



# FGCNews

Newsletter for the ARC Industrial Transformation Training Centre for Functional Grains

Spring 2016



## From the FGC Director

Welcome to another action packed FGC newsletter. In this newsletter we welcome some new FGC members but also say farewell to some of our visitors. We welcome Dr Vito Butardo who has travelled from IRRI in the Philippines to work with us on our RIRDC funded project. We also say farewell to our visitors Hang, Bushra, Dr Aziz and Dr Kishor

It's be great to see the FGC members interacting with the local community. Our participating with the "MyScience" program has hopefully inspired some of our local primary school students to think about a career in science. I'm not sure who had the most fun developing science projects – the students or FGC members.

We've seen a lot of our members participating in various conferences and workshops. This participation is important for the development of our staff and students and it is pleasing to see our members engaging in these activities. A highlight for me was the expert way in which they participated in the line dancing activity at the AGSA conference in Tamworth. We definitely have some talent in that area.

Our students have now implemented some new processes that they learned in a workshop run by Dr Hugh Kearns called 7 secrets of highly effective students. Undertaking a PhD is a difficult job so hopefully the techniques discussed in this workshop will be of benefit to all.

The highlight of Spring 2016 for me was the hosting of a Pulse Symposium in collaboration with NSW DPI. This symposium provided us with an opportunity to celebrate the 2016 year of the pulse as well as bring together stakeholders from whole pulse supply chain. Copies of presentations from the Symposium can be found on our website.

### Professor Chris Blanchard

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Chris, Scott Frazier (June High Principal) and Michael McCormack (MP) at Agrivision

## New FGC Members

### Vito M. Butard Jr.

FGC welcomes Dr Vito M. Butardo Jr, a new postdoctoral research fellow to be based in CSU Wagga Wagga Campus. His research fellowship is on "Next Generation Healthy Rice". Vito's major research goal is to mitigate the impact of malnutrition and by enhancing food security and the nutritional value of rice. His current research focus is on characterising the kinetics of rice grain digestion process. In the past, he screened for low digestibility rice grain phenotypes from diverse varieties of wild, cultivated and mutant rice grains. He then developed low glycaemic index rice grains by altering the storage starch biosynthetic pathways in rice endosperm. He accomplished this by endosperm-specific RNA silencing of major starch branching enzymes and starch synthases in rice, singly and in various combinations. He demonstrated that shifting the synthesis of amylose and amylopectin in favour of higher proportion of long chain amylopectin results in reduced starch hydrolysis and lowered glycaemic impact. He recently used grain quality genomics and systems genetics approaches to understand grain quality and nutrition phenotypes using diverse core collections of world rice accessions. He obtained his PhD degree on Agricultural Sciences major in plant molecular





Vito M. Butardo Jr.

biology, biochemistry and nutrition at the University of Queensland. He previously worked at the CSIRO Plant Industry in Canberra and at International Rice Research Institute in the Philippines.

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### Ali Khoddami

I am a new adjunct researcher at the FGC. I have studied and worked in Iran, Malaysia and Australia on a broad range of agri-food projects. I completed my PhD in the Faculty of Agriculture and Environment at the University of Sydney, graduating in December 2016.

My PhD research was focused on characterising phenolic compounds (a large group of secondary metabolites) in grains of Australian sorghum varieties, the effects of malting on these metabolites, and the impact of the phenolics on broiler nutrition. I am currently working as an agricultural scientist with Dr Tom Roberts in the Plant Breeding Institute, University of Sydney, on the GRDC project lead by FGC Director Prof Chris Blanchard entitled "Expanding options for sorghum". I'm also working on a RIRDC project entitled "Formulating broiler diets based on protein and starch digestive dynamics" in the Poultry Research Foundation at the School of Veterinary Science, University of Sydney.

It is my privilege to be a part of the FGC and I'm very much looking forward to delivering valuable results of my research, which will benefit the Australian grains industry and Australian agriculture more generally.

