

Varieties and plant breeding update

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Sugar Research
Australia™

An introduction to *Varieties and plant breeding update*

By Dr Peter Allsopp, Executive Manager, Development

Welcome to the first edition of the *Varieties and plant breeding update*. This newsletter has been created to bring you the latest information about the SRA breeding program and SRA varieties. For both growers and millers, SRA's work on varieties is a fundamental foundation of helping to build a profitable and productive Australian sugarcane industry.

Following the formation of SRA in 2013, we have worked with the industry to identify your priorities for investment of your levy. That feedback confirmed the development of optimally adapted varieties as one of our eight Key Focus Areas (KFAs) of investment for SRA. The SRA plant breeding program is the single biggest area of investment across SRA and we have set high benchmarks for measuring our performance.

Our goal is to release at least three varieties in each five-year period for each region, to increase the percentage of production from new varieties, and to increase the rate of genetic gain in relation to cane yield, CCS, and sugar yield. We also continue to improve the resistance of varieties to each region's diseases – more than 90 percent of the crop is resistant to smut and 97 percent of the crop has at least intermediate resistance to pachymetra root rot.

SRA's recent grower survey also confirmed variety development and improvement as a top priority for the industry into the future. The survey found that the area planted to new varieties is about 38 percent of all cropping hectares, and new varieties have been grown by 93 percent of respondents at some time in the last five years.

However, we know that there is scope to continually produce improved varieties at a lower cost and we are continuing R&D and working with industry on improvements.

We have also seen this season that when the right varieties combine with good management and some luck from the weather, then there is potential for some impressive cane yields and CCS. Some regions have boasted impressive results and achieved tonnages not seen for several years. At the time of writing, Tully was on track for nearly 100 t/ha, for a total of about 2.85 MT. In the words of TSL, this is a record crop by a huge margin. The Herbert region had predicted a crop of 4.44 MT, up from 4.15 MT in 2014.

For the SRA plant breeding team, our focus is on working with local industry to ensure that we are developing the varieties that you want and need and that they are able to perform in commercial conditions.

We have already started this process already with the release earlier this year of the first SRA-branded varieties, SRA1^Φ, SRA2^Φ, and SRA3^Φ. This work will continue, and this newsletter is focussed on keeping you informed about these activities.

SRA announces new staff appointments in the Herbert region

SRA has started improvements to the sugarcane plant breeding program in the Herbert with the appointment of two new staff in Ingham.

The appointments follow the recommendations of a review into SRA's plant breeding activities in the Herbert, with one of the recommendations being the appointment of additional staff to assist with SRA's work in this area.

SRA announces the appointment of Andrea Bryan as farm manager for SRA's Herbert station and new planting breeding technician, Melanie Adams. They join the current Herbert SRA team of Heidi Clements, Fulvio Gori, Vince Blanco, Glen Park, Megan Zahmel, and Phil Patane, with the breeding program overseen by SRA breeder Dr Felicity Atkin (Meringa).

The appointments are a response to increased workload in the variety selection program and the new staff form part of the bigger picture of improving the Herbert plant breeding program.

Farm manager Andrea Bryan will have responsibility to manage the SRA farm operations on station plus provide farm services for SRA research trials including those off-station. Andrea was a breeding technician at SRA Meringa, and she has a strong background in all facets of breeding. She has also acted in the role of farm manager at Meringa.

Plant-breeding technician Melanie Adams is a Herbert local whose family has been heavily involved in the cane industry. Melanie holds a science degree in plant biology from James Cook University and has been working as an ecologist. She comes with great skills in conducting detailed field observations and data collection, which are skills that are vital to successful screening of potential new varieties.

The main extra Herbert activity will be in stage-2 selection trials, called Clonal Assessment Trials or CATs.

This will allow SRA to more quickly select clones that are adapted to the needs of Herbert region. These clones will then be tested in regional Final Assessment Trials and Regional Variety Trials, the latter in conjunction with the Herbert Cane Productivity Services Limited.

Wet Tropics grower **David Marsilio** is always on the lookout for new and better varieties.



Grower observation: David Marsilio

Tully region farmer David Marsilio is always on the lookout for new opportunities.

