ASSCT
Australian Society of Sugar Cane Technologists

42nd Annual Conference

SMART SCIENCE AND INNOVATION

21 - 24 April 2020 - Bundaberg

AUSTRALIAN SOCIETY OF SUGAR CANE TECHNOLOGISTS

President's Message

ASSCT 2020 Conference

The annual ASSCT Conference is the premier technical and professional event for the Australian sugar industry, and the 2020 conference in Bundaberg is celebrating the theme of Smart Science and Innovation. I encourage everyone to attend and use this opportunity to collaborate, think outside the square and hopefully by the end of the conference some new ideas and directions will be forged for the industry.

The conference is open to all people involved in the sugar industry; growers and researchers, engineers, millers and harvesting contractors, corporate and extension staff.

Sugar Tuesday will focus on showcasing the practical side of the industry, with the Industry Equipment Exhibition being open to the public in the morning, followed by an interactive session targeted to the growers, milling staff and harvesting groups.

During the main days of the conference, Technical Papers and the Poster Paper Sessions will bring together both local and international experts, focusing on cutting edge research and innovative engineering. A key focus is ensuring our industry is viable into the future, and by sharing the latest ideas and findings we are ensuring a united approach to the advancement of the Australian Sugar Industry.

The 42nd ASSCT Conference will be held at the Bundaberg Multiplex Convention Centre, from the 21st to 24th April 2020. The Welcoming Function will be held on Tuesday evening (21st April) following Sugar Tuesday, Happy Hour on Wednesday and the Gala Dinner on Thursday. Also, a delightful Partners Program has been planned, showcasing Bundaberg's local attractions with a focus on the Ag and food industry and innovative local businesses.

On behalf of the local organising committee, I look forward to warmly welcoming you to Bundaberg in April 2020 to participate in the 42nd ASSCT Conference and Industry Equipment Exhibition.

Best wishes,

Neil Halpin

President ASSCT 2020 Conference

SPEAKERS

Over 80 guest speakers, researchers and technologists will present during the ASSCT Conference. The official opening and initial keynote session will start at 9:00am at the Bundaberg Multiplex Convention Centre on Wednesday 22 April 2020.

Mr Richard Heath

Our keynote speaker is Mr Richard Heath, Executive director of the Australian Farm Institute, Director of the Grains Research and Development Corporation and former director Nuffield Australia Farming Scholars.

Mr Heath is also a Member of CSIRO Agriculture and Food Advisory Committee and was previously Associate Professor of Agronomy and Farm Management for the University of Sydney responsible for managing their North West Farms Group. Mr Heath is passionate about advancing the Australian agriculture industry and ensuring it stays profitable, sustainable, and competitive in the new global "smart" agriculture space.

The Hon. Keith Pitt MP

Minister for Resources, Water and Northern Australia and member for Hinkler the Honourable Keith Pitt will present during the ASSCT Conference.

Keith and his family have been part of the Wide Bay-Burnett community for two generations. His first full time job was at Fairymead Sugar Mill. Keith and his wife Allison purchased their first cane farm in 1998, but due to the demands of their growing business, both cane farms were sold. Keith's family continues to grow cane and run a substantial harvesting business.

In February 2016, Keith became the Assistant Minister to the Deputy Prime Minister, Barnaby Joyce, taking responsibility for a range of policy areas such as natural resource management and the Landcare program, soil health, animal welfare, rural skills and central Queensland water. In May 2019, Keith retained the seat of Hinkler in the Federal Election for his third term in Parliament. On February 6, 2020, Keith was appointed as Minister for Resources, Water and Northern Australia.

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Towards a molecular toolkit to assess biological health of soil

Advances in DNA sequencing technology have allowed researchers at The University of Queensland's Gatton campus and Metagen to explore the possibility of designing a molecular toolkit to assess the biological health of soil.

The research led by Anthony Young at UQ's School of Agriculture and Food Sciences will be presented at the 2020 ASSCT Conference, outlining how the research team aim to apply metabarcoding tools to help cane farmers continue to grow their awareness of the importance of soil health.

Anthony Young, The University of Queensland

"We know that nematodes are an excellent indicator of soil health but identifying and recording them is laborious and requires the expertise of a diminishing pool of trained scientists," Dr Young said.

"Further to that, advances in molecular methods to detect specific nematode targets and estimate their numbers have proved useful in the sugar industry but only for two key pests, root-lesion nematode and root knot nematode," he said.

