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FGCNews

Charles Sturt University

Newsletter for the ARC Industrial Transformation Training Centre for Functional Grains

Issue 2 2017

From the FGC Director

By Prof. Chris Blanchard

It's been a busy time for the Functional Grains Centre (FGC) rice team, who attended the International Temperate Rice Conference and also the annual rice field day at Jerilderie. These events provided the team with an opportunity to exchange ideas with colleagues from around the world and discuss issues related to rice quality.

Rice quality will also be the topic of conversation at a national symposium that will be hosted by the FGC in collaboration with Rural Industries Research and Development Corporation (RIRDC) and NSW Department of Primary Industries (DPI) next month. The National Rice Quality Symposium will be held on Wednesday 19 July 2017 at Charles Sturt University (CSU) and will provide a forum to discuss rice quality research. Please contact Jo at fgc@csu.edu.au if you would like to attend the symposium.

The FGC has another new member and I am very pleased to welcome Associate Professor Dan Waters to CSU and thank him for accepting the position of Deputy Director of the FGC. Dan has come to us from Southern Cross University and has had a long career in rice quality research. Dan's skills will be a great asset to the Centre.

In April, I had the opportunity to again attend the annual Australian Research Council (ARC) Directors' forum. This is a very useful meeting that allows Directors to share their experiences and initiate valuable collaborations. Some of the topics of discussion included how to calculate a centre's return on investment and strategies for effectively working with industry. During the forum, Dr Fiona Cameron announced that Dr Sue Thomas would be the new CEO of the ARC. Dr Thomas was the Deputy Vice-Chancellor (Research) at CSU when our Centre was established and provided us with strong support during the application process. We wish her well in her new leadership role at the ARC.

Meet new FGC Deputy Director Associate Professor Dan Waters

By Dan Waters

Dan started his working life on the family farm, which he combined with shearing sheep in northern NSW, New Zealand and the United States. Dan's research career began with his Bachelor of Science honours project isolating gene promoters for the ruminant detoxification of plant derived fluoroacetate. Dan's research since then has largely revolved around understanding and managing the molecular components of plant foods.

This has included the application of exogenous enzymes to degrade anti-nutritive non-starch polysaccharides in wheat based poultry diets, and tracking the gene expression of important flavonoid bio-synthesis genes in developing grape berries.

After being awarded his PhD, Dan has primarily worked on genetics and grain quality in the context of rice breeding at Southern Cross University. This work has included identification of the major gene for rice fragrance, characterisation of alleles which control rice starch gelatinisation temperature and the provision of molecular markers for Australian rice breeding.

Dan has used whole genome sequence analysis to understand the genetic relationships within, and between wild rice species and cultivated rice, along with the distribution of DNA sequence diversity within the genome of cultivated and wild rice.

A more recent focus of attention has been the link between cultivar differences in rice grain protein composition and instrumental measures of rice grain quality, work which has highlighted how the techniques of food chemistry provide insight into the genetic control of important grain quality traits.

Variation in nutritional composition of commercial Australian mungbean varities

By Daniel Skylas

Australian mungbean production is based mainly in central and southern Queensland and northern NSW and around 95 per cent of the crop is destined for export markets. Improving mungbean crop quality has focused on plant breeding approaches to increase yield, stability and disease resistance. However, my post-doctoral research at the Functional Grains Centre (FGC) is investigating if further improvement can be achieved through an increased understanding of varietal performance and nutritional variation. A survey of the comprehensive nutritional evaluation of commercial varieties (Crystal, Satin II and Celera II-AU), grown in different regions in Queensland and New South Wales was carried out. The results of this survey were recently published and may provide more information to plant breeders, producers and processors about growing, processing and value-adding Australian mungbean.

The next step of my research is to expand the scope of the study to fababean varieties, assessing both nutritional and anti-nutritional content of varieties grown under different agronomic conditions. The research, 'Variation in nutritional composition of Australian mungbean varieties' by Skylas DJ, Blanchard CL and Quail KJ has been published in the Journal of Agricultural Science 9: 45-53 (2017).

ITRC Rice and Jerilderie Rice Day Conference

The rice research team at the Functional Grains Centre (FGC) attended the International Temperate Rice Conference (ITRC) held in Griffith NSW in March and the Rice Industry Field Day near Jerilderie. The team outline some of their highlights below.

By Esther Callcott

The conference gave us an insight into the current research in the industry and some of the challenges facing rice breeders and growers. In particular, temperature fluctuations and water availability. During the three-day conference we were able to visit rice farms and see production on a large scale. We also watched a drone demonstration showing how using this technology can improve rice farming practises. On the fourth day we travelled to Jerilderie for the Rice Industry Field Day at 'Old Coree Station'. We met farmers and were introduced to different growing methods. I was particularly interested in experiments where the rice could be grown in aerobic conditions to reduce water consumption. We then had a market update from the SunRice CEO Rob Gordon and a cooking demonstration from Good Chef Bad Chef co-host Zoe Bingley Pullin.

