo Li, The University of Queensland, School of Agriculture and Food Sciences, Australia
542	Nanobubbles in hydroponics ► Yimeng Li, The University of Queensland, Australia
543	Pilot-scale market survey of mango postharvest diseases in Fiji ► Mereia Fong Lomavatu, Ministry of Agriculture, Fiji
544	Phylogenetic relationship among <i>Macadamia integrifolia</i> and <i>Macadamia tetraphylla</i> wild accessions ► Thuy Thi Phuong Mai, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
545	Analysis of the temporal and spatial distribution patterns of abnormal vertical growth in commercial macadamia orchards in Australia ► Mohamed Zakeel Mohamed Cassim, The University of Queensland, Australia
546	Genetic diversity and population structure of field isolates of <i>Ganoderma boninense</i> from oil palm plantation in Solomon Islands ► Agnieszka Mudge, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
547	Investigating new methods to increase adventitious root formation ► William Nak, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
548	Avocado genome sequencing and development of genetic markers for breeding and germplasm identification ► Onkar Nath, The University of Queensland, Australia
549	New achievements for diagnostics of banana streak virus ► Thu Ha Ngo, The University of Queensland, Australia
550	Optimization of coconut micropropagation via somatic embryogenesis ► Zhihua Mu, The University of Queensland, Australia
551	BioClay: Topical RNAi for tomato spotted wilt virus resistance in crops ► Alexander Nilon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
552	Characterization of Heterotrimeric G protein alpha subunit in tomato ► Thao Ninh, The University of Queensland, Australia
553	Breeding for resistance to husk spot disease in macadamia ► Jasmine Nunn, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
554	The use of sucrose and cold pre-treatments for cryopreservation of avocado (<i>Persea americana Mill.</i>) cultivars 'Velvick' and 'Reed' ► Chris O'Brien, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
555	Assessing the interaction between fig size and wasp abundance in a fig-wasp community at Moonbi range, New South Wales ► Blessing Ogunleye, University of New England, Australia
556	Do GAP practices improve market access for vegetable farmers? A case study from Vientiane Capital, Laos ► Gomathy Palaniappan, The University of Queensland, Australia
557	Biosecurity capacity for the Australian avocado industry ► Louisa Parkinson, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
558	Artificial microRNA (amiRNA) strategies for broad-spectrum resistance to tospoviruses ► Jonathan Peters, The University of Queensland, Australia
559	Air temperature an influential climatic factor for growth and reproduction of dry flower pathogens of macadamia ► Kandeeparoopan Prasannath, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
560	Dynamics of seedlings and mango varieties: A case study of breeders in mango production center in Majalengka, West Java, Indonesia ► Puspitasari Puspitasari, Indonesian Center for Horticulture Research and Development, Indonesia
561	Comparative genomics of macadamia species ► Priyanka Sharma, The University of Queensland, Queensland Alliance for Agriculture & Food Innovation, St Lucia, Queensland, Australia
562	Brassica biofumigants for improved soil health ► Gayathri Rajagopal, Department of Agriculture and Fisheries, Queensland Government, Australia
563	Low cost glad wrap film packaging delays postharvest senescence and maintains fruit quality of eight commercial Chili cultivars of Pakistan ► Rehan Riaz, CAB International (Central and West Asia), Pakistan
564	Optimizing planting method and fertilizer application rate for producing high quality nursery of onion cv. Phulkara ► Rehan Riaz, CAB International (Central and West Asia), Pakistan
565	Assessing food safety and quality compliance: An evidence from vegetable industry ► Rehan Riaz, CAB International (Central and West Asia), Pakistan

