

# YCS update

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## YCS research effort focused on answers

*By Professor John Lovett, Chair, Scientific Reference Panel*

In November, researchers working on the Yellow Canopy Syndrome (YCS) research program met for an annual review meeting to progress the collective effort being devoted to solving this problem facing the Australian sugarcane industry.

There are more than 30 researchers working on YCS in some capacity, approaching the problem from different angles and across four projects in multiple locations.

Therefore, these meetings are vital to ensure that the researchers are all moving in the same direction toward the common goal of solving YCS.

This work ranges from diverse activities that include field trials in local regions in collaboration with productivity services organisations, to high-end scientific analysis at the University of Western Sydney, and to further technical work at SRA's laboratories in Brisbane.

The meeting is also vital for the Scientific Reference Panel – comprising myself, Dr Geoff Inman-Bamber, Professor Roger Hellens and Professor Andre Drenth – to understand the progress that has been made and continue to help guide the research toward the goal of understanding and solving YCS.

This year's meeting was also strengthened by the presence of a panel of eight scientific experts, who were invited to provide ideas and discussion regarding the YCS research program (see the story on page three).

This Expert Panel provided some very useful advice for the scientists working on YCS, and the Panel will also add value by providing recommendations to the SRA Board for potential future directions of the research.



While we're not there yet, we are continuing to make progress and are investigating some encouraging leads towards the objective of understanding the cause of YCS and how the condition may be managed.

We have learnt that there are blockages and disruptions to the 'plumbing' inside the sugarcane plant. We have also learnt that there appears to be a relationship between water (either too much of it or not enough) and when YCS appears in the paddock.

It seems that no variety is immune to YCS, although different varieties may be impacted at different times and with some variation. Plants will often have green leaves as well as yellow leaves. We know that YCS is different to normal leaf yellowing such as from drought and that there is a build-up in sugar in the leaves even before the yellowing of leaves occurs. It appears that there is a decrease in photosynthesis, and we know that while impacted crops may recover from YCS, the individual impacted leaves do not recover.

Growers are making a considerable investment in the program through SRA. I believe that the research program is a good investment, which is beginning to show returns. By the time the program is complete we shall certainly understand the syndrome better and hope to develop management options for it.

As you read this, we will soon be heading into the early months of the year when YCS symptoms appear at their worst.

We appreciate that it is not always possible for you to minimise stress on your crop – say if you are in a dryland district and have a month without rain – but work to date suggests that one of the best options for growers is to minimise stress on their crop as much as possible.

It is also worth remembering that the look of the crop in summer is not always a prediction of the final yield. We know that there continue to be severe losses from YCS but we have also seen crops that have recovered by the time the harvester rolls in.

SRA encourages growers to report YCS observations to their local productivity services organisation.

**Left:** The Expert Panel invited to comment upon the YCS research program: Professor John Randles, Dr Graham Bonnett, Professor Blake Bextine, Adjunct Professor James Ridsdill-Smith, Dr Robert Osgood, Professor Jeffrey Hoy, Professor Randy Ploetz, and Adjunct Professor Melvin Oliver at the SRA Meringa research station.



The way YCS appears to be worsened by stress is prompting **Mr Greenwood** to consider the best ways to minimise stress on his crops.

### Grower observation: YCS impact causes management rethink

A continued battle with YCS over the last two years has Andrew Greenwood seeking options for minimising his losses from the unknown syndrome. Farming at Green Hill, south of Cairns, Mr Greenwood has in the worst cases seen yields as low as 40 tonne per hectare in blocks affected by YCS.

The worst aspect of these low yields is that these losses have occurred in paddocks where they should otherwise be some of the best blocks under his management. The losses have occurred in crops of plant cane that came after a fallow with a rotation crop such as soybeans, with the fallow kept clean and lime and fertiliser applied as per soil sample results.

