YCS update

March 2016

Sugar Research Australia™

Prompt response to YCS program review

By Professor John Lovett, Chair, Scientific Reference Panel (SRP)

In SRA's most recent update to you about Yellow Canopy Syndrome (YCS), we explained that the SRA Board had commissioned a significant review of its YCS research investment.

As part of that review, an independent panel of eight scientists – five from the USA and three from Australia – made a critical assessment of the YCS research program to ensure that it was being properly targeted and to assist SRA in making any improvements.

The independent panel's report told the SRA Board that the research effort so far had been strong, but they also said that more work needs to be done to understand the symptoms of YCS so that it is not confused with other leaf yellowing.

The panel also highlighted one of the major challenges that researchers face when dealing with YCS: it is an erratic problem that has a range of impacts and we do not know how it is spread.

The independent panel made some recommendations for improvement that SRA has quickly enacted. One of these major changes is that we now have a dedicated person, Dr Frikkie Botha, SRA's Executive Manager for Strategic Initiatives with direct responsibility for the overall delivery of the YCS integrated research program (IRP).

Dr Frikkie Botha and **Gerard Scalia** from SRA discuss YCS symptom expression in the field at Home Hill.

The panel reported that, for on-going management of the research effort, SRA's Scientific Reference Panel continues to have a significant role to play, by providing excellent input into the YCS integrated research program.

The independent panel also made other recommendations which were considered by a meeting of the SRP with senior SRA Management in January. These are:

- increase focus on a systematic approach to determine whether a biotic agent (pest and/or pathogen) is the cause, focusing particularly on plant physiology and entomology;
- examine the association of water stress with YCS;
- multiple approaches need to be investigated to develop a "clean cane source" – a key issue has been whether a cane supply currently not displaying YCS symptoms is, in fact, already affected by YCS;
- the information collected so far needs sophisticated evaluation;
- more effort is needed to develop a way of diagnosing YCS in a reliable way, and
- SRA breeding teams need to evaluate potential varietal responses to YCS across their existing trials.

The YCS IRP is a collaborative process, involving four major research projects (two at SRA, one at CSIRO and another at Western Sydney University). It also enlists the help of laboratories and scientists around Australia and internationally.

As well as a gigantic effort in the lab, there are also numerous field and pot trials occurring in strong collaboration with growers and productivity services organisations.

These include four field trials and two pot trials in the Burdekin; at Ingham there are insect, soil biology and a YCS management trial; and there are also YCS management trials at Mackay, Proserpine and Mulgrave near Cairns.

You can read more about this work within this YCS update or otherwise contact SRA's YCS Adoption Officer, Belinda Billing, on bbilling@sugarresearch.com.au or 4783 8602.

SRA acknowledges the funding contribution from the Queensland Department of Agriculture and Fisheries towards this research activity.

Rosa Shafiei (SRA), **Dr Frikkie Botha** (SRA), **Dr Kelly Hamonts** (WSU) and **Gerard Scalia** (SRA) discuss YCS and sampling procedures in the Burdekin recently.

Coordinated effort drives YCS research

A birds-eye view of Ian Shepherdson's farm at Home Hill in 2016 reveals a flurry of vehicles, machinery and researchers all working to understand the YCS problem.

Spread across his sugarcane paddocks are three trial sites, including SRA's largest 2016 YCS trial, as well as researchers in paddocks busy sampling for sugarcane that is both yellow (showing symptoms) and green (not showing symptoms).

These researchers are from across the YCS integrated research program, both local to the Burdekin, from SRA in Brisbane, and from Western Sydney University. Other researchers from the CSIRO in Brisbane will also be working at his farm in 2016.

YCS samples frozen in liquid nitrogen and then packed in dry ice ready for transport back to several laboratories. **Annelie Marquardt, Rosa Shafiei, Kate Wathen-Dunn,** and **Gerard Scalia** escort the cargo.

Researchers have been busy preparing and analysing trials as well as collecting hundreds of samples of sugarcane, trying to understand what is happening on the inside and outside of sugarcane plants that are affected by YCS. They are also sampling from plants that are not impacted by this phenomenon.

The samples will be analysed in laboratories not just in Brisbane and Sydney, but also in further away places including Melbourne, Adelaide, and the United States, all as part of SRA's effort to leave no stone unturned in finding answers on the mysterious syndrome.

In recent weeks, researchers from across the YCS integrated research program have been working together to collect samples from sugarcane that is showing symptoms of YCS.

By ensuring that samples from a common source are investigated by researchers across the YCS integrated research program, more useful and reliable information will be obtained. The collaboration is part of a coordinated effort to ensure researchers working on the YCS research program will be analysing plant material from the same origin. It is imperative that the type and quality of sample collected is consistent and of the highest integrity, as all further processing and analyses are dependent upon this.

SRA's Executive Manager for Strategic Initiatives, Dr Frikkie Botha, said that the recent sampling at Ian Shepherdson's farm was a great opportunity to improve the understanding of YCS.

"We have very defined expression of symptoms here," Dr Botha said. "This is something that we haven't seen before where within one paddock there is a very sharp divide between YCS symptomatic plants and plants without symptoms, all with no secondary affects.

