CaneConnection
Winter 2015

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Welcome to the Winter edition of CaneConnection

You are reading a new look version of CaneConnection. This new format of the magazine brings together the latest information about how SRA is working for you into one handy location, combining articles on SRA-funded research along with industry extension information.

CaneConnection is aiming to deliver information to you in a way that translates back to what things really mean on the farm and at the mill. This will mean that we will have a strong focus on case studies and an emphasis on growers’ and millers’ views.

This issue contains stories on some key research projects as well as extension articles that discuss topics relevant to the activities happening on the farm during winter.

With harvest approaching, this issue provides a timely update on harvesting efficiency. With potentially as much as 25 percent of cane being lost in the harvesting process, we can’t afford to not pay attention to this area of the farming system.

We also provide a timely update on the process after harvest in terms of falling and break-crops, which is looking to be an especially important consideration with the forecast El Niño and the pressure this may put on irrigation supplies for some growers.

SRA was proud to unveil the first of its newly named varieties recently: SRA1, SRA2, and SRA3. We take a look at these in more detail.

On research, this issue also provides an update on important work into Yellow Canopy Syndrome, a grower-led project in the Herbert looking at mill ash, we delve into a look at how the SRA breeding program chooses its parent varieties, and we look at the benefits of controlled-release fertilisers.

I’d also like to introduce myself as the Acting Manager for the Professional Extension and Communication (PEC) unit. I was previously with the PEC as Southern Region Development Officer for Biosecurity, but since being in this role have been up and down the industry meeting many of you.

I extend my thanks to Andrew Ward, who has now taken on the role of Manager Plant Health with SRA.

SRA is continuing to improve the way we work together on development and adoption service, which is a critical issue for ensuring that the great work that SRA does turns into bang for your buck.

It has been a busy few months for the PEC team with numerous field days and events held in the months leading up to harvest.

These events, this magazine, and many other activities are important ways of keeping you informed of our activities, and I look forward to building on that into the future.

James Ogden-Brown
Acting Manager of the Professional Extension and Communication Unit
Choosing the perfect parents

While some people claim that you can tell how a woman will look in 20 years by looking at her mother, SRA researchers take a more rigorous approach to choosing breeding stock for their plant breeding program.

The SRA plant breeding program is designed to identify varieties that have genetic traits (for example disease resistance, CCS, TCH) that add extra value to the sugarcane industry.

Xianming Wei, SRA Principal Researcher, said that since 2008 his team have been researching ways of improving the way desirable genetic traits in parental varieties are identified and breeding stock is selected.

“We are always looking for ways to improve the way that we select parents for our breeding program. Obviously there is a lot of data and genetic information that needs to be considered when we select potential parental varieties,” Xianming said.

“We need to challenge ourselves to make sure we are using the information in the best way.”

“For example, say we are considering the potential value of a clone and have two or three pieces of information about different traits, we need to know how each piece of information should be weighted.”

“Is one more important than the others? If we prioritised the information a certain way last year, is the ranking still the same this year when extra information becomes available?”

Xianming explained that they are also developing DNA marker technology for key cane traits and also establish trials to understand how sugarcane traits are genetically controlled so they can be more effectively assessed as parental clones.

“This will help us to improve our understanding of how parents pass their genetic information on to their progeny,” he said.

“For many varieties that are already used as parents in the breeding pool we have a lot of data about the traits that each parent is likely to pass on, based on their progenies’ performance. For example, we have collected data about the cane yield of the parents and the cane yield of the clones they have produced.”

“For other varieties that have not already been used in the breeding pool there are more unknowns. We don’t know how many of their traits they are likely to pass on to their progeny.”

“We are keen to use the DNA marker technology to understand how we can better predict which traits will be passed down. This will mean we can more efficiently and effectively breed high performing varieties,” he said.

Not surprisingly, this is a lengthy process that involves years of trials and a lot of data analysis.
New SRA varieties approved this year

During April, the cane industry's Variety Approval Committees (VACs) in all regions of Queensland and NSW met to consider the release of new varieties in 2015 and to identify varieties that should be targeted for maximum propagation for possible release in 2016. By Roderick Fletcher

At all the meetings there was a degree of excitement among the growers and millers for the new varieties and advanced clones coming through the SRA breeding program for possible release over the next few years. Following this consultation with industry, SRA is releasing the three new varieties in 2015 as well as seven current commercial varieties to be released in new regions.

The release of these new varieties also coincided with a new way of SRA naming its varieties. They are the first varieties to be released since SRA was formed and are named using the “SRA” prefix replacing the previously used “Q”. The last variety released in 2013 under the old “Q” number was Q256.

The three new varieties released this year are SRA1 (QS05-2595) and SRA2 (QS03-2717), which are to be released for the southern region, which includes Bundaberg, Isis (SRA 1 only), Maryborough and Rocky Point, and the NSW growing regions.

The third variety is SRA3 (QN02-777) to be released in the Herbert region. For this year, the varieties will still need to be approved by the Queensland Department of Agriculture and Fisheries (DAF) before they are available for industry, and that this process is expected to be complete within the next few months.

In addition to the three new varieties, seven current Blanket Approved Q canes have been endorsed by other regional VACs for commercial planting and ratooning.

These releases have already been approved by DAF. The varieties involved are Q242, Q245, Q247, Q249, Q252 and Q253 in the northern coastal region and Q252 in the central region.

VACs also approved the maximum propagation of 13 advanced clones for possible release in 2016. These include three varieties in the Northern region, two in the Herbert region, two in the Burdekin region, one in the Central region, one in the Southern region and four in New South Wales (one for 1-year production and three for 2-year production).

The two maximum propagation clones in the Burdekin region and one in the Central region may be considered for release as SRA varieties later this year when more data becomes available. VACs will reconsider these varieties when that information becomes available later in 2015.

Above images (left to right)
SRA 1, SRA 2, Richard Cervellin with SRA Bundaberg in the field with the varieties.
There has been considerable enthusiasm across the industry as it looks forward to the new varieties. Bundaberg Sugar Ltd CEO, Ray Hatt, said that new and more productive varieties would benefit the mills and the growers alike.

“A 5 percent yield improvement coupled with higher CCS could easily produce an extra 100,000 tonnes from the current land area,” Mr Hatt said.