"However molecular methods have not proved useful against the huge range of free living nematodes that are present in sugarcane soils and are arguably more informative with regards to soil health.

"New advances in DNA sequencing technology have facilitated the development of metabarcoding tools which can effectively identify as well as enumerate soil micro organisms such as bacteria and fungi."

Dr Young's research team investigated how to apply this new technology to identify and record soil nematodes, and how molecular tests that are developed could be used by farmers to assess the effectiveness or otherwise of soil health interventions.

"Advances in molecular biology and bioinformatics are making ecological investigations possible that were inconceivable a decade or two ago," Dr Young said.

"The challenge we're facing now is how to translate these advances into packages that can be adopted by stakeholders to drive sustainable production in agricultural systems, and our study reports the first steps in our attempt to develop a molecular toolkit which a cane farmer can use to measure the biological impacts of difference interventions and give them the confidence to adopt better practices." ■

The research was funded by Metagen in association with the Australian Federal Government Innovation Connections Grant Scheme.

EXPLORING THE ROLE OF THE AUSTRALIAN SUGAR INDUSTRY IN CLIMATE STABILISATION

Dr Marguerite Renouf

A recent review of greenhouse gas (GHG) accounting studies of sugarcane has revealed that there is opportunity for the Australian sugar industry to make a substantial contribution to emissions reduction by mitigating cane-growing emissions and abating emissions through bio-production.

The Australian sugar industry can be a positive force for reducing greenhouse-gas emissions for climate stabilisation research paper compiled findings from previous environmental life-cycle assessment studies that have quantified the GHG emissions and savings for different Australian sugarcane systems.

Lead researcher Dr Marguerite Renouf said GHG 'mitigation' at the farm can occur through best-practice cane growing – in particular the efficient use of nitrogen, pesticide and fuel – and energy efficient irrigation.

"It was interesting to observe that GHG mitigation has been a by-product of other environmental stewardship initiatives aimed at protecting water quality and soil health," Dr Renouf said.

"More significant scales of GHG abatement can also be achieved at sugar mills and bio-refineries through dedicated production of bio-electricity, bio-fuels and bio-materials that displace products made from fossil fuels," she said.

The estimated scales of GHG reductions show that both mitigation and abatement are important. However, an important condition for future dedicated bio-production is the avoidance of an up-front GHG debt due to land-use change.

Dr Renouf said the BMP cane growing practices and irrigation energy-efficiency initiatives being implemented by the industry already, have the industry on a good trajectory to achieve a reduction in GHG emissions, and in the future, sugarcane biorefineries established for dedicated production of biofuels, bioplastics and bioelectricity could make the industry a net avoider of GHG emissions. ■

Soldier fly, salivary glands and the impact on Australian sugarcane

Queensland scientists will share their cutting-edge approach to characterise the composition of salivary glands in soldier fly larvae – a common pest of sugarcane – at the 2020 ASSCT Conference.

In an ongoing economic issue for parts of the industry, soldier fly pest management is difficult in sugarcane crops as insecticides are ineffective and no varieties are tolerant to larval feeding, with larvae causing significant damage to roots, and crop yields.

Lead researcher Dr Kayvan Etebari from the School of Biological Sciences at the University of Queensland said little is known about the composition and function of the soldier fly salivary gland or its secretions, and the role that these products play in insect-plant interactions.

"In our study, a global gene expression approach was developed to characterise the composition of salivary glands in soldier fly larvae," Dr Etebari said.

Larvae and soldier fly

"This cutting-edge approach improved our understanding of the insect-plant interaction as it enabled us to produce the first gene expression profile in soldier fly salivary glands," he said.

Soldier fly larvae were collected from an infested sugarcane field near Hay Point, Queensland.

"Although we identified noticeable differential gene expression in the salivary glands of starved and fed soldier fly larvae, further comprehensive investigations to characterise the proteins that these genes code for are required, followed by functional studies in sugarcane plants," Dr Etebari said.

"There are many other sequences in the soldier fly transcriptome which have completely unknown functions. These need to be identified and their role in the interaction between soldier fly and its sugarcane host plant investigated." ■

This research is supported by Sugar Research Australia.

Focus on the performance of the falling-film tube evaporator at Bingera Mill

An evaluation of the first installation of a 4,000 m^2 falling-film tube evaporator (FFTE) in the Australian sugarcane industry will be shared with 2020 ASSCT Conference attendees.

