YCS update

September 2016

Sugar Research Australia™

Communicating YCS activity with the industry

As growers, millers and industry stakeholders are aware, there has been an ongoing media interest in the impact of Yellow Canopy Syndrome (YCS) on the Australian sugarcane industry. That media attention also focuses on the research effort that spans across several research projects and various trials and research activities.

Interacting with the media is an important way of ensuring that SRA is able to communicate with all of our industry stakeholders and able to keep you informed about the progress that is occurring. It is also another means of ensuring the broader community is aware of the issues that exist within the Australian sugarcane industry.

As part of that, SRA recently hosted a crew from ABC Landline to our laboratories at Indooroopilly. The purpose of the visit was to explain SRA's research into YCS all the way from field trials through to laboratory work, not only in Brisbane, but also in collaboration with laboratories at other research institutions.

Above: SRA Technician Rafael Garcia Tavares performing an enzyme assay to determine sucrose and starch quantities in YCS leaf samples.

Header: A YCS leaf sample collected earlier this year from the Hervey Bay region and cut into four pieces, about to undergo analysis in the Brisbane lab.

Above: SRA's Gerard Scalia talks with the ABC's Courtney Wilson about current research looking at the 'inside' of the sugarcane plant, including issues such as sugar and starch accumulation in the leaves of impacted crops.

The visit to Indooroopilly had a strong focus on the research occurring within the project *Leaf sucrose: the link to diseases such as YCS and enhancement of sugarcane productivity*, which is taking a close look at the internal functioning of the sugarcane plant in relation to YCS.

The Landline program will also be visiting field trials and is expected to air at some time during September.

Above: SRA researcher Jaya Basnayake measures photosynthesis on a leaf simultaneously with the sap flow rate in the stem.

Can YCS affect the transport system in the sugarcane stem?

By Jaya Basnayake, Senior Researcher, SRA Brandon

To investigate the effects of YCS on vascular flow rate and to quantify the impairment of sap mobility within the stem vascular system, we installed sap flow meters and psychrometers on YCS symptomatic and asymptomatic (free) plants in a grower's field.

The main objective is to investigate any changes in vascular flow rate in YCS symptomatic plants.

Our preliminary observation in December 2015 and early January 2016 showed sap flow rate impairment in YCS symptomatic stalks compared to asymptomatic stalks of the same age and conditions.

We are planning to do more detailed investigation on this concept during the next YCS season in 2017.

The sap flow meters measure the thermal gradient of moving solvent in the vascular system and convert this temperature gradient to the velocity of the sap flow using the modified Marshall equation (1958) for heat transfer in liquid.

This technology has been tested in grapes and other tree crops but not in sugarcane.

An added advantage of this instrument is the use of it to monitor canopy transpiration rate and water use in order to understand the relationship between YCS and water use in different sugarcane varieties under different stress conditions.

Sap flow meter connected to the sugarcane stem to record a real-time electrograph of sap flow in the stem.

Grower observation

Above: The impacted crop in June 2016.

Mulgrave grower braces for severe YCS impact

Mulgrave district farmer Vince Reghenzani is now contending with his fifth season of dealing with Yellow Canopy Syndrome (YCS) and is expecting he will be faced with some disappointing results when the harvester moves into some of his worst-affected paddocks.

Mr Reghenzani has farmed in Far North Queensland for more than 50 years and says that the impacts from YCS are as bad as he has seen from other factors that have negatively impacted yield over the years of experience.

For example, this year he has an August-2015 plant block of Q200$^{\phi}$ that has had lime applied and fertilised according to the SIX EASY STEPS™ recommendations.

The block has granite gravel country at the top end where the YCS symptoms have been the worst, and moves toward clay country at the bottom where the YCS appeared to be less severe.

"A block like that we should be getting in the range of 100 tonne per hectare, and we need that when considering the costs of establishing the crop," he said.

"But looking at this paddock, it looks like it will go 50-60t/ha. A lot of the stalks are so thin that they are going to get blown out the harvester."

Mr Reghenzani said on his farms the YCS appeared to strike worst in the lighter soils, and he said there needed to be a strong research effort looking at soil health.