566	Postharvest innovation to maintain vegetable quality in developing countries with inaccessible cool chain facilities ► Sonnithida Sambath, Cambodian Agricultural Research and Development Institute, Cambodia
567	RNA sprays to combat plant pathogenic fungi ► Anne Sawyer, The University of Queensland, Australia
568	Investigating the sporulation of <i>Metarhizium anisopliae</i> formulated in calcium alginate in soil ► Sudhan Shah, University of Southern Queensland, Australia
569	Evaluation of the effect of organic fertilisers on lettuce yield in Lao People's Democratic Republic (PDR) ► Suzie Jones, University of Tasmania, Australia
570	Evaluation of the effect of lime and irrigation on lettuce yield in Laos ► Phimmasone Sisouvanh, National University of Laos, Laos PDR
571	Investigating capacities to change soil and irrigation practices in vegetable production in two provinces in Cambodia ► Ann Starasts, University of Southern Queensland, Australia
572	Linkages for life: Assessing tomato value chain pathways and opportunities for better livelihoods of marginal and vulnerable groups in Pakistan ► Sajida Taj, Pakistan Agricultural Research Council, Pakistan
573	Postharvest loss improvement in cabbage and cai meo in Son La, Vietnam ► Van Touch, The University of Sydney, Australia
574	Distribution of the smut fungus <i>Ustilago cynodontis</i> within couch grass (<i>Cynodon dactylon</i>) plants ► Nga Tran, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Center for Horticultural Science, Australia
575	Back to basics: Does seed size affect germination and plant uniformity in broccoli (<i>Brassica oleracea var Italica</i>)? ► Celia van Sprang, Department of Agriculture and Fisheries, Queensland Government, Australia
576	Modification of in vitro bioassay for screening <i>Musa</i> species against <i>Fusarium oxysporum f. sp. cubense</i> ► Yuan Li Wu, Institute of Fruit Tree Research, PR China
577	Using demand-led approaches to improve tomato productivity in Ghana ► Agyemang Danquah, West Africa Centre for Crop Improvement, Ghana
578	Impact of pre-processing blanching treatment on lipophilic pigments and antioxidant property ► Phushudi Peter Tinyane, Tshwane University of Technology, South Africa
579	Untargeted uplc-ms approach to elucidate metabolic variation in South African exported avocados ► Semakaleng Mpai, Tshwane University of Technology, South Africa
580	Impact of pre-processing blanching treatment on metabolites and glycoalkaloids in African nightshade (<i>solanum retroflexum dun</i>) ► Dharini Sivakumar, Tshwane University of Technology, South Africa



LIVESTOCK

Presented on Monday 11 November 2019 from 12:30-13:25

POSTER NUMBER	PAPER TITLE
582	Bacteriostatic effect of egg albumen from hens of different feed efficiencies ► Doreen Onyinye Anene, The University of Sydney, Australia
583	Consumer preferences analysis for animal section at the markets (Mandis) under religious meat value chain ► Shumaila Arif, University of Veterinary and Animal Sciences Lahore, Pakistan
584	Genotypic divergence of <i>Avibacterium paragallinarum</i> isolates with different nicotinamide adenine dinucleotide requirements for growth ► Pat Blackall, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
585	Cattle integration in Indonesian oil palm plantations: Impact on soil properties, oil palm yield, and understory plant composition and biomass ► Jori Bremer, University of New England, Australia
586	Understanding the impact of on-farm animal wastage on productivity and livelihoods of smallholder goat farmers in Punjab and Sindh, Pakistan ► Rebecca Doyle, University of Melbourne, Australia
587	Adaptive and productive sheep breed for changing climate ► Surinder Chauhan, The University of Melbourne, Australia
588	Genetic control of fertility traits across species: Association of genes controlling age at menarche and puberty in women and heifers ► Roy Costilla Monteagudo, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
589	Improving productivity on Sri Lankan small-holder dairy farms: The Sri Lanka Dairy Excellence Training Initiative ► Keryn Cresswell, Vetsouth Ltd, New Zealand
590	Use of point-of-care tests for detection of pig pathogens ► Agnes Dela Cruz, The University of Queensland, Australia
591	Evaluation of copra meal (CM) in corn-animal protein meal-based diets and enzyme on broiler performance ► Ashika Devi, University of the South Pacific, Samoa
592	Preliminary investigations in giant taro (<i>Alocasia macrorrhiza</i> L.) corn meal as energy source in poultry diets ► Siaka Diarra, University of the South Pacific, Samoa
593	Blood phosphorus concentration as an indicator of phosphorus deficiency in growing cattle ► Rob Dixon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
594	Multi-trait genomic predictions for a novel age-at-puberty phenotype in tropically adapted beef heifers ► Bailey Engle, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
595	Ensiling unsuitable vegetables with crop sorghum to produce high quality feed ► Daniel Forwood, The University of Queensland, Australia
596	Biopolymer composites for slow release to manage Pimelea poisoning in cattle ► Emilie Gauthier, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
597	Selection of small SNP panels to predict dairy breed proportions of African crossbred cattle ► Netsanet Gebrehiwot, University of New England, Australia
598	Adsorbents for the sequestration of the Pimelea toxin, simplexin ► Russell Gordon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
599	Drought impacts on grassland productivity: The role of plant-soil feedbacks ► Kamrul Hassan, Western Sydney University, Hawkesbury Institute for The Environment, Australia
600	Communal grazing areas as source of calves for small holder farmers in dry Sumbawa, Indonesia: Challenges and opportunity for improvement ► Nurul Hilmati, Indonesian Agency for Agricultural Research and Development, Indonesia
601	Farmer perception and resources for calf fattening under smallholder production system ► Humera Iqbal, The University of Veterinary and Animal Sciences Lahore, Pakistan
602	Linking smallholder farmers to potential beef markets: A case study of livestock farmers in Pakistan ► Humera Iqbal, The University of Veterinary and Animal Sciences Lahore, Pakistan
603	Shining a light on <i>Haemonchus contortus</i> in sheep ► Elise Kho, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
604	Establishing the underlying genetic basis of phenotypic resistance in <i>Avibacterium paragallinarum</i> ► Edina Lobo, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