“This would greatly assist Bundaberg growers and mills as they strive to increase cane production to their current target of 2 million tonnes. Improved variety development and subsequent higher volumes are essential for the future viability of the cane industry. Disease resistance, CCS, yield and fibre content are important criteria in new varieties and SRA is striving to improve all of these characteristics.”

Herbert region grower and CANEGROWERS Herbert River director Vince Russo said that growers in the region were always keen to hear more about new varieties.

“The entire local cane growing community, including growers, millers, and the general community, continue to look for improvements from our new varieties to help us to be productive and sustainable,” Mr Russo said.

“SRA3 is being released after consultation with the local cane community and we hope that it can deliver positive outcomes for us.”

General Manager of the NSW Milling Cooperative, Ian McBean, said that the local industry was looking forward to the beginning of the new SRA line of varieties and that they had heard positive messages about SRA1 in particular.

“The local industry continues to need new and improving varieties to underpin our viability, to target greater production,” Mr McBean said.

Above image
Dr Mike Cox (SRA) discussing the new varieties with Ray Hatt, Bundaberg Sugar, and Allan Dingle, CANEGROWERS.
YCS: A look inside the cane plant

Sugarcane growers dealing with Yellow Canopy Syndrome (YCS) have seen for themselves the severe impact the as-yet undiagnosed condition is having upon yield and CCS.

SRA research is looking closely at the science behind this yield and CCS loss, with a just-concluded SRA research project having looked at what is occurring within the metabolism of the plant.

Project leader Dr Frikkie Botha, Executive Manager – Research with SRA, said the project Biological Factors Driving YCS looked at factors including the productivity of affected plants and their ability to recover.

“We now know that YCS is about more than just yellow leaves,” Dr Botha said. “Even in green leaves in YCS-affected plants there are internal processes happening that negatively impact yield.

“For example, we know that affected plants are accumulating sugars in the leaves, which is having a negative impact on the plant.

“We have observed that photosynthesis – where the plant converts sunlight into energy – is compromised, throughout the canopy which will result in a reduced yield.”

With this project now concluded, its results will form a useful base to steer and inform four other SRA-funded research projects that are now underway looking at YCS.

Dr Botha said that finding answers to YCS was a challenge, but the new information on sugarcane plant metabolism could help contribute toward management options.

He added that there was also the possibility of some silver lining from SRA’s extensive work on YCS as part of the new information that was being learnt about the cane plant.

For example, SRA now has a comprehensive database of many of the metabolites and changes in gene expression in the sugarcane leaf – something that was not available before and is expected to be valuable for future research.

“Our work is yielding such a wealth of information that there is the possibility of unearthing new information that could help the industry break out of the yield plateau that we are facing,” Dr Botha said.

Nigrospora fungus not the cause of YCS

Sugar Research Australia has eliminated a suspected cause of Yellow Canopy Syndrome, as part of its research investment into the troublesome problem.

SRA Executive Manager for Research, Frikkie Botha, said that the fungus Nigrospora was not the cause of YCS. The fungus has been used as a biological agent for controlling some grass weeds, and had been implicated as a potential agent for the development of YCS.

“We have analysed our database for the presence of signature metabolites for Nigrospora. Based on the results, this fungus can be ruled out as the cause of YCS,” Dr Botha said.

“Every time we rule out something as being a cause of YCS, this brings us one step closer to determining what is causing YCS, and also determining an appropriate response to combat it.

“SRA researchers – and partners with other leading scientific research organisations in Australia and around the world – are working on this problem to find a solution as quickly as possible.”
NUE: Applying the right fertiliser in the right place at the right time

Those familiar with the SIX EASY STEPS nutrient management program will know that an important part of the process involves growers regularly reassessing their on-farm nutrient management plans.

Similarly, the research team behind the program periodically reassess the nutrient management guidelines and consider new information and research results to make sure the SIX EASY STEPS program remains relevant.

This is exactly what a collaborative SRA and University of Southern Queensland (USQ) study is doing.

The project, led by USQ’s Prof. Bernard Schroeder is looking to develop innovative ways of improving sugarcane nitrogen use efficiency.

“We first started working towards developing the SIX EASY STEPS program in the late 1990s, and as an industry, we have come a long way in how we manage nutrients on-farm,” Bernard said.

“We need to make sure that we’re still providing advice that leads to good economic outcomes for growers, a secure cane supply for millers, and considers the needs of the environment, in particular the Great Barrier Reef,” he said.

This research project is focussed on improving nitrogen use efficiency and effectiveness by determining the typical nitrogen demand and uptake for a set of current sugarcane varieties, and formulations, or combinations of formulations, of nitrogen fertilisers that are best able to match the nitrogen supply to the crop’s demand.

“We are also particularly interested in working out how the SIX EASY STEPS nitrogen guidelines can be adapted to address in-block soil and yield variations,” Bernard said.

Project details

Key Focus Area: 2
Soil health and nutrient management

Project name
Boosting N-use efficiency in sugarcane through temporal and spatial management options

Project number
2014/045

Principal provider
University of Southern Queensland

Project end date
October 2017
A Grower’s Perspective – Jay Hubert

Jay Hubert, a grower from Bundaberg, has been a strong supporter and user of the SIX EASY STEPS guidelines.

“In the current economic environment it’s essential that we earn the maximum return possible on every dollar that we invest in our farm.”

As a major agronomic input, fertiliser makes up a high percentage of a farm’s total input costs and Jay believes that by following the SIX EASY STEPS guidelines he is able to apply the optimum amount of fertiliser. “I don’t want to be applying too much fertiliser as this is costing me money. On the other hand, I also don’t want to under apply fertiliser as this will reduce my yield. By following the SIX EASY STEPS guidelines I gain maximum efficiency from the fertiliser that I apply.”

“My fertiliser application may not necessarily reduce across my whole farm, but the application rates across different blocks vary depending on soil type, based on soil organic carbon (%), whether the cane is a plant or ratoon crop, and whether other sources of N (such as legume fallows or mill mud) were used. This means that I pay attention to productivity, profitability and the environment. The system is well-proven and it works.”

“We know it is not always possible, or easy, to apply multiple applications of fertiliser within a particular growing season, or to apply different rates of fertiliser or different formulations within a particular block of cane. This project may help growers develop strategies to deal with these issues on their farms.”

While this particular research project only kicked-off late last year, the project team has been busy with investigations that include a pot experiment at USQ in Toowoomba and field trials in Tully, the Herbert, Mackay and Bundaberg.