Bundaberg Sugar installed the FFTE at Bingera Mill ahead of the 2018 season, and an evaluation program was led by scientist from the Queensland University of Technology during the 2019 season to assess the performance.

The evaluation considered heat-transfer efficiency, effect of scaling rates on heat transfer, de-entrainment efficiency of the juice droplets from the vapour outflow stream and the general operational performance.

Researcher Dr Iman Ashtiani Abdi said in addition, tracer studies were undertaken to determine the distribution of residence times for juice in the evaporator and measurements were also undertaken to determine the extent of sucrose degradation occurring within the evaporator.

"Overall the evaporator has performed well with respect to these test parameters," he said.

"However, the effect of scaling on heat-transfer efficiency was only able to be evaluated for typically 120 hours of operation as the mill was restricted to five-day crushing operations each week due to the small drought-affected crop and a chemical clean of the evaporator was undertaken on shutdown each week."

Dr Abdi said the FFTE, the ancillary equipment and the controls provided a robust operation compared to a regular Robert evaporator.

"While greater care is needed in the cleaning program for the FFTE, the test program did not show any major disadvantages comparted with a Robert evaporator," he said. ■

Falling-film tube evaporator at the Bingera Mill

> "Advantages provided by the FFTE included a smaller footprint, a lower mean residence time for juice and a less expensive installation.

Nitrogen from band-applied enhanced-efficiency fertilisers investigated

Researchers say insights gained from a study of the distribution and chemical speciation of nitrogen from band-applied enhanced-efficiency fertilisers (EEFs) could assist in updating existing best management practices within the Australian sugarcane industry by identifying how to maximise the nitrogen use efficiency (NUE) benefits of different EEFs.

Lead researcher, Chelsea Janke, from UQ's School of Agriculture and Food Science, said while EEF technology offers potential to improve NUE in sugarcane systems, the mechanisms and biochemical interactions of these technologies must be considered with respect to application method, soil physico-chemical properties and soil moisture content.

"Our research indicates that banded nitrification inhibitors are more likely to be effective in soils of limited permeability (i.e. high clay, high organic matter, and high cation exchange capacity) where nitrification occurs in zones closer to the fertiliser band," Mrs Janke said.

"This enables a greater coincidence of inhibitor and substrate," she said.

"Urease inhibitors are functional for a shorter period of time, and we found that the NUE benefits of this EEF applied in sub-soil bands are minimal. In fact, there is some indication that in some situations the enhanced nitrification arising from the less chemically hostile conditions in NBPT-urea bands may actually lead to poorer NUE outcomes compared to urea alone."

Mrs Janke said polymer-coated urea (PCU) exhibited a reduced and sustained supply of nitrogen to soil solution, relative to standard urea, but banding of PCU tended to further slow the release of nitrogen.

"This suggests label recommendations for determining N supply from PCU products may not be accurate for banded applications, making synchronization of N supply and crop demand difficult to achieve," she said.

"Our research also confirmed that soil type and soil moisture status also strongly influence N release kinetics from PCU."

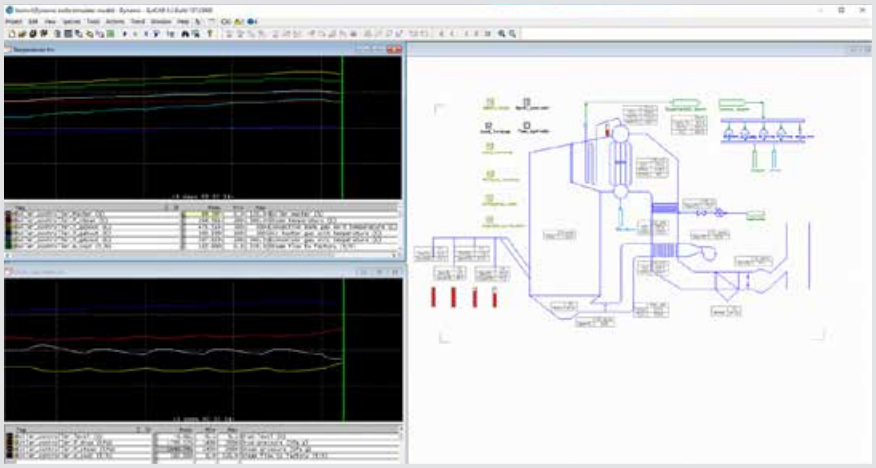
Mrs Janke will present the research findings at the 2020 ASSCT Conference. ■

The project was supported by the Australian Government's National Environmental Science Programme (Tropical Water Quality Hub), as well as scholarship support from Sugar Research Australia Limited, the Australian Government Research Training Program (RTP) and the Howard Memorial Trust.