605	Mitigating the effects of the toxin simplexin in pimelea poisoning of cattle by development of a microbial probiotic ► Zhi Hung Loh, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
606	Buffalo flies receptive to Wolbachia infection: An opportunity to population control? ► Mukund Madhav, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
607	Investigating host biomarkers associated with cattle tick resistance ► Emily Mantilla Valdivieso, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
608	BioClay for sustainable animal health ► Karishma Mody, The University of Queensland, Australia
609	Effects of nano- pesticide formulation parameters on insecticidal effects against sheep blow fly (<i>Lucilia cuprina</i>) larvae ► Mona Moradi Vajargah, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
610	Climate change adaptation through planted forages in Southern Highlands, Tanzania ► Jessica Mukiri, International Center for Tropical Agriculture (CIAT), Kenya
611	Development of a bead-based identification assay for bacteria associated with bovine respiratory disease ► Nusrat Nahar, The University of Queensland, Australia
612	Detection of Stephanofilaria (Nematoda: Filariidae) in buffalo fly lesions ► Muhammad Noman Naseem, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
613	Predicting age of livestock from DNA hair samples ► Loan Nguyen, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
614	Effective host depletion and microbial enrichment method for bovine genital tract microbiome research ► Chian Teng Ong, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
615	Effect of feeding different cultivars of <i>Leucaena leucocephala</i> on rumen-based in vitro anaerobic fermentations ► Diane Ouwerkerk, Department of Agriculture and Fisheries, Queensland Government, Australia
616	Flight zone as an alternative temperament assessment to predict animal efficiency ► Mariano Parra, The University of Queensland, Australia
617	Milk delivery in tropically-adapted neonatal beef calves ► Luis Prada e Silva, The University of Queensland, Australia
618	Delay in progesterone decline before parturition is connected with failure of passive immune transfer in tropical composite beef calves ► Luis Prada e Silva, The University of Queensland, Australia
619	CLEM (Crop Livestock Enterprise Model) – a bio-economic model simulating changes to the whole of farm ► Elizabeth Meier, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
620	DNA testing and genetic evaluation for poll breeding in tropically adapted beef cattle ► Imtiaz Randhawa, The University of Queensland, Australia
621	Proteomics as a potential tool for identifying biomarkers for host resistance to cattle tick ► Ali Raza, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
622	Sequencing Bos indicus bulls using long reads to solve the poll locus ► Elizabeth Ross, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
623	The Brahman Genome: A platinum quality genome for tropical beef production ► Elizabeth Ross, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
624	Cassava-based diets increase live weight gain of Cross Bred bulls in small fattening systems in Malang, East Java ► Deni Setiadi, Brawijaya University, Indonesia
625	Modelling and real-time optimisation of air quality predictions for Australia through Artificial Intelligence Algorithm ► Ekta Sharma, University of Southern Queensland, Australia
626	High level of energy and protein supplementation effect on feed intake and liveweight gain of Bali bulls fed elephant grass ► I Wayan Sulendre, Tadulako University, Indonesia
627	A multiplex molecular assay for <i>Glaeserella australis</i> ► Conny Turni, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
628	Assessing the value of whole genome sequence data in selecting for age at puberty in tropically adapted beef heifers ► Christie Warburton, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
629	Identification of Lonepinella-like species in oral cavity of koalas using housekeeping gene for phylogenetic analysis ► YuChen Wu, The University of Queensland, Australia