While the pot experiment aims to quantify the nitrogen uptake dynamics in young sugarcane plants, data from the field trials will be used to further understand the responses to applied nitrogen, and the effectiveness, uptake and removal of nitrogen by the crop.

If you’d like to know more about SIX EASY STEPS or would like us to send you the Nutrition Guidelines for your region, give us a call on 1300 772 111.

Above image: Dr Barry Salter (SRA), Henry Barfield from Victoria Plains, Prof Bernard Schroeder (USQ) and Michael Barfield from Racecourse looking over the newly released Mackay Soil Guide.

Opposite image: Prof Bernard Schroeder (USQ), Dr Troy Jensen (USQ), John Panitz (SRA) with cane planted at USQ Toowoomba.
Controlled release fertilisers under the microscope

New research being undertaken by CSIRO is putting controlled release fertilisers, and their potential role in the Australian sugarcane industry, under the microscope.

The SRA-funded research, which commenced in 2014, is hoping to answer industry’s questions about how, when and where controlled release nitrogen fertilisers are likely to offer benefits.

CSIRO researcher Kirsten Verburg said that unlike regular fertilisers which start releasing nutrients as soon as they are applied, controlled release fertilisers take longer to release nutrients. This may reduce the risk of nitrogen losses. The key however is being able to match the release of nitrogen to the needs of the crop.

“Controlled release fertilisers have been around for a while, but interest in the sugar industry waned after a few trials conducted in the early 1990s showed limited yield benefits,” Kirsten said.

This suggested at the time that controlled release fertilisers were probably not an economically viable option in sugarcane farming systems.

With the recent focus on environmental sustainability and new products on the fertiliser market, there is a renewed interest in how controlled release fertilisers can be effectively used.

“There are a lot of questions about their application in different climates, soils and farm management systems. To conduct successful and cost-effective adoption and field trials, growers need to better understand the relationship between the nitrogen release patterns of these fertilisers and crop uptake as well as the timing and causes of nitrogen losses.

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This suggested at the time that controlled release fertilisers were probably not an economically viable option in sugarcane farming systems.
At this early stage of the three-year project we are looking at a number of parts of the puzzle.

We are interested in understanding more about when nutrients are released from the fertiliser. We need to understand how the timing of the release changes in different soil types, or at different temperatures. We need to understand if the release patterns are the same in different product types, and if products will perform the same way in the same location each year.

We are also developing a better understanding of the timing of sugarcane crop nitrogen demand and nitrogen losses and how this links to geographic location and soil type.

“This will help us determine the likelihood of losses between fertiliser application and uptake by the crop.

“Once we have the answers to some of these questions we will be in a better position to match the release patterns of various fertilisers to the uptake pattern of the crop.

“In a perfect world, if you could match the release and uptake of nitrogen there would be minimal losses. While that may not be a realistic goal, we do hope that this project will provide the sugar cane industry with a better understanding of why a particular product would work in a given location before they decide to use or trial it,” Kirsten said.

Computer modelling and laboratory experiments are helping to answer some of the questions and the team is working closely with trials currently underway in the Herbert and Johnstone catchments as part of the Paddock to Reef program.

This research will also help to set out what an ideal product would look like for the sugar industry and may eventually help to lay the groundwork for a new generation of controlled release fertilisers that will more reliably reduce nutrient losses without affecting crop yield.

How controlled release fertilisers work

There are a range of commercially available controlled release fertilisers, most of which rely on a coating to slow release. While the composition of fertiliser coatings varies, many follow a similar process for releasing nutrients.

1. Water enters the granule’s coating.

2. Urea (or other fertiliser) dissolves and starts to release. The rate of release typically depends on temperature, but other factors may play a role.

3. Release becomes slower as the store of internal fertiliser is depleted.
Why the right soil sample can make all the difference

Soil sampling and analysis should be the foundation of all fertiliser programs. The way in which the samples are collected will have a significant influence on the results of the analysis. By Kate Daly

Soil samples are used to establish nutrient requirements and provide recommendations, to assess crop production issues, to monitor soil fertility trends and, in recent years, to fulfil legislative requirements. Soil analysis is only one management tool but the results can greatly influence many decisions and practices which affect farm profitability.

The four critical steps in soil testing are:
1. sample collection
2. sample analysis
3. interpretation/recommendation
4. nutrient application.

Management zone/block

- Approximately 12,500 cubic metres of soil
- 5 ha sample site
- 15,000 tonne soil (varies due to bulk density)

Clean plastic bucket

- Fill sample bag as per lab request (e.g. to dotted line)

5-10 kg soil
- Debris/clod-free soil
- (core samples collected from representative sites in block)

500 g - 1 kg soil
- Accurate and clear sample name/block details
- (corresponding with grower records)

10 g soil
- Representative soil sample collected by lab to be tested
Fallow management worth considering in dry years

After harvesting a final ratoon it can be tempting to plough the field out and go directly into another cycle of sugarcane. By Belinda Billing

This is not recommended, with the negative effects of continual cropping of sugarcane recognised as early as 1935, when the loss of fertility in some Australian sugarcane growing districts was first noted.

With the Bureau of Meteorology indicating we are in the early stages of a hot, dry El Niño weather event, the importance of careful fallow management is heightened.

In an irrigated farming system, falling 15-20 percent of your farm will allow for better use of your water allocation along with the benefit of improving the fertility of the land.

The yield from the reduced area may be no lower than what you would have achieved from 100 percent production due to better soil health from fallowing and more strategic use of irrigation water.

Plough-out-replant requires heavy tillage to remove old cane stool and compaction, allows for the build-up of pests and disease, and has been shown to result in an average reduction in yield of 20 tonnes to the hectare when compared to fallowing land.

The benefits of breaking the sugarcane cropping cycle are well documented and numerous. Fallow management options include:

- Fallow (bare or weed)
  Harvest the final ratoon and remove stool through cultivation or herbicide. The paddock is left bare or allowed to become weedy.

- Fallow plant
  After the removal of the final ratoon a crop is grown, this is typically a legume crop, however other crops can be successfully grown (such as corn or rice).

The recognised benefits of either fallow management system are many.
A reduction in the build-up of harmful soil biota, pests and diseases. Research undertaken through Sugar Yield Decline Joint Venture (SYDJV) showed that incorporating a fallow into the sugarcane cycle resulted in reduced populations of harmful soil biota, including plant parasitic and free living nematodes.