"This will allow us a very useful comparison, and I am hopeful that the samples we have taken here should provide more answers on the things that are present in YCS symptomatic plants versus the control plants."

It is also the first time the teams have sampled from Q240$^{(1)}$, which has been chosen in this case because of the very clear YCS symptoms.

The samples are now being analysed and the data will be used alongside practical on-farm trials that are in place across growing regions impacted by YCS.

Punching leaf samples for YCS at Ian Shepherdson's property.

Local grower keen YCS research collaborator

Burdekin grower Ian Shepherdson has experienced first-hand the devastating impact of YCS. Farming near Home Hill, Mr Shepherdson had his worst year of YCS in 2012 and in that year grew about 13,000 tonne of cane when he would normally average about 17,000t.

With all of that loss attributed to YCS, he has estimated in that first year alone the problem cost him over $100,000.

Yields have recovered in recent years and last year were back to 17,000t, however he still continues to see serious impacts and is concerned that YCS will continue to be a problem.

Ian has been a keen collaborator with SRA researchers over several years, with three types of trials on his farm in 2016. Sampling for YCS also occurs on his farm and Ian and his wife, Elizabeth, have also collected samples for SRA using a new leaf punch method.

Ian and Liz are SRA's "eyes in the field", able to check for symptoms daily and to collect samples, making them invaluable to the project. This has provided SRA with material collected at critical times, which allows much to be learnt about YCS development.

SRA has four field trials and two pot trials in the Burdekin, including one field trial that is a collaboration with Burdekin Productivity Services (BPS).

Mr Shepherdson said that the main impact at his farm had been with reduced tonnes, rather than CCS.

"However we do have an early CCS issue where the crop doesn't grow as well early in the year, and then at harvest the crop is just not mature," he said.

Burdekin grower **Ian Shepherdson** has continued to face YCS for several years and at its worst he estimated it cost him $100,000.

"But the main impact is reduced tonnes, and in one block in our worst year we cut about 75 TCH, which is very poor for this area and a second ratoon crop. It should have cut nearly double that, although the CCS did end up about 16.5."

Having YCS has emphasised the need for Ian to minimise stress on the crop, as he believes stressed crops are impacted the worst.

"I appreciate the work that SRA have been doing on YCS," he said. "It has been good to work with them, as well as BPS through the joint trial that BPS and SRA have here."

Mulgrave trial hopes to learn management strategies for YCS

Mulgrave district grower **Richard Hesp** continues to battle the impacts of Yellow Canopy Syndrome (YCS).

Mulgrave district farmer Richard Hesp is now facing what he said is probably his fifth season of contending with Yellow Canopy Syndrome (YCS).

And having seen the syndrome have a huge negative impact on his crop's yield and CCS over these years, he has been a keen partner in an on-farm trial that has been run by SRA at his property at Mt Sophia.

The trial is being run by SRA pathologist Dr Robert Magarey in collaboration with David Calcino from SRA Meringa and Matt Hession from the Mulgrave Mill. It is part of the project Solving YCS, which is led by Davey Olsen. It is one of several trials that have been and continue to be run in partnership with growers, millers, productivity services organisations, and others, to work together to pinpoint the exact cause of YCS.

The trial at Mr Hesp's property is looking at several treatments including differences between ratoons, plant cane, and standover cane, as well as nutrient treatments to determine if there are nutritional interactions as well. This includes treatments for silica, which has been observed to be deficient in some instances where YCS has been observed.

It is one of several trials that SRA is conducting in collaboration with growers and productivity services organisations across the industry.

"This trial is looking at some things you might be able to do in a badly affected crop, including whether there is a nutritional interaction as well," Dr Magarey said. The trial will be carried through until harvest this year, at which time it is hoped that it will yield some useful information for researchers, growers, and millers.

Mr Hesp said that YCS had appeared again in 2016 following rain that occurred across the district around the start of the year.

"So far, the worst of it is in a block of only about 3 acres (1.2 ha) of Q208(ɬ), but I know already that there will be a production loss," he said. "In previous years, I have seen blocks that should have been yielding greater than 90 TCH yielding around 40 TCH."

"CCS has been particularly low, yielding probably three units lower than normal. I have also had other blocks that didn't show YCS as badly, which were probably 20 percent down on tonnes, and I felt that the CCS was down from where it should be as well."

Mr Hesp said he had not drastically changed his farming practices, but that he was eager for answers on the best way of dealing with the syndrome. "We are trying a few ways to minimise stress, for example in our plant cane we are trying to maintain moisture."

"In saying all that, in the Mt Sophia district we have had fairly good growing conditions for the last six months, so there shouldn't be a lot of stress on the crop, but we are still seeing YCS."

He has had similar observations to those of SRA researchers where YCS has been in one block one year, but not at all in the following ratoon. He has also seen a wide range of symptoms.

"In the worst of it, there was a block along the highway where I had people from outside the industry asking me what I had sprayed it with or what I had done wrong. I hadn't done anything. Those blocks are now on their third ratoon and are about average, so it did recover."

SRA researchers have observed YCS in all varieties, which is something that Mr Hesp has also noticed.

The trial at the Hesp family property.

SRA acknowledges and thanks its funding providers, including levy payers (sugarcane growers and millers), the Commonwealth Government, and the Queensland Government (Department of Agriculture and Fisheries).