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Ali Khoddami

## Mater Dei Science Expo

by Esther Callcott

This year FGC PhD students were invited to mentor Year 5 Students on designing, conducting and presenting science experiments surrounding the theme of renewable energy. The year 5 students were well engaged in the tasks and were very enthusiastic about having real scientists help them with their projects. Over the course of 6 weeks each group of students developed projects around solar, hydro and wind energy whilst FGC students guided them through the experimental process. Their hard work and dedication was then brought to light by presenting their results at a science expo in which all teachers and parents of the students could attend. The science expo was a great event and the FGC PhD students could not have been prouder of how the students presented their experimental results and conducted themselves. The science expo revealed how far the students had progressed in their learning and developing a passion for science. I would like to thank Mater Dei Primary School for the wonderful experience and it was an absolute pleasure to mentor students so keen to learn about science.

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Esther callcott with one of her group of mentees at the Science Expo





### Michelle R. Toutounji

The FGC PhD students and visiting academics in Wagga Wagga never thought they would become mentors to a group of 10-12 year old aspiring scientists. It all began with a simple 'yes' to volunteering at a local primary school in a program called MyScience. MyScience encourages primary students to undertake a scientific investigation and to communicate their findings to their school community at a Science Fair. The value of this program lies in its collaborative framework between schools, industry/business and university sectors.

On the 12th August, CSU Wagga Wagga received a visit from David Enever, a Year 5 classroom Teacher from Mater Dei Primary School. Enever thanked FGC members (Esther Callcott, Annie Riaz, Bushra Javaid, Hang Liu, Stephen Cork, Shiwangni Rao, Michelle Toutounji, Kishor Mazumder, Anwar Ali Shad and Mohammad Aziz) for offering to volunteer as mentors in their school program. He explained that this year's science topic at Mater Dei was based on environmentally friendly sources of energy.

The mentors had a total of three 90 minutes sessions to work with the kids and try and investigate their projects in a scientific manner. The children and mentors worked together in these sessions to brainstorm ideas, choose a topic, conduct the investigation and then finally report the findings. Topics included the use of wind turbines, water wheels and solar energy. The mentors however, were warned by Enever that there were a couple of pyromaniacs in the class who just wanted to burn things using solar energy through a magnifying glass!

At the final Science Fair presentation, the children put great amount of effort into their presentation stalls and eagerly waited...ready to be quizzed! Local television news stations covered the A-grade project on wind turbines presented by 2 hard-working, determined girls (mentored by Michelle Toutounji). Overall the day was branded a great success and the entire experience was reportedly just as valuable for the mentors as it was for the children.

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### Qurat ul Ain Riaz

It is always a pleasure to be involved in opportunities of multidimensional growth provided by FGC and the "My Science Project" was one of them. The concept of this community outreach program was to mentor primary school children (year 5) of Mater Dei Catholic School by practically demonstrating to them how a scientific investigation is carried out. The topic of this science investigation was energy generation using wind, water and solar sources. It comprised three mentoring sessions and each session lasted for 2 hours every fortnight. Each group of students selected a topic based on their interest. The first session consisted largely of discussion between mentors and students about material needed and methodology to be followed. In the second and third sessions, students practically performed the experiment and collected data respective-

ly. This interaction with year 5 students as a PhD scholar in Australia was a unique and amazing experience. Above all the 'Science Expo' held at the end of this project was an excellent event where all of the students presented their experiments in different ways. It was an open invitation for everybody to visit and encourage students for their outstanding work. The various ways students' presented their data and interpreted results was so professional. It was an excellent exposure for me and I enjoyed it a lot.

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Two of the students at Mater Dei with their Science Expo Project



Teachers, parents, grandparents and other students all got to see what the FGC Mentors and their students had produced



Esther callcott with one of her group of mentees ata the Science Expo



## Advances in Biotechnology for Food and Medical Applications

**Daniel Skylas**

Early in October, Professor Chris Blanchard, Dr Asgar Farahnaky and Daniel Skylas travelled to the University of Sydney to attend a forum on Advances in Biotechnology for Food and Medical Applications. This forum provided a platform for discussing the latest advances in Biotechnology for food and Medical Applications.