Increased yield in the following sugarcane crop. Studies have shown that breaking the sugarcane monoculture through either bare fallow or legume rotation regularly resulted in yield increases (see Table 1).

Improved soil properties. Fallowing results in improved soil structure and less compaction as a result of a reduction in tillage.

These effects are generally enhanced by the planting of a break crop which offers the benefits of breaking the monoculture (if a non-grass crop is planted) improved weed control, ground cover to protect against soil erosion, the ability to provide organic nitrogen for the next cropping system and, if harvested, an alternative source of farm income. Break crops with strong root systems may also further reduce compaction.

While a fallow results in a percentage of the farm not growing sugarcane for twelve months (or more for an extended fallow) studies show that the resulting yield increase in plant and early ratoons will offset the lost production.

Fallow cropping in a dry year

Growing legumes for grain will likely require irrigation to reduce water stress and maximise yield, particularly soybeans and peanuts. In a very dry year, where water is scarce it is recommended to grow legume varieties for green manure and consider early spray out to allow for early planting of cane with a full soil moisture profile.

If irrigation water is available it is recommended you complete an irrigation budget for your farm when deciding whether to grow crops for grain. Planting densities differ for grain crops and green manure crops. A general guide can be found in Table 2.
Legume Target population Water requirement

Soybean – All regions
Leichhardt is highly susceptible to root rot nematode; nematodes will multiply to high population densities; Stuart and A6785 are resistant to root rot nematode; there will be limited nematode reproduction.

• 250–300 000 plants/ha for cover crops; increase to 300–400 000 if planting late
• 300–400 000 for grain crops

• Cover crops: from late October to December
• Grain crops: mid-December to early/mid-January

• High

Lablab (Dolichos) – All regions

• 60–100 000 plants/ha

• October to December (before the wet season)

• Medium

Cowpea – All regions
Highly susceptible to root rot nematode except Meringa which is moderately susceptible; nematodes will readily multiply.

• 150–250 000 plants/ha

• October to December (before the wet season)

• Low to medium

Mungbean – Burdekin

• 200–300 000 plants/ha for dryland
• 300–400 000 plants/ha for irrigated

• Early plant: September to end of November
• Late plant: January to end of February

• Low to medium

Peanut – Southern, Central, Atherton Tableland
Highly resistant to root rot nematode; no nematode reproduction.

• Irrigated: 130–200 000 plants/ha, depending on type
• Dryland: 50–80 000 plants/ha in southern Qld, depending on type; 80–90 000 plants/ha in north Qld, depending on type

• Bundaberg – early September to mid-December.
• Northern NSW & southern Qld – mid-October to late November.
• Other areas: mid-November to mid-December.

• High

Table 2: Recommended legume planting densities for grain vs green manure and water requirement.

1 target population can vary by district and planting time – seek local advice from your seed merchant or productivity officer

2 planting time can vary by district and variety – seek local advice
You’d be bananas not to prepare for exotic pests and diseases

The recent detection of Panama TR4 in a banana plantation in Tully is threatening the state’s $570 million industry. It is a sobering reminder for the need for all agricultural industries to prepare and plan for exotic pests and diseases.

Since 2009, SRA researchers have been delivering a project to ensure the sugarcane industry is adequately prepared to respond to a potential pest or disease incursion.

SRA researcher Rob Magarey said that unlike the banana industry which was relying on a single variety (largely due to the difficulties in breeding banana varieties), the sugarcane industry has taken a proactive approach that will help minimise losses from pests and disease incursions through varietal resistance and better diagnostic tools.

Research has targeted pests and diseases that are found in our nearest sugarcane producing neighbour – Papua New Guinea. Because Papua New Guinea is home to several of our sugarcane species, it is also home to these diseases.

“Our research has particularly focussed on Ramu stunt (a viral disease), downy mildew (a fungal disease) and moth borers (found around the world and in neighbouring Indonesia and Papua New Guinea),” Rob said.

“Each of these pests and diseases has the potential to cause significant commercial impact. It is important that we are ready.”

“Industry’s ability to respond quickly relies on our ability to recognise and accurately diagnose the pest or disease.”

“In the first phase of our research we developed the essential skills and knowledge we need to be ready for an incursion. We now know how to recognise the symptoms of each pest or disease and have developed diagnostic tests.”

In the case of Ramu stunt, researchers have developed and proven a test for the causal virus. These tests have given consistently positive results for Ramu stunt infected plant material.

For growers this means an accurate diagnosis can be achieved quickly.

“The second phase of our research looked at understanding the resistance of our current and future varieties,” he said. “We have been working with research partners in Papua New Guinea to test promising clones as well as commercial varieties that are currently grown in Australia.”

“This means that if one of these pests or diseases does manage to make its way to Australia, we will already know which varieties are resistant and be able to implement an appropriate management strategy,” Rob said.

Above image
SRA staff (from left) Andrew Greet, Kathy Braithwaite and Judi Bull have been working with Ramu Agri-Industries staff in PNG.

Project details

Key Focus Area: 3
Pest, disease and weed management

Project name
Preparing the Australian sugar industry for threats from exotic pests and diseases

Project number
2009/033

Principal provider
Sugar Research Australia

Project end date
1 May 2015
The third phase of our research has looked at understanding whether there is significant variation in the pathogens causing these diseases. Just as changes in the influenza virus mean people become susceptible to the flu, variations in the disease pathogen can mean some varieties become susceptible.

“It is important that we know how much variation there is in these pathogens. For example, we know that there are several forms of the downy mildew pathogen,” he said.

“Of course this means we need to make sure our contingency plans for pests and diseases are constantly updated,” he said. This research program finished in early May 2015. A follow-up two year project has recently been funded.

“Our industry has always been most fortunate in the work that SRA pathologists and entomologists continue to do. Almost each decade in the last few we have been hit by an exotic disease yet with the good work being done it’s a saviour to our industry that we have always been prepared.

It’s indeed comforting to know that with work such as that which Rob is doing on exotic incursions that we can focus on the task at hand – growing bigger and better cane.

Growers have always been both grateful and confident that risks such as exotic disease is in good hands.”

