

Varieties and plant breeding update

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Tissue culture: clean seed cane for the Australian industry

Tissue culture continues to play an increasingly important role as a source of clean seed planting material for the Australian sugarcane industry. Growers and productivity services use this technology to help boost productivity and to ensure that they are using disease-free planting material.

Until recently, there has been two main commercial providers of tissue culture material for the industry; Lowes TC and VitroFlora. They produce plants using mother stocks of different varieties supplied by SRA (and previously by BSES).

Mission Beach Tissue Culture, with laboratories and nursery at Tully and another one on the Atherton Tableland, and Clonal Solutions Australia, are also beginning to supply tissue culture plantlets to meet the increasing adoption of tissue culture clean seed in the industry.

As a newcomer to sugarcane tissue culture, Mission Beach Tissue Culture owner Steve Lavis said that the company was experienced in supplying banana plants as tissue culture and 2017 will be a trial year with sugarcane through Tully Cane Productivity Services Limited. The trial is starting with a few thousand plants.

"There is an important role for tissue culture in agriculture, including sugarcane," Mr Lavis said. "There will always be diseases that challenge industries, and tissue culture is a good way of producing material that is clean in regards to existing diseases, or for bulking up a new line that has disease resistance or better productivity, if a disease hits an industry.

"The SRA plant breeders have the objective of improving industry productivity, so tissue culture is a way of bringing those new varieties to industry faster."

The tissue culture process begins with SRA technologists using the highest quality source material to produce and multiply new plants. This mother stock is then delivered to the tissue culture companies, such as those mentioned above, where it is mass-produced in the laboratory and grown in a nursery.

In 4-5 weeks, it is available for productivity services or growers as a planting source. Growers should contact their productivity services to coordinate orders.

SRA has developed a number of information sheets on ordering and managing tissue culture in the field, which are available from the SRA website, www.sugarresearch.com.au. There is also an online calculator to help you determine the quantity of plants you require for planting.

Growers and industry service providers can also access the online tool, QCANESelect™, which can assist in making a plan for future plantings and to ensure that growers receive sufficient supplies of the varieties they want.



Steve Lavis of Mission Beach Tissue Culture with sugarcane tissue culture plants produced in the laboratory and grown in the nursery.

SRA continues to work with industry feedback to improve QCANESelect™, and a new project is currently under consideration by the SRA Research Funding Panel to help provide recommendations for the most profitable varieties for adoption on your farm.

This project would add the ability to dynamically analyse a wealth of information and translate it into targeted recommendations for your farm.

For more information on tissue culture

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Harwood mill farmer **Bob Ensbey** says frost tolerance is something that he continues to keep in mind with varieties at his farm.

New research hoped to improve frost tolerance for sugarcane varieties

Farming at Lawrence in NSW, Bob and Phil Ensbey are some of the southern-most sugarcane growers in Australia.

Considering their southerly location and the Clarence River on one edge of their farm, it is little surprise then that frost and flooding are two of the most important factors when it comes to their decisions around farm management and varieties.

Bob Ensbey already believes that some varieties perform better than others on his farm when it comes to frost.

“We feel that Q240[®] is showing tolerance to frost and it takes a fair bit before it side shoots,” Bob said.

He has about 25 percent Q240[®], and the other major varieties are Q208[®] and Q232[®].

(He said he was very impressed with the ratooning ability of Q240[®] and that Q208[®] was also popular with the mill for its millability.)

“We’ve also seen a big improvement with the introduction of Q varieties. We started sugarcane farming here in 1990, and it was not long after then that the Q varieties came in, which was one of the best things that has happened here.

“We have confidence that there will be reasonable sugar in the cane at one year old, so if it does get frosted you can cut it, whereas the old varieties were very poor if they had to be cut at one year.

“For that reason I also try and plant early here, which is the first week of September. That generally allows the cane to get to a point that it could be cut by the time the frosts come around.”

He said his worst frost in memory was in 2002, when there was a total wipeout across the farm. “In that situation, we had to work with the mill where harvesters came from other parts of the river and the whole farm has to be cut.”