“On any normal fallow plant, if I don’t get 100 t/ha then there is something wrong, provided I’ve done everything right. But the YCS cane is not coming near that,” he said. “Twice now it has happened to me and both times it has followed dry years when the growing season in October, November and December was quite dry.”

He believes YCS appears to be worsened by stress.

SRA researchers have also made a number of similar observations that YCS appears to be worsened when there is stress present. A number of trials have been planted in recent months to further investigate the interaction between stress and YCS.

For Mr Greenwood, the question of the YCS impacts and what to do at the end of the crop cycle is mostly applicable to parts of his farms where he cannot grow peanuts, a crop which has continued to deliver both income and substantial benefits for the subsequent cane crop. He has not observed YCS yet in cane that has followed peanuts.

His use of peanuts and a range of other practical farming methods has helped him win local awards for the Mulgrave Mill area, including for example in 2011 and 2012 when he won highest tonnes of cane/ha and highest tonnes of sugar/ha.

“YCS is a major cause of concern because you don’t know who is going to get it, or how, or when, or why. We have to get on top of it.”

#### ***The Integrated Research Program on YCS funded by SRA:***

- Solving the Yellow Canopy Syndrome, led by Davey Olsen, SRA
- Leaf sucrose: the link to diseases such as YCS and enhancement of sugarcane productivity, led by Frikkie Botha, SRA
- A novel polyphasic framework to resolve the Yellow Canopy Syndrome paradox, led by Brajesh Singh, Western Sydney University
- Sugarcane root systems for increased productivity; development and application of a root health assay, led by Anne Rae, CSIRO

## Expert Panel boosts scientific collaboration to solve YCS

SRA has enlisted the help of a team of eight scientific experts to provide feedback and guidance to the YCS research effort. The experts – five from the United States and three from Australia – are specialists in diverse fields including sugarcane plant breeding, plant pathology, physiology, agronomy, entomology and virology.

The mandate of the Expert Panel was to provide feedback and guidance to the YCS research effort and to help stimulate discussion with researchers at an annual YCS research meeting.

"This group has met with our researchers to look at this problem from every possible angle and to ensure our research is coordinated and strategic going forward and focussed on outcomes for sugarcane growers and millers," SRA CEO Neil Fisher said. "Our goal is to make sure we are considered and strategic, while also thinking outside the square as we search for answers."



Expert Panel members Professor Jeffrey Hoy, Adj/Professor James Ridsdill-Smith and Dr Graham Bonnett taking notes as they listen to researchers working the YCS integrated research program.

SRA has prioritised the investment in solving and managing YCS as one of four priority Impact Areas for research investment for the Australian sugarcane industry. SRA is currently investing in four major projects looking at YCS from different angles from the roots to inside the internal functioning and metabolism of affected sugarcane plants. This includes two projects at SRA, one at University of Western Sydney, and one with CSIRO.

"SRA has enlisted the help of these eminent scientists in their field of expertise to help guide our integrated research program," Mr Fisher said. "They add to the rigour and expertise that is already provided by our existing Scientific Reference Panel."

Mr Fisher said the gathering of scientists was a valuable opportunity to collaborate and drive innovative ideas within the YCS research program. "Unfortunately we have yet to solve the YCS dilemma, however we are continuing to improve our understanding of the syndrome and working toward answers on what YCS is, and management options for it," Mr Fisher said.



Professor **Jeffrey Hoy** from the University of Louisiana has more than 30 years of experience with sugarcane. He said it is clear that YCS is a serious problem for Australia. "It appears to be a very stress dependent problem, so it is likely there will be management options that will minimise the problem," he said.

Professor Jeffrey Hoy from the University of Louisiana was Chair of the Expert Panel, and said that he was impressed by the work that was already occurring around the very complex YCS problem.

"I had heard about the YCS problem, so I was very interested see what was going on," Professor Hoy said. "With the tremendous amount of research that has been put into addressing it, the SRA Board thought an independent review would be beneficial. So they gathered a panel of eight different people with diverse expertise.