Allan Royal – MAPS

Biosecurity update

Stopping the entry, establishment and spread of unwanted pests and diseases is vital for our industry. If unchecked, it could be potentially devastating. It is for this reason that biosecurity legislation exists and why it is important for all of us to follow this legislation. Currently, Queensland’s Plant Protection Act 1989 and Plant Protection Regulation 2002 provide legislative powers to control the movement of sugarcane and sugarcane machinery between Queensland’s pest quarantine areas. There is a new Act and Regulation being developed. For more details, visit www.planthealthaustralia.com.au.

A new tool to keep you informed

SRA Calendar

Ever wondered what events are being run in your region? You can now find out very easily by logging onto www.canecalendar.com.au. The calendar includes events that are happening across the industry and can be sorted by event category and event region. All organisations within the sugarcane industry are encouraged to include events that they are managing. Contact Andrea Evers at aevers@sugarresearch.com.au for more information.

A new guide for precision agriculture

Precision agriculture is an area where growers can make gains in productivity and profitability on their farms. SRA has released a new guide – Precision Agriculture for the Sugarcane Industry – that sets out steps to adoption, outlines the benefits, and provides case studies on growers who are already putting the technology to good use. This guide is available as an e-book that can be downloaded from our website (sugarresearch.com.au) or you can order a hard copy by emailing us at communications@sugarresearch.com.au.

Amendment

In the Summer 2014 edition of CaneConnection, we incorrectly stated that Shirtan® registration expires on 30 June 2015.

Shirtan® will continue to be registered and available after this date. Product registrants pay an annual registration fee to APVMA at the end of June. SRA apologises for any confusion.
Mill ash a key ingredient in managing clay soils

A grower-led project in the Herbert has shown that mill ash can deliver lasting soil improvement in heavy clay soils.

Vince Russo, who farms in the Herbert, said that local growers were starting to incorporate furrows and slots into their farming practices, and he was keen to put some numbers behind it.

“In the Herbert we’ve got some pretty large areas of clay soils. While clay soils are fertile, waterlogging has a real impact on our yield potential,” Vince said.

“Through this project we’ve spent the last two years trialling ways to improve internal soil drainage crop establishment and cane yields.”

“We’d been hearing about the benefits of applying mill ash and wanted to see if they would work in our farming system.”

As part of the project, Vince applied five different treatments.

1. conventional land preparation (which included deep ripping)
2. mill ash filled slot on a preformed mound on GPS
3. mill ash broadcast
4. mound pre-wet season and zonal tillage on GPS
5. conventional land preparation, with applied Bioactivate®.

“We could really see a difference in soil condition at planting,” he said.

“The conventional treatment had larger clods, while the alternative treatments had smaller clods and finer particles. We also saw some positive results in the crop establishment in both of the ash treatments.”

“Tiller counts ranged from around 16 in the ash filled slot, compared to 12 in the conventional treatment,” he said.

Vince added that while they were pleased with the high shoot counts, he was disappointed that they didn’t see the increase in yield he was expecting.

“We planted the trial block with KQ228, which unfortunately proved to be a disappointment as it was affected by yellow canopy syndrome,” he said.

“We were able to see some differences in yield, but I don’t think the result was as great as we could have achieved if it hadn’t been for yellow canopy syndrome.”

“What we did see though was that ash had some long-lasting benefits.”

The total cane per hectare (tchp) in plant cane was highest in the ash treatments (broadcast ash treatment: 77.28 tchp, and ash filled slot: 75.47 tchp) and the lowest performing conventional treatment (zonal tillage: 64.45 tchp).

“While the broadcast application of ash was effective, it is not really an economically viable option,” Vince said.

“We worked with local company, SnE Plant Hire who developed a zonal mill mud and ash applicator that proved effective in distributing the mill ash. This applicator is now commercially available to growers throughout the district.”

“This should make it easier for other growers who are farming heavy clay soils to apply mill mud and ash treatments.”

“In the Herbert 60 percent of our soils are clay soils. Even if a few growers adopted this treatment I think we’d see some good outcomes across the district,” he said.

“I would tell people that if they are interested incorporating mill mud or ash into their farming system they get onto it quickly.”

“Mill mud and ash are in high demand, so it would pay to get your name down early.”

This project received funding through SRA as well as the Woolworths Fresh Food Future Program.
Sniffing out ratoon stunting disease

The results from the research already seem promising. "We know that some species of bacteria can be characterised by the chemicals they produce," Amalia said. "Ratoon stunting disease is caused by bacterium called Leifsonia xyli. We started by looking for the tell-tale identifying organic compound produced by Leifsonia xyli," she said.

"Our first step was to understand the particular chemical compounds that are characteristic of an RSD-infected plant. We then tested how reliably and accurately we could detect the presence of these compounds."

"Using the knowledge of the compounds found above the surface of sugar sap we were able to correctly classify 95 per cent of cane samples as either healthy or RSD-infected."

"We are now training the e-noses to identify those compounds and if possible predict the presence of RSD in sugar sap," she said.

The project team’s next step will be to take the e-nose to the field or to the labs, where samples can be analysed with more convenience than current ELISA methods.

"We are trialling three different e-noses to work out which is the most accurate, and which sensor takes the least time to test a sugar sap sample."

"If the technology delivers the results we are anticipating, the third year of our research will focus on developing a smaller device that can achieve similar acceptable levels of classification," Amalia said.

"Once we have proven this technology with RSD, there is potential for it to be used to detect a range of other diseases affecting sugarcane," Amalia said.

Researchers are trialling three different ‘e-noses’ as part of this SRA-funded research project to help detect ratoon stunting disease. It is hoped that one day, one of them will be able to diagnose RSD in-field in minutes.
The NSW Sugar Milling Co-operative is currently working with growers and harvesters to understand how harvesting best practice (HBP) principles can be applied to local conditions to deliver positive results through an SRA-funded project.

Ian McBean, General Manager, NSW Sugar Milling Co-operative, said that they are hoping to collect credible local data that will identify the real costs and benefits of adopting HBP in NSW.

“If we want to prove to growers and harvesters that there are real benefits to implementing HBP we need to show them local results to convince them,” Ian said.

“Previous work done has shown that the major beneficiaries of HBP are the growing and milling sectors at the expense of the harvesting sector. We are hoping that this project will give us the information we need to develop commercial arrangements that will share the benefits across the supply chain.”

According to Ian, the first step of the project was to sit down with representatives from the milling, growing and harvesting sectors to work out what harvesting best practice looked like in New South Wales.