630	Development of a bead based molecular serotyping assay for <i>Glaesserella parasuis</i> ► Sarah Yee, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
631	Modelling the controlled release of toxins in a rumen environment ► Yue Yuan, The University of Queensland, School of Chemical Engineering, Australia
632	Nutritional composition of solid-state fermented camelina meal (an enriched protein source for broiler chickens) ► Oladapo Olukomaiya, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
633	Near infrared spectroscopy reflectance (NIRS) to evaluate seasonal relationship between crude protein and digestibility of forages ► Blessing Ogunleye, University of New England, Australia
634	Association of thermotolerance with milk production, feed saver, fertility and fat percentage breeding values in Holstein Friesian dairy cattle ► Richard Osei-Amponsah, University of Ghana, Ghana
635	Impacts of heat stress on the physiological and production responses of lactating dairy cows grazing pastures over hot summer months ► Richard Osei-Amponsah, University of Ghana, Ghana
636	Effects of acute heat stress on performance, blood parameters and meat quality of four broiler chickens strains ► Foluke Sola-Ojo, University of Ilorin, Nigeria



NUTRITION AND FOOD

Presented on Wednesday 13 November 2019 from 12:30-13:25

Nutrition and food - Wednesday 13 November 2019

POSTER NUMBER	PAPER TITLE
637	Impact of innovative non-thermal technologies on anti-nutrient levels and functional properties of wattle seeds ► Oladipupo Qudus Adiamo, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
638	Women empowerment and poverty reduction in rural Okara, Punjab Pakistan ► Mukaddas Afzal, National Agricultural Research Center, Pakistan
639	Determinants of food inflation in Pakistan: Empirical evidences ► Mukaddas Afzal, National Agricultural Research Center, Pakistan
640	Dubai Municipality initiative to reduce food loss ► Sayed Essam Alhashmi, The University of Sydney, Australia
641	Screening of probiotic lactic acid bacteria and prebiotics to select for effective synbiotics ► Batlah Almutairi, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
642	Characteristics of the Underutilised Pulse bambara groundnut (<i>Vigna subterranea (L.) Verdc.</i>) Relevant to Food & Nutritional Security ► Razlin Azman Halimi, Southern Cross University, Australia
643	Kakadu plum (<i>Terminalia ferdinandiana</i>) - a native Australian fruit with functional properties ► Eshetu Mulisa Bobasa, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
644	Exploring the nutritional and functional properties of two understudied Australian endemic plants: <i>Diploglottis bracteata</i> and <i>Syzygium aqueum</i> ► Mridusmita Chaliha, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
645	Speciation and bioavailability of Zn in sweetcorn and maize kernels at different maturity stages ► Zhong Xiang Cheah, The University of Queensland, School of Agriculture and Food Sciences, Australia
646	Source-sink dynamics influence sweetcorn kernel Zn concentration ► Zhong Xiang Cheah, The University of Queensland, School of Agriculture and Food Sciences, Australia
647	A new method for the authentication of Australian honey ► Sadia Chowdhury, Forensic and Scientific Services Qld Health, Australia
648	Dietary alternative protein sources modulate intestinal microbiota and its relationship with apparent nutrient digestibility in farmed yellowtail kingfish <i>Seriola lalandi</i> ► Chinh Dam, University of The Sunshine Coast, Australia
649	Optimizing the antimicrobial activity of Tasmanian pepper leaf oil emulsion as a natural preservative for capsicum ► Maral Seidi Damyeh, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
650	Measures with a human-centred design approach to increase the effectiveness of washing vegetables in Cambodia ► Franziska Doerflinger, Plant and Food Research, Australia
651	Roadmap for researchers studying northern Australian endemic plant foods ► Selina Fyfe, The University of Queensland, Australia
652	Analysis of environmental contaminants in Australian honey and comparison to stingless bee honey from Queensland and Malaysia ► Natasha Hungerford, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
653	Proteogenomics: An approach to integrate OMICS data for exploring functional genes responsible for stress tolerance and wax quality in Jojoba ► Ardashir Kharabian Masouleh, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
654	The effect of post-harvest storage on the physiochemical properties and phytochemical content of Queen Garnet Plum ► Gethmini Kodagoda, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
655	Nutritional profile of high-amyllose wheat starch: In vitro digestion and fermentation ► Haiteng Li, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Centre for Nutrition and Food Sciences (CNAFS), Australia
656	Indica SSIa allele partially recovers the altered starch properties of down-regulated SBELlb japonica rice without change its high amylose content ► Jixun Luo, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

