



Masterclass breeds a sound approach

By Laureta Wallace
Kondinin Group

ABOVE: (from left to right): Dr Clinton Revell (DAFWA Pasture Leader), Dr Daniel Real (FFI CRC Senior Plant Breeder), Kevin Goss (FFI CRC CEO), Prof. Charles Brummer (UGA, USA) and Dr Rob Delane (DAFWA Executive Director). (Photo: Peter Maloney, DAFWA)

Australian plant breeders are on the right track according to feedback from a recent week-long masterclass in forage breeding coordinated by FFI CRC and the Department of Agriculture and Food Western Australia (DAFWA).

The workshop was facilitated by world-renowned plant breeder Professor Charles Brummer. Based at the University of Georgia, United States, Professor Brummer is a professor of plant breeding and agronomy. His research focus has

been on developing and testing novel plant breeding methodologies, as well as applying genetic and genomic technologies to improve yield, composition, drought and aluminium tolerance and other traits.

Professor Brummer is one of a few breeders of his calibre that remain involved in in-field research while balancing a teaching schedule.

The masterclass attracted an audience of 20 plant breeders from across Australia, with varying skill levels and expertise. The class had a two distinct purposes – on a scientific level it was a discussion of breeding technologies and techniques, while on a working level it was a chance for breeders to get together to share ideas and network.

World leaders

Feedback from Professor Brummer confirmed Australian plant breeders were among the best in their field and on the right path to selecting and developing worthwhile legumes for Australian agricultural systems.

“There are some fantastic things going on here,” Professor Brummer said.

“I’ve never lived in a place where drought plays such a big role in agriculture so it was interesting to learn about that.

“But there are some definite issues here that Australian researchers are going the right way about solving, such as trying to find more drought-tolerant legumes and annual legumes that can fit in to the crop rotation.”

“I saw some amazing success stories with plants that look like they will do great things for agriculture,” Professor Brummer said.

Simple but effective

The content of the masterclass was adapted from a course Professor Brummer delivered in the US and altered to address the needs of Australian plant breeders.

“Plant breeding can be very simple – as easy as picking good plants and crossing them,” Professor Brummer said. “We talked about ways to identify good plants, which can involve anything from different statistical experimental designs to how you set up the experiment in the field.”

There was also discussion of more modern technologies, some of which promise to offer more efficient breeding, such as genetic markers.

“Genetic markers are like a sign-post along the chromosome.

“They mark the place where the gene for a particular trait is, such as flowering time.”

Tried and true

In many cases the most significant improvements can be made by simple adjustments to established traditional plant breeding techniques.

key points

- Australian plant breeders are on the right track in developing new perennial pasture species
- New techniques and technologies are creating opportunities for plant breeding, but improving the implementation of traditional methods can add significantly to the breeding process
- Opportunities such as masterclasses allow researchers to network and gain valuable access to peer feedback.

"Being more precise in the way you select and more rational about the breeding process can make a big difference. In fact, you can make more progress this way than by using genetic markers," Professor Brummer said.

The adoption dilemma

As is the case in Australia, convincing farmers to include perennial pastures in their rotations is a challenge for Professor Brummer and his US colleagues.

Despite the obvious economic benefits he said US farmers were still reluctant to adopt more perennial pastures.

Bringing breeders together

The masterclass was the brainchild of FFI CRC senior plant breeder Dr Daniel Real. Hailing from the University of Uruguay Dr Real has extensive experience in breeding forage legumes and is currently collaborating on research projects with Professor Brummer.

He had taken part in a similar class some time ago and was impressed with the way it was able to foster effective communication and networking amongst a group of researchers.

Both the FFI CRC and DAFWA recognised the communicative benefits of bringing breeders together as well as the opportunity to gather feedback from Professor Brummer. DAFWA supported the masterclass through its *Visiting Specialist Program*, designed to enhance the Department's capacity and reputation as a centre of excellence in research, development and extension, particularly through international collaboration.

In addition to providing a refresher of the latest plant breeding techniques and technologies, the masterclass was a chance for FFI and DAFWA breeders to get to know one another.

"The interaction between the group was great," Dr Real said. "We were able to learn more about each others' specialist skills and the areas other breeders were most experienced."

Rather than liaising over the phone or via email, the breeders were given the opportunity to discuss their projects face-to-face and receive immediate feedback from their peers.

One particular session required each group to give a presentation of their current program. Breeders then offered 'constructive criticism' and ideas for different approaches.

Dr Real said that type of interaction was invaluable for the timely progress of breeding programs and ultimately for the successful domestication of new species.

"Discussing a program with other breeders before starting off can open up new ideas of how to approach the task."

"Plant breeding is a lengthy process and so

uncovering better and quicker ways of doing things can save two to three years off a 10-year program."

Back to basics

For New South Wales research agronomist Carol Harris the masterclass provided a welcome confirmation that she was on the right track in her own plant breeding work.

Currently immersed in trials of tall fescue, cocksfoot and tropical grasses, Carol is not formally trained in the art of plant breeding.

However, her work does touch on some aspects of breeding and she relished the chance to pick the brains of others in the field.

"I think it was good to have a refresher on the basics," Carol said.

"We work in isolation a lot of the time so it's nice to get together with people working in the same areas of work."

"We were able to throw ideas between us

and it was great to be able to discuss the practical aspects of breeding such as what's the best nursery design and how many selections should you do," Carol said.

For Carol, meeting Professor Brummer was a personal highlight.

"From a personal point of view it was great to meet him because he also does a lot of work with tall fescue," Carol said.

"It was interesting to compare the work we are doing here in Australia with what they are doing in the United States," Carol said.

Carol has already been in contact with other researchers from the masterclass and said she looked forward to taking part in another similar workshop in the future. 🌱

➡ More information

Dr Daniel Real, UWA
T: (08) 9368 3879
E: dreal@agric.wa.gov.au

Snorkelling and other plant survival secrets

Salinity and waterlogging often go hand in hand, so the discovery of a perennial plant that has the ability to tolerate both conditions has got UWA PhD student Natasha Teakle working hard to unravel its secrets.

"Anecdotal evidence suggested that the plant *Lotus tenuis* is tolerant to waterlogging and also grows in saline areas. I wanted to look at tolerance to the combination," Natasha said.

Natasha's research has looked at the physiological traits contributing to the plant's salt and waterlogging tolerance. This research has been based at UWA and she has also worked overseas, looking at the mechanisms at a molecular level.

"The plant forms a lot of air spaces – aerenchyma – in the roots, which allows oxygen to go from the shoots to the roots even if the plant is waterlogged. They act in a similar way to a snorkel."

Her work has linked the plant's observed abilities with its underlying genetic make-up. Already, Natasha has identified some of the plant's genes responsible for the tolerance, which could pave the way for profitable farming on marginal land. 🌱

➡ More information

Tash Teakle, UWA
T: 0418 913 379
E: natasha.teakle@grs.uwa.edu.au