“In saying that, for the last few years we have generally been without severe frost. It is just another risk on the farm, but generally not a devastating one.”

All of this means that Bob continues to have a keen interest in SRA research underway looking at the potential development of better regionally-adapted varieties for NSW and he works with SRA on trials on his property.

It is a collaborative project led by Rick Beattie from Sunshine Sugar and SRA’s Dr Roy Parfitt is the chief investigator.

It is looking at the potential to improve sugarcane varieties for NSW in relation to two-year cropping, temperate growing conditions, and frost. It will explore the opportunities to do this through a breeding process called introgression, which would bring in genetics from wild relatives of sugarcane.

For example, in the United States, the Louisiana sugarcane industry has used introgression to improve yields, disease resistance, and cold tolerance.

There are currently a number of frost observation plots and agronomy assessment trials that were planted across the Harwood and Broadwater mill areas in 2014 and 2015.

Agronomic Assessment Trial in December 2015 as part of the research project.



The trials will be assessed later this year and include canes crossed with *Erianthus Arundinaceous* or *Saccharum spontaneum*, foreign varieties, clones from the NSW core program, plus standard varieties for comparison.

The project runs until 2020 and results from the research will be communicated with industry as they become available.

Back at Bob's farm, and while he says that he is keen for better frost tolerance, he also adds that floods are an equal challenge.

"Generally the cane is resilient to floods here just like everywhere else, but we have had years where we have had consecutive years of flooding in January. Each of those floods killed the young cane because the cane was not advanced enough, and the conditions were hot.

"Growing two-year crops, when you do have a flood you generally have a percentage of your farm that is advanced and can recover, but if you get floods in two consecutive years, then it does mean it can really can take several years to recover."

For more information

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2015 and 2016 Harwood Mill Harvest Statistics			
	2016	2015	Change
Tonnes crushed	696,006	772,773	-9.9%
CCS	12.16	11.42	+6.5%
Hectares harvested	4,759	5,134	-7.3%
Average cane yield	146.25	150.52	-2.8%
Average sugar yield	17.78	17.19	+3.5%

Source: Sunshine Sugar.





Atherton farmer **Stephen Raso** says that currently KQ228[®] is the best performing variety at his property.

Atherton peanuts lift cane production

For many sugarcane growers, there has been an increasing shift toward fallow crops to boost the sugarcane crop cycle in recent years.

But for Atherton farmers the Raso family, who started growing sugarcane about 20 years ago with the opening of the Tableland mill, the process has worked the other way around, with sugarcane making its way into a farming operation that until then had been focussed on crops such as peanuts and maize.

Today, 20 years down the track, sugarcane is the main focus for Stephen Raso, who returned to the farm in recent years after a stint away as an accountant working in Brisbane.

Peanuts are now grown at the end of the sugarcane crop cycle, and other opportunity crops such as pumpkins for example may be grown if the opportunity seems right.

“My grandfather bought the farm and it had always grown peanuts and maize, and my parents John and Rita started growing cane about 20 years ago,” Stephen explained.

“Before cane we didn’t have irrigation infrastructure, so dad put the work in and spent the money on irrigators, as while we aren’t reliant on irrigation like down the road at Mareeba, supplementary irrigation is important here.”

He said that going away to another career for several years had both positives and negatives for returning to the farm.

“Being an accountant, it has helped me be acutely aware that farming is first and foremost a business, and to keep a close eye on the dollar side of things,” he said.

“That means sitting down and assessing what is working and if it is helping get the best possible return.

“I don’t always have all the answers, but it is about being willing to experiment and look at things over the long term.

“The flip side of that is that there are some farming things that I don’t know, which I should know at my age. It’s a balance.”

His main varieties are Q200[®], Q208[®] and KQ228[®] and a small amount of Q250[®], with KQ228[®] being the best performer of those.

“We’re of course looking at tonnes and sugar, but also ratooning. We want something that is going to last that five or six years without falling away too quickly, so it can fit in with the rotation with the peanuts,” he said.