657	Comparison of antioxidant properties of coconut testa flour of selected local coconut cultivars of Sri Lanka ► Sanjila Marasinghe, National Institute of Fundamental Studies, Sri Lanka
658	Aquaculture production for the rural population ► Ruth Muhonja, Flinders University, Australia Awards Scholar, Australia
659	Photosensitization, a green treatment for the inactivation of <i>Aspergillus flavus</i> in peanuts mediated by curcumin ► Nalukui Mukubesa, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
660	Understanding the metabolic fate and bioactivity of dietary anthocyanins ► Gabi Netzel, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
661	Effect of photosensitization on inactivation of <i>Aspergillus flavus</i> in maize ► Rafael Jose Nguenha, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
662	Relationships between perceived satiation, subsequent satiety, and plant-based food features ► Dongdong Ni, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
663	Purple sweetcorn - an innovative horticultural product - consumer views ► Sandra Olarte Mantilla, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
664	Nutritional characteristics of Australian grown Feijoa (<i>Acca sellowiana</i>) and its antimicrobial activity ► Anh Dao Thi Phan, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
665	Impact of photosensitization on physicochemical properties in strawberries ► Shammy Sarwar, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
666	Lemon Myrtle (<i>Backhousia Citriodora</i>): Unique Australian native superfood & cosmeceutical active ► Prashant Sawant, Australian Native Products, Australia
668	Exploring the nutritional profile and bioactive potential of Australian grown Saltbush (<i>Atriplex sp.</i>) ► Srivarathan Sukirtha, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia
669	Antimicrobial activity and ellagitannins from <i>Terminalia ferdinandiana</i> ► Yasmina Sultanbawa, The University of Queensland, Australia
670	High-amyllose rice: Starch molecular structural features controlling cooked rice texture and preference ► Keyu Tao, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
671	Differences in the anthocyanin profile of different tissues of the strawberry fruit ► Hung Trieu Hong, The University of Queensland, Australia
672	Indigenous vegetables in Vietnam: The nutritional and use values ► Hung Trieu Hong, The University of Queensland, Australia
673	Discerning wine astringency sub-qualities by tribological approaches in a model system - what is the role of saliva? ► Shaoyang Wang, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
675	Exploring common bean fresh pod market in East African region: A case of Uganda ► Stanley Nkalubo, National Crops Resources Research Institute (NaCRRI), Uganda
676	The performance of locally developed incubators for increased food and income security ► Mohammed Tiyumtaba Shaibu, Council for Scientific and Industrial Research - Animal Research Institute, Ghana



POSTER NUMBER	PAPER TITLE
677	Economic, environmental, and social sustainability assessment of Queensland industries ► Alisher Ergashev, Department of Agriculture and Fisheries, Queensland Government, Australia
678	Digital twin for the future of orchard production systems ► Peyman Moghadam, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
680	Predicting a path to increased genetic gain using artificial intelligence ► Kai Voss-Fels, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
681	Connectivity in Northern Australia ► Kimberley Wockner, Premise, Australia
682	Towards on-field diagnostics: Equipment-free nucleic acid purification in 30 seconds ► Yiping Zou, The University of Queensland, Australia



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The Institute for Future Environments (IFE) is a transdisciplinary research and innovation institute at Queensland University of Technology (QUT) in Brisbane, Australia. QUT researchers from the fields of science, engineering, law, business, health, education and creative industries collaborate at the IFE on large-scale projects relating to our natural, built and virtual environments. The Centre for Tropical Crops and Biocommodities (CTCB) is part of the IFE and brings together an outstanding mix of international expertise in molecular biology, genomics, gene silencing, plant biotechnology, biomass process engineering, and industrial chemistry, creating a continuum of research and development from laboratory through to finished product.

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