And when it comes to sugarcane varieties, his curiosity extends far beyond his own district to right across the industry as he keeps a close watch on varieties that might have potential for his farm.

So if he sees a new variety that is performing well in other regions, he has often used tissue culture plant orders to gain faster access to new varieties, with help from Tully Cane Productivity Services Limited to ensure he has the correct permits for any new variety.

It means he has gained faster access to varieties such as Q250[®] and Q252[®] and Q253[®].

He said that Q250[®] is a good variety with good sugar through to the end of the season.

When we visited Mr Marsilio in early October, the Q250[®] was averaging 15.1 CCS across the mill area, although this was only from 700 tonnes harvested in the region because it is a new variety.

“But every week it is up there with CCS,” he said. “For me, though, the truth in the story is in five years after first planting. So far, I am in my third season with Q250[®] because I got it with tissue culture and it is ratooning brilliantly.”

He has also had success with Q208[®], which has also sparked his interest in Q252[®], as its parents are Q208[®] and Q96.

“You could say Q208[®] came here by accident because it is smut resistant, but thank god it did. If smut never came – and we wish it didn’t – we would have probably missed out on it.”

He said the key was communicating with other growers, checking updates from SRA, and using information sources such as SRA variety guides and the online tool QCANESelect™.

“It really keeps you in touch with what varieties are out there and what SRA is doing. They are doing a lot more work than what we see as growers.

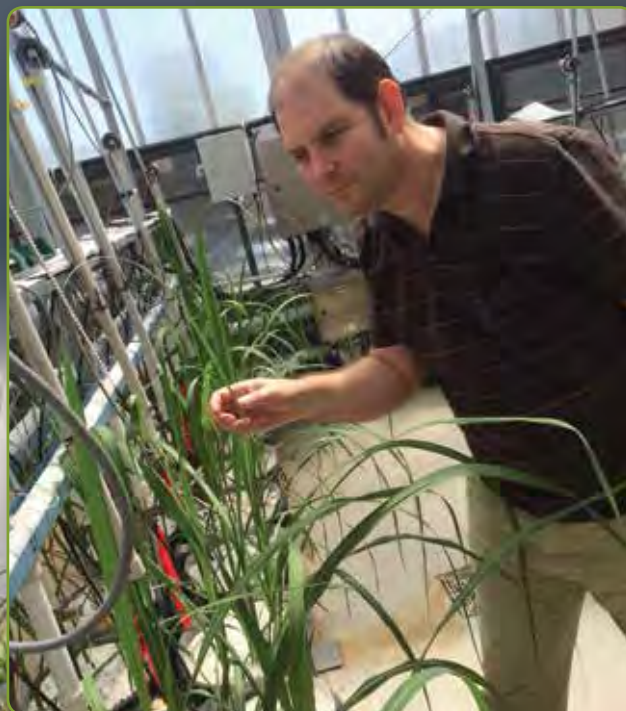
“Varieties are our future – without new varieties and clean plants, then we are history.”

He said that he knew that his approach would not work all the time and that he knew that even at a district level a variety that performed well at his farm might not perform as well 20 km away.



David Marsilio uses tissue culture to speed up access to varieties at his farm.

Dr Chris Stokes from CSIRO inside the climate controlled greenhouse in Townsville.



Northern challenge considered in new research

Collaborative research between CSIRO and Sugar Research Australia could offer the potential to assist with addressing the challenges for the expansion of the sugarcane industry into new regions.

In particular, the research is looking at improving the productivity of sugarcane varieties of the future in relation to water use efficiency.

Lead investigator of the *Sugarcane for future climates* project, Chris Stokes, said that there was continued discussion about expansion of agriculture into northern Australia.

"If the industry does expand, it is most likely to be into more marginal environments, including soils that are more marginal in terms of water holding capacity," Dr Chris Stokes said.

"The overall conditions are likely to have these crops facing more water stress."

Having varieties that can better handle the water stress in difficult growing conditions would be a key factor in any expansion plans for the industry.

The research also offers substantial benefits to existing growing regions, all of which would benefit from the research that is looking to improve the productivity of sugarcane in relation to water use efficiency.

"This research is about improving production by reducing the unavoidable water stress that occurs in sugarcane crops," Dr Stokes said.