One particular theme involved the highlighting of innovation in food processing, in particular, the conversion of waste into high value products with a range of health benefits. There were many exciting presentations from some great speakers and we were also lucky enough to hear from Dr Fiona Cameron during this forum outlining the important role the ARC plays in funding research in this area through both the ARC ITTC and ARC Hub research platforms.

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## Australian Pulse Conference

**by Erica McIntyre**

Over three days in September myself, Chris Blanchard, Stephen Cork and Drew Portman travelled to Tamworth to attend the Australian Pulse Conference. This was my first experience of a conference related to agricultural issues, which proved to be a valuable experience. The theme was Feed the Farm – Feed the World, and covered a broad range of topics ranging from pulse agriculture to pulse nutrition.

The first day was focused on research and included sessions on optimising pulse performance in diverse agro-ecological environments, and application of molecular techniques for breeding efficiency.

The FGC's Director Chris Blanchard chaired the session on phenotyping for biotic and abiotic stresses. These sessions highlighted some of the challenges related to pulse breeding and growing, and presented possible solutions to managing these challenges. After a day of technical research intensive sessions, the day concluded with an entertaining presentation from Marty Wilson on the importance of change management.

Day two of the conference was more broadly focused on the pulse industry, and included the topics: harnessing breeding research to increase global pulse production; and examining the production, trade and consumption of pulses for a sustainable and healthy future. A field trip was organised for the third day that included visits to Tamworth Agricultural Institute (NSW DPI), Liverpool Plains Research Station (NSW DPI) and E. J. Holtsbaum Research Station (University of Syd-

ney, Nowley); however, there was heavy rain forecast so the presentations occurred inside, rather than out in the field as planned. This change in plans did not detract from the quality of the conference. This was an extremely valuable conference for researchers working on pulse related projects. I gained an insightful overview of the pulse industry and the key issues related to growing pulses, pulse nutrition, and pulse consumption.

The presentations on the environmental challenges facing pulse growers were particularly insightful. The conference was a fantastic opportunity to meet people involved at all levels of the pulse industry, and discuss future opportunities for research and collaboration. The passion and enthusiasm for pulses at this event was infectious.

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## Expanding Options for Sorghum

**by John Mawson**

The FGC has recently commenced investigations as part of a new, five-year, GRDC research project: Expanding Options for Sorghum – Food and Distilling.

Sorghum is an important part of the Northern cropping system, however, its true value is not being fully realised. In Australia, sorghum is largely used as animal feed, but internationally sorghum is used in higher value markets such as baijiu (potable white spirits) production in China and there is also increasing interest in its use in food products, both domestically and internationally. The recent development of gluten-free Weet-Bix by Sanitarium is one example of the new opportunities for sorghum.

The first stage of the project will gather market intelligence on the functional and quality requirements of sorghum used for baijiu production. Prof Anthony Saliba has recently completed the first visit to China to determine the key decision drivers influencing sorghum use amongst Chinese processors.

Investigating the properties of selected Australian sorghum varieties in the fermentation and distillation of baijiu will form the second part of the study. Prof John Mawson, Dr Zhong Kai Zhou and other FGC researchers will engage with Chinese university and company partners to conduct pilot- and commercial-scale baijiu trials.

In the third part of the project, Dr Asgar Farahnaky, working with Dr Tom Roberts, Dr Ali Khoddami, and other colleagues from the University of Sydney, will investigate new opportunities to use sorghum in food products and assess the physicochemical, functional and processing properties of selected Australian sorghum varieties for these applications.