“We formed a project group with representatives from harvesting groups, NSWSMC Ag Services staff, cane growers and Agtrix and as a group we were able to define a range of HBP parameters such as ground speed, extractor fan speed, machine setup and base cutter height that were applicable to local conditions,” he said.

“For example, we cut mostly burnt two-year old cane whereas Queensland cuts mainly green one-year old cane. This means the machine setup and field conditions are very different to Queensland and we need to take this into account when agreeing on the HBP parameters.”

NSW cane harvesters are already fitted with GPS devices that record data about location, ground speed as well as some other parameters which are remotely reported via Agdat. The group agreed to fit extra loggers and sensors to the six project machines which would collect and report data for all agreed HBP parameters.

“Once we had worked out how to capture data and turn it into meaningful information for each HBP parameter, we worked with Agtrix to develop a number of mapping layers, reports and dashboards that will give us tools to monitor and improve harvesting performance in real-time,” Ian said.

Quantifying benefits of harvest best practice in NSW

With in-field harvesting losses under the spotlight in New South Wales, industry members realised the best way to address the issue was to look at it from a whole of supply chain perspective.

The NSW Sugar Milling Co-operative is currently working with growers and harvesters to understand how harvesting best practice (HBP) principles can be applied to local conditions to deliver positive results through an SRA-funded project.

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“Once we had worked out how to capture data and turn it into meaningful information for each HBP parameter, we worked with Agtrix to develop a number of mapping layers, reports and dashboards that will give us tools to monitor and improve harvesting performance in real-time,” Ian said.
“Trial work started during the 2014 season with 11 harvester speed trials and four base cutter height trials successfully completed,” he said.

Results from these trials will be used to quantify the impacts of different harvesting speeds and cutting heights on cane losses, cane quality and subsequent yields. The results will also help the New South Wales industry to quantify the impact of in-field conditions like row spacing, row profile and crop class.

“The project runs over three years and we will continue the trials over the next two seasons with the aim of collecting enough data to allow us to answer some of the key questions relating to the costs and benefits of HBP in New South Wales.”

“Once we understand the cost and benefits implications of HBP adoption across the supply chain, we can start thinking about what the best payment model will be.”

“We hope that the results of this research will help the supply chain determine an equitable payment structure which encourages growers and harvesters alike to implement best practices and reduce in-field losses and share the benefits,” Ian said.

Left images
Real-time HBP statistics available on smartphones, desktop computers or tablet devices show performance against a range of agreed parameters.

Below image
Mapping overlays provide a useful tool in understanding harvester performance in individual blocks.
Getting the most from the crop

Harvesting losses are a multi-million dollar cost to the Australian sugar industry since mechanical harvesting began. This information could prevent thousands of tonnes of millable cane being left in-field. By Phil-Anthony Patane

Main sources of harvesting losses affecting yield include:

- Extractor losses (5-25 percent)
- Pickup losses (1-10 percent)
- Chopper losses (2-8 percent)

A number of factors can affect harvester performance and losses, including:

- Cane yield
- Whether the crop is erect or lodged
- Uniformity of row spacing and row length
- Field layout and harvesting conditions
- If row spacing and machine are matched
- Condition and maintenance of machinery
- Operator proficiency.

How can operators minimise excessive harvest losses

Extractor Losses

The big challenge for industry is trying to achieve a balance between cane cleaning and cane loss.

We know from research that high fan speeds cause excessive cane loss but with little improvement to cane quality (see graphs on opposite page).

As fan speed increases over 800 rpm, losses increase dramatically with minimal improvement on cane quality.

However, if operators attempt to reduce losses by running lower fan speeds, EM levels rise to a point where bin weights create a transport/milling issue and the economic benefit of the extra yield gain is eroded by the CCS loss caused by high EM levels.
Topping

Where possible, cane should be topped at the growing point to remove leaf material because tops comprise of 40-45 percent of total EM.

Cane not topped increases EM, depresses CCS and reduces sugar quality through increased colour, ash and starch. Removing tops reduces the load on the extractors, allowing for improved cleaning, reduced cane loss, and less wear and tear on the machine.

This is supported by a trial conducted by Cam Whiteing – SRA engineer – which indicated that although topping reduced yield by 5.5 t/ha, an improvement in CCS of 0.62 units increased growers’ income by $165 per hectare.

Pickup losses and stool damage

When a good row profile is produced, operators should aim to ‘skim’ the surface of the soil with the basecutter blades. This gives a clean cut with minimal soil intake. Operators should also aim to match their basecutter rpm to forward speed.

For a given speed, an overly high basecutter rpm will result in stools being cut by the blades multiple times. This will reduce the ratooning of the stool and increase blade wear.

Far worse than this is when basecutter rpm is too slow for the forward speed – it significantly reduces ratooning by tearing the stalk, and increases soil in cane supply. The disc tears off stalks before a blade reaches the stalk, causing severe damage to the stool.

To minimise the effect of disc-to-stool contact, ideally basecutters should have six blades per disc. The extra blade per rotation leads to less disc-to-stool contact until 8-9 km/h.

Chopper losses

There will always be sugar loss associated with mechanical harvesting, but these losses can be minimised by examining three components:

1. Billet length
2. Feedtrain roller speed
3. Condition of chopper knives.

Billet lengths have decreased over time, from 250 mm+ in the early 1990s, to as short as 100 mm with 6 blades per drum today. As a result, chopper losses have increased from 2 percent up to 6-8 percent.

Adjusting the in-cab billet length dial varies roller train speed, which alters billet length. In doing so, the control either hastens or slows the rotational speed of the rollers (hence the cane bundle) relative to the tip speed of the choppers. While this does vary billet length, it also reduces billet quality and increases losses per cut.

How to maximise billet quality and ensure a consistent billet length

- Run roller tip speed in the range of 55-65 percent of chopper tip speed
- Butt-lifter tip speed 80–90 percent of the roller tip speed

By operating within this range, billet quality is maximised and billets will be a consistent length. Maximising billet quality means that both chopper box and extractor losses are minimised as there are fewer smaller fragments. Improved billet quality means reduced cut-to-crush deterioration, which improves cane quality and sugar quality.
Billet quality quickly reduces as blade sharpness deteriorates. Sharpness of the chopper blade and correct overlap is essential for chopping green leaf and trash, and minimising recycling of billets. Keep the blades as sharp as practically possible with a minimum knife overlap.