The FGC Research Team looking at experimental rice paddocks at the ITRC Conference Field Trip. Pictured: (Left to Right) Dr Vito Butardo Jnr, Shiwangni Rao, Esther Callcott and Michelle Toutounji

Meeting with Zoe Bingley-Pullin. Pictured (left to right): Michelle Toutounji, Zoe Bingley-Pullin, Esther Callcott, Shiwangni Rao and Professor Chris Blanchard

FGC Rice Research Team at ITRC Conference 2017 in Griffith NSW. Pictured: Front Row (left to right): Michelle Toutounji, Dr Vito Butardo Jnr, James Lee, Shiwangni Rao, Associate Professor Dan Waters. Back Row (left to right): Professor John Mawson, Esther Callcott, Professor Chris Blanchard, Dr Phillip Kerr and Dr Asgar Farahnaky

By James Lee

I personally found it fascinating that rice was such a focus for so many people from various parts of the world with their own research and agendas. Italian scientists with backgrounds on agricultural pesticides to an African rice breeder looking to develop a marketable domestic rice breed suitable for his country.

This was my first time going to a conference as a member of the FGC and it was great to meet other members and getting a new perspective of research and development in the agricultural sector and the importance of applied research. I learnt much about the types of research on rice, from agricultural science and agronomy to biology and applied chemistry. What I took from this conference was that it is wonderful to see scientists and farmers work together to apply scientific findings in a practical way, rather than shelving these brilliant ideas.

PhD student James lee is pictured at the IRTC conference in Griffith

By Shiwangni Rao

What better way to begin our visit to the ITRC than in a rice paddock. At the farm owned by Mr Drew Braithwaite we enjoyed a number of presentations about rice farming in Australia and the latest technology . Mr Braithwaite explained his own farming practises and how he makes us of variable rate prescriptions.

NSW Department of Primary Industries (DPI) research scientist Dr Peter Snell spoke about the many rice varieties such as Reiziq, Sherpa, Doongara and Koshikari that are currently cultivated in Australia and the involvement of the NSW DPI in breeding and testing varieties for better yield and diseases resistance. CeRRF -Griffith were also present on site to introduce drone technology to the delegates and promote its benefits. The drones communicate via Wi-Fi and the inbuilt on farm Wi-Fi network by CeRRF allows these drones to be operated in rural farming areas. We also got to see the drones in action.

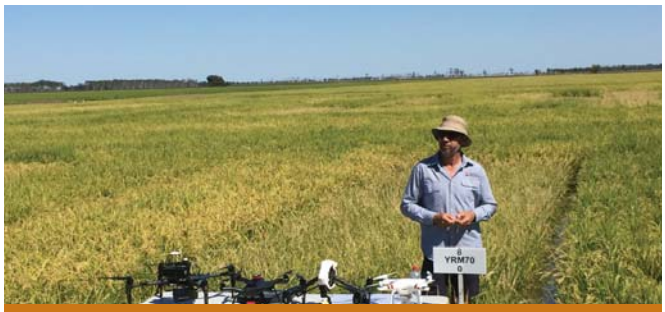
The field trip was a great experience as it made us more aware and connected with how the grains we research in the laboratory are cultivated. It also gave us new understanding of the factors that affect the rice plant and farming system, and how this may translate to what is observed in the rice grain.

Aside from the rice, it was nice to learn more about the other types of agriculture in the region. Griffith is one of the key agricultural areas in the Riverina with orange orchards, vineyards, and wineries. There's also been recent growth in the poultry industry. Griffith is home to the famous Casella Winery that makes Yellow Tail wines along with other wineries such as De Bortoli and Calabria.

By Vito M. Butardo Jr.

This year's ITRC conference theme was aptly titled 'Tradition, Technology, Productivity – A Balancing Act'. The conference was attended by around 200 local and international rice farmers, agricultural extension and agribusiness professionals, processors, breeders, researchers, scientists and students. The scientific program had a good mix of comprehensive plenary and scientific sessions discussing issues relevant to the global temperate rice growing regions. Concurrent sessions on breeding, agronomy, abiotic and biotic stresses, crop protection, irrigation, soil and environment, irrigation, breeding, extension, quality and processing, and precision agriculture were held. Plenary sessions were also held in the first three days of the conference, delivered by prominent and world-leading rice scientists including Dr Matthew Morell, Dr Steve Linscombe, and Professor Melissa Fitzgerald. The scientific program was also interspersed with interactive and hands-on sessions involving rice farm tours, trade and poster exhibitions, and conference dinners. One of the highlights for me in the last day of the conference was the Rice Industry Field Day where participants were given an opportunity to directly interact with Australian rice farmers, extension workers and researchers.