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## The 7 Secrets of Highly Successful PhD Students

by Stephen Cork

Why is house work so much fun? Not feeling ready to write? Suffering from chronic read-itis and experiment-itis? Shhh: that imposter feeling. Don't get me started on my supervisor. These are some of the issues we all face as researchers. Fortunately in August, Thinkwell's Hugh Kearns gave student and supervisor workshops at CSU on the seven secrets of a highly successful PhD students:

1. Care and maintenance of your supervisor
2. Write and show as you go
3. Be Realistic
4. Say no to distractions
5. It's a Job
6. Get Help
7. You can do it.

The FGC team held a conference meeting in September to review the above secrets and share about our own PhD rollercoaster rides.



Figure 1 PhD Rollercoaster (source: Thinkwell)

We all start out well and whoosh 'what am I doing here! Getting stuck, feeling like falling off and the hard slog to the end to just hand in your thesis. The FGC group members now have a smoother PhD ride with our copy of the seven secrets handbook and [www.ithinkwell.com.au](http://www.ithinkwell.com.au) free resources and each other. Keep the momentum, talk about the PhD journey and keep writing!

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## 66th Australasian Grain Science Association Conference

by Rachael Wood

Held at the Best Western Sanctuary Inn Tamworth in NSW from September 14-16, the conference attracted more than 100 delegates. The conference titled 'From the Soil to the Supermarket' connected individuals from across the supply chain and focused on the issues including; impacts of climate change, understanding the gluten free epidemic, grains for health, special grains, grains processing, new innovative technology and cereal crop improvement through breeding and agronomy. The conference also included some high profile speakers from the industry forum "The power of pulses: harnessing the health and nutrition benefits", organised in conjunction with the Grains and Legumes Nutritional Council.

As a newly inducted member into the world of functional grains, I was fascinated by all the wonderful health benefits they have to offer. One dietary recommendation I was unaware of, is that we should be eating four serves of whole grains per day to help protect against cardiovascular disease, type 2 diabetes and excess weight gain. I was also intrigued to learn that eating more than three serves of pulses a week can lower your risk of developing colon cancer and that lupins have the ability to stimulate colonic microbiota. This information led to me immediately start googling ways to include lupins and pulses into my diet, which was made easier thanks to a presentation from Woods Foods revealing their new innovative products incorporating pulses.



All the award winners at the AGSA Conference incl. the FGC's own Shiwangni Rao (2nd row 1st from right) and Drew Portman (front row, middle)

This year's conference also coincided with the presentation of the EE Bond medal which was awarded to Dr Lindsey O'Brien for his contribution to the grains industry and to grain science. Dr O'Brien accepted this award with an oration of Eric Bond's achievements to the Australian grains industry. Other award winners included Dr Sushi Dhital for the Early Career Development scholarship, Guangli Feng for best student presentation





and FGC's very own Drew Portman and Shiwangni Rao winning the AGSA Travel Award.

The conference dinner was held at the same venue where guests partook in dancing lessons from a world class line-dancing choreographer. Following the dinner, a few un-named FGC members celebrated the success of the conference by testing out the world's largest inflatable obstacle course. The 2017 conference will be held in Christchurch New Zealand and will be chaired by Professor Charles Brennan.

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## GRDC Grain Quality Workshop

by Kenneth Chinkwo

The GRDC grain quality and technical workshop was held in October 19th 2016 at the Charles Sturt University convention centre. This workshop brought experts from Grains Research and Development Corporation and Ag Communicators to a single forum. The purpose was to congregate specialists from diverse disciplines to discuss grain storage, best practices and harvests to maximise grain quality.

Presentation and updates of GRDC investment in crop protection, the grain quality and market trends was given by Leigh Nelson and Don Plowman respectively. Further discussions on market requirements on grain quality were facilitated by Dr Ian Wesley. Prof Chris Blanchard elaborated on growing grains for essential food products.

In the afternoon delegates toured the sophisticated cereal chemistry, feed quality and edible oil labs organised by Denise Pleming, Richard Meyer and Jamie Ayton from NSW DPI. After the tours Chris Williams presented a topic on Grains and Market Access. Don McCaffer presented on canola quality and export market requirements.