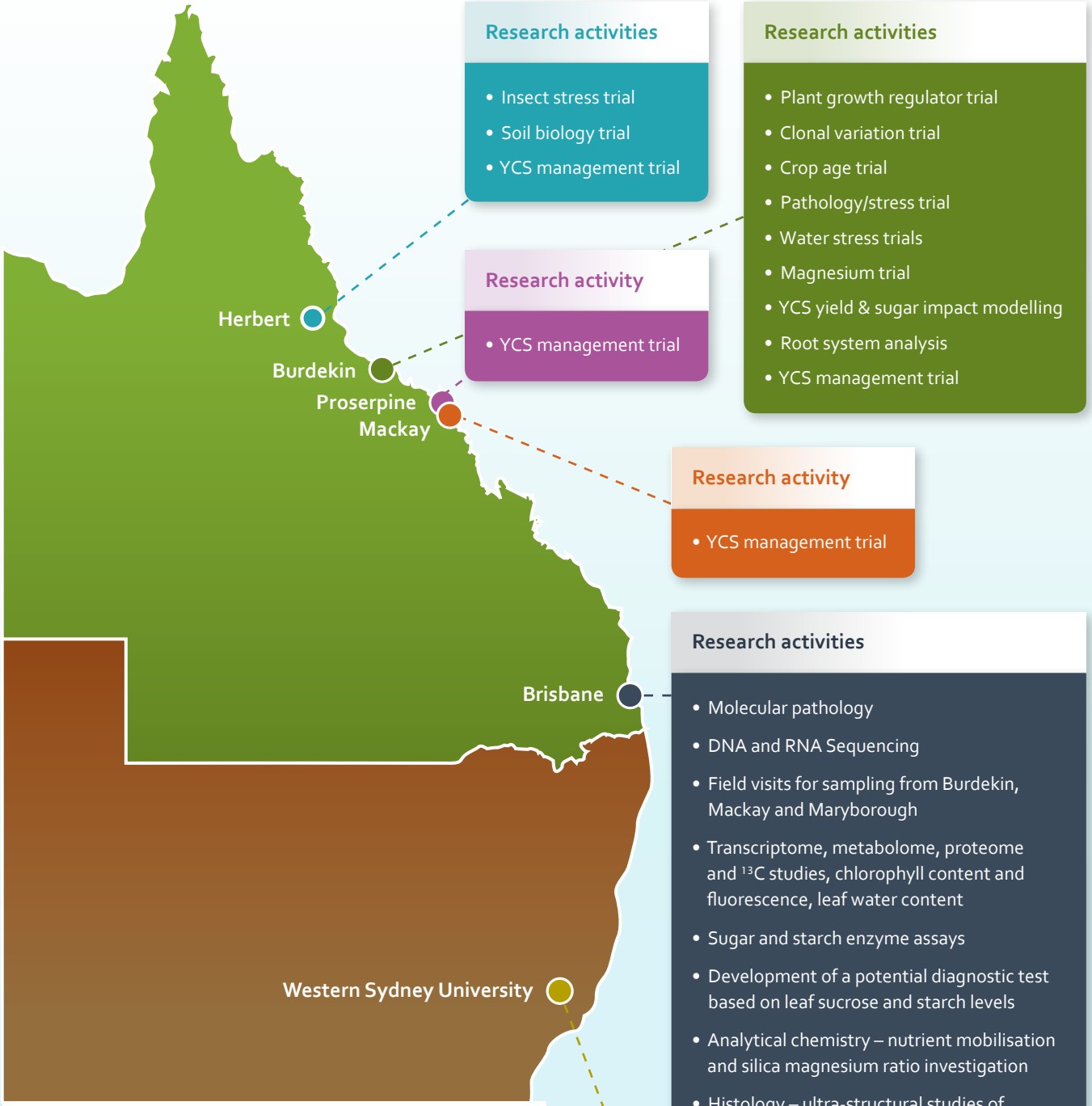
Grower **Vince Reghenzani** in a crop of Q200$^{\phi}$ in June that he expected to yield about 40 percent down on normal expectations given the management and the season.

SRA-funded research is conducting a number of trials this year that relate to soil health. This includes research led by SRA's Davey Olsen in the Burdekin, where a number of the trials are also collaborating with local productivity services organisations and also with growers who are impacted with YCS. This includes trial work at Mr Reghenzani's property looking at some soil health issues.

"I feel very strongly that SRA must continue to conduct work on soil health trials." Mr Reghenzani also said that there needed to be greater consideration given to the difference between varieties when it came to YCS.

Current YCS trials across sugarcane growing districts

A broad range of trials and research activities are occurring in 2016 to help identify the cause of YCS. Many of these trials involve strong collaborations with other research organisations and growers, whom SRA thanks for their assistance.



Research activities

- Insect stress trial
- Soil biology trial
- YCS management trial

Research activities

- Plant growth regulator trial
- Clonal variation trial
- Crop age trial
- Pathology/stress trial
- Water stress trials
- Magnesium trial
- YCS yield & sugar impact modelling
- Root system analysis
- YCS management trial

Research activity

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Research activities

- Molecular pathology
- DNA and RNA Sequencing
- Field visits for sampling from Burdekin, Mackay and Maryborough
- Transcriptome, metabolome, proteome and ^{13}C studies, chlorophyll content and fluorescence, leaf water content
- Sugar and starch enzyme assays
- Development of a potential diagnostic test based on leaf sucrose and starch levels
- Analytical chemistry – nutrient mobilisation and silica magnesium ratio investigation
- Histology – ultra-structural studies of plant cells (microscopy, electron miscroscopy, die up-take studies)

Research activity

- DNA and RNA sequencing to study the potential involvement of a biological agent