Some of the technology used in the rice paddock



The use of drones on farm was one of the interesting presentations on the field trip.

2017 Rice Industry Field Day, 'Old Coree', Jerilderie

By Rachael Wood

Coinciding with the International Temperate Rice Conference (ITRC), the Rice Industry Field Day was held at 'Old Coree Station' Jerilderie on the Thursday 9 March 2017.

The field day held a business and innovation forum showcasing the latest in rice research and technological advancements. The field tour included talks from NSW Department of Primary Industries (NSW DPI) research agronomist Mr Brian Dunn on remote sensing of rice nitrogen management, NSW DPI research scientist Dr Peter Snell on the evolution of aerobic rice, Mr Antony Vagg Rice Research Australia Pty Ltd and Dr Graham Brodie from Melbourne University on alternative weed management in rice farming systems and Malcolm Taylor Agropraisals on the sequential herbicide programs in delayed permanent water.

Following the field tour and innovation forum, guests heard from SunRice CEO Mr Rob Gordon and Chairman Mr Laurie Arthur.

The Sundowner dinner following the field day gave the opportunity for conference delegates, industry professionals and rice growers to further network.

Life as a Post Doc

By Kyle Reynolds

Recently a part of my PhD research was accepted for publication with *Plant Biotechnology Journal* which further explored my work of producing oils containing medium-chain fatty acids (MCFAs) in the leaves of plants with a high vegetative biomass, for example *Nicotiana tabacum.*

This paper wrapped up the completion of my PhD work and following the submission of my thesis in August 2016, I started a postdoctoral fellowship position with CSIRO at Black Mountain, Canberra. The project has allowed me to continue building and applying my knowledge around modifying oil pathways in attempts to improve the oil content and yields from Canola (Brassica napus). Initially, this project will involve investigating possible solutions through transgenic applications, with non-GM strategies also being considered for delivering the desired results.

Canola Oil

By Randy Adjonu

Are canola oils different? If so, what makes them different? Are some canola oils of superior quality than others?

To answer these and many other questions, Dr Randy Adjonu has joined the Functional Grains Centre (FGC) as a postdoctoral research fellow. His research is focused on the stability of canola oils made from different technologies in deep-frying applications. Central to this work is to investigate the factors that govern the deep-frying heat stability of canola oils made from a near similar technology but by different processors. The outcome of the current research will provide valuable data to canola oil processors in understanding the performance of their products in deep-frying applications and it has potential to re-shape the Australia canola oil market, domestically and internationally.

Randy obtained his PhD in Food Science (food chemistry) at Charles Sturt University (CSU) looking at dual-functional food peptides as nano-emulsifiers and bioactive compounds. Since then he's been working in the edible oils industry and has over two and a half years' experience working with canola oils, canola meal and other oil varieties – oil processing and chemistry, product application, production development, process optimisation, quality and food safety management system, customer service and interactions.

He is excited and honoured to be a part of the FGC and looks forward to delivering valuable results from his research to understand the application and the competitive market value of Australian canola oils in deep-frying. Randy will

be working with Mr Jamie Ayton from NSW Department of Primary Industries, and Associate Professor Paul Prenzler and Professor Chris Blanchard from CSU.

FGC shows visiting student the value of research

By Louize Brants

Spending four months in the laboratory at the Functional Grains Centre (FGC) has convinced Belgium university student, Ms Louize Brants that research is the career for her.
The medical laboratory science student from Karel de Grote University College in Antwerp has been working on a project examining the effects of phenolic compounds found in Australian coloured and white rice on cancer cells.

"Studying at the Functional Grains Centre has given me the opportunity to develop my laboratory skills with practical experience in cell culture," said Ms Brants.

"At home I wouldn't have had as much opportunity to practise and the experience has also helped me to develop critical thinking and I'm now sure that I want to go on to a career in research.

"Being able to combine my study with international travel has been wonderful and the research team has been very welcoming and always ready to answer my questions.

"I've already suggested to other students from my College that they should consider studying here."

The experience of living and studying in Wagga Wagga at Charles Sturt University (CSU) has also given Ms Brants an appreciation of Australia's natural environment.

"I was walking this morning and there was a possum in a tree and I often come across groups of Kangaroos.

"It's very beautiful here and it's the little things that you notice, like the different calls of the birds. That wouldn't happen in Belgium."