Points to consider:
- To minimise cane loss there is a compromise between cane cleaning and cane loss.
- Topping can improve CCS, bin weight, fibre and dollars/ha.
- To minimise chopper losses:
  > Set roller/chopper speeds to cut the longest billet.
  > Have the feedtrain surface speed to chopper tip speed ratio in the ideal 60-70% range.
- Important to replace chopper blades – worn blades increase chopper losses.
- Keep basecutter blades as long and square as practically possible.
- Important to discuss with your customers what your needs are and what their needs are.

How can growers minimise excessive cane loss

To minimise pick-up losses, stool damage and excess soil levels entering the mill it is important that row profile is consistent and matches the basecutter height and angle. Hill height and shape will vary depending on cultural practices and agronomic considerations, hence the vital importance of grower and operator discussion.

Whilst it is not possible to stipulate one specific height and/or size, some general rules apply:
1. Hill-up must be consistent across the block and, preferably, the entire farm.
2. Ensure that plant cane is properly filled in. Start bringing in soil once there are eight to ten shoots per metre.
3. Flat or hollow profiles are unacceptable. Harvesters cannot pick up cane out of a hollow.
4. Avoid excessive clods in the row as this increases soil in cane.
5. Aim to produce a flat, smooth interspace free of tine marks to give the harvester a level base to work on.
6. Consistent row profile matching the basecutter angle is the key to minimising stool damage.

Above image: Well filled-in and poorly filled-in cane.

Research indicates that there is no yield impact from filling in early versus filling in late however, filling in late leads to increased stool damage and increased pick up losses when harvested. When the filling in operation is left late, soil will not flow properly into the centre of the hill, resulting in a volcano effect. The volcano effect later results in high quantities of soil in the cane supply and increased cane pick-up losses. Stools are more prone to damage as they are not properly supported by the soil.
Improving field efficiency

With the current lack of harvesting capacity machines are cutting large areas every day to fill their bin quota. This can only be achieved by high pour rates which have negative effects on cane quality. One way for industry to minimise soil in cane supply is to have a strong focus on improving row profile/spacing to suit the harvester.

Another option to reduce pour rate without increasing harvester capacity/cost, involves improving farm efficiency.

Harvester field efficiency is the ratio of time spent cutting cane to the total time spent harvesting. Total harvesting time includes cutting, turning, infield service and maintenance, downtime, waiting for bins and rest breaks.

Research indicates that there is a large variation in harvester field efficiency between farms, blocks and harvester groups as well as between years.

The total cost of harvesting includes two components: variable costs and fixed costs.

Fixed costs related to harvesting include expenses such as depreciation, interest, storage costs, taxation and insurance. Those costs that are variable include fuel, repairs and maintenance and labour.

Variation in harvester efficiency amounts to large differences in the variable cost of harvesting between different farms and harvesting groups. Low field efficiency implies high labour and fuel use per tonne of cane harvested, and vice versa.

The difference in harvester field efficiency and the variable cost of harvesting between farms and blocks is impacted by differences in farm layout.

The Harvest/Transport Model was used to assess the relative impact of farm layout on the cost of harvesting. Modelling shows that turning within blocks accounts for a significant proportion of time spent harvesting. This implies that increasing row length and therefore reducing the number of turns will decrease the variable cost of harvesting. Increased hauling distance was also shown to increase the variable cost of harvesting.

**Points to remember:**

- To minimise soil in cane supply and ratooning losses, establish a row profile that matches basecutter setup, discuss this with your operator.
- The use of GPS guidance reduces variation in row width.
- Improve field efficiency by:
  > Joining blocks together (if possible).
  > Provide adequate headlands to reduce turning time.
  > Maintain headland and haul roads.
  > Provide efficient access to blocks (drain crossings in the correct places for efficient hauling).
### Key Focus Area 1 (Optimally-adapted varieties, plant breeding and release)

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<td>Generation of a high throughput SNP marker chip for introgression of resistance genes from wild germplasm into sugarcane, targeting smut, Pachymetra and nematodes, to generate more resistant varieties faster</td>
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Sugar Research Australia aims to invest in projects that will deliver real benefits on key issues for its investors.