Peter Botta presented on grain storage, quality and food safety and Alex Murray and Dr Aaron Simmons presented on Market requirements for Biofuels in EU 2017 and what this means for canola oil. The final activity for the day was a tour of Riverina Oils and Bioenergy facility.

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## Chickpea Opportunities in India

by Anthony Saliba and Erica McIntyre

We visited India in November to investigate opportunities for chickpeas. The ethnographic approach that we used had us observing buying behaviour at markets, stores and supermarkets. These observations were compared to semi-structured interviews conducted in the homes of Indian consumers. The data is still to be analysed, but early indications were

that supermarkets are becoming more popular and there was a preference for purchasing pre-packaged chickpeas. The rich cultural position that chickpeas enjoy was obvious, with uses ranging from main meals, snacks, dips and even skin care. Moderate differences presented across the quadrants of India, with the North being the most different.

This qualitative arm of the research will be followed by a quantitative on-line survey early next year. Results from the observations, interviews and on-line survey will be triangulated to ensure highly accurate conclusions.

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## FGC Wagga Wagga Pre-Pulse Symposium end of year event

by Robert Taylor

Students and staff from the FGC attended the Pulse Symposium at CSU Wagga Wagga campus in November 2016. As a final training function for 2016 it was arranged that a meeting be held at the FGC and grounds in order to allow for the highlights of the year to be discussed in a relatively informal atmosphere.

The opportunity to have final interactions with staff and students who had completed their research activities was taken to full advantage. Chris Blanchard summarised the year's activities and research programs and offered thanks and best wishes to those staff and students who were due to return home before the end of the year.

It was not all work-related however. As has become an established behaviour, the afternoon turned to sporting activities that were engaged in with enthusiasm by most of the attendees. Cricket, particularly appealing to all of the national groups, provided a showcase of the full range of athletic and hand-eye co-ordination capabilities of the members of the two or so teams.

The teams were carefully selected to pit the FGC's fit and competitive students against the generally older and perhaps wiler staff members. Fortunately, human and infrastructure injuries/damage were/was minimal. The result remains unknown.

A relaxing late lunch was had thereafter. The afternoon provided time to consider the Pulse Symposium which was held the following day. Thanks are due to Chris Blanchard and Marianne Graham for arranging the function and to all who made the day and the Pulse Symposium such a success.

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## Future of Pulse Symposium

by Neeta Karve

I had an incredible chance to attend and present at the 2016 pulse symposium organised by Functional Grains Centre held at Charles Sturt University Wagga Wagga themed as, 'Future of Pulse Production and Consumption'. The conference started with a field visit to expand our knowledge on how pulses are grown in Australia. During the day I attended remarkable presentations delivered on various aspects of pulses such as agronomy, world markets, production, consumption, future trends, research and development and also a display of pulse based snacks emerging in the market. I felt the pulse symposium was like a one-stop opportunity to meet with people involved in various aspects of pulses, catch up with friends and colleagues and hear the latest developments in the pulse industry. I would like to thank the Functional Grains Centre to host the Pulse Symposium and would love to be a part of it in the future.

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NSW DPI staff took Symposium participants on a tour of the pulse field trials

## Let's make it the Century of Pulse

by Drew Portman

Held on the 28th of November at CSU Wagga the Pulse Symposium marks the end of 2016 the year of the pulse, but for the future of pulse breeding and innovation it really is only the beginning. The symposium highlighted much of the research that will lead to exciting advancements within pulses that will undoubtedly revolutionise this food over the next century. The symposium kicked off with breakfast on the run as all participants were treated to a tour of the DPI field trials located in Pine Gully. Mark Richards, an agronomist at the sight kept us all well informed as he explained the different varieties of pulses being grown. Chickpea, field pea, lupin, lentil and faba bean. "Hang on did someone say Lentil?" I was surprised to see a large trial of lentils being grown within NSW, this is exciting stuff. Perhaps even more exciting