Ms Brants has been hosted by the FGC from February through to May and has been supervised by Professor Chris Blanchard, Dr Thiru Vanniasinkam and Dr Ken Chinkwo from CSU's School of Biomedical Sciences.

Dr Vanniasinkam said, "Having international students visit gives our students the opportunity to learn from students studying in another country, allowing exchange of ideas and opportunities to build collaborations with other universities that result in better outcomes for both the visiting student, our students and Charles Sturt University".

Visiting FGC research student Ms Louize Brants from Belgium

Volunteers needed for coloured rice research

By Kiara Thompson and Esther Callcott

The potential health benefits of coloured rice is the subject of new research by Functional Grains Centre (FGC) PhD students Ms Kiara Thompson and Ms Esther Callcott.

Research participants are needed to take part in the study investigating if the bioactive compounds in whole grain coloured rice varieties have therapeutic effects for obesity and related diseases such as cardiovascular disease.

"The seed coats of coloured rice are rich in antioxidants and our aim is to test the role of these chemical compounds in reducing blood clotting, inflammation and chemical damage to cells in overweight or obese people and in those who have type 2 diabetes," Ms Callcott said.

The researchers are seeking volunteers who fit the following criteria:

- Non-smoker male or female aged 18-65 years
- Overweight/obese or type 2 diabetic
- No current history of chronic diseases and not pregnant
- Not currently taking anti-inflammatory or anti-clotting drugs

On the day the volunteers will be required to complete a questionnaire and provide a small fasting blood sample.
A full explanation of the study and your blood results will be provided to the volunteers at the conclusion of the study.

To take part or for more information contact

Esther Callcott: ecallcott@csu.edu.au
Kiara Thompson: kthompson@csu.edu.au

Kiara Thompson and Esther Callcott

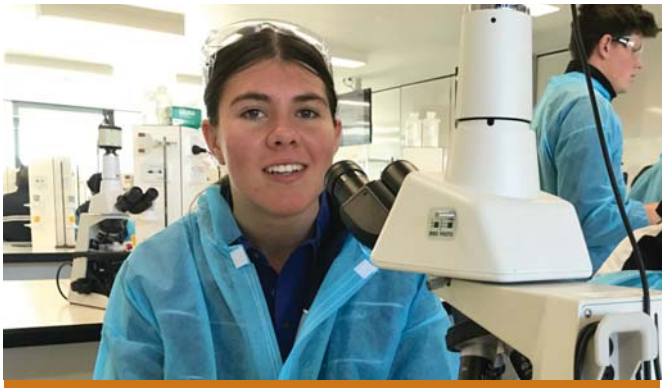
Coloured rice

Inspiring students to consider agricultural science career

From smelling and tasting rice to learning about grain quality and looking at fat cells under the microscope, high school students got to see our research in action at the recent Graham Centre Agricultural Science Enrichment Day. Functional Grains Centre (FGC) researchers Dr Vito Butardo Jr, Ms Michelle Toutounji, Ms Esther Callcott, Ms Kiara Thompson, Ms Esther Callcott, Ms Shiwangni Rao and Ms Louize Brants took part in the annual event designed to showcase the work of agricultural scientists.

More than 200 students from schools in Wagga Wagga and across the Riverina visited the Graham Centre over two days in June.

The students took part in activities including sensory evaluation and experiments to learn more about rice grain quality. They also gained an insight into FGC research into the potential health benefits of coloured and white rice.



High school student Clare Harpley in the lab at the FGC as part of the Graham Centre's Agricultural Science and Enrichment Day

High school students examine some of the properties of rice with Dr Vito Butardo at the Graham Centre Agricultural Science Enrichment Day

Functional Grain Centre partners and collaborators

Australian Government
Australian Research Council

Charles Sturt University

NSW Government Department of Primary Industries

Grain Growers

SunRice

MSM Milling

A Cargill Teys Australia Joint Venture

Flavour Makers
Food Development & Manufacture
Create amazing. Always.

INTERSECT

Grains & Legumes Nutrition Council
Cultivating Good Health

CSIRO

GRDC Grains Research & Development Corporation
Your GRDC working with you

Rural Industries Research & Development Corporation

Graham Centre for Agricultural Innovation

Woods Group

AGT

Contact:

FGC
Functional Grains Centre

ARC Industrial Transformation Training Centre for Functional Grains,
A Charles Sturt University, Wagga Wagga NSW 2650
P (02) 6933 2364 **E** fgc@csu.edu.au **Twitter** @FGC_Admin

Prof. Chris Blanchard
P (02) 6933 2364 **E** cblanchard@csu.edu.au **Twitter** @FGC_Chris