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<td>DAG</td>
<td>Glen Grohn</td>
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<td>Strategies to manage soil-borne fungi and mitigate sugarcane yield</td>
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<td>Regenerating a soil food web capable of improving soil health and</td>
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<td>Role of controlled release fertiliser in Australian sugarcane systems</td>
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<td>Kirsten Verburg</td>
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<td>Modelling extreme yields in the wet tropics to improve nitrogen use</td>
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<td>Improving NUE for sugarcane crops with constrained yield potential</td>
<td>2015/065</td>
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<td>Danielle Skocaj</td>
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<td>Decision support for informed nitrogen management: soil nitrogen</td>
<td>2015/069</td>
<td>DSITIA</td>
<td>Phillip Moody</td>
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<td>How big will that crop be? Incorporating climate forecasting into nitrogen</td>
<td>2015/075</td>
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<td>Rapid detection of ratoon stunting disease</td>
<td>2013/001</td>
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<td>Mass production of the Adelina disease to better manage greyback canegrubs</td>
<td>2013/356</td>
<td>SRA</td>
<td>Nader Sallam</td>
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<td>Innovative approaches to identifying the cause of chlorotic streak and</td>
<td>2013/357</td>
<td>SRA</td>
<td>Barry Croft</td>
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<td>Development of controlled-release formulations of imidacloprid for canegrub</td>
<td>2014/006</td>
<td>SRA</td>
<td>Peter Allsopp</td>
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<td>Solving Yellow Canopy Syndrome</td>
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<td>Developing an alternative herbicide management strategy to replace PSII</td>
<td>2014/050</td>
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<td>A Novel Polyphasic Framework to resolve Yellow Canopy Syndrome Paradox</td>
<td>2014/082</td>
<td>UIWS</td>
<td>Brajesh Singh</td>
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<td>Validation of LSB-PCR diagnostic for ratoon stunting disease and</td>
<td>2014/086</td>
<td>NSW Sugar</td>
<td>Anthony Young</td>
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<td>characterisation of non-Lxx strains of Leifsonia associated with</td>
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<td>Review of the sugarcane Industry Biosecurity Plan (IBP) and development of</td>
<td>2014/088</td>
<td>PHA</td>
<td>Rodney Turner</td>
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<td>a Grower Biosecurity Manual (GBM)</td>
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<td>Delivery of remote sensing technology to combat canegrubs in Queensland</td>
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<td><strong>Key Focus Area 4 (Farming systems and production management)</strong></td>
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<td>Implementing a framework for farmers to engage in the use of precision technologies</td>
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<td>USQ</td>
<td>Troy Jensen</td>
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<td>Developing targeted, seamless weather/climate forecasting systems for critical early season harvest periods</td>
<td>2013/004</td>
<td>USQ</td>
<td>Roger Stone</td>
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<td>Developing remote sensing as an industry wide yield forecasting, nitrogen mapping and research aide</td>
<td>2013/025</td>
<td>UNE</td>
<td>Andrew Robson</td>
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<td>Too wet to forget – reducing the impact of excessive rainfall on productivity</td>
<td>2014/046</td>
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<td>Increased harvest recovery: reducing sugar loss and stool damage</td>
<td>2014/048</td>
<td>SRA</td>
<td>Cameron Whiteing</td>
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<td>Modernisation of furrow irrigation in the sugar industry</td>
<td>2014/079</td>
<td>USQ</td>
<td>Malcom Gillies</td>
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<td>Bio-prospecting for beneficial endophytes of sugarcane</td>
<td>2015/051</td>
<td>AgResearch</td>
<td>Stuart Card</td>
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<td>Spatially explicit estimation of achievable yield potential – an improved basis for fertilizer management</td>
<td>2015/070</td>
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<td>Rob Bramley</td>
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<td>Active and passive remote sensing platforms for improved monitoring and management of N within a PA framework</td>
<td>2015/076</td>
<td>UNE</td>
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<td><strong>Key Focus Area 5 (Milling efficiency and technology)</strong></td>
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<td>Determine the optimum tube dimensions for Robert evaporators through experimental investigations and CFD modelling</td>
<td>2012/054</td>
<td>QUT</td>
<td>Ross Broadfoot</td>
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<td>Improved modelling of wet scrubbers</td>
<td>2012/055</td>
<td>QUT</td>
<td>Anthony Mann</td>
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<td>Determination of factory processing procedures to better manage sugar quality issues</td>
<td>2012/057</td>
<td>QUT</td>
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<td>A retrofit to a mill to reduce its operational and maintenance costs</td>
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<td>Reducing the maintenance costs of mill rolls</td>
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<td>Geoff Kent</td>
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<td>Real time harvest and transport system (under contract)</td>
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<td>Improving mill efficiency through rapid analysis methodologies</td>
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<td>Managing aspects of raw sugar quality in the Australian sugar industry</td>
<td>2014/052</td>
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<td>Investigation into modifying pan boiling techniques to improve sugar quality</td>
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<td>David Moller</td>
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<td>Increasing capacity to undertake cane preparation research through modelling and experimentation</td>
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<td>QUT</td>
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<td>Develop a blueprint for the introduction of new processing technologies for Australian factories</td>
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<td>QUT</td>
<td>Bill Doherty</td>
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<td><strong>Key Focus Area 6 (Product diversification and value addition)</strong></td>
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<td>Process for making bagasse paper pulp</td>
<td>2012/053</td>
<td>QUT</td>
<td>Thomas Rainey</td>
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<td>A profitable future for Australian agriculture: biorefineries for higher-value animal feeds, chemicals and fuels</td>
<td>2015/902</td>
<td>QUT</td>
<td>Ian O’Hara</td>
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### Key Focus Area 7 (Knowledge and technology transfer and adoption)

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<td>Pachymetra awareness project for Condong mill area</td>
<td>2012/064</td>
<td>CANEGROWERS</td>
<td>Doug Irby</td>
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<td>Increasing farm business intelligence within the sugar industry</td>
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<td>AgProfit</td>
<td>Matthew Bryant</td>
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<td>Measuring the profitability and environmental implications when growers transition to Best Management Practice (as defined by the new Canegrowers Smartcane BMP)</td>
<td>2014/015</td>
<td>DAFF</td>
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<td>Improving industry returns through harvest best practice</td>
<td>2014/091</td>
<td>NSW Sugar</td>
<td>Ian McBean</td>
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<td>Understanding the impact of harvester speed on subsequent ratoon performance in the Burdekin</td>
<td>2014/092</td>
<td>BPS</td>
<td>Robert Milla</td>
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<td>Tissue culture – managing impediments to adoption in Tully</td>
<td>2014/093</td>
<td>TCPSL</td>
<td>Graham Cripps</td>
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<td>Sugar industry productivity and data recording spatial data hub for research and extension</td>
<td>2015/045</td>
<td>Agtrix</td>
<td>Patrick Kealy</td>
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### Key Focus Area 8 (Capability development, attraction and retention)

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<td>Modification of lignin biosynthesis in sugarcane for the production of cellulosic ethanol</td>
<td>2010/068</td>
<td>QUT</td>
<td>Patrick Bewg Heather Coleman</td>
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<td>Climate forecasting to improve sugarcane nitrogen management in the wet tropics</td>
<td>2011/062</td>
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<td>Biodegradable polymer nanocomposites derived from natural fibre and starch</td>
<td>2011/071</td>
<td>QUT</td>
<td>William Gilfillan William Doherty</td>
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<td>Enhancing sugarcane for decreased water content and increased sugar content at harvest</td>
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<td>QUT</td>
<td>Anthony Brinnin Mark Kinkema</td>
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<td>Production of furanics and chemicals from bagasse and molasses</td>
<td>2012/074</td>
<td>QUT</td>
<td>Joshua Howard William Doherty</td>
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<td>Identifying and overcoming limitations in crop models with respect to drought tolerance and climate change</td>
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<td>Investigating the utility of mill mud for soil health conditioning and nutrient use efficiency on sodic soils within the Burdekin</td>
<td>2013/077</td>
<td>USQ</td>
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<td>Effect of organic nutrients on sugarcane growth, microbial activity and greenhouse gas emissions</td>
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<td>Sugarcane for water limited environments: characterization of a selected sugarcane germplasm for transpiration efficiency and high biomass production for the sugarcane growing regions in Australia</td>
<td>2014/102</td>
<td>UQ</td>
<td>Sijesh Natarajan Shu Fukai</td>
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