"Our purpose is to provide an assessment of the research program as it exists and how it should be going forward.

"I would describe it as a roadmap to go forward to solve YCS, which is a very serious problem. The work effort was already amazing, but we are hoping to push it further along to find out the cause."



Adjunct Professor **Melvin Oliver** in the field inspecting YCS symptoms near Gordonvale. "The primary priority should be to find the causal agent, and secondly investigate the issues associated with stress and symptoms," he said.

## Walkerston trials demonstrate local collaboration on YCS

Compost, mill mud, and a variety of biological solutions, form the basis of a new YCS management trial on a Walkerston cane farm. The trial is part of a group of collaborative YCS management trials being run by Sugar Research Australia (SRA) and productivity services in Mackay, Proserpine, the Herbert and Burdekin regions.

Allan Royal, Mackay Area Productivity Services (MAPS) Senior Agronomist, said each cane region was conducting different trials, but in the Mackay region the focus was specifically on soil health. Mr Royal said SRA had initiated the trials, which aimed to answer local questions on whether particular management actions could mitigate the impact or severity of YCS.

In Mackay the focus of the trial has come about through MAPS staff's thoughts on soil conditions and their suspicion that poor soil health could be linked to the mystery of YCS.

"We wanted to trial compost and mill mud incorporated in the stool with soil health as our major focus," Mr Royal said.

"The question that we have been asking ourselves is: is the cause below and not above the ground - does the condition of the soil and the health of the root system of the sugarcane plant have an impact on the severity of, or its susceptibility to, YCS?"

"Over some time and many observations, it does appear to us that YCS is more likely to show up in the blocks of cane that are stressed first. And this is where we get on the soil health wagon; because we suspect that vigorous and healthy sugarcane may be rigorous enough to withstand YCS, and this would begin with a healthy balanced soil."

A one hectare block of Q232<sup>®</sup> on the McLennan's Walkerston cane farm that was severely affected by YCS last year was the ideal location for the trial site.

Darrell McLennan and his family have donated this site to SRA and MAPS for the trial, and they have also provided many man hours and much of the machinery required to get the site established.

The three replicate trials of 15 m x 6 m row wide plots took around three weeks to set up and trial establishment began on October 14 with staff from SRA and MAPS as well as Darrell all involved.

The trial set up includes:

- Compost at five and ten tonnes as well as compost at the same rates with added biology products.
- Mill mud applied at 25 t/ha with and without biological products.



Trials in partnership between MAPS and SRA at Mackay are looking at the role of stress in relation to YCS.

Two more treatments will see the application of two different 'soil health' solutions; Essential plus, a nutrition product which aims to improve soil and root health and Companion, a biological microbial inoculant, applied over the rows once a month.

Allan will be monitoring the trial weekly through to harvest next year taking note of the emergence, prevalence and severity of any YCS symptoms across the treatments, as well as any other interesting signs.

The trial design and coordination has been led by John Agnew and Allan from MAPS along with Jane Brownlee, SRA Senior Research Technician. Jane works on the Solving YCS research team led by Davey Olsen.

"Any success we see in these management trials will be communicated to growers by SRA and MAPS, and we will be able to learn from the trials in other regions which are quite different to what we have here in Mackay," Mr Royal said.

"We believe that healthy soil and a strong root system may increase the cane's own abilities to defend against YCS, and we certainly hope to see that happen."

Mr Royal explained that the collaborative management trials were not so much about understanding what is causing YCS but investigating whether there are potential ways of limiting the severity of the condition.

"There is a significant amount of research looking into what is causing YCS, but while we get to the bottom of this mysterious condition we would like to find some strategies for growers to implement that will limit the impact on their farm productivity," he said.

SRA and MAPS thank the McLennan family along with Jurgen's Produce who provided the compost, Mackay Sugar who have provided the mill mud, and John and Barbara Walker, of Brightley, who provided the subsurface compost applicator.

*Article courtesy of Sonia Ball, Canegrowers Mackay.*