"The research isn't just about saving water – although that is part of it – it is more about improving productivity."

Dr Stokes said the research offered potential that was different across regions.

"The value of water use efficiency is likely to vary between regions, such as between regions that are fully irrigated and others that are almost entirely rainfed."

Farmers in existing regions are also expected to face challenges in the future with climate change, which is another factor being examined by this research.

"We are looking at how responsive different clones are in improving their water use efficiency under high carbon dioxide conditions."

Dr Stokes said that there was significant potential for outcomes for the industry, particularly where risks of seasonal water stress are high.

This project has been funded with assistance through the Australian Government's Department of Agriculture and Water Resources through the *Filling the Research Gap* program.

See the CaneClip on this research at www.sugarresearch.com.au.

You can also read more about this research project in the Summer 2015 edition of *CaneConnection*.

Plant breeder profile with Dr Felicity Atkin



Dr Felicity Atkin from SRA Meringa.

What is your role within the plant breeding team at SRA?

I am the Plant Breeder for the Northern-Herbert Selection Program. As I am based in Meringa, I also oversee the SRA Parent Management and Crossing Program for the whole Australian sugar industry.

This means my daily activities vary depending on the time of the year. In any day I could be analysing crossing or selection data, selecting parents/crosses/seed/families/clones for the Northern-Herbert program, meeting with industry representatives, hosting our many visitors to Meringa, or making sure the selection program is progressing as planned during the planting/harvest season.

During the crossing season, I can also be found inspecting and counting flowers, teasing pollen out of flowers to determine their gender, selecting ideal cross combinations based on the flowers available, and then arranging the crosses in the crossing paddock for pollination. There is never a dull moment in this job.

What are the major challenges associated with your job?

One of the major challenges associated with being a sugarcane breeder is predicting where the industry will be in the future, as it takes us approximately 12 years to produce a new commercial variety. For example, the experimental clones being assessed for possible commercial release in 2016 were originally grown and selected using different strategies based on industry, environmental and economic drivers relevant back in 2005/2006 when they were first planted as original seedlings. This means decisions made today by the industry and SRA will have an impact on the type of commercial varieties we will release commercially, from now until anywhere up to 2027.

New focus for breeding program to deliver optimum cane varieties into the future

An industry reference group has worked with SRA's sugarcane breeding program to ensure that future sugarcane varieties deliver characteristics that will improve grower and miller profitability.

The group of 12 people, appointed by the Australian Sugar Industry Alliance (ASA), has reviewed how individual traits of sugarcane varieties (such as CCS, tonnes of cane, disease resistance, and others) are weighted in the industry's variety development program. ASA has recently endorsed these changes.

Selecting and delivering the best possible varieties are based on each of these traits having an economic value.

"Growers and millers have come together through this group to consider the weightings of traits for the breeding program, and this group has now told SRA what they want implemented as part of these changes," SRA Executive Manager for Development, Dr Peter Allsopp, said.

"This group has told us that the breeding program must maximise profitability for the entire industry and, with this as their focus, they have endorsed specific changes to the weightings of traits."

Notable changes to the weightings are the inclusion of a ratoonability index and more emphasis on cane yield.

"This reflects the different production environment to the early 2000s, where now many mills have excess capacity and it makes economic sense to utilise that capacity," Dr Allsopp said. "The overall focus is on maximising profit to the industry."

The review considered a range of important issues and specific traits and the weightings have been tailored to the specific needs of local industry (Northern, Herbert, Burdekin, Central, and Southern Queensland, with northern NSW yet to be finalised).

Phytotoxicity screening

SRA will now undertake variety x herbicide screening as part of its core variety release program. This screening will be conducted on a rolling two year basis. Year one: Selected herbicides will be tested on new varieties in pot trials. Productivity Service organisations will be consulted regarding the herbicides that will be tested. Year two: Variety/herbicide combinations from the pot trials that show a phytotoxicity risk will be evaluated in the field.

The next pot screening trial will be planted in Spring 2016, at either Meringa or Mackay. A field trial containing the varieties/herbicides that showed symptoms in the 2014 pot trials, is currently being assessed at SRA Meringa. This trial will go through to harvest in 2016.