is a significant commercial lentil crop being grown in Holbrook NSW. Returning from the field trip everyone was keen to get stuck in to the symposium. Topics covered all aspects of pulse breeding including agronomy and production, global market trends and research, the enhancement of nutrition and potential functional properties of pulses. Of particular interest to me were the presentations entitled 'Modification of pulse proteins and applications in the food industry' by Neeta Karve, and Dr Asgar Farahnaky's oration of the functional properties of chickpea flours. It was also refreshing to listen to Dr Philip Kerr talk about Lupins being more than just cattle food. The majority of the presentations made on the day are available on the FGC website and are well worth a look. The symposium marked the end of the International Year of the Pulse but this is only the beginning. Pulses are now being incorporated into healthy alternative foods such as lentil chips. Pulses provide a staple food source for many, and in the west the contribution that pulses make within the culinary experience is being recognised. The research into the prospective health benefits that can be gained through the bioactive components of pulses is in its infancy so the best is yet to come.

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Local Prime 7 News interviews a local lentil grower at the Future of Pulse Symposium

## Farewells

by Kishor Mazumder

I have been a visiting research fellow at FGC, CSU from 21 April to 20 October 2016 under the Endeavour Fellowship sponsored by the Australian government. I was invited and hosted by Dr Philip Kerr and subsequently joined the FGC research team led by Prof Chris Blanchard. I was asked to investigate nine cultivars of Australian Lupin to explore and evaluate functional and biofunctional properties. The research I engaged in discovered that lupin seed is a super grain not only due to its functional properties but also because it has significant biofunctional properties like anticancer activity. The entire research was closely supervised by Prof Chris and Dr Philip and co-supervised by Dr Asgar Farahnaky. The whole fellowship time was fabulous and exciting. I am so lucky to have met all the lovely members of FGC. I want to acknowledge Esther, Shiwangni, Michelle, Stephen, Anwar, Annie, Bushra, Hang and

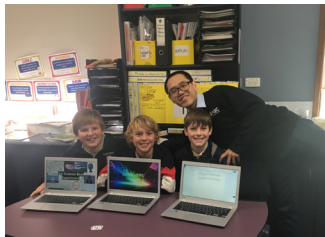


Abi. All of them were so helpful, friendly and cooperative. My special thanks and gratitude goes to Dr Gulzurul Aziz, another Endeavour Fellow from Bangladesh who did a lot for me. My special thanks to Dr Ken Chinkwo who acquainted me with cell culture techniques. During my research I had the opportunity to work in Pharmacy lab, NaLSH and DPI. I found all labs members so helpful and cooperative, with special thanks to Kathy, Michael and Denise for their outstanding help and cooperation. My sincere gratitude and thanks also goes to Prof Dr Rodney Hill, Head of School of Biomedical Science for his continuous care, support, guidance and cooperation from the very beginning of the fellowship till the end date. I am also thankful to Marianne for her continuous support and care in all administrative matters. Additionally, I am also thankful to all faculty

members, fellows and staff of the Biomedical School and Graham Centre. Lastly I am thankful to FGC for the arrangement of the lovely farewell party, it is a wonderful memory for me. I wish I could be part of the FGC and CSU forever! I enjoyed every moment at CSU and Australia and I am amazed at the hospitality of Australians. I am sure that the FGC will continue its significant contribution in functional grain research with the dynamic leadership of Prof Blanchard and will do excellent in its future endeavours.

Oh! Merry Christmas to all.

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We will miss the friendly and kind Hang Liu - pictured with some of his mentors from the MyScience project



Dr Aziz and his FGC colleagues at his farewell morning tea



Bushra Javaid also left us this Spring - here picture [in centre with red scarf] at her farewell morning tea



We farewellled Kishor Mazumer - visiting from Bangladesh, pictured her with Dr Aziz, Dr Phil Kerr, Dr Anwar Shad and Kishor

## Functional Grain Centre partners and collaborators



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