Above: A band of polymer-coated urea (56 days after application) in a soil core

Improved operator training through boiler simulation technology

A paper by Queensland University of Technology's Dr Anthony Mann investigating the role of boiler simulators to complement the traditional modes of mill training will be presented at the Conference.



Screen view of online simulation training

Dr Mann's research summarises the development of a boiler simulator with a generic interface and training program that can be used for operator training.

"Simulators are an ideal complement to the traditional modes of training because they allow trainee operators to learn by doing rather than learning just by observing other operators and following instructions," Dr Mann said.

"Trainee operators can learn from mistakes made on simulators rather than mistakes during actual boiler operation that can have serious consequences," he said.

Some of the components of the boiler-simulator can be incorporated into the distributed control systems used by factories and use of the simulator will improve the skill level of operators and increase the effectiveness of operator training and operator refresher training.

Dr Mann said most operators in sugar factories have another role during the maintenance season, and there is anecdotal evidence from factories that issues arising from operator error are more common early in the crushing season when operators are getting back up to speed.

"Operator training in the sugar industry, like in a lot of other industries, has been based on trainee operators working under the guidance of more experienced operators who act as mentors," he said.

"In many cases, this approach works reasonably well, but in some cases it does not because some experienced operators may not be the best role models or trainers."

Based around these anecdotal factors and other investigation, Dr Mann's research suggests the use of simulation technology would result in a reduced risk of damage to boilers and lost production, and with improved operator performance the number of incidents should be reduced.

"This will improve the financial performance of the industry, the public perception of the industry and in the long term, reduce insurance costs," he said. ■

This research is funded by Sugar Research Australia.

Bundaberg welcomes ASSCT

The primary economic driver of the commercial hubs of Bundaberg, Childers and Gin Gin is agriculture, horticulture and sugarcane industries making Bundaberg the ideal location for the ASSCT conference. The Bundaberg community are delighted to support the ASSCT Conference and warmly welcome delegates to enjoy the vibrant city, local regional attractions and tourism hot spots.

Throughout the region there is a sense of history mixed with wilderness adventure, rural experiences and warm country hospitality. All this and more is waiting for conference delegates to enjoy. With its pristine environment, the Southern Great Barrier Reef region is home to many marine creatures. Humpback whales pass close to the shoreline en route to Hervey Bay, and Australia's largest mainland turtle rookery is situated at Mon Repos Beach.

> **"Throughout the region there is a sense of history mixed with wilderness adventure, rural experiences and warm country hospitality.**

Reef walk, snorkel and dive on one of the great wonders of the world – the Great Barrier Reef. Day cruise boat trips depart from Bundaberg each morning to Lady Musgrave Island.

For bookings contact Bundaberg Tourism on 1300 722 099 or go to **www.bundabergregion.org**

Photo: Bundaberg Tourism

Bundaberg Rum. *Photo: Bundaberg Tourism*

Photo: Bundaberg Tourism

Avro Baby Display, Hinkler Hall of Aviation. *Photo: Bundaberg Tourism*

Lady Elliot Island. *Photo: Bundaberg Tourism*

Conference Program

The official Opening Session of the 42nd ASSCT Conference will be held on Wednesday 22 April 2020 at the Bundaberg Multiplex Sports & Convention Centre, (BMSCC) – 1 Civic Ave, Bundaberg West, Queensland.

All General, Manufacturing and Agricultural sessions will follow at the same site, concluding after the tours on Friday 24 April 2020.

Some key events will be:

- **The welcoming function** – (held the evening before the official opening) commences at 5pm, Tuesday 21 April at the Bundaberg Multiplex Sports & Convention Centre
- **Official Opening Session** – Wednesday 22 April
- **Sugar Tuesday** – Tuesday 21 April from 11am
- **Happy Hour** – Wednesday evening, 22 April
- **Conference Dinner and Awards Presentation** – Thursday night, 23 April
- **AGM** – Friday 24 April
- **Conference Tours** will be held on Friday 24 April.

