YCS update

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Sugar Research Australia™

Defining what we know about YCS

By Dr Frikkie Botha, Executive Manager, Strategic Initiatives

Researchers working across Yellow Canopy Syndrome (YCS) research projects met recently to define the key information that we know about this syndrome. While the root cause of YCS is still a mystery and the focus of our research activity, the below table summarises the main points that we have identified.

Water:

1. Irrigate for maximum productivity, not for YCS management
2. YCS onset cannot be prevented through irrigation

Translocation:

1. Translocation of sugars is compromised
2. Water movement in the plant is compromised

Biotic:

1. YCS is not associated with a known Australian sugarcane pathogen

Nutrients:

1. Fertilise for maximum productivity, not for YCS management
2. Application of organic amendments do not alleviate YCS symptoms

Diagnostics:

1. Sugar and starch levels in the leaf can be used as a potential diagnostic
2. Silica and Magnesium ratio in the leaf is a potential diagnostic tool

Agrochemicals:

1. Imidacloprid does not alleviate or prevent yield impacts of YCS
2. Glyphosate or its derivative residues do not cause YCS

Environment:

1. Environmental stress amplifies YCS expression
2. YCS is independent of time of planting, crop age and crop cycle

Answers to common grower questions

How does YCS affect the cane?

The most obvious visual symptom of YCS is yellow leaves.

However, sugarcane can turn yellow for a variety of reasons including drought stress, herbicide damage, insect attack, disease, nutrient deficiency or natural maturing.

Symptoms from these differ from YCS. The key symptoms are described on the SRA website. Repeated incidences of YCS in a crop can impact yield and CCS.

What are the yield impacts of YCS?

Productivity services organisations in impacted regions have attempted to estimate district yield losses related to YCS, however this is difficult to do when looking at the large scale of an entire region.

Losses at this broad level are complicated by overall losses from factors that growers are faced with around the State; such as the dry conditions experienced throughout 2015, cane grubs and high levels of pachymetra.

SRA estimates the losses to be more commonly in a range of minimal to up to 40 percent in bad incidences. YCS can impact both CCS and tonnes of cane. Losses are worst when YCS comes repeatedly into a crop across the season.

A crop that experiences YCS just once will often recover, with little detectable impact on yield by the time of harvest.

There are indications that the presence of YCS slows sugar accumulation (ripening). Sugar content varies depending on the harvest time, seasonal condition, crop class, and other factors. Our recommendation is to delay harvesting when early low sugar is evident.

Is the cane unusable if it still presents symptoms of YCS when it's time for harvest?

The suitability of the cane for harvest is not driven or influenced by the presence or absence of YCS but by the cane quality, which in turn is largely linked to sugar content. There is no reason not to cut a crop with YCS symptoms when the sugar content is good.

SRA has information on harvesting YCS affected sugarcane on our website. There are a number of strategies that growers can employ to give the cane the best chance to recover and to allow CCS levels to improve.

Is there anything growers can do to stop it from spreading?

The way YCS spreads is the subject of research but is not yet known. However, SRA advises that growers should follow best practice farm practices and hygiene. This includes ensuring that the crop is provided with the inputs that it requires, and that farmers use clean seed for planting material. A healthy crop starts with clean seed. Good farming hygiene such as cleaning down of equipment is also good practice.

Can YCS be transmitted via plant cane?

It has been suggested that YCS may be transmitted in planting material. Although our current trials that look to answer this question are still in progress, we have noticed that when growth conditions are ideal, no yellowing has occurred. We therefore encourage growers to use approved seed cane where possible and to adopt good farming practices.

Is YCS worse in a plant crop or ratoon crop?

YCS has been seen at all stages of plant growth and in all crop classes.

SRA researchers **Dr Priya Joyce** and **Nirosha Hewage Don** pictured recently sampling for YCS in the Burdekin.

Dr Joyce is working on research analysing starch in YCS affected sugarcane leaves.

"Investigations into the accumulation of starch in sugarcane plants in response to biotic stress and in naturally senescing leaves was undertaken to better understand this phenomenon. Our results showed that unlike YCS affected leaves, starch did not accumulate in the leaves of diseased plants nor in senescing leaves collected from the field," Dr Joyce said.

Ultimately research will investigate the use of starch accumulation as a potential rapid screening method to confirm the occurrence of YCS in sugarcane leaves.

What do we know about YCS?

YCS is not caused by or dependent on:

- Any of the known sugarcane pathogens
- The fungus *Nigrospora* spp
- Residual glyphosate
- Crop age
- Nutrient deficiency

YCS is unlikely to be associated with:

- A phytoplasma
- A single abiotic stress
- Above-ground insect damage

YCS is associated with:

- Time of season (first expression from December onwards)
- Accumulation of sugar and starch
- Suppression of photosynthesis
- Imbalances in silicon and magnesium
- Microbial community changes
- Compromised amino and organic acid metabolites

The high sugar and starch in the leaves could:

- Suppress photosynthesis
- Uncouple electron flow
- Cause chlorophyll loss, membrane damage, accelerated aging, accumulation of amino acids, stomatal closure and overheating

Yellow Canopy Syndrome observed in the southern growing region

After investigating many reports of YCS in the Southern Region, the first confirmed case was officially identified in March 2016.

The syndrome was initially observed in a crop near Hervey Bay, but has also since been discovered in other sugarcane crops across other southern mill regions. It had previously only been observed as far south as Sarina.

This crop near Hervey Bay was the first confirmed occurrence of YCS in the southern region, although multiple others have since been observed across the entire southern region.

SRA Executive Manager for Strategic Initiatives, Dr Frikkie Botha, thanked the local industry for being proactive in helping SRA to identify YCS in the region.

"Following the initial detection at Hervey Bay, local growers, millers and service providers have been the eyes on the ground as we seek to determine where YCS is occurring in the southern region," Dr Botha said.

YCS symptom expression in the Hervey Bay crop.

"SRA thanks the local industry for their vigilance and SRA is working with them to take a coordinated and considered approach to mapping incidences of YCS in the southern growing region.

"Once there was one observation confirmed, it was not unexpected that YCS would also occur in other parts of the southern region. It is disappointing news for the local industry."

SRA has held updates for the industry across the region to keep them informed. A key message of these events was that even with YCS on multiple farms in the region, it was not a cause for panic.

"SRA continues to keep the entire sugarcane industry informed about research activities about YCS through various publications and the SRA website.

Growers, millers and productivity services staff hear from Dr Frikkie Botha in Maryborough about the YCS observation in the region.

"If growers have individual concerns, they should contact their productivity services organisation. There is no need for growers to change anything regarding their farm operations."

Dr Botha said the impact of YCS continued to vary.

"The exact impact – and therefore the economic impact – is difficult to precisely quantify," he said.

"In the worst cases, YCS has been observed to reduce yield by 40 percent or more, which is a very devastating impact for those growers suffering that degree of crop loss. In other cases, the impact is less severe and crops have recovered by harvest."

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