An electronic copy of ASSCT Conference Proceedings will be sent prior to the Conference to all ASSCT members who have paid their membership fee of $100 for 2020. An electronic copy of the Conference Proceedings is also included as part of the Conference registration.

Contact:
Doug Sockhill – ASSCT Secretary
Phone: 07 4954 3956
Email: secretariat@assct.com.au
Web: www.assct.com.au

Conference Tours – Friday 24 April

The Manufacturing tour

This tour will visit Bundaberg Sugar Ltd, Bingera Sugar Factory. Bingera Sugar Mill recently upgraded their Evaporator Station during 2016 to 2018, replacing their No.4 and No.5 Evaporators with a new 1,500sq.m No.5 'Roberts' Evaporator and a new 4,000sq.m No.1 Evaporator. The new No.1 Evaporator is a tubed Falling Film (FFT) Evaporator and is the first of this design to be installed in Australia. Bingera also have a very rare 1942 Ruston Lincoln diesel engine, 5 cylinder, 300hp at 333rpm which will be started for the benefit of the visitors.

Also on display will be Bundaberg Walkers new prototype 'Steep-angled Interconveyor (Air Bed)' for the benefit of the tour group. The visit to Bingera Mill will conclude with a barbeque lunch kindly provided by Bingera Mill prior to the return trip to Bundaberg Multiplex Centre.

The Agricultural tour

This tour will give delegates the opportunity to visit the Canetec factory, Bundaberg Sugar's Fairymead Farm and Sugar Research Australia's new research station. Based in Bundaberg, Canetec is an Australian owned company that manufactures a range of sugarcane harvesters for the domestic and overseas markets. Their machines are all designed to meet specific market requirements and are built by a local team of dedicated tradespeople. The tour of the Canetec site will give delegates the opportunity to tour the factory floor to see various components being manufactured and assembled as well as completed machines on display.

Bundaberg Sugar are actively value adding to their farming enterprise by growing a range of alternate crops that can be grown in the fallow or in a longer rotation with sugarcane. The tour will highlight some of these crops and allow Bundaberg Sugar staff to explain their strategy for adopting these crops in their farming system. Corn, soybeans, peanuts, ginger, pineapples and raspberries are being successfully grown in rotation with sugarcane to give a diverse and sometimes challenging mix of crops to manage.

Sugar Research Australia recently opened new research facilities and the tour will include farm trials, research facilities and allow researchers to showcase some of their current projects. This will also be our lunch stop, which will allow visitors a chance to catch up with SRA staff and fellow delegates at the final conference event before heading home.

Tasting sugarcane juice at Fairymead House Sugar History Museum

CONFERENCE INFORMATION

The Partners program has been arranged for partners of delegates not attending the Conference technical sessions who wish to explore to local region's tourism hot spots.

The partner's registration fee of $300 covers the cost of the Welcome Cocktail Function, the Conference Dinner and tours during the partners' program.

The partners program will be held on Wednesday and Thursday. Join us for a fun filled couple of days visiting Bundaberg's local city attractions and regional farm tours.

Accommodation

Bundaberg has excellent accommodation options within walking distance of the Conference venue. ASSCT has arranged courtesy buses for some motels to transport conference delegates to and from the venue each day.

Delegates are responsible for selecting, booking and paying for their own accommodation during the conference. Bundaberg is a popular destination for travellers, so please book early.

A list of motels is available from the ASSCT, or contact
Bundaberg Visitor Information Centre
Phone: 1300 722 099
Email: **info@bundabergregion.org**, or
Web: **www.bundabergregion.org**

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Registration

Early bird discount ends 13 March

- Full/Associate Members and Delegates of Supporting Members – $350 (increases to $390 for payments after 13 March 2020)
- Life Members – $280 (increases to $320 after 13 March)
- Non-Members – $400 (increases to $440 after 13 March)

On-site registration is available commencing 11:00am on Tuesday 21 April or 7:30am on Wednesday 22 April at the conference venue.

The registration fee provides entry to all Conference sessions, the Welcome Function, a Conference Dinner, Conference tours, morning and afternoon teas and lunches on Tuesday, Wednesday and Thursday as well as morning tea and lunch on Friday.

For delegates and partners not registering for the Conference, tickets are available for the two social functions at individual cost. Welcome Cocktail Function on Tuesday evening ($60) and /or the Conference Dinner on Thursday evening ($100) can be purchased from the ASSCT website.

You can register for the conference at
www.assct.com.au/conference/registration

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